

Original User Manual

Series Touch Industrial Monitor and Distance Monitor



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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

The devices described in this documentation are intended to enale the user to control, operate, observe, drive and viualise certain processes.

Technical changes

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

History

The following editions of the manual have already been published:

Version	Comment
05/2022	First edition
10/2022	Software DDC/CI
Table 1: History	



Design of safety instructions



Indicates an imminent danger

Failure to follow the instructions may result in death or serious injury.



	Indicates a possible dangerous situation Failure to follow the instruction may result in injury.

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



Ilustration 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



Ilustration 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



llustration 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



Ilustration 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)







Table 3: VESA IP65 Front and VESA IP65 Rear





Illustration 10: Dimensions VESA



Illustration 11: Dimensions VESA Rear



Size	Α	В	С	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



Table 5: VESA Automation Front and VESA Automation Rear







Illustration 17: Dimensions VESA Automation





Illustration 18: Dimensions VESA Automation Rear

Size	А	В	С	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.



Pushbuttons





Series	SHORTRON® base-plate mounting
Degree of protection	IP65
Travel	2.3 mm
Illumination	Yes, white LED
Labeling Option	Yes ¹
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, Red, White

Key Lock Switch



Series	SHORTRON® base-plate mounting
Degree of protection	IP65
Switchin function	Latching
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

¹ Possible designation plates are provided by your contact person



Selector Switch



Series	SHORTRON® base-plate mounting
Degree of protection	IP65
Switching function	Latching / non latching
Illumination	Yes, white LED
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

Emergency Stop

6	
1 mil	mine
-	

Series	SHORTRON® base-plate mounting
Туре	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	Twist right or left
Anti-lock Collar	Yes

USB



Degree of protection	IP65
USB	USB 2.0
Illumination	No
Labelling Option	No
Front Bezel	Black
Operating Temperature	-25°C 80°C



RFID



Туре	TWN4 MULTITECH CORE C1
Degree of protection	IP65
Frequence	125 kHz / 134,2 kHz / 13.56 MHz
Operating Temperature	-25°C 80°C
Transponder	 125 KHz / 134.2 kHz: 4100, 4102, 4200¹, 4050, 4150, 4450, 4550, AWID, CASI-RUSCO, HITAG 1², HITAG 2², HITAG S², Keri, Miro, Pyramid, TIRIS/HDX, UNIQUE, FDX-B, Q5, TITAN, T55x7, ZODIAC 13.56 MHz / ISO14443A: MIFARE Classic 1k & 4k EV1³, Mini, DESFire EV1, Plus S&X, Pro X⁴, SmartMX⁴, Ultralight, Ultralight EV1³, Ultralight C, SLE44R35, SLE66Rxx (my-d move), LEGIC Advant⁵, PayPass⁴, NTAG2XX³ 13.56 MHz / ISO14443B: Calypso⁴ incl. Innovatron radio protocol 14443-B⁶, CEPAS⁴, HID iCLASS⁵, Moneo⁴, PicoPass⁴, SRI512, SRT512, SRI4K, SRIX4K 13.56 MHz / ISO15693: EM4x33⁴, EM4x35⁴, HID iCLASS⁵, ICODE SLI, LEGIC Advant⁵, M24LR16/64, Tag-it, SRF55Vxx (my-d vicinity)⁴, PicoPass⁴ 13.56 MHz /ISO18092 / NFC: NFCIP-1: Active and passive communication mode, Peer-toPeer, NFC Forum Tag Type 1-4, Sony FeliCa⁷

⁶ only UID, read/write on request

¹ Only emulation of 4100, 4102

² Without encriyption mode

³ r/w enhanced security features on request

⁴ r/w in direct chip command mode

⁵ only UID

 $^{^{7}}$ UID + r/w public area



2.5 Housing variant Front Panel





Illustration 20: Front Panel Front

1	Fastening Clamp
2	Interface Area
3	Seal

Table 8: 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	Α	В	С	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 9: Dimensions Front Panel



Illustration 24: Dimensions Front Panel Cutout



Size	Е	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 10: Dimensions Front Panel Cutout

2.6 Housing variant Open Frame



Illustration 25: Open Frame Front



Illustration 26: Open Frame Rear

1	Fastening Clamp
2	Interface Area
3	Seal







Illustration 27: Dimensions Open Frame



Illustration 28: Dimensions Open Frame Rear

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



Size	Α	В	С	D	E
7"	tbd	tbd	tbd	tbd	tbd
10.1"	257.6 ± 0.2	176.2 ± 0.2	59	20	5.7
12.1"	tbd	tbd	tbd	tbd	tbd
13.3"	tbd	tbd	tbd	tbd	tbd
15"	tbd	tbd	tbd	tbd	tbd
15.6"	393 ± 0.3	242 ± 0.3	59	20	5.7
18.5"	tbd	tbd	tbd	tbd	tbd
21.5"	tbd	tbd	tbd	tbd	tbd
24"	tbd	tbd	tbd	tbd	tbd

