User Documentation

Applicable for:

Typenumber	Category	Family
HD 32T40 MVD-MAx-Cxxx	Monitor	HATTELAND® Series X MVD

Product Status	HWcode	Description
New		4K UHD, Console Model, LED, Widescreen

Document overview:

ID: INB101999-1

Compilation date: 1 Oct 2024 - Compiled by: Website/Visitor.

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

Documents included:

Statement

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Contents of package

Item	Description	Illustration
VSD101004-1	1 x DP to DP (DisplayPort 1.2) Signal Cable. DP 20P Male to DP 20P Male - Length 2.0m Applicable only for Wall Mount/Console models.	
B143B-007J	1 x miniDP to DP (DisplayPort 1.2) Signal Cable. miniDP 20P Male to DP 20P Male - Length 2.0m Applicable only for Wall Mount models.	
TP52/TC01-1,8M	1 x Power Cable (Black) European Type F "Schuko" to IEC. Length: 1.8m (5.9 ft) Applicable only for Wall Mount/Console models.	EUR TYPE F IEC
TP11/TC01-1,8M	1 x Power Cable (Black) US Type B plug to IEC. Length: 1.8m (5.9 ft) Applicable only for Wall Mount/Console models.	US TYPE B IEC
VSD100913-1	1 x Touch Screen Cable USB Type A to Type A. Length Approx 2m. Applicable only for Wall Mount/Console model.	
HD CMB SX2-J1	EN60945 Tested Bracket Kit suitable for console/panel mounting which contains: 3 x Mounting Bracket for top, left and right side 1 x Mounting Bracket for bottom side (terminal/connector plate area) 8 x M5x16 screws	
P0xxxxx		
	Test Report	
Terminal Block Connector Kit	Terminal Block Connector Kit as follows (may in some cases be already factory mounted): 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. Applicable only for Wall Mount/Console models.	

1

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Contents of package

Package may also include: (model dependent)

Item	Description	Illustration
HD REM SX1-A1	External Remote Controller - HD REM SX1-A1 Communicates via Hatteland Technology SCOM, RS-485, 3-button. Included with Console (CORx) models.	
HD TDCMVD KIT-A1	1 x Complete Tactile Display Control (TDC) kit Includes cable VSD203146-1 shown below for connectivity. Included with Console (COTx) models.	
VSD203146-1	1 x TDC BOX Extension 15-pin DSUB cable Male to Female for External Tactile Display Controls (TDC). Length 1.5m. Part of "HD TDCMVD KIT-A1" above.	
2X-EA12	4 x ATEN LockPro HDMI/DP Cablelock + 4 x M3x6 Panhead Screw Torx w/sems spring plain 7mm Zc1 Both not factory mounted, delivered loose in package.	

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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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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 Vision (MVD) 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.
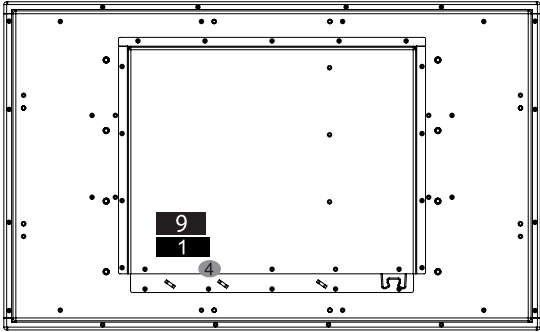
Label Size and Types

ID	Label Layout	Description	Specification
1		**Type** : **Serial Number Label** **Name** : Label B **Size** : 60mm wide x 20mm high (rectangle size) Note: Text content of label will match specifications derived from Data Sheet.	Silver with glue on back, non-tearable and made for thermal transfer printing.
		Barcode type: CODE128 (used extensively world wide in shipping and packaging industries. The symbology was formerly defined as ISO/IEC 15417:2007.)	
4		**Type** : **Warranty Label** **Size** : 30mm wide x 23mm high (oval size)	Tamper-proof sticker with glue on back.
9		**Type** : **Product Label (Variant #1)** **Art** : **IND105459-5** **Size** : 60mm wide x 26mm high (rectangle size) Note : For products w/single power input	Black label, Lexan 0,125 3M467 Adhesive
9		**Type** : **Product Label (Variant #2)** **Art** : **IND105459-6** **Size** : 60mm wide x 26mm high (rectangle size) Note : For products w/more than 1 power input	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
	Warranty label covers screw. Labels placed on rear. - Serial Number Label - Product Label - Warranty Label	HD 32T40 MVD-MAx-CyBz Console Models

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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) Label

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

Handling Symbols Label

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

Serial Number Label Layout (example)

Manufacturer/Country		Compass Safe Distance
Input Voltage(s)	32" Multi Vision Display — **HATTELAND**®	IP Rating — Lowest value used, higher may apply, check specifications.
Power Rating Max/Typ	Manufactured by Hatteland Technology AS, Norway — Compass Safe Distance Standard: TBDcm - Steering: TBDcm — CE — 100-240V AC 50/60Hz — 24V DC — IP22 — TBDW (Typical: TBDW) — TYPE NUMBER-SERIAL NUMBER — MFR Date: 2024-03-21 — HD 32T40 xxD-xxx-xxxx-123456	Type+Serial Number
Date of Production (YYYY-MM-DD)		Barcode (TYP+SNO)

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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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.

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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.

Note: By factory default the Default Touch Enabled Source is set to DisplayPort (DP). Touchscreen is not active if using HDMI. You may change this behaviour in the OSD menu: "Miscellaneous/Touch PWR" as described in the OSD Menu chapter in this manual.

Microsoft® Windows® 7 / Microsoft® Windows® 10 IoT
- Please use Windows® Generic HID driver, no specific driver needed to use multi-touch.

Microsoft® Windows® XP - For 32, 43 and 55 inch units:
- Multi-Touch Screen is not supported for this Operating System.
- Alternative Single Touch / Mouse Mode not supported.
Ref: OS End-of-Life: https://www.hattelandtechnology.com/product-notifications/update-eol-microsoft-windows-xp-professional-for-embedded-systems-and-microsoft-windows-xp-embedded

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

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

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.

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

General Installation Recommendations

First Things First!

IND100148-5 - Rev 05

⚠️ ⚠️ **ATTENTION!**

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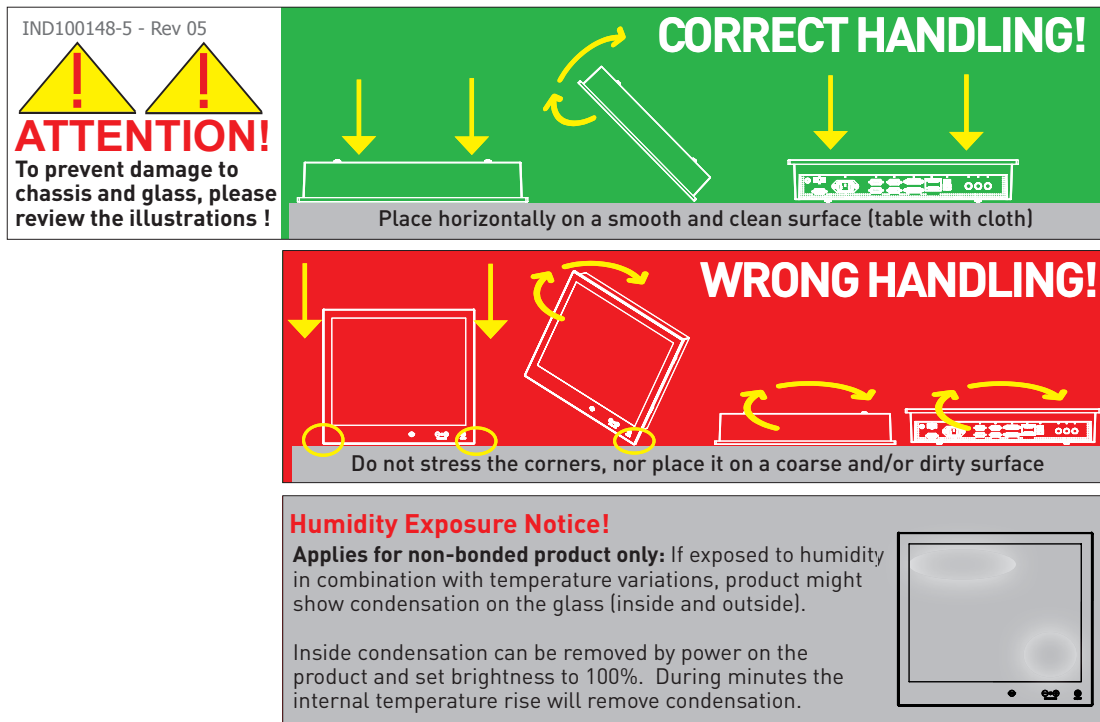
CORRECT HANDLING!

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

Note: Each installation case is different, and Hatteland Technology can only offer general tips as each individual case must be reviewed at local site thoroughly by users themselves and then take necessary steps in basis of the following points below. It is expected that user has adequate installation knowledge regarding protecting the units in terms of preventing overheat, provide good air ventilation and be aware of general precautions to ensure long life time of units and internal electronic components. The points below serve only as a guide and may not all be applicable for the users installation in every situation.

1. Most of our units 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 unit. The air inlet and outlet openings must definitely be kept clear; coverings which restrict ventilation are not permissible.

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Ferrite

The ferrite prevents high frequency electrical noise (radio frequency interference) from exiting or entering the equipment. **This ferrite is required when connecting a RS-232 cable to the SCOM on the unit (1 x 9p D-SUB, female, non-isolated) connector to be fully compliant with type approvals.**

The ferrite should be mounted (clipped in place on the cable) and located as close as possible to the connector piece that connects to the rear of computer.

When ready: Open the ferrite, place the cable inside as shown in FIG1, and then gently close it until a click can be heard (FIG2). You may close and re-open them as many times as required during the installation.

FIG1

FIG2

To computer

To computer
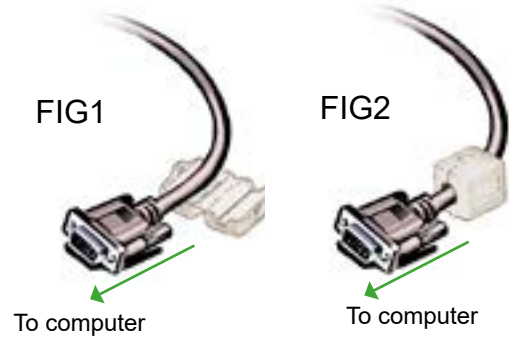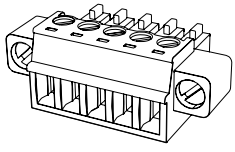
Red Line indicate where Ferrite should be mounted (as close as possible to the connector).
Do not mount ferrite (orange square) below the red line!

Typenumber	Ferrite Type	Preferred distance of ferrite. Side view.
HD 32T40 MVD-MAx-CyBz Console Models	1 x Würth 742 711 31	

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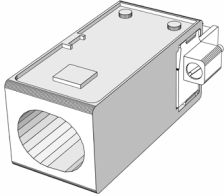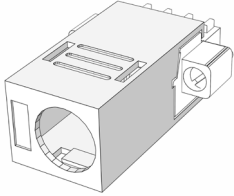
General Installation Recommendations

Housing / Terminal Block Connector Overview

Housing / Terminal Block connectors are available 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 cannot 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 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.).

Illustration	Pins	Manufacturer Details	Connector used for module
	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 / SCOM (Serial Remote Control) / Buzzer 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-MC 1,5/ 5 (5-pin)	 BCZ 3.81 AH05 BK BX (5-pin)
For 5-pin: https://www.phoenixcontact.com/online/portal/us?uri=pxc-oc-itemdetail:pid=1834372&library=usen&pcck=P-11-02-01&tab=1 For 5-pin 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   2

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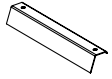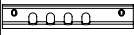
Panel Cutout / Console Mounting Bracket Kit for 32 inch

You need: Torx T25 tool, 1 pcs of HD CMB SX2-J1 kit (included in delivery).
Procedure suitable for: Series X Multi Vision Monitor 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	P03422	32T40 CMB Bracket A	
	1	P034523	32T40 CMB Bracket B	
	8	145 050x016 CA4	DIN 965 M5x16 Countersunk head screws with TX25, A4 STAINLESS STEEL	

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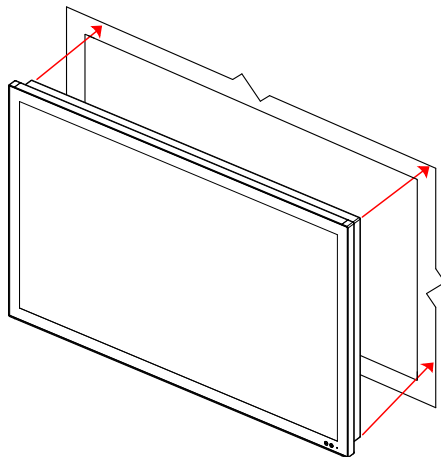
▼ 2: Make sure you are aware that brackets should be mounted on TOP, LEFT, RIGHT and BOTTOM sides. Note that the [B] bracket is different than the [A] brackets and mounted near the connectors. See closeup of details.
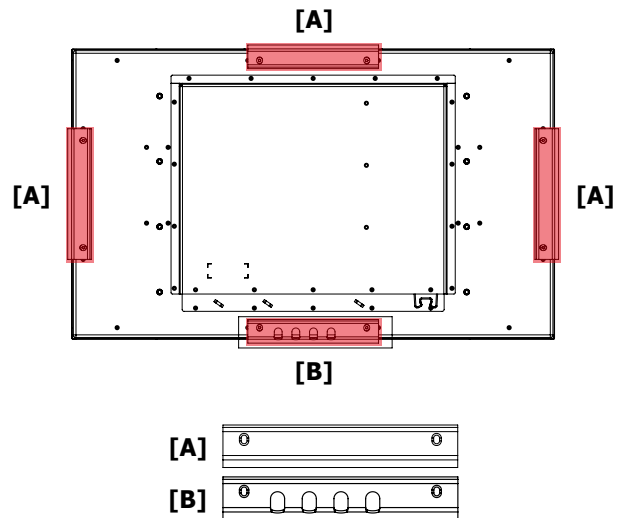
▼ 3: Secure each bracket with the provided screws as illustrated below. Make sure you do it equally and even for all 4 sides. Use Torque Force 3.75Nm. Note the orientation of brackets before you begin.

