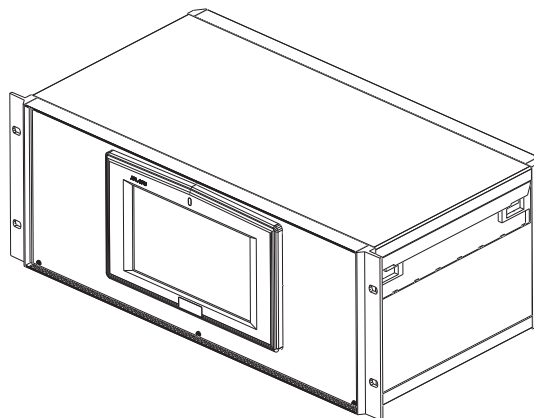
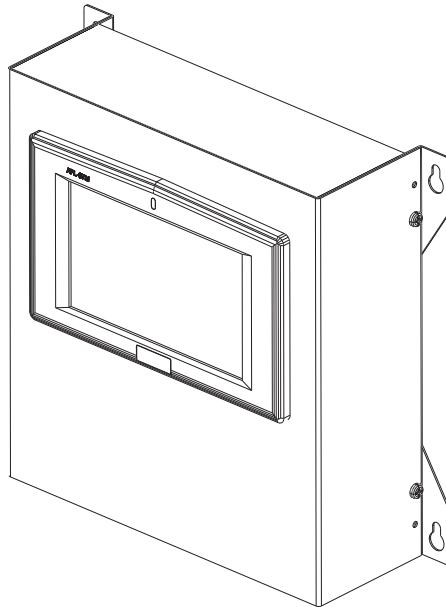


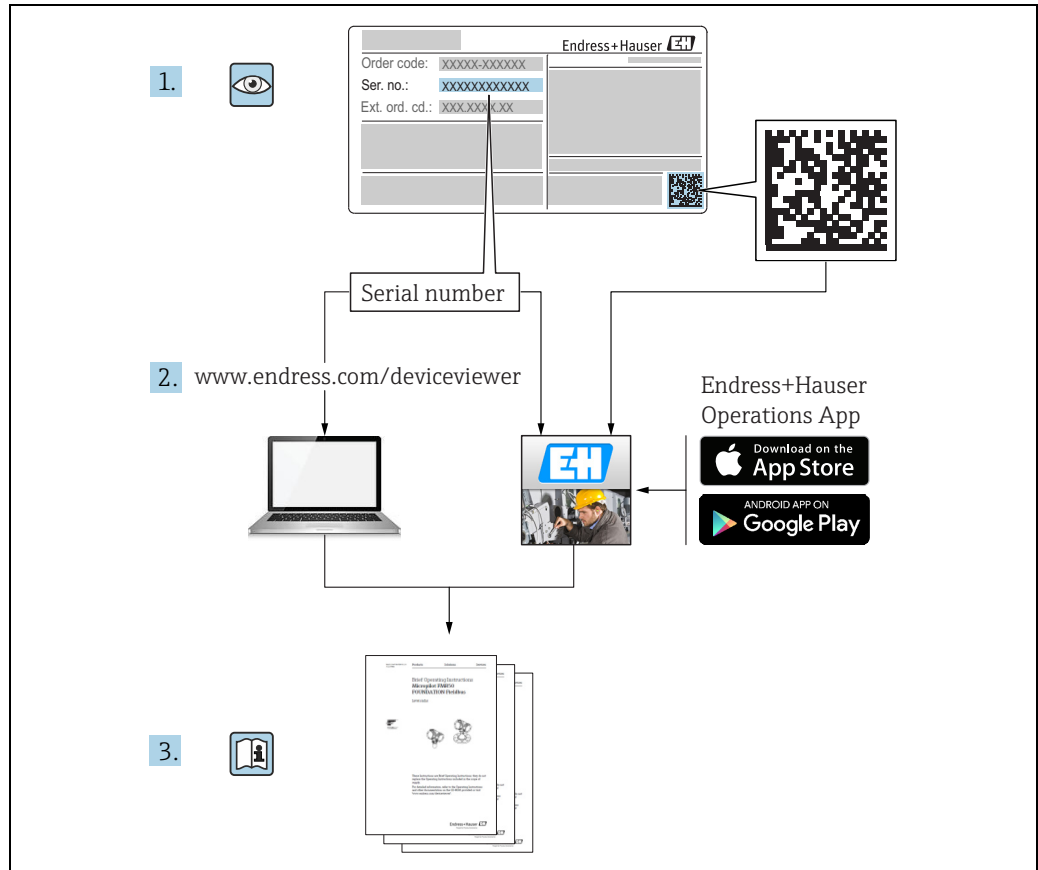
# Operating Instructions

## Tankvision

### Multi Scan NXA83B

Installation manual





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# 1 Document information

## 1.1 Target audience for this manual

This manual should support during the installation of the NXA83B units. It deals with the mechanical, electrical and signal line installation. The first commissioning steps are described as well.

