Instruction manual

Touch Industrial Monitor and Distance Monitor

05/2022

www.christ-es.com

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1 Identification

Target group

This document is not intended for end customers! Necessary safety instructions for the end customer must be passed on by the machine builder or system provider and adopted in the respective national language.

Intended use

This product has not been designed, developed and manufactured for use that creates fatal risks and hazards without exceptionally assured safety measures. These include death, injury, or serious physical harm or otherwise caused loss. These represent nuclear response monitoring, nuclear control systems, air traffic control, mass transportation control, medical life support systems, and weapons systems control.

Technical changes

Christ-Electronic Systems GmbH reserves the right to change the information, designs and technical data contained in this documentation without prior notice.

Copyright

Trademarks

History

The following editions of the manual have already been published:

Version	Comment
05/2022	First edition

Table 1: History

Design of safety instructions

⚠ DANGER	
	**Indicates an imminent danger** Failure to follow the instructions may result in death or serious injury

⚠ WARNING	
	**Indicates a dangerous situation** Failure to observe this warning may result in serious injury or major damage to property

⚠ CAUTION	
	**Indicates a possible dangerous situation** Failure to observe the advice can result in injuries or property damage

NOTICE	
	**Indicates user tips and useful information** Important information to avoid malfunctions

2 Product description

Every industry has its own requirements for machine and system operation. To meet all of them, there are different housing variants with industry-specific features.

All touch panels are equipped with multitouch technology in various inch sizes as standard. This means that gesture control, as used on tablets or smart phones, is no problem. This makes machine operation particularly user-friendly.

The sophisticated device design enables use in large temperature ranges completely without fans. This enables versatile use without any maintenance effort.

Industrial Monitors and Distance Monitors with their robust housing design are ideal for use in demanding industrial environments. Due to optimal touch configuration, smooth operation is possible even with gloves. Even with residues on the display such as moisture, dirt or oils, the touch panel can be operated without errors. The anodized front frame protects the panel from mechanical influences.

The extension of the protection class is particularly easy by using a rear cover extension. In this way, protection class IP65 is achieved. The Industrial PCs can be mounted on support arms as well as installed in housing cutouts.

The hygienic version of the touch panel has a stainless steel housing and is completely IP69 protected. It is particularly suitable for use in hygienically demanding environments such as the pharmaceutical or food industry. Glove operation is also possible here with the help of an adapted touch.

Distance monitors are particularly suitable for use over long distances up to 100 m.

2.1 Monitor

A Christ monitor only needs its own power supply and the transmission of signals from the PC via USB and HDMI or DisplayPort.

Illustration 1: Monitor

Components for image transmission:

PC - USB and video transmission cable (possibly adapter) - Christ Monitor

2.2 Distance Monitor

- 1:1 up to max. 1:5
- Lossfree transmission up to 100 m distance
- Display device either Distance Monitor or manufacturer-independent screen (boxed variant)
- PoE capable (switch must also be PoE capable)
- If devices with DP1.0 are used as source, an active adapter with properties of DP++ must be used

Distance Monitor 1:1

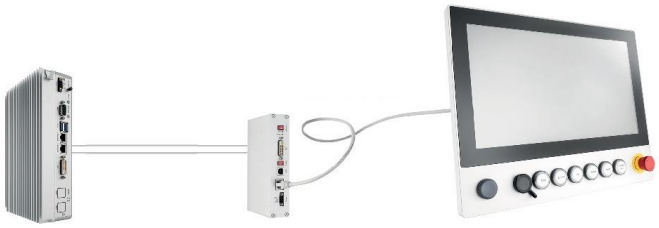


Illustration 2: Distance Monitor 1:1

Components for image transmission:

PC - USB and video transmission cable (possibly adapter) - Transmitter - Ethernet transmission cable - Christ Distance Monitor

Distance Monitor 1:5

Illustration 3: Distance Monitor 1:5

Components for image transmission:

PC - USB and video transmission cable (possibly adapter) - Transmitter - Switch (possibly PoE+ or PoE++) - Ethernet transmission cable - Distance Monitor (up to five)

Variant boxed 1:1

- The receiver can be powered via the transmitter (PoE)
- Manufacturer-independent screens must be supplied separately

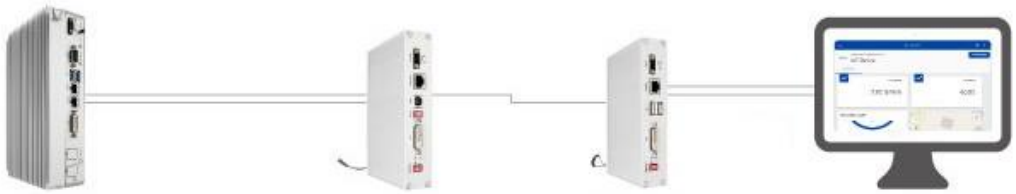


Illustration 4: Variant boxed 1:1

Components for image transmission:

PC - USB and video transmission cable (possibly adapter) - transmitter - receiver - Ethernet transmission cable - manufacturer-independent monitor

Variant boxed 1:5

- The receiver can be powered via the transmitter (PoE)
- Manufacturer-independent screens must be supplied separately

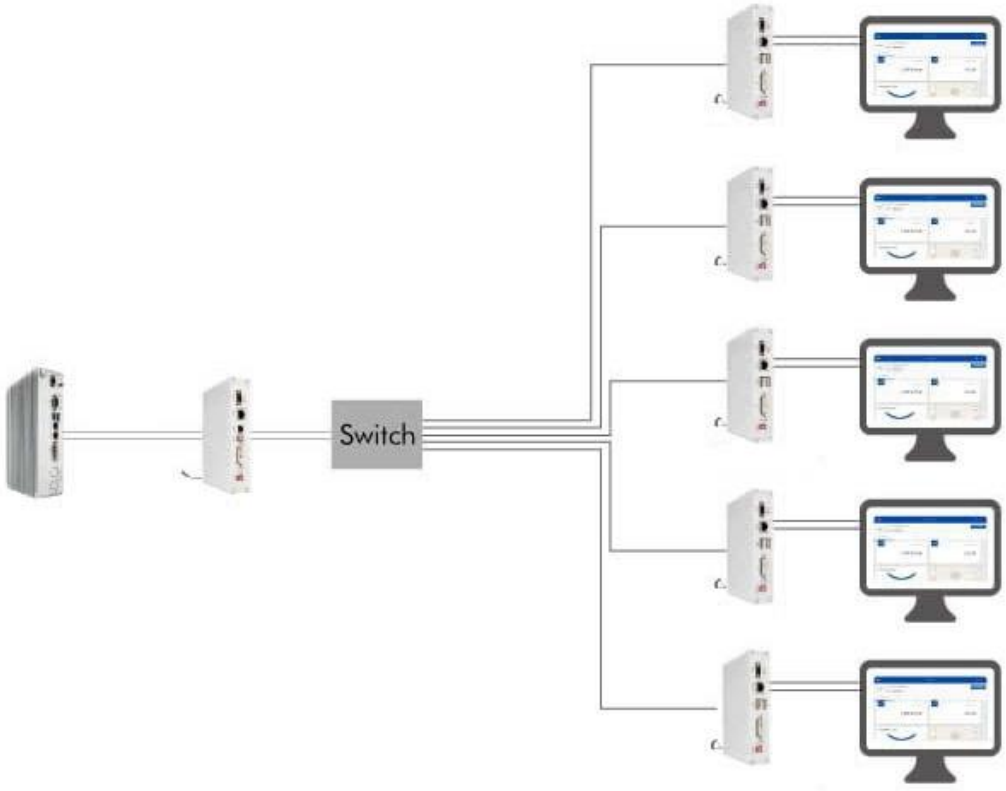


Illustration 5: Variant boxed 1:5

Components for image transmission:

PC - USB and video transmission cable (possibly adapter) - Transmitter - Switch (possibly PoE+ or PoE++) - Ethernet transmission cable - Receiver - Ethernet transmission cable - Manufacturer-independent monitor (up to five)

