# Operating Instructions
# **Raman Rxn2 Mobile Cart**
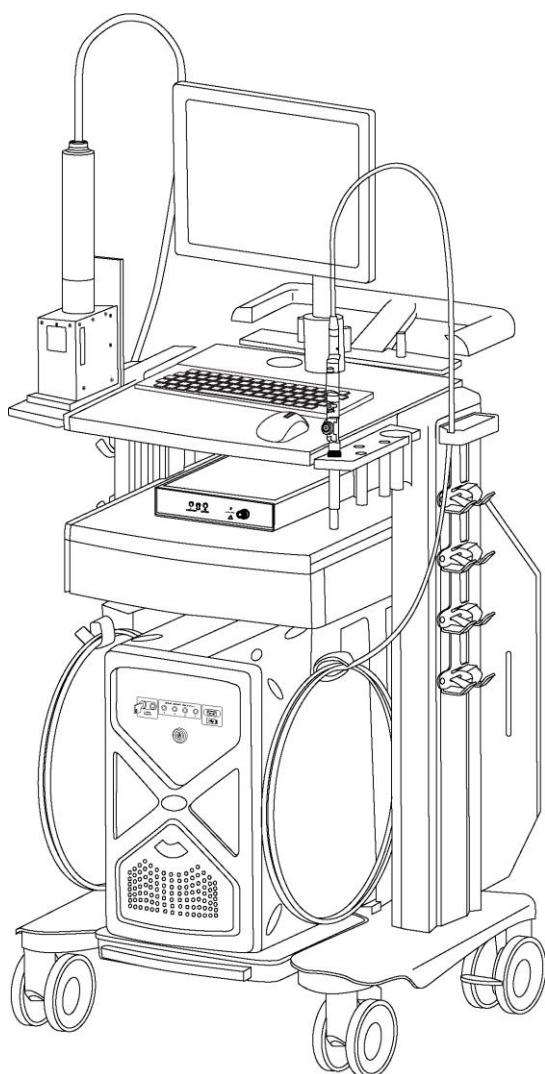


Endress+Hauser [EH]

People for Process Automation

# Table of Contents

# 1　About this document

## 1.1　Warnings

| Structure of Information | Meaning |
|---|---|
| **⚠ WARNING**<br>**Causes (/consequences)**<br>If necessary, consequences of non-compliance (if applicable)<br>▸ Corrective action | This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury. |
| **⚠ CAUTION**<br>**Causes (/consequences)**<br>If necessary, consequences of non-compliance (if applicable)<br>▸ Corrective action | This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries. |
| **NOTICE**<br>**Cause/situation**<br>If necessary, consequences of non-compliance (if applicable)<br>▸ Action/note | This symbol alerts you to situations which may result in damage to property. |

*Table 1. Warnings*

## 1.2　Symbols on the device

| Symbol | Description |
|---|---|
| ⚠ | The Laser Radiation symbol is used to alert the user to the danger of exposure to hazardous visible laser radiation when using the system. |
| ⚡ | The High Voltage symbol that alerts people to the presence of electric potential large enough to cause injury or damage. In certain industries, high voltage refers to voltage above a certain threshold. Equipment and conductors that carry high voltage warrant special safety requirements and procedures. |
| 🗙 | The WEEE symbol indicates that the product should not be discarded as unsorted waste but must be sent to separate collection facilities for recovery and recycling. |
| CE | The CE Marking indicates conformity with health, safety, and environmental protection standards for products sold within the European economic area (EEA). |

*Table 2. Symbols*

## 1.3　U.S. export compliance

The policy of Endress+Hauser is strict compliance with U.S. export control laws as detailed in the website of the Bureau of Industry and Security at the U.S. Department of Commerce.

## 1.4    Glossary

| Term | Description |
| --- | --- |
| AC | Alternating current |
| CDRH | Center for Devices and Radiological Health |
| CFR | Code of Federal Regulations |
| DC | Direct current |
| EO | Electro-optical |
| EU | European union |
| FC | Fiber channel |
| HDPE | High density polyethylene |
| HMI | Human machine interface |
| Hz | Hertz |
| IEC | International Electrotechnical Commission |
| ISPM | International standards for phytosanitary measures |
| kg | Kilograms |
| lbs | Pounds |
| m | Meter |
| mm | Millimeter |
| SFF | Small form factor |
| USB | Universal serial bus |
| V | Volt |
| VESA | Video electronics standards association |
| VGA | Video graphics array |
| WEEE | Waste Electrical and Electronic Equipment |

*Table 3. Glossary*

# 2 Basic safety instruction

Important safeguards:

- Care should be taken when plugging the fibers in to ensure correct orientation of the connector and proper routing of the fibers.
- Care must be taken to make the bend radii of fiber optic cable breakouts as large as possible with no kinks.

## 2.1 Health and safety considerations

It is the user's responsibility to understand and comply with all applicable safety regulations. These will be variable based on the installation location of the instrument. Endress+Hauser takes no responsibility for determining the safe use of the instrument based on this qualification procedure.

> **NOTICE**

▶ Please refer to the appropriate Analyzer Operations Manual for actions and laser safety precautions.

## 2.2 Electrical safety

The embedded Raman Rxn2 and RamanRxn2 analyzers utilize Alternating current (AC) and Direct current (DC) voltages inside the enclosure. Do not disassemble the laser enclosure as there are no serviceable parts inside the laser assembly. Only qualified personnel familiar with high voltage electronics should open the system enclosure to perform necessary maintenance or service.

## 2.3 CDRH compliance

The embedded Raman Rxn2 and RamanRxn2 analyzers are designed and built to meet the laser performance requirements of U.S. 21 Code of Federal Regulations (CFR) Chapter 1, Subchapter (J) and is registered with the Center for Center for Devices and Radiological Health (CDRH).

### 2.3.1 Protective housing

The embedded Raman Rxn2 and RamanRxn2 analyzers are enclosed in a protective housing to prevent human access in excess of the limits of Class I radiation as specified in U.S. 21 CFR Section 1040.10 (f) (1) except for the output, which is Class 3B.

### 2.3.2 Compliance labels

The embedded Raman Rxn2 and RamanRxn2 are certified to comply with the U.S. 21 CFR, Chapter I, Subchapter (J), as administered by the CDRH.

# 3 Product description

## 3.1 Introduction

An ergonomic mobile cart, powered by Kaiser Raman technology, is available as an option for all embedded Raman Rxn2 and RamanRxn2 configurations. The mobile cart includes a secure analyzer mounting location, built-in probe and optic storage for many different probe types, a mount for the routine-analysis sample compartment, fiber storage, and mounting provisions for the instrument control Human machine interface (HMI).

## 3.2 Mobile cart for embedded Raman Rxn2 analyzers

This cart is for use with all embedded Raman Rxn2 analyzers. It includes a Video electronics standards association (VESA) mount touchscreen, wireless keyboard, and mouse. The touchscreen is shipped separately and installed during commissioning. The Raman Rxn2 analyzer is purschased and shipped separately and installed to the cart during commissioning.

The mobile cart is pre-wired with the following cables:

- International Electrotechnical Commission (IEC) C14 Alternating current (AC) power inlet.
- AC power cords: Analyzer (bottom shelf) and two accessories (mid-shelf).
- Touchscreen cables: Direct current (DC) power, video, and Universal serial bus (USB).
- Network connectivity cables.

## 3.3 Mobile cart for non-embedded RamanRxn2 analyzers

For use with all non-embedded RamanRxn2 analyzers using the following computing options. All computing options are sold separately or customer supplied. Customer supplied computer must be approved by Endress+Hauser. The RamanRxn2 analyzer is purchased and shipped separately and installed to cart during commissioning.
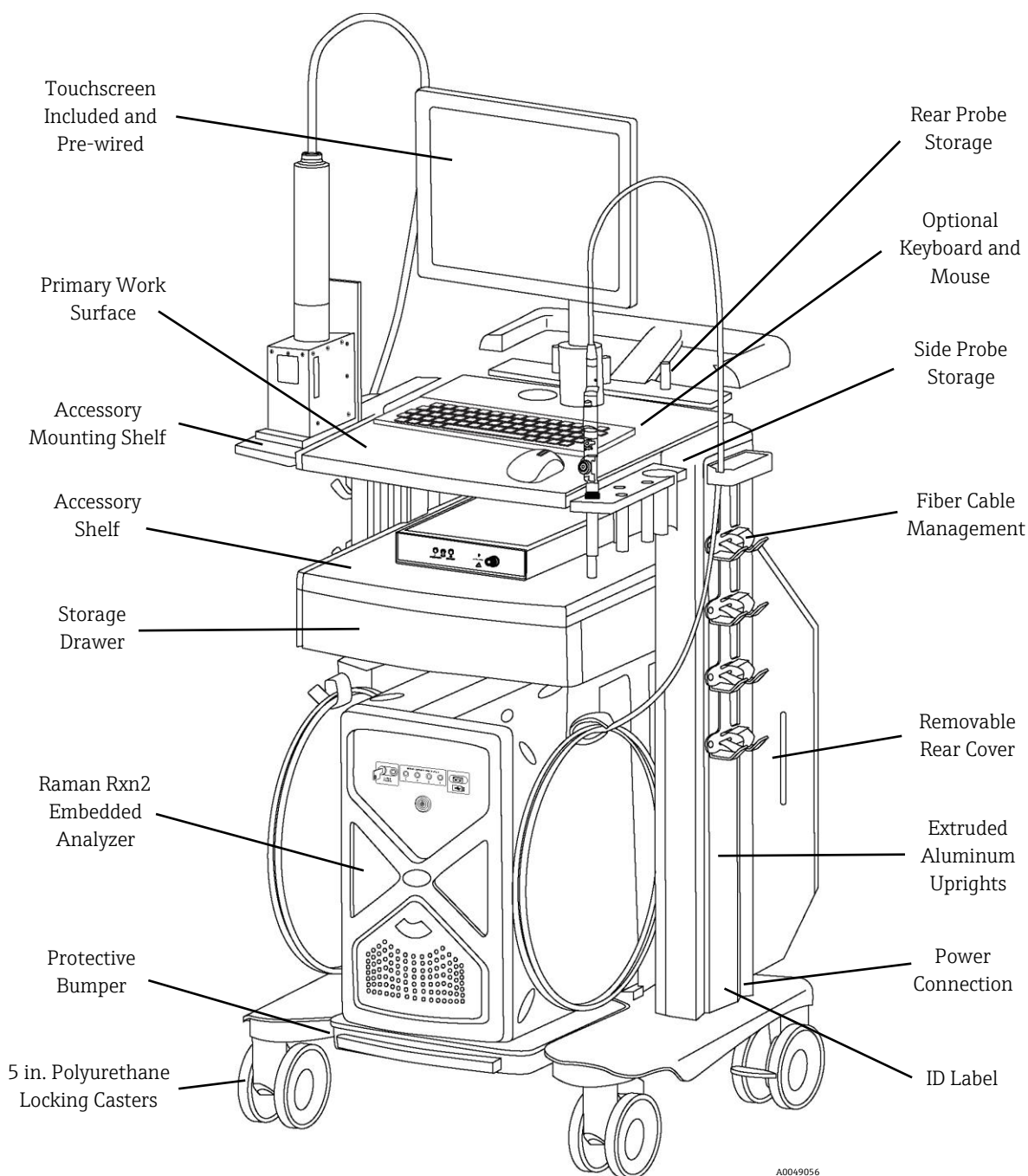
- Raman RunTime Touchscreen Human machine interface (HMI).
- Laptop computer on top shelf.
- Laptop computer closed on middle shelf with external monitor.
- Small form factor (SFF) computer on middle shelf with external monitor.