Beside basic PC operating knowledge no special training is needed to perform the Tank Gauging System operations. Nevertheless it is recommended receiving a training on the system by Endress+Hauser.





## 1.2 Version history

Document version	Valid for SW version	Changes to the previous version
BA01290G/00/EN/01.14	3.0.10	Initial version
BA01290G/00/EN/02.15	3.0.12	Change of order code structure
BA01290G/00/EN/03.16	3.1.0 and 4.0.0	Old V1 support and simplified configuration
BA01290G/00/EN/04.18	3.4.0 and 4.4.0	Changes to V1 Driver and GBT calculations




## 1.3 Document function

### 1.3.1 Used symbols



#### Safety symbols

Symbol	Meaning
 <small>A0011189-EN</small>	<b>DANGER!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 <small>A0011190-EN</small>	<b>WARNING!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 <small>A0011191-EN</small>	<b>CAUTION!</b> This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
 <small>A0011192-EN</small>	<b>NOTICE!</b> This symbol contains information on procedures and other facts which do not result in personal injury.

### Symbols for certain types of information

Symbol	Meaning
 A0011193	<b>Tip</b> Indicates additional information.
 A0011195	<b>Reference to page</b> Refers to the corresponding page number.
1. , 2. , 3. ...	Series of steps
 A0018373	Result of a sequence of actions

### Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1. , 2. , 3. ...	Series of steps
A, B, C ...	Views
 A0011187	<b>Hazardous area</b> Indicates a hazardous area.
 A0011188	<b>Indicates a non-hazardous location</b> Safe area (non-hazardous area)

## 1.4 Documentation

### 1.4.1 Operating instructions

Document number	Instrument	Type of Document
BA01288G/00	<ul style="list-style-type: none"> <li>Multi Scan NXA83B</li> </ul>	Operation manual
BA01290G/00		Installation and Maintenance manual
BA01291G/00		Configuration manual
BA01292G/00		DCC Configuration manual
BA01289G/00		OPC Tank Data Server manual
BA01297G/00		Web Client System Operation manual
BA01287G/00		Weights and Measures Additions
BA01296G/00		Redundancy manual

## 2 Basic safety instructions

### 2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- Trained, qualified specialists: must have a relevant qualification for this specific function and task
- Are authorized by the plant owner/operator
- Are familiar with federal/national regulations
- Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- Being instructed and authorized according to the requirements of the task by the facility's owner operator
- Following the instructions in these Operating Instructions

### 2.2 IT security

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

IT security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

Endress+Hauser can be contacted to provide support in performing this task.

### 2.3 Designated use

#### 2.3.1 Applications

##### **Inventory control**

By using Tankvision Multi Scan to monitor the tank level and stored volume of valuable liquids remotely, owners or operators of tank farms or terminals for petroleum products and chemicals (liquids) can visualize the volume of the stored medium in real time. The data can be used to plan the inventory and distribution. The data can also be used to manage tank farm operations like pumping or transferring products. Tankvision has its unique concept using network technology. Without using proprietary software, the users can visualize and manage their valuable liquids stored in the tanks by a web browser. Tankvision Multi Scan is a flexible and cost effective solution due to its scalable architecture. The application coverage goes from small depots with only a few tanks up to refineries.

##### **Inventory Calculations**

Tankvision Multi Scan calculates based on measured variables and tank capacity tables:

- Observed/Gross volumes,
- Net volumes and
- Mass

of products like

- Hydrocarbons,
- Liquefied gases,
- Asphalt.

They are corrected according to international standards, including API/ASTM tables 5A, 5B/6, 53A, 53B/54, 23/24, LPG.

This includes temperature corrections at 15 °C, 60 °F and alternative temperatures. Additionally, available pumpable volumes and water volume are calculated.

### **Remote configuration of measuring equipment**

Some on-site operations can be avoided using remote configuration of measuring equipment during commissioning or maintenance (the availability of this feature may depend on the system configuration).

### **Application areas**

- Tank farms in refineries
- Ship loading terminals
- Marketing and distribution terminals
- Pipeline terminals
- Logistic terminals for tanks storing products like crude oils, refined white and black products, chemicals, LPG

## **2.4 Workplace safety**

For work on and with the device:

- Wear the required personal protective equipment according to federal/national regulations.
- Switch off the supply voltage before connecting the device.

## **2.5 Operational safety**

Risk of injury!

- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for interference-free operation of the device.

### **Conversions to the device**

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers

- If, despite this, modifications are required, consult with Endress+Hauser.

### **Repair**

To ensure continued operational safety and reliability,

- Carry out repairs on the device only if they are expressly permitted.
- Observe federal/national regulations pertaining to repair of an electrical device.
- Use original spare parts and accessories from Endress+Hauser only.

