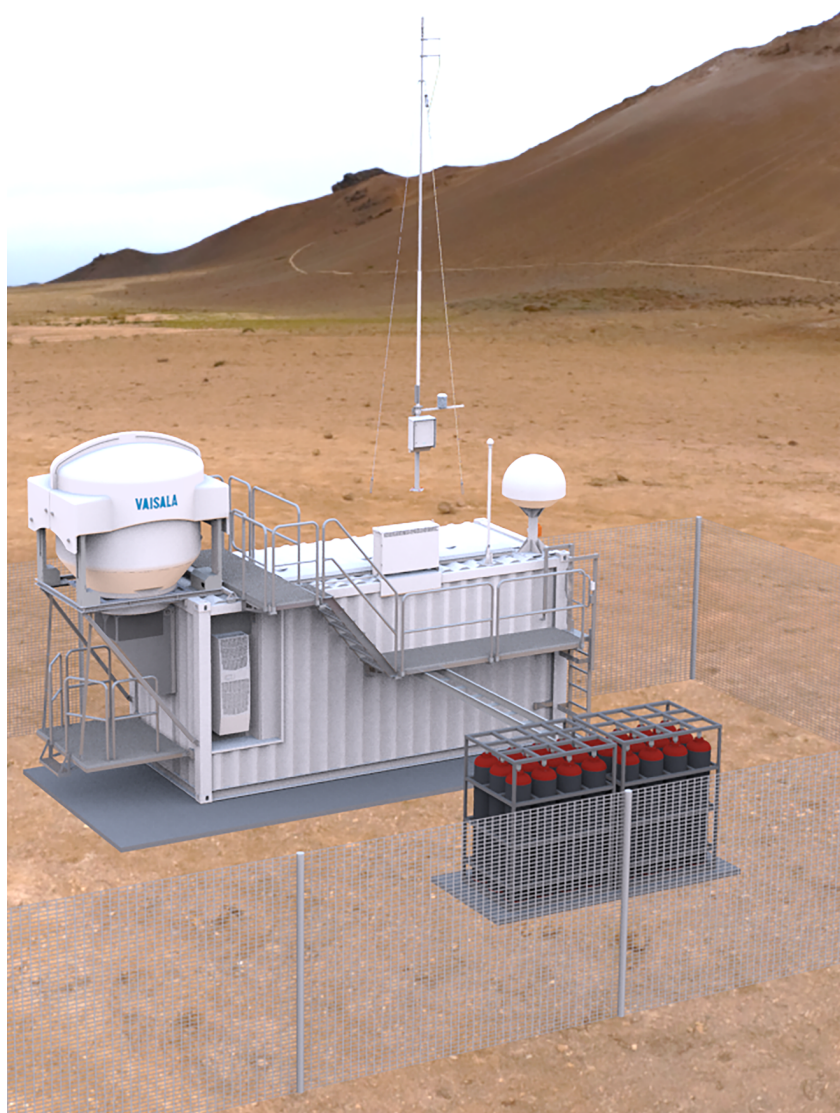


# Preinstallation Guide

Automatic Sounding Station Vaisala  
**AUTOSONDE® AS41**



**VAISALA**

PUBLISHED BY

Vaisala Oyj  
Vanha Nurmijärventie 21, FI-01670 Vantaa, Finland  
P.O. Box 26, FI-00421 Helsinki, Finland  
+358 9 8949 1

Visit our Internet pages at [www.vaisala.com](http://www.vaisala.com).

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# 1. About this document

## 1.1 Version information

This document provides guidelines for planning and preparing the site for AUTOSONDE installation.



**CAUTION!** Installing the product is only allowed by authorized Vaisala personnel or by authorized customer representative only after receiving the specific training from Vaisala.



This document provides basic information on the preinstallation procedure. Always take the site-specific conditions and local requirements into consideration.

Table 1 Document versions (English)

Document code	Date	Description
M212040EN-C	September 2021	Changes include updated information about available options, the gas hoses, regulators, and container foundation.
M212040EN-B	January 2020	The following sections were added: <ul style="list-style-type: none"> <li>• AS41 components</li> <li>• AS41 options</li> <li>• Customer-provided items</li> <li>• Installation preparation steps</li> <li>• Space requirements for installation</li> <li>• Preparations for unloading and installation</li> <li>• Lifting installed AS41 to its foundation</li> <li>• Appendix B: installation preparation checklists</li> </ul>
M212040EN-A	February 2019	First version.

## 1.2 Related manuals

Table 2 Related manuals

Document code	Name
M212004EN	<i>AUTOSONDE AS41 Safety Technical Reference</i>
M212011EN	<i>AUTOSONDE AS41 Maintenance Manual</i>
M210315EN	<i>Vaisala Tilttable Pole Mast DKP206 and DKP210 User Guide</i>

## 1.3 Documentation conventions



**WARNING! Warning** alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.



**CAUTION! Caution** warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.



**Note** highlights important information on using the product.



**Tip** gives information for using the product more efficiently.



Lists tools needed to perform the task.



Indicates that you need to take some notes during the task.

## 1.4 Trademarks

Vaisala® and AUTOSONDE® are registered trademarks of Vaisala Oyj.

All other product or company names that may be mentioned in this publication are trade names, trademarks, or registered trademarks of their respective owners.



## 2. Product overview

### 2.1 Introduction to AUTOSONDE AS41

Vaisala AUTOSONDE AS41 provides full automation of the upper air observations from prelaunch radiosonde preparation, balloon filling, and radiosonde launching to data acquisition, processing, and meteorological message generation.

AS41 can perform up to 60 radiosonde observations without operator intervention and it can be remotely controlled.

AS41 utilizes Vaisala Sounding System MW41. For remote operation, AS41 uses Vaisala Observation Network Manager NM10 software.

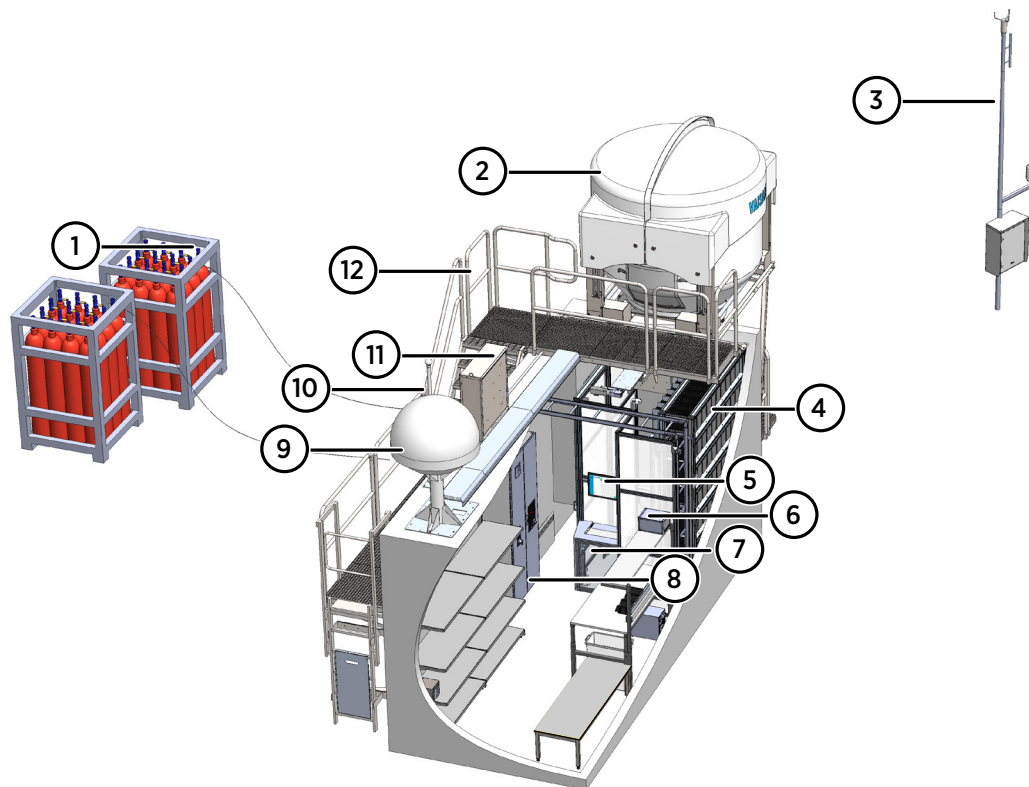


Figure 1 AUTOSONDE AS41 overview front

- 1 Gas banks
- 2 Launcher vessel
- 3 Automatic Weather Station (AWS)
- 4 Robotics room with radiosonde tray storage shelf
- 5 Touch screen / AS41 Control software
- 6 Sounding Processing Subsystem
- 7 Radiosonde loading table
- 8 Main electrical cabinet
- 9 Telemetry antenna
- 10 GPS antenna
- 11 Gas measurement system
- 12 Safety structure

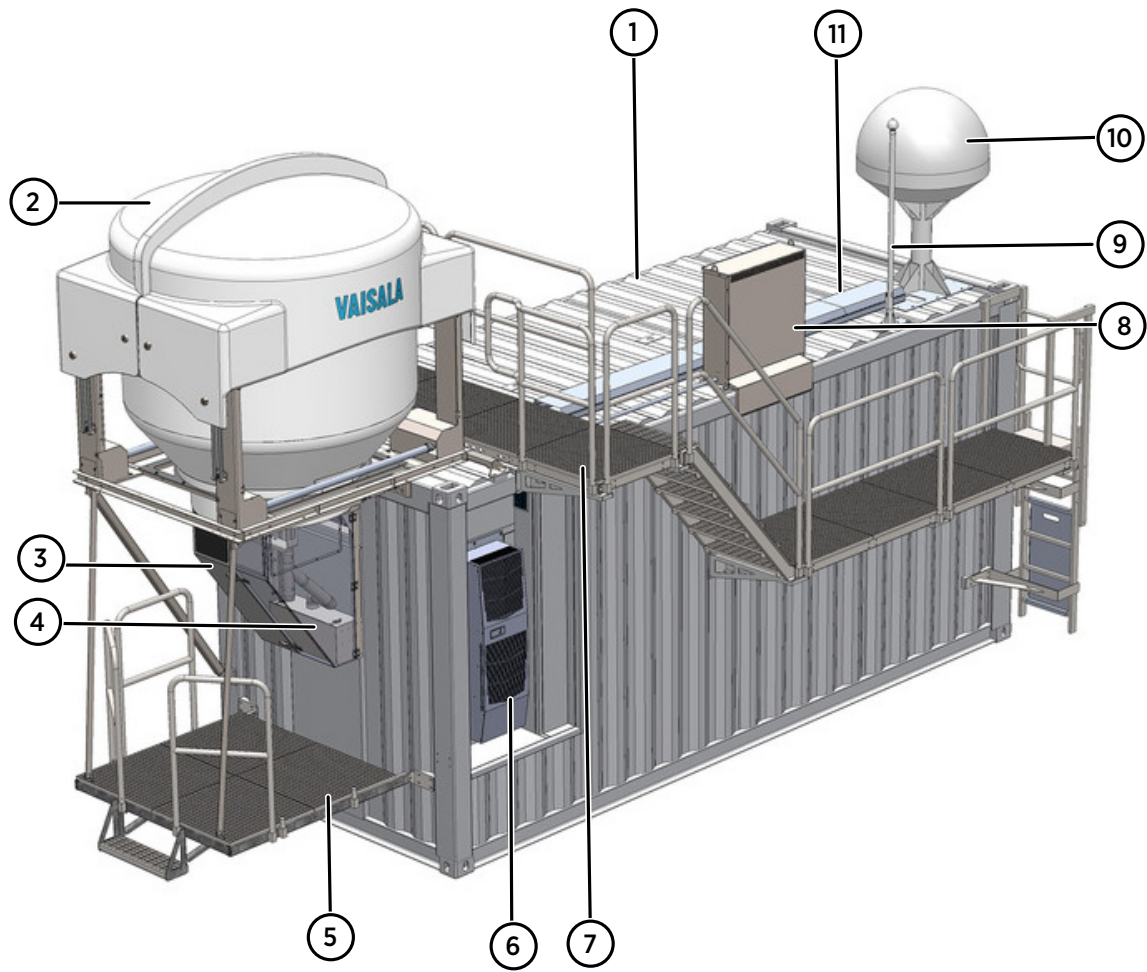


Figure 2 AUTOSONDE AS41 overview back

- 1 Container
- 2 Launcher vessel
- 3 Ex blower door
- 4 Ex blower enclosure
- 5 Maintenance platform
- 6 Air conditioner
- 7 Support structures
- 8 Gas measurement system
- 9 GPS antenna
- 10 Telemetry antenna
- 11 Cable ladder

## 2.1.1 AS41 components

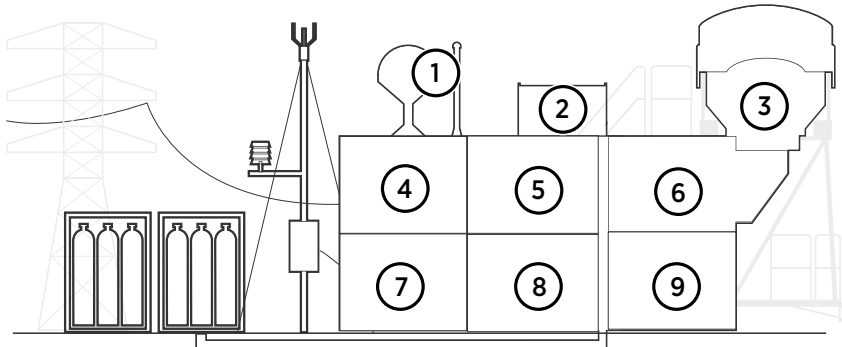


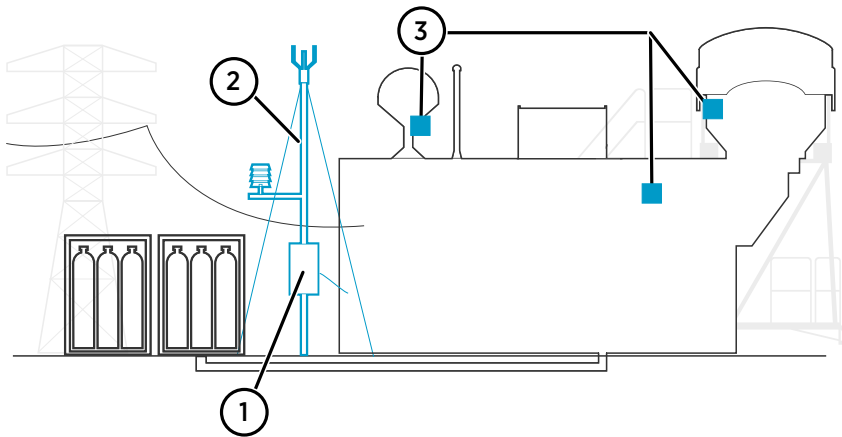
Table 3 Components in AS41 standard delivery

