YCPB Large Packaged Air-to-Water Scroll Heat Pump

50 Hz with Refrigerant R-454B

Installation, Operation, and Maintenance Guide

Form: 150.91-ICOM1.EN.CE (625)

Issue date: 2025-06-11

Supersedes: 150.91-ICOM1.EN.CE (1024)

Contents

General safety guidelines

Important: Read before proceeding.

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals might be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled incorrectly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating and service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, operating, and service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks correctly and safely. It is essential that, before performing any task on this equipment, this individual must read and understand the on-product labels, this document and any referenced materials. This individual must also be familiar with and comply with all applicable industry and governmental standards and regulations relating to the task in question.

Changeability of this document

In complying with the Johnson Controls® policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls Solution Navigator website at https://www.solutionnavigator.com/.

It is the responsibility of rigging, lifting, operating, and service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating and service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment before performing any work on the unit.

Safety symbols

The following symbols are used in this document to alert the reader to specific situations:

DANGER

Indicates a possible hazardous situation which will result in death or serious injury if correct care is not taken.

WARNING

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if correct care is not taken.

⚠ CAUTION

Identifies a hazard which could lead to damage to the machine, damage to other equipment and environmental pollution if correct care is not taken or instructions are not followed.

ⓘ **Note:** Highlights additional information useful to the technician in completing the work being performed correctly.

Safety precautions

Respiratory protection

General and local exhaust ventilation maintains vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, wear appropriate respiratory protection.

Follow EU directive 2016/425 on personal protective equipment and use approved respirators according to CEN CR 529.

Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Gloves

Wear low-temperature resistant gloves. Choose gloves to protect hands against chemicals depending on the concentration specific to the place of work. For special applications, check the chemical-resistant ability of the protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday.

Eye protection

Wear chemical-resistant goggles and a face shield.

Skin and body protection

Wash skin after contact.

ⓘ **Note:** Provide eye flushing systems and safety showers close to the workplace or job site.

Refrigerant information

⚠ WARNING

All refrigerants, including R-454B refrigerant must not be mixed with any flammable gases or liquids for any reason because these mixtures can have unpredictable flammability properties and could be unsafe.

Mixtures of R-454B refrigerant with high concentrations of air at elevated pressure or temperature will change the flammability in the presence of an ignition source. The flammability is also elevated in an oxygen-enriched environment, when oxygen concentrations are greater than that in air.

The exact flammability characteristics of a mixture containing these refrigerant products and air, or these refrigerant products in an oxygen-enriched atmosphere, depends on the interaction between the temperature, the pressure, and the proportion of oxygen in the mixture.

⚠ CAUTION

These products must not be allowed to exist with air above atmospheric pressure or at high temperatures or in an oxygen-enriched environment. These products must not be mixed with air under pressure for leak testing or other purposes.

⚠ CAUTION

Care must be taken to ensure that the R-454B refrigerant is compatible with any other chemicals that the refrigerant may come into contact with in a leakage scenario when being used in process cooling applications.

⚠ DANGER

In general refrigerants must not be exposed to open flames or electrical heating elements. High temperatures and flames can cause the refrigerants to decompose, releasing toxic and irritating fumes.

In addition, a flame, such as a cutting torch, can become dramatically larger or change color if used in high concentrations of many refrigerants. This flame enhancement can cause injury.

⚠ WARNING

Always recover refrigerants, evacuate equipment, and ventilate work areas correctly before using any open flames.

While Opteon™ XL refrigerants exhibit low or mild flammability properties per ISO 817 and ANSI/ ASHRAE 34, this classification system is not recognized by the Globally Harmonized System (GHS). Under GHS, there is no distinction between flammable gases. According to GHS, all flammable gases are noted currently as extremely flammable under section 2 of the SDS.

Fluorinated greenhouse gases

This equipment contains fluorinated greenhouse gases covered by the Kyoto Protocol.

- The global warming potential (GWP) value of the refrigerant type R-454B used in this unit is 466.
- The refrigerant quantity in physical weight and tonnes of CO2 equivalent (tCO2e) is stated in Physical data.
- Do not vent the fluorinated greenhouse gases in this equipment to the atmosphere.

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006, as amended by Commission Regulation (EU) 2020/878

Opteon™ XL41 (R-454B) Refrigerant

Version	Revision Date:	SDS Number:	Date of last issue: 24.01.2024
6.1	12.03.2024	2059543-00027	Date of first issue: 10.10.2017

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Trade name	:	Opteon™ XL41 (R-454B) Refrigerant
SDS-Identcode	:	130000143545
Unique Formula Identifier (UFI)	:	8186-YEN7-0PAD-CG9G

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use of the Substance/Mixture	:	Refrigerant
Recommended restrictions on use	:	For professional and industrial installation and use only., Do not use product for anything outside of the above specified uses

1.3 Details of the supplier of the safety data sheet

Company	:	Chemours Netherlands B.V. Baanhoekweg 22 3313 LA Dordrecht Netherlands
Telephone	:	+31-(0)-78-630-1011
Telefax	:	+31-78-6163737
E-mail address of person responsible for the SDS	:	sds-support@chemours.com

1.4 Emergency telephone number

+(353)-19014670 (CHEMTREC - Recommended) ; +353-(01) 809 2166 (Poison Information Center of Ireland)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification (REGULATION (EC) No 1272/2008)

Flammable gases, Category 1B	H221: Flammable gas.
Gases under pressure, Liquefied gas	H280: Contains gas under pressure; may explode if heated.

