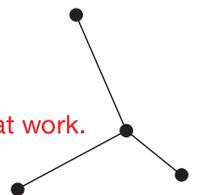


City Multi HVRF Y & R2

Required safety measures for R32 systems



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1. General information

1.1 Safety guidelines according to DIN EN 378 and IEC 60335

When using R32 refrigerant, it is necessary to take additional measures into account in the planning and installation of HVRF systems. As a refrigerant belonging to category A2L, R32 is rated 'mildly flammable'. The guidelines according to DIN EN 378 Part 1-4 and IEC 60335-2-40 must be observed in order to guarantee the safety of persons within buildings.



NOTE!

As this manual is only a summary of relevant content from DIN EN 378 and IEC 60335, it does not guarantee compliance with any particular standards. It provides information and recommendations that are intended to assist in the implementation of R32 projects. Special cases must always be evaluated on an individual basis.

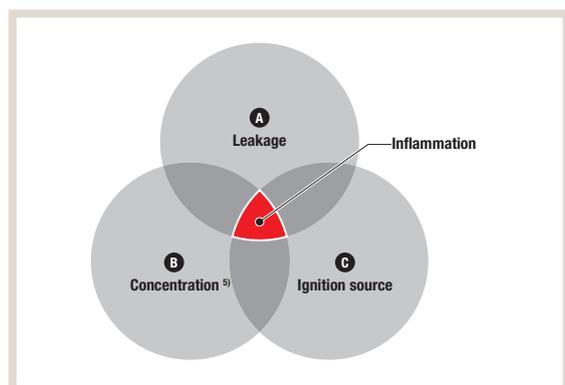
The DIN EN 378 and IEC 60335 standards contain stipulations relating to safety and environmental requirements for air conditioner and heat pumps. Unit safety, various aspects of occupational safety and matters of construction law provide the basis for this content. Key topics include the installation areas of the units, the limit values of refrigerants and the protection of persons.

Refrigerant safety classes		
Flammability	Toxicity	
	Non-toxic	Toxic
Highly flammable	A3	B3
Flammable	A2	B2
Mildly flammable	A2L (R32)	B2L
Non-combustible	A1 (R410A)	B1

1.2 Safe handling of R32

PROPERTIES OF R32

The conditions listed here are necessary for igniting R32, with the refrigerant concentration (stated via the LFL) and a sufficient ignition source being of particular importance.



	R32	R410A
Chemical formula	CH ₂ F ₂	CH ₂ F ₂ / CHF ₂ CF ₂
Composition (mixing ratio in wt %)	Individual composition	R32 / R125 (50 / 50 wt %)
Ozone depletion potential (ODP)	0	0
Global warming potential (GWP) ¹⁾	675	2088
LFL (vol. %) ²⁾	13.3	–
UFL (vol. %) ³⁾	29.3	–
Flammability ⁴⁾	Low flammability	No flame spread (1)

1) Fourth IPCC assessment report
 2) LFL: lower flammability limit
 3) UFL: upper flammability limit
 4) ISO 817: 2014
 5) R32 consistency is higher than LFL²⁾ and lower than UFL³⁾



WARNING!

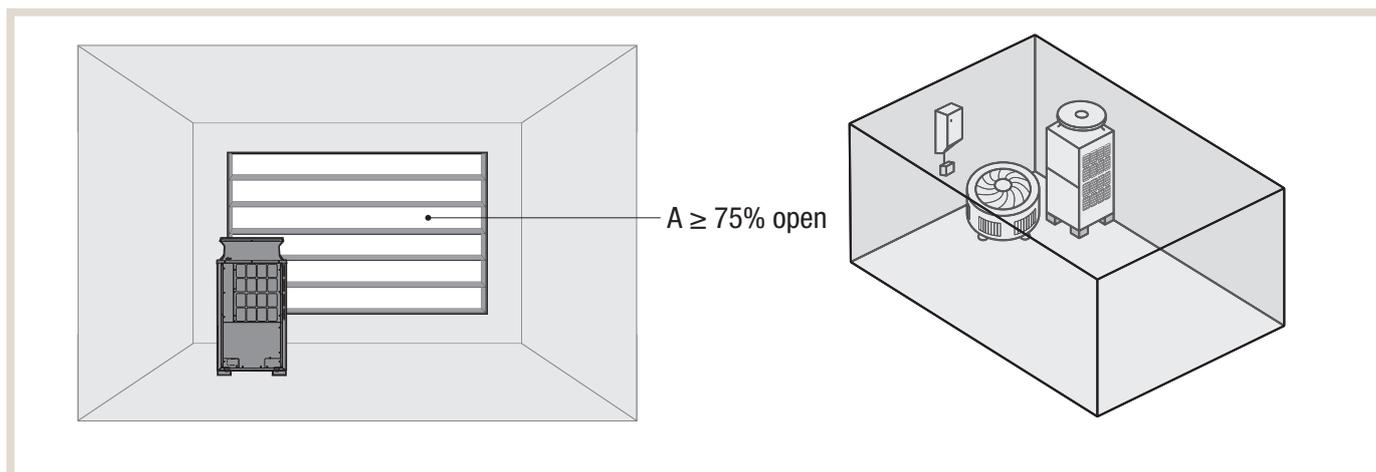
Do not use any resources other than those recommended by the manufacturer for the purpose of cleaning or speeding up the defrosting process.

- ▶ The refrigerant must be stored in a room without any permanently operated sources of ignition (e.g. naked flames or gas appliances and electric heaters in operation).
- ▶ Do not puncture or ignite.
- ▶ Bear in mind that refrigerant may be odourless.

2. Classification of installation areas

2.1 Outdoor installation

The requirements for classification of outdoor installations are defined in the standard DIN EN 378. In the case of outdoor installation, components containing refrigerant are installed in a room in which at least one of the longest walls is at least 75% open to the outside. This also includes ventilation slots to the outside that cover an area (A) amounting to at least 75% of the outside walls.



REQUIREMENTS

- If unit components are to be installed in an outdoor location in which released refrigerant may accumulate (e.g. a recess), the requirements relating to gas detection systems and the ventilation of machine rooms must be met (see 'Refrigerating equipment located inside a machinery room'; DIN EN 378-3 Section 4.3).



NOTE!

The practical limit value (PL; 0.061 kg/m³ for R32) can help provide guidance as to when additional safety precautions are recommended.

- Units containing more than 10 kg of R32 refrigerant must feature a clearly visible label to this effect (usually attached to the unit at the factory). They must also feature a sign stating that smoking, naked flames and other potential sources of ignition must be avoided.
- Unit components installed outdoors must be arranged such that no refrigerant can leak into the building or pose a risk to persons or property in any other way. As a result, they should never be installed in the vicinity of fresh-air vents, doorways, trapdoors or similar openings.



NOTE!

If all components containing refrigerant are located outdoors or in a machine room (according to DIN EN 378), the refrigerant charge quantity is not subject to any stipulated limit. Exception: units in which refrigerants from safety group A2L are used and that are connected via an air duct system to one or more rooms (further information available in design manual PAC-IF).

2.2 Installation in occupied areas

This classification applies when unit components containing refrigerant are located in an area that is restricted by walls, floors and ceilings and in which persons remain present for an extended period of time. If surrounding areas are not separated from this occupied area by an airtight seal, then they may be considered a constituent part of the occupied area (e.g. hollow spaces above false ceilings, crawlways, ducts, moving partition walls). Permissible openings include unhinged doors, open passages and other permanent openings that extend down to the floor (max. 100 mm above the floor).



NOTE!

The exact framework conditions for identifying a permissible opening between two neighbouring rooms can be found in IEC 60335 Section GG.1.4 or under 'Natural ventilation' in chapter 4.

DIN EN 378 (Parts 1 and 3, 'Installation site and personal protection') and IEC 60335 Part 2-40 ('Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers') must be observed when installing air-conditioning units and heat pumps within occupied areas. The requirements that must be met in relation to the installation area are determined on the basis of the refrigerant charge quantity and the size of the room.

In the event that components containing refrigerant are to be installed in an occupied area, the guidelines stated in the following chapters must be met. The hybrid technology in this class limits the maximum possible refrigerant charge quantity to **63.84 kg** (depending on the number of indoor units).



NOTE!

In addition to the regular water-based indoor units, the HBC-Controllers and hydro units also count towards the total number of indoor units.

Max. refrigerant charge quantity	
Number of indoor units	Max. refrigerant charge quantity [kg]
2	31.92
3	47.88
4 or more	63.84

2.3 Installation in a separate machine room

This classification applies when components containing refrigerant are located in a fully-enclosed room or enclosure that is only accessible to authorised persons and is used for the installation of parts of the air conditioner and heat pumps. A machine room may contain additional components provided that the installation requirements are compatible with the air conditioner and heat pumps safety requirements.

**NOTE!**

If all components containing refrigerant are located outdoors or in a machine room (according to DIN EN 378), the refrigerant charge quantity is not subject to any stipulated limit.
Exception: units in which refrigerants from safety group A2L are used and that are connected via an air duct system to one or more rooms (further information available in design manual PAC-IF).

If a separate machine room is used, this must be equipped in accordance with special safety standards. The requirements are defined in DIN EN 378-3 (Section 5) and are not covered in any further detail within this brochure.

**NOTE!**

More detailed information on installations in machine rooms is available on request.

3. Determining the safety zone (for occupied areas)

The required safety measures concerning the installation of components containing refrigerant in occupied areas are governed primarily by the ratio of the refrigerant charge quantity to the volume of the affected rooms. DIN EN 378 provides various limit values for this purpose, which dictate the type and number of additional safety measures to be implemented.



NOTE!

Note the maximum area and height of a room when calculating the volume.

- It is not permitted to exceed a maximum area of 250 m² and a height of 2.2 m when calculating the volume, even if the dimensions of the room itself are larger.

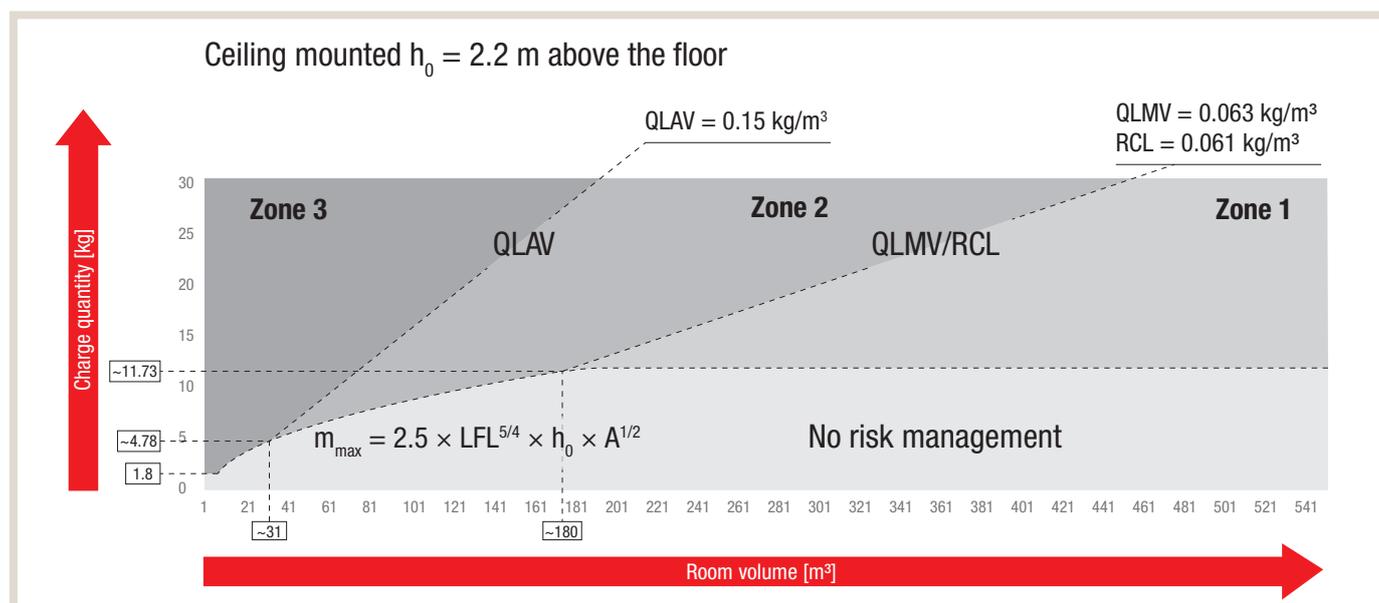
The following figures feature the individual limit values and safety zones based on the room volume and refrigerant charge quantity in occupied areas.