The mobile cart is pre-wired with the following cables.

- IEC C14 AC power inlet.
- AC power cords: Analyzer (bottom shelf), two accessories (mid-shelf), and external monitor (top-shelf).
- Analyzer-to-computer USB and Ethernet communication cables.
- Raman RunTime HMI DC power cable.

# 3.4 Product design

## 3.4.1 General features



*Figure 1. General features*

Touchscreen Included and Pre-wired

Primary Work Surface

Accessory Mounting Shelf

Accessory Shelf

Storage Drawer

Raman Rxn2 Embedded Analyzer

Protective Bumper

5 in. Polyurethane Locking Casters

Rear Probe Storage

Optional Keyboard and Mouse

Side Probe Storage

Fiber Cable Management

Removable Rear Cover

Extruded Aluminum Uprights

Power Connection

ID Label

A0049056

### 3.4.1.1    Rear probe storage detail
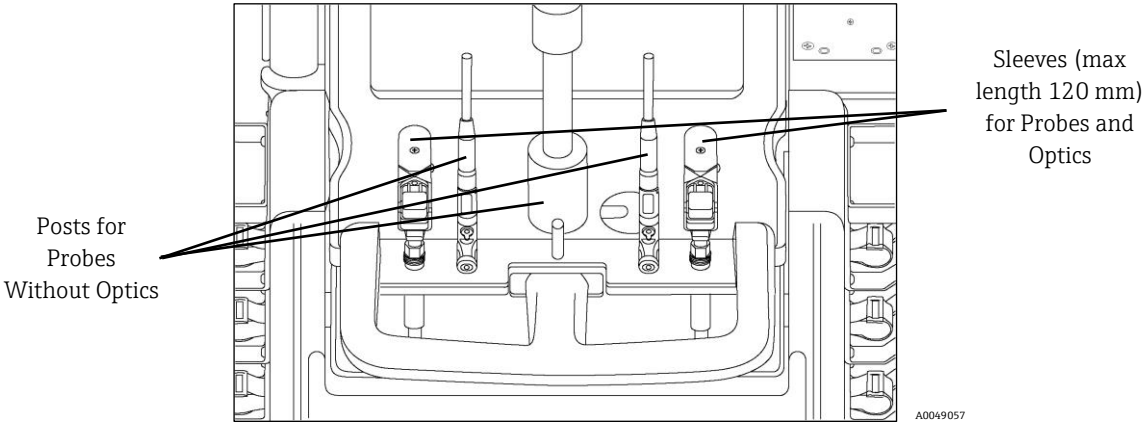


*Figure 2. Rear probe storage detail*

Sleeves (max length 120 mm) for Probes and Optics

Posts for Probes Without Optics

### 3.4.1.2    Side probe storage detail
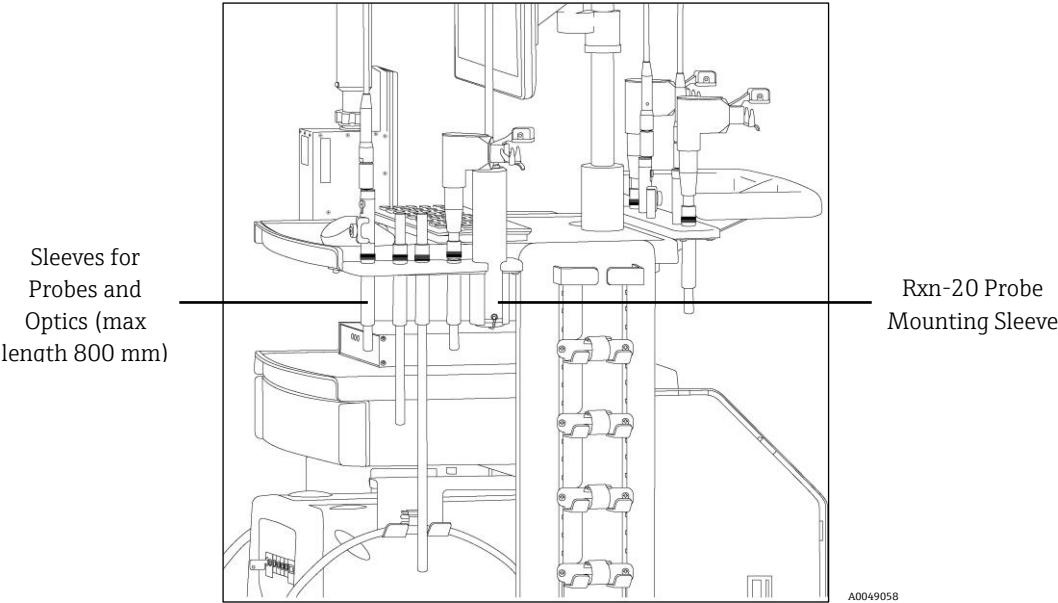


*Figure 3. Side probe storage detail*

Sleeves for Probes and Optics (max length 800 mm)