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2.2 Label elements

Labelling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

Hazard statements :

H221	Flammable gas.
H280	Contains gas under pressure; may explode if heated.

Precautionary statements :

Prevention:

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Response:

P377	Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381	In case of leakage, eliminate all ignition sources.

Storage:

P410 + P403	Protect from sunlight. Store in a well-ventilated place.

Additional Labelling

Contains fluorinated greenhouse gases. (HFC-32)

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Vapours are heavier than air and can cause suffocation by reducing oxygen available for breathing.
Misuse or intentional inhalation abuse may cause death without warning symptoms, due to cardiac effects.
Rapid evaporation of the product may cause frostbite.
May displace oxygen and cause rapid suffocation.

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SECTION 3: Composition/information on ingredients

3.2 Mixtures

Components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Difluoromethane#	75-10-5 200-839-4 01-2119471312-47	Flam. Gas 1B; H221 Press. Gas Liquefied gas; H280	68.8995
2,3,3,3-Tetrafluoropropene#	754-12-1 468-710-7 01-0000019665-61	Flam. Gas 1B; H221 Press. Gas Liquefied gas; H280	31.1

For explanation of abbreviations see section 16.
Voluntarily-disclosed substance

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

Protection of first-aiders : No special precautions are necessary for first aid responders.

If inhaled : If inhaled, remove to fresh air.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
Get medical attention immediately.

In case of skin contact : Thaw frosted parts with lukewarm water. Do not rub affected area.
Get medical attention immediately.

In case of eye contact : Get medical attention immediately.

If swallowed : Ingestion is not considered a potential route of exposure.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : May cause cardiac arrhythmia.

Other symptoms potentially related to misuse or inhalation abuse are
Cardiac sensitisation
Anaesthetic effects
Light-headedness
Dizziness

confusion
Lack of coordination
Drowsiness
Unconsciousness

Risks : Gas reduces oxygen available for breathing.
Contact with liquid or refrigerated gas can cause cold burns and frostbite.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, that may be used in situations of emergency life support should be used with special caution.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Water spray
Alcohol-resistant foam
Carbon dioxide (CO2)
Dry chemical

Unsuitable extinguishing media : None known.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Vapours may form flammable mixture with air
Exposure to combustion products may be a hazard to health.
If the temperature rises there is danger of the vessels bursting due to the high vapor pressure.

Hazardous combustion products : Hydrogen fluoride
carbonyl fluoride
Carbon oxides
Fluorine compounds

5.3 Advice for firefighters

Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary. Use personal protective equipment.

Specific extinguishing methods : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Fight fire remotely due to the risk of explosion.
Use water spray to cool unopened containers.
Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
Remove undamaged containers from fire area if it is safe to do so.
Evacuate area.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions : Evacuate personnel to safe areas.
Only trained personnel should re-enter the area.
Remove all sources of ignition.
Avoid skin contact with leaking liquid (danger of frostbite).
Ventilate the area.
Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).

6.2 Environmental precautions

Environmental precautions : Avoid release to the environment.
Prevent further leakage or spillage if safe to do so.
Retain and dispose of contaminated wash water.

6.3 Methods and material for containment and cleaning up

Methods for cleaning up : Ventilate the area.
Non-sparking tools should be used.
Suppress (knock down) gases/vapours/mists with a water spray jet.
Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable.
Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

6.4 Reference to other sections

See sections: 7, 8, 11, 12 and 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures : Use equipment rated for cylinder pressure. Use a backflow preventative device in piping. Close valve after each use and when empty.

Local/Total ventilation : If sufficient ventilation is unavailable, use with local exhaust ventilation.
If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Advice on safe handling : Avoid breathing gas.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure as-

sessment
Keep container tightly closed.
Wear cold insulating gloves/ face shield/ eye protection.
Valve protection caps and valve outlet threaded plugs must remain in place unless container is secured with valve outlet piped to use point.
Prevent backflow into the gas tank.
Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.
Use a pressure reducing regulator when connecting cylinder to lower pressure (<3000 psig) piping or systems.
Close valve after each use and when empty. Do NOT change or force fit connections.
Prevent the intrusion of water into the gas tank.
Never attempt to lift cylinder by its cap.
Do not drag, slide or roll cylinders.
Use a suitable hand truck for cylinder movement.
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Take precautionary measures against static discharges.
Take care to prevent spills, waste and minimize release to the environment.

Hygiene measures : If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place. When using do not eat, drink or smoke. Wash contaminated clothing before re-use.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers : Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Separate full containers from empty containers. Do not store near combustible materials. Avoid area where salt or other corrosive materials are present. Keep in properly labelled containers. Keep tightly closed. Keep in a cool, well-ventilated place. Keep away from direct sunlight. Store in accordance with the particular national regulations. Keep away from heat and sources of ignition.

Advice on common storage : Do not store with the following product types:
Self-reactive substances and mixtures
Organic peroxides
Oxidizing agents
Flammable liquids
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Self-heating substances and mixtures
Substances and mixtures, which in contact with water, emit flammable gases
Explosives
Very acutely toxic substances and mixtures
Acutely toxic substances and mixtures

Substances and mixtures with chronic toxicity

Storage period : > 10 yr

Recommended storage temperature : < 52 °C

Further information on storage stability : The product has an indefinite shelf life when stored properly.

