User Manual

Triple-IN GmbH
Experts in Laser Distance Measurement

INvention INnovation INterfacing

VMS360

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Document changes

Version	Date	Authors	Last changes
1.00.00	2018-07-07	SC	Initial version

Content

1 About this document

Triple-IN's VMS360 is a complete 3D laser measurement system developed for outdoor automation, industrial applications, security and surveying.

- 360° x 90° scan field;
- From very slow to fast rotation speeds;
- High precision;
- Robust, IP67;
- Real time data through Ethernet.

VMS360 provide rapidly and efficiently accurate and detailed 3D data. VMS360 is suitable for both indoor and outdoor applications, ensuring also goals achievement for existing systems integration.
This document describes the VMS360. It is related to the:

```
RT360 firmware version 04.00.19
PS Laser Scanner firmware version 03.04.xx
```

This User Manual is part of a set of documents:

Manual	Targeted persons	Content
RT360 User's Manual	Technical personnel	Transport, mounting and installation Wiring and maintenance Operating means, system configuration Technical data
Programmer's Manual	Software developers	Data formats Commands and responses
Sensor User's Manual	Technical personnel	The User's manual of the connected sensor
Sensor Programmer's Manual	Software developers	The Programmer's manual of the connected sensor

If you or your colleagues have any comments on this manual, we would be grateful to hear from you. Please write to:


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```

2 Safety Instructions

2.1 General warnings

Warning

Laser class 1 product. Emits invisible light (905 nm).
Do not stare into the beam!

Caution

The red laser marker is a class 2 laser device.
Do not stare into the beam!

Caution

Before using the VMS360 the user manual must be read and all the instructions must be carefully observed.
The VMS360 must be installed, configured and serviced only by qualified personnel.
National and international rules and regulations must be applied according to the field of application and usage.
VMS360 cannot be used as safety device.

Caution

To reduce the risk of electric shock, do not remove the cover. Device contains high voltage components!
Connect and disconnect electrical linkages only under de-energized conditions.

Warning

Do not open the VMS360.
If opened, the mechanical adjustment will be damaged, and warranty will get void!

2.2 Limited warranty

Triple-IN's General Condition of Sales grants limited warranty for defects in material or workmanship in the VMS360.

☞ Limited Warranty

The limited warranty does not cover:
(a) Any problem that is caused by accident, abuse, neglect, shock, electrostatic discharge, degaussing, heat or humidity beyond product specifications, improper installation, operation, maintenance or modification;
(b) Any use contrary to the instructions in this and other related manuals;
(c) Lost firmware passwords;
(d) Malfunctions caused by other equipment;
(e) Damage resulting during shipment (Claim must be presented and examined by the shipper);
(f) Damages resulting from modifications or alterations to the product in any way, including any alterations or removal of its identification marks and labels.

2.3 Handling precautions

VMS360 is a delicate mechanical instrument. Such equipment must be handled with special care to protect the it from possible damage.

Caution

Don't exert any pressure on the device.
Do not open the device.

3 Operating features

3.1 System parts

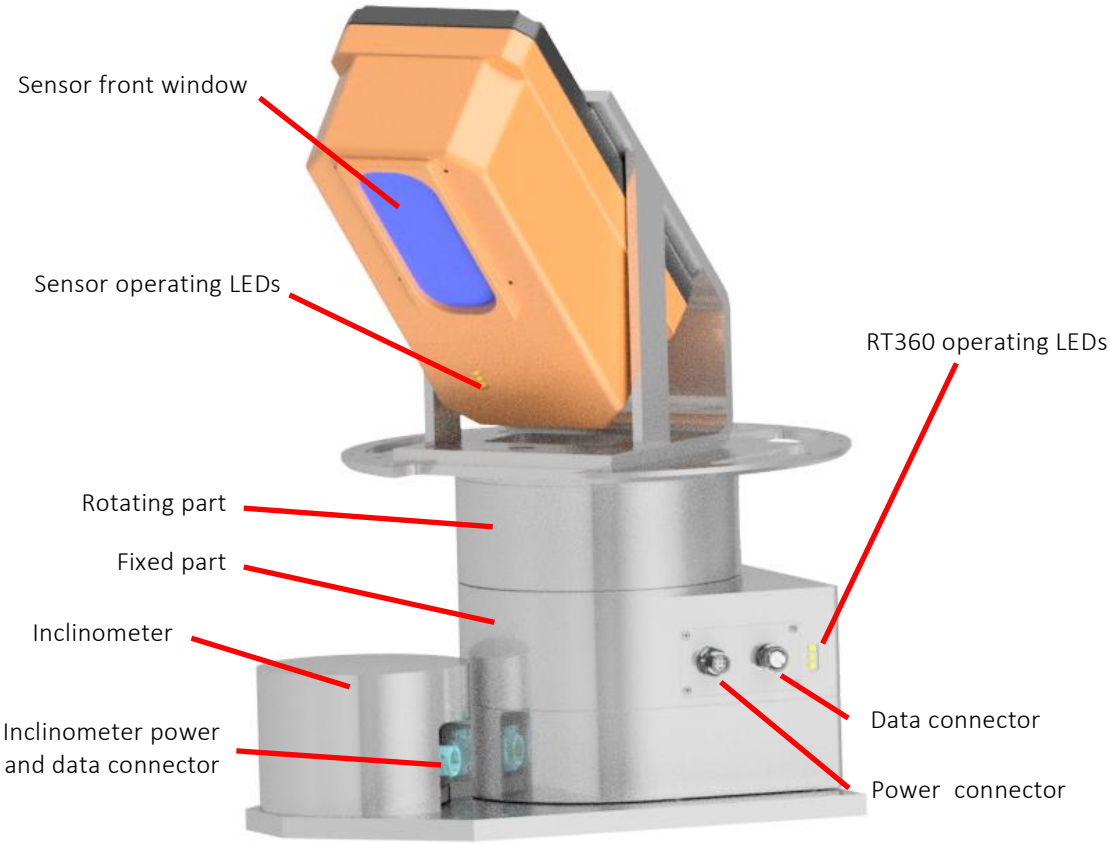

Figure 1: VMS360 with sensor front/right side

PS Laser sensor

It is the scanner head of the system that takes care of driving the laser to provide the measurement lines as described below.

RT360 Rotary table

Handles the rotation of the system and the communication with the outside world. The rotary table itself is composed by:

- *Microprocessor Unit*
  Contains an ARM microcontroller and manages all the peripherals and communications between them and the outside

- *Motor Unit*
  Drives the step motor that provides the horizontal movement.
- *Horizontal Angle Encoder*
  It is an encoder with a resolution of 32000 coder counts.

Air blower

Ensures the system cleaning with a high-speed fan.

Power cable

Provides the power for the VMS Laser Scanner (24V DC) and the air blower.

Ethernet cable

Allow communications between the VMS and an external computer.

Inclinometer (optional) and its cable

The independent optional inclinometer and its cable, which provides power and communication lines.
The cable has an RJ45 connector to the and which provide 100Mbit ethernet connection and Power Over Ethernet wiring.

Protection hood

Covers the entire system and protect it against direct sunlight, dust and rain.

3.2 Connected sensor terms and parts

Please check the connected sensor's User Manual for more information.

3.3 Point of origin and Scan Area

The next drawing shows the origin measures defining the scanning area and the point of origin.

