

# *SmartSight*

## *Operating manual*




<b>Document</b>	Asyrl_SMARTSIGHT_Operating_Manual_EN 000.100.530		
<b>Version</b>	D2	<b>Date</b>	8.06.2019

# Table of Contents

<b>TABLE OF CONTENTS .....</b>	<b>2</b>
<b>1. INTRODUCTION.....</b>	<b>4</b>
1.1. GENERAL INFORMATION .....	4
1.2. SAFETY INSTRUCTIONS .....	5
1.2.1. <i>General instructions</i> .....	5
1.2.2. <i>Specific instructions</i> .....	5
1.3. WARRANTY INFORMATION .....	6
<b>2. DESCRIPTION .....</b>	<b>7</b>
2.1. PRODUCT OVERVIEW.....	7
2.2. GENERAL CHARACTERISTICS .....	9
2.2.1. <i>Vision specifications</i> .....	10
2.2.2. <i>General characteristics</i> .....	13
2.2.3. <i>Architecture</i> .....	15
2.3. ELECTRICAL INTERFACES .....	16
2.3.1. <i>Diagrams of basic configurations</i> .....	16
2.3.2. <i>Control unit</i> .....	21
2.3.3. <i>EasyConnect Box</i> .....	24
2.4. MECHANICAL INTERFACES.....	30
2.4.1. <i>Control unit</i> .....	30
2.4.2. <i>EasyConnect Box</i> .....	30
2.4.3. <i>Vision Kit</i> .....	32
2.4.4. <i>Asycube</i> .....	34
2.5. ACCESSORIES AND OPTIONAL MODULES .....	35
2.5.1. <i>Lighting</i> .....	35
2.5.2. <i>Control camera</i> .....	40
2.5.3. <i>Switch for multi-Asycube connection</i> .....	41
2.5.4. <i>Calibration plate</i> .....	41
<b>3. TRANSPORTATION, HANDLING AND INSTALLATION.....</b>	<b>46</b>
3.1. PACKAGING OF THE PRODUCT, TRANSPORTATION AND HANDLING .....	46
3.2. UNPACKING INSTRUCTIONS .....	46
3.3. INSTALLATION AND STORAGE ENVIRONMENT .....	46
3.3.1. <i>Installation environment</i> .....	46
3.3.2. <i>Storage environment</i> .....	47
<b>4. MAINTENANCE AND REPAIR .....</b>	<b>48</b>
4.1. SAFETY INSTRUCTIONS .....	48
4.1.1. <i>General instructions</i> .....	48
4.2. PERSONNEL RESPONSIBLE FOR MAINTENANCE OR REPAIR OPERATIONS .....	48
4.3. MAINTENANCE.....	49
4.3.1. <i>Maintenance schedule</i> .....	49

4.3.2. General maintenance .....	49
4.4. REPAIRS.....	50
4.5. TECHNICAL SUPPORT .....	51
4.5.1. For a better service .....	51
4.5.2. Contact.....	51
<b>REVISION TABLE .....</b>	<b>52</b>

	<b>SmartSight</b> <b>Operating manual</b>	
<b>Introduction</b>	<b>Version: D2</b>	

# 1. Introduction

## 1.1. General information

This document is the property of Asyri S.A.; it may not be reproduced, modified or communicated, in whole or in part, without our prior written authorisation. For the purposes of product improvement, Asyri SA reserves the right to modify any information contained in this document without prior notice. Before using the product, please read this entire document in order to ensure that the product is used correctly. However, if you encounter difficulties when using the product, do not hesitate to contact our customer service department.

In this manual, the safety information that must be respected is split into three types: "Danger", "Important" and "Note". These messages are identified as follows:



**DANGER!**

Failure to observe this instruction may result in serious physical injury.



**DANGER!**

This instruction identifies an electrical hazard. Failure to respect this instruction may result in electrocution or serious physical injury due to an electric shock.



**IMPORTANT !**

Failure to respect this instruction may result in serious damage to equipment.



**NOTE:**

*The reader's attention is drawn to this point in order to ensure that the product is used correctly. However, failure to respect this instruction does not pose a danger.*



**Reference ...**

*For more information on a specific topic, the reader is invited to refer to another manual or another page of the current manual.*



**IMPORTANT !**

Asyri cannot be held liable for damage to property or injuries to people caused by failure to follow the instructions specified in the "Safety instructions" paragraph. It is the customer's responsibility to inform the personnel concerned.



**NOTE:**

*All dimensions and measurements in this manual are expressed in millimetres (mm)*

## 1.2. Safety instructions

### 1.2.1. General instructions

**DANGER!**



Check that the power supplies and other cables are disconnected from the unit before performing any maintenance operations.

**DANGER!**



Only qualified personnel (trained by Asyri) are authorised to use this product.

**DANGER!**



Do not unscrew the system's electrical boxes or protective covers. Serious injury or death could result from an electric shock. Only authorised Asyri SA personnel are allowed to access these parts of the system for maintenance or for repair.

**DANGER!**



Never disconnect or connect the system cables without being sure that it is switched off.

**DANGER!**



Modifications to the product are not permitted. Unauthorised modifications could lead to a malfunction, fire and physical injury, etc.

**DANGER!**



In the event of a power outage, the product must be stopped. Failure to respect this instruction may result in the product restarting accidentally.

**DANGER!**



Do not use the product in an environment in which it may come into contact with water or oil.

#### 1.2.1.1. Disposal

When the product reaches the end of its service life, it must be disposed of in accordance with regulations concerning industrial waste.



**NOTE:**

All applicable laws, regulations, and standards must be observed when disposing of the product.

### 1.2.2. Specific instructions

#### 1.2.2.1. Personal Protective Equipment (PPE)

For safety reasons, operators must wear the following safety equipment when using the product:

- Safety goggles when using the Asycube backlight without the diffuser installed. (LED lighting equivalent to class 1 compared to lasers)




**NOTE:**

*It is the client's responsibility to install visual signs informing of the potential dangers and to provide the associated protective equipment.*

### 1.3. Warranty information

You will find all warranty information (scope, term, etc.) under the general terms of sale.

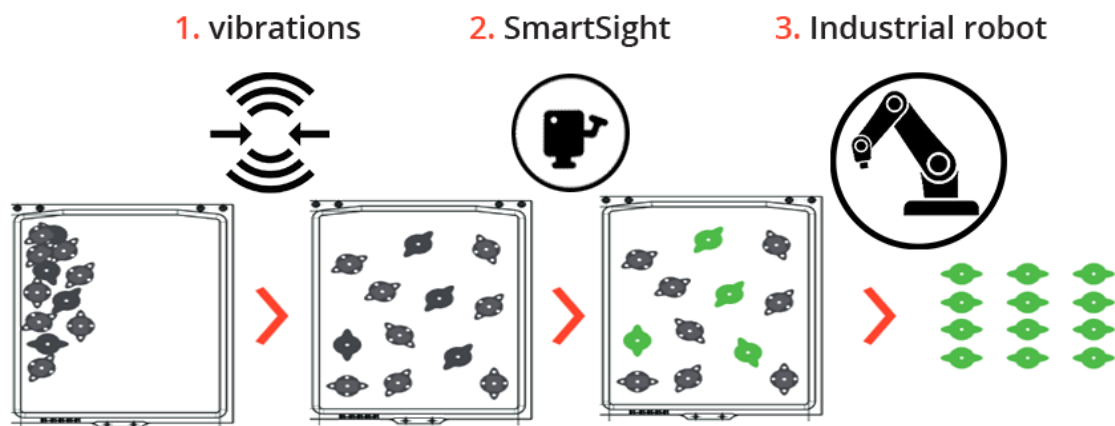
	<b>SmartSight</b> Operating manual	
<b>Description</b>	Version: D2	

## 2. Description

### 2.1. Product overview

SmartSight is Asyri's intelligent visual part-detection system, ensuring straightforward integration of any Asycube flexible feeder system with any industrial robot brand. SmartSight makes the implementation of high-performance flexible feeder systems as simple as setting up conventional feeder systems.

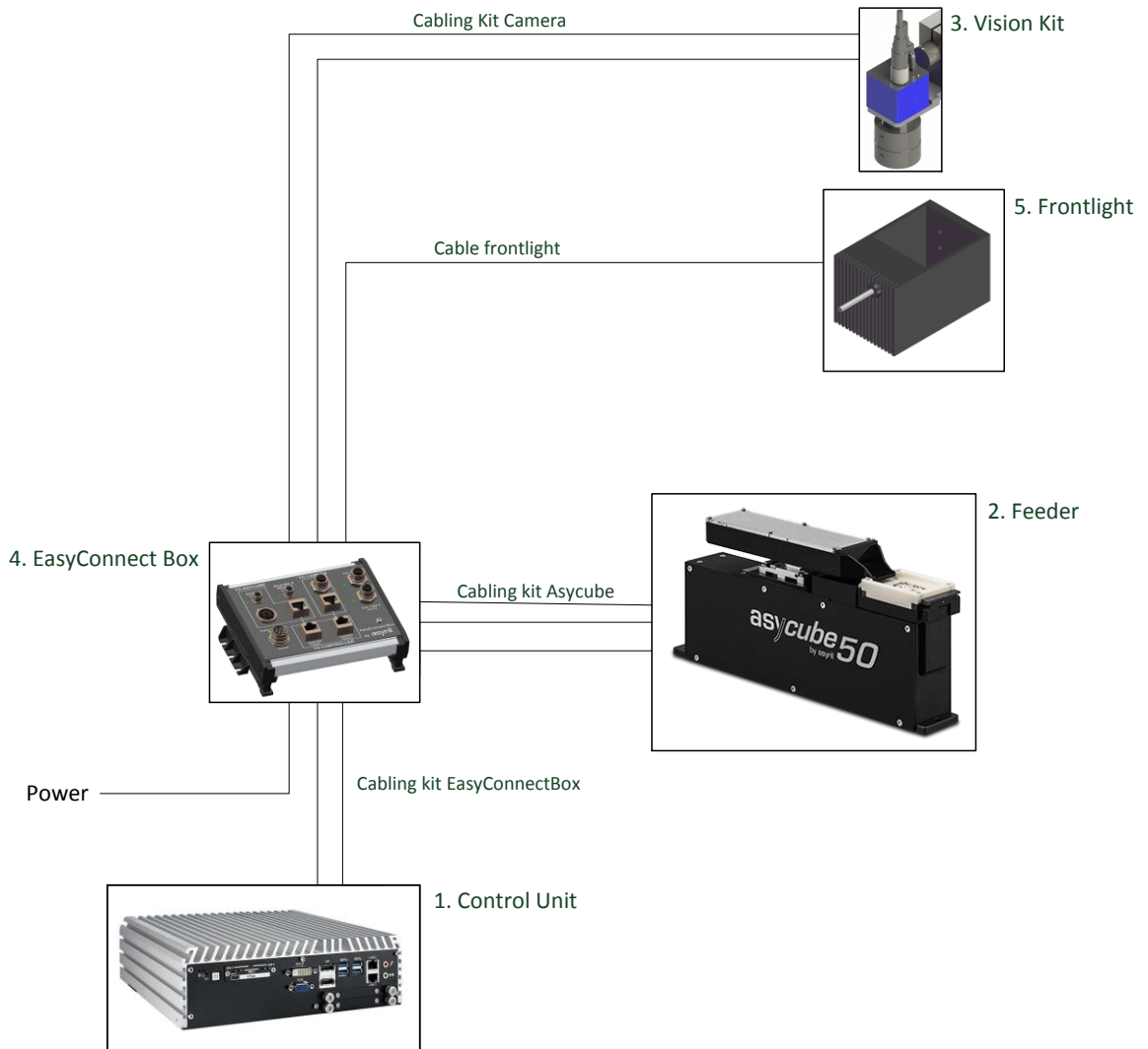
Capable of controlling up to 4 cameras and feeder systems, SmartSight is able to control the movements of parts, ensuring their optimal separation and distribution on the platform. The location of the parts to be picked is then provided to the robot or industrial controller via Ethernet. The system can be easily programmed thanks to Asyri's intuitive user interface.



**Figure 2-1: SmartSight: How it works**

SmartSight comprises Asyri's powerful visual part-detection and feeder-management software installed on an industrial PC (1) as well as an optimally configured Asycube (2) and vision kit (3) including camera and lens, as well as all necessary cabling (see Figure 2-2 for a general illustration of the SmartSight content).

The basic configuration contains one camera over one Asycube. However the system is built to allow more complex configurations with several cameras and feeders that can, or not, work independently and which parameters (recipe) can be saved and loaded on a common basis. Alternative configurations for functionalities such as control part presence, position in gripper, placing position are available on demand. Some standard configurations are described in this document (see 2.3.1 Diagrams of basic configurations).



**Figure 2-2: general content of the SmartSight**



**NOTE:**  
Software and hardware can only be configured by AsyriL.



For further information on wiring the components, see chapter "0 Electrical interfaces".



**NOTE:**  
A front light might be necessary depending on the application. This option is described in 2.5.1 and can be ordered with the SmartSight components. In this documentation, diffuse on-axis lighting (DOAL) always represents the front light type, but it could be replaced with another kind of lighting depending on the specific application.



## 2.2. General characteristics



### IMPORTANT !

Never try to use the product outside its specifications. Failure to respect these specifications will invalidate the product warranty.

SmartSight	
<b>Description</b>	Intelligent visual part detection system for any Asycube flexible feeders
<b>Maximum number of cameras per control unit</b>	4 (see chapter 2.3.2) <sup>1</sup>
<b>Maximum number of Asycubes per control unit</b>	8 (see chapter 2.3.2) <sup>1</sup>
<b>Type of camera</b>	12MPx/5MPx/1.6MPx See information in Table 2-2
<b>Field of view</b>	Diagonal of 40, 50, 80, 240, 380 or 530 mm See information in Table 2-1: vision kits available
<b>Working Distance</b>	Short and long distance available See information in Table 2-1: vision kits available
<b>Number of lighting devices</b>	1 backlight integrated in the Asycube 1 optional additional front light per camera (additional and other lighting devices available on request, up to 4 in total per camera)
<b>Type of materials detectable</b>	Metal, jewels, ceramics, glass, semiconductors, polymer. All geometries.
<b>Component position and orientation detection</b>	X, Y, Rz Pitch & toss (subject to conditions)
<b>Easy configuration of a new recipe</b>	Simple recipe changeover and new part programming
<b>Examples of use</b>	Part localisation and smart feeder management Monitoring part presence, position in gripper, placing position

<sup>1</sup> Restrictions may apply to the availability of Ethernet communication ports

## 2.2.1. Vision specifications

### 2.2.1.1. Standard Vision kits

The vision kit contains one camera and the corresponding lens to fulfil a determined field of view and working distance. The available vision kits are listed in Table 2-1: vision kits available

To choose the optimal vision kit for your application, the following criteria have to be determined:

- Size of the feeder system (Asycube)
- Detection limit: see Table 2-3 for detailed information. Using this value and the geometry of the parts in your applications, you can define the necessary resolution to be associated with the image pixel size in Table 2-1: vision kits available
- Working distance: short and long working distances are available depending on the manipulator and the machine size.
- The field of view is defined as the inner edge of the plate frame. It corresponds to the minimal area necessary to control an Asycube. As consequences, the working distance and image pixel size values are the minimal ones.