## **2.6 Product safety**

The device is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. The device complies with the applicable standards and regulations as listed in the EC declaration of conformity and thus complies with the statutory requirements of the EG directives. Endress+Hauser confirms the successful testing of the device by affixing to it the CE mark.

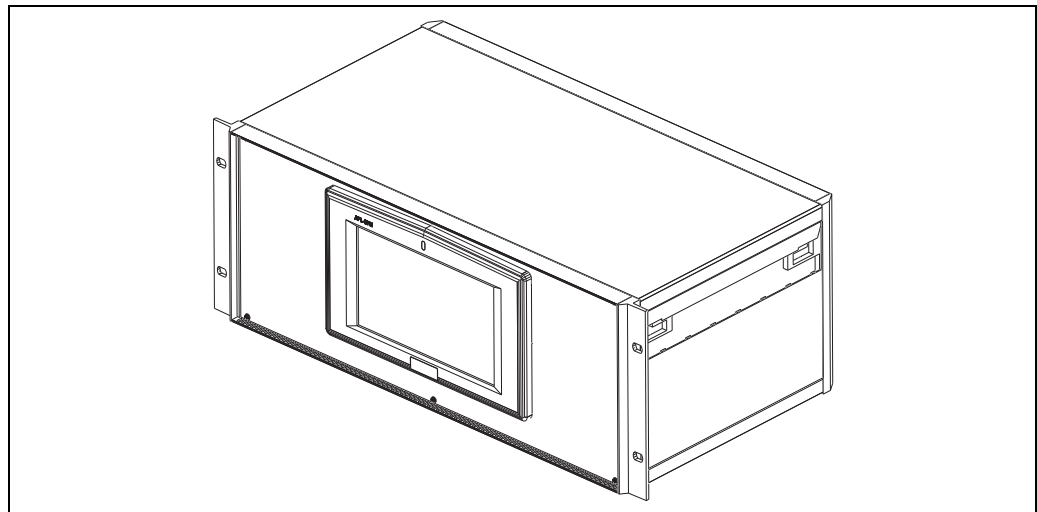
### 3 Introduction

The Multi Scan NXA83B is a configurable system designed for tank gauging and tank inventory management systems. It has been designed to fulfill a number of requirements some of which are listed below:

- Act as a foreign device gateway; allowing old legacy equipment and devices with proprietary interfaces to interface with modern devices using OPC and Ethernet Technology.
- To provide a complete tank gauging and tank inventory management system for small sites. It can interface directly with a wide variety of tank gauging devices and provide a number of communication links to host devices. The NXA83B polls the field instruments maintaining an in-memory database of live and calculated data whilst also being able to service host computers for data.
- It can provide up to 8 serial interfaces, capable of supporting a range of different electrical interfaces such as RS232, RS485, BPM, Current Loop etc.
- An Ethernet port and two USB ports are also provided.
- The NXA83B is available with a 7 in Widescreen LCD screen built into the front of the device, with navigation via a touch screen.

Two versions of the Multi Scan NXA83B are available, Wall Mount and 19 in Rack Mount. Each of these are available with or without the built in touchscreen.

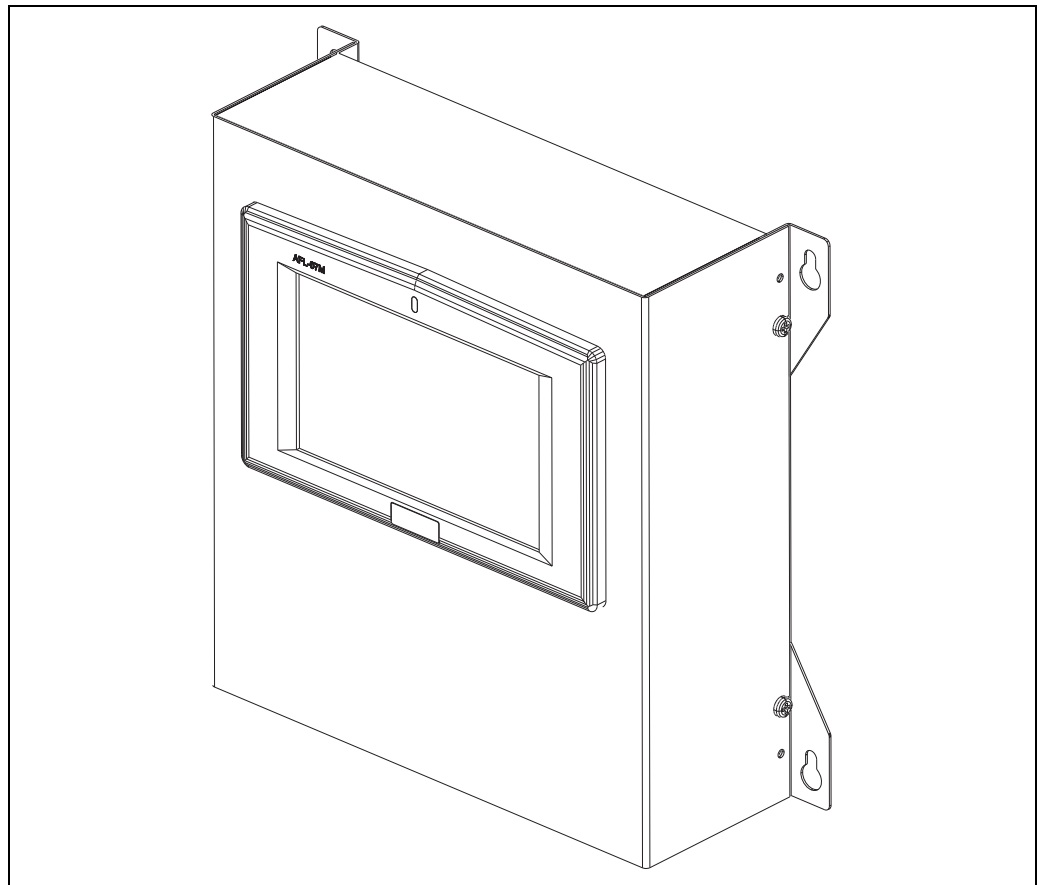
For a Multi Scan NXA83B with no screen, ignore all sections of the manual that deal with the screen.