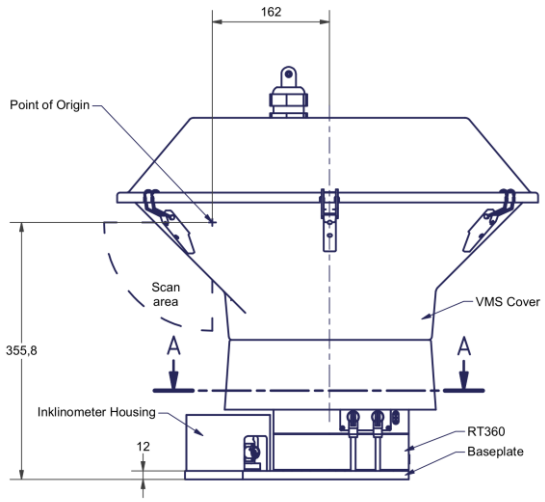

Figure 2: VMS scan area and point of origin

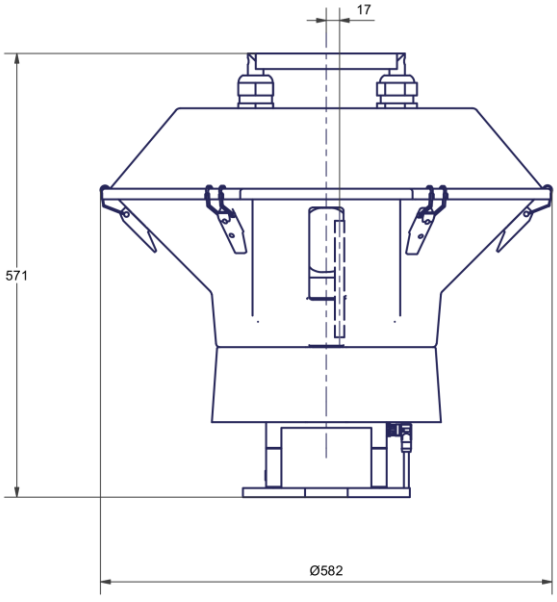

Figure 3: VMS point of origin transversal eccentricity

For Triple-IN PS sensors:

- The angle encoder zero-direction is pointed by the vertical axis of the sensor.
- The scan field starts at angle encoder position 45° and ends after 90° at encoder position 135°.

On the connected sensor, the zero point (origin of the measurements) is marked on the casing with a black dot and the laser source is located with a parallax of 17 mm beside the vertical axis.

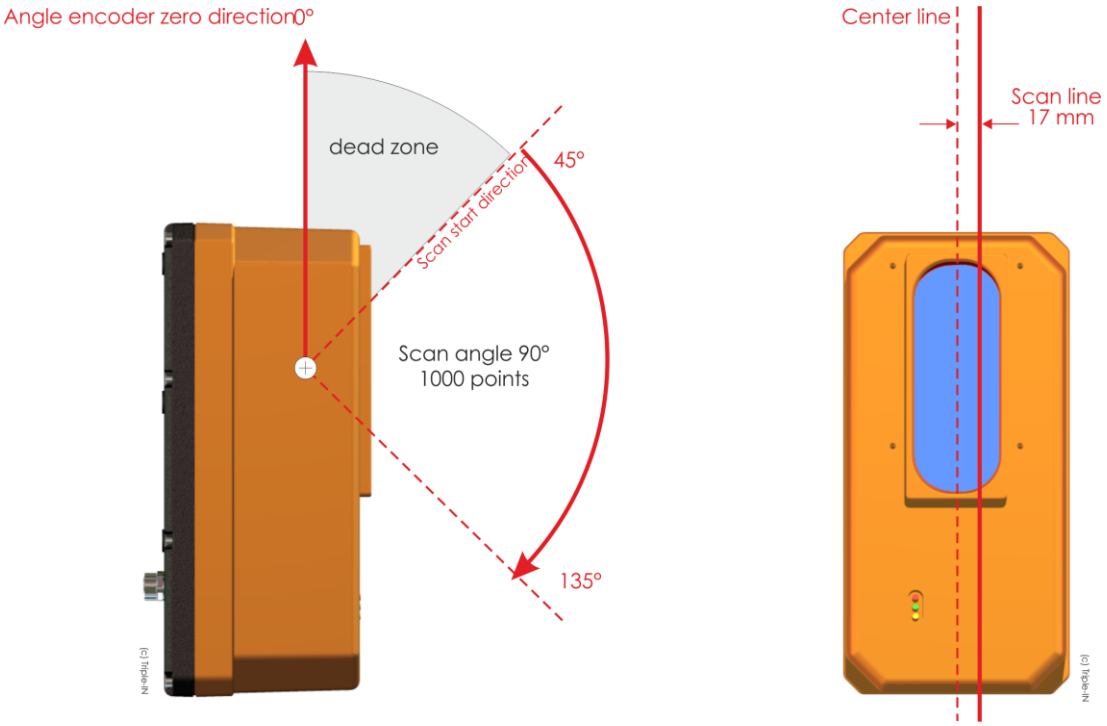

Figure 4: Triple-IN PS sensors scan area and point of origin

3.4 VMS Scan field

3.4.1 Vertical scan field of the PS Laser Scanner

The measurement laser of the PS Laser Scanner is triggered by ticks of the vertical angle encoder. The sensor contains a cube with four mirrored surfaces, which is tilted on the rotation axis in order to build four scan lines.
The angle measurement system is defined by a 360° circle with zero-position on the vertical system axis (see FIGURE 3).
The scan field is defined by the following user settings:

- Profile start direction: vertical encoder reading to the direction where the profile starts.
  Note that this angle position is different to the actual geometry of the the outgoing beam, because the laser beam is reflected on a tilted mirror cube.
- The scan angle defines the number of points in each scan.

The mirror tilt angle and the laser beam reflection on the mirror surface lead to unique vertical and horizontal angles for each outgoing laser beam.

3.4.2 Horizontal movement by the Rotary Table

The Rotary Table RT adds horizontal movement to the PS Laser Scanner and the horizontal angle position must be considered in order to calculate the correct coordinates.
The RT has a movement range of 360° with a predefined 0 position, from which the RT can move 180° to the left and 180° to the right

3.5 Power supply

3.5.1 VMS

Power supply is attached to the four pins power connector (see POWER CONNECTOR paragraph), using the White and Blue wires.
The power supply must provide:

```
24 Volt, 1.8 Ampere, 45 Watts
```

3.5.2 Air blower

With the same four pins power connector, but using the Brown and Black wires, the internal air blower must be powered with:

```
24 Volt, 1.5 Ampere, 36 Watts
```

3.5.3 Optional inclinometer

Please refer to the Inclinometer documentation for specific information about how to power it and detailed specifications on power and communication requirements.

3.6 LED indicators on the RT360

The VMS360 supports 3 LEDs:

- Green LED: Power indicator.
- Yellow LED: Rotary table movement indicator.
- Red LED: Error indicator.

Indicator	Operating Mode	LED state
	Power off	
	Start up	All LEDs are on
	Self-test	All LEDs are blinking+
	System is ready	Green LED is on, Yellow and Red LEDs are off
	Firmware update	Green, yellow and red are alternatively lit by a fast blink pattern
	Horizontal motor is moving	Green and yellow LEDs are steady on. Red LED is off
	System error	Red LED is steady on. Check system health status.

