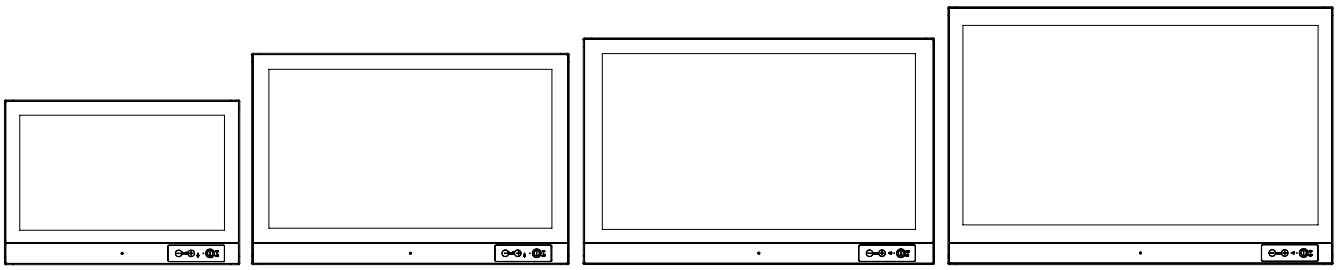
HATTELAND TECHNOLOGY
an EMBRON Company

USER MANUAL



Series E - Maritime Multi Computer (MMC) Models

HD 16T30 MMC-xxx-xxxxxx - 15.6 inch Maritime Multi Computer
HD 21T30 MMC-xxx-xxxxxx - 21.5 inch Maritime Multi Computer
HD 24T30 MMC-xxx-xxxxxx - 23.8 inch Maritime Multi Computer
HD 27T30 MMC-xxx-xxxxxx - 27.0 inch Maritime Multi Computer

(where x=configurations/factory options)

User Manual MMC Series E	
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Please visit www.hattelandtechnology.com for the latest electronic version of this manual.

Contents

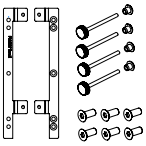
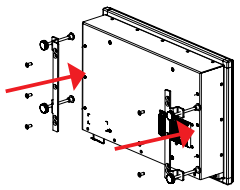
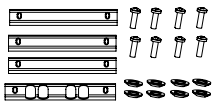
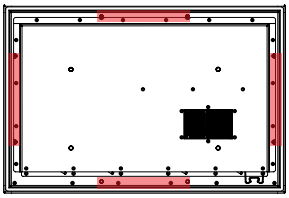
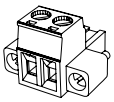
Contents

Contents

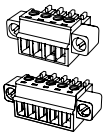
Contents

Contents of package

Note: Entries listed below are for Standard factory shipments. Customized factory shipments may deviate from this list.

Item	Description	Illustration
 TP52/TC01-1,8M	1 x Power Cable (Black) European Type F “Schuko” to IEC. Length 1.8m	
 TP11/TC01-1,8M	1 x Power Cable (Black) US Type B plug to IEC. Length 1.8m	
	Test Reports papers: 1 x Product Declaration 1 x Computer Checklist 1 x BurnInTest Certificate	
 HD CMB SE1-A1	HD 16T30 MMC - EN60945 Tested Bracket Kit suitable for console/panel mounting which contains: 4 x KNURLED KNOB M5 UMBR. Ø=17 mm, 038 0500 599 05 - BLACK (222 38-5 BLACK) 4 x Screw DIN 912 M5x70 UMB. A4 (145 050x070 912 A4) 4 x RAMPA-CAP NUTS TYPE RF 10 15 X 9 M5, STEEL ZINC PL. HEX4 (025509001) 6 x 145 050x012 SZF CSK Screws M5x12 Hex Zinc blank. Kval. 10.9 2 x P022317#02 Suitable for panel thickness min: 3.00 [0.12”] to over 10.00 [0.39”] mm [inch].	
 HD CMB SE1-B1	HD 21T30 MMC / HD 24T30 MMC / HD 27T30 MMC Bracket Kit suitable for console/panel mounting which contains: 8 x 145 050x016 A4T (M5x16 Pan Head screw ISO 14583 Torx, A4) 8 x 9991041 (6.4 X 12 X 2.3 Washer DIN6319-C A4 SF) 3 x P025485#01 (Bracket A HD CMB SE1-B1) 1 x P025487#01 (Bracket B HD CMB SE1-B1) Suitable for panel thickness min: 2.00 [0.08] to max 40.00 [1.57”] mm [inch].	
 1961986	Terminal Block Connector Kit as follows (may in some cases be already factory mounted): 1 x 2-pin Terminal Block 5.08 (1961986) for DC Power In Refer to “Configuring Housing / Terminal Block Connector” section for usage.	 Note: Location may differ between unit sizes

Package may also include: (based on accessories/options ordered)

Item	Description	Illustration
 Terminal Block Connector Kit	Depending on factory mounted options, Terminal Bracket Connector kit as follows: 2 x 4-pin Terminal Block 3.81 for CAN Interface (ZIA0001310-B / ZIA0001310-SLCAN) 4 x 5-pin Terminal Block 3.81 for RS-422/RS-485 NMEA (PCA200828) 4 x 5-pin Terminal Block 3.81 for Digital Input/Output (PCA100297-1)	 Note: Location of module(s) may differ between unit sizes

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General

IEC62368 policy - Introduction

Safety Instructions

Please read and understand the material in the manual in its entirety before doing any installation/servicing/upgrades. Personnel who are allowed to do work on the unit is detailed in the **"IEC62368 policy for Hatteland Technology product"** section later in this manual. Symbols pertaining to different personnel in regard to operations is described in the user manual.

Based on requirements EN 62368-1:2014 and IEC 62368-1:2018

Authority	Description
Children 	This equipment is not suitable for use in locations where children are likely to be present.
Ordinary person/ Sailor/End-User 	Not allowed to open unit. Not allowed to install the unit. Not allowed to terminate/connect cables to the unit.
Instructed person 	Allowed to open hatches/latches which does not require tools, such as Disktrays. Allowed to open "battery-hatch" to change the battery even if tools are required. Allowed to install the unit. Allowed to terminate/connect cables to the unit indoors.
Skilled person 	Allowed to open and disassemble the unit. Allowed to install the unit. Allowed to terminate/connect cables to the unit indoors and outdoors. Allowed to terminate/connect earth/ground wire. Note: Be aware that additional definition for "skilled person" may apply, country dependent.

Hatteland Technology AS

About this manual

The manual contains electrical, mechanical and input/output signal specifications. All specifications in this manual, due to manufacturing, new revisions and approvals, are subject to change without notice. However, the last updated and revision date of this manual are shown both on the frontpage and also in the “Revision History” chapter. This user manual is a standard/general manual that applies to all variations of its product family, i.e. deviation from actual configuration may exist.

About Hatteland Technology

Hatteland Technology is the leading technology provider of specialized display and computer products, delivering high quality, unique and customized solutions to the international maritime, naval and industrial markets.

The company represents innovation and quality to the system integrators worldwide. Effective quality assurance and investment in sophisticated in-house manufacturing methods and facilities enable us to deliver Type Approved and Mil tested products. Our customer-oriented approach, technical knowledge and dedication to R&D, makes us a trusted and preferred supplier of approved solutions, which are backed up by a strong service network.

www.hattelandtechnology.com

You will find our website full of useful information to help you make an informed choice as to the right product for your needs. You will find detailed product descriptions and specifications for the entire range on Displays, Computers and Panel Computers, Military solutions as well as the range of supporting accessories. The site carries a wealth of information regarding our product testing and approvals in addition to company contact information for our various offices around the world, the global service locations and the technical help desk, all ensuring the best possible support wherever you, or your vessel, may be in the world.

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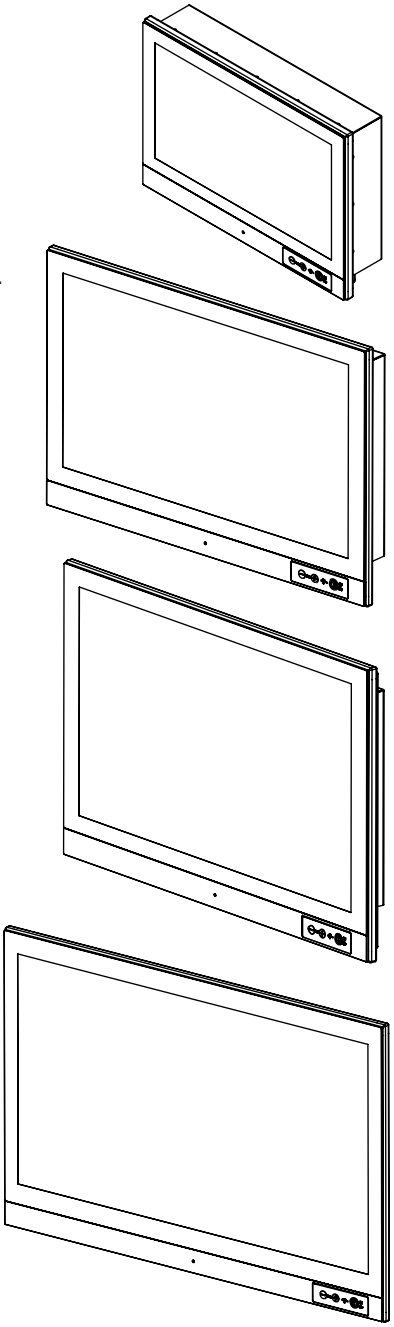
For an up-2-date list, please visit https://www.hattelandtechnology.com/contact

Maritime Multi Computer (MMC) Series E - Introduction



Series E is the new cost effective Panel Computers portfolio from Hatteland Technology. Designed for 10 years manufacturing, all Series E Panel Computers integrate Intel® Apollo Lake processor-based computers, high quality display technology, fan-less design and low power consumption to deliver a fast, reliable all-in-one solution for diverse maritime applications.

The integrated nature of Series E Panel Computers enables tangible cost savings for maritime technology and equipment manufacturers as well as systems integrators. The portfolio features a range of display sizes, new data storage technology and a number of IO options, providing full flexibility to integrate the highest quality displays in a wider range of maritime technology. Especially suited to developing new bridge solutions, Series E Panel Computers make it possible to continue improving safety and efficiency through safe navigation, while still retaining focus on quality and cost.

Series E Panel Computers also meet the same extreme quality standards as the proven Series X Panel Computer range and feature LED Backlight Technology, full dimming (0-100%) all as standard. In addition there are options such as Multi-Power (AC/DC) inputs or Single AC input, SSD and m.2 storage mediums and Multiple interface configurations. The product range can also accommodate and combine multi-touch screen and optical bonding.

Cost effective Panel Computers...

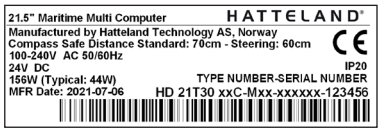
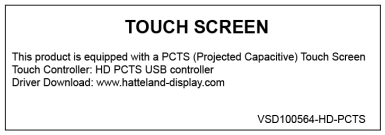
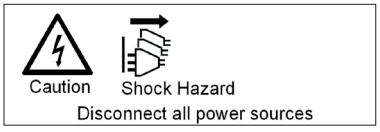
- Intel® Apollo Lake processor
- Fan-Less Design
- LED Backlight Technology
- Full Dimming 100%,
- Low Power Consumption
- Multi-Power Option
- Superior Optical Bonding Option
- Multi-Touch Option
- EN60945 Tested
- Type Approved EU-RO-MR
- ECDIS Compliant

Product Labeling

Introduction

This section details the locations, content details and specifications for factory mounted labels for all currently available standard Hatteland Technology Panel Computer (MMC) models. This information will in most cases also apply for most Customized Models as well, but may differ based on customer requirements, in that case, please refer to the customized User Manual (paper or electronic version, dependent on customer requirements).

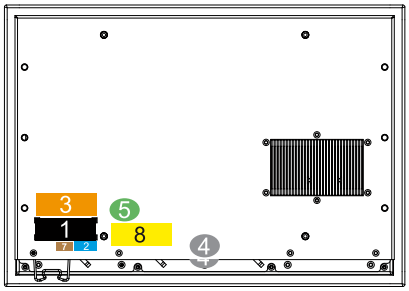
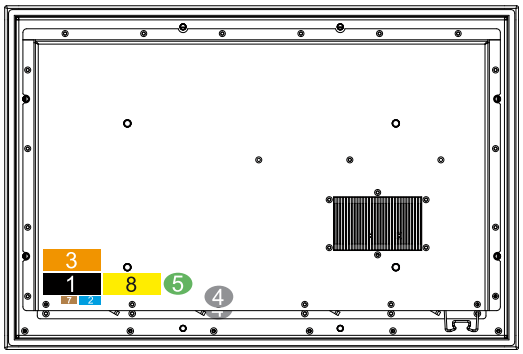
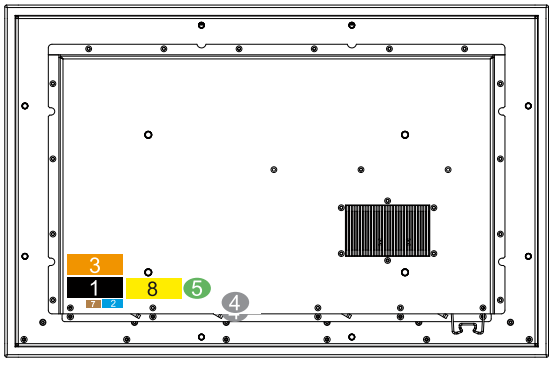
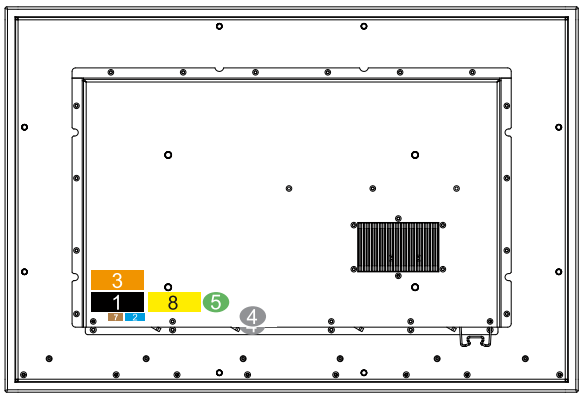
Label Size and Types

ID	Label Layout	Description	Specification
1		**Type : Serial Number Label** **Name** : Label B **Size** : 60mm wide x 20mm high (rectangle size) Note: Text content of label will match specifications derived from Data Sheet.	Silver with glue on back, non-tearable and made for thermal transfer printing.
		Barcode type: CODE128 (used extensively world wide in shipping and packaging industries. The symbology was formerly defined as ISO/IEC 15417:2007.)	
2		**Type : Operating System (OS) label.** **Size** : 70mm wide x 23mm high (rectangle size) Note: Label only present if OS was part of factory option order. Linux OS does not have any label.	As per delivered from supplier. Label applies for: Windows® 7 Professional Windows® 7 Ultimate
2		**Type : Operating System (OS) label.** **Size** : 22mm wide x 9mm high (rectangle size) Note: Label only present if OS was part of factory option order. Linux OS does not have any label.	As per delivered from supplier. Label applies for: Windows® 10 IoT Enterprise
3		**Type : Touch Screen Label** **Name** : Label B **Size** : 60mm wide x 20mm high (rectangle size) Note: Only present if Touch Screen was part of factory option order.	Silver with glue on back, non-tearable and made for thermal transfer printing.
		Note: Content on label will vary based on Touch Screen type and/or Touch Screen Controller. Label shown to the right is for illustration purposes only!	
4		**Type : Warranty Label** **Size** : 30mm wide x 23mm high (oval size) **Amount** : 2 pcs	Tamper-proof sticker with glue on back.
5		**Type : Quality Control (QC) Label** **Size** : 30mm wide x 23mm high (oval size)	Ordinary sticker with glue on back.
7		**Type : Handling Symbols Label** **Size** : 16mm wide x 8mm high (rectangle size) Symbols indicate Cadmium Free product and proper waste handling required.	FLEXcon®PHARMcal®V 400 F WhiteTC-848V-23 TRACrite™150
8		**Type : Shock Hazard Caution Label** **Name : Label B** Size : 60mm wide x 20mm high (rectangle size)	Silver with glue on back, non-tearable and made for thermal transfer printing.
		Rules specified in IEC62368-1:2018 annex L.8 and F.5. Applies for units with Dual/Multi-Power inputs only (more than 1 Power Input).	

Product Labeling

Label Locations

Number ID and coloring based on “Label Size and Types“ table from previous page. All illustrations below are seen from rear (and side where needed) with connectors facing down. Actual labels regarding its size and text orientation vs product size is drawn in. Due to space restrictions on selected units, some labels will be rotated 90 degrees to fit properly. The arrangement of labels may be shifted/stacked differently as it is based on factory options, such as; Touch Screen and Operating System (OS), but they will be grouped together where possible.

Label Positions	Notes	Applies for Product Range
	Warranty labels covers screw. Labels placed on rear. 1 on rear chassis 1 on terminal plate	**HD 16T30 MMC-xxx-xxxxxx**
	Warranty labels covers screw. Labels placed on rear. 1 on rear chassis 1 on terminal plate	**HD 21T30 MMC-xxx-xxxxxx**
	Warranty labels covers screw. Labels placed on rear. 1 on rear chassis 1 on terminal plate	**HD 24T30 MMC-xxx-xxxxxx**
	Warranty labels covers screw. Labels placed on rear. 1 on rear chassis 1 on terminal plate	**HD 27T30 MMC-xxx-xxxxxx**

Product Labeling

Warranty Label

If you are to perform service on a unit still under warranty, any warranty will be void if this label show signs of removal attempts or damaged by screw driver. This label is located on the back of the product and covers a key screw. This is to aid service departments in determining if there has been any unauthorized service on a unit still under warranty.

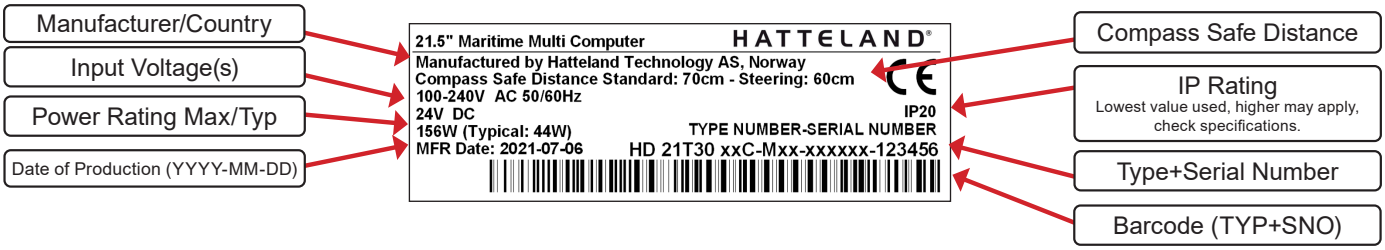
Quality Control (QC) Label

This label indicates that the unit is produced, tested and packed according to the manufacture's QA specifications. It will include a Personal ID and signature by the personnel responsible for approving the unit in production, testing and warehouse departments.

Handling Symbols Label

Ecodesign Requirements for Electronic Displays. The European Union published the Regulation 2019/2021 with specific environmental ecodesign requirements for various types of electronic displays, such as TVs, monitors, and digital signage displays.
Reference: https://www.enviropass.ca/2021/03/01/5-ecodesign-requirements-for-electronic-displays/

Serial Number Label Layout (example)



Please note that typenumber shown above is a generic sample only. May not reflect products mentioned in this manual. Please review actual product S/N label.

Introduction to products with touch screen

Nearly all of our products with touch screen use Projected Capacitive Touch screen (PCTS), widely used with great success on mobile phones and typical pad devices. PCTS can be equally effective also for marine applications. One of the advantages of PCTS is that it has features seen in both resistive and surface capacitive touch screen technologies.

Multitouch is defined as the ability to recognize two or more simultaneous touch points. Using projected capacitive technology allows us to create a more intuitive form of human-device interaction. Touch interface gestures, supported by projected capacitive sensors, can simplify the interface and provide an intuitive user experience that goes beyond the typical "button replacement" found in most simple touch interfaces.

Please review the appropriate Product Datasheet (in this manual) to determine if PCTS are supported and/or its advanced features of additional touch methods (example Tactor and Active Stylus Pen) are available.

The technical benefits of PCTS are:
- Very good optical performance (same as surface capacitive)

- Environmentally strong, the touch sensor is inside the product (better than both surface capacitive and resistive)

- Supports Multitouch (Newer Operating System (OS) required in most cases.

- Excellent readability - light transmission of up to 91% through a standard sensor

- Stability - no drift, therefore no recalibration is required

- Pointing device - works with gloved and ungloved finger

- Resistance to contamination - by harsh cleaning fluids and other noxious substances

- Communicates via USB to external computer or internally

Comparisons between general Touch Technologies used by Hatteland Technology:

Technology	Optical Performance	Gloves	Water	Durability	Multitouch	Stylus	Objects (Tactor)
Analog Resistive	- -	+ +	+ +	-	-	-	- -
Surface Capacitive	+ +	- -	-	+	-	-	- -
Projected Capacitive	+ +	+	+ *	+ +	+ +	+ +	+ +

*Projected Capacitive (PCTS) / Water: Touch Screen Glass Surface can withstand drip and direct rain, but expect reduced capability, detection and performance if units are exposed to these factors while powered. Hatteland Technology recommends protecting the unit from direct rain or drips if critical touch operations are to be performed. Take necessary steps (if detected or suspected) within the installation environment to prevent accidental touch gestures or presses not performed intentionally by a human operator.

Touch Screen Drivers

All units with Touch Screens are automatically detected by the Operating System via HID. There is no need to install additional Third-Party touch screen drivers.

Microsoft® Windows® 10 IoT
- Please use Windows® Generic HID driver, no specific driver needed to use multi-touch.

Linux
- Please use Linux Generic Touch driver. Use kernel 4.10 or later.

If you experience any deviation in the touch input accuracy, consider re-calibrating the touch screen for your system. Please use the standard Operating System functionality to calibrate.

Example for Microsoft® Windows® 10 IoT:
1.Open Control Panel.
2.Click on Hardware and Sound.
3.Under “Tablet PC Settings”, click the Calibrate the screen for pen or touch input link.
4.Under “Display options”, select the display (if applicable).
5.Click the Calibrate button.
6.Select the Touch input option.

Note for units equipped with an PCTS (Projected Capacitive) Touch Screen:

Maritime Multi Computer (MMC, Panel Computer) uses internal USB connection and can be controlled by the Operating System (OS). So, in order to clean the glass without any touch screen movement being detected, you either have to shut down the Operating System (either via customized functions from within applications or by touching the Power On/Off symbol) to make sure the unit has been shut down before attempting to clean the glass surface.

To learn more about how to properly clean glass surfaces, review the “Ergonomics” section in the “General Installation Recommendations” chapter earlier in this manual.

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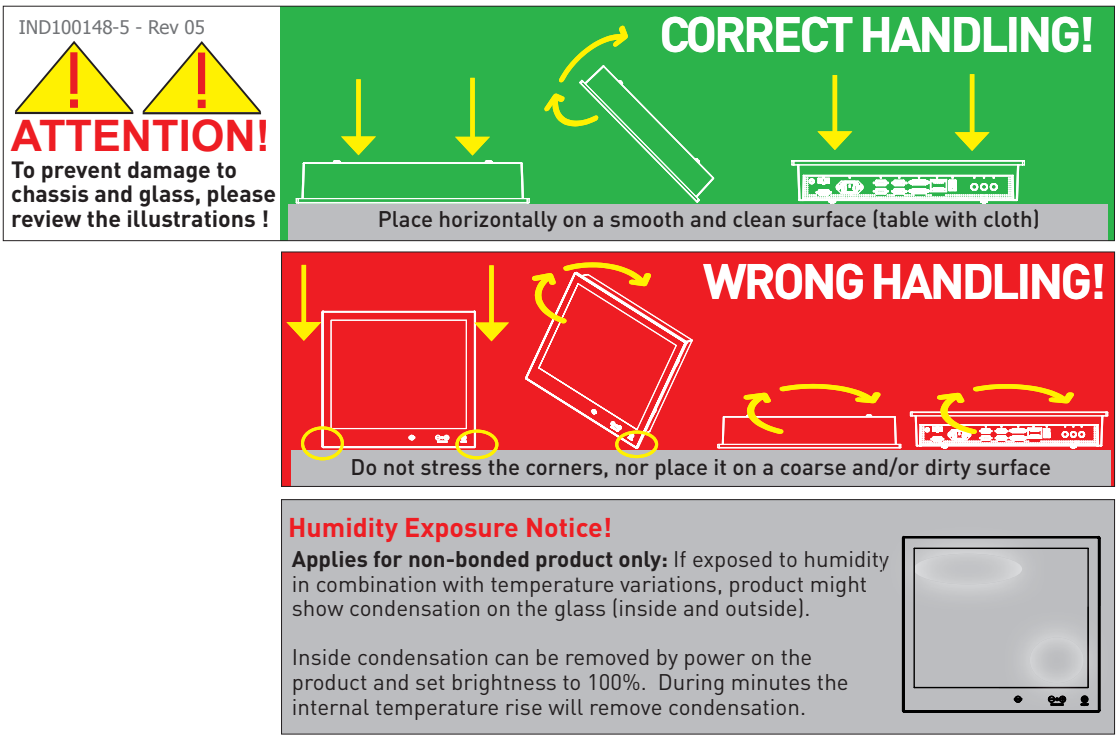
Installation

First Things First!



Installation and mounting

1. Most of our products are intended for various methods of installation or mounting (panel mounting, bracket mounting, ceiling/wall, console mounting etc.); for details, please see the relevant mechanical drawings.

2. Adequate ventilation is a necessary prerequisite for the life of the product. The air inlet and outlet openings must definitely be kept clear; coverings which restrict ventilation are not permissible.

3. Generally, do not install the unit in a horizontal position (laying down), as this will cause heat to build up inside the unit which will damage the LCD Panel. To prevent this problem we recommend installing the unit in a vertical position (±30 degrees) to improve the airflow through the unit.

4. To further improve the thermal situation we recommend using forced air passing by the product. In some cases, convection based cooling can create “heat zones” around the product. This may be required in high temperature applications and also when there is reason to expect temperature problems due to non-optimal way of mounting.

5. Exposure to extreme direct sunlight can cause a considerable increase in the temperature of the unit, and might under certain circumstances lead to excessive temperature. This point should already be taken into consideration when the bridge equipment is being planned (sun shades, distance from the windows, ventilation, etc.). To maximize product life, it is recommended using Hatteland Technology's UV Sun Covers when the product is not in use. Long term direct sun exposure might have cosmetic impacts on the product.

6. Space necessary for ventilation, for cable inlets, for the operating procedures and for maintenance, must be provided.

7. If the push buttons of the product are not illuminated, an external, dimmable illumination (IEC 60945 Ed. 4, 4.2.2.3, e.g. Goose neck light) is required for navigational use. The illumination shall be free from glare and adjustable to extinction.

8. Information about necessary pull-relievers for cables is indicated in the Physical Connection section of this manual. Attention must be paid to this information so that cable breaks will not occur, e.g. during service work.

9. Do not paint the product. The surface treatment influences the excess heat transfer. Painting, labels or other surface treatments that differ from the factory default, might cause overheating.

10. Exposure to heavy vibration and acoustic noise might under certain circumstances affect functionality and expected lifetime. This must be considered during system assembly and installation. Mounting position must be carefully selected to avoid any exposure of amplified vibration.

11. Additional rules may apply to certain procedures where the symbols and are present. For more information, review “IEC62368 policy for Hatteland Technology product” section later in this manual.

Installation limitations

Due to environmental factors, please review the points noted below.

A: Overheat prevention:

For Maritime Multi Computer (MMC, Panel Computers) it is advised that you do not mount the unit in a vertical angle lower than ±30 degrees, as noted in point 3 (previous section), i.e. flat mounting of the unit. This is to prevent both overheating the unit as well as ensure proper cooling airflow to sustain long-life and stable operation. Panel Computer units generate more heat than regular Display units naturally because of CPU and mainboard chips.

C: Projected Capacitive Technology (PCTouch) MULTITOUCH and in general Touch Screen glass:

For all units with a factory mounted touch screen and for outdoor use especially ensure that raindrops do not stay on the unit’s flat glass surface, please do not mount the unit in a vertical angle lower than ±30 degrees, i.e. flat mounting of the unit. This is to prevent accidental touches that are similar to a human finger (cover area for a x period of seconds) as well as make sure the raindrops are “moving” and runs down off the glass surface.

D: General rule for console mounted units:

To ensure proper cooling airflow, long-life and stable operation for all units, please make sure that the console casing has either fans or decent ventilation holes to prevent overheating inside the console due to the combined temperature of both Display or Panel Computer units together with other electronic instruments. A general rule is to make sure the console casing is capable of expelling “worst case scenario” in respect of the “Max Power Consumption” of all devices installed. Please review also point 2, 5, 6 and 9 (previous section) for additional information and installation tips.

General Installation Recommendations

General mounting instructions

1. The useful life of the components of all Electronics Units generally decreases with increasing ambient temperature; it is therefore advisable to install such units in air-conditioned rooms. If there are no such facilities these rooms must at least be dry, adequately ventilated and kept at a suitable temperature in order to prevent the formation of condensation inside the display unit.

2. With most Electronic Units, cooling takes place via the surface of the casing. The cooling must not be impaired by partial covering of the unit or by installation of the unit in a confined cabinet.

3. In the area of the wheel house, the distance of each electronics unit from the magnetic standard compass or the magnetic steering compass must not be less than the permitted magnetic protection distance. This distance is measured from the centre of the magnetic system of the compass to the nearest point on the corresponding unit concerned.

4. Units which are to be used on the bridge wing must be installed inside the “wing control console” protected against the weather. In order to avoid misting of the viewing screen, a 25 ... 50 W console-heating (power depending on the volume) is recommended.

5. When selecting the site of a display unit, the maximum cable lengths have to be considered.

6. When a product is being installed, the surface base or bulkhead must be checked to ensure that it is flat in order to avoid twisting of the unit when the fixing screws are tightened, because such twisting would impair mechanical functions. Any unevenness should be compensated for by means of spacing-washers.

7. Products with AC input shall be grounded to protective Earth (Safety Ground) when necessary via the bolt (usually on terminal plate) available on the product.
   Products with DC input shall be grounded to protective Earth (Safety Ground) via the bolt (usually on terminal plate) available on the product.
   A shorter and thicker cable gives better grounding. A 6mm² is recommended, but a 4mm² or even 2.5mm² can be used for this purpose.

8. Transportation damage, even if apparently insignificant at first glance, must immediately be examined and be reported to the freight carrier. The moment of setting-to-work of the equipment is too late, not only for reporting the damage but also for the supply of replacements.

9. The classification is only valid for approved mounting brackets provided by Hatteland Technology. The unit shall be mounted stand-alone without any devices or loose parts placed at or nearby the unit. Any other type of mounting might require test and re-classification.

10. Additional rules may apply to certain procedures where the symbols and are present. For more information, review “IEC62368 policy for Hatteland Technology product” section later in this manual.

General Installation Recommendations

Ergonomics

1. The front surface of the display glass has an anti-reflective (AR) coating which can be scratched and damaged with improper cleaning. It is recommended using only 90+% pure Isopropyl alcohol (Isopropanol) and a soft fabric cloth for this first cleaning. Fold a cloth into a small pad, dampen the cloth with alcohol, and wipe the glass from one edge to the other in one direction with one continuous motion. The product glass will require cleaning as needed. The soft cloth & alcohol wipe is recommended to clean fingerprints and oils off the glass. Water stains (including coffee, tea & coke) should be first cleaned off the glass with a soft fabric cloth wet with water, immediately followed with wiping using an alcohol wetted cloth.

2. Adjust the unit height so that the top of the screen is at or below eye level. Your eyes should look slightly downwards when viewing the middle of the screen.

3. Adjust screen inclination to allow the angle of gaze to remain at the centre of the screen approximately perpendicular to the line of gaze.

4. When products are to be operated both from a sitting position and from a standing position, a screen inclination of about 30° to 40° (from a vertical plane) has turned out to be favourable.

5. The brightness of displays is limited. Sunlight passing directly through the bridge windows - or its reflection - which fall upon the screen workplaces must be reduced by suitable means (negatively inclined window surfaces, venetian blinds, distance from the windows, dark colouring of the deckhead). However, units can be offered with optical enhanced technology and/or High Bright panels to reduce reflections and are viewable in direct sun light, but as a general rule the units at the bridge wing area are recommended to be installed or mounted by suitable alignment or bulkhead / deckhead mounting in such a way that reflections of light from the front pane of the display are not directed into the observer's viewing direction.

6. The use of ordinary commercial filter plates or filter films is not permitted for items of equipment that require approval (by optical effects, "aids" of that kind can suppress small radar targets, for example).

7. For ECDIS applications, the minimum recommended viewing distance are as follows:
   (IEC62288, Part 7.5 Screen resolution)

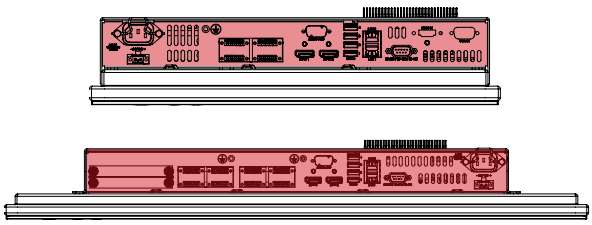
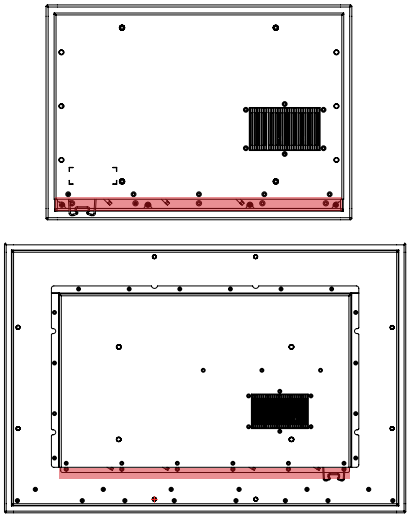
15.6 inch = 616mm	21.5 inch = 852mm	23.8 inch = 943mm	27.0 inch = 1070mm		

Cables

Use only high quality shielded signal cables.

Cable Entries & Connectors (Marked area)

Illustration below for smallest/largest sizes only.

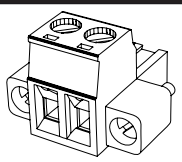
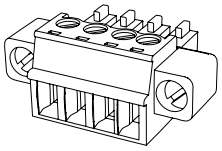
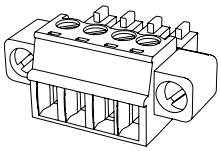
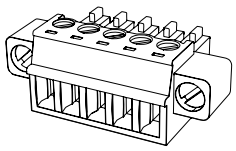
Bottom View	Back View
	

Maximum Cable Length

Any cable should generally be kept as short as possible to provide a high quality input/output. The maximum signal cable length will depend not only on the signal resolution and frequency, but also on the quality of the signal output from the computer/radar.

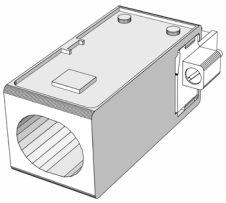
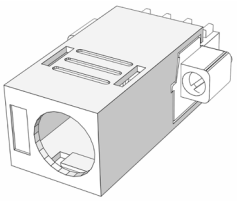
Housing / Terminal Block Connector Overview

Housing / Terminal Block connectors are available in different sizes (example 2-pin, 4-pin, 5-pin) which plug into the connector area of the unit. They are mounted by factory default and delivered with the unit. The housing / terminal block connectors have steering rails, which ensures that it can not be mounted wrong. The color of these connectors may vary between black, green and orange depending on manufacturer. You may use approved equivalents of these connectors, but note that the warranty will be void if any damage would occur to either the unit's original PCB terminal socket connector or inside the unit (electronic components, boards etc.). The table below is applicable for any Series X products, such as Display and Panel Computers, including newer type of Stand-Alone Computers.

Illustration	Pins	Manufacturer Details	Connector used for module
	2-pin	MSTB 2,5/ 2-STF-5,08 BK Screwdriver: SZS 0,6x3,5, slot-headed. Tightening torque min. 0.5 Nm. Tightening torque max 0.6 Nm.	• DC Power IN (24VDC) - Dual Input Identified on Hatteland Technology product datasheet as: "Terminal Block 5.08"
	4-pin	BCZ 3.81/04/180F SN BK BX Screwdriver: 0.4x2.5mm DIN 5264. Tightening torque min.. 0.2 Nm. Tightening torque max. 0.25 Nm.	• CAN Interface (ZIA0001310-B / ZIA0001310-SLCAN) Identified on Hatteland Technology product datasheet as: "Terminal Block 3.81"
	4-pin	BCZ 3.81/04/180F SN BK BX Screwdriver: 0.4x2.5mm DIN 5264. Tightening torque min.. 0.2 Nm. Tightening torque max. 0.25 Nm.	• CAN Interface (ZIA0001310-SLCAN) Identified on Hatteland Technology product datasheet as: "Terminal Block 3.81"
	5-pin	MC 1,5/ 5-STF-3,81 Screwdriver: SZS 0,4X2,5mm VDE, slot-headed. Tightening torque min. 0.22 Nm. Tightening torque max 0.25 Nm.	• RS-422 / RS-485 NMEA (PCA200828-1 / Q170 IO) • Digital Input/Output (PCA100297-1 / Q170 IO) Identified on Hatteland Technology product datasheet as: "Terminal Block 3.81"

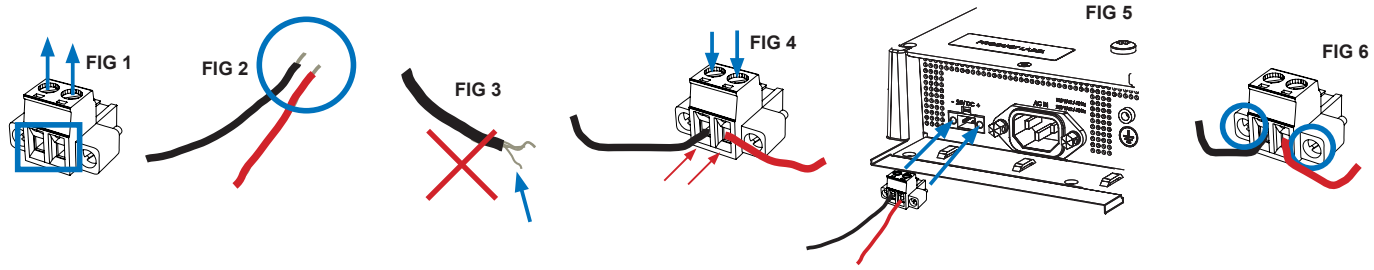
General Installation Recommendations

If your installation requires additional cable fasteners support, please visit and purchase directly from manufacturer: Illustrations below are approximate, actual Housing and Hood may deviate slightly, but function remains the same.

Cable Housing - Illustration	Cover Hood - Illustration
 KGG-MSTB 2,5/ 2 (2-pin) KGG-MC 1,5/ 5 (5-pin)	 BCZ 3.81 AH04 BK BX (4-pin) BCZ 3.81 AH05 BK BX (5-pin)
For 2-pin and 5-pin: https://www.phoenixcontact.com/online/portal/us?uri=pxc-oc-itemdetail:pid=1803934&library=usen&pcck=P-11-02-01&tab=1 https://www.phoenixcontact.com/online/portal/us?uri=pxc-oc-itemdetail:pid=1834372&library=usen&pcck=P-11-02-01&tab=1 For 4-pin and 5-pin http://catalog.weidmueller.com/procat/Product.jsp;jsessionid=B040D5EB6832629E567C884809FDF6C1?productId=(%5b1005290000%5d) http://catalog.weidmueller.com/procat/Product.jsp;jsessionid=D399022A1B3211C0146BCBE716D93211?productId=(%5b1005300000%5d)	

Configuring Housing / Terminal Block connectors

Below is a brief illustration that might be useful during configuration and installation of such connectors. You will need suitable pre-configured cable(s) and tools to configure the connector(s) and cable(s) that are present in your installation environment. Below is a sample procedure for a 2-pin DC power connector. The procedure is the same for other connectors of this type as listed in table above. Unit used as illustration below is for reference only.



Requires assembly. It is expected that the technician has experience in electronics and assembling cables and connectors.

Warning: Do not connect or disconnect cables/connectors to the unit's connector while the unit is powered on. Failure to do so may result in damaged electronics.

FIG 1: Unscrew (from top) or make sure that the screw terminal is fully open, so you can secure the inserted cables correctly to the loose housing connector (it may already be plugged into the unit as per factory installation).

FIG 2: Strip carefully the insulation from the cable to expose the wire(s) inside.

FIG 3: Ensure that the wire(s) is without any loose threads to ensure good connection.

FIG 4: Insert cables* (from front) and screw / secure the cables by turning the screw on top of the housing to secure the cables properly. Check that the cables are firmly in place and do not appear loose or fall out when pulling gently.

**Note: Required polarization verification (for instance -/+ for DC power input) should conform with the markings on the connector area of the unit. Ignoring the markings on the unit or its add-on modules might damage the unit and/or external equipment in which end, warranty will be void.*

FIG 5: Plug the housing into the appropriate connector area of the unit (glass should be facing down) and check again that the cables secured conform with the markings on the connector area of the unit. Finalize the installation by fastening the screws located in front on each side of the housing connector **(FIG 6).**

Connector / Function	Recommended Cable Thickness
2-pin DC Power Input (Terminal Block 5.08)	Minimum 20 AWG - Maximum 18 AWG
4-pin CAN (Terminal Block 3.81)	Minimum 22 AWG - Maximum 20 AWG
5-pin NMEA COM (Terminal Block 3.81)	Minimum 22 AWG - Maximum 18 AWG
5-pin DIO (Terminal Block 3.81)	Minimum 22 AWG - Maximum 18 AWG

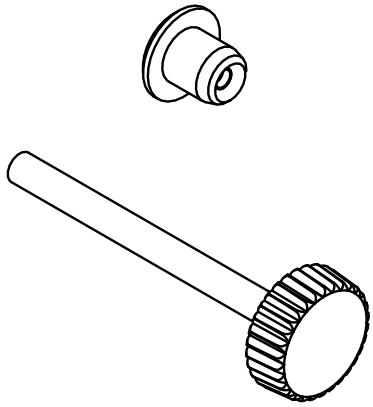
Panel Cutout / Console Mounting Bracket Kit - 15.6 inch

You need: Hex tool (5mm), 1 pcs of HD CMB SE1-A1 Kit (included in delivery).

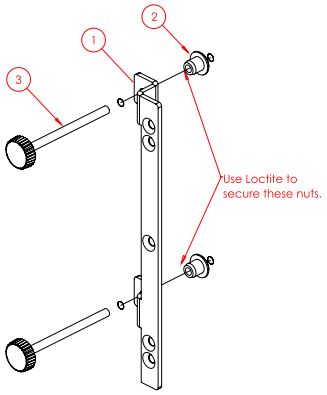
4 pcs	KNURLED KNOB M5 UMBR. Ø=17 mm, 038 0500 599 05 - BLACK (222 38-5 BLACK)
4 pcs	Screw DIN 912 M5x70 UMB. A4 (145 050x070 912 A4)
4 pcs	RAMPA-CAP NUTS TYPE RF 10 15 X 9 M5, STEEL ZINC PL. HEX4 (025509001)
6 pcs	145 050x012 SZF CSK Screws M5x12 Hex Zinc blank. Kval. 10.9
2 pcs	P022317#02

Attention: A suitable pre-cut panel cutout should be made prior to mounting. Do not force the unit into the panel cutout as it might break the outer glass or scratch the chassis on the unit. Make sure that the panel cutout is not too tight for the unit. Please disconnect ALL cables before proceeding. Please re-check the relevant and required panel cutout measurements if unsure.

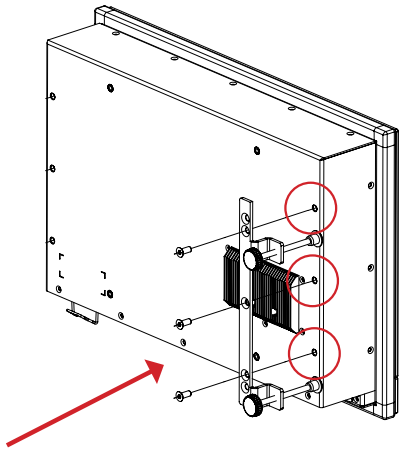
▼ 1: Locate 4 pcs of Thumb screw and Mounting Socket Nut in separate form as illustrated below.



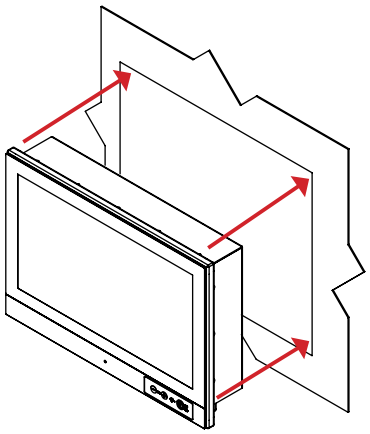
▼ 2: Locate both left and right brackets, and assemble the Thumb Screws with Mounting Socket nut as illustrated.
1: Console Bracket. 2: RAMPA-CAP NUTS.
3: Thumb (wingnut) Screw DIN 912 M5x70
NOTE: Apply Loctite to Thumb Screw/Socket Nut.