2.3 Housing Variant VESA

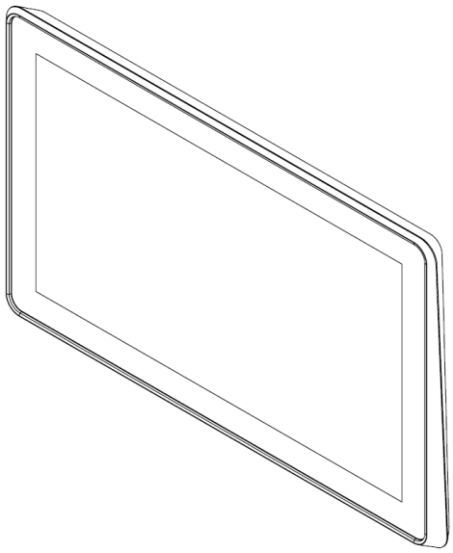


Illustration 6: VESA Front

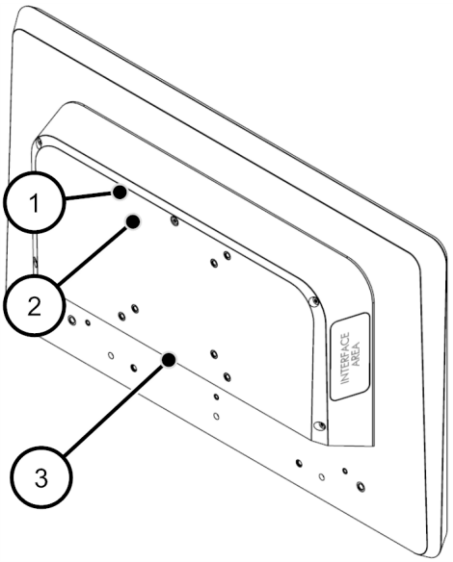


Illustration 7: VESA Rear

1	VESA MIS-D, 100
2	VESA MIS-D, 75
3	Interface Area

Table 2: VESA Front and VESA Rear

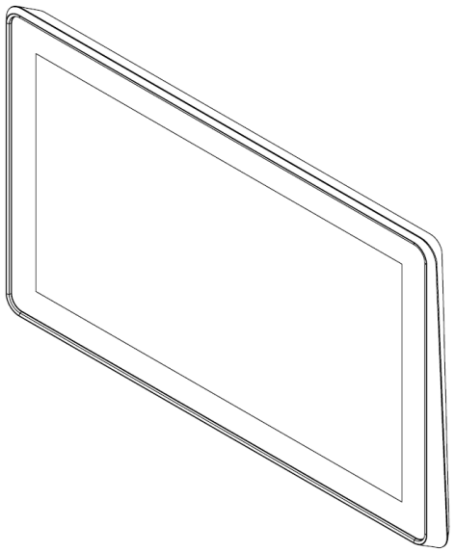


Illustration 8: VESA IP65 Front

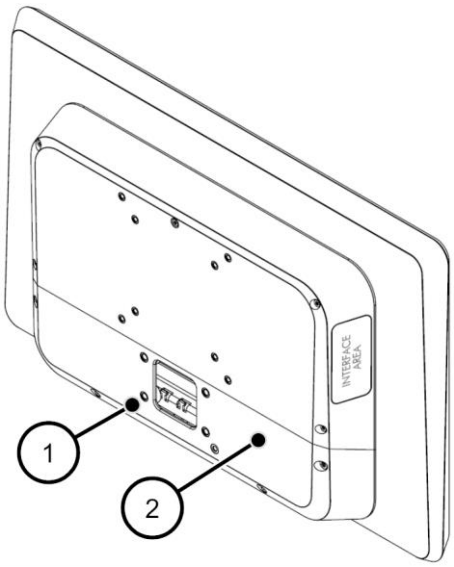


Illustration 9: VESA IP65 Rear

1	VESA MIS-D, 75
2	Interface Cover

Table 3: VESA IP65 Front and VESA IP65 Rear

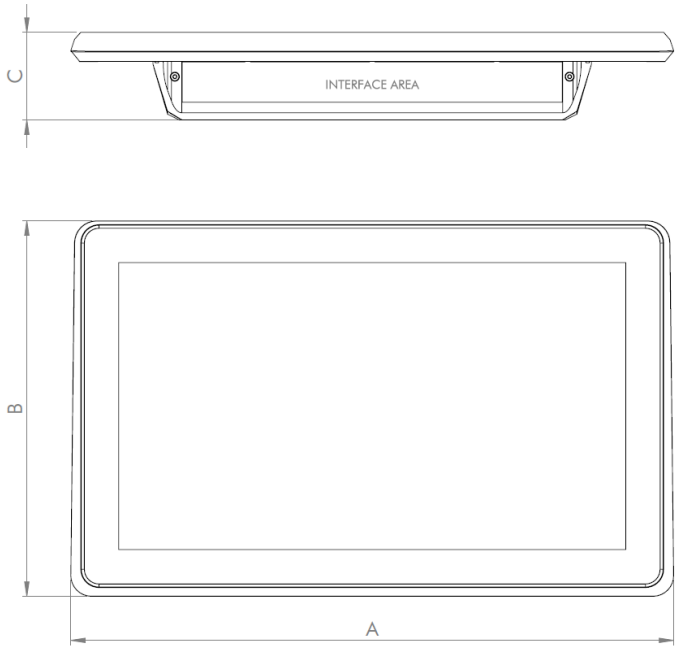


Illustration 10: Dimensions VESA

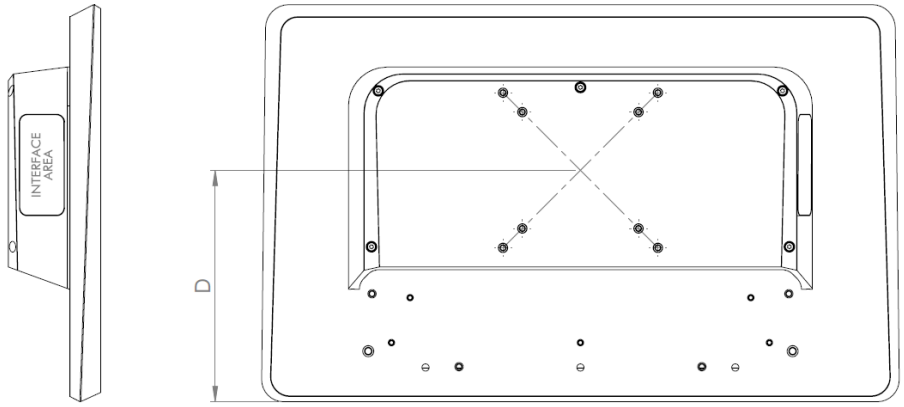


Illustration 11: Dimensions VESA Rear

Size	A	B	C	D
7"	211	144	55	75
10.1"	276	190	58	105
10.4"	274	215	58	130
12.1"	325	222	58	137
13.3"	357	224	58	148
15"	369	288	58	149
15.6"	412	256	58	149
18.5"	477	293	61	149
21.5"	548	334	61	149
24"	604	367	61	149

Table 4: Dimensions VESA

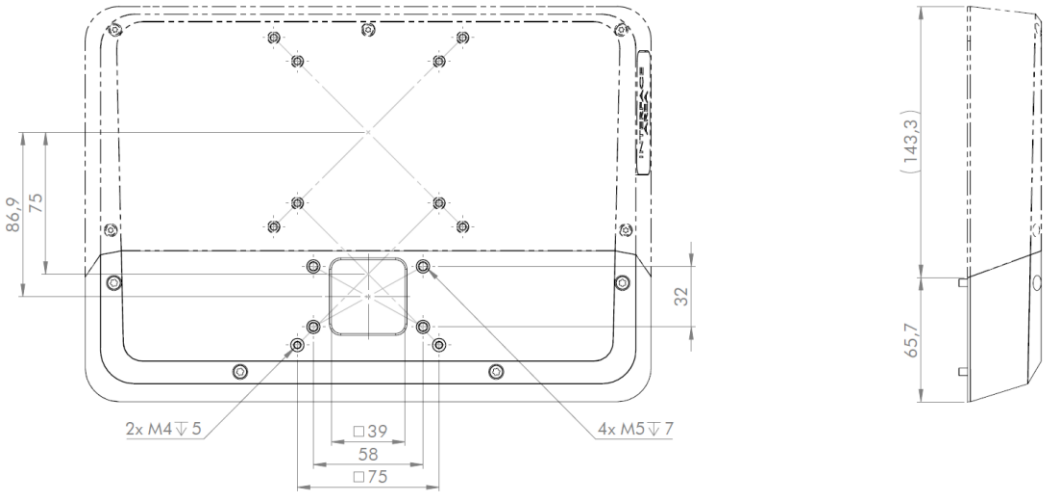


Illustration 12: VESA IP65 Cover

The cover for IP65 protection is available for sizes 13.3 to 24.

