# **USER'S MANUAL**





November 2021

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# Foreword

Thank you for purchasing a North Invent Wave PERFORMANCE Monitor (Panel PC). Our series of rugged Monitors and Panel PCs are developed and built with the greatest care and state of the art electronic and software features. North Invent focuses its full expertise in offering dedicated display solutions, matching with your highest requirements and use.

Before starting to operate the Panel PC, we would like to suggest that you carefully read through the present document, as our aim with this User's Manuel is to give you the best experience in using your device.

May you have any suggestions for improvements, or any feedbacks about this manual, the Panel PC and/or its features, feel free to contact us. We will be pleased to oblige.

This User's Manual is for use only with our Wave PERFORMANCE Monitors (Panel PCs). To assess which series of Monitor or Panel PC you are in possession of, please check the Service Tag label at the back of the monitor. The label must contain WExxx (see below). May you have a different series of Monitor, please contact us, so to have the proper manual sent to your attention.



#### 1. Terms and Abbreviations

- DIU Display Unit
- DP DisplayPort
- ELU Electronics Unit
- HMI Human- Machine Interface
- LCD Liquid Crystal Display
- LED Light-Emitting Diode
- OS Operating System
- PPC Panel PC
- RGB Red-Green-Blue
- SNMP Simple Network Management Protocol

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### 2. Panel PC Description

The Wave PERFORMANCE Monitors are a series of rugged TFT LCD Display Panel PCs available in 18.5", 19", 21.5", 24", 27" and 32" display sizes and with Intel Core i3/i5/i7 and Celeron CPUs. All our Panel PCs are built following a modular approach and can be console mounted or equipped with a stand (hinge).

#### Each Panel PC is constituted by the following set of components:

Display Unit (DIU) - Front end of the Panel PC consisting of the glass (optionally: touch) and display panel in the aluminum frame.

Electronics Unit (ELU) - Back end of the Panel PC consisting mainly of power supply, motherboard, SSD, and memory.

DIU and ELU are modular and easily separable to ensure efficient configuration, maintenance, and repair.

Optional accessories are a hinge (tiltable stand), panel mounting kits and HMI units (operator panels).

#### Each Panel PC presents the following materials and features:

The Front, Display Frame and Cover are made of Marine Grade Aluminum allowing to reduce weight while eliminating corrosion problems.

The electronics include a specifically designed Power Supply, a high-quality Display Controller, a Backlight LED driver, and a custom-made Interface Board.

The Panel PCs use identical Power Supply which can be supplied with 90-264 VAC, 18-36 VDC or as a multipower combination depending on configuration.

Pixel pitch on all displays varies from 0.213 to 0.311 mm both in X and Y direction depending on the display size (see data sheet). Pixel pitch equals 1.07 m viewing distance with a viewing angle of 1 minute of arc as required in IEC 62288 section 7.5.1 for the 27" Panel PC, 0.96 m for the 24" Panel PC, 0.86 m for the 21" Panel PC, 1.02 m for the 19" Panel PC and 0.74 m for the 18.5" Panel PC. Nominal viewing distance in a normal environment is 1.0 m.

#### Each Panel PC complies with the following international Standards and Requirements:

All our Panel PCs have been tested by international accredited testing labs and found to comply with the requirements of the International Association of Classification Societies (IACS) as well as the selected requirements of IEC 60945, IEC 60533, IEC 60529, and selected MIL standards.

The 19", 21.5", 24", 27" and 32" Panel PCs have also been tested according to IEC 62288, IEC 62388, and IEC 61174 and are thereby ECDIS approved.

All our Panel PCs are approved in compliance with the international standard IEC 60945:2002 (Clause 4.4 Equipment category b, protected from the weather (formerly class B)), Maritime navigation and radio communication equipment and systems - General Requirements - Methods of testing and required test results.



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### 3. Product Identification

On the backside there are three markings identifying the Panel PC.

Display Unit (DIU) P/N and serial number Electronics Unit (ELU) P/N and serial number Complete Panel PC P/N and service tag number

Upon request we can assign an additional customer specific P/N.

