TONN-8 Trend Open Network Node

Description

The TONN8 is a Trend network device that enables a Trend system to interface with a wide range of 3rd party systems.

TONN8 utilises the powerful Niagara 4 Framework® to enable the integration of Heating, Ventilation, Air Conditioning (HVAC) systems and non-HVAC systems (e.g. lighting and security) running on a diverse range of networks and protocols, including BACnet®, LonWorks®, M-Bus, Modbus®, and KNX.

It can be configured to provide bidirectional reading and/or writing of data between a Trend system and 3rd party systems, as well as allowing 3rd party systems to access Trend logged data, receive Trend alarms and adjust Trend time schedules.

Features

▪ Bidirectional reading and/or writing of data between a Trend system and 3rd party systems.
▪ Allow 3rd party systems to access Trend logged data, receive Trend alarms and adjust Trend time schedules.
▪ Comprehensive set of 3rd party drivers included as standard with additional optional drivers available.
▪ 2 onboard Ethernet ports.
▪ 2 onboard RS-485 ports.
▪ Expansion modules available to provide communications ports for RS-232, LON FTT, and additional RS-485.
▪ WiFi option for wireless access point or client operation.
▪ DIN rail or surface mounting.
▪ 24 Vac/dc power supply.

Physical

TONN8
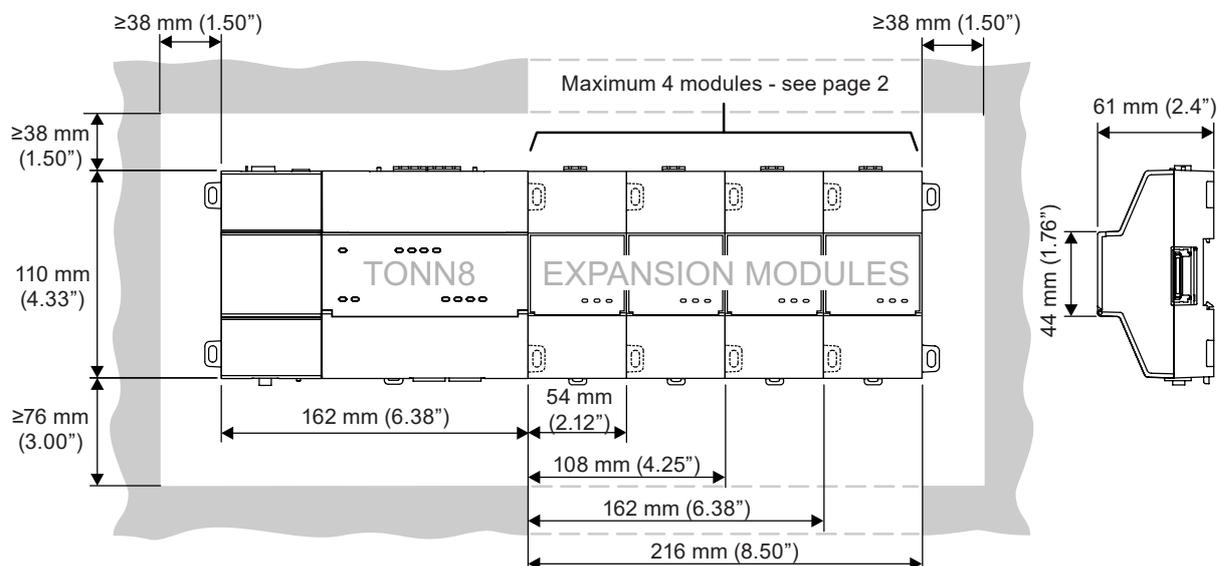
Expansion Modules
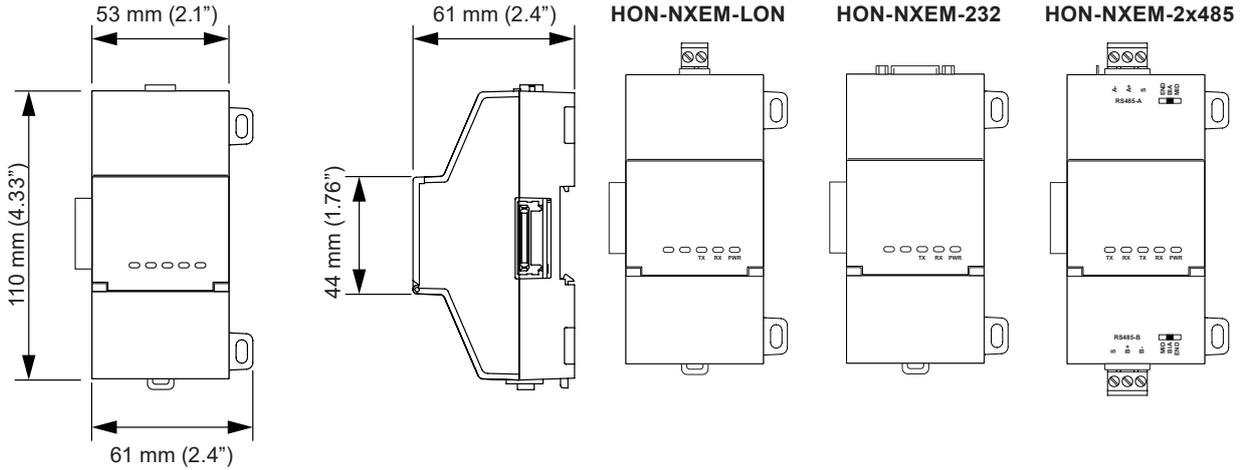
FUNCTIONALITY