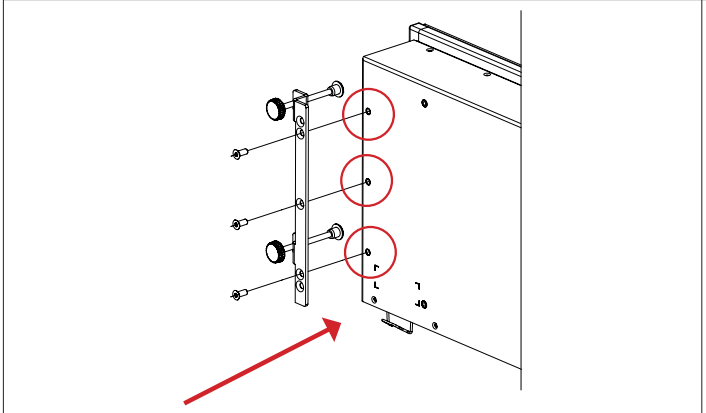
▼ 3: Mount the right bracket on the right rear side of unit first with 3 x M5x12 Countersunk Hex screws as illustrated and fasten it using Torque Force 3.75nm



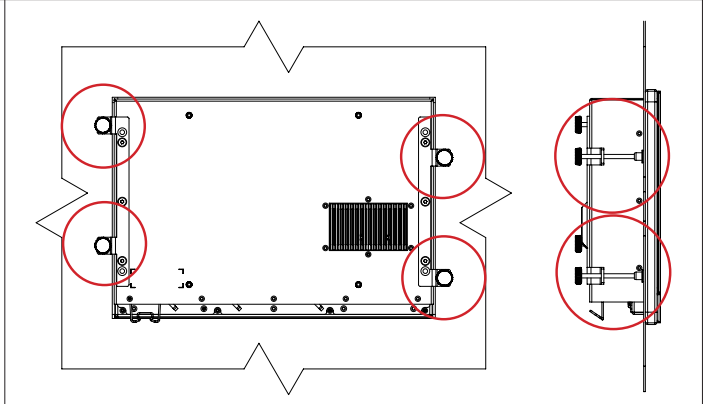
▼ 4: Tilt the unit 45 degree to allow the right bracket to enter cutout first, then tilt it back 45 degree and slide the entire unit into the cutout evenly and carefully. User Controls and Connector Area should be facing downwards.



▼ 5: Once unit is in place, mount the other left bracket on the left side with 3 x M5x12 Countersunk Hex screws as illustrated and fasten it using Torque Force 3.75nm

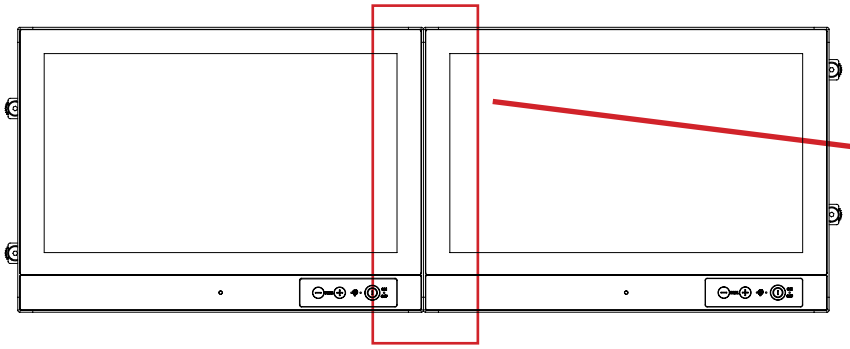


▼ 6: Finally, in a even way fasten each of the 4 Thumb Screws to securly fasten the unit to the rear of the Panel Cutout.

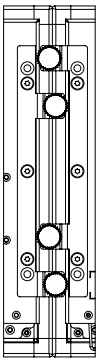


▼ 7: The Console Mounting Kit also allow to edge-to-edge mounting of two or more units, due to the intersection design of the brackets on the rear. Example below illustrates the intersection.

Front View



Rear Details

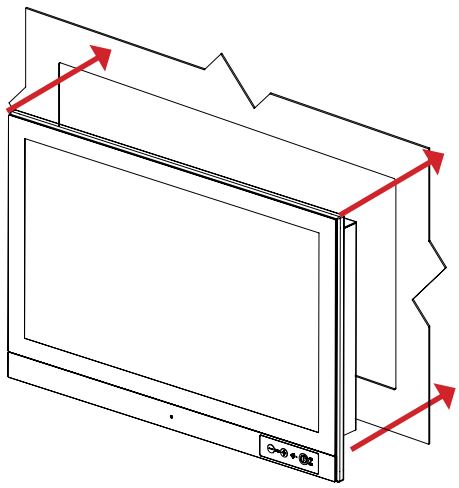


Panel Cutout / Console Mounting Bracket Kit - 21.5, 23.8 and 27.0 inch

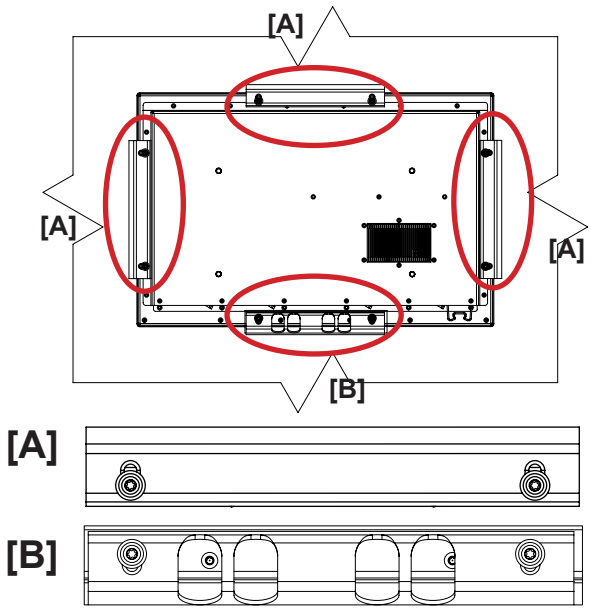
You need: Torx T25 tool, 1 pcs of HD CMB SX1-B1 kit (included in delivery). Note 21.5 inch used as example, but same procedure applies also for 23.8 and 27.0 inch models.

Attention: A suitable pre-cut panel cutout should be made prior to mounting. Do not force the unit into the panel cutout as it might break the outer glass or scratch the chassis on the unit. Make sure that the panel cutout is not too tight for the unit. Please disconnect ALL cables before proceeding. Please re-check the relevant and required panel cutout measurements if unsure.

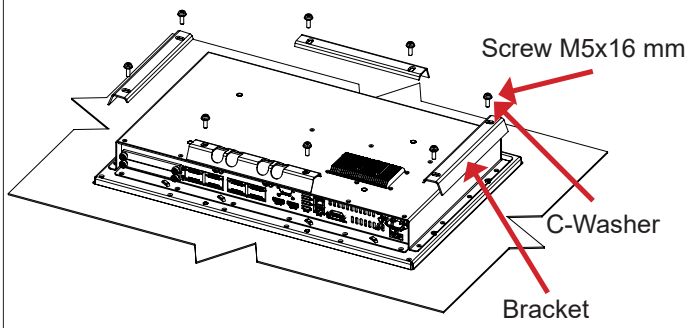
1: Slide the unit into the cutout carefully. User Controls and Connector Area should be facing downwards.



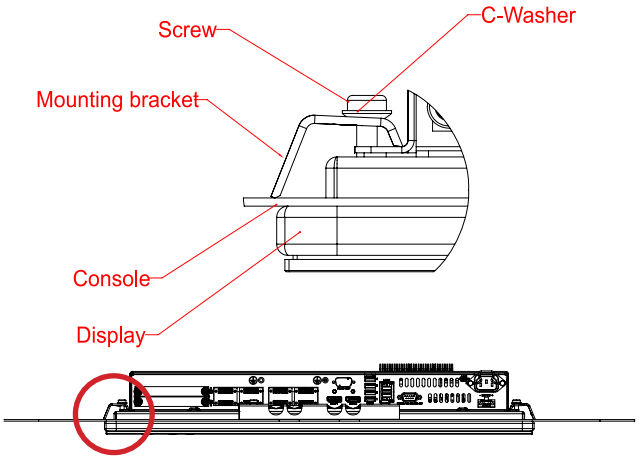
2: Make sure you are aware that brackets should be mounted on TOP, LEFT, RIGHT and BOTTOM sides. Note that the [B] bracket is different than the [A] brackets and mounted near the connectors. See closeup of details.



3: Secure each bracket with the provided M5x16 screws and C-Washers as illustrated below. Make sure you do it equally and even for all 4 sides. Use Torque Force 3.0Nm, 2 screws and 2 washers pr. bracket. Note the orientation of brackets before you begin.



4: Review closeup of the mounting of brackets with screws and C-Washers in place. Seen from bottom side.

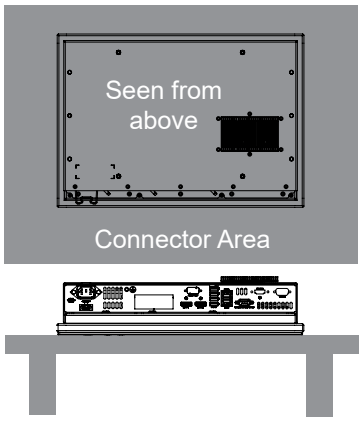


Mounting Bracket, Table / Desktop / Ceiling - 15.6 inch

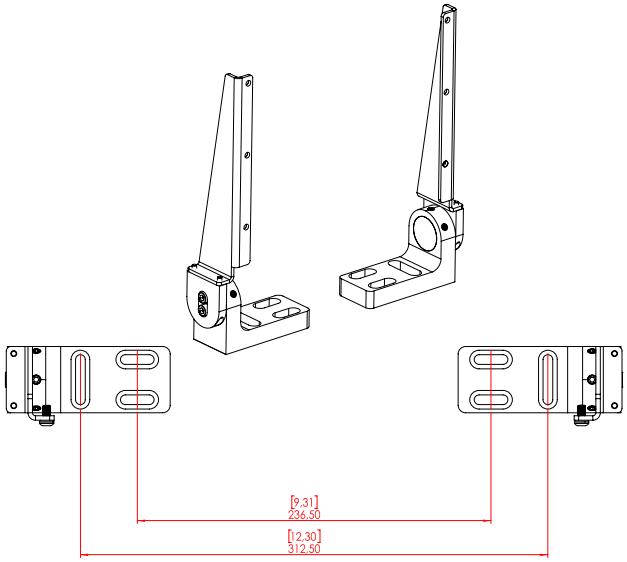
You need:
- M3 Unbrako® Hex Key tool (not included with delivery).
- Fasteners (6 pcs M6) for mounting complete unit onto table or desktop location (not included with delivery).
- 1 pcs of HD TMB SE1-A1 Mounting Bracket Kit (including pre-mounted 6 x M6x6mm Set Socket Screws).

Attention: Please disconnect ALL cables before proceeding. Please review User Manual or visit www.hattelandtechnology.com for Technical Drawings regarding measurements for both main unit and Mounting Brackets.

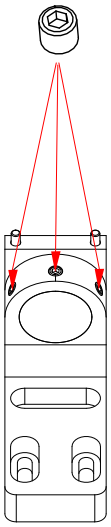
▼ 1: Place the unit on a dry, flat, clean, soft surface (i.e. table) with the glass front facing down as illustrated. Connector area should be facing downwards from you.



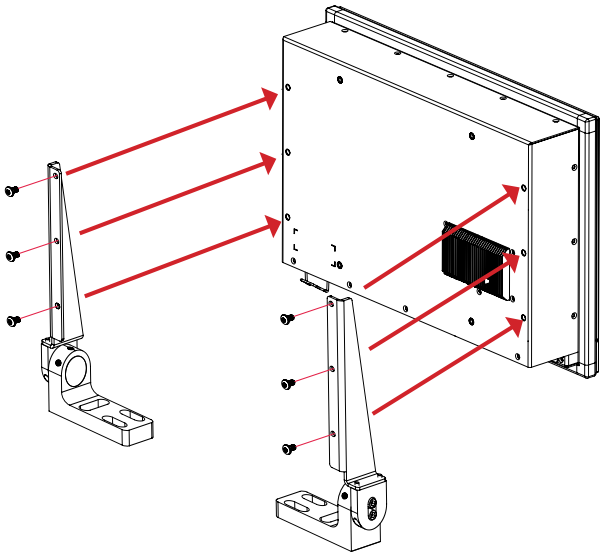
▼ 2: The two brackets comes pre-mounted as shown below. Prepare the drilling, location of holes indicated in the footprint below. Drill 6 pcs of 6mm holes in your table/desktop location.



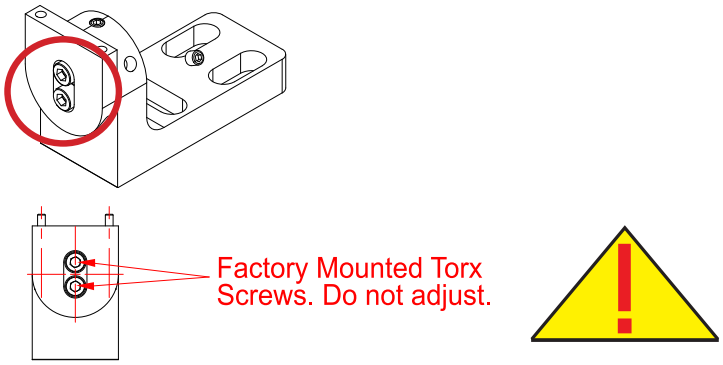
▼ 3: Identify the 3 x Set Socket Screw (M6x6mm) and slightly loosen two of them, now tilt the upper part until you reach an approximate position you need and tighten them slightly (final mounting in step 6).



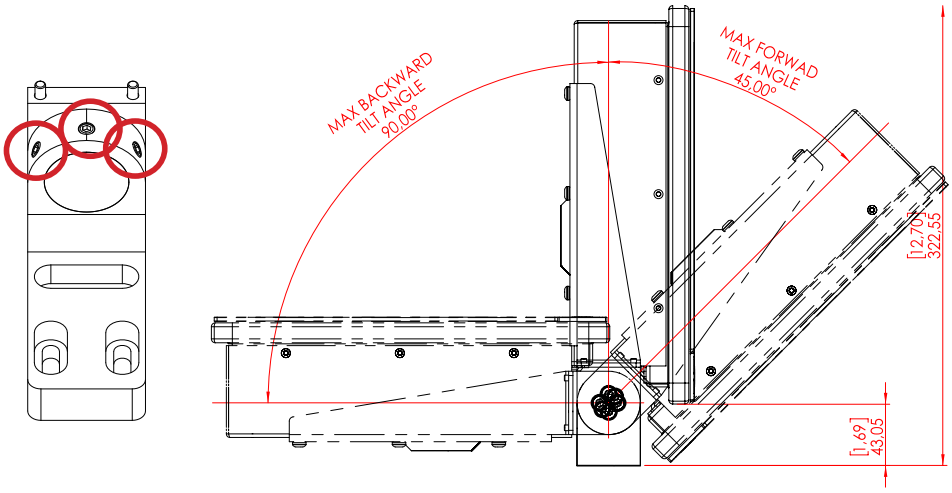
▼ 4: Mount the brackets onto unit as indicated with 3 x M5x10 Panhead Torx screws (included) on both sides. Use Torque Force 4Nm.



▼ 5: Please note the Factory Mounted Torx screws on both bracket sides, THESE ARE NOT TO BE ADJUSTED OR LOOSENED!



▼ 6: Fasten the complete unit to your table/desktop location, and tilt it into the desired position. Locate the Set Socket Screws on both brackets decribed in step 3. Tighten minimum 2 of 3 for each arm to secure position, use Torque Force 7Nm on all. If you need to re-adjust the tilting later, place your hand on top of the unit to keep it steady, and loosen minimum two of any Set Top Screws on both brackets, adjust unit into new tilting angle, and fasten the Set Top Screws again. Verifiy that the unit does not tilt by itself and appear fixed in-place.

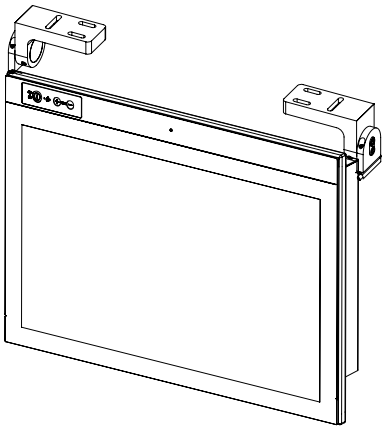


▼ Alternative Mounting: Depending on installation needs, you may mount the complete unit in ceiling in two different ways.

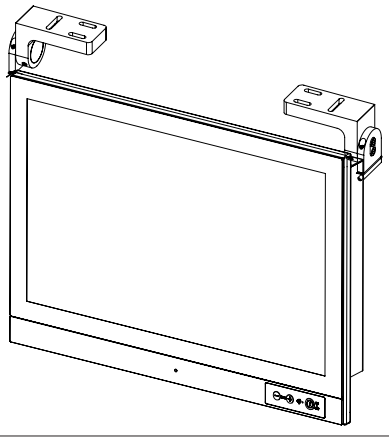
Upside Down Position: User Controls will be upside down, cables go straight up. Displayed image needs to be flipped vertically (via Graphics Driver/Options/Operating System).

Normal Position: User Controls readable, no image flip needed, cables has to bend up or go straight down.

Upside Down



Normal Position



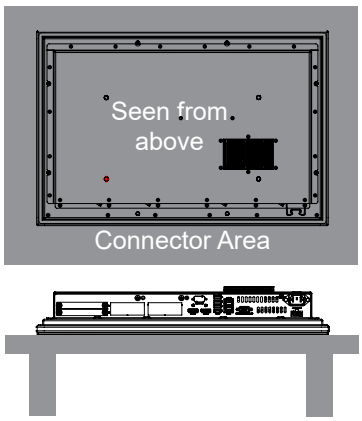
Mounting Bracket, Table / Desktop / Ceiling - 21.5, 23.8 and 27.0 inch

Note: 21.5 inch used as example below, same procedure applies for 23.8 and 27.0 inch as well.

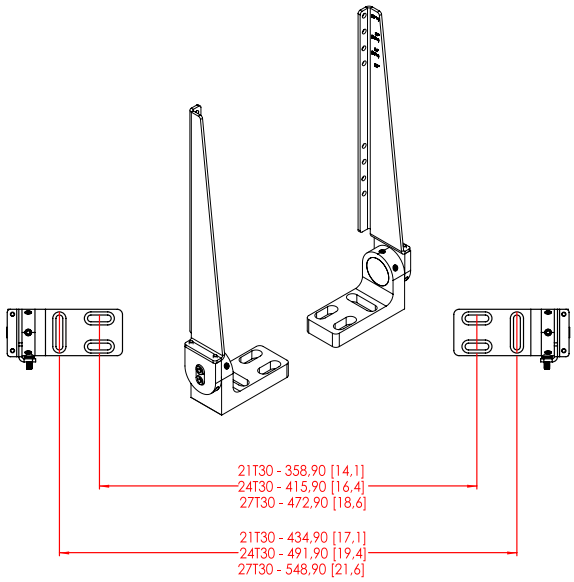
You need:
- M3 Unbrako® Hex Key tool (not included with delivery).
- Fasteners (6 pcs M6) for mounting complete unit onto table or desktop location (not included with delivery).
- 1 pcs of HD TMB SE1-B1 Mounting Bracket Kit (including pre-mounted 6 x M6x6mm Set Socket Screws).

Attention: Please disconnect ALL cables before proceeding. Please review User Manual or visit www.hattelandtechnology.com for Technical Drawings regarding measurements for both main unit and Mounting Brackets.

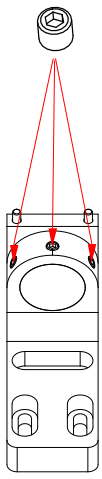
▼ 1: Place the unit on a dry, flat, clean, soft surface (i.e. table) with the glass front facing down as illustrated. Connector area should be facing downwards from you.



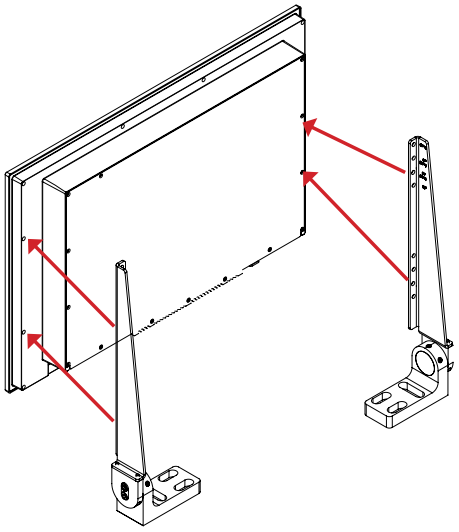
▼ 2: Based on the unit you are installing (21.5, 23.8 or 27.0 inch), prepare the drilling and location of holes indicated in the footprint below. Drill 6 pcs of 6mm holes in your table/desktop location. The two brackets comes pre-mounted as shown below.



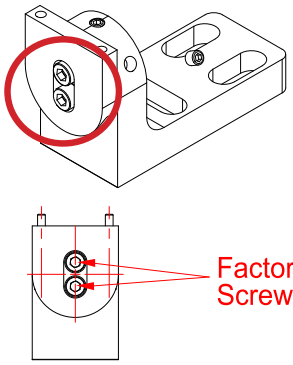
▼ 3: Identify the 3 x Set Socket Screw (M6x6mm) and slightly loosen two of them, now tilt the upper part until you reach an approximate position you need and tighten them slightly (final mounting in step 6).



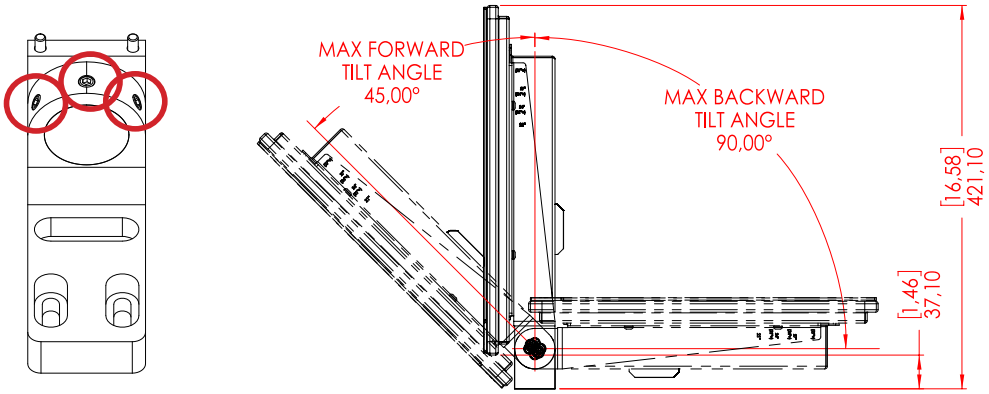
▼ 4: Mount the brackets onto unit as indicated with 3 x M5x10 Panhead Torx screws (included) on both sides. Use Torque Force 4Nm.



▼ 5: Please note the Factory Mounted Torx screws on both bracket sides, THESE ARE NOT TO BE ADJUSTED OR LOOSENED!



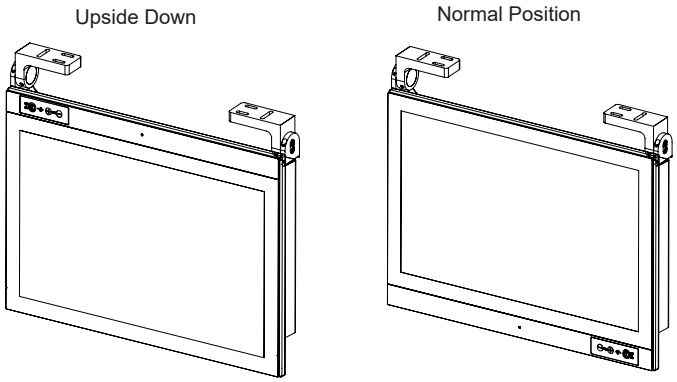
▼ 6: Fasten the complete unit to your table/desktop location, and tilt it into the desired position. Locate the Set Socket Screws on both brackets decribed in step 3. Tighten minimum 2 of 3 for each arm to secure position, use Torque Force 7Nm on all. If you need to re-adjust the tilting later, place your hand on top of the unit to keep it steady, and loosen minimum two of any Set Top Screws on both brackets, adjust unit into new tilting angle, and fasten the Set Top Screws again. Verifiy that the unit does not tilt by itself and appear fixed in-place. Note: Tilt Angle below is illustrated for 23.8 inch. 21.5 and 27.0 inch are approximately the same



▼ Alternative Mounting: Depending on installation needs, you may mount the complete unit in ceiling in two different ways.

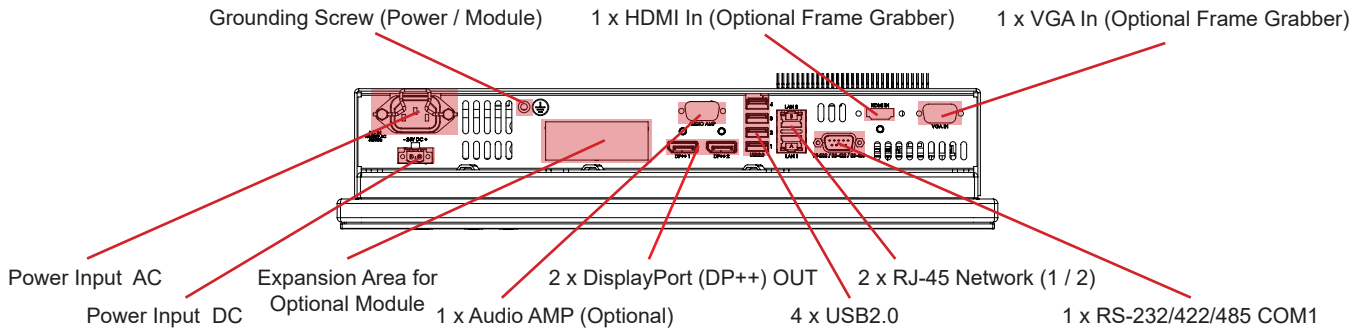
Upside Down Position: User Controls will be upside down, cables go straight up. Displayed image needs to be flipped vertically (via Graphics Driver/Options/Operating System).

Normal Position: User Controls readable, no image flip needed, cables has to bend up or go straight down.

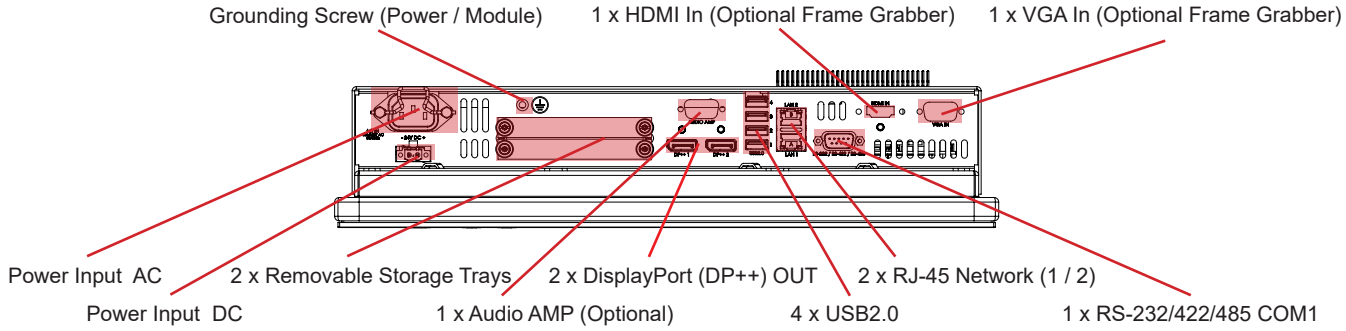


Physical Connections

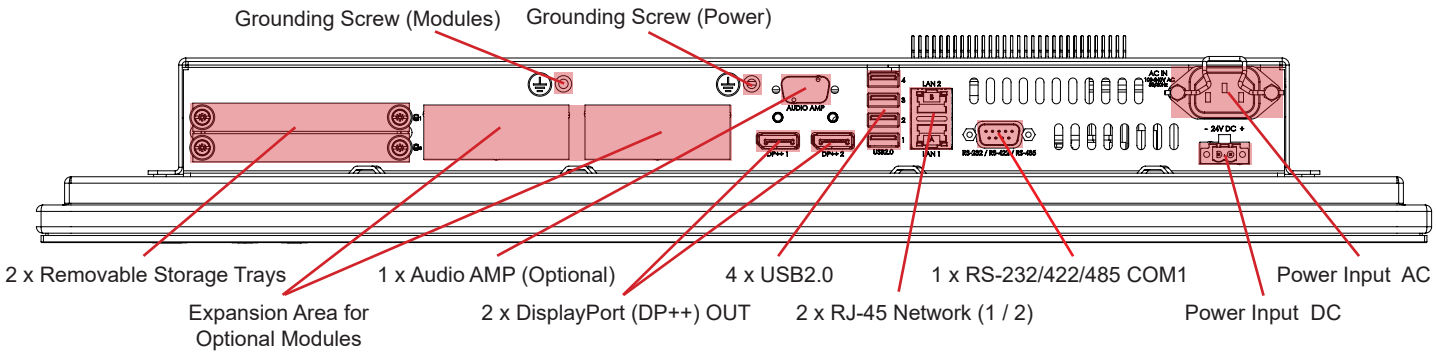
Connection area of unit 15.6 inch with 1 x Module (illustration)



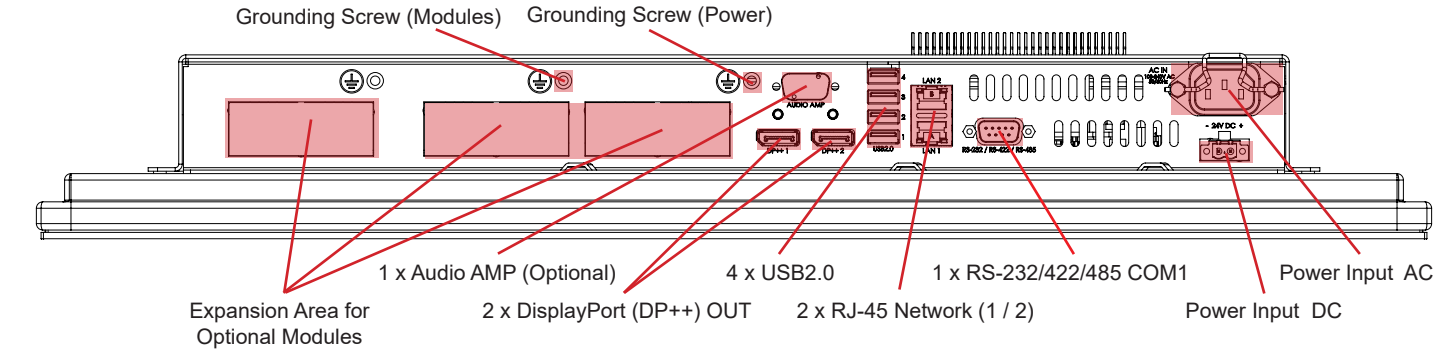
Connection area of unit 15.6 inch with 1 x Removable Storage Trays (illustration)



Connection area of unit 21.5, 23.8 and 27.0 inch with 2 x Modules + Removable Storage Trays (illustration)



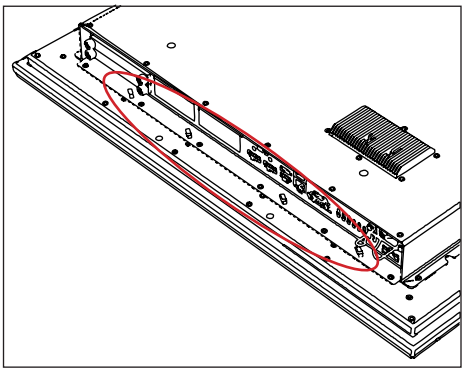
Connection area of unit 21.5, 23.8 and 27.0 inch with 3 x Modules (illustration)

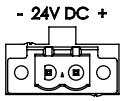


Physical Connections

Reduce Cable Tension

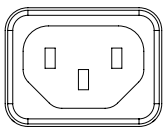
To reduce tension on the cables you connect, secure them with a cable tie to the available chassis hinges located near the connectors. Note that the actual position of these hinges may vary depending on the specific unit.





POWER INPUT DC:

Connect your DC power cable to the 2-pin Terminal Block 5.08 connector. The internal DC power module supports 24VDC. Please check specifications for your unit.



POWER INPUT AC:

The internal AC power module supports both 115VAC/60Hz and 230VAC/50Hz power input. Please check specifications for your unit.

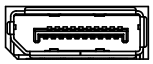
GROUNDING SCREWS:

Grounding screw shall always be used for both DC and AC inputs. Please review “General mounting instructions” in the “Installation” chapter, pt. 7 for more information.

Note for Grounding Screws:
Standard Grounding Screw/Bolt provided by Hatteland Technology is “Pan head screws M4x8mm w/spring and plain washer”.

Multi-power note: (For units supporting AC & DC input simultaneously)

The unit has a dual input power supply which will accept both AC and DC input. If both inputs are connected, the unit will be powered by AC. If AC is disconnected it will automatically switch over to DC without affecting the operation of the unit. This makes it possible to use AC power as primary power and a 24V battery as secondary power, eliminating the need for expensive UPS systems.



DisplayPort (DP++) (1,2) OUT:

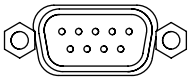
Allows for an additional signal output from the computer. Based on the Operating System (OS), options can be to Clone (Duplicate), Extend Desktop or make external display “Main” screen for the OS. Use a DP++1.2 compliant 20 pins cable. The DP has its own locking mechanism that locks the plug inserted. Make sure the plug “clicks” into place to verify a proper and secure
connection.

DisplayPort note:

This system supports 3 active panels, but please note that some pre-boot environments do not support more than 1-2 active panels. The system priority in these cases are as follows:

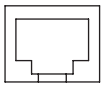
- *Onboard LVDS (Panel) is always detected as Main display.*
- *If only one DP++ output is connected this will become the secondary display.*
- *If both DP++ outputs are connected, DP++ 2 will be Secondary and DP++ 1 will be Third display. The DP++ 1 port may then not show any picture until after OS is loaded.*

Physical Connections



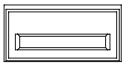
COM4 Serial Port INPUT / OUTPUT:

Supports RS-232/RS-422 Full Duplex and RS-485 Half Duplex using 1 x D-SUB 9P connector (male). Fasten the cable to the connector using the provided screws on the cable housing itself. Enter BIOS to change RS protocol mode and review Pinout Assignments details for pinning/wiring.



Network (1, 2) INPUT / OUTPUT:

Supports 10/100/1000Mbps Ethernet (LAN). Suitable for twisted pair cables CAT.5E. Make sure the network cable connector ”clicks” into the RJ-45 connector.

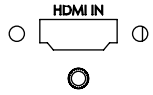


USB2.0 (1, 2, 3, 4) INPUT / OUTPUT:

Supports USB1.1 (<10m, 12Mbps) and USB2.0 (<5m, 480Mbps) compliant peripherals. Drivers for most USB devices are usually included in operating system or on separate installation DVD’s delivered with Third Party products.
Note: USB2.0 port 1 and 2 shares resources so performance will be reduced if both are used at full load simultaneously. USB2.0 port 3 and 4 will always operate at full speed and should be used for any devices that require high bandwidth, example external USB drive.

AUDIO AMP (Factory option):

If ordered as factory option, the unit can utilize 1 x D-SUB 9P connector (female) for 2W Amplified Audio Mono/Stereo Out. Review Pinout Assignments details for pinning/wiring.

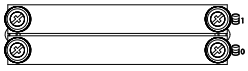


HDMI IN (Frame Grabber):

Factory option for Frame Grabber, review datasheet later in this manual “HD550N1 SDI M2 / HD550N1 HDV M2” for details .

VGA IN (Frame Grabber):

Factory option for Frame Grabber, review datasheet later in this manual “HD550N1 SDI M2 / HD550N1 HDV M2” for details .



2 x 2.5” Removable Storage SATA SSD Trays (Factory Option):

If ordered as factory option, the unit can utilize user accessible 2 x Storage Devices (SSD) of 2.5” size. The storage devices can be easily be upgraded or replaced by loosening the thumbscrew on each side and pulling the tray out.
Before inserting or removing trays with SSD devices installed, the Panel Computer unit must be shut down / powered down before proceeding.

Single Removable Tray and Pre-mounted Storage Device are available from Hatteland Technology as accessory.

Typenumber : **HD xxxyy SX1-z1**
Where x = : Size
Where y = : MB, GB, TB
Where z = : Physical Format / Device Type
(Physical Format examples: 2.5”, 3.5”)
(Device Type examples: SSD, HDD)

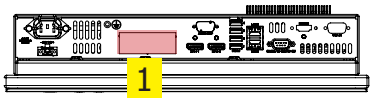
Please review datasheet for your model to determine Size, Format and Device Type compatible with your model.

or Empty Removable Tray 2.5” tray + 4 x M3x4mm screws.
Typenumber : **HD 000TR SX2-A2**

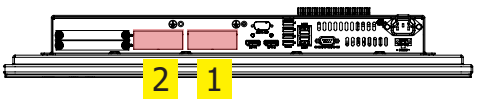
EXPANSION AREA for Optional modules:

In this expansion area of the unit (max 1 x for 15.6 inch model, and max 3 x for 21.5, 23.8 and 27.0 inch models), optional factory mounted modules may be available if ordered (see illustrations below or dedicated Data Sheets as well as “Housing / Terminal Block Connector Overview” in this manual for more information).

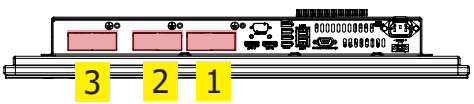
Connect and secure your cables to the Terminal Blocks or connectors, depending on module installed. The table below lists all modules currently available for factory mounting and any module can be mixed with other types of modules (as long as space or configuration permits).



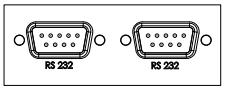
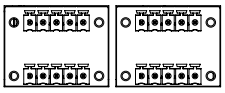
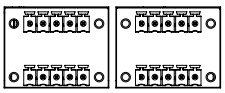
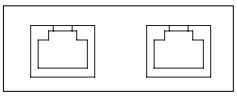
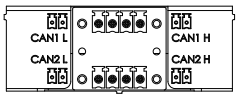
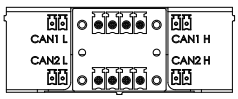
15.6 inch model



21.5, 23.8 and 27.0 inch models with 2 x module+SSD Bay



21.5, 23.8 and 27.0 inch models with 3 x module+ No SSD Bay

#	Illustration	Description	Area
A		**Typenumber: PCA100309-1** RS-232 Isolated module (COM2x) Connector(s): 2 x DSUB 9P Male connectors 1,2 or 3 x of the same module possible to install	1 2 3
C		**Typenumber: PCA100293-1** 4 x RS-422/RS-485 NMEA module Connector: Terminal Block 3.81 1,2 or 3 x of the same module possible to install.	1 2 3
D		**Typenumber: PCA100297-1** 2 x Isolated Digital IO (4 Output + 4 Input) module Connector(s): Terminal Block 3.81 1 x of the same module possible to install.	1
E		**Typenumber: PCA100298-1** LAN 10/100Mbps module. Connector(s): 2 x RJ-45 1 or 2 x of the same module possible to install.	1 2
F		**Typenumber: ZIA0001310-B** 2 x CAN isolated, 2 channel module Connector: Terminal Block 3.81 1 x of the same module possible to install.	1
F		**Typenumber: ZIA0001310-SLCAN** 2 x CAN isolated, 2 channel module Connector: Terminal Block 3.81 1 x of the same module possible to install.	1

Module Expansion Matrix

Table below indicates how many duplicates of the same module can be installed at the same time. Due to limited number of internal connectors, available space and technical limitations, some combinations (with duplicates) are naturally not possible to achieve.

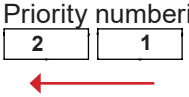
Factory Standards

The following illustration indicate mounting locations of the varirty of modules available and how they are numbered to keep a persistent configuration at our factory. This is seen from user's Point-of-View at rear of the unit.

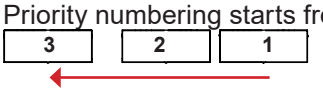
Priority List amongst module installed in Expansion Area 1,2 and 3
1: COMx2 [A]
3: NMEA COM [C]
4: DIO [D]
5: LAN [E]
6: CAN / SLCAN [F]

NOTE: Table on next page is only applicable to 21.5, 23.8 and 27.0 inch. These have support for max 3 modules. 15.6 inch has only option for a single module (rules above and on previous page applies).

Priority numbering starts from Right to Left as illustrated for models with 2 x module areas:

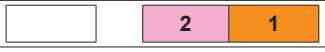
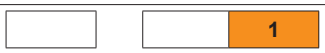
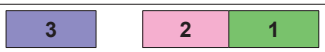
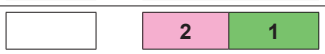
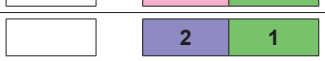
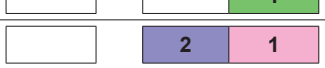
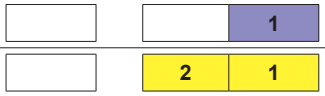


Priority numbering starts from Right to Left as illustrated for models with 3 x module areas:



Physical Connections

Table below indicates how many combinations of modules is possible to install (each table row totals upto max 3). Further, as per. factory standards, the unique location and shifting of modules are illustrated in the last column, where the number inside the table indicate unique id, starting from 1 to max 3 modules.

CAN/SLCAN	LAN	DIO	NMEA COM	COMx2	Default Factory Mounting Position (Single Count)
F	E	D	C	A	
		1	1	1	
	1		1	1	
1			1	1	
			1	1	
	1	1		1	
1		1		1	
		1		1	
1	1			1	
	1			1	
1				1	
	1	1	1		
1		1	1		
		1	1		
1	1		1		
	1		1		
1			1		
			1		
1	1	1			
	1	1			
1		1			
		1			
1	1				
	1				
1					
				2	
				3	
			1	2	
			2		
			2	1	
			3		
		1		2	
		1	2		
	1			2	

CAN/SLCAN	LAN	DIO	NMEA COM	COMx2	Default Factory Mounting Position (Single Count)
F	E	D	C	A	
	1		2		3 2 1
	2				2 1
	2			1	3 2 1
	2		1		3 2 1
	2	1			3 2 1
1				2	3 2 1
1			2		3 2 1
1	2				3 2 1

COM Ports Numbering

Default numbering on a factory standard model (example: Microsoft® Windows® 10) are as follow:
COM 1,2,3 = 3 x System Reserved
COM 4 = 1 x Onboard/Internal Port: API / SCOM (COM), on-board (see note below for details).
COM 5 = 1 x Physical Port, CAN/SLCAN Module - (if factory option, 1st “ZIA0001310-B / ZIA0001310-SLCAN”)
COM 6 = 1 x Physical Port, CAN/SLCAN Module - (if factory option, 2nd “ZIA0001310-B / ZIA0001310-SLCAN”)
COM 7-10 = 4 x Physical Port, RS-422/RS-485 NMEA Module - (if factory option, 1st “PCA200828-1”)
COM 11-14 = 4 x Physical Port, RS-422/RS-485 NMEA Module - (if factory option, 2nd “PCA200828-1”)
COM 15-16 = 2 x Physical Port, RS-232 Isolated Module - (if factory option, 1st “PCA100309-1”)
COM 17-18 = 2 x Physical Port, RS-232 Isolated Module - (if factory option, 2nd “PCA100309-1”)

COM ports are not reserved nor locked by BIOS. COM Port numbering may differ depending on OS used and customized solutions. Use the Operating System functions to determine actual port numbering, if problems arise.

Note: Internal (COM 4 port) support for remote controlling MMC units:

A detailed description of the SCOM (Serial/Ethernet Communication) can be found here:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-7.htm - Review also the “Pinout Assignments” chapter in this manual for additional help during preperation and/or installation of external equipment intended to communicate with.

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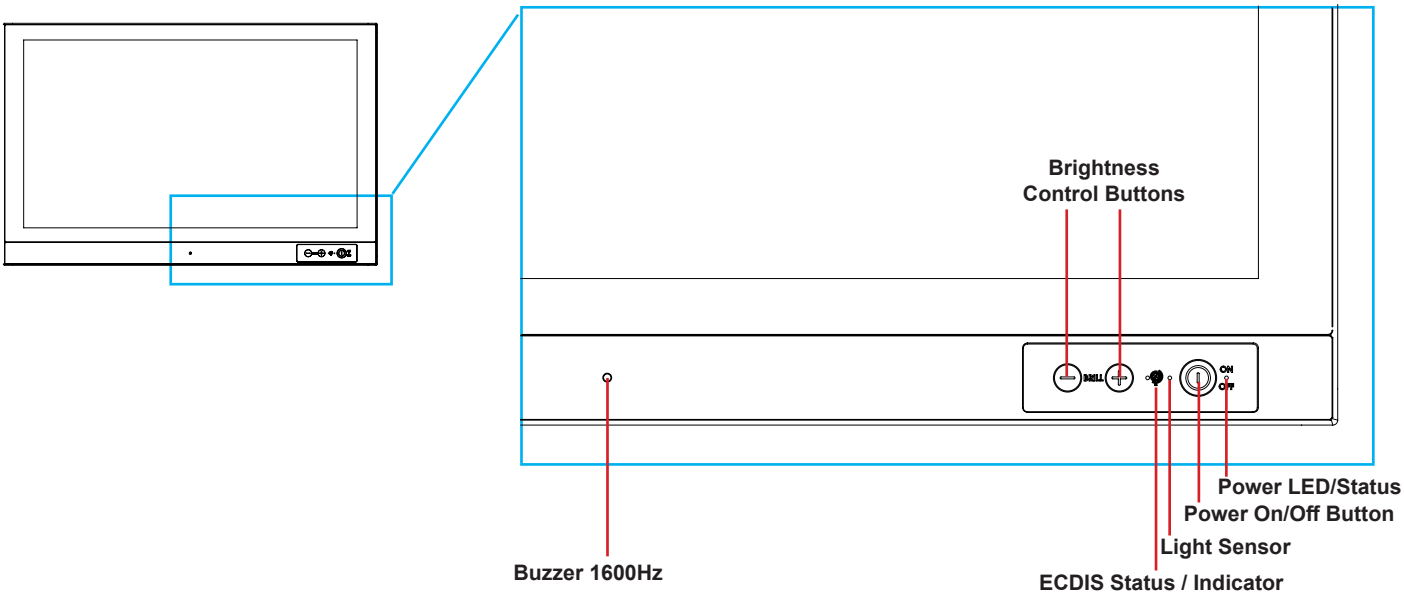
Operation

USER CONTROLS OVERVIEW

The units features tactile user controls on front frame.