Number in figure	Component	Main parts	Note
1	Antennas	<ul style="list-style-type: none"> <li>Vaisala Telemetry Antenna RB31</li> <li>Vaisala GPS Antenna GA31</li> </ul>	-
2	Gas system	<ul style="list-style-type: none"> <li>Gas measurement system, including flow meter</li> </ul>	<ul style="list-style-type: none"> <li>Gas storage, gas regulators, and gas banks are provided by the customer. They are not a part of Vaisala delivery.</li> <li>Gas hoses are provided by the customer. They can also be ordered separately from Vaisala.</li> </ul>
3	Launcher vessel	<ul style="list-style-type: none"> <li>Launcher vessel and covers</li> <li>Ex blower</li> <li>Flashback arrestor</li> <li>Platform for maintenance tasks</li> </ul>	-
4	Electric system	<ul style="list-style-type: none"> <li>Electrical cabinet</li> <li>UPS (with or without extra battery)</li> <li>UPS connection box</li> <li>Mains connection box</li> <li>Air conditioner with cooler and heater</li> <li>Radiator</li> <li>Dehumidifier</li> <li>EN60309 connector for connecting 5-wire system to AS41</li> </ul>	-

Number in figure	Component	Main parts	Note
5	Local workstation	<ul style="list-style-type: none"> <li>AS41 Control software</li> <li>MW41 System software</li> <li>Other software required for installation and configuration</li> </ul>	AS41 and MW41 software installation media are included with the delivery.
6	Robotics system	<ul style="list-style-type: none"> <li>Units inside the robotics room, including mechanics controller, for example</li> </ul>	-
7	Interior	<ul style="list-style-type: none"> <li>Vaisala HUMICAP® Humidity and Temperature Probe HMP110</li> <li>Interior items, such as operator desk and storage shelves</li> </ul>	-
8	Sounding equipment	<ul style="list-style-type: none"> <li>Vaisala Radiosonde RS41-SG (600 g balloon with internal parachute, 3 pcs for test soundings during installation).</li> <li>Vaisala Ground Check Device RI41</li> <li>Vaisala Sounding Processing Subsystem SPS311G</li> </ul>	Order suitable radiosondes for operative use, separately.
9	Mechanical accessories	<ul style="list-style-type: none"> <li>Cable ladder</li> </ul>	-
-	Container safety structure	<ul style="list-style-type: none"> <li>Ladders</li> <li>Stairs</li> <li>Frames</li> </ul>	If container is not installed on even ground, customer is to acquire additional platform or steps for container front foor and for launcher vessel maintenance platform.

## 2.1.2 AS41 options

The following options are available for AS41.



- 1 Surface observation equipment (AWS310 or WXT536)
- 2 10-m mast for AWS310 (DKP210AV-AS)
- 3 Video recorder and web cameras for roof, launcher vessel, and robotics room



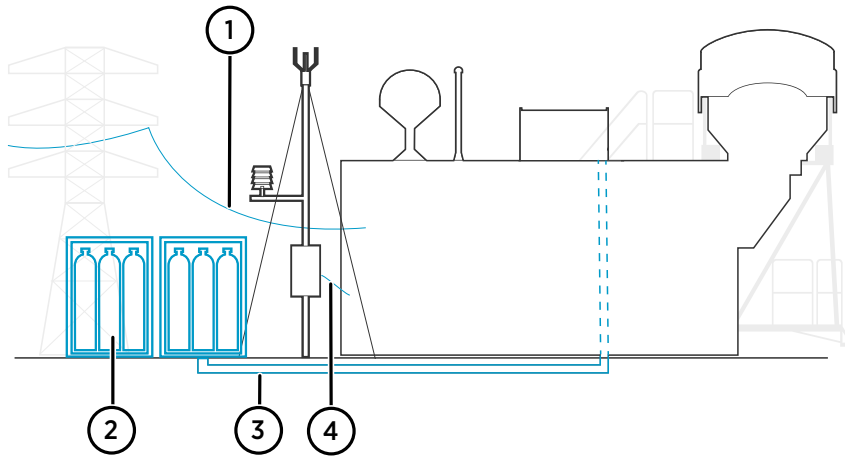
Vaisala Observation Network Manager NM10 may also be included in the delivery. NM10 consists of installations for central site and installations at the AUTOSONDE.



Gas hoses and regulators are sold separately.

### 2.1.3 Customer-provided items

Make sure that the following items are ready at the installation site before AS41 installation begins. The items are not part of the Vaisala delivery.



- 1 Powering
- 2 Gas storage, including gas regulators (2 pcs) and gas tanks
- 3 Gas hoses (2 pcs) and connectors (Swagelok connectors recommended)
- 4 Data cable (1 pc) and power cable (1 pc) for optional AWS310



It is possible to order gas hoses from Vaisala, separately. Order the gas hoses a minimum of 5 weeks before delivery, and provide the required length with the order.



A protective fence must be built around the AUTOSONDE. To make sure there is enough space for installation work, Vaisala recommends building the fence after container installations.

### More information

- [Installation preparation checklists \(page 55\)](#)

## 2.2 Safety

### 2.2.1 General safety precautions

See also *AUTOSONDE AS41 Safety Technical Reference*.



**WARNING!** Warnings precede potentially dangerous procedures throughout this manual. Instructions contained in the warning notes must be followed.



**WARNING!** Failure to comply with these precautions or with specific warnings elsewhere in these instructions violates safety standards of design, manufacture, and intended use of the product. Vaisala assumes no liability for the customer's failure to comply with these requirements.



**WARNING!** Always consult local authorities on decisions that relate to aviation safety, grounding, lightning protection, safe installation, and power supply. Follow local and state legislation and regulations.



**WARNING!** Ground the product and verify outdoor installation grounding periodically. Failure to provide proper grounding can result in injury or death from electrical shock and can severely damage the equipment.



**WARNING!** Pay attention to wind speed and direction before opening any doors or hatches.



**CAUTION!** Improper modification can damage the product or lead to malfunction. Any modification voids your warranty.



**CAUTION!** To prevent damaging the electronic devices, use only carbon dioxide fire extinguishers inside AUTOSONDE. All Vaisala warranties are immediately void after using dry chemical fire extinguisher inside AUTOSONDE.



AUTOSONDE noise level is 76 dBA.

## 2.2.2 Installation safety precautions

For maintenance-related safety issues, see *AUTOSONDE AS41 Maintenance Manual*.





**WARNING!** Follow local and state legislation and regulations on occupational safety.



Wear personal protective equipment (PPE).



**CAUTION!** To prevent damage to the balloon or to the radiosonde, and to ensure proper functioning of AUTOSONDE, follow the installation site requirements listed in this manual carefully. Take the local weather and soil conditions and other local requirements into consideration.



**WARNING!** To secure the operation of AUTOSONDE and the safety of outsiders and operator personnel, follow the instructions for fences and guarding carefully.



**WARNING!** For a safe installation, the wind speed should not exceed 10 m/s during the installation.



**CAUTION!** For a safe and smooth installation process, at least two persons are needed.



**WARNING!** To prevent damage to AUTOSONDE and to ensure the safety of the lifting personnel, use only certified belts and ropes for lifting the AUTOSONDE parts.

### 2.2.3 Safety precautions for working with hydrogen

Using proper grounding is an important precaution when dealing with hydrogen and other potentially explosive gases.



**WARNING!** When entering the AUTOSONDE launcher vessel, the basic rule is to ground yourself three times to ensure that there will be no dangerous differences of potential:

1. Ground yourself to the container when you are still some distance away from the launch tank.
2. Ground yourself to the tank.
3. Before handling a balloon with a gas leak, ground yourself to a non-leaking portion of the balloon.



**WARNING!** You will be working with explosive gas.



Wear protective clothing and eyewear.



**WARNING!** Hydrogen flames are not necessarily readily visible. Such flames can sometimes be detected by observing the movements of warm air around suspected gas fires.

## 2.2.4 ESD protection

Electrostatic Discharge (ESD) can damage electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects in the equipment housing.

To avoid delivering high static voltages to the product:

- Handle ESD-sensitive components on a properly grounded and protected ESD workbench or by grounding yourself to the equipment chassis with a wrist strap and a resistive connection cord.
- If you are unable to take either precaution, touch a conductive part of the equipment chassis with your other hand before touching ESD-sensitive components.
- Hold component boards by the edges and avoid touching component contacts.

## 3. Required tools



The following tools (not included in the product delivery) are required for maintenance tasks:

- Hex wrench set 1.5 ... 10 mm
- Socket set 4 ... 13 mm
- Plier wrench 2 pcs (for example, Knipex 86 03 250)
- Side cutters
- Snipe nose pliers
- Combination pliers
- Spanners: 7, 8, 10, 13, 17, 19 mm
- Adjustable spanner
- Wrench: 13 mm, 17 mm, 19 mm
- Screw drivers
  - Flathead
    - 0.3 × 1.5
    - 0.4 × 2.5
  - Philips
    - PH1
    - PH2
  - Pozidrive
    - PZ1
    - PZ2
  - Torx
    - TX20



Any special tools and jigs needed for AS41 maintenance are included in the product delivery.

# 4. Installation preparation steps

Table 4 Installation preparation steps

Number	Step	Instructions
1.	Selecting the installation site and planning site layout.	<a href="#">Placing AS41 (page 19)</a> <a href="#">Space requirements for installation (page 21)</a> <a href="#">Space requirements for operation (page 22)</a>
2.	Checking and ordering additional items.	<a href="#">Customer-provided items (page 12)</a> <a href="#">Installation preparation checklists (page 55)</a>
3.	Building foundations for: <ul style="list-style-type: none"> <li>• AS41</li> <li>• Gas storage</li> <li>• AWS (optional) mast and guy wires</li> </ul>	<a href="#">Basics of building foundation (page 25)</a> <a href="#">Container foundation (page 25)</a> Build the gas storage foundation following local requirements and conditions. For mast and guy wire foundations, see <i>Vaisala Tilttable Pole Mast DKP206 and DKP210 User Guide</i> .
4.	Building gas storage.	<a href="#">Building gas storage (page 38)</a>
5.	Preparing data connections, powering, and grounding.	<a href="#">Data connection preparations (page 33)</a> <a href="#">Powering preparations (page 33)</a> <a href="#">Grounding preparations (page 37)</a> Make sure electricity is available for installation work.
6.	Participating in installation. Participating in introductory training.	At minimum, reserve a contact person to the site for answering questions by the installation crew. Basic training topics include setting messages, creating sounding schedules, and NM10 pairing, if NM10 option is used.
7.	Building fences.	<a href="#">Protective fences and guarding (page 24)</a> To make sure there is enough space for AS41 installation work, we recommend building the fences after the installation.

# 5. Installation site requirements

## 5.1 Placing AS41



**CAUTION!** To prevent damage to the balloon or to the radiosonde, and to ensure proper functioning of AUTOSONDE, follow the installation site requirements listed in this manual carefully. Take the local weather and soil conditions and other local requirements into consideration.

Consider the following when selecting the installation site:



Local weather and soil conditions



Gas storage requirements, risk of gas explosion



Electricity requirements



Fire protection



Data connection requirements



Accessibility

A proper road with regular maintenance ensures that traffic to and from the site is possible in all seasons. This allows regular refills of the gas storage, for example.



Personnel wellbeing

AUTOSONDE is intended only for short-duration operator actions, not to be continuously used as a working place.

Site visits are needed every 4 weeks for preventive maintenance and for loading consumables. Time required for the tasks is normally between 10 minutes and 3 hours, whereas the total operation time depends on the number of trays in use.

### More information

- ▶ [AUTOSONDE site layout \(page 20\)](#)
- ▶ [Space requirements for installation \(page 21\)](#)
- ▶ [Space requirements for operation \(page 22\)](#)

## 5.1.1 AUTOSONDE site layout



To make sure there is enough space for AUTOSONDE installation work, Vaisala recommends building the fences after AUTOSONDE installation.

Plan fences according to local regulations. In addition to container dimensions, consider space required for easy access to the container and to the maintenance platform.

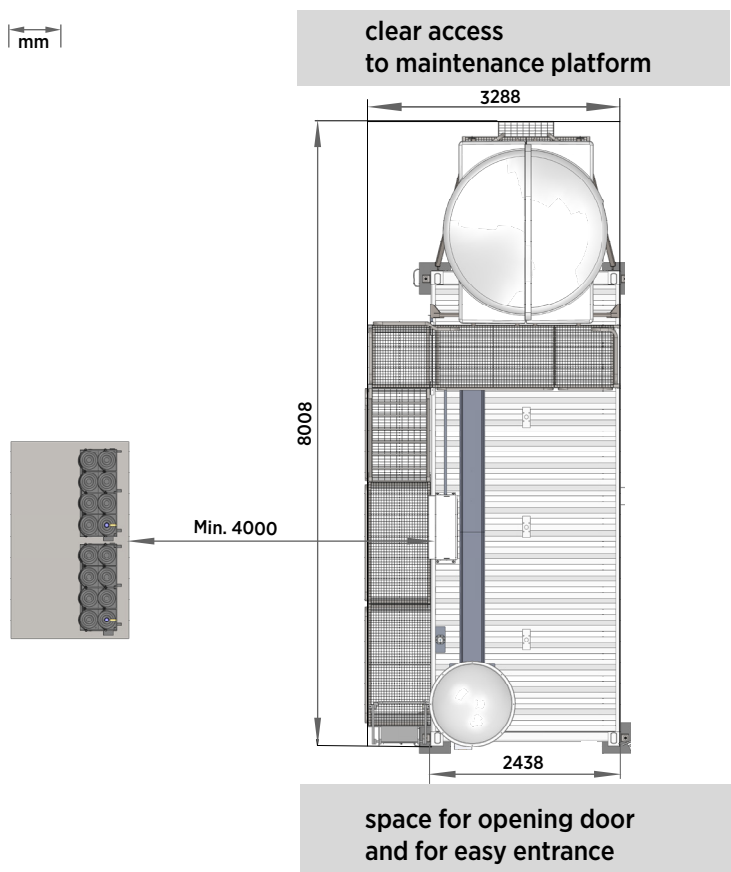


Figure 3 AUTOSONDE site layout for planning fences

### More information

- ▶ Gas storage requirements (page 24)
- ▶ Protective fences and guarding (page 24)

## 5.2 Space requirements for installation



To make sure there is enough space for AUTOSONDE installation work, Vaisala recommends building the fences after AUTOSONDE installation.



