User Reference Manual
DuraMON C-Line

DuraMON 15” C-Line
DuraMON 19” C-Line
DuraMON 22” C-Line
DuraMON 24” C-Line
DuraMON 26” C-Line
DuraMON 27” C-Line

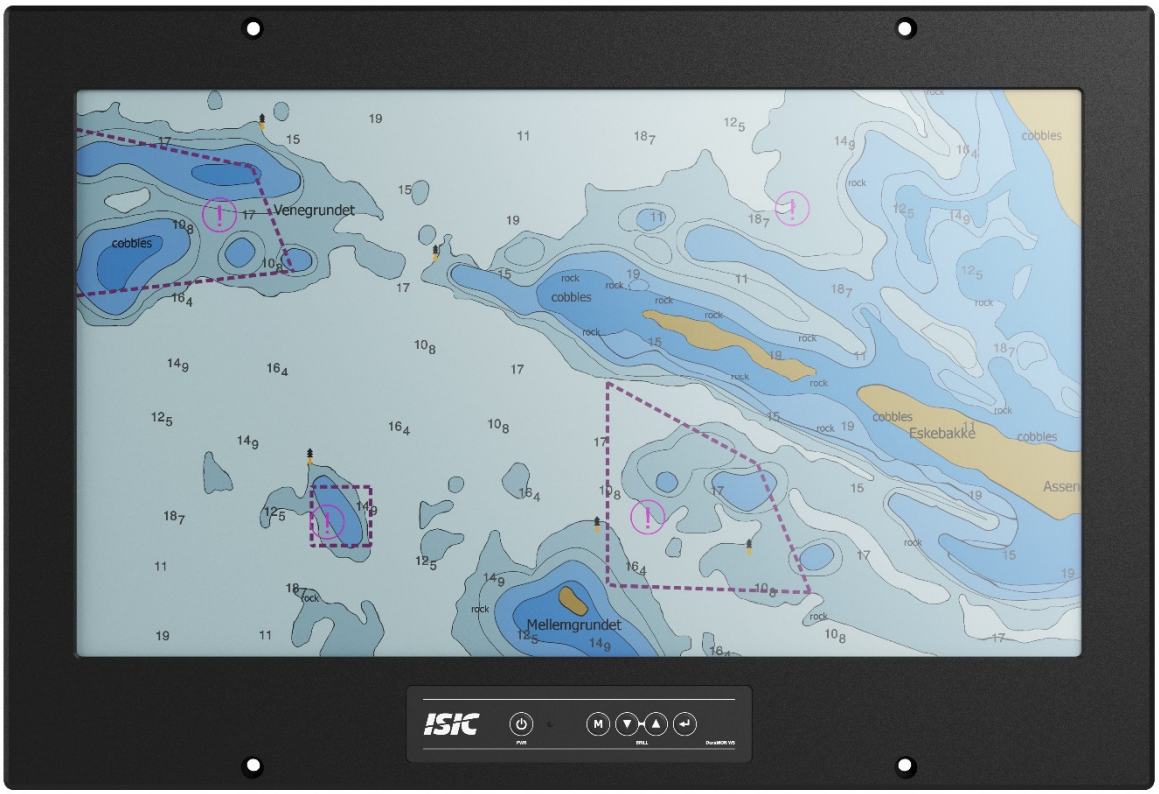

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Image sticking: If the monitor is operated with static images (logo's etc.) it will inevitably lead to images sticking on the display. This is not a permanently situation and can be removed by operating the monitor with a video that is created for this purpose.

FCC Warning

Computing devices and peripherals generate and radiate radio frequency energy, and if not installed and used in accordance with the instructions advised by ISIC A/S, it may cause interference to radio communication.

The DuraMON series, manufactured by ISIC A/S, is designed to comply with the emerging generic EEC standards, that cover applications in maritime environment.

Classification

The monitor is classified as "protected from the weather" according to IEC 60945 (former class b).

Approvals

Approval according to IACS E10 and IEC 60945, Maritime navigation and radio communication equipment and systems – General requirements.
ECDIS IEC 61174 (Not available on 15" & 22")
Radar IEC 62288
Radar IEC 62388

ISIC A/S is complying with the WEEE directive within the European Union, stating that electronic and electric products must be collected separately.
Products are marked according to the directive.

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1 Features

Congratulations on your purchase of a DuraMON. This short form manual is designed to get you started working with your new DuraMON.

The DuraMON series of monitors are all made as rugged monitors especially designed for the demanding operating conditions at sea.

The DuraMON series are tested for full compliance to marine-standards IACS E10 and IEC 60945. The monitor comes with excellent brightness and contrast levels that, together with wide viewing angles, ensure a good readability thus making it very eye-friendly. For the best picture quality, always use a double shielded cable with ferrites, like the one supplied with the monitor.

Direct dimming control (1cd to 100%) from UP/DOWN buttons.
Full settings control via menu or serial link.
Support for DDC
Anti-Reflective coated glass.
IP65 protected front.

Multiple connections to cover the widest range of signal sources:
Display Port
DVI-D
VGA

Resistant to most chemicals

Optional Touch Screen available, but has to be ordered with the monitor (not part of the IEC 60945 approval).

2 General considerations on Installation and Operation

The DuraMON is designed to work at conditions according to IEC 60945. However, keeping the temperature and vibration level at a minimum will extend the life time of the product. ISIC recommend operating this product at normal room temperature (20-25 °C), with the lowest level of vibration and humidity.

Installation of the DuraMON C-Line

In order to obtain the best possible operating conditions, please note the following precautions.

- Room for cooling.
  When designing the cabinet/console for the DuraMON C-Line, please ensure that air can flow freely around the cabinet, in order to avoid any unnecessary rise in temperature. If it is not possible to have an adequate natural airflow, use a fan to force the airflow to be higher.

- Mounting positions
  To obtain adequate cooling by convection ISIC recommends that the DuraMON C-Line is mounted at least 30 degrees from horizontal. If this is not possible, forced cooling must be applied directly to the unit in order not to overheat it.

- Sunlight
  If the unit can be exposed to direct sunlight, there is a potential risk that the unit can be overheated. Please take measures to prevent direct sunlight. Do also consider forced cooling on the back of the unit.

Operation of the DuraMON

To ensure that colors and luminance on the display are correct in ECDIS applications, do not use the monitor until the warm-up period has completed.

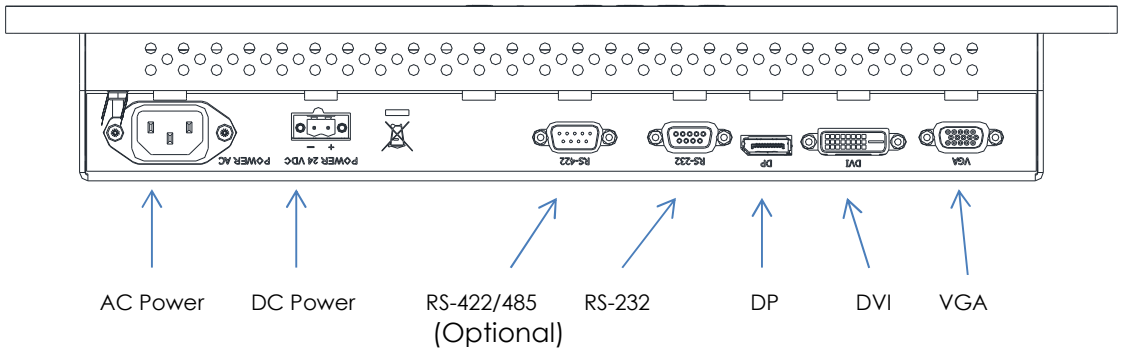
The warm-up period is as follows:

	Day mode	Dusk mode	Night mode
DuraMON 19" C-Line	30 min	30 min	30 min
DuraMON 24" C-Line	30 min	30 min	30 min
DuraMON 26" C-Line	30 min	30 min	30 min
DuraMON 27" C-Line	30 min	30 min	30 min

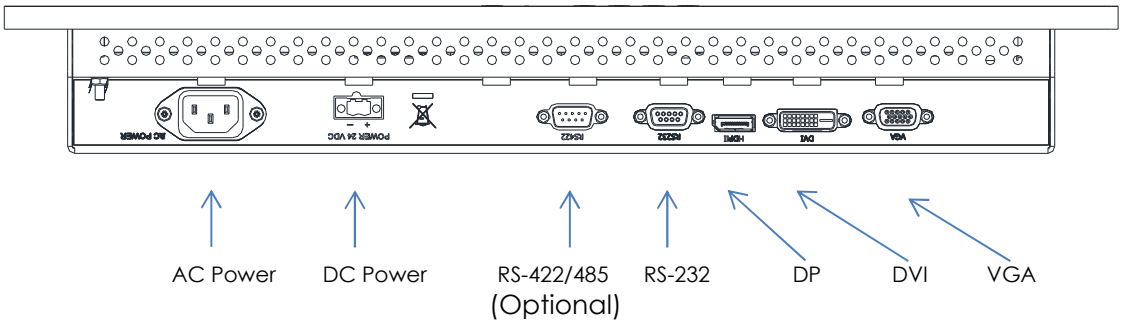
3 DuraMON C-Line connections

Below is a view of optional connections to the monitor. The default inputs are: power, RS-232, DP/HDMI, DVI and VGA.

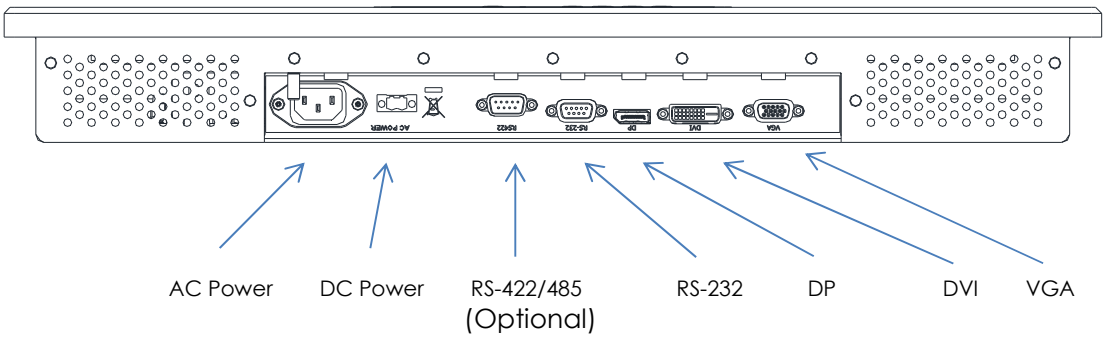
3.1 DuraMON 15" C-Line:



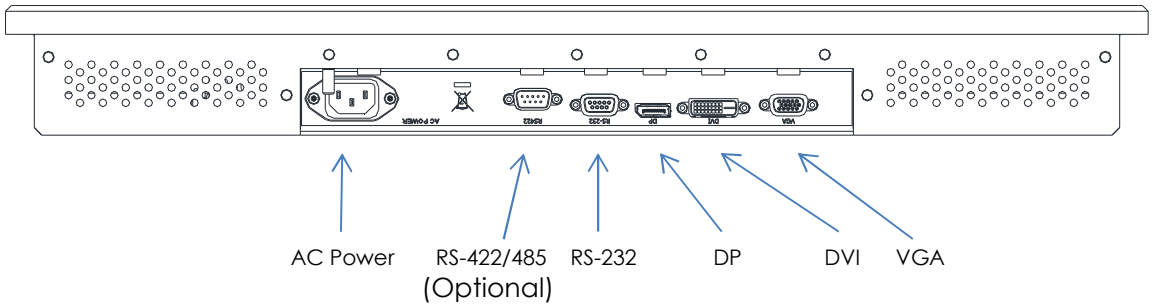
3.2 DuraMON 19" C-Line:



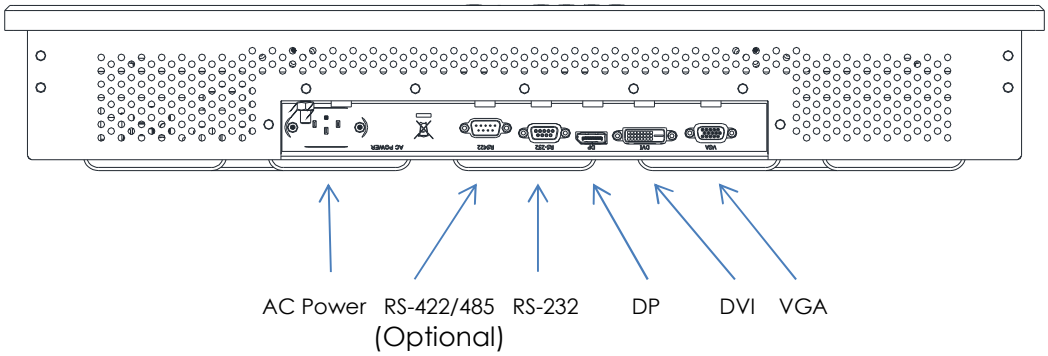
3.3 DuraMON 22" C-Line:



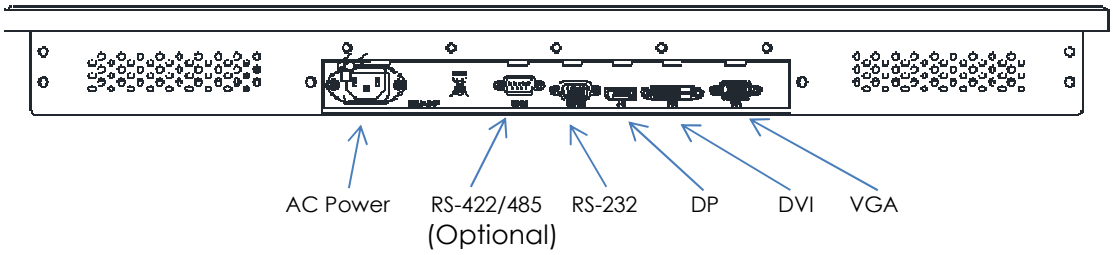
3.4 DuraMON 24" C-Line:



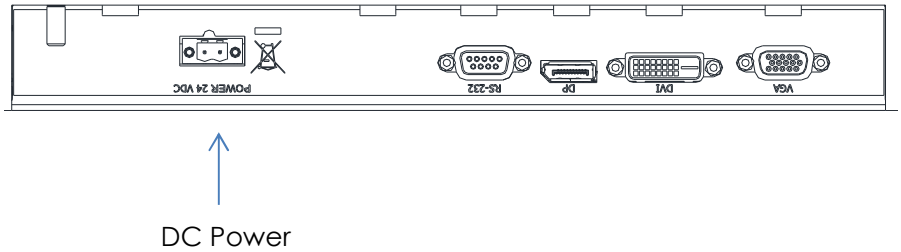
3.5 DuraMON 26" C-Line:



3.6 DuraMON 27" C-Line:

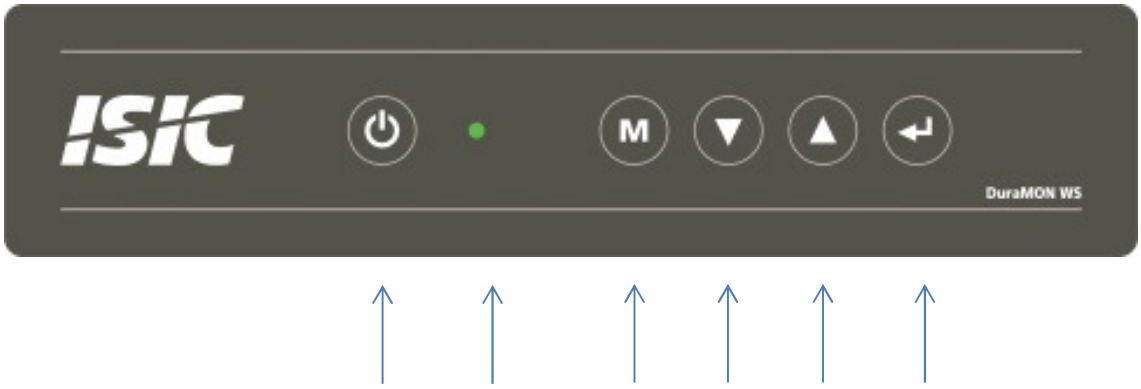


To connect the DC power connector you need a screw driver
Only use multicore cables from AWG16 to AWG12 (1.0 mm^2 to 4 mm^2)
DC connector: Weidmüller, BLZP 5.08HC/02/180F SN BK BX, 1944330000
AC Connector: IEC 60320 type C13



4 DuraMON C-Line front panel controls

The front panel is illuminated and will follow the brightness level of the monitor backlight.



ON/OFF:
This key is used to turn the product on or off. Pressing it will turn the power on, while holding it pressed for 5 seconds will turn the power off. The light in the button will change from Green to red to indicate it's powered down. It is important to notice that, when powered off, the product still consumes some power from the mains. To cut off the power from the product it is necessary to unplug its power cord from the mains.
If there is no active signal, the monitor will go to suspend mode until an active signal is detected. During suspend mode the status light will blink.

Non ECDIS calibrated monitors:
Monitors: The LED will illuminate Green when the monitor is powered on and red when the monitor is powered down. The LED will be red if no active signal is found.

ECDIS calibrated monitors:
The LED will ONLY illuminate green when the backlight level is at calibrated setting AND ONLY on a calibrated port. If the backlight level isn't at calibrated setting OR an uncalibrated port is used the LED will illuminate orange.

ECDIS calibrated monitors (old units):
The LED will ONLY illuminate orange when the backlight level is at calibrated setting AND ONLY on a calibrated port. If the backlight level isn't at calibrated setting OR an uncalibrated port is used the LED will illuminate green.

Menu:
To activate the OSD menu, press "Menu" and "Enter" buttons at the same time.
See Popup Menu section for details.

UP/DOWN:
Used to adjust backlight or to navigate and adjust settings in menus. Pressing UP and DOWN together will restore the backlight level to the last selected ECDIS mode by the serial link. (See document 04924-001 for protocol details).

ENTER:
This key is used to confirm and to enter the advanced OSD by pressing ENTER and thereafter MENU while holding ENTER pressed.

5 Serial connection pin-out

Pin	RS-232 SUB-D 9-pol female	RS-232 (Touch) SUB-D 9-pol female	RS-422/RS-485 (4 wire) SUB-D 9-pol female	RS-485 (2 wire) SUB-D 9-pol female
1				
2	TX	TX	B (RX-)	B (D-)
3	RX	RX	Y (TX+)	
4				
5	GND	GND	GND	GND
6				
7		RTS	A (RX+)	A (D+)
8		CTS	Z (TX-)	
9				

6 Technical specifications DuraMON C-Line

DuraMON C-Line I/O

Video inputs:	**1 x VGA** **1 x DVI-D** **1 x Display Port 1.2** **Recommended resolution for:** **15" is 1024x768 (4/3)** **19" is 1280x1024 (5/4)** **22", 24" and 27" is 1920x1080 (16/9)** **26" is 1920x1200 (max refresh rate is 60 Hz @ 1920x1200)** Generally all VESA compatible video modes are supported. Special modes supported on request.
Control inputs:	**1 x RS-232 – for remote control.** **1 x RS-422/RS-485 – for remote control / daisy-chain (optional).** **1 x USB for touch sensor (optional).** **1 x Buzzer, (75-85 dB(A) / 1m) (activated by serial command)**

DuraMON C-Line Power Supply Options

Standard:	**100-240 VAC 50/60Hz Nominal Marine**
Optional:	**24 VDC Nominal Marine (15"/19" is available with Dual power option)**

DuraMON C-Line Environmental Conditions

Operating Temperature:	**-15 to 55 °C**
Storage Temperature:	**-25 to 70 °C**
Relative Humidity:	**8 to 90 %**

DuraMON C-Line Approvals

Marine:	**IEC 60945 & IACS E10**
ECDIS, Radar	**IEC 61174, IEC 62288, IEC 62388**

6.1 Specification DuraMON 15" C-Line

Resolution:	1024 × 768
Active Area:	304.1mm x 228.1mm (15.0" diagonal)
Pixel Pitch:	0.297mm x 0.297mm
View angle:	88° (L/R/T/B) (typical)
Luminance:	500 cd/m² (typical)
Contrast ratio:	2500:1 (typical)
Colours:	16.7 mill. (24-bit)
Response Time:	35 ms (GtG) (typical)
Window:	Anti-Reflective coated front glass
Protection:	IP65 front – IP20 rear
Weight:	4.1 Kg
Dimensions (WxHxD):	406mm x 342mm x 63.9mm

6.2 Specification DuraMON 19" C-Line

Resolution:	1280 × 1024
Active Area:	376.320mm x 301.056mm (19.0" diagonal)
Pixel Pitch:	0.294mm x 0.294mm
View angle:	89° (L/R/T/B) (typical)
Viewing distance:	1.02 m
Luminance:	300 cd/m² (typical)
Contrast ratio:	2000:1 (typical)
Colours:	16.7 mill. (24-bit)
Response Time:	20 ms (GtG) (typical)
Window:	Anti-Reflective coated front glass
Protection:	IP65 front – IP20 rear
Weight:	6.5 Kg
Dimensions (WxHxD):	483mm x 419mm x 63.9mm

6.3 Specification DuraMON 22" C-Line

Resolution:	1920 × 1080
Active Area:	476.64mm x 268.11mm (21.53" diagonal)
Pixel Pitch:	0. 2482mm x 0. 2482mm
View angle:	89° (L/R/T/B) (typical)
Luminance:	250 cd/m² (typical)
Contrast ratio:	5000:1 (typical)
Colours:	16.7 mill. (24-bit)
Response Time:	20 ms (GtG) (typical)
Window:	Anti-Reflective coated front glass
Protection:	IP65 front – IP20 rear
Weight:	9 Kg
Dimensions (WxHxD):	552mm x 380mm x 68mm

6.4 Specification DuraMON 24" C-Line

Resolution:	1920 × 1080
Active Area:	521.28mm x 293,22mm (23.6" diagonal)
Pixel Pitch:	0.2715mm x 0.2715mm
View angle:	89° (L/R/T/B) (typical)
Viewing distance:	1.00 m
Luminance:	250 cd/m² (typical)
Contrast ratio:	3000:1 (typical)
Colours:	16.7 mill. (24-bit)
Response Time:	25 ms (GtG) (typical)
Window:	Anti-Reflective coated front glass
Protection:	IP65 front – IP20 rear
Weight:	10 Kg
Dimensions (WxHxD):	599.2mm x 408.3mm x 68mm