The functionality of TONN8 can be divided into three sections: System, Drivers and Hardware.

SYSTEM

TONN8 is a Trend network device that enables the Trend system to interface with 3rd party systems.

Communications

The TONN8 has various ports to enable communication over Ethernet, WiFi and RS-485:
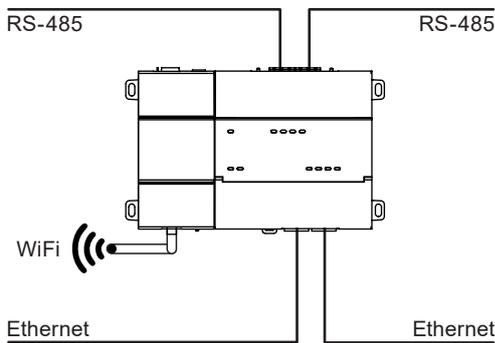
Note: Extra RS-485, RS-232 and LON FTT ports can be added by installing expansion modules (see 'Expansion Modules').

Ethernet: TONN8 has two Ethernet ports. The primary port is used for configuration and for connecting to the Trend network. The secondary port can be configured for communications with 3rd party systems. No IP routing or bridging is provided between the two ports and they must be connected to different subnets.

RS-485: TONN8 has two RS-485 ports which can be used for communications with 3rd party systems.

WiFi: (TONN8-W02- variants only): The WiFi interface can be configured to operate in either Client or Access Point modes.

In Client mode TONN8 can connect to an existing IEEE 802.11 WiFi access point and its associated network.

In Access Point mode TONN8 operates as a wireless access point for WiFi-enabled field bus devices, or to provide browser or IQ™VISION access to local configuration tools.

Expansion Modules

Optional expansion modules can be connected to TONN8 to provide additional communications ports.

There are three different expansion modules which must be purchased separately:

HON-NXEM-LON:	Single LON port
HON-NXEM-232:	Single RS-232 port
HON-NXEM-2x485:	Two RS-485 ports
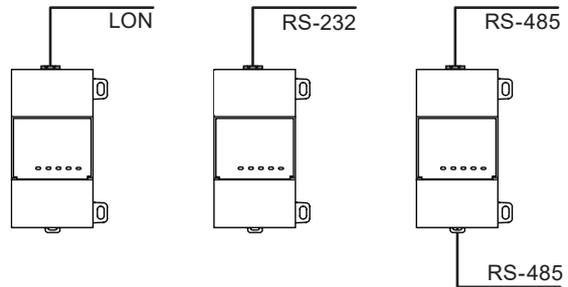
TONN8 supports up to four expansion modules and they may be installed in any combination up to the maximum permitted number for each module type:

Module	Max Number
HON-NXEM-LON	4
HON-NXEM-232	4
HON-NXEM-2x485	2*

*If you are using the maximum of two RS-485 modules, only **one** additional non-RS-485 module (e.g. LON or RS-232) may be used.

Connection

TONN8 Connection to Trend network: TONN8 connects to the Trend network over Ethernet using a virtual CNC (vCNC) in another Trend device.

Connection to 3rd party systems: TONN8 physically connects to the 3rd party systems with any of its available communications ports (either onboard or via optional expansion modules). The Niagara drivers enable communications with the 3rd party systems - see 'Drivers' on page 3.