Power On/Off + Power LED/Status:

Power ON:
To turn the unit on, verify that the Power LED/Status is illuminated in red (indicates suitable power is connected) and press the power button and hold until the the Power LED/Status changes to green light or a image appears on the screen.

Power OFF:
To turn the unit off, press the power button and hold until the Power LED/Status either illuminates/changes from green to red or the image on screen disappears.

Brightness Adjust:
Brilliance / Brightness adjustment of the displayed image is adjusted by pressing the (-) or (+) buttons.

ECDIS Status / Indicator: (optional factory standard)
For units that have been factory ECDIS calibrated the small circle located next to the Globe symbol will illuminate in green constantly as long as the unit is powered. The “+” and “-” symbols will illuminate in orange when the Brightness/ Brillance is adjusted either above or below ECDIS factory calibration point.

To be able to stay within ECDIS calibrated range, please assure that both the “+” and “-” are not illuminated and that the ECDIS light remains illuminated in green during operation.

Buzzer:

To take advantage of the buzzer, please review the SCOM (Serial/Ethernet Communication) manual located here: https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-7.htm (reference: “BZZ” - Buzzer Control command, through the Internal COM4 port).

Touching this area will naturally mute buzzer sound or in some cases make it lower or change audible frequency. In no circumstances should this area be blocked by either stickers or objects!

Light Sensor:

Located next to the ECDIS (Globe) symbol. The Light Sensor is used to sense level of ambient light in the surrounding environment. The sensor data can be read by suitable software through the Hatteland Technology SCOM functionality of the unit and thus can be used to control brightness remotely. Touching or covering this area will naturally make the sensor data inaccurate and should be avoided!

Hatteland Technology’s Serial Remote Control Interface (SCOM) protocol document can be downloaded from: https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-7.htm

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Specifications

Specifications - HD 16T30 MMC-xxx-xxxxxx

All specifications are subject to change without prior notice!

TFT Technology:

- 15.6 inch TFT Liquid Crystal Display module, VA (Vertical Alignment)
- a-si TFT Active Matrix
- Widescreen, Aspect Ratio 16:9
- LED Backlight Technology

TFT Characteristics:

- Native Resolution : 1920 x 1080 (FHD)
- Pixel Pitch (RGB) : 0.17925 (H) x 0.17925 (V) mm
- Response Time : 35ms (tr+tf) (typ)
- Contrast Ratio : 1500:1 (typ)
- Light Intensity : 400 cd/m^2 (typ)
- Viewable Angle : 85 deg. (up/down/left/right) (typical)
- Active Display Area : 344.16 (H) x 193.59 (V) mm
- Max Colors : 16.77M colors (RGB 8-bit)

Computer Specifications:

- Supported OS : See table below
- CPU/Processor : 1 x Intel Atom® x7-E3950 Processor, 2M Cache, 1.60GHz / 2.00GHz
- Installed Storage : 32GB eMMC (Default). See table below
- Installed Memory : 2GB DDR3L single channel. See table below
- System Chipset : Intel® SOC
- Graphics Chipset : Intel® HD Graphics 505 (CPU dependent) Supports OpenGL 4.6 (Windows/Linux) and OpenGL ES 3.2 (Linux)
- Ethernet LAN #1 : Realtek Gigabit LAN 10/100/1000Mbps
- Ethernet LAN #2 : Intel Gigabit LAN 10/100/1000Mbps
- BIOS : AMI BIOS, supports ACPI Note: "Legacy Mode" option is not fully supported for System Chipset and Microsoft® Windows® 10.
- Buzzer : Yes (according to EN60945)
- Speaker : None
- WatchDog Timer : Yes (256 segments, 0, 1, 2...255 sec/min)
- Other features : RTC (0.5s/day), Battery Alarm, WakeOnLan, Fast Boot, AT mode, USB Boot, TPM2.0
- DP++ Out Max Res. : 640 x 480 to 4096 x 2304 @ 60Hz

Power Specifications:

Power Supply Options:

- Multi-Power option : 100-240V AC - 50/60Hz + 24VDC (MMC-Mxx)
- Single AC Power Option : 100-240V AC - 50/60Hz (MMC-Axx)

Note: You may connect either AC power or DC power or both. In case both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be a uninterrupted switch-over to DC input.

Power Consumption: *(see note)

- Operating AC/DC : 44W (typ) - 75W (max)
- Operating AC : 44W (typ) - 125W (max)

Available Computer Configurations:

Type	Description	Size/Specification
Memory/RAM	DDR3L, 1600MHz, SO-DIMM	- 2GB Single Channel - 4GB (2x2GB) - Dual Channel - 8GB (2x4GB) - Dual Channel
Additional Internal Storage	m.2	- 240GB->
Software Support	Application Programming Interface (API) - as defined in associated documents	- SCOM
OS Options	**Windows® 10 IoT Enterprise 2019 LTSC (64bit)** - Product Distribution End Date January 2029 or **Linux:** Kernel 4.10 or later	

*Power Consumption: Numbers are specified as the unit is delivered from factory. All additional installed equipment like USB, PCIe and similar loads have to be added to power consumption. Note that total extra load have to be multiplied by 1.5 to compensate for efficiency in internal power converters. Typical power consumption varies a lot with computer load. We measure with 25% of max computer load.

Physical Dimensions:

- W:397.60 [15.65"] x H:279.50 [11.00"] x D:94.50 [3.72"] mm [inch]
- VESA 200x200 supported. Additional spacers needed to get distance from CPU Cooler
- Weight: Approx. 4.3kg / 9.48lbs

User Controls:

On front bezel IP66:

- Power On/Off, Brightness Control (-/+), Power LED, ECDIS LED
- Buzzer, Light Sensor

Environmental Considerations:

- Operating Temperature : -15°C to +55°C
- Storage Temperature : -20°C to +60°C
- Humidity : Humidity up to 95% (Operating / Storage)
- IP-Rating Protection : IP66 front - IP20 rear (EN60529). IP22=option
- Compass Safe Distance : Standard: 60cm - Steering: 35cm

Lifetime Considerations:

Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Input/Output Connectors:

Connector	Rear
• DisplayPort (DP++) Out	: 2 x 20p DisplayPort (female)
• USB2.0	: 4 x USB Type A
• Ethernet GBLan	: 2 x RJ-45
• COM RS-232 & 422/485	: 1 x DB9M non-isolated (Change RS mode in BIOS)
• AC Power IN	: 1 x Std IEC inlet
• If DC Power IN	: 1 x 2-pin Terminal Block 5.08

Factory Options:

- Projected Capacitive Touch Screen (Multitouch,USB,Pen/Glove support)
- Optical Bonding Technology
- Variations of Storage, RAM Memory and Operating Systems.
- 1 x HT 00235 OPT-A1: 2W Amplified Audio out via DB9F

- Model with 1 x Diskbay with support for 2 x 2.5", no modules
- Model with 1 x Module, no Diskbay

Modules available (depending on base model above):
Review full configuration matrix in User Manual INB101505-1
1 x PCA200828-1: 4xCOM RS-422/485 isolated NMEA 4 channel
or 1 x PCA100309-1: Dual Isolated RS-232, connector 2xDB9
or 1 x ZIA0001310-B: CAN isolated 2 channel or 2 x 4 channel
or 1 x ZIA0001310-SLCAN (1 x CAN isolated, 2 channel, socketCAN) module
or 1 x PCA100297-1: Isolated Digital IO module,4 x OUT/4 x IN
or 1 x PCA100298-1: LAN 10/100Mbps, 2 ports RJ45

Frame Grabber options (1 x supported via M.2 (PCIe x1) slot):

- HD550N1 SDI M2: 1 x SDI IN, 1920x1080@60/50fps
- HD550N1 HDV M2: 1 x HDMI IN+1 x VGA IN, 1920x1200p@60/50fps

Accessories:

- HD CMB SE1-A1 : 1 x Console Mount kit. EN60945 Tested*
- HD TMB SE1-A1 : 1 x Table Mount Bracket. EN60945 Tested
- JH C01MF A-A : 1 x USB Cable 1m, TypeA-Chassis mount receptacle
- HT 00262 OPT-A1: 4 x RS-422/RS-485 isolated, USB ext. module
- HT 00263 OPT-A1: 4 x RS-232 COM non-isolated, USB ext. module
- HT 00264 OPT-A1: 1 x CAN isolated, 2 channel, USB ext. module
- HT 00273 OPT-A1: 4 x Digital IN/OUT isolated, USB ext. module
- HT 00274 OPT-A1: 2 x LAN 10/100Mbps, RJ45, USB ext. module
- HT 00300 MSOS : OS options: https://www.hattelandtechnology.com/options-for-downgrade-upgrade-change-or-add-of-microsoft-windows

*Included in delivery

APPROVALS & CERTIFICATES

This product have been tested / type approved by the following classification societies:

IEC 60945 4th (EN 60945:2002) **IACS E10** **EU RO MR** - Mutual Recognition **ClassNK** - Nippon Kaiji Kyokai
CCS - China Classification Society

Specifications - HD 21T30 MMC-xxx-xxxxxx

All specifications are subject to change without prior notice!

TFT Technology:

- 21.5 inch TFT Liquid Crystal Display module, VA (Vertical Alignment)
- a-si TFT Active Matrix
- Widescreen, Aspect Ratio 16:9
- LED Backlight Technology

TFT Characteristics:

- Native Resolution : 1920 x 1080 (FHD)
- Pixel Pitch (RGB) : 0.24795 (H) x 0.24795 (V) mm
- Response Time : 25ms (tr+tf) (typ)
- Contrast Ratio : 3000:1 (typ)
- Light Intensity : 250 cd/m^2 (typ)
- Viewable Angle : 89 deg. (up/down/left/right) (typical)
- Active Display Area : 476.064 (H) x 267.786 (V) mm
- Max Colors : 16.77M colors (RGB 8-bit)

Computer Specifications:

- Supported OS : See table below
- CPU/Processor : 1 x Intel Atom® x7-E3950 Processor, 2M Cache, 1.60GHz / 2.00GHz
- Installed Storage : 32GB eMMC (Default). See table below
- Installed Memory : 2GB DDR3L single channel. See table below
- System Chipset : Intel® SOC
- Graphics Chipset : Intel® HD Graphics 505 (CPU dependent) Supports OpenGL 4.6 (Windows/Linux) and OpenGL ES 3.2 (Linux)
- Ethernet LAN #1 : Realtek Gigabit LAN 10/100/1000Mbps
- Ethernet LAN #2 : Intel Gigabit LAN 10/100/1000Mbps
- BIOS : AMI BIOS, supports ACPI Note: "Legacy Mode" option is not fully supported for System Chipset and Microsoft® Windows® 10.
- Buzzer : Yes (according to EN60945)
- Speaker : None
- WatchDog Timer : Yes (256 segments, 0, 1, 2...255 sec/min)
- Other features : RTC (0.5s/day), Battery Alarm, WakeOnLan, Fast Boot, AT mode, USB Boot, TPM2.0
- DP++ Out Max Res. : 640 x 480 to 4096 x 2304 @ 60Hz

Power Specifications:

Power Supply Options:

- Multi-Power option : 100-240V AC - 50/60Hz + 24VDC (MMC-Mxx)
- Single AC Power Option : 100-240V AC - 50/60Hz (MMC-Axx)

Note: You may connect either AC power or DC power or both. In case both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be a uninterrupted switch-over to DC input.

Power Consumption: *(see note)

- Operating AC/DC : 44W (typ) - 156W (max)
- Operating AC : 44W (typ) - 125W (max)

Available Computer Configurations:

Type	Description	Size/Specification
Memory/RAM	DDR3L, 1600MHz, SO-DIMM	- 2GB Single Channel - 4GB (2x2GB) - Dual Channel - 8GB (2x4GB) - Dual Channel
Additional Internal Storage	m.2	- 240GB->
Software Support	Application Programming Interface (API) - as defined in associated documents	- SCOM
OS Options	**Windows® 10 IoT Enterprise 2019 LTSC (64bit)** - Product Distribution End Date January 2029 or **Linux:** Kernel 4.10 or later	

*Power Consumption: Numbers are specified as the unit is delivered from factory. All additional installed equipment like USB, PCIe and similar loads have to be added to power consumption. Note that total extra load have to be multiplied by 1.5 to compensate for efficiency in internal power converters. Typical power consumption varies a lot with computer load. We measure with 25% of max computer load.

Physical Dimensions:

- W:536.00 [21.10"] x H:358.50 [14.11"] x D:78.50 [3.09"] mm [inch]
- Weight: Approx. 7kg / 15.43lbs

User Controls:

On front bezel IP66:

- Power On/Off, Brightness Control (-/+), Power LED, ECDIS LED
- Buzzer, Light Sensor

Environmental Considerations:

- Operating Temperature : -15°C to +55°C
- Storage Temperature : -20°C to +60°C
- Humidity : Humidity up to 95% (Operating / Storage)
- IP-Rating Protection : IP66 front - IP20 rear (EN60529).
- Compass Safe Distance : Standard: 70cm - Steering: 60cm

Lifetime Considerations:

Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Input/Output Connectors:

Connector	Rear
• DisplayPort (DP++) Out	: 2 x 20p DisplayPort (female)
• USB2.0	: 4 x USB Type A
• Ethernet GBLan	: 2 x RJ-45
• COM RS-232 & 422/485	: 1 x DB9M non-isolated (Change RS mode in BIOS)
• AC Power IN	: 1 x Std IEC inlet
• If DC Power IN	: 1 x 2-pin Terminal Block 5.08

Factory Options:

- Projected Capacitive Touch Screen (Multitouch,USB,Pen/Glove support)
- Optical Bonding Technology
- Variations of Storage, RAM Memory and Operating Systems.
- 1 x HT 00235 OPT-A1: 2W Amplified Audio out via DB9F

- Model with 1 x Diskbay with support for 2 x 2.5" and max 2 Modules
- Model with 3 x Modules, no Diskbay

Modules available (depending on base model above):
Review full configuration matrix in User Manual INB101505-1
1,2 or 3 x PCA200828-1: 4xCOM RS-422/485 isolated NMEA 4 channel
or 1,2 or 3 x PCA100309-1: Dual Isolated RS-232, connector 2xDB9
or 1 x ZIA0001310-B: CAN isolated 2 channel or 2 x 4 channel
or 1 x ZIA0001310-SLCAN (1 x CAN isolated, 2 channel, socketCAN) module
or 1 x PCA100297-1: Isolated Digital IO module,4 x OUT/4 x IN
or 1 or 2 x PCA100298-1: LAN 10/100Mbps, 2 ports RJ45

Frame Grabber options (1 x supported via M.2 (PCIe x1) slot):

- HD550N1 SDI M2: 1 x SDI IN, 1920x1080@60/50fps
- HD550N1 HDV M2: 1 x HDMI IN+1 x VGA IN, 1920x1200p@60/50fps

Accessories:

- HD CMB SE1-B1 : 1 x Console Mount Kit. EN60945 Tested**
- HD TMB SE1-B1 : 1 x Table Mount Bracket. EN60945 Tested
- HD VED SX1-A1 : 1 x VESA Adapter, not EN60945 Tested
- JH C01MF A-A : 1 x USB Cable 1m, TypeA-Chassis mount receptacle
- HT 00262 OPT-A1 : 4 x RS-422/RS-485 isolated, USB ext. module
- HT 00263 OPT-A1 : 4 x RS-232 COM non-isolated, USB ext. module
- HT 00264 OPT-A1 : 1 x CAN isolated, 2 channel, USB ext. module
- HT 00273 OPT-A1 : 4 x Digital IN/OUT isolated, USB ext. module
- HT 00274 OPT-A1 : 2 x LAN 10/100Mbps, RJ45, USB ext. module
- HT 00300 MSOS : OS options: https://www.hattelandtechnology.com/options-for-downgrade-upgrade-change-or-add-of-microsoft-windows
- HD 000TR SX2-A2 : 1 x Removable Tray 2.5" Empty
- HD xxxyy SX1-z1 : 1 x Removable Tray 2.5" w/Storage Device*

*Where xxx=Size of device. yy=GB,TB. z=S (SSD) - Choose Device from table.
**Included in delivery

APPROVALS & CERTIFICATES

This product have been tested / type approved by the following classification societies:

IEC 60945 4th (EN 60945:2002) **IACS E10** **EU RO MR** - Mutual Recognition **ClassNK** - Nippon Kaiji Kyokai
CCS - China Classification Society

Specifications - HD 24T30 MMC-xxx-xxxxxx

All specifications are subject to change without prior notice!

TFT Technology:

- LED Backlight Technology, TFT Active-matrix
- 23.80 inch viewable image size, Widescreen, Aspect Ratio 16:9
- MVA (Multi-domain Vertical Alignment) LCD Technology, RGB vertical stripe

TFT Characteristics:

- Native Resolution : 1920 x 1080 (FHD)
- Pixel Pitch (RGB) : 0.274.5 (H) x 0.274.5 (V) mm
- Response Time : 14 ms (typ), G/G
- Contrast Ratio : 1000:1 (typical)
- Light Intensity : 250 cd/m² (typical)
- Viewable Angle : +/- 89 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 527.04 (H) x 296.46 (V) mm
- Max Colors : 16.7 millions (RGB 8-bit)

Computer Specifications:

- Supported OS : See table below
- CPU/Processor : 1 x Intel Atom® x7-E3950 Processor, 2M Cache, 1.60GHz / 2.00GHz
- Installed Storage : 32GB eMMC (Default). See table below
- Installed Memory : 2GB DDR3L single channel. See table below
- System Chipset : Intel® SOC
- Graphics Chipset : Intel® HD Graphics 505 (CPU dependent) Supports OpenGL 4.6 (Windows/Linux) and OpenGL ES 3.2 (Linux)
- Ethernet LAN #1 : Realtek Gigabit LAN 10/100/1000Mbps
- Ethernet LAN #2 : Intel Gigabit LAN 10/100/1000Mbps
- BIOS : AMI BIOS, supports ACPI Note: "Legacy Mode" option is not fully supported for System Chipset and Microsoft® Windows® 10.
- Buzzer : Yes (according to EN60945)
- Speaker : None
- WatchDog Timer : Yes (256 segments, 0, 1, 2...255 sec/min)
- Other features : RTC (0.5s/day), Battery Alarm, WakeOnLan, Fast Boot, AT mode, USB Boot, TPM2.0
- DP++ Out Max Res. : 640 x 480 to 4096 x 2304 @ 60Hz

Power Specifications:

Power Supply Options:

- Multi-Power option : 100-240V AC - 50/60Hz + 24VDC (MMC-Mxx)
- Single AC Power Option : 100-240V AC - 50/60Hz (MMC-Axx)

Note: You may connect either AC power or DC power or both. In case both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be a uninterrupted switch-over to DC input.

Power Consumption: *(see note)

- Operating AC/DC : 45.2W (typ) - 156W (max)
- Operating AC : 45.2W (typ) - 125W (max)

Available Computer Configurations:

Type	Description	Size/Specification
Memory/RAM	DDR3L, 1600MHz, SO-DIMM	- 2GB Single Channel - 4GB (2x2GB) - Dual Channel - 8GB (2x4GB) - Dual Channel
Additional Internal Storage	m.2	- 240GB->
Software Support	Application Programming Interface (API) - as defined in associated documents	- SCOM
OS Options	**Windows® 10 IoT Enterprise 2019 LTSC (64bit)** - Product Distribution End Date January 2029 or **Linux:** Kernel 4.10 or later	

*Power Consumption: Numbers are specified as the unit is delivered from factory. All additional installed equipment like USB, PCIe and similar loads have to be added to power consumption. Note that total extra load have to be multiplied by 1.5 to compensate for efficiency in internal power converters. Typical power consumption varies a lot with computer load. We measure with 25% of max computer load.

Physical Dimensions:

- W:593.00 [23.35"] x H:384.00 [15.12"] x D:78.50 [3.09"] mm [inch]
- Weight: Approx. 8.5kg / 18.74lbs

User Controls:

On front bezel IP66:

- Power On/Off, Brightness Control (-/+), Power LED, ECDIS LED
- Buzzer, Light Sensor

Environmental Considerations:

- Operating Temperature : -15°C to +55°C
- Storage Temperature : -20°C to +60°C
- Humidity : Humidity up to 95% (Operating / Storage)
- IP-Rating Protection : IP66 front - IP20 rear (EN60529).
- Compass Safe Distance : Standard: 80m - Steering: 60cm

Lifetime Considerations:

Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Input/Output Connectors:

Connector	Rear
• DisplayPort (DP++) Out	: 2 x 20p DisplayPort (female)
• USB2.0	: 4 x USB Type A
• Ethernet GBLan	: 2 x RJ-45
• COM RS-232 & 422/485	: 1 x DB9M non-isolated (Change RS mode in BIOS)
• AC Power IN	: 1 x Std IEC inlet
• If DC Power IN	: 1 x 2-pin Terminal Block 5.08

Factory Options:

- Projected Capacitive Touch Screen (Multitouch,USB,Pen/Glove support)
- Optical Bonding Technology
- Variations of Storage, RAM Memory and Operating Systems.
- 1 x HT 00235 OPT-A1: 2W Amplified Audio out via DB9F

- Model with 1 x Diskbay with support for 2 x 2.5" and max 2 Modules
- Model with 3 x Modules, no Diskbay

Modules available (depending on base model above):
Review full configuration matrix in User Manual INB101505-1
1,2 or 3 x PCA200828-1: 4xCOM RS-422/485 isolated NMEA 4 channel
or 1,2 or 3 x PCA100309-1: Dual Isolated RS-232, connector 2xDB9
or 1 x ZIA0001310-B: CAN isolated 2 channel or 2 x 4 channel
or 1 x ZIA0001310-SLCAN (1 x CAN isolated, 2 channel, socketCAN) module
or 1 x PCA100297-1: Isolated Digital IO module,4 x OUT/4 x IN
or 1 or 2 x PCA100298-1: LAN 10/100Mbps, 2 ports RJ45

Frame Grabber options (1 x supported via M.2 (PCIe x1) slot):

- HD550N1 SDI M2: 1 x SDI IN, 1920x1080@60/50fps
- HD550N1 HDV M2: 1 x HDMI IN+1 x VGA IN, 1920x1200p@60/50fps

Accessories:

- HD CMB SE1-B1 : 1 x Console Mount Kit. EN60945 Tested**
- HD TMB SE1-B1 : 1 x Table Mount Bracket. EN60945 Tested
- HD VED SX1-A1 : 1 x VESA Adapter, not EN60945 Tested
- JH C01MF A-A : 1 x USB Cable 1m, TypeA-Chassis mount receptacle
- HT 00262 OPT-A1 : 4 x RS-422/RS-485 isolated, USB ext. module
- HT 00263 OPT-A1 : 4 x RS-232 COM non-isolated, USB ext. module
- HT 00264 OPT-A1 : 1 x CAN isolated, 2 channel, USB ext. module
- HT 00273 OPT-A1 : 4 x Digital IN/OUT isolated, USB ext. module
- HT 00274 OPT-A1 : 2 x LAN 10/100Mbps, RJ45, USB ext. module
- HT 00300 MSOS : OS options: https://www.hattelandtechnology.com/options-for-downgrade-upgrade-change-or-add-of-microsoft-windows
- HD 000TR SX2-A2 : 1 x Removable Tray 2.5" Empty
- HD xxxyy SX1-z1 : 1 x Removable Tray 2.5" w/Storage Device*

*Where xxx=Size of device. yy=GB,TB. z=S (SSD) - Choose Device from table.
**Included in delivery

APPROVALS & CERTIFICATES

This product have been tested / type approved by the following classification societies:

IEC 60945 4th (EN 60945:2002) **IACS E10** **EU RO MR** - Mutual Recognition **ClassNK** - Nippon Kaiji Kyokai
CCS - China Classification Society

Specifications - HD 27T30 MMC-xxx-xxxxxx

All specifications are subject to change without prior notice!

TFT Technology:

- LED Backlight Technology, Color Active Matrix
- 27.0 inch viewable image size, Widescreen, Aspect Ratio 16:9
- a-SI (amorphous silicon) Thin Film Transistor (TFT)

TFT Characteristics:

- Native Resolution : 1920 x 1080 (FHD)
- Pixel Pitch (RGB) : 0.31125 (H) x 0.31125 (V) mm
- Response Time : 12 ms (typical) (on/off)
- Contrast Ratio : 3000:1 (typical)
- Light Intensity : 300 cd/m² (typical)
- Viewable Angle : +/- 89 deg. (typical) (Up/Down/Left/Right)
- Active Display Area : 597.6 (H) x 336.15 (V) mm
- Max Colors : 16.7 million

Computer Specifications:

- Supported OS : See table below
- CPU/Processor : 1 x Intel Atom® x7-E3950 Processor, 2M Cache, 1.60GHz / 2.00GHz
- Installed Storage : 32GB eMMC (Default). See table below
- Installed Memory : 2GB DDR3L single channel. See table below
- System Chipset : Intel® SOC
- Graphics Chipset : Intel® HD Graphics 505 (CPU dependent) Supports OpenGL 4.6 (Windows/Linux) and OpenGL ES 3.2 (Linux)
- Ethernet LAN #1 : Realtek Gigabit LAN 10/100/1000Mbps
- Ethernet LAN #2 : Intel Gigabit LAN 10/100/1000Mbps
- BIOS : AMI BIOS, supports ACPI Note: "Legacy Mode" option is not fully supported for System Chipset and Microsoft® Windows® 10.
- Buzzer : Yes (according to EN60945)
- Speaker : None
- WatchDog Timer : Yes (256 segments, 0, 1, 2...255 sec/min)
- Other features : RTC (0.5s/day), Battery Alarm, WakeOnLan, Fast Boot, AT mode, USB Boot, TPM2.0
- DP++ Out Max Res. : 640 x 480 to 4096 x 2304 @ 60Hz

Power Specifications:

Power Supply Options:

- Multi-Power option : 100-240V AC - 50/60Hz + 24VDC (MMC-Mxx)
- Single AC Power Option : 100-240V AC - 50/60Hz (MMC-Axx)

Note: You may connect either AC power or DC power or both. In case both sources are connected, power will be sourced from the AC input. If AC input is lost, there will be a uninterrupted switch-over to DC input.

Power Consumption: *(see note)

- Operating AC/DC : 43.2W (typ) - 156W (max)
- Operating AC : 43.2W (typ) - 125W (max)

Available Computer Configurations:

Type	Description	Size/Specification
Memory/RAM	DDR3L, 1600MHz, SO-DIMM	- 2GB Single Channel - 4GB (2x2GB) - Dual Channel - 8GB (2x4GB) - Dual Channel
Additional Internal Storage	m.2	- 240GB->
Software Support	Application Programming Interface (API) - as defined in associated documents	- SCOM
OS Options	**Windows® 10 IoT Enterprise 2019 LTSC (64bit)** - Product Distribution End Date January 2029 or **Linux:** Kernel 4.10 or later	

*Power Consumption: Numbers are specified as the unit is delivered from factory. All additional installed equipment like USB, PCIe and similar loads have to be added to power consumption. Note that total extra load have to be multiplied by 1.5 to compensate for efficiency in internal power converters. Typical power consumption varies a lot with computer load. We measure with 25% of max computer load.

Physical Dimensions:

- W:650.00 [25.59"] x H:437.00 [17.20"] x D:78.50 [3.09"] mm [inch]
- Weight: Approx. 10.7kg / 23.59lbs

User Controls:

On front bezel IP66:

- Power On/Off, Brightness Control (-/+), Power LED, ECDIS LED
- Buzzer, Light Sensor

Environmental Considerations:

- Operating Temperature : -15°C to +55°C
- Storage Temperature : -20°C to +60°C
- Humidity : Humidity up to 95% (Operating / Storage)
- IP-Rating Protection : IP66 front - IP20 rear (EN60529).
- Compass Safe Distance : Standard: 80cm - Steering: 60cm

Lifetime Considerations:

Even though the test conditions for bridge units provide for a maximum operating temperature of 55°C, continuous operation of all electronic components should, if possible, take place at ambient temperatures of only 25°C. This is a necessary prerequisite for long life and low service costs.

Input/Output Connectors:

Connector	Rear
• DisplayPort (DP++) Out	: 2 x 20p DisplayPort (female)
• USB2.0	: 4 x USB Type A
• Ethernet GBLan	: 2 x RJ-45
• COM RS-232 & 422/485	: 1 x DB9M non-isolated (Change RS mode in BIOS)
• AC Power IN	: 1 x Std IEC inlet
• If DC Power IN	: 1 x 2-pin Terminal Block 5.08

Factory Options:

- Projected Capacitive Touch Screen (Multitouch,USB,Pen/Glove support)
- Optical Bonding Technology
- Variations of Storage, RAM Memory and Operating Systems.
- 1 x HT 00235 OPT-A1: 2W Amplified Audio out via DB9F

- Model with 1 x Diskbay with support for 2 x 2.5" and max 2 Modules
- Model with 3 x Modules, no Diskbay

Modules available (depending on base model above):
Review full configuration matrix in User Manual INB101505-1
1,2 or 3 x PCA200828-1: 4xCOM RS-422/485 isolated NMEA 4 channel
or 1,2 or 3 x PCA100309-1: Dual Isolated RS-232, connector 2xDB9
or 1 x ZIA0001310-B: CAN isolated 2 channel or 2 x 4 channel
or 1 x ZIA0001310-SLCAN (1 x CAN isolated, 2 channel, socketCAN) module
or 1 x PCA100297-1: Isolated Digital IO module,4 x OUT/4 x IN
or 1 or 2 x PCA100298-1: LAN 10/100Mbps, 2 ports RJ45

Frame Grabber options (1 x supported via M.2 (PCIe x1) slot):

- HD550N1 SDI M2: 1 x SDI IN, 1920x1080@60/50fps
- HD550N1 HDV M2: 1 x HDMI IN+1 x VGA IN, 1920x1200p@60/50fps

Accessories:

- HD CMB SE1-B1 : 1 x Console Mount Kit. EN60945 Tested**
- HD TMB SE1-B1 : 1 x Table Mount Bracket. EN60945 Tested
- HD VED SX1-A1 : 1 x VESA Adapter, not EN60945 Tested
- JH C01MF A-A : 1 x USB Cable 1m, TypeA-Chassis mount receptacle
- HT 00262 OPT-A1 : 4 x RS-422/RS-485 isolated, USB ext. module
- HT 00263 OPT-A1 : 4 x RS-232 COM non-isolated, USB ext. module
- HT 00264 OPT-A1 : 1 x CAN isolated, 2 channel, USB ext. module
- HT 00273 OPT-A1 : 4 x Digital IN/OUT isolated, USB ext. module
- HT 00274 OPT-A1 : 2 x LAN 10/100Mbps, RJ45, USB ext. module
- HT 00300 MSOS : OS options: https://www.hattelandtechnology.com/options-for-downgrade-upgrade-change-or-add-of-microsoft-windows
- HD 000TR SX2-A2 : 1 x Removable Tray 2.5" Empty
- HD xxxyy SX1-z1 : 1 x Removable Tray 2.5" w/Storage Device*

*Where xxx=Size of device. yy=GB,TB. z=S (SSD) - Choose Device from table.
**Included in delivery

APPROVALS & CERTIFICATES

This product have been tested / type approved by the following classification societies:

IEC 60945 4th (EN 60945:2002) **IACS E10** **EU RO MR** - Mutual Recognition **ClassNK** - Nippon Kaiji Kyokai
CCS - China Classification Society

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Specifications
Factory Options

All specifications are subject to change without prior notice!

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**CAN Module with CO-Processor**
Typenumber:	**ZIA0001310-B**

Last Revised:	**14 Apr 2021**
Revision#:	**27**

1 x CAN, 2 channels, CAN Module with CO-Processor

Description:

CAN Module with CO-Processor (NXP LPC1756) is a USB to dual isolated CAN interface board. This card will mainly be integrated, electrical and mechanical by factory default for Series X G1/G2 Panel Computers and selected Stand-alone Computers. The Hatteland Technology CAN Module is delivered with software download functions and standard API, SAE J2534, which allow the user to add their own functions, such as real time critical functions, and high level CAN protocol. The CAN Module can operate as a standalone unit, which can be configured to operate independent of application software and hardware. This allow the user to use the CAN Module for time and safe critical operations.

Cost effective CAN solution, Withstand marine requirements, General and open architecture that will allow the end customer to modify and handle the source code, General CAN interface support, NMEA2000, J1939, CANOpen.

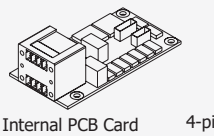
Note: Due to driver limitations, only 1 instance of this module can be connected to the same Computer/Panel Computer unit. If Computer/Panel Computer already has CAN functionality built-in, connecting this module will always fail.

Specifications

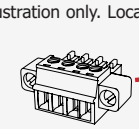
• Number of CAN interfaces	2 independent channels isolated from each other
• Version	CAN 2.0B
• Isolation	Galvanic isolation 2kV, CAN1 to CAN2 and port to chassis
• Protection	- Continuous short circuit signal to signal - Continuous short circuit to isolated GND - Continuous shorts to ±27V
• ESD rating on CAN bus	ESD rating of ±12kV Human body model
• Min Baud rate	50 kbit/s*
• Max baud rate	500 kbit/s*
*Note: Available Baud Rates are defined in/by the respective protocols. Customized solutions are possible, contact our Sales Department.	
• Address mode	11/29bit
• Terminating	No termination on PCB, user will put them in connector
• PCB Connector	(SCD 3.81/08/90F 3.2SN BK BX) (Do not connect to this, use Terminal Block)
• Cable connector	2 x (BCZ 3.81/04/180F SN BK BX) Terminal Block Connector (see illustration below)
• Cable	Twisted pair, no ground
• Recommended Cable Thickness	Minimum 22 AWG - Maximum 20 AWG
• Supported protocols	SAE J2534 Standard Data Bus Interface
• Power Consumption	Max 204mA @ 5V
• Supported OS	**Embedded Enterprise (WEE):** Microsoft® Windows® Server 2003/2008/2008R2 (Eng), Microsoft® Windows® 2003/2008/2008R2 (Eng), Microsoft® Windows® 7 Professional/Ultimate (Eng, SP1), Windows® 10 IoT Enterprise 2016 LTSB. **Linux:** openSUSE® 11.4, Fedora™ 15, Ubuntu® 10.04 LTS, Ubuntu® 12.04 LTS.
Note: Listed Operating Systems above are hardware/platform dependent. Please check datasheet for specific unit if OS is supported.	
• Test and certificate	Hatteland Technology standard (tested / type approved by the following classification societies): **IEC 60945 4th** (EN 60945:2002), **IACS E10**, **EU RO MR** - Mutual Recognition, **ClassNK** - Nippon Kaiji Kyokai
• Relevant Documentation: https://www.hattelandtechnology.com/hubfs/pdf/misc/doc101357-1_hd_can_module_programmer_guide_windows.pdf https://www.hattelandtechnology.com/hubfs/pdf/misc/doc101356-1_hd_can_module_programmer_guide_linux.pdf https://www.hattelandtechnology.com/hubfs/drivers/can_gw_application_note_package.zip	

Illustration and Pinning:

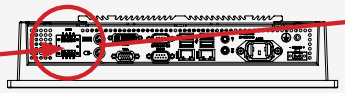
Note: Product below for illustration only. Location of module and product size/design may differ. Connector/pinning remain the same.



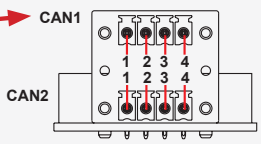
Internal PCB Card

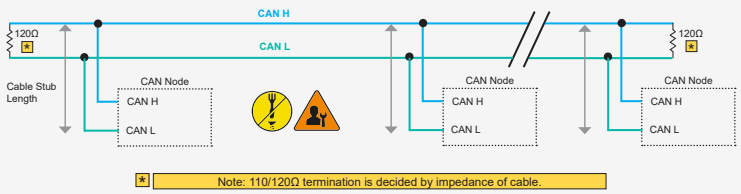


4-pin Terminal Block 3.81



Rear of unit





CAN H = High - CAN L = Low

Pin 01	Can1	CAN L
Pin 02	Can1	CAN L
Pin 03	Can1	CAN H
Pin 04	Can1	CAN H

Pin 01	Can2	CAN L
Pin 02	Can2	CAN L
Pin 03	Can2	CAN H
Pin 04	Can2	CAN H

Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

All specifications are subject to change without prior notice!

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**CAN Module with CO-Processor**
Typenumber:	**ZIA0001310-SLCAN**

Last Revised:	**14 Apr 2021**
Revision#:	**09**

1 x CAN, 2 channels, CAN Module with CO-Processor

Description:

CAN Module with CO-Processor (NXP LPC1756) is a USB to dual isolated CAN interface board. This card will mainly be integrated, electrical and mechanical by factory default for Series X Panel Computers and selected Stand-alone Computers. The Hatteland Technology CAN Module support socketCAN driver in both Windows and Linux environment, which allow the user to add their own functions, such as real-time critical functions, and high level CAN protocol. The CAN Module can operate as a standalone unit, which can be configured to operate independent of application software and hardware. This allow the user to use the CAN Module for time and safe critical operations.

Cost effective CAN solution, Withstand marine requirements, General and open architecture that will allow the end customer to modify and handle the source code, General CAN interface support, NMEA2000, J1939, CANOpen.

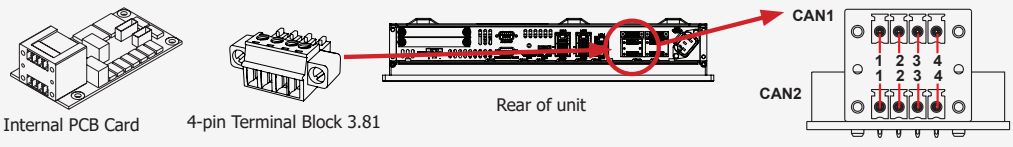
Note: Due to driver limitations, only 1 instance of this module can be connected to the same Computer/Panel Computer unit. If Computer/Panel Computer already has CAN functionality built-in, connecting thisl module will always fail.

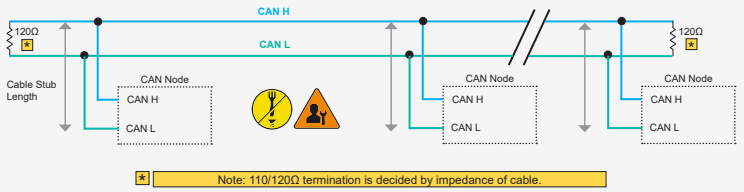
Specifications

• Number of CAN interfaces	2 independent channels isolated from each other
• Version	CAN 2.0B
• Isolation	Galvanic isolation 2kV, CAN1 to CAN2 and port to chassis
• Protection	- Continuous short circuit signal to signal - Continuous short circuit to isolated GND - Continuous shorts to ±27V
• ESD rating on CAN bus	ESD rating of ±12kV Human body model
• Min Baud rate	50k bit/s
• Max baud rate	1M bit/s
• Address mode	11/29bit
• Terminating	No termination on PCB, user will put them in connector
• Cable connector	2 x (BCZ 3.81/04/180F SN BK BX) Terminal Block Connector (see illustration below)
• Cable	Twisted pair, no ground
• Recommended Cable Thickness	Minimum 22 AWG - Maximum 20 AWG
• API/Supported Protocols	API: SocketCAN Data Protocol: SLCAN Protocol
• Power Consumption	Max 204mA @ 5V
• Supported OS	**Embedded Enterprise (WEE):** Windows® 10 IoT Enterprise 2016 LTSB. (Periodic message sending is not supported). **Linux:** Kernel 2.6.37 or newer with SocketCAN support
• Test and certificate	Hatteland Technology standard (tested / type approved by the following classification societies): **IEC 60945 4th** (EN 60945:2002), **IACS E10, EU RO MR** - Mutual Recognition, **ClassNK** - Nippon Kaiji Kyokai
• Relevant Documentation: https://www.hattelandtechnology.com/hubfs/pdf/misc/doc205993-1_usb_slcan_module_user_manual.pdf	
• Suitable Driver Packages: Windows® Driver: https://www.hattelandtechnology.com/hubfs/drivers/slcan_setup_hd_gw_svc1.5.0.zip Linux: https://www.hattelandtechnology.com/hubfs/drivers/customer_pack_hdcan_linux_180222.zip	

Illustration and Pinning:

Note: Product below for illustration only. Location of module and product size/design may differ. Connector/pinning remain the same.





CAN H = High - CAN L = Low

Pin 01	Can1	CAN L
Pin 02	Can1	CAN L
Pin 03	Can1	CAN H
Pin 04	Can1	CAN H

Pin 01	Can2	CAN L
Pin 02	Can2	CAN L
Pin 03	Can2	CAN H
Pin 04	Can2	CAN H

Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**4 channel RS-422 / RS-485 COM module**
Typenumber:	**PCA100293-1**

Last Revised:	**16 Apr 2020**
Revision#:	**27**

4 channel RS-422 / RS-485, NMEA / IEC COM Module

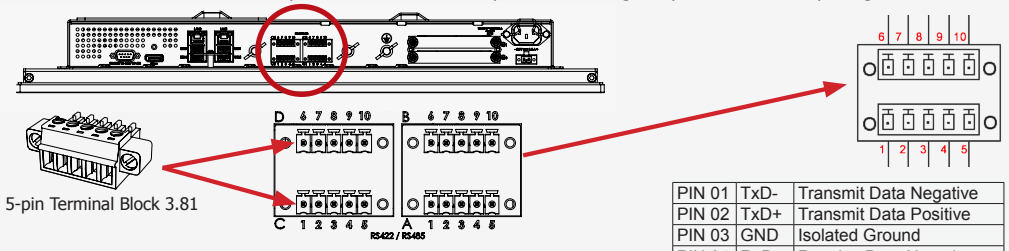
Description:

The Hatteland Technology COM modules provide the system with quad independent COM channels. The module is attached to the motherboard via standard USB interface. Application software access the COM channels as standard COM devices, i.e. in the normal case is there no requirements for additional software development. This module will mainly be integrated, electrical and mechanical, in the final products, such as; Series X G1/G2 Panel Computers and selected Stand-alone Computers.

Internal USB to RS-485 / RS-422 isolated	
• Features	- Independent channels (If card is replaced most OS will not change COM port number). - Outputs are short circuits protected. Inputs are protected. - Driver strength are approved. - All channels is fully isolated, channel to channel and channel to chassis. - Classified towards IEC61162-1 and IEC61162-2. - Tested according to EN61162. - NMEA-183 Compliant. - All requirement for usage in ECDIS applications/systems is fulfilled.
• Absolute Max voltage applied to outputs	-8V to +13V
• Data Rate / Technical Data Output	- Outputs 230kbps (Theoretically 400kbps). - ±15kV ESD protection on all RS-485 signals. (Human Body Model - HBM) - Isolation rating = 2000VRMS, not intended for connection to live power nets.
• Transmitter enable mode	- Standard mode is automatic. - Standard Mode will accept send by RTS, but will in fact ignore RTS. - Each channel have a overide jumper* which can be used to force the transmitter to always be active. See below and next page for details.
• Cable Connector	Terminal Block 5-pin rows (MC 1,5/ 5-STF-3,81) (see illustration below)
• Recommended Cable Thickness	Minimum 22 AWG - Maximum 18 AWG
• Power Consumption	Max 347mA @ 5V
• Supported Operating Systems (OS)	**Embedded Enterprise (WEE):** Microsoft® Windows® Server 2003/2008/2008R2 (Eng), Microsoft® Windows® 2003/2008/2008R2 (Eng), Microsoft® Windows® 7 Professional/ Ultimate (Eng, SP1), Windows® 10 IoT Enterprise 2016 LTSB. **Linux:** Generic support for Kernel 3.0.0.19 or newer
• Drivers "https://www.hattelandtechnology.com/hubfs/pdf/misc/doc102080-1_usb-com_module_configuration.pdf" "https://www.hattelandtechnology.com/hubfs/drivers/ht00262opt-a1_drivers.zip" "https://www.hatteland-display.com/support_hardware_drivers_peripherals.php" Linux, please visit: http://www.ftdichip.com/Drivers/D2XX.htm	
Note: Listed Operating Systems above are hardware/platform dependent. Please check datasheet for specific unit if OS is supported.	
• Test and certificate	Hatteland Technology standard, (tested / type approved by the following classification societies): **IEC 60945 4th** (EN 60945:2002), **IACS E10**, **EU RO MR** - Mutual Recognition, **ClassNK** - Nippon Kaiji Kyokai

Illustration and Pinning:

Note: Product below for illustration only. Location of module and product size/design may differ. Connector/pinning remain the same.