3.7 Connectors

3.7.1 VMS Power connector

The VMS Power connector connects the control computer to the power supply.

3.7.2 VMS Data connector

The VMS Data connector connects the sensor with the local network with an Ethernet interface.
The connector is type M12 connector/IP67/CAT6 connector. The pin/pair assignment conforms with the T568B standard.

3.7.3 Optional inclinometer connector

Please refer to the specific documentation for the Inclinometer.

4 Transport, installation and maintenance

4.1 General handling instructions

- Ensure that the entire system is disconnected from power supply during the installation.
- Mount the device at a location where it is is protected from damages, pollution and high humidity.
- Mount the VMS360 in a way that it is not exposed to direct sunlight.
- Route cables such that danger is excluded for persons and all cables are protected from damages.
- Follow the safety instructions in chapter SAFETY INSTRUCTIONS.

4.2 Packaging and transport

VMS360 is a high precision mechanical and optical instrument. Such equipment must be transported with special caution and sufficient packaging to protect it from possible damage.
Please use original Triple-IN packing material to transport the VMS360.

☞ Warning

Your warranty may be voided if returned device is received with inadequate packaging. Please always use the same package you received from Triple-IN for sending the device back.

At the time of delivery, the user should examine the shipment for loss or damage. If there is evidence of loss or damage, note it on the delivery receipt; this will be used as evidence to back up the claim. Do not use or install a defective device.

4.3 Handling

The system must be handled with care. Shocks can compromise the mechanic adjustment or damage the system or part of it.
Please carry the system holding it vertically, holding it from the bottom part and using the upper metallic handle to keep it steady.

Warning

Do not hold the VMS360 by the plastic hood! The hood is not built to carry the entire system weight!

When you are placing the VMS360 on some plane, please be sure to lay it gently and without shocks.

Warning

Do not power on the VMS360 if it is not firmly fixed!
During the start-up procedure it can make a complete turn to left or right to test the system!

Caution

The VMS360 must NOT be turned by hand! The force applied to manually rotate the system may permanently damage the internal mechanics!

4.4 Condensation avoidance

If the VMS360 is suddenly brought in from the cold into a warm room, condensation may form on the internal parts. To prevent condensation, first put the sensor in the transport box, then in a sealed plastic bag and let it adjust to the warmer temperature before taking it out of the bag.
Do not use the device if condensation forms on it. This is to avoid damages to the electronics. If there is condensation, remove the power supply from the sensor, and wait until the condensation has evaporated.

4.5 Opening the protection hood

1. Remove the two screws on the sides of the aluminium handle;
2. Unscrew the left and right black plastic bolts and remove them;

Figure 5: Top handle fixing

3. Unlock the clamps around the cape of the plastic hood;

Figure 6: Top plastic hood fixing clamps

4. Gently pull up the plastic cape.

4.6 Removing the aluminum shield

1. Remove all the pointed screws;

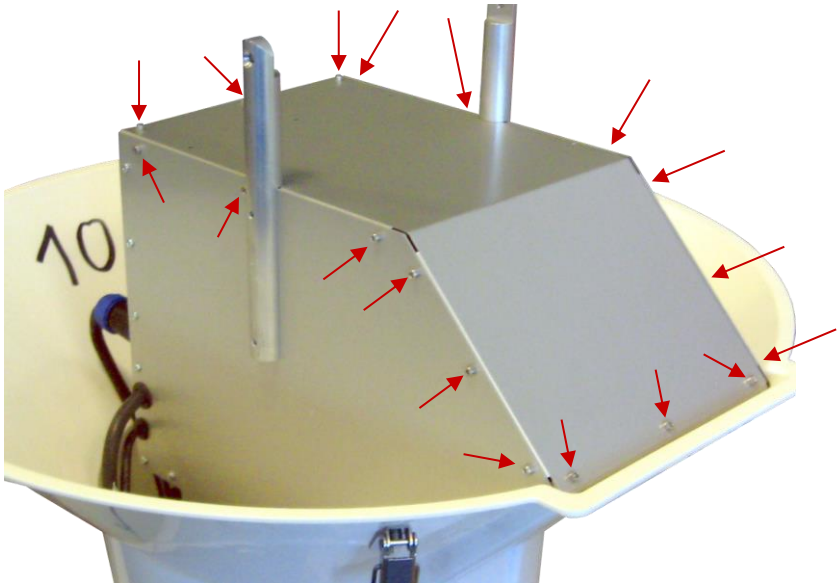

Figure 7: Aluminum shield fixing

2. Now the aluminum shield can be gently removed and the internal parts of the aluminum enclosure can be accessed

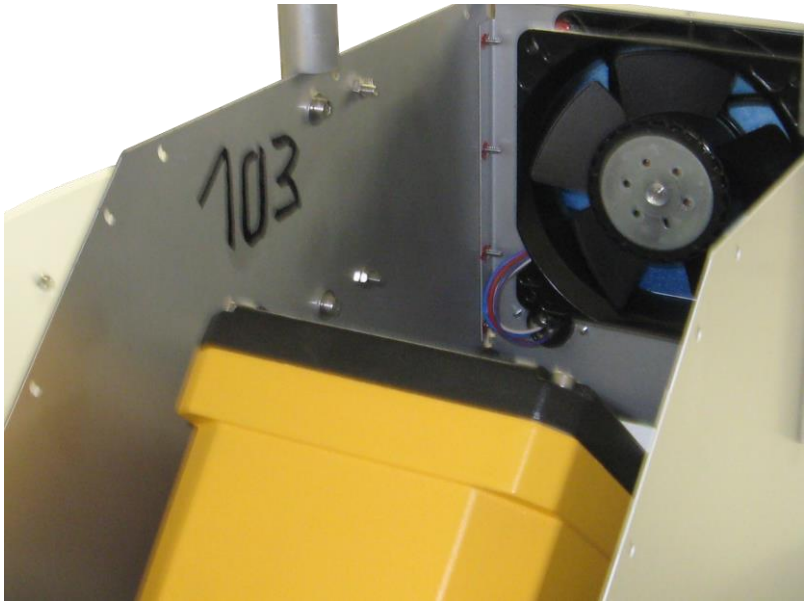

Figure 8: Inside the aluminum shield

4.7 Dust filter

The dust filter must be checked periodically to avoid the internal accumulation of the dust.
To remove the filter for cleaning, just remove the four screws on the back of the fan:

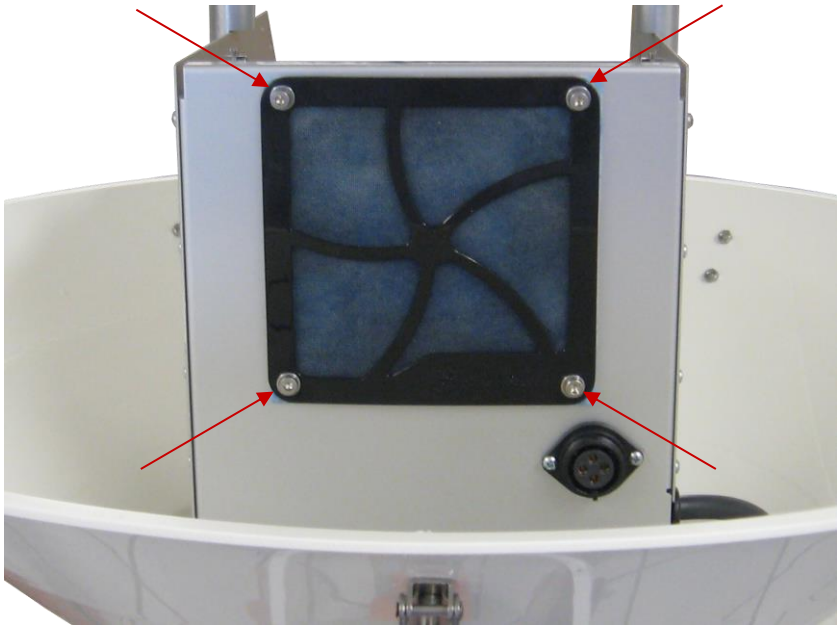

Figure 9: Dust filter removal

Clean the fan and the filter with air flow. Replace the filter with a new one if it is too dirty.