System Integration

TONN8 is supplied with the Trend IP driver enabling it to interface with the Trend system over Ethernet. Several other drivers are also provided allowing the unit to interface with a wide range of 3rd party systems.

Read/Write Values: TONN8 enables bidirectional reading and/or writing of data between a Trend system and 3rd party systems. The points (values) to be read or written from each system are added to the TONN8 database and then linked together as required. If needed, values can be adjusted or manipulated mathematically (e.g. to obtain an average of several values).
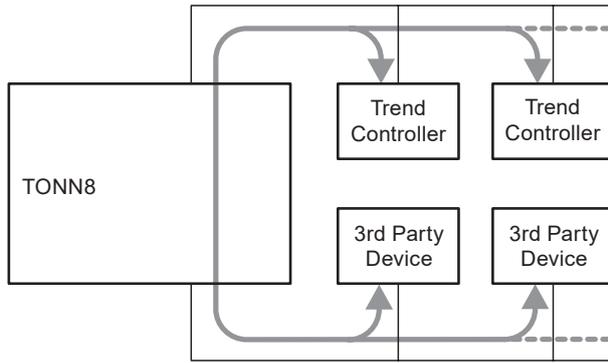
Access logged data: Data logged by Trend controllers can be accessed by a 3rd party supervisor via the TONN8. The TONN8 must be configured to archive the required logged data from the controller and make it available as a Niagara history. The 3rd party supervisor then requests the Niagara history from the TONN8.
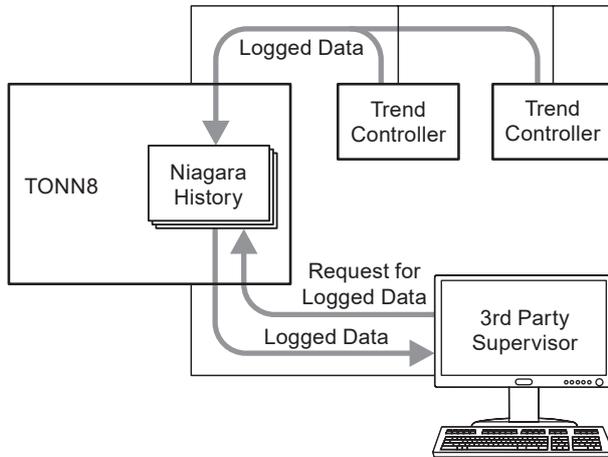
In the diagram above the TONN8 has been configured to archive the logged data from the Trend controller(s). This data is regularly archived by the TONN8 and stored in a Niagara history. When the logged data is required by the 3rd party supervisor, it requests the data from the appropriate Niagara history in the TONN8. The data is then passed from the TONN8 to the supervisor where it can be processed as required, e.g. to display a graph of the data.

Receive alarms from the Trend system: Alarms from the Trend system can be received and acknowledged from a 3rd party supervisor through the TONN8's Niagara framework.

The controller is configured to either send the alarms to the vCNC that TONN8 is connected to, or to the TONN8's IP address and port number used by its alarm listening service. The TONN8 must have its alarm service configured with a console recipient. This places the alarms in the TONN8's Niagara framework. The TONN8 and supervisor must then be configured accordingly.

Adjust Time Schedules in the Trend system: Time Schedules in a Trend controller in the Trend system can be adjusted by a 3rd party supervisor through the TONN8's Niagara framework. To do this Niagara schedules in the TONN8 must be linked to Time Schedule modules in the Trend controller. When the supervisor adjusts the Niagara schedule, the changes are sent to the linked Time Schedule module in the Trend controller.

IQVISION Supervisor: IQVISION can directly access values, histories and Niagara schedules from a TONN8 and make adjustments, providing it is connected to the same IP network and has the appropriate licence.

Operating System

TONN8 ships with the Niagara 4 platform. For backwards compatibility and retro-fit applications, a Niagara AX downgrade option is available. See 'Order Codes' on page 6.

Licensing

TONN8 is licensed based on the number of points to be monitored and includes an 18 month software update agreement.

Upgrade options are available to increase the point count and to extend the period covered by the software update agreement. See 'Order Codes' on page 6 for further details.

Configuration

TONN8 is configured using IQVISION. For full details on how to configure TONN8 please refer to the TONN8 Configuration Manual (TE201415).