5-pin Terminal Block 3.81

PIN 01	TxD-	Transmit Data Negative
PIN 02	TxD+	Transmit Data Positive
PIN 03	GND	Isolated Ground
PIN 04	RxD-	Receive Data Negative
PIN 05	RxD+	Receive Data Positive
PIN 06	TxD-	Transmit Data Negative
PIN 07	TxD+	Transmit Data Positive
PIN 08	GND	Isolated Ground
PIN 09	RxD-	Receive Data Negative
PIN 10	RxD+	Receive Data Positive

4 Ports (Virtual COM) identified in the Operating System (OS):
COMx (A), COMx (B), COMx (C), COMx (D)*
*Configuration dependent, x = next available port number(s) OS.

RS-485 Half Duplex (2-wire, supports ECHO) Configuration:
Connect TX and RX pair-wise: TX- to RX-, TX+ to RX+.

*Note: The jumper for "force of transmitter" is open by factory default. For some custom models this jumper is preset to closed (active), in that case unit has to be opened and jumper set to open to allow Half Duplex mode.

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CAUTION
This unit contains electrostatic sensitive devices.
Observe precautions for handling.

Users who needs to open the unit set jumper settings will VOID THE WARRANTY!
Before opening, proper ESD measurements must be taken!

1. Operator should ground himself by using a wrist band.

2. The wrist band should be connected to ground via a ground cord.

3. A one megaohm resistor, installed in the wrist connection end of the ground cord, is a safety requirement.

4. Hatteland Technology recommend using a Static-dissipative ESD work mat positioned at the workplace. The 3M™ 8501 Portable Field Service Kit is a good choice for this purpose. Make sure that the mat, operator and product are wired/grounded together.

All assisting persons who might come into contact with the endangered boards must also use the ESD equipment.

Jumper Configuration:

Please note:
- By standard factory default, all of the jumpers on all channels are set to open (no jumper), except some customized models as per request.
- It is expected that the user has the required knowledge for working with PCB Cards, electronics and setting jumpers.
- To avoid voiding warranty, please contact us prior to ordering to ensure safe and correct configuration regarding ECHO in factory.
- Incorrect setting of these jumpers can cause strange data losses/corruption which are hard to debug in software.

There are 2 jumpers for each channel (physically they are located as **A,B,D,C** as indicated below). You will have to provide suitable 2mm jumpers (not part of any delivery) See illustration below showing internal PCB card.

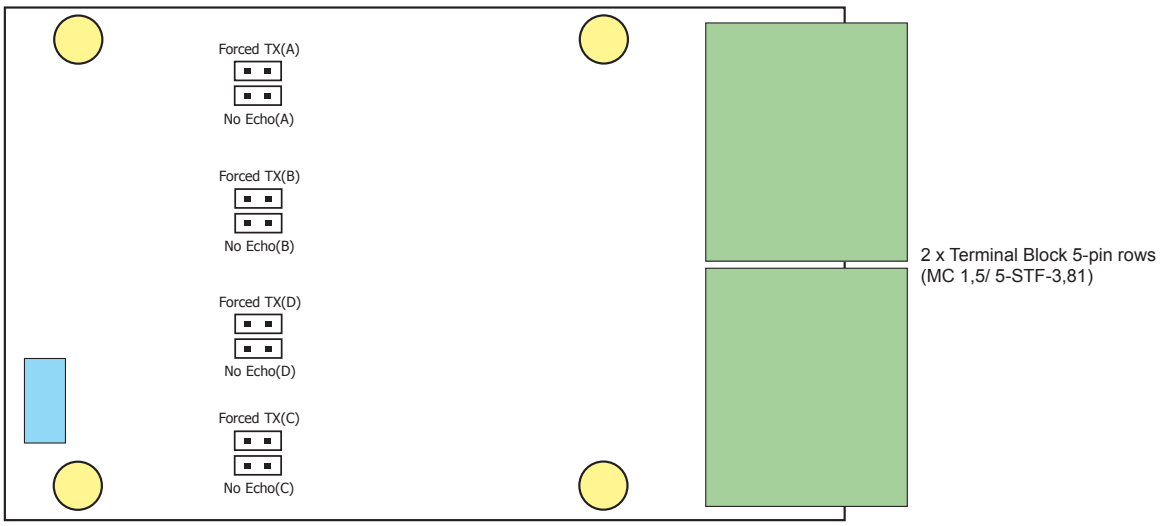
Forced TX(x):
If this jumper is set it will enable the RS485 transmitter for channel X at all times. It can be useful when the end user need the transmitter to remain on at all times. Note that it is only possible to use one transmitter on the bus when this jumper is set. It will force the bus to a logic high state when there is no traffic. Power consumption is increased if this jumper is set since the termination resistor always see the full output voltage.

No ECHO(x) - NOTE: Required for some MODBUS Compability.
Jumper mounted: This setting is only to be used during half duplex communication. When this jumper is set it will disable ability to receive data (Echo of transmitted data) while transmitting is active. Some software libraries are not able to use echo and therefore need this jumper set. Typically example is a very common MODBUS library.

Jumper open (no jumper): Recommended setting. All data sent on the bus is read back and the application/driver on the computer can check that we were able to send the data onto the bus.

Isolation:
This only apply to the module in itself, the internally mounted units are most likely less isolated due to cable/connectors used.

Jumper Locations (top view) - General illustration:



HATTELAND TECHNOLOGY
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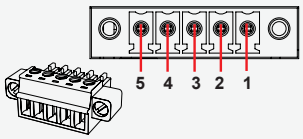
5-pin Isolated NMEA COM
"RS-422/RS-485"



PIN 01	TxD-	Transmit Data Negative
PIN 02	TxD+	Transmit Data Positive
PIN 03	GND	Isolated Ground
PIN 04	RxD-	Receive Data Negative
PIN 05	RxD+	Receive Data Positive

*Pin 1,2,3,4=RS-422/485 Full Duplex (4-wire)
*Pin 1+4, 2+5 = RS-485 Half Duplex (2-wire)
Connect TxD and RxD pair-wise:
TxD- to RxD-, TxD+ to RxD+.

Note: Configuration of options for ECHO of transmitted data and to force the transmitter to always active is available in BIOS.

COM Ports are identifed in the Operating System (example Microsoft® Windows® 10) as:

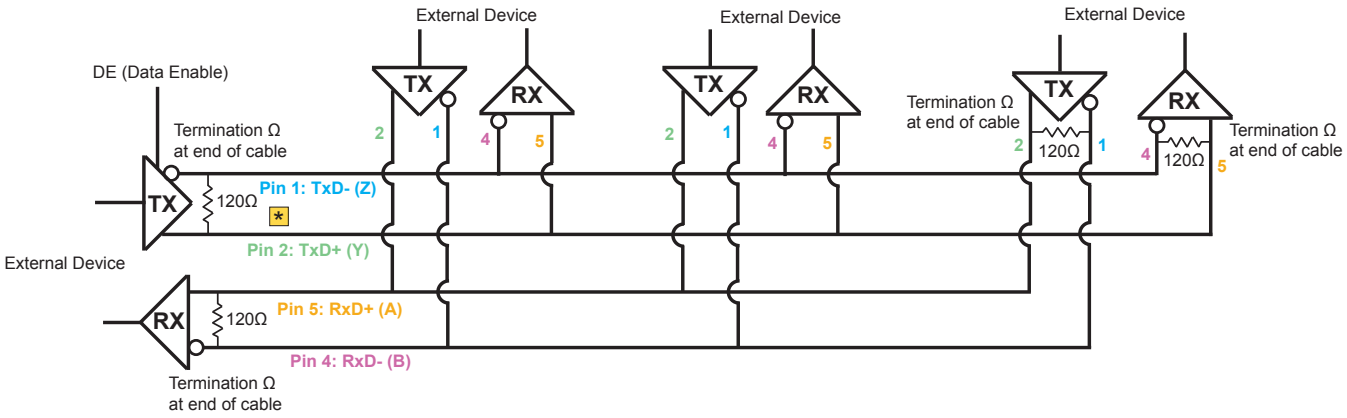
A = COM6, B = COM7, C = COM8, D = COM9.

(COM ports are not reserved nor locked by BIOS. COM Port numbering may differ depending on OS used and customized solutions. Use the Operating System functions to determine actual port numbering, if problems arise).

Our units are based on an isolated RS-485 interface with enhancements to meet NMEA standard. It is recommended connecting the ground wire since it will help protect the system in event of fast transient voltage and most likely also help improve signal integrity in the system.

For slow changing or DC offset our system will most likely work without the ground wire. If this wire is not connected, our units are more sensitive to fast transient voltage at the connectors. (The "isolated Ground" wire will help absorb this energy).

RS-422 / RS-485 FULL DUPLEX

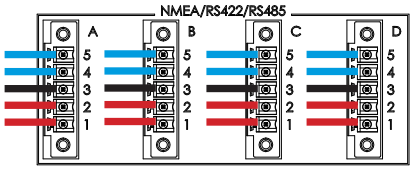


* Note: 120Ω termination on TX pins are rarely needed, unless cable is long or enviroment is very noisy.

NMEA Standards:
IEC61162-1 chapter 3.5.5 state that the input shall withstand 15V between ground and input. The reference speed specified is set at 4800 bit/s.
IEC61162-2 chapter 3.1 state that there are 3 wires to be used. (A, B and C). The reference speed for this interface is set as 38400 bit/s.

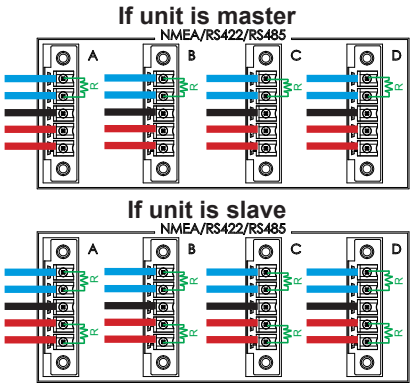
Please visit **http://www.iec.ch** (International Electrotechnical Commission) for the complete standard description.

RS-422 / RS-485 FULL DUPLEX



Without Termination:
- **Black** is always connected
- **Blue** is connected when the device acts as a receiver
- **Red** is connected when the device acts as a transmitter

Total 5 wires.



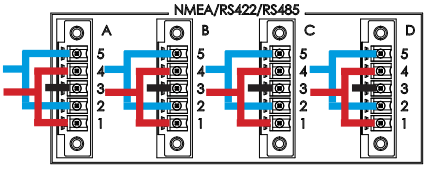
With Termination:
- **Black** is always connected
- **Blue** is connected when the device acts as a receiver
- **Red** is connected when the device acts as a transmitter

Total 5 wires +
Termination (if unit is master):
1 x 110/120 Ω resistor between PIN 4 (RxD-) and 5 (RxD+).
Termination (if unit is slave):
2 x 110/120 Ω resistor between PIN 4 (RxD-) and 5 (RxD+) and PIN 1 (TxD-) and PIN 2 (TxD+).

For each pair there shall be one termination resistor (110/120Ω) at each end of the bus. (A total of 2 resistors on each pair).

PIN 01	TxD-	Transmit Data Negative
PIN 02	TxD+	Transmit Data Positive
PIN 03	GND	Isolated Ground
PIN 04	RxD-	Receive Data Negative
PIN 05	RxD+	Receive Data Positive

RS-485 HALF DUPLEX



- **Black** Pin 3 is always connected
- **Blue** is DATA+ (TxD+ connected to RxD+. Pin 5 and 2)
- **Red** is DATA - (TxD- connected to RxD-. Pin 4 and 1)

Total 3 wires.

Notes:
- Force TX OFF and (Normally) NO ECHO must be set.
- For each pair there shall be one termination resistor (110/120Ω) at each end of the bus. (A total of 2 resistors on each pair).

PIN 01	TxD-	Transmit Data Negative
PIN 02	TxD+	Transmit Data Positive
PIN 03	GND	Isolated Ground
PIN 04	RxD-	Receive Data Negative
PIN 05	RxD+	Receive Data Positive

All specifications are subject to change without prior notice!

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

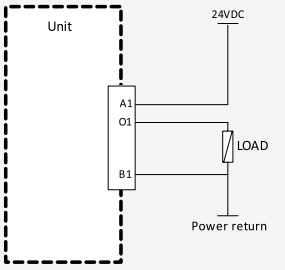
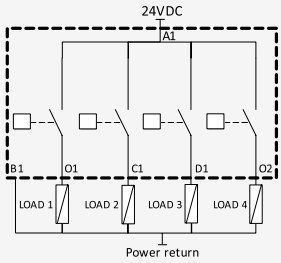
Manufacturer:	**Hatteland Technology AS**
Product:	**Isolated Digital IO module (4 x Output + 4 x Input)**
Typenumber:	**PCA100297-1**

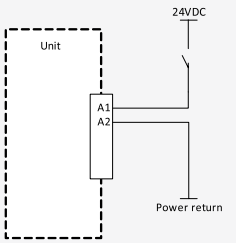
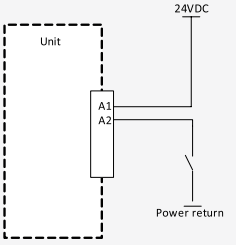
Last Revised:	**10 Mar 2021**
Revision#:	**17**

4 x Isolated Input + 4 x Output, Digital IO Module

Description:

The Hatteland Technology DIO module provide the system with 4 isolated digital output and 4 isolated digital input. The module is attached to the motherboard via USB interface. Application software access the DIO channels via D2XX interface provided by the chip manufacturer, i.e. in the normal case is there no requirements for low level software development. This module will mainly be integrated, electrical and mechanical, in the final products, such as; Series X G1/G2 Panel Computers and selected Stand-alone Computers.

Digital Output		**Application Circuit**
• Features	- Independent output channels, High side switch. - Outputs are short circuits and overload protected. - Thermal shutdown. - Isolated towards chassis. - Output status/diagnostic feedback available for each output channel. - Outputs is rated for inductive and resistive loads. - Outputs is rated for driving small motors. - Classified towards IEC60945 and IEC60950.	
• Maximum Ratings	- Voltage: 9-36V continuously. - Load Current: 150mA. - Response time hardware for change of output state <20ms. - Response time hardware for diagnostic feedback <30ms.* - Worst case short circuit current (each channel) < 1.5A. *Typical response time at system level: 200ms.	
• Typical Application	- Low Power control / relay control. - Medium power buzzer. - Indicator/signal lamps.	**Above: High side switch concept**

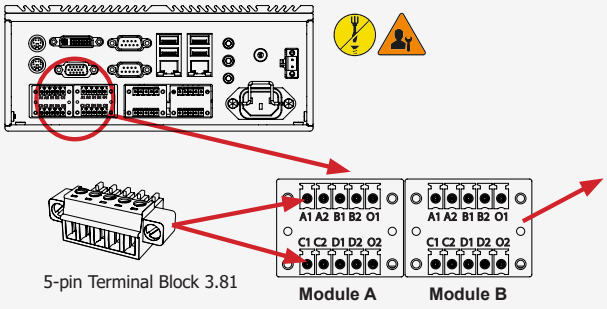
Digital Input		**Application Circuits**
• Features	- Independent input channels. - Fully isolated towards chassis and channel to channel. - Short circuit and reverse voltage protected. - Classified towards IEC60945 and IEC60950.	
• Maximum Ratings	- Input voltage 8-36V. - Response time hardware <10ms. - Input current < 20mA.	

Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

Additional	
• Cable connector	(MC 1,5/ 5-STF-3,81) Terminal Block 3.81 (see illustration below)
• Recommended Cable Thickness	Minimum 22 AWG - Maximum 18 AWG
• Test and certificate	Hatteland Technology standard, (tested / type approved by the following classification societies): **IEC 60945 4th** (EN 60945:2002), **IACS E10**, **EU RO MR** - Mutual Recognition, **ClassNK** - Nippon Kaiji Kyokai
• Safety IEC60950	The DIO module is intended to be used in control circuits and does therefore need external fuse to meet safety agency approvals.

Illustration and Pinning

Note: Product below for illustration only. Location of module and product size/design may differ. Connector/pinning/specifications remain the same.



Module A		Module B	
A1	External Power +	A1	IN+[0]
A2	N/C (Not Connected)	A2	IN-[0]
B1	External Power - (GND1)	B1	IN+[1]
B2	N/C (Not Connected)	B2	IN-[1]
O1	HS[0]	O1	N/C
C1	HS[1]	C1	IN+[2]
C2	N/C (Not Connected)	C2	IN-[2]
D1	HS[2]	D1	IN+[3]
D2	N/C (Not Connected)	D2	IN-[3]
O2	HS[3]	O2	N/C

Supported Operating Systems (OS)

Embedded Enterprise (WEE):	**Linux:**
- Microsoft® Windows® Server 2003/2008/2008R2 (Eng) - Microsoft® Windows® 2003/2008/2008R2 (Eng) - Microsoft® Windows® 7 Professional/Ultimate (Eng, SP1) - Windows® 10 IoT Enterprise 2016 LTSB	Kernel 3.0.0-19 or above

Note: Listed Operating Systems above are hardware/platform dependent. Please check datasheet for specific unit if OS is supported.

Currently supported D2XX Drivers

		Processor Architecture		
Operating System (OS)	**Release Date** (yyyy-mm-dd)	**x86 (32-bit)**	**x64 (64-bit)**	**Comments [Footnote]**
Microsoft® Windows®*	2013-02-20	2.08.28	2.08.28	2.08.28 WHQL Certified [*1] Release Notes [*2]
Linux	2012-06-29	1.1.12	1.1.12	[*3]

*includes the following versions of the Microsoft® Windows® operating systems:
Windows® XP, Windows® Server 2003, Windows® Vista, Windows® Server 2008, Windows® 7, Windows® Server 2008 R2 and Windows® 8.

For updates, please visit: http://www.ftdichip.com/Drivers/D2XX.htm

Footnotes:
[*1] = http://www.ftdichip.com/Drivers/CDM/CDM20828_Setup.exe
[*2] = http://www.ftdichip.com/Drivers/CDM/CDM%202%2008%2030%20Release%20Info%20for%208.1.rtf
[*3] = http://www.ftdichip.com/Drivers/D2XX/Linux/ReadMe-linux.txt

Getting started, documentation and specific Hatteland Technology Library links:
http://www.ftdichip.com/Support/Documents/ProgramGuides/D2XX_Programmer%27s_Guide(FT_000071).pdf
https://www.hattelandtechnology.com/hubfs/pdf/misc/doc101781-1_programmer_guide_ht00273opt-a1.pdf
https://www.hattelandtechnology.com/hubfs/drivers/dio_pca100297-1_ht00273opt-a1_package.zip

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**Internal LAN Module RJ-45**
Typenumber:	**PCA100298-1**

Last Revised:	**10 Mar 2021**
Revision#:	**11**

2 x LAN RJ-45 - Internal Module

Description:

The Hatteland Technology USB->Ethernet module provide the system with dual independent Ethernet ports. The module is connected internally to the motherboard via standard USB interfaces. Application software access the ethernet channels as standard ethernet devices, i.e. in the normal case is there no requirements for additional software development. This module can be integrated, electrical and mechanical, for the product such as Series X G1/G2 Panel Computers and selected Stand-alone Computers (Please check datasheet for your unit if PCA100298-1 is listed as part of Factory Options).

Features:

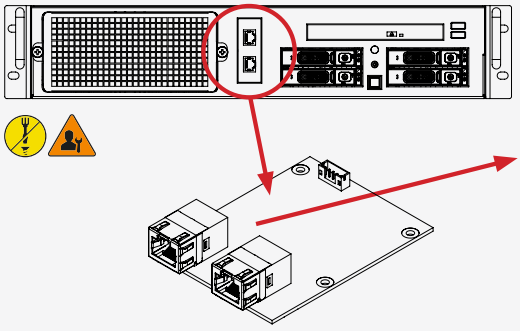
- USB 2.0 and 1.1 Standard Compliant.
- Two internal USB ports are required.
- IEEE 802.3 10Base-T/100 Base-T compatible.

Note: Wake-on-lan is not supported.

Internal 2 x USB to 2 x RJ-45	
• Connector	1kV Isolated RJ-45, 8-pin connector and pinning. Each port as two LED reporting status of transmit/receive
• Power Consumption	Max 326mA @ 5V
• Test and certificate	Hatteland Technology standard, (tested / type approved by the following classification societies): **IEC 60945 4th (EN 60945:2002), IACS E10,** **EU RO MR -** Mutual Recognition, **ClassNK** - Nippon Kaiji Kyokai
• Supported Operating Systems (OS)	**Embedded Enterprise (WEE):** Microsoft® Windows® Server 2003/2008/2008R2 (Eng), Microsoft® Windows® 2003/2008/2008R2 (Eng), Microsoft® Windows® 7 Professional/Ultimate (Eng, SP1), Windows® 10 IoT Enterprise 2016 LTSB. **Linux:** Kernel 3.0.0-64 or above
• Drivers	http://www.asix.com.tw/products.php?op=pItemdetail&PItemID=105;71;101&PLine=71
Note: Listed Operating Systems above are hardware/platform dependent. Please check datasheet for specific unit if OS is supported.	

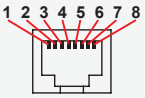
Illustration and Pinning:

Note: Product below for illustration only. Location of module and product size/design may differ. Connector/pinning remain the same.



8-pin RJ-45 10/100Mbps LAN/Ethernet

PCA100298-1 / HT 00274 OPT-A1



Pin 01 - TDP	Transmit Differential Pair (Positive)
Pin 02 - TDN	Transmit Differential Pair (Negative)
Pin 03 - RDP	Receive Differential Pair (Positive)
Pin 04 - NC	Not Connected
Pin 05 - NC	Not Connected
Pin 06 - RDN	Receive Differential Pair (Negative)
Pin 07 - NC	Not Connected
Pin 08 - NC	Not Connected

Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

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DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**COM Module RS-232**
Typenumber:	**PCA100309-1**

Last Revised:	**10 Mar 2021**
Revision#:	**06**

2 channel COM RS-232, DB9M COM Module

Description:

The Hatteland Technology COM module provide the system with dual independent COM channels. The module is attached to the motherboard via standard USB interface. Application software access the COM channels as standard COM devices, i.e. in the normal case is there no requirements for additional software development. This module will mainly be integrated, electrical and mechanical, in the final product such as Series X G1/G2 Panel Computers and selected stand-alone computers.

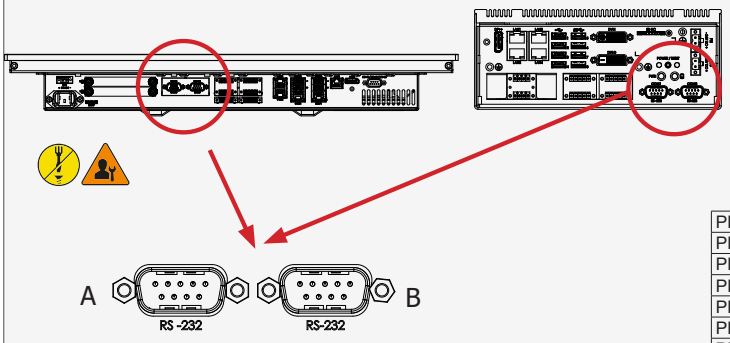
Features:

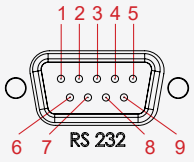
- 2 independent channels (If a card is replaced most operating system will not change COM port number)
- Outputs are short circuits protected

Internal USB to 2 channel x RS-232 isolated	
• Features	Both channels have support for all RS-232 DB-9 signals
• Connector	Standard RS-232 DB-9 male housing and pinning
• Data Rate	Tested from 300 up to 115200 Baud Rates
• ESD Rating (IEC 1000-4-2 Air) (RS-232 I/Os)	±15 kV
• ESD Rating (IEC 1000-4-2 Contact) (RS-232 I/Os)	±8 kV
• Test and certificate	Hatteland Technology standard, (tested / type approved by the following classification societies): **IEC 60945 4th** (EN 60945:2002), **IACS E10**, **EU RO MR** - Mutual Recognition, **ClassNK** - Nippon Kaiji Kyokai
• Supported Operating Systems (OS)	**Embedded Enterprise (WEE):** Microsoft® Windows® Server 2003/2008/2008R2 (Eng), Microsoft® Windows® 2003/2008/2008R2 (Eng), Microsoft® Windows® 7 Professional/ Ultimate (Eng, SP1), Windows® 10 IoT Enterprise 2016 LTSB. **Linux:** Kernel 3.0.0-64 or above
• Drivers/Documentation	https://www.hattelandtechnology.com/hubfs/drivers/pca100390-1_drivers.zip
Note: Listed Operating Systems above are hardware/platform dependent. Please check datasheet for specific unit if OS is supported.	

Illustration and Pinning:

Note: Product below for illustration only. Location of module and product size/design may differ. Connector/pinning remain the same.





A B

RS -232 RS-232

2 Ports available in Operating System as:
COMx (A)*, COMx (B)*

PIN 01	DCD	Data Carrier Detect
PIN 02	RxD	Receive Data
PIN 03	TxD	Transmit Data
PIN 04	DTR	Data Terminal Ready
PIN 05	GND	Signal Ground
PIN 06	DSR	Data Set Ready
PIN 07	RTS	Request To Send
PIN 08	CTS	Clear To Send
PIN 09	RI	Ring Indicator

*Configuration dependent, x = next available port number(s) in operating system.

Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Distributed by:	**Hatteland Technology AS**
Product:	**Internal Frame Grabber Series**
Typenumber:	**HD550N1 SDI M2 / HD550N1 HDV M2**

Last Revised:	**04 May 2021**
Revision#:	**01**

HD550N1 xxx M2 - Internal Frame Grabber Modules

Description:

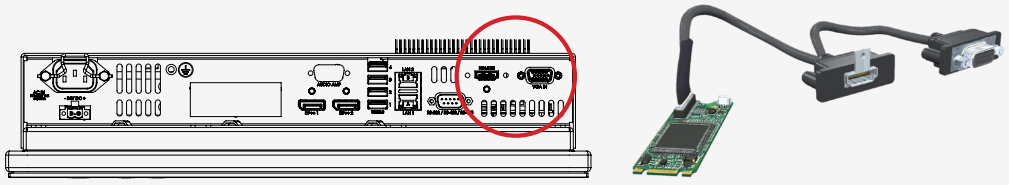
The HD550N1 xxx M2 Internal Frame Grabber modules provides the system with Broadcast Quality type capture capabilities for demanding applications. The module is connected internally to 1 x M.2. (PCIe x1) interface and features 1 x SDI connector or 1 x HDMI and 1 x VGA as available external input(s).

Through an extensive application software and documentation library, the HD550N1 factory option provides the unit with Capture, Recording, Streaming, Playback, Editing and tools features. Audio functionality is not supported. This module can be integrated, electrical and mechanical, for the product such as Series E Panel Computers (MMC), Series X G2 Panel Computers (MMC), and selected Stand-alone Computers. Please check datasheet for your unit if "HD5500N1 HDV M2 / HD5500N1 SDI M2" is listed as part of Factory Options.

Feature	Description	Applies to
• Max. FPS	: 1920×1080p@60/50fps in → 1920×1080p@60/50fps out	HD550N1 SDI M2
	: 1920×1200p@60/50fps in → 1920×1200p@30/25fps out : 1920×1080p@60/50fps in → 1920×1080p@60/50fps out	HD550N1 HDV M2
• Recording Mode	: Software Compression, Real-Time Mode	**Both models**
• Internal Dimension	: W: 22.00 [0.87] × L: 60.00 [2.36] mm [inch] - M.2 Type B/M	**Both models**
• Internal Interface	: 1 x M.2 (PCIe x1)	**Both models**
• External Video Input	: 1 × SDI (2-pin Female)	HD550N1 SDI M2
	: 1 × HDMI (19-pin Female) + 1 x VGA (HD D-SUB 15P female)	HD550N1 HDV M2
• Display Video Format	: YV12, NV12, YUY2, RGB24, RGB32	
• Video RAW Data Resolution • Recording Video Resolution	: **3G-SDI:** 1920×1080p@60/50fps. : **HD-SDI:** 1920×1080p@30/25/24fps, 1920×1080i@60/50fps, 1280×720p@60/50fps : **SD-SDI:** 720×480i@60fps, 720×576i@50fps	HD550N1 SDI M2
	: 1920×1200p@30/25/24fps, 1920×1080p@60/50fps, 1920×1080p@30/25/24fps, : 1920×1080i@60/50fps, 1280×720p@60/50fps, 1280×1024p@60fps, : 1280×960p@60fps, 1024×768p@60fps, 800×600p@60fps, 640×480p@60fps, : 720×480p@60fps, 720×576p@50fps, 720×480i@60fps, 720×576i@50fps	HD550N1 HDV M2
• Recording Video Format	: H.264 (Software Compression)	**Both models**
• Audio Support	: None	**Both models**
• Test and certificate	**Hatteland Technology standard:** Tested / type approved by the following classification societies: *=pending IEC 60945 4th (EN 60945:2002), IACS E10, EU RO MR - Mutual Recognition*, ClassNK - Nippon Kaiji Kyokai*	**Both models**
• Supported Operating Systems (OS)	**Supported by Manufacturer defaults:** Windows 7/8/8.1/10 **Supported by Hatteland Technology Products - Embedded Enterprise (WEE):** Windows® 10 IoT Enterprise 2019 LTSC (64bit) - (Product Distribution End Date January 2029) **Linux:** Kernel 2.6.14 or above (32 and 64bit)	**Both models**
• Drivers / Tools Package	https://www.hattelandtechnology.com/hubfs/drivers/hd550n1_sdi_driver_package.zip	HD550N1 SDI M2
• Drivers / Tools Package	https://www.hattelandtechnology.com/hubfs/drivers/hd550n1_hdv_driver_package.zip	HD550N1 HDV M2
• API / SDK Package	Support API: DirectShow, V4L2, FFmpeg, Gstreamer. Support Languages: C++, C#, .NET, Visual Basic, Qt, Delphi. https://www.hattelandtechnology.com/hubfs/drivers/hd550n1_frame_grabber_doc.zip	**Both models**

Location Illustration:

Note: Product below for illustration only. Location of module and product size/design may differ.



Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

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SPECIFICATIONS

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HATTELAND TECHNOLOGY
an EMBRON Company

Microsoft® Windows® API / SDK - Functionality Matrix

Capture, Recording, Streaming, Playback and Editing in One Library

Data Callback **Event Callback**

Capture

High Performance Renderer:
Thumb Draw, Mirror, Clone, Region, 3D

Image Snapshot:
Single, Continuous, Cropping, Up/Down Scaling
BMP, JPG, PNG, TIF, DICOM/PACS

Deinterlace Engine:
Motion Adapter, Blending, Filter Triangle,
Advanced 3D Adapter, RGB Repack

Alpha Blending Engine:
Text, Scrolling Text, Picture, Memory,
ChromaKey

Auto Signal Detection:
Plug, Unplug, No Signal, Format Changed

Video, Audio and VANC Streams Capture:
Capture Card, Sound Card,
Desktop USB Camera, IP Camera,
IP Video Server

Recording

Encrypt, Sync, Clone Recording	Time Shifting & Pre-Event	Multi-Tracks & Audio Mixer
Multi-Streams Channel Recording	Multi-Streams Share Recording	Multi-Streams 3D Recording

AVI, MP4, ASF, WMV, FLV, MOV,
TS, M3U8, WAV, DICOM/PACS
Misc. File Formats, File Repair

RAW, MPG2, H264^{3D}, H265, AAC
Baseline, Main, High Profile, CAVLC, CABAC

Intel® Media SDK	NVIDIA® CUDA/NVENC™	AMD® VCE™

Transition Effect:
Action Script, Alpha Blending, Blinds,
Transform, Scaling, Rotation

Video Cropping Engine	**Video Scaling Engine**	**Alpha Blending Engine** Text, Scrolling Text, Picture, Memory, Chroma Key

Streaming

2D/3D Universal Streaming Client Capture, Record, Display	**2D/3D Multi-Streams Streaming Server** Delay Live, Audio Mixer

ONVIF Server Client Emulator	**WebRTC** P2P Chat Room Multi-User	**MMS** Public	**NDI** NewTek	**HLS** HTTP

RTSP 4MS DELAY UDP/TCP/HTTP/MIP/RAW-UDP	**TS** CBR/SRT/ UDP/TCP/ HTTP/MIP	**RTMP** Encrypt Public/Server

RAW, MPG2, H264^{3D}, H265, AAC
Baseline, Main, High Profile, CAVLC, CABAC

Intel® Media SDK	NVIDIA® CUDA/NVENC™	AMD® VCE™

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Video Cropping Engine	Video Scaling Engine	Alpha Blending Engine, Text, Scrolling Text, Picture, Memory, ChromaKey

Playback

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Alpha Blending Engine:
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RAW, MPG2, H264^{3D}, H265, AAC

Intel® Media SDK	NVIDIA® CUDA™	AMD® UVD™

Play, Pause, Stop, Step, Seek and Speed
Control, Frame by Frame

Editing

File Transcoding

Intel® Media SDK

File Repair MP4

File Export Multi-Segments	File Merge Multi-Files

Video and Audio Streams
Read and Write

Tools

RS232/RS422/RS485
Access Control

CD&DVD Disc Burning
CD, DVD, DVD-RW

Assistant Capture:
Sound Card, Desktop USB Camera, IP Camera, IP Video Server

Virtual Camera:
Virtual DirectShow Capture Filter

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SPECIFICATIONS

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HATTELAND TECHNOLOGY
an EMBRON Company

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Sync & Clone Recording	Time Shifting & Pre-Event	Multi-Tracks & Audio Mixer
Multi-Streams Channel Recording	Multi-Streams Share Recording	Multi-Streams 3D Recording

AVI, MP4, ASF, WMV, FLV, MOV,
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RTSP 4MS DELAY UDP/TCP/HTTP/MIP/RAW-UDP		**TS** CBR/UDP/TCP/HTTP/MIP		**RTMP** Encrypt Public/Server

RAW, MPG2, H264^{3D}, H265, AAC
Baseline, Main, High Profile, CAVLC, CABAC

Intel® Media SDK	NVIDIA® CUDA/NVENC™	AMD® VCE™

Transition Effect:
Action Script, Alpha Blending, Blinds,
Transform, Scaling, Rotation

Video Cropping Engine	Video Scaling Engine	Alpha Blending Engine, Text, Scrolling Text, Picture, Memory, ChromaKey

Playback

High Performance Renderer:
Thumb Draw, Mirror, Region, 3D

Image Snapshot:
Single, Continuous, Cropping, Up/Down Scaling
BMP, JPG, PNG, TIF

Deinterlace Engine:
Motion Adapter, Blending, Filter Triangle

Alpha Blending Engine:
Text, Scrolling Text, Picture, Memory, Chroma Key

RAW, MPG2, H264^{3D}, H265, AAC

Intel® Media SDK	NVIDIA® CUDA™	AMD® UVD™

Play, Pause, Stop, Step, Seek and Speed
Control, Frame by Frame

Editing

File Transcoding
Intel® Media SDK
File Repair MP4

File Export Multi-Segments	File Merge Multi-Files

Video and Audio Streams
Read and Write

Tools

RS232/RS422/RS485
Access Control

CD&DVD Disc Burning
CD, DVD, DVD-RW

Assistant Capture:
Sound Card, Desktop USB Camera, IP Camera, IP Video Server

Virtual Camera:
Virtual DirectShow Capture Filter

3/3

Specifications
Accessories

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**USB Cable 1m**
Type:	**JH C01MF A-A**

ACCESSORY

Last Revised:	**16 Apr 2019**
Revision#:	**08**

USB Cable

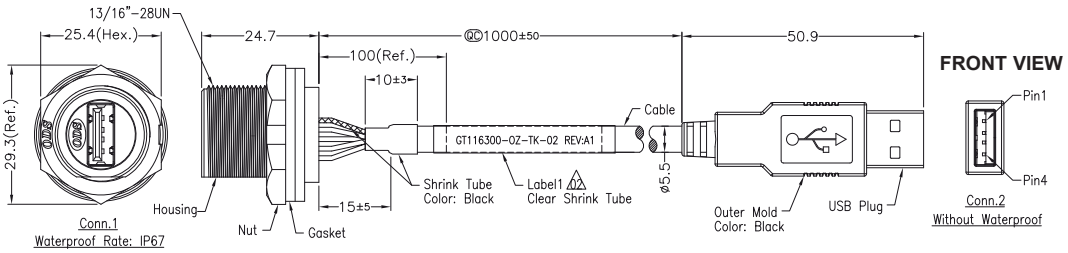
Description:

USB Cable (Type A plug to Chassis mount Type A receptacle) suitable for installations that feature a secure fastening connection from external equipment with standard Type A ports to all Hatteland Technology computers and panel computers with standard USB Type A ports. RoHS Compliant.

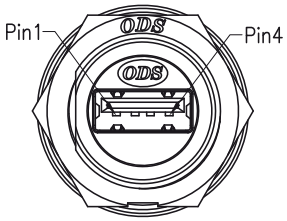
Specifications

• Waterproof Rate	: IP67. (No Ingress of dust / Protected against harmful effects caused in 1 meter water within 30 minutes)
• Temperature Range	: -20°C to +80°C
• Max Panel Thickness	: 7.0mm (Without Cap Chain)
• Materials	: Housing: Nylon, Black : Conn.1: USB2.0-A, Jack : Conn.2: USB2.0-A, Plug : Cap: Nylon, Black
• Cable	: 1m, UL2725 USB2.0, 28AWG*1P+24AWG*2C+AL+D+B, PVC Jacket, UV Resistant, Black 0D=ø5.5mm
• Receptacle Connector	: USB-A Plastic C3 Panel Jack screw with pig tail (GT116300-30)
• Type Approval / Testing	: Hatteland Technology standard, (tested / type approved by the following classification societies): **IEC 60945 4th** (EN 60945:2002), **IACS E10**, **EU RO MR** - Mutual Recognition
• Included with delivery	: 1 x 218-N28 - Cable tie fastener w/glue Panuit 30 : 1 x B2-100 Black Cable tie 2,5x100mm : 1 x GTC Waterproof Mating Cap P/N GT1C533122

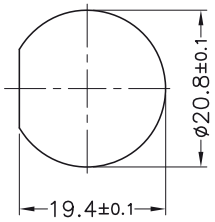
FRONT VIEW **SIDE / TOP VIEW**



PIN ASSIGNMENTS FRONT VIEW



RECOMMENDED PANEL CUTOUT



WIRING DIAGRAM

Shell	Drain	地線	Shell	
4	Black	黑	4	
3	Green	綠	3	Twist
2	White	白	2	
1	Red	紅	1	
Conn.1	Wire Color		Conn.2	

Pin Out

MATING CAP GT1C533122

Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

DATASHEET

HATTELAND TECHNOLOGY
an EMBRON Company

Manufacturer:	**Hatteland Technology AS**
Product:	**External Modules - USB Connectivity**
Typenumber:	**Based on internal modules, see table on page 2**

Last Revised:	**14 Apr 2021**
Revision#:	**19**

External Modules - USB Connectivity

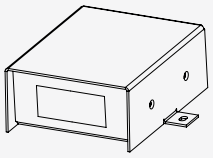
Description:

Hatteland Technology IO module series concept for marine applications adds more functionality to your Maritime Multi Computers and Maritime Stand-Alone computers. They are available as regular factory options for the entire range of Series X Maritime Multi Displays, Maritime Multi Computers and as well as the latest Maritime Stand-Alone computers.

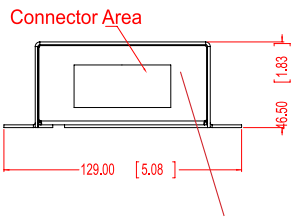
In addition, the module concept has been taken further to a self contained and encased external USB module version. This provides flexibility for new installations and easy upgrade of already installed systems. In fact, any Hatteland Technology product that has a USB2.0 port can take advantage of these External Modules for both legacy, obsoleted, current and future products as long as the software and firmware supports the Operating System.

Fully compatible with all Hatteland Technology latest generation products, external cased modules enable system integrators to benefit from the features of these internal options as an external and easy to connect solution. They interface via a standard USB Type A Cable(s) and the chassis comes with its own mounting hinges.

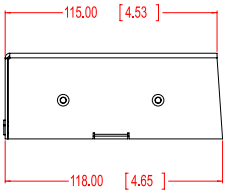
Note for CAN: Due to driver limitations, only 1 instance of this module can be connected to the same Computer/Panel Computer unit. If Computer/Panel Computer already has CAN functionality built-in, connecting this external module will always fail.



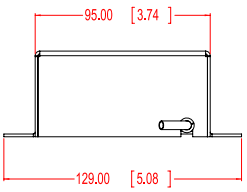
FRONT VIEW



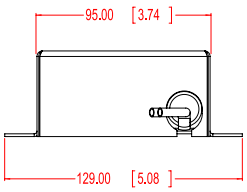
SIDE VIEW



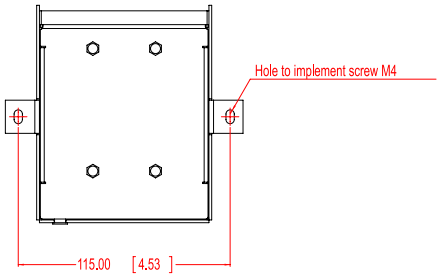
BACK VIEW SIngle Cable



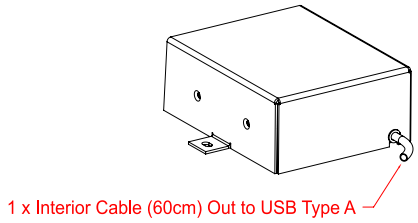
BACK VIEW Double Cable



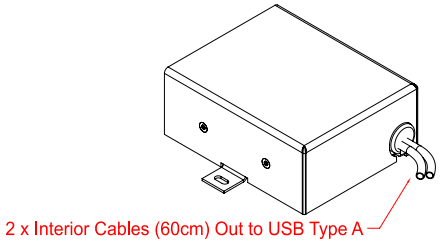
BOTTOM VIEW



DIMETRIC VIEW BACK Single Cable



DIMETRIC VIEW BACK Double Cable



Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

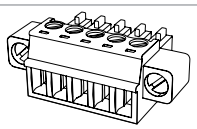
Note: All specifications are subject to change without prior notice!
Please visit www.hattelandtechnology.com for the latest electronic version.