Caution

Do not clean the filter or the fan with water or other liquid product.

4.8 Installation

VMS360 must be fixed by using 4 M6 screws and nuts through the bore holes of the baseplate on to an even surface. See *Figure 21: VMS360 Laser Scanner outlines* on *Page 42* for dimensions and specifications.
Use M6 nuts and screws with a strength class of 6.8 and above only. Secure the screws against loosening and use a 7,6Nm. Screws must be at least 20mm long.
It is highly recommended to use washers.

5 Connectors

5.1 Phoenix SPEEDCON® quick locking system

Warning

Before attaching the connectors, make sure the sealing rubber rings in the sockets are all in place.
Always fit sealing connector caps onto plugs which are not used.

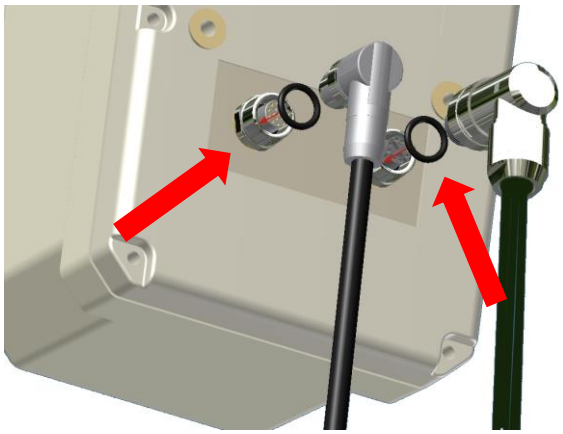

Figure 10: Connector rubber gasket

VMS360 and PS Sensors are equipped with Phoenix SPEEDCON® M12 quick locking connectors.

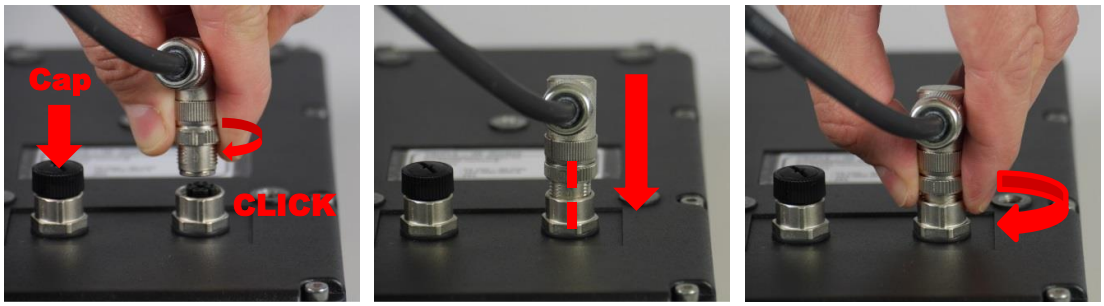

Figure 11: Using the quick locking connectors

1. Make sure the rubber gaskets in the sockets are in place.
2. Turn the retainer ring until you notice a distinct “click”.
3. Align marks at the retainer ring and the socket.
4. Push the connector into the socket.
5. Turn the retainer ring to secure the connection.

5.2 Power connector

The connector is type M12 connector/Phoenix Contact 1436434.

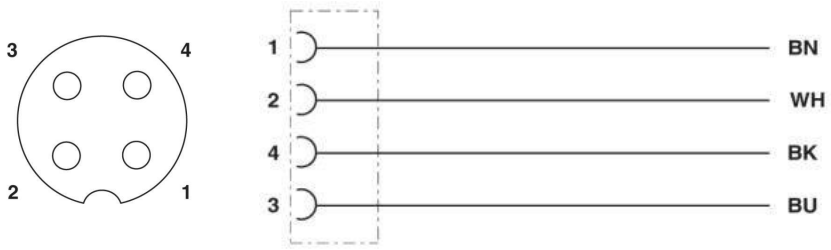

Figure 12: RT360 power connector pinout

Pin	Colour	Colour code	Signal	Comment
1	Brown	BN	Extra +VDC	Extra supply voltage
2	White	WH	+24 VDC	Device supply voltage
3	Black	BK	Extra -VDC	Extra supply ground
4	Blue	BU	-24 VDC	Device supply ground

Pins 2 and 4 are used to give power to the RT360 and to the connected sensor.
Pins 1 and 3 are used to give power to an extra connected device.

☞ Important

In the standard RT360 there is no connector to bring the Extra power line to the rotating part.
This feature is used on the Triple-IN VMS system to power the cleaning blower.

5.3 Data connector

5.3.1 Layout of the Data Connector

The Data Connector connects the device with the local network.

- M12 connector/ IP67/CAT6 connector
- Type Phoenix Contact
  "Flush-type socket - SACC-CI-M12FS-8CON-L180-10G - 1402457"
- Adapter type reference is Phoenix Contact
  " Bus system plug connector - VS-08-M12MR-10G-P SCO - 1417443".

The pin/pair assignment conforms with the T568B standard.

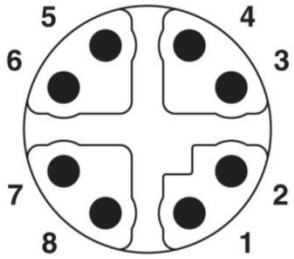

Figure 13: M12 Data and PoE scheme (plug side view)

Pin	Colour	Signal	Purpose
1	White/Orange	TX+	Transmit
2	Orange	TX-	Transmit
3	White/Green	RX+	Receive
4	Blue	n.c.	
5	White/Blue	n.c.	
6	Green	RX-	Receive
7	White/Brown	n.c.	
8	Brown	n.c.	

In the standard configuration, the VMS360 has one loose cable on the rotating part which can be connected to the data connector of a PS sensor.

5.4 Optional inclinometer connector

Please refer to the documentation of the optional inclinometer.

6 Microsoft Windows Software Tools

6.1 TCP/IP Manager for managing network configurations

Triple-IN recommends the open-source Freeware “TCP/IP Manager” (author: A. C. Tundrea) to prepare the computer’s network settings for VMS360. With this tool, you may simply save and restore network settings for VMS360 and standard Windows applications in different profiles.