Asycub	Diagonal of feeder plate (FoV)	Camera	Field of view		Equivalent image pixel size [µm]	Working Distance [mm]		Focal length
			Height [mm]	Width [mm]				
50	40	5 MPx	30	25	12	Small FoV	<b>390</b>	90
		12 MPx	48	35	12		<b>370</b>	90
	50	5 MPx	46	39	19	Short	<b>300</b>	50
		1.6 MPx	47	35	33	Long	<b>580</b>	90
80	80	12 MPx	73	53	17		<b>540</b>	90
		5 MPx	67	56	27	Short	<b>430</b>	50
	80	1.6 MPx	71	53	50	Long	<b>800</b>	90
		1.6 MPx	71	53	50	Short	<b>380</b>	25
240	240	12 MPx	205	150	48	Long	<b>730</b>	50
		5 MPx	195	163	80	Short	<b>530</b>	35
	240	1.6 MPx	200	150	139	Long	<b>840</b>	35
		1.6 MPx	200	150	139	Short	<b>510</b>	12
380	380	12 MPx	356	260	87	Long	<b>860</b>	20
		5 MPx	330	277	127	Short	<b>640</b>	25
	380	1.6 MPx	346	260	240	Long	<b>900</b>	35
		1.6 MPx	346	260	240	Short	<b>610</b>	16
						Long	<b>980</b>	25
						Short	<b>570</b>	8
						Long	<b>1060</b>	15

Asycub	Diagonal of feeder plate (FoV)	Camera	Field of view		Equivalent image pixel size [µm]	Working Distance [mm]		Focal length
			Height [mm]	Width [mm]		Short	Long	
530	530	12 MPx	506	371	124	Short	<b>890</b>	25
						Long	<b>1280</b>	35
		5 MPx	443	371	181	Short	<b>840</b>	16
						Long	<b>1320</b>	25
		1.6 MPx	495	371	344	Short	<b>800</b>	8
						Long	<b>1520</b>	15

Table 2-1: vision kits available

Number of pixels	Sensor size	Pixel size [µm]	Number of pixels	
			Height	Width
<b>12MPx</b>	1.1"	3.45	4096	3000
<b>5MPx</b>	2/3"	3.45	2448	2048
<b>1,6MPx</b>	1/2.9"	3.45	1440	1080

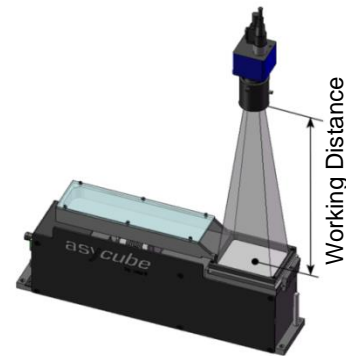


Table 2-2: camera specifications

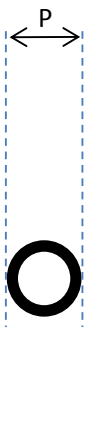

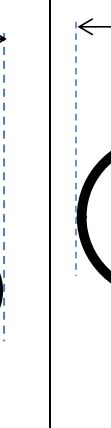

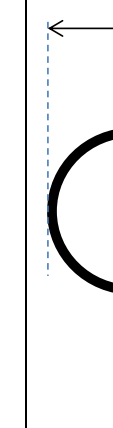
Figure 2-3: Working distance definition

### 2.2.1.2. Detection limit

In order to define a detection limit associated with your application, two situations must be determined:

- Either you want to locate a precise detail (for example, to check whether a part is present on the surface of the Asycube and get its position, or to locate a detail (e.g. a hole) on a part, etc.). In this case, the detail must be greater than 20 pixels in size to achieve quarter pixel localisation accuracy.
- Or you only want to check the presence or absence of a component without actually locating it, in this case, a size of 10 pixels is sufficient.

Table 2-3 indicates the minimum size of a part or specific detail in order for them to be accurately located or detected.

Size of part P [pixels]	P < 20 px	P > 20 px			
Size of detail D [pixels]			D < 10 px	10 px < D < 20 px	D > 20 px
Example					
Part localisation	✗	✓ ¼ px accuracy	✓ ¼ px accuracy	✓ ¼ px accuracy	✓ ¼ px accuracy
Detail detection			✗	✓	✓
Detail location			✗	✗	✓ ¼ px accuracy

**Table 2-3: Detection limit**

The pixel-millimetre conversion depends on the field of view as well as the resolution of the camera. The corresponding value for each vision kit is indicated in Table 2-1: vision kits available


## 2.2.2. General characteristics

### 2.2.2.1. Control unit

The control unit is delivered with OS and software configured and ready to be used. The Cognex dongle key, delivered in the package, has to be connected all the time to allow correct function of the system.



**Figure 2-4: control unit**

Characteristic	Value
Dimensions (mm)	See Figure 2-20
Power supply	24 VDC/75 W
 Windows protection	<p>The Control Unit (partition C) is protected with the EWF from WindowsEmbedded. When enable, the Control Unit can be turned off without shutdown (No UPS is needed). Any changes on the partition C: will be erased at the next restart of the pc.</p> <p>Note that the partition D: is not protected, as recipes must be saved on it. For this reason, switching off the control unit during or just after a recipe-saving operation may corrupt the data.</p>
Backup	<p>The system partition and the data directory of the Control Unit are saved on a CF card placed inside the control unit. This backup can then be used to restore as fast as possible the system in case of a system failure (Harddisk failure). A backup is created at delivery time and can be launched manually at any time.</p>

### 2.2.2.2. EasyConnect Box

The EasyConnect Box allows fast and easy connexions of all devices. One EasyConnect Box is dedicated to each camera and allows up to 2 lighting devices and 1 Asycube to be controlled with additional backlight synchronisation.



**Figure 2-5: EasyConnect Box**

Characteristics	Value
Dimensions [mm] (W x H x L)	170 x 54 x 128
Asycube connexion	1x Data (Ethernet) 1x Power 1x Backlight synchronization
Camera connexion	1x Data (GiGE) 1x Power and I/O
Illumination devices connexion	2x output for external light 1x additional output for an Asycube backlight synchronization
Control unit connexion	2x Ethernet to camera and Asycube
Power	1x input for all connected device (camera, Asycube, lights)



**NOTE:**

The standard cameras delivered in the SmartSight allow synchronizing up to 2 illumination devices. Specific camera might synchronize up to 4 lighting systems, but this feature has to be specified at the order.

### 2.2.2.3. Cables

All cables for connecting the various peripherals to the EasyConnect Box can be ordered from Asyri.

As the EasyConnect Box might be located either near the Asycube/camera module or near the control unit, different cable lengths are available.

All cables are equipped with connectors on both ends, except the power cable for the EasyConnect Box, which has floating conductors.

Characteristics	Value
length	2 m, 5 m, 7.5 m (see table below)
Ethernet cables	Cat. 6 minimum for camera and control unit
Mechanical	There is no suitable cable for the cable chains.

Available lengths	2m	5m	7.5m
Cable kit Asycube	x	x	
Cable kit Camera	x	x	x
Front light cable	x	x	x
EasyConnect Box cable kit	x	x	x

NOTE:



No power supply is delivered with the SmartSight: a 24 V DC power supply must be connected to each EasyConnect Box and to the control unit (only the connector is supplied with the control unit; the cable must be screwed to the connector by the integrator).

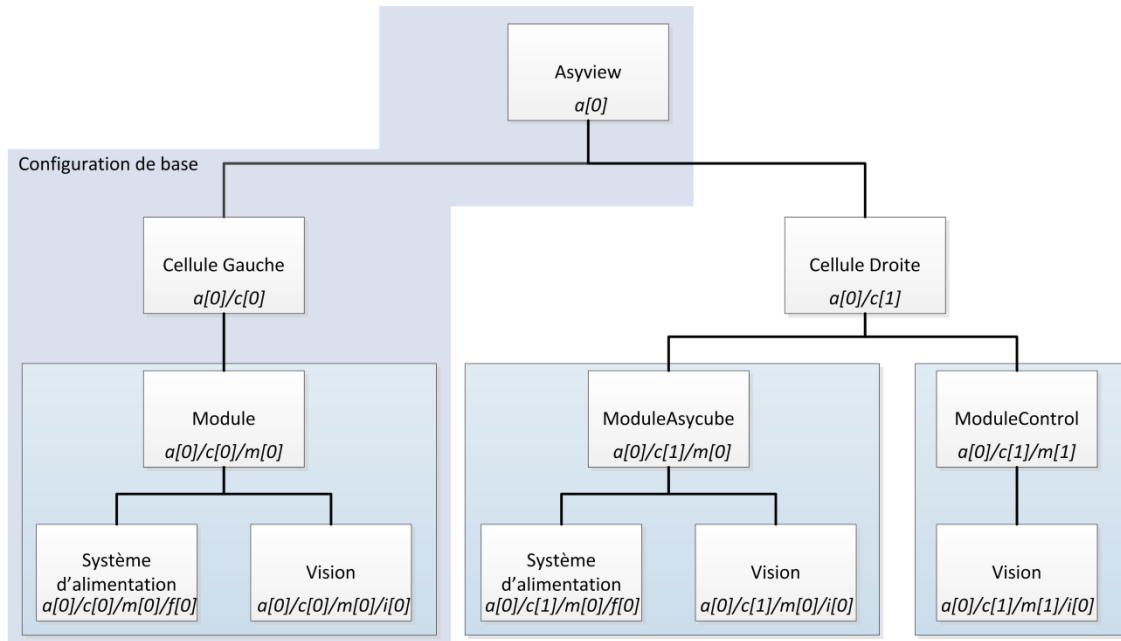


For further information on wiring the components, see chapter "Electrical interfaces Electrical interfaces".

For further information on dimensions, see chapter "2.4 Mechanical interfaces"

### 2.2.3. Architecture

The logical architecture of the SmartSight contains a "cell" level and a "module" level. The "module" level allows the role of each camera and associated feeder module to be defined. The "cell" level allows to group the module parameterization in a common recipe and to start/stop all of them together. Inversely defining the modules in different cells allows working independently with each of them. Figure 2-6 shows an example of configuration and illustrates the "cell" and "module" levels. The Programming Guide relates detailed information about addressing each of the levels and components.

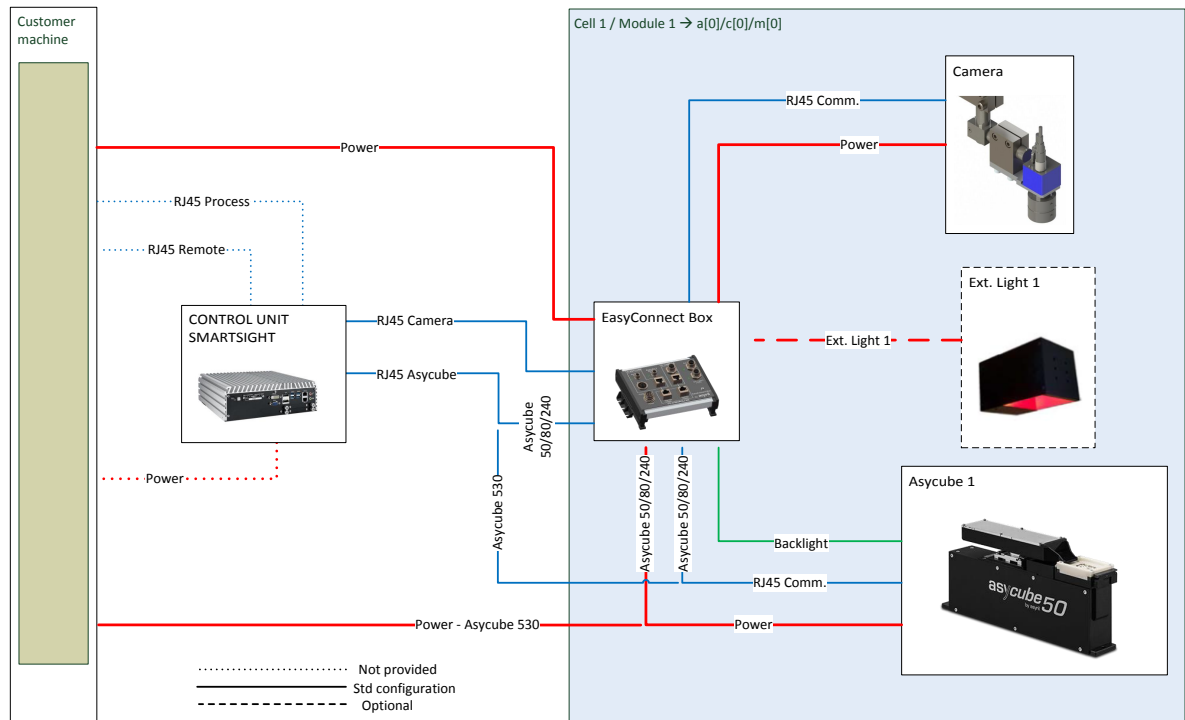


**Figure 2-6: example of architectures of SmartSight: (in purple) the basic configuration with one camera/feeder module and (whole image) with two feeder modules/camera and one module containing a control camera, but separated over two different working cells (see the Programming Guide for more information about addressing each of the levels, but an example is shown in italics with the corresponding component addresses).**

## 2.3. Electrical interfaces

### 2.3.1. Diagrams of basic configurations

In the basic configuration, there is one camera on one Asycube. One or two optional front lights can be added (a camera with four IOs is required to work with the second front light).



**Figure 2-7: General diagram of basic configuration**

The customer provides the 24 VDC supply for the whole system.

The supply and communication cables can be ordered in different lengths depending on how the machine will be integrated on the customer's premises.



For further information on connector and powering the components, see the chapter “2.3.3 EasyConnect Box”



**NOTE:**

Any Ethernet cable connecting a camera or Control unit must be **category 6**.

**IMPORTANT !**



- Before the product is powered on, check that your voltage specifications correspond to those of the product.
- Never disconnect the power cables when the system is in operation. Always switch off the machine before disconnecting the cables.



**IMPORTANT !**

Ensure that no production program or saving recipe is in operation when the machine is being stopped.



### 2.3.1.1. Double basic configuration

This configuration connects two times the basic one to the same Control Unit. Two cameras are connected to two AsyCubes.