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Contains no substances with occupational exposure limit values.

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
Difluoromethane	Workers	Inhalation	Long-term systemic effects	7035 mg/m3
	Consumers	Inhalation	Long-term systemic effects	750 mg/m3
2,3,3,3-Tetrafluoropropene	Workers	Inhalation	Long-term systemic effects	950 mg/m3

Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

Substance name	Environmental Compartment	Value
Difluoromethane	Fresh water	0.142 mg/l
	Intermittent use/release	1.42 mg/l
	Fresh water sediment	0.534 mg/kg dry weight (d.w.)
2,3,3,3-Tetrafluoropropene	Fresh water	0.1 mg/l
	Intermittent use/release	1 mg/l
	Fresh water sediment	1.51 mg/kg dry weight (d.w.)
	Soil	1.49 mg/kg dry weight (d.w.)
	Marine water	0.01 mg/l
	Marine sediment	0.151 mg/kg dry weight (d.w.)

8.2 Exposure controls

Engineering measures

Minimize workplace exposure concentrations.

If sufficient ventilation is unavailable, use with local exhaust ventilation.
If advised by assessment of the local exposure potential, use only in an area equipped with explosion-proof exhaust ventilation.

Personal protective equipment

Eye/face protection	:	Wear the following personal protective equipment: Chemical resistant goggles must be worn. Face-shield Equipment should conform to I.S. EN 166
Hand protection		
Material	:	Impervious gloves
Remarks	:	Choose gloves to protect hands against chemicals depending on the concentration and quantity of the hazardous substance and specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!
Skin and body protection	:	Wear the following personal protective equipment: If assessment demonstrates that there is a risk of explosive atmospheres or flash fires, use flame retardant antistatic protective clothing.
Respiratory protection	:	If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection. Equipment should conform to I.S. EN 14387
Filter type	:	Organic gas and low boiling vapour type (AX)
Protective measures	:	Wear cold insulating gloves/ face shield/ eye protection.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	:	Liquefied gas
Colour	:	colourless
Odour	:	slight, ether-like
Odour Threshold	:	No data available

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Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	-50.9 °C
Flammability (solid, gas)	:	Flammable
Upper explosion limit / Upper flammability limit	:	Upper flammability limit 23.6 %(V) Method: ASTM E681
Lower explosion limit / Lower flammability limit	:	Lower flammability limit 11.3 %(V) Method: ASTM E681
Flash point	:	Not applicable
Auto-ignition temperature	:	496 °C
Decomposition temperature	:	No data available
pH	:	No data available
Viscosity		
Viscosity, kinematic	:	Not applicable
Solubility(ies)		
Water solubility	:	No data available
Partition coefficient: n-octanol/water	:	Not applicable
Vapour pressure	:	15,856 hPa (25 °C)
Relative density	:	0.98 (25 °C)
Density	:	0.98 g/cm³ (25 °C) (as liquid)
Relative vapour density	:	2.2 (Air = 1.0)

Particle characteristics
Particle size : Not applicable

9.2 Other information

Explosives : Not explosive

Oxidizing properties : The substance or mixture is not classified as oxidizing.

Evaporation rate : > 1
(CCL4=1.0)

SECTION 10: Stability and reactivity

10.1 Reactivity

Not classified as a reactivity hazard.

10.2 Chemical stability

Stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions : Vapours may form flammable mixture with air
Can react with strong oxidizing agents.
Flammable gas.

10.4 Conditions to avoid

Conditions to avoid : Heat, flames and sparks.

10.5 Incompatible materials

Materials to avoid : Avoid impurities (e.g. rust, dust, ash), risk of decomposition.
Incompatible with acids and bases.
Incompatible with oxidizing agents.
Oxygen
Peroxides
peroxide compounds
Powdered metals

10.6 Hazardous decomposition products

No hazardous decomposition products are known.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Information on likely routes of exposure : Inhalation
Skin contact

Eye contact

Acute toxicity

Not classified based on available information.

Components:

Difluoromethane:

Acute oral toxicity	:	Assessment: The substance or mixture has no acute oral toxicity
Acute inhalation toxicity	:	LC50 (Rat): > 520000 ppm Exposure time: 4 h Test atmosphere: gas Method: OECD Test Guideline 403 No observed adverse effect concentration (Dog): 350000 ppm Test atmosphere: gas Remarks: Cardiac sensitisation Lowest observed adverse effect concentration (Dog): > 350000 ppm Test atmosphere: gas Remarks: Cardiac sensitisation Cardiac sensitisation threshold limit (Dog): > 735,000 mg/m3 Test atmosphere: gas Remarks: Cardiac sensitisation
Acute dermal toxicity	:	Assessment: The substance or mixture has no acute dermal toxicity

2,3,3,3-Tetrafluoropropene:

Acute inhalation toxicity	:	LC50 (Rat): > 405800 ppm Exposure time: 4 h Test atmosphere: gas Method: OECD Test Guideline 403 No observed adverse effect concentration (Dog): 120000 ppm Test atmosphere: gas Remarks: Cardiac sensitisation Lowest observed adverse effect concentration (Dog): > 120000 ppm Test atmosphere: gas Remarks: Cardiac sensitisation Cardiac sensitisation threshold limit (Dog): > 559,509 mg/m3 Test atmosphere: gas Remarks: Cardiac sensitisation

Skin corrosion/irritation

Not classified based on available information.