1. Download TCP/IP Manager from Triple-IN’s web server.
2. Run the installer resp. unpack the ZIP file.
3. Start TCP/IP Manager.
4. Select in “`TCP/IP Settings > Network connection name`” the network adapter connected with the sensor.
5. Check if “`IP address`” matches the Gateway IP address as stored in the sensor. The default Gateway address is 10.0.10.0.
6. Check if “`Subnet mask`” matches the subnet mask as stored in the sensor. The default network mask is 255.255.0.0.
7. For later use, consider “`Network profile > Create a new profile`” to save the setup.
8. Choose “`Apply Settings`”.
9. To connect a sensor with the default settings:

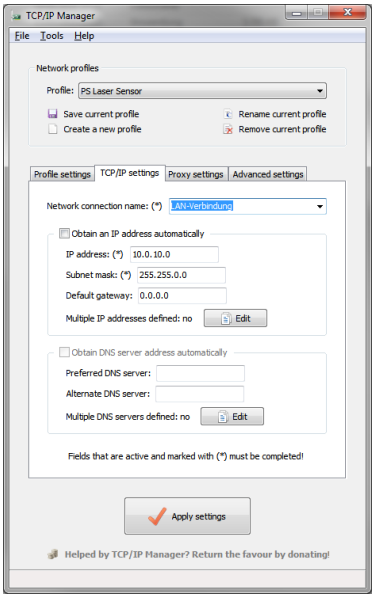

Figure 14: Network configuration with TCP/IP Manager

After disconnecting the sensor, you may use TCP/IP Manager to restore the Windows standards:

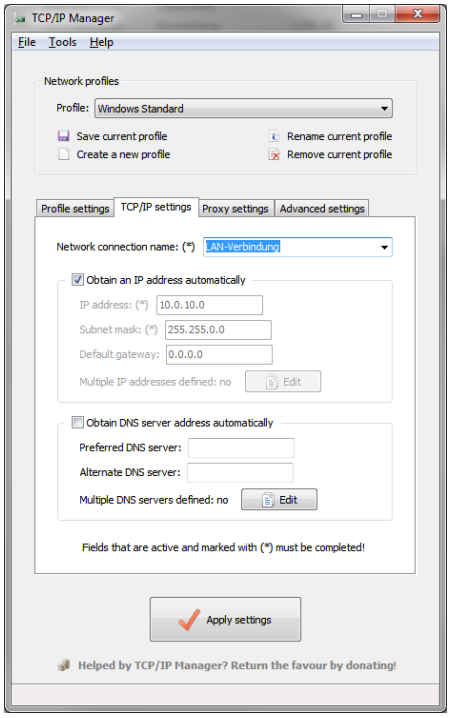

Figure 15: Restore the network configuration with TCP/IP Manager

1. Start TCP/IP Manager.
2. Select in "`TCP/IP Settings > Network connection name`" the network adapter connected with the sensor.
3. "`Obtain an IP address automatically`" should be checked.
4. For later use, consider "`Network profile > Create a new profile`" to save the setup.
5. Choose "`Apply Settings`".

6.2 Triple-IN PSControlProgram

Triple-IN's PSControlProgram is a PC application for controlling the functionality of Triple-IN Laser sensors via Ethernet connection. It makes the user able to set the user parameters of the sensor, start measurements, record the scans to files or show it on the chart or in the table.
The program is available on Triple-IN's webserver.

6.2.1 Installation

To install the application please follow the instructions:

1. Start Windows installation program.
2. Confirm that you have administrator permissions to install the program.
3. The installer inspects the version information to use it during the installation process.
4. The product information (company, product name and version) is displayed on the screen if it's found during the analysis process.
5. Confirm installation.

A full description of the program can be found in the “PSControlProgram User’s manual”. The manual is part of the program distribution.

7 Setting into operation

7.1 Startup Procedure

To start the system:

- Connect the control computer to the same network of the VMS360.
- Connect the power supply to the VMS360.
- After switching on the supply voltage, the device runs through a self-test. After few seconds, all LEDs will be flashing and the firmware of the device will check important hardware components and parameters. Commands will respond to the control computer with a “device not ready” error.
- During the self-test, the RT360 will rotate to search the index and position itself to the so called “zero position”.
- The Red and Yellow LEDs are switched off after the self-test has passed successfully.

☞ Important

After disconnecting the device from power supply, you must wait 30 seconds before turning it back on. Otherwise capacitors not being discharged could leave the device peripheral not fully reset.

7.2 Ethernet connection

7.2.1 Network settings

VMS360 use the Internet Socket Interface for communications over Ethernet. The sensor socket address is a combination of the IP address (the location of the sensor) and a port (which is mapped to the application program process) into a single identity.

7.2.2 UDP/IP transport protocol

The UDP transport protocol can be used to send commands to the sensor, receive responses and receive the online scan stream.

7.2.3 Why choose UDP for scan data stream

TCP was designed to be reliable in data transmission. This means that, if a packet of data is not correctly (without errors) received by the destination, the sender will try to transmit it again until it is received correctly.
In a real-time system though it is more important to have always the most recent data available even if it means to have some previous data lost.
The UDP transport protocol has a lot of advantages for this purpose:

- It is stateless, suitable for very large numbers of clients. It is used for example in streaming media applications such as IPTV
- The lack of retransmission delays makes it suitable for real-time applications such as Voice over IP, online games, and many protocols built on top of the Real Time Streaming Protocol
- It works well in unidirectional communication and is suitable for broadcast information such as in many kinds of service discovery and shared information such as broadcast time or Routing Information Protocol

All these attributes (and more) made the UDP protocol the best choice to send the scan data stream to the requesting consumers.

7.2.4 Sensor IP address, Client IP address, Gateway IP and port

In the described communication pattern, the device provides some functionalities accessible through the Ethernet. Each one of these functionalities is identified as a "Service", and the control computer is the "Client".
The device socket addresses are a combination of an IP address and a port (which is mapped to the application program process). Every available combination identifies a Service.
The sensor has two different IP addresses configured and exposed to the outside:

- Predefined. Is automatically calculated from the serial number and cannot be changed. The network mask is `255.255.0.0` and it is calculated this way:

```
IP = 10.255.(serial / 100).(serial % 100)
```

- Custom. This address can be modified by the user. It is initially set with a default value calculated similarly to the Predefined:

```
IP = 10.0.(serial / 100).(serial % 100)
```

7.2.5 Timeout

The command interface of the firmware has following time outs:

- for measurement requests: `5` seconds
- for measured scans: `30` seconds
- for changing parameters: `60` seconds

The sensor sends an error (`ERR\0`) response if a timeout has occurred.

7.2.6 Services

The following are the services available by default on a sensor. As an example, we list the IP addresses for a sensor with the serial number as `1234`:

Service IP/Port	Protocol	Service	Description
10.0.12.34 1024	UDP/IP	Scan and commands	Command communication line for configuration and online data stream
0.0.0.0 3007	TCP/IP	Update	Used to send firmware updates to the sensor

7.2.7 Custom Service IP and Port

The IP address set by the user cannot be the same as the Predefined.
The Port set by the user cannot be one of: `22`, `80`, `3007`, `6999` and `6996`.