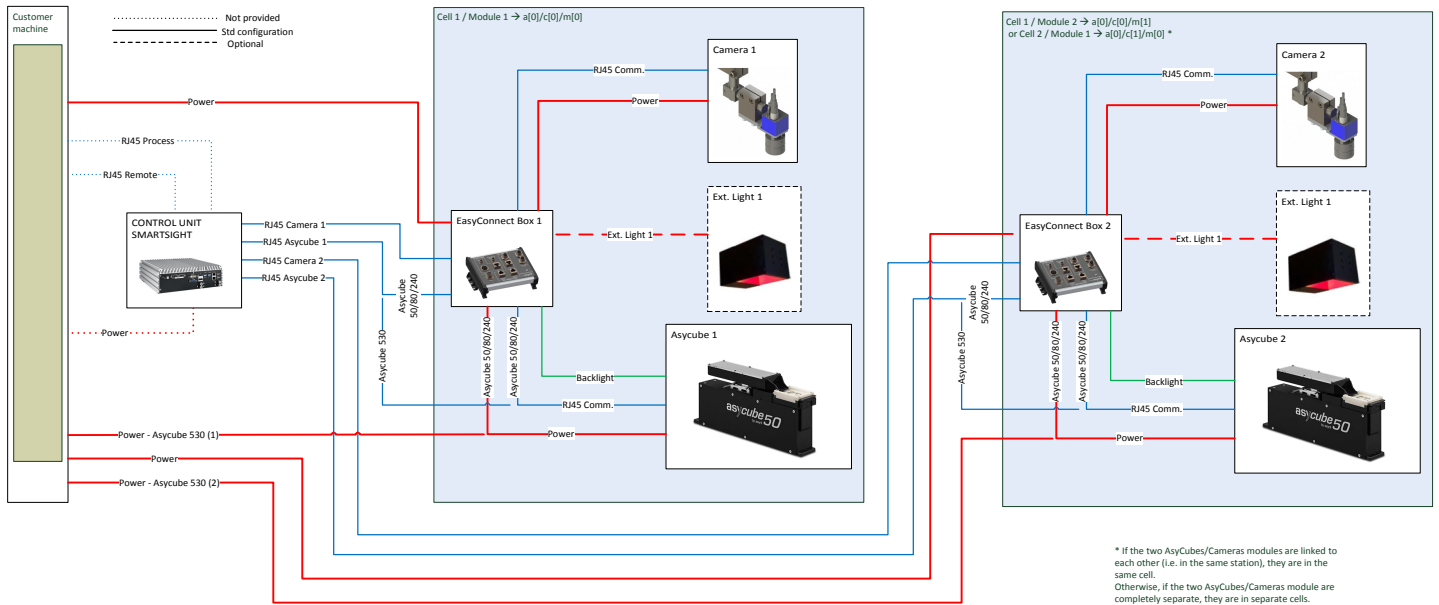


Figure 2-8: General diagram of double basic configuration

### 2.3.1.2. Triple basic configuration

This configuration connects three times the basic one to the same Control Unit. There is three times one camera on an Asycube. In this case, all Asycubes are connected on the same Ethernet port via a switch (see 2.5.3).

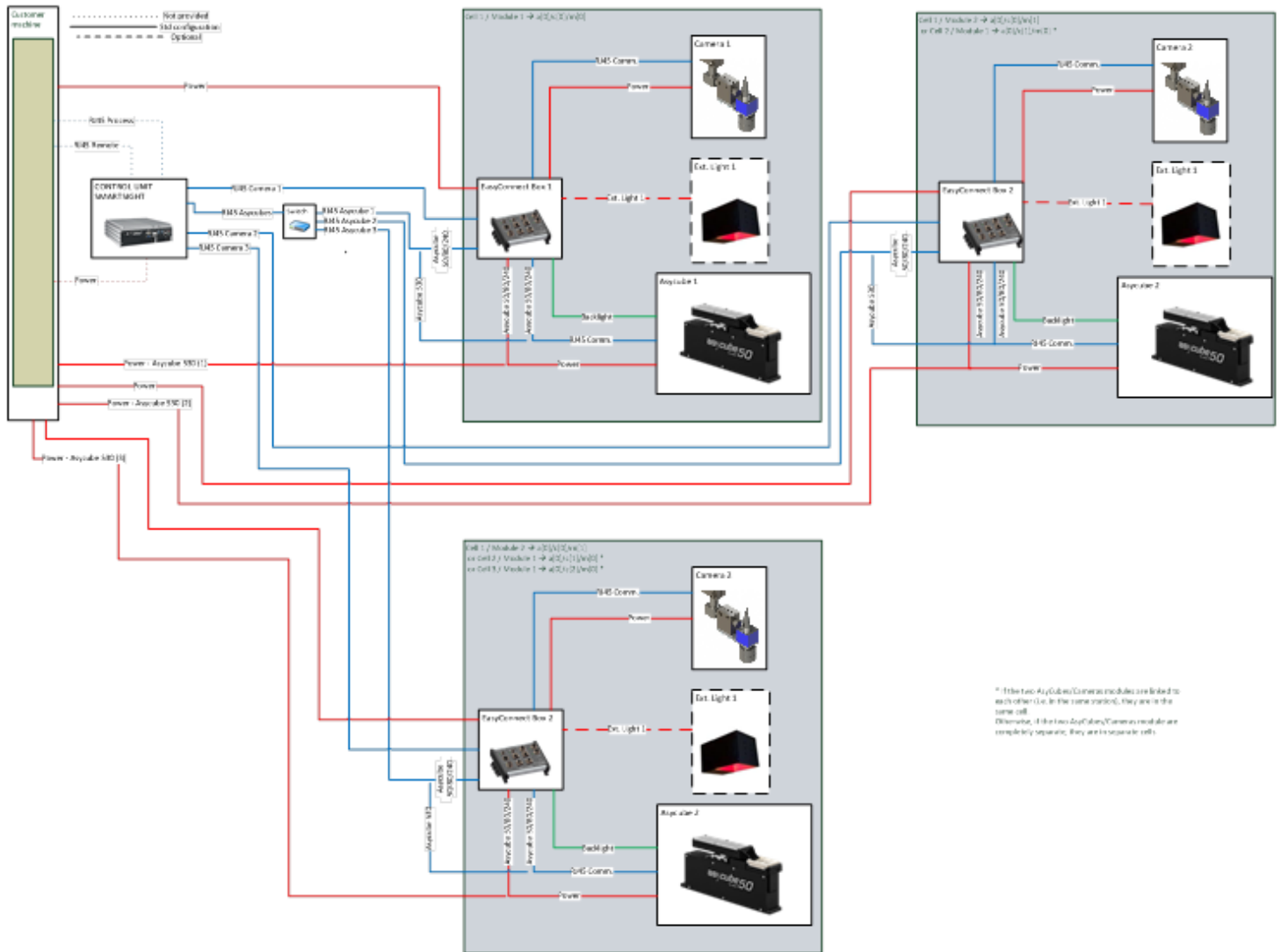


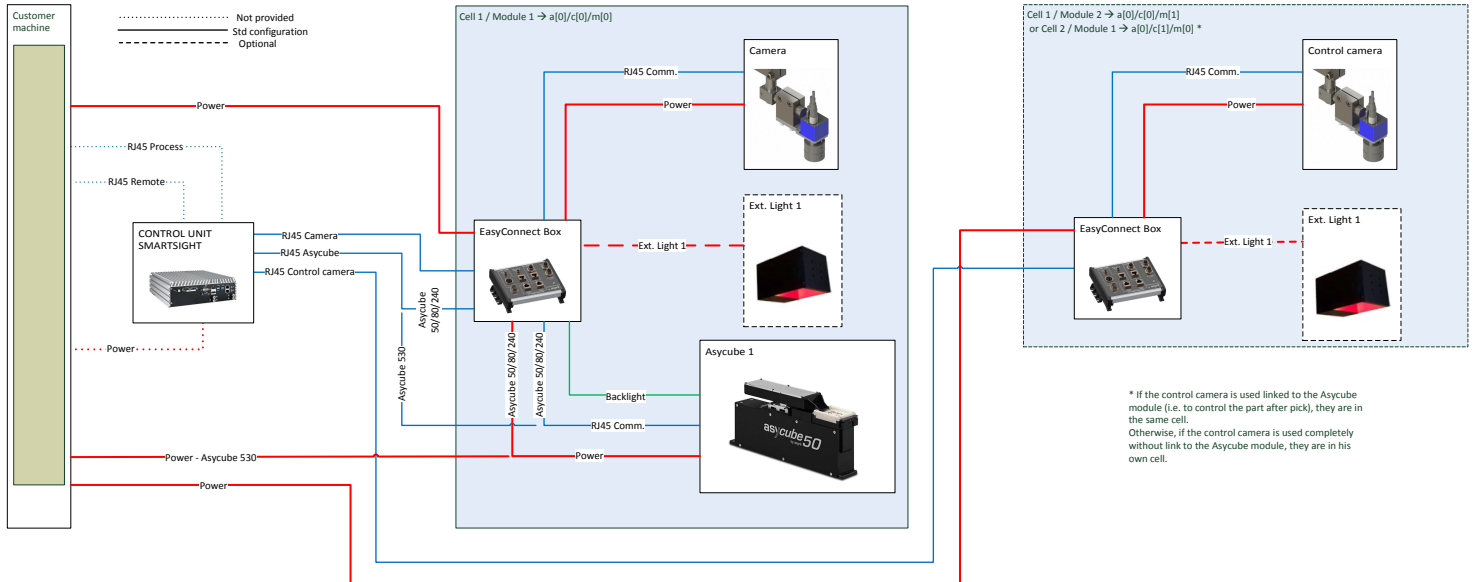
Figure 2-9: General diagram of triple basic configuration

### 2.3.1.3. Basic configuration and a control camera

This configuration is the basic one and an additional control camera. This camera can be used for:

- Check the presence of the part (i.e. after pick on the Asycube)
- Measure the position of the part in the gripper to be more precise in the place process.

The control camera is not dedicated to measurement or quality inspection operations.



**Figure 2-10: General diagram of basic configuration and a control camera**

The module with the Asycube and the module with the control camera are usually used in the same cell. The control camera can be moved out in another cell if the control process is not linked to the part dispensed by the Asycube.

### 2.3.1.4. Basic configuration with a second Asycube

This configuration corresponds to one camera controlling tow Asycubes. The connection corresponds to the basic case for the camera and the first Asycube. The second Asycube is connected directly to the control unit and power supply, but its backlight synchronisation is connected via the EasyConnect Box.

This case corresponds to a camera looking on two Asycubes or to a camera moving on two Asycubes.

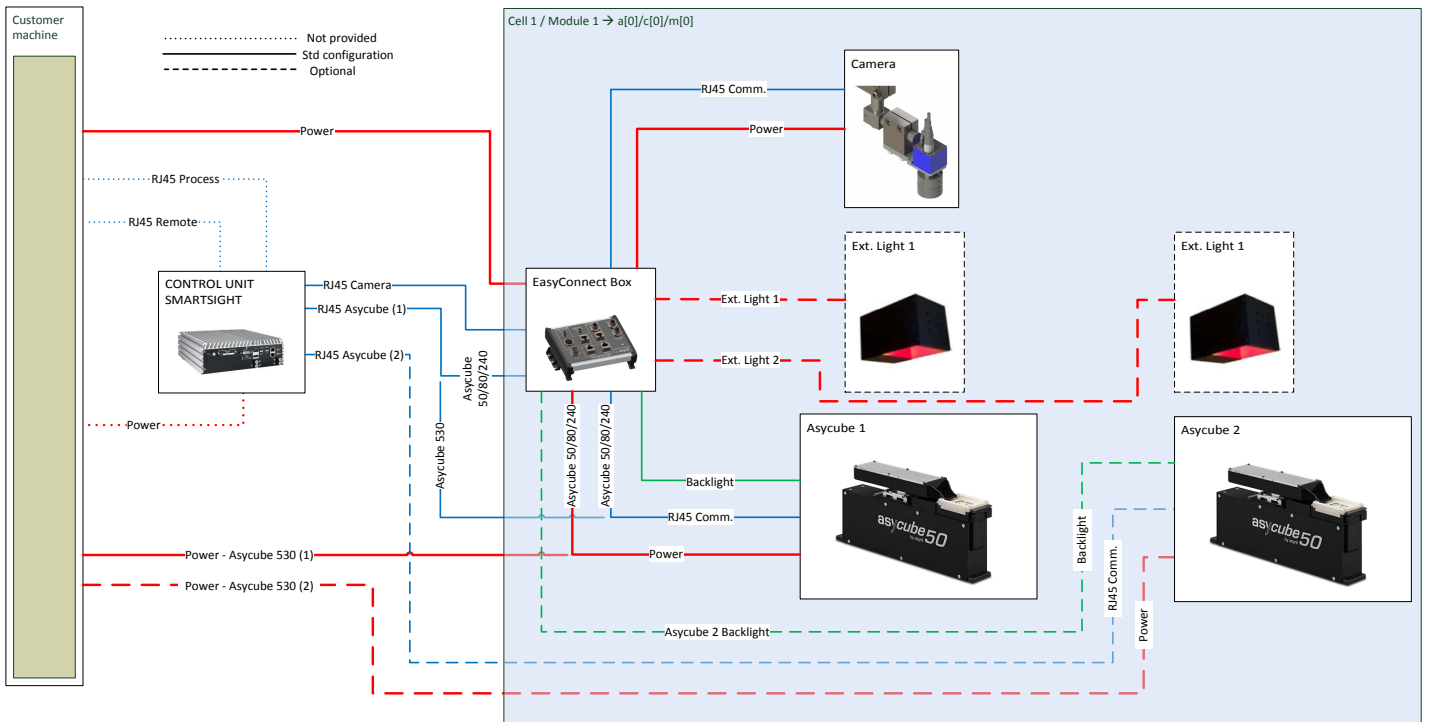
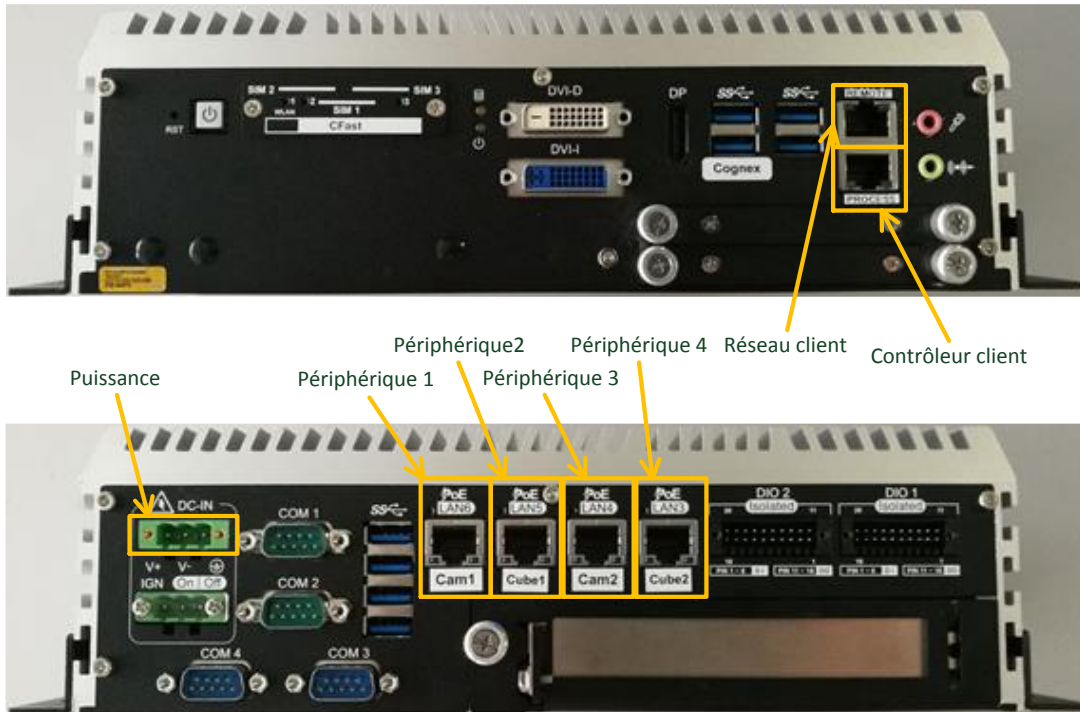


Figure 2-11: General diagram of basic configuration with a second Asycube

### 2.3.2. Control unit

#### 2.3.2.1. General description



**Figure 2-12: Control unit Ethernet connections**



**NOTE:**

When using 4 cameras, the customer's network is no more available but will support the Asycubes communication through a switch. Each device port (1 to 4) is then connected to a camera.