Countersunk head screw M5x16
Mounting bracket
Mounting bracket Bottom
Display with Console gasket
Console Plate with Panel Cut-out
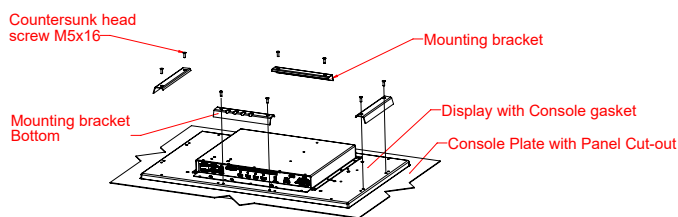
▼ 4: Review closeup of the mounting of brackets with screws. Seen from bottom side.
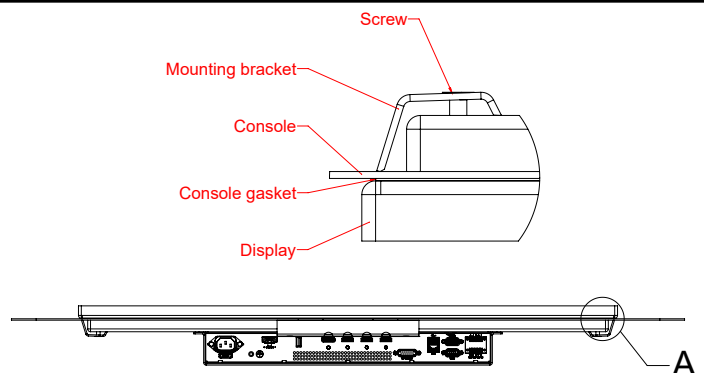
Screw
Mounting bracket
Console
Console gasket
Display

Installation   1

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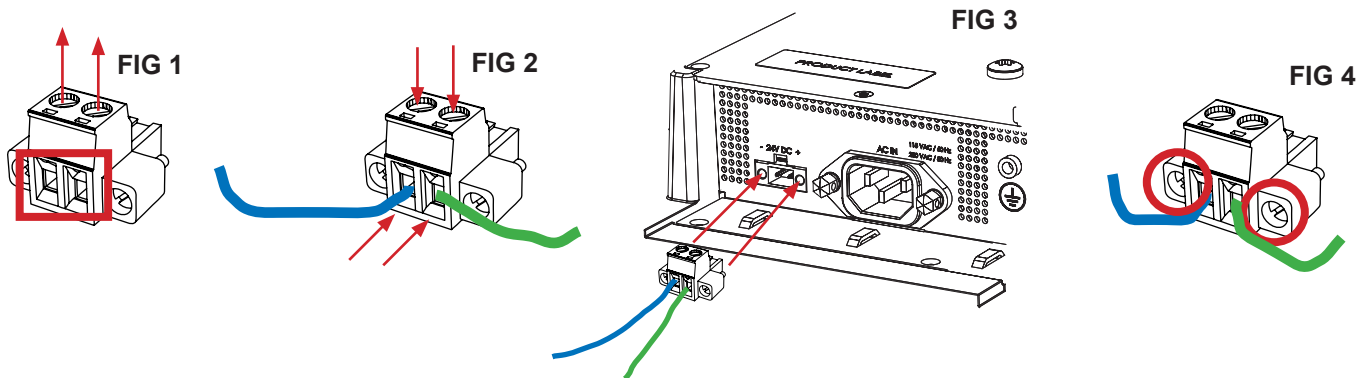
FIG 1: Unscrew (from top) or make sure that the screw terminal (square area) is fully open, so you can secure the inserted cables correctly to the loose housing connector (it may already be plugged into the unit as per factory installation).

FIG 2: 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 3: 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 4).**

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   **1**

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Physical Connections

SCOM RS-422/RS-485   SCOM RS-232   SCOM RJ45 Network   HDMI 1 (2.0) In   HDMI 3 (1.4) In   Firmware Update   Grounding Screw

USER Port   USB SCOM+Touch   TDC Interface   HDMI 2 (1.4) In   DisplayPort (DP 1.2) In   Power Input DC   Power Input AC
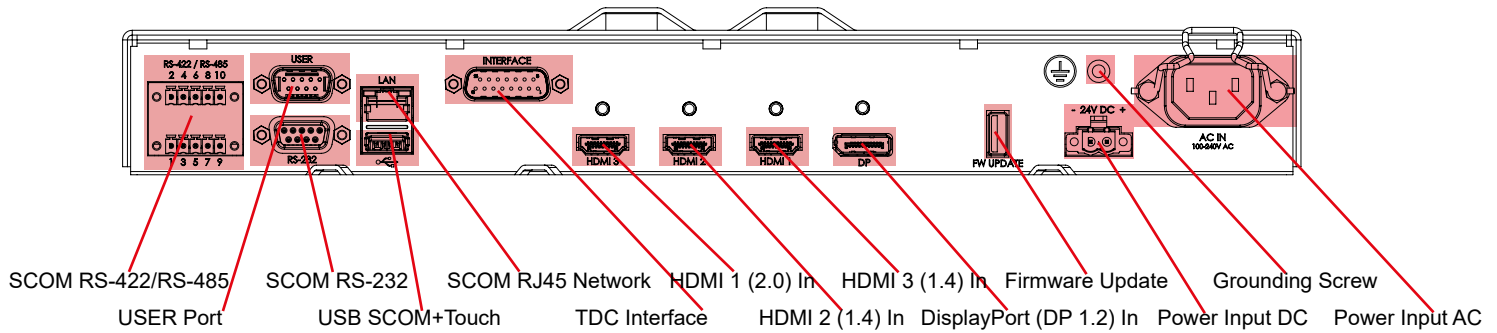
Reduce Cable Tension
To reduce tension on the cables you connect, secure them with a cable tie to the available chassis hinges located below the connectors.

ATEN LockPro HDMI/DP Cablelock
For HDMI and DisplayPort connectivity a suitable cable lock are delivered with each unit. To mount correctly, please visit YouTube: *"How To Keep HDMI Cables Locked in Place with ATEN LockPro™* https://www.youtube.com/watch?v=BSMC1MkyOpo

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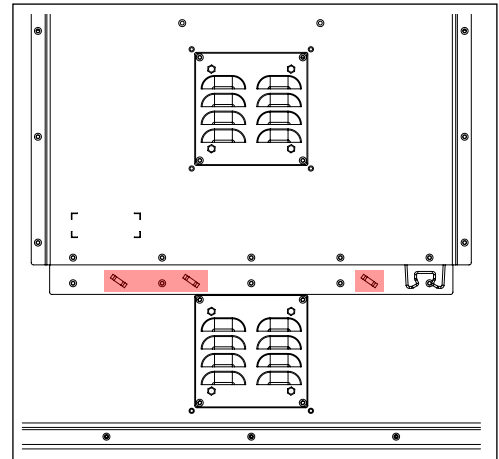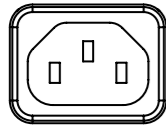
POWER INPUT AC:
The internal AC power module supports both 115VAC/60Hz and 230VAC/50Hz power input. Please check specifications for your unit.
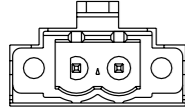
POWER INPUT DC:
Connect your DC power cable to the 2-pin Terminal Block 5.08 connector. The internal DC power module supports 24VDC. Please check specifications for your unit.

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.
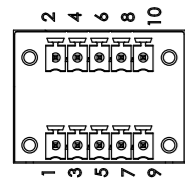
RS-422 / RS-485 COM I/O:
The COM (non-isolated RS-422/485) allows functionality to communicate with serial based equipment including external buzzer functionality. Connect and fasten your cables from your compatible external equipment to the 5-pin Terminal Block 3.81 connector. Please review the "Pinout Assignments" chapter as well as "Housing / Terminal Block Connector Overview" in this manual for more information. One example of perheripal from Hatteland Technology is the External Remote Controller (HD REM SX1-A1). This connector will allow 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
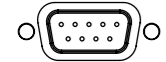
USER Port INPUT / OUTPUT:
Allows for controlling Brightness of the displayed image on screen and power the screen On/Off, by connecting an external remote control to the D-SUB 9P connector (male). The USER port has built in Potentiometer IN, +5VDC OUT, external power button,+12VDC OUT and BRT +/- IN 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.
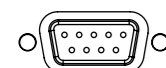
SCOM RS-232 I/O:
This D-SUB 9P connector (female) connector provides additional functionality for the unit. The Serial Remote Control (SCOM) features a RS-232 (non-isolated) interface for controlling internal parameters like brightness. You can access most of the parameters available in the OSD menu 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 connector 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
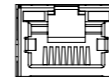
SCOM Network/LAN I/O:
Supports 10/100/1000Mbps Ethernet (LAN). Suitable for twisted pair cables CAT.5E. Make sure the network cable connector "clicks" into the RJ-45 connector. This connector will allow remote control of the display unit to control common functions like brightness, input source and more 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

SCOM + TOUCH SCREEN USB:
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

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".
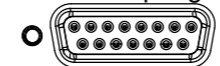
Interface Connector (External Tactile Display Controls - TDC):
This D-SUB 15P connector (male) provides an interface for User Controls in order to Power On/OFF the unit as well as full access to the OSD Menu, Brightness, Contrast functions and more. On certain models this connector is already by factory default occupied and connected.

Secure the Interface cable to the hex spacers provided on the unit and make sure you do not bend any of the pins inside the connector when connecting.

> Note: Cable that connects the TDC unit to the Display unit must under no circumstances be connected or disconnected while the Display unit is powered on. Failure to do so may result in a damaged TDC or Display Unit

Physical Connections
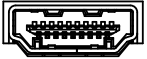
HDMI IN:

Connect your HDMI (male) cable to the HDMI (v2.0) 19P connector (female) of the unit. The HDMI connector has its own locking mechanism that locks the plug inserted. Make sure the plug "clicks" into place to verify a proper and secure connection. For additional secure mounting, consider using the provided "ATEN LockPro HDMI/DP Cablelock". For optimal signal quality and stability, use HDMI 1.4/2.0 compliant cable.

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. For additional secure mounting, consider using the provided "ATEN LockPro HDMI/DP Cablelock". For optimal signal quality and stability, use DP1.2 compliant cable.
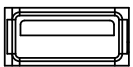
FW (Firmware) Update:

Intended for on-site possibility to upgrade/service the internal Firmware inside the unit that could fix issues or to improve functions Upgrading should only be performed by a skilled technician familiar with typical Firmware/Bios upgrading. Connect a TYPE A USB Cable between this connector and your PC. Port is USB2.0 (<5m).

USER CONTROLS OVERVIEW

The units are designed using Brightness Display Control™ (BDC) 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.

Brightness & Decrease/Increase

LED Status Indicator
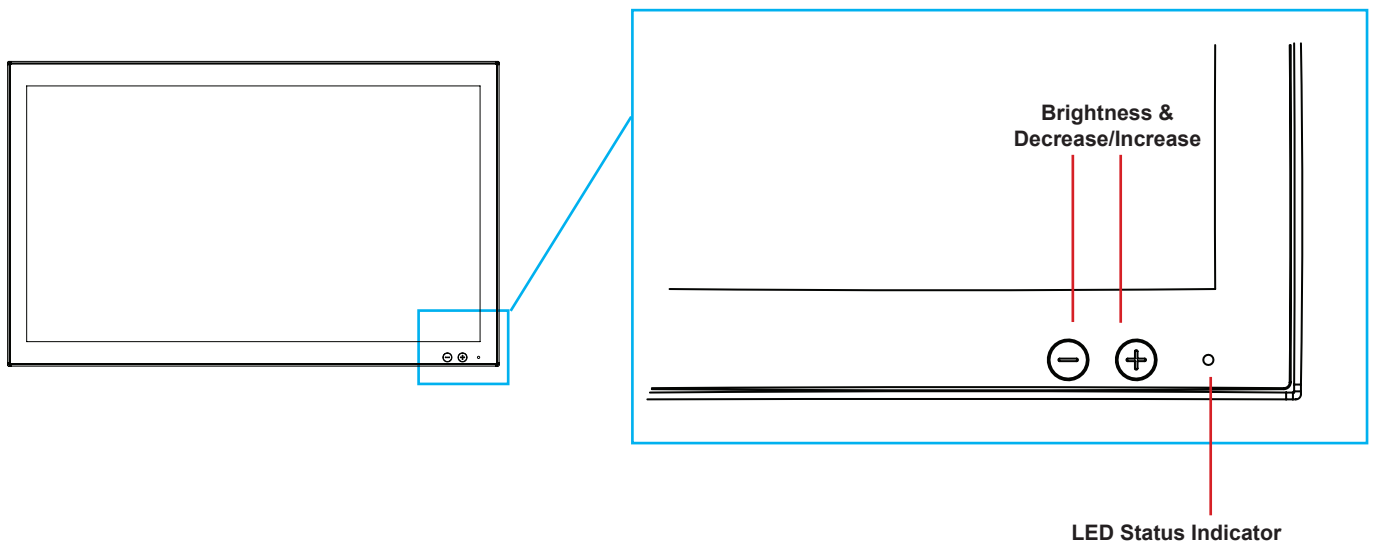
○　　**LED Status Indicator:**
1 x Status LED (orange) 3mm on front glass, lower right.

When valid Input is connected to Displayport:
- If Brightness level (BRU) is equal to calibrated level, the status is off.
- If Brightness level (BRU) is away from calibrated level, the status led is on.

When no valid input is connected to Displayport:
- The status led is on.

⊖　⊕　**Brightness Adjust:**
Brilliance / Brightness adjustment of the displayed image is adjusted by touching the (-) or (+) illuminated symbols.

Display Remote Control:
All settings and on/off functionality shall be controlled from the computer using standard E-DDC 1.3 (DDC/CI) commands.
- Dimming, support complete dimming (0-100%)
- Colormap for ECDIS
- Commands listed in DOC207999-1 later in this manual.

Supported EDID Paramters:
Manufacturer ID, Product ID Code, Serial number, Manufacturer Date, EDID version, Video Input Type, Display size.

Operation　　　　1

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OSD Menu Overview

On Screen Display (OSD) Menu Introduction

The OSD menu consists of single menu overlay with two columns which are Sub-Menu and Adjust Value / Choices Menu which are 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. The OSD Menu overlay will appear over any signal input and based on OSD settings either be position in center, become transparent depending on factory default setting or by user's own preference.

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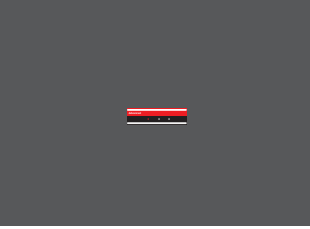
During use/accessing the OSD menu, based on factory default or customized configuration, there might be a pop-up requester asking for a Key Code (password) to gain further access to requested menu. These are 3 digits long.

Keycode	Description
321	Applies for "ECDIS Compliance" products. Code must be entered to get access to OSD MENU. Configured in OSD parameter: "OSD Menu > OSD Lock Mode > Menu Protect"
362	If OSD are in Basic Mode, entering code gets access to Advanced Mode. Configured in OSD parameter: "OSD Menu > OSD Mode > Advanced"
---	Service Mode - Only applicable for authorized service personnel. Configured in OSD parameter: "OSD Menu > 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 by factory default **"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	**Advanced** 0 0 0 Close-up of Requester	**Advanced** 3 2 0 Close-up of Requester
1: Typical position of requester on screen.	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. Current number will appear in red color
Advanced 3 2 1 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.	5: The OSD menu appear	

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 "Basic" and "Advanced" menu modes and a complete map of all the underlying functions available within.