2.4 Housing Variant VESA Automation

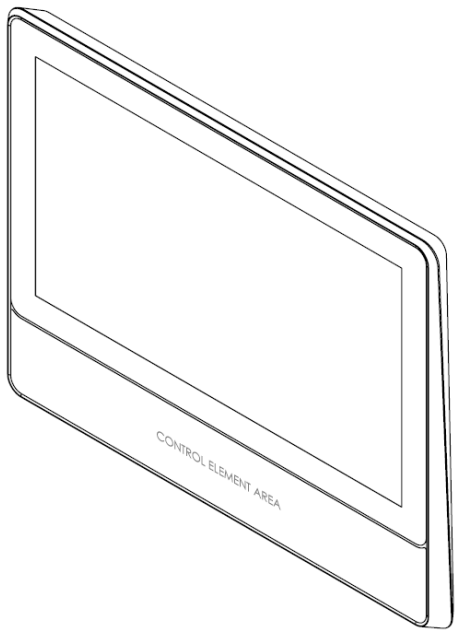


Illustration 13: VESA Automation Front

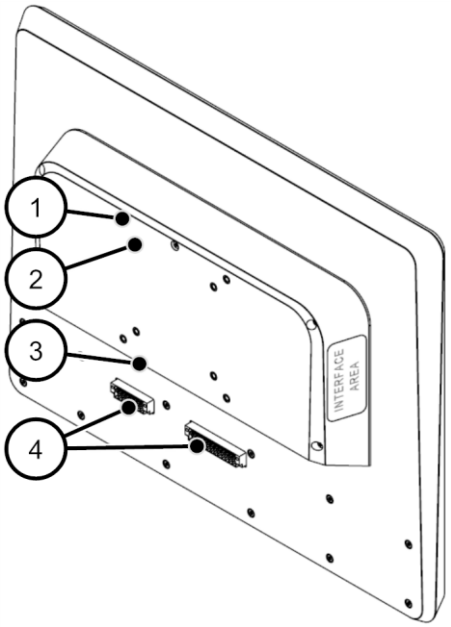


Illustration 14: VESA Automation Rear

1	VESA MIS-D, 100
2	VESA MIS-D, 75
3	Interface Area
4	Extension Connector

Table 5: VESA Automation Front and VESA Automation Rear

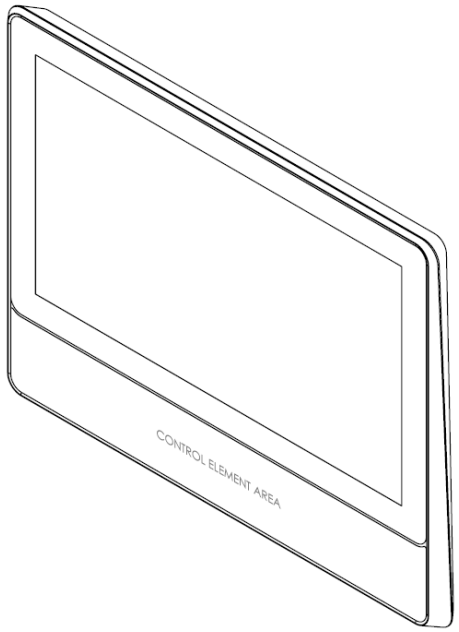


Illustration 15: VESA Automation IP65 Front

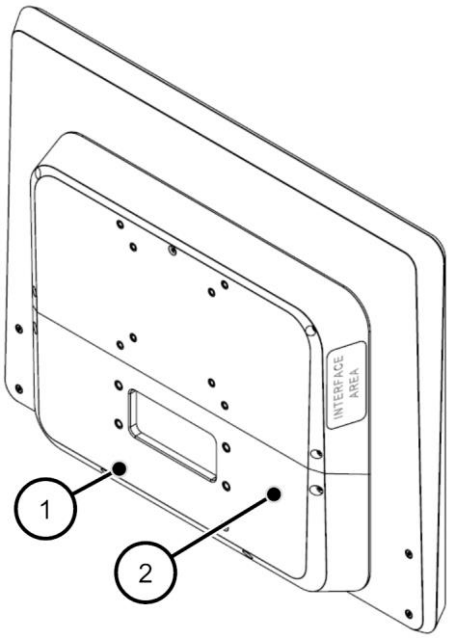
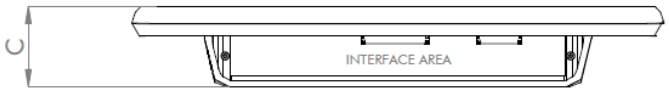


Illustration 16: VESA Automation IP65 Rear

1	VESA MIS-D, 100
2	Interface Cover

Table 6: VESA Automation IP65 Front and VESA Automation IP65 Rear



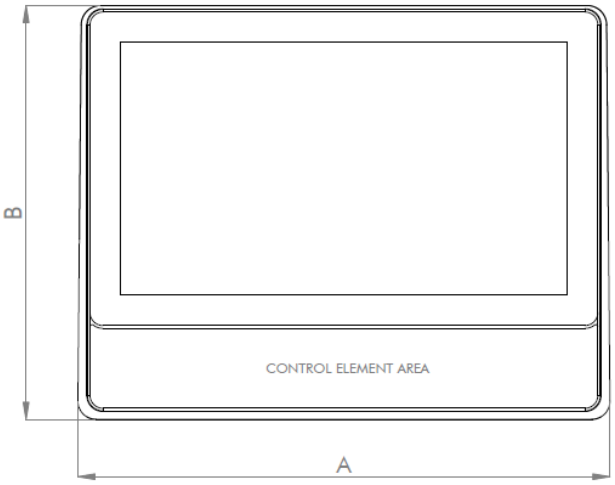


Illustration 17: Dimensions VESA Automation

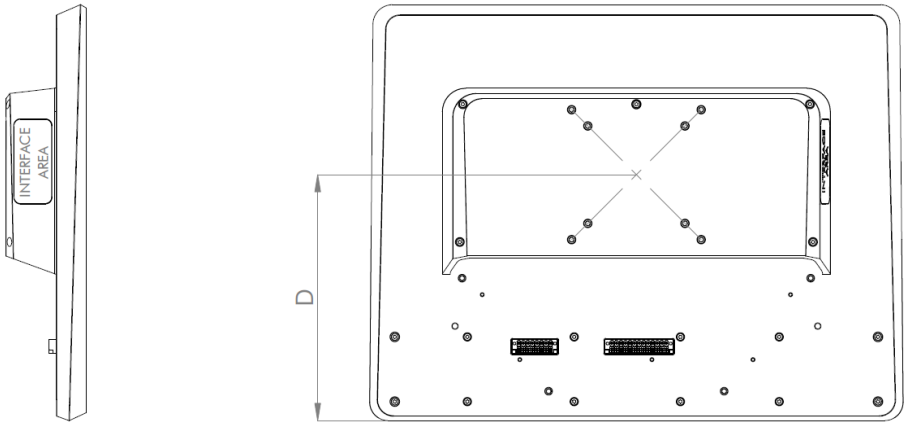


Illustration 18: Dimensions VESA Automation Rear

Size	A	B	C	D
13.3"	357	288	62	189
15.6"	412	320	62	189
18.5"	477	357	62	189
21.5"	548	398	62	189
24"	604	431	62	189