HATTELAND TECHNOLOGY
an EMBRON Company

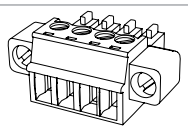
Ordering Details:

TypeNumber	Description	Internal Specifications (link to separate datasheets)
HT 00262 OPT-A1	**NMEA COM** 4 x NMEA RS-422/RS-485 isolated Via 5-pin Terminal Block 3.81 Connector Connects through 1 x USB Cable	**(Based on PCA200828-1)** www.hattelandtechnology.com/hubfs/pdf/ind_ds/ds_pca200828-1_com_module_rs-422_rs-485.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc102080-1_usb-com_module_configuration.pdf www.hattelandtechnology.com/hubfs/drivers/ht00262opt-a1_drivers.zip www.hatteland-display.com/support_hardware_drivers_peripherals.php Linux: http://www.ftdichip.com/Drivers/D2XX.htm **(Based on PCA100293-1) - Obsolete** www.hattelandtechnology.com/hubfs/pdf/ind_ds/ds_pca100293-1_com_module_rs-422_rs-485.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc102080-1_usb-com_module_configuration.pdf www.hattelandtechnology.com/hubfs/drivers/ht00262opt-a1_drivers.zip www.hatteland-display.com/support_hardware_drivers_peripherals.php Linux: http://www.ftdichip.com/Drivers/D2XX.htm
HT 00263 OPT-A1	**COM** 4 x RS-232 COM Via 4 x DB-9 Male Connector Connects through 1 x USB Cable	**(Based on PCA100294-1)** www.hattelandtechnology.com/hubfs/pdf/ind_ds/ds_pca100294-1_com_module_rs-232.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc102080-1_usb-com_module_configuration.pdf www.hattelandtechnology.com/hubfs/drivers/ht00263opt-a1_drivers.zip
HT 00264 OPT-A1	**CAN** 1 x CAN isolated Via 4-pin Terminal Block 3.81 Connector Connects through 1 x USB Cable	**(Based on ZIA0001310-B)** www.hattelandtechnology.com/hubfs/pdf/ind_ds/ds_zia0001310-b_can_module.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc101357-1_hd_can_module_programmer_guide_windows.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc101356-1_hd_can_module_programmer_guide_linux.pdf www.hattelandtechnology.com/hubfs/drivers/can_gw_application_note_package.zip
HT 00264 OPT-A2	**SLCAN** 1 x CAN isolated Via 4-pin Terminal Block 3.81 Connector Connects through 1 x USB Cable	**(Based on ZIA0001310-SLCAN)** www.hattelandtechnology.com/hubfs/pdf/ind_ds/ds_zia0001310-slcan_can_module.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc205993-1_usb_slcan_module_user_manual.pdf www.hattelandtechnology.com/hubfs/pdf/misc/user_guide_for_hatteland_display_can_interface_driver_(linux).pdf Windows® Driver: www.hattelandtechnology.com/hubfs/drivers/slcan_setup_hd_gw_svc1.5.0.zip Linux: www.hattelandtechnology.com/hubfs/drivers/customer_pack_hdcan_linux_180222.zip
HT 00273 OPT-A1	**DIO** 4 x Digital Input isolated 4 x Digital Output Via 5-pin Terminal Block 3.81 Connector Connects through 1 x USB Cable	**(Based on PCA100297-1)** www.hattelandtechnology.com/hubfs/pdf/ind_ds/ds_pca100297-1_4x_digital_module.pdf www.hattelandtechnology.com/hubfs/pdf/misc/doc101781-1_programmer_guide_ht00273opt-a1.pdf www.hattelandtechnology.com/hubfs/drivers/dio_pca100297-1_ht00273opt-a1_package.zip

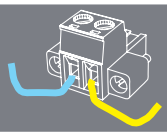
Most modules interfaces by using Terminal Block type connectors (where applicable), as listed below:



For NMEA COM & DIO Module Connection:
5-pin
MC 1,5/ 5-STF-3,81



For CAN Module Connection:
4-pin
BCZ 3.81/04/180F SN BK BX



Secure cables with Screw Terminals

Suitable cable housing references:
For 5-pin:
https://www.phoenixcontact.com/online/portal/us?uri=pxc-oc-itemdetail:pid=1834372&library=usen&pcck=P-11-02-01&tab=1
For 4-pin
http://catalog.weidmueller.com/procat/Product.jsp;jsessionid=B040D5EB6832629E567C884809FDF6C1?productId=(%5b1005290000%5d)

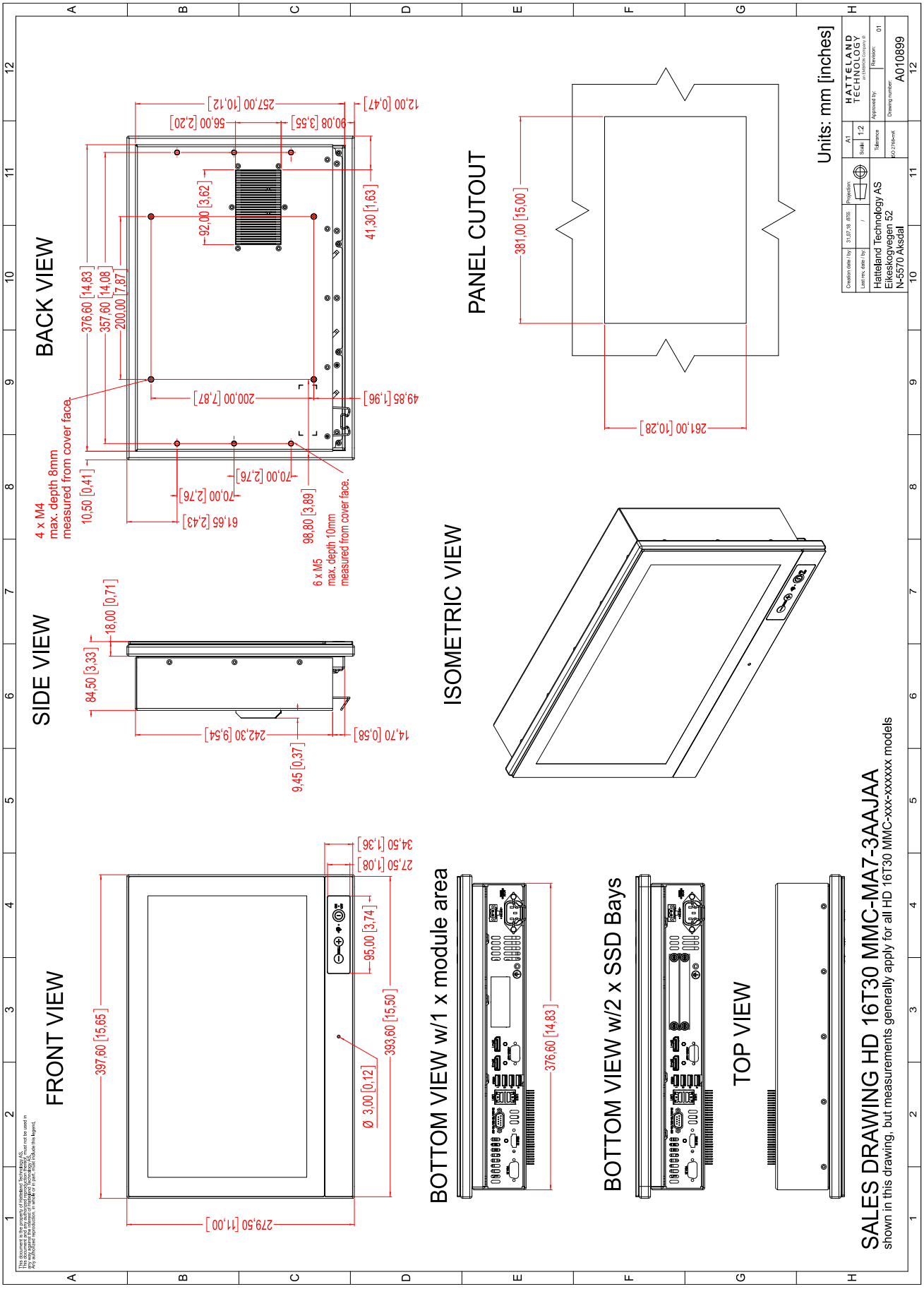
Compass Safe Distance - Standard: 15cm - Steering: 10cm

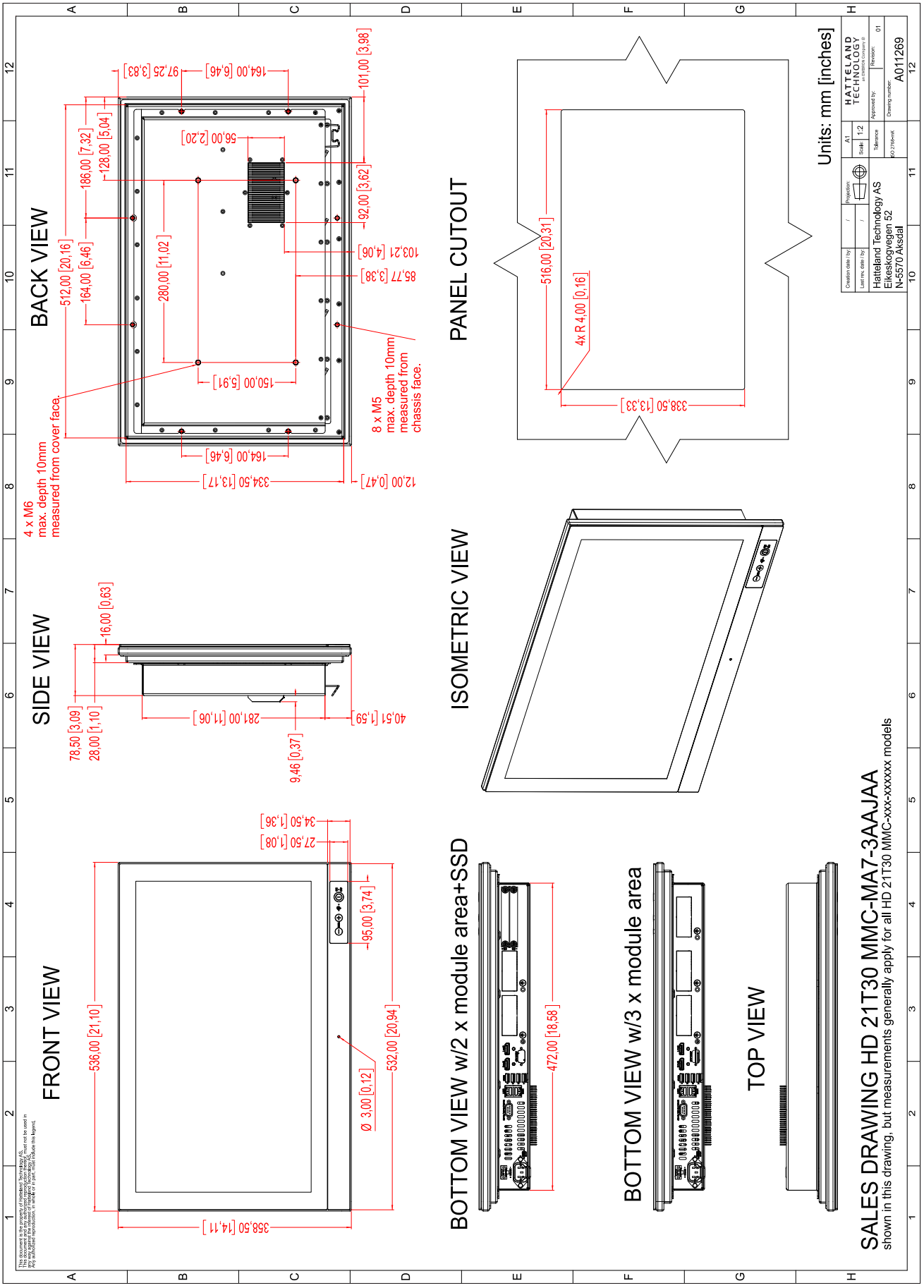
APPROVALS & CERTIFICATES

These products have been tested / type approved by the following classification societies:
IEC 60945 4th (EN 60945:2002) **IACS E10** **EU RO MR** - Mutual Recognition (covers DNV, BV, ABS, GL, NK and LRS certificates)*
* Pending for HT 00274 OPT-A1 / PCA100298-1

2/2

Technical Drawings





Dimensions might be shown with or without decimals and indicated as mm [inches]. Tolerance on drawings is +/- 1mm. For accurate measurements, check relevant DWG file.

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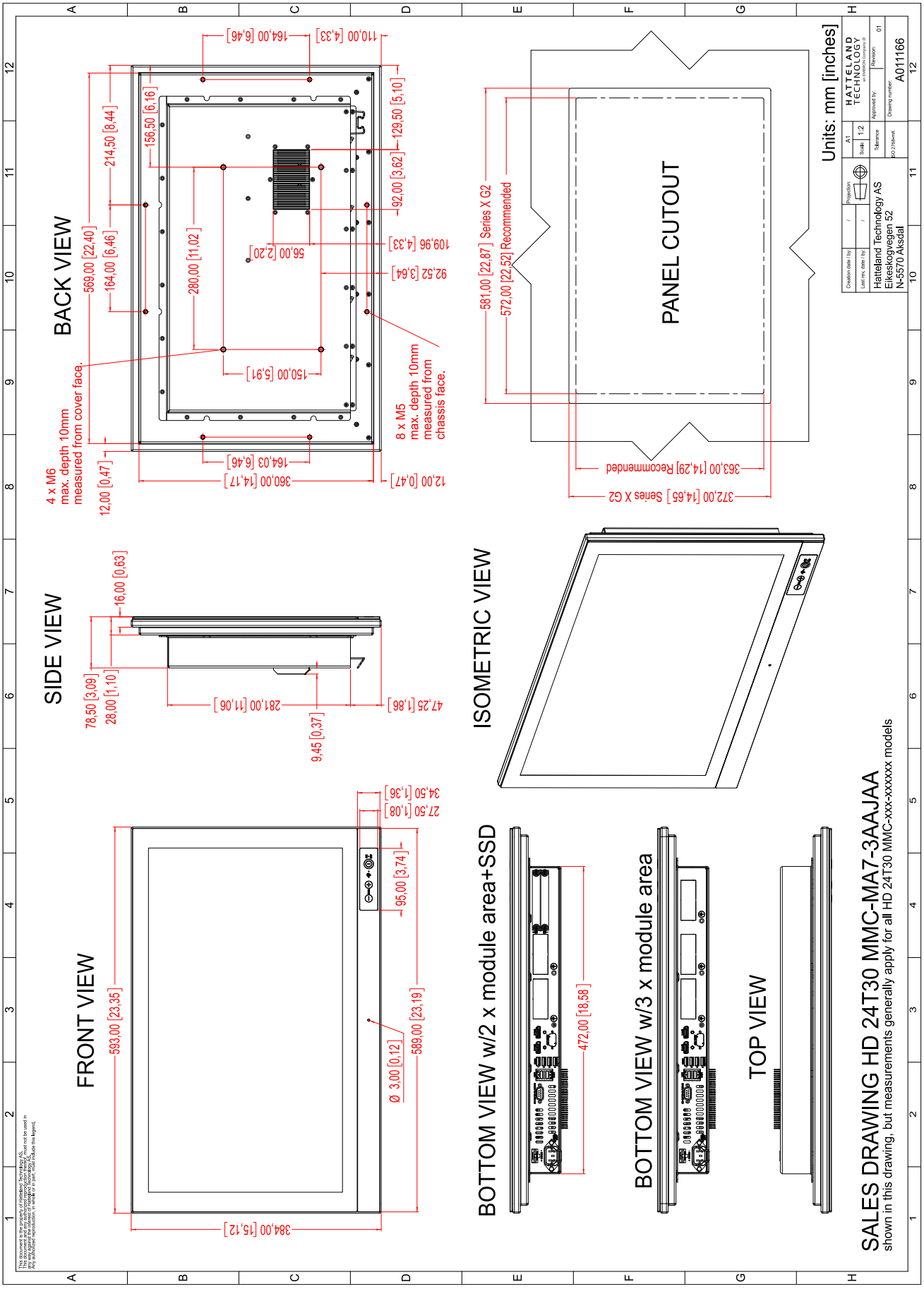

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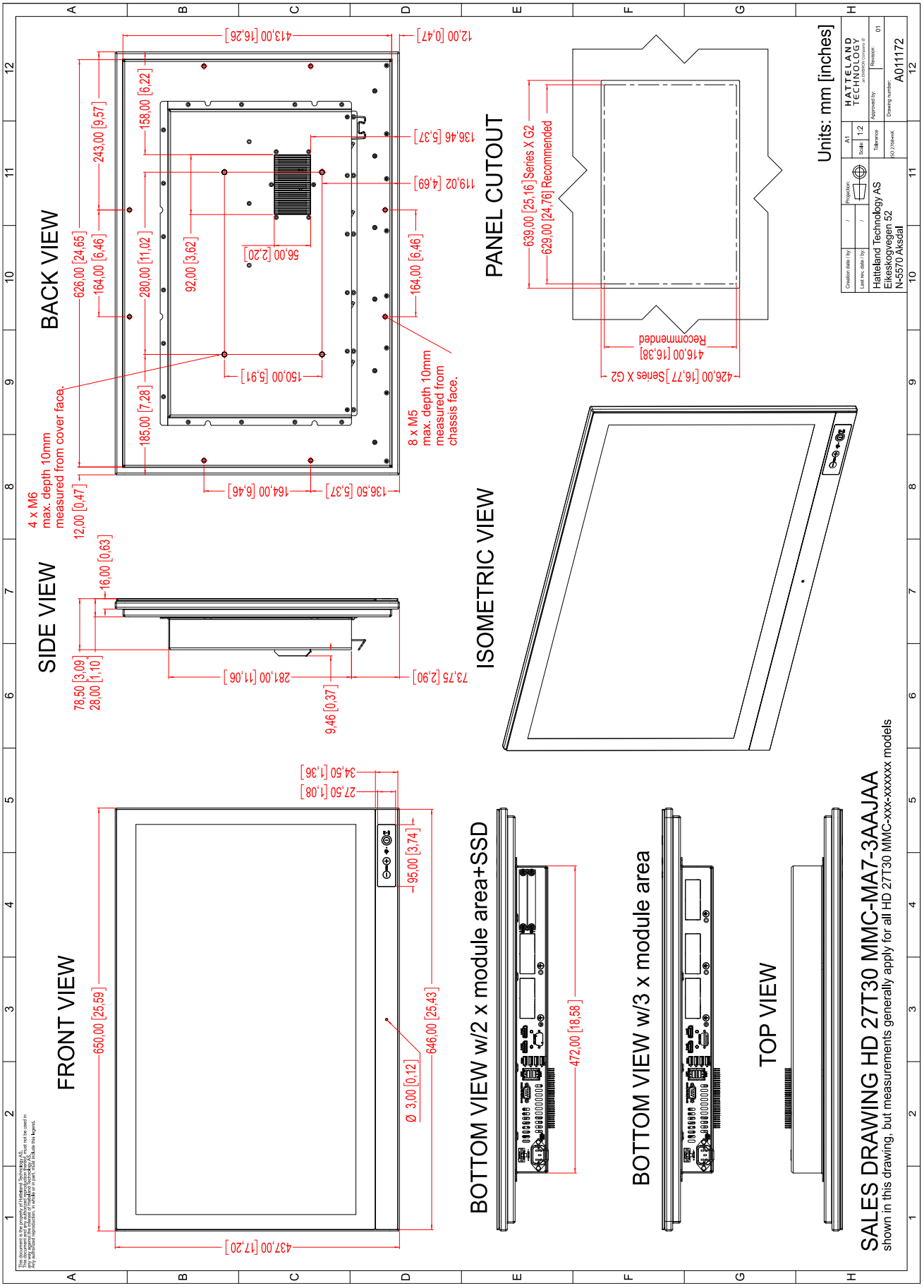

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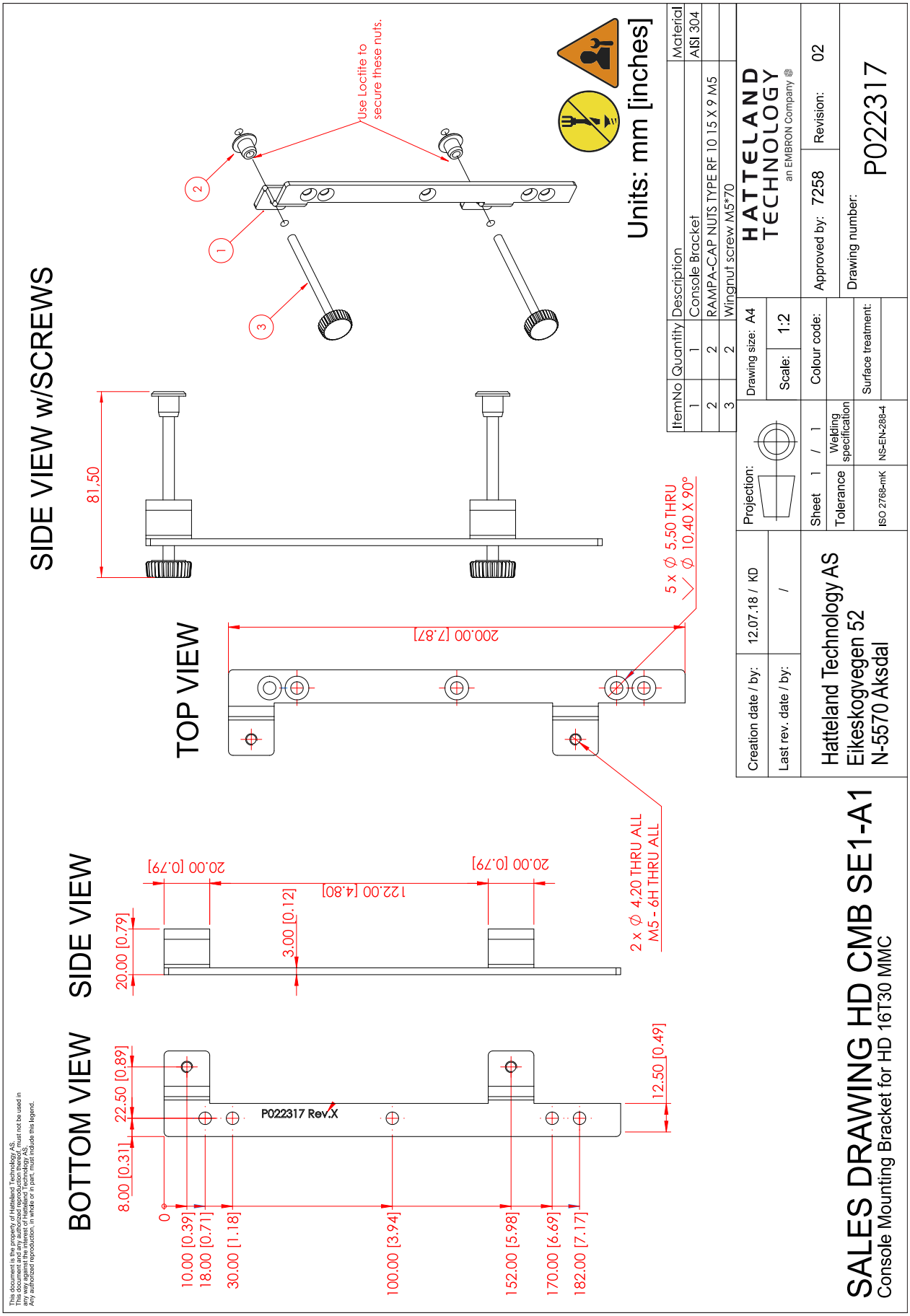
Technical Drawings - Accessories



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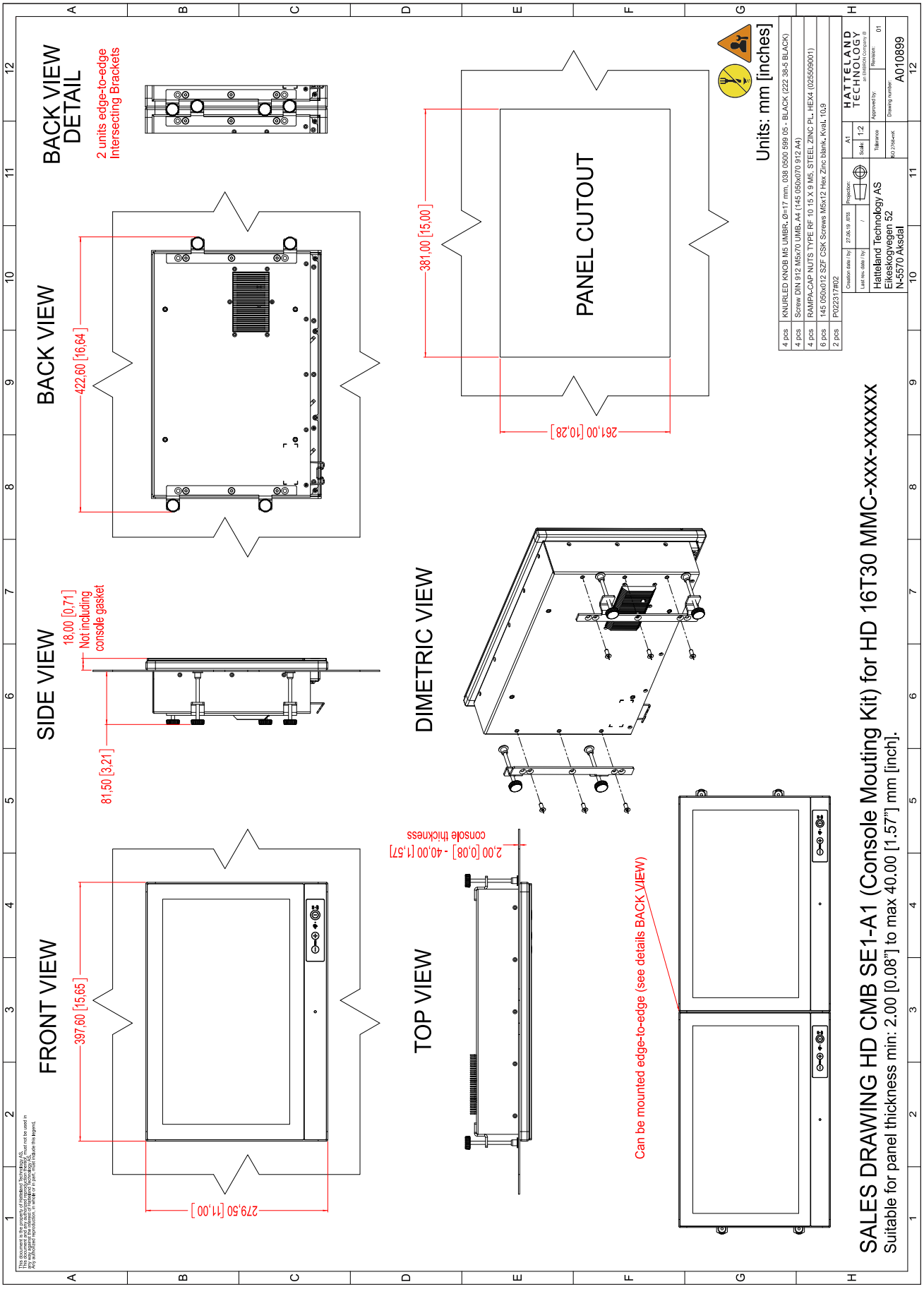

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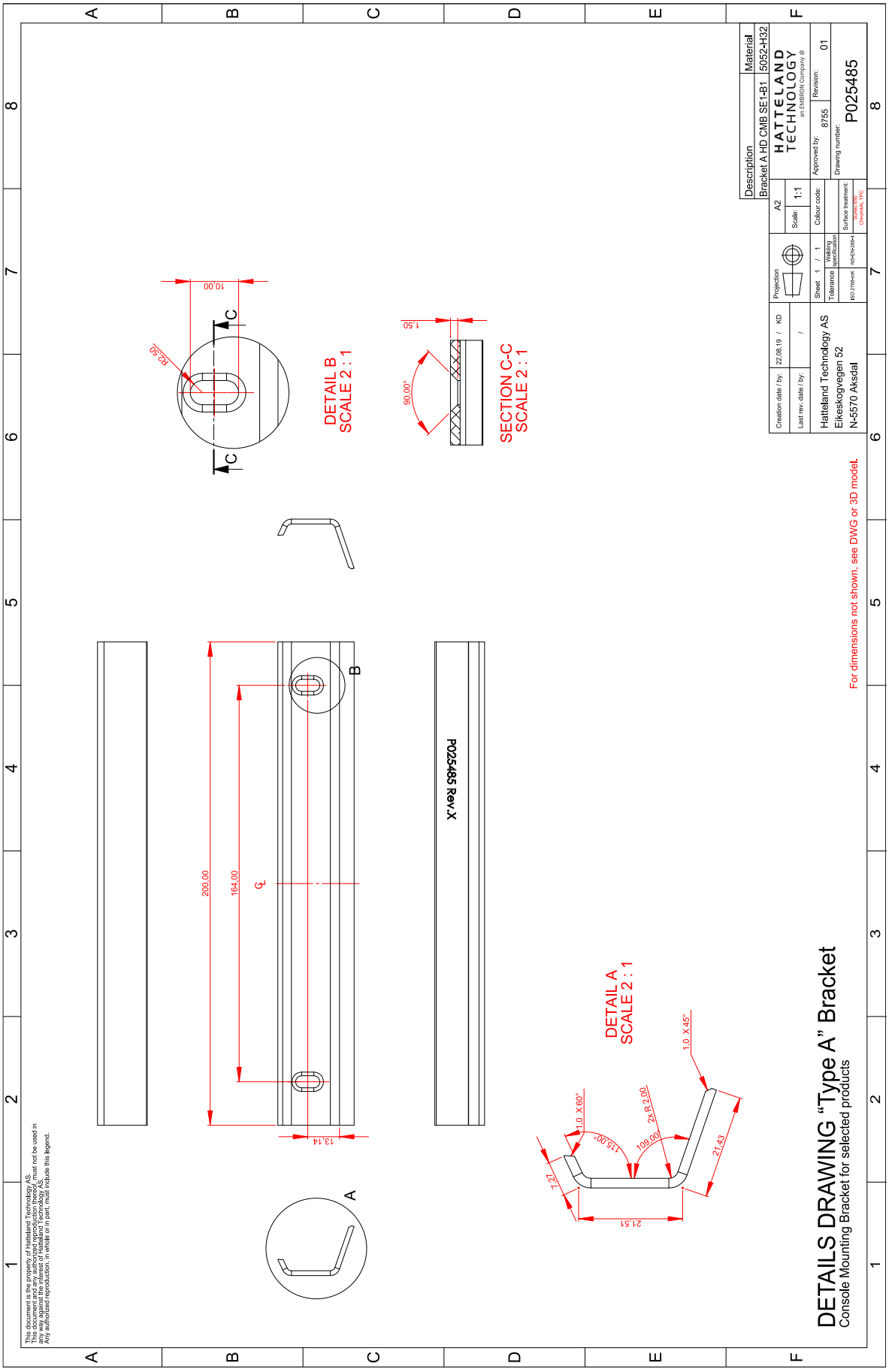

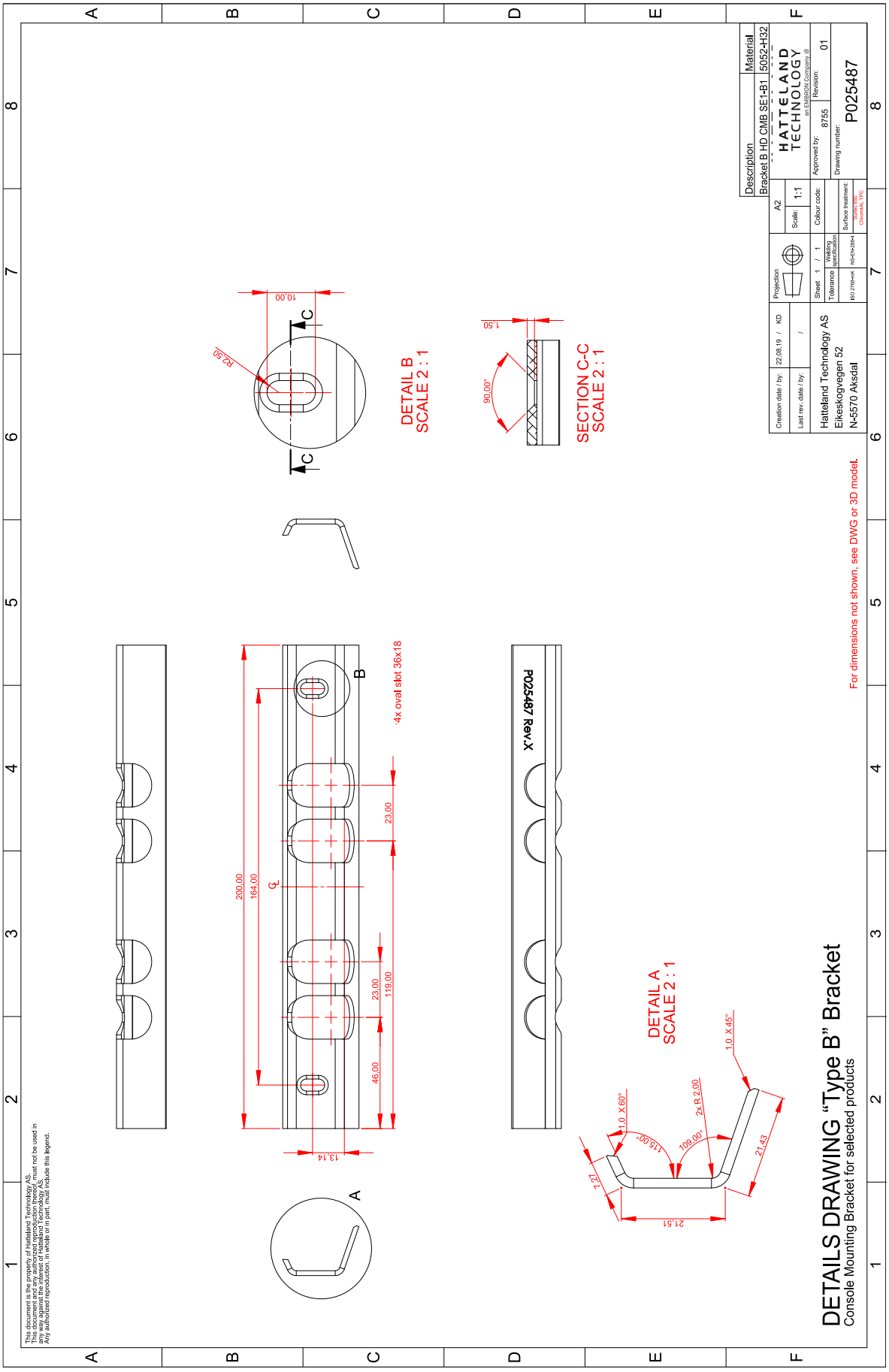

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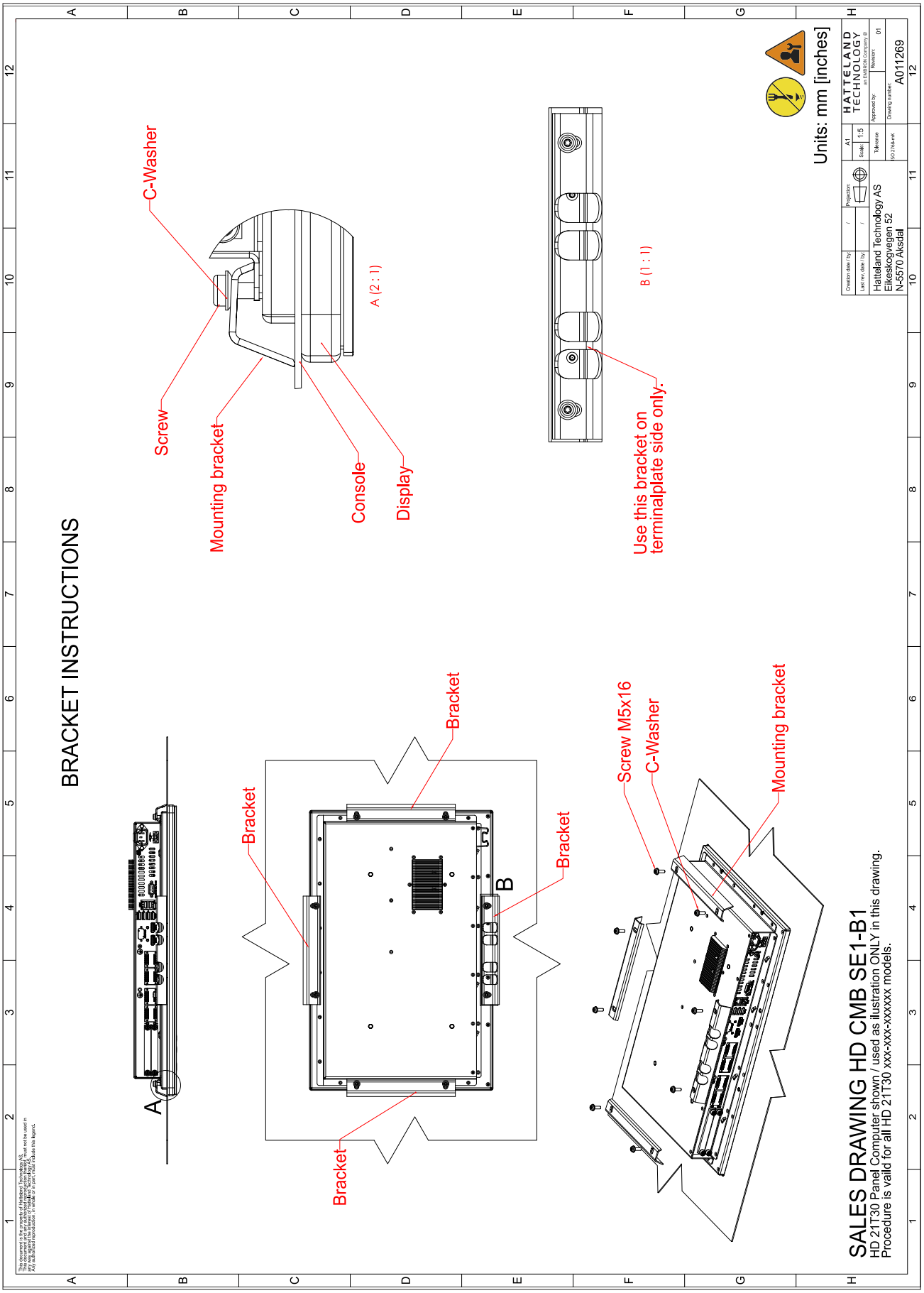

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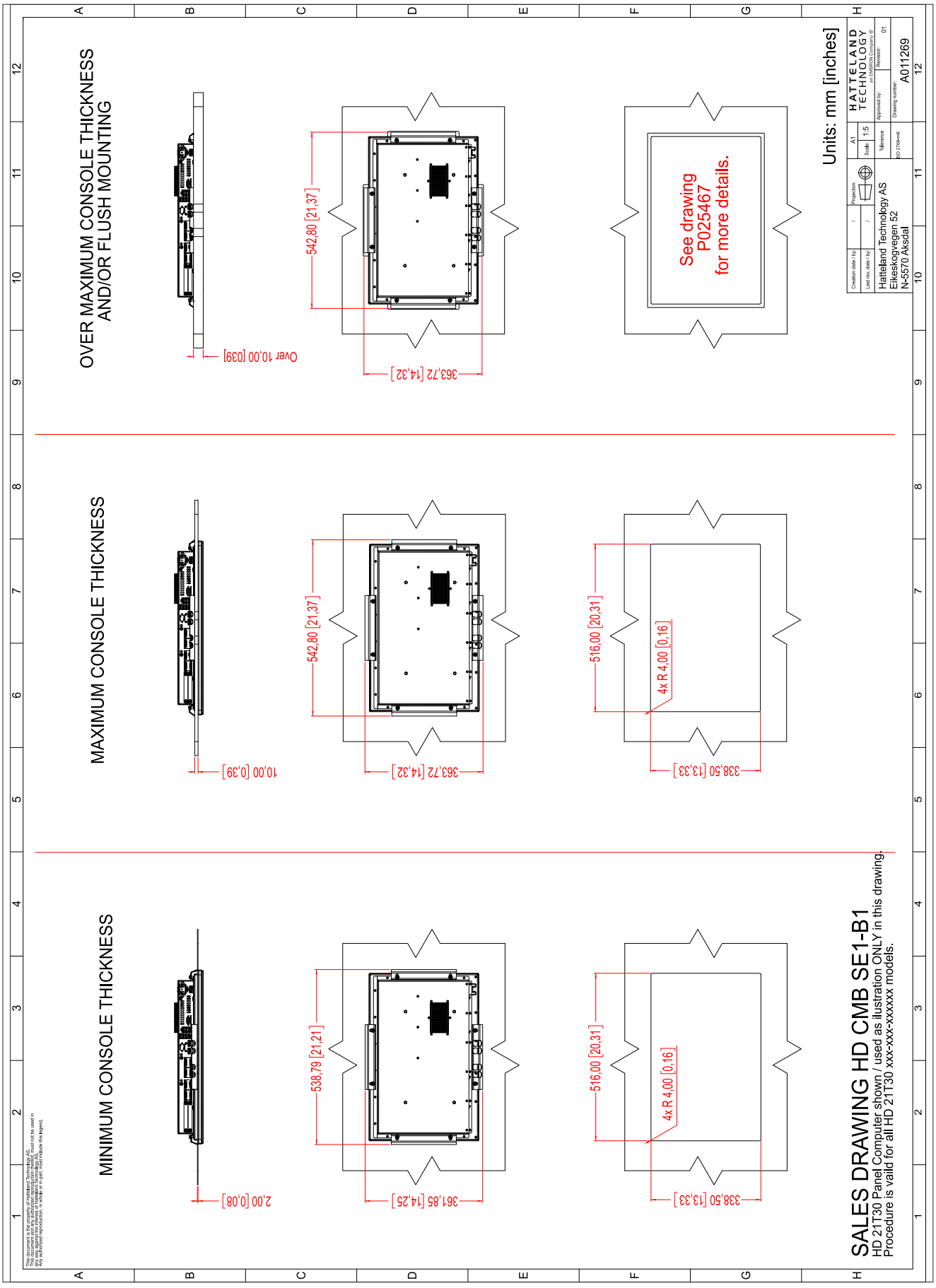

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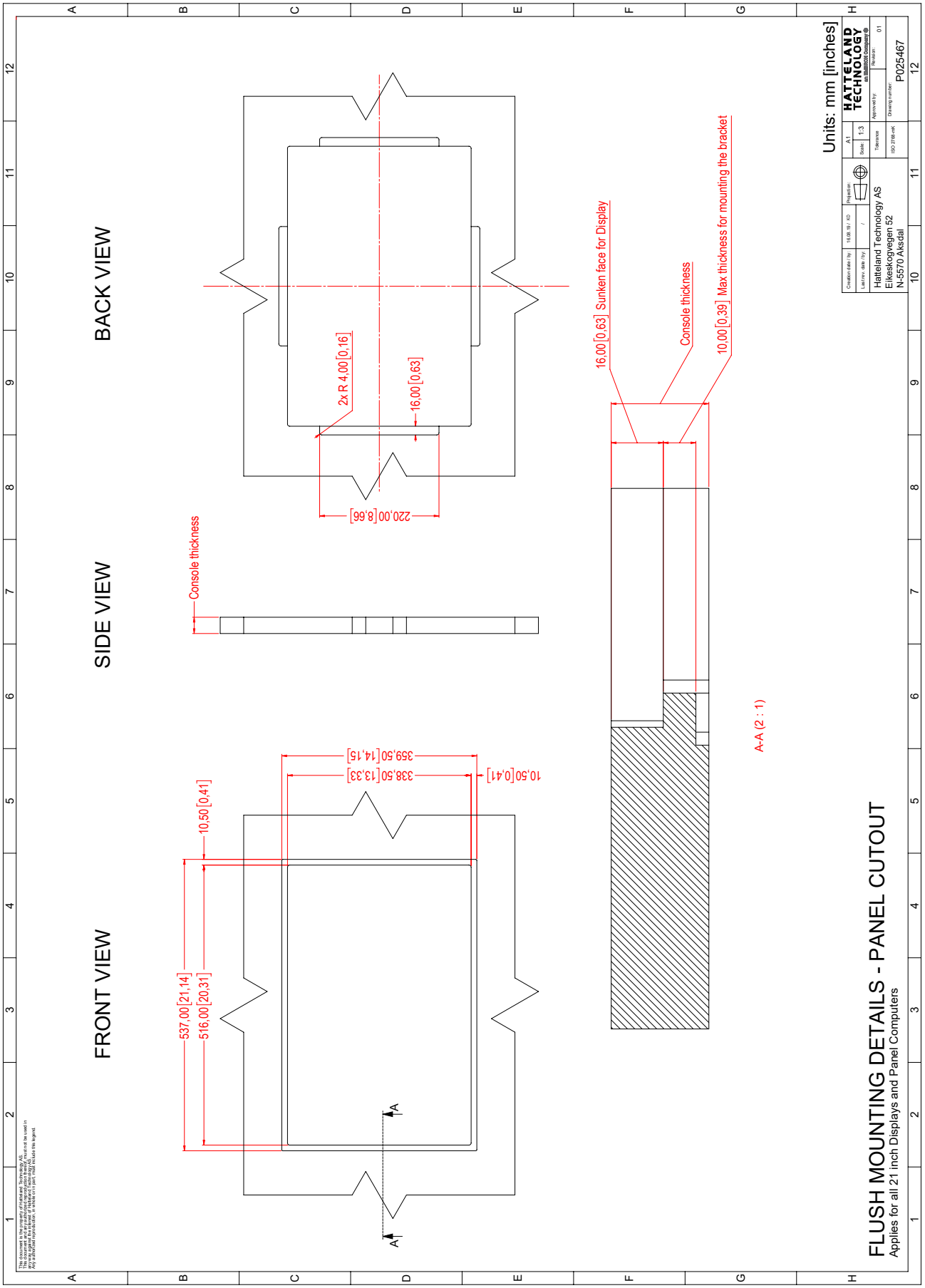

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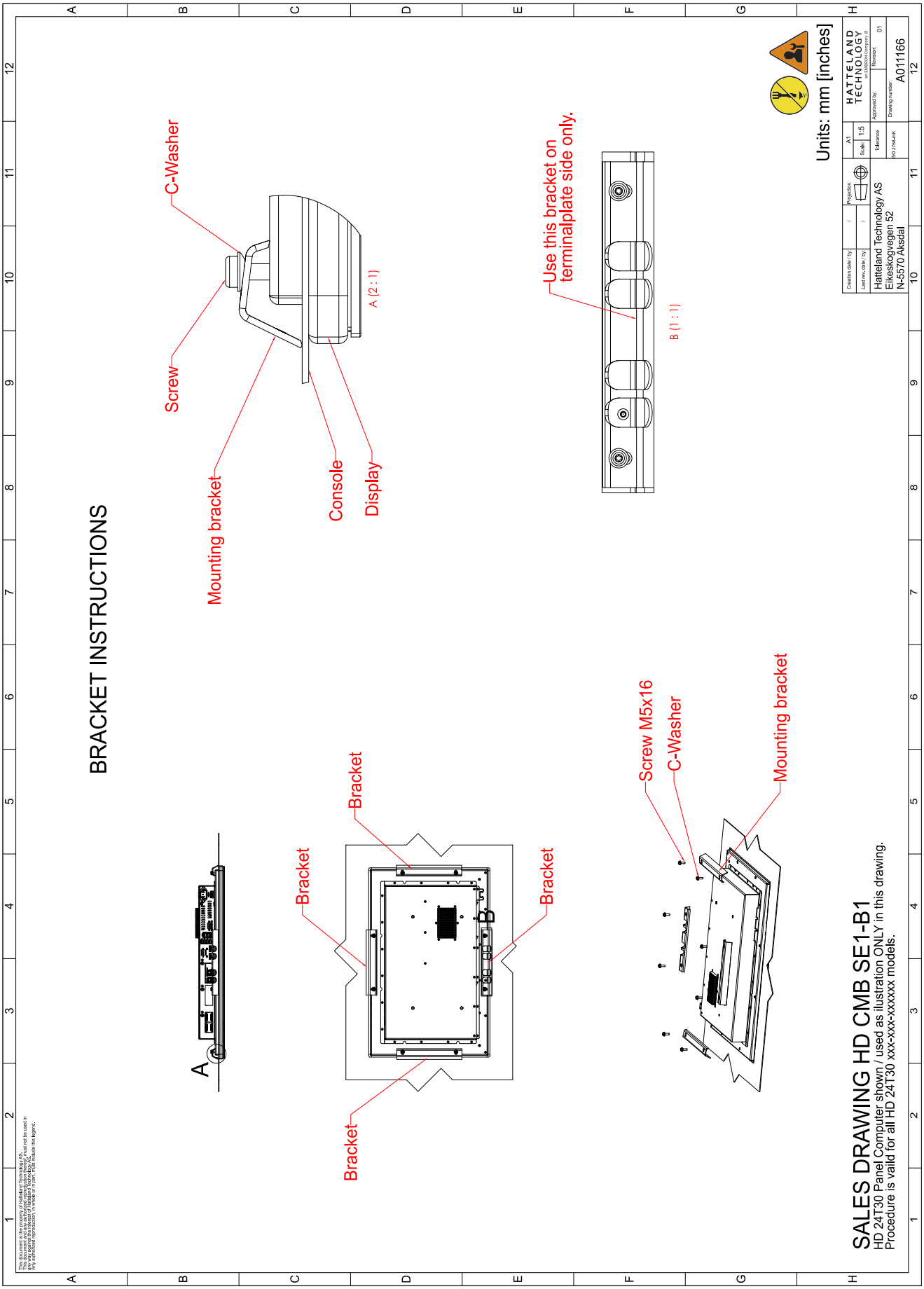