Please see separate document for details about product numbering.

## 4. Packaging and Delivery

Please check the delivered goods immediately on receipt with respect to damages caused by transportation and inform the delivering freight carrier immediately, on site, about any visible transport damages. Additionally, inform us immediately in writing, at the latest within 5 workdays, about any visible transport damages. At reception, the delivery includes the following items:

Wave PERFORMANCE Monitor (Panel PC) AC power cable DC power plug (optional) DP cable (optional)

#### 5. Mechanical Dimensions

For panel cut out drawings and mechanical dimensions of Panel PCs see data sheets.

## 6. Compass Safe-distance:

Every panel PC is tested in order to determine the minimum safe distances at which it should be installed from both the steering and the standard magnetic compasses, so not to significantly affect the accuracy of these compasses. A safe distance takes into account both the constant effect on a magnetic compass by the presence of magnetic material, but also any variable effect due e.g., electrical circuits or the opening/closing of drawers or panels. Thus, provided that a Panel PC is not placed in a position nearer to the center of the magnetic compass than the recommended safe distance, the Panel PC may be installed or removed without any need for adjustment of that compass.

The safe compass distances are mentioned on every Panel PC and/or in the corresponding datasheet.



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# 7. Electrical Installation

All electrical connections are to be found on the lower backside of the Panel PC. The connectors are clearly labelled on the Terminal Plate at the bottom of the Panel PC's backside.



*Figure:* Terminal Plate for a Panel PC with AC+DC power input and four serial ports. Optionally, two serial ports can be replaced with two additional Ethernet ports.

## 7.1. Pin-Assignments

#### AC Power



Pin	Description	Pin	Description	Pin	Description
Ν	Neutral	PE	Protective Earth	L	Line

The Panel PC is connected to AC voltage by means of the standard AC power cable included in the delivery. The AC current to the Panel PC is limited by a 3.15 A internal fuse.

#### **DC Power**



Pin	Description	Pin	Description	Pin	Description
1	Supply voltage, positive 18-36V	2	NC	3	Supply voltage negative

The Panel PC is connected to DC voltage by means of the DC power plug included in the delivery and wires suitable for up to 8 A continuous load. The Panel PC will not be damaged by reversed polarity; may it occur. The DC current to the Panel PC is limited by a 10 A internal fuse.

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#### Displayport



Pin	Description	Pin	Description	Pin	Description
1	ML_3LN (Lane 3-)	8	GND	15	AUXP (Auxiliary Channel+)
2	GND	9	ML_LN1P (Lane 1+)	16	GND
3	ML_L3P (Lane 3+)	10	ML_LN0N (Lane 0-)	17	AUXN (Auxiliary Channel-)
4	ML_L2N (Lane 2-)	11	GND	18	Hot Plug Detect
5	GND	12	ML_LN0P (Lane 0+)	19	POR (Return for Power)
6	ML_L2P (Lane 2+)	13	Config1 (connected to GND)	20	PO (Power 3.3V / 500mA)
7	ML_L1N (Lane 1-)	14	Config2 (connected to GND)		

#### RS232 – DB9 Plug



Pin	Description	Pin	Description	Pin	Description
1	Not connected	4	Not connected	7	Not connected
2	TxD (Transmit Data)	5	GND	8	Not connected
3	RxD (Receive Data)	6	Not connected	9	Not connected

The Panel PC is equipped with two standard 9-pin D-SUB male connectors for RS232 serial ports.

#### RS232 / 422 / 485 - DB9 Plug (optional)



Pin	Description	Pin	Description	Pin	Description
1	TxD- (Transmit Data)	4	RxD+ (Receive Data)	7	Not connected
2	TxD+ (Transmit Data)	5	GND	8	Not connected
3	RxD- (Receive Data)	6	Not connected	9	Not connected

The Panel PC can be equipped with two additional standard 9-pin D-SUB male connectors for either RS232 or RS422/485 serial ports. The RS422/485 ports are configurable in the BIOS.