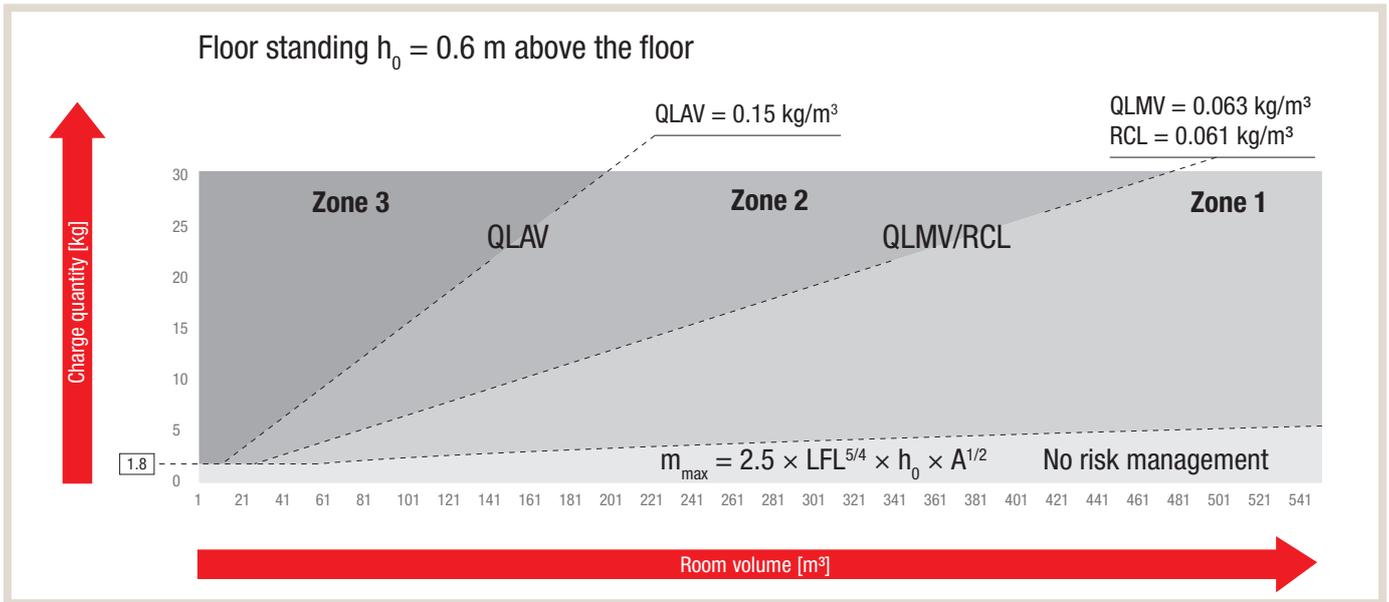
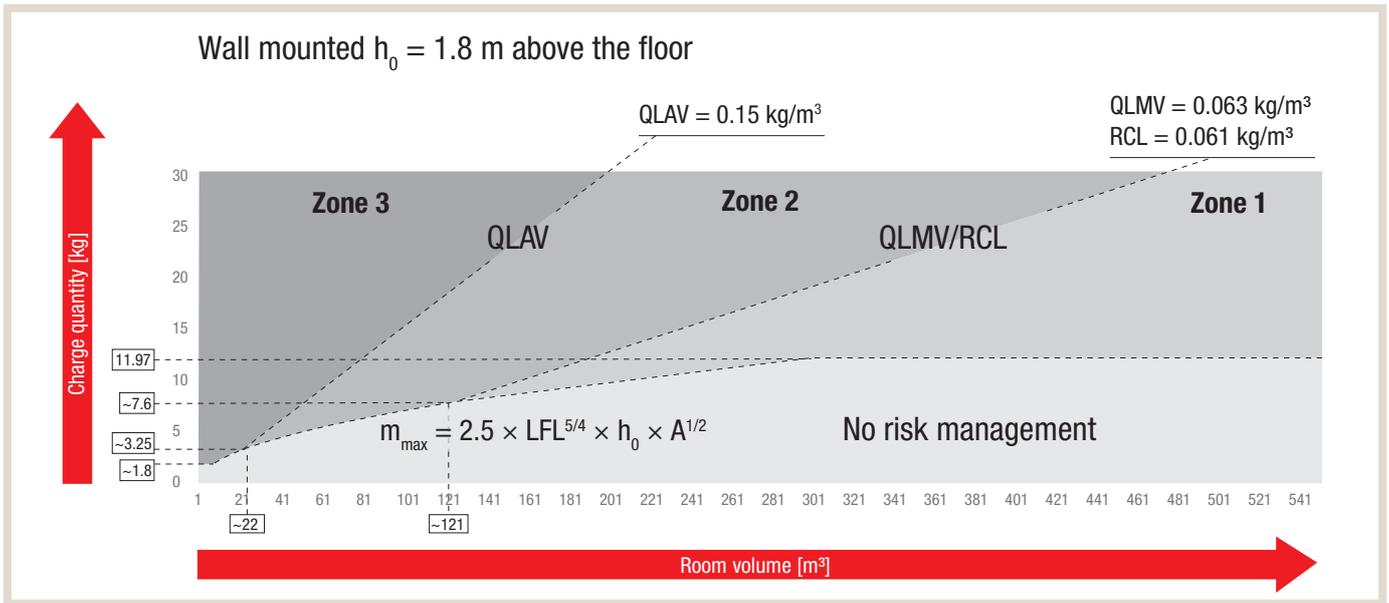


NOTE!

Note the different limits.

- Within the zones that do not require risk management, the limits vary according to the installation height of the unit.





The following tables demonstrate how the corresponding zone is calculated and list the safety measures that are to be taken in this zone.

Determining the safety zone and defining the required measures

No risk management			
Zone	Limit value	Calculation	Required safety measures
No risk management		Charge quantity ≤ 1.8 kg or $m_{\max} = 2.5 \times \text{LFL}^{5/4} \times h_0 \times A^{1/2}$ <ul style="list-style-type: none"> max. 11.97 kg 	No safety measures required

Risk management

In order to enable the options of additional risk management, the unit must meet the following requirements:

- The air conditioner and heat pumps are installed in a class II installation location according to DIN EN 378-1 5.3. *
- Only solder connections are permitted (exception: direct connection between refrigerant pipe, Master HBC-Controller, and hydro unit or outdoor unit).
- Pipes must be protected against accidental damage.
- The doors of the occupied area in question must not be airtight (a small gap above or below the door is required). (Only required by DIN EN 378; not stated in IEC 60335.)
- Measures to weaken the descending refrigerant must be taken if necessary. **

Zone	Limit value	Calculation	Required safety measures
1	QLMV = 0.063 kg/m ³	$m_{\max} < A \times H \times \text{QLMV}$ <ul style="list-style-type: none"> max. 31.92 kg (for two indoor units) max. 34.65 kg (for three or more indoor units) 	No additional safety measures required.
1	RCL = 0.061 kg/m ³	$m_{\max} < A \times H \times \text{RCL}$ <ul style="list-style-type: none"> max. 31.92 kg (for two indoor units) max. 34.65 kg (for three or more indoor units) 	No additional safety measures required. Attention: this limit value applies to the installation of components containing refrigerant on the lowest basement floor.
2	QLAV = 0.15 kg/m ³	$m_{\max} < A \times H \times \text{QLAV}$ <ul style="list-style-type: none"> max. 31.92 kg (for two indoor units) max. 47.88 kg (for three indoor units) max. 63.84 kg (for four or more indoor units) 	At least one of the safety measures stated in chapter 4 is required. In the case of installations on the lowest basement floor, at least two of the safety measures stated in chapter 4 are required.
3		$m_{\max} \geq A \times H \times \text{QLAV}$ <ul style="list-style-type: none"> max. 31.92 kg (for two indoor units) max. 47.88 kg (for three indoor units) max. 63.84 kg (for four or more indoor units) 	At least two of the safety measures stated in chapter 4 are required. Installations on the lowest basement floor are not permitted.

Key:

- m_{\max} = total charge quantity (pre-charge quantity + post-charge quantity)
A = room area (max. 250 m²)
 h_0 = installation height (ceiling assembly = 2.2 m; wall assembly = 1.8 m; floor assembly = 0.6 m)
H = room height (max. 2.2 m)
LFL = flammability of R32 (0.307 kg/m³)
QLMV = quantity limit with minimum ventilation
RCL = refrigerant concentration limit
QLAV = quantity limit with additional ventilation



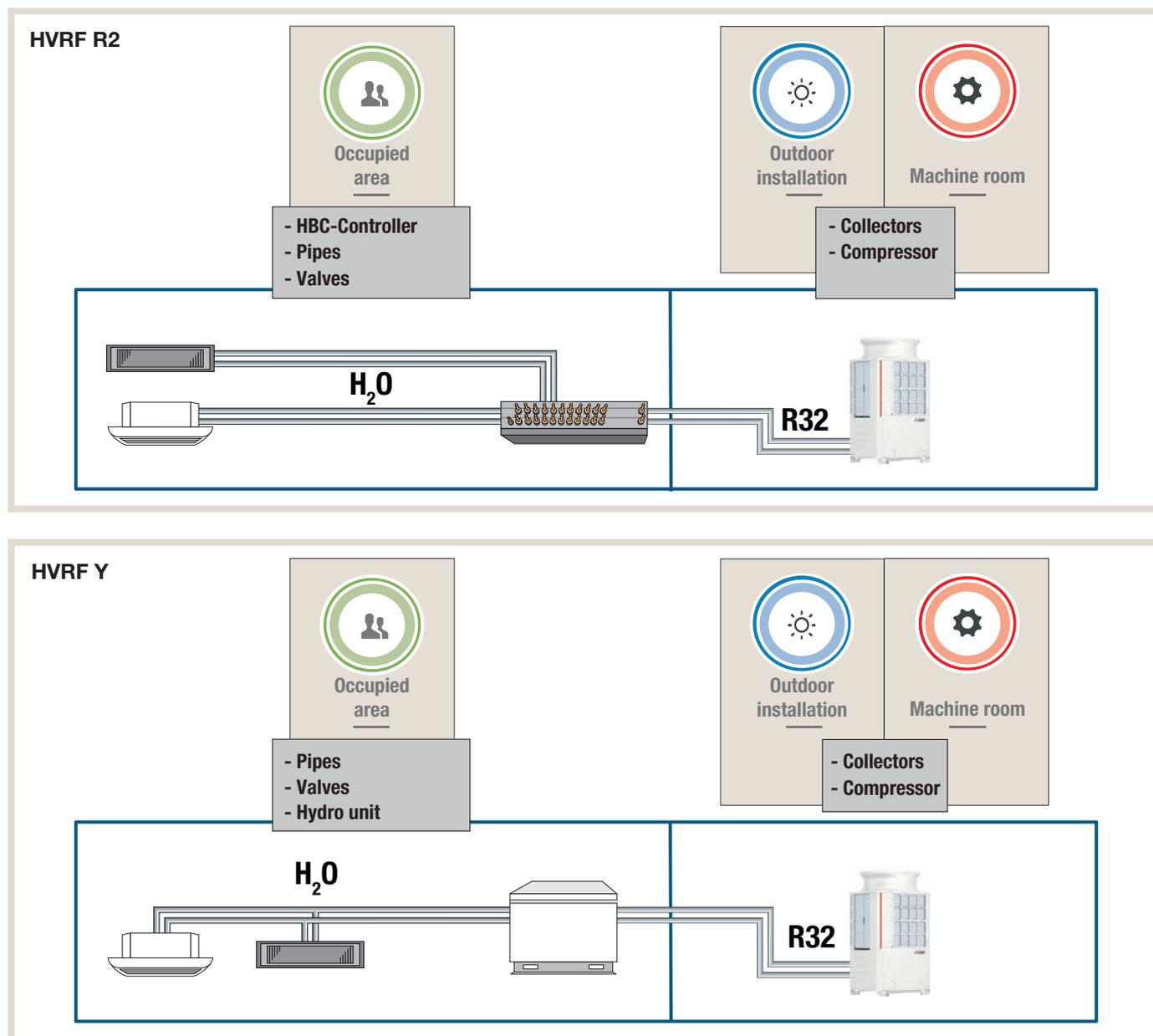
CAUTION!

When components containing refrigerant are installed below 1.8 m, a mechanical circulation must also be included in order to prevent stagnation (accumulation of refrigerant). This unit must be in permanent operation or activated via a refrigerant detector (according to DIN EN 378-3 Section 9). The minimum air throughput is 240 m³/h and the air speed must be between 0.86 and 7.08 m/s (depending on installation height and blow-out angle).

- This only applies to safety zones 1, 2 and 3.