It may be necessary to temporarily dismantle parts of the fence, if it is set up before AUTOSONDE installation.

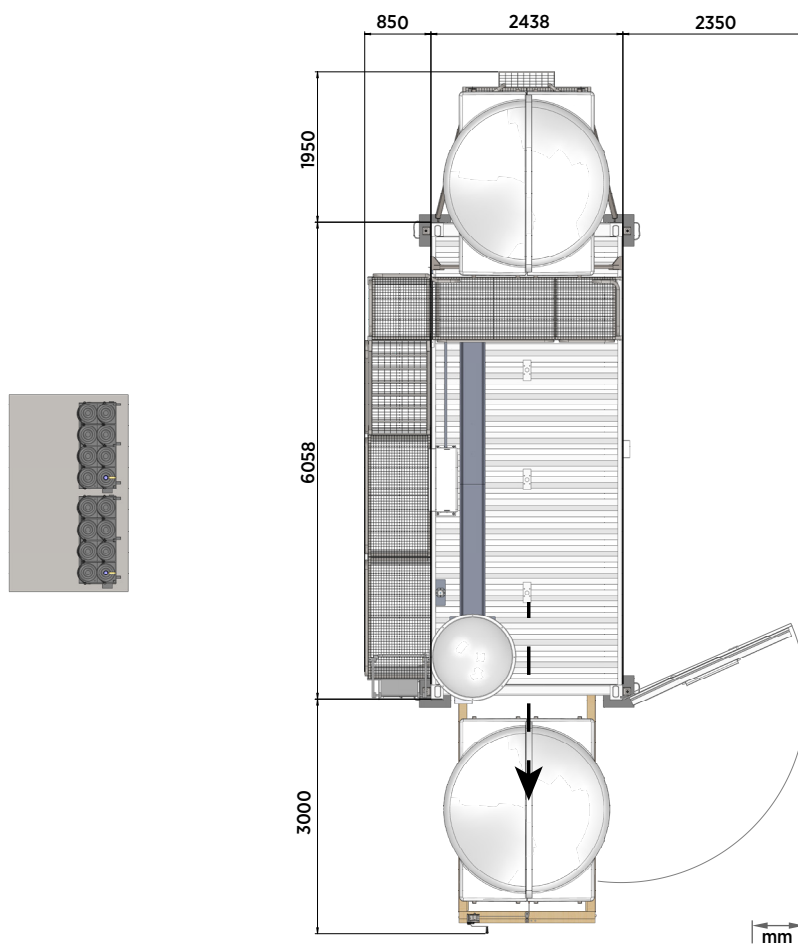


Figure 4 Space requirements for installation, top view

Take into account space required for:

- Operating the crane
- Opening the container door
- Taking the launcher vessel out of the container using a hand-operated winch
- Temporarily placing the launcher vessel

- Installation waste

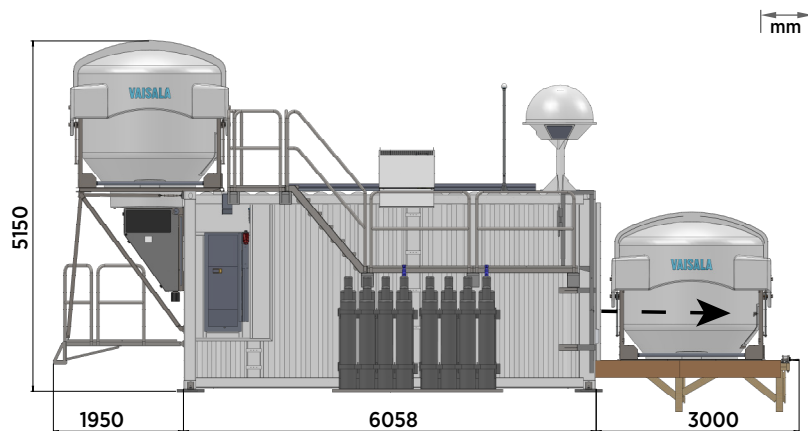


Figure 5 Space requirements for installation, side view

If AUTOSONDE is installed to an area with a pre-existing fence, the installation may need to be done on a temporary location, after which the container is lifted to the foundation by a crane. In such a case, sensitive instruments must be protected by using supportive lifting frames.

### 5.3 Space requirements for operation

Radiosonde launch must be carried out without obstruction and the AUTOSONDE site must provide an open area wide enough for this purpose. Tall objects must not be located too close to AUTOSONDE.

The distance of high masts – such as surface weather masts – from AUTOSONDE must be at least 4 times the height of the mast. With a 10-meter mast, for example, the distance from AUTOSONDE must be 40 meters in order to prevent the balloon from hitting the mast after launch.



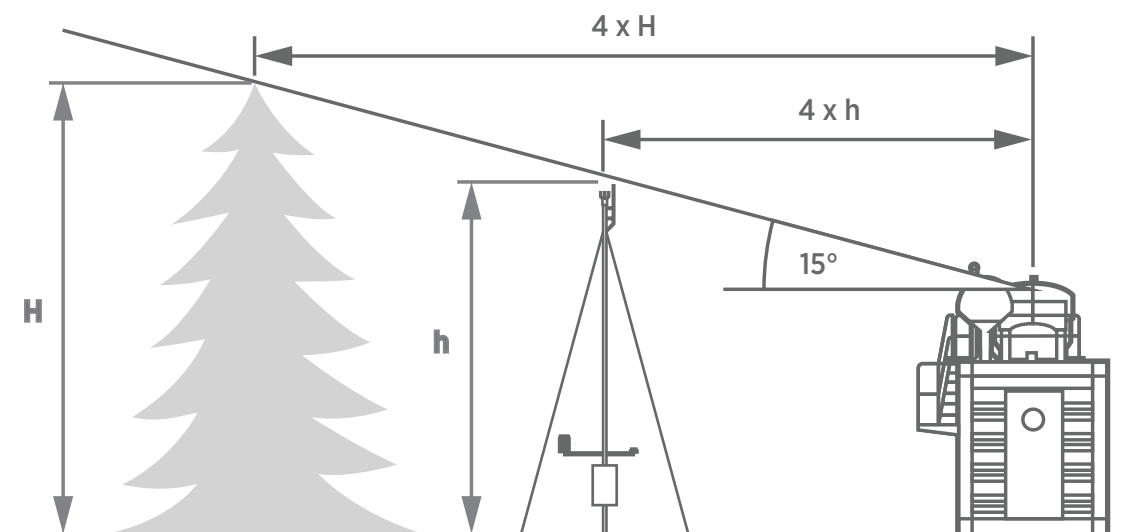


Figure 6 Maximum obstacle height

Tall buildings or mountains can hinder radiosonde signal reception. The angle to the top of such obstacles from AUTOSONDE should be less than  $10^\circ$ , so that it is possible to maintain line-of-sight to the radiosonde.

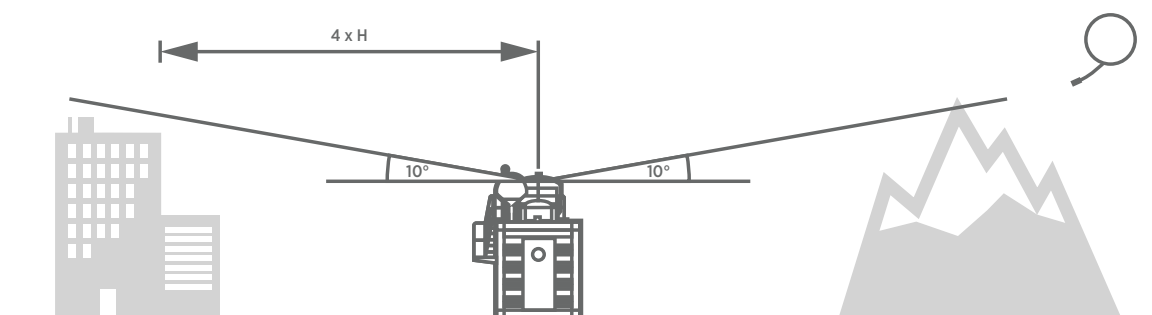


Figure 7 Signal path line-of-sight requirement

### 5.3.1 Surface observation requirements

There are two surface observation options available for AUTOSONDE AS41:

- Vaisala Automatic Weather Station AWS310
- Vaisala Weather Transmitter WXT536 (delivered with AUTOSONDE and installed on the container by Vaisala)

The AWS310 is installed on a 10-m mast. The mast must be located at least 40 m from AUTOSONDE.

The signal cable and the power cable are fed from the AUTOSONDE container to the AWS mast. The armored signal cable includes 4 pairs of wires needed for data transmission between the AWS and the AUTOSONDE system. The power cable is for 230 VAC power supply for the AWS system.

The standard length of the cables is 75 meters. The cables are not included in the delivery and are available for ordering from Vaisala. The signal cable (225650) and the power cable (225651) can be set into a cable ditch where a cable duct is recommended.



When ordering the cables, use the item codes provided and specify the needed length. If you want to source the cables locally, make sure that the cables fulfill the following minimum specifications:

- Data cable: JAMAK ARM 4x(2+1)x0.5 mm<sup>2</sup>, Draka or equivalent
- Power cable: MCMK 2x1,5 +1,5

All cables must be suitable for ground installation. Cable ducts are recommended.

### 5.3.2 Gas storage requirements

If hydrogen is used, the minimum distance of the gas storage from the AUTOSONDE container is 4 meters. The gas storage can be installed on either side of the container, but Vaisala recommends installing the gas storage according to the layout figures. If you install the gas storage on the other side of the container, contact Vaisala for instructions on how to install the gas hoses.

### 5.3.3 Protective fences and guarding



**WARNING!** To secure the operation of AUTOSONDE and the safety of outsiders and operator personnel, follow the instructions for fences and guarding carefully.

For safety reasons, AUTOSONDE is operated in an environment that is normally off-limits to the general public. Prevent intruders from entering the area by arranging either a fence with appropriate warning signs, or guarding.

Take the installation site and local regulations into account when determining the fence required. Both AUTOSONDE and gas storage must be fenced in.

- Reserve an area large enough for AUTOSONDE operational use.
- Arrange warning signs according to local regulations. Potential hazards include hydrogen gas, falling ice and snow when the launcher vessel covers are opened, and the automatic start mechanism.
- Prevent outsiders from going up to the roof. Use a ladder guard on the ladder, and install a warning sign to inform of the danger caused by the moving launcher vessel covers.



**WARNING!** When the covers at the top of the launcher vessel open, heavy snow or ice may fall down. Make sure that the area around the launcher vessel is clear of people before the covers open.

Normally, operator personnel do not need to enter the most dangerous areas where explosive or mechanical hazards are concentrated.

# 6. Building foundation

## 6.1 Basics of building foundation



**CAUTION!** Installing the product is only allowed by authorized Vaisala personnel or by authorized customer representative only after receiving the specific training from Vaisala.

Build the AUTOSONDE foundation following the local requirements and weather conditions. The base must be stable enough so that the weather conditions will not be able to move the container position. The foundation must be ready when the AUTOSONDE container is transported to the site.



The foundation area must be large enough, particularly in arctic regions, extending to approximately 3 meters from all container walls.

If you have a ready foundation for AUTOSONDE AS15, it is likely that you can use the current foundation for AUTOSONDE AS41. If you are planning to use the current AS15 foundation for the AS41 installation, contact Vaisala technical support for detailed information on how to proceed.

## 6.2 Container foundation

AUTOSONDE is delivered with side twist locks for anchoring the container on a concrete foundation or on a steel frame. The side twist locks are attached on the long side wall of the container.