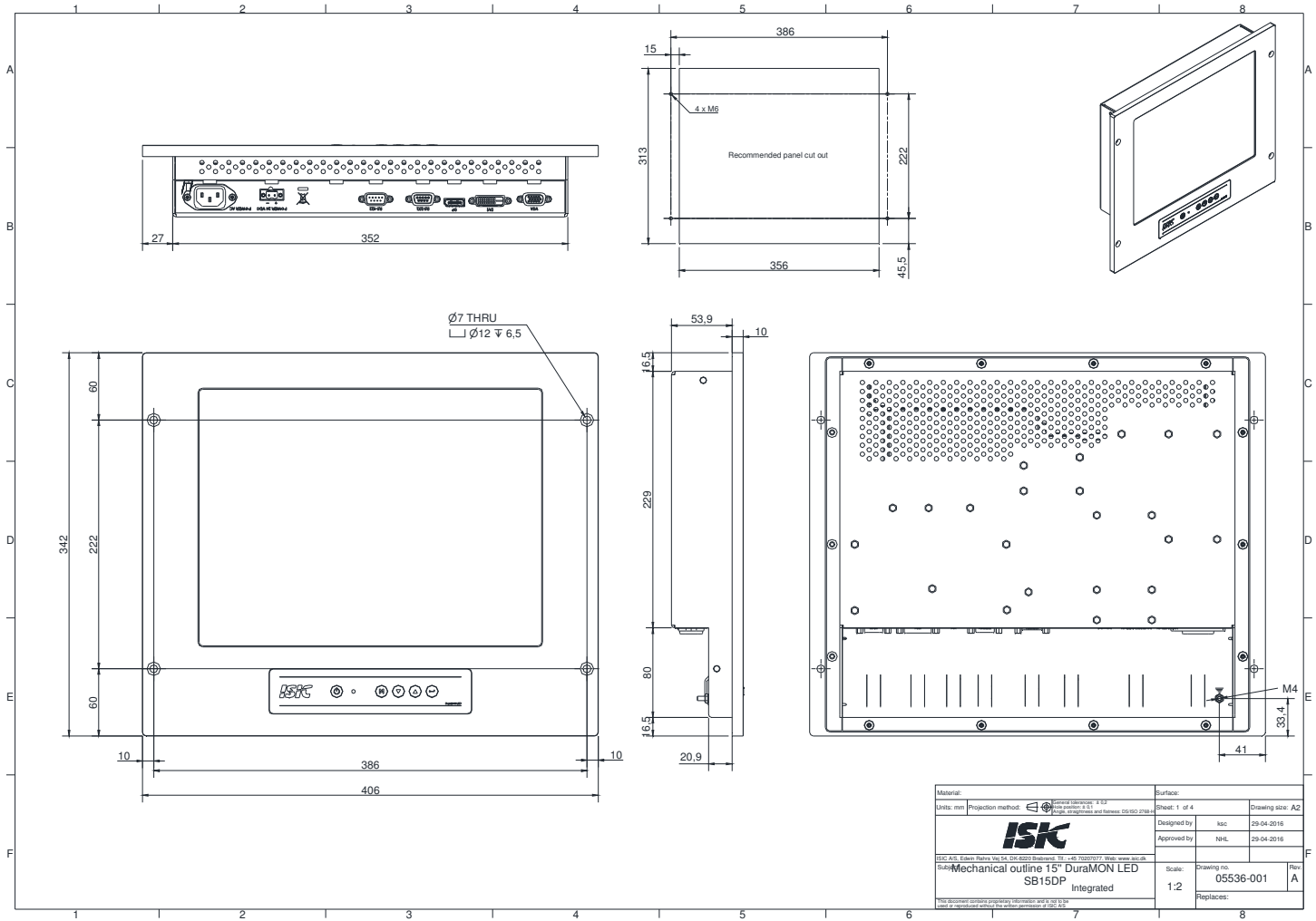
6.5 Specification DuraMON 26" C-Line

Resolution:	1920 × 1200
Active Area:	550.08mm x 343.8mm (25.54" diagonal)
Pixel Pitch:	0.2865mm x 0.2865mm
View angle:	88° (L/R/T/B) (typical)
Viewing distance:	1.02 m
Luminance:	350 cd/m² (typical)
Contrast ratio:	1500:1 (typical)
Colours:	16.7 mill. (24-bit)
Response Time:	20 ms (GtG) (typical)
Window:	Anti-Reflective coated front glass
Protection:	IP65 front – IP20 rear
Weight:	12 Kg
Dimensions (WxHxD):	619mm x 463mm x 98.6mm