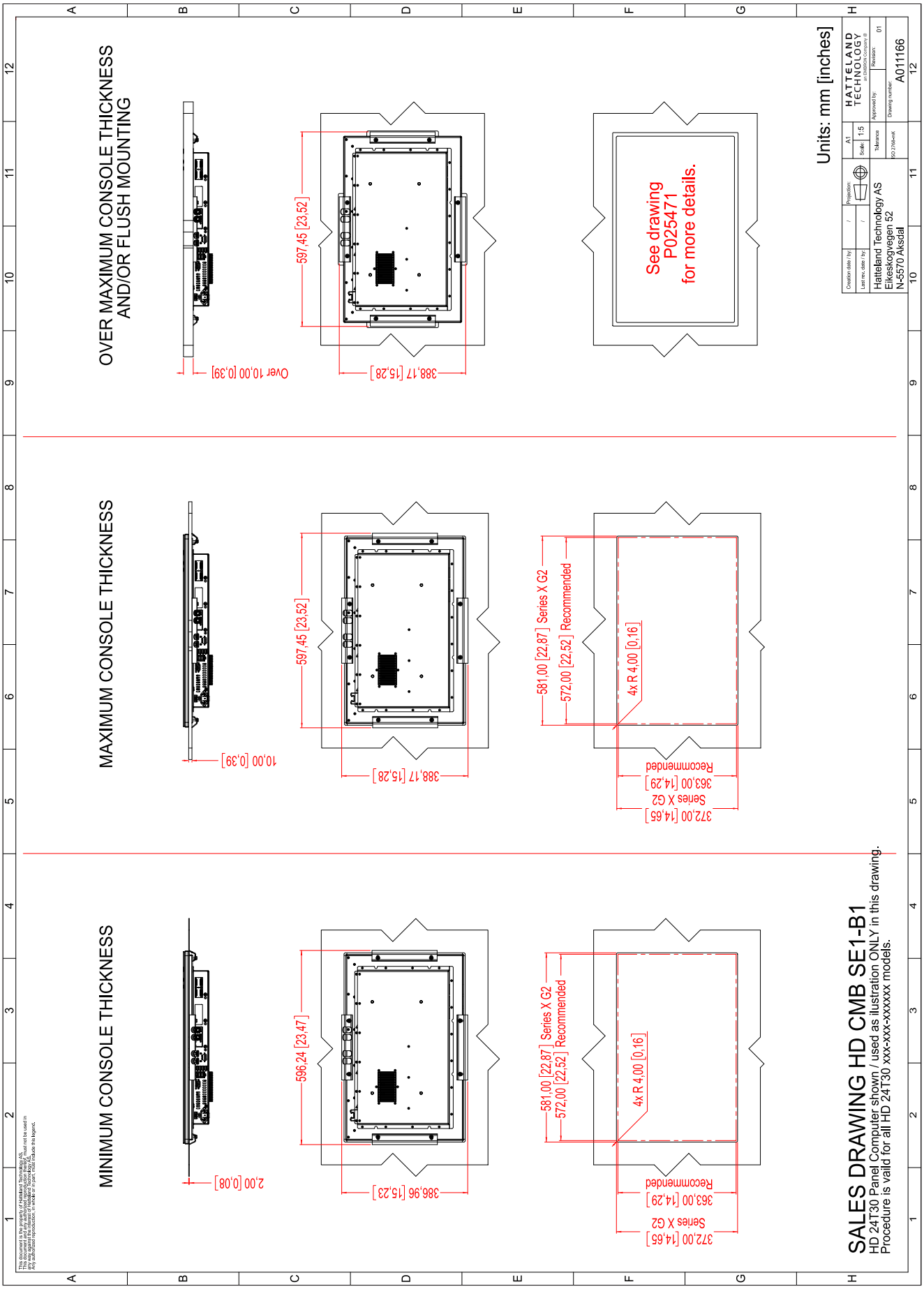

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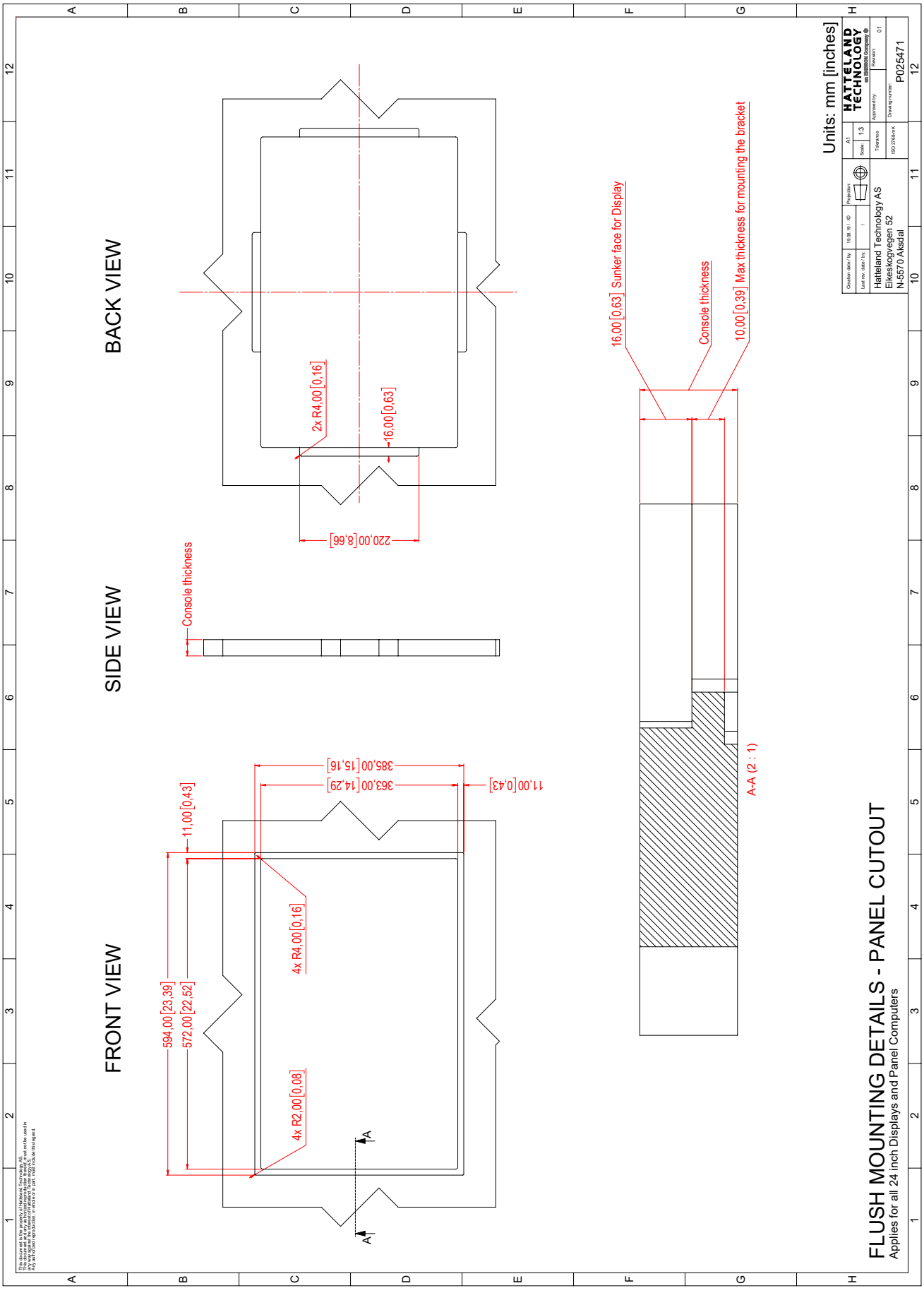

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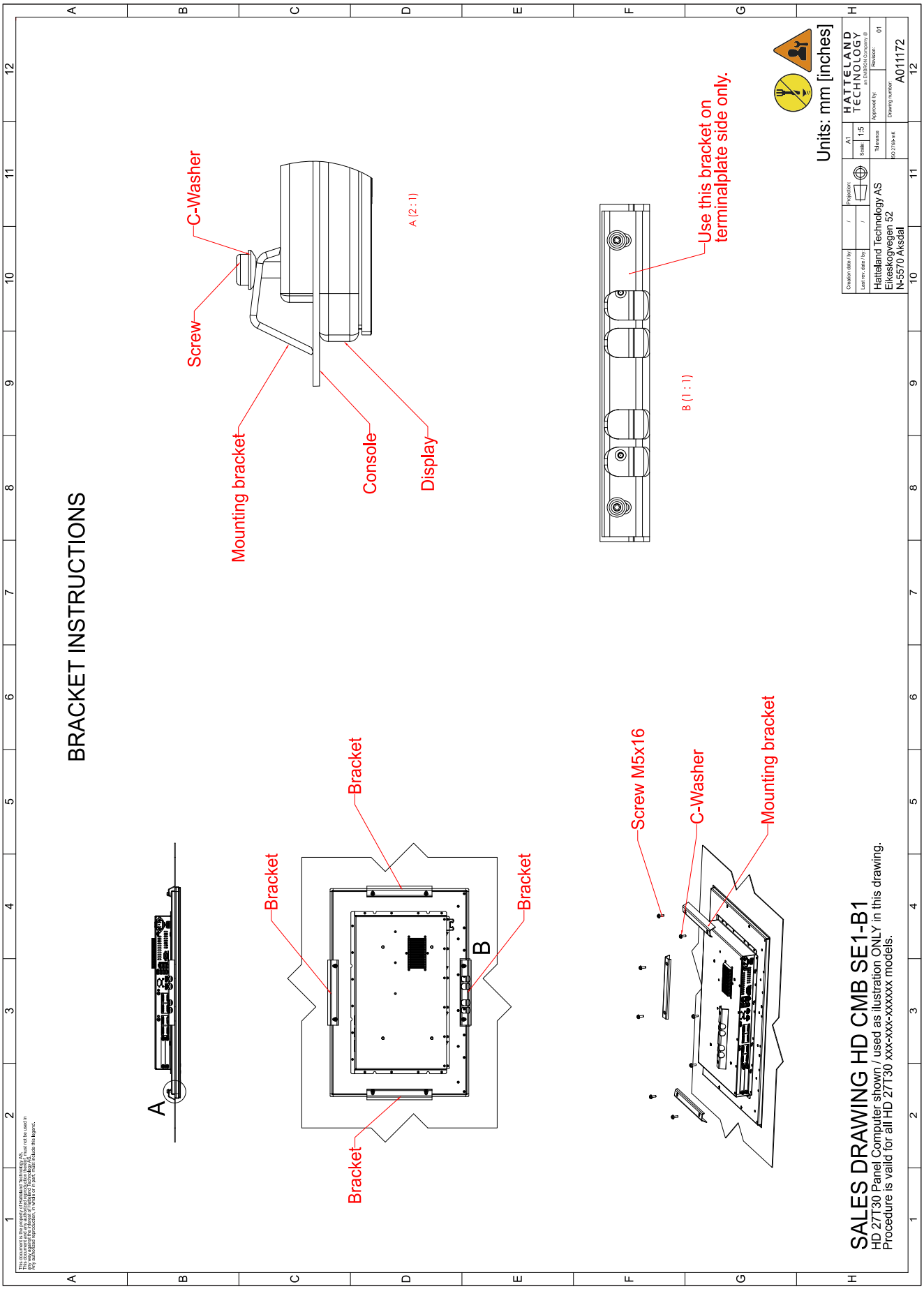

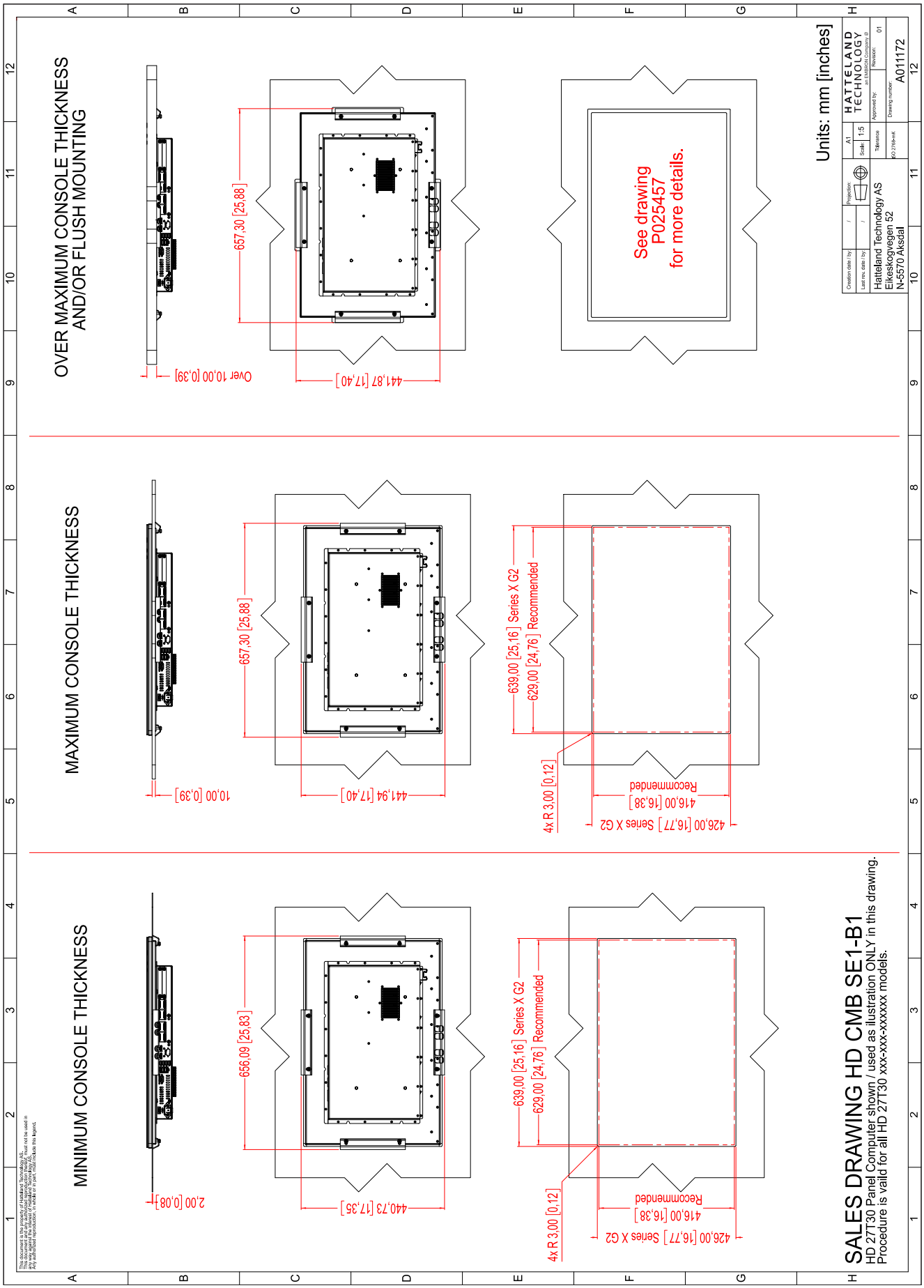

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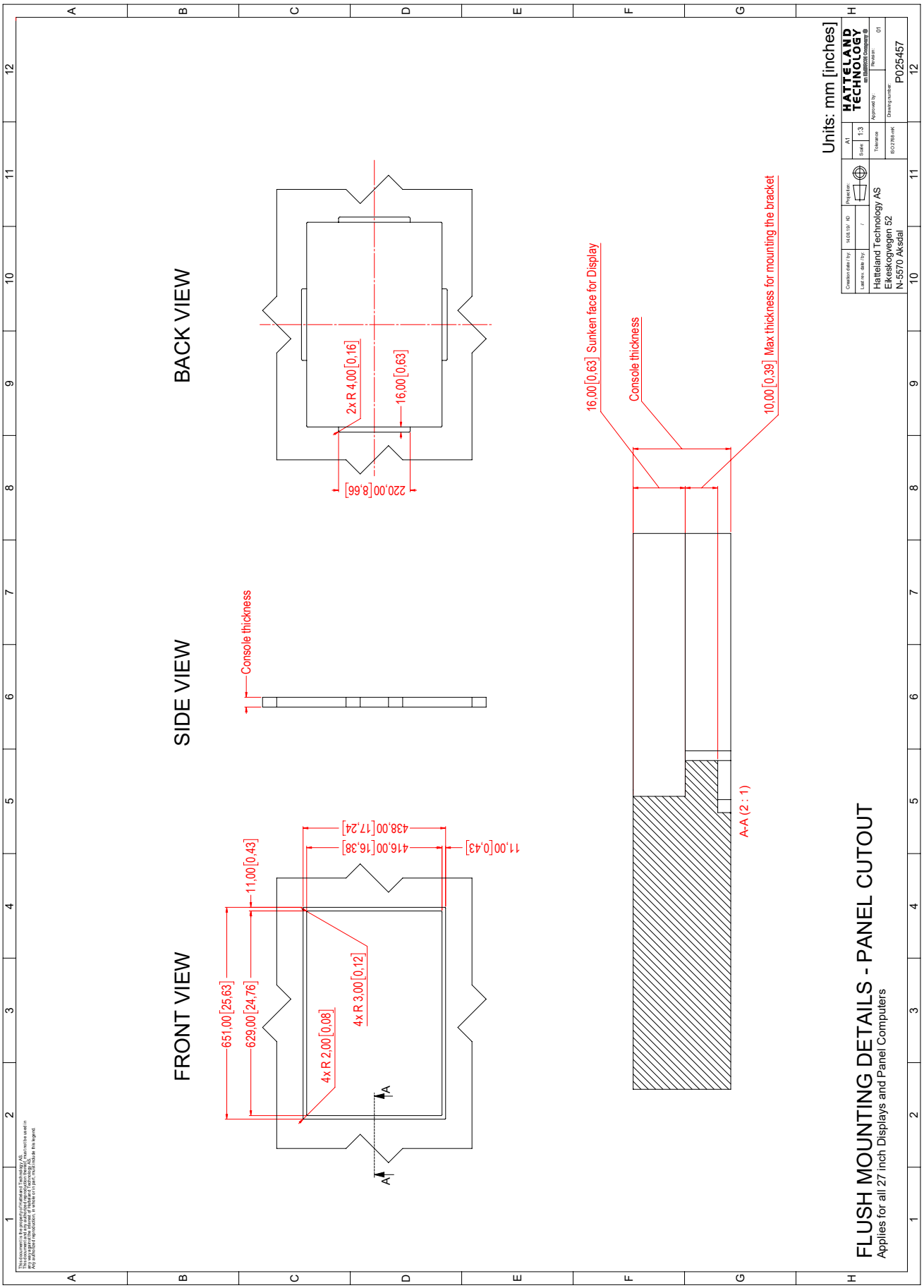

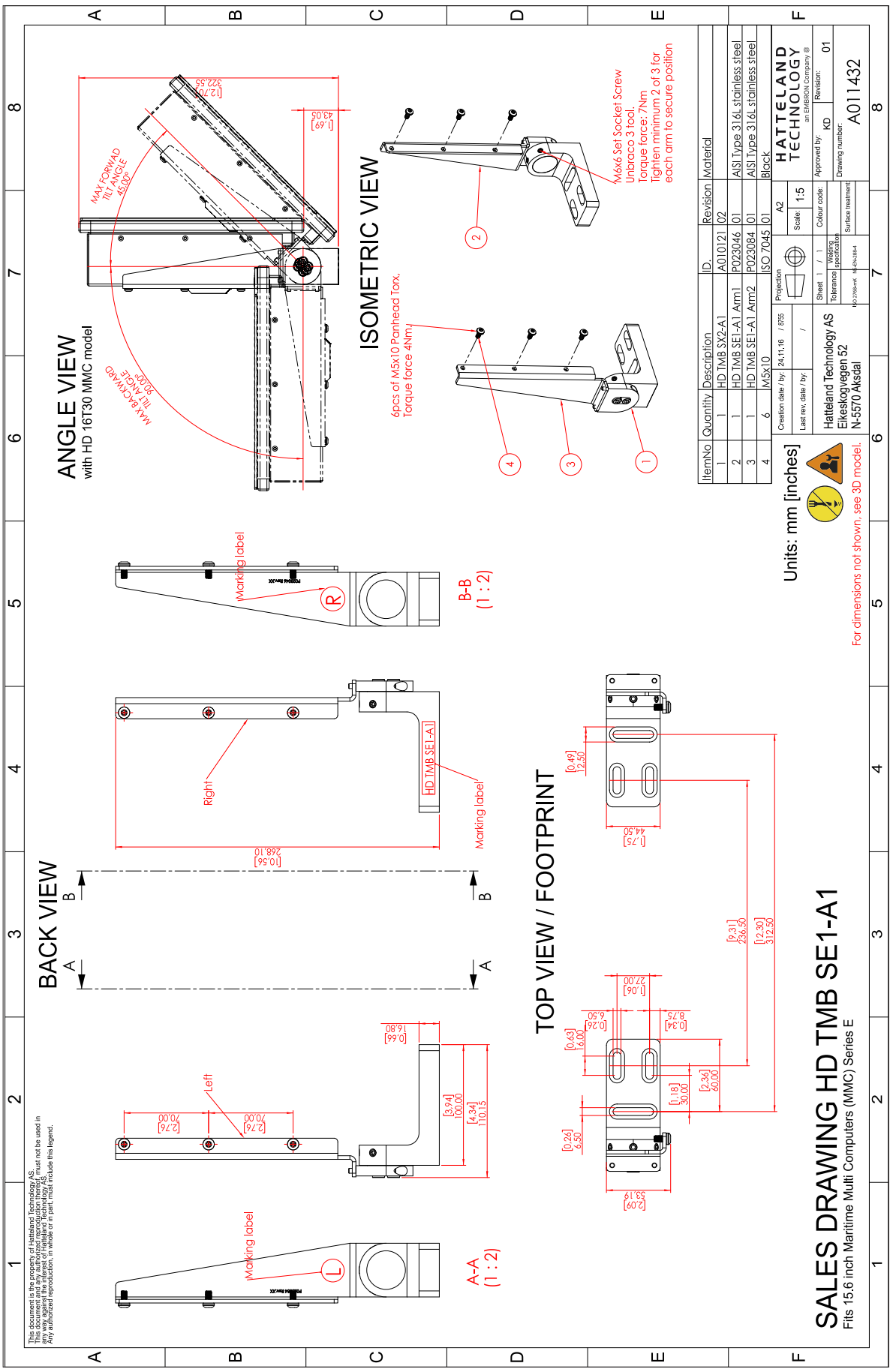

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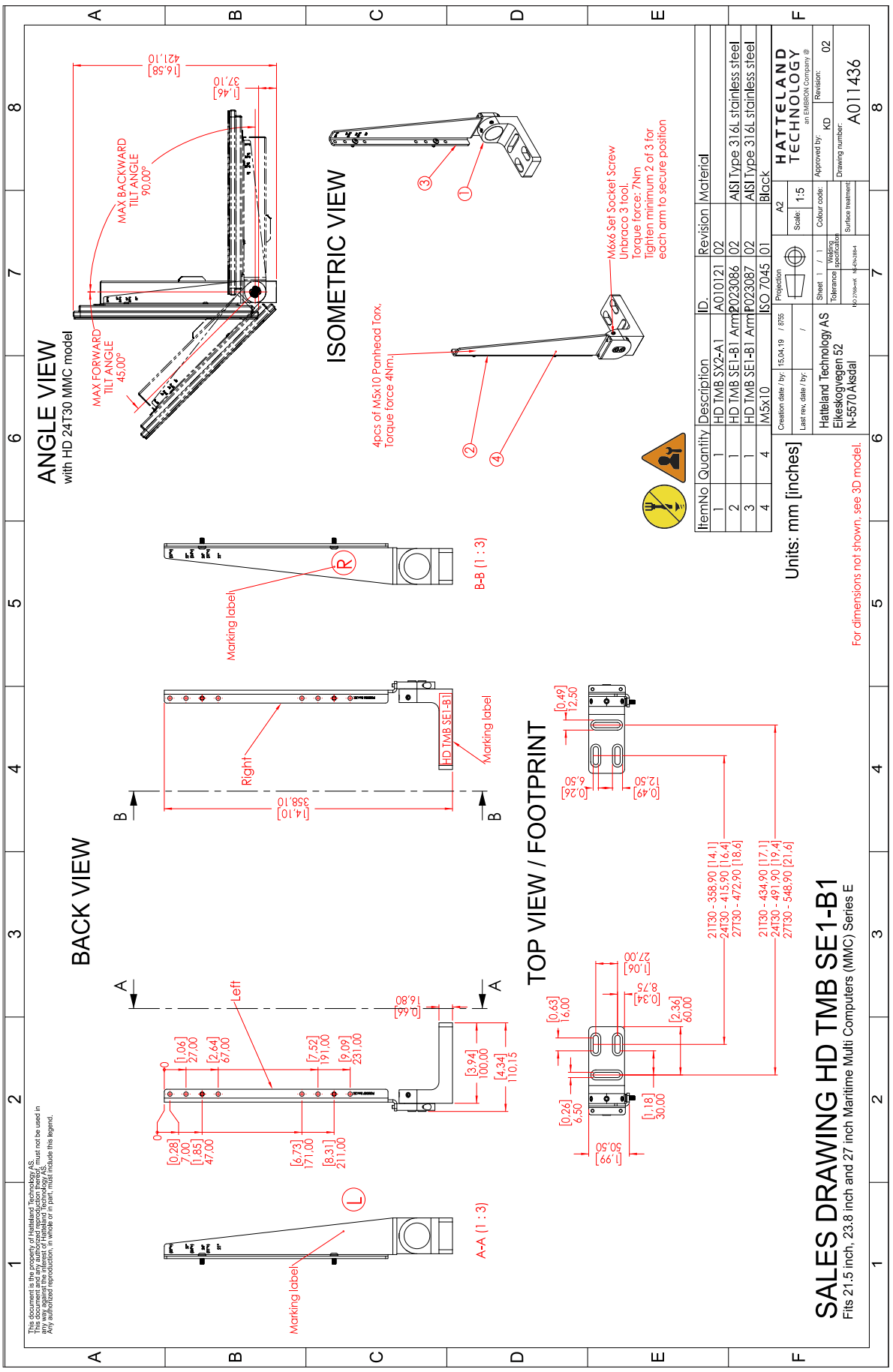

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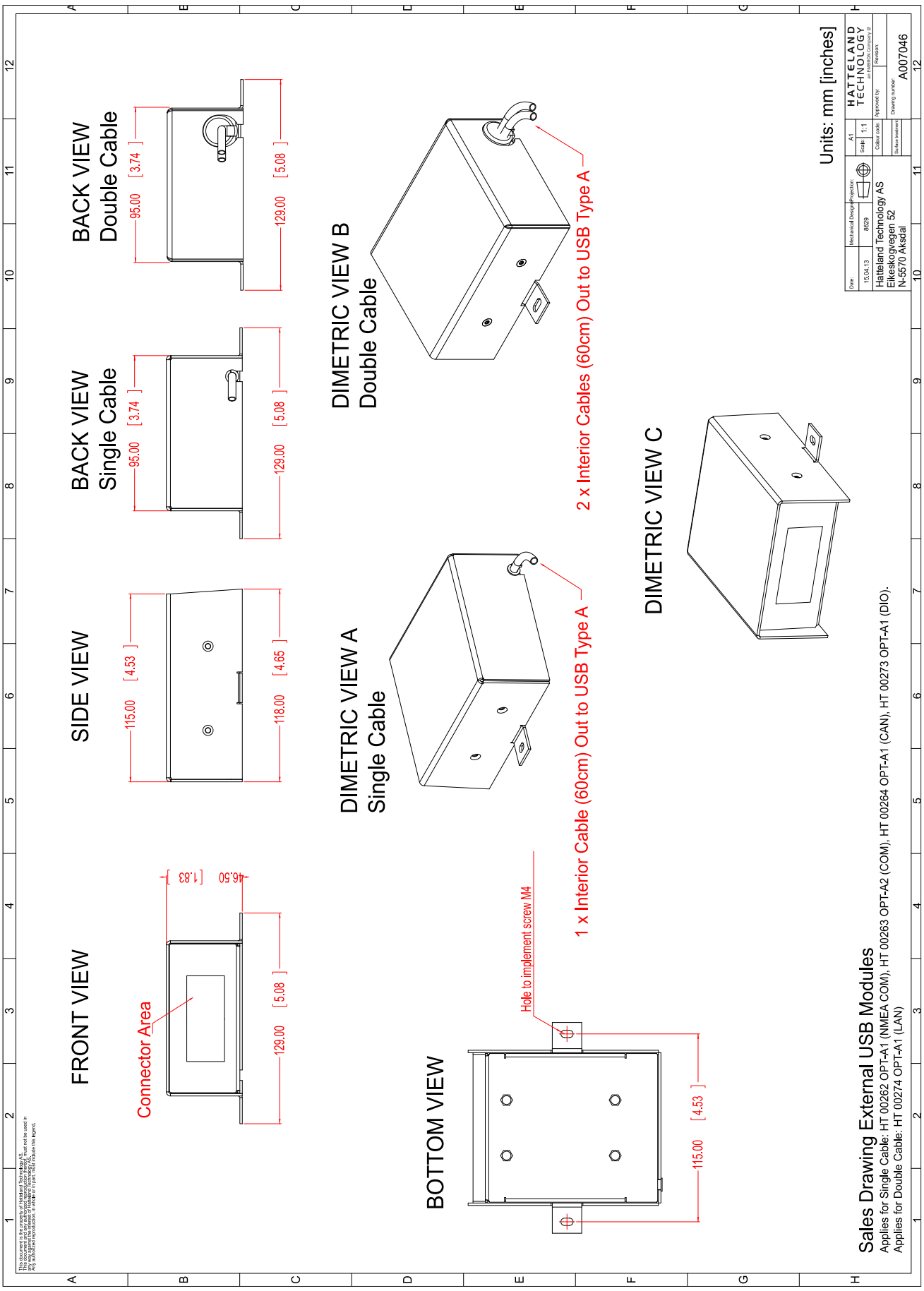

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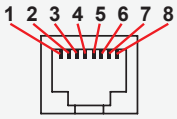
Appendixes

Pinout Assignments

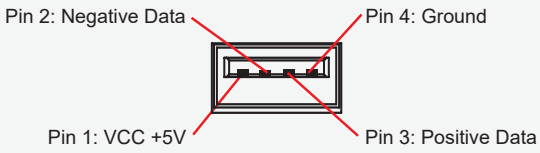
Connectors illustrated here are either standard by factory default or may be available (through factory customization). Note that some combinations may not be possible due to space restrictions. List also valid for customized models. All pin out assignments are seen from users Point of View (POV) while looking straight at the connector. Please review the dedicated datasheet or technical drawings for your actual unit to identify and determine the presence of desired connector. Detailed information about Housing Connectors (terminal blocks) can be found earlier in this manual.

8-pin RJ45 10/100/1000Mbps LAN/Ethernet

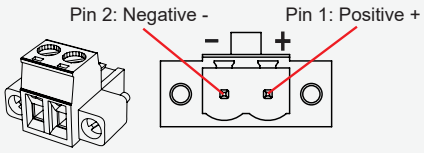


PIN 01	D0P+	Differential Pair 0 (Positive)
PIN 02	D0N-	Differential Pair 0 (Negative)
PIN 03	D1P+	Differential Pair 1 (Positive)
PIN 04	D2P+	Differential Pair 2 (Positive)
PIN 05	D2N-	Differential Pair 2 (Negative)
PIN 06	D1N-	Differential Pair 1 (Negative)
PIN 07	D3P+	Differential Pair 3 (Positive)
PIN 08	D3N-	Differential Pair 3 (Negative)

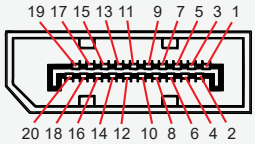
4-pin USB TYPE A



2-pin Terminal Block 5.08 - DC Power Input



20-pin DisplayPort (DP) Female



PIN 01	ML_Lane 0 (p) - Lane 0 (positive)
PIN 02	GND - Ground
PIN 03	ML_Lane 0 (n) - Lane 0 (negative)
PIN 04	ML_Lane 1 (p) - Lane 1 (positive)
PIN 05	GND - Ground
PIN 06	ML_Lane 1 (n) - Lane 1 (negative)
PIN 07	ML_Lane 2 (p) - Lane 2 (positive)
PIN 08	GND - Ground
PIN 09	ML_Lane 2 (n) - Lane 2 (negative)
PIN 10	ML_Lane 3 (p) - Lane 3 (positive)
PIN 11	GND - Ground
PIN 12	ML_Lane 3 (n) - Lane 3 (negative)
PIN 13*	CONFIG1 - connected to Ground*
PIN 14*	CONFIG2 - connected to Ground*
PIN 15	AUX CH (p) - Auxiliary Channel (positive)
PIN 16	GND - Ground
PIN 17	AUX CH (n) - Auxiliary Channel (negative)
PIN 18	Hot Plug - Hot Plug Detect
PIN 19	Return - Return for Power
PIN 20	DP_PWR - Power for connector (3.3 V 500 mA)

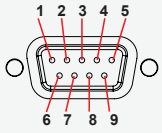
*Pins 13 and 14 may either be directly connected to ground or connected to ground through a pulldown device. This is the pinout for source-side connector, the sink-side connector pinout will have lanes 0–3 reversed in order; i.e., lane 3 will be on pin 1(n) and 3(p) while lane 0 will be on pin 10(n) and 12(p).

Pinout Assignments

Serial Communication settings configured in BIOS: "Advanced/F81964 Super IO Configuration/Serial Port 4 Configuration/"
COM Port is identified in (Windows 10) Operating System as "COM4:"

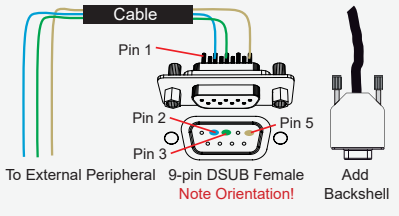
Termination: "On" or "Off" supported.
Flow Control: Selectable in BIOS "Change Settings":
"Send by RTS" or "Auto RTS" (Automatically, no action needed by user application.)
"RS485 RTS# Auto Flow Control:" Disabled/Enabled

9-pin non-isolated Serial COM DSUB Male RS-232

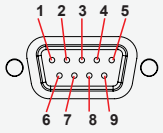


PIN 01	-	Do not connect
PIN 02	RxD	Receive Data
PIN 03	TxD	Transmit Data
PIN 04	-	Do not connect
PIN 05	GND	Signal Ground
PIN 06	N/C	No internal connnection
PIN 07	N/C	No internal connnection
PIN 08	N/C	No internal connnection
PIN 09	N/C	No internal connnection

Total 3 pins required.

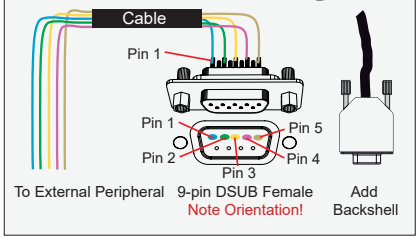


9-pin non-isolated Serial COM DSUB MALE RS-422 / RS-485 FULL DUPLEX

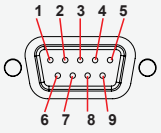


PIN 01	TxD- (Z)	Transmit Data Negative
PIN 02	TxD + (Y)	Transmit Data Positive
PIN 03	RxD + (A)	Receive Data Positive
PIN 04	RxD - (B)	Receive Data Positive
PIN 05	GND	Signal Ground
PIN 06	N/C	No internal connnection
PIN 07	N/C	No internal connnection
PIN 08	N/C	No internal connnection
PIN 09	N/C	No internal connnection

Total 5 pins required.

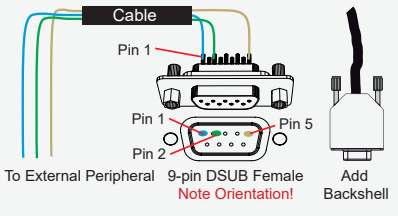


9-pin non-isolated Serial COM DSUB MALE RS-485 HALF DUPLEX



PIN 01	Data -	Data Negative
PIN 02	Data +	Data Positive
PIN 03	-	Do not connect
PIN 04	-	Do not connect
PIN 05	GND	Signal Ground
PIN 06	N/C	No internal connnection
PIN 07	N/C	No internal connnection
PIN 08	N/C	No internal connnection
PIN 09	N/C	No internal connnection

Total 3 pins required.

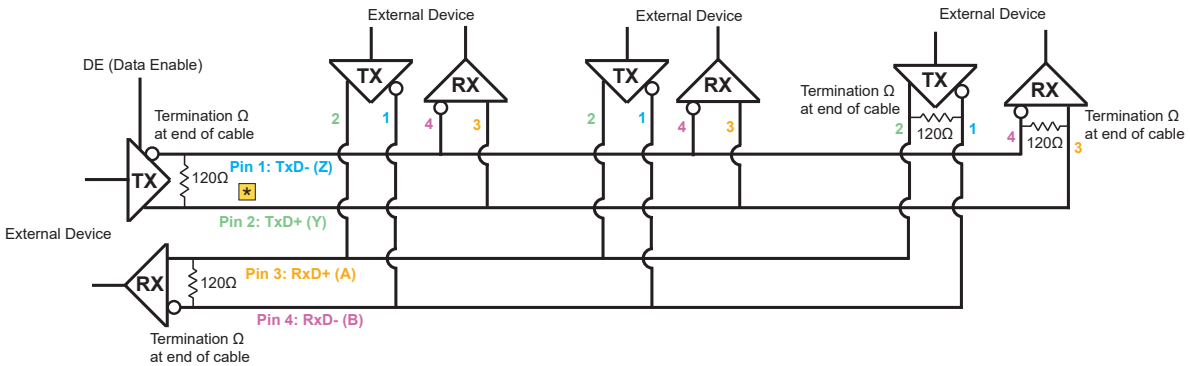


Building your own cable:

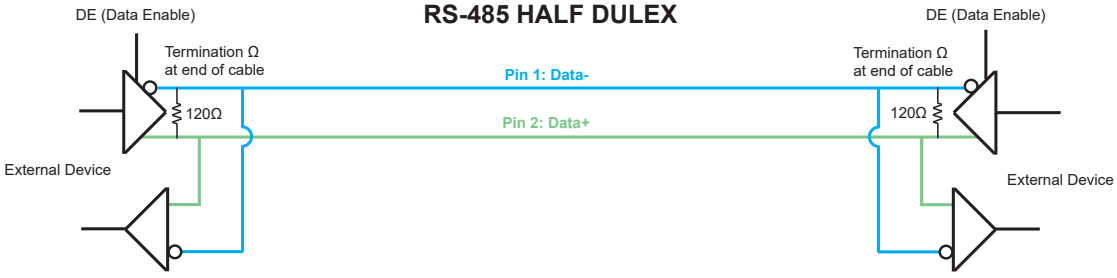
Note: Requires soldering and assembly. It is expected that the technician has experience in electronics, soldering and assembling cables and connectors.

Use a cable that contains at least the wires required (not single wires). Heat Shrink Tubes must be applied to soldered wire/pins. Test connection (beep) with Voltage Meter. Test connection between power pin and other pins to ensure no short circuit is present prior to connecting cable and power on Display unit. Finally, the 9-pin DSUB must be covered by a back shell.

RS-422 / RS-485 FULL DULEX



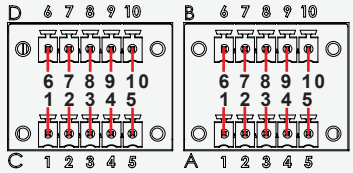
RS-485 HALF DULEX

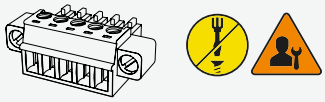


Pinout Assignments

10+10 pin RS-422 / RS-485 NMEA Module

Type Number “PCA200828-1 / PCA100293-1”





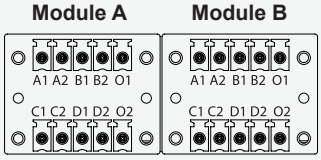
PIN 01	TxD-	Transmit Data Negative
PIN 02	TxD+	Transmit Data Positive
PIN 03	GND	Isolated Ground
PIN 04	RxD-	Receive Data Negative
PIN 05	RxD+	Receive Data Positive
PIN 06	TxD-	Transmit Data Negative
PIN 07	TxD+	Transmit Data Positive
PIN 08	GND	Isolated Ground
PIN 09	RxD-	Receive Data Negative
PIN 10	RxD+	Receive Data Positive

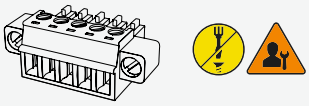
RS-485 Half Duplex (2-wire) Configuration:
Connect TX and RX pair-wise:
TX- to RX-, TX+ to RX+.

*Note: The jumper for “force of transmitter (Forced TX(y)” is open by factory default. For some custom models this jumper is preset to closed (active), in that case unit has to be opened and jumper set to open to allow Half Duplex mode.

10+10 pin Isolated Digital Input/Output Module

Type Number “PCA100297-1”

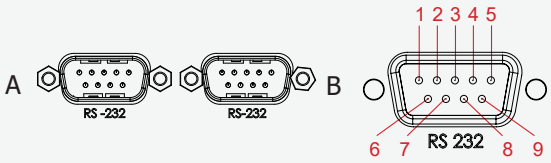




Module A			Module B	
A1	External Power +		A1	IN+[0]
A2	N/C (Not Connected)		A2	IN-[0]
B1	External Power - (GND1)		B1	IN+[1]
B2	N/C (Not Connected)		B2	IN-[1]
O1	HS[0]		O1	N/C
C1	HS[1]		C1	IN+[2]
C2	N/C (Not Connected)		C2	IN-[2]
D1	HS[2]		D1	IN+[3]
D2	N/C (Not Connected)		D2	IN-[3]
O2	HS[3]		O2	N/C

COM Module RS-232 - 2 x ports, 9-pin DSUB Male

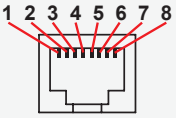
Type Number “PCA100309-1”



PIN 01	DCD	Data Carrier Detect
PIN 02	RxD	Receive Data
PIN 03	TxD	Transmit Data
PIN 04	DTR	Data Terminal Ready
PIN 05	GND	Signal Ground
PIN 06	DSR	Data Set Ready
PIN 07	RTS	Request To Send
PIN 08	CTS	Clear To Send
PIN 09	RI	Ring Indicator

8-pin RJ-45 10/100Mbps LAN/Ethernet

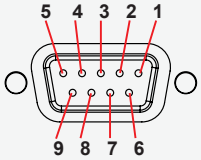
PCA100298-1 / HT 00274 OPT-A1



Pin 01 - TDP	Transmit Differential Pair (Positive)
Pin 02 - TDN	Transmit Differential Pair (Negative)
Pin 03 - RDP	Receive Differential Pair (Positive)
Pin 04 - NC	Not Connected
Pin 05 - NC	Not Connected
Pin 06 - RDN	Receive Differential Pair (Negative)
Pin 07 - NC	Not Connected
Pin 08 - NC	Not Connected

9-pin Amplified Mono/Stereo Audio Out, DSUB Female

Type Number “HT 00235 OPT-A1”

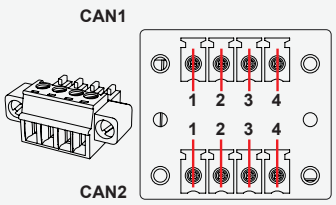


PIN 01	LAUDR	Left Audio Return*
PIN 02	LAUD	Left Audio*
PIN 03	RAUDR	Right Audio Return
PIN 04	RAUD	Right Audio
PIN 05	N/C	No internal connection
PIN 06	N/C	No internal connection
PIN 07	N/C	No internal connection
PIN 08	N/C	No internal connection
PIN 09	N/C	No internal connection

*For Mono: connect pin 01 and 02 only

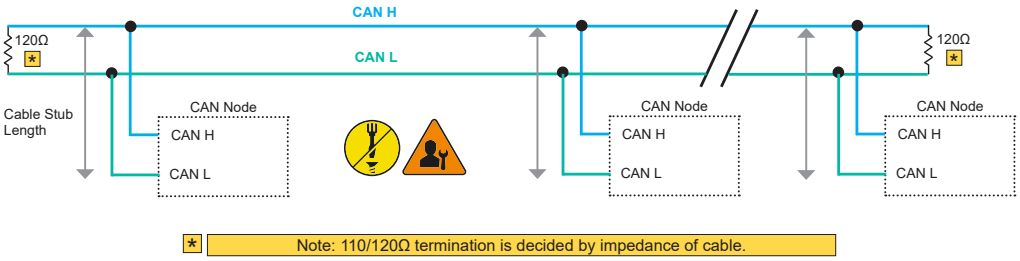
Pinout Assignments

4+4 pin CAN I/O Module, 2 channels
Type Number "ZIA0001310-B / ZIA0001310-SLCAN"



Pin 01	Can1	CAN L
Pin 02	Can1	CAN L
Pin 03	Can1	CAN H
Pin 04	Can1	CAN H

Pin 01	Can2	CAN L
Pin 02	Can2	CAN L
Pin 03	Can2	CAN H
Pin 04	Can2	CAN H



* Note: 110/120Ω termination is decided by impedance of cable.