When building the foundation, make sure that the AS41 is leveled with the help of shim plates in accordance with the limitations in standard *DNVGL-CG-0060, 2016* as shown in the following figure:

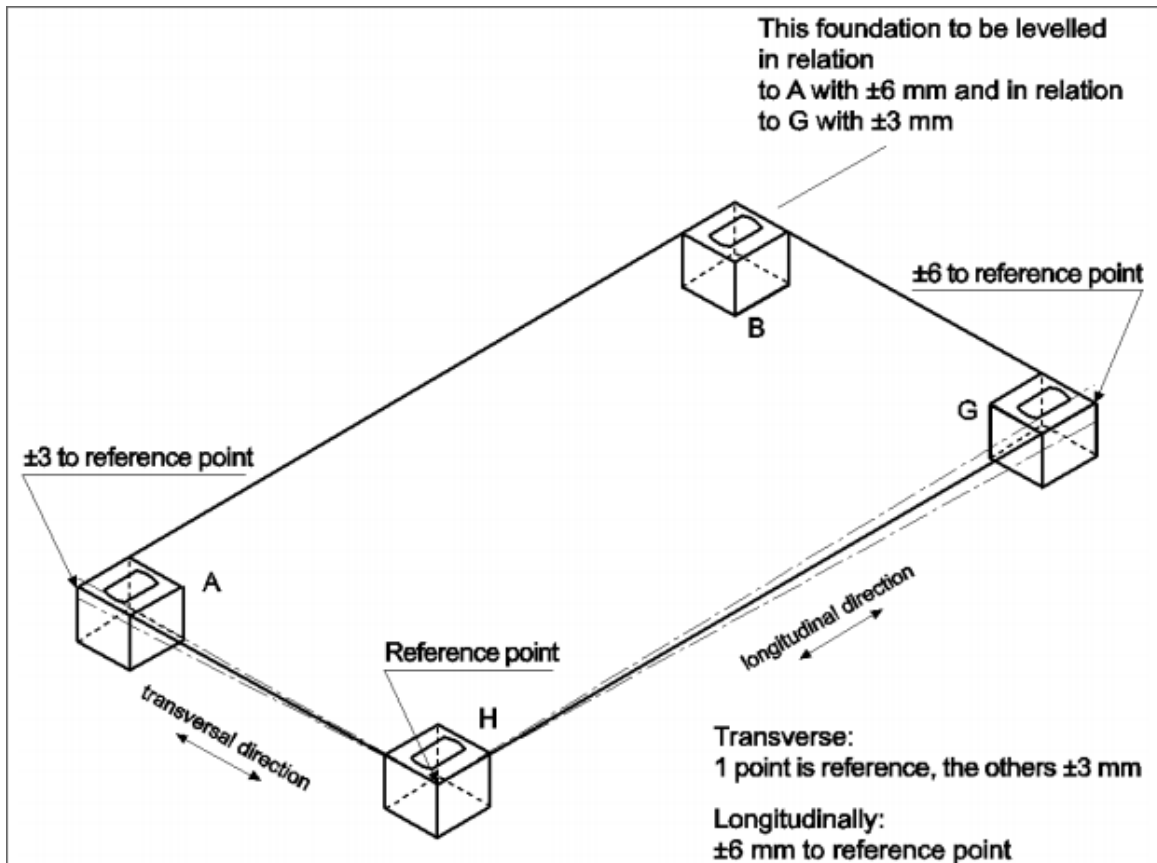


Figure 8 Container securing, DNV-GL-CG-0060, 2016

When building a concrete foundation, take into account the following requirements:

Table 5 Requirements for building the concrete foundation

Requirement	Value
Nominal anchorage depth	92 mm
Depth of drill hole	$\geq 100$ mm
Minimum base material thickness	160 mm
Minimum edge distance	75 mm

For all types of foundations, take into account the allowed distances and maximum loads shown in the following figures:

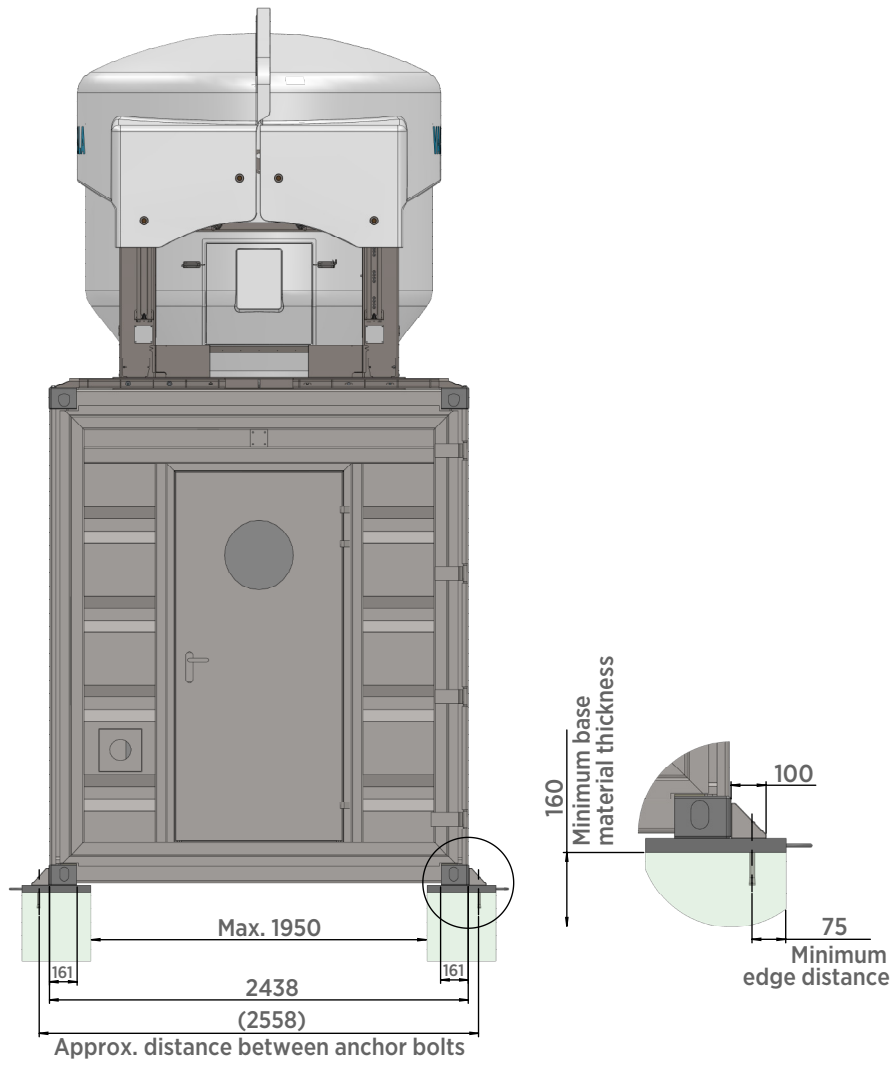


Figure 9 Distances for container foundation, front view

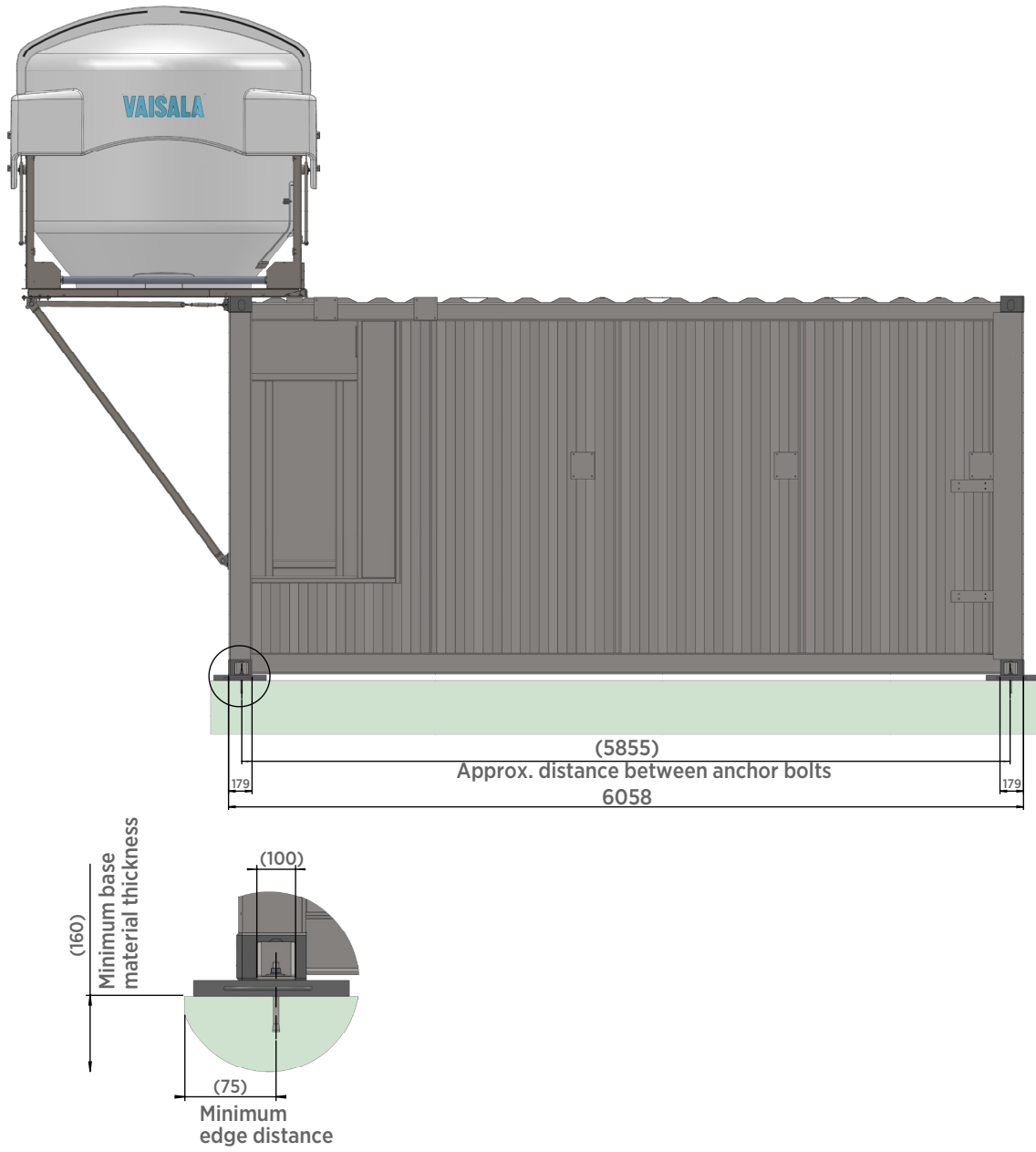


Figure 10 Distances for container foundation, side view

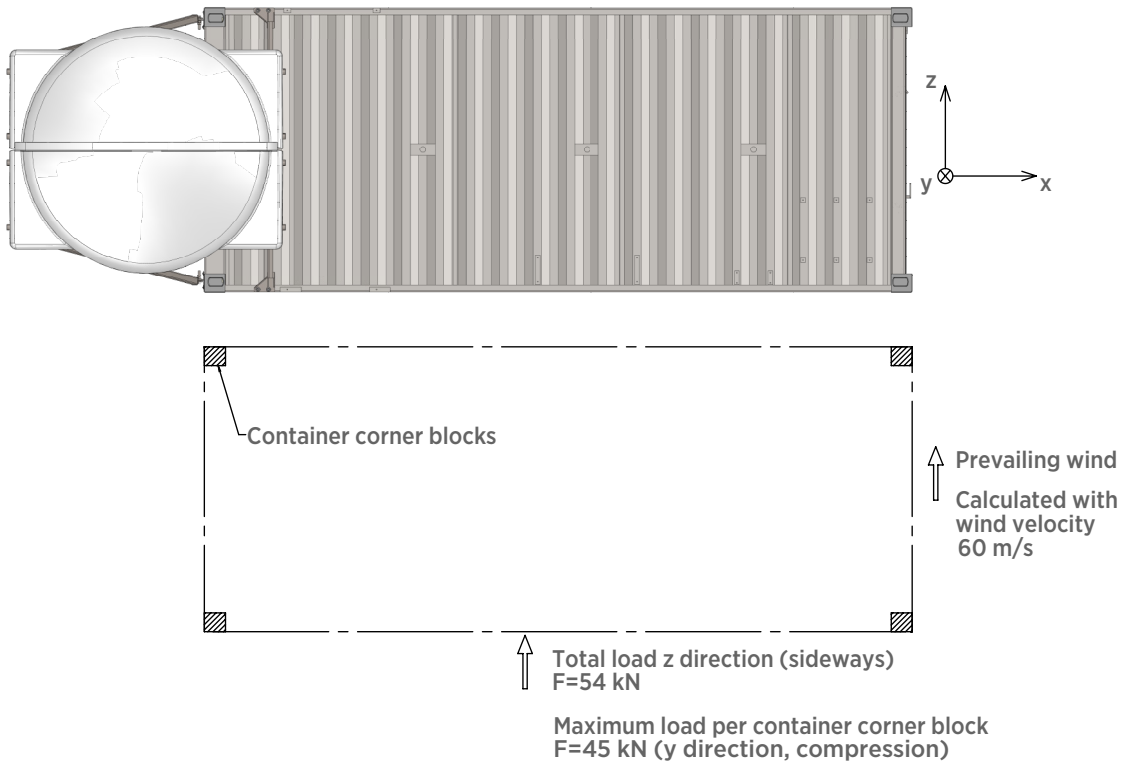


Figure 11 Maximum loads for container foundation

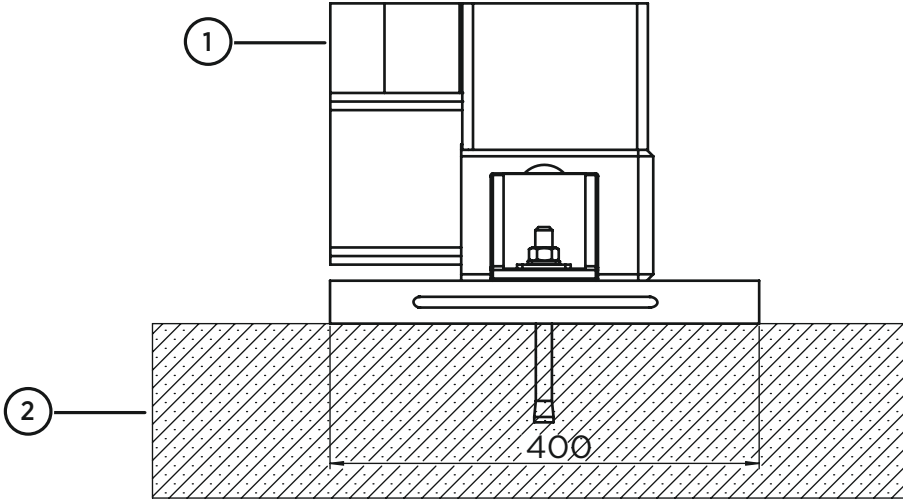
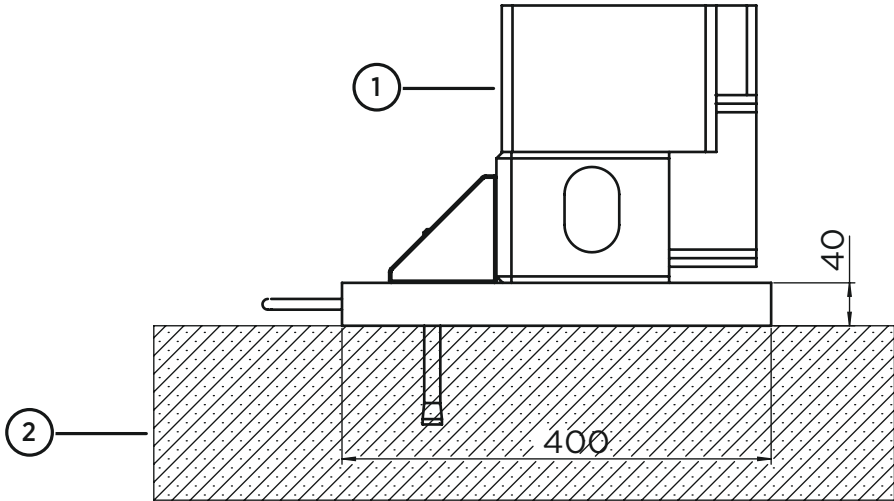


