EN

# VisionApp 360

**Software**

Interface Protocol

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# 1. Introduction

This documentation 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 operating instructions for VisionApp 360 software).

**NOTE!**
Upper and lower case letters must be observed.

# 2. LIMA Protocol

First of all set up and save the device settings and the project via VisionApp 360 software. Afterwards, the LIMA protocol can be used to query certain values from the device or to change them at the device.

## 2.1 Establishing Connection via TCP/IP

### 2.1.1 Control Unit with VisionApp 360 Application

Establishing a TCP/IP connection to the VisionApp 360 application which is running at the control unit:

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

Example with standard settings for application for a control unit:

- IP address: 192.168.100.252
- Port: 62232

## 2.2 General Information on LIMA Communication

The following general points must be observed for LIMA communication:

- Evaluation of responses to LIMA commands is recommended. Depending on the command, it may take several seconds to receive a response.
- LIMA commands may only be transmitted sequentially to the VisionApp 360 application. The next command may not be transmitted until a response to the previous command has been received.
- Data consistency must be assured during communication. Evaluation of the run counter is recommended to this end, for example in order to determine whether or not any new events have occurred.

Error diagnosis for responses to LIMA commands:

| Response to LIMA command | Cause | Possible Solution |
|---|---|---|
| Device Busy | The LIMA command cannot be processed because the device is currently processing another LIMA command. | • Resend the LIMA command at a later point in time. |
| Lima Error on File Read | The project could not be loaded because the respective project is not available in the project folder. | • Make sure that a project with the corresponding name is available in the project folder.<br>• Check the name of the project in the LIMA command. |
| Invalid Path | The LIMA command contains a path specification which is not available in the VisionApp 360 project. | • Enter the correct path specification to the LIMA command. |

# 3. Set Commands

## 3.1 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 4.

### 3.1.1 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. |

### 3.1.2 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. |

### 3.1.3 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. |

### 3.1.4 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. |

### 3.1.5 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. |

### 3.1.6 Activate/Deactivate Calibration

| | |
|---|---|
| **Command** | `<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="sensor group designation" PATH="Calibration Enable" VALUE="X" />` |
| **Parameter** | Values for X:<br>0: Calibration deactivated<br>1: Calibration activated |
| **Description** | Sensor calibration is activated or deactivated for the selected sensor group. For activating calibration must have already been conducted to this end. It can be subsequently reactivated. Calibration is not deleted. |

## 3.2 Device Settings

The following commands affect the selected sensors. An example can be found in section 4.

### 3.2.1 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: 26 … 100,000 | **Default:** | 150 |
| **Description** | Sets the value for exposure time in µs. | | |

### 3.2.2 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<br>MLSL: 5000 |
| **Description** | Sets the time value between the two consecutive profiles in µs.<br>This command is only operational in the internal trigger mode.<br>166 µs = 6000 Hz<br><br>Example:<br>MLWL: 5714 µs = 175 Hz<br>MLSL: 5000 µs = 200 Hz<br><br>**NOTE!**<br>The ROI settings must be reduced in order to achieve a higher measuring frequency. | | |

### 3.2.3 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:<br>0: Laser off<br>1: Laser on | **Default:** | 0 |
| **Description** | Software command for switching the laser on and off. If X = 1 (enabled), other signals applied to the I/Os have no effect. | | |

### 3.2.4 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. | | |

## 3.3 Region of Interest (ROI)

### 3.3.1 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<br>MLWL: 32 … 2048 | **Default:** | MLSL: 1280<br>MLWL: 2048 |
| **Description** | Defines the number of camera lines in the X direction which will be read out.<br>MLSL: This selection affects the adjustable measuring frequency and network utilization (bandwidth). Adjustment is made in steps of 16.<br>MLWL: This selection affects network utilization (bandwidth). Adjustment is made in steps of 1. | | | |

### 3.3.2 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<br>MLWL: 0 … 2047 | **Default:** | 0 |
| **Description** | Defines ROI offset in the in X direction. The setting specifies offset to the first line.<br>MLSL: Adjustment is made in steps of 16.<br>MLWL: Adjustment is made in steps of 1. | | | |