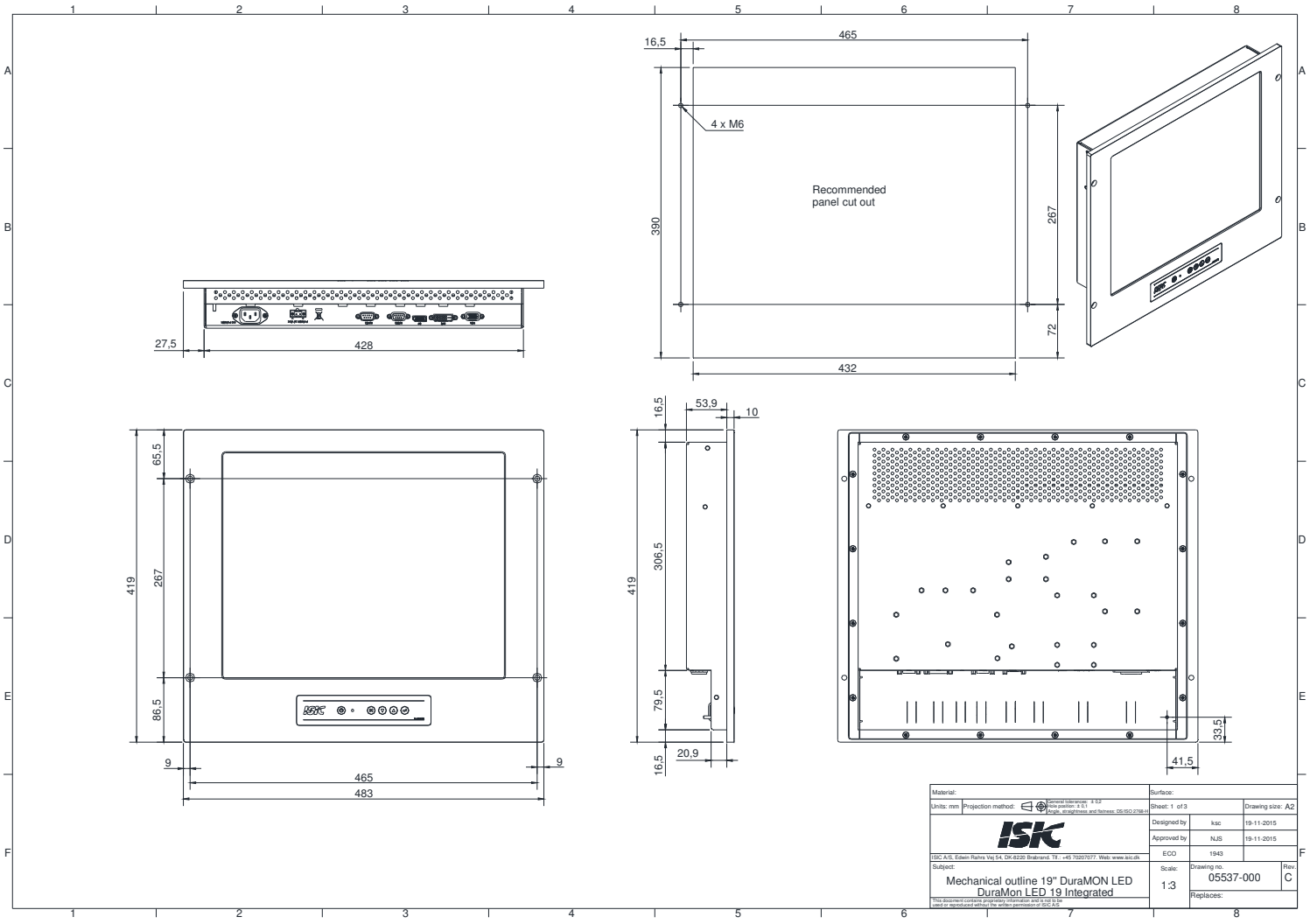
6.6 Specification DuraMON 27" C-Line

Resolution:	1920 × 1080
Active Area:	597.888 mm x 336.312 mm (27" diagonal)
Pixel Pitch:	0.3114mm x 0.3114mm
View angle:	89° (L/R/T/B) (typical)
Viewing distance:	1.08 m
Luminance:	350 cd/m² (typical)
Contrast ratio:	3000:1 (typical)
Colours:	16.7 mill. (24-bit)
Response Time:	14 ms (GtG) (typical)
Window:	Anti-Reflective coated front glass
Protection:	IP65 front – IP20 rear
Weight:	11 Kg
Dimensions (WxHxD):	683.5mm x 451.6mm x 68mm

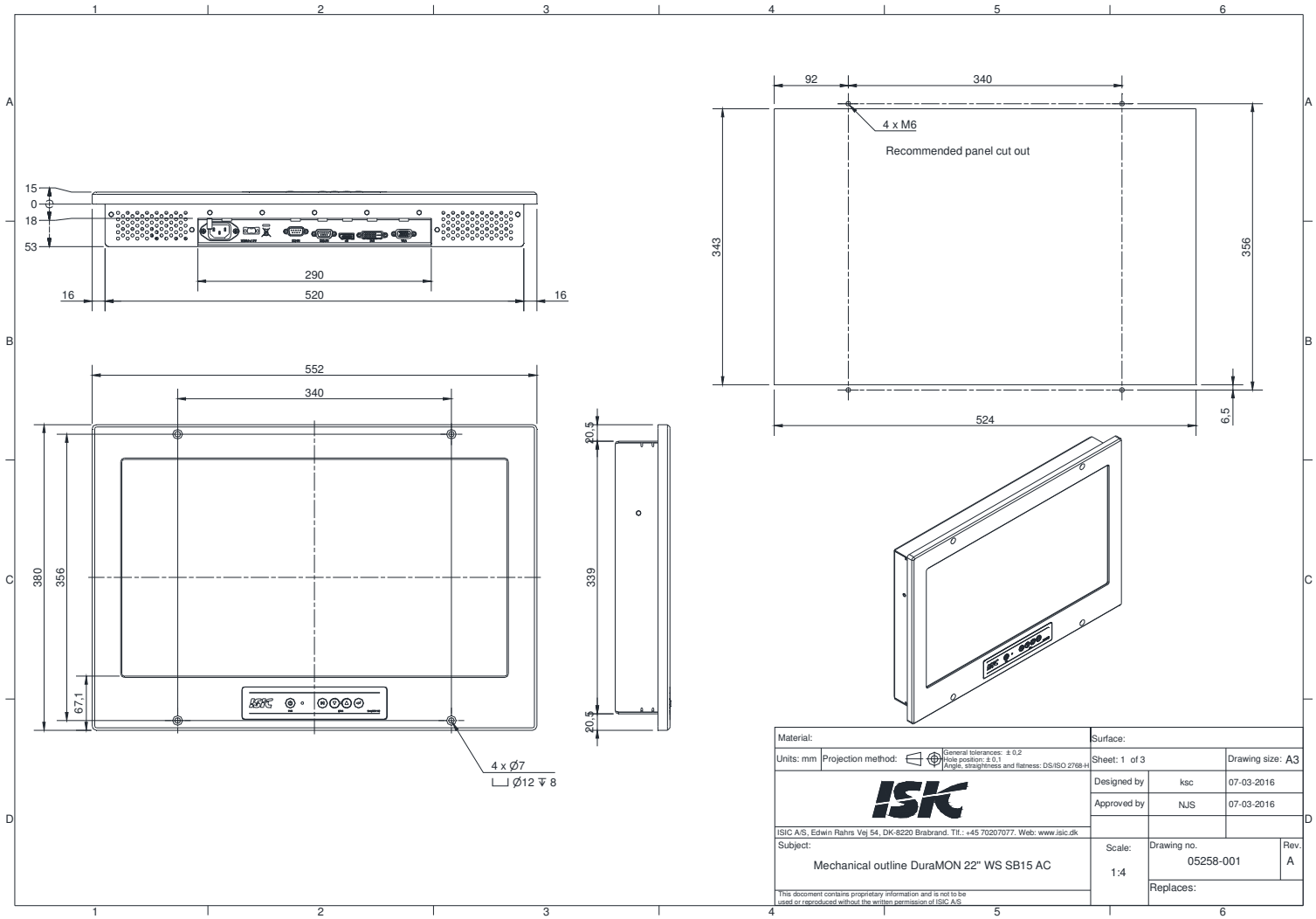
6.7 Mechanical outline DuraMON 15” C-Line



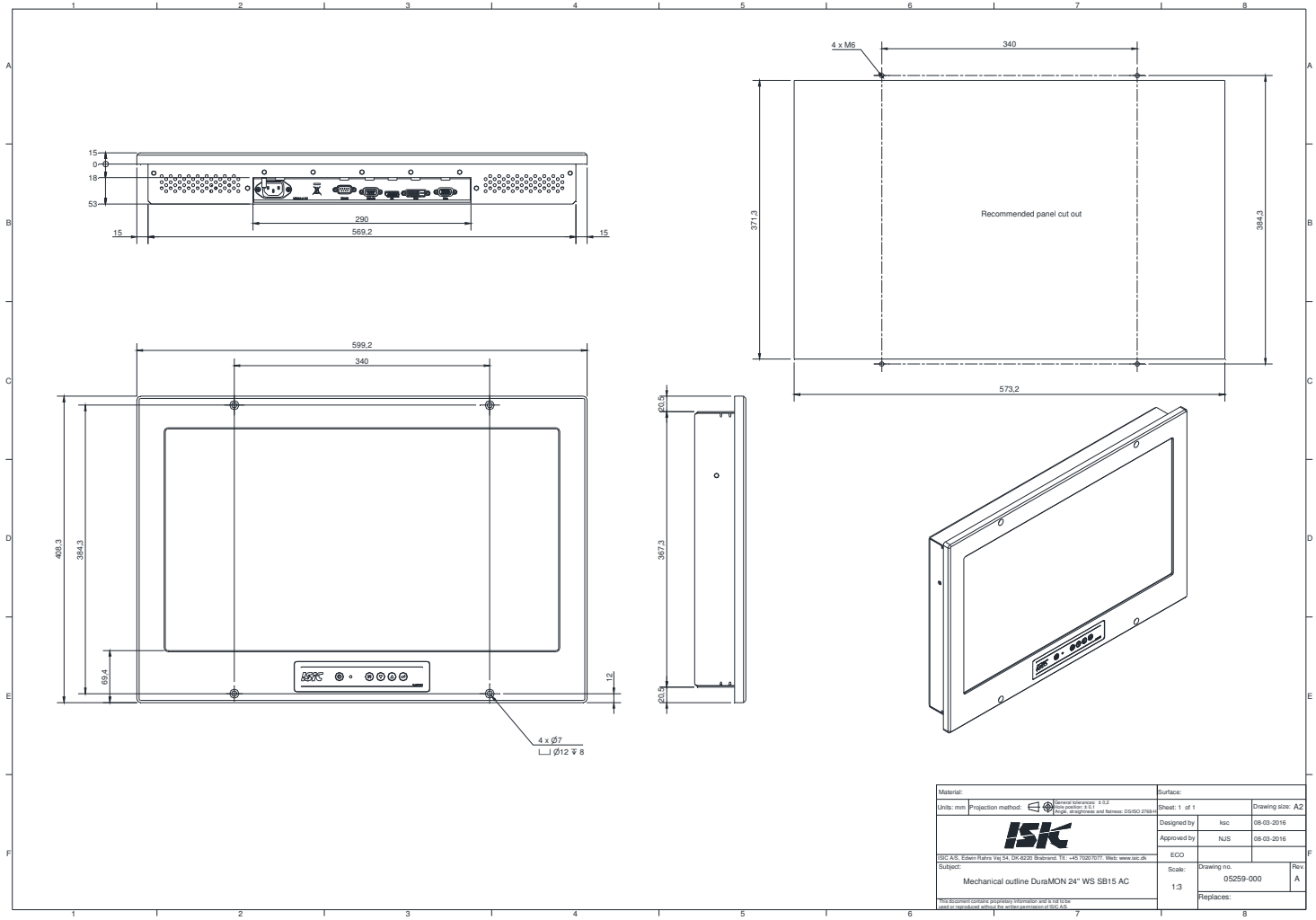
6.8 Mechanical outline DuraMON 19” C-Line