Figure 12 Anchoring to concrete foundation

- 1 Container
- 2 Foundation



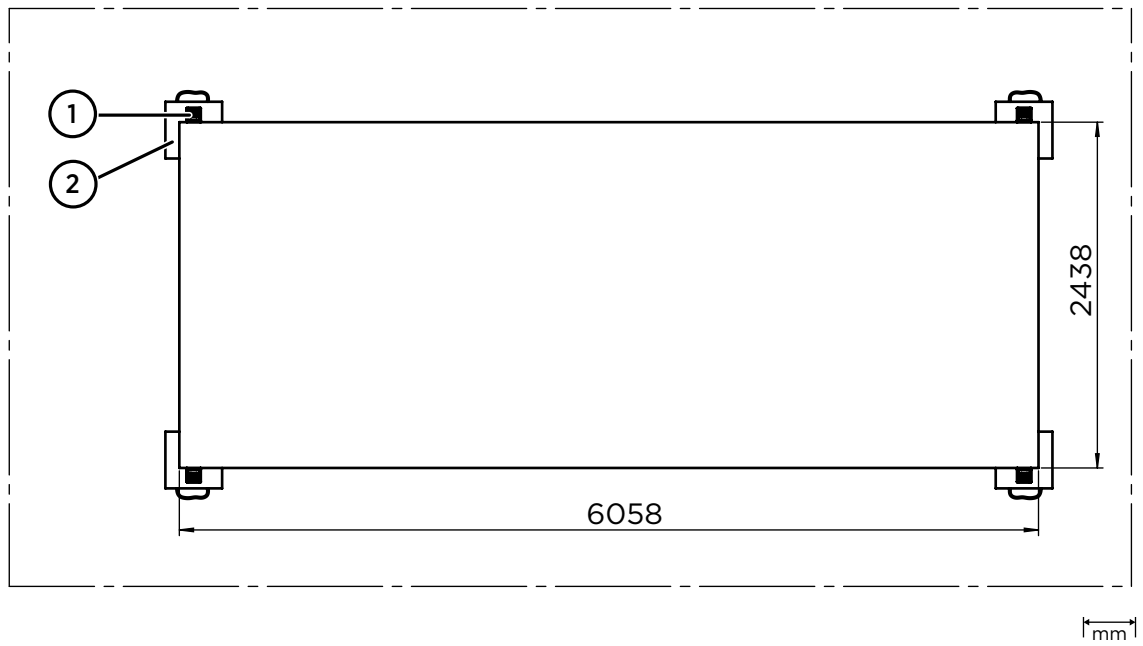


Figure 13 Locations for side twist locks and outrigger pads

- 1 Side twist lock
- 2 Outrigger pads

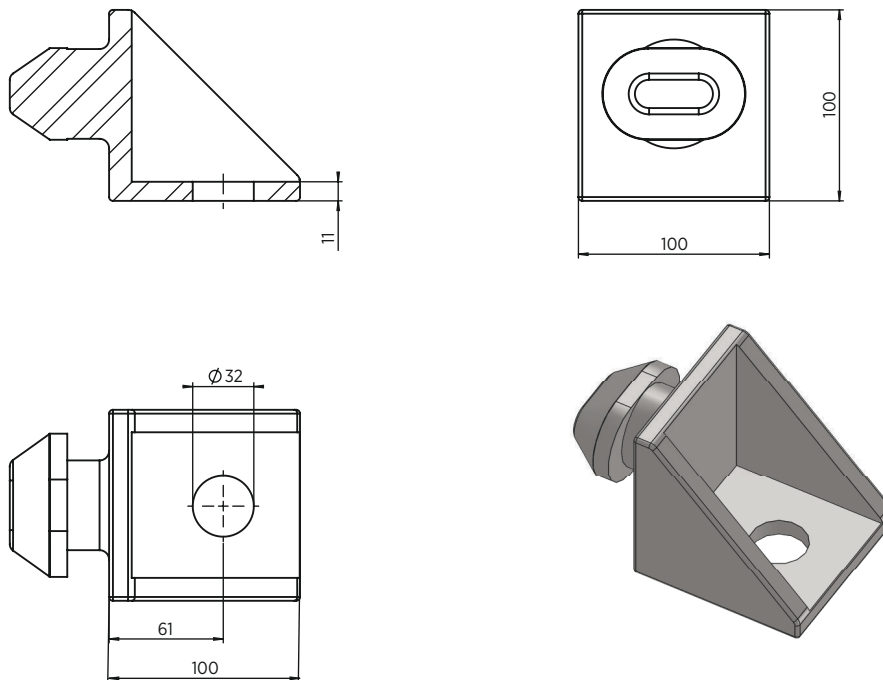


Figure 14 Side twist lock details

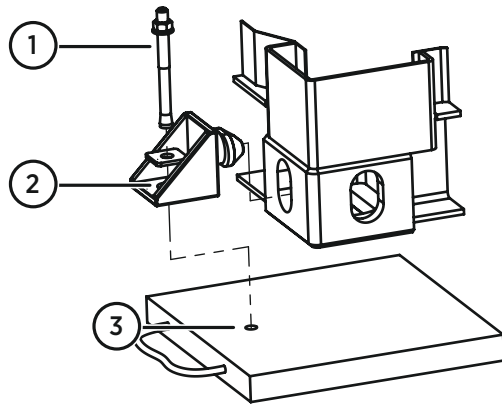


Figure 15 Anchoring with side twist locks

- 1 Wedge anchor, M16×182
- 2 Side twist lock
- 3 Drilled hole for the anchor bolt, hole depth 150 mm

# 7. Preparing site

## 7.1 Data connection preparations

Before AS41 installation:

- Plan data connections to and from AUTOSONDE sounding station, such as:
  - Telephone line
  - LAN
- Order related data cables and connection services from a local service provider
- Install data connections and protect the cables in the ground



Make sure that the data cables reach inside the container. Reserve 15 meters of free length from the ground outside container to the operator desk. Other cabling inside AS41 is provided by Vaisala.

During AS41 installation, the cables are directed through an inlet in the container wall inside the container.



**CAUTION!** The telecom cabling must not be located in the air near the AUTOSONDE container. The released balloon and radiosonde can be damaged if they hit the cables.

## 7.2 Powering preparations



In all mains power installations, local or national regulations must be taken into account.

Before AS41 installation:

- Consider requirements for AC (mains) power
- Place a lockable electrical junction box for AC (mains) power near planned AUTOSONDE location
- Install a suitable power cable at the junction box end

Table 6 AC (mains) powering options

	5-wire system	3-wire system
<b>Powering</b>	400 VAC, 50 Hz	230 VAC, 50 Hz
<b>Variation allowed</b>	±10 %	±10 %

	5-wire system	3-wire system
<b>Max. power Consumption</b>	5500 W	5500 W
<b>Cable cross-section</b>	Min. $5 \times 6 \text{ mm}^2$ for a copper wire When calculating required cross-section, consider required cable length.	Min. $3 \times 10 \text{ mm}^2$ for a copper wire. When calculating required cross-section, consider required cable length.
<b>Wires</b>	L1, L2, L3, N, PE	L1, N, PE
<b>Main circuit breakers</b>	$3 \times 20 \text{ A}$ Each phase must function independently.	25 A The system can be connected to a single-phase supply by short-circuiting the circuits in the mains connection box.



**CAUTION!** Do not use an external residual-current device for the AC (mains) power.

AUTOSONDE electronic cabinet includes fault current protection for general purpose power outlets. If a residual-current device is connected to the AC (mains) feed, AUTOSONDE does not work. This is because servo drives and frequency converters (AC drives) in the electric cabinet create leakage currents that activate the residual-current device.

Table 7 AC (mains) power cable

Item	Description
Connector	<ul style="list-style-type: none"> <li>5-wire: 2 A 5-pin EN60309 connector with 3P + N + E socket. Open-end, connected to the plug next to the air conditioner. (Included in the delivery)</li> <li>3-wire: open-end wire connected to the mains connection box inside the container.</li> </ul>
Cable length	Calculate required length from junction box to AUTOSONDE wall, and add 5 meters of free length.

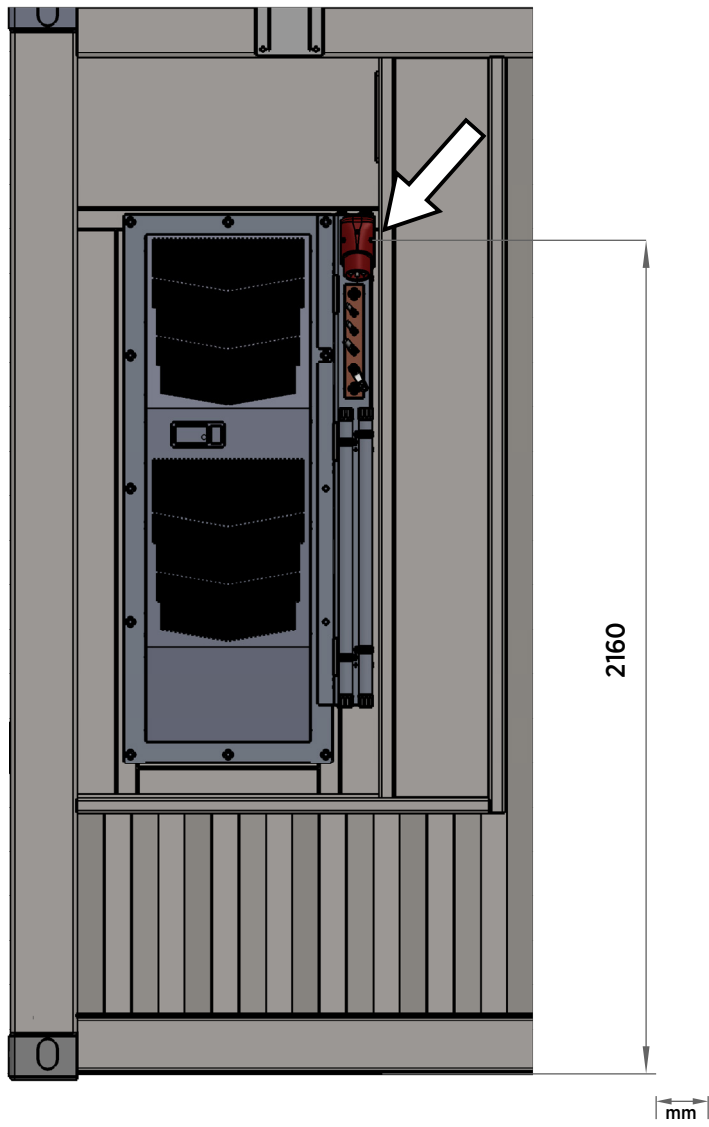


Figure 16 Main power connector (EN60309) height

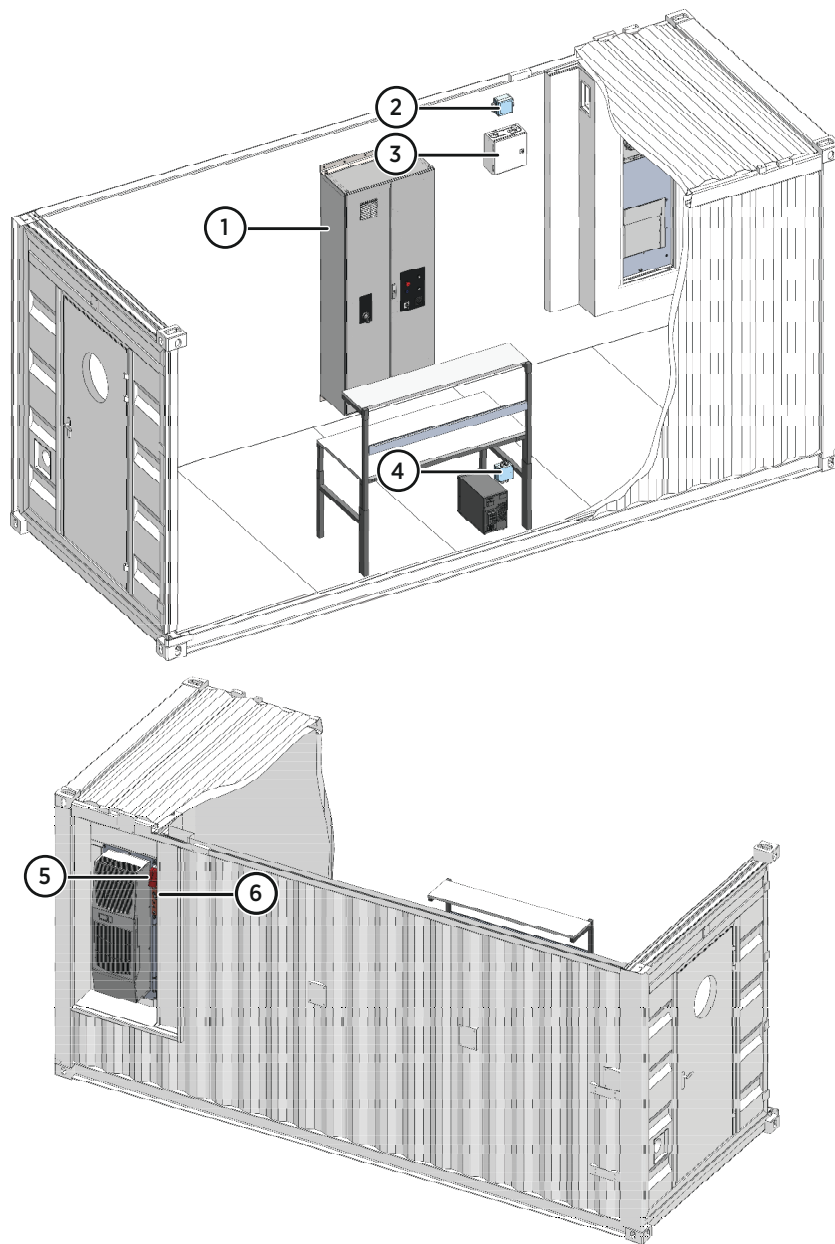


Figure 17 AS41 electrical connections in the container

- 1 Electric cabinet
- 2 AWS connection box
- 3 Mains connection box
- 4 UPS connection box
- 5 Main power connection
- 6 Main grounding point

## 7.3 Grounding preparations

Before AS41 installation, plan and purchase the external grounding for AS41 container:

- Main grounding cable for the container (1 pc, 35 ... 50 mm<sup>2</sup>)
- Ground electrode compliant with local conditions and legislations

The grounding electrode can be either a pure copper grounding ring around the container or a rod buried on the ground according to local conditions and legislations. During installation, as the grounding outside the container is finalized, the cable is connected to a cable terminal in the main grounding bar (unless otherwise instructed by the local authorities and regulations), which is located next to the air conditioner unit.