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#### LAN (RJ45)



Pin	Description	Pin	Description
1	DA+	5	DC-
2	DA-	6	DB-
3	DB+	7	DD+
4	DC+	8	DD-

#### USB A



Pin	Description	Pin	Description
1	GND	3	Data +
2	Data -	4	V <sub>CC</sub>

#### HMI – DSUB 15



Pin	Description	Pin	Description	Pin	Description
1	Backlight UP key	6	GPI (general purpose input)	11	Speaker line
2	Backlight DOWN key	7	GPO (general purpose output)	12	5 VDC
3	Reset key	8	PLED+ (Power LED anode)	13	PSU A Indicator
4	LED brightness control (PWM)	9	PLED- (Power LED cathode)	14	PSU B Indicator
5	Power key	10	Speaker return	15	GND

Refer to the wiring diagram on next page for recommended used of the HMI port.

An optional HMI panel can be supplied upon request.



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## 8. Operating System (OS)

The Panel PC can be delivered with or without an installed OS. Currently Windows and Linux OS is supported. Screen brightness can be adjusted using the Windows Display Settings. The following chapters assume that Windows 10 OS has been installed.

### 9. Color calibration and use in ECDIS applications

The Panel PC may be color calibrated from factory. In this case, a set of calibration files will be provided to allow the operating system to apply the calibration when it is installed. The calibration files may be obtained from a USB pen-drive enclosed with the Panel PC or by mail. Please follow the procedure below to apply the calibration profile to the Microsoft Windows 10 operating system.

1. Press the Windows key + R together to get to the Run dialog box. Type "colorcpl" and press Enter to launch Color Management.

exces Al Aufles	Advanced		
	_		
Qevice:	Display: 1. Generic PnP Monitor	Intel(R) UHD Graphics 620	~
	Use my settings for this device		jdentity monitors
Profiles associat	ted with this device		
Name		File name	
Arts	Esseve	5	et as Default Profile
Understanding	colour management settings		Pigfilm

- 2. Select Display 1 from the drop-down list and tick "Use my settings for this device".
- 3. Click the Add button, a dialog will open.

Navo	Filmer	
WCS-enhedsprofiler		
Profil for virtuel sRGB-enhedsmodel	wsRGB.cdmp	
Profil for virtuel scRGB-enhedsmodel	wscRGB.cdmp	
ICC-profiler		
Laptop Internal MaxBright Display	TPMB72_1.icm	
Laptop Internal MaxBright Display	TPM872.icm	
Laptop Internal MaxBright Display	TPMB60.icm	
Notebook PC Internal Display	TPLCD_4181_SDR.icm	
Notebook PC Internal Display	TPLCD_4181_HDR.icm	
Notebook PC Internal Display	TPLCD_41A5_SDR.icm	

- 4. Click the Browse button to open the file select dialog.
- 5. Browse to the location of the calibration data.
- 6. Select the color profile (.icc) and click the add button.
- 7. The color profile containing the factory calibration will be added to the list of color profiles.

Colour Managama	st.		
ALES Al Profiles A	dvanced		
Device:	Display: 1. Generic PsP Monitor - Intel(R) UH	O Graphics 623	v
	Use my settings for this device		jdentify monitors
Profiles associated	with this device	File name	
congetec AG, 15-	04-3521 John (default)	congates AG, 15-0	4-3321.icm
BAL-	Barrove	Şet.	es Default Profile
êdd	Innes	Şet.	es Default Profile

- 8. Select the profile that was just added and click the Set as Default Profile button.
- 9. The factory calibration profile has now been added and activated on the unit.



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#### Use in ECDIS applications:

If the Panel PC is to be used in an ECDIS application, the appropriate ECDIS color table must be integrated into the ECDIS software. The ECDIS color table is provided as a .csv file that lists the RGB values required to produce each color token. The color table is provided along with the calibration data.