Table 7: Dimensions VESA Automation

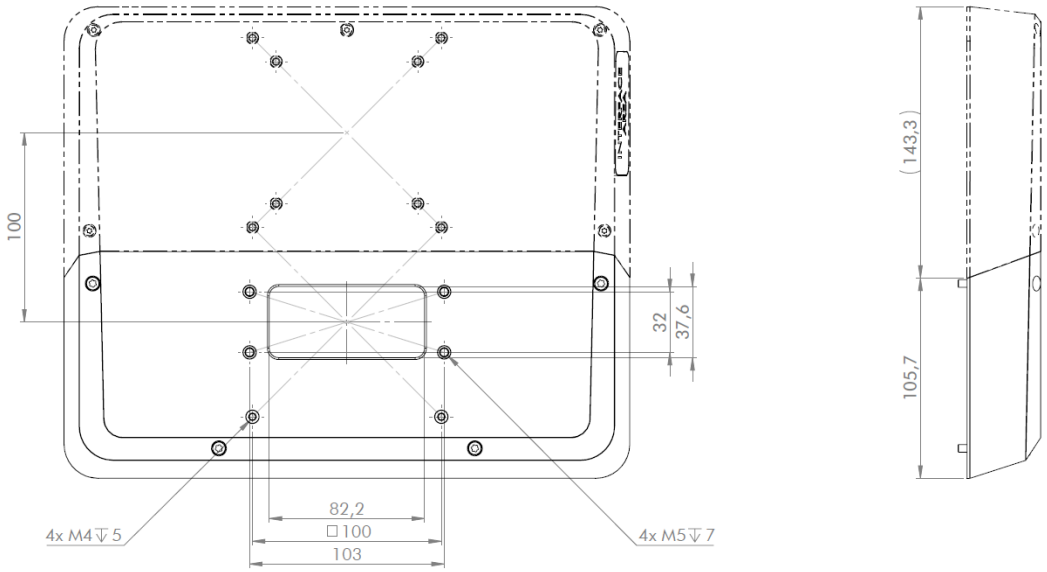


Illustration 19: VESA Automation IP65 Cover

The cover for IP65 protection is available for sizes 13.3 to 24.

We offer the following components for installation in button positions P1 to P8.

Illustration	Properties	
Pushbutton	Series	SHORTRON® base-plate mounting

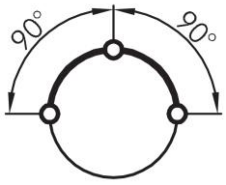
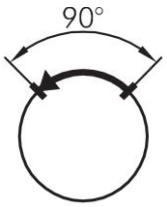
Illustration		Properties	
		Degree of protection	IP65
		Travel	2.3 mm
		Illumination	Yes, white LED
		Labeling Option	Yes
		Front Bezel	Silver-Coloured
		Operating Temperature	-25 °C ... 70 °C
		Contact Elements	max. 2 x NC / 2 x NO / 1 x NC + 1 x NO
		Nameplate	Blue, Yellow, Green, Transparent, White
Key Lock Switch		Series	SHORTRON® base-plate mounting
	 Zeichnung Beispielhaft	Degree of protection	IP65
		Switchin function	Maintained action
		Illumination	No
		Labeling Option	No
		Front Bezel	Silver-Coloured
		Operating Temperature	-25 °C ... 70 °C
		Contact Elements	max. 2 x NC / 2 x NO / 1 x NC + 1 x NO
Selector Switch		Series	SHORTRON® base-plate mounting
	 Zeichnung Beispielhaft	Degree of protection	IP65
		Switching function	Maintained action / momentary action
		Illumination	Yes
		Labeling Option	No
		Front Bezel	Silver-Coloured
		Operating temperature	-25 °C ... 70 °C
		Contact Elements	max. 2 x NC / 2 x NO / 1 x NC + 1 x NO

Table 8: Pushbuttons Components

Illustration	Properties	
Emergency Stop 	Series	SHORTRON® base-plate mounting
	Type	FRVKZ
	Degree of protection	IP65
	Travel	2.3 mm
	Illumination	No
	Labelling Option	No
	Front Bezel	Yellow
	Operating Temperature	-25°C ... 70°C
	Contact Elements	max. 2 x NC + 1 x NO
	Switching Position Indicator	Yes
	Release	Rechts- und Linksdrehung
	Anti-lock Collar	Yes
USB Port 	Degree of protection	IP65
	USB	USB 2.0
	Illumination	No
	Labelling Option	No
	Front Bezel	Black
	Operating Temperature	-25°C ... 80°C
RFID Reader 	Type	TWN4 MULTITECH CORE C1
	Degree of protection	IP65
	Frequency	125 kHz / 134.2 kHz
	Operating Temperature	-25°C ... 80°C
	Transponder	4100, 4102, 4200, 4050, 4150, 4450, 4550, AWID, CASI-RUSCO, HITAG 1, HITAG 2, HITAG S, Keri, Miro, Pyramid, TIRIS/HDX, UNIQUE, FDX-B, Q5, TITAN, T55x7, ZODIAC