Components:

Difluoromethane:

Result : No skin irritation

2,3,3,3-Tetrafluoropropene:

Result : No skin irritation

Serious eye damage/eye irritation

Not classified based on available information.

Components:

Difluoromethane:

Result : No eye irritation

2,3,3,3-Tetrafluoropropene:

Result : No eye irritation

Respiratory or skin sensitisation

Skin sensitisation

Not classified based on available information.

Respiratory sensitisation

Not classified based on available information.

Components:

Difluoromethane:

Exposure routes : Skin contact
Result : negative

Exposure routes : Inhalation
Result : negative

2,3,3,3-Tetrafluoropropene:

Exposure routes : Skin contact
Result : negative

Germ cell mutagenicity

Not classified based on available information.

Components:

Difluoromethane:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)

Method: OECD Test Guideline 471
Result: negative

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

Germ cell mutagenicity- Assessment : Weight of evidence does not support classification as a germ cell mutagen.

2,3,3,3-Tetrafluoropropene:

Genotoxicity in vitro : Test Type: Bacterial reverse mutation assay (AMES)
Method: OECD Test Guideline 471
Result: positive

Test Type: Chromosome aberration test in vitro
Method: OECD Test Guideline 473
Result: negative

Genotoxicity in vivo : Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Mouse
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

Test Type: In vivo mammalian alkaline comet assay
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 489
Result: negative

Test Type: Mammalian erythrocyte micronucleus test (in vivo cytogenetic assay)
Species: Rat
Application Route: inhalation (gas)
Method: OECD Test Guideline 474
Result: negative

Germ cell mutagenicity- Assessment : Weight of evidence does not support classification as a germ cell mutagen.

Carcinogenicity

Not classified based on available information.

Components:

Difluoromethane:

Carcinogenicity - Assessment	:	Weight of evidence does not support classification as a carcinogen

2,3,3,3-Tetrafluoropropene:

Result	:	negative
Carcinogenicity - Assessment	:	Weight of evidence does not support classification as a carcinogen

Reproductive toxicity

Not classified based on available information.

Components:

Difluoromethane:

Effects on fertility	:	Species: Mouse Application Route: Inhalation Result: negative Remarks: Based on data from similar materials
Effects on foetal development	:	Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test Species: Rat Application Route: inhalation (gas) Method: OECD Test Guideline 414 Result: negative Test Type: Combined repeated dose toxicity study with the reproduction/developmental toxicity screening test Species: Rabbit Application Route: inhalation (gas) Method: OECD Test Guideline 414 Result: negative
Reproductive toxicity - Assessment	:	Weight of evidence does not support classification for reproductive toxicity

2,3,3,3-Tetrafluoropropene:

Effects on fertility	:	Test Type: Two-generation reproduction toxicity study Species: Rat Application Route: inhalation (gas) Method: OECD Test Guideline 416 Result: negative
Effects on foetal development	:	Test Type: Prenatal development toxicity study (teratogenicity) Species: Rat Application Route: inhalation (gas) Method: OECD Test Guideline 414

Result: negative

Reproductive toxicity - Assessment : Weight of evidence does not support classification for reproductive toxicity, No effects on or via lactation

STOT - single exposure

Not classified based on available information.

Components:

Difluoromethane:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less

2,3,3,3-Tetrafluoropropene:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 20000 ppmV/4h or less

STOT - repeated exposure

Not classified based on available information.

Components:

Difluoromethane:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

2,3,3,3-Tetrafluoropropene:

Exposure routes : inhalation (gas)
Assessment : No significant health effects observed in animals at concentrations of 250 ppmV/6h/d or less.

Repeated dose toxicity

Components:

Difluoromethane:

Species : Rat, male and female
NOAEL : 49100 ppm
LOAEL : > 49100 ppm
Application Route : inhalation (gas)
Exposure time : 13 Weeks
Method : OECD Test Guideline 413

2,3,3,3-Tetrafluoropropene:

Species : Rat, male and female
NOAEL : 50000 ppm

LOAEL	:	>50000 ppm
Application Route	:	inhalation (gas)
Exposure time	:	13 Weeks
Method	:	OECD Test Guideline 413

Aspiration toxicity

Not classified based on available information.

Components:

Difluoromethane:

No aspiration toxicity classification

2,3,3,3-Tetrafluoropropene:

No aspiration toxicity classification

11.2 Information on other hazards

Endocrine disrupting properties

Product:

Assessment	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 12: Ecological information

12.1 Toxicity

Components:

Difluoromethane:

Toxicity to fish	:	LC50 (Fish): 1,507 mg/l Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia (water flea)): 652 mg/l Exposure time: 48 h Method: ECOSAR (Ecological Structure Activity Relationships)
Toxicity to algae/aquatic plants	:	EC50 (green algae): 142 mg/l Exposure time: 96 h Method: ECOSAR (Ecological Structure Activity Relationships)

2,3,3,3-Tetrafluoropropene:

Toxicity to fish	:	LC50 (Cyprinus carpio (Carp)): > 197 mg/l Exposure time: 96 h Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	:	EC50 (Selenastrum capricornutum (green algae)): > 100 mg/l Exposure time: 72 h Method: OECD Test Guideline 201 NOEC (Selenastrum capricornutum (green algae)): > 75 mg/l Exposure time: 3 d Method: OECD Test Guideline 201

12.2 Persistence and degradability

Components:

Difluoromethane:

Biodegradability	:	Result: Not readily biodegradable. Method: OECD Test Guideline 301D

2,3,3,3-Tetrafluoropropene:

Biodegradability	:	Result: Not readily biodegradable. Method: OECD Test Guideline 301F

12.3 Bioaccumulative potential

Components:

Difluoromethane:

Partition coefficient: n-octanol/water	:	log Pow: 0.714

2,3,3,3-Tetrafluoropropene:

Bioaccumulation	:	Remarks: Bioaccumulation is unlikely.
Partition coefficient: n-octanol/water	:	log Pow: 2 (25 °C)

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

Product:

Assessment	:	This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of

0.1% or higher.