User Controls   2

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OSD Menu Overview

OSD "Basic" and "Advanced" Menu modes (examples)

You may encounter two different menu size setups based on factory default or by customized preset configuration. The "Basic" Menu mode offers easy and clear access to most commonly used functions. The "Advanced" Menu mode offers more choices with technical information and is suited for technical minded users or specific configuration needs.

Example of BASIC MENU

DisplayPort		Resolution: 3840x2160@60Hz
Image Settings	Select source to Adjust	Main Input
Color Mode Settings	Brightness	128
PIP Menu	Contrast	128
OSD Menu	Saturation	128
Miscellaneous	Hue	128
Input Source Settings	Sharpness	128
Communication	Exit	
Service Settings		
Presets		
Fault Status		
Exit		
	Main Input:	Second Input:
	Third Input:	Fourth Input:

Basic OSD Menu showing for example "Image Settings" chosen in the menu. The first column is visible at all times, while the two next columns will change based on contents of that submenu and adjustable values. The design and size of OSD menu area does not change in any setting. In Basic Mode, certain settings have been locked (gray text) to allow only the most common basic functions available for user only.

Example of ADVANCED MENU

DisplayPort		Resolution: 3840x2160@60Hz
Image Settings	Select source to Adjust	Main Input
Color Mode Settings	Brightness	128
PIP Menu	Contrast	128
OSD Menu	Saturation	128
Miscellaneous	Hue	128
Input Source Settings	Sharpness	128
Communication	Exit	
Service Settings		
Presets		
Fault Status		
Exit		
	Main Input:	Second Input:
	Third Input:	Fourth Input:

Advanced OSD Menu showing for example "Image Settings" chosen in the menu. The first column is visible at all times, while the two next columns will change based on contents of that submenu and adjustable values. The design and size of OSD menu area does not change in any setting. In Advanced Mode, all settings are available (except those which are dependent on signal inputs or by product design).

User Controls　　　**3**

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OSD Menu Overview

OSD Visual User Feedback (examples)

Throughout all OSD menus there are certain graphic elements 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 have text based, human readable text for clarity and uses no graphical icons. 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.

Image Settings	PIP H. Position
A round frame with text marked in red, means this is the currently selected item in the menu with additional settings that can be adjusted	Text marked in gray color means that the current function in menu is either not enabled or is not available to adjust.
RS232 ●	**128**
A dot next to an item in the menu, means that this function is currently active and set by user previously (stored setting).	A Slider Bar meter indicates the minimum and maximum value for the current function selected. The current value is written to the left.

Note: The examples above are the most common ones displayed.

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OSD Menu Overview

OSD Menu Structure

In this table all functions within menus and their submenus are shown. Functions that begins with an [1] 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 [2] and in **bold/red font color** indicates this function is only available while in "Service" menu mode. Functions that begins with an [3] and in **bold/red font color** Indicates only "Advanced" and "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.

Image Settings

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Image Settings >	Select Source to Adjust >	- Main Input - Second Input - Third Input - Fourth Input	
	Brightness >	(Slider Bar)	
	Contrast >	(Slider Bar)	
	Saturation >	(Slider Bar)	
	Hue >	(Slider Bar)	
	Sharpness >	(Slider Bar)	
	Analog VGA Adjustment >	- Auto Position - Auto Color - H. Position - V. Position - Clock - Phase	
	Auto Adjustment >	- On - Off	
	< Exit		

Color Mode Settings

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Color Mode Settings >	Color Temperature >	- 9300K - 8000K - 6500K - User	
	Gamma >	- No Calibration - Calibration DisplayPort - Calibration HDMI	
	Red Gain >	(Slider Bar)	
	Green Gain >	(Slider Bar)	
	Blue Gain >	(Slider Bar)	
	Gamma Reset >	- On - Off	
	< Exit		

User Controls   **5**

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OSD Menu Overview

PIP Menu

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
PIP Menu >	PIP Mode >	- PIP OFF - PIP Child - PIP Split - PIP Wide - Triple PIP - Tri Stack PIP - Quad PIP - PIP Horizon	
	PIP Child Size >	- 1 - 2 - 3 - 4 - 5 - 6 - 7	If PIP is activeted
	PIP H. Positiont	(Slider Bar)	
	PIP V. Position	(Slider Bar)	
	Swap Source	(Automatic Action)	
	Display Rotate	- 0° - 90° - 180° - 270°	
	< Exit		

OSD Menu

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
OSD Menu >	OSD Language >	- English - Français > (French) - Deutsch > (German) - Italiano > (Italian) - Espanol > (Spanish) - Norsk > (Norwegian) - 日本語 > (Japanese) - 簡體中文 > (Simplified Chinese)	
	OSD H. Position >	(Slider Bar)	
	OSD V. Position >	(Slider Bar)	
	OSD Timeout (sec) >	(Slider Bar)	
	OSD Transparent >	(Slider Bar)	
	OSD Mode >	- Basic - Advanced - Service	
	[3]OSD Lock Mode >	- Normal - Menu Protect - Full Protect	
	[3]OSD Key Outdoor >	- On - Off	
	< Exit		

User Controls   **6**

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Miscellaneous[4]

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Miscellaneous >	[3] Aspect Ratio >	- Full - 16:9 - 4:3 - 1:1 - Native	
	[3] GDC Sensitivity >	- 0-255	
	[3] Power Plan >	- Enable - Disable	
	[3] LAN/Sleep-Mode >	- Enable - Disable	
	[3] Touch PWR >	- DisplayPort - HDMI1 - HDMI2 - HDMI3 - Disable - Signal - Active	
	[3] Power Button >	- Enable - Disable	
	[3] DDC/CI >	- DisplayPort - HDMI1 - HDMI2 - HDMI3 - Disable - Signal - Active	
	[3] Key 1 >	- Black Level - Touch PWR - Main Input - Second Input - PIP Mode - Aspect Ratio - Swap Source - Test Pattern - Language - No Function	
	[3] Key 2 >	- Black Level - Touch PWR - Main Input - Second Input - PIP Mode - Aspect Ratio - Swap Source - Test Pattern - Language - No Function	
	< Exit		

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Input Source Settings

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Input Source Settings >	Main Input >	- DisplayPort - HDMI1 - HDMI2 - HDMI3	
	Second Input >	- DisplayPort - HDMI1 - HDMI2 - HDMI3	
	Third Input >	- DisplayPort - HDMI1 - HDMI2 - HDMI3	
	Fourth Input >	- DisplayPort - HDMI1 - HDMI2 - HDMI3	
	Auto Source >	- On - Off	
	Auto EQ	- On - Off	
	< Exit		

Communication[4]

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Communication >	[3] RS232 >	(Automatic Action)	
	[3] 2-wire RS485 >	(Automatic Action)	
	[3] 4-wire RS485 >	(Automatic Action)	
	[3] USB >	(Automatic Action)	
	[3] Address RS >	0-254	
	[3] Auto IP Address >	- Enable - Disable	
	[3] Fixed IP Address >	(Number Input, xxx.xxx.xxx.xxx)	
	< Exit		

User Controls   **8**

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Service Settings

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Service Settings >	[2] Video Scaler Firmware:	(Text only)	
	[2] uC Firmware:	(Text only)	
	[2] Current Temperature:	(Text only)	
	[2] Test Pattern >	- Enable - Disable	
	[2] Burn In >	- Enable - Disable	
	< Exit		

Presets

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Presets >	[3] Save >	- User1 - User2 - User3 - User4 - User5	
	Load >	- Default - User1 - User2 - User3 - User4 - User5	
	DVI EDID >	- UHD - WUXGA	
	Over Drive	- Off - Low - Middle - High	
	Recall >	(Automatic Action)	
	< Exit		

Fault Status

Main Menu	Sub Menu	Adjust / Choices Menu	Notes
Fault Status >	[2] NVRAM	(Text only)	
	[2] Ethernet	(Text only)	
	[2] GDC	(Text only)	
	[2] TPM Sensor	(Text only)	
	[2] LED Driver	(Text only)	
	[2] MAC Eeprom	(Text only)	
	< Exit		

[2]**Note:** only for "Service" menu mode.
[3]**Note:** only for "Advanced" and "Service" menu mode.

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On Screen Display (OSD) Menu Functions

The following section covers all possible settings that are user adjustable via easy understandable menus, text and navigation. To simplify reading the menu choices, **"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.**

NOTE: Certain menus have different Signal Input references due to Hardware Code changes in July 2019. Please review "Hardware Code (HWxx) chapter in this manual for more information. The available choices for the affected menus are listed as "*For current models" / "*For HW00 models", where appropriate.

Image Settings

Lets you configure various visual preferences for any signal input, including activated Picture-in-Picture (PIP) sources available and if configured by user. The contents of this submenu and choices are listed below.

|---2---   **Image Settings > Select Source to Adjust**

The possible signal source inputs are; "Main Input", "Second Input", "Third Input" and "Fourth Input". Note: Any of the inputs may have been configured as either listed below* depending on factory defaults and user preferences. To set the category for a chosen input, review the "Input Source Settings" later in this manual.

* For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
* For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

|---2---   **Image Settings > Brightness**

Increase/decrease the black level saturation of the TFT panel electronically by controlling the voltage level in real-time of the current selected source signal. Window overlays (PIP/PBP) and the OSD Menu overlay will be unaffected. This will be independent of the actual adjustment done by the front user controls like potmeters or buttons. A visual slider in the OSD menu will show the current value.

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

|---2---   **Image Settings > Contrast**

Increase/decrease the contrast of the panel electronically by controlling the voltage level in real-time of the current selected source 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.

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

User Controls   1

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OSD Menu Functions

|---2---
Image Settings > Saturation

Increase/decrease the overall video color saturation/color amount of the current selected source signal. Note that this function can also make noisy color signals appear crisper/clearer if adjusted to gray scales. Note: Function not supported for Digital signal.

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

|---2---
Image Settings > Hue

Allows you to adjust/shift the main color properties of all Red, Green, Blue and Yellow (unique hues) values. This can be useful in certain cases 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: Function not supported for Digital signal.

● 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 255. 128 is factory default.

|---2---
Image Settings > Analog VGA Adjustment

NOTE: This menu/sub-menu is only available/visible for HW00 models with DVI/VGA signal inputs.
Please review "Hardware Code (HWxx) chapter in this manual for more information.

These functions are not available with typical Digital Signals (DisplayPort, HDMI and DVI).
For VGA it allows you to adjust signals Horizontally (left/right) and Vertically (up/down) within the TFT panel Active Area, in addition Clock and Phase can also be adjusted (if there seems to be a "water fall / rolling bars" effect present in the active display 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 > Analog VGA Adjustment > 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.

User Controls   2

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OSD Menu Functions

|--------3-------- **Image Settings > Analog VGA Adjustment > Auto Color**

Will automatically adjust the color balance of the currently displayed full screen signal. This function will analyze 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")

|--------3-------- **Image Settings > Analog VGA Adjustment > H. Position**

"H Position"   = Move image within the TFT panel active area Horizontally (left/right), values from 0 to 255.

● Note: Default value is centered inside the active TFT panel area.

|--------3-------- **Image Settings > Analog VGA Adjustment > V. Position**

"V.Position"   = Move image within the TFT panel active area Vertically (up/down), values from 0 to 255.

● Note: Default value is centered inside the active TFT panel area.

|--------3-------- **Image Settings > Analog VGA Adjustment > 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 255.

|--------3-------- **Image Settings > Analog VGA Adjustment > 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 255.

User Controls   3

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OSD Menu Functions

|---2---

Image Settings > Auto Adjustment

NOTE: This menu/sub-menu is only available/visible for HW00 models with DVI/VGA signal inputs.
Please review "Hardware Code (HWxx) chapter in this manual for more information.

Will auto adjust everything regarding Position, Clock, Phase and Color Attributes depending on what the detected signal feed contains. This function has additional confirmation to prevent accidental or unintended usage.

Choices as follows:

     "On"   = Activates the Automatic Adjustment.
     "Off"   = Deactivate the Automatic Adjustment

User Controls   **4**

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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 OSD Menu overlay will be unaffected. Lower values make the image appear warmer, while higher values will make it appear cooler. The contents of this submenu and choices 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**

Set to either "9300K" (Cool, a blueish white), "8000K" (Neutral, a white close to natural light), "6500K" (Warn, a reddish white) or "User", (only available when Advanced Menu Mode is active).

|--------3--------   **Color Mode Settings > Color Temperature > User**

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

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

|---2---   **Color Mode Settings > Gamma**

This will activate the stored gamma curve color compensation as well as the LED indicators or backlight brilliance used with ECDIS. Set to either as listed below* 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.
* For current models: "No Calibration", "Calibration DisplayPort" or "Calibration HDMI".
* For HW00 models: "No Calibration", "Calibration DVI", "Calibration RGB", "Calibration DisplayPort" or "Calibration HDMI"

|---2---   **Color Mode Settings > Red Gain**

Increase or Decrease the overall gain for the displayed image on screen affecting values RGB, where R=RED intensity in specific is adjusted (GB values are not affected).

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

User Controls   5

HATTELAND TECHNOLOGY
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OSD Menu Functions

|---2--- **Color Mode Settings** **> Green Gain**

Increase or Decrease the overall gain for the displayed image on screen affecting values RGB, where G=GREEN intensity in specific is adjusted (RB values are not affected).

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

|---2--- **Color Mode Settings** **> Blue Gain**

Increase or Decrease the overall gain for the displayed image on screen affecting values RGB, where B=BLUE intensity in specific is adjusted (RG values are not affected).

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

|---2--- **Color Mode Settings** **> Gamma Reset**

This will restore the original factory default setting, where "No Calibration" profile is automatically chosen and Gamma=2.2 with 140nits.

Settings as follows:

"On"   = Executes Gamma Reset and sets to "No Calibration"
"Off"   = No function executed

User Controls   **6**

HATTELAND
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OSD Menu Functions

PIP Menu

Lets you adjust how the Picture-in-Picture (PIP) display mode is 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 either signal inputs. The contents of this submenu and choices are listed below.
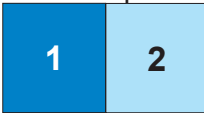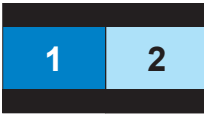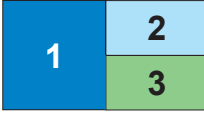
Since several sources can be used as PIP overlay, each available PIP overlay can be configured. To choose the specific PIP overlay to be adjusted, see earlier reference in the manual under "Image Settings > Select Source to Adjust" function.

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), even if the display unit supports this natively.
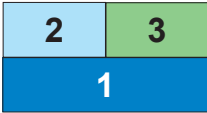
|---2--- ## PIP Menu > PIP Mode

Settings as follows:
"PIP Off"   = Picture in Picture is inactive and the other PIP settings can not be accessed.