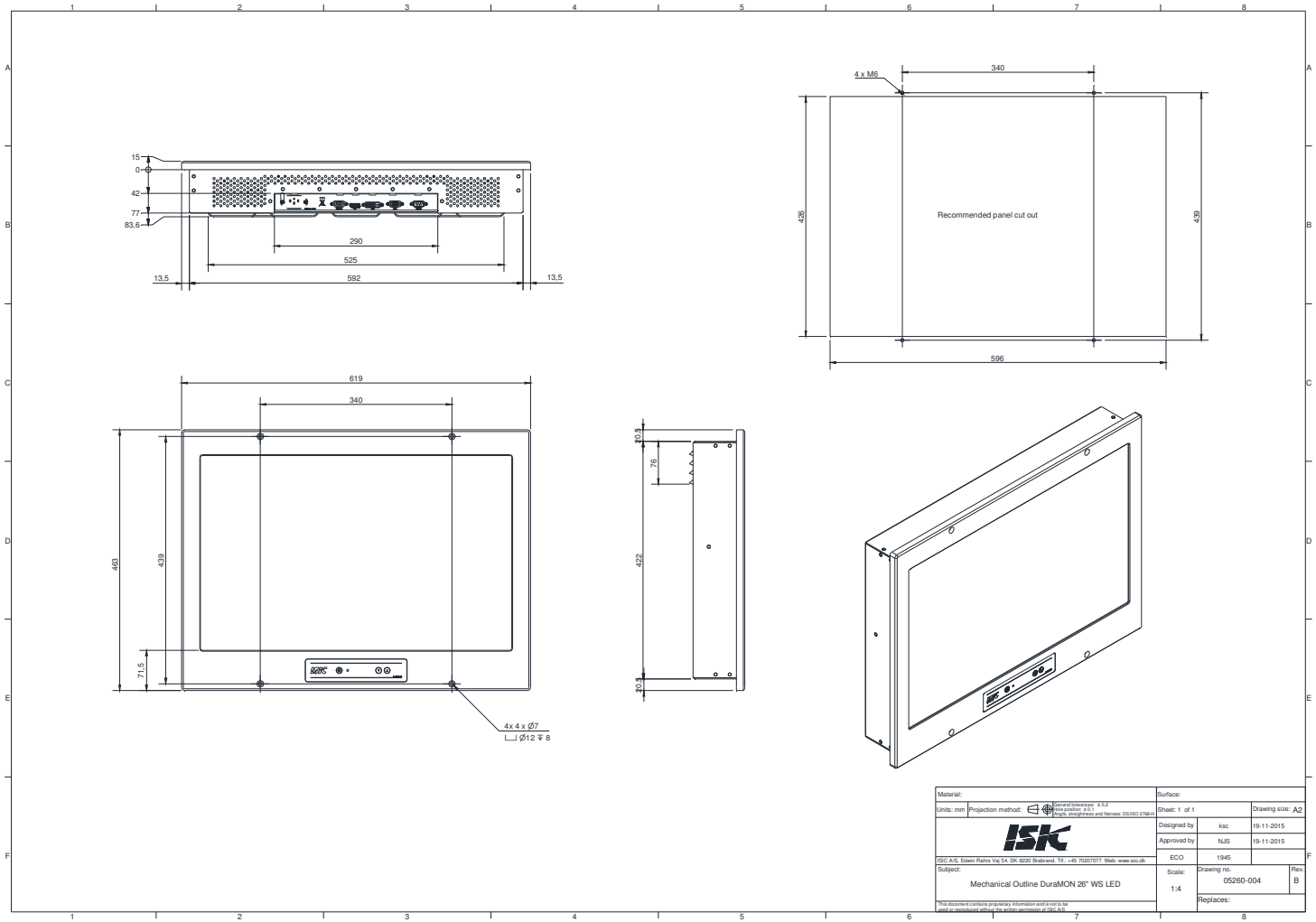
6.9 Mechanical outline DuraMON 22” C-Line



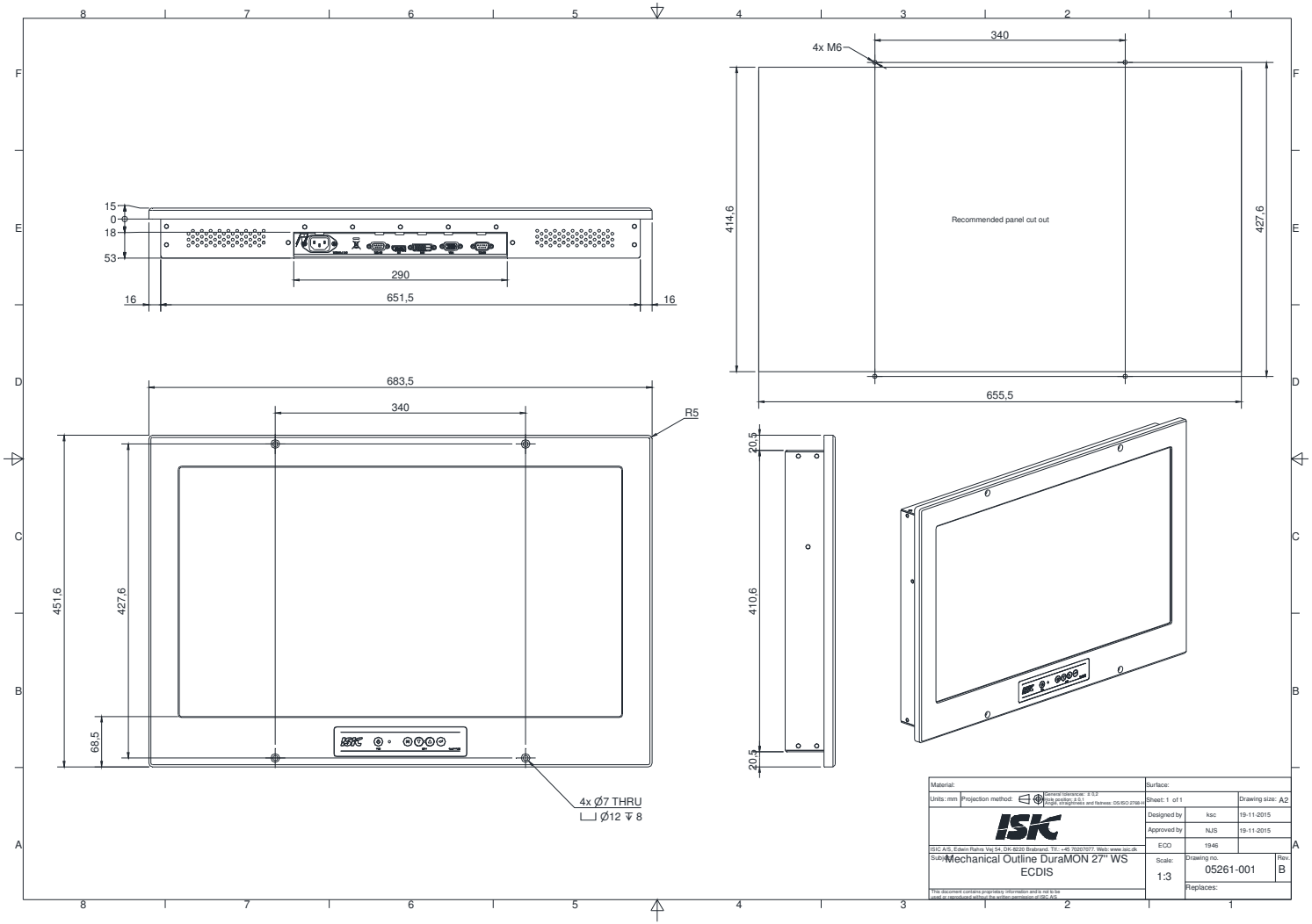
6.10 Mechanical outline DuraMON 24” C-Line