#### 2.3.2.2. Power

The connector provided must be connected to a power supply (not supplied by Asyri) with the following characteristics:


Characteristics	Value
Voltage	24VDC
Power	75 W

**Table 2-4: Control unit power supply**

#### 2.3.2.3. Ethernet TCP/IP configuration

The Control unit has 6 Ethernet ports which are assigned like this:

- One Ethernet port for communication with the customer's controller.
- One Ethernet port for external connection with the customer's network.
- 4 other Ethernet ports for devices (Asycubes and cameras).

	<b>SmartSight Operating manual</b>	
<b>Description</b>	Version: D2	

All the ports are configured by Asyri for the Asycubes and the cameras, depending on the options chosen. The table below shows the IP addresses for the ports to be used by the customer:

Ethernet port	IP Address	Subnet Mask
Customer's network	DHCP (dynamic host configuration protocol)	dynamic
Customer's controller	192.168.0.70 (can be changed)	255.255.255.0

**Table 2-5: IP addresses for customer**

The table below gives information on the Ethernet connection from the Control unit to the various devices for standard configurations:

- Basic configuration (Figure 2-7)

Ethernet port	Device connected	IP Address	Subnet Mask
Device 1	Asycube 1	192.168.127.1	255.255.255.0
Device 2	Camera 1	192.168.21.1	255.255.255.0
Device 3			
Device 4			

**Table 2-6: IP addresses for devices in basic configuration**

- Double basic configuration (Figure 2-8)


Ethernet port	Device connected	IP Address	Subnet Mask
Device 1	Asycube 1	192.168.127.1	255.255.255.0
Device 2	Camera 1	192.168.21.1	255.255.255.0
Device 3	Asycube 2	192.168.128.1	255.255.255.0
Device 4	Camera 2	192.168.22.1	255.255.255.0

**Table 2-7: IP addresses for devices in double basic configuration**

- Triple basic configuration (Figure 2-9)

Ethernet port	Device connected	IP Address	Subnet Mask
Device 1	Asycubes (to a switch)	192.168.127.1	255.255.255.0
Device 2	Camera 1	192.168.21.1	255.255.255.0
Device 3	Camera 2	192.168.22.1	255.255.255.0
Device 4	Camera 3	192.168.23.1	255.255.255.0

**Table 2-8: IP addresses for devices in triple basic configuration**

	<b>SmartSight</b> <b>Operating manual</b>	
<b>Description</b>	Version: D2	

- Basic configuration and a control camera (Figure 2-10)

Ethernet port	Device connected	IP Address	Subnet Mask
Device 1	Asycube 1	192.168.127.1	255.255.255.0
Device 2	Camera 1	192.168.21.1	255.255.255.0
Device 3	Camera 2	192.168.22.1	255.255.255.0
Device 4			

**Table 2-9: IP addresses for devices in basic configuration and a control camera**

- Basic configuration with a second Asycube (Figure 2-11)

Ethernet port	Device connected	IP Address	Subnet Mask
Device 1	Asycube 1	192.168.127.1	255.255.255.0
Device 2	Camera 1	192.168.21.1	255.255.255.0
Device 3	Asycube 2	192.168.128.1	255.255.255.0
Device 4			

**Table 2-10: IP addresses for devices in basic configuration with a second Asycube**

#### 2.3.2.4. Connection to the Human-Machine interface (HMI)

The graphic interface is installed on the control unit. Interaction is via a keyboard, mouse and screen (supplied by the customer) connected to the control unit.

The screen must have the following minimum specifications:

Characteristic	Value
Resolution	1280 x 1024

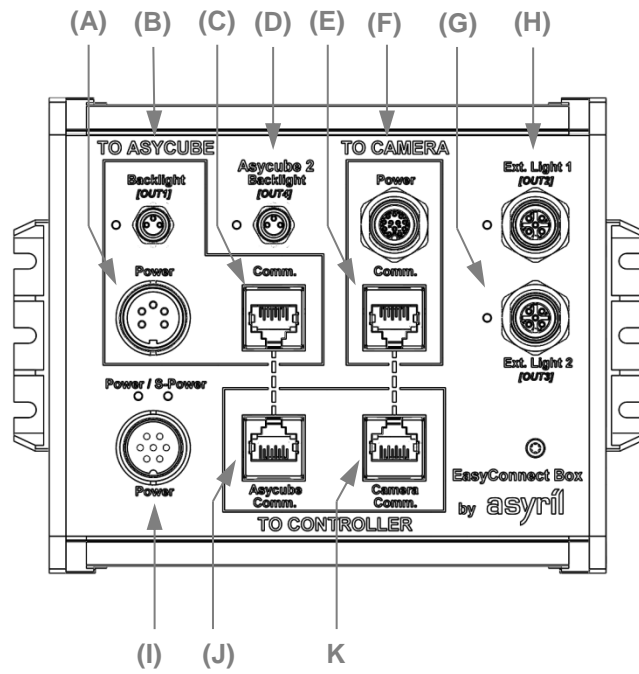
**Table 2-11: optimal resolution for the HMI screen**

### 2.3.3. EasyConnect Box

#### 2.3.3.1. Overview

The electrical interfaces to the Easy Connect Box are as follows:

- (A) Asycube Power connection (output)
- (B) Backlight synchronization of Asycube 1 (output)
- (C) Asycube Ethernet connection (output RJ45 to the Asycube)
- (D) Backlight synchronization of Asycube 2 (output, not used for std configuration).
- (E) Camera Ethernet connection (output RJ45 to the camera)
- (F) Camera Power (output) and I/O (input) connection
- (G) External light 2 (output)
- (H) External light 1 (output)
- (I) Easy Connect Box Power connection (input)
- (J) Camera Ethernet connection (input RJ45 from the controller)
- (K) Asycube Ethernet connection (input RJ45 from the controller)



**Figure 2-13: Electrical interfaces of the EasyConnect Box**



2.3.3.2. Power connection

**IMPORTANT !**



- Before supplying power to the EasyConnect Box, check that your distribution voltage is the same as the nominal voltage.
- Never connect/disconnect the power cables if the machine is turned on.
- Use PELV (protected extra-low voltage) nominal voltage.

Pin	Signal description
(1)	PELV 24 V DC S-Power
(2)	0 V GND S-Power
(3)	PELV 24 V DC S-Power
(4)	0 V GND S-Power
(5)	24VDC PELV power
(6)	0 V GND power
(7)	EARTH

Connector type (on EasyConnect Box side):  
M16, 7 Poles, male

In case of all functions working simultaneously (Asycube, camera, external lights), the current increases to 15A.

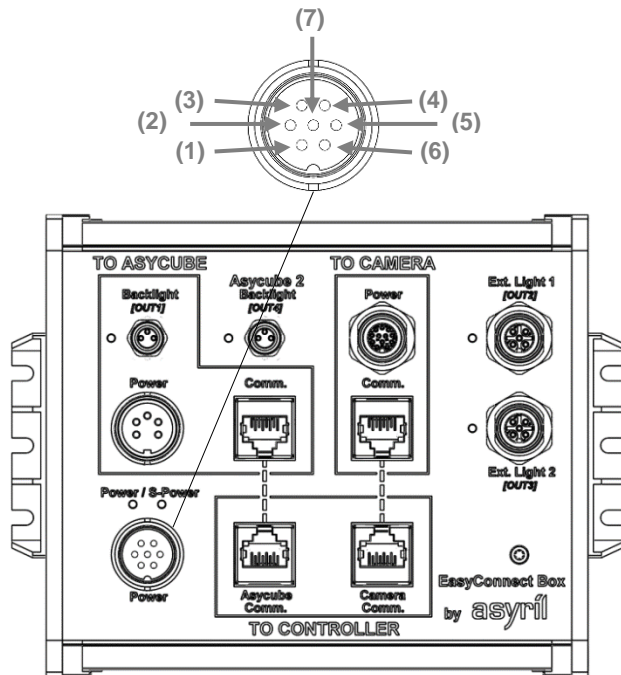


Figure 2-14: power connection

Characteristic	Value
Voltage	+24V DC $\pm$ 5%
Current Power	5A
Current S-Power	Up to 10A

**IMPORTANT !**



- S-Power is the safety power. This 24V supplies the Asycube (see the documentation of the Asycube) and the external lights. Switching OFF this 24V allows to be sure that all lights stay OFF (e.g. to secure IR backlight danger). Consequently, a 24-V signal must be applied to the S-Power to be able to use the lights. If the connected lights consume more than 2 A, both S-Power connections must be used to ensure that the current in the pin is not too high.

2.3.3.3. Asycube Power connection

**IMPORTANT !**



- Before supplying power to the Asycube, check that your distribution voltage is the same as the nominal voltage.
- Never connect/disconnect the power cable of the Asycube if the machine is on.
- Use PELV (protected extra-low voltage) nominal voltage.

Pin	Signal description
(1)	PELV 24 V DC S-Power
(2)	0 V GND S-Power
(3)	24VDC PELV Power
(4)	0 V GND power
(5)	EARTH

Connector type on EasyConnect Box side:

M16, 7 Poles, female

In case of all functions working simultaneously (vibration, backlight, outputs), the current increases to 8A.

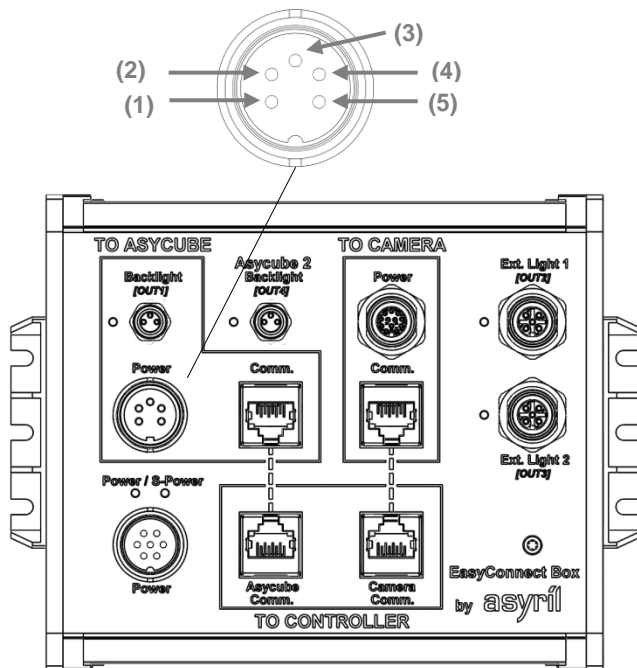


Figure 2-15: power connection

Characteristic	Value
Voltage	+24V DC $\pm$ 5%
Current Power	5A
Current S-Power	3A

**IMPORTANT !**



- S-Power is the safety power. This 24V supplies the backlight and the digital outputs. Switching OFF this 24V allows to be sure that the backlight and the outputs stay OFF (e.g. to secure IR backlight danger). Consequently, a 24-V signal must be applied to the S-Power to be able to use the backlight.

2.3.3.4. Camera Power connection

**IMPORTANT !**



- Before supplying power to the camera, check that your distribution voltage is the same as the nominal voltage.
- Never connect/disconnect the power cable of the camera if the machine is turned on.
- Use PELV (protected extra-low voltage) nominal voltage.

Pin	Signal description
(1)	0 V GND power
(2)	24VDC PELV Power
(7)	OUT1
(8)	OUT2
(11)	OUT3 only with 4-output camera
(12)	OUT4 only with 4-output camera

Connector type on Easy Connect Box side:  
HIROSE HR10A-10P-12S

Characteristic	Value
Voltage	+24V DC $\pm$ 5%
Current Power	0.13A

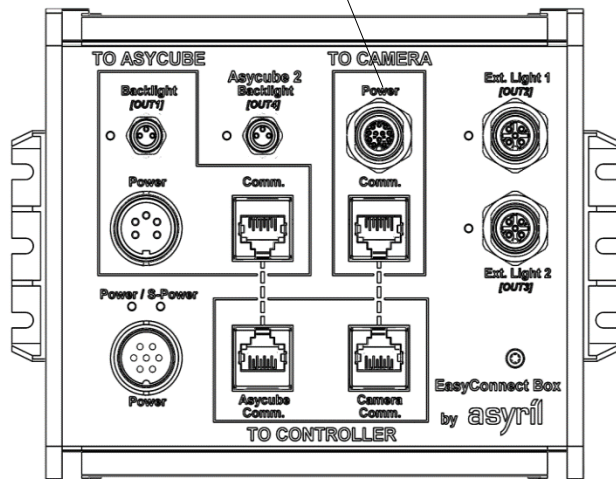
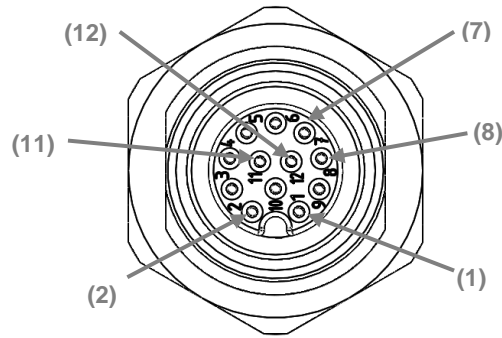


Figure 2-16: power connection



**IMPORTANT !**

- To use the backlight synchronisation of the Asycube 2 and/or the external light 2, you need the camera with 4 outputs (non-standard). Ask Asyrii sale office to order this component.

2.3.3.5. Ethernet connections RJ45

The communications with the controller, the Asycube and the camera are established by standard Ethernet communication via RJ45 ports **(A)**. The EasyConnect Box has no IP address, it is only a gateway.

- (A) To the Control unit for Asycube
- (B) To Asycube
- (C) To Control Unit for Camera
- (D) To Camera



**NOTE:**

Ethernet cable (C) and (D) connecting a camera and Control unit must be **category 6**.

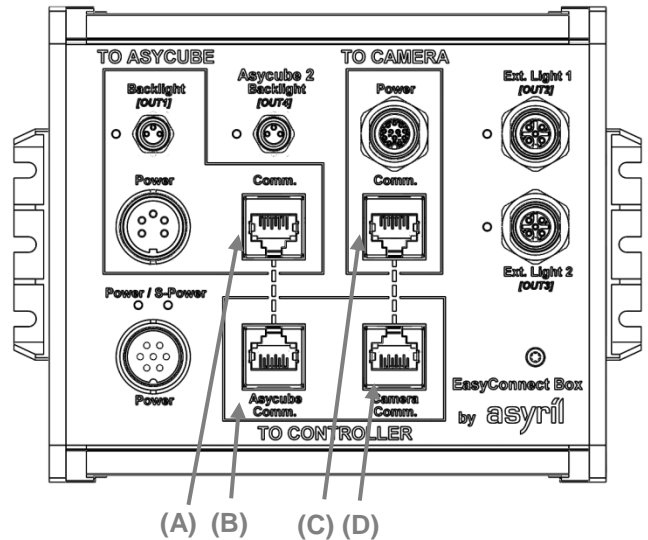


Figure 2-17: Ethernet connection RJ45

2.3.3.6. Backlight Synchronization connection to Asycube 1 and Asycube 2

A standard M8 3-pin cable is used to synchronise the camera's image acquisition with the Asycube backlight. This cable must be connected as follows:

Pin	Waveform
(1)	Not wired
(3)	0 V GND
(4)	+24VDC pulse (illumination synch.)

