User Documentation

Applicable for:

Typenumber	Category	Details	HWcode	Status
HD 15T22 MMD-xxx-FHxx	Display	N/A		Active
HD 15T22 MMD-xxx-Fxxx	Display			Active
HD 17T22 MMD-xxx-FHxx	Display			Active
HD 17T22 MMD-xxx-Fxxx	Display			Active
HD 19T22 MMD-xxx-FHxx	Display			Active
HD 19T22 MMD-xxx-Fxxx	Display			Active
HD 24T22 MMD-xxx-FHxx	Display			Active
HD 24T22 MMD-xxx-Fxxx	Display			Active
HD 26T22 MMD-xxx-Fxxx	Display			Last Time Buy!
HD 27T22 MMD-xxx-Fxxx	Display			Active
HD 15T22 MMD-xxx-FHxx	Display		HW00	Obsolete
HD 24T23 MMD-xxx-Fxxx	Display			Active
HD 27T22 MMD-xxx-Uxxx	Display			New

Family	Market			
HATTELAND® Series X G2	Marine & Offshore			

Document overview:

ID: INB101192-1
Name: Series X G2 - Displays
Compilation date: 08 Aug 2023 - Compiled by: 5045stei

Note: Revision history is listed pr. chapter on the last pages of this compilation.
Last page includes Legacy revision history which is not maintained after January 2023.

Documents included:

Statement

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Contents of package

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

Item	Description	Illustration
HA-SDM-2M	1 x Standard DVI Signal Cable. DVI-D 18+1P Male to DVI-D 18+1P Male Single Link - Length 2.0m	
HA-VGA-2M-32	1 x Standard VGA Signal Cable. DSUB 15P Male to DSUB 15P Male - Length 2.0m	
TP52/TC01-1,8M	1 x Power Cable (Black) European Type F "Schuko" to IEC. Length 1.8m *Note: Included in package for models with AC input.*	EUR TYPE F IEC
TP11/TC01-1,8M	1 x Power Cable (Black) US Type B plug to IEC. Length 1.8m *Note: Included in package for models with AC input.*	US TYPE B IEC
DVI-4	1 x DVI-I > RGB/VGA adapter DVI-I 24+5P (Dual Link) Male to DSUB 15P Female	
HD CMB SX2-A1	Model Dependent: 2 pcs of Mounting Brackets for Console/Panel Mounting, Anodized Aluminium/Stainless Steel. The bracket kit is suitable for 15, 17 and 19 inch units and is EN60945 Tested (pending). Suitable for panel thickness min: 2.0 [0.08"] to max: 50.00 [1.97"] mm [inch].	
Terminal Block Connector Kit	Terminal Block Connector Kit as follows (may in some cases be already factory mounted): 1 x 2-pin Terminal Block 5.08 for DC Power In 2 x 5-pin Terminal Block 3.81 for RS-422 / RS-485 / SCOM / Buzzer Module Refer to "Configuring Housing / Terminal Block Connector" section for usage.	Note: Location of module(s) may differ between unit sizes
HD CMB SX2-E1	Model Dependent: Bracket Kit suitable for console/panel mounting which contains: 3 x Mounting Bracket for top, left and right side (P006858-1) 1 x Mounting Bracket for bottom side (terminal/connector plate area) (P020605) 6 x M5x16 Pan Head screw ISO 14583 Torx, A4 screws (145 050x016 A4T) 6 x M6 C-washers DIN6319 Steel (144 064x120x22) 2 x DIN 965 M5x16 Countersunk head screws with TX25, A4 STAINLESS STEEL (145 050x016 CA4) Suitable only for 24 and 27 inch units and is EN60945 Tested.	
HD CMB SX2-F1	Model Dependent: Bracket Kit suitable for console/panel mounting which contains: 4 x Mounting Bracket for top, left, right and bottom side (P007085-1) 8 x Panskrue M5x16 Torx, blank (145 050X016 ZT) 8 x M6 C-washers DIN6319 Steel (144 064x120x22) Suitable only for 26 inch units and is EN60945 Tested.	
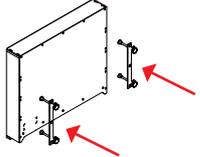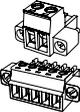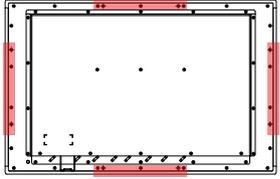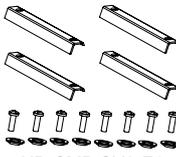
IND100131-36

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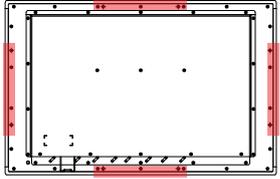
Contents of package

Package may also include:

Item	Description	Illustration
VSD100913-1	1 x Touch Screen Cable (Black) USB Type A to Type A. Length Approx 2m. *Only included in package if model is equipped with factory mounted Touch Screen*	
	For models (15-27 inch) an EPDM sealing gasket for IP66 console mount may be factory pre-mounted / included with delivery if ordered. For High Bright models, it is pre-mounted by factory default. Details / Type number reference: Surface: RAL9011, Glue: 3M9471LE, Thickness 2mm. P006997-1 (15), P007130-1 (17), P007131-1 (19) P022211 (24), P007178 (26), P018743 (27)	

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IEC62368 policy - Introduction

Safety Instructions

Please read and understand the material in this 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.

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Introduction to products with touch screen (factory option)

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® Svr Emb Std 2012 / Microsoft® Windows® 7 / Microsoft® Windows® 10 IoT:
- Please use Windows® Generic HID driver, no specific driver needed to use multi-touch.
- Alternative configuration available: See "Mouse Mode feature" below.

Mouse Mode feature:
The Multi-Touch screen interface can be configured to support mouse emulation to support certain legacy software. If your system and its GUI (Graphical User Interface) experience lack of response to gadgets/buttons pressed via touch screen, the package below might help. This feature works from **Microsoft® Windows® XP** and up. Please note that Multi-touch will be disabled and replaced by Single Touch mode.
https://www.hattelandtechnology.com/support-archive-touch-screen-drivers?technology=&interface=&os=&os_version=&driver_id=111&product_id=
ref: **https://www.hattelandtechnology.com/product-notifications/new-touchscreen-solution-series-x-g2-mmd-15-17-19-inch**

Linux
- Please use Linux Generic Touch driver.
  Note: Kernel before 2.6.38: Single touch support.
  Note: Kernel above 2.6.38: Multi touch support.
  Note: For optimal graphical performance/hardware support with Skylake/Kaby Lake CPU's on T22 MMC units, the Linux Kernel 4.4 or later is required/recommended.

Note for Microsoft® Windows® XP Support:
- Multi-Touch Screen is not supported for this Operating System or Hatteland Technology products described in the manual supports Windows XP. End of Life reference:
https://www.hattelandtechnology.com/product-notifications/update-eol-microsoft-windows-xp-professional-for-embedded-systems-and-microsoft-windows-xp-embedded

Touch Screen Calibration

If you experience any deviation in the touch input accuracy, consider re-calibrating the touch screen for your system. Procedures below are for standard Microsoft® Windows® Operating System calibrate functions.

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.

Example for Microsoft® Windows® 7:

1: Open Control Panel.

2: Open "Tablet PC Settings".

3: Under "Display options," select your display.

4: Click the Calibrate button and follow instructions.

5: To save settings, click "Apply" or "OK" on the "Table PC Settings" window.

Product Labeling

Introduction

This section details the locations, content details and specifications for factory mounted labels for all currently available standard Hatteland Technology Maritime Multi Display (MMD) 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	19" Maritime Multi Display HATTELAND® Manufactured by Hatteland Technology AS, Norway Compass Safe Distance Standard: 90cm - Steering: 45cm 100-240V AC 50/60Hz 24V DC IP22 75W TYPE NUMBER-SERIAL NUMBER MFR Date: 2021-06-21 HD 19T22 MMD-xxx-xxxx-123456 *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.*	**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 Datasheet.	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.)	
4	WARRANTY VOID IF REMOVED	**Type** : **Warranty Label** **Size** : 30mm wide x 23mm high (oval size)	Tamper-proof sticker with glue on back.
9	CE UKCA QUALITY CONTROL OK ✔ QC IND105459-5	**Type** : **Product Label (Variant #1)** **Art** : **IND105459-5** **Size** : 60mm wide x 26mm high (rectangle size)	Black label, Lexan 0,125 3M467 Adhesive
9	Caution Shock Hazard Disconnect all power sources CE UKCA QUALITY CONTROL OK ✔ QC IND105459-6	**Type** : **Product Label (Variant #2)** **Art** : **IND105459-6** **Size** : 60mm wide x 26mm high (rectangle size) Note : High touch current >5mA	Black label, Lexan 0,125 3M467 Adhesive

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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, but they will be grouped together where possible.

Label Positions	Notes	Applies for Product Range
	Warranty label covers screw. Labels placed on rear.	**HD 15T22 MMD-xxx-Fxxx**
	Warranty label covers screw. Labels placed on rear.	**HD 17T22 MMD-xxx-Fxxx**
	Warranty label covers screw. Labels placed on rear.	**HD 19T22 MMD-xxx-Fxxx**
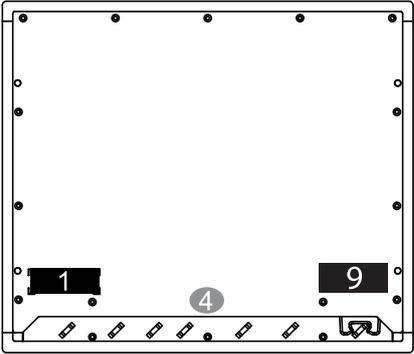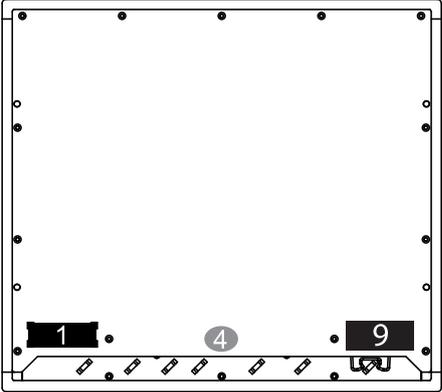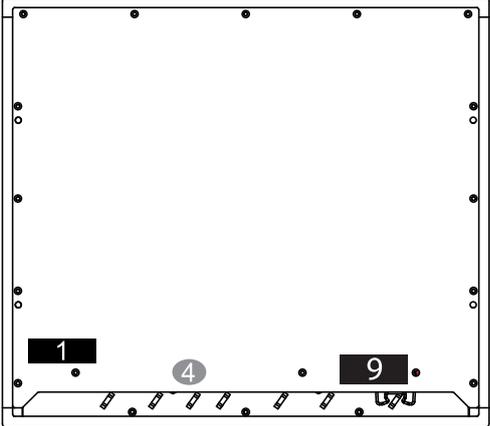
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Product Labeling

	Warranty label covers screw. Labels placed on rear.	**HD 24T22 MMD-xxx-Fxxx** **HD 24T23 MMD-xxx-Fxxx**
	Warranty label covers screw. Labels placed on rear.	**HD 26T22 MMD-xxx-Fxxx**
	Warranty label covers screw. Labels placed on rear.	**HD 27T22 MMD-xxx-Fxxx**

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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)

Indicates that the unit is produced, tested and packed according to the manufacture's QA specifications.

Handling Symbol

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)

Manufacturer/Country		Compass Safe Distance
Input Voltage(s)		IP Rating
Power Rating Max/Typ		Lowest value used, higher may apply, check specifications.
Date of Production (YYYY-MM-DD)		Type+Serial Number
		Barcode (TYP+SNO)

19" Maritime Multi Display   **HATTELAND®**
Manufactured by Hatteland Technology AS, Norway
Compass Safe Distance Standard: 90cm - Steering: 45cm
100-240V AC 50/60Hz
24V DC   IP22
75W   TYPE NUMBER-SERIAL NUMBER
MFR Date: 2021-06-21   HD 19T22 MMD-xxx-xxxx-123456

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.

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General Installation Recommendations

First Things First!

IND100148-5 - Rev 05

ATTENTION!
To prevent damage to chassis and glass, please review the illustrations !

CORRECT HANDLING!
Place horizontally on a smooth and clean surface (table with cloth)

WRONG HANDLING!
Do not stress the corners, nor place it on a coarse and/or dirty surface

Humidity Exposure Notice!

Applies for non-bonded product only: If exposed to humidity in combination with temperature variations, product might show condensation on the glass (inside and outside).

Inside condensation can be removed by power on the product and set brightness to 100%. During minutes the internal temperature rise will remove condensation.
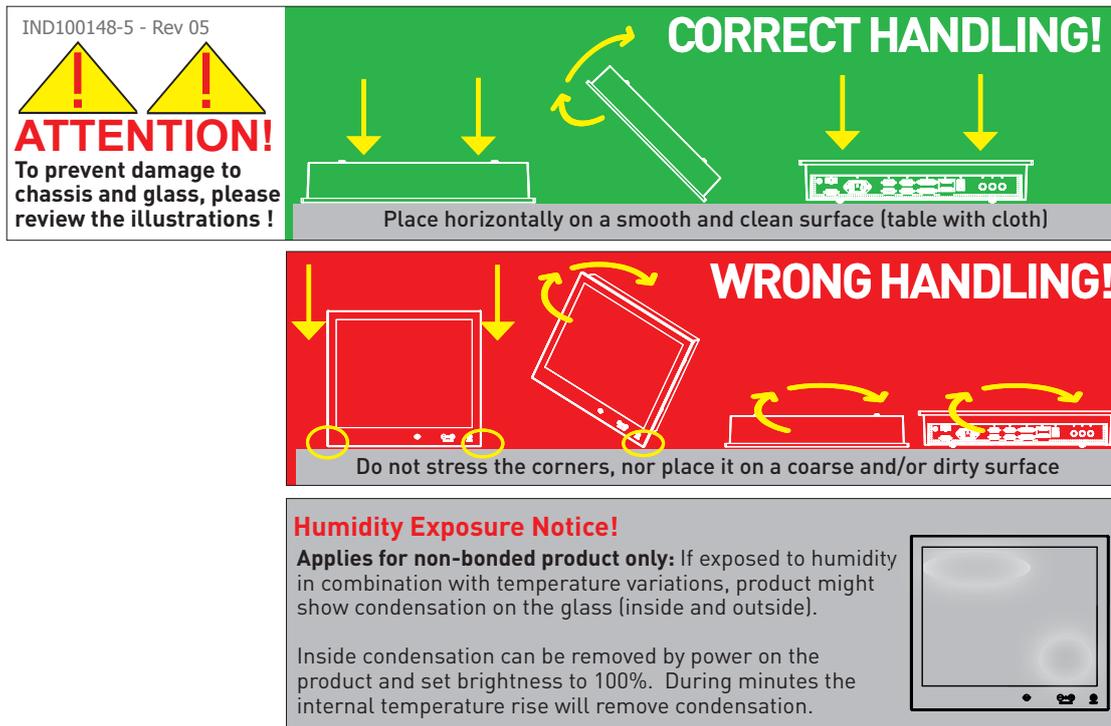
Installation and mounting

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. **NOTE!** Long term direct sun exposure might have cosmetic impacts on the product, and damage the touch.

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 should be free from glare and adjustable to extinction.

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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.

B: Glass Display Control™ (GDC) front glass touch buttons:
> As this uses Projected Capacitive technology (instead of conventional hard physical buttons and knobs), the touch controller can react and is sensitive to raindrops (for outdoor installations). To 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.

> For Maritime Multi Display (MMD) units (not available for Panel Computers (MMC) units), the angle could potentionally be lower as the On Screen Display (OSD) menu offers a "OSD Key utdoor" function with 5 seconds delay before activation on front glass functions. Please review the "OSD Menu Functions" to learn more. In certain situations this might help, but is only suggested as a trouble-shooting tip during installation or during short-term observer use if found suitable. It should not be considered as a defintive trusted solution.

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, please review point B above regarding standing raindrops. The only solution to this situation is not to mount the unit in a vertical angle lower than ±30 degrees, i.e. flat mounting of the unit to ensure touch screen is not activated and accidentally automatically chooses functions in your running chart, radar or other software installed.

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 must be grounded to protective Earth (Safety Ground) when necessary via the bolt (usually on terminal plate) available on the product.
   Products with DC input must 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 should 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.

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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)

17 inch = 907mm	19 inch = 1010mm	24 inch = 951mm	26 inch = 985mm	27 inch = 1070mm	

Installation   4

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General Installation Recommendations

Cables

Use only high quality shielded signal cables.

Cable Entries & Connectors (Marked area)

Illustration below for smallest/largest sizes only.

Bottom View - Displays	Back View - Displays
Bottom View - Panel Computers	**Back View - Panel Computers**
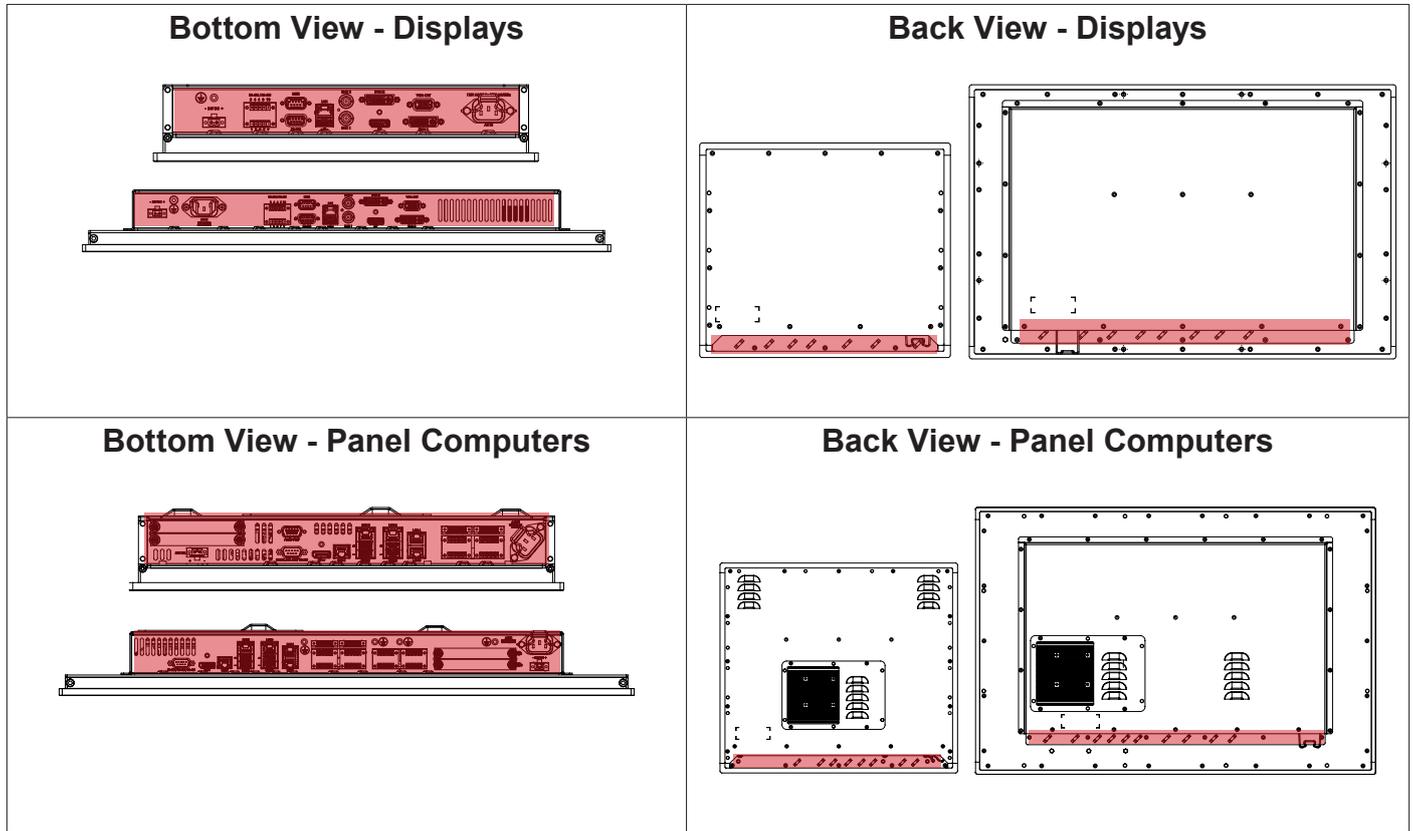
Maximum Cable Length

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.

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General Installation Recommendations

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"
	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 / PCA100293-1 Q170 IO) • Digital Input/Output (PCA100297-1 / Q170 IO) Identified on Hatteland Technology product datasheet as: "Terminal Block 3.81"
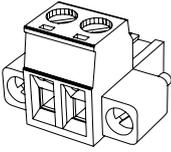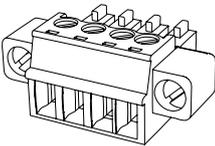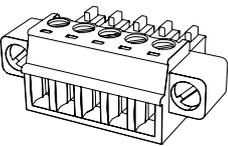
If your installation requires additional cable fasteners support, please visit and purchase directly from manufacturer: Illustrations below are approximate, actual Housing and Hood may deviate slightly, but function remains the same.

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)

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General Installation Recommendations

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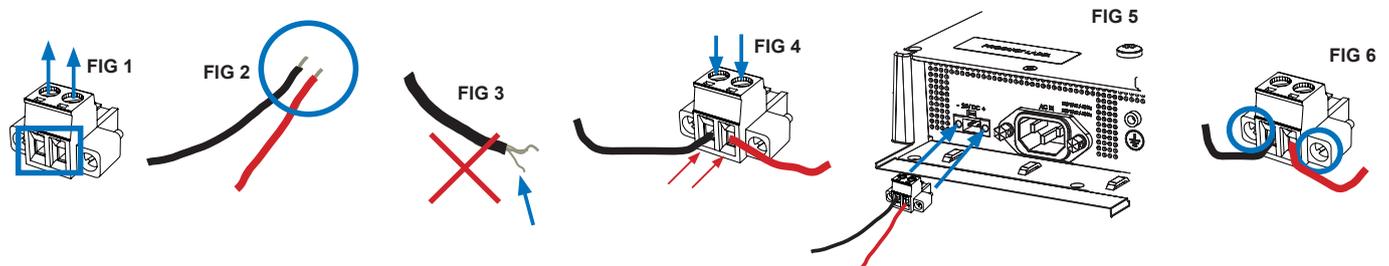
Requires assembly. It is expected that the technician has experience in electronics and assembling cables and connectors.

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

Installation Procedures

Panel Cutout / Console Mounting Bracket Kit for 15, 17 and 19 inch

You need: Hex tool (6mm), 2 pcs of HD CMB SX2-A1 Kit (included in delivery). Procedure suitable for: Display and Panel Computers. Brackets are EN60945 Tested. 19 inch Maritime Multi Display (MMD) used as example below.

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: Mount one of the flat brackets on any side on rear of unit first with 3 x M5x12 Countersunk Hex screws as illustrated and fasten it using Torque Force 3.75Nm	▼ 2: Tilt the unit 45 degree to allow the flat 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.
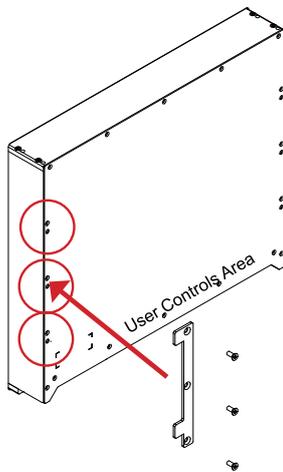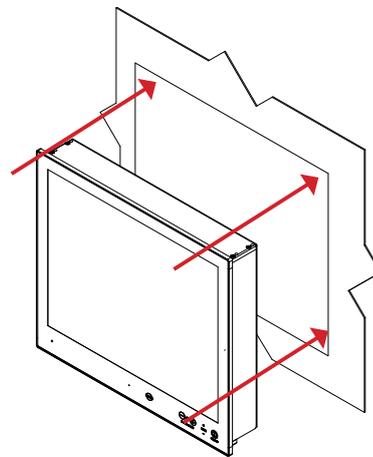
▼ 3: Once unit is in place, mount the other flat bracket on the other side with 3 x M5x12 Countersunk Hex screws as illustrated and fasten it using Torque Force 3.75Nm	▼ 4: Prepare 4 pcs of Thumb screw and Mounting Socket Nut in separate form as illustrated below.
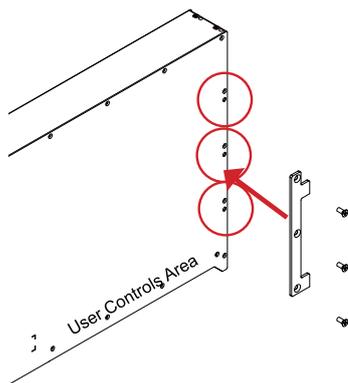
Installation   1
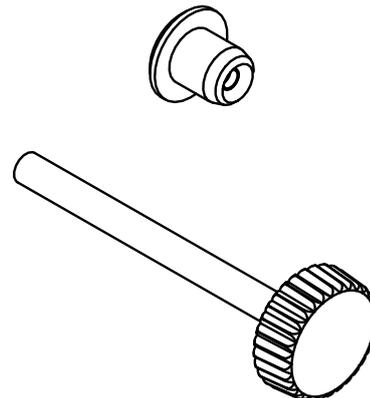
▼ 5: Mount the Thumb Screw and Mounting Socket Nut through each of the flat brackets threaded holes as illustrated and fasten the Mounting Nut tight at the end.
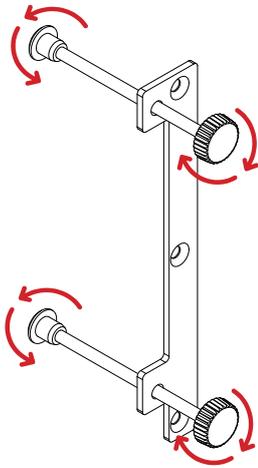
▼ 6: Finally, in a even way fasten each of the 4 Thumb Screws to securly fasten the unit to the rear of the Panel Cutout.
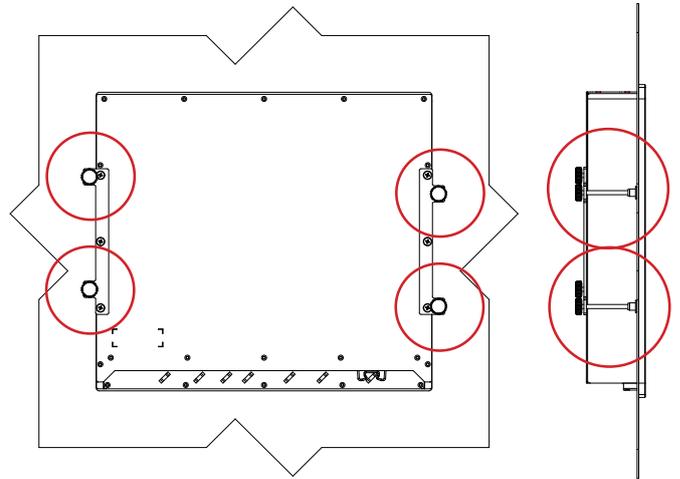
▼ 7: The Console Mounting Kit also allow to edge-to-edge mounting of two units, due to the intersection design of the flat brackets on the rear. Example below illustrates the intersection.

Front View

Rear Details

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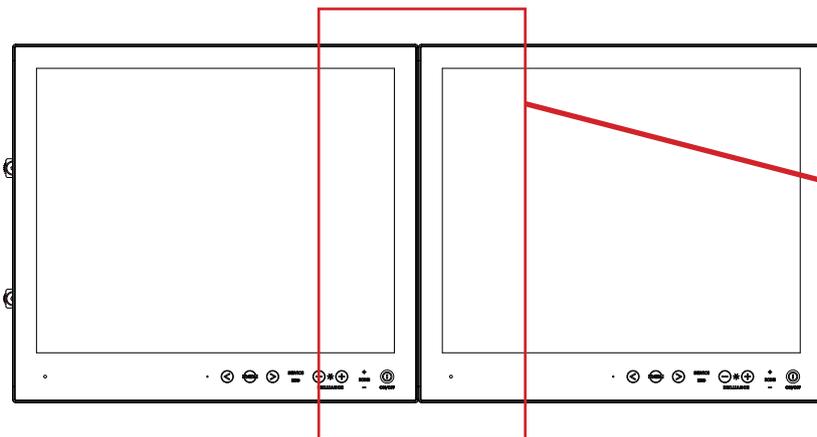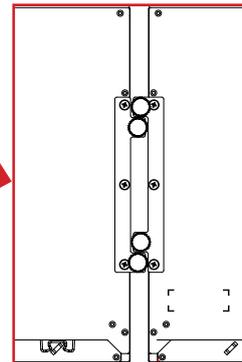
Panel Cutout / Console Mounting Bracket Kit for 24 and 27 inch

You need: Torx T25 tool, 1 pcs of HD CMB SX2-E1 kit (included in delivery).
Procedure suitable for: Display and Panel Computers Series X Generation 2 range. Brackets are EN60945 Tested.

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.

Item	Amount	Art	Description	Notes
	3	P006858-1	Bracket HD 24T21 SH-A	
	1	P020605	HD 2xT2x CMB Bottom	
	6	145 050x016 A4T	M5x16 Pan Head screw ISO 14583 Torx, A4	For P006858-1
	6	144 064x120x22	M6 C-washers DIN6319 Steel	For P006858-1
	2	145 050x016 CA4	DIN 965 M5x16 Countersunk head screws with TX25, A4 STAINLESS STEEL	For P020605

▼ 1: Slide the unit into the cutout carefully. User Controls and Connector Area should be facing downwards.
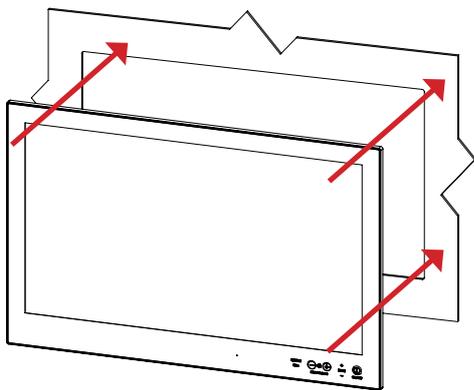
▼ 2: Make sure you are aware that brackets should be mounted on TOP, LEFT, RIGHT and BOTTOM sides. Note that the [B] bracket is different than the [A] brackets and mounted near the connectors. See closeup of details.
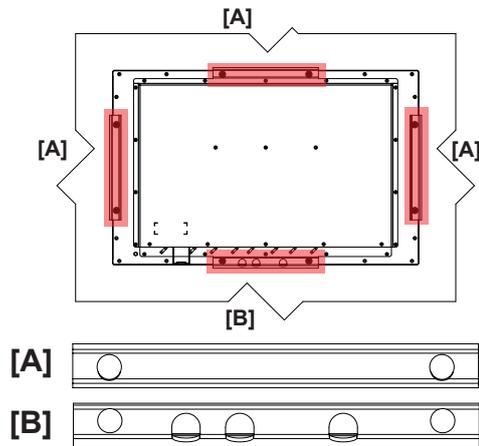
▼ 3: Secure each bracket with the provided screws as illustrated below. Make sure you do it equally and even for all 4 sides. Use Torque Force 3.75Nm. Note the orientation of brackets before you begin.
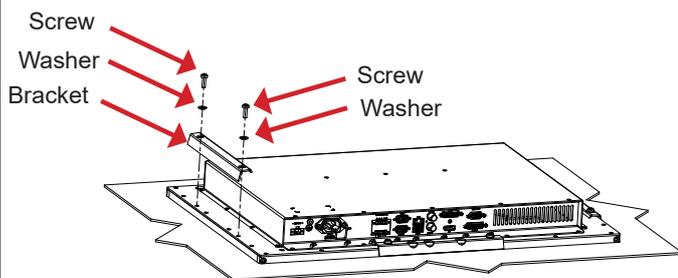
▼ 4: Review closeup of the mounting of brackets with screws. Seen from bottom side.

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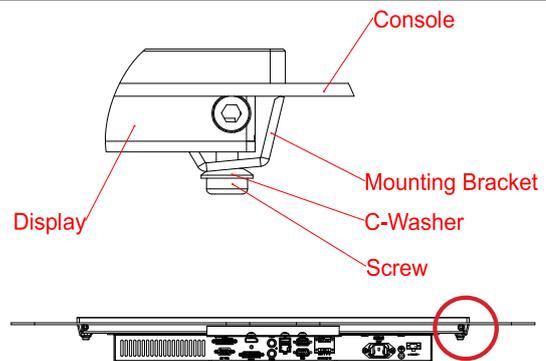
Panel Cutout / Console Mounting Bracket Kit for 26 inch

You need: Torx T25 tool, 1 pcs of HD CMB SX2-F1 kit (included in delivery).
Procedure suitable for: Display and Panel Computers Series X Generation 2 range. Brackets are EN60945 Tested.

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.

Item	Amount	Art	Description
	4	P007085-1	Bracket HD 26T2x SH-A
	8	145 050X016 ZT	Panskrue M5x16 Torx, blank
	8	144 064x120x22	M6 C-washers DIN6319 Steel

▼ 1: Slide the unit into the cutout carefully. User Controls and Connector Area should be facing downwards.
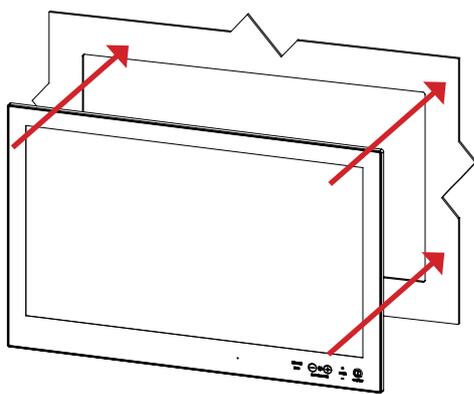
▼ 2: Place and mount the 4 x brackets as illustrated below.
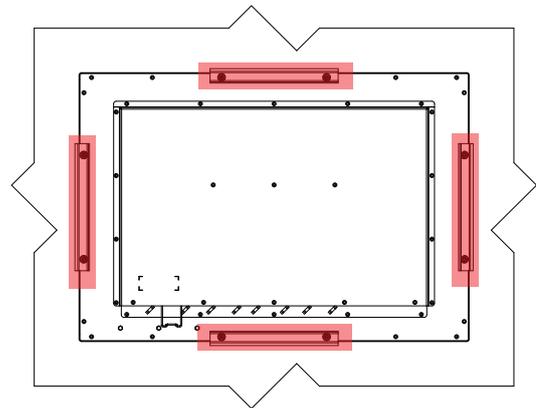
▼ 3: Secure each bracket with the provided M5x16 screws and C-Washers as illustrated below. Make sure you do it equally and even for all 4 sides. Use Torque Force 3.75Nm, 2 screws and 2 washers pr. bracket. Note the orientation of brackets before you begin.
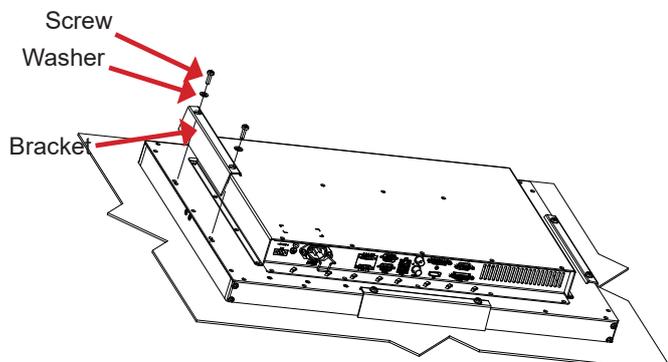
▼ 4: Review closeup of the mounting of brackets with screws and C-Washers in place. Seen from bottom side.

Screw
Washer
Bracket

C-Washer Screw
Display
Mounting Bracket
Console

Installation   1

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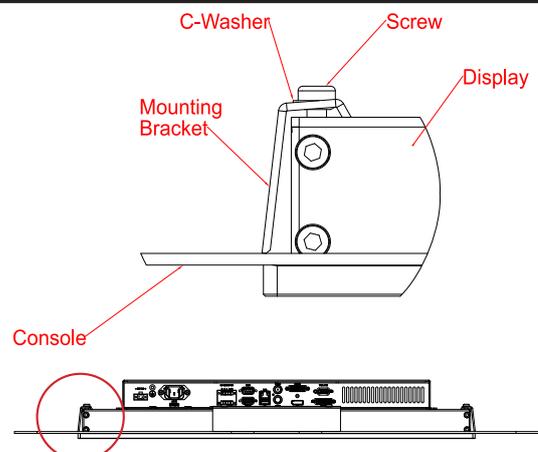
Mounting Bracket, Table / Desktop / Ceiling - 15, 17 and 19 inch

Procedure suitable for: Display (MMD) and Panel Computer (MMC) Series X Generation 2 (G2) product ranges.
19 inch Maritime Multi Display (MMD) used as example below.

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 SX2-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.

Seen from above

Connector Area
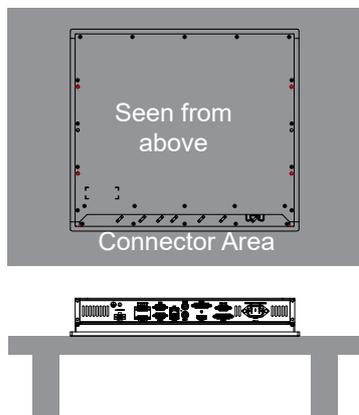
▼ 2: The two bracket pieces comes pre-mounted as shown below. Both sides are identical. Prepare the drilling, location of holes indicated in the footprint below. Drill 6 pcs of 6mm holes in your table/desktop location.