"PIP Child" **1** **2**	The Second Signal Source will be displayed in a small frame as an overlay over the Main Source signal. Other PIP settings can now be adjusted.
"PIP Split" **1** **2**	The Main Source and Second signal sources are shown side-by-side with the Main Source to the left and the Second Source to the right. Other PIP settings can now be adjusted. 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 3840 x 2160 resolution, sources must be set to 1920 (wide) x 2160 (height) to appear correctly (aspect ratio).
"PIP Wide" **1** **2**	The Main Source and Second signal sources are shown side-by-side in widescreen mode with the Main Source to the left and the Second to the right. Other PIP settings can now be adjusted.
"Triple PIP" **1** **2** **3**	The Main Source, Second and Third signal sources are shown as row/column style. Other PIP settings can now be adjusted. Note: Only 1920x1080 signals are accepted. Main source will be stretched to fill screen. If aspect ratio is needed set the Main Source to 1920 (wide) x 2160 (height) to appear correctly (aspect ratio).
"Quad PIP" **1** **2** **3** **4**	The Main Source, Second, Third and Fourth signal sources are shown row/ column style. Other PIP settings can now be adjusted. Since there are no Main Source under these overlays in this setting, the Main Source is now part of a 2-by-2 visible setup (usually located in the top left corner) displaying 4 x true 1920x1080 (Full HD) signals at the same time. "Important: Before enabling PIP Quad function, resolution needs to be set to 1920x1080p (FHD)"

User Controls   **7**

HATTELAND
TECHNOLOGY
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"Tri Stack PIP"	The Main Source shown as horizon and Second and Third signal sources are shown side-by-side above it. Source 1 will display an resolution of max 3840x1080@30Hz and Source 2 and 3 at max 1920x1080@60Hz. If resolution on Source 1 device is not set to 3840x1080, the image display for the particular source will be displayed with correct aspect ratio. This will introduce black bars on each side. No stretching of image will occur, either vertically or horizontally.
"PIP Horizon"	The Main Source and Second signal sources are shown as horizon stacked on top of each other. Both sources will display an resolution of max 3840x1080@30Hz. If resolution on connected devices is not set to this, the image display for the particular source will be displayed with correct aspect ratio. This will introduce black bars on each side. No stretching of image will occur, either vertically or horizontally.

If Touch Screen is present on unit and operational during any PIP modes:

Touch always on   = in this all touch signal is broadcasted to connected computer unit independently of active graphical inputs.

Touch active   = broadcast touch signal when main source is active.

OSD Menu Functions

PIP Menu > PIP Child Size

Adjust the size (H and V proportionally) for the currently selected PIP Source, values from 1 to 7.

Note: Example shows calculation and approximate size in mm and precise pixels assuming a FHD 1920x1080 was used as PIP Source. PIP size is dependent on incoming PIP source signal, such as its resolution and aspect ratio will both affect sizes in mm and pixels in comparsion to illustration below. However, the visual appearance between each step is relative to example below. All mm values are rounded up to nearest. Deviation is +/- 1mm. PIP Position in H. and V. are 0 in this example.

55 inch panel:
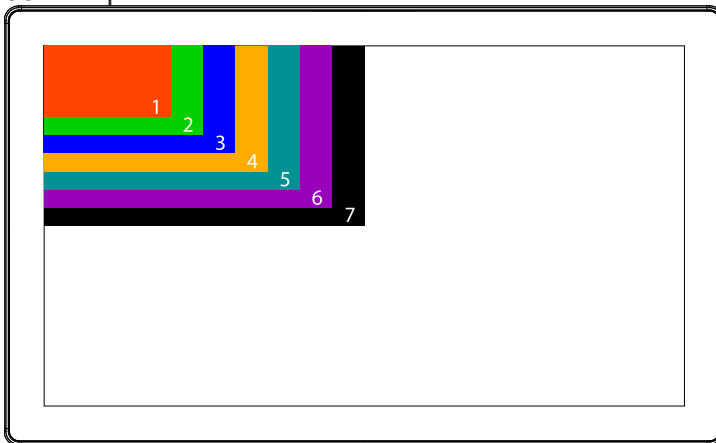
STEP VALUE	in MM	in Pixels
1 (Min Size)	239 x 135	768 x 432
2	300 x 169	960 x 540
3	361 x 204	1154 x 648
4	422 x 238	1344 x 756
5	483 x 273	1534 x 864
6	544 x 307	1728 x 972
7 (max size) 1/4 of Native TFT	605 x 340	1920 x 1080

32 inch panel:
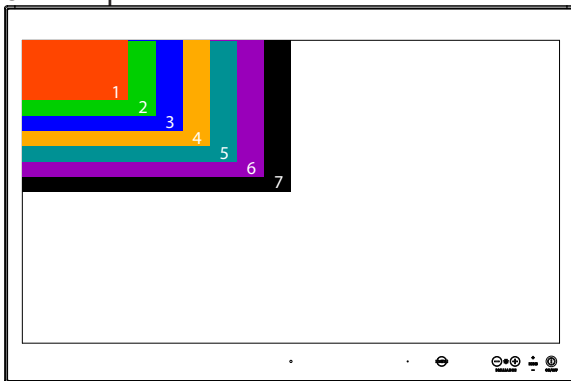
STEP VALUE	in MM	in Pixels
1 (Min Size)	140 x 80	768 x 432
2	176 x 100	960 x 540
3	212 x 120	1154 x 648
4	248 x 140	1344 x 756
5	284 x 160	1534 x 864
6	319 x 180	1728 x 972
7 (max size) 1/4 of Native TFT	355 x 200	1920 x 1080

User Controls   **9**

HATTELAND TECHNOLOGY
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OSD Menu Functions

|---2---   **PIP Menu > PIP H. Position**

Adjust the Horizontal (left/right) position for the currently selected PIP Source, values from 0 to 255.

|---2---   **PIP Menu > PIP V. Position**

Adjust the Vertical (up/down) position for the currently selected PIP Source, values from 0 to 255.

|---2---   **PIP Menu > Swap Source**

Swaps the Primary source signal with Secondary source signal 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.

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OSD Menu Functions

OSD Menu

Allows you to customize the visual appearance of the On Screen Display (OSD) menu and its behavior. The contents of this submenu and choices are listed below.

|---2--- **OSD Menu > OSD Language**

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

Settings as follows:

"English"	= Display OSD in English.
"Français"	= Display OSD in French.
"Deutsch"	= Display OSD in German.
"Italiano"	= Display OSD in Italian.
"Norsk"	= Display OSD in Norwegian.
"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 Menu > OSD H. Position**

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

● Note: Default value is 128 (50% half of current resolution)

|---2--- **OSD Menu > OSD V. Position**

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

● Note: Default value is 128 (50% half of current resolution)

|---2--- **OSD Menu > OSD Timeout (sec)**

Adjust the timeout in seconds that the OSD menu overlay is automatically exited and hidden from view. This timeout is counted from last activity (navigation or adjusting parameters). The value is adjustable from 5 to 30 seconds.

● Note: Default timeout value is 10 seconds.

User Controls   **11**

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OSD Menu Functions

|---2---
OSD Menu > 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).

|---2---
OSD Menu > OSD Mode

Configuring the OSD Menu access based on most common functions to service/trouble-shooting.

Settings as follows:

"Basic" = A few functions are 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 are 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 personnel.

● 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.

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OSD Menu Functions

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

To prevent accidental or unwanted user intervention, you can set the behavior of how the OSD menu is accessible by the user including adjusting brightness via the "(-) Brilliance (+)" symbols. Normally by factory default accessible by touching the "MENU" symbol.

Settings as follows:

"Normal"   = 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 touch 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 (sec) value.

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

|---2--- **OSD Menu > 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 "sensitve" 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 in a outside environment where rain drops could potentially trigger touch button functions.

Settings as follows:

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

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OSD Menu Functions

Allows you to adjust various settings for interaction/communication and behavior. The contents of this submenu and choices are listed below.

|---2---   **Miscellaneous > Aspect Ratio**   *Available in "Advanced/Service" mode only

Allows you to scale the currently displayed full screen signal in various ways.

Settings as follows:

"Full" = 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.

"16:9" = Default setting. Ensures a widescreen aspect ratio true to the actual properties of the screen.

"4:3" = Shows the incoming signal as 4:3 scaling. Note: On a widescreen physical size, the image on screen will have black borders on each side and the image on screen may appear distorted or compressed in height.

"1:1" = Zoom current screen signal to fill the entire active display area as 1:1 native pixel resolution. Example; if the incoming signal is a 1920x1080, on a 3840x2160 unit, the incoming signal will be shown 50% less in size and centered on screen. Aspect ratio is kept unchanged.

"Native" = Size in respect of native TFT LCD resolution.

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OSD Menu Functions

|---2---   **Miscellaneous > GDC Sensitivity**   ***Available in "Advanced/Service" mode only**

The touch enabled symbols known as GDC (Glass Display Control™) 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 most optimal value has been preset.

Values from 0 to 255.

- Note: Default is model dependent and set by factory. Note that the difference between 0 and 255 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 an increased occurrence 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.

|---2---   **Miscellaneous > Power Plan**   ***Available in "Advanced/Service" mode only**

This setting will allow you to control the overall power mode in Power off mode.

Settings as follows:

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

- Note: Factory Default set to "Disable"

|---2---   **Miscellaneous > Lan/Sleep Mode**   ***Available in "Advanced/Service" mode only**

This setting will allow you to control the power mode of Ethernet port in Power off mode.

Settings as follows:

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

- Note: Factory Default set to "Enable"

User Controls   **15**

HATTELAND TECHNOLOGY
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OSD Menu Functions

|---2--- **Miscellaneous > Touch Power**   ***Available in "Advanced/Service" 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 (applies to defined Main Source Input):

Note:
Touch is enabled only when choice is Main Input:
For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3"
For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA". Touch is enabled when choice is Main Input.

+ Additional settings:
"Signal"   = Touch is enabled when any input is active as Main Input.
"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.

|---2--- **Miscellaneous > External Power Button** *Available in "Advanced/Service" 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 (Potentiometer 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.

|---2--- **Miscellaneous > DDC/CI**   ***Available in "Advanced/Service" 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 listed below* (enabled on any input source that appear as Main Input)

* For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
* For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

User Controls   **16**

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OSD Menu Functions

Miscellaneous > Key 1 / Key 2   ***Available in "Advanced/Service" mode only***

Assign a commonly used OSD menu function to the available touch enabled "Hot Keys" (<) and (>) which are located on the 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 "Key1" and "Key2"):

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

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

"Main Source"   = Flip up/down through the available signal sources (to full screen) defined as Main Input.
Reference in user manual: "PIP Menu / Swap Source"

"Second Source"   = Flip up/down through the available signal sources (to PIP/PBP) defined as Second, Third and Fourth Inputs
Reference in user manual: "PIP Menu / Swap Source"

"PIP Mode"   = Flip up/down through the PIP/PBP functions.
Reference in user manual: "PIP Menu / PIP Mode"

"Graphic Scaling"   = Flip up/down through the scaling methods available.
Reference in user manual: "OSD Miscellaneous / Aspect Ratio"

"Swap Source"   = Loops through all the sources available defined as Main, Second, Third and Fourth input.
Reference in user manual: "Input Source Settings"

"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"

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

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

● Note: Default Hot Keys are assigned to "No Function"

User Controls   **17**

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OSD Menu Functions

Input Source Settings

Allows you to assign the defined inputs to a physical reference to the available signal sources connected to the unit (example; you can assign "DisplayPort" as "Main Input"). The contents of this submenu and choices are listed below. Note: Switch time between sources is ~5 sec.

|---2---
Input Source Settings > Main Input

Whatever chosen as "Main Input" will be used as reference throughout the OSD Menu.
Available sources are as listed below*

  * For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
  * For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

|---2---
Input Source Settings > Second Input

Whatever chosen as "Second Input" will be used as reference throughout the OSD Menu.
Available sources are as listed below*

  * For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
  * For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

|---2---
Input Source Settings > Third Input

Whatever chosen as "Third Input" will be used as reference throughout the OSD Menu.
Available sources are as listed below*

  * For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
  * For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

|---2---
Input Source Settings > Fourth Input

Whatever chosen as "Fourth Input" will be used as reference throughout the OSD Menu.
Available sources are as listed below*

  * For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
  * For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

|---2---
Input Source Settings > Auto Source

Turns on or off the internal automatic detection of incoming signals and when found stops and show this signal source on the screen. If no source is connected physically, the function will loop through all inputs forever. Available sources are as listed below:*

  * For current models: "DisplayPort", "HDMI1", "HDMI2" or "HDMI3".
  * For HW00 models: "DisplayPort", "HDMI", "DVI" or "VGA".

Settings as follows:
"On"   = Loops until a valid signal source is found and stops. "On" is Factory default.
"Off"   = No automatic detection loop will occur. User has to set manually.
                 Unit will enter Sleep mode.

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

IND100064-48

HATTELAND
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OSD Menu Functions

Communication	*Available in "Advanced/Service" mode only

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

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 preparation and/or installation of external equipment intended to communicate with.

Settings as follows:

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

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

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

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

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

"Auto IP Address"   = Enable or Disable the discovery to assign IP Adress Automatically.

"Fixed IP Address"   = You can set the IP address manually (xxx.xxx.xxx.xxx).

● Note: Default mode is "RS232" protocol.

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OSD Menu Functions

Service Settings   *Available in "Service" mode only*

Will show various technical and unit related information, such as; Firmware versions, 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 video controller.
                                 Example: "FW300001-0A21"

"uC Firmware"   = Displays the firmware version of the touch enabled buttons.
                                 Example: "FW100002-TA09"

"Current Temperature"   = Shows the internal temperature measured by onchip sensor.
                                 Example: "+042..", in Celsius Degrees.

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OSD Menu Functions

|---2---

| Service Settings > Test Pattern | *Available in "Service" mode only |

Will show the internal test pattern which enables user to check for deviations in the TFT panel / display controller behavior. 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. The unit will show a Test Pattern even if no signal cable is connected or any valid signal source is detected.

To activate this function, touch the "MENU" button.

Note: Depending on the current firmware in the display unit, either one of these test patterns are present: Reference: Engineering Change Notification, 14 July 2021:
https://www.hattelandtechnology.com/product-notifications/firmware-update-affecting-series-x-mvd-displays-32-43-and-55-inch-1
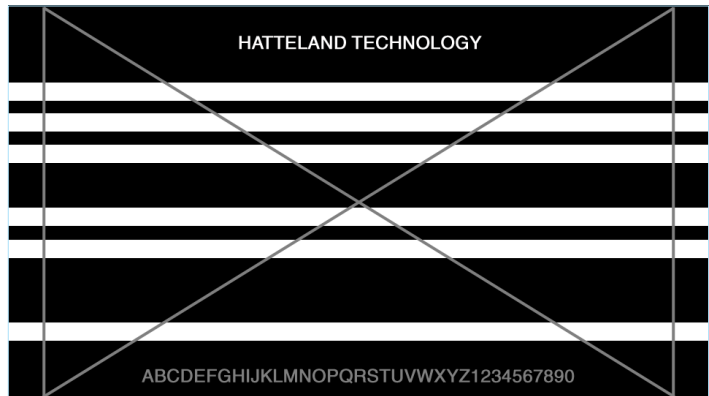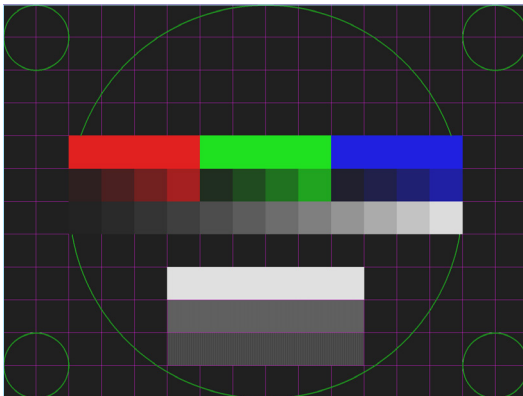
● Note: This function will not inform/report any deviations directly, you need to have the required technical expertise to interpret the test pattern displayed.

|---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 office, or Service Partner before using this setting.