Connector type on Easy Connect Box side:  
M8, 3P, female

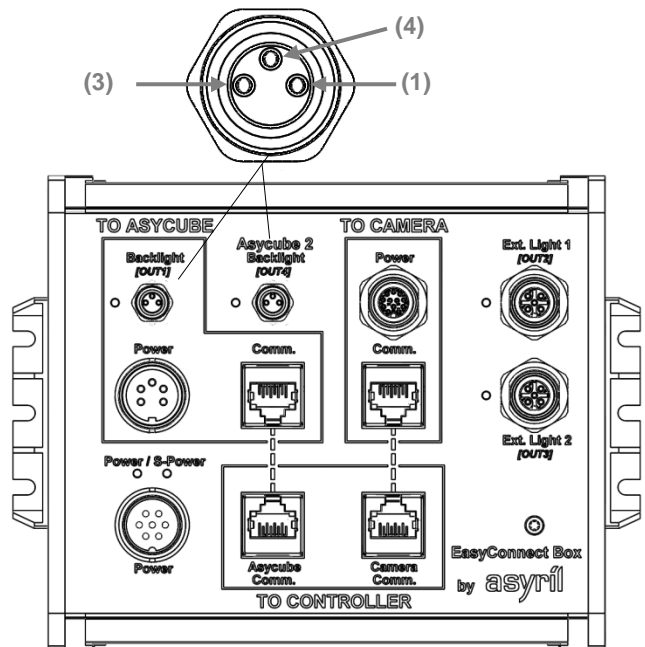


Figure 2-18: Backlight synchronization Asycube 1 and Asycube 2



**IMPORTANT !**

- To use the backlight synchronisation of the Asycube 2 and/or the external light 2, you need the camera with 4 outputs (non-standard). Ask AsyriL sale office to order this component.

2.3.3.7. External light 1 and 2 connections

A standard M12 4-pin cable is used to connect the external light. This cable must be connected as follows:

Pin	Waveform
(1)	24 V DC S-Power (3.5 A max.)
(2)	0 V GND S-Power
(3)	0 V GND S-Power
(4)	24VDC pulse (max.3.5A)
(5)	Not wired

Connector type on Easy Connect Box side:  
M12, 5P, female

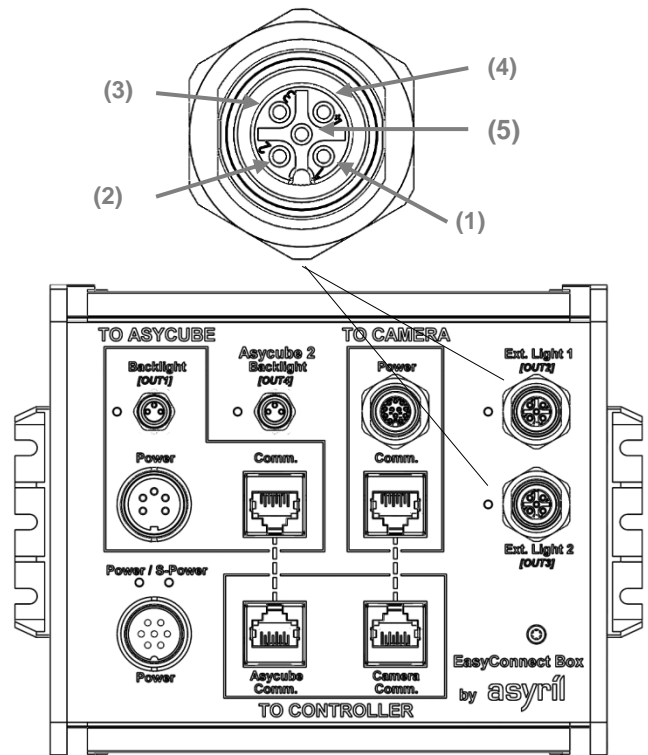


Figure 2-19: External light 1 and 2



**NOTE:**

If the external light have a power connection and a command connection (4 wires), use pins 1 and 2 for the power (3.5A max.) and 3 and 4 for the command.

If the external light have only a power/command signal (two wires), use the pins 3 and 4 (3.5A max.).



**IMPORTANT !**

- To use the backlight synchronisation of the Asycube 2 and/or the external light 2, you need the camera with 4 outputs (non-standard). Ask Asyri sale office to order this component.

## 2.4. Mechanical interfaces

The customer is responsible for assembling and integrating the Vision and Asycube components and for wiring the various components. The quality of the images obtained depends on the correct alignment of the cameras, lighting and Asycube. Particular care must therefore be taken with the various media and with the settings when assembling these components.

All CAD models can be downloaded on the Asyrii webpage.

### 2.4.1. Control unit

The control unit is fixed to two rails, and the dimensions are indicated in Figure 2-20.

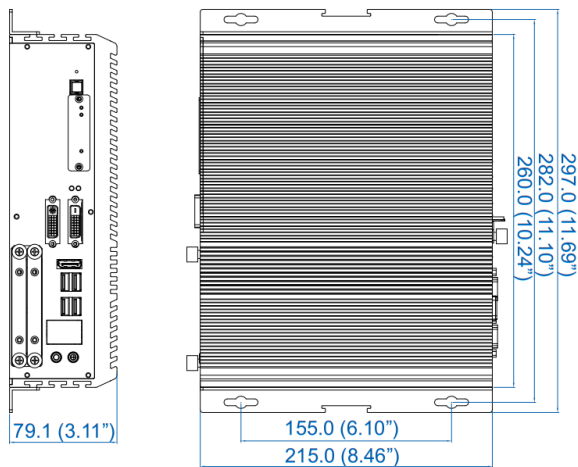
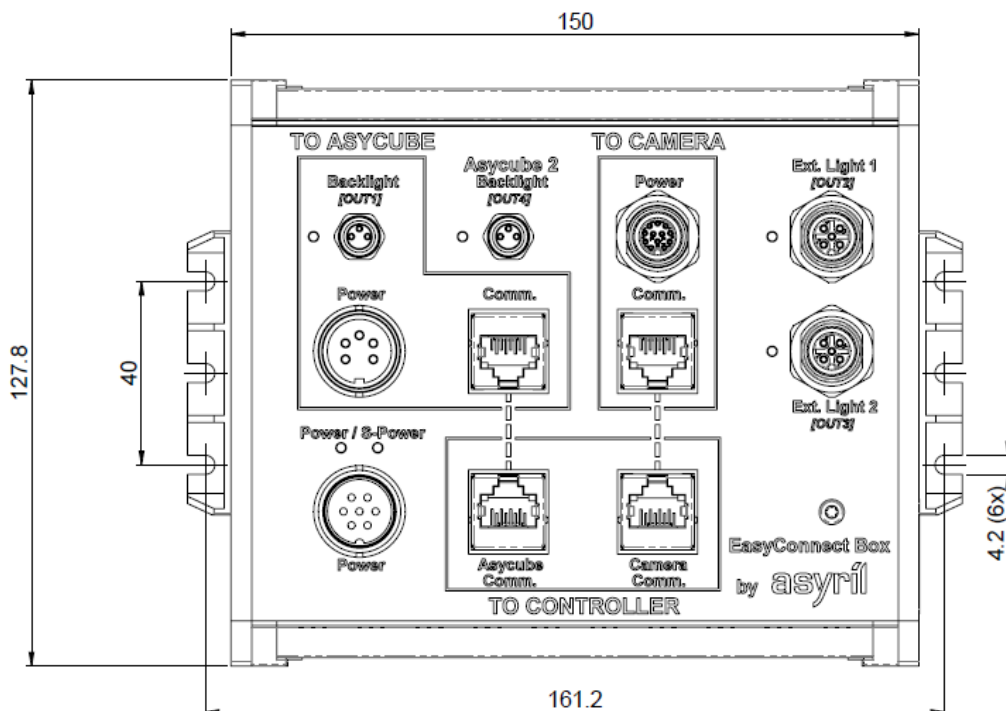


Figure 2-20: Dimension of the control unit and mounting rails

### 2.4.2. EasyConnect Box



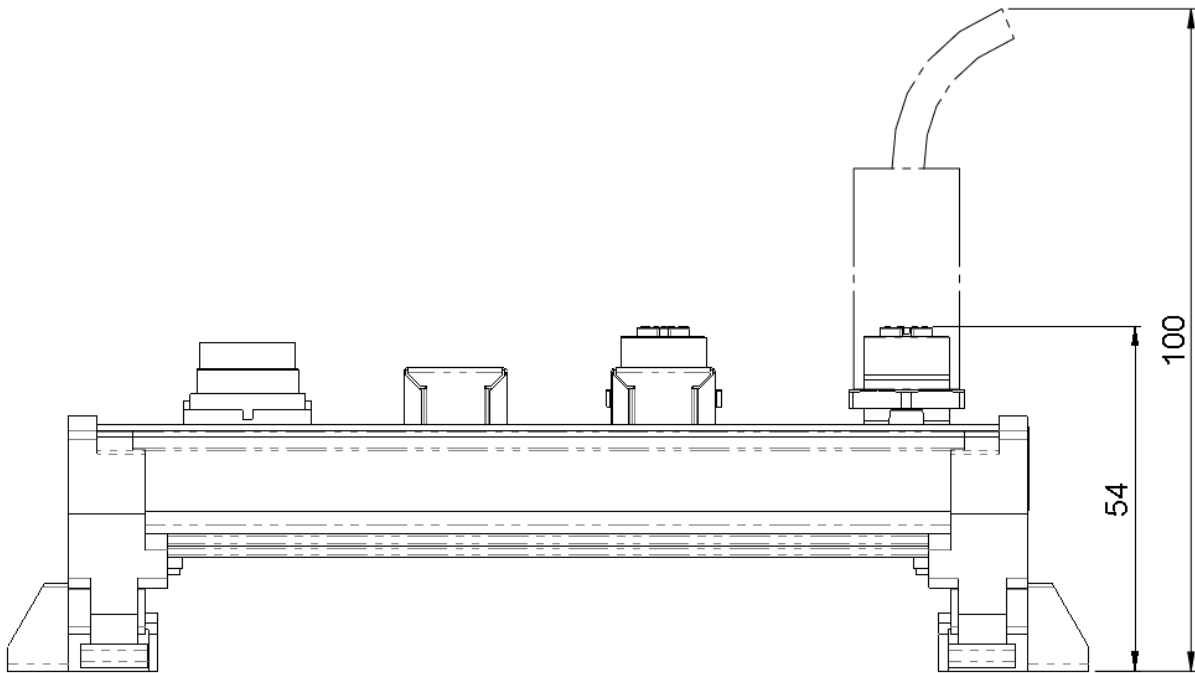
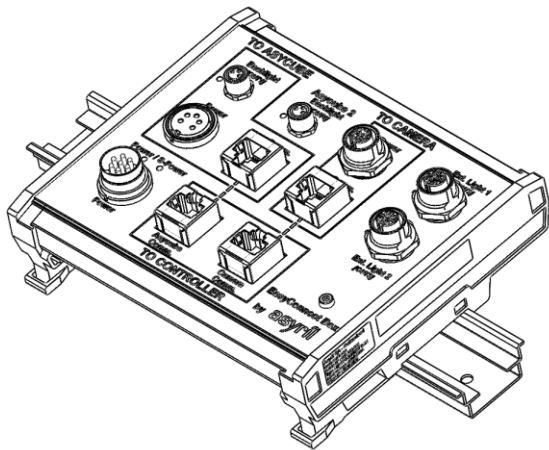
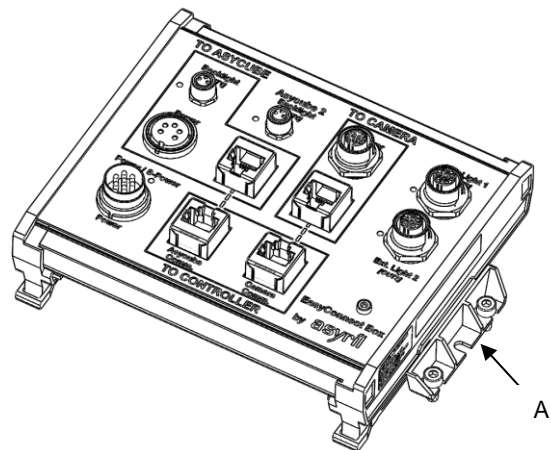


Figure 2-21: Dimensions of the EasyConnect Box



DIN 35 RAIL Fixation



Fixation with screws

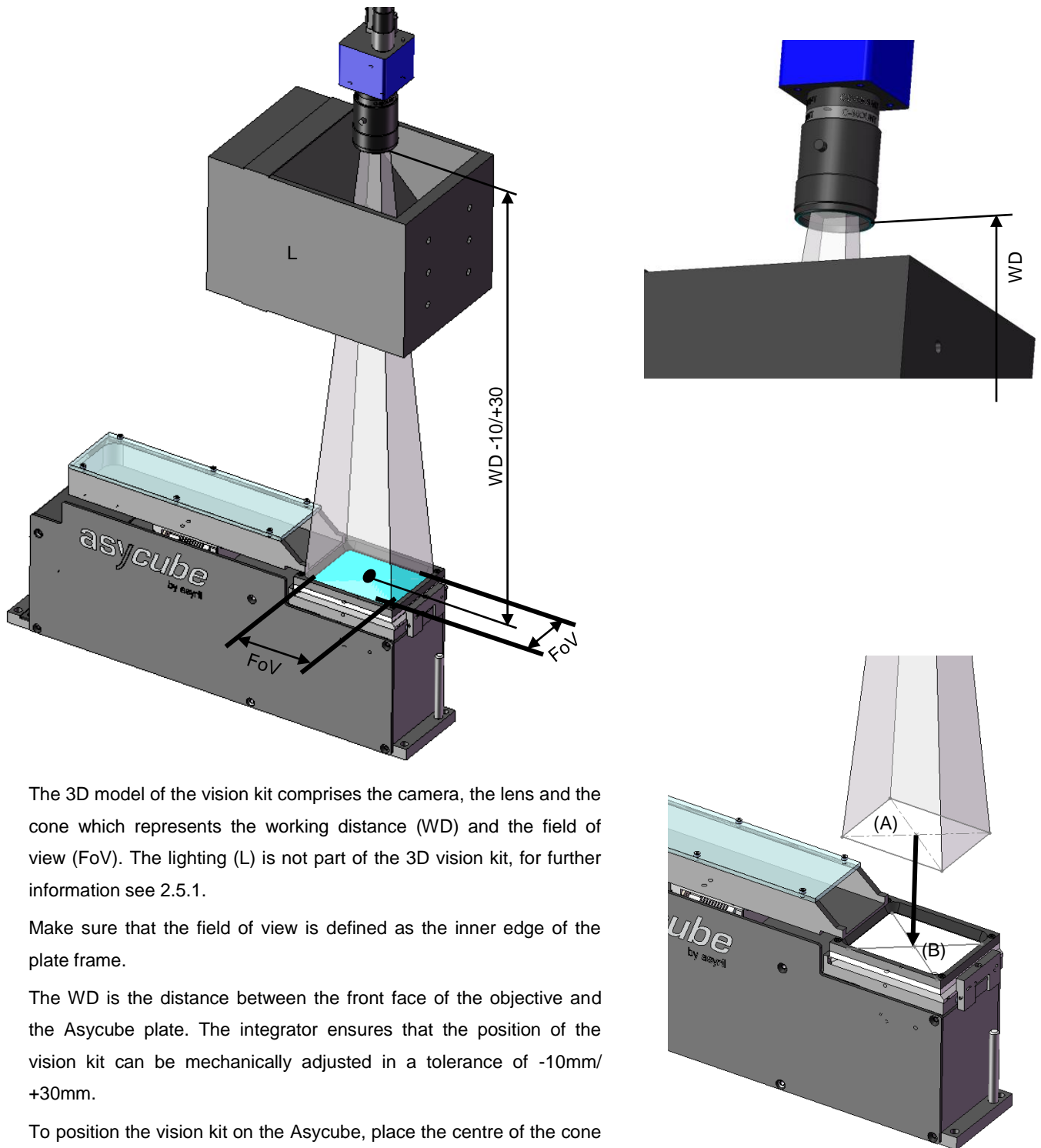


**NOTE:**

For the fixation with the DIN rail, unclip both screw fixtures (A)

### 2.4.3. Vision Kit

The CAD model of the vision kit can be downloaded from the AsyriI webpage. The method for integrating the vision kit with the Asycube is described in Figure 2-22.