DRIVERS

Standard Drivers

TONN8 is supplied with the Trend IP driver plus:

- BACnet® IP Client over Ethernet.
- BACnet® MS/TP Client over RS-232 or RS-485.
- EIB/KNX IP Driver designed to connect to an EIB/KNX network via an IP to EIB interface.
- LON® over IP, using CEA-852, communicates through IP/LON® router.
- LON® over twisted pair.
- M-Bus network via an RS-232 to M-Bus interface.
- RTU MODBUS® RTU over RS-232 or RS-485.
- TCP MODBUS® TCP over Ethernet.
- SNMP over Ethernet.
- BACnet® IP Server (includes BACnet® IP Client Driver.
- BACnet® Server only.
- MODBUS® Driver that serves TONN8 data to other MODBUS® Master devices over RS-485.
- OPC UA
- MODBUS® TCP Slave Driver that 'serves' TONN8 data to other MODBUS® Master devices over a MODBUS® TCP connection.

Cloud Connectivity

IQVISION supports connectivity with the Honeywell Forge Cloud solution.

Additional Drivers

The following additional drivers can be purchased in addition to those supplied as standard:

- Fidelio Driver.
- SMS Driver.

Fidelio Driver: Enables TONN8 to communicate over an IP network to a Micros Fidelio hotel room booking system.

SMS Driver: Enables TONN8 to end SMS messages.

Note: The SMS hardware is not supplied and requires the HON-NXEM-232 module.

TONN8 can also be used with any other third party drivers available for the Niagara 4 platform.

ANALYTICS

TONN8 Supports Niagara analytics - see the Analytics Data Sheet - TA201430.

E-SIGNATURE

TONN8 Supports Niagara e-signature - see the E-signature Data Sheet - TA201432.

HARDWARE - TONN8

Enclosure

The TONN8 is housed in a plastic case. An integral clip on the back of the case enables the unit to be clipped on to (and quickly released from) a standard TS35 DIN rail. Four fixing lugs also allow surface mounting if required. Horizontal mounting is recommended, to achieve maximum heat dissipation and meet the operating temperature upper limit. Any other mounting orientation reduces this upper limit.

Communications Ports

Ethernet: TONN8 has two 10/100 Mbit Ethernet ports identified as PRI LAN 1 and SEC LAN 2. No routing or bridging is provided between the two ports and, where both are used, they must be connected to different subnets. Normally, only LAN 1 (primary port) is used, for configuration and connection to a Trend system. LAN 2 (secondary port) may be used for connection to a 3rd party system; it must not be used as the primary port.

Serial RS-485: TONN8 has two RS-485 ports. Each is capable of operation up to 115,200 baud.

RS-485 Bias/Termination: Each RS-485 port has a 3-position switch that allows the connections to be biased and/or terminated. Biasing ties the data lines to the power rail using resistors and helps to provide reliable communications.

Switch Position	Bias Resistors	Termination	Use when TONN8...
BIA	2.7KΩ	None	... is located in the middle of a trunk that is not biased elsewhere.
END	562 Ω	150 Ω	... is located at the end of a trunk that is not biased elsewhere.
MID	47.5KΩ	None	... is located in the middle of a trunk that is already biased.

Note: LON and RS-232 ports and additional RS-485 ports can be added by connecting expansion modules (see ''Expansion Modules' on page 2). For module hardware see page 5.

USB: There are two USB ports: one is available for backing-up or restoring the TONN8 configuration, and the other allows access to basic configuration settings (system shell mode). Neither USB port can be connected to Trend/3rd party systems.

WiFi Interface (TONN8-W02- variants only)

An integral WiFi adapter provides wireless connectivity using the IEEE 802.11a/b/g/n standard, and provides an RP-SMA antenna connector. A tilt-and-swivel 2.4GHz antenna is provided as standard. A 3-position switch sets the WiFi mode:

- OFF - WiFi interface is disabled (default condition).
- ACC - Operates as a WiFi access point for up to 20 clients.
- CLT - Operates as a client to an existing 802.11a/b/g/n router or access point.

Full details on configuring the WiFi adapter can be found in the TONN8 Configuration Manual (TE201415).

Input Power Supply

The TONN-8 requires a Class 24 Vac (24 VA) or 24 Vdc (1 A) supply, with neither leg tied to ground. The supply must include a suitably rated switch in close proximity and be clearly marked as the disconnecting device for the unit.

Power Failure Protection & Data Backup

System critical data is saved to the memory card (see below). In the event of a power outage any unsaved data is held in SRAM which is maintained by a super capacitor for up to two weeks.