12.6 Endocrine disrupting properties

Product:

Assessment : The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects

Global warming potential

Regulation (EU) No 517/2014 on fluorinated greenhouse gases

Product:

100-year global warming potential: 466

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product : Dispose of in accordance with local regulations.
According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.
Waste codes should be assigned by the user, preferably in discussion with the waste disposal authorities.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
Empty pressure vessels should be returned to the supplier.
Empty containers retain residue and can be dangerous.
Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death.
If not otherwise specified: Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number or ID number

ADN	:	UN 3161
ADR	:	UN 3161
RID	:	UN 3161
IMDG	:	UN 3161
IATA (Cargo)	:	UN 3161
IATA (Passenger)	:	UN 3161

Not permitted for transport

14.2 UN proper shipping name

ADN	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
ADR	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
RID	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IMDG	:	LIQUEFIED GAS, FLAMMABLE, N.O.S. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IATA (Cargo)	:	Liquefied gas, flammable, n.o.s. (Difluoromethane, 2,3,3,3-Tetrafluoropropene)
IATA (Passenger)	:	Liquefied gas, flammable, n.o.s. Not permitted for transport

14.3 Transport hazard class(es)

		Class	Subsidiary risks
ADN	:	2	2.1
ADR	:	2	2.1
RID	:	2	2.1, (13)
IMDG	:	2.1	
IATA (Cargo)	:	2.1	
IATA (Passenger)	:	Not permitted for transport	

14.4 Packing group

ADN

Packing group	:	Not assigned by regulation
Classification Code	:	2F
Hazard Identification Number	:	23
Labels	:	2.1

ADR

Packing group	:	Not assigned by regulation
Classification Code	:	2F
Hazard Identification Number	:	23
Labels	:	2.1
Tunnel restriction code	:	(B/D)

RID

Packing group	:	Not assigned by regulation
Classification Code	:	2F
Hazard Identification Number	:	23
Labels	:	2.1 ((13))

IMDG

Packing group	:	Not assigned by regulation

Labels	:	2.1
EmS Code	:	F-D, S-U

IATA (Cargo)

Packing instruction (cargo aircraft)	:	200
Packing group	:	Not assigned by regulation
Labels	:	Flammable Gas

IATA (Passenger) : Not permitted for transport

14.5 Environmental hazards

ADN
Environmentally hazardous : no

ADR
Environmentally hazardous : no

RID
Environmentally hazardous : no

IMDG
Marine pollutant : no

14.6 Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

14.7 Maritime transport in bulk according to IMO instruments

Remarks : Not applicable for product as supplied.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	:	Not applicable
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	:	Not applicable
Regulation (EC) No 1005/2009 on substances that deplete the ozone layer	:	Not applicable
Regulation (EU) 2019/1021 on persistent organic pollutants (recast)	:	Not applicable
Regulation (EU) No 649/2012 of the European Parliament and the Council concerning the export and import of dangerous chemicals	:	Not applicable

REACH - List of substances subject to authorisation (Annex XIV) : Not applicable

Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.

		Quantity 1	Quantity 2
P2	FLAMMABLE GASES	10 t	50 t

Other regulations:

Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

15.2 Chemical safety assessment

Chemical Safety Assessments have been carried out for these substances.

SECTION 16: Other information

Other information : Opteon™ and any associated logos are trademarks or copyrights of The Chemours Company FC, LLC.
Chemours™ and the Chemours Logo are trademarks of The Chemours Company.
Before use read Chemours safety information.
For further information contact the local Chemours office or nominated distributors.

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

Full text of H-Statements

H221 : Flammable gas.
H280 : Contains gas under pressure; may explode if heated.

Full text of other abbreviations

Flam. Gas : Flammable gases
Press. Gas : Gases under pressure

ADN - European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways; ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CLP - Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECHA - European Chemicals Agency; EC-Number - European Community number; ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - Interna-

tional Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RID - Regulations concerning the International Carriage of Dangerous Goods by Rail; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; SVHC - Substance of Very High Concern; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TRGS - Technical Rule for Hazardous Substances; TSCA - Toxic Substances Control Act (United States); UN - United Nations; vPvB - Very Persistent and Very Bioaccumulative

Further information

Sources of key data used to compile the Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/

Classification of the mixture:		**Classification procedure:**
Flam. Gas 1B	H221	Based on product data or assessment
Press. Gas Liquefied gas	H280	Based on product data or assessment

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

IE / EN

Version: 2.1
Revision Date: 05.05.2023

SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended.

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
Product name: **HUILE ESTER 160SZ/160Z (BULK)5402030P01B**

1.2 Relevant identified uses of the substance or mixture and uses advised against
Identified uses: Refrigeration Lubricants.
Uses advised against: None identified.