### 3.3.3 ROI Step in X Direction

| | | | | |
|---|---|---|---|---|
| **Command** | `<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="`*sensor group designation*`" PATH="`*sensor designation* `SetROI1StepX" VALUE="`*X*`" />` | | | |
| **Parameter** | Range for value X: | MLSL: No function<br>MLWL: 0…2047 | **Default:** | 0 |
| **Description** | Indicates the increment of pixels read out in the X direction.<br>MLSL: Not possible<br>MLWL: Adjustable in steps of 1 | | | |

### 3.3.4 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: 35…1280<br>MLWL: 35…2048 | **Default:** | MLSL: 1280<br>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. | | | |

### 3.3.5 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…1022<br>MLWL: 0…2046 | **Default:** | 0 |
| **Description** | Defines ROI offset in the in Z direction. This setting specifies offset to the first line. | | | |

## 3.4 Commands for Module Control – VisionApp 360 Module

### 3.4.1 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 6).<br>The data are transmitted via port 63333 as a default feature. |

### 3.4.2 Stop TCP/IP Server

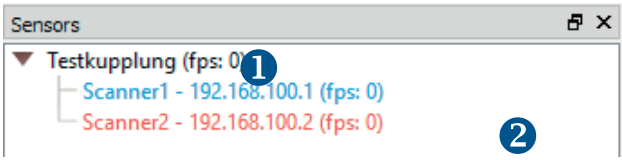
| | |
|---|---|
| **Command** | `<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="VisionApp" PATH="Start" VALUE="0" />` |
| **Description** | Stops the TCP/IP server. |

### 3.4.3 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.<br><br>**ATTENTION!**<br>Do not change to port 62232! |

# 4. Sample Setup

## 4.1 Enter Sensor Group and Utilized Sensors

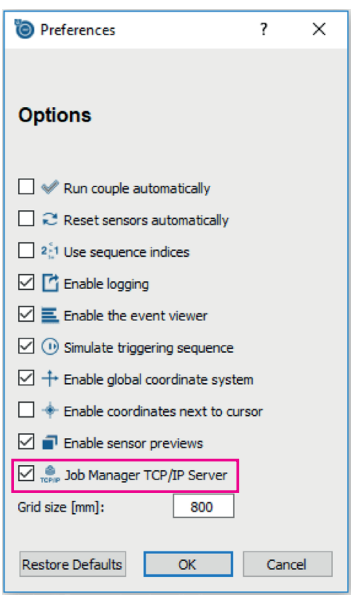



① Sensor group designation (here: couple), freely selectable

② Sensor designations (here: Sensor1, Sensor2), freely selectable

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

## 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.

## 4.3 Commands

### 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" />

### 4.3.2 Commands for Devices

**Set exposure time at Sensor1 to 500 µs:**

<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Sensor1 SetExposure-Time" VALUE="500" />

**Switch off the laser at Sensor2:**

<LIMA CMD="Module_SetNode" DIR="Request" MODULENAME="couple" PATH="Sensor2 SetLaserDeacti-vated" VALUE="0" />

### 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" />

### 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" />

# 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" />

**HINWEIS!**
For further information about the Get commands please see the weCat3D Interface Description (section 7) in the download area of the sensor.

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 | |
| GetIOState | bit0: E/A 1<br>bit1: E/A 2<br>bit2: E/A 3<br>bit3: E/A 4 |
| GetEncoderHTL | |
| GetEncoderTTL | |
| GetTemperature | |
| GetScannerState | bit0: Profile scanner OK<br>bit1: ExposureTime OK<br>bit2: LaserONTime OK<br>bit3: Not in use<br>bit4: Not in use<br>bit5: Measurement rate too fast<br>bit6: Not in use<br>bit7: Not in use |
| GetSignalEnable | The number of signals in each scan, see function SetSignalEnable |
| GetSignalContentZ | |
| GetSignalContentStrength | |
| GetSignalContentWidth | |