19 in Rack Mount

NXA83\_RackMount\_Title





NXA83\_WallMount\_Title

Wall Mount

### 3.1 Device Support and Compatibility

The Multi Scan NXA83B is designed to interface to the following gauge and transmitter types:

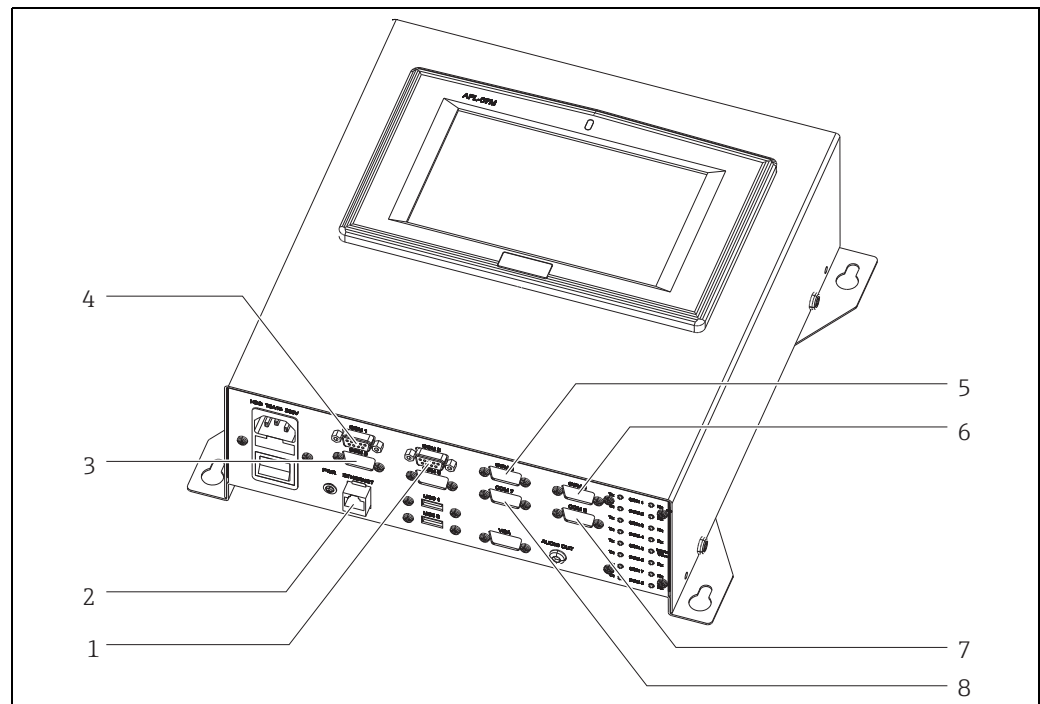
Supplier	Gauge/transmitter type
Endress+Hauser	<ul style="list-style-type: none"> <li>▪ NMR81 and NMR84 Micropilot</li> <li>▪ NRF81 Tankside Monitor</li> <li>▪ NMS80 and NMS81 Proservo</li> <li>▪ NRF590 Tank Side Monitor</li> <li>▪ NMS5 Proservo</li> </ul>
Enraf	<ul style="list-style-type: none"> <li>▪ 811 Servo Gauge</li> <li>▪ 813 Servo Gauge</li> <li>▪ 854 Servo Gauge</li> <li>▪ 872 Radar Gauge</li> <li>▪ 873 Radar Gauge</li> <li>▪ 865 Temperature Selector</li> <li>▪ 911 Flexline Radar Gauge</li> </ul>
Whessoe	<ul style="list-style-type: none"> <li>▪ 1311 Transmitter/1071 Outstation</li> <li>▪ 1315 Transmitter/2006 Mechanical float gauge, 1140 Servo gauge</li> <li>▪ ITG 50/60/70 Servo gauges</li> </ul>
Saab	<ul style="list-style-type: none"> <li>▪ TRL2</li> <li>▪ Rex</li> <li>▪ Pro Radar Gauges</li> </ul>
Motherwell	<ul style="list-style-type: none"> <li>▪ 2800 Servo Gauge</li> </ul>
Varec	<ul style="list-style-type: none"> <li>▪ 1800/1900 Mark/Space Transmitters</li> </ul>

Additional protocols and variants upon request.