The TONN8 configuration can also be backed up to a USB storage device.

Memory Card

A removable memory card is supplied which contains both the operating system and storage space for the system configuration. Sensitive data is encrypted when stored on the card and decoded 'on the fly' as they are accessed.

Indicators

There are various indicators located on the front of the unit which are visible through the front flap. The flap hinges down to reveal the indicator labelling, backup button and USB ports:
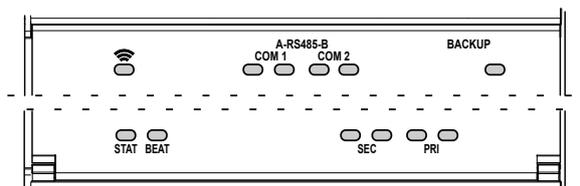
RS-485 Indicators: RS-485 port A (COM1) and RS-485 Port B (COM2) each have two indicators:

Indicator	Function
RX	Indicates the TONN8 is transmitting data on the RS-485 port.
TX	Indicates the TONN8 is receiving data from a device connected to the RS-485 port.

(WLAN) Indicator: ON whenever WiFi communications is enabled (i.e. in either ACC or CLT mode).

STAT Indicator: Provides a CPU status check and should be constantly ON during normal operation, OFF or flashing indicates a fault.

BEAT Indicator: Indicates if TONN8 is operating correctly and should flash once per second during normal operation. Flashing more than once per second indicates a fault.

Note: During start up and other critical operations the BEAT indicator flashes in a 90% ON 10% OFF pattern. Do not remove power during this time or data loss may result.

Ethernet Indicators: Primary Ethernet port (PRI LAN1) and Secondary Ethernet port (SEC LAN2) each have two indicators:

Indicator	Function
Link	ON - Ethernet link is made. OFF - No Ethernet link is made.
Activity	ON / Blinking - indicates data TX or RX. OFF - No Ethernet activity.

BACKUP indicator: Only visible if the drop-down flap is open. It has the following possible states:

Status	Description
OFF	Normal operation.
ON	USB backup media detected (i.e. a USB storage device is connected to the USB socket).
Flashing	Different types of flash are used to indicate the various modes that occur during backup and restore operations.

HARDWARE - EXPANSION MODULES

Enclosure

Each expansion module is housed in a plastic enclosure with a complimentary styling to the TONN8. A connector on the left side of the module plugs into the right side of the TONN8 or another module.

An integral clip on the back of the case enable the unit to be clipped on to (and quickly released from) a standard TS35 DIN rail. Two fixing lugs also allow surface mounting if required.

Input Power Supply

The expansion modules are powered from the TONN8 via the side connector.

LON Expansion Module

LON Port: Provides TONN8 with an additional single FTT-10A LONWORKS® port. A 2-way removable screw-terminal connector plug is provided enabling it to connect to a LONWORKS network.

Indicators: There are three indicators on the front of the module:

Indicator	Function
TX	Blinking indicates that TONN8 is transmitting a message on the LONWORKS network.
RX	Blinking indicates that another LONWORKS device is transmitting a message on the LONWORKS network.
PWR	ON - module is powered.

RS-232 Expansion Module

RS-232 Port: Provides TONN8 with an additional single RS-232 port. The port is electrically isolated. A DB9 male connector is provided enabling easy connection. An onboard UART supports baud rates of up to 115200.

Indicators: There are three indicators on the front of the module:

Indicator	Function
TX	Blinking indicates that TONN8 is sending data to a device on the RS-232 port.
RX	Blinking indicates that TONN8 is receiving data from a device on the RS-232 port.
PWR	ON - module is powered

RS-485 Expansion Module

RS-485 Ports: Provides TONN8 with two additional RS-485 ports. Each port is electrically isolated. A 3 way removable screw-terminal connector plug is provided for each port.

RS-485 Bias/Termination: Each RS-485 port has a 3-position switch that allows the connections to be biased and/or terminated. Biasing ties the data lines to the power rail using resistors and helps to provide reliable communications.

Switch Position	Bias Resistors	Termination	Use when the module...
BIA	$2.7K\Omega$	None	... is located in the middle of a trunk that is not biased elsewhere.
END	$562\ \Omega$	$150\ \Omega$	... is located at the end of a trunk that is not biased elsewhere.
MID	$47.5K\Omega$	None	... is located in the middle of a trunk that is already biased.