| ASCII command | Remarks |
|---|---|
| GetSignalContentReserved | |
| GetSignalWidthMin | |
| GetSignalWidthMax | |
| GetSignalStrengthMin | |
| GetSignalSelection | |
| GetAcquisitionLineTime | |
| GetCameraRunning | |
| GetTriggerSource | |
| GetTriggerAmountProfilesY | |
| GetAmountProfilesY | |
| GetTriggerEncoderStep | |
| GetTriggerDelay | |
| GetExposureTime | |
| GetLaserActive | |
| GetROI1WidthX | |
| GetROI1OffsetX | |
| GetROI1StepX | |
| GetROI1HeightZ | |
| GetROI1OffsetZ | |
| GetSyncOut | |
| GetSyncOutDelay | |
| GetEncoderTriggerFunction | |
| GetEncoderCountDirection | |
| GetEA1Function | |
| GetEA1FunctionLaserOff | |
| GetEA1FunctionProfileEnable | |
| GetEA1FunctionResetCounter | |
| GetEA1InputFunction | |
| GetEA1InputLoad | |
| GetEA1Output | |
| GetEA1OutputFunction | |
| GetEA1ResetCounterRepeat | |
| GetEA1ResetCounterSignaledge | |
| GetEA1ResetCounterBaseTimeCounter | |
| GetEA1ResetCounterPictureCounter | |
| GetEA1ResetCounterEncoderHTL | |
| GetEA1ResetCounterEncoderTTLRS422 | |
| GetEA2Function | |
| GetEA2FunctionLaserOff | |
| GetEA2FunctionProfileEnable | |
| GetEA2FunctionResetCounter | |
| GetEA2InputFunction | |

| ASCII command | Remarks |
|---|---|
| GetEA2InputLoad | |
| GetEA2Output | |
| GetEA2OutputFunction | |
| GetEA2ResetCounterRepeat | |
| GetEA2ResetCounterSignaledge | |
| GetEA2ResetCounterBaseTimeCounter | |
| GetEA2ResetCounterPictureCounter | |
| GetEA2ResetCounterEncoderHTL | |
| GetEA2ResetCounterEncoderTTLRS422 | |
| GetEA3Function | |
| GetEA3FunctionLaserOff | |
| GetEA3FunctionProfileEnable | |
| GetEA3FunctionResetCounter | |
| GetEA3InputFunction | |
| GetEA3InputLoad | |
| GetEA3Output | |
| GetEA3OutputFunction | |
| GetEA3ResetCounterRepeat | |
| GetEA3ResetCounterSignaledge | |
| GetEA3ResetCounterBaseTimeCounter | |
| GetEA3ResetCounterPictureCounter | |
| GetEA3ResetCounterEncoderHTL | |
| 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 |

| ASCII command | Remarks |
|---|---|
| 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 |

# 6. 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` |

| Description | Offset in bytes | Type (bytes) | Predefined value |
|---|---|---|---|
| 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[scanner Points] or double [scannerPoints] (n) | |
| Sensor2 data: same format as for Sensor1. There are k = `numberOfSources` sensors per connection | 1200 + n | float[scanner Points] 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` |

# 7. Change Index

| Version | Date | Description/Change | Software version |
|---|---|---|---|
| 1.0.0 | 2018-05-24 | Initial version of commands documentation | 1.0.0.1 |
| 1.1.0 | 2018-09-12 | • Correction of the parameter value, section 2.2.3<br>• Default value, section 2.2.4<br>• New section 4: “Data Format” | 1.0.0 |
| 1.2.0 | 2019-04-18 | • Several LIMA commands removed (Device settings)<br>• E/A settings and commands removed | 1.0.0 |
| 1.3.0 | 2020-01-21 | • Correction in section 3.3.4 | 1.3.0 |
| 1.4.0 | 2020-07-08 | • Extension LIMA protocol (see section 2)<br>• Extension LIMA communication (see section 4) | 1.3.0 |