IND100064-48

HATTELAND TECHNOLOGY
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OSD Menu Functions

Preset

Allows Memory Presets (Recall/Save/Load) for OSD menu settings and overlays user have defined. The contents of this submenu and choices are listed below.

|---2---   **Preset > Save**   ***Available in "Advanced/Service" mode only***

Allows you to save current state of all functions and values to user defined presets.

Choices 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.

|---2---   **Preset > Load**

Allows you to load previous states of all functions and values to user defined presets.

Choice as follows:

"Default"	= Reset back to initial values as they appeared when menu was accessed before any user interaction in the menu was noticed.
"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---   **Preset > Recall**

Press "MENU" button to reset back to factory defaults. Will override and restore all previous modified settings.

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OSD Menu Functions

Fault Status   *Available in "Service" mode only

Will show detected Fault Status by measuring various internal values for the items monitored.
Status is stated as either "OK" or "FAULT". The contents of this submenu and choices are listed below.

Fault Status as follows:

"NVRAM"   = Status on Non-volatile random-access memory which is used to
                             store parameters and settings.

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

"GDC"   = Status on User Controls button controller.

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

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

"MAC Eeprom"   = Status of the storage of the Ethernet Port MAC Address.

User Controls   **23**

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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.
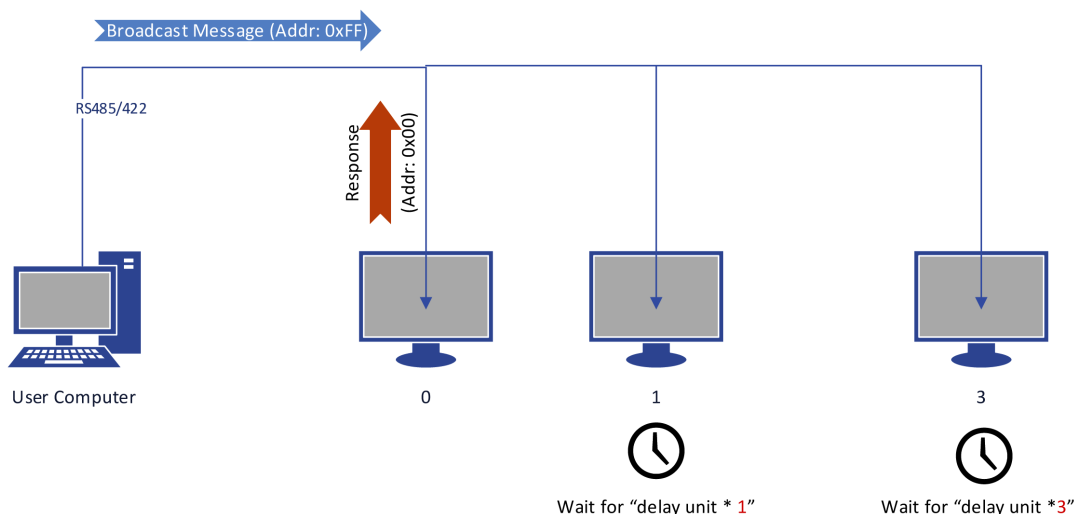
Illustration: Broadcast Message: Timing 1

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
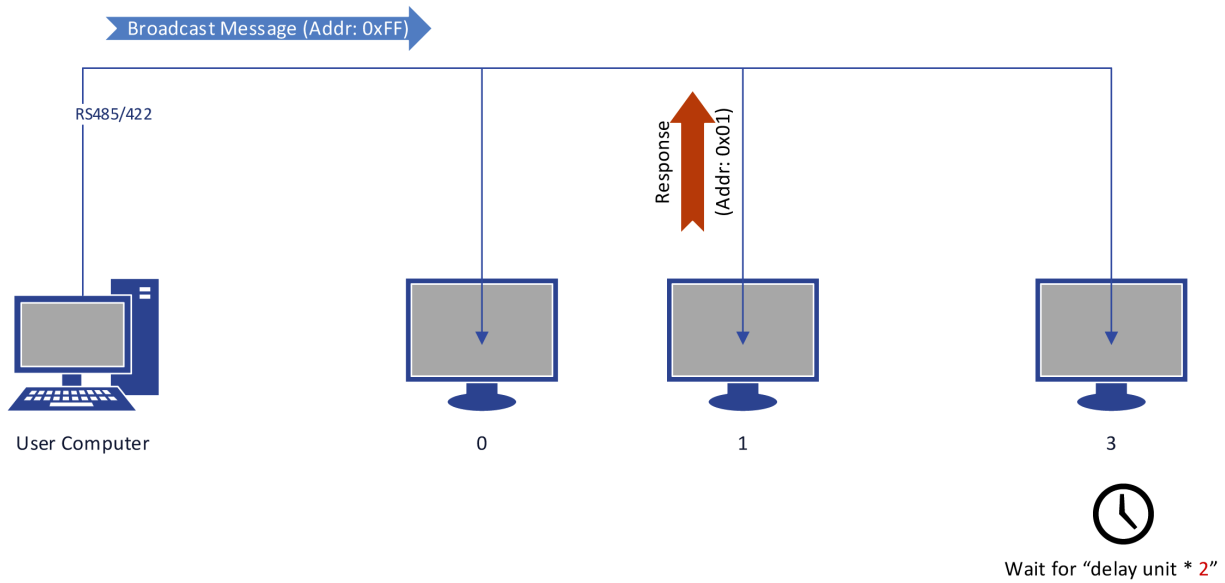
Illustration: Broadcast Message: Timing 3

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:

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

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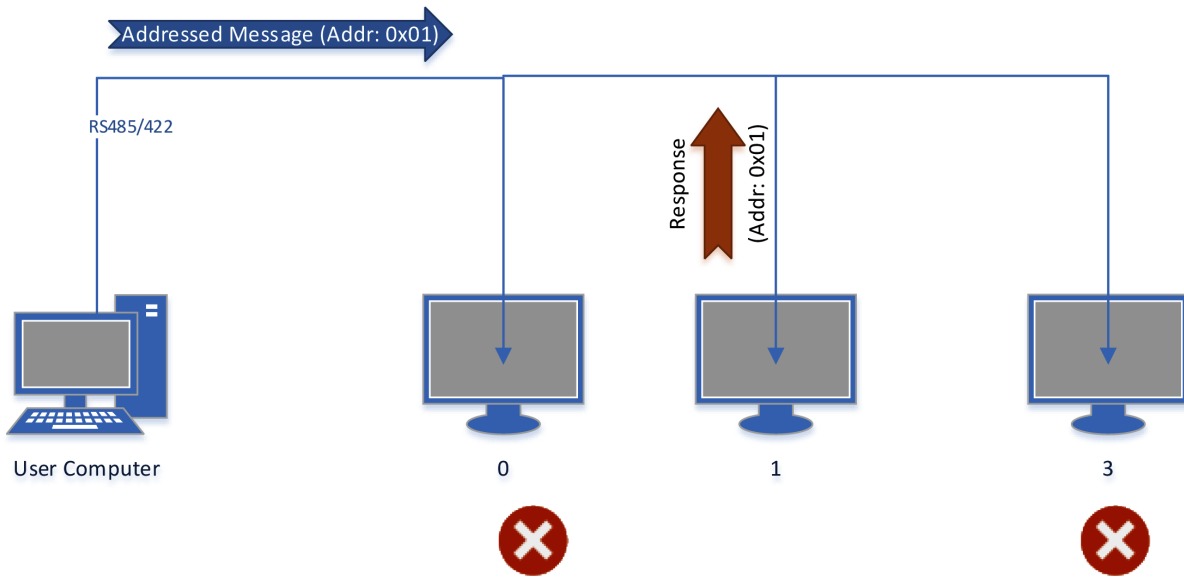
Illustration: Addressed Message

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.

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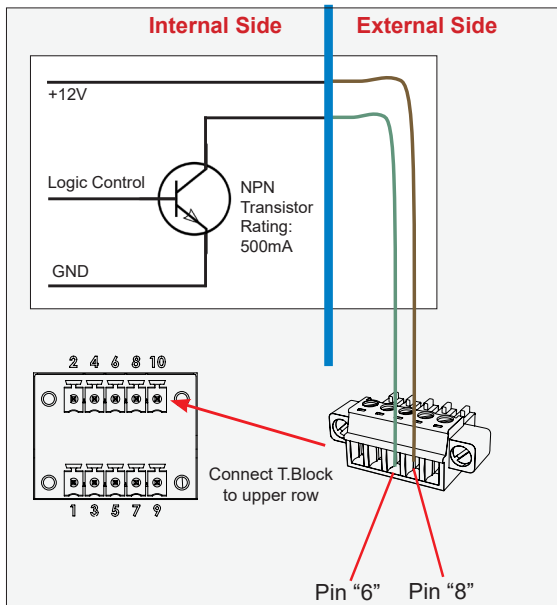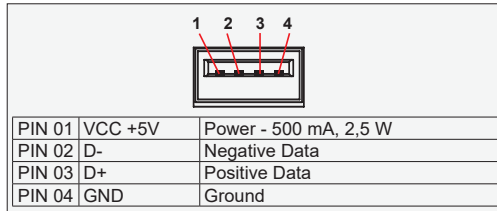
9-pin Serial COM RS-232+Buzzer non-isolated, DSUB Male

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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Serial/Ethernet/USB Communication (SCOM) Interface

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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Serial/Ethernet/USB Communication (SCOM) Interface

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.
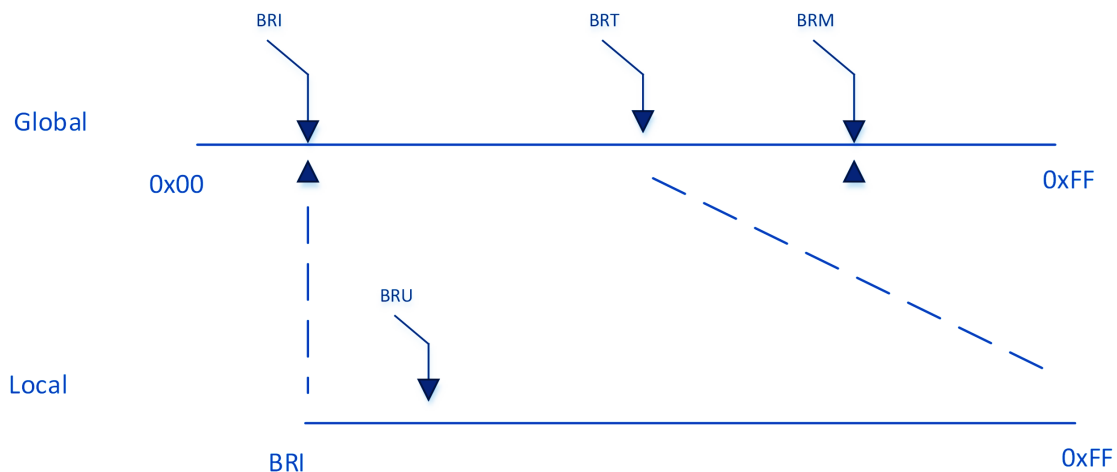
Illustration: Brightness Logic

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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

6

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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

IND100084-18

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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

"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)
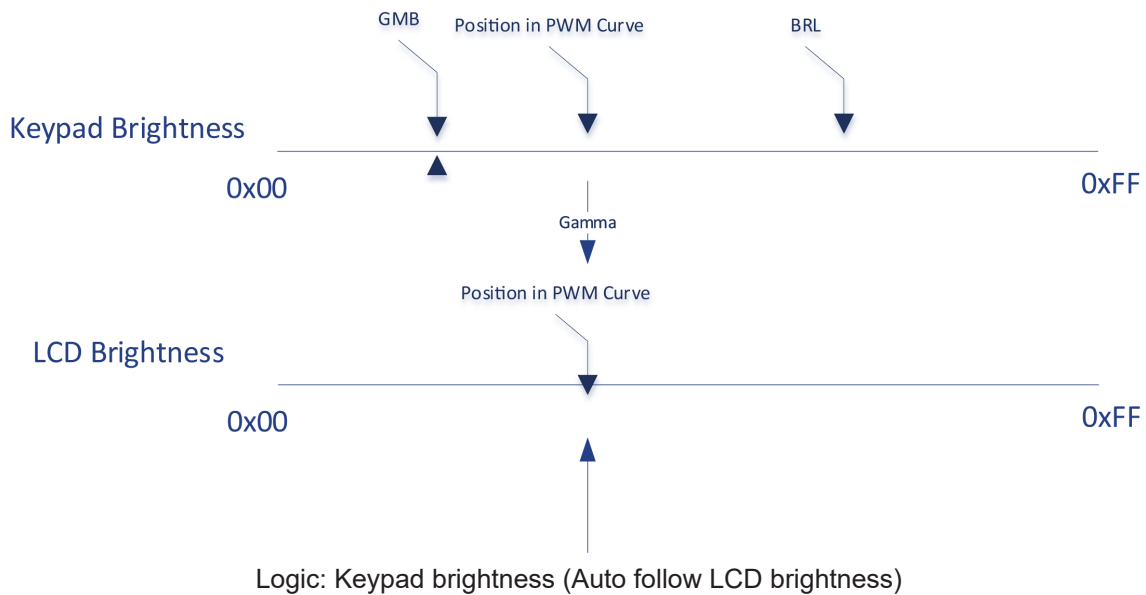
2: BRL Only