A range of gauge commands are supported but the availability of these commands depends on the gauge types.

The host and field communication parameters are configurable, however, a number of the above devices operate with fixed parameters.

## 3.2 Typical Connections



- 1 SAAB TRL2
- 2 Ethernet (OPC)
- 3 ENRAF BPM
- 4 DCS (MODBUS)
- 5 MODBUS Tank Gauges
- 6 ENRAF CIU 858
- 7 WHESSOE 550
- 8 VAREC MARK/SPACE

NXA83\_Typical-Connections

## 4 Installation

### 4.1 Mechanical Installation

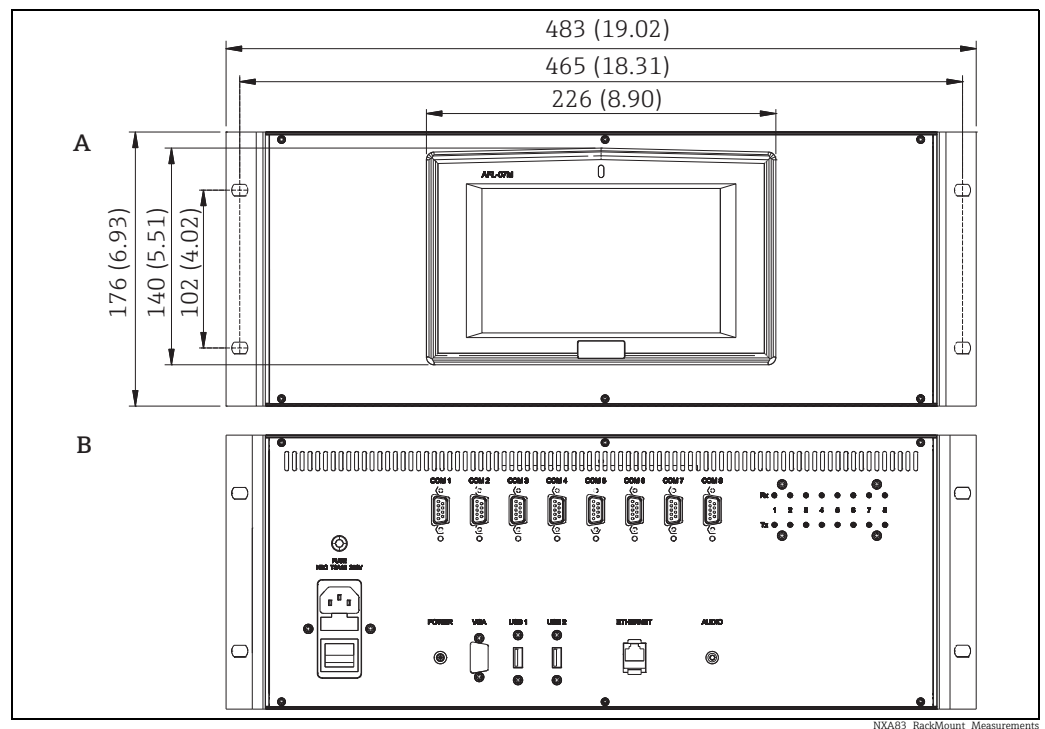
The Multi Scan NXA83B is available in two different enclosures - Wall Mount or 19 in Rack Mount.

All versions of the Multi Scan NXA83B are intended for installation within a building and should not be mounted in hazardous areas.

#### 4.1.1 Rack Mount

The Rack mount version is housed in an aluminium 4U 19 in case, which has 4 front fixing holes suitable for M6 bolts.

All power and signal connectors are located on the rear panel of the enclosure.