Table 9: Expansion components

2.5 Housing variant Front Panel

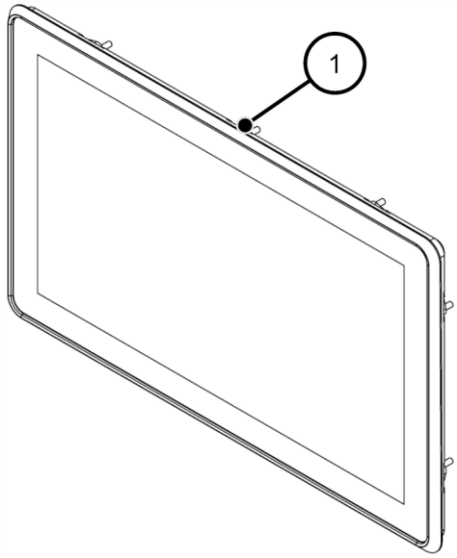


Illustration 20: Front Panel Front

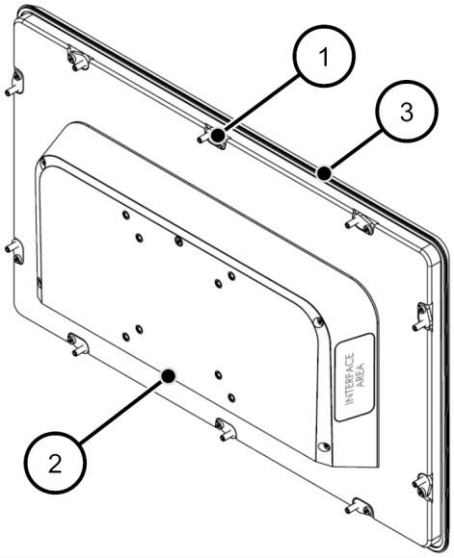


Illustration 21: Front Panel Rear

1	Fastening Clamp
2	Interface Area
3	Seal

Table 10: Front Panel Front und Front Panel Rear

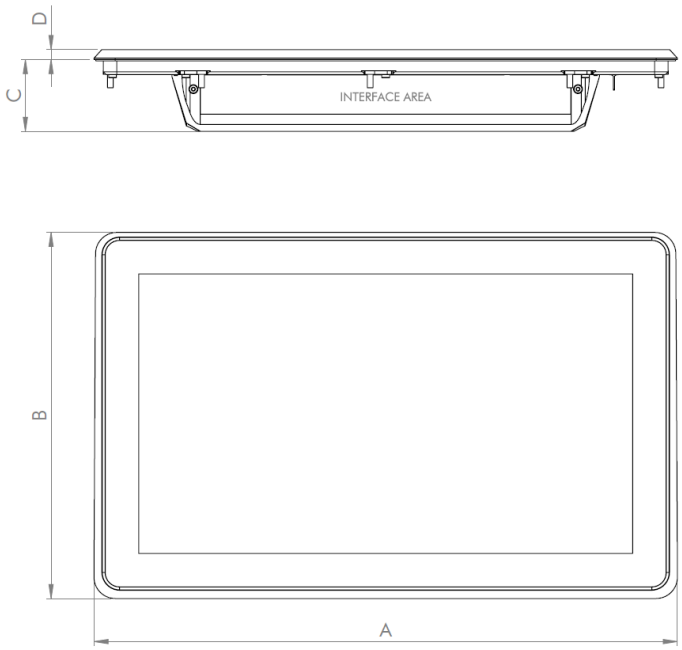


Illustration 22: Dimensions Front Panel

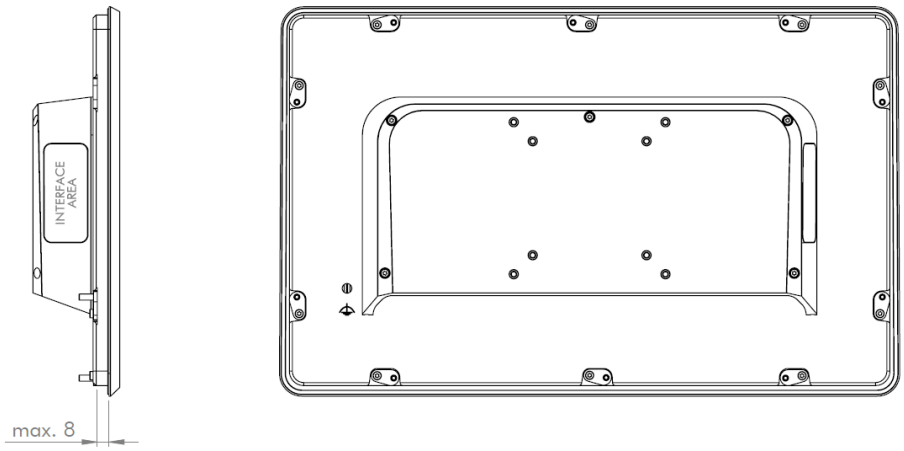


Illustration 23: Dimensions Front Panel Rear

The drawing of the Front Panel is exemplary and may show deviations to the device. The detailed technical drawing can be found in the specific data sheet.

Size	A	B	C	D
7"	208	145	47	7
10.1"	273	190	50	7
12.1"	322	222	52	7
13.3"	354	224	50	7
15"	366	288	52	7
15.6"	409	256	52	7
18.5"	474	293	52	7
21.5"	545	334	52	7
24"	601	367	54	7

Table 11: Dimensions Front Panel

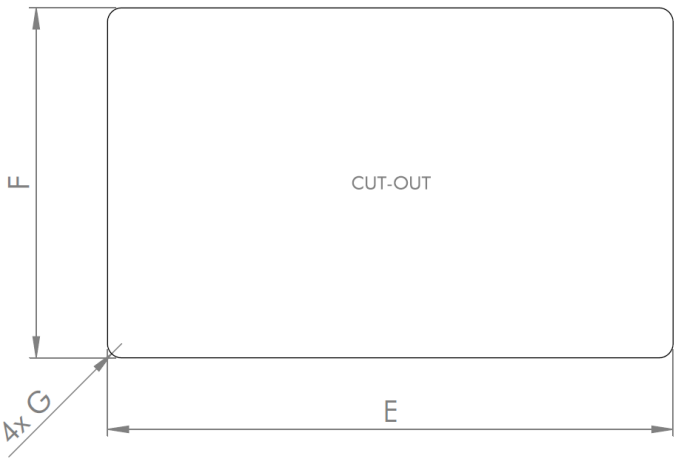


Illustration 24: Dimensions Front Panel Cutout

Size	E	F	G
7"	196	134	R 10
10.1"	262	179	R 10
12.1"	310	211	R 10
13.3"	343	213	R 10
15"	355	277	R 10
15.6"	397	245	R 10
18.5"	463	283	R 10
21.5"	533	323	R 10
24"	590	356	R 10

Table 12: Dimensions Front Panel Cutout

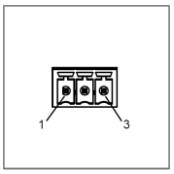
3 Description Hardware

3.1 External Interfaces

Power Supply

⚠ CAUTION	
	**External cable for Power Supply, Signal or Periphery** Malfunction occur ➢ Prepare a proper earth connection on the power supply

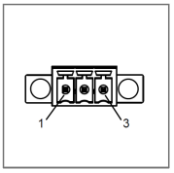
Supply Connector



Mating Connector	Phoenix Connector MC 1,5 / 3-ST-3.5	
PIN	**Function**	**Description**
1	GND	Ground
2	FE	Functional Earth
3	+24 VDC	Supply

Table 13: Pinout Supply Connector

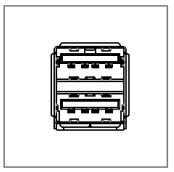
Supply Connector screwable



Mating Connector	Phoenix Connector MC 1,5 / 3-STF-3.5 (screwable)	
PIN	**Function**	**Description**
1	GND	Ground
2	FE	Functional Earth
3	+24 VDC	Supply

Table 14: Pinout Supply Connector screwable

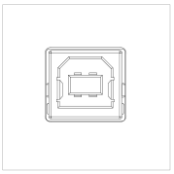
USB Host 2.0 (Type A)



PIN	**Function**	**Description**
1	VBUS	USB VCC
2	D-	USB Data-
3	D+	USB Data+
4	GND	USB Ground

Table 15: Pinout USB 2.0

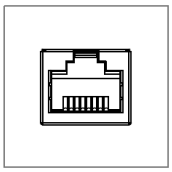
USB Device 2.0 (Type B)



PIN	Function	Description
1	VBUS	USB VCC
2	D-	USB Data-
3	D+	USB Data+
4	GND	USB Ground

Table 16: Pinout USB 2.0 Device

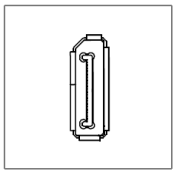
Ethernet



PIN	Function	Description
1	D1+	Transmit Data +
2	D1-	Transmit Data -
3	D2+	Receive Data+
4	D3+	Bidirectional +
5	D3-	Bidirectional -
6	D2-	Receive Data -
7	D4+	Bidirectional +
8	D4-	Bidirectional -

Table 17: Pinout Ethernet

Display Port



PIN	Function	Description
1	DP data 0+	DP data 0+
2	GND	Ground
3	DP data0-	DP data0-
4	DP data1+	DP data1+
5	GND	Ground
6	DP data1-	DP data1-
7	DP data2+	DP data2+
8	GND	Ground
9	DP data2-	DP data2-
10	DP data3+	DP data3+
11	GND	Ground
12	DP data3-	DP data3-
13	CONFIG1 CAD	Cable adapter recognized
14	CONFIG2	Ground (Pull-Down)
15	AUX_CH+	Additional device +
16	GND	Ground
17	AUX_CH-	Additional device -
18	HPD	Hot Plug recognized
19	GND	Ground
20	DP_PWR 3,3V	Power Supply DP

Table 18: Pinout Display Port

With the DP1.0 it is not possible to display an image on DVI / HDMI devices. An active adapter with properties of DP++ is required for this.

Display Port 1.1 is also known as "Dual-Mode Display Port" and "Display Port++". This allows compatibility with DVI and HDMI.

HDMI

PIN	Function	Description
1	D2 P	Data2+
2	PE	Shield Data2
3	D2 N	Data2-
4	D1 P	Data1+
5	PE	Shield Data1
6	D1 N	Data1-
7	D0 P	Data0+
8	PE	Shield Data0
9	D0 N	Data0-
10	CLK P	Clock+
11	PE	Clock Schirm
12	CLK N	Clock-
13	CEC	CEC
14	Utility	Utility
15	SCL	Serial Clock
16	SDA	Serial Data
17	GNDA	Ground
18	+5 V	+5 V
19	HP Detect	Hot-Plug-Detection

Table 19: Pinout HDMI

4 Environmental Conditions

⚠ WARNING	
	**Insufficient air supply to the device** Overheating ➢ Never cover the device completely or operate it in a small, unventilated housing

4.1 Temperature test

The values for operating temperature and humidity were determined under worst-case conditions.
The test ran under 100 % utilisation of display brightness.