- 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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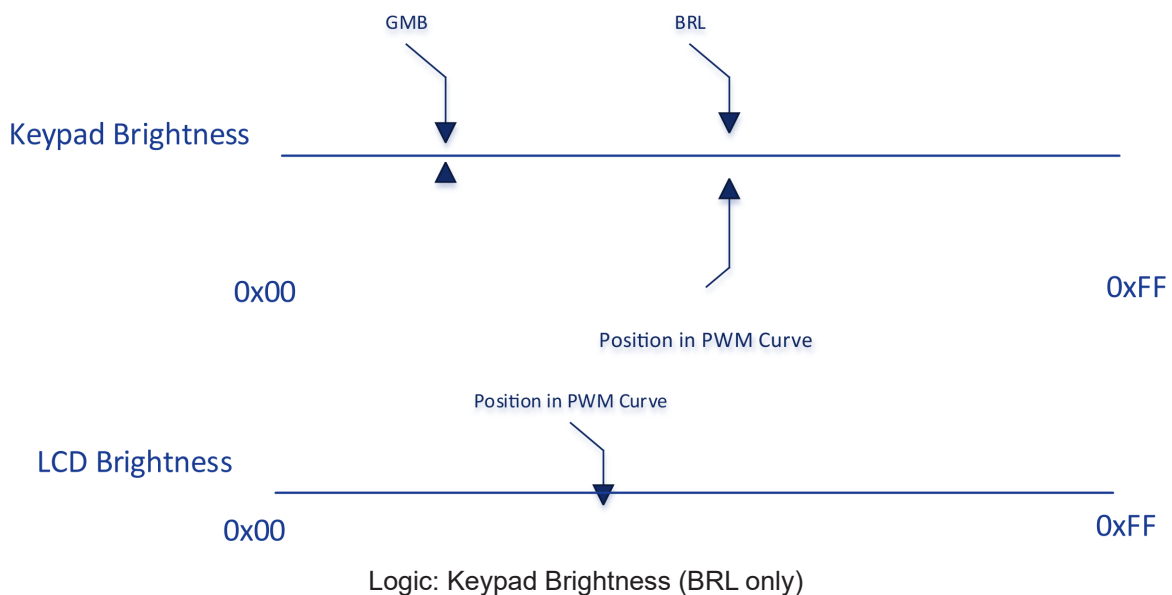
3: Auto follow Light Sensor

- 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 | 0xFF
              gamma

GMB   Position in PWM Curve   BRL

Keypad Brightness

0x00   0xFF

Logic: Keypad Brightness (Light sensor follow)
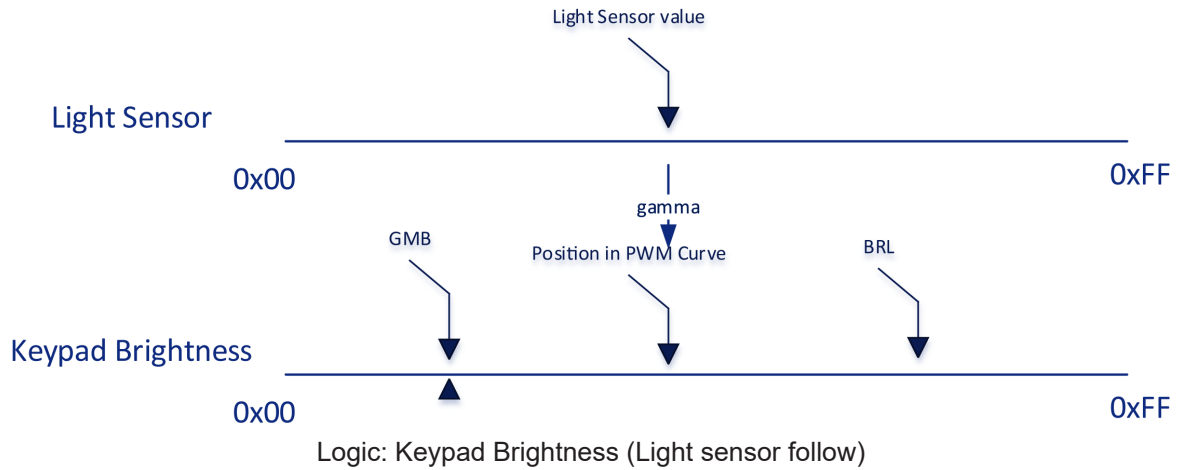
4:

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

"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

"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).

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"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								

21

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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

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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Serial/Ethernet/USB Communication (SCOM) Interface

"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

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

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					

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

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.
Note: Table covers HW00 and HW01 models, notes are added where applicable. Reference Engineering Change Notification:
https://www.hattelandtechnology.com/product-notifications/hardware-change-/-upgrade-for-32inch-and-55inch-products

Function	Data	Description	Details
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'
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'
Saturation control	0x83, nn | '+' | '-' | 'r' | 'R' | '?'	Set Saturation = value / increment / decrement / reset / query	Saturation Range='0"0'~'2"5"5' Default = '1"2"8'
Hue control	0x84, nn | '+' | '-' | 'r' | 'R' | '?'	Set Hue = value / increment / decrement / reset / query	Hue Range='0"0'~'2"5"5' Default = '1"2"8'
Manual Phase control	0x85, nn | '+' | '-' | '?'	Set dot clock phase = value / increment / decrement / query	Phase Range='0"0'~'2"5"5'
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'
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'
Auto Source Select	0x88, n | 'r' | 'R' | '?'	Set Auto Source Select = disable / enable / reset / query	'0' - disable '1' - enable (default)
OSD mode	0x89, n | 'r' | 'R' | '?'	Set OSD mode = full / simple / reset / query	'0' - Advanced (default) '1' - Basic '2' - Service
Sharpness	0x8A, nn | '+' | '-' | 'r' | 'R' | '?'	Set sharpness = value / increment / decrement / reset / query	Sharpness Range='0"0'~'2"5"5' Default = '1"2"8'
Manual Frequency control	0x8B, nn | '+' | '-' | '?'	Set dot clock frequency = value / increment / decrement / query	Clock Range='0"0'~'2"5"5'
Aspect Ratio	0x8C, n | 'r' | 'R' | '?'	Set image graphic scaling = value / reset / query	'0' - Full '1' - 16:9 '2' - 4:3 '3' - 1:1 '4' - Native

1

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

Function	Data	Description	Details
OSD Lock Mode	0x8D, n | 'r' | 'R' | '?'	Set OSD mode = normal / lock / reset / query	'0' - Normal (default) '1' - Full Protect '2' - Menu Protect
Auto adjustment	0x8F, n | 'r' | 'R' | '?'	Set auto adjust = on / off	'0' - Off '1' - On (default)
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 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 Transparency	0x92, nn | '+' | '-' | 'r' | 'R' | '?'	Set OSD transparency = value / increment / decrement / reset / query	OSD transparency Range = '0'~'7' Default = '0'
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'
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
Filter	0x96, n | 'r' | 'R' | '?'	Select Filter = Enable (on) / Disable (off) / reset / query	'0' - Off (default) '1' - On
Main input select	0x98, n | 'r' | 'R' | '?'	Select input main = value / reset / query	0x00 - DVI (HW00 models only) 0x10 - VGA (HW00 models only) 0x20 - HDMI1 0x21 - HDMI2 (HW01 models only) 0x22 - HDMI3 (HW01 models only) 0x30 - DisplayPort
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

2

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

Function	Data	Description	Details
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 '4' - Triple PIP '5' - Quad PIP '6' - Tri Stack PIP '7' - PIP Horizon
Gamma	0x9D, n | 'r' | 'R' | '?'	Select Gamma value = value / reset / query	Gamma value '0' - No Calibration (default) '1' - Calibration DVI (HW00 models only) '2' - Calibration RGB (HW00 models only) '3' - Calibration DP '4' - Calibration HDMI
Power on	0x9F, n |'?'		'0' - OFF '1' - ON Map PWR command
Direct Access (Key 1 / Key 2)	0xA0, '1' | '2', n | 'r' | 'R' | '?'	Set direct access = value / reset / query '1' for "Key 1" = '1', n | 'r' | 'R' | '?' '2' for "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)
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 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 Child Size	0xA6, n | '+' |'-' | 'r' | 'R' | '?'	Set PIP window size = value / increment / decrement / reset / query	PIP V window size Range = '1'~'7' Default = '7'
Second source select	0xA7, n | 'r' | 'R' | '?'	Select input second = value / reset / query	0x00 - DVI (HW00 models only) 0x10 - VGA (HW00 models only) 0x20 - HDMI1 0x21 - HDMI2 (HW01 models only) 0x22 - HDMI3 (HW01 models only) 0x30 - DisplayPort
3rd source select	0xAB, n | 'r' | 'R' | '?'	Select input third = value / reset / query	0x00 - DVI (HW00 models only) 0x10 - VGA (HW00 models only) 0x20 - HDMI1 0x21 - HDMI2 (HW01 models only) 0x22 - HDMI3 (HW01 models only) 0x30 - DisplayPort

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

Function	Data	Description	Details
4th source select	0xAE, n | 'r' | 'R' | '?'	Select input fourth = value / reset / query	0x00 - DVI (HW00 models only) 0x10 - VGA (HW00 models only) 0x20 - HDMI1 0x21 - HDMI2 (HW01 models only) 0x22 - HDMI3 (HW01 models only) 0x30 - DisplayPort
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
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'
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'
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'
Graphic horizontal resolution enquiry	0xB7	Horizontal resolution (in pixels) in 3 digital hex number	'nnn' = horizontal resolution
Graphic vertical resolution enquiry	0xB8	Vertical resolution (in pixels) in 3 digital hex number	'nnn' = vertical resolution
Graphic horizontal sync frequency	0xB9	Horizontal sync frequency (in units of 100Hz) in 3 digit hex number	'nnn' = horizontal frequency
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
Set Address RS	0xBB, n|'?'	Set Address RS = value	Address RS Range -'0'~'F'
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
Auto Position	0xC3	Auto set image position	'0' - fail '1' - success
Auto Color Balance	0xC5	Auto set image Color balance	'0' - fail '1' - success
Out Door mode	0xCA, '0' | '1' | 'R' | 'r' | '?'	Set the key is delay 5 second/ reset / query	'0' - OFF (default) '1' - ON
Burn in	0xCC, '0' | '1' | 'R' | 'r' | '?'	Set burn in mode / reset / query	'0' - normal mode (default) '1' - burn in mode
Test pattern	0xCD, '0' | '1'	Display test pattern / Go to default state	'0' - normal display '1' - display built in test pattern
Recall OSD Defaults	0xCE	Reset all parameters defined in OSD menu to default factory values	'0' - fail '1' - success
OSD Save Preset	0xD7, n	Saving all parameter to user default value (n = '1' to '5' correspond to User1 to User5)	'0' - fail '1' - success
OSD Load Preset	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

4

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

Function	Data	Description	Details
Swap Main & PIP	0xE3	Swap main and second source	'0' - fail '1' - success
Gamma reset	0xE5	Reset Gamma table value, after send this command do AC on/off	'0' - fail '1' - success
GDC Menu Button	0xF7	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release
GDC '>' (down) Button	0xFA	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release
GDC '<' (up) Button	0xFB	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release
GDC '+' (right) Button	0xFC	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release
GDC '-' (left) Button	0xFD	Physical button press equivalent	No Data: Single press+release 0x00: Press and hold 0xFF: Release
Power Plan - VGA buffer and USB in off mode	0x71, n | 'r' | 'R' | '?'	*[1] - See comment	'0' - Disable **'1' - Enable (Default)**
Power Plan - LAN in off/sleep mode	0x72, n | 'r' | 'R' | '?'	*[2] - See comment	'0' - Disabled **'1' - Enabled (Default)**
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= "DVI" (HW00 models only) 0x10 - "Only active if selected source has a valid input signal" AND Selected Source= "VGA" (HW00 models only) 0x20 - "Only active if selected source has a valid input signal" AND Selected Source= "HDMI1". 0x21 - "Only active if selected source has a valid input signal" AND Selected Source= "HDMI2" (HW01 models only) 0x22 - "Only active if selected source has a valid input signal" AND Selected Source= "HDMI3" (HW01 models only) 0x30 - "Only active if selected source has a valid input signal" AND Selected Source= "DisplayPort".
External Power Button	0x74, n | 'r' | 'R' | '?'	*[3] - See comment	**'0' - Disabled (Default)** '1' - Enabled
Picture Direction	0x75, n | 'r' | 'R' | '?'		**'0' - 0 degrees (default)** '1' - 180 degrees

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

Function	Data	Description	Details
DDC / CI Settings	0x76, n | 'r' | 'R' | '?'		0xFE - Disabled 0xFD - Active Main Source **0xFF - All Active Sources (default)** 0x00 - Follow DVI (HW00 models only) 0x10 - Follow VGA (HW00 models only) 0x20 - Follow HDMI1 0x21 - Follow HDMI2 (HW01 models only) 0x22 - Follow HDMI3 (HW01 models only) 0x30 - Follow DisplayPort
GDC Button Sensitivity	0x78, nnn | 'r' | 'R' | '?'		Range='0''0''0' ~ '2''5''5'
RS Address (extended)	0x7D, n | 0xFF,'r' | 0xFF, 'R' | 0xFF, '?'	***[4] - See comment**	Range 0x00 ~ 0xFE
Stretch Horizontal	0x7E, nn | 'r' |'R' | '?'		Range='0''0' ~'1''0''0' Default = '0''5'0'
Stretch Vertical	0x7F, nn | 'r' |'R' | '?'		Range='0''0' ~'1''0''0' Default = '0''5'0'

6

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

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 Te, 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 Lr 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 $5 * 10 / 9600 = 5.2$ms.

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 Te is as defined for Broadcast Command response and Tg is defined above.

1

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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
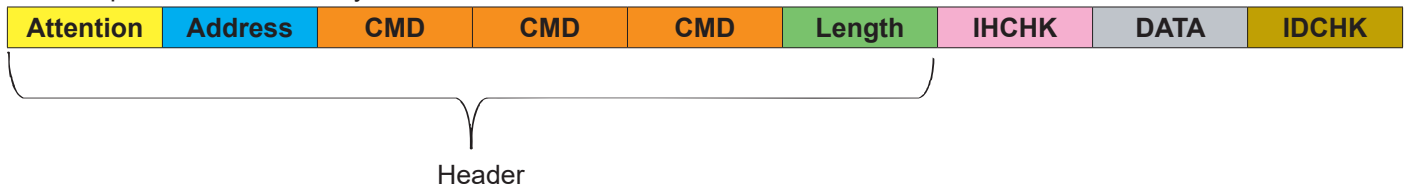
Number Base Systems mentioned in this section.

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

Calculating Checksums (IDCHK, 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.

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, ASCII, BIN and Character table

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

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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

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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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

1

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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

IND100064-52

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Operation Advanced (DDC/CI) Control Overview

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

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Preset Signal Timings

Resolution	Pixel Freq. MHz	H. Timing Sync Polar	Freq. KHz	Total Pixel	Active Pixel	V. Timing Sync Polar	Freq. Hz	Total Lines	Active Lines	Notes
640x350 @70Hz	25.151	P	31.44	800	640	N	70.02	449	350	
720x400 @70Hz	28.295	N	31.44	900	720	P	70.02	449	400	
640x480 @60Hz	25.175	-	31.47	800	640	-	59.94	525	480	
800x600 @60Hz	40	-	37.88	1056	800	-	60.32	628	600	
1024x768 @60Hz	65	-	48.36	1344	1024	-	60	806	768	
1152x864 @60Hz	88.566	-	54	1640	1152	-	60	900	864	
1280x1024@60Hz	108	-	63.98	1688	1280	-	60.02	1066	1024	
1600x1200@60Hz	160.875	-	74.48	2160	1600	-	59.96	1242	1200	
1920x1080@60Hz	148.5	-	66.6	2160	1920	-	60	1125	1080	
1920x1200@60Hz	154.11	-	74.1	2080	1920	-	59.99	1235	1200	For models with VGA: Analog VGA
2560x1440@60Hz	241	+	88.8	2720	2560	-	60.01	1481	1440	
3840x2160@30Hz	262.75		65.68	4000	3840		29.98	2191	2160	For models with DVI: DVI-D
3840x2160@60Hz	533.25		133.31	4000	3840		59.99	2222	2160	HDMI 2.0 & DP 1.2

Appendix   **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.