7.2.8 Changing the device's network configuration using PSControlProgram

PSControlProgram is useful to change the sensors' default network settings over Ethernet:

1. Start PSControlProgram.

2. Choose button “Connect” to connect the application with a device. The IP and port dialog appears on the beginning of the connection progress.
3. Enter the device IP address and the computer’s IP address (or 0.0.0.0:0). Note that, if computer’s IP address is specified, both addresses must be part of the same network.

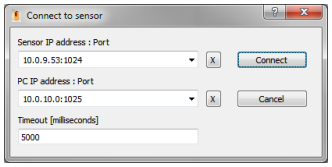

Figure 16: PSControlProgram network connection dialog

4. Once the connection has been made, all sensors parameters can be changed on the “Parameters” view.

Important

Do not change the network configuration on the connected sensor!
See the next step!

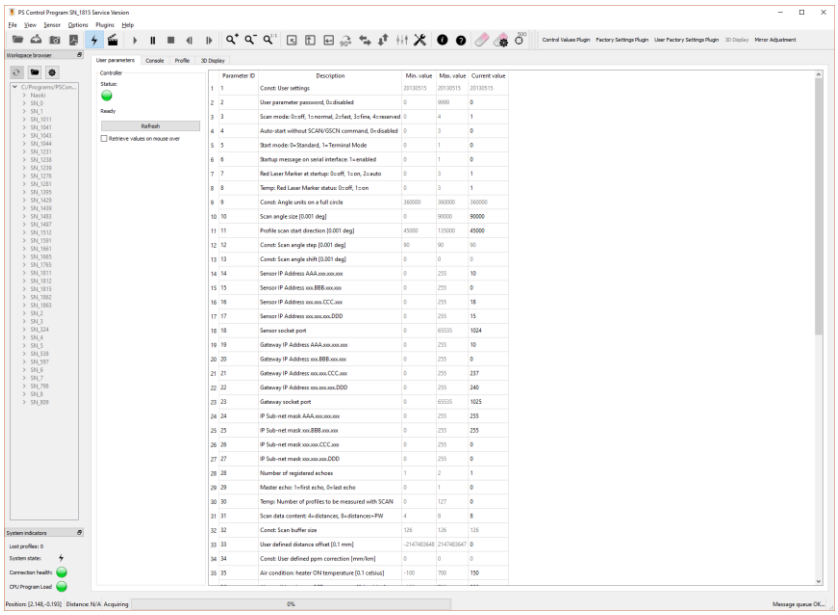

Figure 17: PSControlProgram PS sensor parameters view

5. To change the network configuration of the RT360, launch the 3D Display plug-in and change the network configuration from the RT Parameters list:

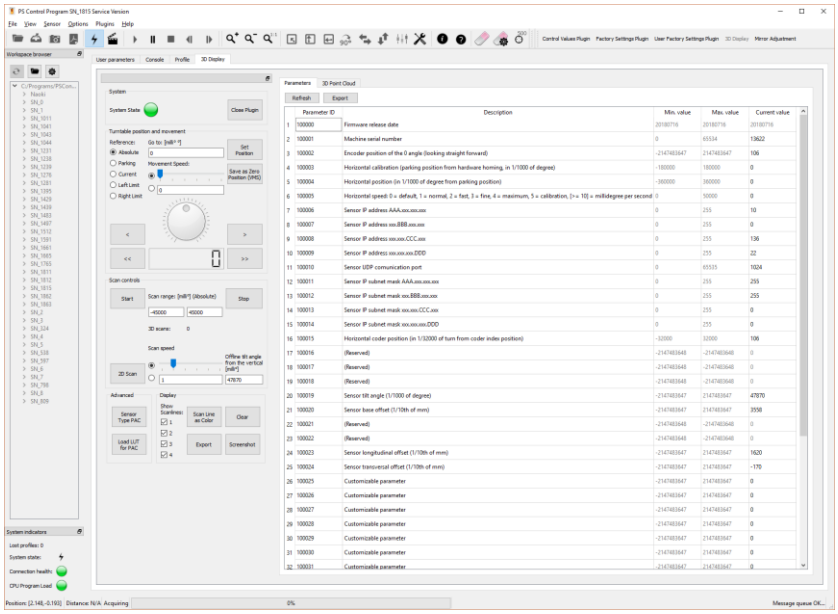

Figure 18: PSControlProgram RT parameters view

6. Switch-off and restart the sensor to apply the changed network settings.

7.3 Configuration

7.3.1 Ways of configuration

You can configure the VMS360 using the commands “GPRM get parameter” and “SPRM set parameter” of the binary command/control interface.
This can be done with PSControlProgram.

7.3.2 About User Parameters

The entire sensor configuration is stored in a table of user parameters. Every parameter has a number as unique parameter identification code. The user can edit the parameter over Ethernet by use of binary commands.
A list of parameters can be found in the “RT Programmers Manual”.

☞ Important

Parameter identifiers always refer to a certain firmware version. Therefore, an individual parameter reference table exists for every firmware version.
You find the description of the binary commands for the processing of the user parameters in the “RT Programmer’s Manual”.

7.4 Taking Scans with PS Control Program

Please refer to the PS Control Program User’s manual for more information about how to drive the RT360 with a PS sensor connected.

8 Coordinate transformation

8.1 Cartesian coordinate with origin in the sensor

The definition of the sensor coordinate systems is

- The origin of the sensor coordinate system is the measurement zero point. Note that the origin has an eccentricity to the center axis.
- right hand system; angles count clockwise
- x-axis is pointing in scan direction
- z-axis is pointing to the vertical direction (zenith)
- y-axis is right-angled to x and right-angled to z.

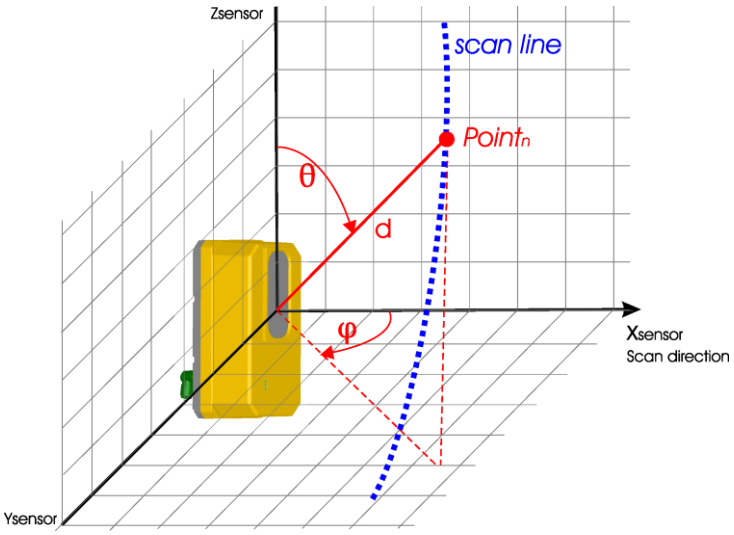

Figure 19: PS sensor coordinate system

Cartesian coordinates can be calculated with the vertical zenith direction ϑ and the measured distance.

```
Xsensor = dpoint * sin(ϑpoint)
Ysensor = 0
Zsensor = dpoint * cos(ϑpoint)
```

8.2 Cartesian coordinate with origin in the rotary table

The sensor is mounted on a tilted bracket over the rotary table. The eccentricity from the sensor's origin to the bracket's origin the tilt angle δ, and the horizontal direction γ must be known.