Rxn-20 Probe Mounting Sleeve

### 3.4.2 Mobile cart configured for non-embedded RamanRxn2 with Raman RunTime HMI

Touchscreen
HMI Included
and Pre-wired

Optional
Keyboard and
Mouse

Calibration
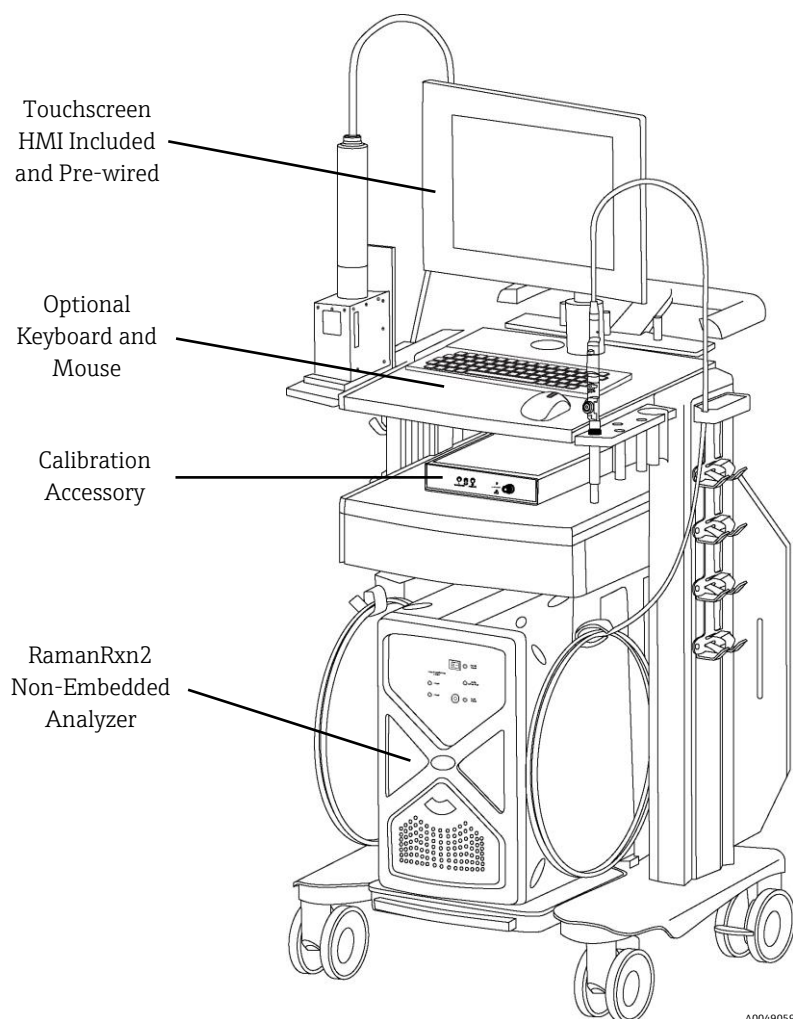Accessory

RamanRxn2
Non-Embedded
Analyzer

A0049059

*Figure 4. Mobile cart with Raman RunTime HMI*

### 3.4.3    Mobile cart configured for non-embedded RamanRxn2 with laptop computer on top shelf



Laptop

Calibration Accessory

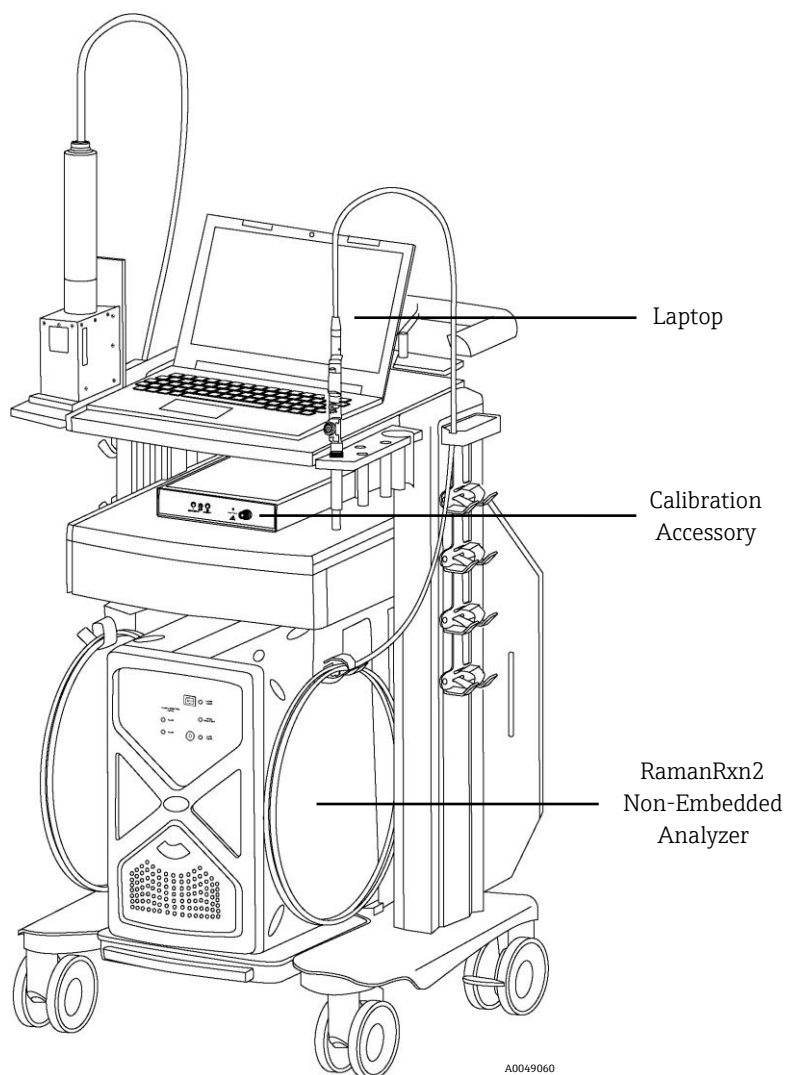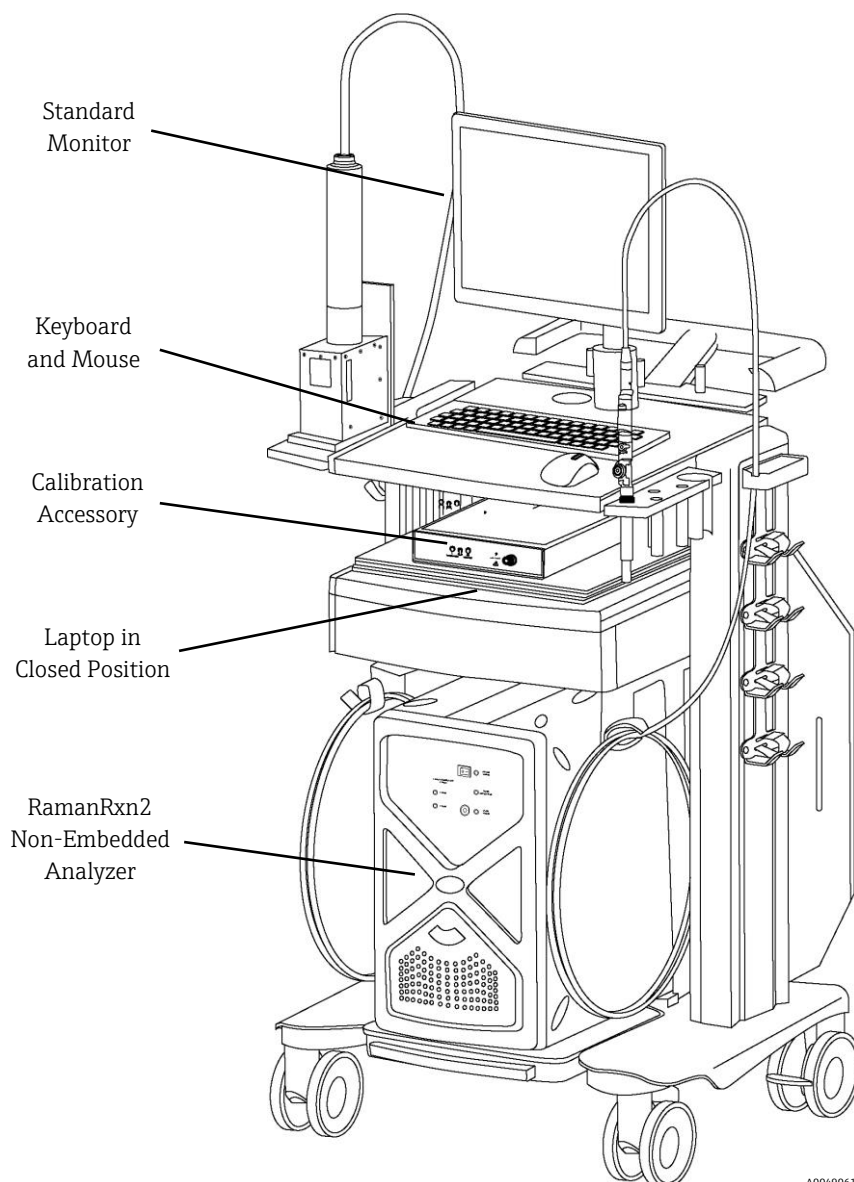RamanRxn2 Non-Embedded Analyzer

A0049060

*Figure 5. Mobile cart with laptop computer*

### 3.4.4 Mobile cart configured for non-embedded RamanRxn2 with laptop computer on middle shelf with external monitor

Standard Monitor

Keyboard and Mouse

Calibration Accessory

Laptop in Closed Position

RamanRxn2 Non-Embedded Analyzer

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*Figure 6. Mobile cart with laptop computer and external monitor*

### 3.4.5 Mobile cart configured for non-embedded RamanRxn2 with small form factor computer on middle shelf with external monitor
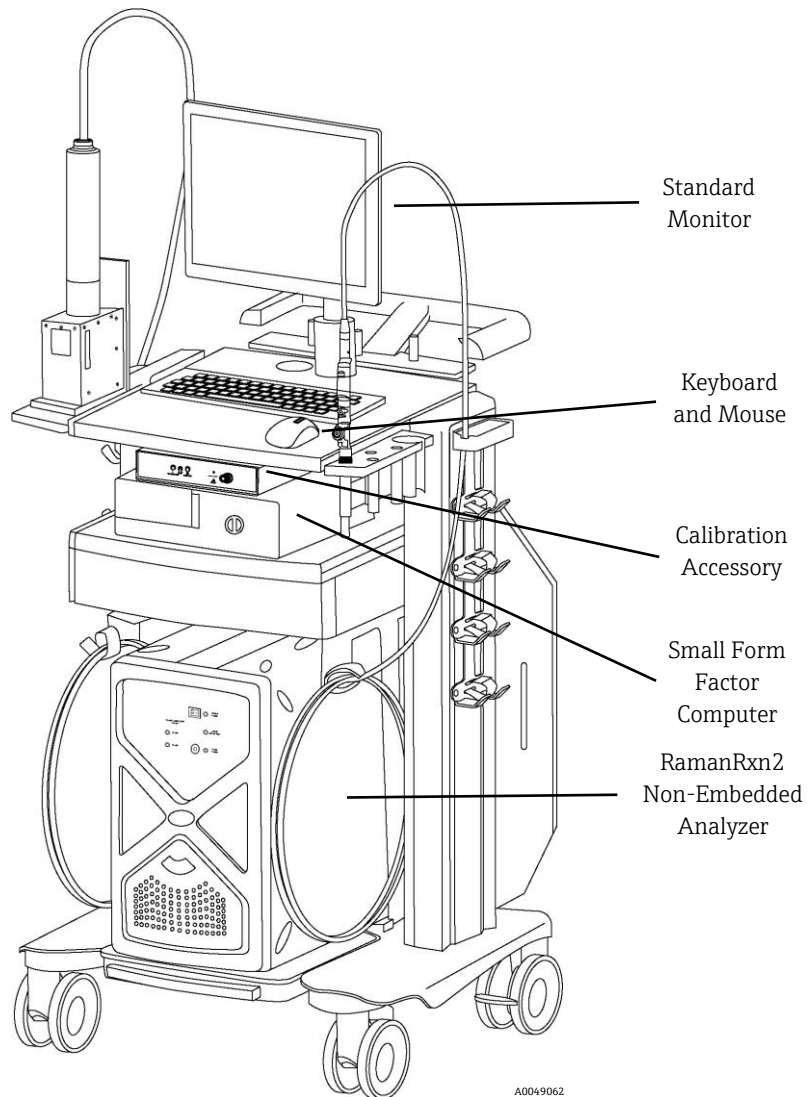


Standard
Monitor

Keyboard
and Mouse

Calibration
Accessory

Small Form
Factor
Computer

RamanRxn2
Non-Embedded
Analyzer

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*Figure 7. Mobile cart with SFF computer and external monitor*

# 4     Incoming product acceptance and product identification

## 4.1     Incoming acceptance

1.  Verify that the packaging is undamaged. Notify the supplier of any damage to the packaging. Keep the damaged packaging until the issue has been resolved.
2.  Verify that the contents are undamaged. Notify the supplier of any damage to the delivery contents. Keep the damaged goods until the issue has been resolved.
3.  Check that the delivery is complete and nothing is missing. Compare the shipping documents with your order.
4.  Pack the product for storage and transportation in such a way that it is protected against impact and moisture. The original packaging offers the best protection. Make sure to comply with the permitted ambient conditions.

