

# PXI Express Embedded Controller 3U 4 TE W-11865MLE 32-1024

## **User Manual**

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SCHROFF GmbH Langenalber Str. 96-100 75334 Straubenhardt/Germany SCHROFF.nVent.com



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Table 1: Revision History

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## **1** References and Architecture Specifications

#### 1.1 Related Documents

This product meets the requirements of the following specifications:

- IEEE 1101.1-199, including IEC 603-2 Connectors
- IEEE 1101.10, including IEEE 1101.1 Equipment Practice,
- ATX Specification Version 2.4
- PICMG EXP.0 Revision 2.0 CompactPCI Express Specification
- PICMG 2.0 R3.0 CompactPCI Specification
- PXI-1 Hardware Specification Rev 2.3
- PXI-2 Software Specification Rev 2.6
- PXI-5 PXI Express Hardware Specification Rev 1.1

#### **1.2 Safety Certification**

The product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control and laboratory use.

• EN 61010-1 / IEC 61010-1

#### 1.3 CE / UKCA Compliance

Essential requirements of applicable European Directives are met by this product. Since 2020 the UKCA declaration requirements are fulfilled as well.

- LVD 2014/35/EU
  - U Low-Voltage Directive U Electromagnetic Compatibility Directive
- EMC 2014/30/EU
  RoHS 2011/65/EU
- RoHS Directive 2

Products fulfilling those requirements are marked with a CE/UKCA label.

For Declarations of Conformity of this product please visit https://SCHROFF.nvent.com/



## 2 Technical Information

#### 2.1 Description

The nVent SCHROFF PXI Express / CPCIexp Embedded Controller 21265-170 delivers exceptional performance and versatility in a remarkably compact 3U, one-slot form factor. Powered by an XEON® W-11865MLE processor, it boasts eight cores clocked at 1.5 GHz with 24 MB cache and a low 25W TDP, ensuring efficient operation without sacrificing processing power. The integrated Xe (Gen 12) graphics engine with up to 96 Execution Units further enhances its capabilities for demanding visual applications. Additionally, the inclusion of the RTS Real-Time Hypervisor opens doors for complex real-time control tasks.

This controller shines in terms of connectivity, supporting either a 4-port (x4x4x4x4) or 2-port (x4x8) system slot configuration, enabling flexible system expansion and data transfer speeds of up to 28 GB/s. The versatile front panel interface provides a DisplayPort++ 1.4 connection for high-resolution displays, two 10 GbE Ethernet ports with Time-Sensitive Networking (TSN) support, and two USB 3.1 Gen2 Type A ports for connecting various peripherals.

Storage and memory are equally impressive, with a spacious 1 TB M.2 SATA NVMe SSD ensuring fast data access and a generous 32 GB DDR4 memory guaranteeing smooth program execution and multitasking.

For other configurations regarding CPU, DDR4 memory, hard disk capacity or visual adjustments (heat sink, front panel, surfaces), please contact your responsible sales partner.



#### 2.2 Functional Block Diagram



#### 2.3 Technical Data

The following table provides general technical product information of the nVent SCHROFF PXI Express Embedded Controller 21265-170.

Physical parameters	
Height	128.7 mm (aligns with 3U card cages)
Width	20.3 mm (4TE)
Depth	213.2 mm
Weight	0,44 kg
Compute parameters	
CPU	Intel® Xeon™ W-11865MLE (8 x 1.5/4.5 GHz, 24 MB cache, 25W)
Main Memory	Dual Channel (1 of 3 modules equipped) 1x DDR4 32 GB 3200MHz 1V2 CL22
Hard Drive	1x M.2 2280 1TB SATA3 NVMe
Interfaces	
Ethernet	2x 10G BASE-T RJ45 Ports
Graphics	1x DP++ 1.4 Port with Integrated Intel Xe (Gen 12) graphics engine with up to 96 EU
USB	3x USB3.1 Gen2 Type A
PXI Express System Slot	4 Port x4x4x4x4
Connectivity (1PE-3PE/1PE-2PE)	2 Port x4x8 ( <i>capable of up to PCIe</i> Gen4, Gen3)
Management and Power	
BIOS	AMI Aptio® V UEFI 2.x on 32 MB SPI flash
Board Management Controller	Multi-stage watchdog, Non-Volatile storage, Hardw. monitoring, statistics, I <sup>2</sup> C, Fan Ctrl.
Security	Trusted Platform Module (TPM 2.0)
Power Demands	12.0 V         typ. 1.3 A         max. 4.2 A           5.0 V         typ. 1.5 A         max. 4.5 A           5.0 Vaux         typ. 0.3 A         max. 0.7 A           Supports ACPI 5.0a and ATX2.2         A
Ambient	
Operation	+0 °C to +45 °C
Storage	-40 °C to +85 °C
Admissible humidity	20 % to 80 %, non-condensing, 2000m
Pollution degree	2
Shock and Vibration	
Shock	15 g peak, 11 ms halfsine EN 60068-2-27
Vibration operation non-operation	5 to 100 Hz, 0,15 g rms EN 60068-2-64 5 to 500 Hz, 1,87 g rms EN 60068-2-64