1.3 Details of the supplier of the safety data sheet
Supplier

Company Name:	LUBRIZOL FRANCE
Address:	25 QUAI DE FRANCE CS 61062 76173 ROUEN CEDEX, 76173 FR
Telephone:	(33) 02.35.58.14.00
E-mail contact:	EUSDS@lubrizol.com {Lubrizol Safety Data Sheets can be obtained at www.mylubrizol.com}

1.4 Emergency telephone number:
FOR TRANSPORT EMERGENCY CALL CHEMTREC (+1) 703 527 3887 OR WITHIN FRANCE 09.75.18.14.07

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
This product does not meet the classification requirements of the current European legislation.

Classification according to Regulation (EC) No 1272/2008 as amended.
Not classified

2.2 Label elements according to Regulation (EC) No 1272/2008 as amended
Not applicable

2.3 Other hazards:

Endocrine Disruption- Toxicity
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

Endocrine Disruption- Ecotoxicity
The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.2 Mixtures
Regulation No. 1272/2008.
This material has no known hazards under applicable laws.

See Section 15 for Regulation (EC) No. 1907/2006 REACH Article 59(1). Candidate List (Substances of Very High Concern (SVHC))

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation:	Remove exposed person to fresh air if adverse effects are observed.
Eye contact:	Flush thoroughly with water. If irritation occurs, get medical assistance. Remove contact lenses, if present and easy to do. Continue rinsing.
Skin Contact:	Take off contaminated clothing and wash before re-use. Wash with soap and water. If skin irritation occurs, get medical attention.
Ingestion:	Treat symptomatically. Get medical attention. Do not induce vomiting. Rinse mouth. Get medical attention if symptoms occur.
4.2 Most important symptoms and effects, both acute and delayed:	See section 11.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards:	No data available.
Treatment:	Treat symptomatically.

SECTION 5: Firefighting measures

General Fire Hazards:	No unusual fire or explosion hazards noted.
5.1 Extinguishing media	
Suitable extinguishing media:	CO2, dry chemical, foam, water spray, water fog.
Unsuitable extinguishing media:	Do not use water jet as an extinguisher, as this will spread the fire.
5.2 Special hazards arising from the substance or mixture:	A solid stream of water will spread the burning material. Material creates a special hazard because it floats on water. See section 10 for additional information.

5.3 Advice for firefighters

Special fire-fighting procedures:	No data available.
Special protective equipment for fire-fighters:	Recommend wearing self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures:	Personal Protective Equipment must be worn, see Personal Protection Section for PPE recommendations.
6.2 Environmental Precautions:	Avoid release to the environment. Do not contaminate water sources or sewer. Environmental manager must be informed of all major spillages. Prevent further leakage or spillage if safe to do so.
6.3 Methods and material for containment and cleaning up:	Dike far ahead of larger spill for later recovery and disposal. Pick up free liquid for recycle and/or disposal. Residual liquid can be absorbed on inert material.
6.4 Reference to other sections:	See sections 8 and 13 for additional information.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling:	Observe good industrial hygiene practices. Provide adequate ventilation. Wear appropriate personal protective equipment.
Maximum Handling Temperature:	Not determined.
7.2 Conditions for safe storage, including any incompatibilities:	Store away from incompatible materials. See section 10 for incompatible materials.
Maximum Storage Temperature:	Not determined.
7.3 Specific end use(s):	End uses are listed in an attached exposure scenario when one is required.

SECTION 8: Exposure controls/personal protection

8.1 Control Parameters

Occupational Exposure Limits

None of the components have assigned exposure limits.

8.2 Exposure controls

Appropriate engineering controls:	No special requirements under ordinary conditions of use and with adequate ventilation.

Individual protection measures, such as personal protective equipment

General information: Please follow the recommended personal protective equipment (PPE) guidelines below and refer to the appropriate EN standard where applicable. Use personal protective equipment as required.

Eye/face protection: If contact is likely, safety glasses with side shields are recommended. Eye protection should meet the standards set out in EN 166.

Skin protection

Hand Protection: Neoprene. Suitable gloves can be recommended by the glove supplier. Nitrile.

General: Because specific work environments and material handling practices vary, safety procedures should be specific for each intended application. The correct choice of protective gloves depends upon the chemicals being handled, and the conditions of work and use. Most gloves provide protection for only a limited time before they must be discarded and replaced (even the best chemically resistant gloves will break down after repeated chemical exposures). Gloves should be chosen in consultation with the supplier / manufacturer and taking account of a full assessment of the working conditions. For typical use and handling of chemical substances, gloves should meet the standards set out in EN 374. For applications involving mechanical risks with potential for abrasion or puncture, the standards set out in EN 388 should be considered. For tasks involving thermal hazards, the standards set out in EN 407 should be considered.

Break-through time: Breakthrough time data are generated by glove manufacturers under laboratory test conditions and represent how long a glove can be expected to provide effective permeation resistance. It is important when following breakthrough time recommendations that actual workplace conditions are taken into account. Always consult with your glove supplier for up-to-date technical information on breakthrough times for the recommended glove type.
For continuous contact, we suggest gloves with a minimum breakthrough time of 240 minutes, or > 480 minutes if suitable gloves can be obtained. If suitable gloves are not available to offer that level of protection, gloves with shorter breakthrough times may be acceptable as long as appropriate glove maintenance and replacement regimes are determined and adhered to.
For short-term, transient exposures and splash protection, gloves with shorter breakthrough times may commonly be used. Therefore, appropriate maintenance and replacement regimes must be determined and rigorously followed.