237,40 [9,35]
313,40 [12,34]
27,00 [1,06]
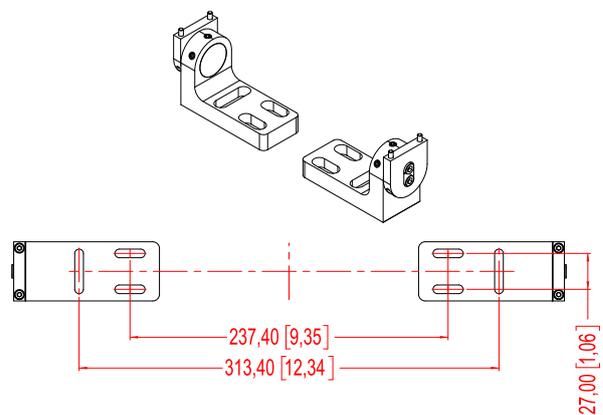
▼ 3: Identify the 3 x Set Socket Screw (M6x6mm) and slightly loosen two of them, now tilt the upper part until you reach an approximate position you need and tighten them slightly.
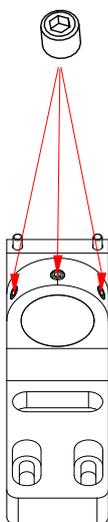
▼ 4: Mount the brackets onto unit as indicated with 2 pcs M4x35 DIN912 screws (included) on both sides. Use Torque Force 2Nm.

Connector Area

Installation   1

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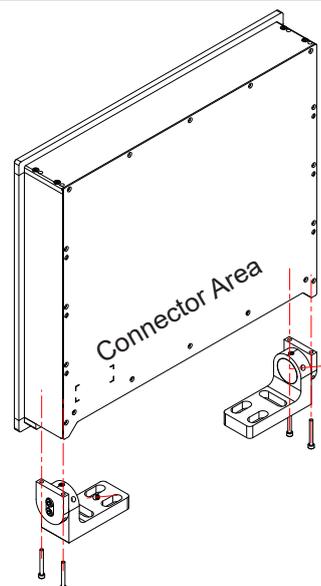
▼ 5: Please note the Factory Mounted Torx screws on both bracket sides, THESE ARE NOT TO BE ADJUSTED OR LOOSENED!

Factory Mounted Torx Screws. Do not adjust.
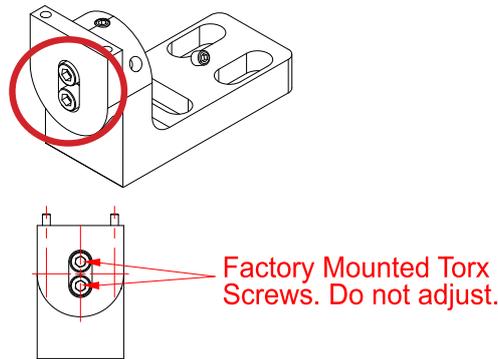
▼ 6: Fasten the complete unit to your table/desktop location, and tilt it into the desired position. Locate the Set Socket Screws on both brackets decribed in step 3. Secure all 3 Set Top Screws on both sides, use Torque Force 7Nm on all. If you need to re-adjust the tilting later, place your hand on top of the Display/Panel Computer 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.
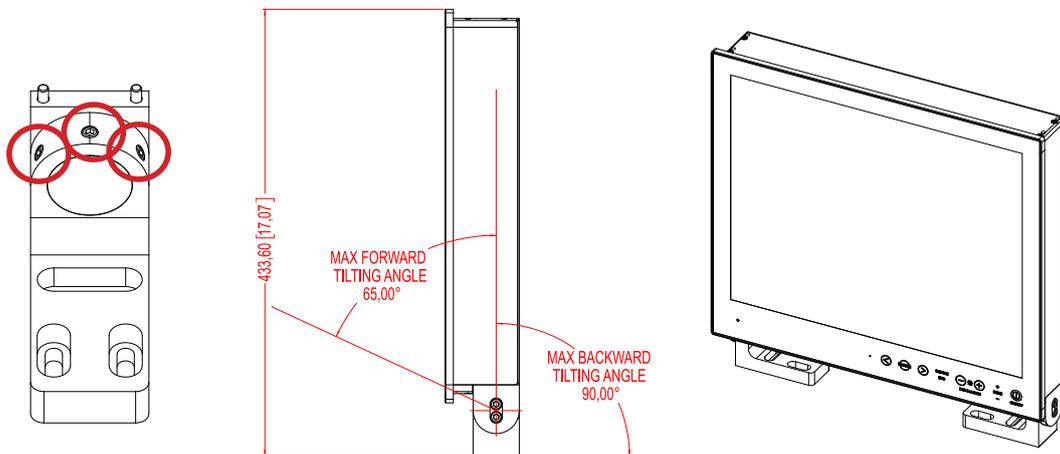
433,60 [17.07]

MAX FORWARD TILTING ANGLE 65,00°

MAX BACKWARD TILTING ANGLE 90,00°

▼ ▼ 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. You may configure Glass Display Control™ (GDC) LED symbols to show or not, since symbols will be seen upside down. Displayed image needs to be flipped vertically. Review the appropriate SCOM manuals ("Glass Display Control™ (GDC) LED & Button operations" section).

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

Upside Down

Normal Position

Installation   2

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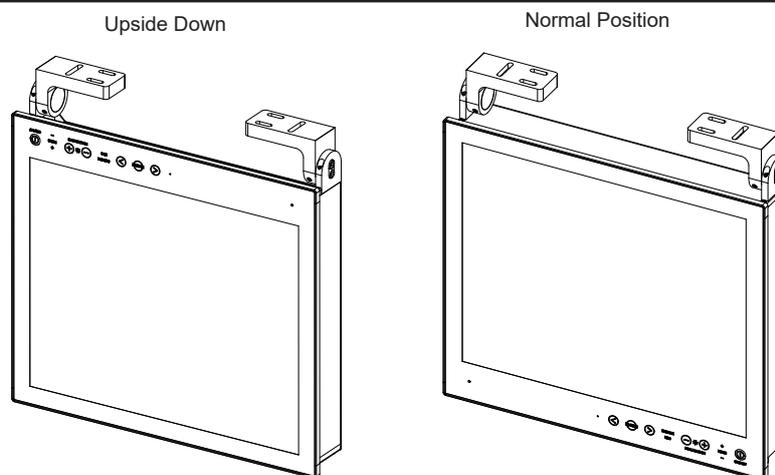
Mounting Bracket, Table / Desktop / Ceiling - 24, 26 and 27 inch

You need: M5 Unbrako® Hex Key tool and 1 pcs of HD TMB SX1-C1 Mounting Bracket Kit. Fasteners (6 pcs M6) for Table / Desktop location not included. Procedure suitable for: Display and Panel Computers. 24 inch unit used as illustration below, but same procedure apply for 26 and 27 inch units as well.

Attention: A suitable pre-drilled location should be prepared and checked prior to mounting. 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.

Seen from above

Connector Area
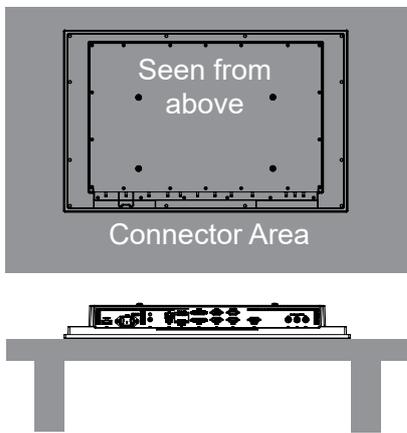
▼ 2: Inspect the mounting holes of brackets. For mounting to a 24 inch unit, please use the **lower holes** as indicated. For mounting to a 26 / 27 inch unit, please use the **upper holes** as indicated.

24 inch

26 inch

27 inch

UPPER MOUNTING HOLES FOR 26/27 INCH

MOUNTING HOLES FOR 24 INCH

MOUNTING HOLES FOR 26/27 INCH

MOUNTING HOLES FOR 24 INCH LOWER
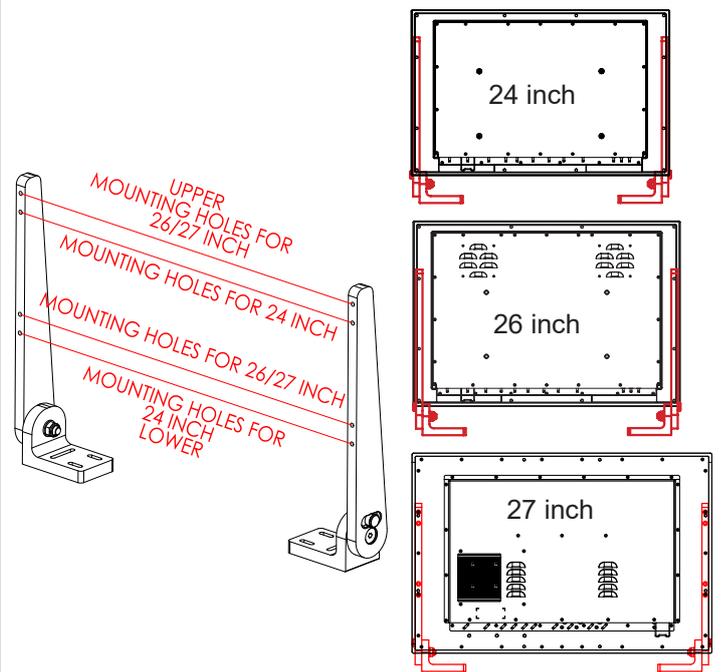
▼ 3: Place one bracket at the time with the mounting holes facing down into the suitable mounting position and fasten with 2 x M5 screws on each bracket. Torque Force 3.5Nm.
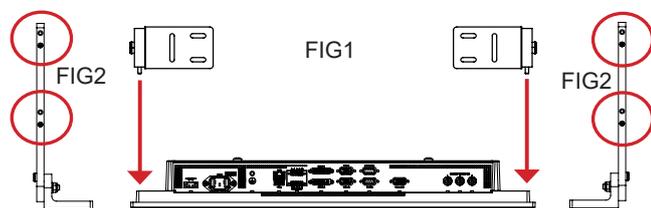
FIG1

FIG2

FIG2

▼ 4: While unit is lying flat on table, check the Tilting Lock Pin position. These can be pulled out by hand, turned 90° (FIG1) and turned back 90° until the Lock Pin automatically clicks into place by a spring (FIG2).

FIG1

FIG2

Locked   Unlocked

Installation   **1**

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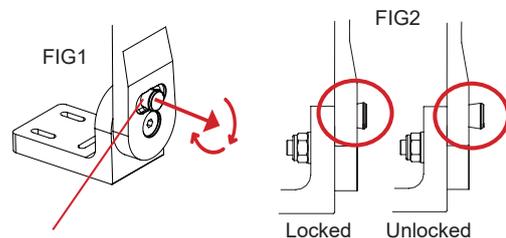
▼ 5: You may now mount the unit onto your desired location. It is advised that you unlock the Lock Pin (as shown in step 4), tilt the unit 90° backwards (FIG1) and properly fasten the bracket base into location (FIG2).
NB! Be careful not to break or scratch the edge of the front glass! Then repeat step 4 again until your desired tilting position has been achieved and you have verified that the Lock Pin are in locking position and the unit is firmly attached and does not appear loose (FIG3).
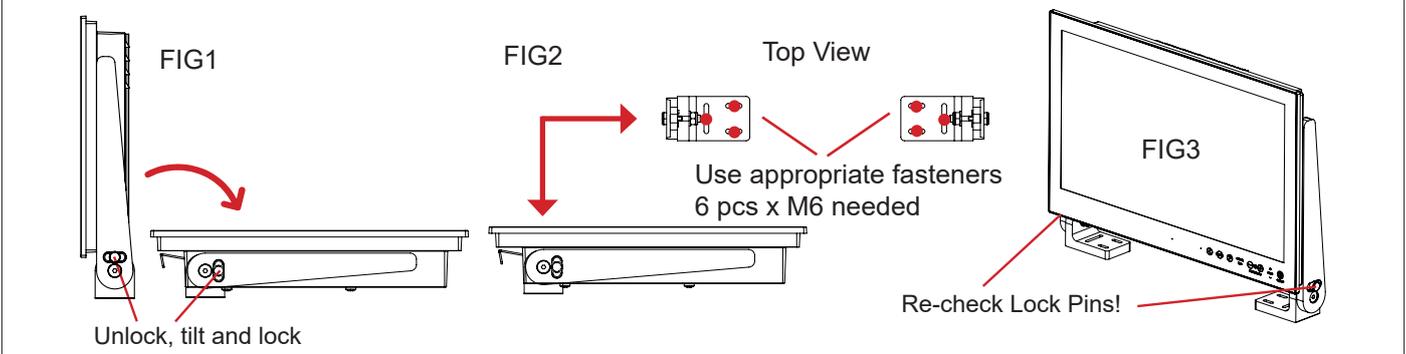
FIG1

FIG2

Top View

Use appropriate fasteners
6 pcs x M6 needed

FIG3

Re-check Lock Pins!

Unlock, tilt and lock

▼ 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. You may configure Glass Display Control™ (GDC) LED symbols to show or not, since symbols will be seen upside down. Displayed image needs to be flipped vertically. Review the appropriate SCOM manuals ("Glass Display Control™ (GDC) LED & Button operations" section).

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

Upside Down

Normal Position

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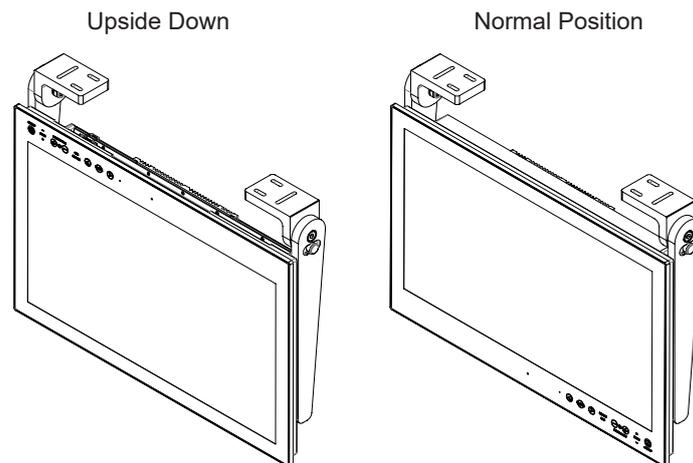
Physical Connections

Connection area of unit (illustration)

Power Input DC — Grounding Screw — Power Input AC — RS-422/RS-485 COM — USER Port — RS-232 COM — RJ45 Network — USB SCOM+Touch — 2 x BNC, Composite Video IN — DisplayPort (DP) In — 2 x DVI-I In — VGA/RGB Out
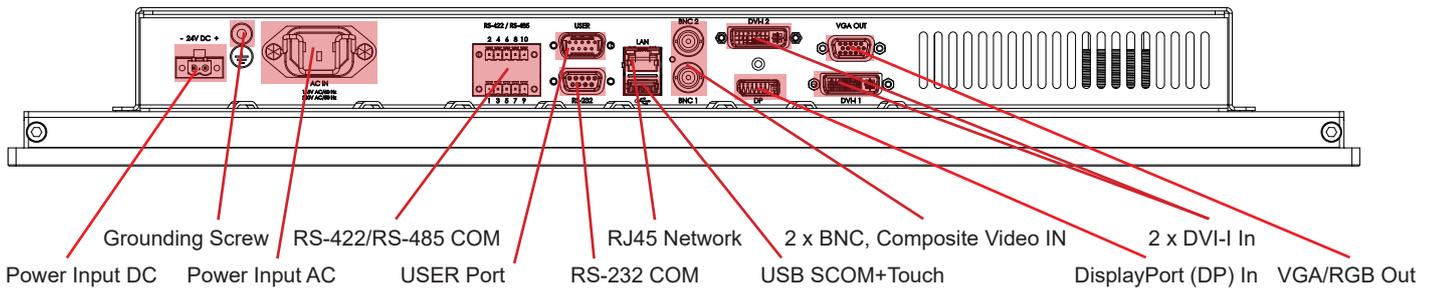
Note: 24 inch unit used as example above, please review specifications for your actual model.

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: Amount of chassis hinges can vary depending on model.
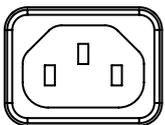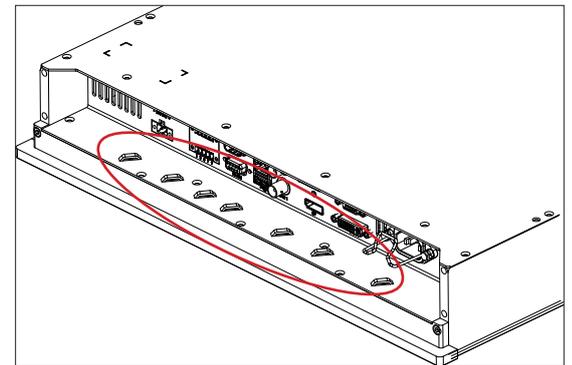
POWER INPUT:
The internal AC power module supports both 115VAC/60Hz and 230VAC/50Hz power input. Please check specifications for your unit.
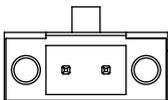
- + POWER INPUT:
Connect your DC power cable to the 2-pin Terminal Block 5.08 connector. The internal DC power module supports 24VDC. For more information, please review "Housing Connector Overview" earlier in this manual.

GROUNDING SCREW:
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 plainwasher".

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.

1

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Physical Connections
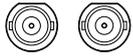
COMPOSITE VIDEO IN 1,2:

Connect a Composite Video signal (PAL/NTSC/SECAM) to any of these 2 x BNC female connectors to allow video feed to be used as Full Screen, Picture-In-Picture (PIP) or Picture-By-Picture (PBP) from i.e. cameras & DVD players in addition to the regular DVI, DP or RGB/VGA (Via adapter) signal input.
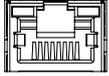
Network/LAN INPUT / OUTPUT (NET A):

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. This connector will allow remote control via SCOM of the display unit to control common functions like brightness, input source and more.

Hatteland Technology's Serial Remote Control Interface (SCOM) protocol document can be downloaded from:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm

USB TOUCH SCREEN / SCOM:

Connect a TYPE A USB Cable between this connector and your PC. Port is USB2.0 (<5m). This connector transmit touch screen signal from the display unit (if factory mounted) to connected computer. In addition it also simultanously supports remote control of the display unit to control common functions like brightness, input source and more via the Serial Remote Control (SCOM) as provided by Hatteland Technology.

Hatteland Technology's Serial Remote Control Interface (SCOM) protocol document can be downloaded from:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm
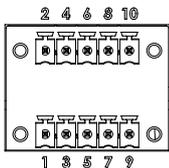
RS-422 / RS-485 COM I/O:

The COM (non-isolated RS-422/485) allows functionality to communicate with serial based equipment including controlling internal buzzer externally. Connect and fasten your cables from your compatible external equipment to the 5-pin Terminal Block 3.81 connector. Please review the "Pinout Assignments" chapter as well as "Housing / Terminal Block Connector Overview" in this manual for more information.

Hatteland Technology's Serial Remote Control Interface (SCOM) protocol document can be downloaded from:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm

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Physical Connections

DVI-I IN:

Connect your DVI cable to any of the two DVI-I 29p connector (female). Secure your DVI cable to the hex spacers provided on the unit and make sure you do not bend any of the pins inside the connector. Connect the other end of the cable to the DVI connector on your equipment and secure it.

Note for DVI and VGA signal inputs:
DVI-I #1, DVI-D #1 and VGA #1 is Single Link. DVI-I #2, DVI-D #2 and VGA #2 is Dual Link.

Important note for DVI signal detection:
Please note that for the operating system to detect DVI signals correctly, the DVI cable MUST be connected physically to the unit during boot up otherwise you may experience a black image. Furthermore certain graphics drivers may need to refresh their device list (often done manually by user - detect devices), while in some cases the Plug-n-Play will automatically detect the DVI signal correctly. Please consult your local technician if you have this behavior of detection problems when using DVI. In all cases the problem can be solved in the operating system, and this is not a malfunction in the graphic controller for display units.
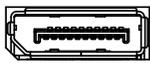
DisplayPort (DP) IN:

Connect your DP (male) cable to the DisplayPort (v1.2) 20P connector (female) of the unit. 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.
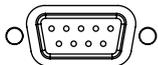
RS-232 COM I/O:

This D-SUB 9P connector (female) provides additional functionality for the unit. The Serial Remote Control features a RS-232 (non-isolated) interface for controlling internal parameters like brightness. You can access most of the parameters available in the OSD menu and with special commands control the unit externally. This COM can also be used to upgrade the firmware for the graphic controller inside the unit which is available on request and through service channels (for qualified personnell only). Fasten your external cable to the D-SUB 9P connector (female) using the provided screws on the cable housing.

Please review "Management Settings/Communication" in the "OSD Menu Functions" chapter for more information.

Hatteland Technology's Serial Remote Control Interface (SCOM) protocol document can be downloaded from:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm
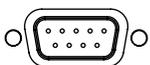
USER Port INPUT / OUTPUT:

Allows for controlling Brightness of the displayed image on screen and power the screen On/Off, by connecting an external remote control to the D-SUB 9P connector (male). The USER port has built in Potentiometer IN, +5VDC OUT, external power button,+12VDC OUT and BRT +/- IN functionality. Review the "Pin Assignments" chapter in this manual for more information on how to activate this functionality. Do not connect/disconnect cables to this connector while product is powered on.
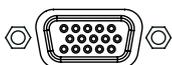
VGA OUT:

VGA OUT enables a direct clone of the incoming VGA signal if using a DVI-I to VGA adapter. Connect the cable to the D-SUB 15P connector (female) and secure it to the hex spacers provided on the unit. Connect the other end to your equipment and secure it. Note that only DVI-I port #1 supports cloning.

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User Controls

USER CONTROLS OVERVIEW

The units are designed using Glass Display Control™ (GDC) touch technology to allow interactivity adjusting brilliance (brightness) and control power on / off with the use of illuminated symbols. Note that these symbols are only visible (backlight illuminated) when suitable power is connected, except for the power symbol which has a white silk print to indicate its position on the front glass. Further, not all symbols are available depending on factory options and product sizes (where applicable). There are no physical moving knobs, potmeters, wheels or push buttons available as everything is touch surface controlled by Projected Capacitive technology that allows a human finger (including several types of gloves) to control the unit.
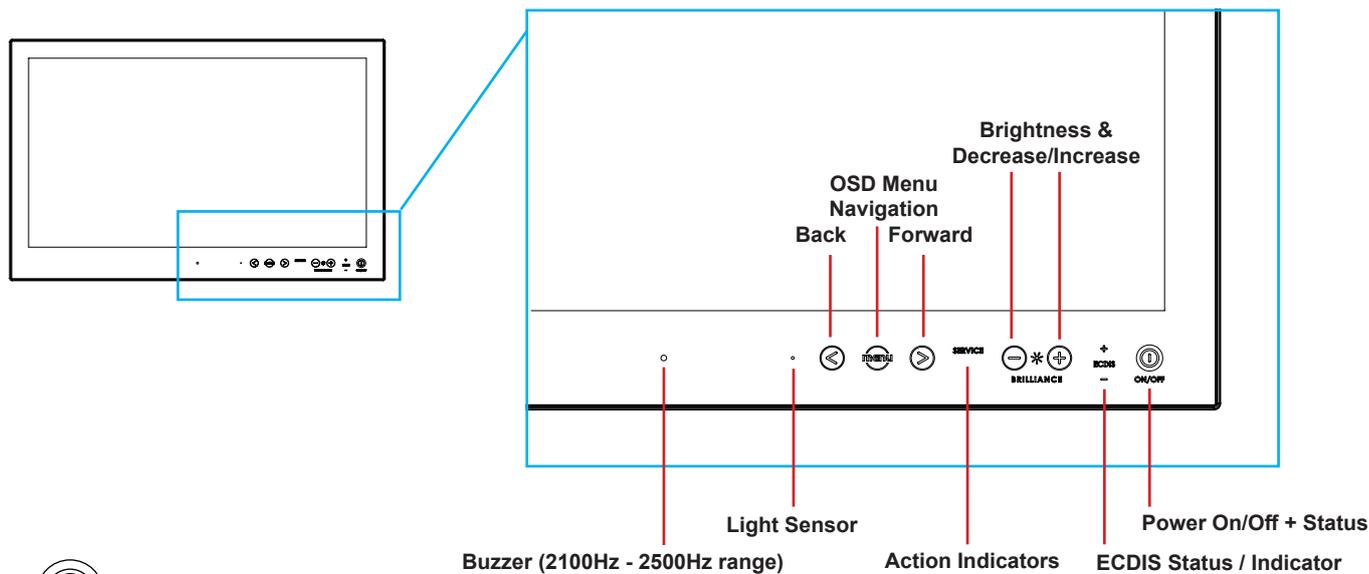
Power ON/OFF:
This symbol and all text will illuminate in red when suitable power is connected and the unit is turned off. When the unit is on and operating, this symbol will illuminate constantly either in yellow color (signal not recognized/not present and no image on screen) or green color (signal detected and image on screen).

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

Power OFF:
To turn the unit off, touch the power symbol and hold until it either illuminates/changes from green/yellow to red or the image on screen disappears.

OSD Menu, Navigation:
If the OSD (On Screen Display) menu was activated (and is clearly visible on screen), both the "<" and ">" are used to navigate, set options and change values within the OSD menu.

To access the main OSD menu, touch anywhere on the "MENU" circle symbol and the OSD menu will clearly be seen as an overlay over the existing displayed image. The complete definition of all the menus and functions are available in the "OSD MENU FUNCTIONS" chapter in this manual.

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User Controls

SERVICE

Action Indicators:
= Reserved for future use, no built-in function defined.

BRILLIANCE

Brightness Adjust:
Brilliance / Brightness adjustment of the displayed image is adjusted by touching the (-) or (+) illuminated symbols. The entire area of text and symbols are visible as long as the unit is powered. Note that only the (-) and (+) are touch sensitive while the "*" and "BRILLIANCE" symbols are not.

ECDIS

ECDIS Status / Indicator: (optional factory standard)
For units that have been factory ECDIS calibrated the text "ECDIS" 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 in orange color and that "ECDIS" text remains illuminated in green during operation. Note that by touching these symbols no action will be performed or has been assigned.

Note: ECDIS functionality is mostly only suitable for model sizes above 15 inch units.

Light Sensor:
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. Note: This sensor is barely visible to the eye and lies under the glass. It has no illumination behind to indicate it's position. Touching or covering this area will naturally make the sensor data inaccurate and should be avoided!

Buzzer:
Only functional for units ordered with Buzzer functionality. The location of the buzzer hole (physical hole in glass) is barely visible to the eye. 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!
Please review the "Pinout Assignments" chapter in this manual for controlling the Buzzer functionality.

Note:
In the following "On Screen Display (OSD)" menu chapter, these buttons are referenced as:

menu	"MENU"
(-) (+)	"(-) Brilliance (+)"
(<) (>)	"(<) Navigation (>)"

Note: GDC Symbols on front glass will by factory default fade away if signal input was lost, cable detached etc. Review OSD Menu function, "Keep OCM Mode" and its settings of "On" and "Off" meaning.

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OSD Menu Overview

On Screen Display (OSD) Menu Introduction

The OSD menu consists of main menus and submenus which are very easy to navigate through. All functions are explained in-depth later in this user manual. Prior to using the OSD menu, you should be sure to familiarize yourself with how to physically access the menu, how to navigate up/down/left/right, how to modify values, exiting menus and more.

⚠️ **Please note: Factory default illustrations only! Available functions, icons and text may deviate slightly from actual OSD menu on your product due to different OSD software configurations and customized solutions.**

OSD Key Code (password) overview

During use/accessing the OSD menu, based on factory default or customized configuration, there might be a pop-up requester asking for a Key Code (password) to gain further access to requested menu. These are 3 digits long.

Keycode	Description
321	Applies for "ECDIS Compliance" products. Code must be entered to get access to OSD MENU. Configured in OSD parameter: "OSD Settings > OSD Lock Mode > Menu Protect"
362	If OSD are in Basic Mode, entering code gets access to Advanced Mode. Configured in OSD parameter: "OSD Settings > OSD Mode > Advanced"
---	Service Mode - Only applicable for authorized service personnel. Configured in OSD parameter: "OSD Settings > OSD Mode > Service"

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OSD Menu Overview

OSD Keycode / OSD Lock Mode

During use, a small requester may pop-up on screen asking you for a "Key Code". This is a safety feature (due to ECDIS Compliance) that might be predefined in your setup. To quickly understand how to enter a code, navigate and finally access the underlying main menu, simply follow the illustration below. The "Key Code" is factory default set to "321". If the "Key Code" requester do not appear on screen, you can skip reading this section for now and proceed to the next page.

Active Display Area + Requester	Close-up of Requester	Close-up of Requester
1: Typical position of requester on screen. Yellow box indicate number position, default loaction is always on first number.	2: Enter first number (from 0 to 9). Use "Navigation/Hot Keys" touch buttons to increase/decrease. Number change in real time.	3: Now touch menu button to store first number and proceed to second number. Yellow bar will move its position too.
Close-up of Requester	Active Display Area + OSD Menu	
4: Repeat step 2 and 3, until "Key Code" reads "3 2 1" and finally touch menu button to continue.	6: The OSD menu appear by default in the middle of Active Display Area	
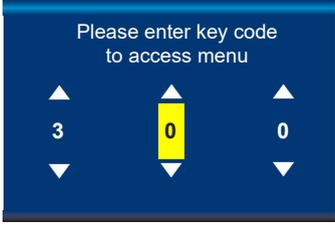
After the code is successfully entered you will gain access to the OSD Menu and a multitude of functions will be available for adjusting or reviewing. Please proceed to the next page, where you will learn the differences between the different menu modes and a complete map of all the underlying functions available within.

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OSD Menu Overview

OSD "Basic", "Advanced" & "Service" Menu modes

Three OSD Modes are available. The "Basic" Menu mode offers easy and clear access to most commonly used functions. The "Advanced" Menu mode offers a more advanced menu with technical information and is suited for more technical minded users and the "Service" Mode reveals more options in "Service settings" for service purposes. "Advanced" and "Service" modes are password (KeyCode) protected. Password for Advanced Mode is "**362**", Password for Service Mode is intentionally only available from Service Partners and our HelpDesk which should only be used by experienced personnell. Please contact your Service Partner or our HelpDesk to retrieve the password.

Exit Menu	**Input Source Settings**
Input Source Settings	Exit
Image Settings	Main Source:
Color Mode Settings	Digital 1 ▶
Multi-PIP Settings	Second Source:
OSD Miscellaneous	Composite 1 ▶
Management Settings	Auto Source Select Enable ⬍
Service Settings	Rename Source Digital 1 ⬍
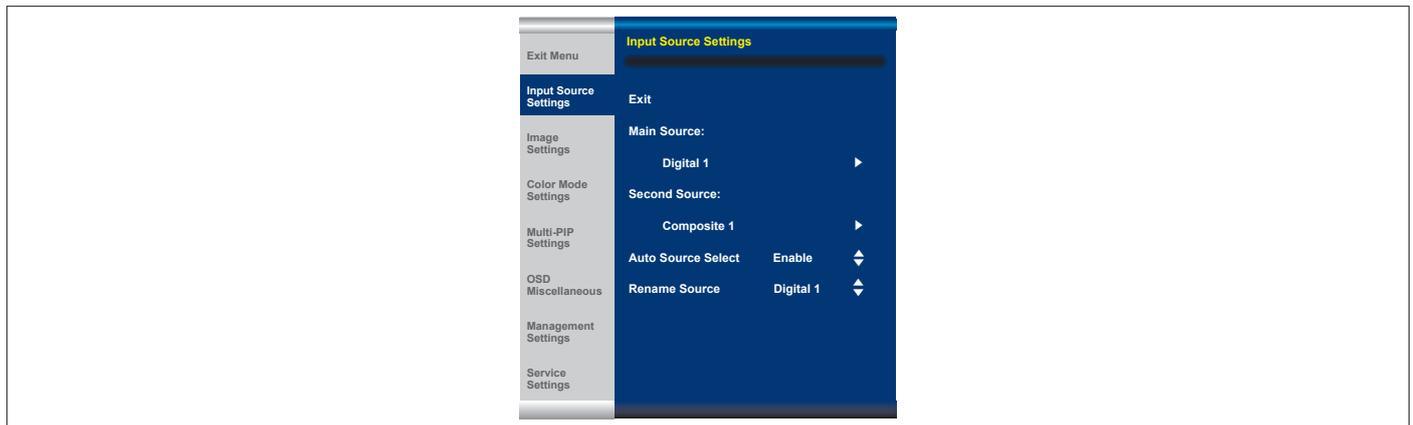
OSD Menu showing for example "Input Source Settings" chosen in the menu. The left menu bar is visible at all times, while the right section will change based on contents of that submenu. The design and size of OSD menu area does not change, even in any of the "Basic", "Advanced" and "Service" mode settings.

OSD Visual Feedback (examples)

Throughout all OSD menus there are certain symbols you need to familiarize yourself with. These are to visually indicate that a value can be increased/decreased, accessed, display a Slide Bar Meter or just for information purposes only. All functions with arrows have text based, human readable lists with start and end choices. A Slider Bar with number beside it will indicate the value has a minimum, current and max limit. All changes in values and lists happen in real time as you touch the menu button and/or touch navigation buttons.

▶	⬍
Arrow pointing right means that there is a submenu available for this function for further adjustments and functions.	Arrow pointing up/down means that the current choice can be changed in-place from a list that has a start and end.
34	**Color Mode Settings**
Slider Bar meter indicates the "filling" up based on a minimum and maximum value. The current value is written to the right.	Whenever a function is selected, the item will be visually indicated with a yellow bar behind it. The other choices available will be in white text with no yellow bar behind.
Norsk / **English** / **Francais** **Digital 1**	**PIP Mode** **OFF** / **PIP Display** / **SWAP**
Functions displayed in Green Color indicates either the current stored value of the function and sometimes to draw user's attention towards information about a selected function or its current state.	Functions displayed in gray text means that set of functions may depend on a different option to be turned on or configured first. In this example, "PIP" functions are all unaccessible, since "PIP Mode" is "OFF".

Note: The examples above are the most common ones displayed. Your menu may have slight different style and colors, depending on firmware, variations and customized solutions, but the logic of operation is the same.

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OSD Menu Structure

In this table all functions within menus and their submenus are shown. Functions that begins with an asterix (*****) and in **bold/red font color** style indicates this function/menu is only available during "Advanced" menu mode or during Video CVBS fullscreen. Functions that begins with an asterix (*****) and in **bold/blue color** indicates this function is only available while in "Service" menu mode. Functions with a ">" in the end, indicates a submenu or list of options will be displayed. Depth of the sub-menus (levels) are identified from 1 to 5.