Table 2: Technical Data



#### 2.4 General View

The compact 4 TE, 3U PXI Express controller 21265-170 features a front panel equipped with a convenient latch-off mechanism for easy access to the interior. A mounted heat sink ensures efficient thermal management, keeping the system cool and reliable.

1	Front Panel 3U 4TE	6	Front handle with lock and ejector
2	Display Port DP++ 1.4 connector	7	CR1225 Battery 3.0V
3	USB3.1 Type A connectors	8	M.2 SATA3 2280 drive
4	Status LEDs (HDD, PWR)	9	CPU Carrier Board
5	RJ45 Ethernet connectors Front handle	10	Heat Sink
	with lock and ejector		



Figure 1: Isometric Front View



#### 2.5 Interchangeable Components



BIOS Battery: 63918013 CR1225 Lithium 3V Battery Cell



Please check polarity indication on the battery cell and Battery holder before assembling or changing battery cell. BIOS does not save configuration changes when battery is inserted wrong.

#### <u>CPU Variants<sup>1</sup>:</u> COM T6B TS570 W-11555MLE CTR CONGATEC COM T6B TS570 W-11865MLE CTR CONGATEC

<sup>1</sup>also available as ITR versions (Industrial Temperature Range)

<u>Main Memory<sup>2</sup>:</u> **32 GB DDR4 SODIMM 3200MHz CL22 (installed)** <sup>2</sup>one of two DDR4 sockets occupied. Possible is splitting into two bars or adding a second.

Hard Drive:SSD M.2 B-KEY 1TB SATA3 860 EVO (installed)SSD M.2 B-KEY 2TB SATA3 860 EVO

other modifications: BIOS Logo, custom Heat sinks or front panels, etc. upon request



2.6 Technical Drawings



Figure 2: Front and Top View



## **3** General Installation

#### 3.1 Unpacking

## ATTENTION

When opening the parcel and ESD bag, use caution to avoid damaging the controller.

Consider the following when unpacking and storing the system controller:

- Leave the system controller packed until it is needed for immediate installation.
- After unpacking the system controller, store the packaging material in case the system controller must be returned.

If the packaging is damaged and the system controller shows possible damages, please report it to the shipper and analyze the damage.

#### 3.2 Getting Started / Initial Operation

## 



**Risk of injury and accidents due to insufficiently qualified personnel!** The installation may only be carried out by qualified personnel who are authorized to do so according to the valid safety regulations, e.g. by authorized specialized companies or authorized departments of the company.

- 1. Plug in the chassis AC cord to have PE grounding potential when inserting controller.
- 2. Ensure your PXI Express chassis is set to "DEF" and main switch is set to "O" (Off)
- 3. Gently insert the controller into Slot 1 guiding rails. Ensure the connector zones align properly before inserting till the end.
- 4. Pull up the front handle slightly until front panel seals with front. Tighten the 4 screws.
- 5. Press the Push-Button to initiate the power up/booting sequence.
- 6. During bootup, press ESC to access BIOS settings or F11 for boot options.
- 7. Use the BIOS menu to set the correct boot priority based on your chosen boot medium (e.g., USB drive, CD-ROM).
- 8. Select correct Boot Priority in accordance with your selected boot mediums.
- 9. Install a supported operating system following the manufacturer's instructions.
- 10. Download and install the necessary drivers from the provided link for full functionality.



Embedded Controllers or PXI Express External Adapter Cards can only be installed in System Controller Slot (Slot 1). Please use Air Baffles on idle left sided System Controller Slots.



#### 3.3 Safe Shutdown Sequence

Your PXI Express chassis and controller has to be seen like an regular Windows-based PC and should not be shut down by direct unplugging the power cord, switching off the main switch or deasserting the system controller during runtime.

To avoid damaging your system controller, peripheral cards and its data, follow these secure shutdown methods:

- 1. **Shutdown Process:** Use the familiar shutdown procedure of your OS. This gracefully closes programs and saves data before powering down both the controller and the PXIe chassis.
- 2. **Push Button Sequence:** If your chassis INHIBIT switch is set to DEF, a quick press of the front panel button will initiate a safe shutdown or sleep mode transition for the controller, depending what is chosen in operating system or BIOS.
- 3. Inhibit "MAN" shutdown: If your chassis INHIBIT switch is set to MAN you can shutdown controller as described in 1. or 2, but main power levels will stay active. For a complete power down please wait until display turns inactive and also set AC main switch to Off (O) or unplug the power cord.