Indicators: There are five indicators on the front of the module:

Indicator	Function
TX	There are two TX indicators: one for each port. Blinking indicates that TONN8 is sending a message to a device on the RS-485 trunk.
RX	There are two RX indicators one for each port. Blinking indicates that TONN8 is receiving data from a device on the RS-485 trunk.
PWR	ON - Module is powered

FIELD MAINTENANCE

The TONN8 requires no routine maintenance.

> ⚡ **Warning:** Contains no serviceable parts. Opening the unit exposes hazardous voltages.

DISPOSAL

COSHH (Control of Substances Hazardous to Health - UK Government Regulations 2002) ASSESSMENT FOR DISPOSAL OF TONN8.

RECYCLING ♻.
All plastic and metal parts are recyclable. The printed circuit board may be sent to any PCB recovery contractor to recover some of the components for any metals such as gold and silver.

> **WEEE Directive:**
>
> At the end of their useful life the packaging, product, and battery (if fitted) should be disposed of by a suitable recycling centre.
> Do not dispose of with normal household waste.
> Do not burn.

COMPATIBILITY

Connection to Trend System: Any Ethernet-enabled Trend device with an available virtual CNC (vCNC).

Trend Controllers: All IQ™ controllers except. IQ1 & IQ2 series controllers must be updated to the latest firmware available. IQL controllers must be connected to the Trend network e.g. via XTEND.

Note: TONN8 does not support EMIC's.

Trend Supervisors: IQVISION.

Expansion Modules: HON-NXEM-LON, HON-NXEM-232, HON-NXEM-2x485.

3rd Party Systems: TONN8 is supplied with drivers for several 3rd party systems. Additional drivers can also be purchased - see 'Drivers' on page 3 for details.

TOPS: Not supported by TONN8 running Niagara 4. An option is available to downgrade the operating system to Niagara AX which will allow communication with TOPS.

INSTALLATION

TONN8 is designed to be clipped on to a standard TS35 DIN rail or surface mounted. The TONN8 must be installed inside a secondary enclosure with a minimum protective rating of IP20 (or equivalent) or mounted outside normal reach (e.g. in a plenum).

Briefly the installation procedure involves:

Mount TONN8 in position	Set RS-485 bias/termination (if required)
Mount expansion modules	Connect RS232 (if using RS-232 module)
Connect to power and earth/ground	Connect LON (if using LON module)
Connect antenna (WiFi variants only)	Power up
Connect primary Ethernet network	Configure TONN8
Connect RS-485 to network(s) (if required)	Check correct operation

A full description of installing the unit is given in the TONN8 Installation Instructions - Mounting (TG201414) a printed copy of which is included with the unit.

Configuration of TONN8 is described in the TONN8 Configuration Manual (TE201415).

ORDER CODES

For Niagara analytics order codes see the see the Analytics Data Sheet - TA201430. For Niagara e-signature order codes see the E-Signature Data Sheet - TA201432.

TONN8

TONN-8100-24	TONN8 with 100 Proxy Points license and 1 year software update agreement.
TONN-8250-24	TONN8 with 250 Proxy Points license and 1 year software update agreement.
TONN-8500-24	TONN8 with 500 Proxy Points license and 1 year software update agreement.
TONN-81250-24	TONN8 with 1250 Proxy Points license and 1 year software update agreement.
TONN-85000-24	TONN8 with 5000 Proxy Points license and 1 year software update agreement.
TONN-810000-24	TONN8 with 10000 Proxy Points license and 1 year software update agreement.
TONN-W02-8100-24	TONN8 with WiFi module Zone 2, 100 Proxy Points license and 1 year software update agreement.
TONN-W02-8250-24	TONN8 with WiFi module Zone 2, 250 Proxy Points license and 1 year software update agreement.
TONN-W02-8500-24	TONN8 with WiFi module Zone 2, 500 Proxy Points license and 1 year software update agreement.
TONN-W02-81250-24	TONN8 with WiFi module Zone 2, 1250 Proxy Points license and 1 year software update agreement.
TONN-W02-85000-24	TONN8 with WiFi module Zone 2, 5000 Proxy Points license and 1 year software update agreement.
TONN-W02-810000-24	TONN8 with WiFi module Zone 2, 10000 Proxy Points license and 1 year software update agreement.