Input Source Settings

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
Exit				
Input Source Settings >	< Exit			
	Main Source >	< Exit		
		Digital 1, Digital 2, Analog RGB1, Analog RGB2, Composite 1, Composite 2, Composite 3, DisplayPort1	(Text Displayed)	
	Second Source >	< Exit		
		Digital 1, Digital 2, Analog RGB1, Analog RGB2, Composite 1, Composite 2, Composite 3, DisplayPort1	(Text Displayed)	
	Auto Source Select >	< Exit		
		DVI-I1 Mode	DVI Mode/VGA Mode/Auto Mode	
		DVI-I2 Mode	DVI Mode/VGA Mode/Auto Mode	
		Auto Source Selection	Enable/Disable	
	Rename Source >	<On Screen Keyboard Input>		

Image Settings

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
Image Settings >	< Exit			
	Auto Position >	(Automatic Action)		
	Auto Color Balance >	No/Yes		
	*Brightness >	(Slider Bar 0~255)		
	*Contrast >	(Slider Bar 0~255)		
	*Saturation >	(Slider Bar 0~255)		
	*Hue >	(Slider Bar 0~255)		
	Sharpness >	(Slider Bar 0~24)		
	Display >	< Exit		
		H. Position >	(Slider Bar 0~100)	
		V. Position >	(Slider Bar 0~100)	
		Clock >	(Slider Bar 0~100)	
		Phase >	(Slider Bar 0~100)	
		Picture Direction >	Select 0/180	
	*Video Setup >	< Exit		
		Main MADI Mode >	Normal, Adaptive, Off	
		Noise Reduction >	< Exit	
			Dynamic NR Mode >	High, Medium, Low, Adaptive, Off
			MPEG NR Mode >	On, Off
			Sharpness Noise Coring >	High, Medium, Low, Adaptive, Off
		Film Mode >	2:2, 3:2, 3:2-2:2, Off	
		DCDi >	On, Off	

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OSD Menu Overview

Color Mode Settings

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
Color Mode Settings >	< Exit			
	Color Temperature >	< Exit		
		9300K		
		8000K (Default)		
		6500K		
		Exit		
		*User >	< Exit	
			Red >	(Slider Bar 0~255)
			Green >	(Slider Bar 0~255)
			Blue >	(Slider Bar 0~255)
	*Gamma >	No Calibration, Calibration VGA, Calibration DVI, Calibration DisplayPort		
	*Color Domain RGB Range	< Exit		
		RGB Range		
		YUV Full Range		
		YUV Limit Range		

Multi-PIP Settings

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
Multi-PIP Settings >	< Exit			
	PIP Mode >	PIP Off, PIP Child, PIP Split, PIP Wide.		
	PIP Display >	< Exit		
		PIP Child Size >	< Exit	
			PIP Size >	(Slider Bar 1~9)
			PIP H-Size >	(Slider Bar 0~20)
			PIP V-Size >	(Slider Bar 0~20)
		PIP Position >	< Exit	
			PIP H-Position >	(Slider Bar 0~100)
			PIP V-Position >	(Slider Bar 0~100)
	Swap Source >	(Automatic Action)		
	PIP Picture >	< Exit		
		Brightness >	(Slider Bar 0~255)	
		Contrast >	(Slider Bar 0~255)	
		Saturation >	(Slider Bar 0~255)	
		Hue >	(Slider Bar 0~255)	
		Sharpness >	(Slider Bar 0~24)	

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OSD Miscellaneous

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
OSD Miscellaneous >	< Exit			
	OSD Position >	< Exit		
		OSD H. Position >	(Slider Bar 0~255)	
		OSD V. Position >	(Slider Bar 0~255)	
	Language >	< Exit		
		Norsk >	(Select for Norwegian)	
		English >	(Select for English)	
		Français >	(Select for French)	
		Deutsch >	(Select for German)	
		Italiano >	(Select for Italian)	
		日本語 >	(Select for Japanese)	
		簡體中文 >	(Select for Simplified Chinese)	
	Preset Save >	< Exit		
		Recall >	NO, Yes (Performs Factory Defaults!)	
		Save >	< Exit	
			User 1 to 5 >	(Automatic Action)
		Load >	< Exit	
			User 1 to 5 >	(Automatic Action)
	OSD Timeout (Sec) >	(Slider Bar 0~30)		
	OSD Transparent >	(Slider Bar 0~255)		
	OSD Mode >	< Exit		
		Basic >	(Select)	
		Advanced >	(Select) and Enter Key Code "362"	
		Service >	(Select)	
	*OSD Lock Mode >	Normal Mode >	(Select)	
		Menu Protect >	(Select) and Enter Key Code "321"	
		Full Protect >	(Select) and Enter Key Code "321"	
	*Hot Key Assignment >	Key 1 >	OSD Language, Test Pattern, Swap Source, Graphic Scaling, PIP Mode, Second Source, Main Source, PIP Child Size, Brightness, DisplayPort, Composite 1, Composite 2, Composite 3, Digital 1, Digital 2, Analog RGB1, Analog RGB2, No Function	
		Key 2 >	OSD Language, Test Pattern, Swap Source, Graphic Scaling, PIP Mode, Second Source, Main Source, PIP Child Size, Brightness, DisplayPort, Composite 1, Composite 2, Composite 3, Digital 1, Digital 2, Analog RGB1, Analog RGB2, No Function	
	*OSD Key Outdoor >	< Exit		
		On / Off		
	Spectrum >	(Slider Bar 0~512)		
	* Keep OCM Mode >	On / Off		

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OSD Menu Overview

Management Settings

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
Management Settings >	< Exit			
	* Graphic Scaling >	< Exit		
		Graphic Scaling >	Full Screen, Fill to Aspect Ratio, One To One	
		Zoom >	(Slider Bar 0~100)	
		Horizont Stretch >	(Slider Bar 0~100)	
		Vertical Stretch >	(Slider Bar 0~100)	
	Auto Adjustment >	On, Off		
	*Unknown Timing Search >	< Exit		
		Auto Mode >	< Exit	
			Display Size >	4:3, 5:4, 1:1, 16:9, 16:10
			Execute >	(Automatic Action)
		Blind Mode >	< Exit	
			H. Resolution >	(Slider Bar 0~2000)
			V. Resolution >	(Slider Bar 0~2000)
			Total H. Line >	(Slider Bar 0~2000)
			H. Blank Pixels >	(Slider Bar 0~500)
			V. Blank Pixels >	(Slider Bar 0~500)
			Execute >	(Automatic Action)
		Save Timing >	Save Timing 1 to 8 >	(Automatic Action)
		Clear Timing >	Clear Timing 1 to 8 >	(Automatic Action)
	*GDC Sensitivity >	(Slider Bar 0~255)		
	*Filter >	Enable, Disable		
	*Communication >	< Exit		
		RS232 >	(Select)	
		2-wire RS-485 >	(Select)	
		4-wire RS485/422 >	(Select)	
		Address RS >	(Slider Bar 0~15)	
		IP Address >	Auto IP >	(Select)
			Fixed IP >	(Number Input; xxx.xxx.xxx.xxx)
		USB	(Select)	
		Enable RS232 FW Download >	Enable, Disable	
	*Power Plan >	< Exit		
		VGA Out / USB in OFF Mode >	Enable, Disable	
		LAN in OFF / Sleep Mode >	Enable, Disable	
	*Touch Power Enabled >	< Exit		
		Always Active >	(Select)	
		Any signal is On >	(Select)	
		Select signal is On >	< Exit	
			Digital 1 >	(Select)
			Digital 2 >	(Select)
			Analog RGB 1 >	(Select)
			Analog RGB 2 >	(Select)
			Composite 1 >	(Select)
			Composite 2 >	(Select)
			Composite 3 >	(Select)
			DisplayPort 1 >	(Select)
	*External Power Button >	Enable, Disable		
	*DDC/CI Setting >	Digital 1, Digital 2, Analog RGB1, Analog RGB2, DisplayPort 1, None		

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OSD Menu Overview

Service Settings

Level 1 (Main Menu)	Level 2	Level 3	Level 4	Level 5
Service Settings >	< Exit			
	Video Scaler Firmware Ver >	(Text Displayed)		
	uC Firmware >	(Text Displayed)		
	Elapsed Time >	(Text Displayed)		
	Current Temp >	(Text Displayed)		
	*Fault Status >	(Text Displayed)		
		*< Exit		
		NVRAM >	(Text Displayed)	
		Ethernet >	(Text Displayed)	
		GDC >	(Text Displayed)	
		TMP Sensor >	(Text Displayed)	
		Video Scaler >	(Text Displayed)	
	Test Pattern >	(Automatic Action)		
	*Burn In >	Enable, Disable		
	*Smart ISP >	(Select)		
	*Watchdog Test >	(Select)		

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On Screen Display (OSD) Menu Functions

The following section covers all possible settings that the user can (in a certain mode) encounter or needs to adjust via easy understandable menus, text and navigation. For simpler reading the menu choice **"Exit"** has been left out of description in this chapter intentionally. Whenever **"Exit"** is available, you can exit current menu and go back to the previous one visited. When there are no more previous menus available, the OSD menu overlay will be shut off and hidden. All settings are saved real-time or when you exit any menu (including time out of menu visibility).

The number shown in the "|------x------" line gives the indication of the submenu level where the function is located (also reference to the table in the previous chapter). It requires the user to touch the "MENU" symbol to enter that submenu.

⚠️ **Please note: Available functions described may deviate slightly from actual OSD menu on your unit. This is due to different OSD software configurations and customized solutions. Shown here are factory standards.**

Input Source Settings

Lets you configure Main and Secondary signal source inputs (DVI, DisplayPort, VGA or Composite video signals) as well as activate or disable the Auto Source functionality. The contents of these submenus are listed below.

● Note: Switch time between sources is ~5 sec.

|---2--- **Input Source Settings - Main Source**

The possible signal inputs are; "Digital 1" (DVI), "Digital 2" (DVI), "Analog VGA1" (RGB/VGA), "Analog VGA2" (RGB/VGA), "Composite 1", "Composite 2", "Composite 3" (Composite Video) and DisplayPort 1 (DP). Composite Video inputs supports standard PAL/NTSC/SECAM signals.

● Note: The current active main source name will be greyed out in the list. By factory default, "Digital 1" (DVI) are assigned as Main Source. The current active main source will be shown in green color at the bottom of this menu.

|---2--- **Input Source Settings - Second Source**

The possible signal inputs are; "Digital 1" (DVI), "Digital 2" (DVI), "Analog VGA1" (RGB/VGA), "Analog VGA2" (RGB/VGA), "Composite 1", "Composite 2", "Composite 3" (Composite Video) and DisplayPort 1 (DP). Composite Video inputs supports standard PAL/NTSC/SECAM signals.

● Note: The current active secondary source name will be greyed out in the list. Also, if DVI, VGA or DP are defined as Main Source, they cannot be re-selected as second source as well. The second source is used together with Main Source for the Picture-in-Picture (PIP) functionality. PIP only works with one source of DVI/DP/VGA together with Composite Video sources. By Factory default "Composite 1 (Video)" are assigned as the second source. The current active main source will be shown in green color at the bottom of this menu.

Please note: Only one VGA Source can be defined as either Main or Single. Unit does not support dual VGA sources defined as Main+Source. Valid options are 1 x VGA + any of the other Digital based sources.

OSD Menu Functions

|---2--- **Input Source Settings - DVI-I1 Mode**

This OSD setting item is used to select the DVI-I1 port operating mode.

Settings as follows:

DVI Mode   = The port is locked to DVI-D mode, only accepting digital input.
                 "Analog RGB1" option in input source selection will be disabled.

VGA Mode   = The port is locked to VGA mode, only accepting analog input.
                 "Digital 1" option in input source selection will be disabled.

Auto Mode   = The port can work in both DVI-D and VGA mode.

Note: For graphic cards that comes with DVI-I output, it is suggested to lock the operating mode to DVI mode or VGA mode. **By factory default, Single Link is supported.**

● Note: By factory default, this setting is configured as "Auto Mode".

|---2--- **Input Source Settings - DVI-I2 Mode**

This OSD setting item is used to select the DVI-I2 port operating mode.

Settings as follows:

DVI Mode   = The port is locked to DVI-D mode, only accepting digital input.
                 "Analog RGB 2" option in input source selection will be disabled.

VGA Mode   = The port is locked to VGA mode, only accepting analog input.
                 "Digital 2" option in input source selection will be disabled.

Auto Mode   = The port can work in both DVI-D and VGA mode.

Note: For graphic cards that comes with DVI-I output, it is suggested to lock the operating mode to DVI mode or VGA mode. **By factory default, Dual Link is supported.**

● Note: By factory default, this setting is configured as "Auto Mode".

|---2--- **Input Source Settings - Auto Source Select**

Set to either 'Enable' or 'Disable'. Signal is automatically searched for and selected. If the Main Source signal is disconnected physically, the video controller will automatically search and select from the next item available in the list, such as; "Digital 1" (DVI), "Digital 2" (DVI), "Analog VGA1" (RGB/VGA), "Analog VGA2" (RGB/VGA), "Composite 1", "Composite 2", "Composite 3" (Composite Video) and "DisplayPort 1" (DP).

● Note: If all signals are physically disconnected from the unit, the Auto Source function will loop endlessly until it detects a valid signal to display. By factory default, this setting is configured as "Enable".

● Switch time for next source is ~5 sec. The longest auto detection time is ~1minute from 1st source to last source.

User Controls   **2**

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OSD Menu Functions

Input Source Settings - Rename Source

By factory default, every signal source input are named based on it's signal property as described in the previous functions, but with the rename source function you can rename these into more understandable descriptions like; "FRONT-CAMERA", "NIGHT RADAR" etc. When activated, a requester on screen similar to a standard keyboard layout will appear. Use the "(-) Brilliance (+)", "(<) Navigation (>)" and "MENU" touch buttons to enter and edit the new name. Below is an example for editing the "Source" input name. Only uppercased letters allowed.

The "|<" button will erase (backspace) the last character entered. Press "Enter" to save new name.

Yellow border around letter indicate selected character.

Edit Source Label

NAME:

NIGHT RA

A	B	C	D	E	F	G	H	I	J	K	L
M	N	O	P	Q	R	S	T	U	V	W	X
Y	Z	0	1	2	3	4	5	6	7	8	9
-	|←	Space						Enter			
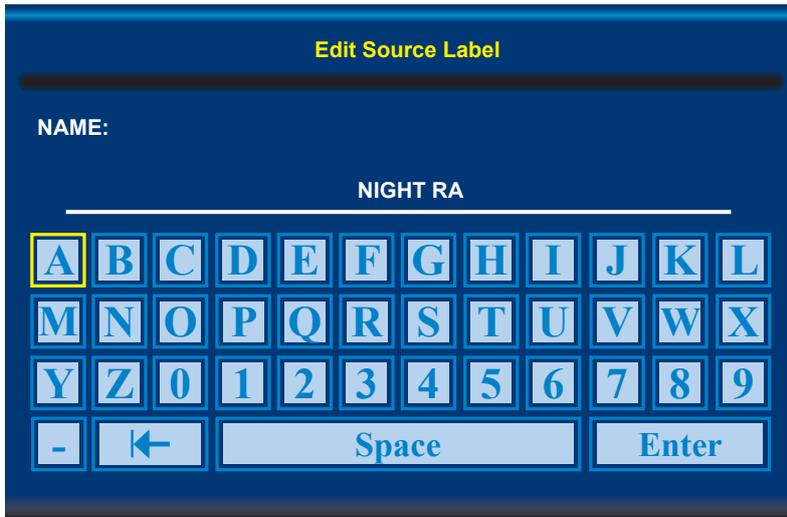
OSD Menu Functions

Image Settings

Lets you configure various visual preferences for any signal. The contents of these submenu are listed below.

|---2---   **Image Settings - Auto Position**

Will automatically fit the currently displayed full screen signal and center it based on the active area of the TFT display. This function relies on properties of the incoming signal.

● Note: This function will not try to scale or deform the image, so if the image looks stretched, please review the Management Setting/Scaling function later in this manual to adjust it on pixel level. Available for RGB/VGA mode only.

|---2---   **Image Settings - Auto Color Balance**

Choose between "Yes" or "No". This function will automatically adjust the color balance of the currently displayed full screen signal. This function will analyse the incoming signal strength for RGB values and adjust it for "best eye visuality". Colors are automatically calculated based on an overall coloring model to attempt a more true, relevant and correct look. In general, you should display an image on screen while performing this action that contains variations of Red, Green, Blue, Black, White, Gray colors to get the best optimal balance of the current signal. An example is a test pattern image, similar to the picture illustrated later in the manual (see "Service - Test Pattern")

● Note: Available for RGB/VGA mode only.

|---2---   **Image Settings - Brightness**   ***Available in "Advanced" mode only**

Increase/decrease the black level saturation in real-time of the currently displayed full screen signal. Window overlays (PIP/PBP) and the OSD Menu overlay will be unaffected. A visual slider in the OSD menu will show the current value. This value adjusts the TFT panel's brightness by controlling the voltage feed.

● Note: Value adjustable from 0 to 255. 128 is factory default.

|---2---   **Image Settings - Contrast**   ***Available in "Advanced" mode only**

Increase/decrease the contrast in real-time of the currently displayed full screen signal. Window overlays (PIP/PBP) and the OSD Menu overlay will be unaffected.

● Note: Value adjustable from 0 to 255. 128 is factory default.

|---2---   **Image Settings - Saturation**   ***Available in "Advanced" only + Video Fullscreen**

Increase/decrease the overall video color saturation/color amount of the currently displayed full screen image (no effect on DVI/DP/VGA signals). Can be used if the incoming CVBS signal from older equipment (due to bad cables) appear to have a lack of strong colors or just to generally make the displayed image become more vivid. Note that this function can also make noisy color signals appear crisper/clearer if adjusted to gray scales.

● Note: Value adjustable from 0 to 255. 128 is factory default.

User Controls   **4**

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OSD Menu Functions

|---2--- **Image Settings - Hue**   ***Available in "Advanced" only + Video Fullscreen**

Allows you to adjust/shift the main color properties of all Red, Green, Blue and Yellow (unique hues) values. This can be useful for certain Composite Video sources (no effect on DVI/DP/VGA signals) whose output may have shifted or seems to be "out of phase", where for instance blue seems more dominant than green, red and yellow-ish colors. By using HUE one can shift the entire color range of all components left or right in the spectrum.

● Note: Value adjustable from 0 to 255. 128 is factory default.

|---2--- **Image Settings - Sharpness**

Increase/decrease the overall image sharpness. This affects the active display area, and applies to all signal inputs and window overlays (PIP/PBP). Use it to increase the visual quality of signals from older equipment or improve electronically weak signals.

● Note: Value adjustable from 0 to 24. 12 is factory default. Available in RGB/VGA, CVBS modes only.

|---2--- **Image Settings - Display**

Allows you to adjust RGB/VGA signals Horizontally (left/right) and Vertically (up/down) within the TFT panel Active Area.

● Note: This function can move information in the image outside the visible TFT Active Area, so use caution when modifying this parameter. Try to determine the max end of borders (look at each corner) of the image before you proceed using this function.

|--------3-------- **Image Settings - Display - H Position**

Settings as follows:

"H Position"   = Move image within the TFT panel active area Horizontally (left/right), values from 0 to 100.

● Note: Factory Default value (50) is centered inside the active TFT panel area.
● Note: Available for RGB/VGA mode only.

|--------3-------- **Image Settings - Display - V Position**

Settings as follows:

"V.Position"   = Move image within the TFT panel active area Vertically (up/down), values from 0 to 100.

● Note: Factory Default value (50) is centered inside the active TFT panel area.
● Note: Available for RGB/VGA mode only.

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OSD Menu Functions

|--------3-------- | **Image Settings - Display - Clock**

Adjust the horizontal frequency (clock) of the analog signal to improve visibility of the entire image. When it is adjusted, you will notice that the image will appear to be stretched and might in some situations start to flicker/scroll, at which point you must reverse the last adjustment to stop it from flickering/scrolling anymore. This function can be used for older signals that is not automatically detected by the internal display controller.

To adjust the Clock and Phase to an optimal setting it is recommended to display an image with alternating white and black lines by stepped by 1 pixels either vertically or horizontally. It is suggested to use a dedicated and external test pattern while adjusting. Values from 0 to 100.

● Note: Available for RGB/VGA mode only.

|--------3-------- | **Image Settings - Display - Phase**

Fine tune the data sampling position of the signal (impacts on image quality). This function will remove small transparent defects in typical characters where a portion seems to be more faint then the nearby black pixels. The faint pixels are always visible as a line from top to bottom (vertically). Note that this function is automatic and does not allow for manual values. It is suggested to use a dedicated and external test pattern while adjusting. Values from 0 to 63.

● Note: Available for RGB/VGA mode only.

|--------3-------- | **Image Settings - Display - Picture Direction**

Choose between "0" and "180" degree rotation. 0 is normal view (Landscape), while 180 will rotate image to appear upside down (flipped vertically). Factory default setting is "0" (Landscape).

OSD Menu Functions

|---2--- | **Image Settings - Video Setup**   ***Available when Video Fullscreen only**

Provides submenus where the following settings for Composite video signals are available:

|--------3-------- | **Image Settings - Video Setup - Main MADI mode**

Motion Adaptive De-Interlacing. Motion adaptive de-interlacing is a pixel-based two-phase process. Phase 1 involves the detection of motion and the generation of a motion value for each pixel. These pixel motion values are used as a measure of the current "degree of motion". In Phase 2, the pixel motion values are used to select the appropriate de-interlacing technique. As a result, areas of an image that are not moving will be fully static (flicker free) and moving objects will have smooth edges.

Set to either "Normal", "Adaptive" or "OFF".

● Note: Default is OFF

|--------3-------- | **Image Settings - Video Setup - Noise Reduction**

The media noise reduction block removes unwanted ringing and block noise from images that have undergone MPEG or JPEG compression and decompression. The two types of media noise that can be reduced are:

- Block Noise: MPEG encoders, in the presence of an almost flat area, can create a squared structure due to the discrete 8x8 squares that are used in the MPEG compression process. This creates a noticeable squared structure in the image. The process smoothens these square boundaries so they are not visible. The amount of smoothening is programmable between neighboring pixel values that will be smoothened. The amount of smoothening starts to decrease linearly from the maximum (defined by TO) to 0 (defined by 2 x TO) to avoid the hard switch effect of the smoothening applied.

- Mosquito Noise: This process smoothens checker box and discrete noise artifacts referred to as Mosquito Noise around large edge transitions caused by MPEG encoders.

This submenu will give you the following choices:

|------------4------------ | **Image Settings - Video Setup - Noise Reduction - Dynamic NR Mode**

Dynamic NR (Noise Reduction) Mode can be set to either "High", "Medium", "Low", "Adaptive" or "OFF". This is the "strength" of how much noise to detect and automatically remove in order to enhance the overall image quality. The Block Noise process will be used.

● Note: Default is OFF

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OSD Menu Functions

|------------4------------- **Image Settings - Video Setup - Noise Reduction - MPEG NR Mode**

MPEG NR (the generic coding of moving pictures and associated audio information) can be set to either "ON" or "OFF". This function will try to reduce noise as result from compressed/formatted MPEG video streams. This noise is often seen as larger blocks or containers of compressed pixels and is suitable to improve the visual performance of video feeds capable of outputting direct MPEG streams. The Block Noise process will be used.

● Note: Default is OFF

|------------4------------- **Image Settings - Video Setup - Noise Reduction - Sharpness Noise Coring**

Adjust the clarity after Noise Reduction was applied to the video signal. Can be set to "High", "Medium", "Low", "Adaptive" or "OFF". The Mosquito Noise will be used.

● Note: Default is OFF

|--------3-------- **Image Settings - Video Setup - Film Mode**

This function will analyze the resolution and frames per second information in the video feed and determine how to process/display each frame correctly (to avoid judder and staggering playback), also referenced as "pull down method". This option should be chosen to secure that the video feed is at maximum quality and performance. 2:2 is suitable for PAL/SECAM signals, while 2:3 is suitable for NTSC signals. 2:2-2:3 will try to conform to both standards and may be suited in some cases for mixed incoming video feeds. 3:2 film enables sequences of 24 Hz original film content and convert this to an output of 48 Hz or 72 Hz vertical refresh rate. This feature reduces the noticeable uneven judder seen on a 3:2 film sequence that is converted to 60 Hz vertical refresh rate.

Set to either; "2:2", "3:2", "3:2-2:2" or "OFF".

● Note: Default is OFF

|--------3-------- **Image Settings - Video Setup - DCDi**

DCDI® BY Faroudja low-angle Diagonal interpolation. In addition to the advanced de-interlacing capabilities mentioned in the previous sections, further image enhancement is achieved by applying special processing to a moving low angle diagonal pattern in a video image. For motion video, the intra-field interpolation is done using the patented and highly acclaimed DCDI® (Directional Correlational De-Interlacing) algorithm by Faroudja®. Conventional Interpolation algorithms operate on the basis that the current pixel is related to the pixels above and below it. This is untrue of diagonal edges. Whenever an edge is not vertical, the way the current pixel depends on the angle of the edge is related to those diagonally above and below it. Hence, conventional vertical Interpolation algorithms work well on edges close to the horizontal and vertical directions. However, they will break down completely as the angles of edges become more diagonal, causing jagged edge artifacts. DCDi® by Faroudja computes and tracks the angles of edges and uses this information to optimally fill in the missing pixels, removing jagged edge artifacts.

Set to either "ON" or "OFF".

● Note: Default is OFF

OSD Menu Functions

Color Mode Settings

Lets you adjust the color temperature (Kelvin degrees) of the image. This applies to the Main Source signal. Window overlays (PIP/PBP) and the OSD Menu overlay will be unaffected. Lower values make the image appear warmer, while higher values will make it appear cooler. The contents of these submenus are listed below.

Illustration (does not appear in menu): The Kelvin color temperature scale (approximate and symbolic):

1800K	4000K	5500K	8000K	12000K	16000K

|---2--- **Color Mode Settings - Color Temperature**

- "9300K" Cool, a blueish white.
- "8000K" Neutral, a white close to natural light
- "6500K" Warm white.

|--------3-------- **Color Mode Settings - Color Temperature - User** *Available in "Advanced" and "Service" mode only

Allows individual adjustment of Red, Green and Blue color gains. The selected setting will be saved for each signal input respectively.

- Note: Value adjustable from 0 to 255. 128 is factory default.

|---2--- **Color Mode Settings - Gamma** *Available in "Advanced" and "Service" mode only

This will activate the stored gamma curve color compensation as well as the LED indicators or backlight brilliance used with ECDIS. Set to either "No Calibration", "Calibration VGA", "Calibration DVI" or "Calibration DisplayPort", where these represents the two storage locations for compensation data. When either of them are active, they will override the color temperature setting for the signal channel. Different signal channels can be set to different settings that will be saved.

This function is suitable for use with external equipment. Color temperature will be disabled.

- Note: Default is "No Calibration" with Gamma 2.2 and 140nits.

|---2--- **Color Mode Settings - Color Domain** *Available in "Advanced" and "Service" mode only

- "RGB Range"
- "YUV Full Range"
- "YUV Limit Range"

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Multi-PIP Settings

Lets you adjust how the Picture-in-Picture (PIP) or Picture-by-Picture (PBP) display modes are set up. The default position of the rectangle is set to the upper left corner of the Active Display area. Note that this requires a valid incoming signal to be present in any of the "DVI", "DisplayPort", "VGA" or "Composite" inputs. The contents of these submenus are listed below.

Note: The highest resolution supported for PIP and external signals are 1920 x 1080. Example: PIP does not support an external signal of 3840 x 2160 (4K).

Valid combinations of Picture-in-Picture (PIP) and Picture-by-Picture (PBP):
Gray = Same. Red = Not possible. Green = OK.

Main >	DVI1	DVI2	VGA1	VGA2	Composite1	Composite2	Composite3	DisplayPort
Second								
DVI1	Gray	Green	Red	Green	Green	Green	Green	Green
DVI2	Green	Gray	Green	Red	Green	Green	Green	Green
VGA1	Red	Green	Gray	Red	Green	Green	Green	Green
VGA2	Green	Red	Green	Gray	Green	Green	Green	Green
Composite1	Green	Green	Green	Green	Gray	Red	Red	Green
Composite2	Green	Green	Green	Green	Red	Gray	Red	Green
Composite3	Green	Green	Green	Green	Red	Red	Gray	Green
DisplayPort	Green	Green	Green	Green	Green	Green	Green	Gray

|---2--- **Multi-PIP Settings - PIP Mode**

Settings as follows:
"PIP OFF" = Function is inactive and other settings can not be accessed.

"PIP Child"	The Secondary Source will be displayed in a small frame as an overlay over the Main Source signal. When this function is activated a new menu item will appear under "PIP Mode" called "PIP Display". Known as "Picture-In-Picture (PIP).
"PIP Split"	The Main Source and Secondary signal sources are shown side-by-side with the Main Source to the left and the Secondary Source to the right. **Note:** Both sources will be stretched to fill screen. If aspect ratio is needed, consider PIP Wide function below, or set the sources to match 50% resolution of the native display. Example: If native TFT panel has 1920 x 1024 resolution, sources must be set to 960 (wide) x 512 (height) to appear correctly (aspect ratio).
"PIP Wide"	The Main Source and Secondary signal sources are shown side-by-side in widescreen mode with the Main Source to the left and the Secondary to the right. Aspect Ratio of souce signals are preserved.

● Note: Default is OFF

OSD Menu Functions

|---2--- **Multi-PIP Settings - PIP Display**   ***Available only when PIP Mode on**

When PIP Child mode is active, the size and position of the rectangle displaying the Secondary Source can be adjusted via the submenus below. Secondary Source needs to be a valid signal source.

|--------3-------- **Multi-PIP Settings - PIP Display -- PIP Child Size**

Settings as follows:

"PIP Size"   = Adjust the full size (H and V) for Secondary Source, values from 1 to 9. Factory Default is 9.

"PIP H-Size"   = Adjust the Horizontal size for Secondary Source, values from 0 to 20. Factory Default is 10.

"PIP V-Size"   = Adjust the Vertical size for Secondary Source, values from 0 to 20. Factory Default is 10.

● Note: Default value for all 3 functions is 0.

|--------3-------- **Multi-PIP Settings - PIP Position**

When PIP Child mode is active, the size and position of the frame displaying the Secondary Source can be adjusted by means of submenus for size and position respectively below.

Settings as follows:

"PIP H-Position"   = Adjust the Horizontal (left/right) position for Secondary Source, values from 0 to 100. Factory Default is 50.

"PIP V-Position"   = Adjust the Vertical (up/down) position for Secondary Source, values from 0 to 100. Factory Default is 50.

|---2--- **Multi-PIP Settings - Swap Source**

Swaps the Main and Secondary source signals (if present) including adjustments you may have made, meaning that whatever is in Main Source will become the contents of the defined PIP rectangle, and contents of the PIP rectangle to become full screen.

● Note: You can also assign the Swap Source to the Hotkeys. Review "OSD Settings - Hot Key Assignment / Swap Source" section later in this manual.

● Note: Switch time between Main and Secondary source is ~5 sec.

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OSD Menu Functions

Multi-PIP Settings - PIP Picture

When PIP mode is active, the picture appearance of the Secondary Source can be adjusted via the following settings:

Settings as follows:

"Brightness"   = Adjust the black level (brightness) of the Secondary Source, values from 0 to 255. Factory Default is 128.

"Contrast"   = Adjust the contrast of the Secondary Source, values from 0 to 255. Factory Default is 128.

"Saturation"   = Adjust the overall color intensity of the Secondary Source, values from 0 to 255. Factory Default is 128.

"Hue"   = Adjust the Hue color properties of the Secondary Source, values from 0 to 255. Factory Default is 128.

"Sharpness"   = Adjust the sharpness of the Secondary Source, values from 0 to 24. Factory Default is 12.

OSD Menu Functions

OSD Miscellaneous

Allows you to customize the visual appearance of the On Screen Display (OSD) menu, such as; position, transparency, time-out, assign hot keys, define access modes and save, load and recall favourite settings and more. The contents of these submenus are listed below.

|---2--- **OSD Miscellaneous - OSD Position**

Settings as follows:

"OSD H. Position"   = Place the OSD menu overlay Horizontally (left/right),
                                          values from 0 to 255.

"OSD V. Position"   = Place the OSD menu overlay Vertically (up/down),
                                          values from 0 to 255.

● Note: Default position of the OSD menu overlay is in the lower left corner of the of the Active Display area. Default value for both functions is 255.

|---2--- **OSD Miscellaneous - Language**

Available OSD language to be used for all text and warnings that may appear.

Settings as follows:

"Norsk"   = Display OSD in Norwegian.
"English"   = Display OSD in English.
"Français"   = Display OSD in French.
"Deutsch"   = Display OSD in German.
"Italiano"   = Display OSD in Italian.
"日本語"   = Display OSD in Japanese.
"簡體中文"   = Display OSD in Simplified Chinese.

● Note: Current selected language is shown in green color. Default language is English.

|---2--- **OSD Miscellaneous - Preset Save**

Allows you to work with Memory Preset Save (Recall/Save/Load) for OSD menu settings and overlays.

The contents of the submenu is listed below.

Settings as follows:

"Recall"   = Reset back to factory defaults. Will override and restore all previous
                            modified settings.

OSD Menu Functions

|--------3-------- `OSD Miscellaneous - Preset Save - Save`

Allows you to save current state of all function and values to user defined presets. The contents of the submenu is listed below.

Settings as follows:

"User 1"	= Save all OSD settings to User 1 slot.
"User 2"	= Save all OSD settings to User 2 slot.
"User 3"	= Save all OSD settings to User 3 slot.
"User 4"	= Save all OSD settings to User 4 slot.
"User 5"	= Save all OSD settings to User 5 slot.

|--------3-------- `OSD Miscellaneous - Preset Save - Load`

Allows you to load current state of all function and values to user defined presets. The contents of the submenu is listed below.

Settings as follows:

"User 1"	= Load all OSD settings from User 1 slot.
"User 2"	= Load all OSD settings from User 2 slot.
"User 3"	= Load all OSD settings from User 3 slot.
"User 4"	= Load all OSD settings from User 4 slot.
"User 5"	= Load all OSD settings from User 5 slot.

|---2--- `OSD Miscellaneous - OSD Timeout (Sec)`

Adjust the timeout in seconds that the OSD menu overlay is automatically exited and hidden from view including locking mode (see OSD Lock Mode/Advanced Mode on next page). This timeout is counted from last activity (navigation or adjusting parameters). The value is adjustable from 0 to 30 seconds.

● Note: Default timeout value is 10 seconds.

|---2--- `OSD Miscellaneous - OSD Transparent`

Adjust the alpha blend also known as transparency of the OSD Menu overlay. It means that all signal inputs and PIP/PBP images show through the OSD Menu. It is used when important information on the display is necessary to be visible at all times.

● Note: Level adjustable from 0 to 7. 0 is factory default (no transparency/solid background color).

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OSD Menu Functions

|---2--- **OSD Miscellaneous - OSD Mode**

Configuring the OSD Menu access based on most common functions to service/troubleshooting.

Settings as follows:

"Basic" = A few functions is not visible/available in this state. For most uses this is the preferred setting and are safe for the display functionality and continuous trusted operation on the unit.

"Advanced" = All functions and parameters is visible/available in this state. Some of the settings adjusted could impact on display functionality and image quality. Only experienced and qualified personnel should access and change parameters when in this mode. Also, more technical details about signals, frequency will be available.

"Service" = Only applicable for authorized service personnell. Key code is available from Hatteland Technology service network / HelpDesk.

- Note: Learn how to navigate and enter the correct code, by reading the "OSD Keycode / OSD Lock Mode" introduction section in the previous chapter.
- Note: When requesting "Advanced" mode from "Basic" mode, the user is required to enter a key code. This code is factory preset to "362". You can enter the code by using navigation and "MENU" to confirm. After a successful entering of the key code, the OSD menu will always be in this state during powered on. After a power off and on to the unit, the OSD Mode will be reverted back to "Basic" mode.

|---2--- **OSD Miscellaneous - OSD Lock Mode** *Available in "Advanced/Service" mode only*

To prevent accidental or unwanted user intervention, you can set the behaviour of how the OSD menu is accessible by the user including adjusting brightness via the "(-) Brilliance (+)" symbols. Normally by factory default accessible by pressing the "MENU" function on the front (user controls).

Settings as follows:

"Normal Mode" = Default accessible pop-up by touching the "MENU" symbol. For Non-ECDIS Compliant usage.

"Menu Protect" = Ask for key code first (321) when the "MENU" symbol is touched on the front glass and before the OSD menu will appear. Required for ECDIS Compliance usage.

"Full Protect" = When activated: You will have to press the "MENU" symbol for 5 seconds after which the key code requester will appear. Note that only the "MENU" symbol will activate the password request, all other touches on other symbols are ignored. After key code was entered and accepted, the OSD menu will appear in which case you have **"x"** seconds to use brilliance and power functions before all functions are deactivated again and returns to "Advanced Mode".

"x" value is defined as OSD Timeout value (see previous page).

- Note: Learn how to navigate and enter the correct code, by reading the "OSD Keycode / OSD Lock Mode" introduction section earlier in this chapter.

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OSD Menu Functions

OSD Miscellaneous - Hot Key Assignment *Available in "Advanced/Service" mode only*

Assign a commonly used OSD menu function to the available touch enabled Hot Keys which are located on the front of unit (user controls). The following functions are available to assign and most of them have a negative and positive counting logic. All of these functions are described before and after this segment in the manual.

Settings as follows (for both "Key 1" and "Key 2"):

"OSD Language" = Flip up/down through available languages (real-time changes).
Reference in user manual: "OSD Settings / Language"

"Test Pattern" = Display the internal test image overriding any signal inputs. Both Hot Keys performs the same action.
Reference in user manual: "Service Settings / Test Pattern"

"Swap Source" = Swap the Main Source and Secondary Source appearance. Both Hot Keys performs the same action.
Reference in user manual: "Input Source Settings / Swap Source"

"Graphic Scaling" = Flip up/down through the scaling methods available.
Reference in user manual: "Management Settings / Graphic Scaling / Graphic Scaling"

"PIP Mode" = Flip up/down through the PIP/PBP functions. Note: Only when PIP is active. Does not work for Fullscreen.
Reference in user manual: "Multi-PIP Settings / PIP Mode"

"Second Source" = Flip up/down through the available signal sources (to PIP/PBP) for Second Source.
Reference in user manual: "Multi-PIP Settings"

"Main Source" = Flip up/down through the available signal sources (to full screen) for Main Source.
Reference in user manual: "Multi-PIP Settings"

"PIP Child Size" = Increase/Decrease the size of the Picture-In-Picture overlay.
Reference in user manual: "Multi-PIP Settings / PIP Display / PIP Child Size"

"Brightness" = Increase/Decrease Brightness of the TFT panel (not backlight).
Reference in user manual: "Image Settings / Brightness"

"No Function" = Nothing will be activated when user presses Hot Keys on the front. Both Hot Keys performs the same action.

● Note:Default Hot Keys are assigned to "No Function". You can assign different functions to "Key 1" and "Key 2".

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OSD Menu Functions

|---2--- **OSD Miscellaneous - OSD Key Outdoor   *Available in "Advanced/Service" mode only**

To prevent accidental activation of Glass Display Control™ (GDC) touch functions, you can add an extra layer of security on how "sensitive" the touch detection operates. This applies for "MENU", "(-) Brilliance (+)" and "Power Off" functions. The OSD Key Outdoor function is especially effective if the unit is located where handheld UHF radio is commonplace or in a outside environment where rain drops could potentially trigger touch button functions. Note that this setting does not apply for fullscreen sized touch screen glasses.

The OSD Key Outdoor function has an added UHF protection for the uC (FW) Firmware version 0A27 and higher. When OSD Key Outdoor is ON, it will continuously detect for UHF frequencies and try to block these.

Settings as follows:

"Off"   = All touch symbols operates normally. Factory Default setting.
"On"   = Touch symbols responds when you press and hold it for 5 seconds*

*Button presses will then operate normally until it has detected no button presses for 6 seconds (timeout period). After timeout period the OSD Key Outdoor setting will revert back to 5 seconds "press and hold" behaviour.

For more information, please review appendix chapter "UHF Interference Prevention" later in this manual

|---2--- **OSD Miscellaneous - Spectrum**

Function only applicable for customized solutions.

● Note: Adjustable from 0 to 512. 0 is factory default.

|---2--- **OSD Miscellaneous - Keep OCM Mode   *Available in "Service" mode only**

If signal input is not detected or disconnected, the unit will enter Deep Sleep Mode. In this mode, no MCC commands are processed if sent to unit. If MCC commands are needed, simply set the "Keep OCM Mode" function to "ON". The unit will now respond to MCC commands, even without any detected signal input or signal cable connected to unit.

Additionally, when function is chosen to be "Off", the GDC symbols (Brightness, GDC buttons) on front will automatically fade away after 10s inactivity detected on incoming signal (signal lost, connected computer shutdown, cable detached etc.). If function is chosen to "On", the GDC symbols will illuminate constantly.

Settings as follows:

"Off"   = Factory Default setting, will enter Deep Sleep Mode. No MCC commands are processed (ignored). GDC symbols (Brightness, GDC buttons) on front will automatically fade away after 10s.

"On"   = Disables the Deep Sleep Mode and enables detection and processing of MCC commands. GDC Symbols will not fade away.

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OSD Menu Functions

Management Settings

Allows you to adjust overall settings for interaction/communication for the unit, such as scaling, zoom, timing of signals, sensitivity for the touch control, VGA filter and Serial/Ethernet communication and more. The contents of these submenus are listed below.

|---2--- **Management Settings - Graphic Scaling**   ***Available in "Advanced" mode only**

Allows you to scale the currently displayed full screen signal in various ways. The contents of the submenus is listed below.

|--------3-------- **Management Settings - Graphic Scaling - Graphic Scaling**

All scaling will performed from center of active display area and outwards in all directions.

Settings as follows:

> "Full Screen"   = Zoom current full screen signal to fill the entire active display area. Aspect ratio is ignored, which means that picture may appear distorted or stretched.
>
> "Fill to Aspect Ratio" = Zoom current full screen signal to fill the entire active display area and preserve the aspect ratio. This means that you may notice black bars without any image information either on top/bottom or left/right of the centered image.
>
> "One To One"   = Zoom current full screen signal to fill the entire active display area as 1:1 native pixel resolution. Example; if the incoming signal is a 800x600, on a 1600x1200 unit, the incoming signal will be shown 50% less in size and centered on screen. Aspect ratio is kept unchanged.

|--------3-------- **Management Settings - Scaling - Zoom**

All zooming will performed from center of active display area and outwards in all directions.