Glove thickness:	For general applications, we recommend gloves with a thickness typically greater than 0.35 mm. It is important to note that glove thickness is not the only predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers' technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, before being disposed of. Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential.
Other:	No data available.
Respiratory Protection:	A respiratory protection program compliant with all applicable regulations must be followed whenever workplace conditions require the use of a respirator. Under normal use conditions, respirator is not usually required. Use appropriate respiratory protection if exposure to dust particles, mist or vapors is likely. Use self-contained breathing apparatus for entry into confined space, for other poorly ventilated areas and for large spill clean-up sites. Respiratory Protective Equipment (RPE) is not normally required where there is adequate natural or local exhaust ventilation to control exposure. In case of insufficient ventilation, wear suitable respiratory equipment. The correct choice of respiratory protection depends upon the chemicals being handled, the conditions of work and use, and the condition of the respiratory equipment. Safety procedures should be developed for each intended application. Respiratory protection equipment should therefore be chosen in consultation with the supplier/manufacturer and with a full assessment of the working conditions. Please refer to the relevant EN standards for the RPE selected.
Hygiene measures:	Observe good industrial hygiene practices.
Environmental Controls:	No data available. See section 6 for details.

Lubrizol

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SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	liquid
Form:	liquid
Color:	Colorless to yellow
Odor:	Mild
Odor Threshold:	No data available.
pH:	Not applicable
Freezing point:	No data available.
Boiling Point:	No data available.
Flash Point:	270 °C (Tagliabue Open Cup)
Evaporation Rate:	No data available.
Flammability (solid, gas):	No data available.
Upper/lower limit on flammability or explosive limits	
Flammability Limit - Upper (%):	No data available.
Flammability Limit - Lower (%):	No data available.
Vapor pressure:	No data available.
Relative vapor density:	No data available.
Relative density:	0.977 (20 °C)
Solubility(ies)	
Solubility in Water:	Insoluble in water
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Autoignition Temperature:	No data available.
Decomposition Temperature:	No data available.
Viscosity:	33.7 mm2/s (40 °C); 5.9 mm2/s (100 °C)
Explosive properties:	No data available.
Oxidizing properties:	No data available.
VOC Content:	No data available.

Particle characteristics

Particle Size:	Not applicable
Particle Size Distribution:	Not applicable
Specific surface area:	Not applicable
Surface charge/Zeta potential:	Not applicable
Assessment:	Not applicable
Shape:	Not applicable
Crystallinity:	Not applicable
Surface treatment:	Not applicable

Other information

Pour Point Temperature: Approximate -46 °C

SECTION 10: Stability and reactivity

10.1 Reactivity: No data available.

10.2 Chemical Stability: Material is stable under normal conditions.

10.3 Possibility of hazardous reactions: Will not occur.

10.4 Conditions to avoid: Do not expose to excessive heat, ignition sources, or oxidizing materials.

10.5 Incompatible Materials: Strong acids. Oxidizing agents. Strong bases.

10.6 Hazardous Decomposition Products: Thermal decomposition or combustion may generate smoke, carbon monoxide, carbon dioxide, and other products of incomplete combustion.

SECTION 11: Toxicological information

Information on likely routes of exposure

Inhalation: No data available.

Ingestion: No data available.

Skin Contact: Causes mild skin irritation.

Eye contact: No data available.

11.1 Information on toxicological effects

Acute toxicity

Oral
Product: Ingestion of this material may cause gastric disturbances. Not classified for acute toxicity based on available data.

Dermal
Product: Not classified for acute toxicity based on available data.

Inhalation
Product: Not classified for acute toxicity based on available data.

Skin Corrosion/Irritation:
Product: Remarks: Causes mild skin irritation. Prolonged or repeated contact may cause irritation.

Serious Eye Damage/Eye Irritation:
Product: Remarks: Not classified as a primary eye irritant.

Respiratory sensitization:
No data available

Skin sensitization:

No data available

Specific Target Organ Toxicity - Single Exposure:

Product: If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract.

No data available

Aspiration Hazard:

No data available

Chronic Effects

Carcinogenicity:

No data available

Germ Cell Mutagenicity:

No data available

Reproductive toxicity:

No data available

Specific Target Organ Toxicity - Repeated Exposure:

No data available

11.2 Information on health hazards

Other hazards

Product: If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract.;

Endocrine Disruption

Product: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.;

SECTION 12: Ecological information

12.1 Ecotoxicity

Fish

No data available

Aquatic Invertebrates

No data available

Toxicity to Aquatic Plants
No data available

Toxicity to soil dwelling organisms
No data available

Sediment Toxicity
No data available

Toxicity to Terrestrial Plants
No data available

Toxicity to Above-Ground Organisms
No data available

Toxicity to microorganisms
No data available

12.2 Persistence and Degradability
Biodegradation
Product: OECD TG 301 B, 63.1 %, 28 d, Readily degradable

BOD/COD Ratio
No data available

12.3 Bioaccumulative potential
Bioconcentration Factor (BCF)
No data available

Partition Coefficient n-octanol / water (log Kow)
No data available

12.4 Mobility:
No data available

12.5 Results of PBT and vPvB assessment
No data available

12.6 Endocrine Disruption:
Product: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher.

12.7 Other adverse effects
No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Disposal methods: Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations. Dispose of packaging or containers in accordance with local, regional, national and international regulations. Empty container contains product residue which may exhibit hazards of product.