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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.

GENERAL ISSUES FOR COMPUTER BASED PRODUCTS
Note: Applies for a range of various products. This is only meant as a general guide.

CD-ROM FAILURE OR READ/DETECTION PROBLEMS:
If the product is operated/located in a area with extreme condensation, the CD/DVD drive may not work correctly due to condensation on the read head. Keep the product on for a while until it's reached normal operating temperature, and retry accessing discs. Otherwise, consider using USB memory sticks or alternative storage devices.

NO CD-ROM AVAILABLE ON YOUR PRODUCT FOR INSTALLING DRIVERS/SOFTWARE:
Please use USB memory sticks, USB Floppy drive, USB CD-Rom Drive or alternative storage devices to transfer/install software on CD-ROM-less units.

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Parts and Recycling

Parts in Displays and Panel Computers, and how to recycle

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

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

Dismantling of Displays and Panel Computers into its recyclable parts

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

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

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

Spare Parts for Panel Computers (none for Displays)

Parts that require scheduled checks and replacement:

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

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

Service Parts for Displays and Panel Computers

Parts that needs to be replaced in case of failure:

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

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

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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 brilliance may inhibit visibility of information at night.

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15-pin External User Control Interface, DSUB Male

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

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.
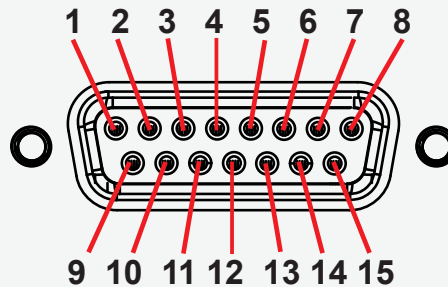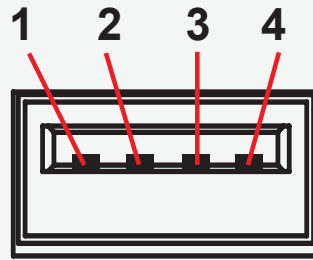

PIN 01	+3V3	+3V DC Out
PIN 02	SCL	Clock
PIN 03	SDA	Data
PIN 04	N/C	Not Connected
PIN 05	N/A	Reserved
PIN 06	N/A	Reserved
PIN 07	N/A	Reserved
PIN 08	Buz+	Buzzer (positive)
PIN 09	GND	Grounding
PIN 10	+5V	+5V DC Out
PIN 11	N/C	Not Connected
PIN 12	N/A	Reserved
PIN 13	N/A	Reserved
PIN 14	N/A	Reserved
PIN 15	Buz-	Buzzer (negative)

Pinout Assignment   **1**

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4-pin USB2.0 TYPE A Female

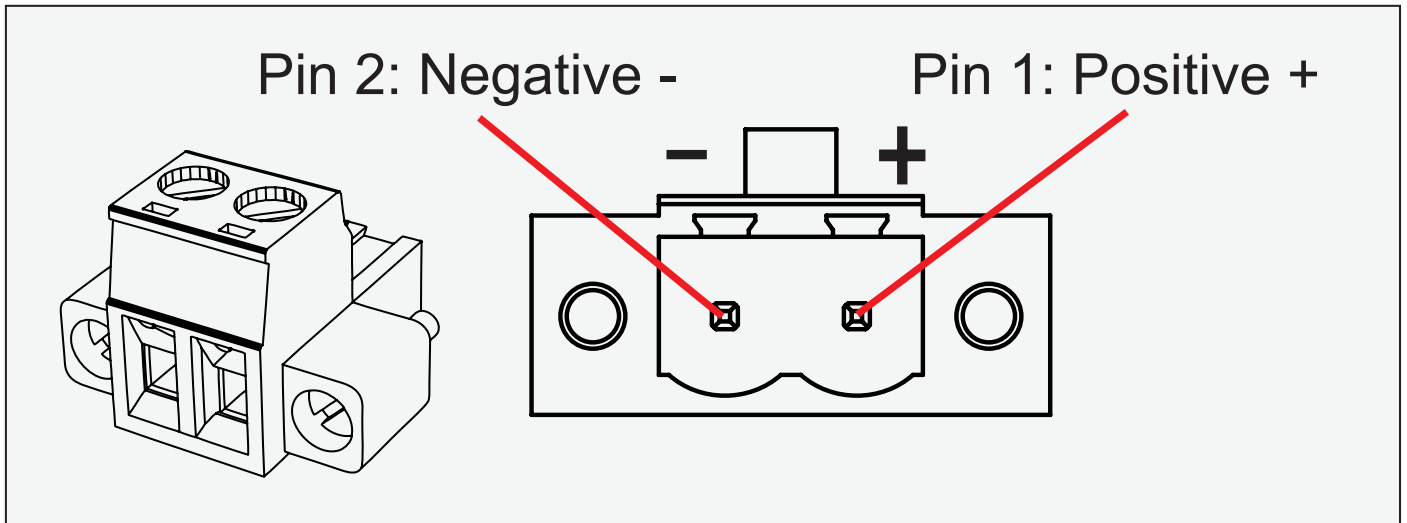All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

1   2   3   4

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

Pinout Assignment   **1**

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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 +

Pinout Assignment   **1**

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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**
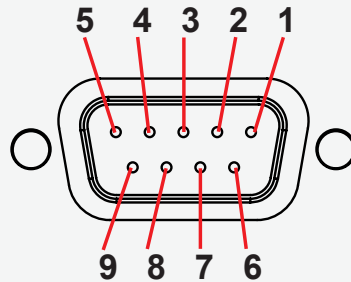
HATTELAND TECHNOLOGY
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9-pin User Interface, DSUB Male

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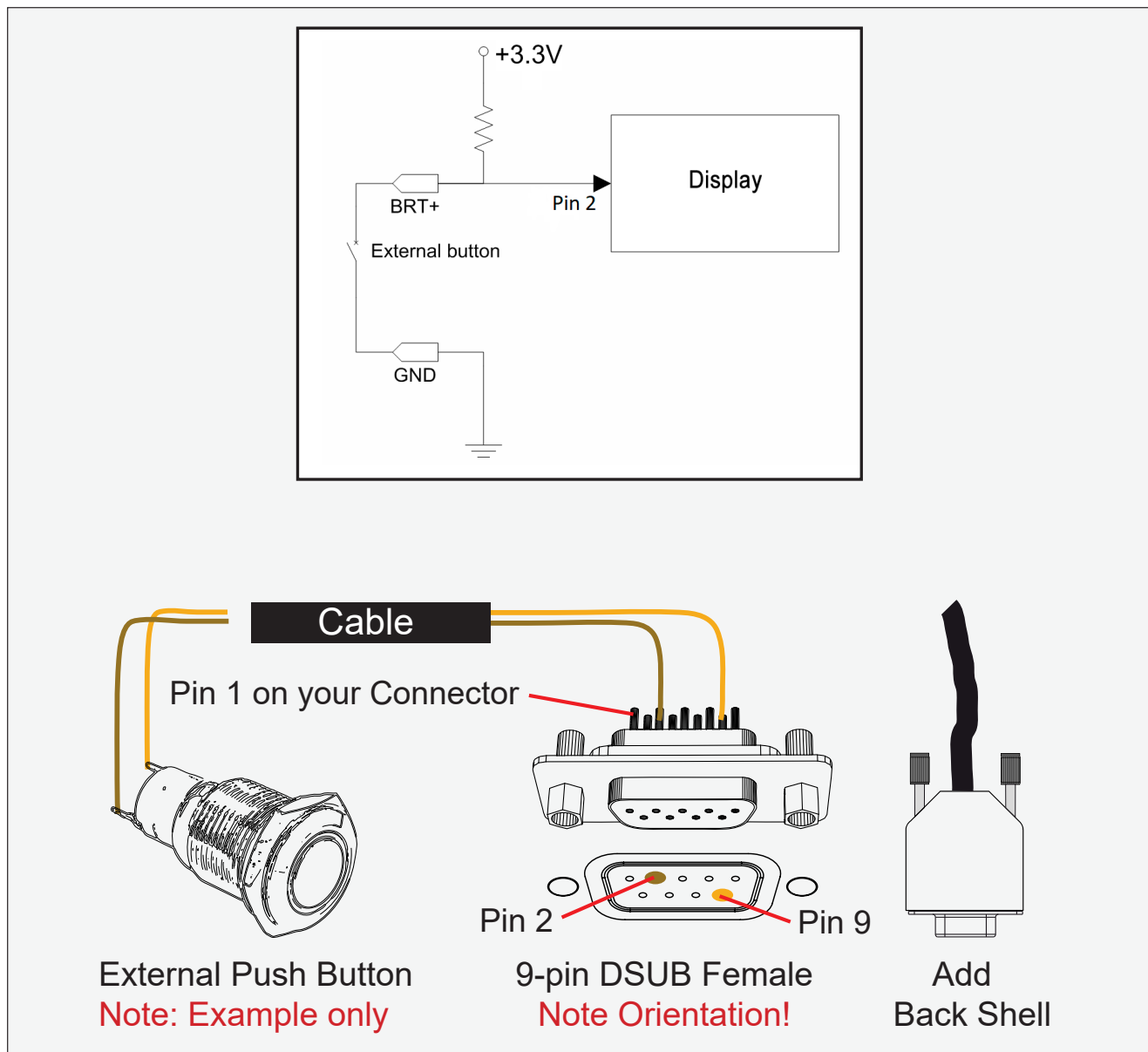
Building your own cable: Note: Requires soldering and assembly. It is expected that the technician has experience in electronics, soldering and assembling cables and connectors.

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
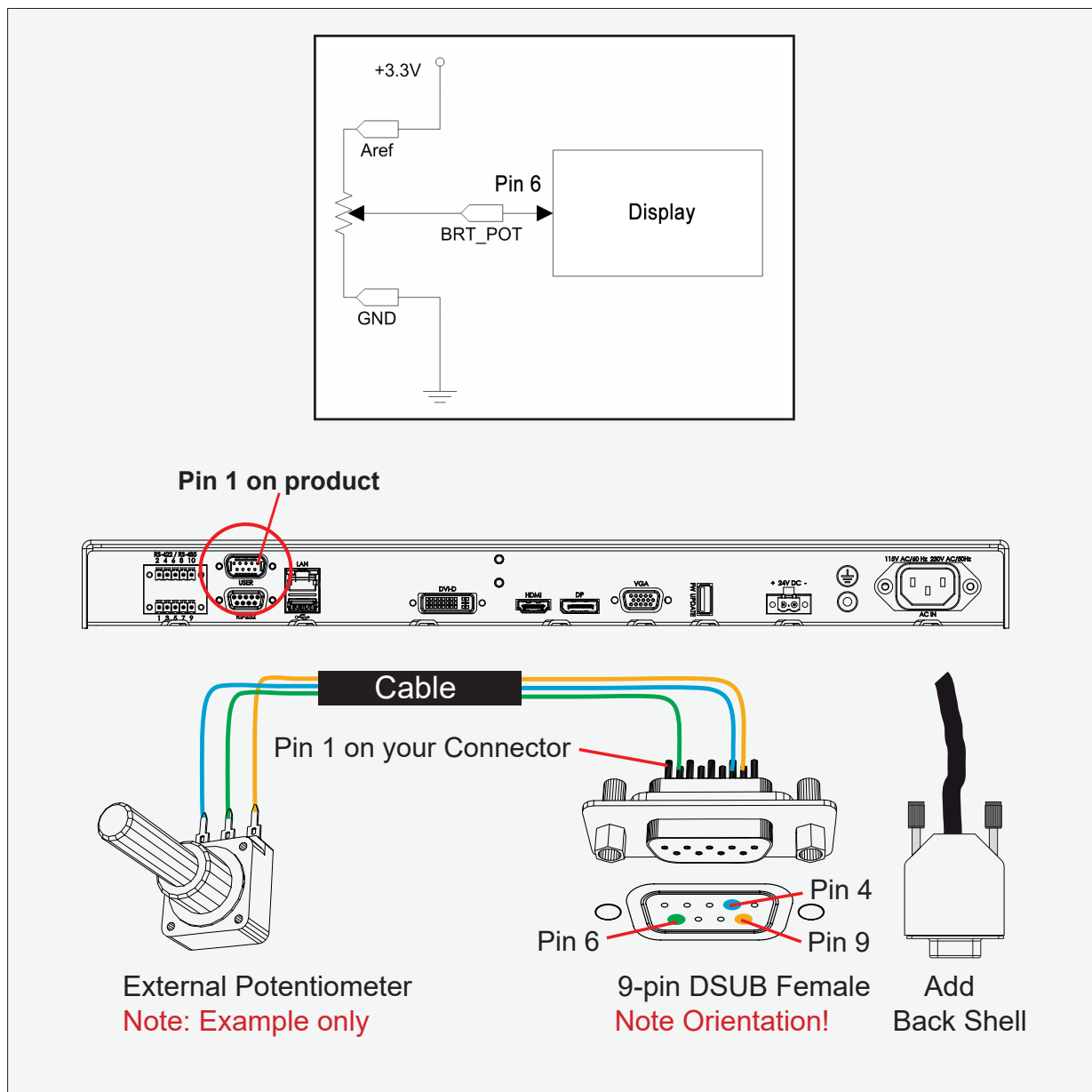
9-pin User Interface, DSUB Male

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

| External Push Button | 9-pin DSUB Female | Add |
| Note: Example only | Note Orientation! | Back Shell |