The 3D model of the vision kit comprises the camera, the lens and the cone which represents the working distance (WD) and the field of view (FoV). The lighting (L) is not part of the 3D vision kit, for further information see 2.5.1.

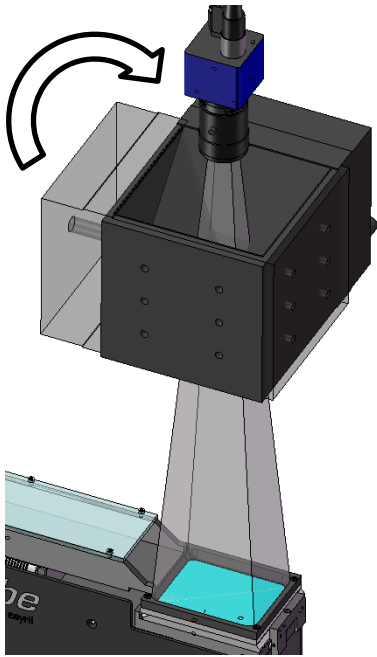
Make sure that the field of view is defined as the inner edge of the plate frame.

The WD is the distance between the front face of the objective and the Asycube plate. The integrator ensures that the position of the vision kit can be mechanically adjusted in a tolerance of -10mm/+30mm.

To position the vision kit on the Asycube, place the centre of the cone face (A) on the centre of the plate (B)

**Figure 2-22: Vision kit integration**





The front light (DOAL in this example) can be positioned freely at 4x90°

**Figure 2-23: Front light integration**

### 2.4.3.1. Camera

Overall dimensions of the mounting interfaces (valid for the three models):

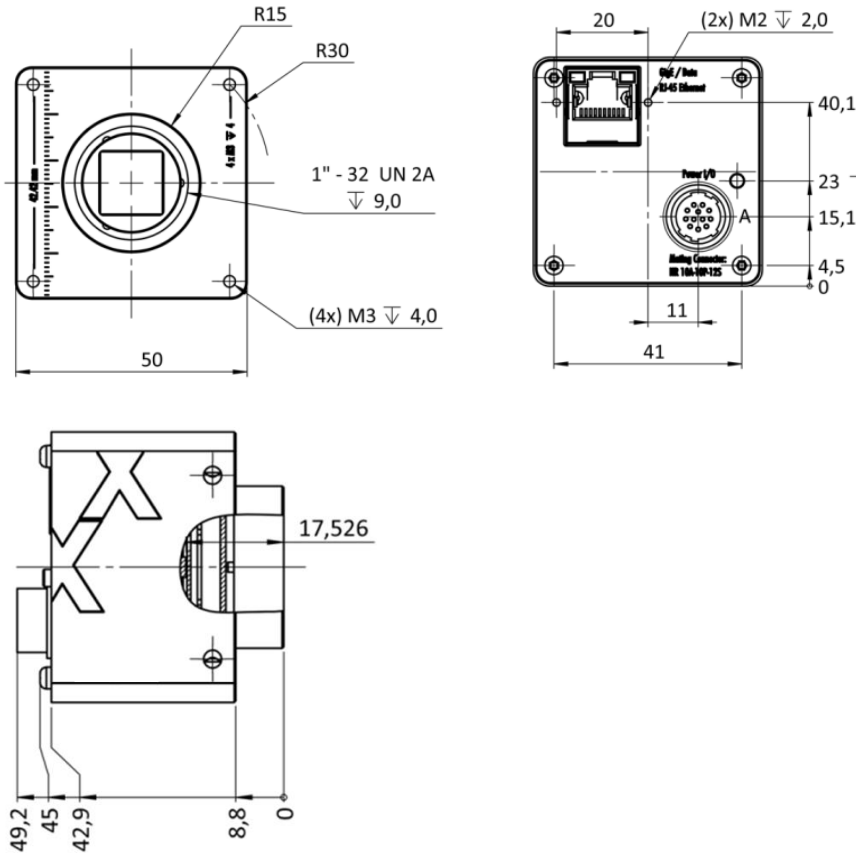


Figure 2-24: camera dimensions and mounting

### 2.4.3.2. Lens

Like the choice of cameras and lighting, the choice of lens depends on the specific details of the request. Refer to Table 2-1: vision kits available

for the specifications of each vision kit.

### 2.4.4. Asycube



The Asycube Operating Manual provides all the information relating to the Asycube's electrical and mechanical interfaces.

## 2.5. Accessories and optional modules

These components are defined by Asyri according to customer requirements. CAD model can also be downloaded on the Asyri webpage. The key information on the choice of equipment is provided below.

### 2.5.1. Lighting

We mainly work with Effilux lighting systems. In addition to using the specific type and size of lighting for your requirements, the lighting supply must be 24 VDC (max. 3.5A), it is supplied and switched through the EasyConnect Box.

#### 2.5.1.1. Different types of lighting

For each camera, one or more types of lighting can be adopted:

- backlight
- co-axial diffuse lighting (DOAL)
- Flat dome
- LED strip

The Figure 2-25 shows the different types of lighting available in standard configurations.

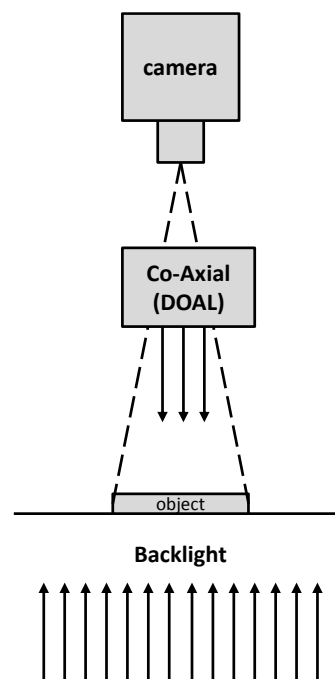


Figure 2-25: types of lighting available

2.5.1.2. Effect of each type of lighting

The type of lighting chosen may highlight certain specific areas of the part to be observed or detected. The table below gives the example of a jewel bearing lit from two different angles: backlighting or front light.

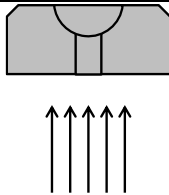
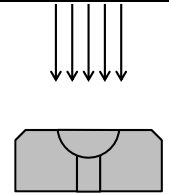
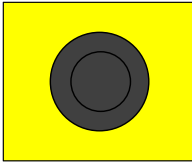
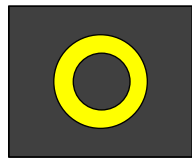
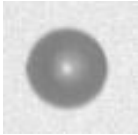
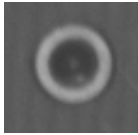
	Lighting	
	Backlight	Front light
Example of a jewel bearing lit (backlighting or front light)		
Areas of the part lit (shown in yellow)		
Rendering image		

Table 2-12: Effect of types of lighting on Asycube

2.5.1.3. Asycube lighting

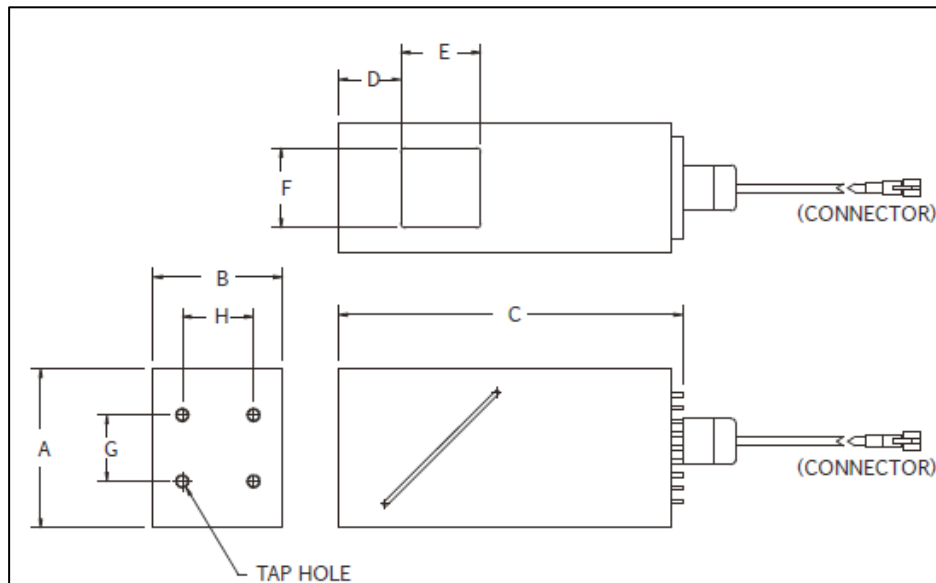
The table below summarises the lighting combinations proposed in standard and their main dimensions:

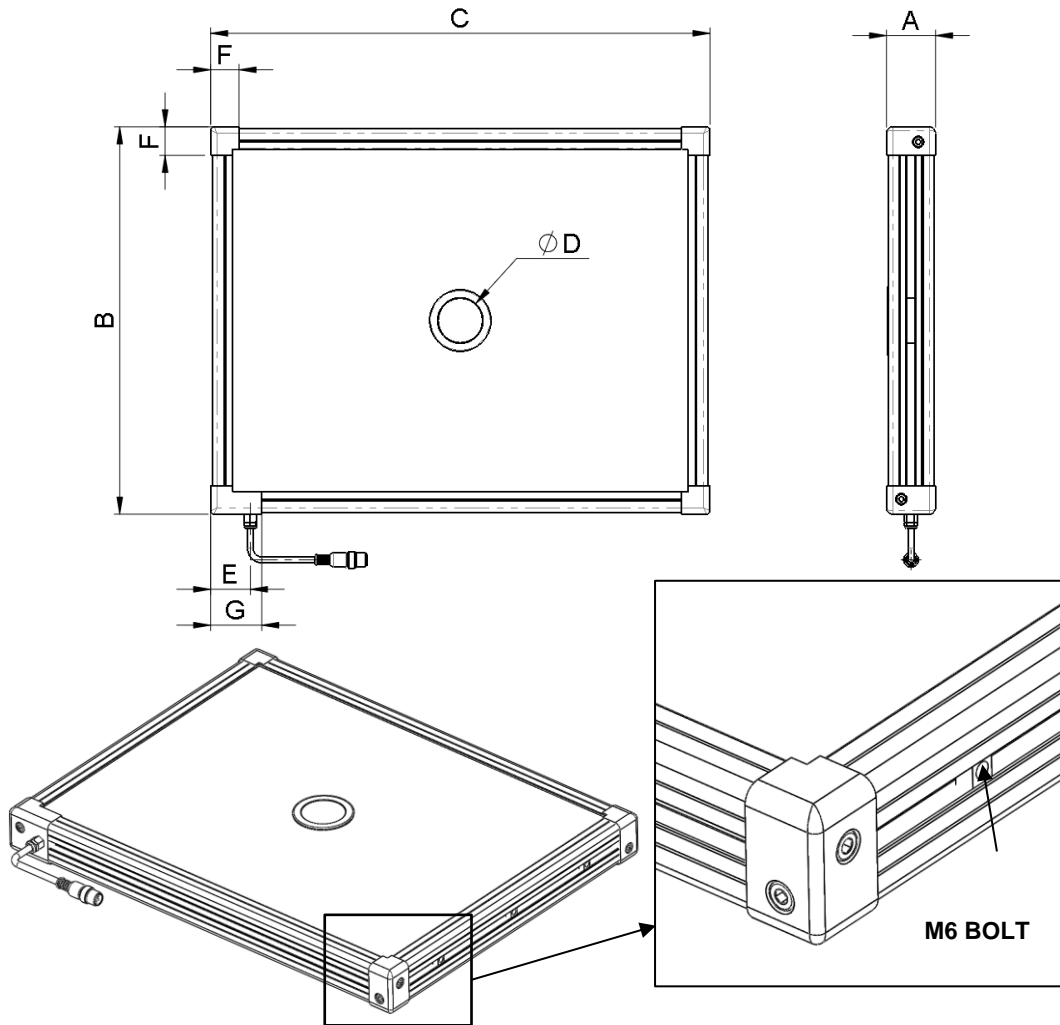
Field of view	Lighting					
	FLAT DOME 400x300	FLAT DOME 500x400	DOAL 100	DOAL 70	Strip	Integrated backlight
30 x 25 mm Asycube 50	✗	✗	✗	✓	✗	✓
46 x 35 mm Asycube 50	✗	✗	✓	✗	✗	✓
52 x 67 mm Asycube 80	✗	✗	✓	✗	✗	✓
195 x 150 mm Asycube 240	✓	✗	✗	✗	✗	✓
330 x 260 mm Asycube 380	✗	✓	✗	✗	✗	✓
460 x 371 mm Asycube 530	✗	✗	✗	✗	✓	✓