Settings as follows:

> "Zoom"   = Zoom the current full screen signal horizontally and vertically in equal steps. Values from 0 to 100.

> ● Note: Values under or over 50, may cause blurry and unfocused imagery, since it overrides the external signal's 1.1 pixel information and properties. Factory Default value is 50.

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OSD Menu Functions

|--------3-------- **Management Settings - Graphic Scaling - Horizont Stretch**

All stretching will performed from center of active display area and outwards in one direction.

Settings as follows:

"Horizont Stretch" = Zoom/stretch current full screen signal in Horizontal direction only (left and right). Values from 0 to 100.

● Note: Values under or over 50, may cause blurry and unfocused imagery, since it overrides the external signal's 1.1 pixel information and properties. Factory Default value is 50.

|--------3-------- **Management Settings - Graphic Scaling - Vertical Stretch**

All stretch will performed from center of active display area and outwards in one direction.

Settings as follows:

"Vertical Stretch" = Zoom/stretch current full screen signal in Vertical direction only (up and down). Values from 0 to 100.

● Note: Values under or over 50, may cause blurry and unfocused imagery, since it overrides the external signal's 1.1 pixel information and properties. Default value is 50.

|---2--- **Management Settings - Auto Adjustment**

Allows you to let the video controller always perfom a Automatic Adjustment based on the detected properties in the incoming signal or when incoming signal sources changes it's properties real time. It will scale and position incoming signal sources that has changed since the last detection was executed successfully. Set to either "ON" or "OFF".

● Note: This function is the same as the manual function found in "Image Settings - Auto Position" earlier described. Default value is "OFF".

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OSD Menu Functions

|---2--- **Management Settings - Unknown Timing Search   *Available in "Advanced" mode only**

Use this if you are unable to find or detect the incoming full screen signal automatically (applies for Analog VGA and CVBS video signals only. A PIP or PBP configured signal is not supported). It may be a customized signal regarding resolution and refresh frequency. In these situations the custom signal sources can be searched upon or entered manually within the OSD menu and even stored conveniently. The contents of these submenus are listed below.

|--------3-------- **Management Settings - Unknown Timing Search - Auto Mode**

Try to determine the incoming signal by automatic detection routines which is based on a known list of properties for resolutions and frequency combinations that fall out, but between the most common industry standard set of resolutions/refresh frequencies.

Settings as follows:

"Display Size"   = Force the Aspect Ratio to either to 4:3, 5:4, 1:1, 16:9 or 16:10

"Execute"   = Choose to produce timing table, update the "Blind Mode Data" and refresh the screen condition using the data of the timing table. If this procedure seem to fail, use the "Blind Mode" below to enter values manually.

|--------3-------- **Management Settings - Unknown Timing Search - Blind Mode**

If you know the advanced properties of the incoming signal or want to troubleshoot a possible detected signal (that seem to have small deviations), you may try to adjust the values below and see the result in real time. These settings should be performed by a skilled technician or a individual that has the needed knowledge to do so. Internally these settings below are saved into a data register called "Timing Table".

Settings as follows:

"H. Resolution"   = Set the Horizontal resolution of the timing table. Values from 0 to 2000.
"V. Resolution"   = Set the Vertical resolution of the timing table. Values from 0 to 2000.
"Total H. Line"   = Set the Total Horizontal Lines of the timing table. Values from 0 to 2000.
"H. Blank Pixels"   = Set the Horizontal Start of timing table, (sync pulse + back porch). Values from 0 to 500.
"V. Blank Pixels"   = Set the Vertical Start of timing table, (sync pulse + back porch). Values from 0 to 500.
"Execute"   = Choose to produce timing table and refresh the screen condition using the data of the timing table.

● Note: You may experience fast, slow flickering or sliding lines during adjustments. This is normal, and gives the indication that a different setting may have to be adjusted also, since all these functions are connected to each other in order to create a stable signal that the video controller can display correctly.

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OSD Menu Functions

|--------3--------   **Management Settings - Unknown Timing Search - Save Timing**

The current "Timing Table Data" that is currently visible in the "Blind Mode" or via the "Auto Mode" functions may now be saved to a user defined slot. Available save slots from 1 to 8. Saving "Time Table Data" may prove to be useful until the external equipment is either replaced or changed. If so, you should use the "Clear Timing" function below to remove any obsoleted "Timing Table Data" from time to time. Factory Default save slot is 1.

|--------3--------   **Management Settings - Unknown Timing Search - Clear Timing**

Will allow you to clear "Timing Table Data" currently saved / or not saved, based on the "Save Timing" function above. You may clear save slots 1 to 8. Factory Default slot is 1.

|---2---   **Management Settings - GDC Sensitivity**   ***Available in "Advanced" mode only***

The touch enabled symbols known as GDC (Glass Display Control™) available on the front glass of the unit can be adjusted in sensitivity. It basically means that a small value requires a larger area to be covered longer over time, while a large value will require less smaller area to be covered in less time. If you set the value too low or too high, you may feel a difference in either increased responsiveness or the lack of such. By factory default the value is set to 150.

Settings as follows:

"GDC Sensitivity"   = Adjust values from 0 to 255.

- Note: Default is model dependent and set by factory. Note that the difference between 0 and 100 is minimal, as it is not suitable to go beyond a fair responsiveness that could cause accidental triggering of functions to occur by nearby objects touching the glass (i.e. rain drops for instance, washing glass with cloth).

- Caution: If the sensitivity value was set very low, you may experience a increased occurence of non-responsiveness which also affects accessing the correct menu function in order to re-adjust this value. It is therefore suggested as a last resort solution to reset this value via SCOM (Serial/Ethernet Communication) functionality instead by sending a "Reset Factory Default" (or "Load User Default"+Slot Number, if available and previously stored by using "Save User Default"+Slot Number) commands if you are unable to navigate the OSD menu.

  Please review the appropriate Technical User Manual located here:
  https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm

|---2---   **Management Settings - Filter**   ***Available in "Advanced" mode only***

Filter (applies for VGA1 signal input only) is a Signal Noise Reduction technique to enhance a possible weak or bad RGB/VGA signal. It will remove certain types of noise patterns typically apparent in close proximity of other electronic equipment with less or lack of proper shielding to prevent interference.

Settings as follows:

"Filter"   = Set to either "Enable" or "Disable".

- Note: Default is "Disable"

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OSD Menu Functions

Management Settings - Communication   ***Available in "Advanced" mode only**

The unit allows for remote control (adjust brightness for example) and/or accessing internal information about the unit such as typenumber, serial number and more. To setup this feature, you first need to configure the Serial, Ethernet or USB protocol properly to match your external equipment specifications. The contents of the submenus is listed below.

Settings as follows:

"RS232" = Sets the internal communication to standard RS-232 protocol.

"2-wire RS-485" = Sets the internal communication to RS-485 protocol (Half duplex).

"4-wire RS485/422" = Sets the internal communication to RS-485/422 protocol (Full duplex).

"Address RS" = Set the global unique channel/port ID for the unit (range 0-254).

"IP Address" = IP can be found Automatically or you can set the IP address manually (xxx.xxx.xxx.xxx) for Ethernet protocol by choosing "Fixed IP".

"USB" = Sets the internal communication to standard USB protocol.

"Enable RS232 FW" "Download" = Allows Factory Firmware upgrade for the unit via RS-232 Serial Communication.

● Note: Default mode is "RS232" protocol.

A more detailed description of the SCOM (Serial/Ethernet Communication) can be found here:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.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.

OSD Menu Functions

|---2--- **Management Settings - Power Plan**   *Available in "Advanced" mode only

This setting will allow you to control the power mode of USB/VGA out and Ethernet port in Power off mode.

Settings as follows for "VGA Out/USB in Off Mode":

"Enable"　　　　　　　= Enabled in power off mode.
"Disable"　　　　　　　= Disabled in power off mode.

● Note: Factory Default set to "Enable"

Settings as follows for "LAN in OFF/Sleep Mode":

"Enable"　　　　　　　= Enabled in power off mode.
"Disable"　　　　　　　= Disabled in power off mode.

● Note: Factory Default set to "Enable"

|---2--- **Management Settings - Touch Power Enabled**   *Available in "Advanced" mode only

This setting will allow you to filter the signal processing from touch screen to reach the computer. For instance, if user only want touch screen to be active when DisplayPort signal is defined as Main Input, but disallows touch screen processing on other signal inputs, the non-touch screen enabled signal inputs would require the user to operate elements on screen either with keyboard, mouse or just for information purposes only with no user interaction possible via touch screen.

Settings as follows:

"Always Active"　　　= Touch is always enabled, even if there are no image on screen. Display unit may be powered off, but require power cable connected as well as a powered on computer. Signals from touch screen will still reach the computer.

"Any signal is On"　　= Touch is enabled when any input is active as Main Input.

"Select signal is On"　= Following list and Choices available:
    "Digital 1"　　　　　= Touch is enabled only when DVI 1 is active as Main Input.
    "Digital 2"　　　　　= Touch is enabled only when DVI 2 is active as Main Input.
    "Analog RGB 1"　　= Touch is enabled only when VGA is active as Main Input.
    "Analog RGB 2"　　= Touch is enabled only when VGA is active as Main Input.
    "Composite 1"　　　= Touch is enabled only when Composite 1 is active as Main Input.
    "Composite 2"　　　= Touch is enabled only when Composite 2 is active as Main Input.
    "Composite 3"　　　= Touch is enabled only when Composite 3 is active as Main Input.
    "DisplayPort"　　　= Touch is enabled only when DisplayPort is active as Main Input.

● Note: Factory Default set to "DisplayPort"

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OSD Menu Functions

Management Settings - External Power Button   *Available in "Advanced" mode only

This setting will allow you to manually enable the use of an external power button to turn off the Display unit. Please review the Pinout Assignments (Potmeter Control 9-pin DSUB MALE Connector) for connectivity.

Settings as follows:

    "Enable"   = Key press from External power button detection enabled.
    "Disable"   = Key press from External power button detection disabled.

    ● Note: Factory Default set to "Disable"

Management Settings - DDC/CI Setting   *Available in "Advanced" mode only

This setting will allow user to enable and set which signal input where DDC/CI display control communication will occur. For more information about DDC/CI, please review the "Operation Advanced (DDC/CI) Control Overview" chapter in this manual.

The possible choices are: "Digital 1" (DVI), "Digital 2" (DVI), "Analog RGB 1" (VGA), "Analog RGB 2" (VGA), "DisplayPort 1" (DP) and "None".

    ● Note: Factory Default set to "None"

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OSD Menu Functions

Service Settings

Will show various technical and unit related information, such as; Firmware versions, Elapsed Time, Internal Temperature, Fault Status and activation for the internal Test Pattern image useful for trouble-shooting. Some of these functions are static information while others are accessible. Whenever you are in contact with helpdesk or service, they might require you to read back some of these values in order to precisely pinpoint any problem/question you should have with the unit or its functionality.

Information blocks as follows:

"Video Scaler Firmware"   = Displays the firmware version of the internal videocontroller. Example: "FW200001-0BV2"

"uC Firmware"   = Displays the firmware version of the touch enabled buttons. Example: "FW100002-0A12"

"Elapsed Time"   = Shows the time elapsed in hours since first-time power on. Example: "180"

"Current Temp"   = Shows the internal temperature measured by onchip sensor. Example: "+027.0 C", in Celcius Degrees.

"Fault Status"   = Will show detected Fault Status by measuring various internal values. Status is stated as either "OK" or "FAULT" Note: This item is only visible in "Advanced" menu mode.

|---2---   **Service - Fault Status**   *Available in "Service" mode only*

Will show detected Fault Staus by measuring various internal values during operation. Status is stated as either "OK" or "FAULT". The contents of this submenu is listed below.

Fault Status as follows:

"NVRAM"   = Status for Non-volatile random-access memory, used to store parameters and settings.

"Ethernet"   = Status for Ethernet/LAN communication chip controller.

"GDC"   = Status for Glass Display Control™ (GDC) touch button controller.

"TMP Sensor"   = Status for internal temperature measured by on-chip sensor.

"Video Scaler"   = Status for on-board Digital Visual Interface graphics chip processor.

OSD Menu Functions

|---2--- | **Service Settings - Test Pattern**

Will show the internal test pattern with greyscales, colors and raster patterned boxes to check for deviations in the TFT panel/display controller behaviour. It is independent of any current resolution or specifications found in the signal inputs. The test pattern is generated internally in the display controller and is sent 1:1 directly to the TFT panel. It can be useful during trouble-shooting situations to determine the source of a display or connectivity problem regarding external equipment.

To activate this function, touch the "MENU" button.
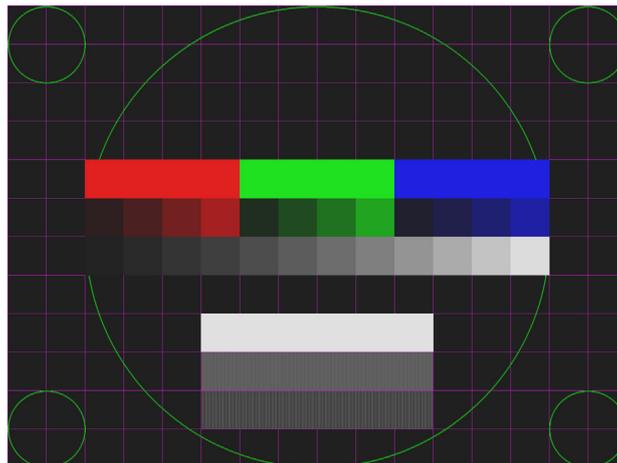
● Note: This function will not inform/report any deviations directly, you need to have the required technical expertise to interpret the test pattern displayed.

|---2--- | **Service Settings - Burn In**   *Available in "Service" mode only

Used to Warm up the panel with full-screen solid color. For internal testing purposes only.
Please contact your nearest Hatteland Technology or Service Partner before using this setting.

|---2--- | **Service Settings - Smart ISP**   *Available in "Service" mode only

Used for Video Scaler firmware update. For experienced personell only, please contact Hatteland Technology or Service Partner for more information.

|---2--- | **Service Settings - Watchdog Test**   *Available in "Service" mode only

Used for internal testing only. For experienced personell only, please contact Hatteland Technology or Service Partner for more information.

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Serial/Ethernet/USB Communication (SCOM) Interface

Introduction

This document defines the electrical interface, serial data format, and communication protocols of the Serial Communication Control Interface (SCOM). The purpose of this interface is to enable a computer application to control one or more units. Unit refer to display product. Interface configuration done within OSD Menu.

Serial / USB Interface Configuration

The serial / USB interface can have different configurations defined as follows:

RS-232	One computer controls one unit, no individual address
USB	One computer controls one unit, no individual address
4-wire RS-485/RS-422	One computer controls units, each with individual address.
2-wire RS-485	One computer controls units, each with individual address.

Each unit will be assigned with an address value before it is connected to a shared network. The user application (PC) can send the message to the specific unit by marking the message with corresponding address number. The unit which has the matching address will respond immediately, while the others keep silent.

Broadcast commands will be processed by all linked units simultaneously once the last byte of the message is received. In order to avoid confliction on bus, each unit should respond back at different times. As the units are working independently, they can hardly know how many units are linked in the same bus. In this case, the interval between receiving message and responding back should be calculated in the base of their own address. The lowest addressed unit will respond first.

To calculate the address based interval, there is a formula to calculate the interval (Te):

Te = (Tr +Lr) * N, where
Lr = length of the ACK/NAK message response
Tr = Response time
N = the total number of monitors

Response time Tr is a fixed value which are calculated to make sure there is no conflict on the bus. Principally, Tr is equivalent to 2.5 byte periods after the last byte of a command message is received. However, due to the difference in microcontroller clock, all the units may not finish the message receive at the same timing point. So the Tr should be calculated based on the jitter changes.
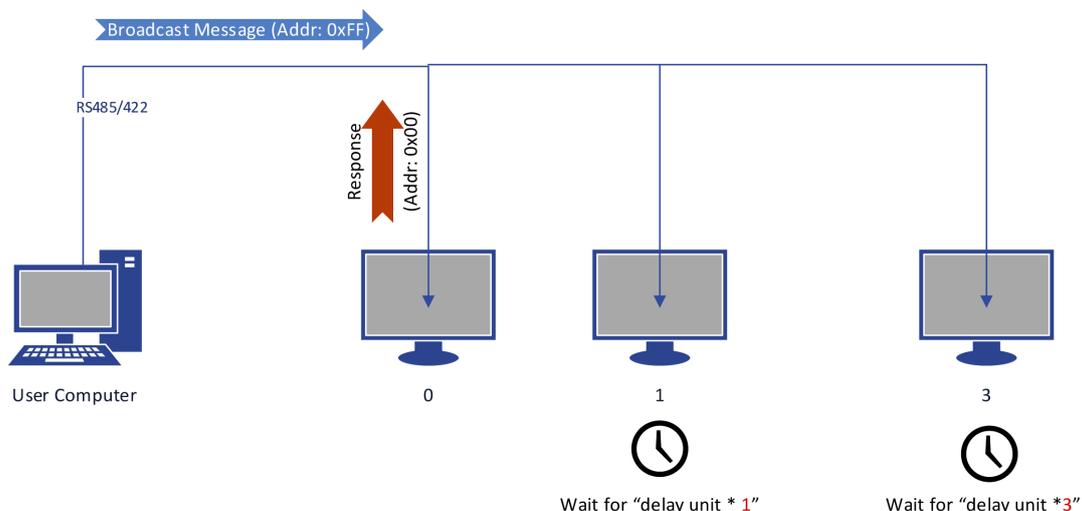
Illustration: Broadcast Message: Timing 1

Serial/Ethernet/USB Communication (SCOM) Interface

Broadcast Message (Addr: 0xFF)

RS485/422

Response (Addr: 0x01)

User Computer

0   1   3

Wait for "delay unit * 2"

Illustration: Broadcast Message: Timing 2

RS485/422

Response (Addr: 0x03)

User Computer

0   1   3
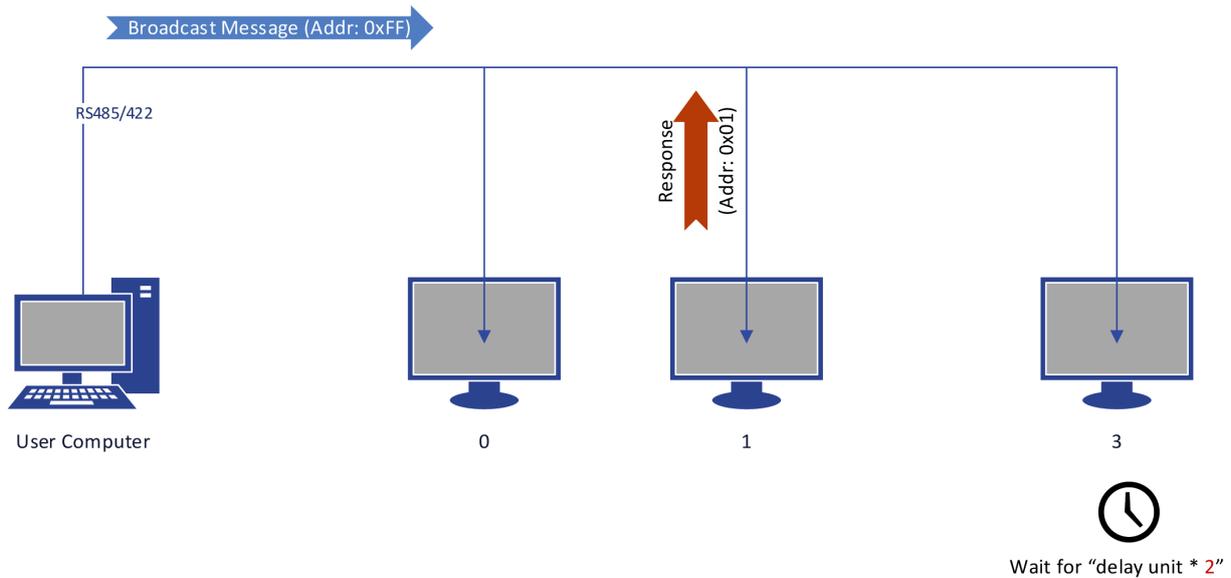
Illustration: Broadcast Message: Timing 3

User computer is linked with three units via the RS485 bus. These three units are assigned in address: 0, 1, 3. At the beginning, User computer broadcast a message to all connected units. Assuming all of them finish receiving at the same time, then the address '0' unit will respond with no latency. The other two units with higher address, stay silent until the calculated delay expires.

For the user computer, there is also a formula to calculate the interval between broadcast message. After the previous message was sent, the next message should not be issued until:

$Tc = Te\_max + Tg$, where
$Te\_max = Max(Te)$
$Tg =$ the receiving time of 5 bytes.

For example, a test computer connects 8 units on bus, the interval between broadcast messages is calculated as:

$Tc = (Tr + Lr) * 8 + Tg$.

2

Serial/Ethernet/USB Communication (SCOM) Interface
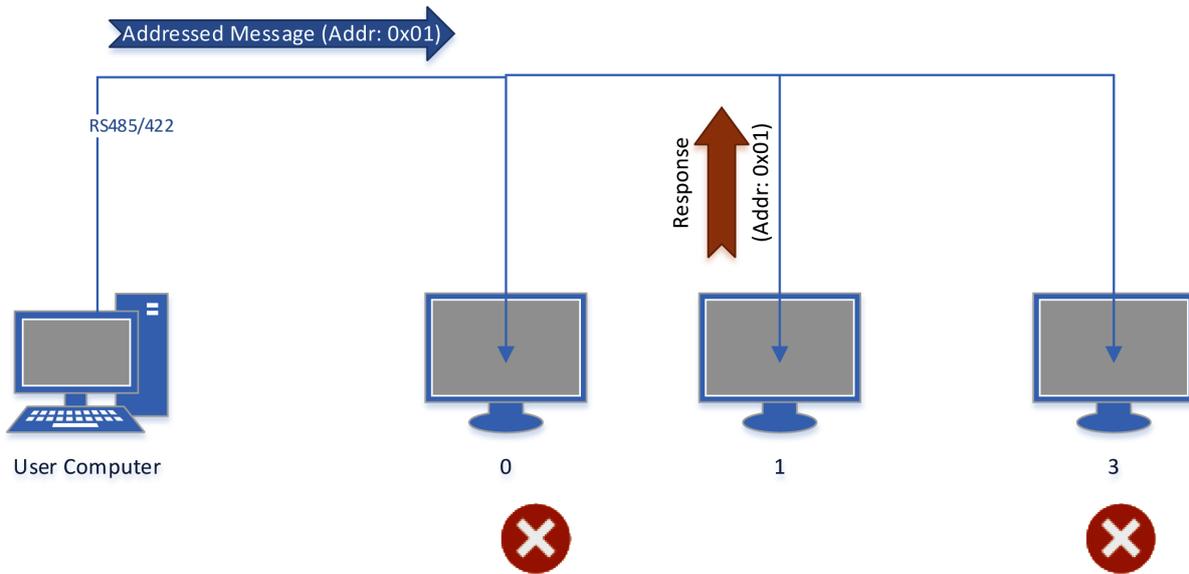
Illustration: Addressed Message

In the scenario that user computer sends out the message to specific address, the unit which owns the matching address will respond immediately, while the other keep silent.

Ethernet Interface Configuration

The Ethernet/LAN/Network interface are selected by the OSD menu. The configuration is defined as follows:

Ethernet	One computer controls units via Automatic IP or Fixed IP through port 10001. IP address for the computer must be on the same subnet as the internal set IP of the unit. The local software firewall on computer, router or network system must accept communication in/out on port 10001 (open port).

The SCOM message contained in TCP is the same as the one used in RS232/485/422.

Check the section later in this manual "C# / Pseudo Ethernet/TCP Code example".

Cables

Serial Mode: A cable with an overall shield terminated at the back shell should be used.
Ethernet Mode: A CAT-5, CAT-6 cable capable of 10/100/1000Mbps bandwidth transmissions.
USB Mode: A USB Type A-A (male-male) cable, less than 5meters is recommended.

Electrical Interface

Electrical signals shall conform to RS-485, RS-422, RS-232, USB or Ethernet standards. Only Receive Data, Transmit Data, and Signal Ground are used. The same conditions apply for both Serial mode 4-wire (Full Duplex) and 2-wire (Half Duplex), and will just be referred to as RS-485 in this document. Hardware handshake is only supported by loopback handshake for RS-232.

Serial/Ethernet/USB Communication (SCOM) Interface

- Compatible connectors (as listed on datasheets):
- SCOM RS-422/485   : Terminal Block Connector 3.81, non-isolated
- SCOM RS-232   : D-SUB 9P (female), non-isolated
- SCOM Ethernet   : RJ45 (female)
- SCOM USB   : USB 2.0 (Type A, female)

Multiple access:
NXP Firmware : FW1000002-0A25

Video Scaler Firmware:
- Series X G2 MMD models: FW200001-0BV8

- Series X MVD Series Video Scaler Firmware Overview
- 32" and 55" with DP/HDMI/DVI/VGA inputs   : FW300001-0A59
- 32",43",55" with 4 digital inputs: - 43"   : FW400002-0A12
- 32",43",55" with 4 digital inputs: - 32"   : FW400002-1A12
- 32",43",55" with 4 digital inputs: - 55"   : FW400002-2A12

This means, for example, that while using Ethernet through a RJ-45 port to communicate with unit, users can now also at the same time communicate via RS-232 port simultaneously. Only limitation is for RS-422 and RS-485 at the same time which is not possible.

Reference:

https://www.hattelandtechnology.com/product-notifications/firmware-update-affecting-series-x-g2-mmd-displays-15-to-27-inch-1

For models having older firmware as described above, the selection of active communication must be set via the OSD menu setting item: "Management Settings - Communication". This will only allow 1 connection at the same time through the defined connector.

Serial/Ethernet/USB Communication (SCOM) Interface

For Pin Out assignments, please review the following diagrams that covers all units and connector types:
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.

10-pin RS-422 / RS-485 Module w/Buzzer

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

"RS-422/RS-485 SCOM + Buzzer" (Internal Buzzer can be controlled externally).

Pin 1,3,5,7 = RS-485 Full Duplex (4-wire)
Pin 5,7 = RS-485 Half Duplex (2-wire)

Buzzer - External Drive Logic:
• Able to supply 12VDC+-5%@100mA
• Short circuit protected at <500mA
• <50VDC from ground of Display unit (Our input is isolated, this is layout limitation)
• Our input is classified as signal input, not power.

Notes:
Unit may have several physical connectors available for Buzzer control. Please only use RS-232 or RS-485 pins to control Buzzer, not both at the same time.

Series X (G1 - Generation 1):
• External drive logic can drive the buzzer even when the Display Unit is off.

Series X (G2 - Generation 2) / MVD Series:
• Display Unit needs external power connected to turn buzzer on. (Any logic power state).

PIN 01	RxD+	Receive Data Positive
PIN 02	GND	Ground
PIN 03	RxD-	Receive Data Negative
PIN 04	+5V	+5V Out
PIN 05	TxD+	Transmit Data Positive
PIN 06	BUZ-	Buzzer Control Negative
PIN 07	TxD-	Transmit Data Negative
PIN 08	BUZ+	Buzzer Control Positive
PIN 09	GNDR	Ground 100Ω
PIN 10	GND	Ground

10-pin RS-422 / RS-485 Module w/Buzzer

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Suggested "Buzzer" Control Logic inside Computer/System. Display Unit needs external power connected to turn buzzer on. (Any logic power state).

To ensure that EMC requirements are met, we recommend that the cable is screened and screen is terminated/grounded at both ends with as short as possible pig tail. For Military/Naval use: +12V line from customer system should be low pass filter or else the power ripple may cause radiated emission to fail. Use a cable that contains at least 2 wires (not 2 single wires). Test connection (beep) with Voltage Meter. Wires may be combined if using RS-422/485 COM as well.

Internal Side | **External Side**

+12V

Logic Control

NPN Transistor Rating: 500mA

GND

Connect T.Block to upper row

Pin "6"   Pin "8"

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

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

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 USB2.0 TYPE A Female

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

PIN 01	VCC +5V	Power - 500 mA, 2,5 W
PIN 02	D-	Negative Data
PIN 03	D+	Positive Data
PIN 04	GND	Ground

9-pin Serial COM RS-232+Buzzer non-isolated, DSUB Male

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

RS232-Wake On Ring is not enabled.

Buzzer - External Drive Logic:
• Able to supply 12VDC+-5%@100mA
• Short circuit protected at <500mA
• <50VDC from ground of Display unit (Our input is isolated, this is layout limitation)
• Our input is classified as signal input, not power.

Series X (G1 - Generation 1):
• External drive logic can drive the buzzer even when the Display Unit is off.

Series X (G2 - Generation 2) / MVD Series:
• Display Unit needs external power connected to turn buzzer on. (Any logic power state).

Notes:
Unit may have several physical connectors available for Buzzer control. Please only use RS-232 or RS-485 pins to control Buzzer, not both at the same time.

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 2 wires (not 2 single wires). Heat Shrink Tubes must be applied to soldered wire/pins. Test connection (beep) with Voltage Meter. Wires may be combined if using RS-232 COM as well.

PIN 01	BUZ+	Buzzer Control Positive IN
PIN 02	TxD	Transmit Data
PIN 03	RxD	Receive Data
PIN 04	DTR	Data Terminal Ready
PIN 05	GND	Ground
PIN 06	DSR	Data Set Ready
PIN 07	RTS	Request To Send
PIN 08	CTS	Clear To Send
PIN 09	BUZ-	Buzzer Control Negative IN

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Suggested "Buzzer" Control Logic inside Computer/System:
Internal Side | **External Side**

+12V

Logic Control

NPN Transistor Rating: 500mA

GND

Pin 1 on your Connector

Pin 1   Pin 9

9-pin DSUB Male
Note Orientation!

Add Back Shell

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Serial/Ethernet/USB Communication (SCOM) Interface

SCOM Introduction
The SCOM commands specified in this document are of the same structure as older versions of Hatteland Technology SCOM commands for other products. This format will be explained in the following sections.

Data Rates
The unit is configured to transmit and receive data at 9600 bits/second (Serial mode) or via standard Ethernet 10/100/1000Mbps connection through port 10001.

Data Format Serial Mode
Data shall be transmitted with no parity, 8 data bits, one start bit and one stop bit. XON/XOFF flow control should be switched off/disabled.

Message Format
The basic message format shall be as follows:

Byte #	0	1	2	3	4	5	6	7	8 or 7+DATA=END
	ATTN	ADDR	CMD	CMD	CMD	LEN	IHCHK	DATA	IDCHK

The minimum message size is 7 bytes (0x07). The maximum message size is 82 bytes (0x52), consistent with the EN61162-1 standard. Colors will be used throughout this manual to indicate byte positions. Every byte sent are viewed in this document as HEX values and are based on standard characters in the ASCII table (0 to 255) to send or receive messages in a human readable input/output. No further decoding or decrypting functionality is needed or required. Every command sent and received are always ended with a 0x00 (null byte terminator).

Byte 0 is sent first then the rest of the bytes follow, there is no handshake during this transmissions. Bytes are sent as fast as possible.

ATTN

Attention (ATTN)
This single byte is used to identify a start of message. 3 values are possible:

ATTN	Description
0x07	Command, also known as ASCII BELL
0x06	Acknowledge, also known as ASCII ACK
0x15	Negative Acknowledge, also known as ASCII NAK

A device sends a command using the 0x07 Attention Code. The unit will respond to the command with either an ACK if the command completed successfully, or a NAK if the command failed. The unit also replies with a NAK if the command was not understood, invalid or unsupported. If a command description doesn't state differently then with NAK attention code the unit will return received data. The unit will ignore any message that doesn't start with Command attention code.

NOTE: A complete HEX, ASCII, BIN and Character table overview are available in the APPENDIX chapter.

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ADDR

Address (ADDR)
This single byte is used to specify a particular unit to receive a Command and to identify the unit responding (ACK or NAK) to a Command. All units will support the broadcast address. The factory default adress is 0x00, while in this manual illustrated throughout as 0xFF. Only in use when in RS-485/RS-422 mode. Otherwise 0xFF shall be used.

The Address field shall have the following values:

ADDR	Description
0xFF	Broadcast - Addressed to all units
0x00 to 0xFE	Address of a specific unit, 0 to 254 (max 255 units)

CMD

Message Commands and Queries (CMD) Contents
The command can be one of the following values and consists always of 3 bytes in positions 2,3,4:
See page 3

LEN

Data Length (LEN)
This single byte defines the length of DATA in the message in bytes. The maximum value for this field is 74 bytes (0x4A in HEX). The minimum value is 0 bytes (0x00 in HEX).

IHCHK

Inverse Header Checksum (IHCHK)
This single byte is a simple 8-bit checksum of the header data, message bytes 0 to 5 on which a bit-wise inversion has been performed. The checksum will be initialised to 0. The 8-bit sum (without carry) of bytes 0, 1, 2, 3, 4, 5 and 6 will be 0xFF (255 in value). If the unit receives a message with an incorrect checksum, the unit will reply with the attention code set to NAK and no data field.

DATA

Data Field (DATA)
The bytes is the DATA field which will only be transmitted if LEN is greater than 0. This field depends on the CMD transmitted.

IDCHK

Inverse Data Checksum (IDCHK)
This single byte will only be transmitted if LEN is greater than 0. This is a simple 8-bit checksum of the data field, message bytes 7 to 7+(LEN-1) on which a bit-wise inversion has been performed. The checksum will be initialised to 0. The 8-bit sum (without carry) of bytes 7 through 7+LEN inclusive will be 0xFF. The receiver will reply to any message that the checksum has failed with the attention code set to NAK. Basically this byte is located at the very end of a received stream.

NOTE: A complete HEX, ASCII, BIN and Character table overview are available in the APPENDIX chapter.

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Message Commands and Queries (CMD) Contents

Byte 2	Byte 3	Byte 4	ASCII	Description	I/O	Non-Volatile / Volatile
0x42	0x52	0x49	BRI	Minimum Brightness	R/W	NV
0x42	0x52	0x4D	BRM	Maximum Brightness	R/W	NV
0x42	0x52	0x54	BRT	Brightness Control	R/W	V
0x42	0x52	0x4C	BRL	GDC LED Brightness Control	R/W	NV
0x42	0x52	0x55	BRU	User Brightness Control	R/W	NV
0x47	0x4D	0x42	GMB	GDC minimum brightness	R/W	NV
0x47	0x42	0x46	GBF	Keypad Brightness auto follow	R/W	NV
0x4C	0x49	0x53	LIS	Read Ambient Light Sensor	R	
0x4F	0x44	0x4D	ODM	Outdoor Mode	R/W	NV
0x52	0x45	0x43	REC	Recall GDC	W	
0x50	0x4F	0x54	POT	Potential Meter Control	R/W	NV
0x42	0x5A	0x5A	BZZ	Buzzer Control On/OFF	R/W	V
0x53	0x57	0x49	SWI	Read NXP Firmware Version	R	
0x53	0x57	0x56	SWV	Read Video Scaler Firmware Version	R	
0x54	0x59	0x50	TYP	Read Type Number	R	
0x53	0x4E	0x42	SNB	Read Serial Number	R	
0x53	0x43	0x49	SCI	Write Customer Service ID	W	NV
0x43	0x53	0x49	CSI	Read Customer Service ID	R	
0x45	0x54	0x43	ETC	Elapsed Time Counter Query System	R	
0x4D	0x41	0x4E	MAN	Read Manufacture ID Code	R	
0x54	0x4D	0x50	TMP	Read Temperature Sensor	R	
0x56	0x45	0x52	VER	Inquiry specific Type Number	R	
0x46	0x57	0x56	FWV	Inquiry Firmware Versions	R	
0x43	0x42	0x52	CBR	COM1&2 Port Baudrate	R/W	NV
0x42	0x41	0x4B	BAK	Turn on/off acknowledge on broadcast command	R/W	NV
0x44	0x4C	0x4E	DLN	Download ECDIS Package	R	
0x44	0x4C	0x3F	DL?	Request Number of available ECDIS Pack	R	
0x43	0x41	0x4C	CAL	ECDIS calibrated brightness inquiry	R	
0x52	0x43	0x46	RCF	Recall Factory default	W	
0x50	0x57	0x52	PWR	Power On/Off/Sleep unit	W	
0x56	0x55	0x52	VUR	Read User Configuration from Video Scaler	R	
0x56	0x55	0x53	VUS	Write User Configuration to Video Scaler	W	
0x07	0xFF	0x4D	MOD	Operation Mode Selection	R/W	
0x4D	0x43	0x43	MCC	OSD Menu Control Commands + Commands List Table*	R/W	

I/O	**=** R=Read, W=Write.
Volatile	**=** V=The variable values controlled by these commands are cleared at power restart).
Non-Volatile	**=** NV=The variable values controlled by these commands are stored even after power restart.
Page #	**=** Page number in this manual where command is detailed.

*MCC
OSD Menu Control Commands. "MCC" command also features a Query "?" mode, "R" or "r" reset mode to factory default, increase +1 from current value "+" and decrease -1 from current value "-". Details and usage of these commands are available later in this manual.

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SCOM Section: Brightness

In SCOM protocol, there are five brightness related commands, which define the backlight/LED brightness value and their adjustable range.

LCD Brightness   : Full range of LCD backlight.
System Brightness   : Full range of system level brightness.
User Brightness   : Variation range of User level.

- BRI: Minimum backlight brightness.
- BRM: Maximum backlight brightness.
- BRT: Backlight brightness.
- BRU: User backlight brightness.

BRI and **BRM** value define the min & max boundary of the visual backlight brightness. **BRT** gives the global backlight brightness value. However, **BRT** should be the value between **BRI** and **BRM**.