IEC62368 policy for Hatteland Technology products

Introduction

According to the requirements of EN 62368-1:2014.

The tables below refers to the policies for opening, servicing and installation of the unit(s) referred to in this manual. This equipment is designed to be used as a fixed installation and to be sold through special sales channels for professional use.

Based on requirements EN 62368-1:2014 and IEC 62368-1:2018

Defenition	Description
Ordinary person/ Sailor/End-User 	Ordinary person is the term applied to all persons other than instructed persons and skilled persons. Ordinary persons include not only users of the equipment, but also all persons who may have access to the equipment or who may be in the vicinity of the equipment. Under normal operating conditions or abnormal operating conditions, ordinary persons should not be exposed to parts comprising energy sources capable of causing pain or injury. Under a single fault condition, ordinary persons should not be exposed to parts comprising energy sources capable of causing injury.
Instructed person 	Instructed person is a term applied to persons who have been instructed and trained by a skilled person, or who are supervised by a skilled person, to identify energy sources that may cause pain and to take precautions to avoid unintentional contact with or exposure to those energy sources. Under normal operating conditions, abnormal operating conditions or single fault conditions, instructed persons should not be exposed to parts comprising energy sources capable of causing injury.
Skilled person 	Skilled person is a term applied to persons who have training or experience in the equipment technology, particularly in knowing the various energies and energy magnitudes used in the equipment. Skilled persons are expected to use their training and experience to recognize energy sources capable of causing pain or injury and to take action for protection from injury from those energies. Skilled persons should also be protected against unintentional contact or exposure to energy sources capable of causing injury,

IEC62368 policy for Hatteland Technology products

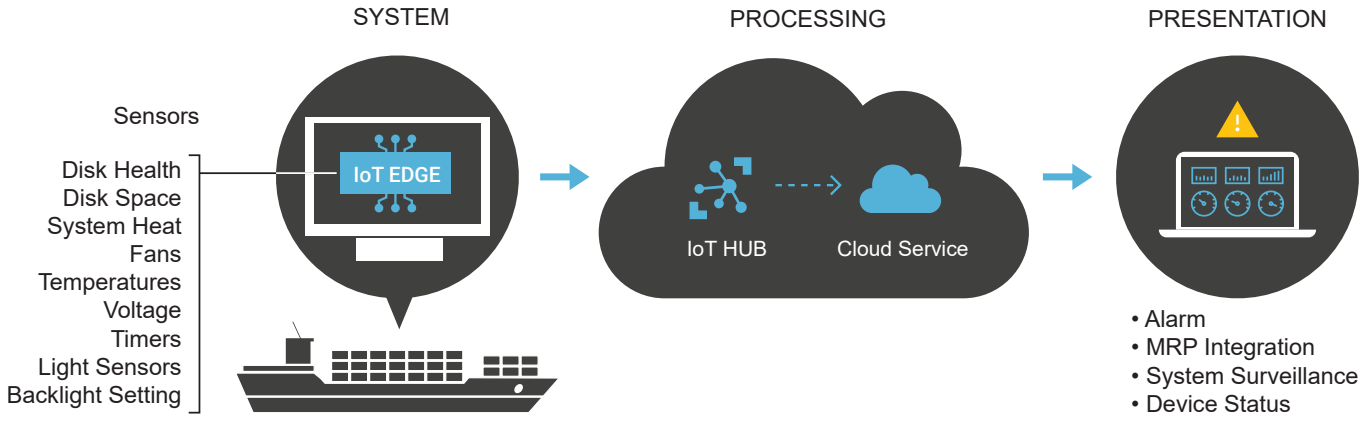
Authority	Description
Children 	This equipment is not suitable for use in locations where children are likely to be present.
Ordinary person/ Sailor/End-User 	Not allowed to open unit. Not allowed to install the unit. Not allowed to terminate/connect cables to the unit.
Instructed person 	Allowed to open hatches/latches which does not require tools, such as Disktrays. Allowed to open "battery-hatch" to change the battery even if tools are required. Allowed to install the unit. Allowed to terminate/connect cables to the unit indoors.
Skilled person 	Allowed to open and disassemble the unit. Allowed to install the unit. Allowed to terminate/connect cables to the unit indoors and outdoors. Allowed to terminate/connect earth/ground wire. Note: Be aware that additional definition for “skilled person” may apply, country dependent.

Conditions	Description
AC power net Class	Class 1. Pollution degree 2. Over voltage category 2.
Transient requirement	External circuits are considered to be installed wholly within the same building structure.
Battery	Obligated to use battery specified for the product.
Altitude	Products are designed for a max operating altitude of 2000m.

Installation	Description
Mounting brackets	Only bracket defined/specified for the unit is allowed.
AC power cord	When installed it shall be possible to disconnect the unit from the AC power net i.e. possible to reach AC connecter.
Transient requirement	External circuits are considered to be installed wholly within the same building structure.
Earthing	Obligated to use defined earthing material/method specified for the unit. Minimum protective bonding conductor size of copper conductors: Wire: Minimum 1,5mm^2 but Hatteland Technology recommends 2,5mm^2 (AWG12) marked yellow/green.
Outdoor	Units with IP66/67-rated fronts can be used in outside environments, provided that the console they are fitted in fulfil certain requirements. - There must be a fully water/dustproof seal between the IP66 front and the console. - Dust/water ingress protection of console. (Unit/product is rated for pollution degree 2). - Humidity/condensation control in console. - Thermal management in console (so units can operate within rated temperature range). Units with IP20/IP22 shall not be used outdoor.
Outdoor Installation	Appropriate RCD with ground current rating of 20mA or less shall be used.

IoT (Internet of Things) Overview

IoT Enabled Products from Hatteland Technology



With IoT you can easy, fast and secure review any product parameters, Accessible from anywhere on any device, Monitor and estimate health of products to ensure optimal operation today and tomorrow, Keep track of events down to seconds or past years to plan future maintainance and more. Via an IoT EDGE application you can collect data from the various sensors in our products, and send this information to a Cloud Service for further processing and analytics.

The table below provides an overview of onboard IoT parameters of the units and their access methods. The system built around are equipped with features of sensoring temperature, voltage, environmental luminance and other diagnostic parameters. The end-user can utilize the parameters to analyze the working status of the system. The IoT parameters are distributed in different modules, examples SuperIO, VCOM and S.M.A.R.T.

Since the data sent to Cloud Service is stored in a structured plain text format and accessible via standarized API, there is no limits on how you can use this data further in any type of application, part of software development or even design your own customized graphical layouts to easily illustrate the data - in near real-time!

Access to parameters - Series E Panel Computers (MMC)

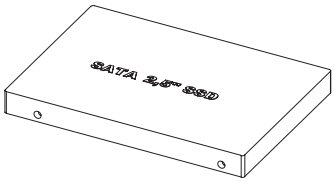
Typenumbers	Chipset	IoT Parameter	Hardware	Access Method	Reference
HD 16T30 MMC HD 21T30 MMC HD 24T30 MMC HD 27T30 MMC	Intel® SOC	VBAT (CMOS Battery Voltage)	Motherboard	SCOM "SIO"	www.hattelandtechnology.com/hubfs/pdfget/inb100018-7.htm
		VCore (CPU Core Voltage)	Motherboard		
		V5V (+5V)	Motherboard		
		V12V (+12V)	Motherboard		
		V3VSB (3.3V Standby)	Motherboard		
		V3VCC (3.3V Active)	Motherboard		
		CPUTEMP (CPU temperature PECI)	Motherboard		
		SYSTEMP (SYS Temperature onboard)	Motherboard		
		CPUFAN (CPU FAN speed)	FAN		
		LIS (Light Sensor via SCOM)	Light Sensor	SCOM "LIS"	
		S.M.A.R.T. Data	HDD/SSD	S.M.A.R.T Monitor Tools	www.smartmontools.org
		System Parameters provided by Operating System, like CPU load, RAM load, Disk load etc	Motherboard	WinAPI	**Example:** OpenHardwareMonitor www.github.com/openhardwaremonitor/openhardwaremonitor

SSD Selection Guide

Solid State Disk (SSD) Devices

Last revised : November 2020

SSD's has many benefits over conventional hard drives where operational performance in marine environment is the reason for Hatteland Technology to recommend SSD's. Historically, the limited write endurance and storage capability vs cost been the main limitations for SSD devices.
SSD based at modern technology and with correct dimensioning/usage, will in most of the use cases overcome those short comings.



SSD selected and installed by Hatteland Technology have been through an extensive test program which guarantee that SSD performance complies to defined parameters in the specifications and that the SSD will operate without issues in delivered system configuration, hardware and software combinations, and is suited for its operational (marine) environments .

Selection guide (3d-party SSD):

- Use SSD that is designed for the actual use case, follow recommendations from OS/SW/HW providers.
- Use SSD that is designed and tested vs Enterprise 24/7 operational profile.
- Use SSD where byte written (PBW/TBW) is defined from Enterprise profile; JEDEC218/219 or from full/true random profile.
- Use SSD which can handle unplanned/unscheduled loss of power

SSD devices have limited, but predictable, life time. The life time of the SSD device is directly dependent on the application software.

SSD Selection Guide

Calculation / estimation of operational lifetime
Assumed System with Hatteland Technology provided SSD or selected according to guide above.

1. Measure/estimate/calculate average disk usage per day.

For measuring, use SMART data.

- Measure the difference in numbers of write cycles at the start and at end of the test (or the difference in remaining lifetime)
- Run the test with relevant disk load and during relevant time period
  Relevant disk load - should correspond to the average disk load during the operational lifetime.
  Relevant time - time it takes to generate relevant disk load with statically significance.

Many SSD manufacturers provide tool for calculating expected operational lifetime.

2. Selection of SSD

Select SSD type/series.
Define minimum expected lifetime [Year]
Define minimum required SSD capacity [GB]

From datasheet,
- check if the endurance is expressed as PBW/TBW or DWPD.
- check warranty [year]

PBW - PetaByte Written = 1000 terabyte written = 1000 000 gigabyte written.
TBW - Total Byte Written normally expressed in terabyte.
DWPD - Disk Write Per Day.

Note relation TBW and DWPD : TBW = DPWD * warranty * 365 * SSD capacity.

Calculate minimum TBW/DPWD.
If TBW in datasheet : TBW = Lifetime *365 * average disk load per day.
If DPWD in datasheet : DPWD = TBW / (warranty * 365 * SSD capacity).

Use datasheet,
Select disk where actual capacity is greater or equal to minimum required capacity and TBW/DPWP in datasheet is greater or equal to calculated minimum TBW/DPWD.

If lifetime is not according to requirements:
Select different SSD, size and/or type, or use mechanism such as over provisioning to extend the operational lifetime.

Calculation of required size of SSD (Multi-Level Cell - MLC) device)

The table below details the write endurance of the an enterprise environment. All values are verified by Hatteland Technology during the qualification / selection process. Please review our relevant Product Datasheets for your unit to determine the actual installed device and its TBW values before proceeding with calculations below.

Write Endurance Specifications **Previous** 2.5" SSD (MLC)	
Device Size	**Value in TBW (Terabytes)**
80 GB	45
120 GB	70
160 GB	100
240 GB	140
300 GB	225
600 GB	330
JESD218 standard1 and based on JESD219 workload.	

Write Endurance Specifications **Current** 2.5" SSD (MLC)	
Device Size	**Value in TBW (Terabytes)**
150 GB	412
240 GB	599
480 GB	945
800 GB	1663
960 GB	1750
1200 GB	2455

Formula for calculating disk size:
z = **y** * **x**

Where **y** = Requested minimum lifetime (with respect to wear out, [year]).
Where **x** = Data rate (GB /per year).
Where **z** = Total amount of data written data to SSD during its whole lifetime.

Step-by-Step Calculation

Step 1: Measure (preferred) or estimate data rate **y**, [GB /per year].
Step 2: Define minimum expected lifetime for SSD device **x** [year].
Step 3: Calculate total amount of data written to the SSD during its whole lifetime, **z** = **y** * **x**.
Step 4: Use table, **column 2**, the **z** value shall be less or equal to the value in the table to achieve requested lifetime.

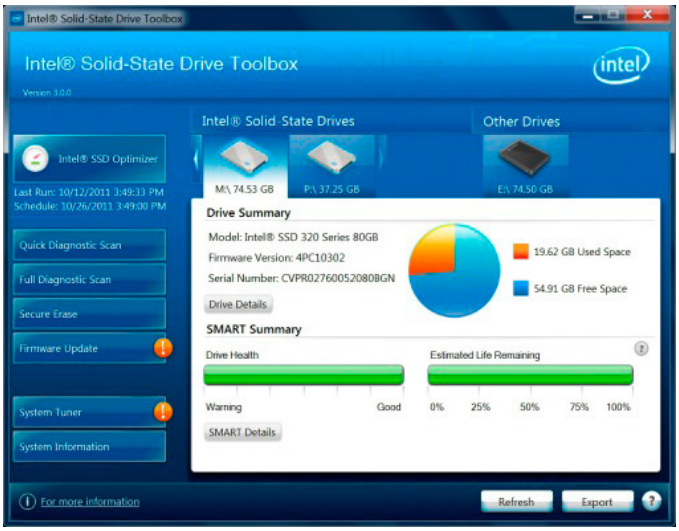
Write Endurance Specifications **Previous** 2.5" SSD (MLC)	
Device Size	**Value in TBW (Terabytes)**
80 GB	45
120 GB	70
160 GB	100
240 GB	**140**
300 GB	225
600 GB	330

Write Endurance Specifications **Current** 2.5" SSD (MLC)	
Device Size	**Value in TBW (Terabytes)**
150 GB	412
240 GB	**599**
480 GB	945
800 GB	1663
960 GB	1750
1200 GB	2455

Step 5: Select the SSD device, **column 1**, which corresponds to the selected value in **column 2**.
Step 6. Check that the size of the selected SSD is greater than required size of the SSD, if not select the size of the SSD that matches customer requirements.

Measure of number of write cycles (Intel® Solid-State Drive Toolbox software)

Download Software from: **https://downloadcenter.intel.com/download/30162?v=t**



Preparation

1: Install "Intel® Memory and Storage Tool" at target system.

2: Install the unit in valid configuration, i.e. the application shall running valid use case, if possible use worst case scenario (with respect to disk activity).

3: Before start of measurement, check and store actual SMART data.
- Start "Intel® Solid-Sate Drive toolbol".
- Refresh (button at home screen).
- Export SMART data, store current data at file (button at home screen).

Measurement

1: Check and save time for start test scenario.

2: Execute the test scenario long enough to cover all valid use cases which may affect disk activity. (Recommended measurement period is at least 1 week without interruption).

3: When the measurement is completed...
- Check and save time for completion of the test scenario.
- Start Intel® Solid-Sate Drive toolbox.
- Refresh (button at home screen).
- Export SMART data, store current data at file (button at home screen).

Calculation

1: Calculate number of written bytes during the measurement period, use E1 or F1 parameter (stored log file). Number of written bytes per second = (**F1**compleation - **F1**start) / (**Time**completion - **Time**start)

2: Convert to bytes per year.

3: Calculate expected life time (see previous time, section "Step-by-Step Calculation").

ATX / AT Power Modes

Battery Connected. ATX mode:

BIOS setting	Battery	Power Status	Expected	Results
Always On	Connected	ON	ON	ON
Always On	Connected	OFF	ON	ON
Last State	Connected	ON	ON	ON
Last State	Connected	OFF	OFF	OFF
Always Off	Connected	ON	OFF	OFF
Always Off	Connected	OFF	OFF	OFF

Battery Disconnected. ATX mode:

BIOS setting	Battery	Power Status	Expected	Results	Notes
Always On	Disconnected	ON	ON	OFF	See note below for ATX Mode.
Always On	Disconnected	OFF	ON	OFF	
Last State	Disconnected	ON	ON	OFF	
Last State	Disconnected	OFF	OFF	OFF	
Always Off	Disconnected	ON	OFF	OFF	
Always Off	Disconnected	OFF	OFF	OFF	

Battery Reconnected. ATX mode:

BIOS setting	Battery	Power Status	Expected	Results	Notes
Always On	Reconnected	ON	ON	OFF first boot, then ON	See note below for ATX Mode.
Always On	Reconnected	OFF	ON	OFF first boot, then ON	
Last State	Reconnected	ON	ON	OFF first boot, then ON	
Last State	Reconnected	OFF	OFF	OFF	
Always Off	Reconnected	ON	OFF	OFF	
Always Off	Reconnected	OFF	OFF	OFF	

AT mode:

BIOS setting	Power Status	Expected	Results
Always On	ON	ON	ON
Always On	OFF	ON	ON
Last State	ON	ON	ON
Last State	OFF	ON	ON
Always Off	ON	ON	ON
Always Off	OFF	ON	ON

*Notes:

Due to limitations in Super I/O firmware, the behavior of Last State and Always On power mode settings in BIOS is affected if CMOS battery is removed or dead.

- If battery is dead or not present, the power button must be used to power on the unit.
- After battery is replaced, the power button must be used to power up the unit the first boot. After that it will return to normal behavior.
- Note that the system will show warning during boot, if battery voltage is below set limit (default: 2,6V, can be changed in BIOS), giving users time to plan service to replace the battery before the battery dies.

For setups where this limitation is not acceptable, the workaround is to set the system to AT mode. The system will then always start when power is connected, and the BIOS settings are ignored.

- If this is required, please specify “AT mode” option when ordering new units, as it’s a jumper setting modified during production process or by authorized service partner.

Power Mode

Power mode is configurable under BIOS setup menu.

Advanced -> SCOM BUS Configuration -> Power Mode

- **Always On (AT Mode)**
  (Computer will start when external power is applied, valid in next power-recycle)

- **Power Button Only (ATX Mode)**
  (Computer will only start when power button is pressed, valid in next power-recycle)

- **Previous State**
  (Computer will start when power button is pressed or if it was running before power was lost, valid in next power-recycle)

Trusted Platform Module (TPM)

TPM 2.0 module with support for TPM 1.2 is included.

This is a security device designed to secure the system using integrated cryptographic keys.

Support and requirements:

- Only supported for OS installed as UEFI boot. Legacy boot is not supported.
- Secure Boot must be configured and enabled for full TPM functionality to be available.
- TPM 2.0 is not natively supported by Windows 7, but hotfix to add support for Bitlocker Drive Encryption with TPM 2.0 is available here:
  https://support.microsoft.com/en-us/help/2920188/update-to-add-support-for-tpm-2-0-in-windows-7-and-windows-server-2008
  Alternatively search for **KB2920188** to find the hotfix using your preferred search engine.

BIOS settings:

TPM settings can be managed in BIOS.

- Enter BIOS by pressing Del key during boot
- Go to Advanced tab and select Trusted Computing

Available options:

BIOS Setting	Options	Default	Description
Security Device Support	Disable/Enable	Enable	Enable/disable TPM Security Device
SHA-1 PCR Bank	Disabled/Enabled	Enabled	
SHA256 PCR Bank	Disabled/Enabled	Enabled	
Pending operation	None/TPM Clear	None	Option to schedule an operation. TPM Clear will clear all information stored on the Security Device
Platform Hierarchy	Disabled/Enabled	Enabled	
Storage Hierarchy	Disabled/Enabled	Enabled	
Endorsement Hierarchy	Disabled/Enabled	Enabled	
TPM2.0 UEFI Spec Version	TCG_1_2/TCG_2	TCG_2	**TCG_1_2:** Compatible mode for Win8/Win10 **TCG_2:** Support new TCG2 protocol and event format for Win10 or later
Physical Presence Spec Version	1.2/1.3	1.3	Select PPI Spec Version supported by OS.
Device Select	TPM 1.2/TPM 1.3/Auto	Auto	**TPM 1.2** will restrict support to 1.2 devices **TPM 2.0** will restrict support to 2.0 devices **Auto** will support both with default set to 2.0. TPM 1.2 devices will be enumerated-

To save any changes made and exit BIOS, press F4 button.
For detailed usage info please refer to official documentation for your selected operating system.

Additional features overview/details

Secure Boot

Secure Boot is a security feature that can protect the system from running unauthorized boot loaders and avoid loading non-signed drivers during boot process. The feature is only supported for boot devices in UEFI mode.

CSM Support (BIOS Legacy boot and Option ROM support) is not compatible with this security feature and must be disabled in BIOS before enabling Secure Boot.

Basic Procedure:

-Set UEFI boot type in BIOS (set by default)
- Enter BIOS by pressing Del key during boot.
- Navigate to Boot tab in BIOS
- Make sure Boot mode select is set to: UEFI Boot Type
- Press F4 to save and Exit

- Disable CSM Support
- Enter BIOS by pressing Del key during boot.
- Go to Advanced tab and Select “CSM Configuration”.
- Set CSM Support to Disabled
- Press F4 to save and exit (unit must be restarted before continuing)

- Enable Secure Boot
- Enter BIOS by pressing Del key during boot.
- Go to Security tab and Select “Secure Boot”.
- Set Attempt Secure Boot to Enabled
- Secure Boot Mode is set to standard as default.
- Customized option will enable Key Management menu below with advanced settings.
- Press F4 to save and exit

Choose Boot Device

By factory default, press F7 to choose boot device at startup of unit.

Battery Status and Alarm

CMOS battery voltage is monitored during each boot and the following warning will show if it's below set low limit:

WARNING!!!
The CMOS battery capacity too low.

If this error is displayed, it is recommended to schedule service of the unit for replacement of CMOS battery.

When the CMOS battery is dead, or voltage is too low, it will not keep track of time/date when power is disconnected. BIOS settings will still be remembered, but bootup takes longer time and some BIOS related functions may not work optimally without battery.

The low limit is set to 2.4V by default. This is the minimum voltage required by main board for full functionality and to keep track of time and date while powered off.

The low voltage limit can be changed or disabled in BIOS by following the steps:

- Enter BIOS by pressing Del key during boot.
- Go to Advanced tab and select RTC Battery Alarm Configuration submenu
- Select option: RTC Battery Alarm Voltage
    - Default value is 2.4V
    - Limit can be set to any value between 2.0V and 3.0V (0,1V steps) or disabled to not show any warning.
    - Press F4 to save and exit

To check the current CMOS Battery voltage in BIOS go to: Advanced -> Hardware Monitor -> VBAT value
If the battery is dead or not connected the voltage will be reported as <1V.

Nominal CMOS battery voltage is between 3.0-3.2V when new and will decrease gradually over time.

Once voltage is below 2.4V it will no longer function properly, and there is risk of time/date loss.

The expected lifetime of CMOS battery is 5+ years. Depending on usage and storage conditions, the actual lifetime may vary between 3-10 years.

LAN Teaming

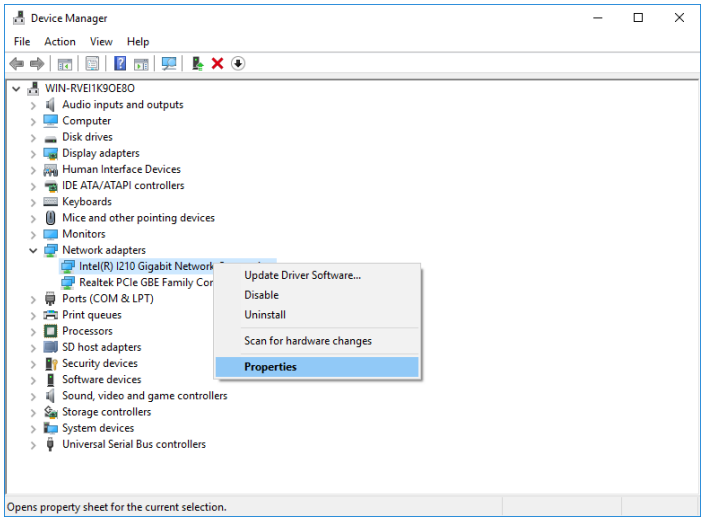
The network ports support VLAN and Teaming functionality.

For Windows 10, Intel Network Connections version 23.2.x or newer is required.
For Linux OS, adapter teaming is implemented using the native Linux Channel bonding module.

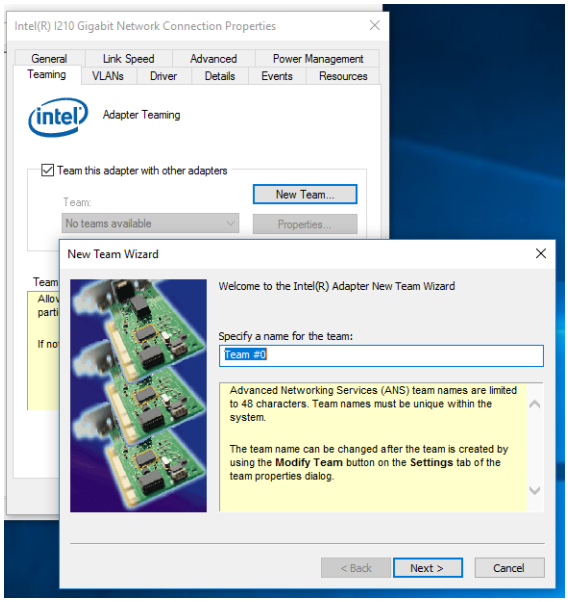
Latest Intel network driver/software is available at:
https://downloadcenter.intel.com/product/64402/Intel-Ethernet-Controller-I210-IT

Procedure to set up teaming in Windows 10:

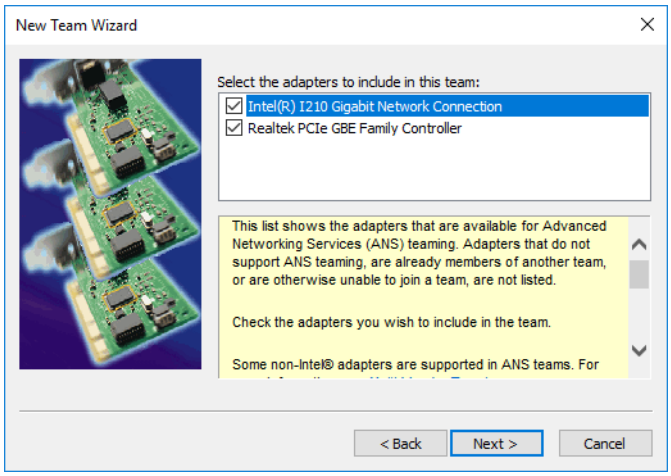
- Open Device Manager and expand Network adapters
- Right-click on intel port and select properties.



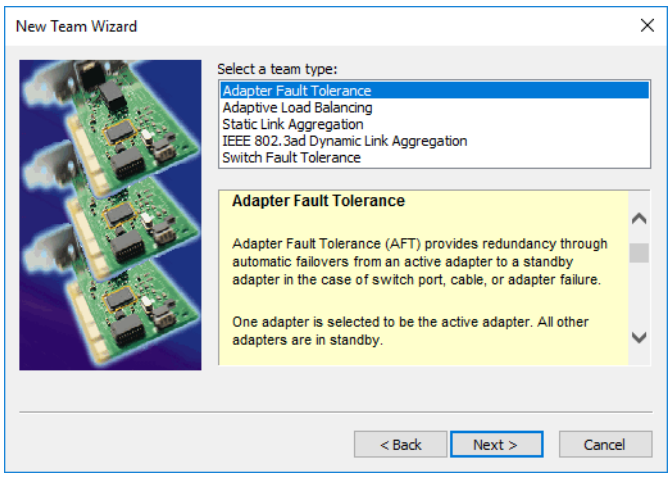
- Open the Teaming tab and check “Team this adapter with other adapters”
  - If Teaming tab is not shown, you need to update Intel network driver/software.
- Click on “New Team…” button, specify team name and press Next.



- Select the network ports to be added to the team then press Next.



- Select team type from list, then press Next.



- Select Next/Finish to confirm and create team.
- If notification about jumbo packet limitation is shown, press OK.

Additional features overview/details

Reading internal temperature

SCOM* command “TMP” can be used to read out internal temperature sensor value.

*If you are not familiar with the SCOM protocol, please review the Hatteland Technology’s Serial Remote Control Interface (SCOM) protocol document can be downloaded from:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-7.htm

Using the eMMC as a backup/recovery device when SSD is used

Solution is pending implementation.

- Available for Microsoft® Windows® 10 only.
- eMMC will be used as boot and recovery device.
- The feature requires an SSD for the Operating System.

The backup is configurable, and can take periodic snapshots of a running system, and restore the unit to this state or factory settings. It will be possible to replace the SSD and restore the unit to the last backup with ease.

In the event of a drive failure or replaced SSD, the system will boot to recovery mode, where the system can be restored.

Install Operating System (OS)

For units without factory installed OS:
To install any OS on the unit, follow the instructions given by the manufacturer.

Install Microsoft® Windows® 10 with recovery option

1: Boot to Windows 10 installer
2: Select language settings
3: Click “Repair your computer”
4: Click “Troubleshoot”
5: Click “Command Line” and type the following indicated in a black box below.

type `diskpart`
type `list disk`
Take note of which disk number the SSD and eMMC is. This will usually be eMMC=0 and SSD=1

type `exit`

Step 1 - Prepare disks
==========
The contents of the script files will be listed on the end of this section (next page in this manual).
Refrence: "Diskpart_Pre-install.txt" and "Diskpart_Post-install.txt"

type `diskpart /s \Diskpart_Pre-install.txt`

Step 2 - Apply install image
==========
type `DISM /Apply-Image /ImageFile:\Image\W10LTSC2019.wim /Index:1 /ApplyDir:W:\`

Step 3 - Prepare boot sector
==========
type `cd "W:\Windows\System32"`

type `bcdboot W:\Windows /s S:`

Step 4 - Prepare recovery
==========
type `md R:\Recovery\WindowsRE`

type `xcopy /h W:\Windows\System32\Recovery\Winre.wim R:\Recovery\WindowsRE`

Step 5 - Finalize disk setup
==========
type `diskpart /s \Diskpart_Post-install.txt`

Step 6 - Finalize installation
==========
Reboot the computer and complete normal Windows setup
Activate Windows
Update Windows and install missing drivers
Set up Windows and software to default state

Step 7 - Set up backup
==========
Aquire Wimlib binaries from https://wimlib.net
Windows 64bit: https://wimlib.net/downloads/wimlib-1.13.0-windows-x86_64-bin.zip

Copy Wimlib files to D:\

Set up a scheduled script to run backup, or manually create snapshots.
See below reference for details.

Wimlib reference scripts:

```
REM ======================================================
REM ==== Initial backup example                       ====
REM ======================================================

REM ======================================================
REM ==== Get current time and date                    ====
REM ==== independent of locale                       ====
REM ======================================================

for /f "tokens=2 delims=.=" %%i in ('wmic os get localdatetime ^/value') do set tmp=%%i & set
td=%tmp:~0,4%-%tmp:~4,2%-%tmp:~6,2%_%tmp:~8,2%.%tmp:~10,2%.%tmp:~12,2%
echo %td%

REM ======================================================
REM ==== Capture initial complete base image          ====
REM ======================================================

D:\WimLib\wimcapture.cmd C:\ D:\Backup\Base.wim

**********************************************************************
**********************************************************************
REM ======================================================
REM ==== Differential backup example                  ====
REM ======================================================

REM ======================================================
REM ==== Backup changed data to separate file         ====
REM ======================================================

D:\WimLib\wimappend.cmd C:\ D:\Backup\%td%.wim --delta-from=D:\Backup\Base.wim
```

"DiskPart_Pre-install.txt" script contents

```
REM ====================================================
REM ===== DiskPart_Pre-install.txt                  =====
REM =====                                            =====
REM ===== These commands are used with DiskPart     =====
REM ===== to create four partitions for a           =====
REM ===== UEFI/GPT-based PC.                        =====
REM =====                                            =====
REM ===== Adjust the partition sizes to fill        =====
REM ===== the drive as necessary.                   =====
REM =====                                            =====
REM ===== This script assumes eMMC is disk 0        =====
REM ===== and SSD is disk 1                         =====
REM ====================================================

REM ===== 1 Prepare disk 0 (eMMC) ======================
select disk 0
clean
convert gpt

REM ===== 1.1 System partition ========================
create partition efi size=100
format quick fs=fat32 label="System"
assign letter="S"

REM ===== 1.2 Recovery tools partition ================
create partition primary size=1024
format quick fs=ntfs label="Recovery tools"
assign letter="R"
set id="de94bba4-06d1-4d40-a16a-bfd50179d6ac"

REM ===== 1.3 Data partition ===========================
create partition primary
format quick fs=ntfs label="Recovery data"
assign letter="D"

REM ===== 2 Prepare disk 1 (SSD) =======================
select disk 1
clean
convert gpt

REM ===== 2.1 Microsoft Reserved (MSR) partition =======
create partition msr size=16

REM ===== 2.2 Windows partition =======================
create partition primary
format quick fs=ntfs label="Windows"
assign letter="W"
```

"DiskPart_Post-install.txt" script contents

```
REM ================================================
REM ===== DiskPart_Post-install.txt            =====
REM ===== Post install script                 =====
REM =====                                      =====
REM ===== This should be run after copying    =====
REM ===== WinRE to recovery partition         =====
REM ================================================

REM ================================================
REM ===== 1 Setting hidden flag for            =====
REM ===== Recovery partition                  =====
REM ================================================
Select disk 0
select partition 2
gpt attributes=0x8000000000000001
```

Operating System Recovery (tool)

Reference: DOC207939-1
The tool described in this chapter is available directly from Support at Hatteland Technology. In order to receive a copy of the software (Windows 10 only) and the appropriate matching OS image to your exact product model, please have a complete unit's Type number and Serial number ready prior to contacting Support at Hatteland Technology (or through dedicated Service Partner channels) via: **https://www.hattelandtechnology.com/support/contact**

Please note:
- At least 30GB of free disk space is needed on the unit in order to create the 16GB USB Memory Stick.
- It can take up to 1 hour to create the USB Memory Stick.

1 How to Use

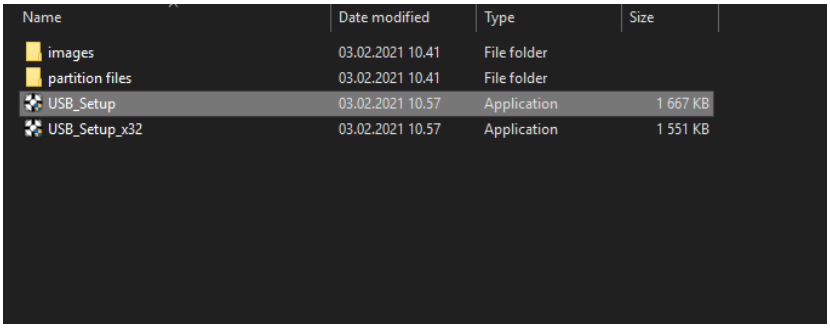
1.1 Prerequisites

To create the Recovery USB-stick, you need to have the following:
- A Windows 10 PC, with Windows version 1703 or newer.
- USB Drive. We recommend a size of at least 16GB.
- Customer Pack is provided by Hatteland Technology.

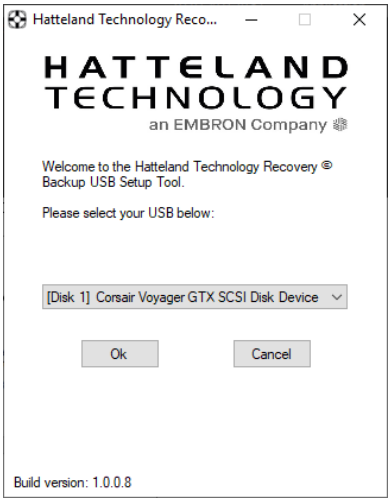
Note: This tool can only be used on Hatteland Technology products.

1.2 How to create your Recovery USB-Stick

1. Unpack the customer pack to your PC.
2. Run USB_Setup.exe

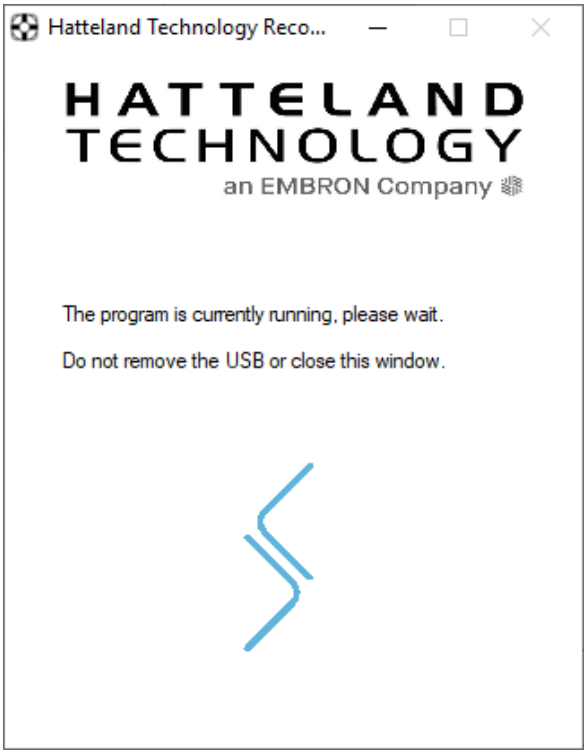


3. Select your USB Drive in the dropdown menu.



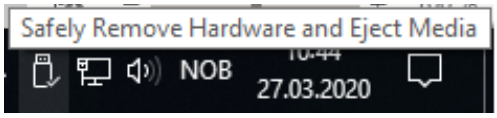
You will be prompted to confirm that the selected USB will be completely wiped of all data. The USB-stick chosen will have all its data deleted.

4. The program will run for a couple of minutes, the speed of the creator depends on the speed of the operating system and the USB-stick.

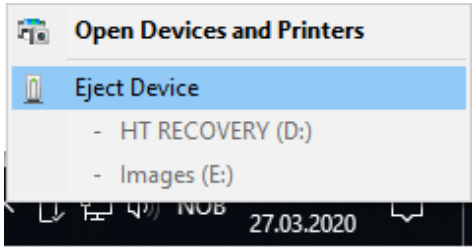


5. Wait for the "Success" message to appear and a dialog box will appear. Press OK.

6. You have now completed creating the USB Recovery Stick. Please disconnect the USB from the PC using the "Safe Removal" feature.
   a.



   b.



1.3 Using the USB Recovery Solution

1.3.1 Prerequisites

- This solution only works on Hatteland Technology Panel Computers and Hatteland Technology Computers.
- This solution does not support "Legacy" BIOS, only UEFI is supported.

1.3.2 How-to-use

Boot into your USB-stick, by pressing "F7"-key during start-up of your Hatteland Technology Panel Computer. Some of our computer models uses "F11"-key to access boot menu.
You will see a list of bootable devices, select your USB-stick.
If your USB-stick is shown with multiple partitions, select partition 1.

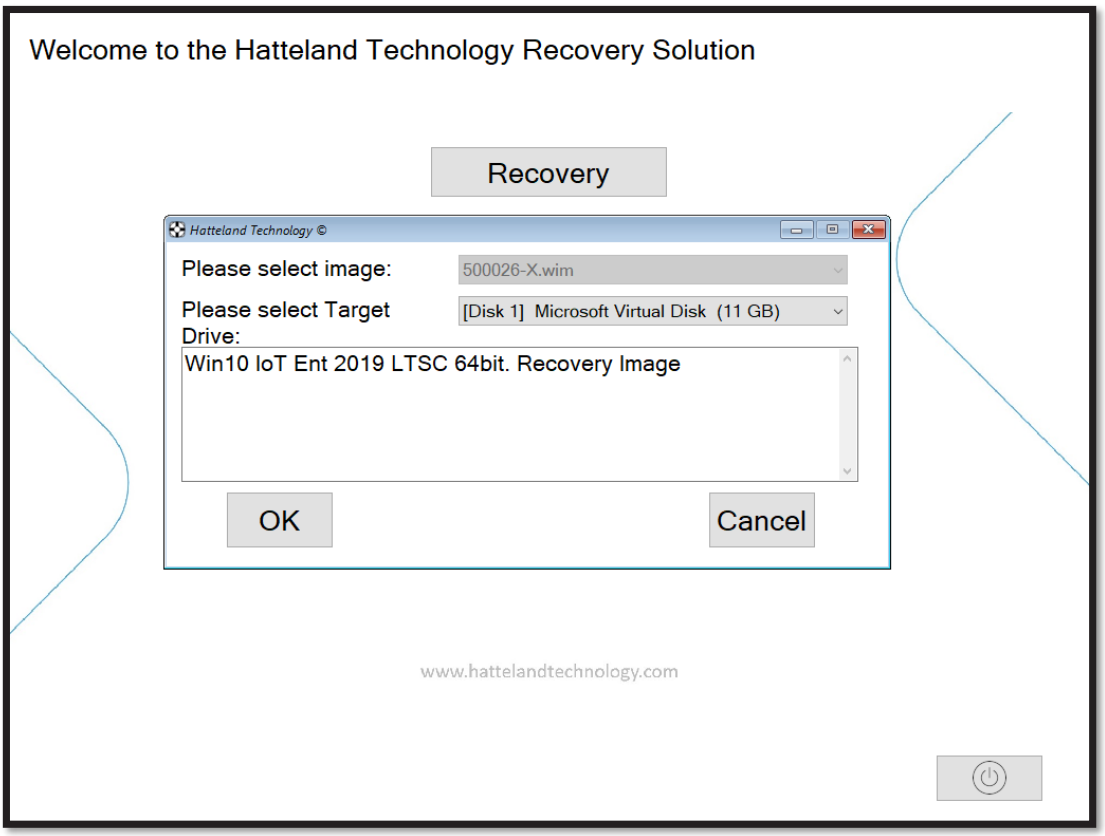
1.3.2.1 Home Screen

From the home screen, you are met with a Recovery button and a Power button. You can click on them using mouse, touch or navigate with your keyboard ("Tab"-key).

1.3.2.2 Recovery

The Recovery buttons opens the recovery function.
You select the target drive you wish to recover.
The description in the large box is the description of the image.
When you press "ok", you will get a final warning that the target drive will be wiped and all data on the drive will be lost.

After pressing "yes", the program will do everything needed for the recovery automatically.
When finished, you are asked to restart or shut down your computer.
Please disconnect your USB-stick after restarting or shutting down.



Revision History

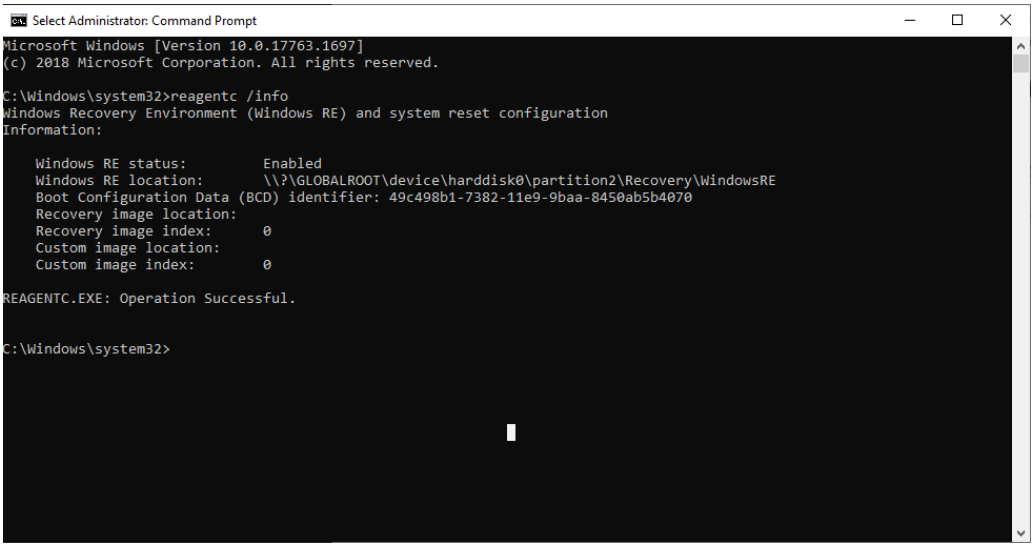
	Created		Approved		
Rev	Date	By	Date	By	Description
1	2020.07.16	Yrjan Rein	2020.07.22	Gunnar Myklebust	Initial Version
2	2021.02.03	Yrjan Rein	2021.02.04	Morten Mæland	Updated Pictures. Removed chapter that is not relevant to the function of "recovery only". Updated name of the USB setup executable.
3					

How to activate Windows Recovery Environment on OS Drive

Reference: DOC208258-1

Products delivered before Q1-2021 from Hatteland Technology may not have Windows Recovery Environment present. The Windows Recovery Environment must be manually activated before it can be used. Please follow the steps below.

1. Check if your device has WinRE activated.
    a. Open Command Line window with Administrator rights
    b. Run the command: reagentc /info



    c. If it looks like the picture above, test the WinRE by typing the following command and restarting your computer: reagentc /boottore
    d. If your computer successfully booted into Windows Recovery Environment, press "continue". You should boot into Windows like normal and the WinRE is verified.

2. If your Windows RE status is "Disabled" or did not boot into Windows Recovery Environment during boot test, do the following steps:
    a. Open Command Line window with administrator rights
    b. Run the following commands in order:
        i. attrib -h -s c:\Recovery\WindowsRE\Winre.wim
        ii. xcopy /h c:\Recovery\WindowsRE\Winre.wim c:\Windows\System32\Recovery
        iii. reagentc /enable
    c. Now test the WinRE by restarting your PC after typing the command: reagentc /boottore
    d. If your computer successfully booted into Windows Recovery Environment, press "continue". You should boot into Windows like normal and the WinRE is verified.