If you have any questions, please contact your supplier or your local sales center.

### 4.1.1     Identifying the product

The order code and serial number of your product can be found in the following locations:

- On the mobile cart.
- In the delivery papers.

### 4.1.2     Manufacturer address

Endress+Hauser
371 Parkland Plaza
Ann Arbor, MI 48103 USA

## 4.2     Scope of delivery

The scope of delivery comprises:

- Mobile Cart in the configuration ordered
- Mobile Cart Operating Instructions
- Mobile Cart Certificate of Product Performance
- Local declarations of conformity, if applicable
- Certificates for hazardous zone use, if applicable
- Mobile Cart optional accessories, if applicable

If you have any queries: Please contact your supplier or local sales center.

# 5    Installation

**NOTICE**

▶ Uncrating and installation should only be performed by qualified service personnel.

## 5.1    General guidelines

### 5.1.1    Crate

- **Ramp side.** Unload cart from this side.
- **Storage side.** Accessory location, probes, and touchscreen.

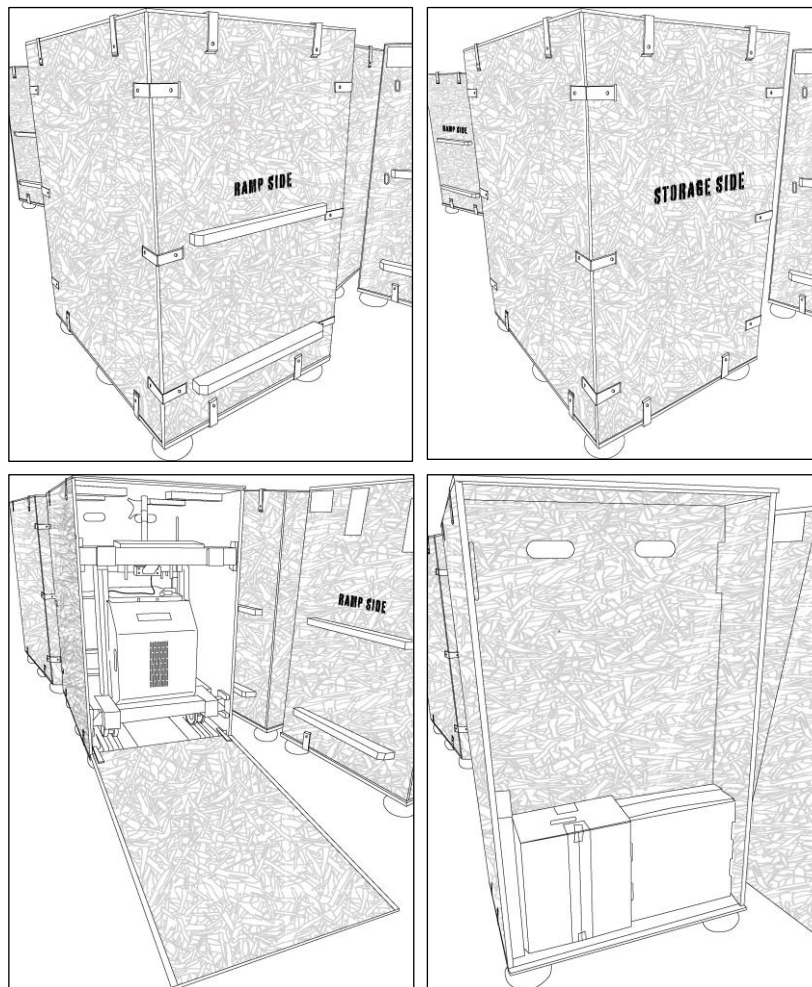**⚠ CAUTION**

▶ Do not remove both crate covers at same time.



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A0049064
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A0049067

*Figure 8. Crate ramp and storage sides*

## 5.1.2    Mobile cart uncrating

1. Remove the 10 clips from ramp side. Use a screwdriver to release first clip. Use first clip as a tool to release remaining clips.

Cover with Hand
During Release



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A0049069
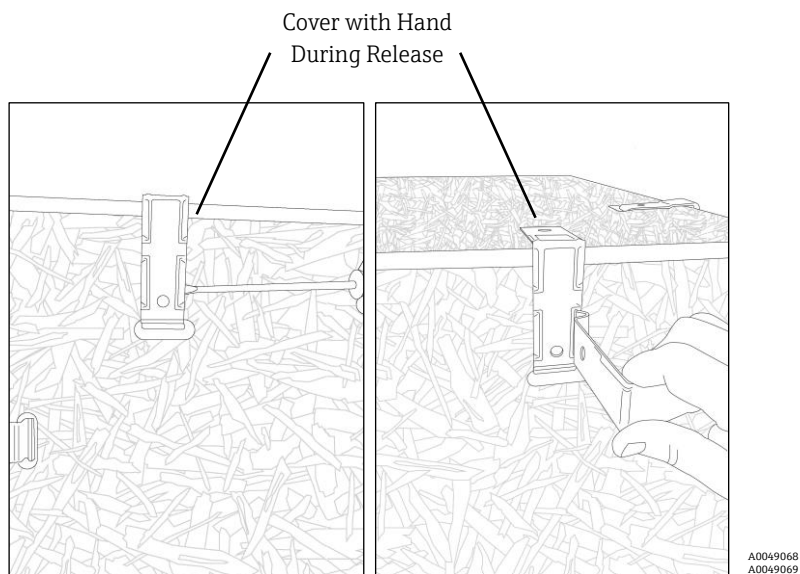
*Figure 9. Crate clips*

2. Lay ramp down.
3. Remove top and bottom cross braces.



A0049066
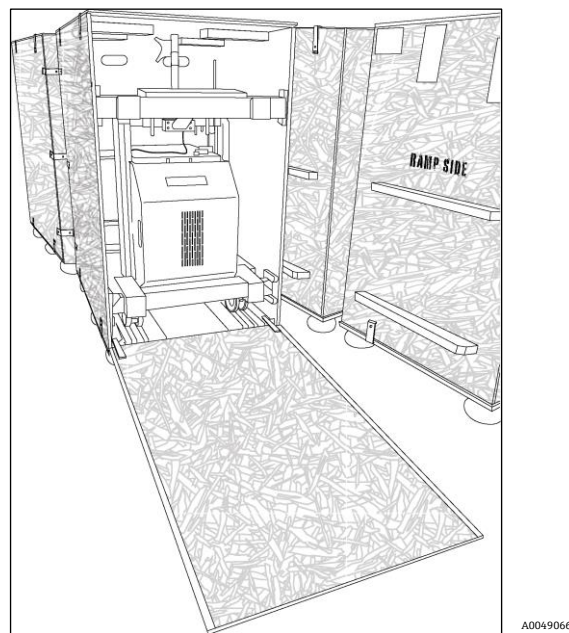
*Figure 10. Crate ramp*

4. Unlock rear wheels if necessary.
5. Wheel cart out.
6. Re-install cross braces to crate and re-install ramp side cover with 10 clips.