Global WiFi Approvals

TONN8 is has WiFi and safety certification in the following countries:

IQVISION v2.00 or greater required:

> Austria (AT), Australia (AU), Belgium (BE), Bulgaria (BG), Canada (CA), China (CN), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hong Kong (HK),Hungary (HU), Iceland (IS), Ireland (IE), Italy (IT), Latvia (LV), Liechtenstein (LI1), Lithuania (LT1), Luxembourg (LU), Malta (MT), Netherlands (NL), New Zealand (NZ), Norway (NO), Poland (PL), Portugal (PT), Puerto Rico (PR), Romania (RO), Singapore (SG), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH1), United Kingdom (UK1), United States (US).

IQVISION v2.10 or greater required:

> Chile (CL), Jordan (JO), Kuwait (KW), Panama (PA), Peru (PE), Philippines (PH), Saudi Arabia (SA), South Africa (ZA), Thailand (TH).

IQVISION v2.20 or greater required:

> Afghanistan (AF), American Samoa (AS), Andora (AD), Argentina (AR), Dominican Republic (DO), French Guiana (GF), Georgia (GE), Guadeloupe (GP), Guam (GU), India (IN), Iraq (IQ), Israel (IL), Marshall Islands (MH), Martinique (MQ), Mexico (MX), Micronesia (FM), Monaco (MC), Oman (OM), Palau (PW), Qatar (QA), Reunion (RE), Taiwan (TW), Ukraine (UA), United Arab Emirates (AE), Vietnam (VN), Virgin Islands, US (VI), Azerbaijan (AZ), Bahrain (BH), Brazil (BR), Egypt (EG), Indonesia (ID), Malaysia (MY), Morocco (MA), Trinidad and Tobago (TT), Turkey (TR), Uzbekistan (UZ).

For the following countries use TONN8's non WiFi enabled variants:

> Algeria (DZ), Armenia (AM), Belarus (BY), Japan (JP), Kazakhstan (KZ), Korea (South) (KR), Lebanon (LB), Russian Federation (RU), Tunisia (TN)

EXPANSION MODULES

HON-NXEM-LON	TONN8 LON Expansion Module - Single Port.
HON-NXEM-2x485	TONN8 RS-485 Expansion Module - Dual Port.
HON-NXEM-232	TONN8 RS-232 Expansion Module - Single Port.

UPGRADES

TONN-DEVICE-UP-10	TONN8 Upgrade for an addition 500 proxy points.
TONN-DEVICE-UP-25	TONN8 Upgrade for an addition 1250 proxy points.
TONN-DEVICE-UP-50	TONN8 Upgrade for an addition 2500 proxy points.
TONN-JACE-8000-AX	Enables TONN8 to run Niagara AX. *Note: enabling TONN8 to run on Niagara AX will cause some functionality to stop working, e.g. WiFi, the Niagara 4 specific drivers.*

ADDITIONAL DRIVERS

TONN-DR-MFID	Fidelio Driver for N4 TONN8.
TONN-DR-SMS-ALM	SMS Driver for N4 TONN8.

SOFTWARE UPDATE AGREEMENTS

TONN8 ships with an 18 month free software update agreement. An additional period of cover can be purchased:

TONN-SMA-8005-1YR	1 year software update agreement for a 100-499 point TONN8.
TONN-SMA-8005-3YR	3 year software update agreement for a 100-499 point TONN8.
TONN-SMA-8005-5YR	5 year software update agreement for a 100-499 point TONN8.
TONN-SMA-8010-1YR	1 year software update agreement for a 500-1249 point TONN8.
TONN-SMA-8010-3YR	3 year software update agreement for a 500-1249 point TONN8.
TONN-SMA-8010-5YR	5 year software update agreement for a 500-1249 point TONN8.
TONN-SMA-8025-1YR	1 year software update agreement for a 1250-4999 point TONN8.
TONN-SMA-8025-3YR	3 year software update agreement for a 1250-4999 point TONN8.
TONN-SMA-8025-5YR	5 year software update agreement for a 1250-4999 point TONN8.
TONN-SMA-8100-1YR	1 year software update agreement for a 5000-9999 point TONN8.
TONN-SMA-8100-3YR	3 year software update agreement for a 5000-9999 point TONN8.
TONN-SMA-8100-5YR	5 year software update agreement for a 5000-9999 point TONN8.
TONN-SMA-8200-1YR	1 year software update agreement for a 10000+ point TONN8.
TONN-SMA-8200-3YR	3 year software update agreement for a 10000+ point TONN8.
TONN-SMA-8200-5YR	5 year software update agreement for a 10000+ point TONN8.