#### 10. Simple Network Management Protocol (SNMP)

It is possible to control the Panel PC backlight (brightness) and buzzer via Ethernet using SNMP.

An SNMP agent must be installed using the following procedure:

Microsoft .Net Core 3.1 is required to run the NorthSNMP agent. Make sure it is installed or install from this link: <u>https://dotnet.microsoft.com/download/dotnet-core/thank-you/runtime-desktop-3.1.6-windows-x64-installer</u>

Download and install the SNMP agent according to the procedure below:

1. Create folder "c:\program files\NorthInvent\NorthSNMP" and copy files from NorthSNMP.zip to the folder.

Pictures     Picture     Pictur	iame ^ papettings.Development.json papestings.ion @ cgocK.ndl @ cgocK.ndl @ Microsoft.Extensions.Configuration.Abst @ Microsoft.Extensions.Configuration.Bind	Date modified 07/04/2021 02:01 03/08/2020 16:04 03/07/2020 11:23 03/08/2020 14:24 08/03/2017 19:26 20/05/2020 23:55 20/05/2020 23:55	Type File folder JSON File JSON File Application exten Application exten Application exten	Size 1 KB 1 KB 18 KB 216 KB 21 KB	
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3D Objects			Application exten	25 KB	
Desktop	Microsoft.Extensions.Configuration.Com	20/05/2020 23:56	5 Application exten	20 KB	
Desktop	Microsoft.Extensions.Configuration.dll	20/05/2020 23:56	Application exten	27 KB	
Documents	Microsoft.Extensions.Configuration.Envir	20/05/2020 23:56	Application exten	21 KB	
Documents	Microsoft.Extensions.Configuration.FileE	20/05/2020 23:57	7 Application exten	23 KB	
Downloads	Microsoft.Extensions.Configuration.Json	20/05/2020 23:57	7 Application exten	22 KB	
👌 Music	Microsoft.Extensions.Configuration.User	20/05/2020 23:57	Application exten	21 KB	
E Pictures	Microsoft.Extensions.Dependencylnjecti	20/05/2020 23:56	5 Application exten	37 KB	
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2 ESD-ISQ (Ct)	Microsoft.Extensions.FileProviders.Abstra	20/05/2020 23:56	5 Application exten	18 KB	
LIEEL NITES (D.)	Microsoft.Extensions.FileProviders.Physic	20/05/2020 23:56	5 Application exten	35 KB	
CEPUNITS (D.)	Microsoft.Extensions.FileSystemGlobbin	20/05/2020 23:57	Application exten	39 KB	

2. Run the install.bat found in NorthSNMP.zip to install the service.



Then open Windows firewall on UDP port 161 <u>either</u> by running the below commands in PowerShell <u>or</u> by using the Windows Defender graphical interface.

New-NetFirewallRule -DisplayName "UPD161 SNMP IN" -Direction Inbound -Protocol UDP -LocalPort 161 -Action Allow -Profile Any New-NetFirewallRule -DisplayName "UPD161 SNMP OUT" -Direction Outbound -Protocol UDP -LocalPort 161 -Action Allow -Profile Any



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1. Press Windows key and type wf.msc to open the firewall control panel

P Windows Defender Firewall wit	Inbound Rules						Actions	
El Indexe Buiet 30 Orthourd Hule 30 O	Interest deals if prevails/act_accord if prevails/act_accord if prevails/act_accord if prevails/act_accord if prevails/act_accord if prevails/act_accord if spectry Music if spectry Mus	Group         #Free-Bill AL, 41, 4000         #Free-Bill AL, 4100         #Free-Bill AL, 41000         #Free-Bill AL, 4100 <t< th=""><th>Profile All All All All All All All All All Domai Domai Domai Public Private Public Private Public Private Public</th><th>Enabled Yes Yes Yes Yes Yes Yes Yes Yes Yes Yes</th><th>Action Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow Allow 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2. Select "Inbound rules" and click "add rule"