### 5.1.3    Accessory uncrating

1.  Ensure ramp side cover is installed with all 10 clips.

2.  Remove 10 clips from storage side.

3.  Set cover aside, remove accessories.

4.  Re-install storage side cover with 10 clips.
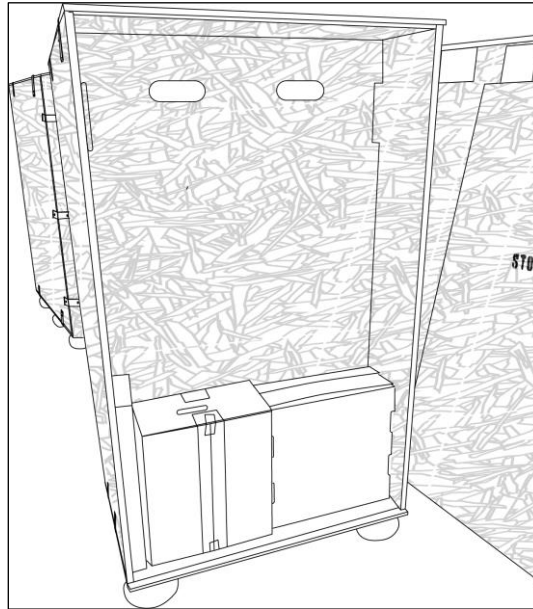


*Figure 11. Storage side*

### 5.1.4    Mobile cart rear cover removal

1.  Lock wheels.

2.  Release latches on either side of cover by turning counter-clockwise. Pivot latches away from sides.

3.  Grab cover with fingers in handle and thumb on rear of cover.

4.  Pull firmly, but slowly, to rear and slightly upwards at the same time.
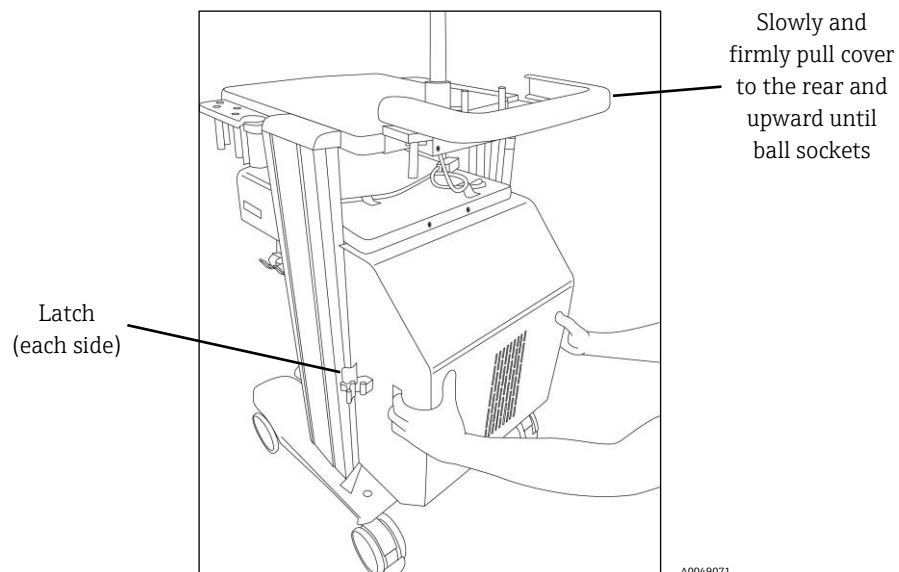


*Figure 12. Rear cover removal*

### 5.1.5    Mobile cart rear cover installation

1. Lock wheels.
2. Rest base of cover on cart base.
3. Ensure cover sides are to the outside of the small tabs on the bottom of the gantry.
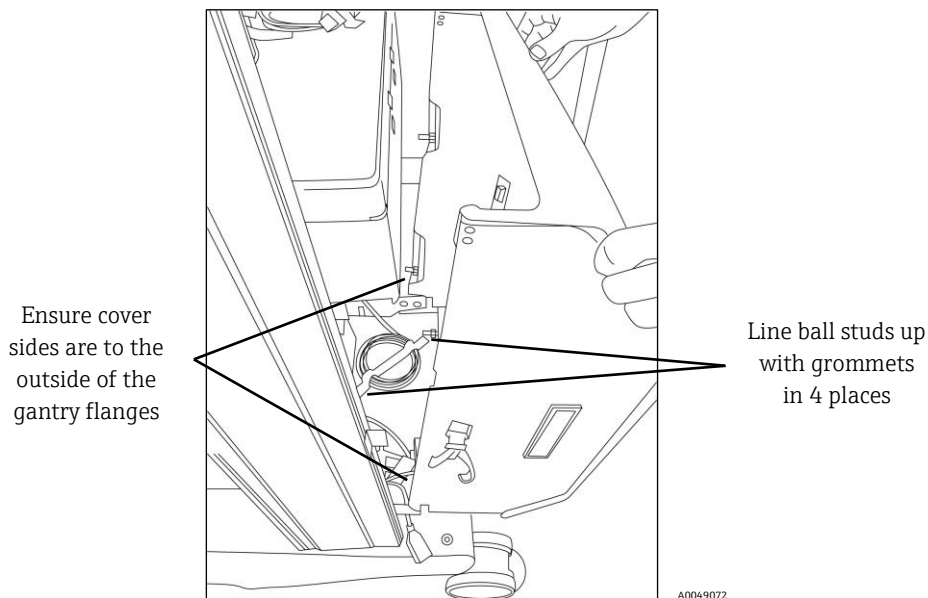4. Line up ball studs of cover to grommets of gantry.



Ensure cover sides are to the outside of the gantry flanges

Line ball studs up with grommets in 4 places

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*Figure 13. Rear cover installation*

5. Push firmly on both sides to fully engage all four grommets. Look for even gap between cover sides and cart posts on both sides.
6. Engage latches.

### 5.1.6    Mobile cart mid-shelf drawer

The mobile cart ships with accessories in the mid-shelf drawer that are required for installation and commissioning.

- Analyzer tie-down strap.
- Cable ties, pack of 100.
- Three meter power cord (US sales only).
- Sample chamber mounting screws and washers.
- Non-embedded configuration only:
  - o Dell laptop power supply adapter cable.
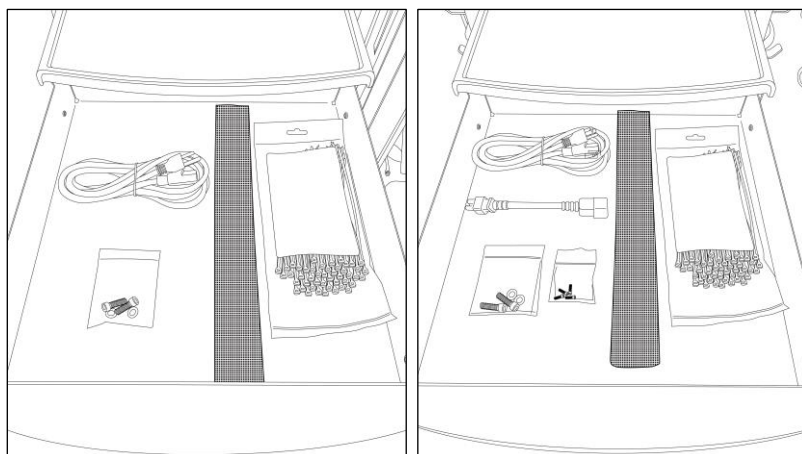  - o Raman RunTime HMI VESA mount screws.



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*Figure 14. Embedded and non-embedded drawer contents*

### 5.1.7    Mobile cart power distribution

The mobile cart includes a power distribution enclosure under the bottom shelf of the cart. The enclosure contains a power strip for AC power distribution as well as the embedded Raman Rxn2 touchscreen power supply. The enclosure is opened using a quarter-turn thumbscrew located on the front edge of the enclosure.
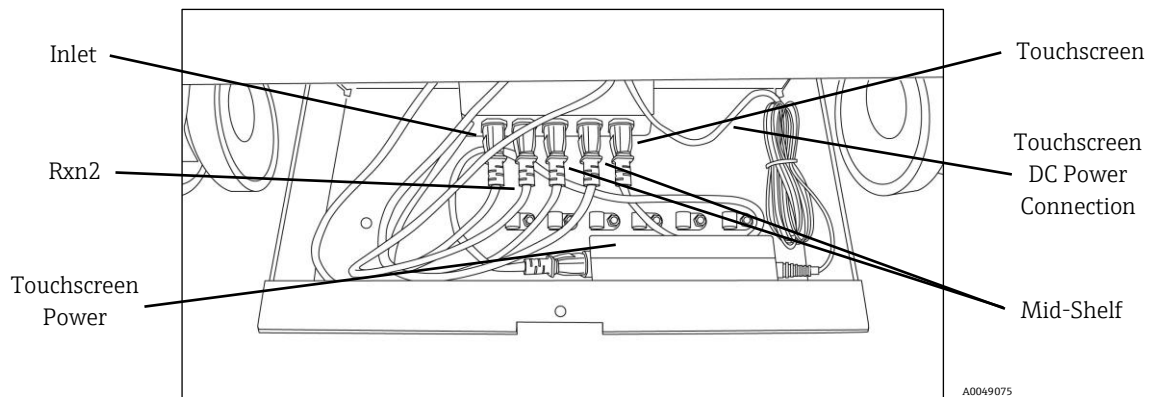


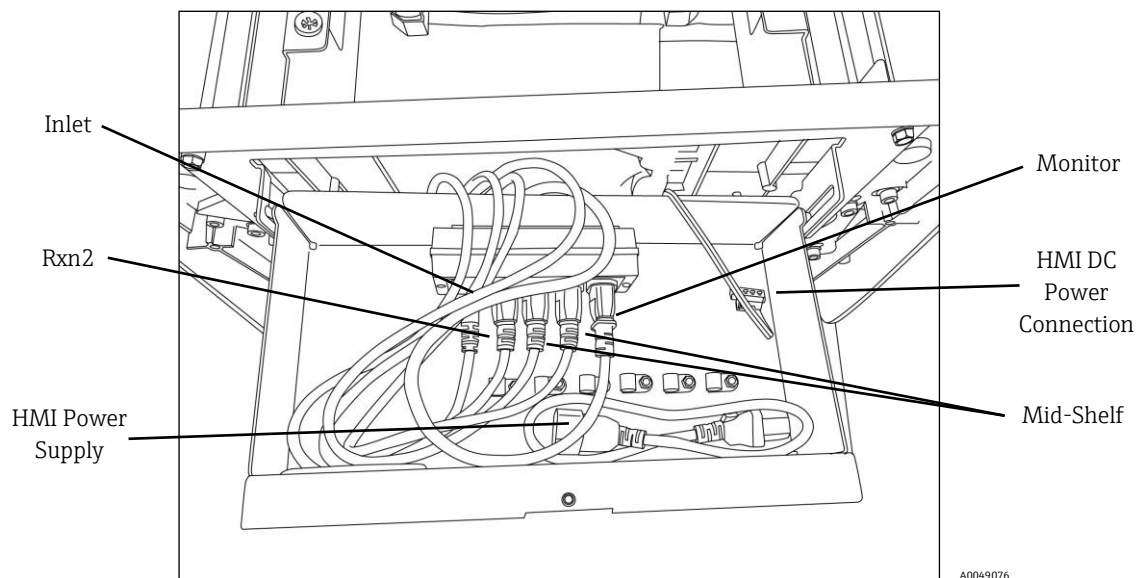*Figure 15. Embedded mobile cart power distribution*



*Figure 16. Non-embedded mobile cart power distribution*

# 6   Electrical connection

## 6.1   Electrical

An integrated internationally approved pigtailed power cord is provided for connecting main power to the mobile cart. The pigtail incorporates a standard IEC-320 C-14 inlet to which any standard and locally approved power cord with an IEC-320 C-13 plug may be attached to provide mains power to the cart accessory. The mobile cart accepts AC power from 100 – 240 V and 50/60 Hz. All mains power is distributed internal to the mobile cart to the analyzer, monitor, computer/HMI, and optional Calibration Accessory using an internationally-approved power distribution strip with internationally-approved cordage.