#### 3.4 Power Loss Behaviour

For an unexpected case of AC or DC power loss of your chassis you can configure Power Loss Behaviour of your embedded controller. Enter BIOS menu upon bootup (F2) and switch to chapter "Boot". On parameter "Power Loss Control" you can choose between 3 options:



#### • Remain Off (default value)

After Power Loss event the controller will stay off and not bootup again.

• Turn On

After Power Loss event the controller will start boot sequence into OS

Last State

After Power Loss event it will either turn on / stay off, dependent on its last state

#### 3.5 Cooling recommendations for higher CPU load applications

- **Plenty of Airflow:** Ensure unobstructed airflow to your controller for normal operation. Blocked or environmental hot air can cause overheating events.
- **Prevent Air shortages:** Use optional air baffles to block unused slots and prevent air "shortcuts" for optimizing cooling.
- **Sealed front** : Ensure all slots and the front panel are sealed with fitting blind front panels or peripheral cards to minimize air leakage and maximize cooling efficiency.
- **Controller Spare Slots:** In chassis with idle left-sided controller slots, use additional baffles to focus airflow directly onto the one slot-sized controller.
- **Monitor Mixed Cards:** When using cards with varying air impedances, monitor cooling performance under specific loads and adjust if necessary.



#### 3.6 Supported Operating Systems

The nVent SCHROFF controller 21265-170 offers flexibility when it comes to operating systems, but it's essential to choose one that has the necessary drivers for optimal performance. While it arrives without a pre-installed OS, you have the freedom to select the system that best suits your needs. It's crucial to ensure the chosen operating system has compatible drivers available. While nVent SCHROFF has tested and confirmed compatibility with the listed options, using unsupported operating systems or drivers can lead to performance issues or malfunctions.

#### **Evaluated Operating Systems**

- Windows: Windows 11 Pro 64-bit 23H2 Built 22631.3155 (widely supported)
   Windows 10 Pro 64-bit 22H2 Built 19045.3448 (recommended)
- Linux: Ubuntu 22.04 LTS (widely supported)

#### Additional helpful steps for Windows 11 OS Installation:

- 1.) Set Chipset --> Processor (Integrated Components) --> PCI Express Configuration --> PCI Express Root Port1 Status to [DISABLED] (temporary during Win11 installation)
- 2.) Check that your Display supports 1600x900 at least to be valid with WIN11 pre drivers
- 3.) Press Shitkey + F10 and a CMD console window appears.
- 4.) Type in oobe\bypassnro and press Enter. Windows11 installer will then reboot into a offline capable version.
- 5.) Follow then the normal Micosoft Windows 11 Installer guidelines.
- 6.) Please install the corresponding hardware drivers for you selected controller.
- Do not hesitat to ask your sales responsative when facing problems.
- 7.) When Windows 11 and drivers are set up corrently, please proved a reboot and configure back Point 1.) to ENABLED

#### 3.7 Software and Driver Installation

For Windows 10 users, download and install the necessary driver package from this link:

#### https://schroff.nvent.com/products/enc21265-170

If you're using other Windows versions, Linux, NI Realtime or else, please contact your local sales representative for specific driver package, instructions and optional technical support.

Once you've installed your chosen OS, complete the setup by installing the SCHROFF PXIe Initial Setup software package. This package includes essential drivers, a system manager tool, pre-configured INI files, and registry settings for optimal PXI system operation. Download the latest version of nVent SCHROFF PXIe Initial Setup from link above.





## 4 Interface description

#### 4.1 Front Panel LED Indicators



On the front panel of the embedded controller there are two status control LEDs and two indicator LEDs per Ethernet port. At the following table the functions and a short description of their indicated behavior are listed.

Function	Color	LED status	Behavior
PWR	Green	Off	System power off or idle
		On (solid)	PWR_OK asserted / bootable
HDD	Green	Off	Internal NVMe drive is inactive
		On (blinks)	Data transfer on int. NVMe drive
ETH0	Green	On (blinks)	Network link established / active
or	Dual	Off	Link Speed is 10 or 100 Mbps
ETH1		Green (solid)	Link Speed is 1 Gbps
		Amber (solid)	Link Speed is 2.5 Gbps

Table 3: Front Panel LED Indicators

#### 4.2 DisplayPort



The front Display Port is capable of Dual-Mode (DP++) and offers additional flexibility. It converts HDMI and DVI signals when attached with a non-active cable type and supports the following interfaces:

- VESA DisplayPort Standard 1.2
- data rate of up to 5.4 GT/s on 4 data lanes
- up to 4096x2304 resolutions at 60 Hz
- Audio formats: AC-3 Dolby Digital, Dolby Digital Plus, DTS-HD, LPCM, 192 KHz/24 bit, Dolby TrueHD, DTS-HD Master Audio

#### 4.3 USB



There are two USB 3.2 Type A connectors located on the front panel. The xHCI host controller supports USB 3.2 specification with all signaling speeds (SuperSpeedPlus down to Low-Speed). A data transfers rate of up to 10 Gbps for USB 3.2 Gen 2x1 compatible decices and the USB debug feature. Each port can support up to 1500 mA load on 5.0V level. More powerful devices may be under supported due to current limitation.



When using USB 2.0 or USB 3.0 unshielded cables, it is recommended using a ferrite within a cable loop at 5-8cm far from the endpoint to reduce EMI effects. Please ensure your device meets local EMC standards.



#### 4.4 Ethernet



The embedded controller offers two 2.5 Gigabit Ethernet interfaces via an onboard Intel® i225 or i226LM/V/IT Phy. The interface supports:

- Full-duplex operation at 10/100/1000/2500 Mbps
- Half-duplex operation at 10/100 Mbps
  - Can act as EtherCAT master (3<sup>rd</sup> party driver required)

Wake On Lan Feature is supported and has to be configured within the device driver or in the BIOS settings to be active.

#### 4.5 I<sup>2</sup>C / SMBUS Interface

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The controller supports I<sup>2</sup>C (fast mode, multi-master) on hardware level and in addition the SMBus protocol. The SMBUS interface acts as your gateway to the inner of your PXI Express system. It allows you to access and control various PXI Express SMBUS devices throughout the chassis, unlocking their functionalities. Additionally, you can retrieve essential information like chassis and controller EEPROM data.

Within a nVent SCHROFF chassis, you can monitor real-time temperature, fan speeds, and voltage levels, gaining valuable insights into system health. Moreover, you can directly apply desired configurations, adjusting fan speeds, setting trigger segments and maintaining specific firmware parts for optimal operation.

To have access to SMBus please install the latest version of nVent PXI Express Initial setup for driver support. Also an general API based on the SMBUS register mapping is available and let you easy design-in into your application. For further information please get in contact to your sales partner.



## 5 Safety

#### 5.1 Safety Instructions - Disclaimer

nVent SCHROFF accepts no liability for any errors in this documentation. To the maximum extent permissible by law, any liability for damage, direct or indirect, arising from the supply or use of this documentation is excluded.

nVent SCHROFF retains the right to modify this document, including the liability disclaimer, at any time without notice and accepts no liability for any consequences of such alterations.

#### 5.2 Safety Symbols

In these original operating instructions, warning notices point out residual risks that cannot be avoided by constructive means when installing or operating the PXI Express System Controller. The warning notices are classified according to severity of the damage occurring and its statistic occurrence.

	🛆 DANGER
	Short description of the danger
Symbol	The signal word DANGER indicates an immediate danger.
	Non-observance will result in severe injuries or death.

	Short description of the danger
Symbol	The signal word WARNING indicates a possible danger.
	Non-observance can lead to serious injury or death.

	<b>A</b> CAUTION
	Short description of the danger
Symbol	The signal word CAUTION indicates a possible danger.
	Non-observance can lead to injuries.

## ATTENTION

#### Short description

The signal word ATTENTION indicates possible damages to equipment. Non-observance can lead to damage to the device.



Important information



### 6 Service

#### 6.1 Technical support and Return for Service Assistance

nVent SCHROFF actively informs their customer about EOL, service expirations and software updates by customer information letters.

We generally recommend to return the complete system controller. For all product returns and support issues, please contact your local nVent SCHROFF sales representative to connect you to our technical support team. We recommend that you save the packing material. Shipping without the original packing material will void the warranty.

#### 6.2 Warranty

All nVent SCHROFF hardware features a two-year standard warranty that is extendable upon request. nVent SCHROFF offers repair services performed in a timely manner by highly trained factory technicians.

Declaration of Conformity (DoC)—A DoC is our claim of compliance with the Council of the European Communities using the manufacturer's declaration of conformity. This system affords the user protection for electromagnetic compatibility (EMC) and product safety. You can obtain the DoC for your product on the corresponding product page on our website <u>https://SCHROFF.nvent.com/</u>

#### 6.3 Disposal



The devices described in this manual must be recycled. In accordance with the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE), they may not be disposed of in the municipal waste disposal services. To ensure environmentally friendly recycling the devices can be returned to a locally approved disposal center. Make sure that you observe the regulations applicable in your country.



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