Footnotes: see next page

CLASS II ACCORDING TO DIN EN 378-1 5.3



* Class II installation according to DIN EN 378-1 5.3:

In the event that all compressors and pressure containers (e.g. collector) are located in the machine room or outdoors, the class II installation location requirements apply. Control units, pipe coils (including their collection and distribution components), pipes and their valves, connections and fittings may be located in an occupied area. This is shown in the above figures.

** Measures to weaken the descending refrigerant:



NOTE ON WEAKENING THE DESCENDING REFRIGERANT!

This is only required if the refrigerant charge quantity of the largest R32 air conditioner and heat pumps in the building, divided by the total volume of the lowest floor, exceeds the QLMV value.

► Only required by DIN EN 378; not required by IEC 60335.

Also applies if no components containing refrigerant are located on the lowest floor.

- In this case, a mechanical ventilation unit must be installed on the lowest floor (max. 0.2 m above the ground).
- Required air flow: $Q = 10/RCL$ [m³/h].
- The air routing must either be directed to the outside or take place in a larger room with a sufficient volume for ensuring that the refrigerant concentration is < QLMV.
- Note that sufficiently large air intake openings must be present.
- The mechanical ventilation must either be in permanent operation or activated via a suitable refrigerant detector (according to DIN EN 378-3 Section 9).

4. Permissible safety measures

This section addresses the permissible safety measures for additional risk management.

4.1 Ventilation (natural or mechanical)

NATURAL VENTILATION

- Rarefaction opening to a larger room with a sufficient volume for ensuring that the maximum refrigerant concentration in the event of a leak is $< 0.0768 \text{ kg/m}^3$.
- In order to enable air circulation, there must be two openings to the neighbouring room.

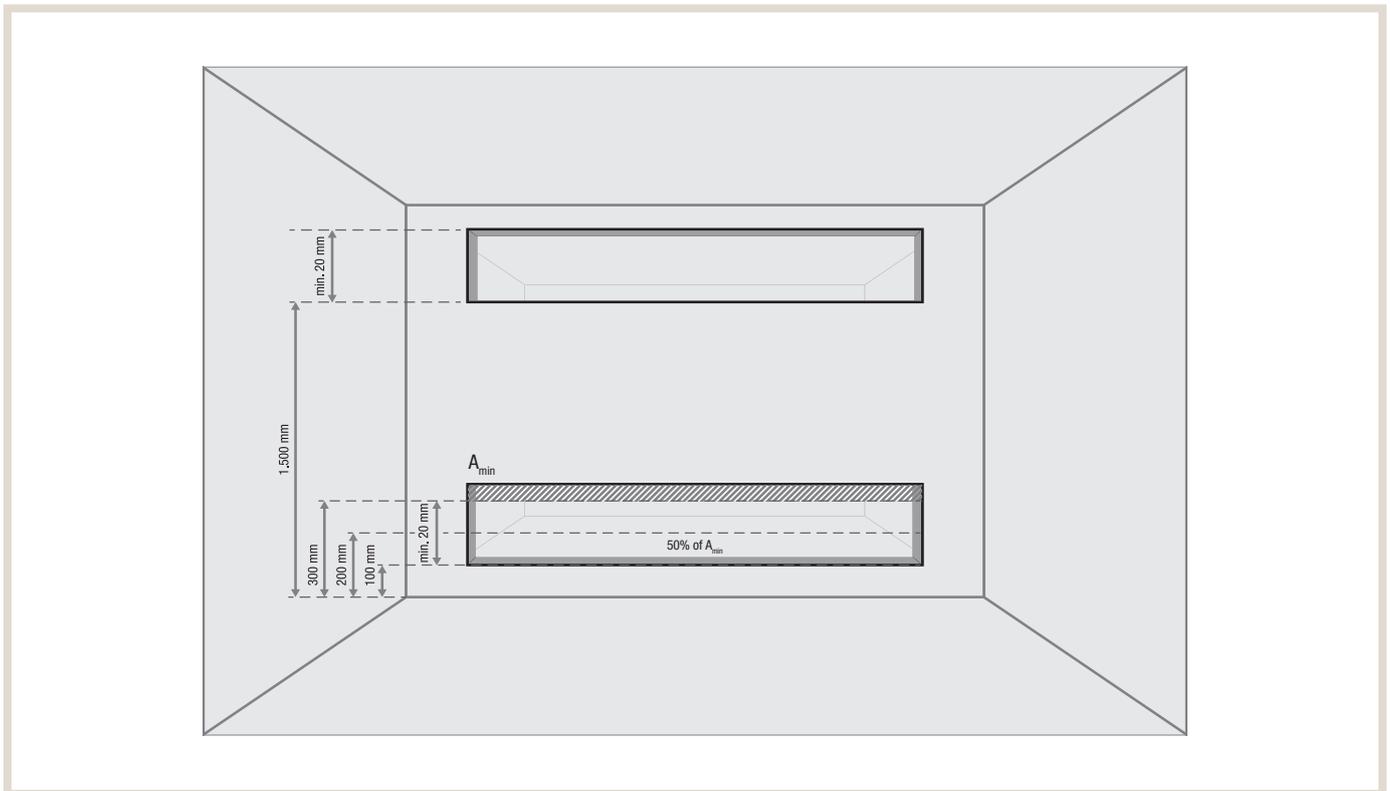
Requirements for the lower opening:

- The total area (A_{\min}) of the lower opening must be at least 0.12 m^2 * (for R32).
- The minimum height of the opening is 20 mm.
- Openings that are located more than 300 mm above the floor must not be included when calculating the minimum area A_{\min} .
- At least 50% of the required area A_{\min} must be less than 200 mm above the floor.
- The bottom edge of the opening must be located no more than 100 mm above the floor.

* A_{\min} : the value shown here is a reference that is strictly applied. This value may vary depending on the charge quantity and room size. The basic formula can be found in IEC 60335 Section GG.1.4.

Requirements for the upper opening:

- The total area of the upper opening must correspond to at least 50% of A_{\min} (0.06 m^2).
- The bottom edge of the opening must be located at least 1.5 m above the floor.
- The minimum height of the opening is 20 mm.



CAUTION!

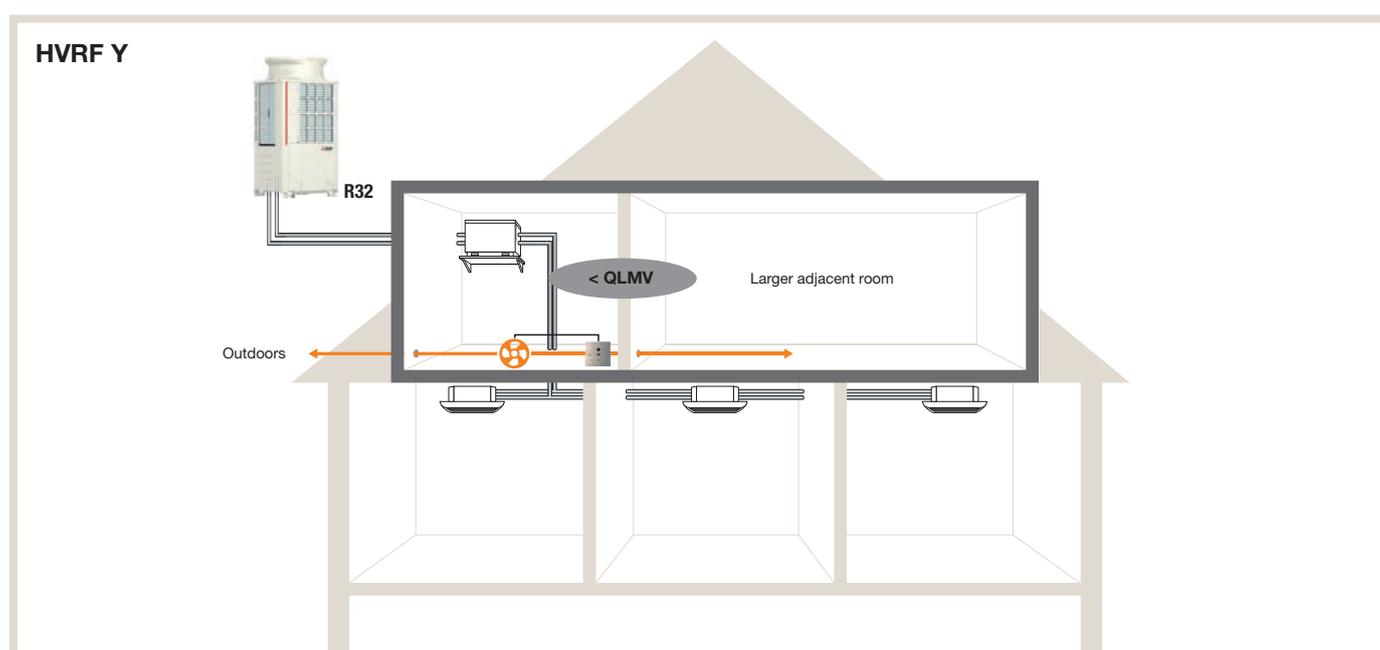
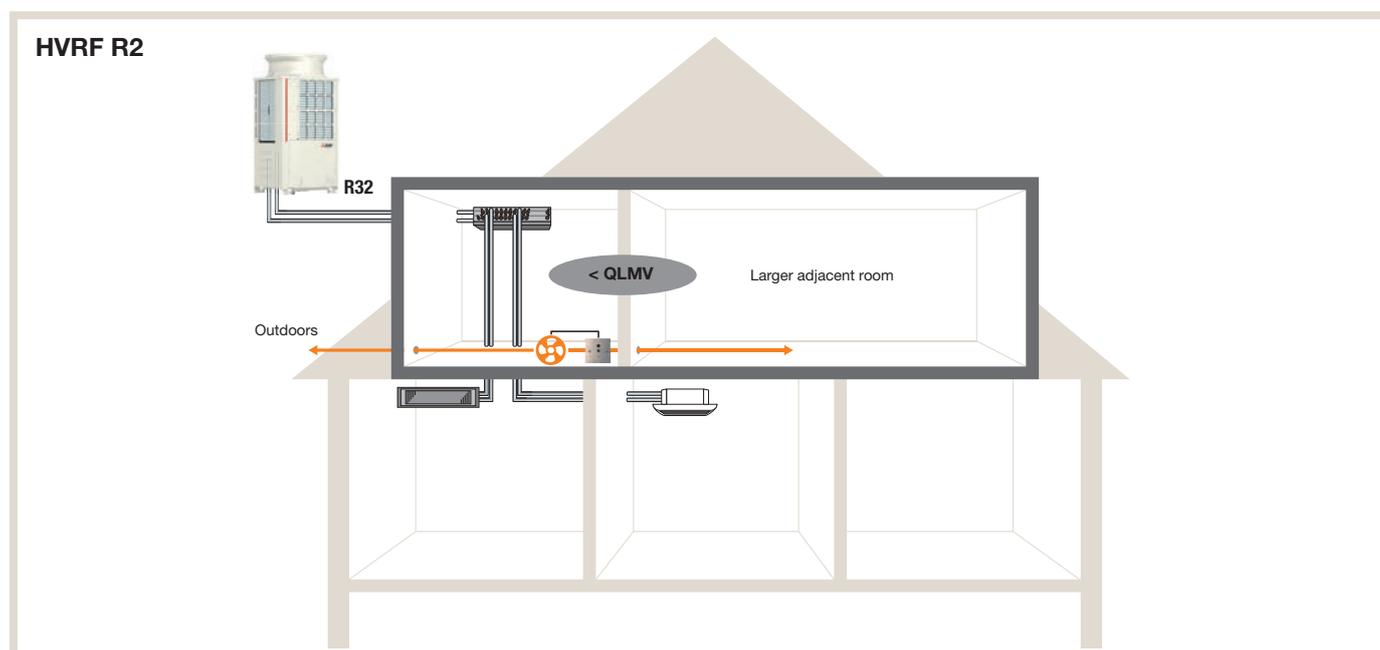
- ▶ Rarefaction openings to the outside are not permitted.
- ▶ The openings must be permanent; as such, it must not be possible to seal them.

MECHANICAL VENTILATION (RECOMMENDED)

- Air routing either to the outside or to a larger room with a sufficient volume for ensuring that the maximum refrigerant concentration in the event of a leak is $< \text{QLMV}$.
- The ventilation must either be in permanent operation or activated via a refrigerant detector (according to DIN EN 378-3 Section 9 and IEC 60335 Section GG.11.3).
- Required air flow (Q):
 $Q = 10/\text{RCL} [\text{m}^3/\text{h}]$

**CAUTION!**

- ▶ Ensure that the air intake openings feature sufficient dimensions.
- ▶ Air outlet opening must be no higher than 0.1 m above the floor.
- ▶ Ensure sufficient clearance between air intake and outlet openings (avoid air short-circuit).