4.2 IP Protection Class

The protection class only can be guaranteed under the following conditions:

- The device is installed correctly
- All components and covers of the interfaces are assembled
- Compliance with all environmental conditions

5 Assembly and Commissioning

This chapter describes all the steps for assembly. The following warnings are safety instructions that must be applied throughout the assembly chapter and in every other life cycle of the device.

⚠ DANGER	
	**Danger from electric shock, explosion or electric arc** Serious injury or death ➢ Pull out the mains plug and do not open the covers

⚠ WARNING	
	**Dropping a device** Injuries and bruises to the legs and / or feet ➢ Wear safety shoes

Note for the installation site

This device is not designed for outdoor use.

Make sure that the ambient temperature and humidity are within the ranges which are specified under Environmental Conditions.

Do not install the device directly in the sunlight.

Make sure that the device is installed so that is accessible for the operator.

Installation instructions

Check the package contents for any visible damage and for completeness.

In case of damage, do not install the device and contact the Christ Service.

5.1 Torque

All screws must be tightened with a minimum torque.

Screw	Torque
M3	1 Nm
M4	2,3 Nm

5.2 Connection of the power supply

Use conductors with a cross-section of 0.75 mm² to 1.5 mm². Use the MC 1,5/ 3-STF-3,5 BKBDWH:GND Q PCB connector from Phoenix.

Strip the insulation from the individual wires of the conductor (1). Insert these into the connection contacts (3) of the PCB connector and tighten the screw contacts (2) with a screwdriver and a maximum torque of 0.3 Nm.

The rear view (4) of the connector is shown for clarification.

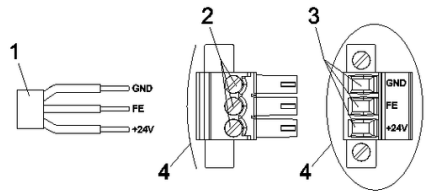
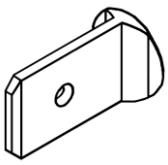


Illustration 25: Connection of the power supply

5.3 Earth Connection

NOTICE	
	Earthing not connected Not guaranteed functionality of the device ➢ All earth connections must be connected to an earth point

At the earthing connection, a line must be laid to the central earthing point of the control cabinet or the system. The earthing connection is marked with a label.



Earth connection

Label

5.4 Mounting VESA and VESA Automation

VESA

The VESA housing variant is executed in two different VESA sizes.

- VESA MIS-D, 75
- VESA MIS-D, 100

There are four mounting threads with the measurement of M4 x 5. The fixing screws are not included in the delivery attachment of the device because of the different installation situation.

In the assembly drawing, any support arm was used as an example.

Step 1:

Dock the unit onto the support arm and screw it on

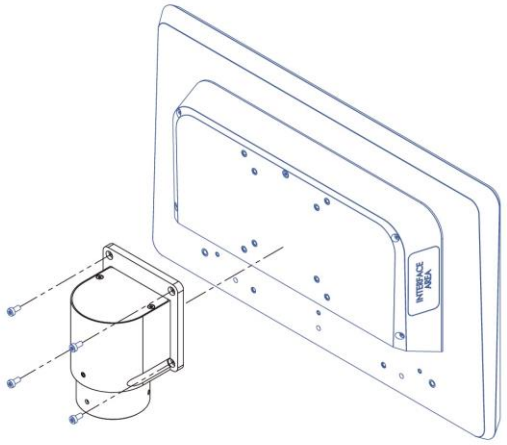


Illustration 26: Mounting VESA Step 1

Final situation:

Device is mounted to the support arm

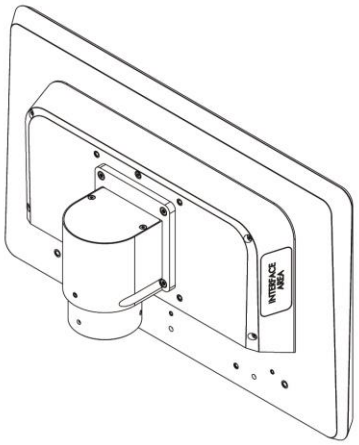


Illustration 27: Mounting VESA final situation

VESA IP65

For the housing variant VESA which has included the IP65 cover, the device can only be mounted with the VESA MIS-D, 75 if the cables are routed through the cutout.

There are four mounting threads with the measurement of M4 x 5. The fixing screws are not included in the delivery attachment of the device because of the different installation situation.

Assembly process

Initial situation

Mounting arm and device are not connected

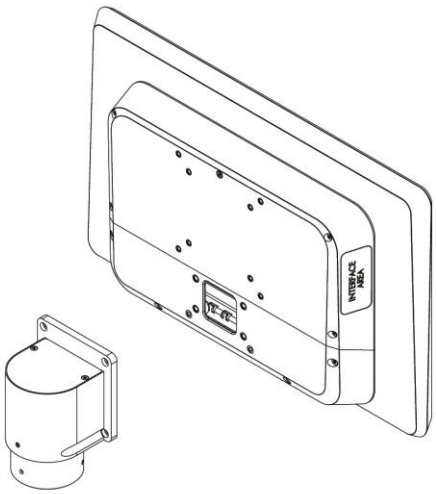


Illustration 28: Mounting VESA IP65 initial situation

Step 1:

Loosen the screws of the IP cover and remove it

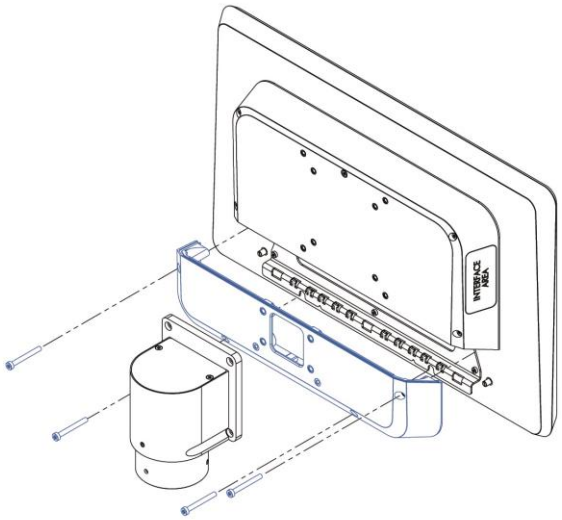


Illustration 29: Mounting VESA IP65 Step 1

Step 2:

Fix the IP cover with the two lower screws to the mounting arm

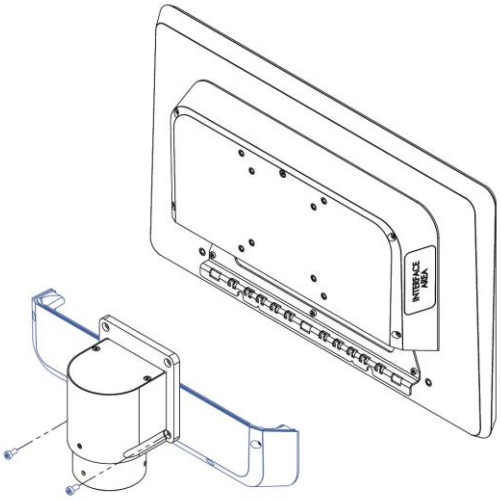


Illustration 30: Mounting VESA IP65 Step 2

Step 3:

Hanging in the device into the IP cover, connecting the cables and straighten up the device