Table 12: Dimensions Open Frame





Illustration 29: Dimensions Open Frame Cutout Counterplate

Illustration 30: Dimensions Open Frame Cutout Front- and Spacerplate

Size	F	G	н	К
7"	tbd	tbd	tbd	tbd
10.1"	248	166	R 5	R10 ± 0.2
12.1"	tbd	tbd	tbd	tbd
13.3"	tbd	tbd	tbd	tbd
15"	tbd	tbd	tbd	tbd
15.6"	383	232	R 5	$R10 \pm 0.2$
18.5"	tbd	tbd	tbd	tbd
21.5"	tbd	tbd	tbd	tbd
24"	tbd	tbd	tbd	tbd

Table 13: Dimensions Open Frame Cutout

Installation Open Frame

The actual cut-out-dimensions of the front- and spacerplate need to be subjected to the prevalant assembly situation (production tolerances, ambient temperature, etc.) and therefore to be defined by the customer.





Illustration 31: Installation Open Frame Cutout

1	Frontplate
2	Spacerplate
3	Counterplate



3 Description Hardware

3.1 External Interfaces

Power Supply

	 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	
³ PIN	Function	Description
1	GND	Ground
2	FE	Functional Earth
3	+24 VDC	Supply

Table 14: 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 15: 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 16: 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 17: 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 18: 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 19: 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 20: Pinout HDMI



4 Environmental Conditions

	 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 from electric shock, explosion or electric arc Serious injury or death Pull out the mains plug and do not open the covers 	
	 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 32: Connection of the power supply

5.3 Earth Connection



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:

Final situation:

Dock the unit onto the support arm and screw it on

Device is mounted to the support arm





Illustration 33: Mounting VESA Step 1

Illustration 34: 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 35: Mounting VESA IP65 initial situation

Step 1: Loosen the screws of the IP cover and remove it



Illustration 36: Mounting VESA IP65 Step 1



Step 2:

Step 3:

Fix the IP cover with the two lower screws to the Hanging in the device into the IP cover, mounting arm connecting the cables and straighten up the



Illustration 37: Mounting VESA IP65 Step 2

Step 4: Hold up the device and tighten the screws



Illustration 39: Mounting VESA IP65 Step 4

device





Illustration 38: Mounting VESA IP65 Step 3

Final situation: Device is mounted to the mounting arm



Illustration 40: Mounting VESA IP65 final situation



NOTICE

5.5 Mounting Front Panel

<u>_</u> !	7

Seal does not close

Moisture penetration into the deviceTighten the screws with a defined torque

Step 1: Install the front panel into the cutout

Step 2:

The fastening clamps must lie entirely behind the mounting plate



Illustration 41: Mounting Front Panel Step 1



Illustration 42: Mounting Front Panel Step 2



Step 3:

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



Illustration 43: 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 21: Power supply

Stand





Illustration 44: Stand large



Illustration 45: Stand small



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

Table 22: Stand large

VESA75 Stand small

Height 150 mm

Setting angle 0 - 81°

7" - 10.4"

Table 23: Stand small



7 Software

Display Data Chanel (DDC) / Command Interface (CI) is a type of connection between the computer and the display. Information can be requested and settings can be set. There ist different software for controlling the displays with different operating systems. For each operating system Windows and Linux there ist one example listed.

Operating System Windows - Monitorian

The tool Monitorian is available free of charge and allows control of all connected screens via a small clear display at the bottom of the screen.

After installation, the Monitorian icon can be accessed at the bottom right of the screen display.



Illustration 46: Icon Monitorian

The brightness and contrast of the screen display can be adjusted with sliders.



Illustration 47: Slider blue for brightness and slider pink for contrast

By right-clicking on the Monitorian icon, some settings can be made.



Illustration 48: Adjustment possibilities Monitorian



Operating System Linux - ddcutil

With Linux, display settings can be queried and adjusted via the command line tool ddcutil.

This can be used, for example, to detect connected monitors or to set parameters such as brightness or contrast.

After installing the program, the mode of operation and available commands can be called up in the programme help with the following command: ddcutil --help



8 Maintenance

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

8.1 Cleaning



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.

8.2 Maintenance

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



9 Technical Data

9.1 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 24: Weight

9.2 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 μ s (Used power supply: FSP060-DAAN3)
External Power Supply	SELV
Earthing	Functional Earthing (Cable cross-section has to be identical to the supply lines)

Tablee 25: Electrical Specifications



9.2.1 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 26: Power Consumption

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

9.3 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 27: Electromagnetic Compatibility



9.4 Environmental Conditions

Operating Temperature (Standard Conditions)	0 ~ 50 °C
Storage Temperature	-10 ~ 70 °C
Humidity	$5 \sim 80 \%$ (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: 59 Hz at individual amplitudes of 1,5 mm 9200 Hz constant acceleration: 30 m/s ² X, Y, Z orientations with 10 cycles (approx. 10 min)
Shock Resistance (Shock)	EN 60068-2-27 70 m/s ² , 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 28: Environmental Conditions

9.5 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 29: 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 subpixel constantly illuminatied	error type 4 subpixel constantly dark
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



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



10 Standards and Approvals

- 10.1 CE Marking
 - CE

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.

10.2 RoHS



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

10.3 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

10.4 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



11 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

11.1 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.



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