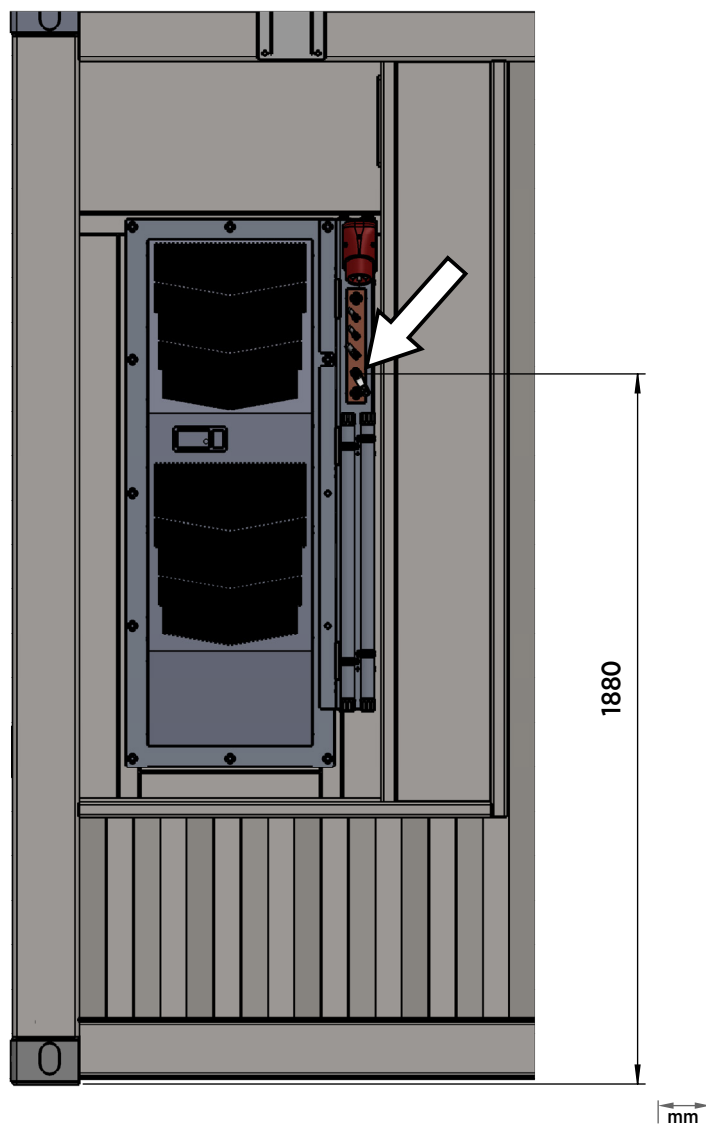


Figure 18 Height of cable terminal on main grounding bar

All AS41 electrical devices have grounding for fault protection and work safety.

The grounding takes care of:

- Electrical ground (3-wire or 5-wire system)
- Lightning protection ground
- Explosion protection ground
- Sounding system ground

## 7.4 Building gas storage

The customer is responsible for building a gas storage that complies with local safety instructions and construction rules.

At its simplest, the gas storage can be a plain base for 2 or more gas banks. The 2 gas tubes from AUTOSONDE must reach both gas batteries. Note that the gas pressure regulators are fixed to the tubes and are connected to the common output of the gas batteries.

The gas storage must be large enough to accommodate 2 or more gas banks, each including several gas cylinders. Other storage dimensions depend on the transportation and handling of the gas batteries: what type of truck and lifting system is used, or in what position the gas batteries stand (connector to one side or connector up).

If lighting is necessary in the gas storage, Vaisala recommends the use of a spot light far enough from the storage. You can also use Ex-protected lights, but in such a case you must observe the local regulations. The AUTOSONDE electrical cabinet contains an optional connection for the gas storage lamp.

Grounding is not needed for wooden gas storage buildings, because the gas pipes include ground cables with connecting clamps to the gas battery. With other building materials, you must arrange appropriate grounding.



After building the gas storages and the gas lines, make sure to check the cleanliness of the gas system and flush it with pressurized inert gas before connecting the gas lines to AS41.

### 7.4.1 Regulators

The regulators supplied by the customer are normally of local type. Vaisala can also deliver the regulators, if necessary. In this case, the type of the connection to the gas bank must be known. The regulators must be of excellent quality, otherwise they can prevent the whole AUTOSONDE system from functioning properly.

Table 8 Recommended regulator specifications

Component	Specification
Input pressure	According to the used maximum pressure of the gas storage.



Component	Specification
Two-stage regulator	Two-stage gas pressure regulators reduce cylinder pressure in two steps, and they provide constant delivery pressure without periodic readjustment. First stage decreases the high pressure to approximately 15 bar.
Output pressure	2 ... 5 bar adjustable Must not vary more than $\pm 0.5$ bar when the flow rate is between 350 ... 600 l/min at temperature range $-25 \dots +50$ °C
Flow rates	Helium: <ul style="list-style-type: none"> <li>• Recommended flow rate: 350 l/min</li> <li>• Max. flow rate: 500 l/min</li> </ul> Hydrogen: <ul style="list-style-type: none"> <li>• Recommended flow rate: 400 l/min</li> <li>• Max. flow rate: 600 l/min</li> </ul>
Input pressure gauge	According to the maximum pressure
Output pressure gauge	0 ... 12 bar
Safety valve	Recommended: 7 bar Max: 11 bar



The minimum pressure inside the gas measurement system should be 2.0 bar, and the recommended pressure is 2.5 ... 3 bar. In case of long gas lines, make sure to take into account the pressure loss throughout the line.

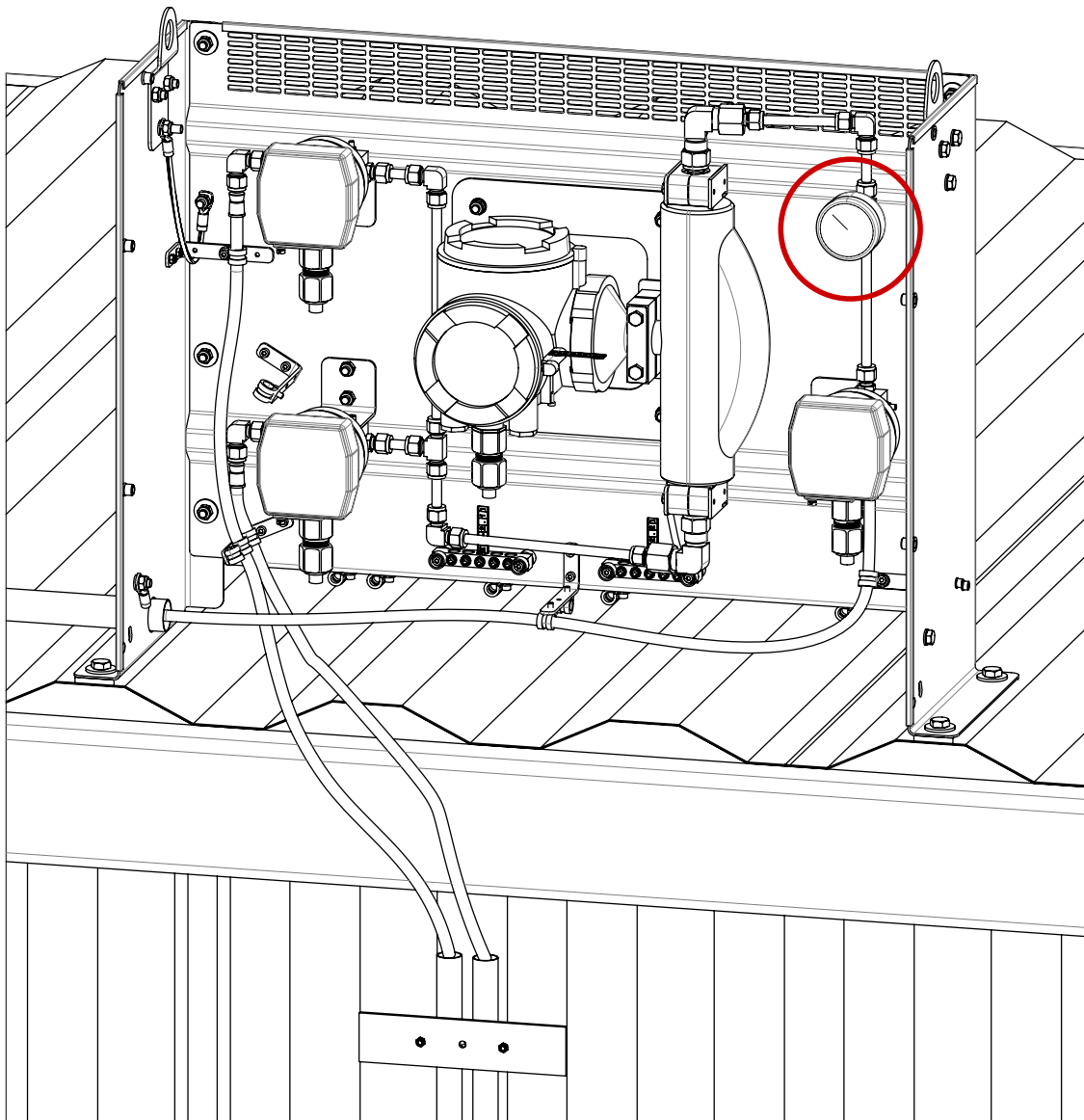


Figure 19 Pressure gauge in gas measurement system

## 7.4.2 Gas hoses

The standard AUTOSONDE delivery does not include gas hoses, but they can be supplied by Vaisala on request. Use high-quality, armored hoses. Swagelok FL series stainless steel metal hoses are recommended. The hoses are certified for a pressure of 103 bar, but usually only up to 5 bar is used (regulator adjustment). The minimum length for gas hoses is 10 m, which is suitable when the distance between the gas storage and AUTOSONDE is 4 m.



It is possible to order gas hoses from Vaisala, separately. Order the gas hoses a minimum of 5 weeks before delivery, and provide required length with the order.

During AS41 installation, gas hoses are drawn from the AUTOSONDE roof to the gas storage. Make sure that they reach the gas regulator connectors.

### 7.4.3 Gas hose connectors



Ordering the following Swagelok connectors for gas measurement system end is recommended. When you order the gas hoses from Vaisala, the gas hose connectors are included in the delivery.



Figure 20 Hose connector to gas measurement system

Table 10 Hose connector to gas measurement system

Tube adapter size	Nominal hose size designator	End connection designator	Minimum inside diameter	Maximum outside dimension
3/8 (inches)	4	TA6	6.9 mm	16.8 mm

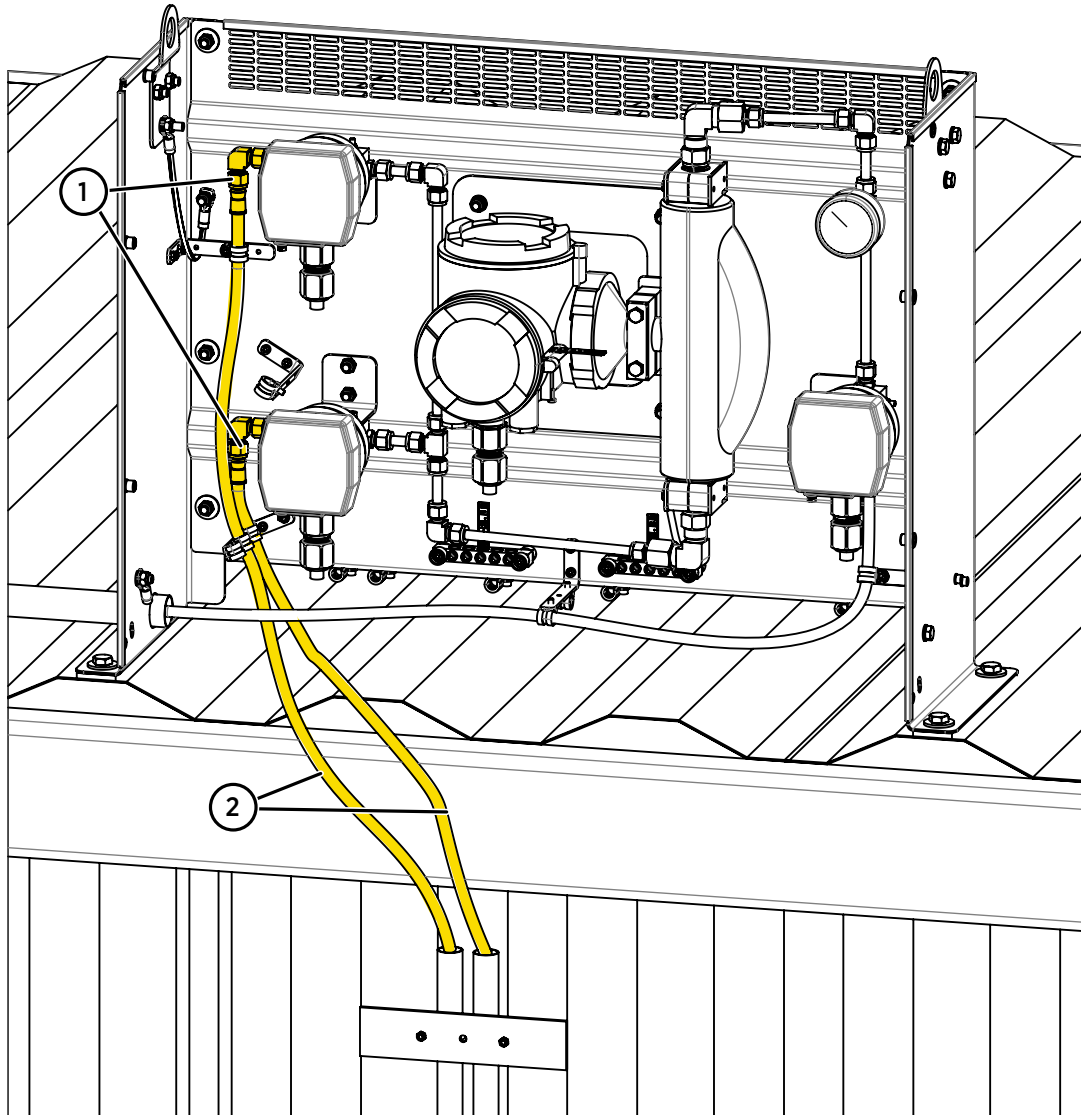


Figure 21 Hose connectors attached to the gas measurement system

- 1 Gas hose connectors (2 pcs, male) attached to valves (2 pcs, female connectors)
- 2 Gas hoses (2 pcs) led to the gas regulator



When you order the gas hoses from Vaisala, the following gas hose connectors are included in the delivery.