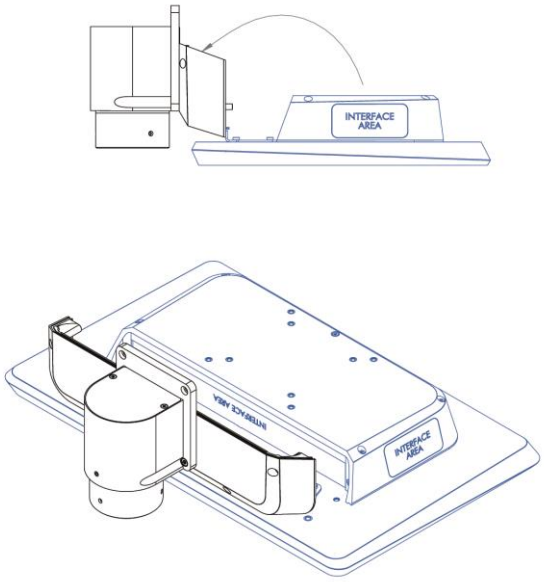


Illustration 31: Mounting VESA IP65 Step 3

Step 4:
Hold up the device and tighten the screws

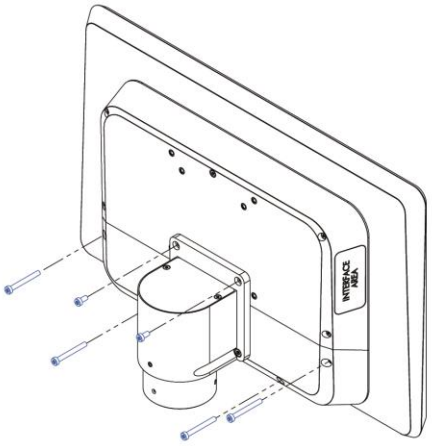


Illustration 32: Mounting VESA IP65 Step 4

Final situation:
Device is mounted to the mounting arm

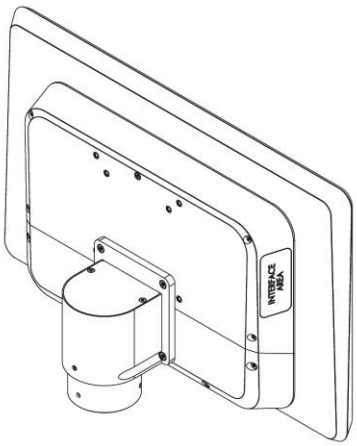


Illustration 33: Mounting VESA IP65 final situation

5.5 Mounting Front Panel

NOTICE	
	**Seal does not close** Moisture penetration into the device ➢ Tighten the screws with a defined torque

Step 1:
Install the front panel into the cutout

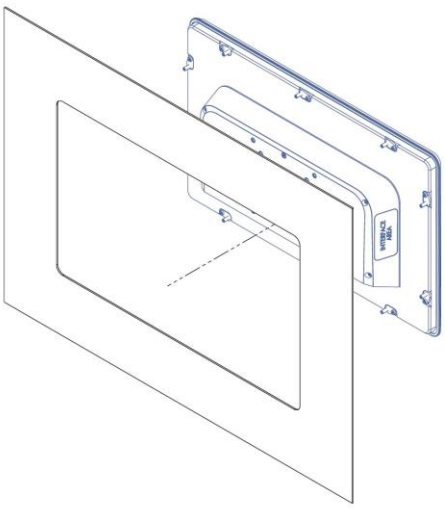


Illustration 34: Mounting Front Panel Step 1

Step 2:
The fastening clamps must lie entirely behind the mounting plate

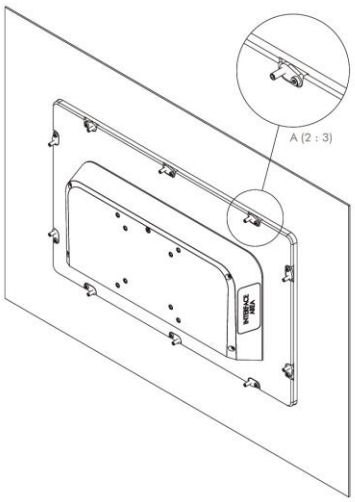


Illustration 35: Mounting Front Panel Step 2

Step 3:
Turn the fastening clamps outwards and tighten them with a torque of at least 1Nm

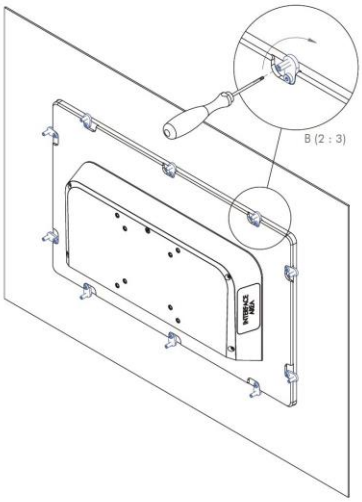
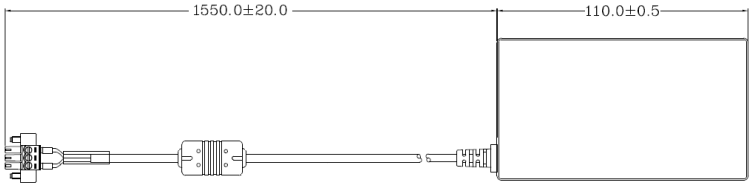


Illustration 36: Mounting Front Panel Step 3

6 Accessories and Spare Parts

The accessories listed here have been checked by Christ and are compatible with the products.
The following accessories are available:

Power supply



Input Voltage	90 - 264 VAC
Input Current	max. 1 A
Input Frequency	47 - 63 Hz
Consumption with unloaded output	max. 0.075 W
Output Voltage	24 VDC
Output Current	max. 2.5 A
Temperature Range Operation	0 - 70°C
Humidity Operation	20 - 80% RH non condensing

Table 20: Power supply

Stand

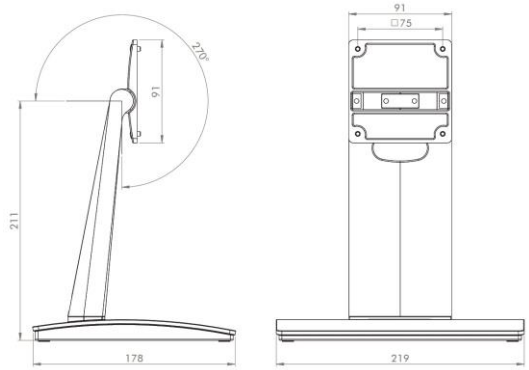


Illustration 37: Stand large

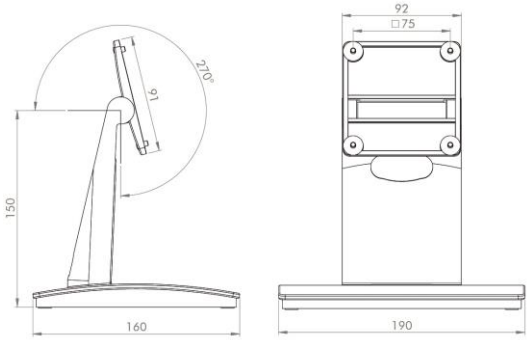


Illustration 38: Stand small

VESA75 Stand large
Height 210 mm
Setting angle 0 - 99°
12.1" - 24"

Table 21: Stand large

VESA75 Stand small
Height 150 mm
Setting angle 0 - 81°
7" - 10.4"

Table 22: Stand small

7 Maintenance

The following chapter describes maintenance measures that can be performed by a qualified end user.

7.1 Cleaning

⚠ DANGER	
	**Triggering unintended functions** Loss of control of the plant / machine / device ➢ The unit may only be cleaned when it is switched off or unplugged.

To clean the device, use a soft cloth moistened with detergent solution or screen cleaner.

The cleaning agent must not be applied directly to the device. Under no circumstances may aggressive solvents, chemicals or scouring agents be used.

7.2 Maintenance

It does not require any maintenance on the part of the user.

8 Technical Data

8.1 Mechanical Specifications

The weight specifications are maximum guideline values. They are given in the unit kilogram [kg].