For mobile cart options sold within the continental United States, an approved 3.0-meter power cord is provided with the mobile cart for attachment to mains power. For mobile cart options sold outside the continental United States, a power cord is NOT included. It is the responsibility of the end user and/or local distributor to provide a locally approved power cord for attachment to mains power.

# 7    Commissioning

## 7.1    Mobile cart for embedded Raman Rxn2 analyzers

### 7.1.1    Install touchscreen

1.  Install touchscreen to VESA mount on monitor post using screws supplied with touchscreen.
2.  It may be easier to first remove the VESA mount from the monitor post, install to touchscreen, then install back to the monitor post. To remove VESA mount:
    o   Loosen VESA mount on monitor post using a 3/32 in. Allen key.
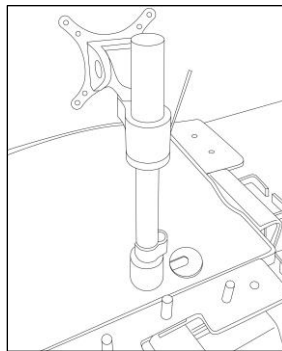    o   Slide VESA mount up to remove from post.



*Figure 17. VESA mount*

3.  If the VESA mount is removed, re-install to monitor post. Secure using 3/32 in. Allen key.
4.  Install Video graphics array (VGA), USB, and DC power cables to touchscreen.
5.  Secure VGA thumbscrews.
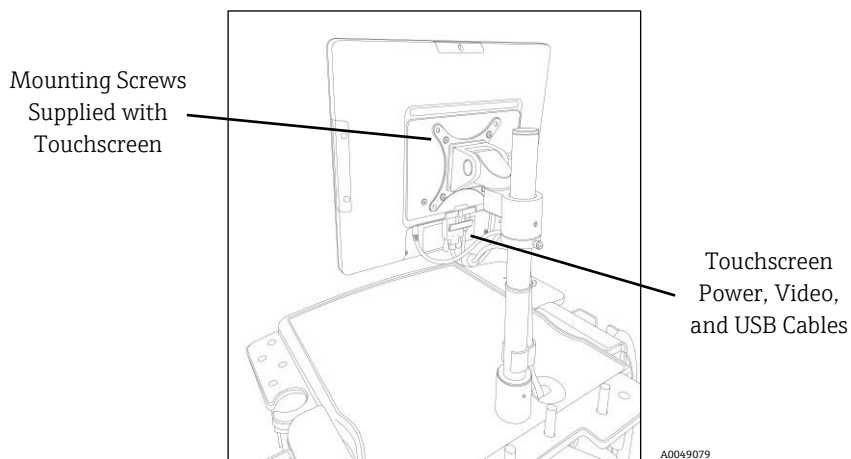


*Figure 18. Monitor mount*

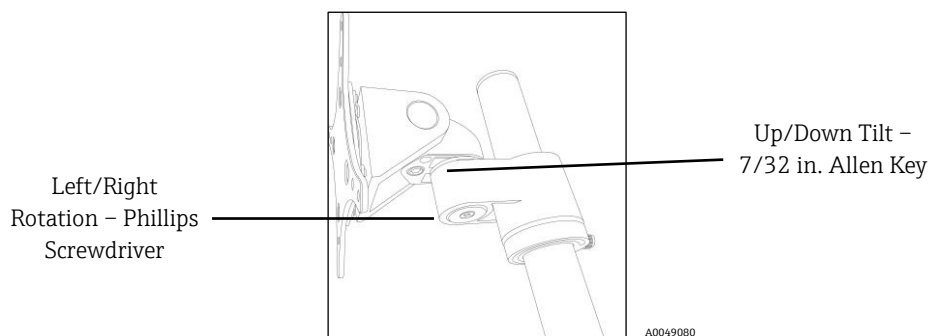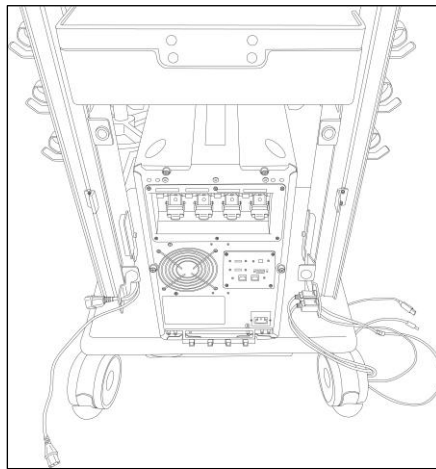6.  Tighten monitor knuckle if needed to support weight of touchscreen.



*Figure 19. Monitor post*

### 7.1.2    Install Raman Rxn2 to cart

1. Remove rear cover.
2. Load the Raman Rxn2 from the rear of the cart, ensuring that the rubber feet are engaged in cutouts in cart base.



*Figure 20. Embedded Raman Rxn2*

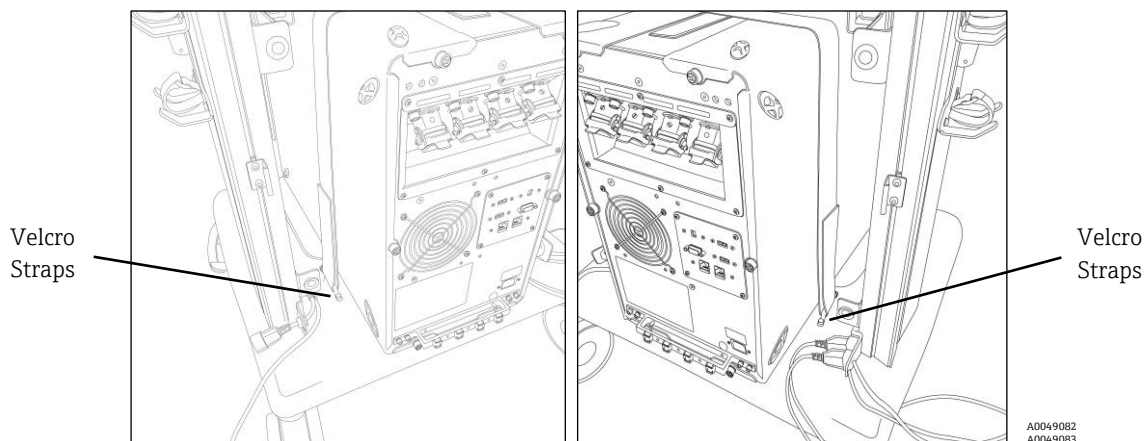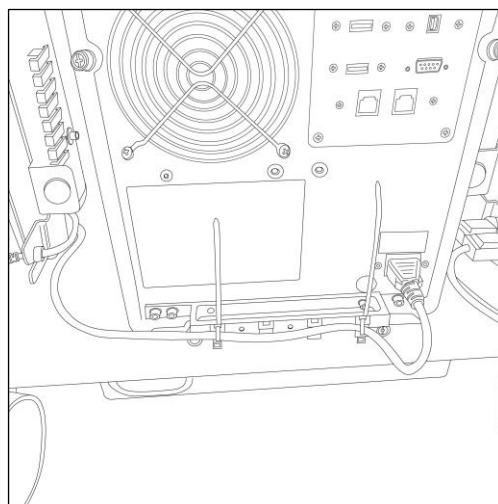3. Install velcro strap tightly over the Raman Rxn2 to webbing guides on both sides of the Raman Rxn2.



*Figure 21. Velcro straps*

### 7.1.3    Install AC mains power cord to the Raman Rxn2

Connect power cord to the Raman Rxn2 and secure in two locations as shown with supplied cable ties. Rotate cable tie mounts on strain relief bar to accommodate.



*Figure 22. Raman Rxn2 cables*

### 7.1.4    Touchscreen video and USB

Loop video and USB cables between the strain relief bar and fan guard and connect to the Raman Rxn2 as shown, securing in several locations with cable ties as shown.
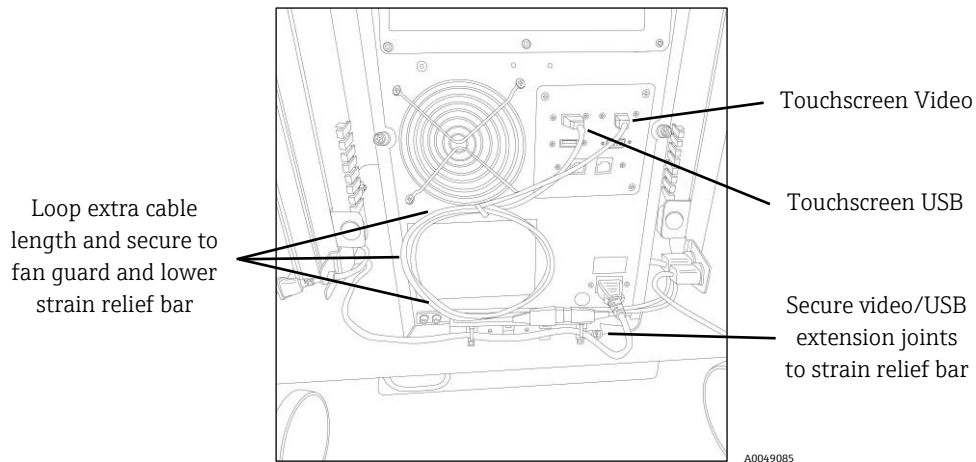
Loop extra cable length and secure to fan guard and lower strain relief bar