3. If you're still unable to boot into WinRE or the status is still "disabled". Please contact Hatteland Technology Customer Support. Contact information available at http://www.hattelandtechnology.com/.

Revision History

	Created		Approved		
Rev	Date	By	Date	By	Description
1	27.01.2021	Yrjan Rein	28.01.2021	Gunnar Myklebust	Initial Version
2					
3					

User Guide

RTC Timer (ApolloLake)

Revision History

	Created		Approved		
Rev	Date	By	Date	By	Description
1	2018-09-24	Wei Jing	2019-03-26	Morten Mæland	First version
					-

Abbreviation

Abbreviation	**Description**
RTC	Real-time Clock

1 Description

APOLLOLAKE S/L motherboard is equipped with accurate external RTC chip. It can hold the time accurately under absence of NTP time server.

The RTC timer works together with internal PCH timer on processor.

When OS is running, User APP is updating PCH time at runtime. During System boot, BIOS will copy the timer from external RTC to internal PCH.

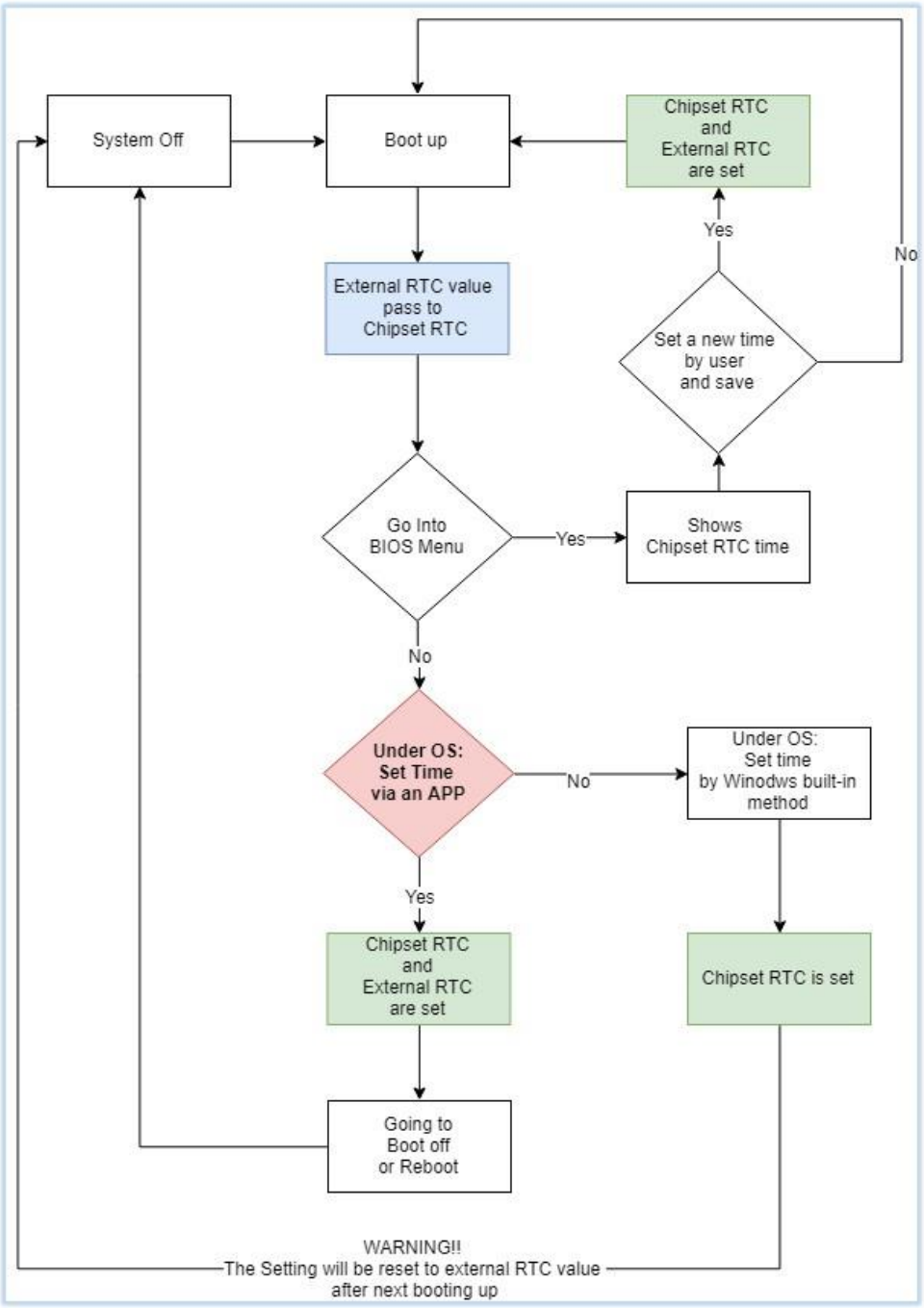


Figure 1-1 RTC time update

However, when the system is shutdown or restart, the BIOS firmware has no chance to do the time copy, then the time of external RTC timer is not up-to-date.

In this case, we need an additional method to update RTC timer under OS, together with PCH time. So RTC time will always be up-to-date.

This document will introduce the method of accessing RTC timer under OS.

2 Access RTC time

2.1 General Usage

2.1.1 SMBUS Access

The RTC timer is connected to SMBUS interface of processor PCH SMBUS controller. SMBUS I/O registers are exposed in system IO space. The user can control the I/O register to conduct SMBUS communication. The SMBUS Base Address is **0xF040** on ApolloLake S/L Board.

To operate read/write operations on SMBUS, the user has to follow the following procedure of writing data into specific registers.

1. Clear Host Status: Write data 0xFE to offset 0x00, wait the offset 0x00 value changing to 0x40.
2. Set Device address: Write data of address (for RTC timer 0x64(write)/0x65(read)) to offset 0x04
3. Set Slave Device Register Address: Write data of register index on target device to offset 0x03
4. Set Slave Device Register Data (only required for write operation): Write data of register data on target device to offset 0x05
5. Set Execute bit: Write 0x48 to offset 0x02, and wait for offset 0x02 value change back to 0x08.
6. For read operation, the readout data is available at offset 0x05.

2.1.2 Read Data from RTC timer

Step	Description	IN/OUT	Address	Data
1	Clear Host Status	OUT	Base Address + 0x00	0xFE
2	Wait 1 sec			
3	Read Host Status	IN	Base Address + 0x00	
4	Wait 1 sec			
5	Read Host Status	IN	Base Address + 0x00	(Expect 0x40)
6	Set Device address	OUT	Base Address + 0x04	0x65
7	Set Slave Device Register Address	OUT	Base Address + 0x03	0xXX (See note 1 Time/Date Register Definition)
8	Set Execute Bit	OUT	Base Address + 0x02	0x48

9	Wait 1 sec			
10	Read Execute Bit	IN	Base Address + 0x02	(Expected 0x08)
11	Read Returned data	IN	Base Address + 0x05	(See note 1 Time/Date Register Definition)

Note:

1. Time/Date Register definition in RTC timer

Address	Function	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
00h	Seconds	0	40	20	10	8	4	2	1
01h	Minutes	0	40	20	10	8	4	2	1
02h	Hours	0	0	20	10	8	4	2	1
03h	Weekday	0	6	5	4	3	2	1	0
04h	Date	0	0	20	10	8	4	2	1
05h	Month	0	0	0	10	8	4	2	1
06h	Year	80	40	20	10	8	4	2	1

2.1.3 Write Data to RTC timer

Step	**Description**	**IN/OUT**	**Address**	**Data**
1	Clear Host Status	OUT	Base Address + 0x00	0xFE
2	Wait 1 sec			
3	Read Host Status	IN	Base Address + 0x00	
4	Wait 1 sec			
5	Read Host Status	IN	Base Address + 0x00	(Expect 0x40)
6	Set Device address	OUT	Base Address + 0x04	0x64
7	Set Slave Device Register Address	OUT	Base Address + 0x03	0xXX (See note 1 Time/Date Register Definition)
8	Set Slave Device Register Data	OUT	Base Address + 0x05	0xXX (See note 1 Time/Date Register Definition)
9	Set Execute Bit	OUT	Base Address + 0x02	0x48
10	Wait 1 sec			
11	Read Execute Bit	IN	Base Address + 0x02	(Expected 0x08)

Note:

1. Time/Date Register definition in RTC timer

Address	Function	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
00h	Seconds	0	40	20	10	8	4	2	1
01h	Minutes	0	40	20	10	8	4	2	1
02h	Hours	0	0	20	10	8	4	2	1
03h	Weekday	0	6	5	4	3	2	1	0
04h	Date	0	0	20	10	8	4	2	1
05h	Month	0	0	0	10	8	4	2	1
06h	Year	80	40	20	10	8	4	2	1

3 Driver support

3.1 Windows

Windows does not provide direct IO address access in user-space, so a third party driver/library is required to implement the IO control logic in application.

Here we recommend a method of 3rd party driver: Inpout driver.
http://www.highrez.co.uk/downloads/inpout32/default.htm

"
The InpOut32 device driver supports writing to "old fashioned" hardware port addresses. It does NOT support USB devices such as USB Parallel ports or even PCI parallel ports.

The device driver is installed at runtime. To do this however needs administrator privileges. On Vista & later, using UAC, you can run the InstallDriver.exe in the \Win32 folder to install the driver appropriate for your OS. Doing so will request elevation and ask for your permission (or for the administrator password). Once the driver is installed for the first time, it can then be used by any user *without* administrator privileges
"[1]

The inpout driver package consists of:

- Driver: Inpout.sys
- DLL file: Inpout.dll

Driver file is required to install beforehand. Then the user application call the provided interface to read/write on IO port:

1. Set Output to IO port.
   void Out32(short Address, short Data);
2. Read Input from IO address
   short Inp32(short Address);
3. Check if InpOut driver is opened.
   BOOL IsInpOutDriverOpen(void);

3.1.1 Example Code Windows

```
typedef void  (__stdcall *lpOut32)(short, short);
```

```
typedef short (__stdcall *lpInp32)(short);


lpOut32 gfpOut32;
lpInp32 gfpInp32;

//Base Address Read

unsigned char SlaveDeviceReadByte(unsigned char bSlaveDeviceAddr, unsigned char
bSlaveRegisterAddr)
{
	unsigned char bValue = 0;

	//1. Clear host status
	gfpOut32(iBaseAddrSMBUS + bOffsetHostStatus, 0xFE);

	//2. Wait for 2 sec
	Sleep(1000);

	//3. Read Host Status
	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetHostStatus);

	Sleep(1000);

	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetHostStatus);
	if(bValue != 0x40)
	{
		//Error
	}

	//4. Set Device address
	gfpOut32(iBaseAddrSMBUS + bOffsetSlaveDeviceAddress, bSlaveDeviceAddr);

	//5. Set Slave register address
	gfpOut32(iBaseAddrSMBUS + bOffsetSlaveRegisterAddress, bSlaveRegisterAddr);

	//6. Set Execute bit
	gfpOut32(iBaseAddrSMBUS + bOffsetExecute, 0x48);

	//7. Wait 1 sec
	Sleep(1000);

	//8. Read Execute bit
	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetExecute);
	if(bValue != 0x08)
	{
		//Error
	}

	//9. Read returned data

	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetSlaveRegisterData);

	return bValue;
}


void SlaveDeviceWriteByte(unsigned char bSlaveDeviceAddr, unsigned char
bSlaveRegisterAddr, unsigned char bSlaveRegisterData)
{
```

```
	unsigned char bValue = 0;

	//1. Clear host status
	gfpOut32(iBaseAddrSMBUS + bOffsetHostStatus, 0xFE);

	//2. Wait for 2 sec
	Sleep(1000);

	//3. Read Host Status
	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetHostStatus);

	Sleep(1000);

	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetHostStatus);
	if(bValue != 0x40)
	{
		//Error
	}

	//4. Set Device address
	gfpOut32(iBaseAddrSMBUS + bOffsetSlaveDeviceAddress, bSlaveDeviceAddr);

	//5. Set Slave register address
	gfpOut32(iBaseAddrSMBUS + bOffsetSlaveRegisterAddress, bSlaveRegisterAddr);

	//6. Set Slave register data
	gfpOut32(iBaseAddrSMBUS + bOffsetSlaveRegisterData, bSlaveRegisterData);

	//7. Set Execute bit
	gfpOut32(iBaseAddrSMBUS + bOffsetExecute, 0x48);

	//8. Wait 1 sec
	Sleep(1000);

	//9. Read Execute bit
	bValue = (unsigned char)gfpInp32(iBaseAddrSMBUS + bOffsetExecute);
	if(bValue != 0x08)
	{
		//Error
	}
}

//Convert decimal value to RTC register data format
unsigned char ConvertDectoRTCFormat(unsigned char bTimeValue, bool BWeekday = false)
{
	unsigned char bRTCFormatValue = 0x00;

	if(!BWeekday)
	{
		bRTCFormatValue += ((bTimeValue/10) << 4);
		bRTCFormatValue += bTimeValue%10;
	}
	else
	{
		if(bTimeValue < 1 || bTimeValue >  7)
		{
			bRTCFormatValue = 0x00;
		}
		else
		{
```

```
                    bRTCFormatValue = 1 << bTimeValue;
                }
        }

        return bRTCFormatValue;
}

void Main(void)
{
        …

                    //Write to RTC timer
                    cout << "Writing Year to RTC...";
                    SlaveDeviceWriteByte(bRTCSlaveAddressWrite, bRTCRegisterYear,
bYear);
                    cout << "Done" << endl;
                    cout << "Writing Month to RTC...";
                    SlaveDeviceWriteByte(bRTCSlaveAddressWrite, bRTCRegisterMonth,
bMonth);
                    cout << "Done" << endl;
                    cout << "Writing Day to RTC...";
                    SlaveDeviceWriteByte(bRTCSlaveAddressWrite, bRTCRegisterDay,
bDay);
                    cout << "Done" << endl;
                    cout << "Writing Hour to RTC...";
                    SlaveDeviceWriteByte(bRTCSlaveAddressWrite, bRTCRegisterHours,
bHours);
                    cout << "Done" << endl;
                    cout << "Writing Minute to RTC...";
                    SlaveDeviceWriteByte(bRTCSlaveAddressWrite, bRTCRegisterMinutes,
bMinutes);
                    cout << "Done" << endl;
                    cout << "Writing Second to RTC...";
                    SlaveDeviceWriteByte(bRTCSlaveAddressWrite, bRTCRegisterSeconds,
bSeconds);
                    cout << "Done" << endl;
}
```

3.2 Linux

Under Linux, there are two methods to access RTC timer:

- Direct IO Access
- RTC Driver

3.2.1 Direct IO Access

Linux provides the generic IO port access method. The user application can call the IO Read/Write functions from user space. The two commonly used function is inb and outb.

1. Read input from Port address

```
unsigned char inb(unsigned short int port);
```

2. Set Output in Port Address

```
void outb(unsigned char value, unsigned short int port);
```

Before the IO port address can be accessed in user space. The application should use another function **ioperm** to ask for the permission of usage.

ioperm() sets the port access permission bits for the calling thread for num bits starting from port addressfrom. If turn_on is nonzero, then permission for the specified bits is enabled; otherwise it is disabled. Ifturn_on is nonzero, the calling thread must be privileged. [2]

```
int ioperm(unsigned long from, unsigned long num, int turn_on);
```

3.2.2 RTC Driver

RTC Chip RV8803 is generically supported by Linux Kernel 4.4 and above.
The user can use standard RTC system calls to read, write date/time in external RTC timer.

4 Note

1. It is not recommended to operate read/write too frequently, because heavy load on this bus may affect internal system devices working improperly.

2. It is always suggested to change RTC time at the same time when changing OS time/PCH time.

   Windows 10 refuses all the backwards date change in RTC. So when the date in RTC is changed to earlier date and different from Windows date, Windows will ignore the date/time change by RTC.

   For example,

   If user is changing RTC time from 01/10/2017 to 03/03/2015, by accessing RTC date in OS. But the OS date is not updated accordingly. Then power input is cut off by accident.

   This causes a mismatch between PCH date and RTC date. In next boot, the PCH date is updated to 03/03/2015, but OS reject this earlier date and keep using 01/10/2017.

   In this case the date must be changed manually before Windows will do automatic changes.

5 Reference

[1] **InpOut32 and InpOutx64,** http://www.highrez.co.uk/downloads/inpout32/default.htm

[2] **ioperm(2) - Linux man page** http://linux.die.net/man/2/ioperm

BIOS Default Settings Overview

BIOS Setup Values
Doc No.
Board: APOLLOL
BIOS: APOLLOL-W1M-190718
1. Setup pages and values

Items	BIOS default setting	comment	APOLLOLW1MA 16T30, 21T30, 24T30, 27T30
Main>			
BIOS Information			
BIOS Version	APOLLOL-W1M-190718		APOLLOL-W1MA190718
Memory Information			
Total Memory	xxxx BM		
Memory Memory	xxxx MHz		
System Date	[xx xx/xx/xxxx]		
System Time	[xx:xx:xx]		
Advanced>			
Trusted Computing			
TPM20 Device Found			
Vendor: IFX			
Firmware Version: 7.62			
VGA Palette Snoop	[Disable]		
	[Enable] *	Sub menu is visible only when this item is Enabled	
Active PCR banks	SHA-1,SHA256		
Available PCR banks	SHA-1,SHA256		
Pending operation	[None] *		
	[TPM Clear]		
Platform Hierarchy	[Disable]		
	[Enabled] *		
Storage Hierarchy	[Disable]		
	[Enabled] *		
Endorsement Hierarchy	[Disable]		
	[Enabled] *		
TPM2.0 UEFI Spec Version	[TCG_1_2]		
	[TCG_2] *		
Physical Presence Spec Version	[1.2]		
	[1.3] *		
TPM20 InterfaceType	[CRB]		
Device Select	[TPM 1.2]		
	[TPM 2.0]		
	[Auto] *		
ACPI Settings			
Enable Hibernation	[Disabled]		
	[Enabled]*		
ACPI Sleep State	[Suspend Disabled]		
	[S3 (Suspend to RAM)]*		
LVDS (eDP/DP) Configuration			
LVDS (eDP/DP) Controller	[Disabled]		
	[Enabled]*	Sub menu is visible only when this item is Enabled	
LVDS Protocol	[18bit, Single Channel]		
	[18bit, Dual Channel]		
	[24bit(VESA), Single Channel]		
	[24bit(VESA), Dual Channel] *		
	[24bit(JEIDA), Single Channel]		
	[24bit(JEIDA), Dual Channel]		
Panel Type	[800 x 480]		
	[1024 x 768]		
	[1280 x 1024]		
	[1366 x 678]		
	[1440 x 900]		
	[1600 x 900]		
	[1920 x 1080] *		

Power Configuration					
	Power Mode				
		Internal USB 3.0 -1	[Disabled] *		
			[Enabled]		
		Internal USB 3.0 -2	[Disabled] *		
			[Enabled]		
		USB port 4 on Terminal (top)	[Disabled] *		
			[Enabled]		
		USB port 3 on Terminal	[Disabled] *		
			[Enabled]		
		USB port 2 on Terminal	[Disabled] *		
			[Enabled]		
		USB port 1 on Terminal (bottom)	[Disabled] *		
			[Enabled]		
		Internal USB 2.0 -1	[Disabled] *		
			[Enabled]		
		Internal USB 2.0 -2	[Disabled] *		
			[Enabled]		
	Reset Mode				
		Internal USB 3.0 -1	[Disabled] *		
			[Enabled]		
		Internal USB 3.0 -2	[Disabled] *		
			[Enabled]		
		USB port 4 on Terminal (top)	[Disabled] *		
			[Enabled]		
		USB port 3 on Terminal	[Disabled] *		
			[Enabled]		
		USB port 2 on Terminal	[Disabled] *		
			[Enabled]		
		USB port 1 on Terminal (bottom)	[Disabled] *		
			[Enabled]		
		Internal USB 2.0 -1	[Disabled] *		
			[Enabled]		
		Internal USB 2.0 -2	[Disabled] *		
			[Enabled]		
	Panel power				
		panel power control	[Disabled]		
			[Enabled] *		
		panel supply voltage	[3.3V]		
			[5V] *		
RTC Battery Alarm Voltage					
		RTC Battery Alarm Voltage	[Disabled]		[Disabled]
			[2.0V] *		[2.0V]
			[2.1V]		[2.1V]
			[2.2V]		[2.2V]
			[2.3V]		[2.3V]
			[2.4V]		[2.4V] *
			[2.5V]		[2.5V]
			[2.6V]		[2.6V]
			[2.7V]		[2.7V]
			[2.8V]		[2.8V]
			[2.9V]		[2.9V]
			[3.0V]		[3.0V]
SCOM Bus Settings					
	SCOM Bus Status		Working		
	Type No.		N/A		
	Serial No.		N/A		
	FW Version		FW100005-TA09		
	Keypad		No Keypad		
	IO Card		No IO Card		
	Buzzer Off		[Disabled]		
			[Enabled] *		
	Power Mode		[Always On] *		
			[Power Button Only]		
			[Previous State]		
External RTC Configuration					
	Auto Sync RTC		[Disabled] *		
			[Enabled]		

BIOS Default Settings Overview

F81964 Super IO Configuration			
	Super IO Chip	F81964	
	Serial Port 1 Configuration		
	Serial Port	[Disabled]	
		[Enabled] *	
	Device Settings	IO=3F8h; IRQ=4	
	Change Settings	[Auto] *	
		[IO=2F8h; IRQ=3]	
		[IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12]	
		[IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12]	
		[IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12]	
		[IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12]	
	Serial Port 2 Configuration		
	Serial Port	[Disabled]	
		[Enabled] *	
	Device Settings	IO=2F8h; IRQ=3	
	Change Settings	[Auto] *	
		[IO=3F8h; IRQ=4]	
		[IO=3F8h; IRQ=3,4,5,6,7,9,10,11,12]	
		[IO=2F8h; IRQ=3,4,5,6,7,9,10,11,12]	
		[IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12]	
		[IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12]	
	Serial Port 3 Configuration		
	Serial Port	[Disabled]	
		[Enabled] *	
	Device Settings	IO=3E8h; IRQ=5	
	Change Settings	[Auto] *	
		IO=3E8h; IRQ=5	
		IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12	
		IO=2E8h; IRQ=3,4,5,6,7,9,10,11,12	
		IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12	
		IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12	
	Serial Port 4 Configuration		
	Serial Port	[Disabled]	
		[Enabled] *	
	Device Settings	IO=2E8h; IRQ=7	
	Change Settings	[Auto] *	
		IO=2E8h; IRQ=7	
		IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12	
		IO=3E8h; IRQ=3,4,5,6,7,9,10,11,12	
		IO=2F0h; IRQ=3,4,5,6,7,9,10,11,12	
		IO=2E0h; IRQ=3,4,5,6,7,9,10,11,12	
	Multi Function	[RS-232] *	
		[RS-485]	
		[RS-422]	
	Terminal	[off] *	This menu is only configuable when set RS485 or 422
		[on]	
	RS485 RTS# Auto Flow Control	[Disabled] *	This menu is only visible when set RS485
		[Enabled]	

H/W Monitor			
	PC Health Status		
	Smart Fan 1 Function	[Disabled] *	
		50 C	
		60 C	
		70 C	
		80 C	
		90 C	
	Smart Fan 2 Function	[Disabled] *	
		50 C	
		60 C	
		70 C	
		80 C	
		90 C	
		[Disabled] *	

ACPI Shutdown Temperature	[70 C/158 F]	
	[75 C/167 F]	
	[80 C/176 F]	
	[85 C/185 F]	
	[90 C/194 F]	
	[95 C/203 F]	
CPU Temperature	: xx C	
SYS Temperature	: xx C	
Fan1 Speed	: xx RPM	
Fan2 Speed	: xx RPM	
VCORE	: +0.xxx V	
VBAT	: +2.xxx V	
VCC12V	: +11.xxx V	
VDDQ +1.35V	: +1.3xx V	

CPU Configuration		
Socket 0 CPU Information		
Intel® Atom™ Processor E3950 @	1.60GHz	
CPU Signature	506C9	
Microcode Patch	2E	
Processor Cores	4	
Intel HT Technology	Not Supported	
Intel VT-x Technology	Supported	
CPU Power Management		
Turbo Mode	[Disabled]	
	[Enabled] *	
Active Processor Cores	[Disabled] *	
	[Enabled]	Sub menu is visible only when this item is Enabled
Core 0	[Enabled] *	
	[Disabled]	
Core 1	[Enabled] *	
	[Disabled]	
Core 2	[Enabled] *	
	[Disabled]	
Core 3	[Enabled] *	
	[Disabled]	
Monitor Mwait	[Enabled] *	

CSM Configuration		
Compability Support Module Configuration		
CSM Support	[Disabled]	
	[Enabled]*	Sub menu is visible only when this item is Enabled
CSM10 Module Version	7.79	
GateA20 Active	[Upon Request] *	
	[Always]	
INT19 Trap Response	[Immediate] *	
	[Postponed]	
Boot option filter	[UEFI and Legacy] *	
	[Lagacy only]	
	[UEFI only]	
Option ROM execution		
Network	[Do not launch] *	
	[EUEFI]	
	[Lagacy]	

Preheat Configuration		
Preheat Function	[Disabled] *	
	[Enabled]	

NVMe Configuration		
NVMe controller and Drive information		

SDIO Configuration		
SDIO Access Mode	[Auto] *	
	[ADMA]	
	[SDMA]	

	[PIO]	
Mass Storage Devices:	--	
Sdio Device 1 Details:	--	
Bus 0 Dev 1c Func 0		
USB Configuration		
USB Device:		
USD Module Version	17	
USB Controllers:	1 XHCI	
USB Devices:	1 Keyboard, 1Mouse	
Legacy USB Support	[Enabled] *	
	[Disabled]	
	[Auto]	
EHCI Hand-off	[Enabled] *	
	[Disabled]	
USB Mass Storage Driver Support	[Enabled] *	
	[Disabled]	
USDB hardware delays and time-outs:		
USB transfer time-out	[1 sec]	
	[5 sec]	
	[10 sec]	
	[20 sec] *	
Device reset time-out	[10 sec]	
	[20 sec] *	
	[30 sec]	
	[40 sec]	
Device power-up delay	[Auto]*	
	[Manual]	Sub menu is visible only when this item is Manual
Device power-up delay in seconds	[5] *	
	[1..40]	
Chipset>		
Uncore Configuration		
IPU PCI Device Configuration:		
USD Module Version	17	
USB Controllers:	1 XHCI	
USB Devices:	1 Keyboard, 1Mouse	
IPU Enable/Disable	[Disabled] *	
	[Enabled]	Sub menu is visible only when this item is Enabled
SA IPU ACPI mode	[Disabled]	
	[IGFX Child] *	
	[ACPI]	
Rear camera	[Disabled] *	
	[IMX214]	
	[IMX135]	
Front Camera	[Disabled]	
	[0V2740] *	
Rotation	[0] *	
	[90]	
	[180]	
	[270]	
South Cluster Configuration		
HD-Audio Configuration		
HD-Audio Support	[Enabled] *	
	Disabled	
LPSS Configuration		
Low power sub system		
LPSS I2C #5 Support (D23:F0)	[Disabled] *	
	[PCI]	
	[APCI]	
LPSS I2C #8 Support (D23:F3)	[Disabled] *	
	[PCI]	
	[APCI]	
SATA Device		
Chipset-SATA Controller Configuration		
Chipset SATA	[Enabled] *	
	Disabled	

SATA Mode Selection	[AHCI] *	
SATA Port 0	xxx	
SATA Port 1	xxx	
USB Configuration		
XHCI Pre-Boot Driver	[Enable]	
	[Disable] *	
XHCI Mode	[Enable] *	
	[Disable]	
USB VBUS	[Off]	
	[ON] *	
USB HSIC1 Support	[Enable]	
	[Disable] *	
USB SSIC1 Support	[Enable]	
	[Disable] *	
USB Port Disable Override	[Disabled] *	
	[Enabled]	Sub menu is visible only when this item is Enabled
USB Port #0	[Disable]	
	[Enable] *	
USB Port #1	[Disable]	
	[Enable] *	
USB Port #2	[Disable]	
	[Enable] *	
USB Port #3	[Disable]	
	[Enable] *	
USB Port #4	[Disable]	
	[Enable] *	
USB Port #5	[Disable]	
	[Enable] *	
USB Port #6	[Disable]	
	[Enable] *	
USB Port #7	[Disable]	
	[Enable] *	
USB 3 Port #0	[Disable]	
	[Enable] *	
USB 3 Port #1	[Disable]	
	[Enable] *	
USB 3 Port #2	[Disable]	
	[Enable] *	
USB 3 Port #3	[Disable]	
	[Enable] *	
USB 3 Port #4	[Disable]	
	[Enable] *	
USB 3 Port #5	[Disable]	
	[Enable] *	
XDCI Support	[Disabled] *	
	[PCI Mode]	
XHCI Disable Compliance Mode	[FALSE] *	
	[TRUE]	

Security>		
Password Description IF ONLY the administrator's password is set, then this only limits access to Setup and is only asked for when entering Setup. IF ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights. The password length must be in the following range: Minimum length 3 Maximum length 20		
Setup Administrator Password	--	
User Password	--	
Secure Boot		
System Mode	User	
Secure boot	Not active	
Vendor Keys	Active	
Attempt Secure Boot	[Disabled] *	

	[Enabled]	
Secure boot Mode	[Standard] *	
	[Customized]	Submenu is only visable when this item is Customized

Boot>		
Boot Configuration		
Setup Prompt Timeout	[1]*	
	1 .. 65535	
Bootup NumLock State	[On]*	
	[Off]	
Quiet Boot	[Disabled] *	
	[Enabled] *	
Boot mode selection	[LAGACY]	
	[UEFI] *	
	[DUAL]	
FIXED BOOT ORDER Priorities		
Boot Option Priority		
Boot option #1	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #2	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #3	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #4	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #5	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #6	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #7	[xxxxxxxxxxxxx] *	
	[Disabled]	
Boot option #8	[xxxxxxxxxxxxx] *	
	[Disabled]	
UEFI Hard Disk Drive BBS Prioities		
Boot Option #1	[xxxxxxxxxxxxx] *	
	[Disable]	

Save & Exit>		
Save Options		
Save Changes and Exit		
Discard Changes and Exit		
Save Changes and Reset		
Discard Changes and Reset		
Save Changes		
Discard Changes		
Default Options		
Restore Defaults		
Save as User Defaults		
Restore User Defaults		

GENERAL ISSUES FOR TFT PANEL BASED PRODUCTS

Note: Applies for a range of various products. This is only meant as a general guide.

NO PICTURE / LED BEHAVIOUR:

If there is no light at all in the LED at the FRONT, check power cables. If the LED in front is green, then check if the brightness is set/adjusted to max brightness. Lack of image is most likely to be caused by incorrect connection, lack of power or wrong BIOS settings.

SCROLLING / UNSTABLE IMAGE:

Signal cable may not be completely connected to computer or TFT display. Check the pin assignments and signal timings of the display and your video card with respect to recommended timing and pin assignments. Make sure that the video card is compatible and that it is properly seated / installed on the computer.

DISPLAY AREA IS NOT CENTERED / SIZED CORRECTLY

Make sure that a supported video mode has been selected on the display, or on the video card / system. If it is impossible to position the image correctly, i.e. the image adjustment controls will not move the image far enough, then test it again using another graphics card for the PC system. This situation may occur with a custom graphics card that is not close to standard timings or if something is in the graphics line that may be affecting the signal, such as a signal splitter (please note that normally a signal splitter will not have any adverse effect). If it is impossible to change to the correct resolution/color depth, check if you have the right graphics driver installed in your system.

IMAGE APPEARANCE:

A faulty TFT panel can have black lines, pixel errors, failed sections, flickering or flashing image. Incorrect graphic card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, it may scroll, flicker badly or possibly even no image is present. Sparkling on the display may be a faulty TFT panel signal cable, and it needs service attention.

VGA Signal Only: Horizontal interference can usually be corrected by adjusting the PHASE (OSD menu).
Vertical interference can usually be corrected by adjusting the FREQUENCY (OSD menu).

DEW CONDENSATION BEHIND GLASS:

Note that this problem will not occur on bonded products. For non-bonded products, do the following:
Power on the TFT product and set brightness to 100%. Turn off any automatic screensavers on PC or similar. During minutes the dew will be gone. To speed up the process, use a fan heater for a reasonable time. Do not overheat the unit.

HATTELAND TECHNOLOGY

an EMBRON Company

Declaration of Conformity

We, manufacturer, **Hatteland Technology AS,** Eikeskogvegen 52, N-5570 Aksdal, Norway

declare under our sole responsibility that the JH MMD, JH MMC, JH STD, JH MIL, HM NMD, HM MIL, HM CMD, HT STD, HD MMD, HD MVD, HM MMD, HM XRD, HM RMD, HT MMC, HD MMC and HT/HM (computers) product ranges is in conformity with the following standards in accordance with the EMC Directive.

Low Voltage Directive 2014/35/EU
EN 60950:2006/A2:2013
EMC Directive 2014/30/EU
EN 55032:2012 Class A / AC:2011 Class A
EN 55024:2010

Signature:.....
Frode Grindheim
Vice President Product Management
Aksdal, Norway

CE

Signature:.....
Arne Kristiansen
Site Manager - Test & Commission Division
Oslo, Norway

CE MARK FIRST AFFIXED DATE (11 March 2010)

Declaration of Conformity

We, manufacturer, **Hatteland Technology AS,** Eikeskogvegen 52, N-5570 Aksdal, Norway
declare under our sole responsibility that the JH MMD, JH MMC, JH STD, JH MIL, HM NMD, HM MIL, HM CMD, HT STD, HD MMD, HD MVD, HM MMD, HM XRD, HM RMD, HT MMC, HD MMC and HT/HM (computers) product ranges is in conformity with IEC 60945 4th (EN 60945:2002) and IACS E10 (where applicable)

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Declaration of Conformity

We, manufacturer, **Hatteland Technology AS,** Eikeskogvegen 52, N-5570 Aksdal, Norway

declare under our sole responsibility that the products listed below comply with
FCC 47 CFR Part 15, Subpart B, Class A:

JH MMD, JH MMC, JH STD, JH MIL, HM NMD, HM MIL, HM CMD, HT STD, HD MMD, HD MVD, HM MMD, HM XRD, HM RMD, HT MMC, HD MMC and HT/HM (computers) product ranges

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Signature:.....
Frode Grindheim
Vice President Product Management
Aksdal, Norway

FC

Signature:.....
Arne Kristiansen
Site Manager - Test & Commission Division
Oslo, Norway

FCC MARK FIRST AFFIXED DATE (16 February 2012)

This document was last approved, reviewed and found valid on **22 Sep 2020** by the signed participants as stated above.

Return Of Goods Information

Return of goods:

(Applies not to warranty/normal service/repair of products)

Hatteland Technology referenced as “manufacturer” in this document.

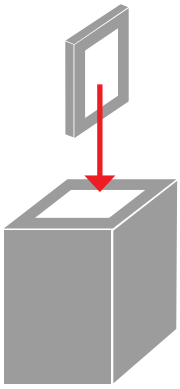
Before returning goods, please contact your system supplier before sending anything directly to manufacturer. When you return products after loan, test, evaluation or products subject for credit, you must ensure that all accessories received from our warehouse are returned. This applies to cables, powermodules and additional equipment except screws or similar, user manual, datasheets or other written paper documents. Furthermore, the product must not have any minor / medium or severe scratches, chemical spills or similar on the backcover, front frame or glass.

This is required in order to credit the invoice 100%. Missing parts will not be subject for credit, and you will not get total credit for returned product. You will either be charged separately, or the amount is withdrawn from the credit. If you decide to ship the missing items later on, you will get 100% credit for that particular invoice or items received at manufacturer incoming goods control. Please contact our Repair Centre if additional questions or review the following links at bottom of page for more information online.

Handling and packing units for return/credit

To prevent damage during shipping and transportation, respect the guidelines below.

Make sure you surround the product with the following material (whenever possible):



Use the original packaging from manufacturer, firm foam material, bubble wrap, lots of PadPack paper or foam chips/polyester wrapped in sealed plastic bags. Please make sure that the unit is protected with a surrounding plastic bag to prevent dust accumulation around the unit.

If you do not have the original packaging or are uncertain as to how to secure the unit properly, please consider seeking advice from nearby shipping or transportation offices, if in doubt!

Do not under any circumstances use loose foam chips, expanded polyester, clothes, cardboard with sharp edges/spikes, too little or nothing to secure the unit inside the box. Do not use cardboard boxes that are clearly too weak or not suitable for securing the unit properly during overseas shipment.

How to issue a Return merchandise authorization (RMA):

Hatteland Technology requires a pre-registered CDV number prior to sending goods for return. If you do not have an pre-registered CDV number, please visit the links below on how to get one.

https://www.hattelandtechnology.com/rma-procedure

Once understood, proceed to registering RMA:
http://lcm.hatteland-display.com/CustomerRMA/CustomerRMA.aspx

Additional information:
https://www.hattelandtechnology.com/legal-documents

General Terms and Conditions

As of January 2015, Hatteland Technology AS' *"Terms of Sales and Delivery"* and *"Warranty Terms"* have been substituted by the updated *"General terms and conditions for sale of goods and performance of additional services"* (the "General Terms and Conditions").

Further, from January 2015 onward, the previous *"Terms of Sales and Delivery"* and *"Warranty Terms"*, as well as other standard terms and conditions, policies and instructions issued by Hatteland Technology AS, will be removed from the User Manuals.

Instead, the updated General Terms and Conditions and the other standard terms and conditions, policies and instructions issued by Hatteland Technology AS will be available via our website only.

Please visit https://www.hattelandtechnology.com/legal-documents#terms-and-conditions to review the latest revision

Long Term Storage Recommendations

For Minimum storage life for Hatteland Technology products,Storage Conditions,
Periodic maintenance - test procedure, please visit:
https://www.hattelandtechnology.com/hubfs/pdf/misc/ind100350-5_long_term_storage_recommendations.pdf

INSTRUCTIONS FOR THE CONSIGNEE

1) CONTROL
Control the goods immediately by receipt. Examine the quantity against the invoice/packinglist/shipping documents. Look for outward defects on the packing which may indicate damage on or loss of contents. Control the container and the seals for any defects.

2) SECURING EVIDENCE
When defects on the goods have been found, evidence must be secured, and seller must be informed. Call the transporter and point out the defects. Add a description of the defects on the goods receipt, the forwarder's copy of the way-bill or on the driving slip.

3) RESCUE
Try to restrict the damage and the loss. Seller will compensate expenses incurred due to reasonable security efforts in addition to damage and loss.

4) COMPLAINT
Immediately write a complaint to the transporter or his agent. Immediately forward the complaint to the transporter or his agent, and hold the transporter responsible for the defects. The complaint must be sent at the latest:

- for carriage by sea: within 3 days
- for overland / air transportation within 7 days

5) DOCUMENTATION
For any claims the following documentation is required and must forwarded to the company or their agent: invoice, way-bill and/or bill of landing, and/or statement of arrival, inspection document, besides a copy of the letter of complaint to the transporter.

Pixel Defect Policy

PIXEL DEFECT POLICY

Dot-defects (Bright or dark spots on the panel)

Due to the effect that dot failures are part of the TFT technology such failure occurrence cannot be prevented basically. Even though dot defects usually occur during production process, new defects can appear within the lifespan of a TFT display. Neither the production at LCD-supplier nor the use of an LCD-Monitor after shipment can be influenced by Hatteland Technology. Hence Hatteland Technology cannot be made responsible for such dot failures. However Hatteland Technology understands and accepts the responsibility towards the customers for the delivery of new displays, therefore accepts a limitation on dot defects occurrence on new displays delivered to the customer.

PRINCIPLES

a. One pixel consists of 3 dots (Red, Green and Blue)

b. Dot defects are differentiated between:
- Bright dot defects: Spot on the panel appear as pixels or sub pixels that are always lit. Non-extinguishing dot.
- Dark dot defects: Spot on the panel appear as pixels or sub pixels that are always dark (off). Non-lightening dot.

c. Inspector observes the LCD from normal direction at a distance of 50cm above the worktable. Dark dots are counted under entire white screen. Bright dots are counted under entire black screen.

d. Dot failures within tolerances below do not qualify for warranty claims.

PIXEL DEFECT TOLERANCES

Bright dot	≤ 4 dots
Two adjacent bright dots *	≤ 2
Distance between 2 dot defects *	≥ 15mm
Dark dots	≤ 8
Total number of bright or dark dot defects. *	≤ 8

* 1 or 2 adjacent dot defects considered as 1 defect.

EXTRAORDINARY CIRCUMSTANCES

Possible cases which cannot be influenced either by customer or Hatteland Technology.

Examples for extraordinary circumstances:
- Allocation from LCD-Supplier
- Outstanding high number of LCD-panels with bright dots but within LCD-suppliers Specification.
- Sharply increased demand by customer

In such cases a mutual agreement is inevitable.

Examples:
- Acceptance of bright dots in “non-critical” display areas.
- Acceptance of bright dots with defined color.

Last Revised April 2019

Link to online resource:
https://www.hattelandtechnology.com/hubfs/pdf/misc/ind100351-1_pixeldefectpolicy.pdf

Rev 02 - 20 May 2021

Parts in Displays and Panel Computers, and how to recycle

Part	Where to dispose of parts	
TFT Panel	Electrical waste	Optically bonded units: the TFT Panel, Glass and frame is to be disposed of as Electrical waste. Do not separate.
Glass	Metal waste	
Frame	Metal waste	
Chassis	Metal waste	
Brackets	Metal waste	
Motherboard / Electronic Boards (PCB's)	Electrical waste	
Power supply	Electrical waste	
Cable Kit	Electrical waste	
Outerbox, sleeve and Kit box	Paper waste	
Paper sheets/User Manual	Paper waste	
Plastic bags	Plastic waste	
EPS Foam	Plastic waste	

Contact Hatteland Technology for specific part numbers: https://www.hattelandtechnology.com/spareparts

Dismantling of Displays and Panel Computers into its recyclable parts

To be able to dispose of the unit in the correct manner, Hatteland Technology bases its requirements on *Commissioning Regulation (EU) 2019/2021.* For more instructions concerned to the dismantling procedure, please contact Hatteland Technology. Reference online: https://www.hattelandtechnology.com/parts-and-recycling

Step 1. Seperate the electronics from any metal and glass that is easily separatable.
If unit is optically bonded, do not separate TFT panel from glass and Metal frame (glass,TFT panel and Metal Frame is to be disposed of as if electronic waste if Optically Bonded).

Step 2. Sort the source materials and dispose of the electronics and metal/glass parts in the appropriate recycling/sorting station.

Spare Parts for Panel Computers (none for Displays)

Parts that require scheduled checks and replacement:

Part	Applicable for
SSD	Panel Computers
BIOS Battery	Panel Computers
Air filter	Panel Computers

Contact Hatteland Technology for specific part numbers: https://www.hattelandtechnology.com/spareparts

Service Parts for Displays and Panel Computers

Parts that needs to be replaced in case of failure:

Part	Applicable for
CPU	Panel Computers
RAM	Panel Computers
Power Supply	Displays and Panel Computers
SSD	Panel Computers
CPU FAN/Cooler	Panel Computers
System fans	Displays and Panel Computers
Video Controller	Displays

Contact Hatteland Technology for specific part numbers: https://www.hattelandtechnology.com/spareparts
Contact Hatteland Technology for availabilty of Firmware and Software updates: https://www.hattelandtechnology.com/support/contact

Notes

General Notes:

- The unit is tested according to
  IEC 60945 4th (EN 60945:2002), 4.4, equipment category b) “protected from the weather (formerly class B)”.

- Other type approvals applies for the different products.
  Please see the appropriate “Specifications” page in this manual for more information.

- Use of brillance and front User Controls may inhibit visibility of information at night.

- License Terms for the installed OEM Operating System (OS) can be found in the following default factory paths:
  Note: This is a general listing for a varity of OS’s Hatteland Technology can factory install depending on unit.
  Please check specification for your unit to verify type of OS installed in order to retrieve the license terms.

  Microsoft® Windows® 10 IoT Enterprise LTSC 2019: C:\Windows\System32\en-US\Licenses_Default\EnterpriseS\license.rtf

User Notes

Revision History

Rev.	By	Date	Notes
00_01	SE	21 Jun 2019	Release for internal review.
00_02	ALL SE	07 Aug 2019	Revised after internal review.
00_03	ALL SE	18 Sep 2019	Revised after internal review.
00_04	SE	18 Oct 2019	Revised after internal review.
00_05	ALL SE	17 Jan 2020	Revised after internal review.
00_06	ALL SE	12 Feb 2020	Revised after internal review.
01	ALL SE	20 Feb 2020	Pre-release for internet
02	ALL SE	20 Apr 2020 to 02 Oct 2020	Revised after internal reviews and re-released to internet
03	VM JE SE	06 Jul 2021	Revised after internal reviews and updated throughout entire user based on latest company profile. Updated “Recovery” section, page 119-123. Added factory option for Framegrabber/HDMI/VGA, page 35-42, 48-51, 64-66. Removed Factory Option COM Module PCA100294-1 (RS-232) throughout the entire user manual, not applicable for these products. General updates performed and grammar and definitions improved throughout the entire user manual. Added information related to IEC62368 and Commissioning Regulation (EU) 2019/2021 throughout the entire user manual.

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