	VESA	VESA Automation	Front Panel
7"	2	--	2
10.1"	2	--	2
12.1"	2.5	--	2.5
13.3"	3	tbd	3
15"	3.5	tbd	3.5
15.6"	3.8	5	3.8
18.5"	5.5	6.5	tbd
21.5"	6.5	7.5	tbd
24"	tbd	9	tbd

Table 23: Weight

8.2 Electrical Specifications

Supply Voltage Monitor	10.8 VDC ... 28.8VDC
Supply Voltage Distance Monitor	24 VDC
Power Consumption	see table Power Consumption
Continuous Rated Current	max. 2,5A
Inrush Current (load-independent)	max. 70A for 80 µs (Used power supply: FSP060-DAAN3)
External Power Supply	SELV
Earthing	Functional Earthing (Cable cross-section has to be identical to the supply lines)

Tablee 24: Electrical Specifications

8.2.1 Power Consumption

Display Size	Power Consumption
7"	up to 20 W
10.1"	up to 25 W
12.1"	up to 25 W
13.3"	up to 30 W
15"	up to 30 W
15.6"	up to 30 W
18.5"	up to 30 W
21.5"	up to 35 W
24"	up to 35 W

Table 25: Power Consumption

NOTICE

Specifications are maximum values
Peripheral devices are considered (e.g. 1 x USB 2.0 equals 2,5 W)

8.3 Electromagnetic Compatibility

Emitted Interference	EN55032 Class A
Immunity of supply line DC	±2 kV according to IEC 61000-4-4; EFT ± 0,5 kV according to IEC 61000-4-5; Surge asymmetrical
Immunity of signal lines	±1 kV according to IEC 61000-4-4; EFT
ESD	± 4 kV Contact discharge according to EN61000-4-2 ± 8 kV Air discharge according to EN 61000-4-2
Immunity of conducted emission	3 V 150 kHz – 80 MHz, 80% AM nach IEC 61000-4-6
Immunity of high-frequency radiation	3 V/m 80 MHz – 1 GHz, 80% AM nach IEC 61000-4-3 3 V/m 1 GHz – 6 GHz, 80% AM nach IEC 61000-4-3

Table 26: Electromagnetic Compatibility

8.4 Environmental Conditions

Operating Temperature (Standard Conditions)	0 ~ 50 °C
Storage Temperature	-10 ~ 70 °C
Humidity	5 ~ 80 % (non condensing)
Protection Class (Standard Conditions)	IP65 (IP20 rear)
Protection Class (Different Conditions)	IP65 (see device-specific datasheet)
Shock Resistance (Sinusoidal Vibration)	EN 60068-2-6: 5...9 Hz at individual amplitudes of 1,5 mm 9...200 Hz constant acceleration: 30 m/s² X, Y, Z orientations with 10 cycles (approx. 10 min)
Shock Resistance (Shock)	EN 60068-2-27 70 m/s², 3 times in X, Y, Z - orientations
Transportation and Storage	Suitable packing increases shock resistance
max. Installation Altitude	2000 m
Cooling	Natural Air Convection

Table 27: Environmental Conditions

8.5 Display Specifications

Color Depth	8 bit
Lifetime	min. 50,000 h
Viewing Angle (right/left/up/down)	min. 85°/85°/85°/85°
Backlight	LED
Touch Technology	PCAP

Table 28: Display Specifications

NOTICE

Pixel Errors

Due to the manufacturing process, displays may contain faulty pixels (pixel errors), which do not constitute a claim or warranty.

The international standard ISO 9241-307:2009 defines, on an international level, the maximum possible pixel errors in an LC-display. This standard discribes different error types, in consideration of different pixel error classes.

There are the following pixel error classes, each with three differnet error types:

Maximum acceptable errors per 1 Mio. pixels according to ISO 9241-307:2009				
error class	error type 1 pixel constantly illuminatied	error type 2 pixel constantly dark	error type 3	error type 4 subpixel constantly dark

			subpixel constantly illuminatied	
0	0	0	0	0
I	1	1	n = 0 to 2 2 - n	2 x n + 1
II	2	2	n = 0 to 5 5 - n	2 x n
III	5	15	max. 50	max. 50
IV	50	150	max. 150	max. 150

Why this classification of errors?

Each pixel of a display contains three subpixels which have the basic colors red, green and blue. The combination makes it possible to show a wide spectrum of colors.

Considering for example the display solution of 1280 x 800 pixels, thereof a total of 1,024000 pixels or 3,072000 subpixels are embedded in the display area. This means , the display holds 3,072000 single transistors at an area of 261.1 mm by 163.2 mm.

These figures make it clear that it is not possible to specifically produce defect-free displays even by today's manufacturing standards.

Christ Electronic Systems GmbH therefore adapts to the corresponding requirements of most international manufacturers. The displays must always comply with error class II. If the permissible number of errors of the pixel error class II is not exceeded, there is also no complaintable "failure" of the display.

Refering to the calculation, the following errors can occur in the display:

- Max. 2 constantly illuminated and 2 constantly dark pixels
- Max. 5 constantly illuminated or 10 constantly dark subpixel

Avoid burn-in on displays

NOTICE

Images that do not change

"Image shadows", "ghost images" arise

➢ Changing displayed images, screen saver, energy-saving mode

With LC displays, so-called "ghost images" or "image shadows" can occur under certain circumstances. These are images that remain from the previous image and are felt to be "burnt into" the display. These do not remain forever. If "image shadows" occur, the device should be switched off for a longer period of time so that the burnt-in image disappears.

To avoid "ghost images" or "image shadows", the following behaviour is recommended:

- Do not display still images over an extended period of time
- Change standing images at short intervals
- Switch off the unit or use the energy-saving mode when you do not need it
- Use the screen saver function

9 Standards and Approvals

9.1 CE Marking

The device has been tested in accordance with the applicable EU directives and the associated harmonized standards.

NOTICE	
	Decleration of Conformity The declaration of Conformity can be downloaded from the Christ Electronic Systems Homepage.

9.2 RoHS

The device complies with the requirement of the EU Directive RoHS 2011/65/EU.

9.3 Electromagnetic Compatibility

The device complies with the requirements of the EU Electromagnetic Compatibility Directive 2014/30/EU with the harmonized standards listed below:

EN 55032: 2015 Class A	Electromagnetic compatibility of multimedia equipment - Emission Requirements
EN 55035: 2017	Electromagnetic compatibility of multimedia equipment - Immunity requirements

9.4 Environmentally Appropriate Disposal

The device must not be disposed of with domestic waste.

The appliance complies with the requirement of the EU Directive WEEE 2012/19/EU, which is symbolised by the symbol with the crossed-out dustbin.

In order to enable environmentally friendly recycling, the various materials must be separated from one another.

Disposal must be carried out in accordance with the applicable legal regulations.

Component parts	Disposal
Enclosure	Metal Recycling
Electronic	Electronics Recycling
Paper / cardboard packaging	Paper / Cardboard boxes Recycling
Plastic packing materials	Plastics Recycling

10 Technical Support

Despite the highest quality standards and detailed function tests of all our products, daily use of our devices can always lead to damage or failure of a wearing part. The failure of a machine in production costs a lot of money. That is why the Christ company processes complaints as quickly as possible.

You can send the device to us without prior notice. All you need to do is fill out the repair cover letter and enclose it with the touch panel or IPC so that the service department can start the repair quickly.When the device arrives, it goes through a defined process that clearly documents all processes and makes the respective status traceable. As soon as your panel or IPC is registered in our system, you will receive a confirmation of receipt so that you can also get a precise overview.

Technical Support can be contacted as follows:

Service, Repair and Technical Support
Phone: +49 8331 8371-500
Fax: +49 8331 8371-497
E-Mail: service@christ-es.de

Or directly via the Homepage.
Christ Service

10.1 Device Seal

A device seal is affixed to every Christ device in order to prove whether the device has been opened by a third party. In case of a defect, please do not open the device, but contact our service department. They will discuss the further procedure with you.

Index of Illustration

Index of Tables