BRU is the user backlight control which presents the user controlled brightness value. This value is linked with potentiometer (when POT is valid). The adjustable scale for BRU value is 0 ~ 255. The corresponding PWM steps behind BRU, is framed by BRI and BRT. The visual variation range for BRU is from BRI to BRT. The BRU steps are scaled down into 255 by the value between BRI and BRT.
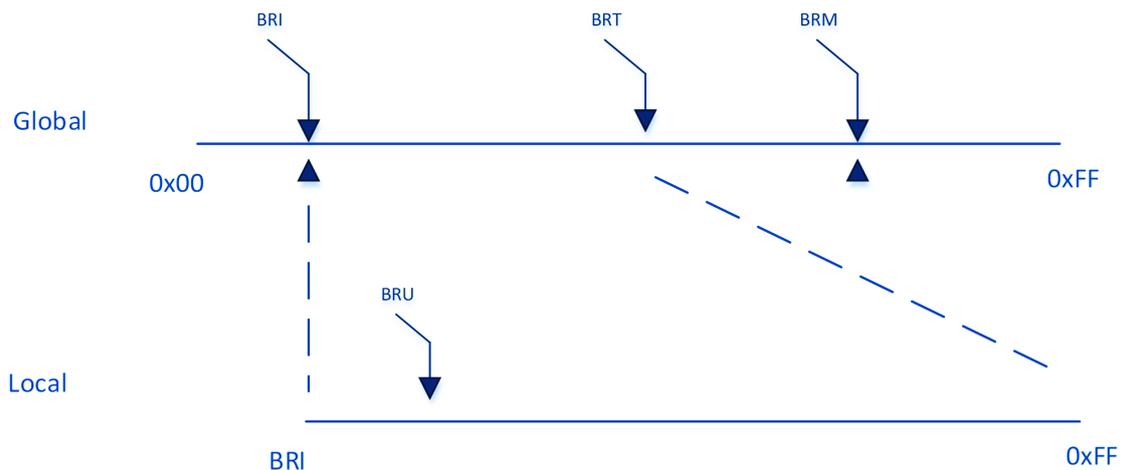
Illustration: Brightness Logic

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"BRI" - Minimum Backlight Brightness

The command is used to set the minimum brightness of backlight. It defines the lower bound of the visual brightness range. For example, if we set BRI to 10%, the minimum achievable brightness is 10% in PWM step curve.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x52	0x49	0x01	IHCHK	Min Brightness	IDCHK

Minimum Brightness: A value describing the minimum backlight brightness.

Range: [0x00-0xFF]
      0x00: is off.
      0xFF: is max brightness.

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (0xFF if no stored value).

Write:
Sets the minimum backlight brightness. The brightness value shall be sent as 1 byte in the DATA field.

Example:
Set 60% BRI:

0x07	0xFF	0x42	0x52	0x49	0x01	0x1B	0x99	0x66

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x49	0x01	0x1C	0x99	0x66

Read:
Read the minimum backlight brightness. The length of data shall be zero.

Example:
Get BRI:

0x07	0xFF	0x42	0x52	0x49	0x00	0x1C

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x49	0x01	0x1C	0x99	0x66

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"BRM" - Maximum Backlight Brightness

The command is used to set the maximum brightness of backlight. It defines the upper bound of the visual brightness range. For example, if we set BRM to 90%, the maximum achievable brightness is 90% in PWM step curve.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x52	0x4D	0x01	IHCHK	Max Brightness	IDCHK

Maximum Brightness: A value describing the maximum backlight brightness.

Range: [0x00-0xFF]
- 0x00: is off.
- 0xFF: is max brightness.

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (0xFF if no stored value).

Write:
Sets the maximum backlight brightness. The brightness value shall be sent as 1 byte in the DATA field.

Example:
Set 60% BRM:

0x07	0xFF	0x42	0x52	0x4D	0x01	0x17	0x99	0x66

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x4D	0x01	0x18	0x99	0x66

Read:
Read the minimum backlight brightness. The length of data shall be zero.

Example:
Get BRM:

0x07	0xFF	0x42	0x52	0x4D	0x00	0x18

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x4D	0x01	0x18	0x99	0x66

"BRT" - Brightness Control

This command controls the display backlight brightness setting. If BRT is 100%, the user can adjust the user brightness (BRU) from 0-100%. If the BRT is set to 60%, the visual brightness is set to 60%. The user can adjust the user brightness (BRU) from 0-100% within the 60% set by BRT. If the user sets the user Brightness to half (BRU=50%), the visual brightness will be 30% (half of 60%). If BRT is set back to 100%, the visual brightness will be 50% (half of 100%).

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x52	0x54	0x01	IHCHK	BRT	IDCHK

BRT: A value describing the brightness.
This command can only be set using SCOM and can not be adjusted directly by press of a button etc.

Range: [0x00-0xFF]
      0x00: is off.
      0xFF: is max brightness.

After unit reset the value is set to: Load BRT value from factory configuration file.
After microcontroller reset the value is set to: Load BRT value from factory configuration file.

Write:
The brightness value shall be sent as one byte in the DATA field. Intermediate values will control brightness over the range from minimum to maximum luminance.

Example:
Set 60% BRT:

0x07	0xFF	0x42	0x52	0x54	0x01	0x10	0x99	0x66

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x54	0x01	0x11	0x99	0x66

Read:
Get the BRT variable. To trigger a BRT read command, the length of the DATA field must be zero. The DATA field in the microcontroller reply will indicate the current brightness control setting.

Example:
GET BRT value:

0x07	0xFF	0x42	0x52	0x54	0x00	0x10

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x54	0x01	0x11	0x99	0x66

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"BRL" - GDC LED Brightness Control

The command is used to set the keypad's LED brightness manually. This can only control the Brightness LED if the GBF command is set to not follow backlight.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x52	0x4C	0x01	IHCHK	Brightness LED	IDCHK

Brightness LED: A value describing the front button LED brightness.

Range: [0x00-0xFF]
> 0x00: is off.
> 0xFF: is max brightness.

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (0xFF if no stored value)

Write:
Sets the button LED brightness. The brightness value shall be sent as 1 byte in the DATA field.

Example:
Set 60% BRL:

0x07	0xFF	0x42	0x52	0x4C	0x01	0x18	0x99	0x66

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x4C	0x01	0x19	0x99	0x66

Read:
Gets the button LED brightness. The length of data shall be zero.

Example:
Get BRL:

0x07	0xFF	0x42	0x52	0x4C	0x00	0x19

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x4C	0x01	0x19	0x99	0x66

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"BRU" - User Brightness Control

This command controls the user brightness control (BRU). If BRT is 100%, the user can adjust the user brightness (BRU) from 0-100%. If the BRT is set to 60%, the visual brightness is set to 60%. The user can adjust the user brightness (BRU) from 0-100% within the 60% set by BRT. If the user sets the user brightness to half (BRU=50%), the visual brightness will be 30% (half of 60%). If BRT is set back to 100%, the visual brightness will be 50% (half of 100%).

Note: BRU read is also open to VS for user brightness inquiry.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x52	0x55	0x01	IHCHK	BRU	IDCHK

BRU: A value describing the brightness. This command can be directly adjusted using buttons.

Range: [0x00-0xFF]
        0x00: is off.
        0xFF: is max brightness.

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (0xFF if no stored value)

Write:

Set the BRU variable. The brightness value shall be sent as 1 byte in the DATA field.

Example:
Set 60% Brightness:

0x07	0xFF	0x42	0x52	0x55	0x01	0x0F	0x99	0x66

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x55	0x01	0x0A	0x99	0x66

Read:

Get the BRU valuable. To trigger a BRU read command, the length of the DATA field must be zero. The DATA field in the microcontroller reply will indicate the current brightness control setting.

Example:
Get BRU value:

0x07	0xFF	0x42	0x52	0x55	0x00	0x10

ACK reply from unit:

0x06	0xFF	0x42	0x52	0x55	0x01	0x0A	0x99	0x66

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SCOM Section: Glass Display Control™ (GDC)
Commands related to configure and control the GDC behaviour.

"GMB" - Buttons Minimum Brightness
This command controls the minimum brightness level of the button LEDs of keypad and GDC system. The BRL level can never be lower than this limit no matter which "GBF mode" it is in.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x47	0x4D	0x42	0x01	IHCHK	Buttons Minimum Brightness	IDCHK

Buttons Minimum Brightness: A value describing the minimum allowed LED brightness level.

Range: [0x00-0xFF]
      0x00: is "No minimum limit".
      0xFF: is "Buttons will always be at max brightness".

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (0x00 if no stored value)

Write:
This command will set the minimum brightness level of the button LEDs. The brightness value shall be sent as 1 byte in the DATA field. If the current level of the button brightness (BRL) is lower than the new GMB value, BRL level must be raised to the GMB level.

Example:
Set GMB 0x01:

0x07	0xFF	0x47	0x4D	0x42	0x01	0x22	0x01	0xFE

ACK reply from unit:

0x06	0xFF	0x47	0x4D	0x42	0x01	0x23	0x01	0xFE

Read:
If the current BRL level is smaller than the GMB level, this command will return the GMB level. If the current BRL level is bigger than the GMB level, this command will return the BRL level. The length of DATA shall be zero.

Example:
Get GMB:

0x07	0xFF	0x47	0x4D	0x42	0x00	0x22

ACK reply from unit:

0x06	0xFF	0x47	0x47	0x4D	0x42	0x01	0x23	0x99*	0x66

*In this example, BRL was bigger than GMB level and thus BRL was returned.

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"GBF" - Keypad Brightness auto follow

This command controls if the keypad brightness level will follow the LCD backlight brightness, follow the brightness sensor, or if the keypad brightness shall be manually set by BRL command. If the GBF command is set to follow the LCD backlight brightness, or the light sensor brightness, the result is scaled by the BRL.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x47	0x42	0x46	0x01	IHCHK	Follow LCD	IDCHK

Follow LCD: A value describing if the Keypad LED brightness will follow the LCD backlight level, brightness sensor or need to be manually updated through BRL command.

Range: Valid levels in table:

0x00	Keypad brightness will be set manually.
0xAA	Keypad brightness will follow brightness sensor.
0xFF	Keypad brightness will follow LCD backlight level.

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (0xFF if no stored value)

Write:
Set value of GBF. The Length of DATA is 1.

Example:
GBF set to follow backlight:

0x07	0xFF	0x47	0x42	0x46	0x01	0x0E	0xFF	0x00

ACK reply from unit:

0x06	0xFF	0x47	0x42	0x46	0x01	0x0F	0xFF	0x00

Read:
To trigger the Read GBF command, the length of DATA must be zero.

Example:
GBF Read Command:

0x07	0xFF	0x47	0x42	0x46	0x00	0x0E

ACK reply from unit:

0x06	0xFF	0x47	0x42	0x46	0x01	0x0F	0xFF	0x00	0x66

*In this example, BRL was bigger than GMB level and thus BRL was returned.

The following 2 pages are notes for the **GBF** command.

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Notes for the "GBF" command

1: Auto Follow LCD backlight level
- Use System brightness (BRI, BRM, BRT) and User Brightness (BRU) to calculate the LCD Brightness Step.
- Find the position in LCD brightness PWM curve and generate proper PWM to LCD.
- Convert the position of LCD PWM curve to Keypad PWM Curve based on gamma.
- Use the converted value to generate proper PWM to keypad.
- GMB defines the low-end saturated value of keypad brightness. BRL defines the high-end saturated value of keypad brightness.

Logic: Keypad brightness (Auto follow LCD brightness)
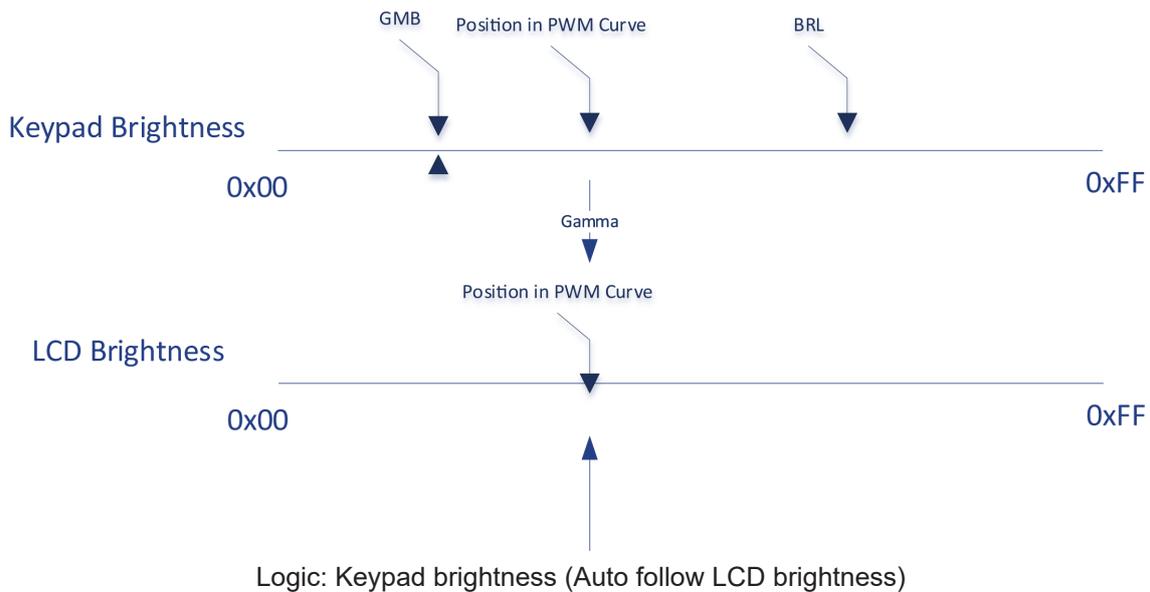
2: BRL Only
- Use System brightness (BRI, BRM, BRT) and User Brightness (BRU) to calculate the LCD Brightness Step.
- Find the position in LCD brightness PWM curve and generate proper PWM to LCD.
- Keypad brightness is independent with LCD brightness.
- Use the BRL value to generate proper PWM to keypad.
- GMB defines the low-end saturated value of keypad brightness. BRL takes effect.

Logic: Keypad Brightness (BRL only)

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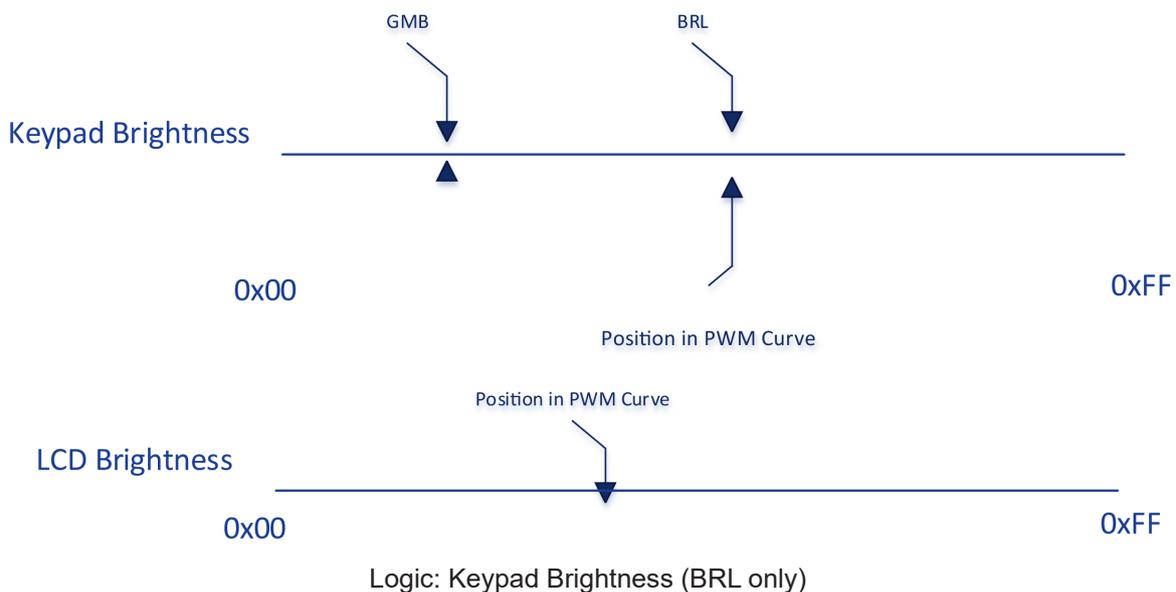
3: Auto follow Light Sensor
- Use System brightness (BRI, BRM, BRT) and User Brightness (BRU) to calculate the LCD Brightness Step.
- Find the position in LCD brightness PWM curve and generate proper PWM to LCD.
- Convert the position of Light sensor value to Keypad PWM Curve based on gamma.
- Use the converted value to generate proper PWM to keypad.
- GMB defines the low-end saturated value of keypad brightness. BRL defines the high-end saturated value of keypad brightness.

Light Sensor value

Light Sensor

0x00   gamma   0xFF

GMB   Position in PWM Curve   BRL

Keypad Brightness

0x00   0xFF

Logic: Keypad Brightness (Light sensor follow)
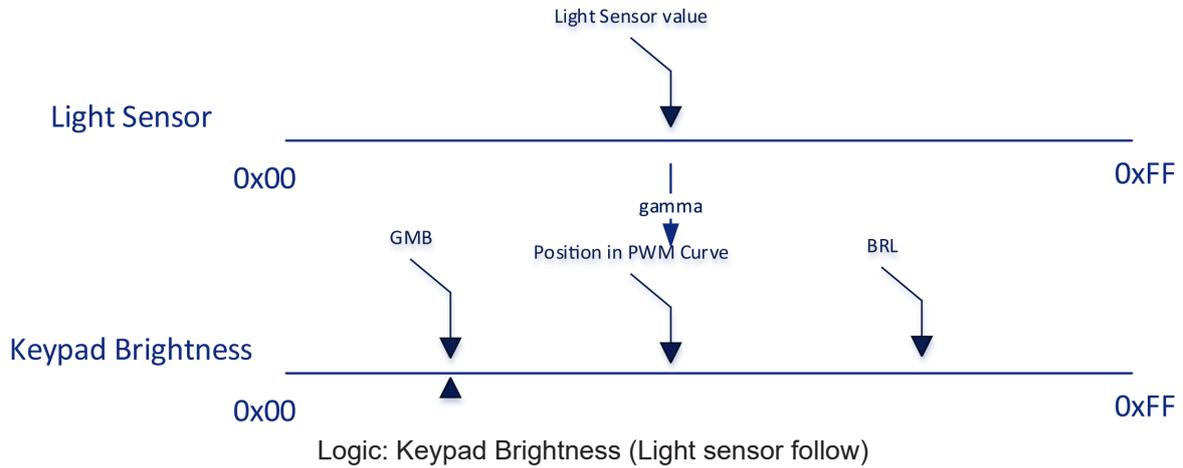
4:
If Light sensor is failing and GBF is set as "Light sensor follow", the position of PWM Curce is set at 0xFF.

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"LIS" - Read Ambient Light Sensor

This command is used to read the value of the ambient light sensor. This value reads the Channel 0 of the ambient light sensor in system with keypad and embedded light sensor of GDC in GDC system.

Example:

Read Light Sensor:

0x07	0xFF	0x4C	0x49	0x53	0x00	0x11

Reply from unit:

0x06	0xFF	0x4C	0x49	0x53	0x02	0x10	0x02	0x34	0xC9

DATA0 = Most Significant Byte.
DATA1 = Least Significant Byte.

Read:

When the LIS command is sent with the data 0x4C, it returns an estimated luminance in lux.

Example:

Read luminance in Lux from Light Sensor:

0x07	0xFF	0x4C	0x49	0x53	0x01	0x10	0x4C	0xB3

Reply from unit:

0x06	0xFF	0x4C	0x49	0x53	0x02	0x10	0x01	0x23	0xDB

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"ODM" - Outdoor Mode

This command shall set the GDC outdoor mode. The outdoor mode will add 5 second delay to the GDC buttons. However this 5s press is not needed again if 5s does not elapse since last button usage (If one button has been held for more than 5s, any button will respond instantly. If there is user absence for more than 5s ODM is activated again).

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x4F	0x44	0x4D	0x01	IHCHK	OUT	IDCHK

OUT: Describes the status of the OUT variable

Range: Valid levels in table:

0x00	Turn off the outdoor mode
0xFF	Turns on the outdoor mode

After unit reset the value is set to: Nothing is stored.
After microcontroller reset the value is set to: Nothing is stored.

Write:
Sets the outdoor mode to on or off.

Example:
Deactivate Outdoor Mode:

0x07	0xFF	0x4F	0x44	0x4D	0x01	0x18	0x00	0xFF

ACK reply from unit:

0x06	0xFF	0x4F	0x44	0x4D	0x01	0x19	0x00	0xFF

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"REC" - Recall GDC

This command will recall the GDC registers to default values.

BRL   = Restored to value in Factory Configuration file.
GMB   = Restore to value in Factory Configuration file.
ODM   = Restore to value 0x00.
POT   = Restore to value 0xFF.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x52	0x45	0x43	0x01	IHCHK	Recall	IDCHK

RECALL:

Range: Valid levels in table:

0xFF	Recalls GDC

After unit reset the value is set to: Nothing is stored.
After microcontroller reset the value is set to: Nothing is stored.

Write:
Sets the outdoor mode to on or off.

Example:

Activate GDC Recall:

0x07	0xFF	0x52	0x45	0x43	0x01	0x1E	0xFF	0x00

ACK reply from unit:

0x06	0xFF	0x52	0x45	0x43	0x01	0x1F	0xFF	0x00

"REC" - Recall GDC

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"POT" - Backlight Control Interface selection

This command is used to select which HW control method will be used in user backlight control (BRU).
The available control methods: SCOM command, GDC keypad and analog potentiometer.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x50	0x4F	0x54	0x01	IHCHK	DATA	IDCHK

DATA: The data field length is only 1.

Range: Valid levels in table:

0x00	Backlight Controlled by SCOM only (Brightness Button on GDC is disabled.).
0xFF	Backlight controlled by SCOM and GDC keypad.
0x0F	Backlight Controlled by POT meter only.
0xF0	Backlight controlled by SCOM, GDC keypad and POT meter.

Write Example:
Write POT configuration:

0x07	0xFF	0x50	0x4F	0x54	0x01	0x05	0x00	0xFF

Reply from unit:

0x06	0xFF	0x50	0x4F	0x54	0x01	0x06	0x00	0xFF

Read Example:
Read POT configuration:

0x07	0xFF	0x50	0x4F	0x54	0x00	0x06

Reply from unit:

0x06	0xFF	0x50	0x4F	0x54	0x01	0x06	0x00	0xFF

Note: If POT is set 0x0F, any BRU write will return NACK.

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SCOM Section: Buzzer

Commands to control the internal Buzzer, or External Buzzer (if available). If External Buzzer is available, commands apply for both internal and external Buzzer at the same time.

"BZZ" - Buzzer Control

This command is used to control buzzer on/off signal. Two modes are available, Single Mode or Cyclic mode. First example below shows Single Operation. Cyclic Operation is explained on next page.

Single Operation (identified in BYTE #5 with 0x01):

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x5A	0x5A	0x01	0x02	Buzzer	IDCHK

Byte #7 (Buzzer): Describes the status of the Buzzer, in this example Single Operation (either 0x00 for OFF, or 0xFF for ON).

Range: Valid levels in table:

0x00	Turn the buzzer off.
0xFF	Turn the buzzer on.

After unit reset the value is set to: 0x00.

Write:
Set the buzzer status.

Example:
Activate Buzzer:

0x07	0xFF	0x42	0x5A	0x5A	0x01	0x02	0xFF	0x00

ACK reply from the unit:

0x06	0xFF	0x42	0x5A	0x5A	0x01	0x03	0xFF	0x00

Read:
Get the buzzer status. Length of DATA must be zero.

Example:
Get Buzzer Status:

0x07	0xFF	0x42	0x5A	0x5A	0x00	0x02

ACK reply from the unit (Buzzer is on):

0x06	0xFF	0x42	0x5A	0x5A	0x01	0x03	0xFF	0x00

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Cyclic Operation (identified in BYTE #5 and #7 with 0x03):

Byte #	0	1	2	3	4	5	6	7	8	9	10
	0x07	0xFF	0x42	0x5A	0x5A	0x03	0x00	Buzzer	ON	OFF	IDCHK

With two more bytes after Byte #7 (Buzzer) value, the BZZ command is able to run the defined pattern of ON and OFF cycle.

Byte #7: Describes the status of the Buzzer, in this example Cyclic Operation (0x03)

Buzzer (Byte #7) can be defined as follows:

0x00	Turn the buzzer off.
0xFF	Turn the buzzer on, run defined ON-OFF pattern forever
0x01-0x0F	Turn the buzzer on, run defined ON-OFF pattern for XX cycles and turn off buzzer

After unit reset the value is set to: 0x00
After microcontroller reset the value is set to: 0x00

ON (Byte #8): Define the Buzzer on time in the pattern.
Range values multiplied in milliseconds:

0x00 - 0xFF	On time = ON x 100ms

OFF (Byte #9): Define the Buzzer off time in the pattern.
Range values multiplied in milliseconds:

0x00 - 0xFF	Off time = OFF x 100ms

After unit reset the value is set to: 0x00
After microcontroller reset the value is set to: 0x00

Both ON and OFF has to be set the value larger than 0x00, in order to trigger the ON-OFF-ON Alarm mode. If at least one of them is set to 0x00, the buzzer is constantly on, when BZZ is turned on. If both are set larger than 0x00, the buzzer is turned on periodically, when BZZ is turned on.

Example:
Activate Buzzer: Cyclic operation - Example Repeat Cycles 3 times (0x03) with 200ms (0x02) ON then 100ms OFF (0x01):

0x07	0xFF	0x42	0x5A	0x5A	0x03	0x00	0x03	0x02	0x01	0xF9

ACK reply from the unit:

0x06	0xFF	0x42	0x5A	0x5A	0x03	0x01	0x03	0x02	0x01	0xF9

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SCOM Section: Service

Commands to review Service related information available for the unit.

"SWI" - Main Software Version Query

This query is sent to the unit in order to get the microcontroller software version ID. Length of DATA must be zero. The DATA field will be an ASCII text string indicating the software version. The Maximum length of DATA is 13 bytes.

Example:

Get Software Version:

0x07	0xFF	0x53	0x57	0x49	0x00	0x06

Reply from unit:

0x06	0xFF	0x53	0x57	0x49	0x0D	0x07	0x46	0x57	0x31	0x30
0x30	0x30	0x30	0x32	0x2D	0x30	0x41	0x30	0x31	0x40	

0x??   = Where **??** are HEX value (ASCII chars A-Z, 0-9 + symbols).

"SWV" - Video Scaler Software Version Query

This query is sent to video scaler in order to get the firmware version ID. Length of DATA must be zero. The DATA field will be an ASCII text string indicating the software version. The Maximum length of DATA is 13 bytes.

The SWV command will be forwarded to the video scaler. The microcontroller does not need to process this data other than forwarding request and reply.

Example:

Get Software Version:

0x07	0xFF	0x53	0x57	0x49	0x00	0x06

Reply from unit:

0x06	0xFF	0x53	0x57	0x49	0x0D	0x07	0x46	0x57	0x32	0x30
0x30	0x30	0x30	0x31	0x2D	0x30	0x41	0x30	0x31	0x40	

0x??   = Where **??** are HEX value (ASCII chars A-Z, 0-9 + symbols).

"TYP" - Type/Model Number Query

This query is sent to the unit in order to identify the unit type by its model number / part number. Length of DATA shall be zero. The unit will reply to this command with an ACK attention code. The DATA field should be translated to an ASCII text string which indicates the specified Type/Model Number, e.g: "HD08T30MMDMA1FAGA". The maximum length of the Type Number is 21 bytes. The command should not return bytes with value 0xFF.

Example:

Read Type/Model Number:

0x07	0xFF	0x54	0x59	0x50	0x00	0xFC

Reply from unit:

0x06	0xFF	0x54	0x59	0x50	0x11	0xEC	0x48	0x44	0x30	0x38
0x54	0x33	0x30	0x4D	0x4D	0x43	0x4D	0x41	0x31	0x46	0x41
0x47	0x41	0xA9								

0x?? = Where **??** are HEX value (ASCII chars A-Z, 0-9 + symbols).

"SNB" - Serial Number Query

This query is sent to the unit in order to identify the unit serial number. Length of DATA shall be zero. The unit will reply to this command with an ACK attention code. The DATA field will be set to an ASCII text string to indicate the specified Serial Number, e.g: "123456". The maximum length of DATA is 6 bytes. The command should not return a byte which is 0xFF.

Example:

Command Unit Serial Number:

0x07	0xFF	0x53	0x4E	0x42	0x00	0x16

Acknowledge Type/Model Number example "123456":

0x06	0xFF	0x53	0x4E	0x42	0x06	0x12	0x31	0x32	0x33	0x34
0x35	0x36	0xCA								

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"SCI" - Store Customer Service ID

This command is used to program the Customer Service ID. The maximum length of the DATA field is 16 bytes. All ASCII characters are allowed.

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (All Bytes = 0xFF if not previously stored).

Example:
Write SCI:

0x07	0xFF	0x53	0x43	0x49	0x02	0x18	0x30	0x31	0x9E

ACK Reply from unit:

0x06	0xFF	0x53	0x43	0x49	0x02	0x19	0x30	0x31	0x9E

"CSI" - Read Customer Service ID

This command is used to read the Customer Service ID. The length of DATA is zero bytes.
The command should not return bytes with value 0xFF.

Example:
Read "CSI":

0x07	0xFF	0x43	0x53	0x49	0x00	0x1A

ACK Reply from unit:

0x06	0xFF	0x43	0x53	0x49	0x02	0x19	0x30	0x31	0x9E

"ETC" - Elapsed Time Counter

This command will return the hours the video scaler has been on. The DATA field should be translated to an ASCII text string which shows the elapsed hours.

Example:
Get ETC:

0x07	0xFF	0x45	0x54	0x43	0x01	0x19

ACK reply from unit: "00004" hours:

0x06	0xFF	0x45	0x54	0x43	0x05	0x19	0x30	0x30	0x30	0x30
0x34	0x0B									

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"MAN" - Read Manufacturer data

This command is used to read the Manufacturer ID. The length of DATA is zero bytes. The command always returns "JHD".

The purpose of defining this command is to be compatible with old SCOM command.

Example:

Read "MAN":

0x07	0xFF	0x4D	0x41	0x4E	0x00	0x1D

ACK Reply from unit:

0x06	0xFF	0x4D	0x41	0x4E	0x03	0x1B	0x4A	0x48	0x44	0x29

"TMP" - Read Temperature Sensor

The unit features temperature sensor that measures the temperature inside. The TMP command can be used to read the current sensor temperature. The length of DATA shall be 1 or 2 and contain the following:

Data length is 1, return the value from temperature sensor 0x00

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x54	0x4D	0x50	0x01	IHCHK	TMP	IDCHK

Data length is 2, return the value from assigned temperature sensor

Byte #	0	1	2	3	4	5	6	7	8	9
	0x07	0xFF	0x54	0x4D	0x50	0x02	IHCHK	TMP	NUM	IDCHK

TMP: A value describing the Read Temperature Type.

Range: Valid levels in table:

0x52 = 'R'	Read Current Temperature from on-board Sensor

NUM: Index of Temperature Sensors

0x00	On-board main sensor
0x01~0x0F	Remote sensor

Read Current Temperature:

The unit will reply to this command with an ASCII string indication the temperature in °C, e.g.: "+027.5°C". Read accuracy is ±0.5°C.

Example:

Get Current Temperature:

0x07	0xFF	0x54	0x4D	0x50	0x02	0x07	0x52	0x00	0xAD

ACK reply from unit: "+036.5ºC"

0x06	0xFF	0x54	0x4D	0x50	0x08	0x01	0x2B	0x30	0x33	0x36
0x2E	0x35	0xBA	0x43	0xDD						

"VER" - Read Specific Type

This command is used to read the specific Type segment in Type Number. The returned value is the three characters from pos 8 to 10 in stored Type Number. If there is no type number stored, return 0 byte.

For example, if the type number is "HD55T22MVDMA1AAAAAAA", VER should return "MVD"

The purpose of defining this command is to be compatible with old SCOM command.

Example:

Read "Ver":

0x07	0xFF	0x56	0x45	0x52	0x00	0x0C

ACK Reply from unit:

0x06	0xFF	0x56	0x45	0x52	0x03	0x0A	0x4A	0x48	0x44	0x29

"FWV" - Read Firmware information

This command will be used to read various firmware versions.
The purpose of defining this command is to be compatible with old SCOM command.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x46	0x57	0x56	0x01	IHCHK	FW Type	IDCHK

FW TYPE: Specify the firmware type.

Range: Valid values in table

Device Type	Value	Comment
Microcontroller Firmware	0x00	Same as SWI
Video Scaler	0x01	Same as SWV
Microcontroller Config File	0x02	

Example:

Get Microcontroller Firmware :

0x07	0xFF	0x46	0x57	0x56	0x01	0x19	0x00	0xFF

ACK reply from unit: "00004"

0x06	0xFF	0x46	0x57	0x56	0x05	0x19	0x30	0x30	0x30	0x30
0x34	0x0B									

SCOM Section: Interface
Commands to control the global settings that affects communication/protocol behaviour.

"CBR" - COM Ports Baudrate Configuration
This command is used to configure the baudrate on COM ports. The command will select between RS232 and RS485 port. There are two available options for baudrate: 9600 and 115200.

This command to configure baudrate on:

Byte #	0	1	2	3	4	5	6	7	8	9
	0x07	0xFF	0x43	0x42	0x52	0x02	IHCHK	COM	BAUD	IDCHK

COM: Define the COM Port.

Range: Valid levels in table:

0x00	RS232 Port
0xFF	RS485/422 Port

Baudrate: Define the COM Port's baudrate.

Range: Valid levels in table:

0x00	9600 bps
0xFF	115200 bps

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value.
(All bytes = 0x00 if the type number is not yet programmed)

Write:
Set the COM Baudrate.

Example:
Set RS232 Port to 9600 bps:

0x07	0xFF	0x43	0x42	0x52	0x02	0x20	0x00	0x00	0xFF

ACK reply from unit:

0x06	0xFF	0x43	0x42	0x52	0x02	0x21	0x00	0x00	0xFF

Read:
Get the COM port baudrate status. Length of DATA must be 1.

Example:
Get RS232 Baudrate:

0x07	0xFF	0x43	0x42	0x52	0x01	0x21	0x00	0xFF

ACK reply from unit:

0x06	0xFF	0x43	0x42	0x52	0x02	0x21	0x00	0xFF	0x00

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"BAK" - Broadcast Acknowledgement

This command is used to set turn on/off broadcast acknowledgement of the received message on RS485/422 port. The purpose of adding this command is to simplify the message processing on computer side.

Setting will be changed after sending an answer.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x42	0x41	0x4B	0x01	IHCHK	ONOFF	IDCHK

ONOFF: Enable/Disable ACK on Broadcast messages.

Range: Valid levels in table:

0x00	Broadcast ACK OFF
0xFF	Broadcast ACK ON

After unit reset the value is set to: last stored value.
After microcontroller reset the value is set to: last stored value. (All bytes = 0xFF if the type number is not yet programmed). By factory defaults BAK is set to ON. (Always reply to commands).

Write Example:
Enable Broadcast ACK:

0x07	0xFF	0x42	0x41	0x4B	0x01	0x2A	0xFF	0x00

ACK reply from unit:

0x06	0xFF	0x42	0x41	0x4B	0x01	0x2B	0xFF	0x00

Read Example:
Get Broadcast ACK status:

0x07	0xFF	0x42	0x41	0x4B	0x00	0x2B

ACK reply from unit ACK is off):

0x06	0xFF	0x42	0x41	0x4B	0x01	0x2B	0x00	0xFF

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SCOM Section: ECDIS
Commands for downloading ECDIS Color Table files (if stored in memory and performed by factory).

"DLN" - Download package

This command shall be sent to request a specific data packet stored in the microcontroller. The DATA field shall contain the packet number being requested; the byte in the DATA field represents a hexadecimal word (00 to FF) identifying the block of data to be downloaded. The total number of packets available is found by issuing the "DL?" command.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x44	0x4C	0x4E	0x01	IHCHK	DATA	IDCHK

DATA: The packet number being requested.

If the data checksum and packet number is valid, the microcontroller shall reply to this command with an ACK attention code, the hexadecimal packet number, a separator ('-'), and the ASCII packet data. The maximum DATA field size for a packet of data shall be 32 bytes per message; therefore the DATA field in the reply shall be a maximum length of 32 bytes. The DATA field of the message is not required to be of maximum length (it may be smaller than 32 bytes).

Example:
Requesting package 80 (active ECDIS table):

0x07	0xFF	0x44	0x4C	0x4E	0x01	0x1A	0x50	0xAF

Reply from unit is 1 byte of packet number (0x50), a separator '-' and Human Readable Text 'TEST'

0x06	0xFF	0x44	0x4C	0x4E	0x06	0x16	0x50	'-'	'T'	'E'
'S'	'T'	0x42								

Active ECDIS table is stored first and can be read with only specifying the packed nr. To read from the other tables, another byte is added for table nr. Active ECDIS table is determined by Calibration mode.
The DATA field shall contain the packet number being requested and table nr; the first byte in the DATA field represents a hexadecimal entry (0x00 to 0xFF) identifying the block of data to be downloaded. The total number of packets available is found by issuing the "DL?" command. The second byte in the DATA represents the table nr from 0-x.

Example:
Requesting package 80 of table 1:

0x07	0xFF	0x44	0x4C	0x4E	0x02	0x19	0x50	0x01	0xAE

Reply from unit is 1 byte of packet number (0x50), a separator '-' and Human Readable Text 'TEST'

0x06	0xFF	0x44	0x4C	0x4E	0x06	0x5F	0x50	'-'	'T'	'E'
'S'	'T'	0x42								

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"DL?" - Request Number of packages available

This command is used to request the number of packets available for download. The DATA field of the command shall contain no data when requesting size of active ECDIS.

Byte #	0	1	2	3	4	5	6
	0x07	0xFF	0x44	0x4C	0x3F	0x00	IHCHK

The microcontroller shall reply to this command with an ACK attention code. The number of packets shall be sent as 1 byte in the DATA field of the response. This byte shall indicate the resulting number of packets; a value of 0x00 shall indicate zero packets, while a value of 0xFF shall indicate that there are 255 packets to download.
If there are more tables the DATA field shall contain the table nr from 0-X.
If the Calibration mode is set to "Calibration VGA", the Data field will contain table nr 0.
If the Calibration mode is set to "Calibration DVI", the Data field will contain table nr 1.
If the Calibration mode is set to "Calibration DP", the Data field will contain table nr 2.
If the Calibration mode is set to "Calibration HDMI", the Data field will contain table nr 3
If the Calibration mode is set to "No Calibration", or if the Data table is not present for the selected calibration mode, the microcontroller will reply with a nak.