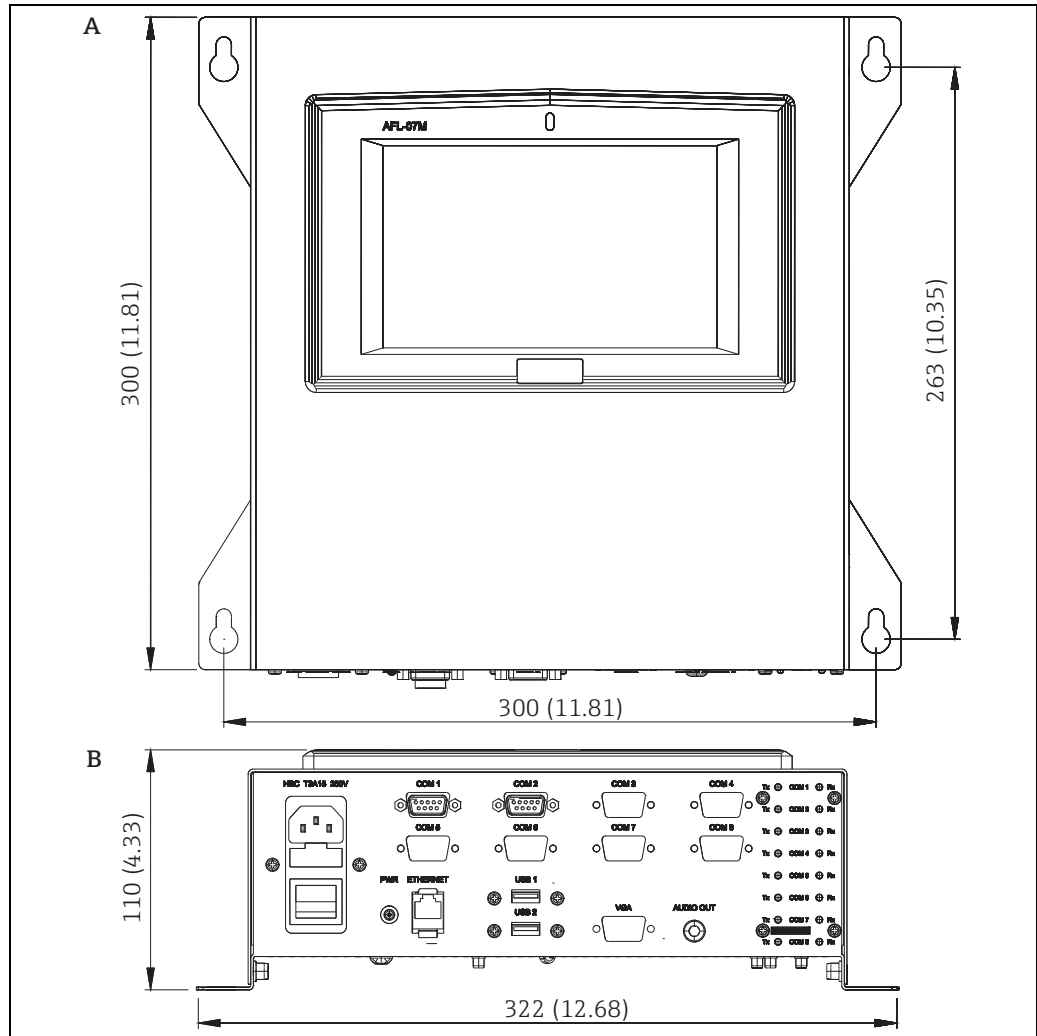
Measuring unit mm (in)

- A Front view
- B Back view

Depth of enclosure: 260 mm (10.24 in)

### 4.1.2 Wall Mount

The Wall mount version is housed in a stainless steel enclosure, suitable for wall mounting via 4 fixing holes designed to accept M6 bolts. All connectors for power and signals are located on the bottom face of the enclosure. The unit should always be mounted with this face at the bottom, for correct orientation of the LCD display.



Measuring unit mm (in)

- A Front view
- B Bottom view

## 4.2 Electrical Installation

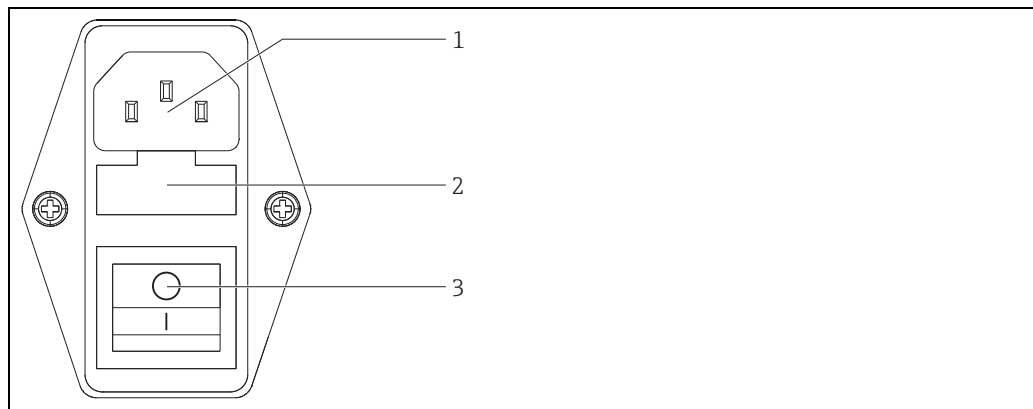
The Multi Scan NXA83B requires connection to a mains power supply with the following characteristics:

Voltage	Frequency	Current	Power
100 to 240 V <sub>AC</sub>	47 to 63 Hz	max. 0.8 A	40 W

The Multi Scan NXA83B contains a 20 × 5 mm (0.79 × 0.2 in) cartridge fuse protecting the mains input. The fuse is rated at 3.15 A, time delay (ant surges/slow blow). The fuse must be suitable for use at 240 V<sub>ac</sub>.