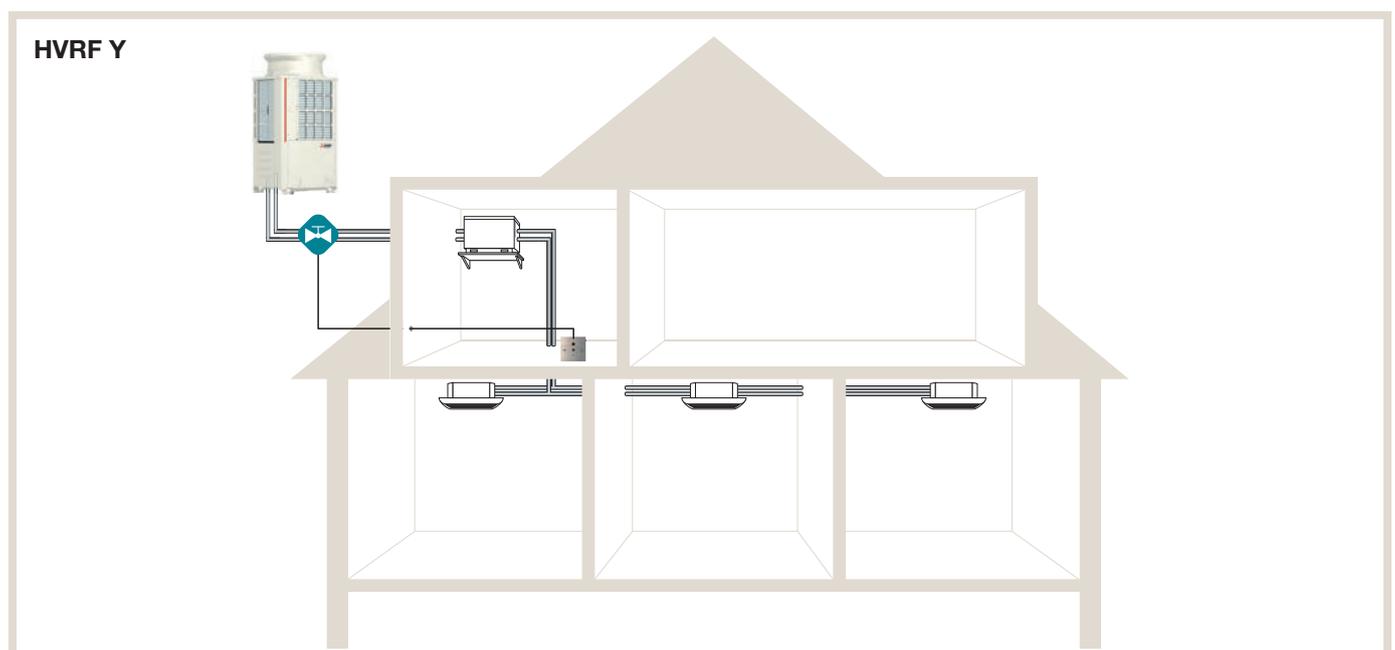
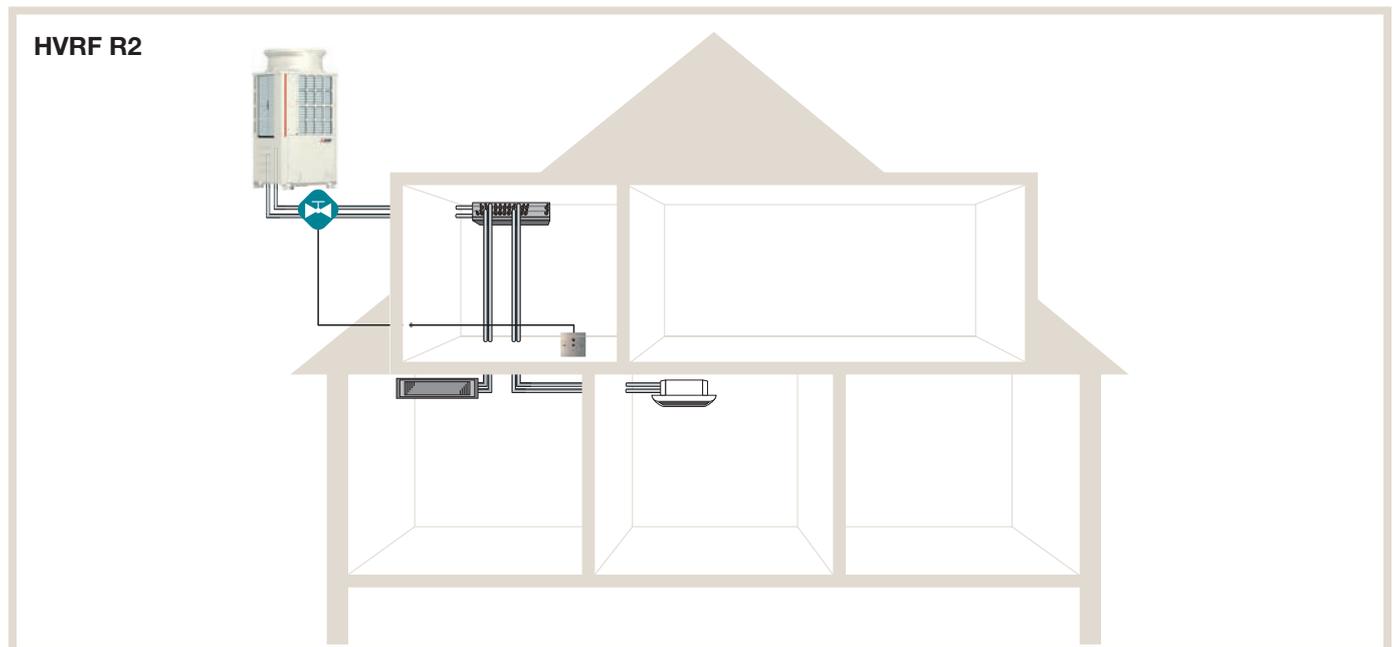
4.2 Safety stop valves

- The stop valves must be located outside the building or in a room with a sufficiently large volume (RCL/QLMV must not be exceeded).
- Valves must be controlled via a refrigerant detector (according to DIN EN 378-3 Section 9 and IEC 60335 Section GG.12).
- Valves must close automatically in event of power failure.



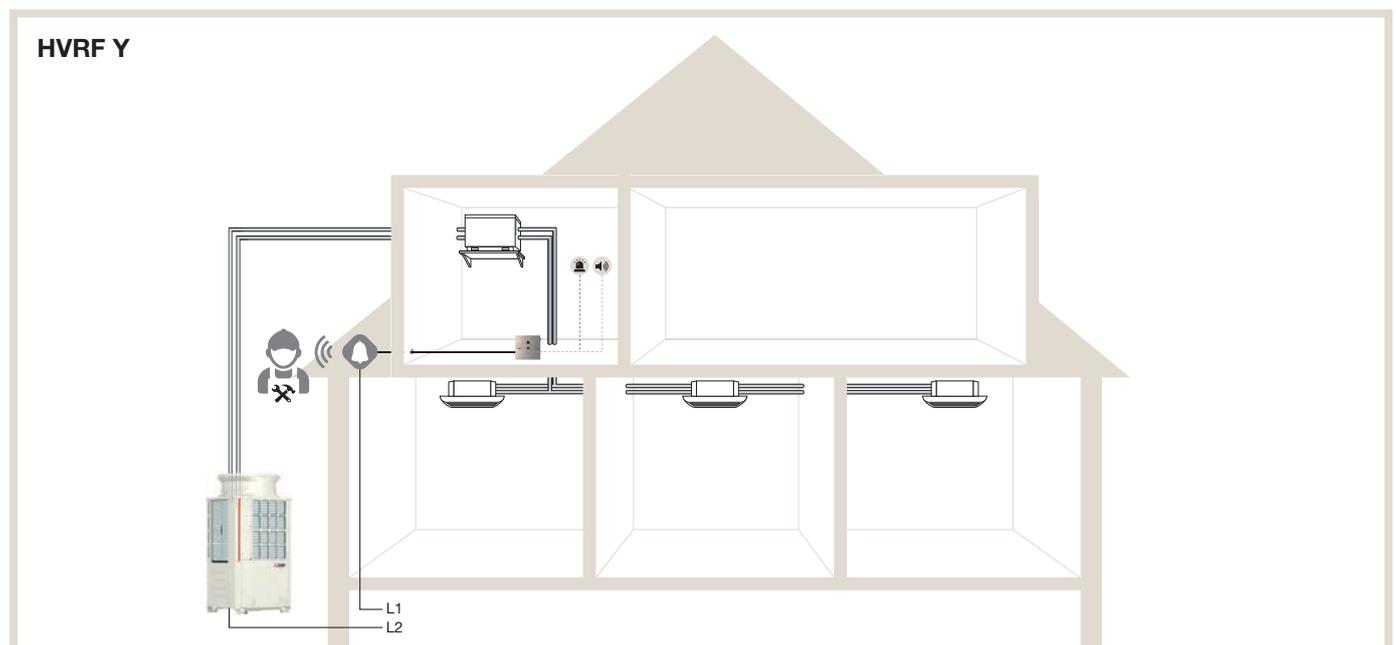
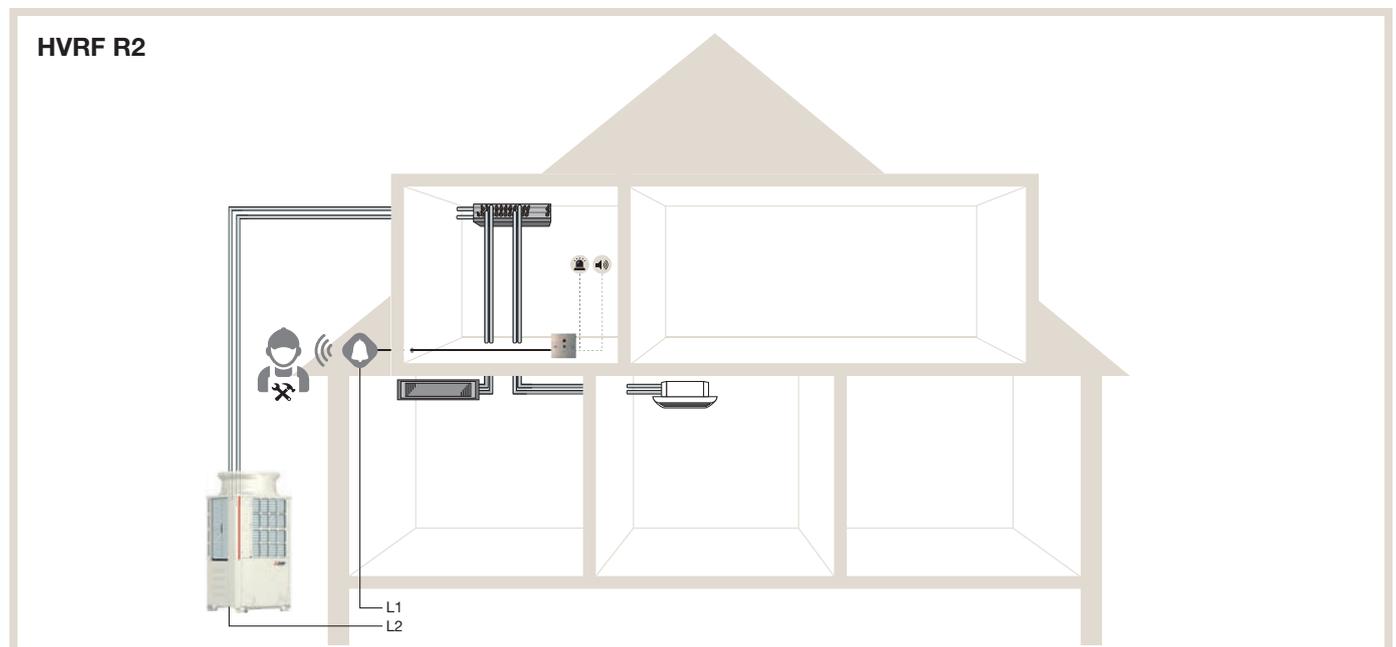
NOTE!

- ▶ Determine how much refrigerant can penetrate into the room after shutting off. This value must be less than QLMV and stated in the assembly documents (see DIN EN 378-2, Section 6.4.3.1).
- ▶ Up to 3 kg of refrigerant may be present in a Master HBC-Controller in cooling mode.