The number of packets necessary to deliver the entire block of data is defined as:
 # Packets = (Size of Data / (32 bytes per packet - 2 overhead bytes per packet)) rounded up to the nearest whole number.

Examples:
Packets = 3049 bytes / 32 data bytes per packet = 96.6 rounded up to 97 Packets

Example:
Requesting size of table 0:

0x07	0xFF	0x44	0x4C	0x3F	0x00	0x2A

Acknowledge: DL? indicates 4 (0,1,2,3) available packets:

0x06	0xFF	0x44	0x4C	0x3F	0x01	0x2A	0x01	0xFE

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"CAL" - Calibration brightness level

This command inquire the GDC calibration Level. For units that are ECDIS calibrated from factory, the LED pattern (ECDIS) indicates that the backlight/brightness is at calibrated level.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x43	0x41	0x4C	0x01	IHCHK	CAL	IDCHK

CAL: Inquiry Mark.

0x3F	Inquiry the active CAL value

Read:
Get the calibration level. The length of DATA should be is 1 and DATA0 = 0x3F ('?').

Example:
Get calibration level:

0x07	0xFF	0x43	0x41	0x4C	0x01	0xB2	0x3F	0xC0

ACK reply from unit (CAL level is 0xAA):

0x06	0xFF	0x43	0x41	0x4C	0x01	0xB3	0xAA	0x55

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SCOM Section: Factory
Commands related to configuration of global Factory preset.

"RCF" - Recall Factory Configuration
This command will recall the original copy of factory configuration. The user copy of configuration will be replaced and overwritten completely.

Affected Configuration Type:
      1: Brightness.
      2: Backlight & GDC & FAN PWM lookup table.
      3: Buzzer Configuration.
      4: GDC configuration.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x52	0x43	0x46	0x01	IHCHK	Recall	IDCHK

Recall:

Range: Valid levels in table:

0xFF	Recalls factory configuration

After unit reset the value is set to: Nothing is stored.
After microcontroller reset the value is set to: Nothing is stored.

Example:
Activate Factory Configuration Recall:

0x07	0xFF	0x52	0x43	0x46	0x01	0x1D	0xFF	0x00

ACK reply from unit:

0x06	0xFF	0x52	0x43	0x46	0x01	0x1E	0xFF	0x00

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SCOM Section: Power
Commands related to configuration of global Power settings.

"PWR" - Power On/Off/Sleep unit
This command is used to power on/off the unit or put the unit in sleep mode.

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x50	0x57	0x52	0x01	IHCHK	Power	IDCHK

Power:

Range: Valid levels in table:

0x00	Power Off
0x0F	Sleep Mode (Stand by)
0xFF	Power On

After unit reset the value is set to: Nothing is stored
After microcontroller reset the value is set to: Nothing is stored

Write Example:
Power unit:

0x07	0xFF	0x50	0x57	0x52	0x01	0xFF	0xFF	0x00

ACK reply from unit:

0x06	0xFF	0x50	0x57	0x52	0x01	0x00	0xFF	0x00

Read Example:
Ask for power state

0x07	0xFF	0x50	0x57	0x52	0x00	0x00

ACK reply from unit:

0x06	0xFF	0x50	0x57	0x52	0x01	0x00	0xFF	0x00

Note:
> 1: PWR will give response right after the power state change is started. But due to the latency of power up sequence, the new power state may be activated after the command is sent.
>
> 2: Change to the current power state, always return ACK.

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SCOM Section: Video Scaler

Commands related to configuration of the internal Video Controller logic and behaviour including function related to the On Screen Display Menu (OSD).

"VUR" - Read User Configuration from Video Scaler

The command reads the user saved configuration from video scaler. The configuration saves OSD settings. The user configuration table size is 256 bytes.

The read process will be divided into 4 packets (64 bytes in each).

Byte #	0	1	2	3	4	5	6	7	8	9
	0x07	0xFF	0x56	0x55	0x52	0x02	IHCHK	Bank	Packet Number	IDCHK

Bank:

Defines which user-saved configuration are in request. Range: 0~7.

Packet Number:

Defines which packet to be downloaded. Range: 0~3.

Write Example:

Requesting package 0 and bank 0:

0x07	0xFF	0x56	0x55	0x52	0x02	0xFA	0x00	0x00	0xFF

Reply from unit:

0x06	0xFF	0x56	0x55	0x52	0x65	0x98	0x01	0x01	0x00
…	0x00	0x00	0x00	0xFD					

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"VUS" - Store User Configuration to Video Scaler

The command write the user configuration to video scaler. The user configuration table size is 256 bytes.

Note: the command is passed to VS only.
The read process will be divided into 4 packets (64 bytes in each).

Byte #	0	1	2	3	4	5	6	7	8	9	10	...	72	73
	0x07	0xFF	0x56	0x55	0x53	0x42	IHCHK	Bank	Packet Number	0xFF	0x02	…	0x00	IDCHK

Bank:
Defines which user-saved configuration are in request. Range: 0~7.

Packet Number:
Defines which packet to be downloaded. Range: 0~3.

Write Example:
Write package 0 to bank 1

0x07	0xFF	0x56	0x55	0x53	0x42	0xB9	0x00	0x01	0x00	0x02
…	0x00	0xFF								

Reply from unit:

0x06	0xFF	0x56	0x55	0x53	0x02	0xFA	0x00	0x00	0xFF

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SCOM Section: OSD Control Functionality

This command is used to provide remote access to OSD menu and handle the internal communication towards the video scaler.

"MOD" - Operation Mode Selection

This global command is used to select the operation mode of the firmware and affects the commands listed in the "MCC" section on next page. The aim of this function is to provide backwards compatibility for the Series X MMD Generation (G2) models which enables them to receive and respond to SCOM commands and queries like the previous Series X MMD Generation 1 (G1) models. By factory default (unless customer specified) is set to Series X MMD Generation 2 (G2) - GEV2 mode.

Note: Review the differences in the "MCC Commands List" on the following pages for details.
Reference: Engineering Change Notification (ECN):
https://www.hattelandtechnology.com/product-notifications/update-series-x-maritime-multi-display-mmd-firmware-update

GEV1 = Reference to Series X Maritime Multi Display (MMD) - Generation 1 (G1) - HD xxT21xxD models.
GEV2 = Reference to Series X Maritime Multi Display (MMD) - Generation 2 (G2) - HD xxT22xxD models and
           Multi Vision Displays (MVD) - HD xxT22 MVD models.

Format:

Byte #	0	1	2	3	4	5	6	7	8
	0x07	0xFF	0x4D	0x4F	0x44	0x01	IHCHK	DATA	IDCHK

DATA:

The data field length is only 1.
Range: Valid levels in table:

0x00	GEV2 Mode
0x01	GEV1 compatible mode

After unit reset the value is set to: last stored value.
0x00 is the default value.

Write Example:
Write MOD configuration "GEV1 compatible mode"

0x07	0xFF	0x4D	0x4F	0x44	0x01	0x18	0x01	0xFE

Reply from unit:

0x06	0xFF	0x4D	0x4F	0x44	0x01	0x19	0x01	0xFE

Read Example:
Read MOD configuration:

0x07	0xFF	0x4D	0x4F	0x44	0x00	0x19

Reply from unit:

0x06	0xFF	0x4D	0x4F	0x44	0x01	0x19	0x00	0xFF

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"MCC" - OSD Control Functionality

Each MCC command will specify a OSD Command ID in the first data byte. The OSD Command ID represents an OSD menu setting item or internal function.

Byte #	0	1	2	3	4	5	6	7	8	...	7+LEN	8+LEN
	0x07	0xFF	0x4D	0x43	0x43	LEN	IHCHK	Command ID	Data1		Datax	IDCHK

Command ID:
Supported Command ID in video scaler Command list.

Data:
Defines the data of option numbers, inquiry, reset and so on.

Write Example:
MCC Command "OSD Factory Default" (0xCE)

0x07	0xFF	0x4D	0x43	0x43	0x01	0x25	0xCE	0x31

Reply from unit of "1" successfull:

0x06	0xFF	0x4D	0x43	0x43	0x01	0x26	0x01	0xFE

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MCC Commands List

NOTE: A char between the ' ' indicate an ASCII value. Example '1' = 0x31.
A complete HEX, ASCII, BIN and Character table overview are available in the APPENDIX chapter.

Some commands have footnotes, see references at the end of this table. "GEV2" = Series X Generation 2 (G2) models, "GEV1" = Series X Generation 1 (G1) models:
Reference Compatibility: https://www.hattelandtechnology.com/product-notifications/firmware-update-for-32-and-55-inch-products
https://www.hattelandtechnology.com/product-notifications/video-scaler-firmware-update-affecting-series-x-g2-mmd-hm-24-cmd-and-series-1-g2-mmd

Function	Data	Description	GEV2	GEV1	Differences
Brightness control Important: Not to be confused with "BRU" - User Brightness Control command.	0x81, nn | '+' | '-' | 'r' | 'R' | '?'	Set brightness = value / increment / decrement / reset / query	Brightness Range='0''0'~'2''5''5' Default = '1''2''8'	Brightness Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-100 to 0-255
Contrast control	0x82, 'a' | 'A' , nn | '+' | '-' | 'r' | 'R' | '?'	Set contrast = value / increment / decrement / reset / query	Contrast Range='0''0'~'2''5''5' Default = '1''2''8'	Contrast Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-100 to 0-255 Remove the option to configure all input source. All individual input has own settings.
Saturation control	0x83, nn | '+' | '-' | 'r' | 'R' | '?'	Set Saturation = value / increment / decrement / reset / query	Saturation Range='0''0'~'2''5''5' Default = '1''2''8'	Saturation Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-100 to 0-255
Hue control	0x84, nn | '+' | '-' | 'r' | 'R' | '?'	Set Hue = value / increment / decrement / reset / query	Hue Range='0''0'~'2''5''5' Default = '1''2''8'	Hue Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-100 to 0-255
Manual Phase control	0x85, nn | '+' | '-' | '?'	Set dot clock phase = value / increment / decrement / query	Phase Range='0''0'~'2''5''5'	Phase Range='0''0'~'3''F' Default = '3''2'	Value Range changed from 0-100 to 0-255
Image H position	0x86, nn | '+' |'-' | 'r' | 'R' | '?'	Set image Hpos = value / increment / decrement / reset / query	Hpos Range='0''0'~'2''5''5' Default = '1''2''8'	Hpos Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-100 to 0-255
Image V position	0x87, nn | '+' | '-' | 'r' | 'R' | '?'	Set image Vpos = value / increment / decrement / reset / query	Vpos Range='0''0'~'2''5''5' Default = '1''2''8'	Vpos Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-100 to 0-255
Auto Source Select	0x88, n | 'r' | 'R' | '?'	Set Auto Source Select = disable / enable / reset / query	'0' - disable '1' - enable (default)	'0' - disable '1' - enable (default)	Same as GEV1
OSD mode	0x89, n | 'r' | 'R' | '?'	Set OSD mode = full / simple / reset / query	'0' - Advanced (default) '1' - Basic '2' - Service	"0" = Full (default) "1" = Simple	Same as GEV1 Add new option of service menu
Sharpness	0x8A, nn | '+' | '-' | 'r' | 'R' | '?'	Set sharpness = value / increment / decrement / reset / query	Sharpness Range='0''0'~'2''5''5' Default = '1''2''8'	Sharpness Max Range: "0''"0' to "F''"F' Default: "0" "7"	Value Range changed from 0-15 to 0-255
Manual Frequency control	0x8B, nn | '+' | '-' | '?'	Set dot clock frequency = value / increment / decrement / query	Clock Range='0''0'~'2''5''5'	Clock Range ='0''0' to '6''4'	Value Range changed from 0-100 to 0-255
Graphic Scaling	0x8C, n | 'r' | 'R' | '?'	Set image graphic scaling = value / reset / query	'0' - Fill Screen (default) '1' - One To One '2' - Fill to aspect ratio	'0' - Fill Screen (default) '1' - 1:1 '2' - Fill to aspect ratio	Similar/Same as GEV1.

Serial/Ethernet/USB Communication (SCOM) Interface - MCC Commands

Function	Data	Description	GEV2	GEV1	Differences
OSD lock mode	0x8D, n | 'r' | 'R' | '?'	Set OSD mode = normal / lock / reset / query	'0' - normal (default) '1' - FULL Protect '2' - Menu Protect	'0' - normal (default) '1' - FULL Protect '2' - Menu Protect	Same as GEV1
Auto adjustment	0x8F, n | 'r' | 'R' | '?'	Set auto adjust = on / off	'0' - off '1' - on (default)	'0' - off '1' - on (default)	Same as GEV1
OSD H position	0x90, nn | '+' | '-' | 'r' | 'R' | '?'	Set OSD Hpos = value / increment / decrement / reset / query	OSD Hpos Range='0"0'~'2"5"5 Default = '2"5"5	OSD Hpos Range='0"0'~'6"4' Default = '3"2	Value Range changed from 0-100 to 0-255
OSD V position	0x91, n | '+' | '-' | 'r' | 'R' | '?'	Set OSD Vpos = value / increment / decrement / reset / query	OSD Vpos Range='0"0'~'2"5"5 Default = '2"5"5	OSD Vpos Range='0"0'~'6"4' Default = '3"2	Value Range changed from 0-100 to 0-255
OSD Transparency	0x92, nn | '+' | '-' | 'r' | 'R' | '?'	Set OSD transparency = value / increment / decrement / reset / query	OSD transparency Range = '0'~'7' Default = '0'	Range = '0'~'7' Default = '0'	Same as GEV1
Select OSD menu timeout	0x93, nn | '+' | '-' | 'r' | 'R' | '?'	Set OSD menu timeout = value / increment / decrement / reset / query	OSD menu timeout Range = '0"0'~'1"E' Default = '0"A'	OSD menu timeout Range = '0"0'~'1"E' Default = '0"A'	Same as GEV1
Select OSD language	0x95, n | 'r' | 'R' | '?'	Select language = value / reset / query	Language '0' - English (default) '1' - French '2' - German '3' - Italian '4' - Spanish '5' - Japanese '6' - Simplified Chinese '7' - Norwegian	Language '0' - English (default) '1' - French '2' - German '3' - Italian '4' - Spanish '5' - Japanese '6' - Simplified Chinese '7' - Norwegian	Same as GEV1
Filter	0x96, n | 'r' | 'R' | '?'	Select Filter = Enable (on) / Disable (off) / reset / query	'0' - Off (default) '1' - On	'0' - Off (default) '1' - On	Same as GEV1
Main input select	0x98, n | 'r' | 'R' | '?'	Select input main = value / reset / query	0x00 - Digital 1 (default) 0x01 - Digital 2 0x10 - Analog RGB1 0x11 - Analog RGB2 0x20 - Composite 1 0x21 - Composite 2 0x22 - Composite 3 0x30 - DisplayPort1	0x30 - Digital 1 0x31 - Digital 2 0x32 - Analog RGB1 0x33 - Analog RGB2 0x34 - Composite 1 0x35 - Composite 2 0x36 - Composite 3	Different Input ID between GEV1 and GEV2
Communication mode	0x99, n | 'r' | 'R' | '?'	Select Communication mode = value / reset / query	'0' - RS232 (Default) '1' - Ethernet '2' - 2wire RS485 '3' - 4wire RS422 '4' - USB '5' - Enable RS232 FW Download	'0' - RS232 (Default) '1' - Ethernet '2' - 2wire RS485 '3' - 4wire RS422 '4' - Download	Only difference is add new communication mode "USB"
PIP Mode	0x9A, n | 'r' | 'R' | '?'	Select PIP Mode = value / reset / query	'0' - PIP Off (default) '1' - PIP Child '2' - PIP Wide '3' - PIP Split	'0' - PIP Off (default) '1' - PIP Child '2' - PIP Wide '3' - PIP Split	Same as GEV1

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Serial/Ethernet/USB Communication (SCOM) Interface - MCC Commands

Function	Data	Description	GEV2	GEV1	Differences
Gamma value select	0x9D, n | 'r' | 'R' | '?'	Select Gamma value = value / reset / query	Gamma value '0' - No Calibration (default) '1' - Calibration DVI '2' - Calibration VGA '3' - Calibration DP '4' - Calibration Composite	Gamma value '0' - Calibration VGA '1' - Calibration DVI '2' - No Calibration (default)	Different remap of option ID
Power Control	0x9F, n |'?'		'0' - Off '1' - On Map PWR command	'0' - Power Off '1' - Power On	Same as GEV1
Hot Key Assignment	0xA0, '1' | '2', n | 'r' | 'R' | '?'	Set Hot Key = value / reset / query '1' for hot key 1 = '1', n | 'r' | 'R' | '?' '2' for hot key 2 = '2', n | 'r' | 'R' | '?'	'0' - Brightness '1' - PIP size '2' - Main source '3' - Second source '4' - PIP mode '5' - Scaling '6' - Swap '7' - Test pattern '8' - Language '9' - No function (default) 'A' - Analog1 'B' - Analog2 'C' - Digital1 'D' - Digital2 'E' - Composite1 'F' - Composite2 'G' - Composite3 'H' - DisplayPort	'0' - Brightness '1' - PIP size '2' - Main source '3' - Second source '4' - PIP mode '5' - Scaling '6' - Swap '7' - Test pattern '8' - Language '9' - LED drive 'A' - No function (default)	Remove LED drive option in GEV2 Option ID for "No function" is changed to '9' Remove LED drive option in GEV2 Option ID for "No function" is changed to '9' Remove LED drive option in GEV2 Option ID for "No function" is changed to '9' Remove LED drive option in GEV2 Option ID for "No function" is changed to '9' Remove LED drive option in GEV2 Option ID for "No function" is changed to '9'
PIP brightness control	0xA2, nn | '+' |'-' | 'r' | 'R' | '?'	Set PIP brightness = value / increment / decrement / reset / query	PIP window brightness Range='0"0'~'2"5"5' Default = '1"2"8'	PIP window brightness Range='0"0'~'6"4' Default = '3"2'	Value Range changed from 0-100 to 0-255
PIP contrast control	0xA3, nn | '+' |'-' | 'r' | 'R' | '?'	Set PIP contrast = value / increment / decrement / reset / query	PIP window contrast Range='0"0'~'2"5"5' Default = '1"2"8'	PIP window contrast Range='0"0'~'6"4' Default = '3"2'	Value Range changed from 0-100 to 0-255
PIP H position	0xA4, nn | '+' |'-' | 'r' | 'R' | '?'	Set PIP H pos = value / increment / decrement / reset / query	PIP H pos Range='0"0'~'2"5"5' Default = '1"2"8'	PIP H pos Range='0"0'~'6"4' Default = '6"4'	Value Range changed from 0-100 to 0-255
PIP V position	0xA5, nn | '+' |'-' | 'r' | 'R' | '?'	Set PIP V pos = value / increment / decrement / reset / query	PIP V pos Range='0"0'~'2"5"5' Default = '2"5"5'	PIP V pos Range='0"0'~'6"4' Default = '6"4'	Value Range changed from 0-100 to 0-255
PIP window size select	0xA6, n | '+' |'-' | 'r' | 'R' | '?'	Set PIP window size = value / increment / decrement / reset / query	PIP V window size Range = '1'~'7' Default = '7'	PIP V window size Range = '1'~'7' Default = '7'	Same as GEV1

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Serial/Ethernet/USB Communication (SCOM) Interface - MCC Commands

Function	Data	Description	GEV2	GEV1	Differences
Second source select	0xA7, n | 'r' | 'R' | '?'	Select input second = value / reset / query	0x00 - Digital 1 (default) 0x01 - Digital 2 0x10 - Analog RGB1 0x11 - Analog RGB2 0x20 - Composite 1 0x21 - Composite 2 0x22 - Composite 3 0x30 - DisplayPort1	0x30 - Digital 1 0x31 - Digital 2 0x32 - Analog RGB1 0x33 - Analog RGB2 0x34 - Composite 1 0x35 - Composite 2 0x36 - Composite 3	Different Input ID between GEV1 and GEV2
Color Temperature Select	0xB3, n | 'r' | 'R' | '?'	Set Color Temperature = value / / reset / query	Color temperature '0' - '9''3''0''0' - 9300K '1' - '8''0''0''0' - 8000K (default) '2' - '6''5''0''0' - 6500K '3' - 'U''S''E''R' - USER	Color temperature '0' - '9''3''0''0' - 9300K '1' - '8''0''0''0' - 8000K (default) '2' - '6''5''0''0' - 6500K '3' - 'U''S''E''R' - USER	Same as GEV1
Red Level for Selected Color Temperature	0xB4, nn | '+' | '-' | 'r' | 'R' | '?'	Set Red Level = value / increment / decrement / reset / query	Red Gain Range='0''0'~'2''5''5' Default = '1''2''8'	Red Gain Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-32 to 0-128
Green Level for Selected Color Temperature	0xB5, nn | '+' | '-' | 'r' | 'R' | '?'	Set Green Level = value / increment / decrement / reset / query	Green Gain Range='0''0'~'2''5''5' Default = '1''2''8'	Green Gain Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-32 to 0-128
Blue Level for Selected Color Temperature	0xB6, nn | '+' | '-' | 'r' | 'R' | '?'	Set Blue Level = value / increment / decrement / reset / query	Blue Gain Range='0''0'~'2''5''5' Default = '1''2''8'	Blue Gain Range='0''0'~'6''4' Default = '3''2'	Value Range changed from 0-32 to 0-128
Graphic horizontal resolution enquiry	0xB7	Horizontal resolution (in pixels) in 3 digital hex number	'nnn' = horizontal resolution	'nnn' = horizontal resolution	Same as GEV1
Graphic vertical resolution enquiry	0xB8	Vertical resolution (in pixels) in 3 digital hex number	'nnn' = vertical resolution	'nnn' = vertical resolution	Same as GEV1
Graphic horizontal sync frequency	0xB9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	'nnn' = horizontal frequency	'nnn' = horizontal frequency	Same as GEV1
Graphic vertical sync frequency	0xBA	Vertical sync frequency (in units of 0.1Hz) in 3 digit hex number and 1char	'nnnc' = vertical frequency c = 'i' or 'p' Interlace or progressive	'nnnc' = vertical frequency c = 'i' or 'p' Interlace or progressive	Same as GEV1
Set Address RS	0xBB, n|'?'	Set Address RS = value	Address RS Range -'0'~'F'	Address RS Range -'0'~'F'	Same as GEV1
Set IP address	0xBC, n.n.n.n | 'a' | 'A'|'?'	Set fix IP and IP = n.n.n.n (each n range is from '0' to '2''5''5') / Set auto IP, after send this command do AC on/off	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
Auto Position	0xC3	Auto set image position	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
Auto Color Balance	0xC5	Auto set image Color balance	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
Out Door mode	0xCA, '0' | '1' | 'R' | 'r' | '?'	Set the key is delay 5 second/ reset / query	'0' - OFF (default) '1' - ON	'0' - OFF (default) '1' - ON	Same as GEV1
Burn in	0xCC, '0' | '1' | 'R' | 'r' | '?'	Set burn in mode / reset / query	'0' - normal mode (default) '1' - burn in mode	'0' - normal mode (default) '1' - burn in mode	Same as GEV1
Test pattern	0xCD, '0' | '1'	Display test pattern / Go to default state	'0' - normal display '1' - display built in test pattern	'0' - normal display '1' - display built in test pattern	Same as GEV1
OSD Factory Default	0xCE	Reset all parameters defined in OSD menu to default factory values	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1

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Serial/Ethernet/USB Communication (SCOM) Interface - MCC Commands

Function	Data	Description	GEV2	GEV1	Differences
Saving the user default	0xD7, n	Saving all parameter to user default value (n = '1' to '5' correspond to User1 to User5)	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
Loading the user default	0xD8, n	Loading all parameter to user default value (n = '1' to '5' correspond to User1 to Uesr5, and '0' is read Default)	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
Swap Main & PIP	0xE3	Swap main and second source	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
Gamma reset	0xE5	Reset Gamma table value, after send this command do AC on/off	'0' - fail '1' - success	'0' - fail '1' - success	Same as GEV1
GDC Menu Button	0xF7	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release	No Data: Single press+release	Same as GEV1 Add new options to hold and release Same as GEV1 Add new options to hold and release
GDC '>' (down) Button	0xFA	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release	No Data: Single press+release	Same as GEV1 Add new options to hold and release Same as GEV1 Add new options to hold and release
GDC '<' (up) Button	0xFB	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release	No Data: Single press+release	Same as GEV1 Add new options to hold and release Same as GEV1 Add new options to hold and release
GDC '+' (right) Button	0xFC	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release	No Data: Single press+release	Same as GEV1 Add new options to hold and release
GDC '-' (left) Button	0xFD	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release	No Data: Single press+release	Same as GEV1 Add new options to hold and release
Power Plan - VGA buffer and USB in off mode	0x71, n | 'r' | 'R' | '?'	*[1] - See comment	'0' - Disable '1' - Enable (Default)	N/A	New command in GEV2.
Power Plan - LAN in off/sleep mode	0x72, n | 'r' | 'R' | '?'	*[2] - See comment	'0' - Disabled '1' - Enabled (Default)	N/A	New command in GEV2.

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Serial/Ethernet/USB Communication (SCOM) Interface - MCC Commands

Function	Data	Description	GEV2	GEV1	Differences
Touch Power Mode	0x73, n | 'r' | 'R' | '?'		**0xFF - "Always Active" (Default)** 0xFE - "Only active when unit is on and has a valid input signal" 0x00 - "Only active if selected source has a valid input signal" AND Selected Source= "Digital 1". 0x01 - "Only active if selected source has a valid input signal" AND Selected Source= "Digital 2". 0x10 - "Only active if selected source has a valid input signal" AND Selected Source= "Analog RGB1". 0x11 - "Only active if selected source has a valid input signal" AND Selected Source= "Analog RGB2". 0x20 - "Only active if selected source has a valid input signal" AND Selected Source= "Composite 1". 0x21 - "Only active if selected source has a valid input signal" AND Selected Source= "Composite 2". 0x22 - "Only active if selected source has a valid input signal" AND Selected Source= "Composite 3". 0x30 - "Only active if selected source has a valid input signal" AND Selected Source= "DisplayPort1".	N/A	New command in GEV2
External Power Button	0x74, n | 'r' | 'R' | '?'	***[3] - See comment**	**'0' - Disabled (Default)** '1' - Enabled	N/A	New command in GEV2
Picture Direction	0x75, n | 'r' | 'R' | '?'		**'0' - 0 degrees (default)** '1' - 180 degrees	N/A	New command in GEV2
DDC / CI Settings	0x76, n | 'r' | 'R' | '?'		0xFE - Disabled 0xFD - Active Main Source **0xFF - All Active Sources (default)** 0x00 - Follow Digital 1 0x01 - Follow Digital 2 0x10 - Follow Analog RGB1 0x11 - Follow Analog RGB2 0x20 - Follow Composite 1 0x21 - Follow Composite 2 0x22 - Follow Composite 3 0x30 - Follow DisplayPort1	N/A	New command in GEV2

Serial/Ethernet/USB Communication (SCOM) Interface - MCC Commands

Function	Data	Description	GEV2	GEV1	Differences
GDC Button Sensitivity	0x78, nnn | 'r' | 'R' | '?'		Range='0''0''0' ~ '2''5''5'	N/A	New command in GEV2
DVI-I 1 Port Mode	0x7B, n | 'r' |'R' | '?'		'0' - Auto '1' - DVI-D '2' - DVI-A/VGA	N/A	New command in GEV2
DVI-I 2 Port Mode	0x7C, n | 'r' |'R' | '?'		'0' - Auto '1' - DVI-D '2' - DVI-A/VGA	N/A	New command in GEV2
RS Address (extended)	0x7D, n | 0xFF,'r' | 0xFF, 'R' | 0xFF, '?'	*[4] - See comment	Range 0x00 ~ 0xFE	N/A	New command in GEV2
Stretch Horizontal	0x7E, nn | 'r' |'R' | '?'		Range='0''0' ~'1''0''0' Default = '0''5'0'	N/A	New command in GEV2
Stretch Vertical	0x7F, nn | 'r' |'R' | '?'		Range='0''0' ~'1''0''0' Default = '0''5'0'	N/A	New command in GEV2

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Comments to MCC Command table

*[1] Power Plan - VGA buffer and USB in Off Mode:
Enabled:
When this setting is selected and computer is turned off is must enter "Completely off" mode

Off:
When this setting is selected and computer is turned off is must enter "Off" mode.

*[2] Power Plan - LAN in off/Sleep mode:
Enabled:
When this setting is selected and computer is turned off (in "Off", "Completely Off" and "Low Power Mode") the LAN is powered.

Off:
When this setting is selected and computer is turned off (in "Off", "Completely Off" and "Low Power Mode") the LAN is unpowered

*[3] External Power button:
The command is used to enable or disable the power ON/Off input on User interface.

*[4] RS Address (extended):
The command is extended command Address configuration of RS485 configuration. It provides the same function as MCC 0xBB, but with two differences:
- Extended command MCC 0x7D is able to set address from 0x00 to 0xFE
- Extended command data byte in heximal format.
This command update the same data byte in EEPROM and OSD status package as MCC 0x7D.

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Operational Requirements

The following sections define the operational requirements.

Serial Message Failure

If serial messages stop being transmitted or are corrupt, the unit will remain at the last commanded brightness.

Periodic Messages

Commands shall be transmitted to the unit at a repetition no faster than 4 Hz.

Sending Multiple Commands / Command Queue

To ensure all commands are transmitted and executed successfully on the unit, a delay between each command in the queue shall be at least 500ms. Some internal commands require slightly longer to process internally in the unit, than others.

Keep-alive Alarm

The "SWI" query can be used for keep-alive alarm logic in the application software on the computer. It is recommended to limit this function to once a second (1000ms).

Individually Addressed Command Response Time

The unit will output the required response within T_r = 2.5 character periods after the last byte of a command message is received (2.6ms at 9600 bit/sec for Serial Mode only), except as specified herein.

Broadcast Command Response Time

In response to Serial mode RS-485 broadcast command messages, after the last byte of the command message is received, all units will reply within the time period defined for T_e, below. Further more, any gap between these individual responses will be less than the Intermessage Gap, defined below.

$T_e = (T_r + L_r) * N$, where
L_r = length of the ACK/NAK message response
T_r = response time
N = the total number of units*

*) As the units reply in order to their address, the units must be given subsequent addresses, starting at zero, for N to equal the total number of units. If not, N = the highest unit address + 1.

The maximum L_r for a selected command set are shown in the table below:

Command	BRT	BZZ	ETC	POT	SNB	SWI	SWK	TYP	MCC
Lr	9	9	11	9	13	19	11	28	xx**

**)This command will vary in size, and response time is longer. Make sure ACK is received from all units before sending a new command.

Example:
For the BRT command, and 8 units, this corresponds to T_e = (2.5 * 10 + 9 * 10) * 8 / 9600 = 95.8 ms

Intermessage Gap - Serial Mode

Following an individually addressed command, the next command shall not be issued until at least T_g = 5 character periods after the ACK or NAK message received. At 9600, that is 5 * 10 / 9600 = 5.2ms.

Following the issue of a broadcast command message, the next command shall not be issued until at least $T_c = T_e + T_g$, where T_e is as defined for Broadcast Command response and T_g is defined above.

Serial/Ethernet/USB Communication (SCOM) Interface

Unit Response and Addresses

When individual unit addressing is supported by an installed configuration of units in a RS-485 (for units that support it) system, a separate ACK or NAK message for each unit will be transmitted providing each unit's individual address in response to any broadcast addressed Command.

NAK messages will not be generated when an error in a Broadcast message is detected. When individual unit addressing is not supported, the unit will only respond to the broadcast address and will include the broadcast address in the ACK and NAK messages. NAK messages will not be generated when an error in a Broadcast message is detected.

When a unit receives an incomplete message and the next byte is not received until after a time equal to the Intermessage Gap, the next bytes received shall be processed to check for the start of a new command (0x07, ASCII Bell).

If the header checksum is valid, but the first byte of the command message is not 0x07, as specified, the unit may wait until after the next inter-message gap to resume checking. A NAK message shall not be generated.

If the header checksum is valid, but the value of the CMD field does not equal one of the defined commands, the unit shall reply by generating a NAK message as though a VER command had been received.

If the header checksum is valid, but the value of the LEN field is greater than the maximum allowed, the unit shall ignore the message. A NAK message shall not be generated.

If the data checksum is valid, but the value in the DATA field associated with a command is invalid (out of range, undefined, etc.), the unit shall generate a NAK message indicating the current data value in the DATA field.

Additional Commands

In time, additional commands and corresponding data fields may be defined. These additions will not conflict with the operation of the interface as defined herein in this document.

Calculating Checksums (IDCHK, IHCHK)

Here is a simplified method to calculating checksum. The example is using decimal numbers, for explanation purposes only. The actual values are in hexadecimal throughout the user manual.

Visual representation of the byte:

Attention	Address	CMD	CMD	CMD	Length	IHCHK	DATA	IDCHK

Header
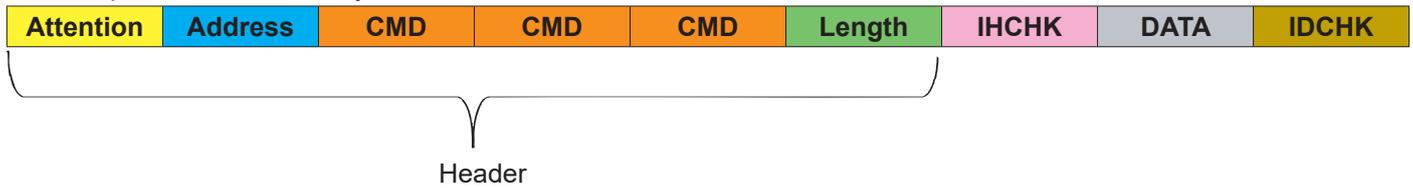
Number Base Systems mentioned in this section.

Binary	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Decimal	128	64	16	16	8	4	2	1
Hex	80	40	20	10	8	4	2	1

The total value of a byte is represented by 8 bits, all bits have the value of either 0 or 1. One byte can represent a decimal number between 0 and 255 (256 different combinations).

For example: let us convert 55 from decimal to binary. We place in the table below (marked in green) 1 or 0 for the highest available decimal number in that cell and subtract until we reach 0.

So in the case of 55, it is: 55 - 32 - 16 - 4 - 2 - 1 = 0

1 or 0	0	0	1	1	0	1	1	1
Binary	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Decimal	128	64	32	16	8	4	2	1

This results in binary value 0011 0111 based on the input in the table, which in decimal are 55, and HEX 0x37.

IDCHK

Calculating IDCHK require us to find the inverted value of the sum of all data bits. We send a data package with the data value as 55, which we know is 0011 0111. The inverted data value is the inverted of 0011 0111 (55 converted to binary), which is 1100 1000.

If we then convert 1100 1000 to decimal using the conversion table above, we get 200
In simpler terms, you could say we are doing 55 - 255 = -200. Ignore the fact that it is a negative number.

Attention	Address	CMD	CMD	CMD	Length	IHCHK	55	200

Calculating Checksums (IDCHK, IHCHK)

IDCHK with two data fields (2 bytes). | DATA1 | DATA2 | IDCHK |

Calculating IDCHK while having two data fields (or more) is almost the same as single data field. Sum the two data fields, subtract 1 for every time you exceed 255 and start from 0.

Example of 2 data bytes:

Data field 1: 55 or as HEX 0x37
Data field 2: 230 or as HEX 0xE6

Add all the data fields together.
230 + 55 = 285

Subtract 255 until the summed data value is below **255**.
285 - **255** = 30

Subtract 1 for every time subtracted **255** above.
30 - 1 = 29

Subtract 29 based on decimal values from the binary table on previous page until you reach 0:
29 - 16 - 8 - 4 - 1 = 0

Which gives us binary number (by using explanations on previous page).
0001 1101
inverted is (by using explanations on previous page).
1110 0010

Convert 1110 0010 to decimal is 226 or as HEX 0xE2

Attention	Address	CMD	CMD	CMD	Length	IHCHK	55	230	226

IDCHK with three data fields (3 bytes). | DATA1 | DATA2 | DATA3 | IDCHK |

Example using 3 data bytes:

Data field 1: 233 or as HEX 0xE9
Data field 2: 229 or as HEX 0xE5
Data field 3: 228 or as HEX 0xE4

Add all the data fields together.
233 + 229 + 228 = 690

Subtract **255** until the summed data value is below **255**.
690 - 255 = 435
435 - 255 = 180

Subtract 2 for every time subtracted **255** above.
180 - 2 = 178

Subtract 178 based on decimal values from the binary table on previous page until you reach 0:
178 - 128 - 32 - 16 - 2 = 0

Which gives us binary number (by using explanations on previous page).
1011 0010
inverted is (by using explanations on previous page).
0100 1101

Convert 0100 1101 to decimal is 77 or as HEX 0x4D

Attention	Address	CMD	CMD	CMD	Length	IHCHK	233	229	228	77

2

IHCHK

Let us calculate IHCHK. We send the same data package, the data value does not matter for this calculation. Instead, we focus on the following formula that sums all the header values and inverts them. Note that DATA of 55 and IDCHK of 200 is present in table below as described on previous page. Length is set to 1 as there is only 1 byte in the DATA field.

Attention	Address	CMD	CMD	CMD	Length	IHCHK	Data	IDCHK
7	255	66	82	73	1	IHCHK	55	200

Add together as indicated below.

Field	Value		HEX
Attention field:	7	or as HEX	0x07
Address field:	255	or as HEX	0xFF
CMD 1 field:	66	or as HEX	0x42
CMD 2 field:	82	or as HEX	0x52
CMD 3 field:	73	or as HEX	0x49
Length field:	1	or as HEX	0x01

(Length of 1 indicates only 1 byte 55 is present in DATA field).