6.11 Mechanical outline DuraMON 26” C-Line



6.12 Mechanical outline DuraMON 27” C-Line



7 ECDIS mode

Be aware that use of the backlight, brightness or contrast controls in ECDIS mode may inhibit visibility of information particularly at night!

To setup ECDIS on the system a color map must be downloaded from the monitor to the ECDIS application. Please see the Dura Serial Communication protocol for details.

8 Dura Serial Communication protocol

See document 04924-001 for protocol details.

The type of the product can be queried by sending the 'TYP' command, ref. the Serial Protocol Document.

Monitor	Typ response from monitor
DuraMON 15" C-Line	DuraMON 15
DuraMON 19" C-Line	DuraMON 19
DuraMON 22" C-Line	DuraMON 22
DuraMON 24" C-Line	DuraMON 24
DuraMON 26" C-Line	DuraMON 26
DuraMON 27" C-Line	DuraMON 27

9 Compass safe distance

Test object / condition	Minimum Compass safe distance [cm] (5.4°/H deviation or a horizontal magnetic flux of 0.094µT)	Minimum Compass safe distance [cm] (18°/H deviation or a horizontal magnetic flux of 0.313µT)
DuraMON 15" C-Line	165	110
DuraMON 19" C-Line	65	35
DuraMON 22" C-Line	175	110
DuraMON 24" C-Line	215	140
DuraMON 26" C-Line	225	135
DuraMON 27" C-Line	180	110

10 Power Consumption

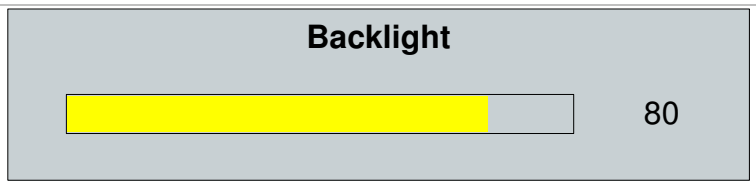
Test object / condition	Ptyp [W]	Pmax [W]
DuraMON 15" C-Line	18	30
DuraMON 19" C-Line	35	45
DuraMON 22" C-Line	31	35
DuraMON 24" C-Line	25	30
DuraMON 26" C-Line	50	60
DuraMON 27" C-Line	30	45

11 Inrush current

Test object / condition	24 [VDC]	115 [VAC]	230 [VAC]
DuraMON 15" C-Line	105	55	100
DuraMON 19" C-Line	105	55	100
DuraMON 22" C-Line	105	55	100
DuraMON 24" C-Line	105	55	100
DuraMON 26" C-Line	105	60	110
DuraMON 27" C-Line	105	55	100

12 Popup Menu

Without entering the OSD menu it is possible to adjust brightness by pressing “up” or “down” key.

Press “up” or “down”		It is now possible to adjust the backlight level by pressing either up- or down key.

12.1 Advanced OSD

With the Advanced OSD (On Screen Display) you can modify the settings and control the special features of the DuraMON as described on the next pages.

To enter the Advanced OSD, press both the “ENTER” and the “MENU” button at the same time.

To navigate the Advanced OSD use the “UP” and “DOWN” buttons and press “ENTER” to select a specific setting. To get back to the previous menu point, press the “MENU” button.

12.2 Input select

Input Select – Main Picture Channel		Input Select – Scan Input	
	The Main Picture Channel can be selected between all available inputs (VGA, Display Port and DVI.		Scans Inputs for active source. Default is On.

12.3 VGA Adjustments

Image Adjustments – Auto Adjust			Image Adjustments – Clock	
	Selecting auto adjust will force the system to adjust the image (clock, phase, bandwith and position)			The pixel clock for VGA can be selected here.
Image Adjustments – Phase			Image Adjustments – Hor. Position	
	The phase of the display can be set for VGA.			The horizontal position of the picture can be set here.

Image Adjustments – Vert. Position	
	The vertical position of the picture can be set here.

12.4 Color adjustments (not available in ECDIS mode)

Color Adjustment – Backlight			Color Adjustment – Brightness	
	It is possible to set the backlight level. Default is 50%. *Unless popups or OSD is present it is possible to press the "UP" or "DOWN" button to adjust the backlight level and then press "ENTER" afterwards.*			It is possible to set the brightness level. Default is 50%.

Color Adjustment – Contrast			Color Adjustment – Saturation	
	It is possible to set the Contrast level. Default is 50%.			It is possible to set the color saturation level. Default is 50%.
Color Adjustment – Hue			**Color Adjustment – Auto Color Adjust**	
	It is possible to set the Hue level. Default is 50%.			It is possible to set use the command Auto Color Adjust.

12.5 Advanced Color (not available in ECDIS mode)

Adv. Color Settings – Gamma	
	It is possible to set the Gamma Default is Native.

Adv. Color Settings – Color Temp	
	It is possible to set the Color Temperature. Default is User.

Adv. Color Settings – Red/Green/Blue	
	The rate for Red/Green/Blue can be set here from 0 – 255. Default is 255/255/255 Note: These values are only adjustable when Color Temperature is set to 'User'

12.6 OSD settings

OSD Settings – Menu Timeout			OSD Settings – Menu Hor. Pos.	
	The Menu Timeout period can be set between 0 and 60 seconds in steps of 5 seconds. Default is 30 seconds			The Horizontal Position of the OSD can be set from 0 (left margin) to 100 (right margin). Default is 0 (left margin).
OSD Settings – Menu Vert. Pos.			**OSD Settings – Transparency**	
	The Vertical Position of the OSD can be set from 0 (upper margin) to 100 (bottom margin). Default is 50 (center of the display)			The transparency of both the OSD and the Popup can be selected from 0 (solid) to 15 (clear) Default is 2

12.7 System settings

System Settings – Aspect Ratio			System Settings – Load Factory Defaults	
	Change Aspect Ratio. Default is Full.			Reset the monitor to factory settings.

