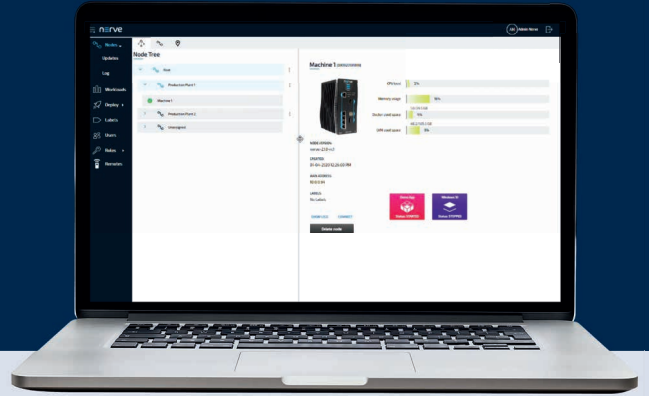


Nerve Blue

The missing link between your business and your machines



Nerve Blue is a radically open edge computing platform that promotes vendor independence and flexibility. Its open architecture allows users to deploy their own software or applications developed by 3rd parties. With Nerve Blue, users can reduce system complexity and cost, improve machine performance, and offer innovative new services to customers.

Collect, store and analyze machine data

- ✓ Real-time data access from PLC and IO infrastructure
- ✓ Time-series database integrated in device software and in the Management System
- ✓ Data Services for manipulating and distributing data between different systems
- ✓ Local and web-based user interface for data visualization

Consolidate multiple functions on one device

- ✓ Virtualized environment running Windows or Linux virtual machines
- ✓ Support for lightweight Docker containers
- ✓ Soft PLC (CODESYS®)
- ✓ Converge hardware based functions in software

Manage and deploy software

- ✓ Central repository for containers, VM and CODESYS® programs
- ✓ Simultaneous deployment of workloads to multiple devices and locations
- ✓ User management for device and software configuration
- ✓ Remote screen and console access to devices and installed software

Nerve Blue Software

One-time license per Nerve Device

Qualified Nerve Device

One-time purchase

Management System

Monthly fee per active Nerve Device

Delivery Model

- VM and container hosting
- Local UI
- Time-Series Database
- Local data processing
- Real-time data manipulation
- Soft PLC

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- TTTech MFN 100, Kontron A-250/A-150, Siemens Simatic IPC 127E/427E, Vecow SPS 5600, SuperServer E100-9AP-IA
- Qualification of other Nerve Devices available on request

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- VM and container deployment
- Data streaming to the cloud
- Cloud interfaces
- Global device management
- OTA patches and bugfixes

Base System

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|-------------------------|--|
| Base System | Linux based kernel Support for Atom, Core I5 and I7 based COTS hardware (qualifiable as Nerve Devices) |
| Hardware Support | TTTech MFN 100, Kontron A-250/A-150, Siemens Simatic IPC 127E/427E, Vecow SPS 5600, SuperServer E100-9AP-IA / 1019D-16C-FHN13TP/ 5029C-T |
| Hypervisor | ACRN and KVM |
| OS Support | Linux and Windows (as virtual machine) |
| Soft PLC | CODESYS 3.5 (PROFINET Master/Slave, EtherCAT, Modbus TCP/IP), Cycle time down to 1 ms Hosted in a real-time virtual machine to ensure isolation |
| Workload Management | Local UI for workload management Resource management to ensure application performance |
| Extensible Architecture | Open for integration of 3rd party software firewalls |
| Updates | Over-the-air updates for Base System |
| Communication Security | Encrypted Transport Layer Security (TLS 1.2) based communication Firewall friendly - communication to the Management System uses port 443 |
| Application Sandboxing | Applications are hosted as virtual machines and containers to maintain system separation |
| Network Segmentation | Configurable networking for separation of workload networks |

Data Services

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|------------------------|---|
| Database | Timescale Time-Series Database (optional InfluxDB) |
| Multi Protocol Gateway | Graphical User Interface for configuration High speed data ingestion: 100,000 data points per second Accurate time-stamping at ingestion point |
| Input Protocols | MQTT / JSON, Modbus, Siemens S7, OPC UA Client/Server, OPC UA PubSub |
| Output Protocols | MQTT / JSON, OPC UA Client/Server, OPC UA PubSub, Timescale DB (SQL), InfluxDB, Microsoft IoT Hub Offline buffering and automatic synchronization |
| Data Visualization | Grafana locally on Nerve Device and remotely in Management System |
| Analytics | Python SDK and toolchain for analytics container creation Analytics support built with Intel MKL and DAAL libraries Output to Azure IoT Hub |

Management System

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|------------------------|---|
| Hosting | Hosted on Azure cloud or on-premises |
| Management System | Deployable as Linux Docker with browser-based GUI View status of connected Nerve Devices, secure onboarding of new Nerve Devices Supports low bandwidth and intermittent connections to Nerve Devices |
| Workload Management | Workload management (deployment and updates) remotely via Management System Selective application deployment to mitigate user error Workloads accessible from the external network Support for local repositories (service PC or server) |
| Database | Timescale Time-Series Database |
| Data Visualization | Grafana via Data Services |
| Permission Management | User management via LDAP, OAuth 2.0 support |
| Remote Access | Remote service access (VNC, RDP, Shell), remote port tunneling (e.g. for FTP) Connection via http and https proxy server in Local UI network setup |
| Logging and Monitoring | Centralized logging support (Elasticsearch/Kibana) |
| Alarms | Alarms created through Grafana (RAM, CPU, temp. status & certificate expiry warning) |