Pinout Assignment 3

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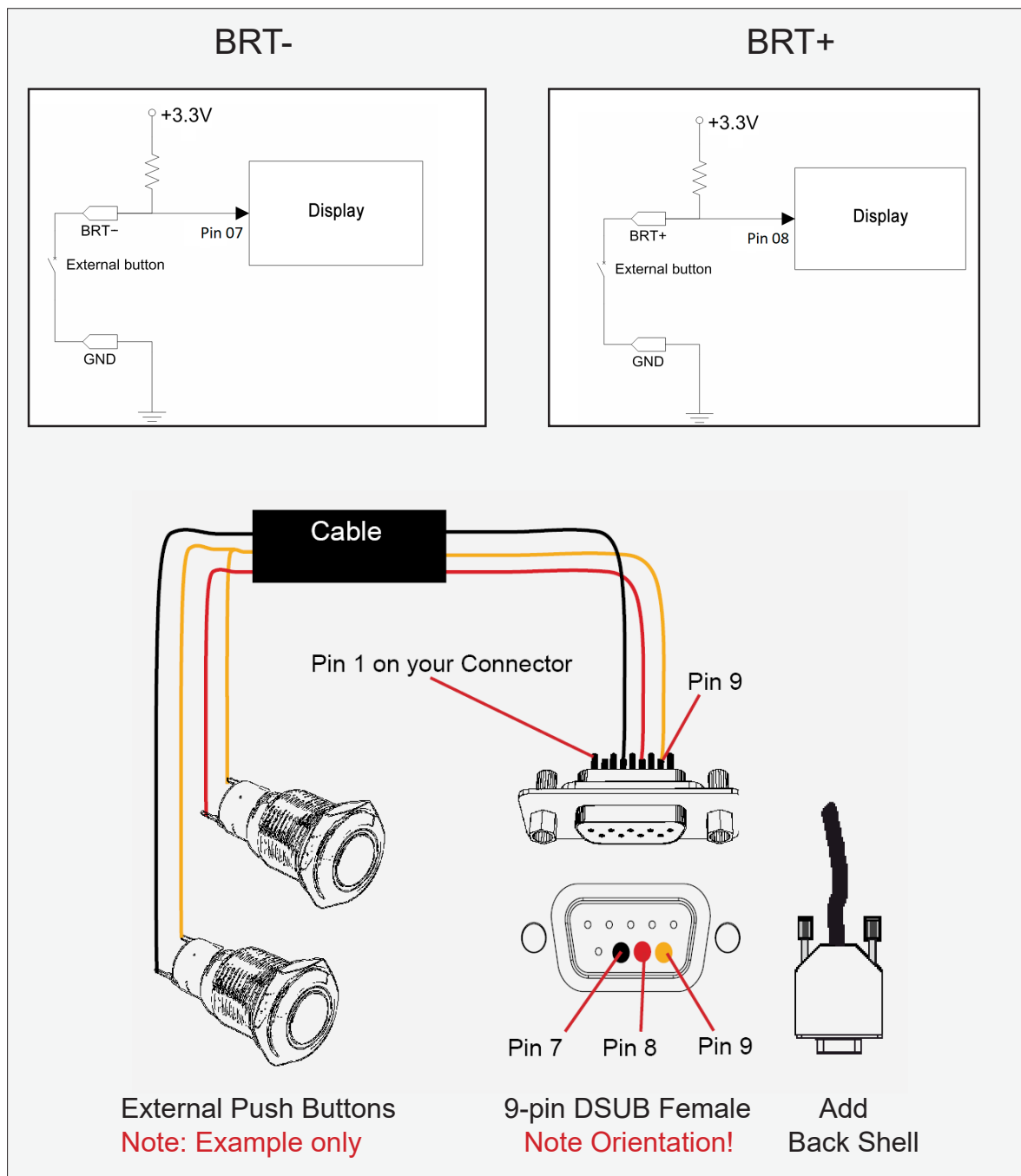# 9-pin User Interface, DSUB Male

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

USER-External 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-	BRT+
+3.3V — BRT− — Pin 07 — Display — External button — GND	+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	9-pin DSUB Female	Add
Note: Example only	Note Orientation!	Back Shell

Pinout Assignment   4

IND105446-32

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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

Pinout Assignment   1
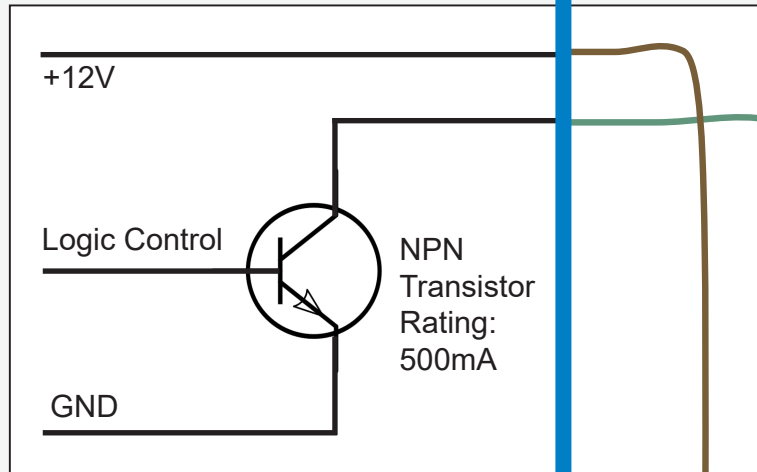
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All pinout assignments are seen from users Point of View (POV) while looking straight at the connector.

Suggested "Buzzer" Control Logic inside Computer/System:

Internal Side   **External Side**

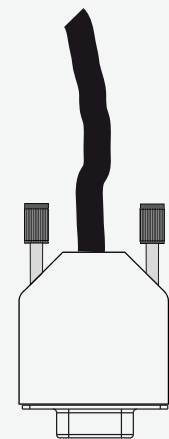+12V

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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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).
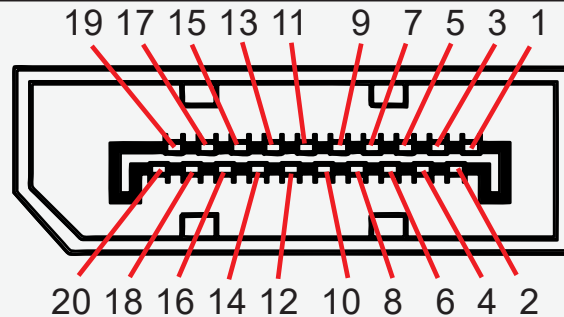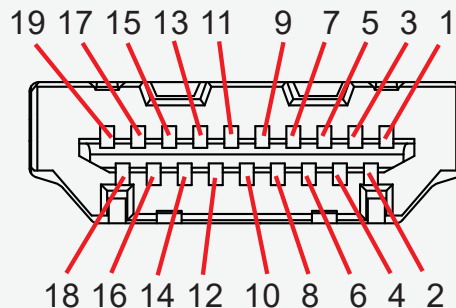
PIN 01	ML_Lane 0 (p) - Lane 0 (positive)
PIN 02	GND - Ground
PIN 03	ML_Lane 0 (n) - Lane 0 (negative)
PIN 04	ML_Lane 1 (p) - Lane 1 (positive)
PIN 05	GND - Ground
PIN 06	ML_Lane 1 (n) - Lane 1 (negative)
PIN 07	ML_Lane 2 (p) - Lane 2 (positive)
PIN 08	GND - Ground
PIN 09	ML_Lane 2 (n) - Lane 2 (negative)
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

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19-pin HDMI Female

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

PIN 01	TMDS Data2+
PIN 02	TMDS Data2 Shield
PIN 03	TMDS Data2−
PIN 04	TMDS Data1+
PIN 05	TMDS Data1 Shield
PIN 06	TMDS Data1−
PIN 07	TMDS Data0+
PIN 08	TMDS Data0 Shield
PIN 09	TMDS Data0−
PIN 10	TMDS Clock+
PIN 11	TMDS Clock Shield
PIN 12	TMDS Clock−
PIN 13	CEC
PIN 14	Reserved (HDMI 1.0–1.3a) Utility/HEAC+ (HDMI 1.4+, optional, HDMI Ethernet Channel and Audio Return Channel)
PIN 15	SCL (I²C Serial Clock for DDC)
PIN 16	SDA (I²C Serial Data for DDC)
PIN 17	Ground (for DDC, CEC, ARC and HEC)
PIN 18	+5 V (min. 0.055 A)
PIN 19	Hot Plug Detect (all versions) HEAC- (HDMI 1.4+, optional, HDMI Ethernet Channel and Audio Return Channel

Pinout Assignment   1

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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)

To ensure that EMC requirements are met, all connected cables shall be screened and should be terminated / grounded at both ends with as short as possible pig tail.

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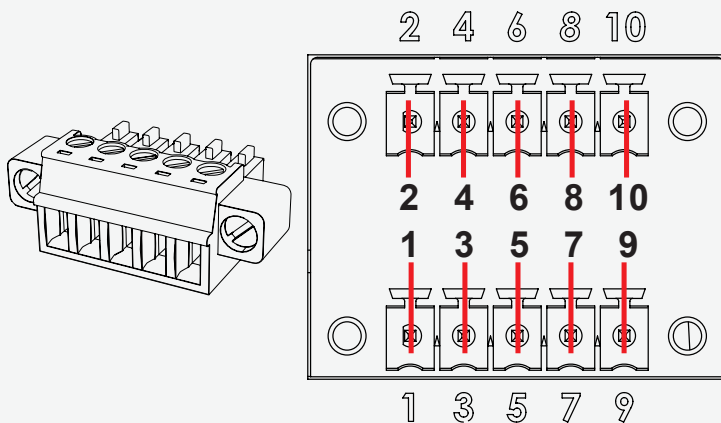
Notes:
Unit may have several physical connectors available for Buzzer control. Please only use RS-232 or RS-485 pins to control Buzzer, not both at the same time.

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:
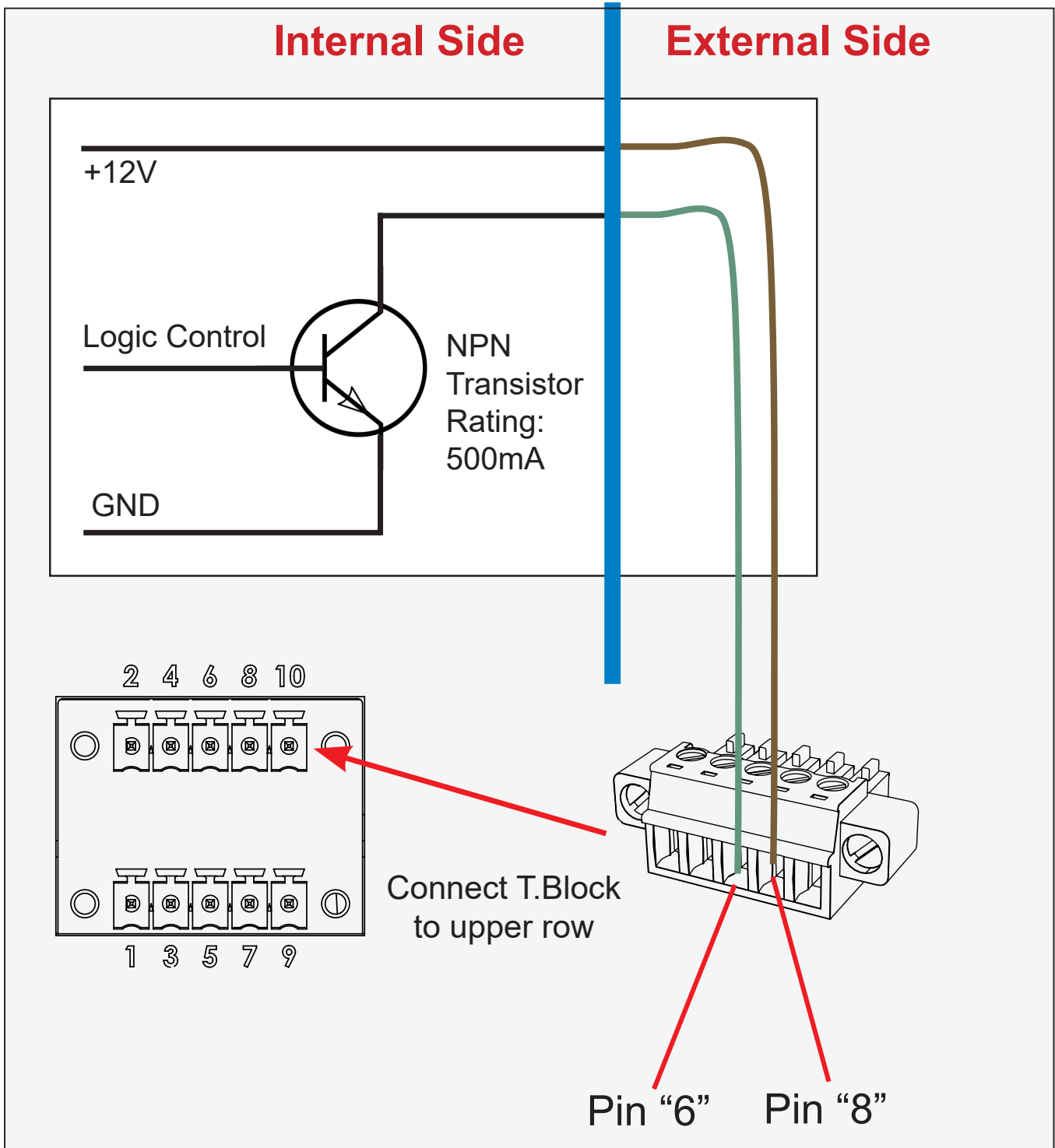• Display Unit needs external power connected to turn buzzer on. (Any logic power state).

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

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

1 3 5 7 9

Connect T.Block to upper row

Pin "6"   Pin "8"

Revision history pr. chapter/document id

IND100106-7 - User Documentation statement - REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SE
Initial version

IND100131-66 - Contents of package - REV: 01 - DATE: 20 Mar 2024 - AUTHOR: SR
Initial version

IND100078-81 - Safety introduction and overview - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100077-316 - Product labeling and locations - REV: 01 - DATE: 04 Apr 2024 - AUTHOR: SR
Initial version

IND100077-314 - Product labeling details - REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SR
Initial version

IND100110-12 - Touchscreen overview - REV: 01 - DATE: 15 Oct 2024 - AUTHOR: SE
Initial version

IND100110-21 - Touch Screen Drivers - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100078-110 - Installation recommendations - REV: 01 - DATE: 22 Feb 2024 - AUTHOR: SR
Initial version

IND100210-83 - Ferrites - REV: 01 - DATE: 20 Mar 2024 - AUTHOR: SR
Initial version

IND100210-31 - Housing / Terminal Block Connector Overview - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100078-112 - Installation procedures - REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SR
Initial version

IND100210-30 - Configuring DC power input housing connector - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100133-100 - Physical connections - REV: 01 - DATE: 21 Mar 2024 - AUTHOR: SR
Initial version

IND100064-74 - User controls - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SS
Initial version

IND100064-95 - On Screen Display (OSD) Menu - Functions map - REV: 01 - DATE: 23 Oct 2024 - AUTHOR: SR
Initial version

IND100064-96 - On Screen Display (OSD) Menu - Functions - REV: 01 - DATE: 01 Jan 1970 - AUTHOR: SR
Initial version

IND100084-17 - Serial Communication (SCOM) Interface - Introduction - REV: 01 - DATE: 31 Mar 2023 - AUTHOR: SR
Initial version

IND100084-18 - Message commands and queries - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SR
Initial version

IND100084-29 - MCC commands list - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

IND100084-23 - Operational requirements - REV: 01 - DATE: 20 Jan 2023 - AUTHOR: SE
Initial version

#ADD_PAGE_BREAK#
#ADD_PAGE_BREAK#

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

IND100104-10 - Preset Signal Timings - REV: 01 - DATE: 21 Jan 2023 - AUTHOR: SE
Initial version

IND105446-13 - 15-pin External User Control Interface, DSUB Male - REV: 01 - DATE: 21 Feb 2023 - AUTHOR: SE
Initial version

IND105446-2 - 4-pin USB2.0 TYPE A Female - REV: 01 - DATE: 20 Feb 2023 - AUTHOR: SE
Initial version