Add all the fields together.
$$7 + 255 + 66 + 82 + 73 + 1 = 484$$

Subtract 255 until the summed data value is below **255**.
$$484 - 255 = 229$$

Subtract 1 for every time subtracted **255** above.
$$229 - 1 = 228$$

Subtract 228 based on decimal values from the binary table (marked in green) until you reach 0:
$$228 - 128 - 64 - 32 - 4 = 0$$

1 or 0	1	1	1	0	0	1	0	0
Binary	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
Decimal	128	64	32	16	8	4	2	1

Which gives us binary number (by using explanations on previous page).
1110 0100
inverted is (by using explanations on previous page).
0001 1011

Convert 0001 1011 to decimal is 27 or as HEX 0x1B

Attention	Address	CMD	CMD	CMD	Length	IHCHK	Data	IDCHK
7	255	66	82	73	1	27	55	200

HEX, ASCII, BIN and Character table

HEX	DEC	BIN	Character/Symbol	Description
0x00	0	00000000	NUL	Null terminator / character / End of string
0x01	1	00000001	SOH	Start of Heading
0x02	2	00000010	STX	Start of Text
0x03	3	00000011	ETX	End of Text
0x04	4	00000100	EOT	End of Transmission
0x05	5	00000101	ENQ	Enquiry
0x06	6	00000110	ACK	Acknowledgment
0x07	7	00000111	BEL	Bell
0x08	8	00001000	BS	Back Space
0x09	9	00001001	HT	Horizontal Tab
0x0A	10	00001010	LF	Line Feed
0x0B	11	00001011	VT	Vertical Tab
0x0C	12	00001100	FF	Form Feed
0x0D	13	00001101	CR	Carriage Return
0x0E	14	00001110	SO	Shift Out / X-On
0x0F	15	00001111	SI	Shift In / X-Off
0x10	16	00010000	DLE	Data Line Escape
0x11	17	00010001	DC1	Device Control 1 (oft. XON)
0x12	18	00010010	DC2	Device Control 2
0x13	19	00010011	DC3	Device Control 3 (oft. XOFF)
0x14	20	00010100	DC4	Device Control 4
0x15	21	00010101	NAK	Negative Acknowledgement
0x16	22	00010110	SYN	Synchronous Idle
0x17	23	00010111	ETB	End of Transmit Block
0x18	24	00011000	CAN	Cancel
0x19	25	00011001	EM	End of Medium
0x1A	26	00011010	SUB	Substitute
0x1B	27	00011011	ESC	Escape
0x1C	28	00011100	FS	File Separator
0x1D	29	00011101	GS	Group Separator
0x1E	30	00011110	RS	Record Separator
0x1F	31	00011111	US	Unit Separator
0x20	32	00100000		Space " "
0x21	33	00100001	!	Exclamation mark
0x22	34	00100010	"	Double quotes
0x23	35	00100011	#	Number
0x24	36	00100100	$	Dollar
0x25	37	00100101	%	Percentage
0x26	38	00100110	&	Ampersand
0x27	39	00100111	'	Single quote
0x28	40	00101000	(	Open parenthesis (or open bracket)
0x29	41	00101001	)	Close parenthesis (or close bracket)
0x2A	42	00101010	*	Asterisk
0x2B	43	00101011	+	Plus
0x2C	44	00101100	,	Comma
0x2D	45	00101101	-	Minus / Hyphen
0x2E	46	00101110	.	Period, dot or full stop
0x2F	47	00101111	/	Slash or divide
0x30	48	00110000	0	Zero
0x31	49	00110001	1	One
0x32	50	00110010	2	Two

HEX, ASCII, BIN and Character table

HEX	DEC	BIN	Character/Symbol	Description
0x33	51	00110011	3	Three
0x34	52	00110100	4	Four
0x35	53	00110101	5	Five
0x36	54	00110110	6	Six
0x37	55	00110111	7	Seven
0x38	56	00111000	8	Eight
0x39	57	00111001	9	Nine
0x3A	58	00111010	:	Colon
0x3B	59	00111011	;	Semicolon
0x3C	60	00111100	<	Less than (or open angled bracket)
0x3D	61	00111101	=	Equals
0x3E	62	00111110	>	Greater than (or close angled bracket)
0x3F	63	00111111	?	Question mark
0x40	64	01000000	@	At symbol
0x41	65	01000001	A	Uppercase A
0x42	66	01000010	B	Uppercase B
0x43	67	01000011	C	Uppercase C
0x44	68	01000100	D	Uppercase D
0x45	69	01000101	E	Uppercase E
0x46	70	01000110	F	Uppercase F
0x47	71	01000111	G	Uppercase G
0x48	72	01001000	H	Uppercase H
0x49	73	01001001	I	Uppercase I
0x4A	74	01001010	J	Uppercase J
0x4B	75	01001011	K	Uppercase K
0x4C	76	01001100	L	Uppercase L
0x4D	77	01001101	M	Uppercase M
0x4E	78	01001110	N	Uppercase N
0x4F	79	01001111	O	Uppercase O
0x50	80	01010000	P	Uppercase P
0x51	81	01010001	Q	Uppercase Q
0x52	82	01010010	R	Uppercase R
0x53	83	01010011	S	Uppercase S
0x54	84	01010100	T	Uppercase T
0x55	85	01010101	U	Uppercase U
0x56	86	01010110	V	Uppercase V
0x57	87	01010111	W	Uppercase W
0x58	88	01011000	X	Uppercase X
0x59	89	01011001	Y	Uppercase Y
0x5A	90	01011010	Z	Uppercase Z
0x5B	91	01011011	[	Opening bracket
0x5C	92	01011100	\	Backslash
0x5D	93	01011101	]	Closing bracket
0x5E	94	01011110	^	Caret - circumflex
0x5F	95	01011111	_	Underscore
0x60	96	01100000	`	Grave accent
0x61	97	01100001	a	Lowercase a
0x62	98	01100010	b	Lowercase b
0x63	99	01100011	c	Lowercase c
0x64	100	01100100	d	Lowercase d
0x65	101	01100101	e	Lowercase e

HEX	DEC	BIN	Character/Symbol	Description
0x66	102	01100110	f	Lowercase f
0x67	103	01100111	g	Lowercase g
0x68	104	01101000	h	Lowercase h
0x69	105	01101001	i	Lowercase i
0x6A	106	01101010	j	Lowercase j
0x6B	107	01101011	k	Lowercase k
0x6C	108	01101100	l	Lowercase l
0x6D	109	01101101	m	Lowercase m
0x6E	110	01101110	n	Lowercase n
0x6F	111	01101111	o	Lowercase o
0x70	112	01110000	p	Lowercase p
0x71	113	01110001	q	Lowercase q
0x72	114	01110010	r	Lowercase r
0x73	115	01110011	s	Lowercase s
0x74	116	01110100	t	Lowercase t
0x75	117	01110101	u	Lowercase u
0x76	118	01110110	v	Lowercase v
0x77	119	01110111	w	Lowercase w
0x78	120	01111000	x	Lowercase x
0x79	121	01111001	y	Lowercase y
0x7A	122	01111010	z	Lowercase z
0x7B	123	01111011	{	Opening brace
0x7C	124	01111100			Vertical bar
0x7D	125	01111101	}	Closing brace
0x7E	126	01111110	~	Equivalency sign - tilde
0x7F	127	01111111		Delete (no visible character)
0x80	128	10000000	€	Euro sign
0x81	129	10000001		(no visible character)
0x82	130	10000010	‚	Single low-9 quotation mark
0x83	131	10000011	ƒ	Latin small letter f with hook
0x84	132	10000100	„	Double low-9 quotation mark
0x85	133	10000101	…	Horizontal ellipsis
0x86	134	10000110	†	Dagger
0x87	135	10000111	‡	Double dagger
0x88	136	10001000	ˆ	Modifier letter circumflex accent
0x89	137	10001001	‰	Per mille sign
0x8A	138	10001010	Š	Latin capital letter S with caron
0x8B	139	10001011	‹	Single left-pointing angle quotation
0x8C	140	10001100	Œ	Latin capital ligature OE
0x8D	141	10001101		(no visible character)
0x8E	142	10001110	Ž	Latin captial letter Z with caron
0x8F	143	10001111		(no visible character)
0x90	144	10010000		(no visible character)
0x91	145	10010001	'	Left single quotation mark
0x92	146	10010010	'	Right single quotation mark
0x93	147	10010011	"	Left double quotation mark
0x94	148	10010100	"	Right double quotation mark
0x95	149	10010101	•	Bullet
0x96	150	10010110	–	En dash
0x97	151	10010111	—	Em dash
0x98	152	10011000	˜	Small tilde

HEX, ASCII, BIN and Character table

HEX	DEC	BIN	Character/Symbol	Description
0x99	153	10011001	™	Trade mark sign
0x9A	154	10011010	š	Latin small letter S with caron
0x9B	155	10011011	›	Single right-pointing angle quotation mark
0x9C	156	10011100	œ	Latin small ligature oe
0x9D	157	10011101		(no visible character)
0x9E	158	10011110	ž	Latin small letter z with caron
0x9F	159	10011111	Ÿ	Latin capital letter Y with diaeresis
0xA0	160	10100000		Non-breaking space (no visible character)
0xA1	161	10100001	¡	Inverted exclamation mark
0xA2	162	10100010	¢	Cent sign
0xA3	163	10100011	£	Pound sign
0xA4	164	10100100	¤	Currency sign
0xA5	165	10100101	¥	Yen sign
0xA6	166	10100110	¦	Pipe, Broken vertical bar
0xA7	167	10100111	§	Section sign
0xA8	168	10101000	¨	Spacing diaeresis - umlaut
0xA9	169	10101001	©	Copyright sign
0xAA	170	10101010	ª	Feminine ordinal indicator
0xAB	171	10101011	«	Left double angle quotes
0xAC	172	10101100	¬	Not sign
0xAD	173	10101101		Soft hyphen
0xAE	174	10101110	®	Registered trade mark sign
0xAF	175	10101111	¯	Spacing macron - overline
0xB0	176	10110000	°	Degree sign
0xB1	177	10110001	±	Plus-or-minus sign
0xB2	178	10110010	²	Superscript two - squared
0xB3	179	10110011	³	Superscript three - cubed
0xB4	180	10110100	´	Acute accent - spacing acute
0xB5	181	10110101	µ	Micro sign
0xB6	182	10110110	¶	Pilcrow sign - paragraph sign
0xB7	183	10110111	·	Middle dot - Georgian comma
0xB8	184	10111000	¸	Spacing cedilla
0xB9	185	10111001	¹	Superscript one
0xBA	186	10111010	º	Masculine ordinal indicator
0xBB	187	10111011	»	Right double angle quotes
0xBC	188	10111100	¼	Fraction one quarter
0xBD	189	10111101	½	Fraction one half
0xBE	190	10111110	¾	Fraction three quarters
0xBF	191	10111111	¿	Inverted question mark
0xC0	192	11000000	À	Latin capital letter A with grave
0xC1	193	11000001	Á	Latin capital letter A with acute
0xC2	194	11000010	Â	Latin capital letter A with circumflex
0xC3	195	11000011	Ã	Latin capital letter A with tilde
0xC4	196	11000100	Ä	Latin capital letter A with diaeresis
0xC5	197	11000101	Å	Latin capital letter A with ring above
0xC6	198	11000110	Æ	Latin capital letter AE
0xC7	199	11000111	Ç	Latin capital letter C with cedilla
0xC8	200	11001000	È	Latin capital letter E with grave
0xC9	201	11001001	É	Latin capital letter E with acute
0xCA	202	11001010	Ê	Latin capital letter E with circumflex
0xCB	203	11001011	Ë	Latin capital letter E with diaeresis

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HEX, ASCII, BIN and Character table

HEX	DEC	BIN	Character/Symbol	Description
0xCC	204	11001100	Ì	Latin capital letter I with grave
0xCD	205	11001101	Í	Latin capital letter I with acute
0xCE	206	11001110	Î	Latin capital letter I with circumflex
0xCF	207	11001111	Ï	Latin capital letter I with diaeresis
0xD0	208	11010000	Ð	Latin capital letter ETH
0xD1	209	11010001	Ñ	Latin capital letter N with tilde
0xD2	210	11010010	Ò	Latin capital letter O with grave
0xD3	211	11010011	Ó	Latin capital letter O with acute
0xD4	212	11010100	Ô	Latin capital letter O with circumflex
0xD5	213	11010101	Õ	Latin capital letter O with tilde
0xD6	214	11010110	Ö	Latin capital letter O with diaeresis
0xD7	215	11010111	×	Multiplication sign
0xD8	216	11011000	Ø	Latin capital letter O with slash
0xD9	217	11011001	Ù	Latin capital letter U with grave
0xDA	218	11011010	Ú	Latin capital letter U with acute
0xDB	219	11011011	Û	Latin capital letter U with circumflex
0xDC	220	11011100	Ü	Latin capital letter U with diaeresis
0xDD	221	11011101	Ý	Latin capital letter Y with acute
0xDE	222	11011110	Þ	Latin capital letter THORN
0xDF	223	11011111	ß	Latin small letter sharp s - ess-zed
0xE0	224	11100000	à	Latin small letter a with grave
0xE1	225	11100001	á	Latin small letter a with acute
0xE2	226	11100010	â	Latin small letter a with circumflex
0xE3	227	11100011	ã	Latin small letter a with tilde
0xE4	228	11100100	ä	Latin small letter a with diaeresis
0xE5	229	11100101	å	Latin small letter a with ring above
0xE6	230	11100110	æ	Latin small letter ae
0xE7	231	11100111	ç	Latin small letter c with cedilla
0xE8	232	11101000	è	Latin small letter e with grave
0xE9	233	11101001	é	Latin small letter e with acute
0xEA	234	11101010	ê	Latin small letter e with circumflex
0xEB	235	11101011	ë	Latin small letter e with diaeresis
0xEC	236	11101100	ì	Latin small letter i with grave
0xED	237	11101101	í	Latin small letter i with acute
0xEE	238	11101110	î	Latin small letter i with circumflex
0xEF	239	11101111	ï	Latin small letter i with diaeresis
0xF0	240	11110000	ð	Latin small letter eth
0xF1	241	11110001	ñ	Latin small letter n with tilde
0xF2	242	11110010	ò	Latin small letter o with grave
0xF3	243	11110011	ó	Latin small letter o with acute
0xF4	244	11110100	ô	Latin small letter o with circumflex
0xF5	245	11110101	õ	Latin small letter o with tilde
0xF6	246	11110110	ö	Latin small letter o with diaeresis
0xF7	247	11110111	÷	Division sign
0xF8	248	11111000	ø	Latin small letter o with slash
0xF9	249	11111001	ù	Latin small letter u with grave
0xFA	250	11111010	ú	Latin small letter u with acute
0xFB	251	11111011	û	Latin small letter u with circumflex
0xFC	252	11111100	ü	Latin small letter u with diaeresis
0xFD	253	11111101	ý	Latin small letter y with acute
0xFE	254	11111110	þ	Latin small letter thorn
0xFF	255	11111111	ÿ	Latin small letter y with diaeresis

```csharp
{
        // Create SCOM package
                byte[] cmd = enc.GetBytes("BRT");
                byte[] data = new byte[1] { 0x99 };   // 60% brightness
                COMMessage message = new COMMessage(cmd, data);

        // Transmitting SCOM package to TCP
                SendTCPCommand(message);
}


private Byte[] SendTCPCommand(COMMessage commessage)

{

        // Creating new TCPclient
                TcpClient tcpClient = new TcpClient();

        // Byte version of the SCOM package
                byte[] byteMessage = (byte[])commessage.Message.ToArray(typeof(byte));

        //Display IP adresse
                IPAddress displayAddr = IPAddress.Parse(DisplayIPAddress);
                Int32 port = 10001; //constant

        //Connecting
                tcpClient.Connect(displayAddr, port);

        // Create a stream from TCPClient
                NetworkStream stream = tcpClient.GetStream();

        //Write the SCOM package into stream
                stream.Write(byteMessage, 0, byteMessage.Length);

        // Wait for response
                Thread.Sleep(GlobalWaitTime);

        // Read Response
        // To be compliant with SCOM package (ATTN, ADDR, CMD, CMD, CMD, LEN, IHCHK, DATA, IDCHK)
                stream.Read(data, 0, data.Length);
}
```

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Operation Advanced (DDC/CI) Control Overview

Introduction

DDC/CI (Display Data Channel/Command Interface) specifies a means for a computer to send commands to the unit's Display Video Controller to programmatically adjust parameters of the display instead of pressing physical buttons or navigate through an OSD menu. Specific commands to control units are defined in a separate official Monitor Control Command Set (MCCS) industry standard. The signal inputs supported are DVI*, HDMI, DisplayPort (DP) and VGA*.

To determine if your unit has the DDC/CI commands supported as described in this chapter, please review the "On Screen Display (OSD) Menu" chapter (Service section) in this manual.

It is expected that the user has previous experience of the DDC/CI protocol and how to implement the commands in their own control applications. A suitable starting point for sending commands, are the GUI operated (or command line version) of softMCCS software, reference: http://www.entechtaiwan.com/lib/softmccs.shtm

The listed DDC/CI commands below are equivalent to the same functions available in the well implemented Hatteland Technology Serial/Ethernet Communication Control Interface (SCOM) protocol, where specified, reference: https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm

The column "SCOM" is a reference and not part of the DDC/CI commands explained in the table below.

> *NOTE: This chapter is an overall description of DDC/CI support for various/selected Hatteland Technology products. References to VGA (RGB), DVI and Composite may not be present on your product, due to hardware changes/Engineering Change Notifications issued for Multi Vision Displays (MVD), please check actual datasheet for your model to verify.
> Reference: https://www.hattelandtechnology.com/product-notifications/hardware-change-/-upgrade-for-32inch-and-55inch-products

Syntax: [S] = Start Condition & [P] = Stop Condition (marked with gray color). Numbers in black/green/red colors are Byte Value in Hexadecimal.

Description	Syntax and Functionality	Details and Values	Via SCOM
User Brightness Control (backlight) (0x10)	Set/Write Brightness value: [S] <6E:w> 51 84 03 10 00 xx FD [P] Reply of successfull request: [S] <6F:r> FD 80 BE*[P] Read Brightness value: [S] <6E:w> 51 82 01 10 AC [P] Reply of successfull request: [S] <6F:r> 6E 88 02 00 10 00 00 FF 00 xx 95*[P]	10 = Command ID Where **xx** = 0 to 255 **Min-Max Range:** 0-255 (0x00-0xFF) During Read reply, these values will be present. Read/Write support.	BRT
Power Mode (Power On/Off/Sleep) (0xD6) *Note: Not the same as OSD's "Power Plan" function.	Write Power Mode: [S] <6E:w> 51 84 03 D6 00 xx 5C [P] Reply of successfull request: [S] <6F:r> 5C 80 BE*[P] Read Power Mode: [S] <6E:w> 51 82 01 D6 6A [P] Reply of successfull request: [S] <6F:r> 6E 88 02 00 D6 01 00 05 00 xx 67*[P]	D6 = Command ID Where **xx** is: 0x01 = On 0x02 = Standby 0x03 = Standby 0x04 = Standby 0x05 = OFF 0x3F = Read Command: Modes are described in INB100018-6 (SCOM) document. Read/Write support.	PWR
Glass Display Control™ (GDC) Brilliance Button (0xE2)	Set/Write Brilliance Value: [S] <6E:w> 51 84 03 E2 00 xx 68 [P] Reply of successfull request: [S] <6F:r> 68 80 BE*[P] Read Brilliance Value: [S] <6E:w> 51 82 01 E2 5E [P] Reply of successfull request: [S] <6F:r> 6E 88 02 00 E2 00 00 FF 00 xx 00*[P]	E2 = Command ID Where **xx** = 0 to 255 **Min-Max Range:** 0-255 (0x00-0xFF) During Read reply, these values will be present. Read/Write support.	BRU

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Operation Advanced (DDC/CI) Control Overview

Description	Syntax and Functionality	Details and Values	Via SCOM
Color Mode: Kelvin Color Temperature (0x14)	Set/Write Color Temperature: [S] <6E:w> 51 84 03 14 00 ww xx [P] Reply of successfull request: [S] <6F:r> xx 80 BE*[P] Read Color Temperature Value: [S] <6E:w> 51 82 01 14 A8 [P] Reply of successfull request: [S] <6F:r> 6E 88 02 00 14 00 00 0E 00 yy zz*[P]	14 = Command ID Where Write **ww xx** **05 A9** = 6500 **07 AB** = 8000 **08 A4** = 9300 Where Read **yy zz** **05 AB** = 6500 **07 A9** = 8000 **08 A6** = 9300 Read/Write support.	MCC: (Color Temperature Select)
Gamma Calibration (0x14)	Set/Write Calibration: [S] <6E:w> 51 84 03 14 00 ww xx [P] Reply of successfull request: [S] <6F:r> xx 80 BE*[P] Read Calibration: [S] <6E:w> 51 82 01 14 A8 [P] Reply of successfull request: [S] <6F:r> 6E 88 02 00 14 00 00 0E 00 yy zz*[P]	14 = Command ID Where Write **ww xx** **0C A0** = VGA* **0D A1** = DVI* **0E A2** = DP **0F A3** = HDMI Where Read **yy zz** **0C A2** = VGA* **0D A3** = DVI* **0E A4** = DP **0F A5** = HDMI Read/Write support.	MCC: (Gamma (Calibration))
Buzzer Control (0xE5) Note: May not be available on all models, please review specific datasheet if "Buzzer" is available.	Write/Turn ON: [S] <6E:w> 51 84 03 E5 00 FF 5C [P] Reply of successfull request: [S] <6F:r> 5C 80 BE*[P] Write/Turn oFF: [S] <6E:w> 51 84 03 E5 00 00 5D [P] Reply of successfull Turn OFF request: [S] <6F:r> 5D 80 BE*[P]	E5 = Command ID Where **FF** = Turn On Where **00** = Turn Off Write Support only.	BZZ

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Description	Syntax and Functionality	Details and Values	Via SCOM

Touch Power Mode (0xE6)	`Write/Set Power Mode:`
	`[S] <6E:w> 51 84 03 E6 00 xx A1 [P]`
	`Reply of successfull request:`
	`[S] <6F:r> 5C 80 BE*[P]`
	
	`Read Power Mode:`
	`[S] <6E:w> 51 82 01 E6 5A [P]`
	`Reply of successfull request :`
	`[S] <6F:r> 6E 88 02 00 E6 01 00 FF 00 FF 53*[P]`
		E6 = Command ID
		Where **xx** is:
		
		0xFF = Always Active
		0xFE = Only active when display is on and has an active input signal
		0x00 = Only active if selected source is active AND Selected Source="DVI-I_1"*
		0x01 = Only active if selected source is active AND Selected Source="DVI-I_2"*
		0x02 = Only active if selected source is active AND Selected Source="DVI3"*
		0x03 = Only active if selected source is active AND Selected Source="DVI4"*
		0x10 = Only active if selected source is active AND Selected Source="RGB_1"*
		0x11 = Only active if selected source is active AND Selected Source="RGB_2"*
		0x12 = Only active if selected source is active AND Selected Source="RGB_3"*
		0x13 = Only active if selected source is active AND Selected Source="RGB_4"*
		0x20 = Only active if selected source is active AND Selected Source="CVIDEO1"
		0x21 = Only active if selected source is active AND Selected Source="CVIDEO2"
		0x22 = Only active if selected source is active AND Selected Source="CVIDEO3"
		0x23 = Only active if selected source is active AND Selected Source="CVIDEO4"
		0x30 = Only active if selected source is active AND Selected Source="DP1"
		0x31 = Only active if selected source is active AND Selected Source="DP2"
		0x32 = Only active if selected source is active AND Selected Source="DP3"
		0x33 = Only active if selected source is active AND Selected Source="DP4"
		0x3F = Read Command
		
		Read/Write support.
			MCC:
			(Touch Power Mode)

Actual Temperature (0xF0)	`Read Temperature:`
	`[S] <6E:w> 51 82 01 F0 4C [P]`
	`Reply of successfull request:`
	`[S] <6F:r> 6E 88 02 00 F0 01 ww xx yy zz 63*[P]`
		F0 = Command ID
		
		Read support.
		
		Reply 4 bytes (ww, xx, yy, zz) indicating degree in Celcius.
		Example: 0038
			TMP

Unit Run Time (0xF3)	`Read Elapsed Hours:`
	`[S] <6E:w> 51 82 01 F3 4F [P]`
	`Reply of successfull request:`
	`[S] <6F:r> 6E 88 02 00 F3 01 ww xx yy zz 63*[P]`
		F3 = Command ID
		
		Read support.
		
		Reply in ASCII 4 bytes (ww, xx, yy, zz) indicating hours.
		Example: 1038
			ETC

3

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UHF Interference Prevention

Note: Information below is an excerpt from original document located on Engineering Change Notification:
https://www.hattelandtechnology.com/product-notifications/series-x-g2-maritime-multi-display-mmd-firmware-update-24_2020_ecn

To calibrate the GDC (Glass display controller) to be better able to distinguish between UHF interference and a finger press on the "buttons", the GDC must be calibrated and please follow these steps.
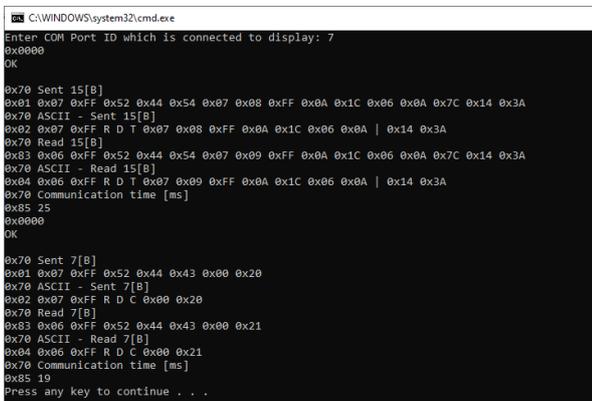
1. Open the folder '2. uC Firmware FW100002' and then the folder "Tools".

2. Click "start_calibration.bat"
3. Enter the COM Port ID that is connected to the display (example: 3) then press "Enter"

4. The script will start to run (do not press any key on the computer keyboard yet, the user calibration has now started):

5. Press the each of the buttons below for 3 seconds each with a "normal" finger press.

1st	**Power** "button"	4th	**>** - "button"
2nd	**+** - "button"	5th	**Menu** - "button"
3rd	**-** - "button"	6th	**<** - "button"

6. Once done, go back to the command window and press enter. The GDC is now calibrated and OSD Key Outdoor mode is set to 'On'.

Appendix   1

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UHF Interference Prevention

To turn on/off the function for limiting the UHF interference on the Series X G2 Maritime Multi Displays, there are two ways of doing it.

1. Using SCOM commands.
2. Using the On-Screen Display menu.

	Name	Date modified	Type	Size
□	Firmware	07.06.2022 12:50	File folder	
	hd_swdl_3	07.06.2022 12:50	File folder	
	Tools ←	07.06.2022 12:50	File folder	
	FW_Update.bat	06.11.2020 16:56	Windows Batch File	1 KB
	Power_ON.bat	06.11.2020 16:56	Windows Batch File	1 KB
	Radio_Protection_ODM_OFF.bat	06.11.2020 17:01	Windows Batch File	1 KB
	Radio_Protection_ODM_ON.bat	06.11.2020 16:58	Windows Batch File	1 KB
	Start_Calibration.bat	06.11.2020 16:58	Windows Batch File	1 KB

5.4.1 How to turn On/Off UHF protection using SCOM:

1. Open the folder "2. uC Firmware FW100002"
2. Run the "Radio_Protection_ODM_ON.bat" to turn the protection 'On' or
3. Run the "Radio_Protection_ODM_OFF.bat" to turn the protection 'Off'
4. Enter the COM Port ID connected to the display (example: 3) then press enter

```
C:\WINDOWS\system32\cmd.exe
Enter COM Port ID which is connected to display: 7
0x0000
OK

0x70 Sent 9[B]
0x01 0x07 0xFF 0x4F 0x44 0x4D 0x01 0x18 0xFF 0x00
0x70 ASCII - Sent 9[B]
0x02 0x07 0xFF O D M 0x01 0x18 0xFF 0x00
0x70 Read 9[B]
0x83 0x06 0xFF 0x4F 0x44 0x4D 0x01 0x19 0xFF 0x00
0x70 ASCII - Read 9[B]
0x04 0x06 0xFF O D M 0x01 0x19 0xFF 0x00
0x70 Communication time [ms]
0x85 23
Press any key to continue . . .
```

5. Press 'Enter' and the UHF protection is turned on or off.

5.4.2 How to turn On/Off UHF protection using On-screen Display:

1. Go to **OSD Menu** > "**OSD Miscellaneous**" > **OSD Mode** set it to "**Service**" and use this password: **911**.
2. Go to **OSD Menu** > "**OSD Miscellaneous**" > **OSD Key Outdoor and s**et it to "On" or "Off" dependent on wanted function to be on or off.

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18/24/24+5 pin DVI-D, DVI-I, Single/Dual Link Female

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

DDC = Display Data Channel. T.M.D.S = Transition Minimized Differential Signal. PIN C1,C2,C3,C4 = Only present on DVI-I connectors.

Connector shows a DUAL LINK design, but some units may not support it. Only units with 1920x1200 or more in resolution require / support DUAL LINK.
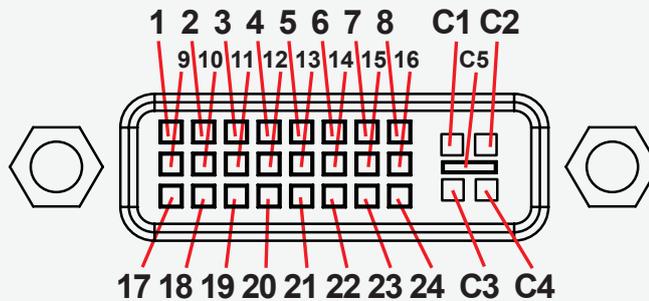
PIN 01	T.M.D.S. Data2 - (Digital - RED link 1)
PIN 02	T.M.D.S. Data2 + (Digital + RED link 1)
PIN 03	T.M.D.S. Data2/4 Shield
PIN 04	T.M.D.S. Data4 - (Digital - GREEN link 2)
PIN 05	T.M.D.S. Data4 + (Digital + GREEN link 2)
PIN 06	DDC Clock
PIN 07	DDC Data
PIN 08	Analog Vertical Sync (DVI-I only)
PIN 09	T.M.D.S. Data1 - (Digital - GREEN link 1)
PIN 10	T.M.D.S. Data1 + (Digital + GREEN link 1)
PIN 11	T.M.D.S. Data1/3 Shield
PIN 12	T.M.D.S. Data3 - (Digital - BLUE link 2)
PIN 13	T.M.D.S. Data3 + (Digital + BLUE link 2)
PIN 14	+5V Power (for standby mode)
PIN 15	Ground (for +5V and analog sync)
PIN 16	Hot Plug Detect
PIN 17	T.M.D.S. Data0 - (Digital - BLUE link 1) and digital sync.
PIN 18	T.M.D.S. Data0 + (Digital + BLUE link 1) and digital sync.
PIN 19	T.M.D.S. Data0/5 Shield
PIN 20	T.M.D.S. Data5 - (Digital - RED link 2)
PIN 21	T.M.D.S. Data5 + (Digital - RED link 2)
PIN 22	T.M.D.S. Clock Shield
PIN 23	T.M.D.S. Clock + (Digital clock + (Links 1 and 2)
PIN 24	T.M.D.S. Clock - (Digital clock - (Links 1 and 2)
PIN C1	Analog RED
PIN C2	Analog GREEN
PIN C3	Analog BLUE
PIN C4	Analog Horizontal Sync.
PIN C5	Analog Ground (return for RGB signals)

Pinout Assignment   **1**

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15-pin Analog RGB/VGA, DSUB HD Female

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Onboard or via DVI-4 adapter.
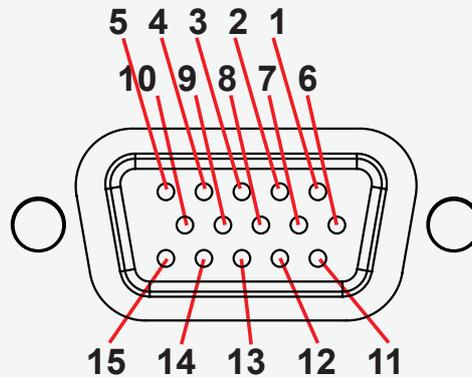
PIN 01	RED	Red, analog
PIN 02	GREEN	Green, analog
PIN 03	BLUE	Blue, analog
PIN 04	ID2/RES	Reserved for monitor ID bit 2 (grounded)
PIN 05	GND	Digital ground
PIN 06	RED_RTN	Analog ground red
PIN 07	GREEN_RTN	Analog ground green
PIN 08	BLUE_RTN	Analog ground blue
PIN 09	KEY/PWR	+5V power supply for DDC (optional)
PIN 10	GND	Digital ground
PIN 11	ID0/RES	Reserved for monitor ID bit 0 (grounded)
PIN 12	ID1/SDA	DDC serial data
PIN 13	HSYNC.	Horizontal sync or composite sync, input
PIN 14	VSYNC.	Vertical sync, input
PIN 15	ID3/SCL	DDC serial clock

Pinout Assignment   **1**

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20-pin DisplayPort (DP) Female

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

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).
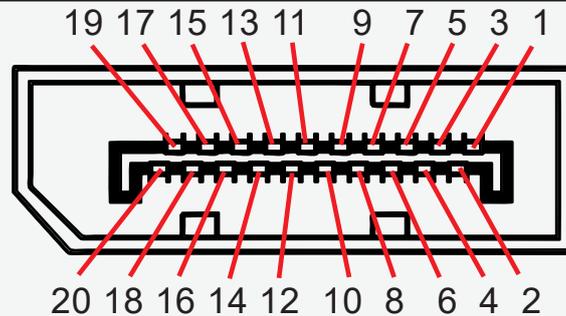
PIN 01	ML_Lane 0 (p) - Lane 0 (positive)
PIN 02	GND - Ground
PIN 03	ML_Lane 0 (n) - Lane 0 (negative)
PIN 04	ML_Lane 1 (p) - Lane 1 (positive)
PIN 05	GND - Ground
PIN 06	ML_Lane 1 (n) - Lane 1 (negative)
PIN 07	ML_Lane 2 (p) - Lane 2 (positive)
PIN 08	GND - Ground
PIN 09	ML_Lane 2 (n) - Lane 2 (negative)
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)

Pinout Assignment   **1**

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

RS232-Wake On Ring is not enabled.

Buzzer - External Drive Logic:
• Able to supply 12VDC+-5%@100mA
• Short circuit protected at <500mA
• <50VDC from ground of Display unit (Our input is isolated, this is layout limitation)
• Our input is classified as signal input, not power.

Series X (G1 - Generation 1):
• External drive logic can drive the buzzer even when the Display Unit is off.

Series X (G2 - Generation 2) / MVD Series:
• Display Unit needs external power connected
  to turn buzzer on. (Any logic power state).

Notes:
Unit may have several physical connectors available for Buzzer control. Please only use RS-232 or RS-485 pins to control Buzzer, not both at the same time.

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 2 wires (not 2 single wires). Heat Shrink Tubes must be applied to soldered wire/pins. Test connection (beep) with Voltage Meter. Wires may be combined if using RS-232 COM as well.

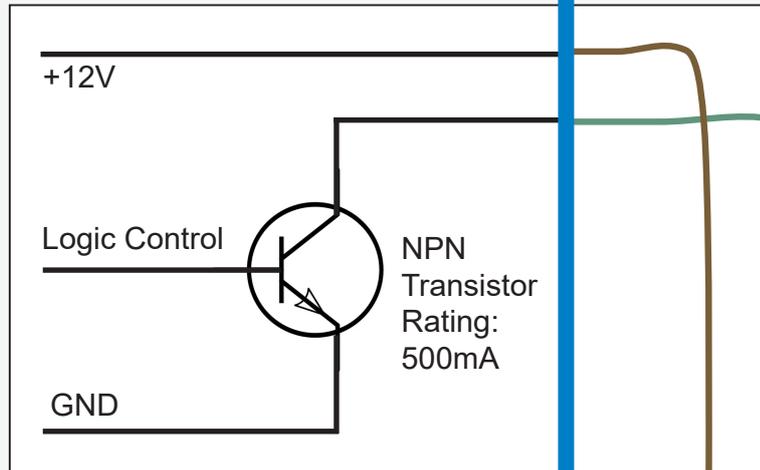| PIN 01	BUZ+	Buzzer Control Positive IN
PIN 02	TxD	Transmit Data
PIN 03	RxD	Receive Data
PIN 04	DTR	Data Terminal Ready
PIN 05	GND	Ground
PIN 06	DSR	Data Set Ready
PIN 07	RTS	Request To Send
PIN 08	CTS	Clear To Send
PIN 09	BUZ-	Buzzer Control Negative IN

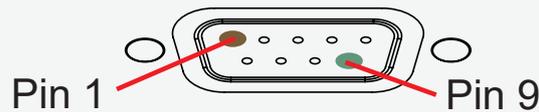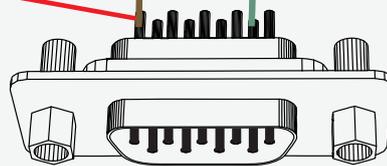All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

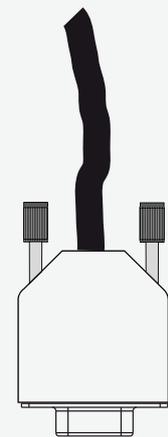## Suggested "Buzzer" Control Logic inside Computer/System:

Internal Side   **External Side**

+12V

Logic Control

NPN
Transistor
Rating:
500mA

GND

Pin 1 on your Connector

Pin 1   Pin 9

9-pin DSUB Male
Note Orientation!