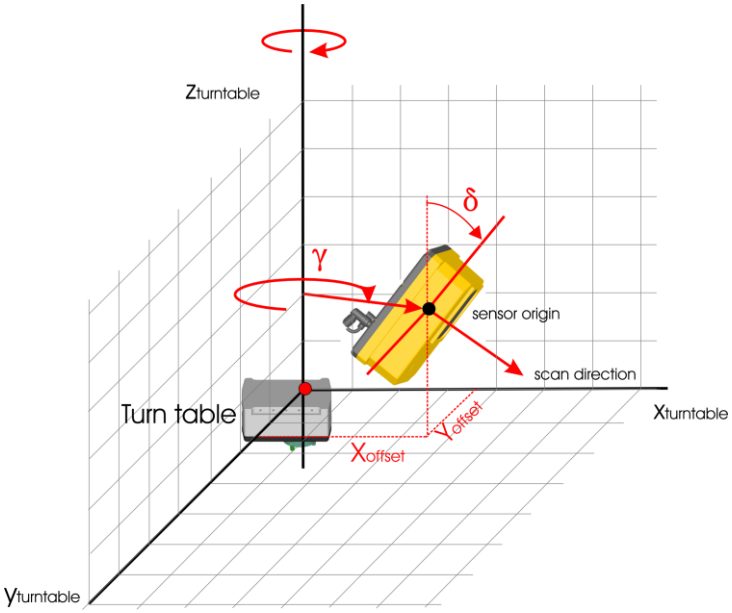

Figure 20: Rotary table coordinate system

If the sensor is tilted around y by the angle δ, the Cartesian coordinates with origin on the turn table can be calculated as follows:

```
Xtilted = Xsensor * cos(δ) + Zsensor * sin(δ)
Ytilted = Ysensor
Ztilted = Zsensor * cos(δ) - Xsensor * sin(δ)
```

The zero point of PS Laser Scanner has an eccentricity of 17 mm to the center axis of the sensor. To center the sensor's coordinate system to the origin of the turn table, the eccentricity must be added, together with the other offsets.

```
Xcentered = Xtilted + Xoffset
Ycentered = Ytilted + Yoffset
Zcentered = Ztilted + Zoffset
```

Finally, the reading of the horizontal angle encoder rotates the sensor's coordinates into turn table coordinates:

$$X_{turntable} = X_{centered} * \cos(\gamma) + Z_{centered} * \sin(\gamma)$$
$$Y_{turntable} = Y_{centered} * \cos(\gamma) - X_{centered} * \sin(\gamma)$$
$$Z_{turntable} = Z_{centered}$$

9 Firmware update

The firmware of the VMS360 can be updated using the Ethernet connection.
Download from the Triple-IN's web server the command line utility "TISendUpdate" and decompress the content of the archive. The folder directory will look like this:

```
02/06/2015  17:09           119 822 libgcc_s_dw2-1.dll
02/06/2015  17:09         1 537 038 libstdc++-6.dll
02/06/2015  17:09            80 384 libwinpthread-1.dll
06/11/2017  14:07               456 README.txt
06/11/2017  14:28         1 043 549 tisendupd.exe
```

The firmware upgrade is performed using a reserved TCP/IP connection on the port 3007. Using the tool "tisendupd.exe" the update is easy and safe. Just open a command prompt and write the command using this format:

```
tisendupd.exe –o UPDATE_FILE –a IPADDRESS[:PORT]
```

The PORT field can be omitted, and the default port will be used (3007).

Warning

Do not power off the VMS Laser Scanner until the firmware is completely updated.

The program will provide on screen feedback during the update procedure (see the next page). Please wait until it's finished and even when it is done (successful or not), wait at least 5 minutes before powering off the VMS Laser Scanner.
As soon as the update is finished, the system will be restarted automatically if needed. Please try to reconnect and verify the firmware version to confirm the update was successful.

```
C:\tisendupdate>tisendupd.exe -o 20180321.ttu -a 10.255.7.98
APU-002
[APU Firmware; 1.00/111B06.3315(rc2)]
Triple-IN Ethernet Updater (c) Triple-IN GmbH 2015-2017

- Connecting to: 10.255.7.98:3007 ...
  Connected!
- The device has accepted our request.
  > 256.0 KB transferred by now...
  > 512.0 KB transferred by now...
  > 768.0 KB transferred by now...
  > 1024.0 KB transferred by now...

…

  > 7.3 MB transferred by now...
  > 7.5 MB transferred by now...
  > 7.8 MB transferred by now...
  File completely sent. 7.9 MB transferred.
  The update process may take a while. Please wait...
- The device has received the update file.
- The device has checked the update file.
- The device is processing the update file.
  System is still updating. 4 minutes until timeout

…

  System is still updating. 3 minutes until timeout
- The update process is complete.
The device is updated.
Please restart it if needed!
```

As soon as the tool will finish its work, the device will be restarted to complete the update.

10 Troubleshooting

The LEDs are all off

Be sure that the power cable is connected and the correct voltage and current are provided.

❖ Information

A very long power cable can incur into voltage loss from the source to the device.
Be sure that the correct voltage and current are available to the device side of the cable.

The LEDs continue to blink indefinitely

Check the connections between the RT360 and the PS Laser Scanner. The Rotary Table will not be able to complete the initial self-test if it is not able to communicate with the PS Laser Scanner.

LEDs stays all on indefinitely

Try to perform a power cycle, waiting at least 30 seconds before powering on again.

The device does not respond

Check the LEDs status and be sure that only the green LED is on.
Sometimes the network needs some moments to make a new connected device available.
If after one or two minutes the device is still not available, please try a power cycle.

Appendix

A Technical Specification

Ordering information

Model	Article number
VMS360	Please contact us!

Rotary Table Technical Data

WORKING RANGE	
Horizontal rotation range	-180° to +180°
Horizontal resolution	0.011 degrees 0.2 mrad
Minimum Range (m)	2.7
ROTATION SPEED	
Minimum	0.11 °/second
Maximum	45 °/second
Predefined	
Fast (40 KHz PRF)	7.2 °/second
Normal (40 KHz PRF)	1.8 °/second
Fine (40 KHz PRF)	0.11 °/second
POWER SUPPLY	
Rotary table and connected sensor power	24V DC – 1A (2A with heater)
Extra power line	Max. 24VDC, 1.5A
COMMUNICATION	
Network interface	Ethernet 100MBit/s
Communication protocol	Binary Command Interface via UDP/IP
OTHERS	
Housing	Aluminum Die Cast, Seawater resistant
Operating temperature range	-10°C to +50°C
Storage temperature range	-30°C to +80°C
Weight	< 6 Kg

PS Laser scanner technical data

Please refer to the PS Laser Scanner documentation for the updated technical data of your system.

Dimensional drawings and outlines

Note

The following drawings are without scale.