Table 2-13: Asycube lighting

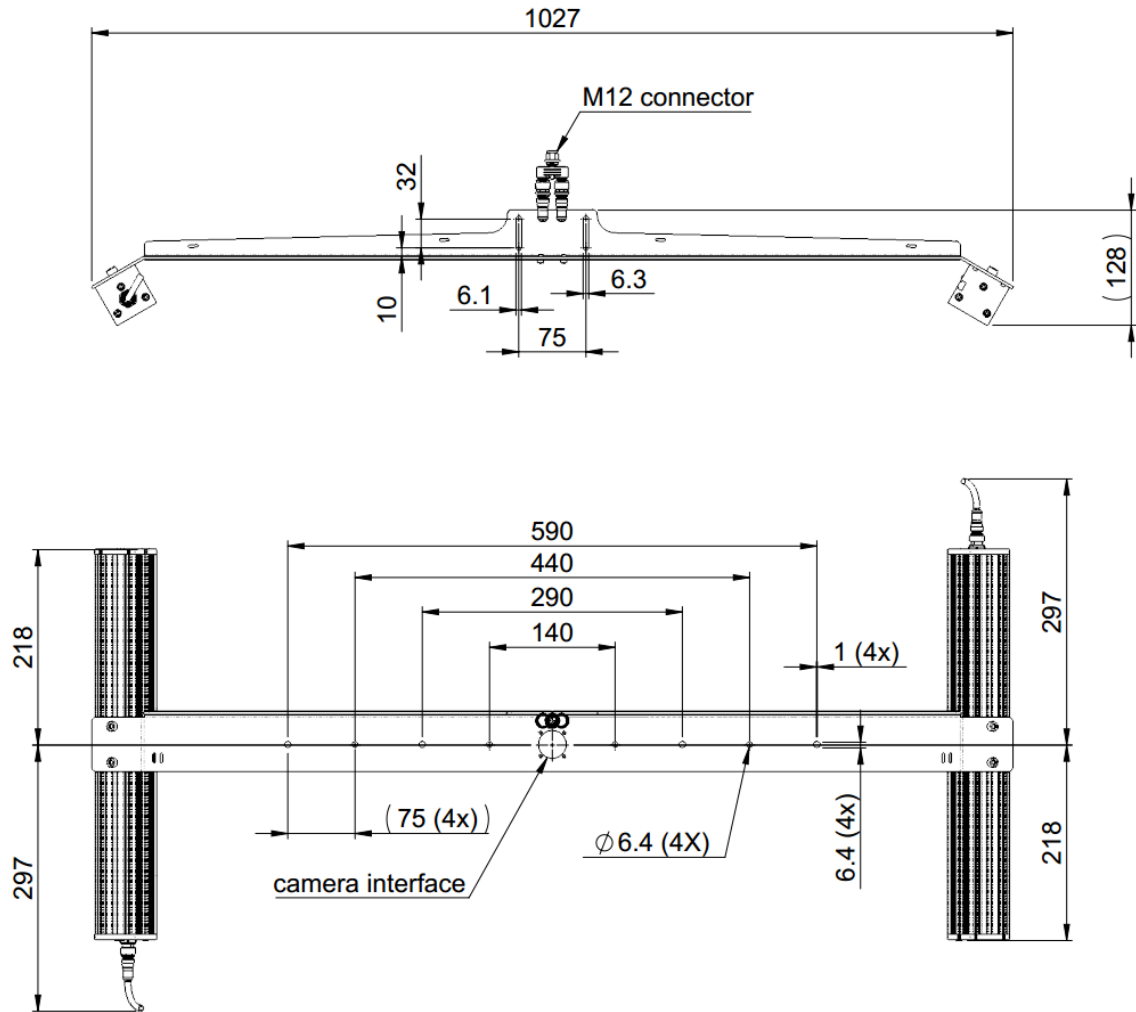
	A	B	C	D	E	F	G,H	Hole	VDC [V]	I [mA]	Colour	Weight
<b>DOAL 70</b>	95	89	139,6	21,2	70	70	50	M5 x 6	24 V	540	R, G, B, W	0,75kg
<b>DOAL 100</b>	123,8	120	168,7	18,2	100	100	50	M5 x 6	24 V	570 945	R G, B, W	1,2kg
<b>FLAT DOME 400 x 300</b>	43,2	340	440	Ø40	35	25	45	M6 x 5	24 V	3500	R, G, B, W, IR	4,3kg
<b>FLAT DOME 500 x 400</b>	43,2	440	540	Ø50	35	25	45	M6 x 5	24 V	3500	R, W	7 kg
<b>LED strip</b>	See illustration								24V	3200	R	6.5kg

Table 2-14: lighting dimensions





The flat dome is supplied with six M6 bolts which can be inserted freely in the nuts around the whole circumference (on each side).



The strips are supplied with the mounting bracket, the cables and the M12 connector. The bracket is also used to mount the camera.

The cable between the M12 connector and the EasyConnect box is not included and must be ordered separately

**Figure 2-26: Lighting dimensions**

*2.5.1.4. Position of the lighting*

*Front lightings must be mounted centrally close (5-10mm) to the camera lens*

### 2.5.2. Control camera

Asyril can also supply a vision kit for a control camera.

Camera	Field of view		Equivalent image pixel size [µm]	Working Distance [mm]
	Height [mm]	Width [mm]		
1.6MPx	50	37	35	250
1.6MPx	25	19	18	250
5MPx	7	6	2.9	92

Please contact Asyril with your requirements to get a technical proposition and offer.

#### 2.5.2.1. Different types of lighting

For each camera, one or more types of lighting can be adopted:

- dark field
- backlight
- co-axial lighting (DOAL or telecentric)

The figure shows the different types of lighting available.

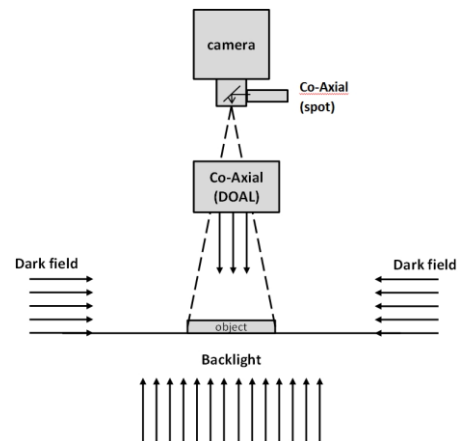


Figure 2-27: types of lighting available



For further information on the possible camera/lighting combinations, contact Asyril.

Field of view	Lighting					Colour
	DOAL 70	DOAL 48	Coaxial spot	Backlight 51 x 51	Backlight 38 x 30	
50 x 37 mm	✓	✗	✗	✓	✗	Green, red, blue, white
25 x 18 mm	✓	✓	✗	✓	✓	Green, red, blue, white
7 x 6 mm	✓	✓	✓	✓	✓	Green, red, blue, white



### 2.5.3. Switch for multi-Asycube connection

Depending on the configuration (number of Asycubes and cameras) a switch may be required to communicate with all the Asycubes. The switch is compatible with DIN rail. The power supply is not delivered by Asyri, but the connector is present on the device.

Characteristic	Value
Input Voltage	12 to 45 VDC, 18 to 30 VAC
Input Current	0.14 A @ 24 V
Connection	1 removable 3-contact terminal block
Dimensions	40 x 100 x 86.5 mm

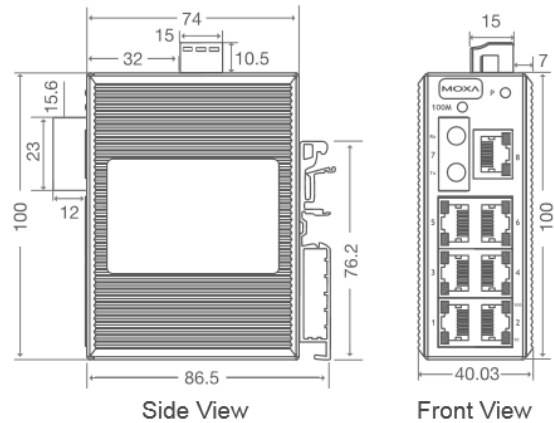


Figure 2-28: Dimensions of the switch for Asycubes

### 2.5.4. Calibration plate

Calibration is used to:

- Define the camera orientation in relation to the feeder system
- Reference the field of view in relation to the robot workspace
- Work in millimetres in the field of view rather than pixels.



**NOTE:**

There are different ways to perform the calibration depending on the application. Please contact Asyri to define the corresponding tooling if necessary.

#### 2.5.4.1. Asycube 50 & 80

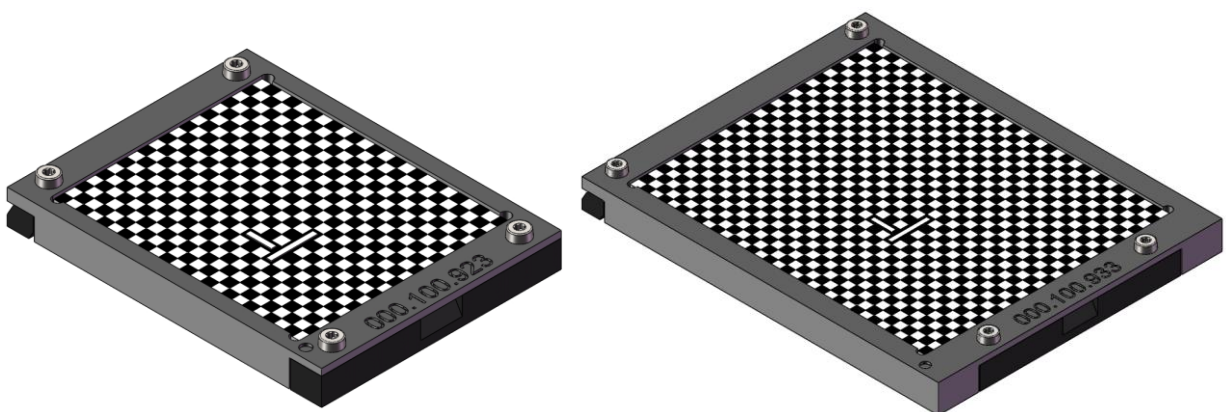
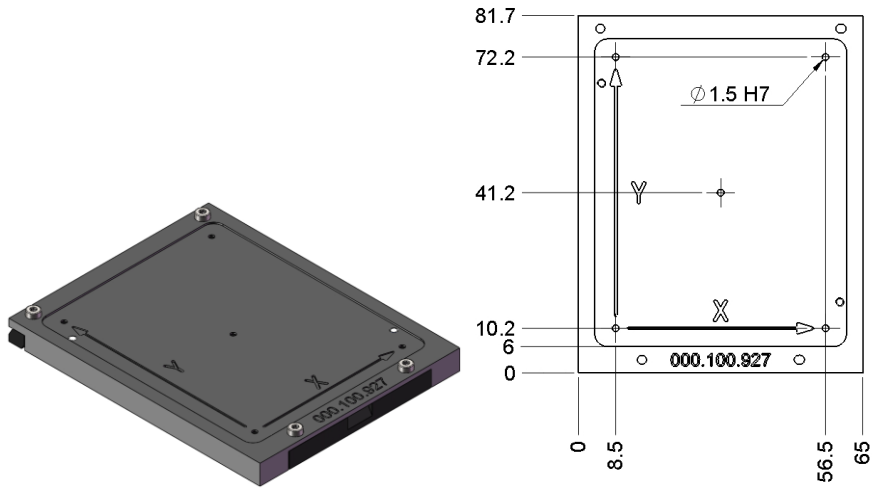
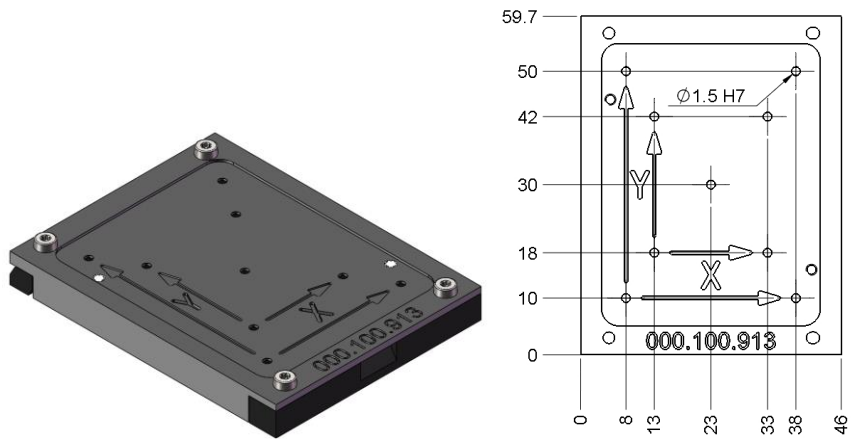


Figure 2-29: 50 and 80 pixel/mm calibration plate

*Robot / Vision referencing*



**Figure 2-30: Asycube 80 calibration plate**



**Figure 2-31: Asycube 50 calibration plate**



*For more information about the calibration procedure, refer to the user guide and the programming guide.*

### 2.5.4.2. Asycube 240

The 240 calibration plate contains the checkerboard used to perform the pixel/mm calibration and the reference holes used to perform the robot/vision calibration.

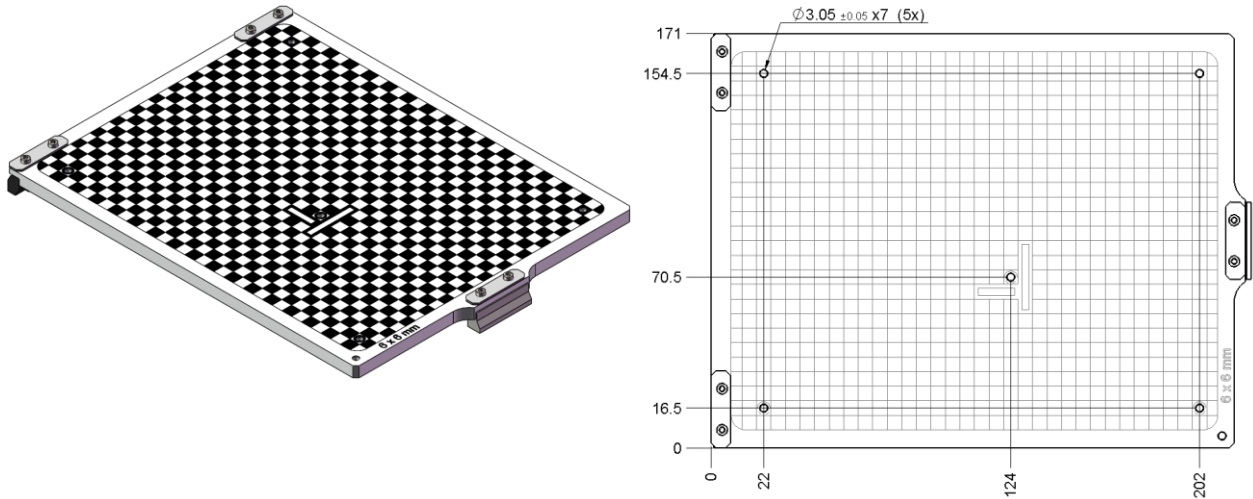


Figure 2-32: 240 robot/vision and pixel/mm calibration plate

### 2.5.4.3. Asycube 380

The 380 calibration plate contains the checkerboard used to perform the pixel/mm calibration and the reference holes used to perform the robot/vision calibration.