The mains should be supplied with a standard IEC lead (kettle plug) and plugged into the socket shown below. A mains switch is provided to turn power on/off to the Multi Scan

NXA83B. The socket, switch and fuse are found on the bottom face of the wall mount unit, or on the rear panel of the 19 in rack unit.  
 There is a GREEN power indication LED which will be permanently illuminated whilst power is applied to the Multi Scan NXA83B. The LED mounted on the same panel as the main power connector.



1 IEC Socket  
 2 Fuse  
 3 Mains Switch

NXA83\_Mains-Switch

### 4.3 Network and USB connections

The Multi Scan NXA83B has one Ethernet network connector and two USB connectors mounted on the bottom face (wall mount) or rear panel (rack mount) of the unit. For graphics → 11.

The Ethernet connector accepts RJ45 network cables and has the standard PC pin assignment. To connect directly to another PC requires a cross-over network cable, whilst to connect to a hub, switch or similar requires a standard cable.

The network port is required to configure the Multi Scan NXA83B, using the Tankvision Multi Scan Configurator software, via a remote desktop session. It may also be used to connect to host systems using the Modbus TCP and datacon protocols.

Network port	Pin	Signal name
<p style="text-align: center;">1 8</p> <p style="text-align: center; font-size: x-small;">NXA83_Network-Port_Pin-Assignment</p>	1	TX+
	2	TX-
	3	RX+
	4	No Connect
	5	No Connect
	6	RX-
	7	No Connect
	8	No Connect

The two USB connectors allow a range of peripheral devices to be connected to the Multi Scan NXA83B, such as flash memory 'sticks', printers and modems. They are compliant with the USB 2.0 specification.

## 4.4 Serial Ports

The Multi Scan NXA83B has eight serial ports available for connection to gauges or host computers. These are:

- COM 1 – COM 8



W&M systems will use COM 8 to connect to the touchscreen.

The serial ports will use the RS232 hardware specification by default. However a range of plug in cards is available to support other hardware interfaces.

Supported boards include:

- Old and New V1
- RS485/RS422 Modbus
- Whessoe Current Loop
- Enraf Bi Phase Mark
- Varec Mark/Space
- SAAB TRL
- L&J Tankway

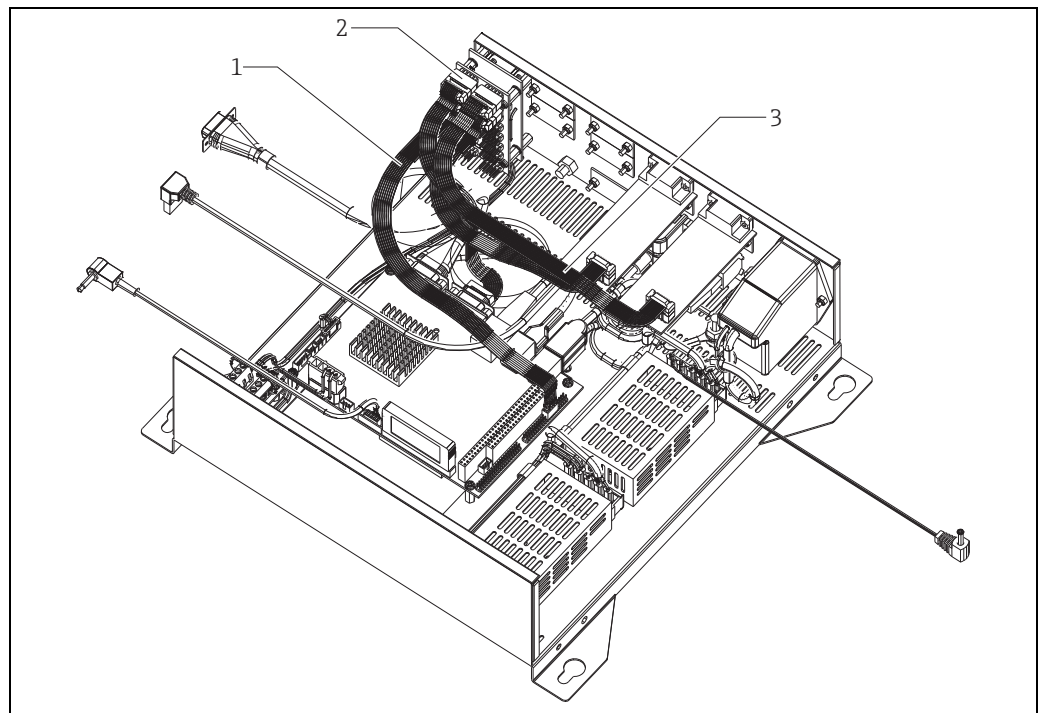
Usually the interfaces will be specified at time of purchase, and the Multi Scan NXA83B will be supplied with all required boards installed.