Figure 22 Hose connector to gas regulator

Table 11 Hose connector to gas regulator

Male pipe thread NPT	Nominal hose size designator	End connection designator	Minimum inside diameter	Maximum outside dimension
1/4 (inches)	4	PM4	7.1 mm	20.3 mm

## 7.5 Preparations for unloading and installation

Make sure that the following is available at the installation site:

- Crane or cranes for installation
- Ladders (4.5 m)
- An area or a container for installation waste



If you want to open the container before the installation crew arrives at the site, use bolt cutters to remove the 8-mm bolt seal from the entry door.

Check lifting tasks and masses from the following table. It is possible that one crane is sufficient for AS41 installation.

Table 12 Crane use during AS41 installation (indicative)

When	Machinery	For	Mass (kg)	Description
Delivery to site	Larger crane (or truck with crane)	Transporting packed container. Lifting packed container to its foundation or to a temporary location for handling installations.	7500	-
First day	Smaller crane	Lifting launcher vessel to a location on the ground, where installation is done. Lifting launcher vessel to its final location on the container.	600	The launcher vessel must be drawn out of the container using a winch available inside the container.
First day	Smaller crane	Lifting antenna, wooden support frame, and chamber bottom from launcher vessel.	90	-
First day	Smaller crane	Lifting stairs to their correct location on the container.	50	-
First day	Smaller crane	Lifting telemetry antenna on container roof.	50	-
First day	Smaller crane	Lifting gas measurement system on container roof.	50	-

When	Machinery	For	Mass (kg)	Description
Second day	Larger crane	Lifting an installed AS41 to its foundation.	7500	<p>Required when site specifications are not aligned with Vaisala site plan and the installation needs to be done on a temporary location.</p> <p>For calculating required crane capacity, provide:</p> <ul style="list-style-type: none"> <li>• Customer-modified site plan</li> <li>• Mass</li> <li>• Center of mass</li> <li>• Lifting distances and height</li> </ul> <p>Lifting frames must be used for protecting the equipment.</p>

#### More information

- [Installation preparation checklists \(page 55\)](#)

### 7.5.1 Lifting installed AS41 to its foundation

If there is not enough space at the final site, AS41 may need to be installed on a temporary location and then lifted by a crane to its foundation.

Make sure that adequate lifting frames are used for protecting the launcher vessel and the sensitive instruments.

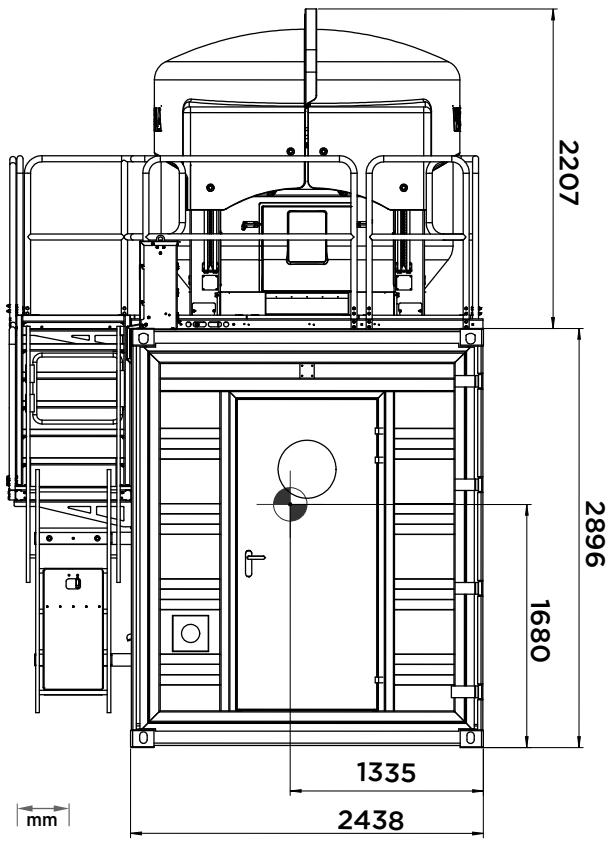


Figure 23 Center of mass

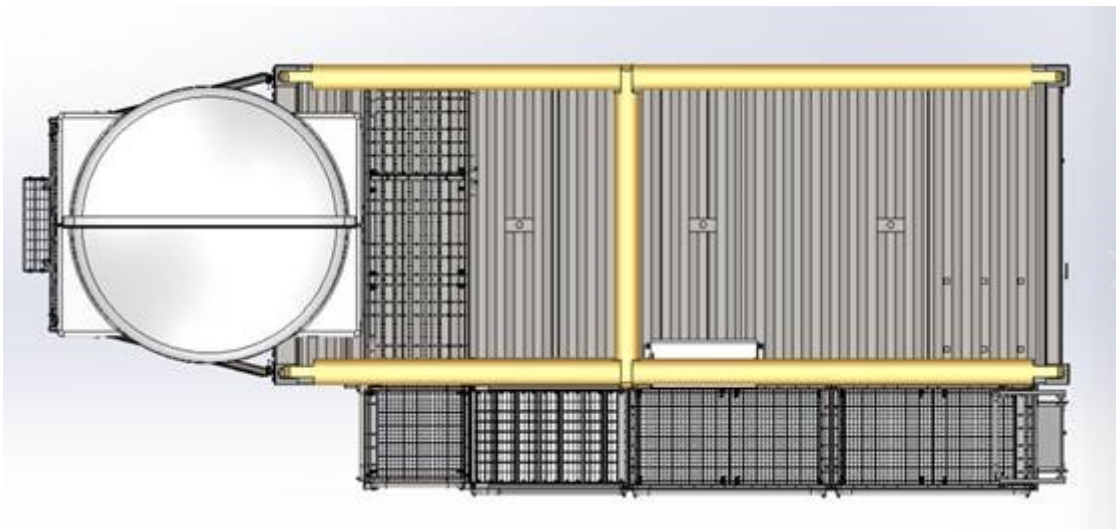


Figure 24 Lifting frames example, top view

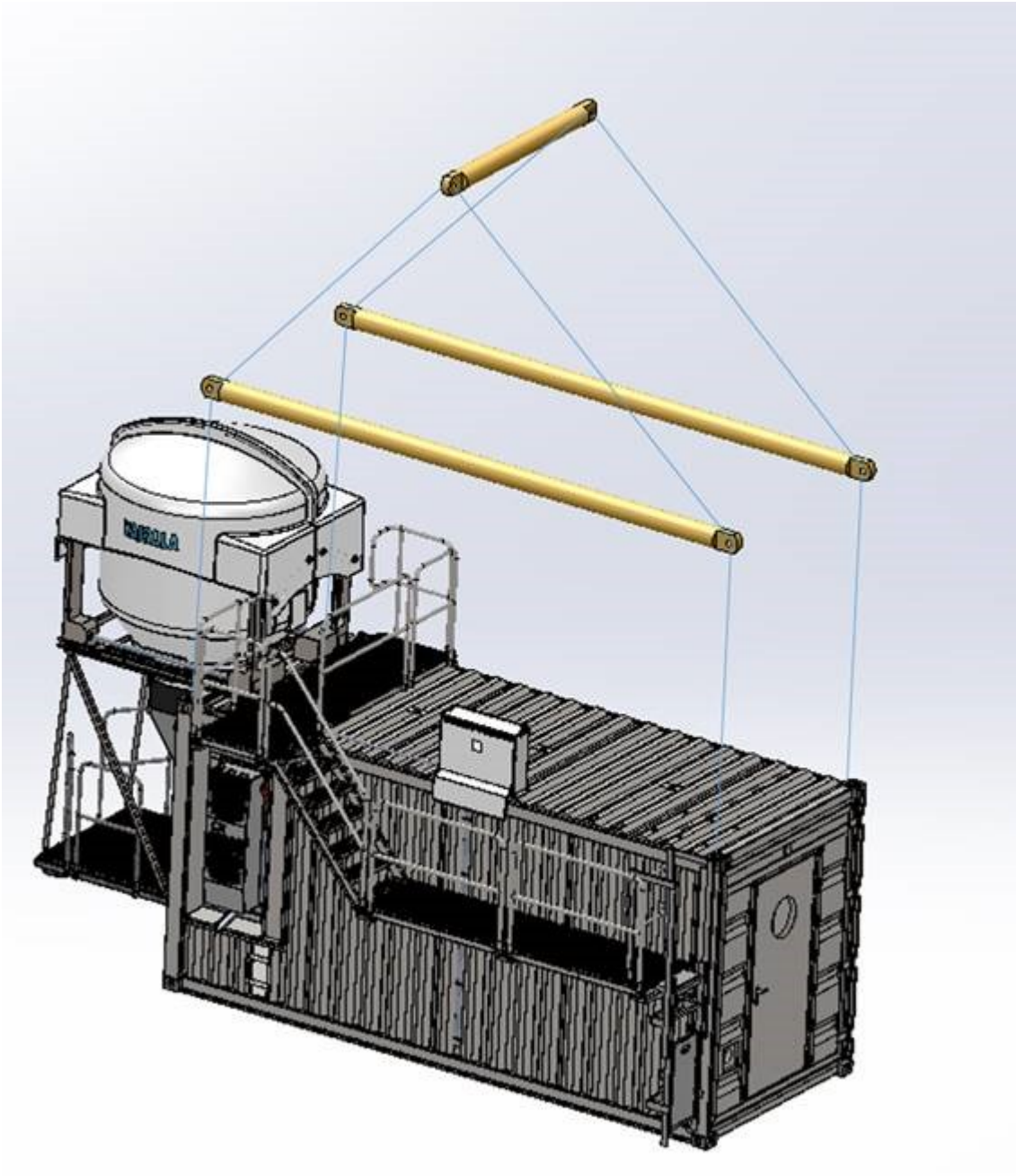


Figure 25 Lifting frames example, side view



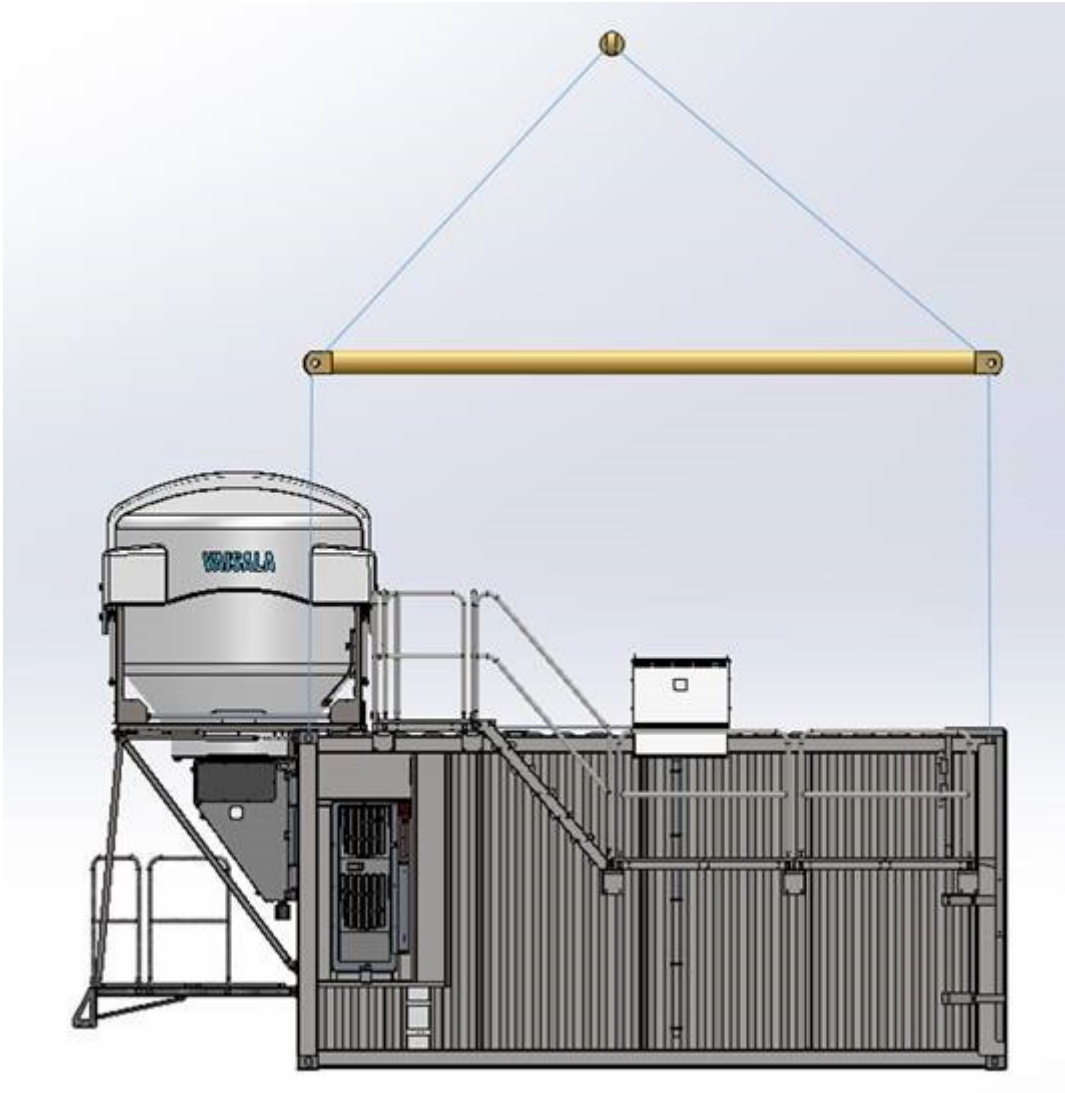


Figure 26 Example of lifting AS41, side view

## 8. Packing and transportation



Make sure to thoroughly check the outside and the inside of the container for any sign of damage. If there are any damages, it is important to document them with pictures and descriptions.