13 Troubleshooting

Problem	Cause	Solutions
No picture on display	Backlight level set to minimum	Increase backlight
No picture on display	Monitor turned off	Turn on the monitor
No picture on display	No input signal present	Apply signal
No picture on display	No power cord connected	Apply power
Buttons on front doesn't work	Unit in ECDIS mode	Press Menu + Enter to unlock the monitor
No picture on display	No power cord connected	Apply power
Buttons on front doesn't work	Keypad defect	Please do not try to open the unit. Send it to ISIC A/S for repair.
The unit will not turn on.	Unknown	Please do not try to open the unit. Send it to ISIC A/S for repair.

14 Servicing the unit

In case that the unit still fails after following the troubleshooting send the unit to ISIC for repair. There are no user serviceable parts inside and to ensure ECDIS compliance the monitor has to be recalibrated at ISIC.

15 Terms, Acronyms and abbreviations

Communication protocol:	Use a serial link to control various settings in the monitor
DVI-D:	Digital Visual Interface
ECDIS:	Electronic Chart Display and Information System
GtG:	Grey to Grey
IP20:	International Protection Rating (protected against objects with a size larger than 12.5mm)
IP65:	International Protection Rating (dust tight and protected against water jets)
OSD:	On Screen Display
VGA:	Video Graphics Array
DP:	Display Port
HDMI:	High-Definition Multimedia Interface

16 ISIC info / Support

In case you have inquiries or problems with your DuraMON, you have a number of possibilities to get support.

Company name:	ISIC A/S
Head office:	Edwin Rahrs Vej 54 DK – 8220 Brabrand Denmark
Shipping address:	Holmstrupgaardvej 5 DK-8220 Brabrand Denmark
Telephone:	+45 70 20 70 77
Mail: www:	isic@isic-systems.com www.isic-systems.com
VAT number:	DK 16 70 45 39
Bank Address:	Danske Bank A/S Holmens Kanal 2-12 DK-1092 København K Denmark
Bank Code: IBAN DKK: IBAN EUR: IBAN USD: SWIFT:	3000 DK51 3000 0013 6133 11 DK30 3000 4073 0448 71 DK77 3000 4073 0448 98 DABADKKK
Contacts: RFQ's:	By mail to sales@isic-systems.com
Orders:	By mail to orders@isic-systems.com
Support:	Via homepage www.isic-systems.com under aftersales By mail to service@isic-systems.com During office-hours (Mo-Fr: CET 0800 - 1600) at +45 70 20 70 77
Service:	Before shipment for service Request Return Material Authorisation number at homepage http://www.isic-systems.com/aftersales/tech-support-rma/ By mail to service@isic-systems.com

17 Revision history

Rev A	June 2016	First release
Rev B		**Page 14,** corrected vert position and transparency in bottom menu. **Page 18**, view distance for 27" changed to 1.08m
Rev C	2018	**Page 2**, remove ISIC PN Move OSD menu to end of manual **Page 4,** changed dimming from 0% to 1cd **Page 9**, changed DC voltage to 18-31VDC, added resolution for 15" and 22", added RS232 touch interface for 19" **Page 10,11**, changed weight of monitors, changed brightness of 27" to 300 cd, view distance for 24" changed to 1.00m, changed weight for 26" to 12Kg. **Page 20**, changed compass distance for 15" to 110
Rev D	Marts, 2018	**Page 9,** changed the ECDIS color
Rev E	Aug. 2025	General update

18 Appendix A: Pixel policy

ISO 9241-307:2008 guidelines for LCD pixel defects

Introduction

TFT displays consist of a set number of pixels. Each pixel consists of 3 sub-pixels also called dots (one red, one blue and one green). Every sub-pixel is addressed by its own transistor. As a result, the manufacturing of glass substrate is very complex.
Due to the nature of this manufacturing process, occasional defects can occur. Pixel defects or failures cannot be fixed or repaired and may occur at any stage during the service life of the TFT display.
To regulate the acceptability of defects and protect the end user, ISIC A/S complies with the ISO 9241-307:2008 standard. This standard recommends how many defects are considered acceptable in a display, before it should be replaced within the terms of the warranty.

Monitor classification

ISO 9241-307:2008

Allowed defects per type per million pixels						
Defect classes	**Pixel defects**			**Cluster defect**		
	Type 1	**Type 2**	**Type 3 total** ($2xN_{3a} + N_{3b}$)	**Type 1**	**Type 2**	**Type 3**
Class: 0	0	0	0	0	0	0
Class: I	1	1	5	0	0	0
Class: II	2	2	10	0	0	1
Class: III	5	15	100	0	0	5

ISIC TFT monitors comply with ISO 9241-307:2008 Class II.
Special agreements about other classifications can be made between ISIC A/S and the customer.

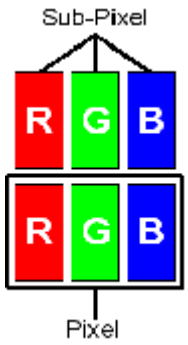
Measurement method/monitoring conditions for pixel defects

In compliance with the ISO-9241-307:2008 standard, the following conditions are observed:

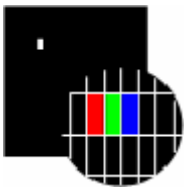
- Final check for pixel fault undertaken right after burn-in, i.e. with pre-heating of the display.
- Surrounding temperature 25ºC ± 5ºC
- Relative air humidity 40–70%

Pixel definition

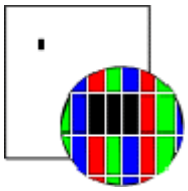
Every pixel consists of three sub-pixels/dots (red, blue, green).
Every sub-pixel has its own transistor.
The three sub-pixels/dots must be considered as one unit.



Pixel

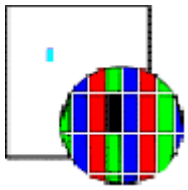


Pixel defect type 1 Pixel constantly lit



Pixel defect type 2 Pixel constantly dark

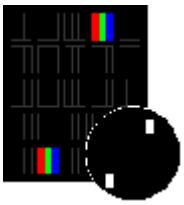
Pixel defect type 3a
Sub-pixel/dot (red, blue, green) constantly lit



Pixel defect type 3b
Sub-pixel/dot (red, blue, green) constantly dark

Cluster

A cluster consists of 5 x 5 pixels.

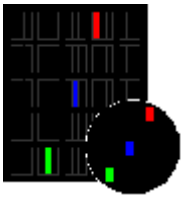


Cluster pixel defect type 1

Pixels in a cluster area constantly lit

Cluster pixel defect type 2

Pixels in a cluster area constantly dark



Cluster pixel defect type 3a
Sub-pixels/dots in a cluster area constantly lit

Cluster pixel defect type 3b
Sub-pixels/dots in a cluster area constantly dark

Pixel faults accepted by ISIC A/S

The maximum number of pixel faults that is considered acceptable at different screen resolutions is shown in the table below.

This is the native resolution and not the resolution as adjusted by user.

Class II

Allowable number of pixel faults in monitor applications							
Screen type	**Native resolution**	**Number of pixels**	**Pixel defect type 1**	**Pixel defect type 2**	**Pixel defect Type 3 total** ($2xN_{3a} + N_{3b}$)	**Cluster defect type 1 and 2**	**Cluster defect type 3**
WVGA	**800x480**	**384,000**	**0**	**0**	**3**	**0**	**0**
XGA	**1024x768**	**768,432**	**1**	**1**	**7**	**0**	**0**
WXGA	**1280x800**	**1,024,000**	**2**	**2**	**10**	**0**	**1**
SXGA	**1280x1024**	**1,310,720**	**2**	**2**	**13**	**0**	**1**
UXGA	**1600x1200**	**1,920,000**	**3**	**3**	**19**	**0**	**1**
FHD	**1920x1080**	**2,073,600**	**4**	**4**	**20**	**0**	**2**
WUXGA	**1920x1200**	**2,304,000**	**4**	**4**	**23**	**0**	**2**

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