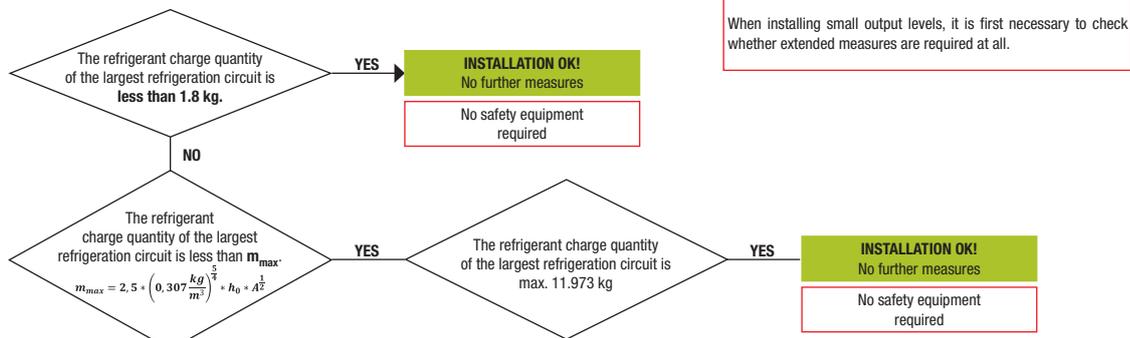
4.3 Safety alarm unit

- Alarm must be activated via a refrigerant detector (according to DIN EN 378-3 Section 9 and IEC 60335 Section GG.13).
- At minimum, the alarm system must issue warnings within the room via a visual and audible signal (e.g. sirens and flashing light).
- An authorised person (e.g. technician) must be alerted automatically in order to initiate further measures.
- The alarm system power supply must be independent of the outdoor unit power supply.
- According to IEC 60335 Section GG.13, an additional warning is required at a location with 24-hour monitoring if any of the following points apply to the room in question:
 - Sleeping facilities are provided (e.g. hotel rooms)
 - Persons are restricted in their movements (e.g. retirement homes)
 - The number of persons present is not regulated
 - Access is open to persons who are not familiar with the required safety precautions



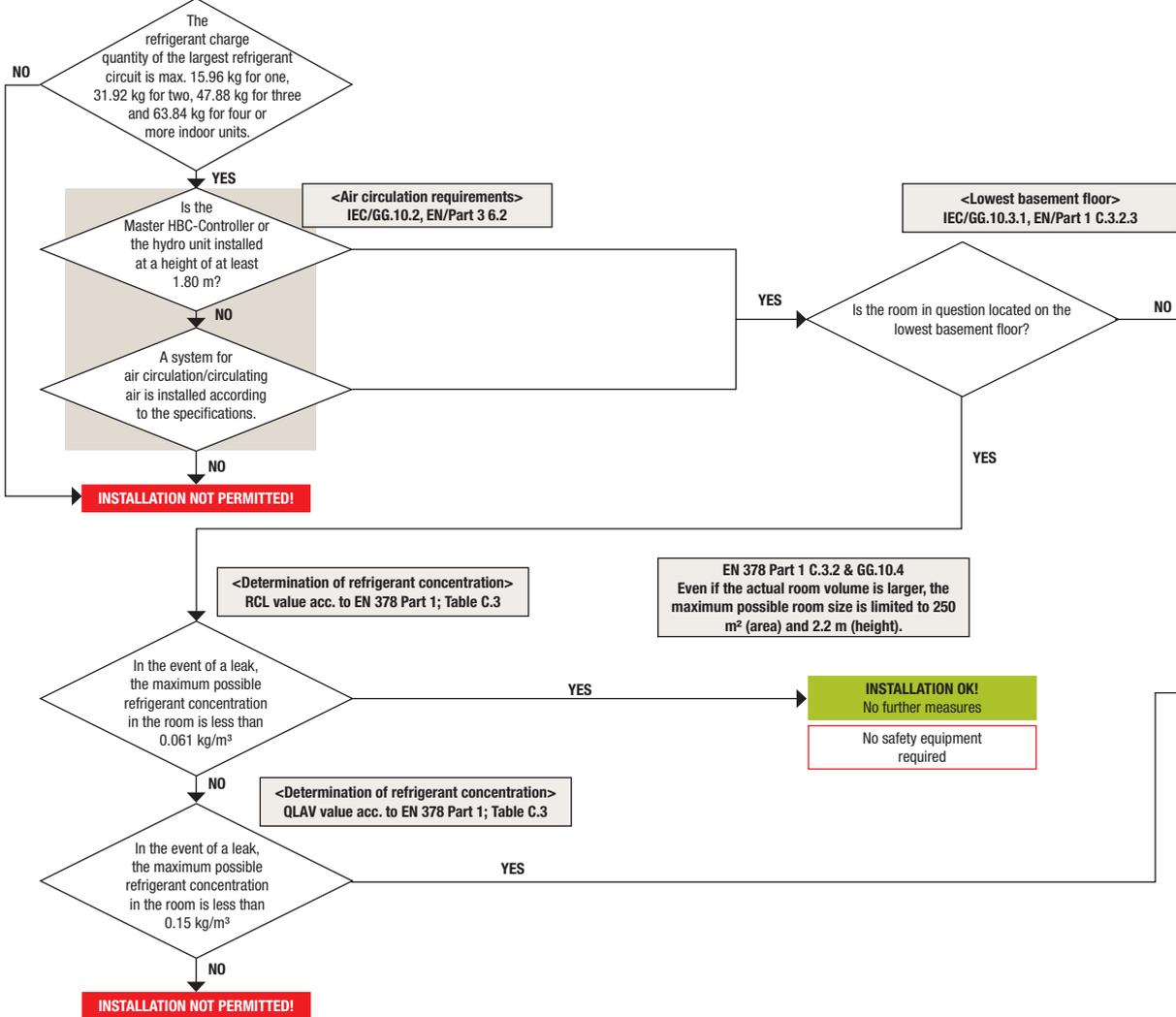
5. Flowchart checklist

No special requirements

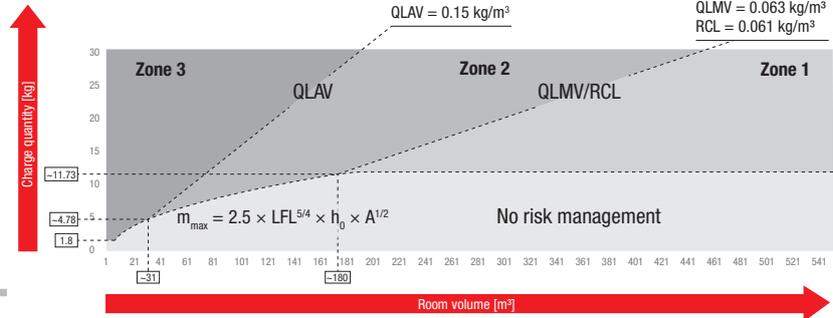


In order for the following flowchart to be applicable, the unit must meet the requirements for 'Air conditioner and heat pumps with increased density' (according to 22.125; IEC 60335) and the requirements for the applicability of 'Alternative risk management' (according to DIN EN 378-1; C.3.1). Also see the calculation table in the chapter 'Determining the safety zone'.

Additional risk management

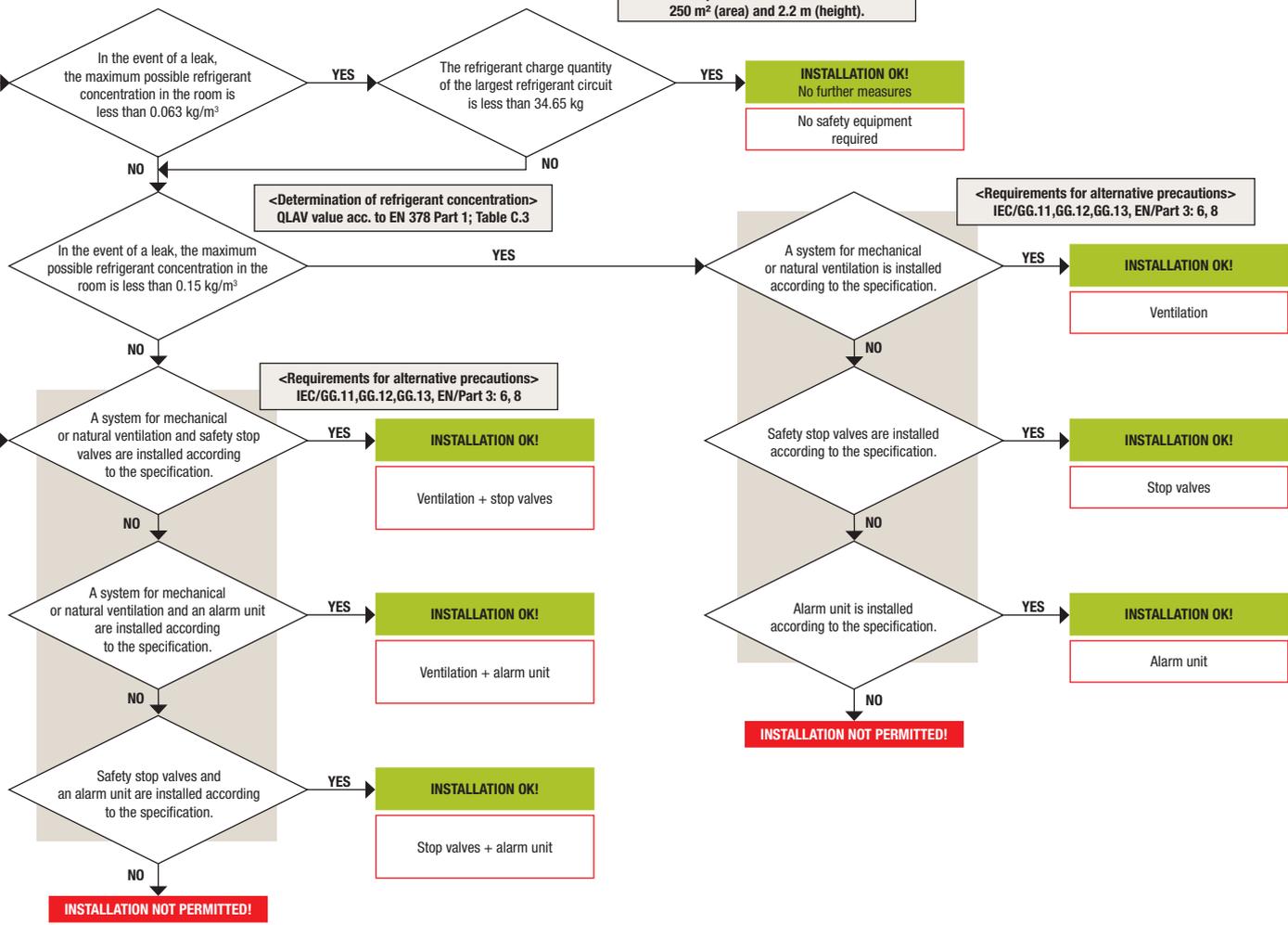


Ceiling mounted $h_0 = 2.2$ m above the floor



<Determination of refrigerant concentration>
QLMV value acc. to EN 378 Part 1; Table C.3

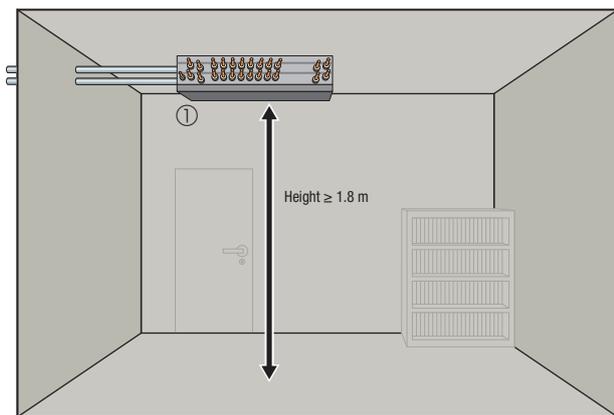
EN 378 Part 1 C.3.2 & GG.10.4
Even if the actual room volume is larger, the maximum possible room size is limited to 250 m² (area) and 2.2 m (height).