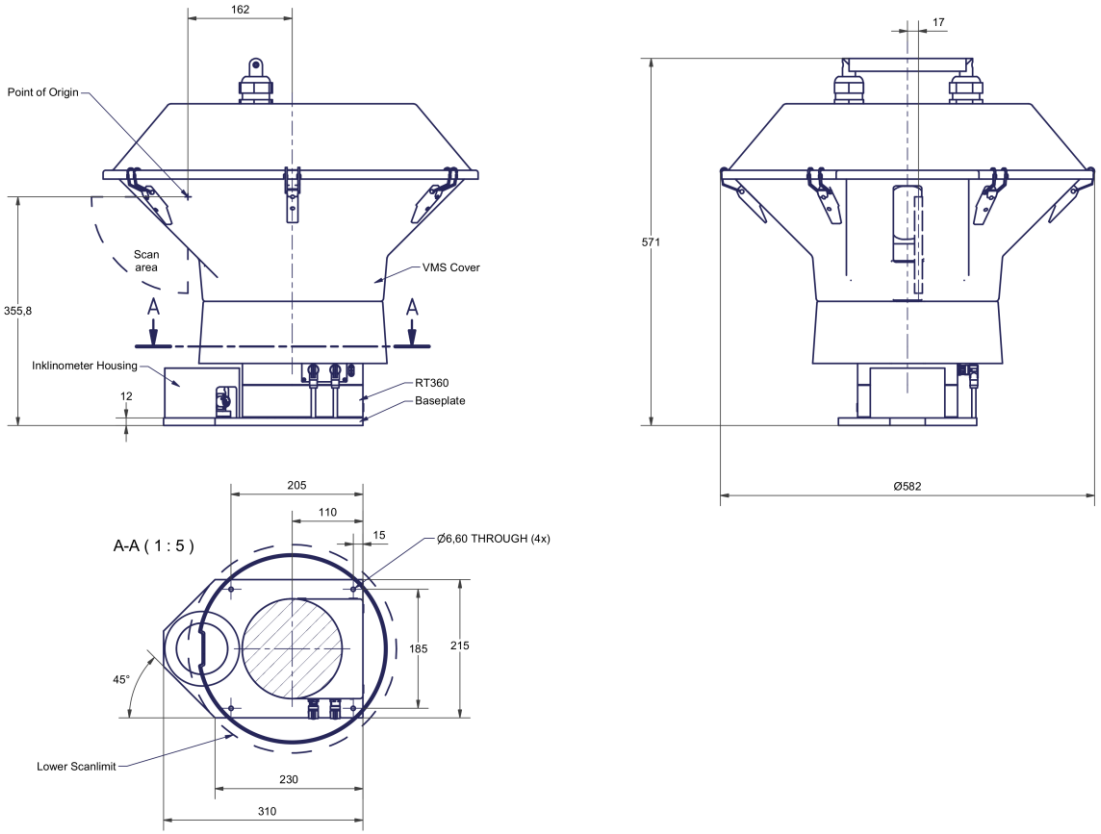

Figure 21: VMS360 Laser Scanner outlines

3D CAD Model

A 3D CAD model (STEP format) of the VMS360 outlines are available on demand.

Power cable layout

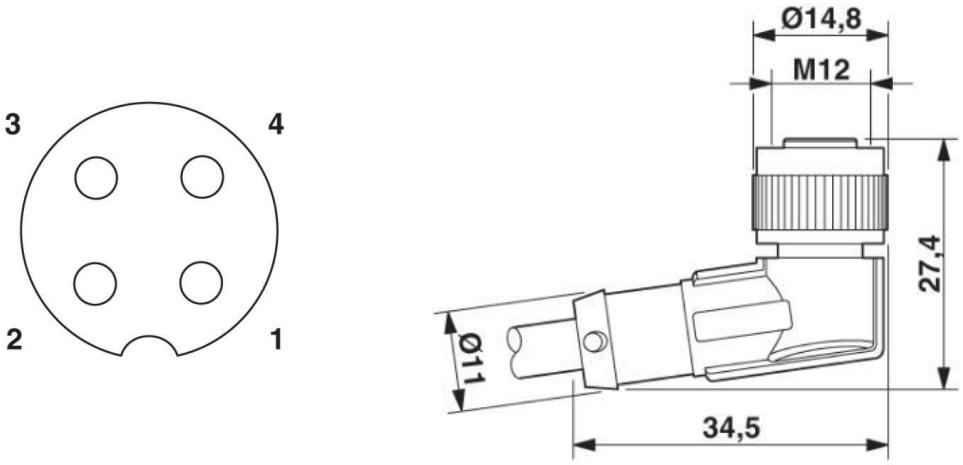

Figure 22: VMS360 Laser Scanner outlines (no scale)

Ethernet cable layout

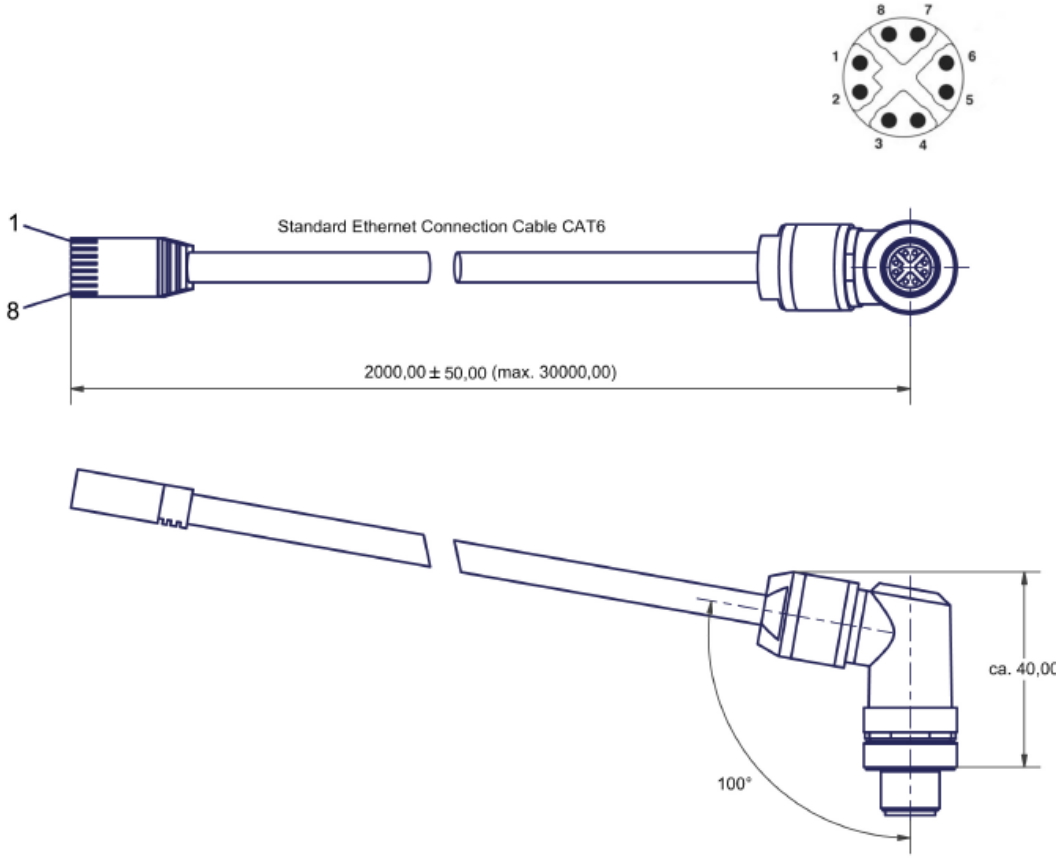

Figure 23: Ethernet and PoE cable

B Table of figures