All serial ports are located on the Bottom face (wall mount) or Rear panel (rack mount) of the unit. Only ports that have been purchased (and licensed) will have connectors, all other ports will be fitted with blanking plates.

## 4.5 LED Module

The Multi Scan NXA83B has an LED module which consists of a bank of eight pairs of LEDs, one pair for each of the serial ports, to indicate communication activity. One LED is transmit and the other one is receive.

Each pair of LEDs has a serial connector from the RS232 port on the mother board, and another going to the interface board.



- 1 Cables from RS232 ports on the motherboard
- 2 LED Module
- 3 Cables to interface boards

NXA83\_WallMount\_LED-Module

## 4.6 Interface Connection Details

### 4.6.1 Internal Relay Board Connection

Connector Type: 9 Way D-Type socket

Interface connection	Pins	Relay contacts
<p style="text-align: center; font-size: small;">NXA83_Interface-Connection_Internal-Relay-Board</p>	1 – 6	Relay 1 contacts
	2 – 7	Relay 2 contacts
	3 – 8	Relay 3 contacts
	4 – 9	Relay 4 contacts

Each contact pair may be configured to be N/O or N/C.

### 4.6.2 RS232 Connection

Connector Type: 9 Way D-Type plug

Interface connection	Pins	RS232
<p style="text-align: center; font-size: small;">NXA83_Interface-Connection_Varec-Mark</p>	2	RXD
	3	TXD
	5	GROUND
	7	RTS
	8	CTS

### 4.6.3 RS485/RS422 Connection

Connector Type: 9 Way D-Type (MALE) plug

Interface connection	Pins	RS485 2 WIRE	RS485/RS422 4 WIRE
<p style="text-align: center; font-size: small;">NXA83_Interface-Connection_Varec-Mark</p>	1	-	T-
	2	-	T+
	3	TD+	R+
	4	TD-	R-
	5	GROUND	GROUND

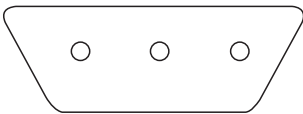
### 4.6.4 Enraf BPM Connection

Connector Type: Phoenix Connector, Screw Terminal

Interface connection	Pins	ENRAF BPM
<p style="text-align: center; font-size: small;">NXA83_Interface-Connection_Enraf-BPM</p>	1	TL1
	2	SCREEN
	3	TL2

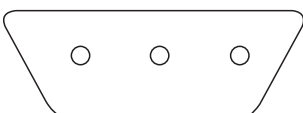
### 4.6.5 Saab TRL2 Connection

Connector Type: Phoenix Connector, Screw Terminal

Interface connection	Pins	SAAB TRL2
 <small>NXA83_Interface-Connection_Enraf-BPM</small>	1	FB1
	2	SCREEN
	3	FB2

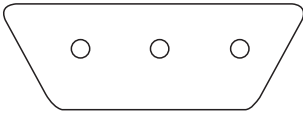
### 4.6.6 Whessoe Current Loop Connection

Connector Type: Phoenix Connector, Screw Terminal

Interface connection	Pins	WHESSOE 20 mA
 <small>NXA83_Interface-Connection_Enraf-BPM</small>	1	LOOP +
	2	SCREEN
	3	LOOP -

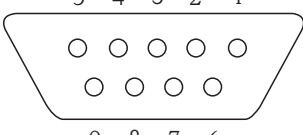
### 4.6.7 HART Connection

Connector Type: Phoenix Connector, Screw Terminal

Interface connection	Pins	HART
 <small>NXA83_Interface-Connection_Enraf-BPM</small>	1	LOOP -
	2	SCREEN
	3	LOOP +

### 4.6.8 L&J Tankway Connection

Connector Type: 9 Way D-Type socket

Interface connection	Pins	Function
 <small>NXA83_Interface-Connection_Varec-Mark</small>	1/6	POWER
	2/7	COMPUTER
	3/8	ENCODER
	5/9	GROUND



### 4.6.9 Varec Mark / Space Connection

Connector Type: 9 Way D-Type socket

Interface connection	Pins	Function
	1/6	+48 V SUPPLY
	2/7	MARK
	3/8	SPACE
	5/9	0 V SUPPLY
	4	SPARE

### 4.6.10 V1 Connection

Connector Type: Phoenix Connector, Screw Terminal

Interface connection	Pins	HART
	1	FIELDBUS 0 V
	2	SCREEN
	3	FIELDBUS +24 V

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