The AUTOSONDE container can be transported either by sea or by land.

The container has a CSC safety approval, which means that it can be stacked and transported on board a ship as one sea container. For transportation, all AUTOSONDE parts, including the launcher vessel, are packed inside the 20-foot HC container. The total weight of the container is 7.5 t.

CSC safety approval is valid 5 years from the inspection. Date of the safety approval is available in the CSC plate. If CSC safety approval is needed after the expiration, the customer must order a separate inspection from an approval agency.

Within Europe, transportation normally takes place by truck. Usually, the container is lifted to a trailer which is pulled by a truck with a crane capable of lifting the container.

The crane used in AUTOSONDE installation must have a minimum lifting capacity of 75 metric tons.



Figure 27 AUTOSONDE container lifted for transportation

## 9. AS41 specifications

Table 13 Automatic Sounding Station Vaisala AUTOSONDE® AS41

Property	Description/Value
Loading capacity	60 radiosondes
Storage capacity for consumables	4 months (2 soundings a day)
Radiosonde	RS41-SG, RS41-SGP
Sounding workstation	<ul style="list-style-type: none"> <li>• Sounding system software preinstalled</li> <li>• Operating system Windows 10 preinstalled</li> <li>• AUTOSONDE Control software preinstalled</li> <li>• System recovery tools, including USB drive with recovery image</li> </ul>
Vaisala Sounding Processing Subsystem	SPS311G, SPS341AG
Antennas	Telemetry antenna (directional UHF) GPS antenna
Automatic ground check device	RI41-AS41
Uninterrupted Power Supply	Options for 1 hour and 3 hours
Surface observation options	<ul style="list-style-type: none"> <li>• AWS310, sensors on separate 10-meter mast, complies with WMO CIMO guide 8</li> <li>• WXT536, sensors on short mast attached to the container</li> </ul>

Table 14 Electrical specifications

Property	Description/Value
Main electric cabinet	Located inside the container Includes surge arresters, circuit breakers, residual current devices, mechanics controller, safety controller, servo drives, and frequency controllers.
Mechanics controller	Industry standard programmable logic controller with analog and digital I/O and electric motor controls.
Input power	400 VAC 50 Hz 20 A, 3-phase 230 VAC 50 Hz 25 A, 1-phase
Max. power consumption	5500 W
Average power consumption	Under 1000 W
Cabling	Halogen-free
Wall sockets	Integrated in the operator desk
Lights	Ceiling light with presence detector Remotely controlled robotics room lights
Heater	1000 W with thermostat

Property	Description/Value
Air conditioner with heating functionality	2000 W
UPS	Capacity for completing one ongoing sounding

Table 15 Mechanical specifications

Property	Description/Value
<b>Container</b>	
Dimensions during transportation (L × W × H)	6058 × 2438 × 2896 mm Transports as CSC-approved 20-foot HC sea container
Dimensions during operational use (L × W × H)	7800 × 3300 × 5100 mm
Dimensions of access door with window (L × H)	900 × 2100 mm
Total weight with launcher vessel	7.5 t
<b>Launcher vessel</b>	
Vessel tube dimensions	Ø 2 m
Vessel tube material	Acid-proof steel frame Separate from the container
Covers	2 pieces, operated by electric gearmotors
Cover dimensions	Ø 2 m, inside
Cover material	Laminated fiberglass
<b>Gas flow measurement</b>	
Gas flow measurement unit	<ul style="list-style-type: none"> <li>Installed on the container roof</li> <li>2 flexible input gas hoses controlled by magnetic gas valves</li> <li>Connection to gas regulator</li> <li>Output hose to nozzle controlled by magnetic valves</li> </ul>
Gas flow meter	With electrical current output Maintenance-free, no moving parts Automatic measurement of gas amount
<b>Balloon</b>	
Balloon size	200 ... 1200 g
Balloon filling gas	Hydrogen or helium
Nozzle	Connected to the balloon during loading Gas-proof connection
<b>Container outdoor painting color codes</b>	
White	RAL9003
Gray (for the container access door)	RAL7035

Property	Description/Value
<b>Container painting color types for outdoors</b>	
First coating	Interzinc 52
Second coating	Intergard 475HS Interseal 1052
Third coating	Interthane 990SG

Table 16 Operating environment

Property	Description/Value
Operating temperature	-40 °C ... +53 °C
Operating humidity	0 ... 100 %RH, condensing
Max. operating wind speed	25 m/s
Surviving wind speed	60 m/s
Storage temperature	-40 °C ... +53 °C
Storage humidity	0 ... 100 %RH, condensing

Table 17 Compliance

Property	Description/Value
Explosive atmospheres Part 14: Electrical installations design, selection and erection	IEC 60079-14 (2013), IEC 60079-10-1 (2015)
Machine safety	Machinery Directive 2006/42/EC

Table 18 Remote server

Property	Description/Value
Vaisala Observation Network Manager software NM10	Preinstalled
Operating system	Windows 10 preinstalled
System recovery tools	Including USB drive with recovery image

Table 19 Workstation requirements

Property	Description/Value
Operating system compliance	Windows 10 Pro 64-bit and IoT Enterprise LTSC 64-bit (English) Windows Server 2016 (English) Operating system language must be English

Property	Description/Value
Web browser compliance	<p>Google Chrome (latest version)</p> <p>Mozilla Firefox (latest version)</p> <p>Microsoft Internet Explorer 11</p> <p>Vaisala recommends using Google Chrome and Mozilla Firefox for viewing AUTOSONDE Control software.</p>
Minimum hardware requirements, PC	<p>Processor Intel Core i5 with 4 cores or equivalent</p> <p>Memory 16 GB RAM</p> <p>Hard disk space 500 GB</p> <p>Serial port, either integrated or via USB/RS232 converter for Automatic Weather Station (AWS)</p> <p>USB port for RI41-AS41</p> <p>Two Ethernet adapters</p>
Minimum hardware requirements, display	<p>24" touch screen with VESA mounting and HDMI (Dell 24 Touch Monitor P2418HT or similar)</p> <p>Full HD display</p> <p>When taking a computer not delivered by Vaisala into use, pay special attention to energy saver and similar settings on the computer. On many computers, the default settings can cause shutdown of computer parts if there is a long time period with no input from the user, for example, during a sounding. This might result in a lost sounding.</p> <p>Make sure that the time zone is set to UTC.</p>
Requirements for accessories	HDMI – DP adapter for connecting screen and PC

# 10. Writing a problem report


When troubleshooting the product, write a problem report including:

- What failed (what worked / did not work)?
- Where did it fail (location and environment)?
- When did it fail (date, immediately / after a while / periodically / randomly)?
- How many failed (only one defect / other same or similar defects / several failures in one unit)?
- What was done when the failure was noticed?
- What was connected to the product and to which connectors?
- Input power source type, voltage, and list of other items (such as lighting, heaters, and motors) that were connected to the same power output.
- Are all parts connected and grounded properly? Take a photo to help the troubleshooting.

# Appendix A. Packing material for AS41

The following table lists the packing material used for AUTOSONDE AS41 transportation. To minimize any environmental impacts, Vaisala recommends that you use the best available recycling practices to recycle the material.

Table 20 AUTOSONDE AS41 packing material

Description	Approximate quantity
Wood	320 kg
Plywood	20 kg
Hard board	30 kg
Plastic foam	2 kg
PE	< 1 kg
Metal	5 kg
Cargo straps	20 pcs
Slings	5 pcs
Absorpole desiccant	6 pcs
	 <p><b>CAUTION!</b> To prevent environmental damage, dispose of hazardous waste in accordance with local regulations. Refer to the material safety datasheet located in the plastic pocket on the inside of the container door.</p>
VCI desiccant bag	5 pcs
Dunnage bags	2 pcs



# Appendix B. Installation preparation checklists

Print these checklists to use when preparing for AS41 delivery.

Table 21 Preinstallation checklist

Task	Description	✓
Notify Vaisala in advance about special conditions related to the foundation or site layout. For example, if the foundation is uneven. For help in planning the site layout, contact Vaisala.	See <a href="#">AUTOSONDE site layout (page 20)</a> and <a href="#">Space requirements for installation (page 21)</a> . Initial installations may need to be done on a temporary location, after which the container is lifted on the foundation.	
Build foundations for: <ul style="list-style-type: none"> <li>• Container</li> <li>• Gas storage</li> <li>• (Optional AWS310 mast, DKP210)</li> </ul>	See <a href="#">Basics of building foundation (page 25)</a> and <a href="#">Container foundation (page 25)</a> . Build the gas storage foundation following the local requirements and conditions. For building foundations for DKP210 and guy wires, see foundation instructions in <i>Vaisala Tilttable Pole Mast DKP206 and DKP210 User Guide (M210315EN)</i> .	
Order gas hoses (2 pcs) from the gas regulators to AS41.	Gas hoses must be high-quality, armored hoses. Swagelok FL series stainless steel metal hoses are recommended. Make sure gas hoses include connectors that can be attached to the gas measurement system on container roof. For more information, see <a href="#">Gas hose connectors (page 41)</a> . Gas hoses can be ordered from Vaisala a minimum of 5 weeks before delivery. Provide the required length with the order.	
Install the following: <ul style="list-style-type: none"> <li>• Gas storage</li> <li>• Gas regulator (2 pcs)</li> <li>• Gas hoses (2 pcs) at regulator end</li> </ul>	See <a href="#">Building gas storage (page 38)</a> . Build the gas storage following the local requirements and conditions.	
Carry out preparations for data connections and for AS41 powering and external grounding.	See <a href="#">Data connection preparations (page 33)</a> , <a href="#">Powering preparations (page 33)</a> , and <a href="#">Grounding preparations (page 37)</a> .	
Make sure electricity is available for installation work.	-	
If AWS310 is included in the delivery, prepare a cable channel or a ditch for power and data cable between AWS310 and AS41.	-	
Agree with Vaisala if repair paint is purchased locally or delivered to the installation site from Vaisala.	Paint is needed during installation for repairing possible damages during transport.	

Task	Description	✓
Reserve a container or a separate area for installation waste.	By default, the customer is responsible for waste disposal at the installation site. For amounts of packaging material, see <a href="#">Packing material for AS41 (page 54)</a> .	
If NM10 is included in the delivery, install NM10 first to the central site. Make sure the NM10 certificate file is available for AS41 installation.	-	



AS41 installation typically takes 5 days. If the delivery contains AWS310, 2 additional days are required.

Table 22 Installation checklist

Task	Description	✓
Reserve a crane for the first installation day.	A crane is used for lifting packed container on the foundation. A smaller crane may be used for: <ul style="list-style-type: none"> <li>Lifting launcher vessel to a location on the ground, where installation is managed.</li> <li>Lifting launcher vessel to its final location on the container.</li> <li>Lifting stairs, antennas, and gas measurement system to their final locations.</li> </ul> For more information, see <a href="#">Preparations for unloading and installation (page 43)</a> .	
For non-standard installations, reserve a separate installation area for the first installation day.	If there is not enough room for installation tasks, AS41 may need to be installed on a temporary location and then lifted to its final position.	
Reserve ladders (4.5 m) for installation crew.	-	
Participate in overseeing the installation. At minimum, reserve a contact person to the site for answering questions by the installation crew.	-	
For non-standard installations, reserve a crane for the second installation day for lifting the container to its foundation.	AS41 may need to be installed on a temporary location and then lifted to its final position. See <a href="#">Preparations for unloading and installation (page 43)</a> and <a href="#">Lifting installed AS41 to its foundation (page 44)</a> .	
Reserve an electrician for connecting the electricity on the agreed day (typically, the second installation day).	-	

Task	Description	✓
Connect the following data lines on the agreed day (typically, the fourth installation day): <ul style="list-style-type: none"> <li>• Network cable</li> <li>• AWS310 data cable (optional)</li> </ul>	Functional tests and a test sounding are carried out during the installation.  Tests are performed using RS41-SG radiosonde (600 g balloon with internal parachute, 3 pcs included in the delivery).  If radiosondes intended for operative use are available at the site, it is also possible to use them for testing.	
Participate introductory training on the fifth installation day.	Basic training topics include setting messages, creating sounding schedules, and NM10 pairing, if NM10 option is used.	

Table 23 Post-installation checklist

Task	Description	✓
If the foundation is high, install additional steps on the front door.	The customer is responsible for acquiring and installing the additional steps according to local requirements.	
If the foundation is high, install additional steps or a platform under the ladders in the launcher vessel end.	The customer is responsible for acquiring and installing the additional steps or platform according to local requirements.	
Acquire and install fences and warning signs.	The customer is responsible for acquiring and installing fences and warning signs according to local requirements.	



# Warranty

For standard warranty terms and conditions, see [www.vaisala.com/warranty](http://www.vaisala.com/warranty).

Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

# Technical support



Contact Vaisala technical support at [helpdesk@vaisala.com](mailto:helpdesk@vaisala.com). Provide at least the following supporting information as applicable:

- Product name, model, and serial number
- Software/Firmware version
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see [www.vaisala.com/support](http://www.vaisala.com/support).

# Recycling



Recycle all applicable material.



Follow the statutory regulations for disposing of the product and packaging.





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