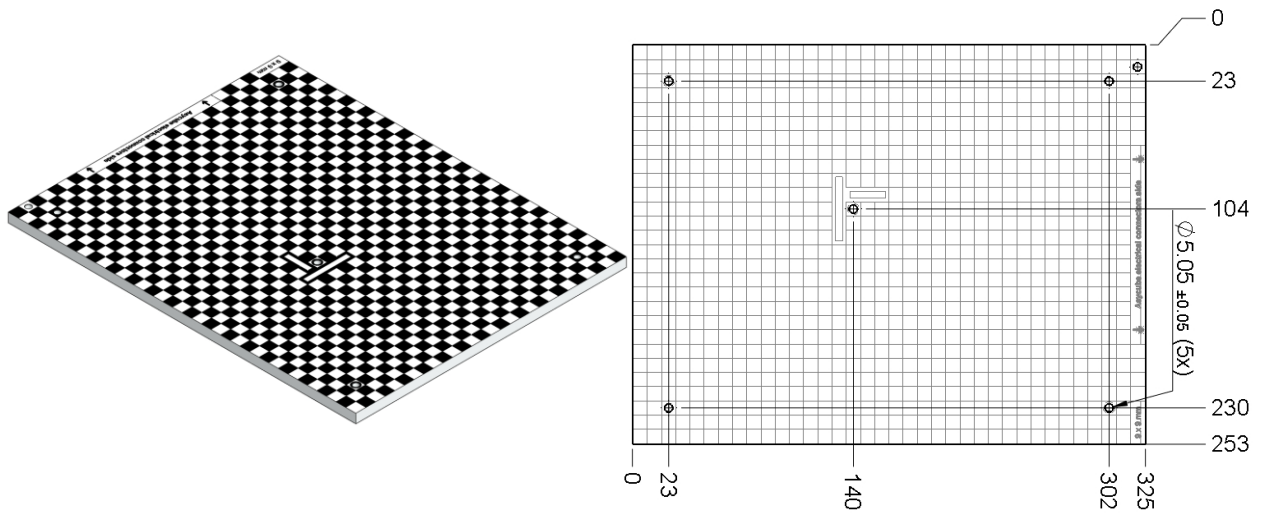
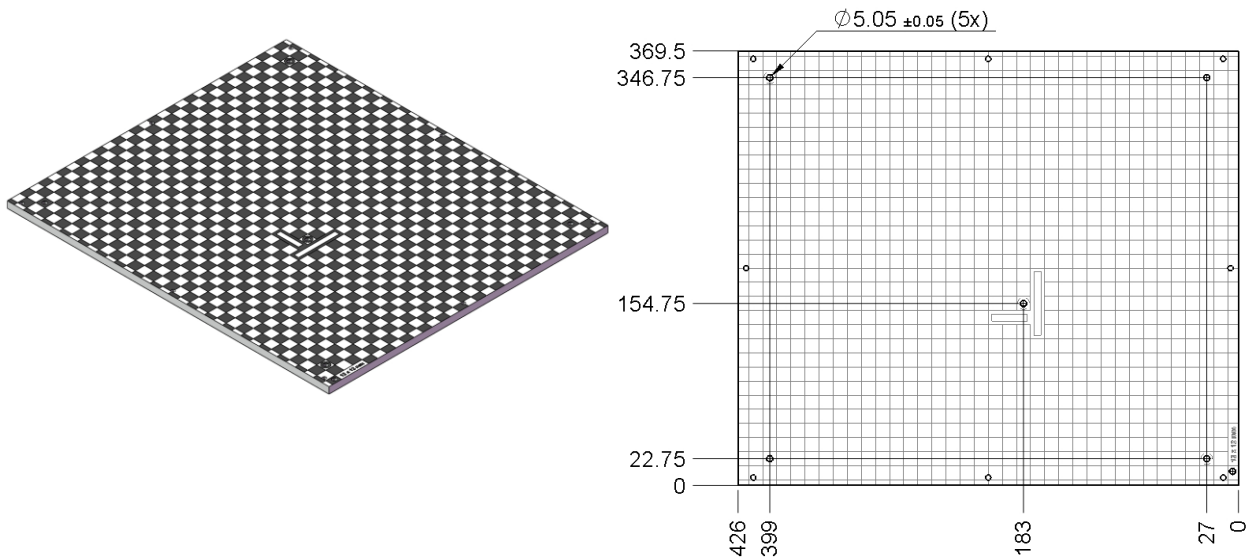


Figure 2-33: 380 robot/vision and pixel/mm calibration plate

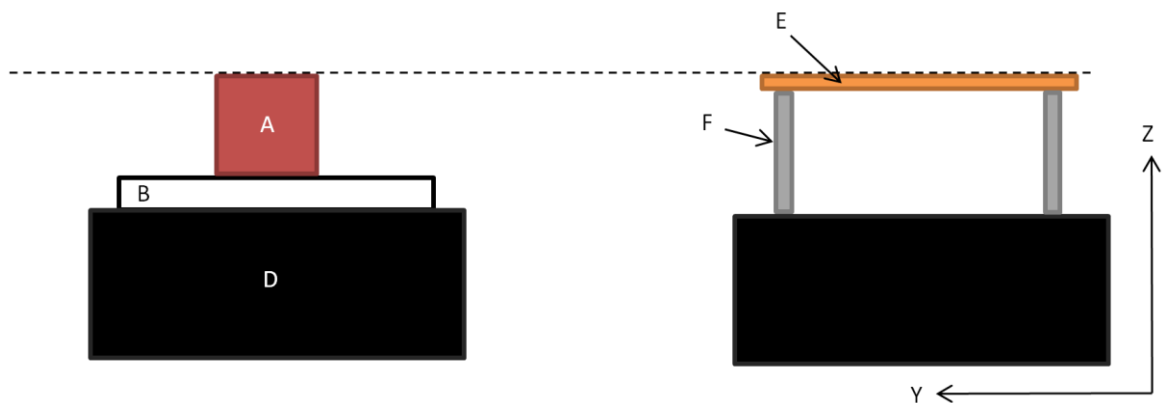
The 530 calibration plate contains the checkerboard used to perform the pixel/mm calibration and the reference holes used to perform the robot/vision calibration.



**Figure 2-34: 530 robot/vision and pixel/mm calibration plate**

#### 2.5.4.4. Riser kit for the calibration plate

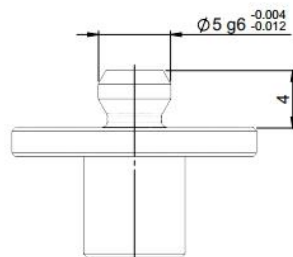
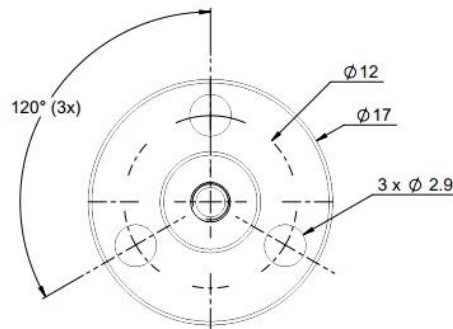
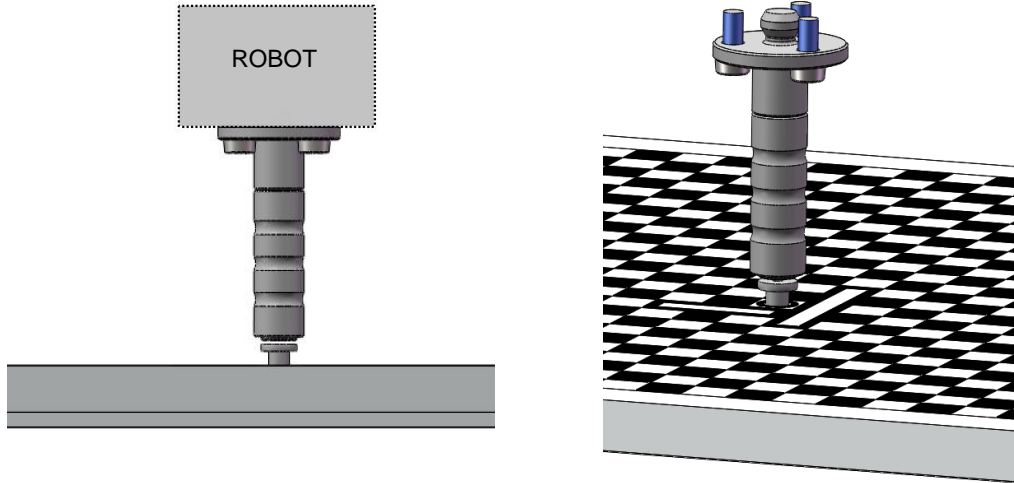
A riser kit (F) is available in addition to the calibration plate (E) for all Asycube models (D). This kit offers enhanced accuracy when the parts (A) on the Asycube plate (B) have a fairly large Z dimension. The riser kit is used to adapt the calibration plate to the height of the parts in order to perform the vision and robot calibration in the same plane as the parts' upper surface. This ensures more accurate part detection while reducing errors caused by the parallax, and also the accuracy of the robot calibration (for which the maximum accuracy can be found in the calibration plan). The part numbers for the riser kits can be found in the products list



2.5.4.5. Robot calibration help tool

To facilitate robot/vision calibration using the calibration plates, a "robot calibration kit" is available for the Asycube 240 and 530.

The part number for this tool is available in the products list



## 3. Transportation, handling and installation

### 3.1. Packaging of the product, transportation and handling

The product must be transported in accordance with the specifications indicated on the package (top, bottom, fragile, etc.). In addition, the following points must be strictly respected:

**IMPORTANT !**



- Take adequate precautions during handling.
- Do not climb on the package.
- Never place heavy objects on the package.
- Take particular care to avoid damaging the product during transportation

### 3.2. Unpacking instructions

Before unpacking,

- (A) Ask the transporter to be present at the time of unpacking.
- (B) Pay particular attention to the external condition of the product.
- (C) If any damage is noted, do not sign the receipt and contact Asyрил immediately.
- (D) In all cases, indicate the condition of the ShockWatch label on the delivery note.



**NOTE:**

If the products received do not match your delivery note, or are delivered in poor condition, do not sign the receipt and contact Asyрил as soon as possible.

### 3.3. Installation and storage environment

#### 3.3.1. Installation environment

The SmartSight system must be used under the following conditions:

- Work temperature: +5°C to +40°C
- Pay particular attention to dust: the system must be used in a clean environment.
- Avoid exposing the system to direct light radiation that is too intense. Failure to respect this instruction may result in poor operation of the vision recognition system.
- Humidity: from 30% to 85% max. without condensation.

**WARNING!**



In cases of extreme humidity, please note that the performance of the component supply may be impaired. In addition, for humidity levels below 30%, electrostatic forces may disrupt the behaviour of the parts.

- Avoid powerful electromagnetic waves, ultraviolet light or other radiation.
- Do not use the product in an area where it may be exposed to water or oil projections.

- Clean room applications: cleanliness class ISO7



**IMPORTANT !**

The product must not be used in a corrosive gas atmosphere. Oxidation may occur, resulting in damage to the product.

### 3.3.2. Storage environment

The storage environment of the product must be similar to its operating environment.

## 4. Maintenance and repair

### 4.1. Safety instructions

#### 4.1.1. General instructions



**IMPORTANT !**

No maintenance operation must be performed inside the product. To perform internal maintenance operations, please contact Asyril. Failure to respect this requirement will invalidate the warranty.



**DANGER!**

Never use the system when it is damaged. Check that you have resolved the problem before restarting the machine.



**DANGER!**

Stop the system and disconnect it from its supply before carrying out any maintenance operation.



**DANGER!**

Never pour water over the product. Spraying water over the product or cleaning it with water may cause serious malfunctions, or cause injuries due to the associated electrical danger.

### 4.2. Personnel responsible for maintenance or repair operations

Maintenance operations must be performed by trained personnel. Three categories of personnel are defined:

- (A) Maintenance technicians who have not been trained by Asyril
- (B) Maintenance technicians who have been trained by Asyril
- (C) Asyril maintenance technicians.

Ensure that the person responsible for the maintenance work performed on the product has read and understood this manual. In all cases, the safety precautions must be followed.



**NOTE:**

A report will be written for each maintenance operation performed by Asyril.

For more information about our maintenance service, please consult our After-Sales department.



### 4.3. Maintenance

**NOTE:**



The information given in the table below is provided purely for illustrative purposes. The frequency at which these operations should be performed must be adapted according to usage of the product, the operating environment, etc.

#### 4.3.1. Maintenance schedule

The system and its accessories require very little maintenance. However, basic inspections should be performed regularly to maintain an optimal level of product performance:

	How it works	Period	Personnel	Reference
<b>Optical parts</b>	Visually inspect and, if necessary, clean	Monthly	A	-
<b>Control unit</b>	Saving recipes	Monthly	A	Refer to the HMI doc.
<b>Control unit</b>	System backup/restore	Yearly	B	HowTo documentation delivered after training by AsyriL

**Table 4-1: Periodic maintenance table**



**IMPORTANT !**

For any kind of maintenance, always use original factory replacement parts.



**NOTE:**

For Asycube maintenance information, refer to the Asycube operating manual.

#### 4.3.2. General maintenance

##### 4.3.2.1. *Cleaning the optical parts*

Visually inspect the optical parts (camera, lens, lighting, etc.) and clean if necessary.

#### 4.4. Repairs

This section provides a non-exhaustive list of the available spare parts for your product. The product should be returned to the manufacturer for any repair work. In exceptional cases, and after approval by Asyri SA, this repair work may be performed in the client's premises by trained personnel.



**IMPORTANT !**

Regardless of the type of replacement operation, always use genuine Asyri parts.

Two types of parts are defined:

- (A) Parts likely to be replaced every year (wearing parts)
- (B) Parts likely to be replaced every 5 years.

Description of part	Type	Item number
PC VECOW ECS-9210 I5	B	according to order confirmation
CAMERA	B	according to order confirmation
LIGHTING	B	according to order confirmation
SWITCH	B	according to order confirmation

**Table 4-2: SmartSight spare parts**



**NOTE:**

*For Asycube spare parts, refer to the Asycube operating manual.*

## 4.5. Technical Support

### 4.5.1. For a better service ...

Before contacting asyril, please note down the following information concerning your product:


- Serial number and product key for your equipment
- Software version(s) used
- Error message, alarm, or visual signals displayed by the interface.

### 4.5.2. Contact

You can find extensive information on our website: [www.asyril.com](http://www.asyril.com)

You can also contact our Customer Service department:

<https://www.asyril.com/en/company/support.html>

	<b>SmartSight</b> <b>Operating manual</b>	
<b>Revision table</b>		Version: D2

## Revision table

Rev.	Date	Author	Comments
A	22.08.2012	DaM	Original version
A1	19.11.2012	BoB	Diagrams added
B	30.10.2015	DaM	Update version with EasyConnect Box and vision kits
B1	17.05.2016	BeJ	Update lighting weight and table numbering
B2	10.08.2016	DaM	Updating of the product names and documentation
B3	15.12.2017	BeJ	Update for Asycube 530 + 9MPx camera
C	03.04.2018	HsJ	Update for new PC
D	10.11.2018	BeJ	Update 2.5.4 for 530/240 + robot calibration, update for exo camera
D1	10.05.2019	BeJ	Update for Asycube 380 + §2.5.1.4 + §2.5.4.3
D2	04.09.2019	HuG	Update for §2.5.3 Switch for multi-Asycube connection

This document is the property of Asyriil S.A.; it may not be reproduced, modified or communicated, in whole or in part, without our prior written authorisation. For the purposes of product improvement, Asyriil SA reserves the right to modify any information contained in this document without prior notice.



asyril sa  
 Z.I. le Vivier 22  
 ch-1690 villaz-st-pierre  
 Switzerland  
 Tel. +41 26 653 71 90  
 info@asyril.com  
 www.asyril.com