Touchscreen Video

Touchscreen USB

Secure video/USB extension joints to strain relief bar

*Figure 23. Touchscreen and USB*

### 7.1.5    Install network cables to the Raman Rxn2

1. Connect cart Network 1 and Network 2 to the Raman Rxn2 Network 1 and Network 2, respectively.

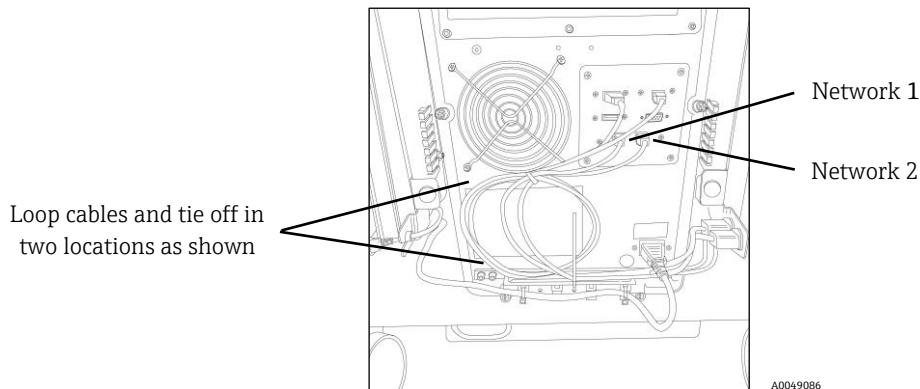2. Loop cables and connect to the Raman Rxn2, securing in several locations as shown.

Loop cables and tie off in two locations as shown

Network 1

Network 2

*Figure 24. Network 1 and network 2*

### 7.1.6    Install fiber cables to the Raman Rxn2

1. Connect fibers to Electro-optical (EO) connectors of the Raman Rxn2.

2. Route fibers alongside of the Raman Rxn2 toward front of cart.

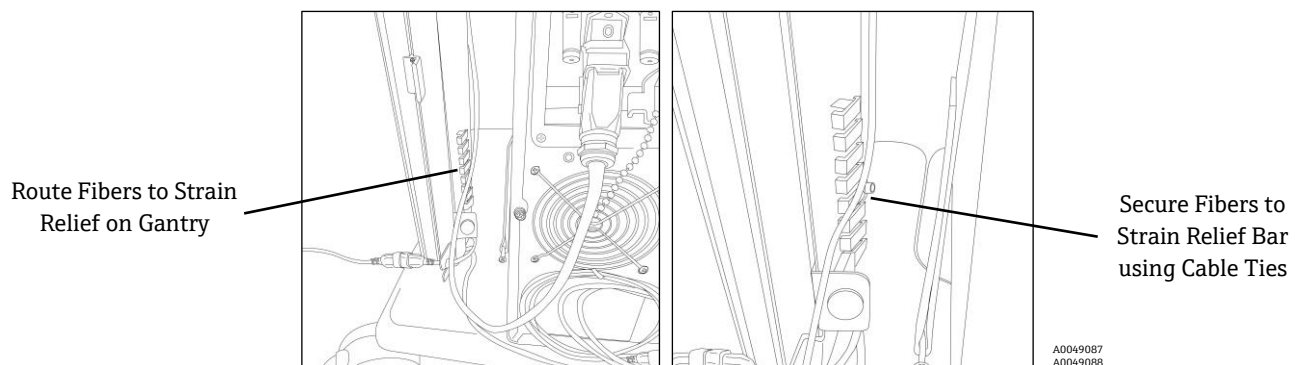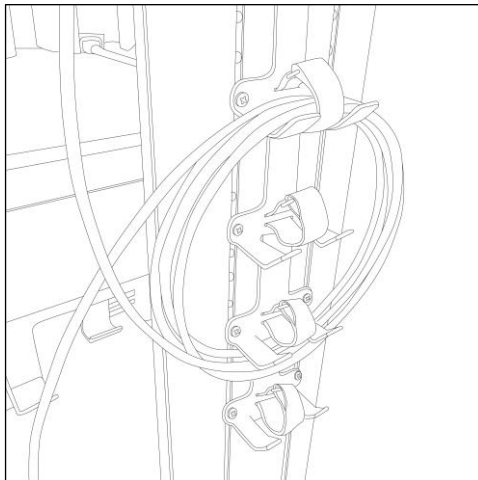3. Secure to strain relief brackets with supplied cable ties.

Route Fibers to Strain Relief on Gantry

Secure Fibers to Strain Relief Bar using Cable Ties

*Figure 25. Fiber cables*

4. Install and latch rear cover.

### 7.1.7 Hang fiber cables
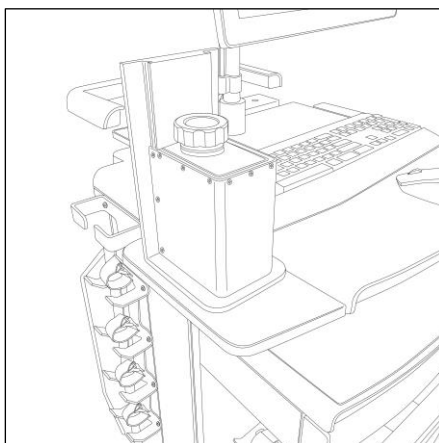
Use integrated velcro straps when not in-use.



*Figure 26. Velco straps*

### 7.1.8 Install sample chamber if purchased using supplied screws/washers

Install sample chamber vertically using supplied screws and washers.



*Figure 27. Sample chamber*

## 7.2    Mobile cart for non-embedded RamanRxn2 analyzers

### 7.2.1    Raman RunTime HMI installation

1.  Install HMI to VESA mount on monitor post using screws supplied with HMI.
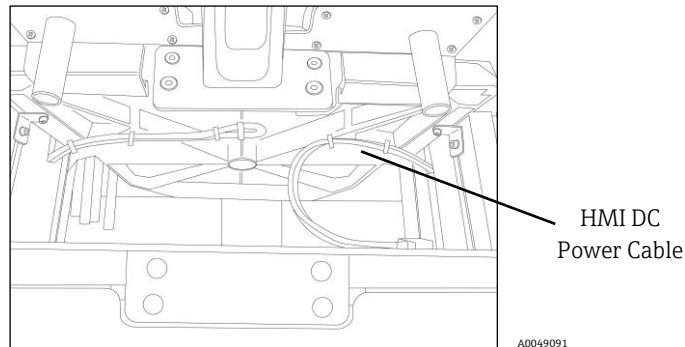2.  Unclip DC power cable from under top-shelf.

*Figure 28. HMI DC power cable*

3.  Route DC power cable, analyzer USB, and analyzer Ethernet cables through top-shelf grommet and up monitor post. Secure cables to monitor post using supplied cable ties.
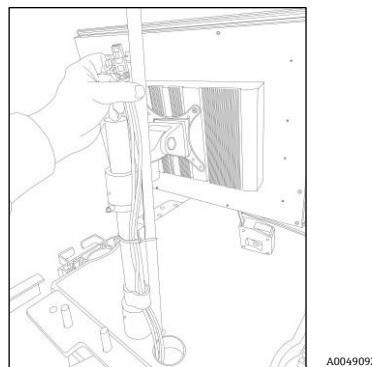
*Figure 29. HMI cable routing*

4.  Connect DC power cable, analyzer USB, and analyzer Ethernet cables to HMI per label on rear of HMI. Secure DC power cable to HMI using flat-blade screwdriver.
5.  Install HMI power supply into power distribution box under cart.
    o   Place power supply in lower right corner of power distribution box with AC mains inlet oriented to the left.
    o   Disconnect larger diameter AC power cord from right end of power strip.
    o   Connect included 0.6 m AC power cord to right end of power strip in place of previously removed power cord.
    o   Connect 0.6 m AC power cord to HMI power supply.
    o   Connect green 3-pin connector from power supply to DC power cable provided with cart. Secure with flat-blade screwdriver.
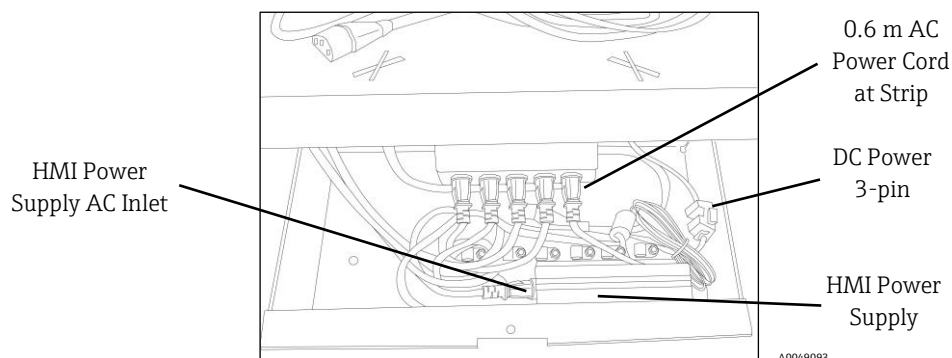
*Figure 30. HMI power supply*

### 7.2.2    Laptop installation – no external monitor

1. Remove monitor post at base using 3/32 in. Allen key.

2. Set laptop on top shelf.

3. Install laptop power supply to mid-shelf. Use the supplied Dell power supply adapter cable for power.

4. Route DC power cable for laptop to top shelf through desk grommet. Secure with cable ties as necessary.

5. Route analyzer USB and CSM Ethernet to laptop through desk grommet. Secure with cable ties as necessary.

### 7.2.3    Laptop installation – external monitor (customer supplied)

1. Install laptop power supply to mid-shelf. Use included Dell power supply adapter cable for power.

2. Set laptop on mid-shelf.

   **NOTICE**

   ▶ The laptop must be configured to operate in "clamshell" mode.