6. Installation examples for components containing refrigerant in occupied areas (recommendations)

6.1 Installation of Master HBC-Controller and Hydro unit

Installation in zone 1 above 1.8 m

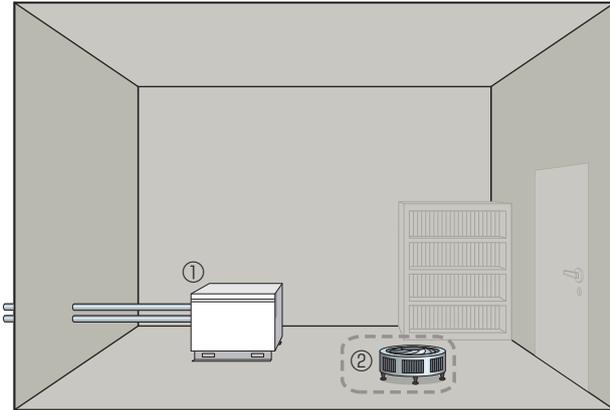


Safety measures:

- None

Key:

- ① Master HBC-Controller/Hydro unit

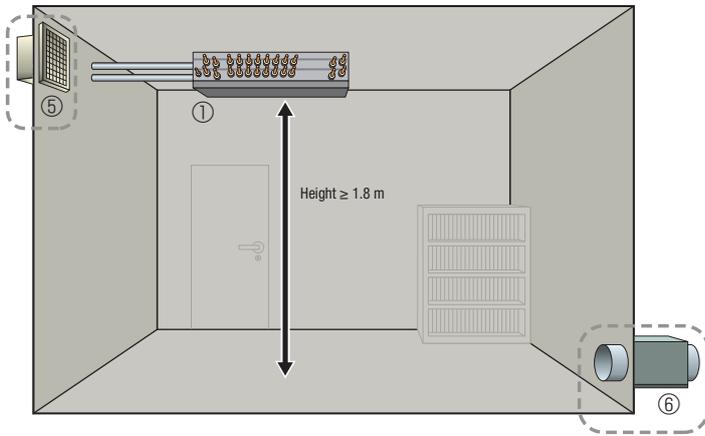
Installation in zone 1 below 1.8 m**Safety measures:**

- Air circulation
(permanent operation or controlled
via refrigerant detector)

Key:

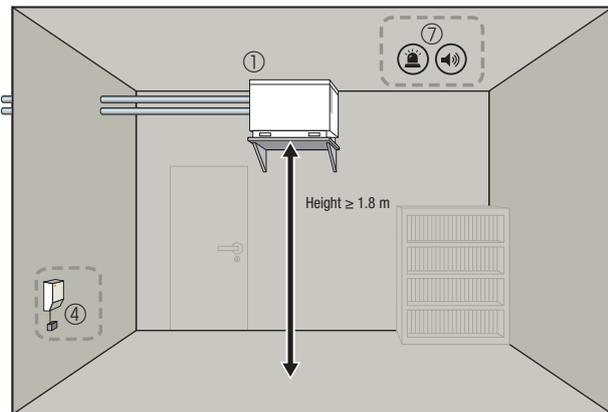
- ① Master HBC-Controller/Hydro unit
- ② Air circulation

Installation in zone 2 above 1.8 m



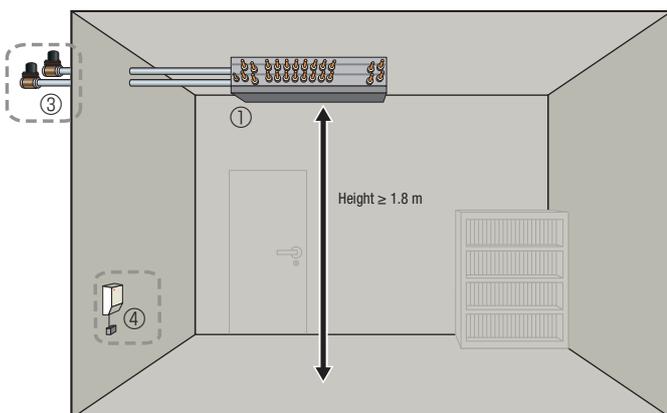
Safety measures:

- Mechanical ventilation (permanent operation or activated via refrigerant detector)



Safety measures:

- Safety alarm unit (controlled via refrigerant detector)

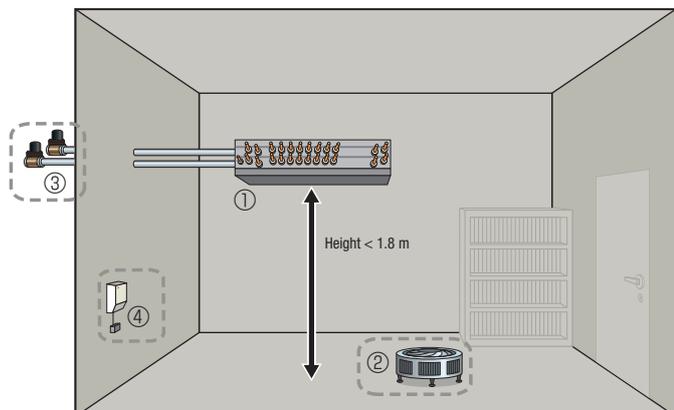


Safety measures:

- Safety stop valves (controlled via refrigerant detector)

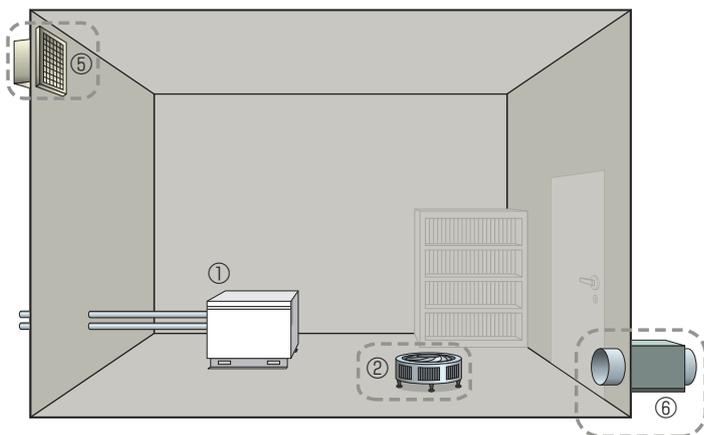
- Key:
- | | | |
|------------------------------------|--|---|
| ① Master HBC-Controller/Hydro unit | ⑤ Air intake | ⑧ Authorised person (e.g. technician) |
| ③ Stop valve | ⑥ Mechanical ventilation | ⑨ Poss. monitored location (e.g. retirement home) |
| ④ Refrigerant detector | ⑦ Alarm system (acoustic and visual alarm) | |

Installation in zone 2 below 1.8 m



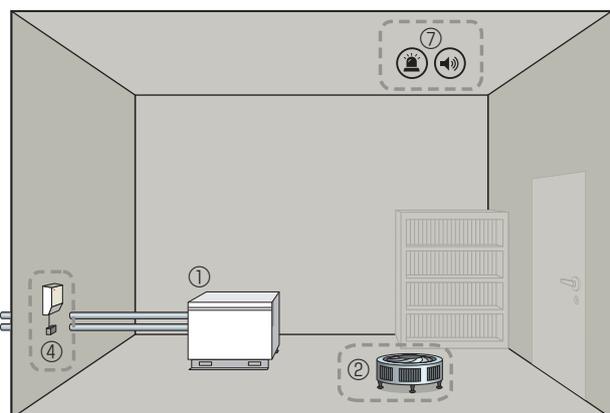
Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety stop valves (activated via refrigerant detector)



Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)

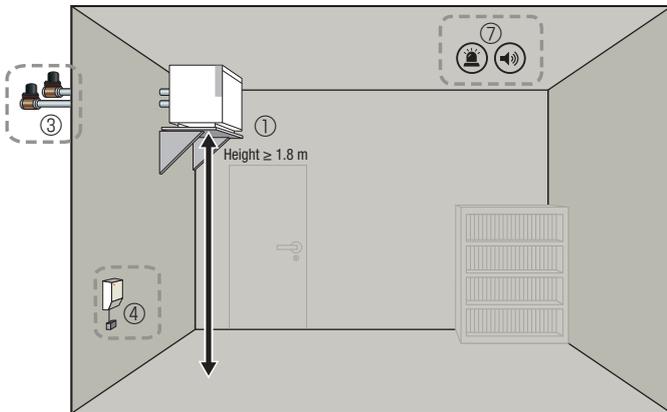


Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)

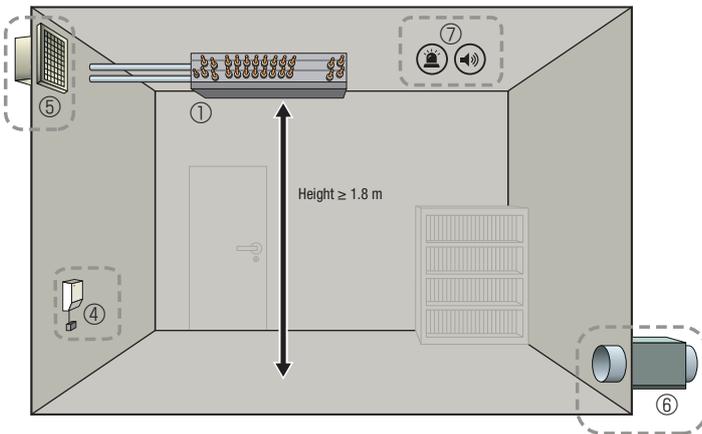
- Key:
- ① Master HBC-Controller/Hydro unit
 - ② Air circulation
 - ③ Stop valve
 - ④ Refrigerant detector
 - ⑤ Air intake
 - ⑥ Mechanical ventilation
 - ⑦ Alarm system (acoustic and visual alarm)
 - ⑧ Authorised person (e.g. technician)
 - ⑨ Poss. monitored location (e.g. retirement home)

Installation in zone 3 or zone 2 (on lowest basement floor) above 1.8 m



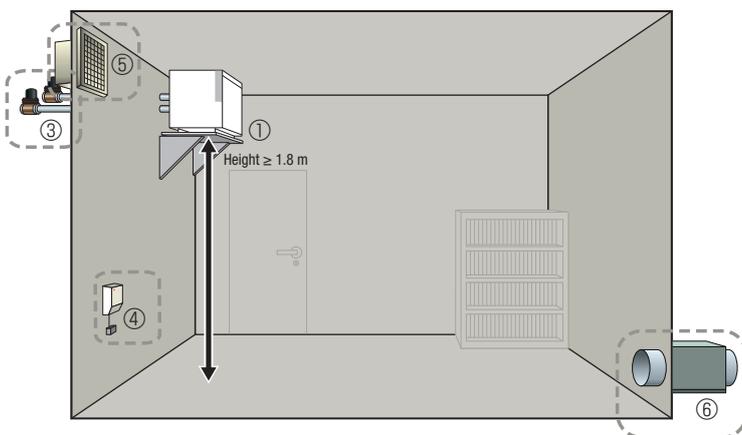
Safety measures:

- Safety alarm unit (controlled via refrigerant detector)
- Safety stop valves (controlled via refrigerant detector)



Safety measures:

- Safety alarm unit (controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)

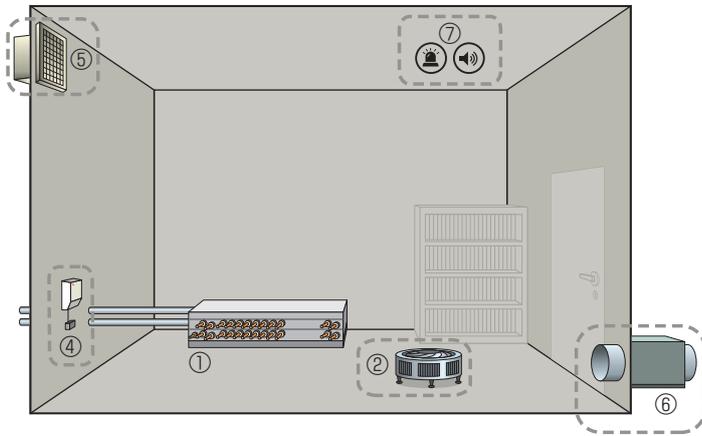


Safety measures:

- Safety stop valves (controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)

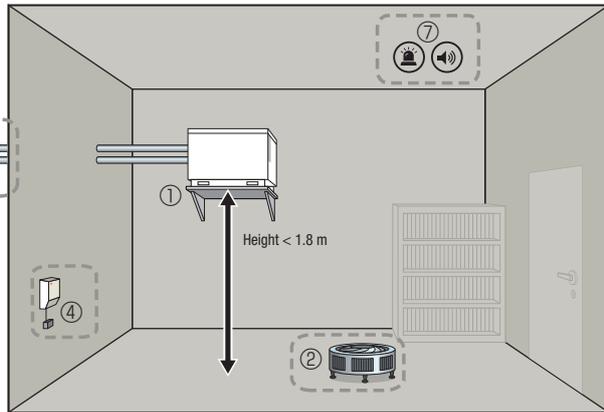
- Key:
- | | | |
|------------------------------------|--|---|
| ① Master HBC-Controller/Hydro unit | ⑤ Air intake | ⑧ Authorised person (e.g. technician) |
| ③ Stop valve | ⑥ Mechanical ventilation | ⑨ Poss. monitored location (e.g. retirement home) |
| ④ Refrigerant detector | ⑦ Alarm system (acoustic and visual alarm) | |