Add
Back Shell

Pinout Assignment   2

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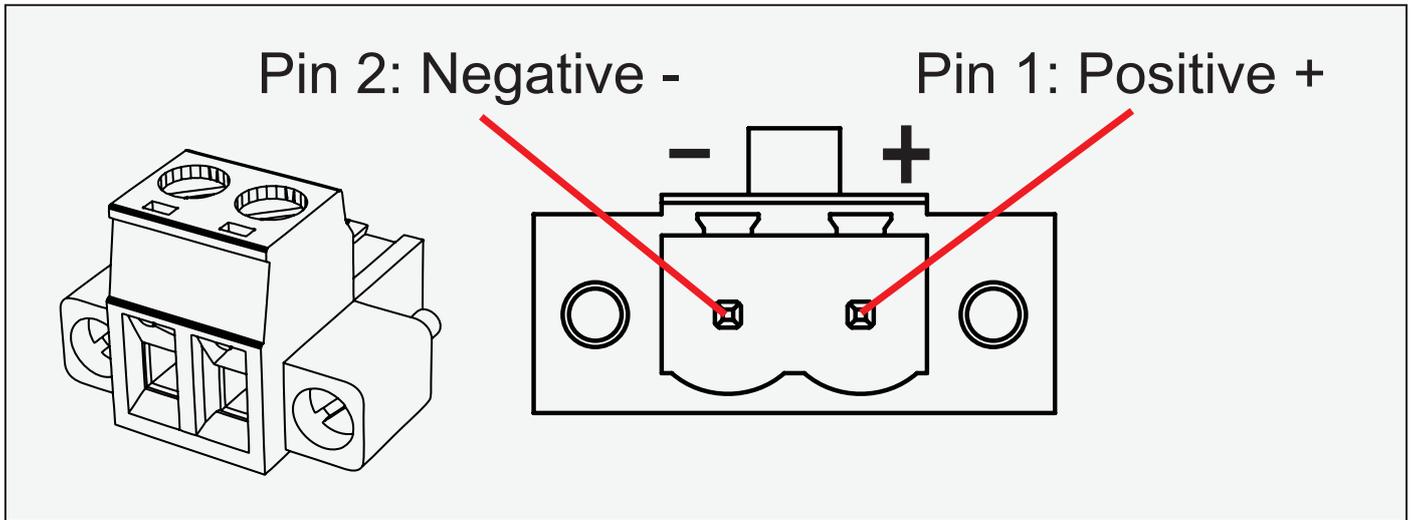
2-pin Terminal Block 5.08 - DC Power Input

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Pin 2: Negative -   Pin 1: Positive +

−   +
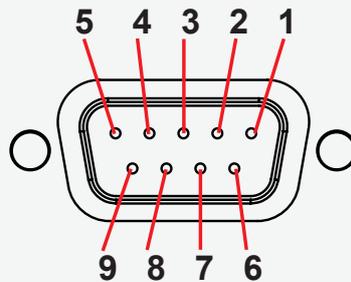
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9-pin User Interface, DSUB Male

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

- External Potentiometer
- External Push Button On/Off
- External Push Button - Dimming
- +5V DC
- +12V DC

Warning: Do not connect or disconnect cables/connectors to this connector while the Display unit is powered on. Failure to do so may result in damaged electronics inside the Display Unit. A short on wires may cause system to restart.

PIN 01	+5V	+5V out - Max 0.5A
PIN 02	PWR	Power On / Off
PIN 03	Res.	Reserved, do not connect
PIN 04	Aref	For potentiometer
PIN 05	+12V	+12V out - Max 0.5A
PIN 06	BRT_POT	Potentiometer in
PIN 07	BRT –	Button in
PIN 08	BRT+	Button in
PIN 09	GND	Ground

Pinout Assignment   **1**

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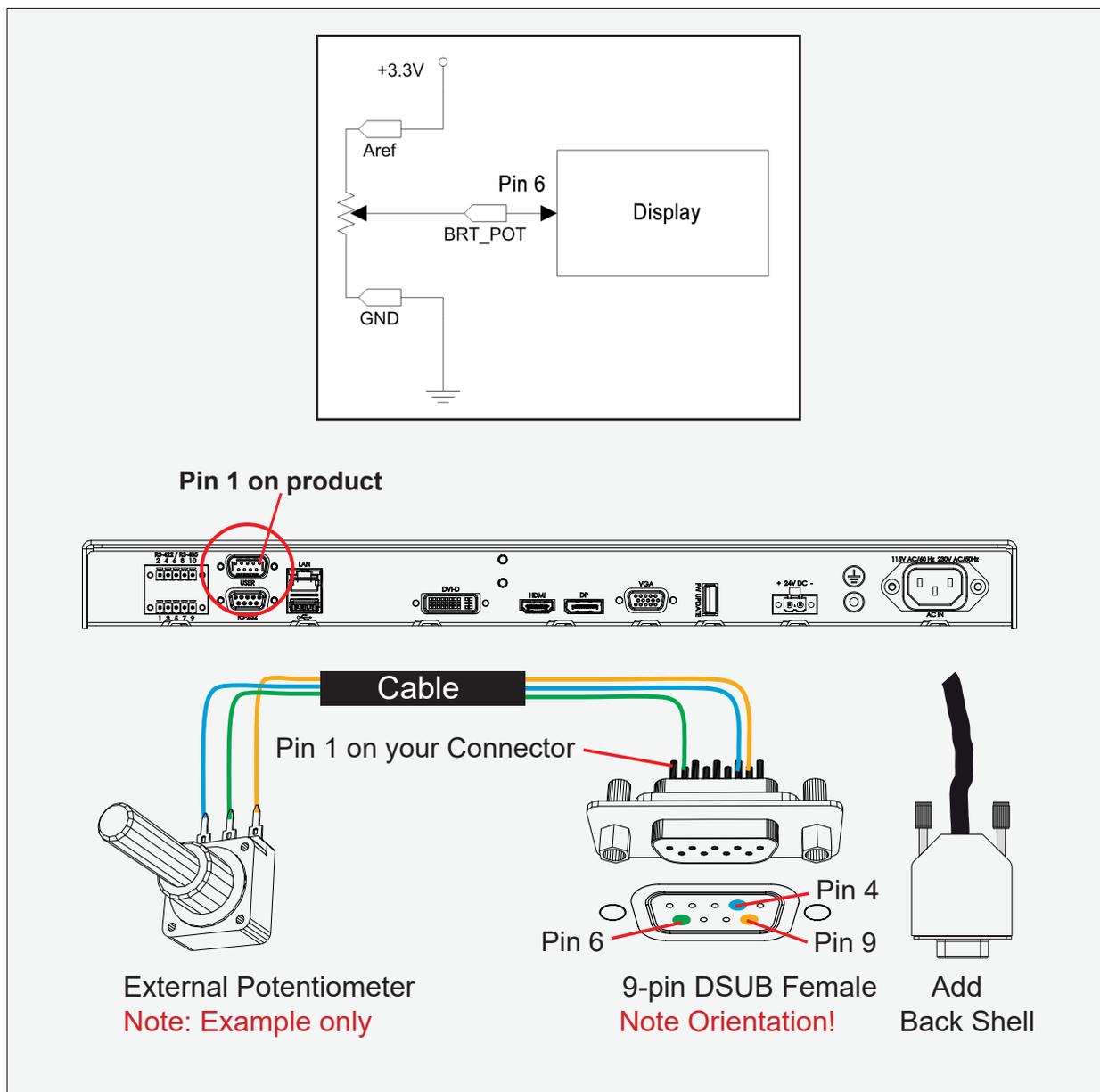All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

User-Potentiometer Control: Potentiometer shall be **10kΩ LINEAR.** Connect like the illustrations shown below:

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 3 wires (not 3 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.

In order to activate the external Potentiometer control, the internal *""POT" - Backlight Control Interface selection"* command has to be set first via our SCOM (Serial Communication Control Interface).

Usage for SCOM: Review the dedicated Technical Manual available from our website:
https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm

Pinout Assignment   **2**

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9-pin User Interface, DSUB Male

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

User-External Power ON/OFF Control:
External Power Button must be of "Push Button" type.Instant-On. To turn off unit, Press & Hold down for 3 seconds.

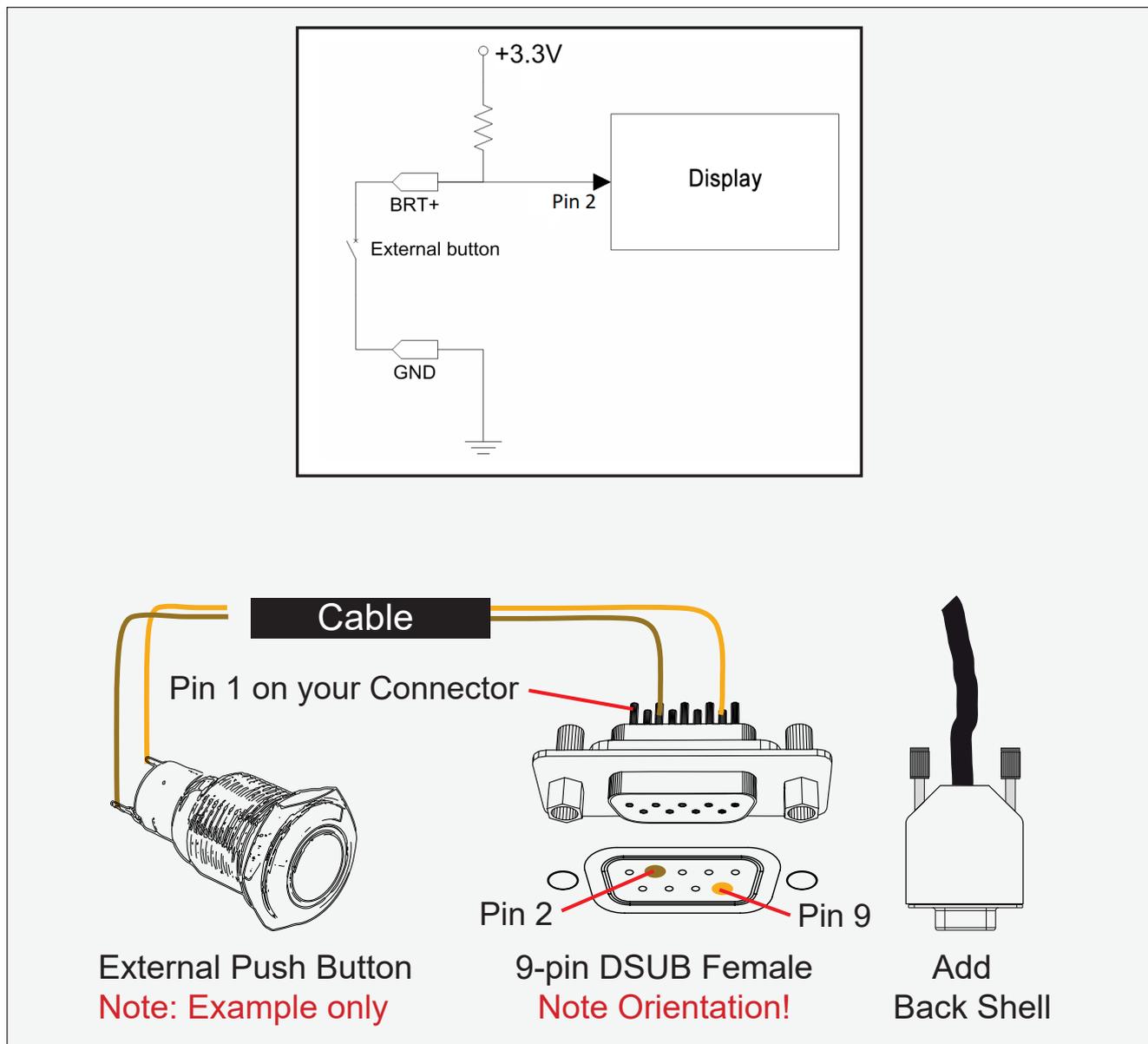**Building your own Push Button for External Power Button:**
Note: Requires soldering and assembly. It is expected that the technician has experience in electronics, soldering and assembling cables and connectors.

Use a cable that contains at least 2 wires (not 2 single wires). Heat Shrink Tubes must be applied to soldered wire/pins. Test connection (beep) with Voltage Meter.

In order to activate the external Power ON/OFF control it must be enabled:
Via OSD Menu: "OSD Miscellaneous>External Power Button" and set to Enable or Via SCOM (Serial Communication Control Interface): "MCC" - OSD Control Functionality -> "External Power Button (0x74)".

Usage for SCOM: Review the dedicated Technical Manual available from our website: https://www.hattelandtechnology.com/hubfs/pdfget/inb100018-6.htm

+3.3V

BRT+
Pin 2
Display
External button
GND

Cable

Pin 1 on your Connector

Pin 2   Pin 9

External Push Button
Note: Example only

9-pin DSUB Female
Note Orientation!

Add
Back Shell

Pinout Assignment   **3**

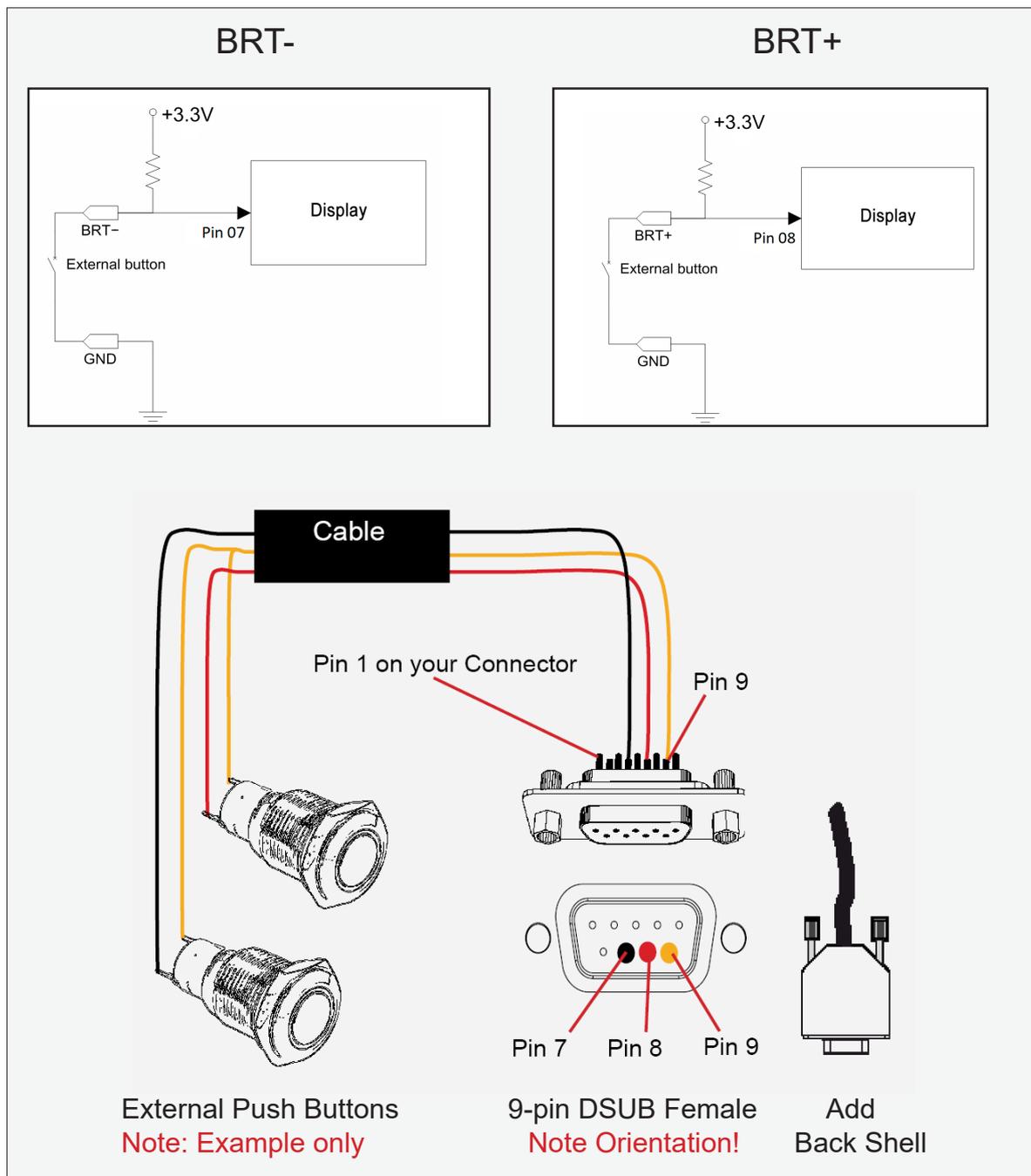HATTELAND
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All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

USER-External dimming: External dimming buttons must be of "Push Button" type. Push or push and hold down for dimming.

Building your own Push Button for External dimming:
Note: Requires soldering and assembly. It is expected that the technician has experience in electronics, soldering and assembling cables and connectors.
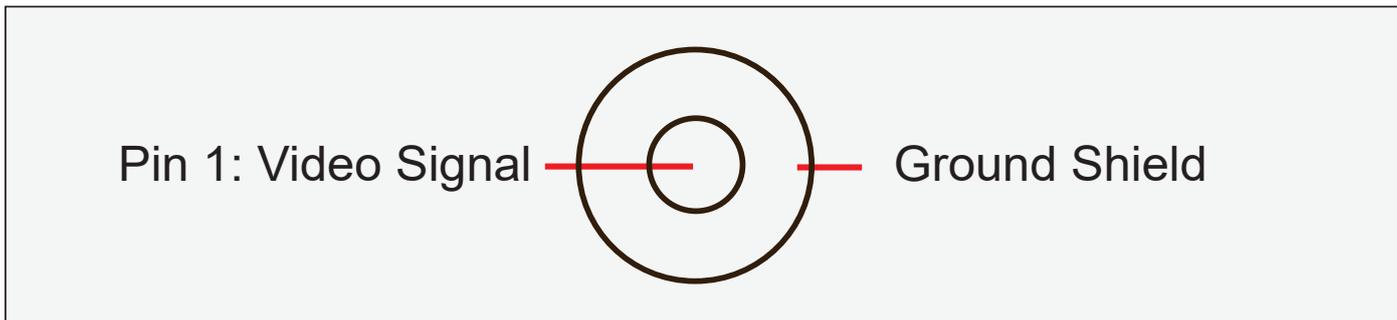
Use 1 cable that contains at least 3 wires (not 3 single wires), or 2 cable that contains at least 2 wires. Heat Shrink Tubes must be applied to soldered wire/pins. Test connection (beep) with Voltage Meter.

BRT-

+3.3V

BRT−   Pin 07   Display

External button

GND

BRT+

+3.3V

BRT+   Pin 08   Display

External button

GND

Cable

Pin 1 on your Connector

Pin 9

Pin 7   Pin 8   Pin 9

External Push Buttons
Note: Example only

9-pin DSUB Female
Note Orientation!

Add
Back Shell

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Pin 1: Video Signal —————○————— Ground Shield

10-pin RS-422 / RS-485 Module w/Buzzer

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

"RS-422/RS-485 SCOM + Buzzer" (Internal Buzzer can be controlled externally).

Pin 1,3,5,7 = RS-485 Full Duplex (4-wire)
Pin 5,7 = RS-485 Half Duplex (2-wire)

Buzzer - External Drive Logic:
• Able to supply 12VDC+-5%@100mA
• Short circuit protected at <500mA
• <50VDC from ground of Display unit (Our input is isolated, this is layout limitation)
• Our input is classified as signal input, not power.
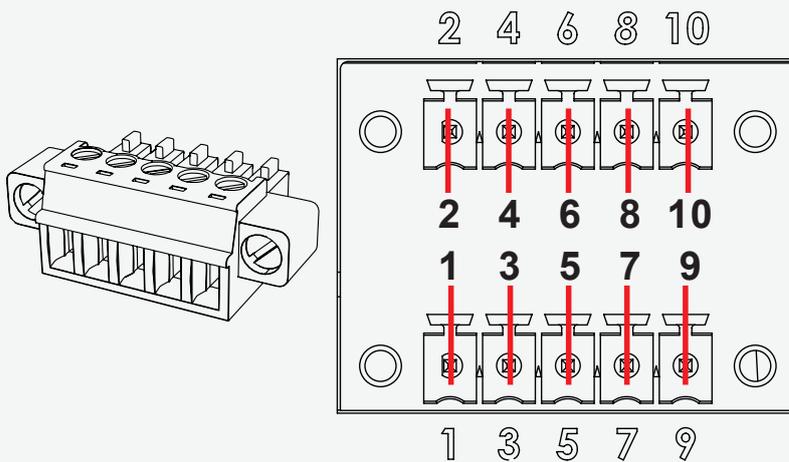
Notes:
Unit may have several physical connectors available for Buzzer control. Please only use RS-232 or RS-485 pins to control Buzzer, not both at the same time.

Series X (G1 - Generation 1):
• External drive logic can drive the buzzer even when the Display Unit is off.

Series X (G2 - Generation 2) / MVD Series:
• Display Unit needs external power connected to turn buzzer on. (Any logic power state).

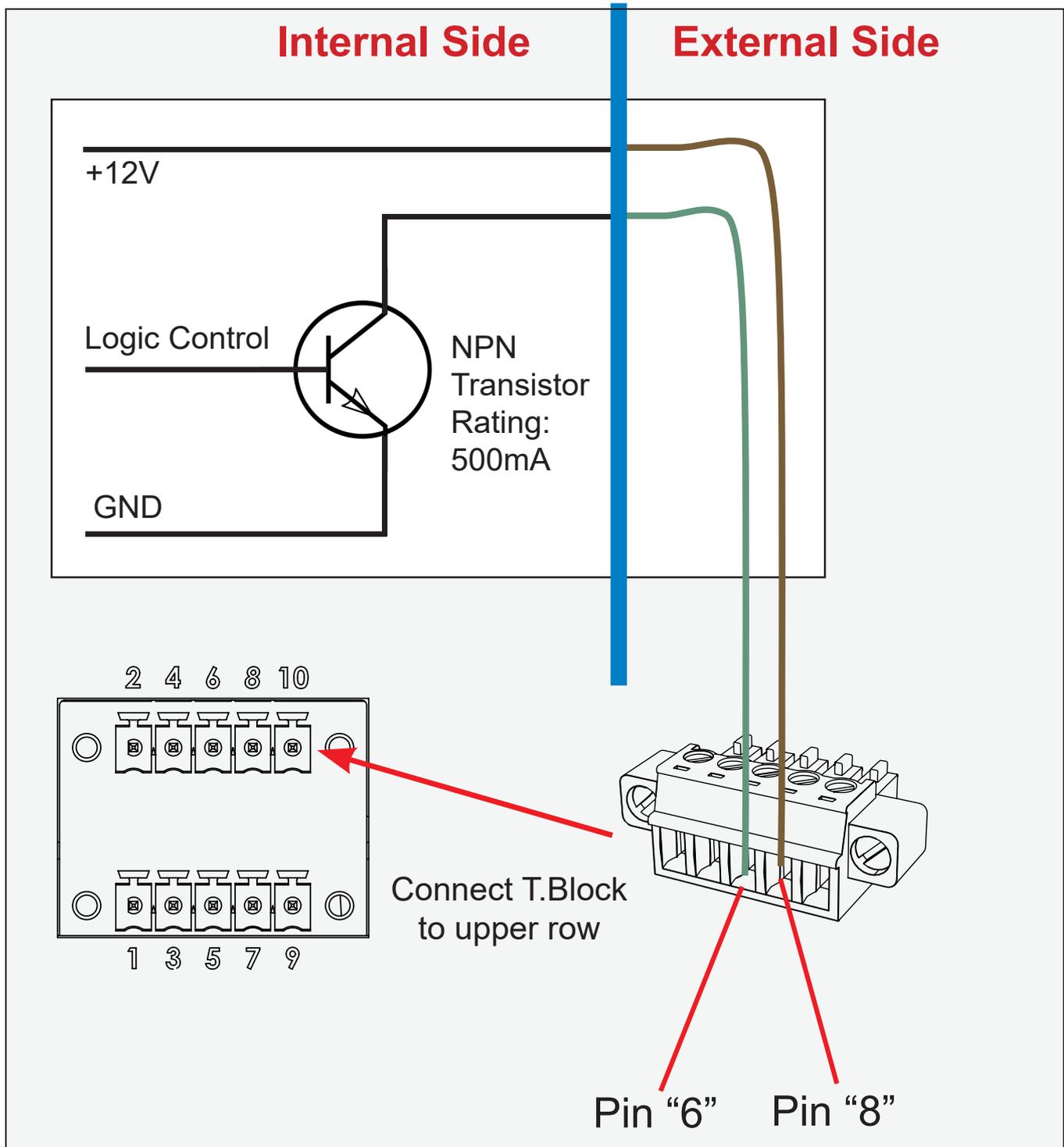| PIN 01	RxD+	Receive Data Positive
PIN 02	GND	Ground
PIN 03	RxD-	Receive Data Negative
PIN 04	+5V	+5V Out
PIN 05	TxD+	Transmit Data Positive
PIN 06	BUZ-	Buzzer Control Negative
PIN 07	TxD-	Transmit Data Negative
PIN 08	BUZ+	Buzzer Control Positive
PIN 09	GNDR	Ground 100Ω
PIN 10	GND	Ground

Pinout Assignment   1

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All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Suggested "Buzzer" Control Logic inside Computer/System. Display Unit needs external power connected to turn buzzer on. (Any logic power state).
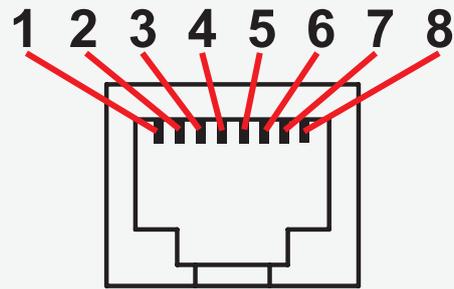
To ensure that EMC requirements are met, we recommend that the cable is screened and screen is terminated/ grounded at both ends with as short as possible pig tail. For Military/Naval use: +12V line from customer system should be low pass filter or else the power ripple may cause radiated emission to fail. Use a cable that contains at least 2 wires (not 2 single wires). Test connection (beep) with Voltage Meter. Wires may be combined if using RS-422/485 COM as well.

Internal Side   External Side

+12V

Logic Control

NPN
Transistor
Rating:
500mA

GND

2 4 6 8 10

Connect T.Block
to upper row

1 3 5 7 9

Pin "6"   Pin "8"

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

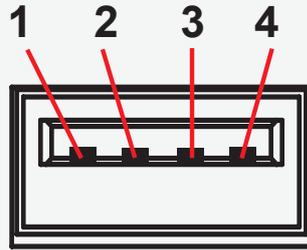All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

1 2 3 4 5 6 7 8

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)

Pinout Assignment   **1**

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4-pin USB2.0 TYPE A Female

All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

1   2   3   4

PIN 01	VCC +5V	Power
PIN 02	D-	Negative Data
PIN 03	D+	Positive Data
PIN 04	GND	Ground

Pinout Assignment   1

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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.

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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.

IND100078-80

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Basic Trouble-shooting

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.

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Parts and Recycling

Parts in Displays and Panel Computers, and how to recycle

Rev 02 - 20 May 2021

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

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IND105367-1

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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 Glass Display Control™ (touch key functions) may inhibit visibility of information at night.

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Revision history pr. chapter/document id

IND100106-7 - User Documentation statement
REV: 01 - DATE: 01 Jan 1970 - AUTHOR: SE
Initial version

IND100131-36 - Contents of package
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 07 Aug 2023 - AUTHOR: SE
Removed "printed papers", ref https://www.hattelandtechnology.com/product-notifications/changes-product-marking-all-products

IND100078-81 - Safety introduction and overview
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100110-12 - Touchscreen overview
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100110-22 - Touch Screen drivers and calibration
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: UT
Initial version
REV: 02 - DATE: 26 May 2023 - AUTHOR: SR
Pending description

IND100077-169 - Product labeling and locations
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 12 Jun 2023 - AUTHOR: SE
Revised labels, ref: ECN

IND100077-220 - Product labeling details
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 01 Jan 1970 - AUTHOR: SE
Revised labels, ref: ECN

IND100078-49 - Installation recommendations
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100210-14 - Housing / terminal block connector overview
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100078-45 - Panel Cutout / Console Mounting Bracket Kit for 15, 17 and 19 inch
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100078-46 - Panel Cutout / Console Mounting Bracket Kit for 24 and 27 inch
REV: 01 - DATE: 21 Jan 2023 - AUTHOR: SE
Initial version

IND100078-36 - Panel Cutout / Console Mounting Bracket Kit for 26 inch
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100078-48 - Mounting Bracket, Table / Desktop / Ceiling - 15, 17 and 19 inch

REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100078-33 - Mounting Bracket, Table / Desktop / Ceiling - 24, 26 and 27 inch
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100133-64 - Physical connections
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100064-40 - User controls
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100064-54 - On Screen Display (OSD) Menu - Functions map
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100064-55 - On Screen Display (OSD) Menu - Functions
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100084-17 - Serial Communication (SCOM) Interface - Introduction
REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 11 May 2023 - AUTHOR: SR
Pending description

IND100084-18 - Message commands and queries
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 11 May 2023 - AUTHOR: SR
Pending description
REV: 03 - DATE: 19 Jul 2023 - AUTHOR: SR
fix page alignment and - user brignetss control
REV: 04 - DATE: 19 Jul 2023 - AUTHOR: SR
fix page alignment and - user brignetss control

IND100084-22 - MCC Commands List
REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 13 Jun 2023 - AUTHOR: SE
Added HotKey Assignments, ref:https://www.hattelandtechnology.com/product-notifications/video-scaler-firmware-update-affecting-series-x-g2-mmd-hm-24-cmd-and-series-1-g2-mmd

IND100084-23 - Operational requirements
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100077-259 - Calculating checksums (IDCHK, IHCHK)
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100077-122 - HEX, ASCII, BIN and character tables
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100077-124 - C# / pseudo ethernet/TCP code example
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100064-52 - Operation Advanced (DDC/CI) Control Overview
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100077-252 - UHF Interference Prevention

REV: 01 - DATE: 21 Jan 2023 - AUTHOR: SE
Initial version

IND105446-15 - 18/24/24+5 pin DVI-D, DVI-I, Single/Dual Link Female
REV: 01 - DATE: 20 Feb 2023 - AUTHOR: SE
Initial version

IND105446-14 - 15-pin Analog RGB/VGA, DSUB HD Female
REV: 01 - DATE: 20 Feb 2023 - AUTHOR: SE
Initial version

IND105446-4 - 20-pin DisplayPort (DP) Female
REV: 01 - DATE: 17 Feb 2023 - AUTHOR: SE
Initial version

IND105446-36 - 9-pin Serial COM RS-232+Buzzer non-isolated, DSUB Male
REV: 01 - DATE: 22 Feb 2023 - AUTHOR: SE
Initial version

IND105446-3 - 2-pin Terminal Block 5.08 - DC Power Input
REV: 01 - DATE: 17 Feb 2023 - AUTHOR: SE
Moved from Datasheet to this document

IND105446-32 - 9-pin User User Interface/ON-OFF/Dimming, DSUB Male
REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SE
Initial version
REV: 02 - DATE: 11 May 2023 - AUTHOR: SR
Pending description

IND105446-54 - 1-pin RCA/BNC COMP. VIDEO Female
REV: 01 - DATE: 20 Feb 2023 - AUTHOR: SE
Initial version

IND105446-11 - 10-pin RS-422 / RS-485 Module w/Buzzer
REV: 01 - DATE: 22 Feb 2023 - AUTHOR: SE
Initial version

IND105446-1 - 8-pin RJ45 10/100/1000Mbps LAN/Ethernet
REV: 01 - DATE: 17 Feb 2023 - AUTHOR: SE
Moved from Datasheet to this document

IND105446-73 - 4-pin USB2.0 TYPE A Female
REV: 01 - DATE: 20 Feb 2023 - AUTHOR: SE
Initial version

IND100078-80 - IEC62368 policy
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100077-185 - Troubleshooting
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND105367-1 - Parts and recycling
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SS
Initial version
REV: 02 - DATE: 20 Jan 2023 - AUTHOR: SE
Updated version

IND100077-171 - General notes
REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

Legacy revision history

Note: Archived text (from legacy single documentation file called "USER MANUAL") prior to January 2023. Page numbers listed does NOT reflect this document.

Rev: 26 - Date: 03 Oct 2022
Updated folder picture for UHF Interference Prevention.
OSD Miscellaneous -> *Hot Key Assignment > added: Brightness, DisplayPort, Composite 1, Composite 2,Composite 3, Digital 1, Digital 2, Analog RGB1, Analog RGB2.
Removed: Black Level (Authors: SS,VM)

Rev: 25 - Date: 22 Jul 2022
Updated OSD menu for color mode settings > color temperature >. (Authors: SS,VM)

Rev: 24 - Date: 23 May 2022
Added and updated PinAssignments for USER port.
Updated information for Physical connection, USER port (Authors: SS,VM)

Rev: 23 - Date: 01 Dec 2021
Added missing Torque Force for HD CMB SX2-A1, page 31
Updated Technical Drawings and related documents affected by new Safety Requirements,
ref: https://www.hattelandtechnology.com/product-notifications/series-x-mmd-and-mmc-generation-2-chassis-update (Authors: ALL,VM,SE)

Rev: 22 - Date: 22 Jun 2021
Added Touch Screen Calibration information, page 17
Added HD 24T23 MMD datasheet, typenumber, drawings to user manual
Added information related to IEC62368 and Commissioning Regulation (EU) 2019/2021 throughout the
entire user manual. (Authors: JE,SE)

Rev: 21 - Date: 06 Jan 2021
Added details for OSD Key Outdoor mode regarding UHF, page 68, 156,157
Ref:
https://www.hattelandtechnology.com/product-notifications/series-x-g2-maritime-multi-display-mmd-firmware-update
https://www.hattelandtechnology.com/product-notifications/series-x-g2-maritime-multi-display-mmd-firmware-update-24_2020_ecn
General maintenance performed throughout the entire manual and specifications pages (Authors: VM,HS,SE)

Rev: 20 - Date: 08 May 2020
Added PIP valid combination table, page 61
Revised text and illustration for Terminal Block connection, page 28
General maintenance performed throughout the entire manual and specifications pages (Authors: VM,SE)

Rev: 19 - Date: 05 Feb 2020
Added reserved function "Spectrum Mode", page 49,67
Revised "Keep OCM Mode" function description, page 43, 67
-ref: https://www.hattelandtechnology.com/product-notifications/firmware-update-affecting-series-x-g2-mmd-displays-15-to-27-inch (Authors: VM,SE)

Rev: 18 - Date: 03 Feb 2020
Replaced DDC/CI Chapter with the appropriate section intended for Series X G2 MMD models, page 78-80 (Authors: VM,SE)

Rev: 17 - Date: 02 Dec 2019
Removed Global and Docmentation Driver DVD from Contents of Package, page 8, ref:
https://www.hatteland-display.com/mails/20_2019_eol.html
Adjusted OSD menus according to:
https://www.hatteland-display.com/mails/13_2019_ecn.html
Serveral corrections regarding OSD Menu modes/header made throughout the OSD Menu chapter
Replaced P007032-1 Gasket 24" with P022211, page 9,146
Added information about "UHF Protection", page 67 (Authors: ALL,SE)

Rev: 16 - Date: 01 Aug 2019
Updated with latest company profile, revised various grammar, several improvements performed through
the entire user manual (Authors: SE)

Rev: 15 - Date: 29 Mar 2019
Revised with updated drawings for 24 inch High Bright model, page 101
Revised Touch Screen Drivers information, page 18
Added detection time between sources, longest time, page 51,52,61
(Authors: YS,KKK,VM,SE)

Rev: 14 - Date: 27 Feb 2019
Adjusted text for PIP CHILD, PIP SPLIT, PIP WIDE, page 60 (Authors: MS,SE)

Rev: 13 - Date: 04 Jan 2019
Changed "Disable" to "Enable", page 72 (Authors: VM,SE)

Rev: 12 - Date: 17 Dec 2018
Revised Hot-key details, page 65
Revised HD CAK SX2-A1, HD CAK SX2-B1 drawings, page 141,142
(Authors: VM,KKK,SE)

Rev: 11 - Date: 28 Nov 2018
Added HD CAK SX2-A1, HD CAK SX2-B1 accessories, page 86,87,89,139,140 (Authors: BB,SE)

Rev: 10 - Date: 15 Oct 2018
Added HD 26TAP SX1-A1, page 132
Revised HD CMB SX2-E1, F1 description and drawings throughout the manual
Removed HD VED SX2-H1 throughout the manual (now obsolete)
- Ref: http://www.hatteland-display.com/mails/12_2018_ecn.html
General updates performed throughout the entire manual after internal reviews (Authors: WJ,LS,HAB,YG,BB,SE)

Rev: 09 - Date: 06 Aug 2018
Revised Panel Cutout for 19 inch, page 84,85,96,97 (Authors: LS,KK,JK,SE)

Rev: 08 - Date: 29 Jun 2018
Added new HD VED SX2-I1, -J1, -K1 drawings & specs., page 86,87,88,89,125,126,127
- Ref: http://www.hatteland-display.com/mails/12_2018_ecn.html (Authors: BB,WJ,SE)

Rev: 07 - Date: 08 May 2018
Revised text for "SCOM+Touch" added mention of USB, page 49, 58, 70 (Authors: VM,WJ,SE)

Rev: 06 - Date: 26 Mar 2018
Revised Contents of Package (USB cable), page 9 (Authors: BB,SE)

Rev: 05 - Date: 19 Feb 2018
Corrected errors in Contents of Package (DP cable removed, VGA cable added), page 5
(Authors: BB,FG,SE)

Rev: 04 - Date: 13 Feb 2018
Removed references to HD CMB SX1-B1 and HD CMB-SX1-C1, now replaced by HD CMB SX2-E1 and
HD CMB SX2-F1.
Revised Swap Source, only available for PIP, page 61, 65 (Authors: VM,SE)

Rev: 03 - Date: 20 Dec 2017
Revised "Service Mode OSD", removed "362" wrong code + added note, page 50, 66
General updates performed throughout the user manual based on latest specifications and company profile. (Authors: FG,SE)

Rev: 02 - Date: 29 Nov 2017
Added JH 26TAP STD-A1 accessory, page 137
Revised Contents of Package, note "Q1/2018" for HD CMB SX2-E1 / -F1 throughout the manual
General update throughout the user manual based on latest specifications and company profile (Authors: KKK,BB,PL,SE)

Rev: 01 - Date: 23 Oct 2017
Final version 01 for internet release
Note: Address changed from "Stokkastrandvegen 87B, N-5578 Nedre Vats" to "Eikeskogvegen 52, N-5570 Aksdal" throughout the manual, reference: http://www.hatteland-display.com/mails/26_2017_pr.html (Authors: WJ,KKK,BB,JE,FG,SE)

Rev: 00 - Date: 09 Jun 2017
Release for internal review. (Authors: WJ,SE)

Rev: 00 - Date: 15 Jun 2017
Added Panel Gaskets (Authors: SE)

Rev: 00 - Date: 18 Aug 2017
Revised after internal review, added HB models and more accessories (Authors: KK,WJ,SE)