3. Connect analyzer USB and CSM Ethernet cables to laptop.

4. Connect customer provided wireless USB keyboard/mouse transceiver to available USB port on laptop.

5. Install external monitor to monitor post:

   o Install monitor to VESA mount on monitor post using screws supplied with monitor.

   o Unclip AC power cord from under top-shelf and route through desk grommet and up monitor post to monitor. Secure with cable ties as necessary.
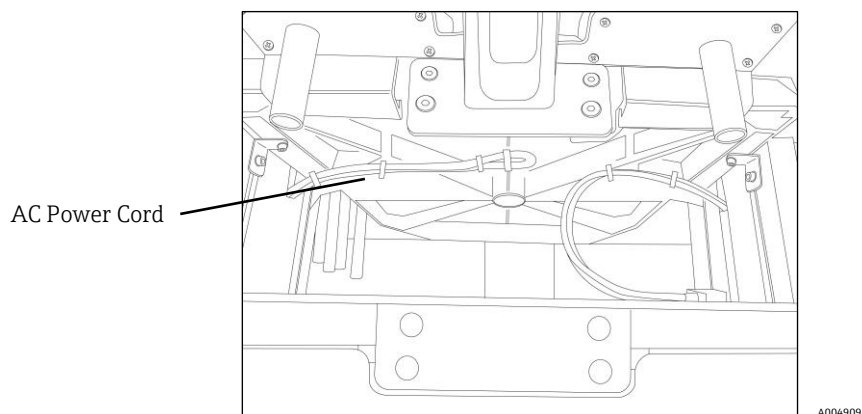


*Figure 31. External monitor power cord*

   o Route appropriate video cable (customer supplied) from laptop to monitor through desk grommet and up monitor post to monitor. Secure with cable ties as necessary.

### 7.2.4    Small form factor computer installation – external monitor

1. Install small form factor computer on mid-shelf.

2. Connect AC power cord.

3. Connect analyzer USB and CSM Ethernet cables to computer.

4. Connect customer provided wireless USB keyboard/mouse transceiver available USB port on computer.

5. Install external monitor to monitor post:

   o Install monitor to VESA mount on monitor post using screws supplied with monitor.

   o Unclip AC power cord from under top-shelf and route through desk grommet and up monitor post to monitor. Secure with cable ties as necessary.

   o Route appropriate video cable from computer to monitor through desk grommet and up monitor post to monitor. Secure with cable ties as necessary.

### 7.2.5    Install the RamanRxn2 to cart

1.  Remove rear cover.

2.  Load the RamanRxn2 from the rear of the cart, ensuring the rubber feet are engaged in cutouts in cart base.

3.  Install velcro strap as tight as possible over the RamanRxn2 to webbing guides on both sides of the RamanRxn2.

### 7.2.6    Install AC mains power cord to Raman Rxn2

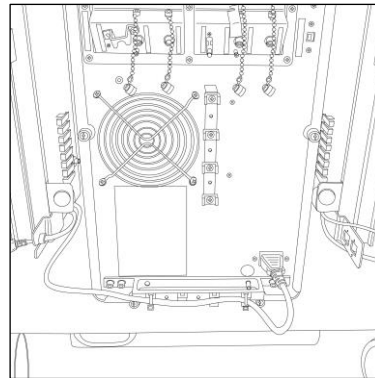Connect cord to the Raman Rxn2 and secure in two locations as shown with supplied cable ties. Rotate cable tie mounts on strain relief bar to accommodate.



*Figure 32. Main power*

### 7.2.7    Install USB and Ethernet cables to RamanRxn2

Loop cables between fan guard and bottom strain relief bar and connect to the RamanRxn2, securing in several locations as shown.
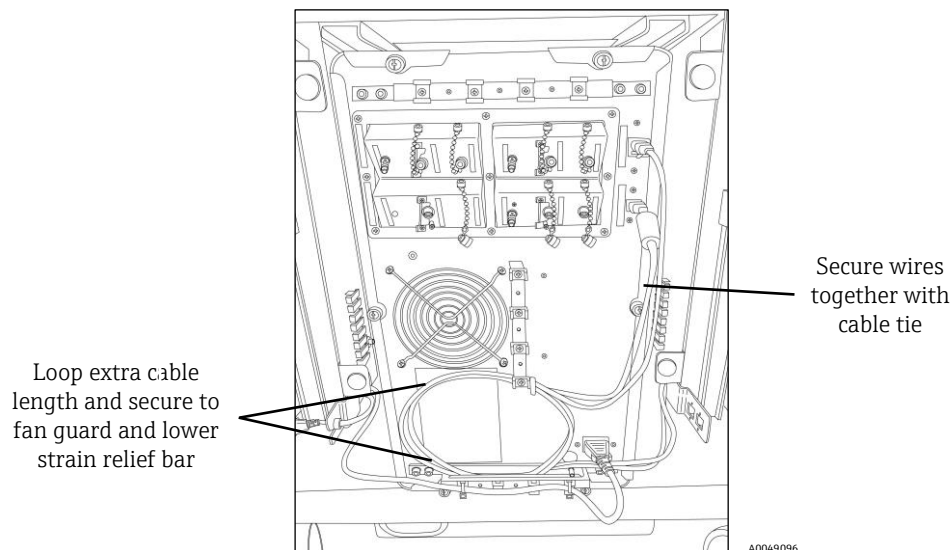


Secure wires together with cable tie

Loop extra cable length and secure to fan guard and lower strain relief bar

*Figure 33. Analyzer USB cables*

### 7.2.8    Install fiber cables to RamanRxn2

1.  Secure cables to center strain relief using cable ties to ensure proper strain relief of individual fiber breakouts at Fiber channel (FC) connectors.

2.  Connect FC fibers and interlock connector to the RamanRxn2.

3.  Route fibers alongside of the RamanRxn2 toward front of cart.

4.  Tie off to strain relief brackets on cart posts with included cable ties.

### 7.2.9 Hang fiber cables
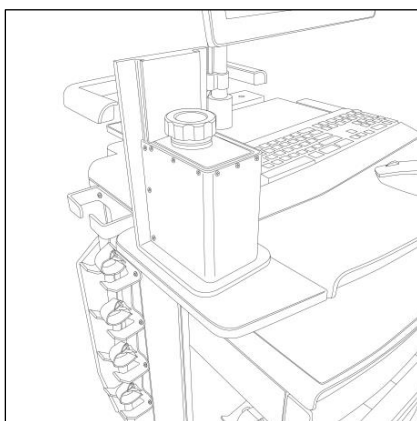
Use integrated velcro straps when not in-use.
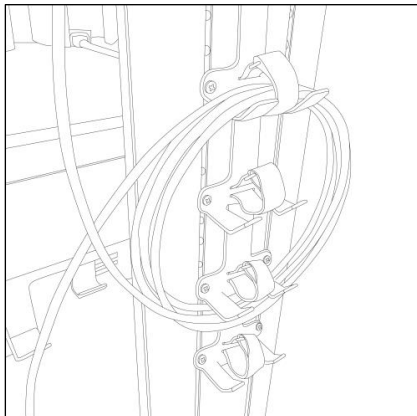


*Figure 34. Velco straps*

### 7.2.10 Install optional sample chamber

Install sample chamber vertically using supplied screws and washers.



*Figure 35. Sample chamber*

# 8    Technical data

The specifications for the Raman Rxn2 mobile cart are listed below.

| Item | Description |
|---|---|
| Dimensions | ▪ **Cart.** 685 mm × 1022 mm × 753 mm (27.0 in. W × 40.2 in. H (table top) × 29.6 in. L).<br>▪ **Shipping Crate.** 902 mm x 1549 mm x 1276 mm (35.5 in. W x 61.0 in. H x 50.3 in. L). |
| Weight | ▪ **Cart.** 59 kg (130 lbs).<br>▪ **Shipping Crate.** ~ 179 kg (395 lbs), depends on cart and accessory configuration. |
| Materials of Construction | **Cart**<br>▪ Aluminum and steel with durable powder coat finish.<br>▪ High density polyethylene (HDPE) and Delrin probe storage and accessory shelves.<br>▪ Polyurethane wheel treads with polyamide locking casters.<br>**Shipping Crate**<br>▪ Heat treated wood, ISPM 15 compliant and marked. |
| Instrument Compatibility | ▪ Embedded Raman Rxn2 analyzer. See customer drawing 3000183.<br>▪ Non-embedded RamanRxn2 analyzer. See customer drawing 3000184. |
| Wiring | ▪ Pre-wired for embedded Raman Rxn2 installation including: analyzer, touchscreen HMI, and calibration accessory.<br>▪ Pre-wired for RamanRxn2 installation including: analyzer, Raman Runtime HMI or other computer/monitor, and calibration accessory. See customer drawing 3000184 for suggested use. |
| Power Supply | ▪ Universal 100-240 VAC, 50-60 Hz, 10 A max with IEC C14 inlet.<br>▪ 3 m US mains power cord included. |
| Network Connectivity | ▪ Two RJ45 10/100/1000 Ethernet connectors for analyzer automation protocols. (Embedded Raman Rxn2 only.) |

*Table 4. Mobile cart specifications*

# 9       Supplementary documentation

All documentation is available:

- On the media device supplied (not included in the delivery for all device versions).
- Smart phone/tablet: Endress+Hauser Operations App.
- For Technical Documentation, refer to our website (https://endress.com/downloads).

| Part Number | Document Type | Document Title |
|---|---|---|
| TI01639C | Technical Information | Raman Rxn2 Mobile Cart Technical Information |

*Table 5. Supplementary documentation*

# 10 Index

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