Installation in zone 3 or zone 2 (on lowest basement floor) below 1.8 m



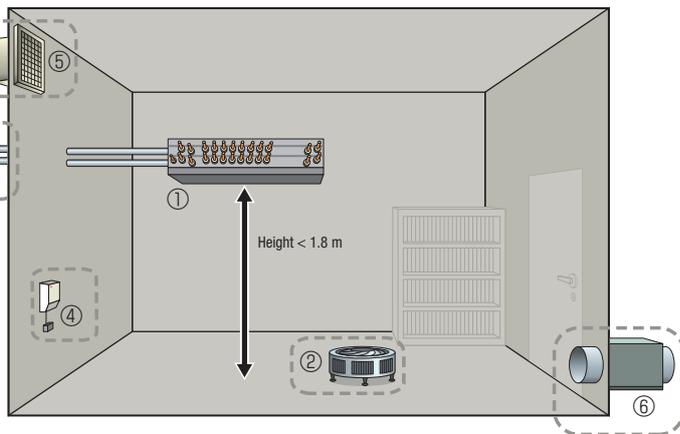
Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)



Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)
- Safety stop valves (controlled via refrigerant detector)



Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)
- Safety stop valves (controlled via refrigerant detector)

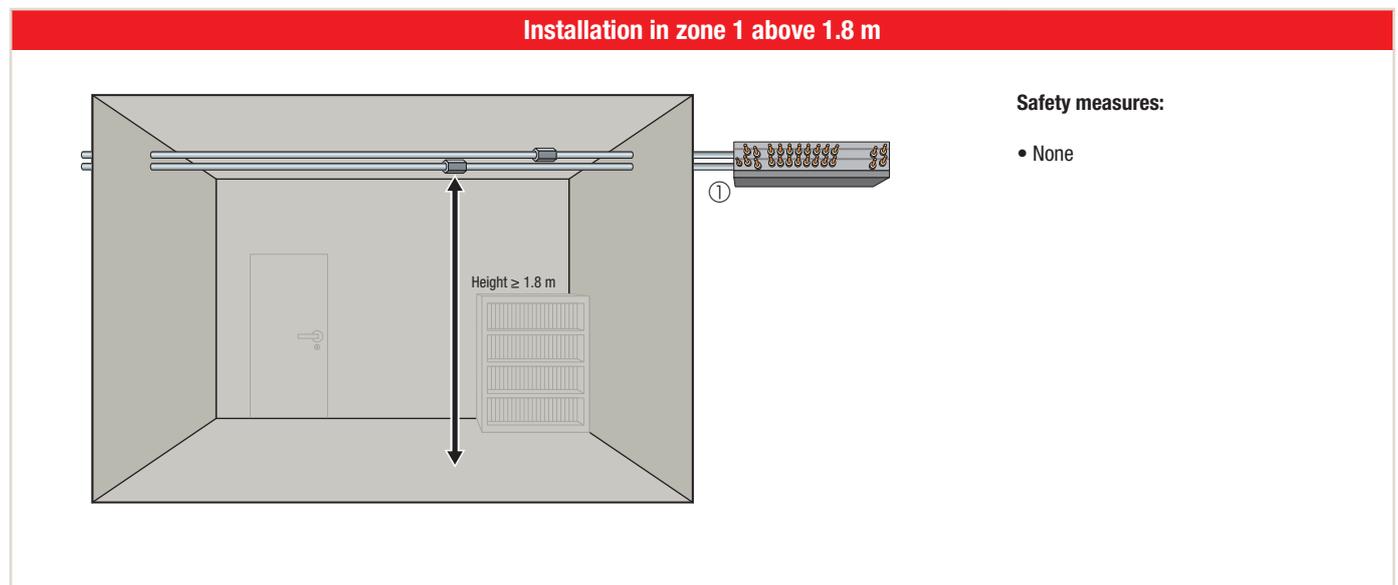
- Key:
- | | | |
|------------------------------------|--------------------------|---|
| ① Master HBC-Controller/Hydro unit | ④ Refrigerant detector | ⑦ Alarm system (acoustic and visual alarm) |
| ② Air circulation | ⑤ Air intake | ⑧ Authorised person (e.g. technician) |
| ③ Stop valve | ⑥ Mechanical ventilation | ⑨ Poss. monitored location (e.g. retirement home) |

6.2 Installation of pipes

Even if rooms only feature pipes containing refrigerant, these rooms must still be checked.

According to IEC 60335 Section 22.116, pipes that connect the components of the cooling system to one another are not considered a source of escaping refrigerant if the following requirements are met:

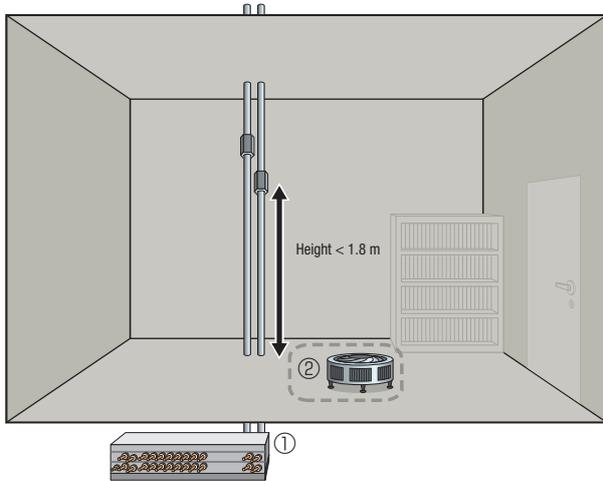
- No junctions
- No bends with a bend radius less than 2.5x the external pipe diameter (use standardised bending pliers)
- Protected against possible damage during standard operation, maintenance or servicing



Key:

- ① Master HBC-Controller/Hydro unit

Installation in zone 1 below 1.8 m

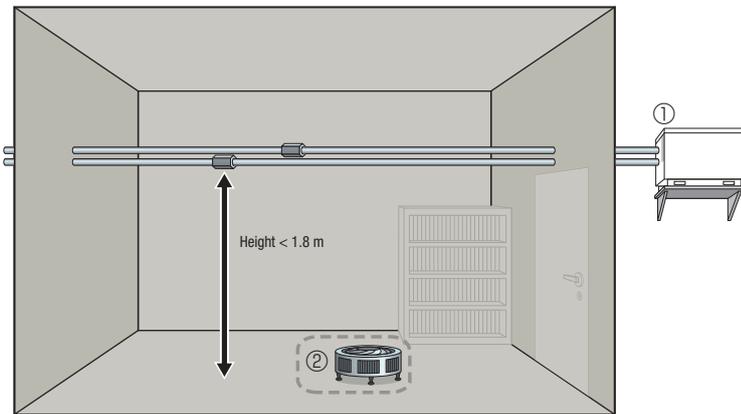


Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)

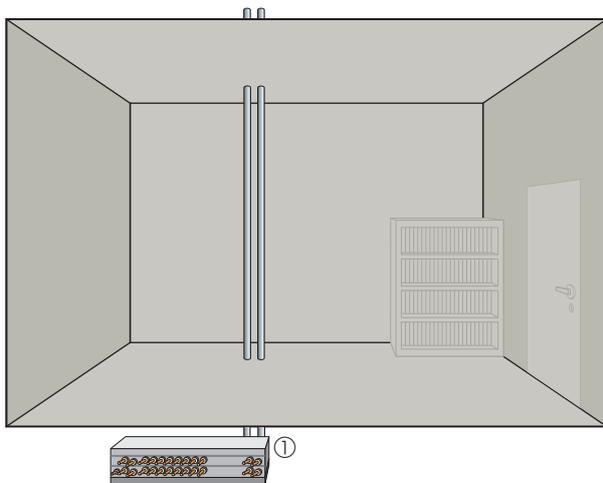
Note:

The vertical routing of refrigerant pipes through an occupied area must automatically be considered a floor installation.



Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)

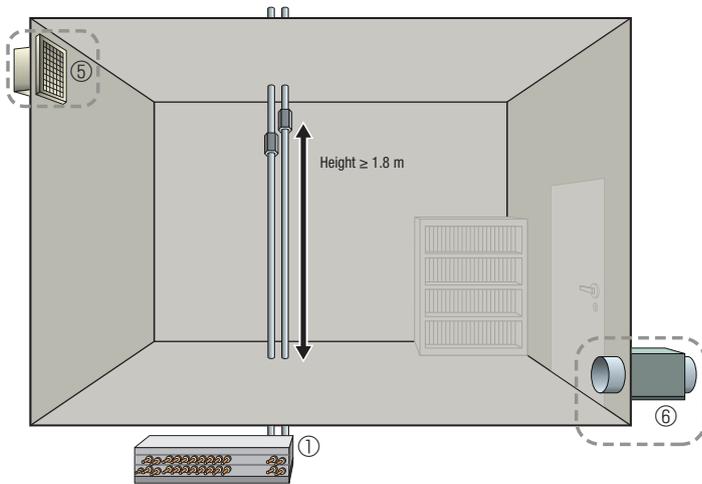


Safety measures:

- None

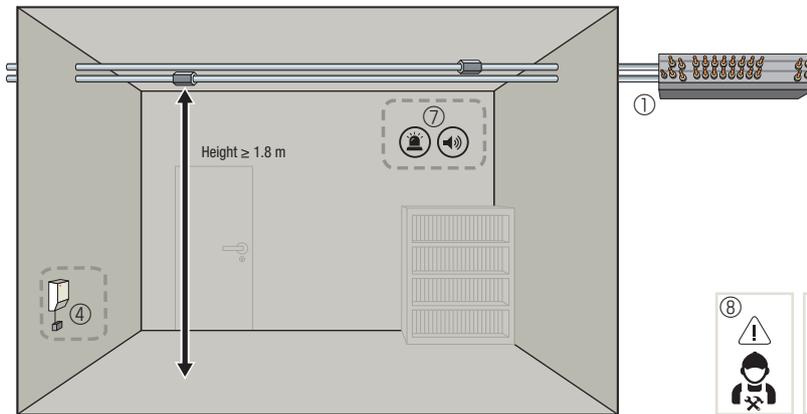
Key:
 ① Master HBC-Controller/Hydro unit
 ② Air circulation

Installation in zone 2 above 1.8 m



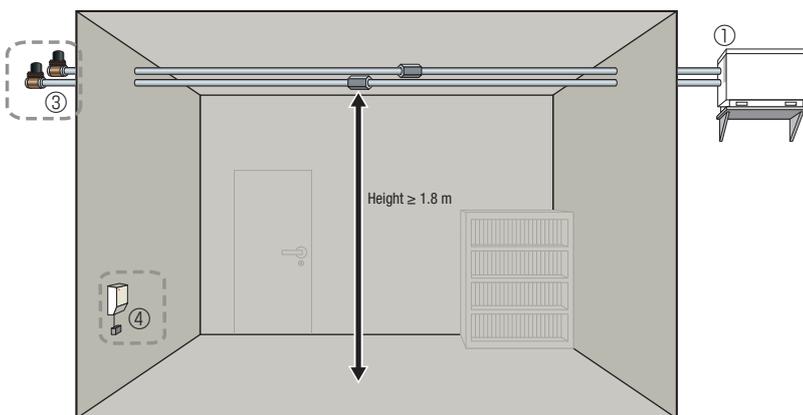
Safety measures:

- Mechanical ventilation (permanent operation or activated via refrigerant detector)



Safety measures:

- Safety alarm unit (controlled via refrigerant detector)

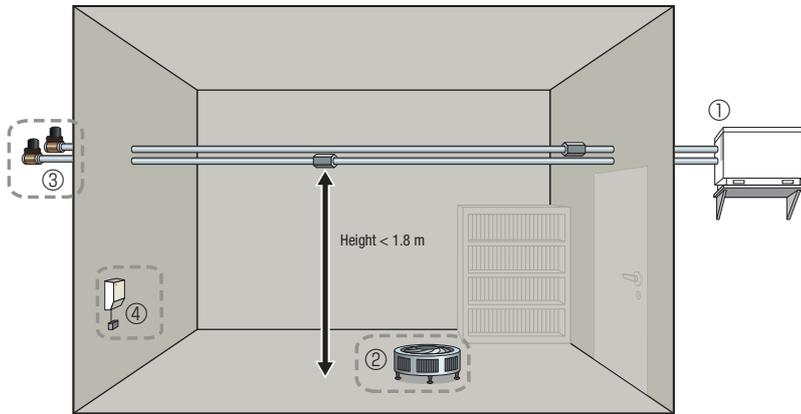


Safety measures:

- Safety stop valves (controlled via refrigerant detector)

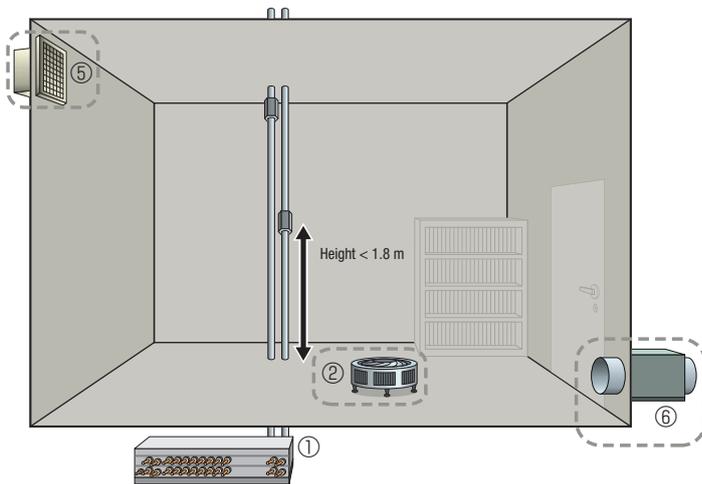
- Key:
- | | | |
|------------------------------------|--|---|
| ① Master HBC-Controller/Hydro unit | ⑤ Air intake | ⑥ Authorised person (e.g. technician) |
| ③ Stop valves | ⑥ Mechanical ventilation | ⑥ Poss. monitored location (e.g. retirement home) |
| ④ Refrigerant detector | ⑦ Alarm system (acoustic and visual alarm) | |

Installation in zone 2 below 1.8 m



Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety stop valves (activated via refrigerant detector)

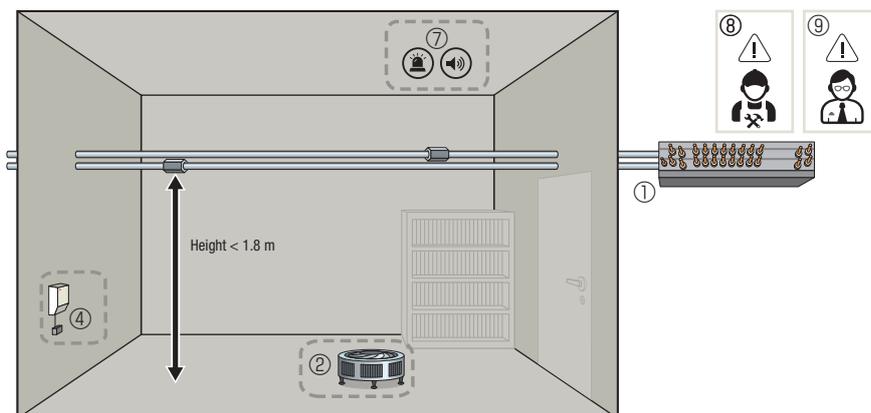


Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)

Note:

The vertical routing of refrigerant pipes through an occupied area must automatically be considered a floor installation.

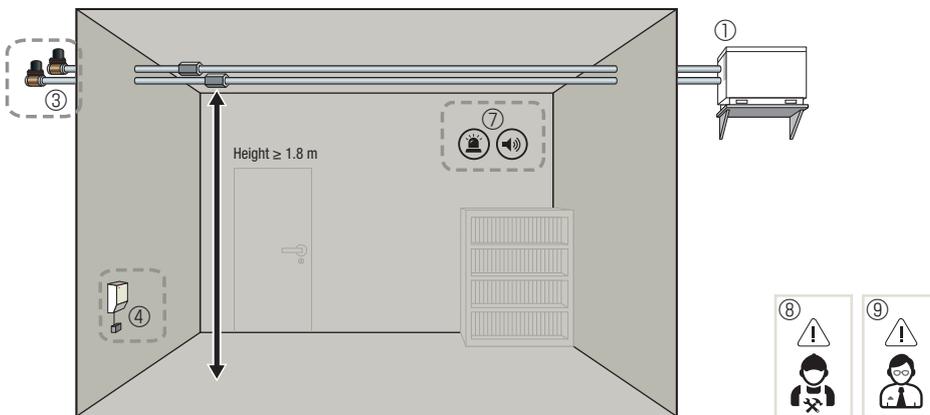


Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)

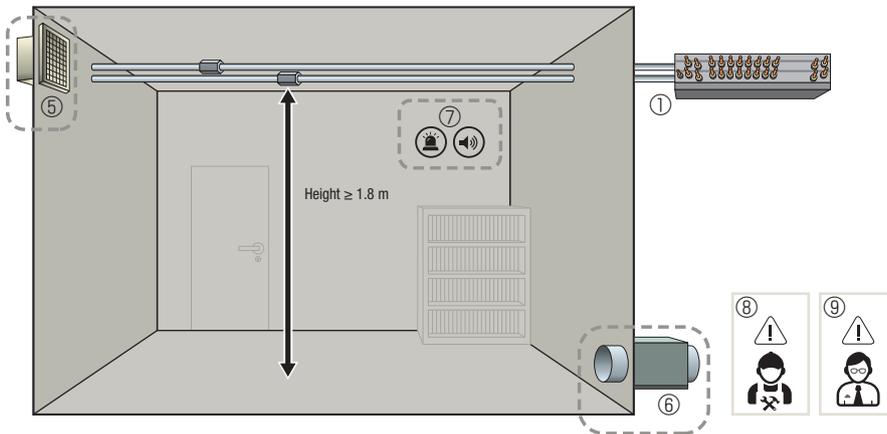
- Key:
- | | | |
|------------------------------------|--|---|
| ① Master HBC-Controller/Hydro unit | ⑤ Air intake | ⑧ Authorised person (e.g. technician) |
| ③ Stop valve | ⑥ Mechanical ventilation | ⑨ Poss. monitored location (e.g. retirement home) |
| ④ Refrigerant detector | ⑦ Alarm system (acoustic and visual alarm) | |

Installation in zone 3 or zone 2 (on lowest basement floor) above 1.8 m



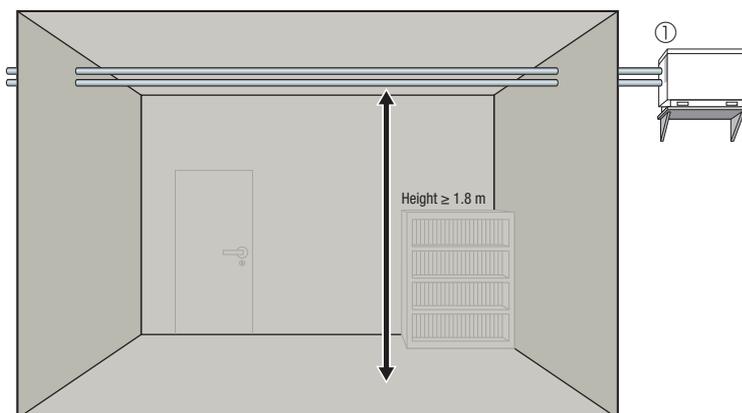
Safety measures:

- Safety alarm unit (controlled via refrigerant detector)
- Safety stop valves (controlled via refrigerant detector)



Safety measures:

- Safety alarm unit (controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)

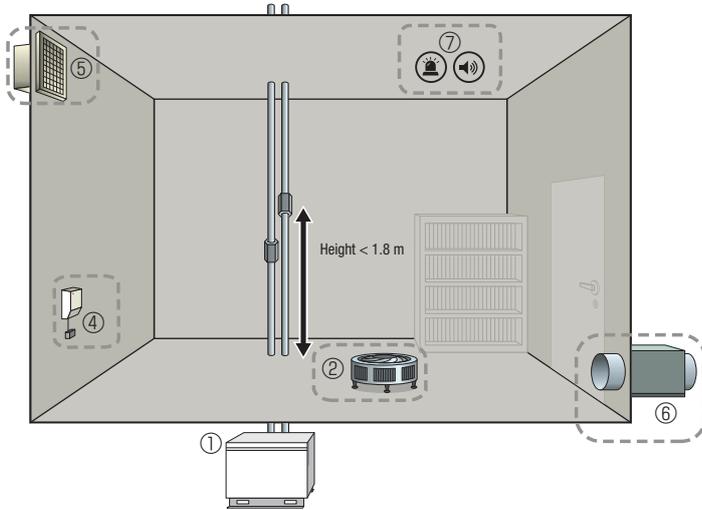


Safety measures:

- None

- Key:
- | | | |
|------------------------------------|--|---|
| ① Master HBC-Controller/Hydro unit | ⑤ Air intake | ⑧ Authorised person (e.g. technician) |
| ③ Stop valves | ⑥ Mechanical ventilation | ⑨ Poss. monitored location (e.g. retirement home) |
| ④ Refrigerant detector | ⑦ Alarm system (acoustic and visual alarm) | |

Installation in zone 3 or zone 2 (on lowest basement floor) below 1.8 m

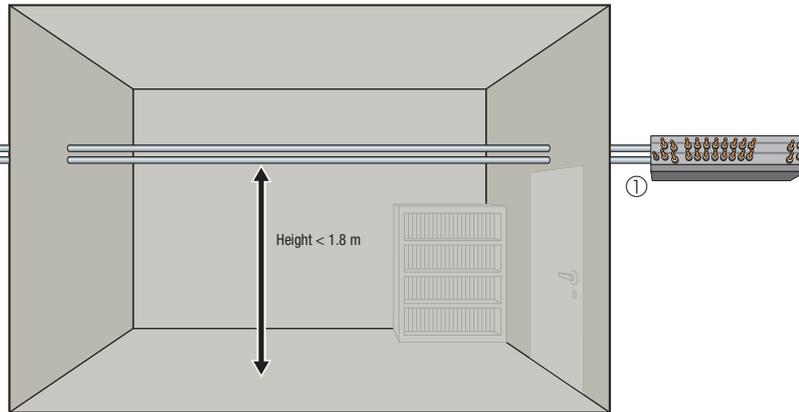


Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Mechanical ventilation (permanent operation or activated via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)

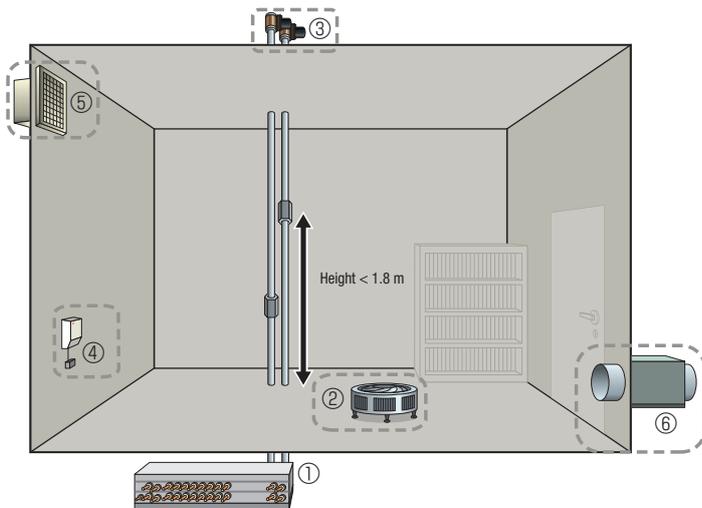
Note:

The vertical routing of refrigerant pipes through an occupied area must automatically be considered a floor installation.



Safety measures:

- None



Safety measures:

- Air circulation (permanent operation or controlled via refrigerant detector)
- Safety alarm unit (controlled via refrigerant detector)
- Safety stop valves (controlled via refrigerant detector)

Note:

The vertical routing of refrigerant pipes through an occupied area must automatically be considered a floor installation.

Key:

- ① Master HBC-Controller/Hydro unit
- ② Air circulation
- ③ Stop valves

- ④ Refrigerant detector
- ⑤ Air intake
- ⑥ Mechanical ventilation

- ⑦ Alarm system (acoustic and visual alarm)
- ⑧ Authorised person (e.g. technician)
- ⑨ Poss. monitored location (e.g. retirement home)

3 steps to success:

1 // State company name and your contact details

2 // Specify unit type/serial no./service ref.

3 // Briefly describe request/fault

We will put you through to our technicians straight away or call you back as soon as possible.



By experts, for experts

The service hotline //

Refrigeration/air-conditioning technology

+49 2102 1244-975

Heating technology

+49 2102 1244-655

Mon. – Thu. 08:00 – 17:00 // Fri. 08:00 – 16:00

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Our air conditioning systems and heat pumps contain fluorinated greenhouse gases R410A, R407C, R134a and R32.
For more information, please refer to the relevant operation manuals.

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