P New Outbound Rule Witard	P New Inbound Rule Wizard		× 🔗 New Inbour	d Rule Wizard X		
Rule Type	Protocol and Ports			Action		
Select the type of frewall rule to create.	Specify the protocols and posts to which this rule applies.			Specify the action to be taken when a connection matches the conditions specified in the rule.		
Shape: a Rula Type What type of nule would you like to create? a Patronal and Pros.	Steps: a Pute Type a Protocol and Ports	Does this rule apply to TCP or UDP?	Steps: Plue Type Protocol and Pr	What action should be taken when a connection matches the specified conditions?		
Alian     A	e Adon a India a Nene	<ul> <li>⊕ gene</li> <li>Dane the obseque to all load points or specific load points?</li> <li>☐ generative band points.</li> <li>(1) Bangelo BL 443 0000010</li> </ul>	# Ann	Born He convector     The angle of the set of the		
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3. Select "Outbound rules" and click "add rule".

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	Rule Type Select the type of frevul rule to create.		Protocol and Port Specify the protocols and	Protocol and Ports Specify the protocols and ports to which this rule applies.			Action Seedy the action to be taken when a connection matches the conditions specified in the rule.		
	Skeps: e Rule Type	What type of nile would you like to create?	Steps: Pule Type	Does this rule apply to TCP or UDP?		Steps: PLie Type Detection Plate	What action should be taken when a connection matches the specified conditions?		
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P New Outbound Rule Wiza	ed	×	P New Outbound Rule Wizard		×
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With the SNMP agent installed you can control the device by SNMP commands either through your dedicated application or by using one of the publicly available applications like NetSNMP (<u>http://www.net-snmp.org/</u>).

The following examples presumes that NetSNMP is installed in the local machine:

Control	Command
Get backlight value	snmpget -v2c -cpublic localhost 1.3.6.1.4.1.30329.1.1.3.2.0
Set backlight 55%	snmpset -v2c -cpublic localhost 1.3.6.1.4.1.30329.1.1.3.2.0 i 55
Turn on buzzer	snmpset -v2c -cpublic localhost 1.3.6.1.4.1.30329.1.1.5.24.0 i 1
Turn off buzzer	snmpset -v2c -cpublic localhost 1.3.6.1.4.1.30329.1.1.5.24.0 i 0

The backlight setting interval is 0-100% where 100% is max brightness.

#### 11. System Utility and API

The Panel PC uses an ITX motherboard manufactured by Congatec and a System Utility tool and an API are available from the Congatec Product page: <u>https://www.congatec.com/en/products/mini-itx/conga-ic370/</u>

#### 12. Technical Specifications

Please refer to the relevant datasheet with the technical specifications for your type of Panel PC.

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## 13. Troubleshooting

If you encounter any trouble with your Panel PC, please check if your problem is listed below and follow the given instructions.

If the problem persists, please contact North Invent for service instructions.

Problem	Instructions
No power on	Check if the AC or DC voltage supplied to the Panel PC is within the specification (90-264 VAC or 18-36 VDC).
	Check if the AC or DC power LED is lit and if not press the power on control (HMI connected).
No picture displayed	Check if the brightness is set to 100% using the backlight UP key (HMI connected).
Picture is too dark	Increase the brightness using the backlight UP key (HMI connected).
	Increase the brightness using the Windows Display Settings (HMI not connected).
OS is not loading	Check if an OS was included in your purchase/delivery.

## 14. Cleaning

Dust and dirt which typically accumulates on the front of the Panel PC, can easily be removed using a soft cloth moistened with hot water.

A solvent can also be used but never use any kind of abrasive compound.

Oil and grease can be removed using pure alcohol.

The front glass can be cleaned with any solvent suitable for glass.

## 15. Maintenance and Service

The Panel PCs are developed to be almost maintenance free.

If the Panel PC malfunctions, please check if the problem can be solved with troubleshooting.

If the problem persists, please contact North Invent for service instructions.

Allow app. 1 hour stabilization time before measuring luminance and colors.

#### 16. Update

The technical documentation is subject to change. For an updated version please visit our website www.northinvent.com.



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