ACCESSORIES

TONN-8-24	TONN8 Hardware only no WiFi - for warranty/repair only. License must be transferred from existing host.
TONN-W02-8-24	TONN8 Hardware only with WiFi module for zone 2 - for Warranty/Repair only. License must be transferred from existing host.
TONN-8-CLIP	Trend branded clip for TONN8.
TONN-8-SD	SD Card for TONN8.
HON-NX8-KIT	TONN8 Accessory Kit comprising WiFi-Antenna, RS-485 and power terminals.

SPECIFICATIONS

TONN8

Electrical

Power Input	24 Vac ±10% 50/60 Hz, 24 VA max; 24 Vdc ±10% 1A.

Power Failure Protection
Saved data	Micro SD card (supplied).
Unsaved data	SRAM, maintained by super capacitor for up to 2 weeks (typical).

Communications Ports
Ethernet	2 10/100MB Ethernet.
RS-485	2 isolated with selectable bias.

WiFi Interface (TONN8-W02- variants only)
Network	IEEE802.11a/b/g/n.
Modes	OFF, ACC (wireless access point), CLT (client).
Security Protocol	WPA-PSK, WPA2-PSK.
Frequency	2.4 GHz channels: 1–11; 5.8 GHz channels: 36, 40, 44, 48,149, 153, 157, 161, and 165.

Software

Operating System	Niagara v4.9, with option to run Niagara AX.

Indicators

📶 (WLAN)	Green LED.
RS-485 A (COM1)	
TX	Yellow LED.
RX	Green LED.
RS-485 B (COM2)	
TX	Yellow LED.
RX	Green LED.
BEAT	Yellow LED.
STAT	Green LED.
PRI (Primary Ethernet, LAN1)	
Link	Green LED.
Activity	Yellow LED.
SEC (Secondary Ethernet, LAN2)	
Link	Green LED.
Activity	Yellow LED.
BACKUP	Green LED.

Environmental

Ambient Limits
Storage	-40 °C (-40 °F) to +85 °C (185 °F).
Operating	-20 °C (-4 °F) to +60°C (140 °F).
Humidity	5 to 95 %RH non-condensing.
Altitude	<2000 m (6562').
Pollution Degree	3.

Mechanical

Dimensions (WxHxD)	179 mm (7.05") x 110 mm (4.33") x 61.1 mm (2.41") including fixing lugs.
Weight	405 g (0.89 lb).
Mounting	TS35 DIN Rail (EN50022) or surface mount.

Connectors

Power
Connector type	2-way 2-part connector with rising cage clamp screw terminals.
Cable size	0.33 – 0.82 mm^2 (22 – 18 AWG).

RS-485 Ports
Connector type	3-way 2-part connector with rising cage clamp screw terminals.
Cable size	0.33 – 0.82 mm^2 (22 – 18 AWG).
Ethernet Ports	RJ45.
Backup & Restore	USB type A.
Debug (Shell Mode)	USB type Micro A.

Certification

EU	CE EN 61326.
USA	UL 916.
Canada	C-UL listed to Canadian Standards Assoc (CSA) C22.2 o.205-M1983.
EMC	FCC Part 15 Subpart B, Class B; FCC Part 15 Subpart C; 1999/5/EC R&TTE Directive.
Wi-Fi (Client or WAP)	IEEE802.11a/b/g/n; IEEE802.11n HT20 @ 2.4GHz; IEEE802.11n HT20/HT40 @ 5GHz.

EXPANSION MODULES

Electrical

Communications Ports
HON-NXEM-LON	LONWORKS FTT-10A LON.
HON-NXEM-2x485	2 electrically isolated RS-485.
HON-NXEM-232	1 electrically isolated RS-232.

Mechanical

Dimensions (WxHxD)	62 mm (2.44") x 110 mm (4.33") x 61.1 mm (2.41") including fixing lugs.

Weight
HON-NXEM-LON	132 g (0.29 lb).
HON-NXEM-2x485	129 g (0.28 lb).
HON-NXEM-232	118 g (0.26 lb).

Connectors
HON-NXEM-LON	2-way 2-part connector with rising cage clamp screw terminals.
HON-NXEM-2x485	3-way 2-part connector with rising cage clamp screw terminals.
HON-NXEM-232	DB9 male connector.

Environmental

Ambient Limits
Storage	-40 °C (-40 °F) to +85 °C (185 °F).
Operating	-20 °C (-4 °F) to +60°C (140 °F).
Humidity	5 to 95 %RH non-condensing.