Contaminated Packaging: Container packaging may exhibit hazards.

SECTION 14: Transport information

ADR
Not regulated.

IMDG
Not regulated.

IATA
Not regulated.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code
None known.

Shipping descriptions may vary based on mode of transport, quantities, temperature of the material, package size, and/or origin and destination. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material. For transportation, steps must be taken to prevent load shifting or materials falling, and all relating legal statutes should be obeyed. Review classification requirements before shipping materials at elevated temperatures.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

EU Regulations
EU. Regulation 1005/2009/EC on substances that deplete the ozone layer, Annex I, Controlled Substances:
None present or none present in regulated quantities.

EU. Regulation 2019/1021/EU on persistent organic pollutants (POPs) (recast), as amended:
None present or none present in regulated quantities.

EU. Chemicals Subject to PIC Procedure: Regulation 649/2012/EU on export and import of dangerous chemicals, as amended:
None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006, REACH Article 59(1). Candidate List:
None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006, REACH Annex XIV Substances subject to authorisation, as amended:
None present or none present in regulated quantities.

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use:
None present or none present in regulated quantities.

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work.:
None present or none present in regulated quantities.

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:
None present or none present in regulated quantities.

EU. Directive 2012/18/EU (SEVESO III) on major accident hazards involving dangerous substances, Annex I:

None present or none present in regulated quantities.

EU. Regulation No. 166/2006 PRTR (Pollutant Release and Transfer Registry), Annex II: Pollutants:
None present or none present in regulated quantities.

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:
None present or none present in regulated quantities.

Inventory Status

Australia (AIIC)
All components are in compliance with chemical notification requirements in Australia.

Canada (DSL/NDSL)
All substances contained in this product are in compliance with the Canadian Environmental Protection Act and are present on the Domestic Substances List (DSL) or are exempt.

China (IECSC)
All components of this product are listed on the Inventory of Existing Chemical Substances in China.

European Union (REACh)
To obtain information on the REACH compliance status of this product, please e-mail REACH@SDSInquiries.com.

Great Britain (UK REACH)
To obtain information on the UK REACH compliance status of this product, please e-mail REACH@SDSInquiries.com.

Japan (ENCS)
All components are in compliance with the Chemical Substances Control Law of Japan.

Korea (ECL)
All components are in compliance in Korea.

New Zealand (NZIoC)
All components are in compliance with chemical notification requirements in New Zealand.

Philippines (PICCS)
All components are in compliance with the Philippines Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969).

Switzerland (SWISS)
All components are in compliance with the Environmentally Hazardous Substances Ordinance in Switzerland.

Taiwan (TCSCA)
All components of this product are listed on the Taiwan inventory.

Turkey (KKDIK)
To obtain information on the KKDIK compliance status of this product, please e-mail REACH@SDSInquiries.com.

United States (TSCA)
All substances contained in this product are listed on the TSCA inventory or are exempt.

The information that was used to confirm the compliance status of this product may deviate from the chemical information shown in Section 3.

15.2 Chemical safety assessment: No Chemical Safety Assessment has been carried out.

SECTION 16: Other information

Key literature references and sources for data: Internal company data and other publically available resources.

Wording of the H-statements in section 2 and 3: none
none

Other information: Revision(s) are noted by the double bar in the margin and the light gray box.

Abbreviations and acronyms:

ACGIH – American Conference of Governmental Industrial Hygienist
ADR - International Carriage of Dangerous Goods by Road
AICS - Australian Inventory of Chemical Substances
ATEmix - Acute Toxicity Estimate for the mixture

BCF - Bio concentration factor
DMSO - Dimethyl sulfoxide
DSL - Domestic Substance List
EC50 - Effective concentration that gives a response in 50% of the population
ECHA - European Chemical Agency
ECL - Existing Chemical List
ENCS - Existing and New Chemical Substances
EPA – Environmental Protection Agency
IARC - International Agency for Research on Cancer
IATA - International Air Transport Association
IECSC - Inventory of Existing Chemical Substances
IMDG - International Maritime Dangerous Goods
IP 346 – A gravimetric assay used to determine the percentage weight of polycyclic aromatics in oil, via a DMSO extraction technique
LC50 - Lethal concentration required to kill 50% of the population
MARPOL - International Conventions for the Prevention of Pollution from Ships
NDSL - Non Domestic Substance List
NOAEC - No observed adverse effect concentration
NOAEL - No observed adverse effect level
NOEC - No observed effective concentration
NTP - National Toxicology Program
NZloc - New Zealand Inventory of chemicals
OECD TG - Organization for Economic Cooperation and Development Test Guidelines
OSHA – Occupational, Safety, and Health Administration
PBT – Persistent bioaccumulative toxic chemical
PEL – Permissible Exposure Level
PICCS - Philippine Inventory of Chemicals and Chemical Substances
PPE - Personal Protective Equipment
PRTR - Pollutant Release and Transfer Register
REACH - Registration, Evaluation, Authorization & restriction of Chemicals
SVHC - Substance of Very High Concern
SWISS - Switzerland chemical ordinance
TCSCA - Toxic Chemical Substance Control Act
TLV – Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA – Time Weighted Average
vPvB – very Persistent very Bioaccumulative

Issue Date:	05.05.2023
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A2L information

⚠ WARNING

R-454B refrigerant is classified as an A2L refrigerant due in part to its designation as mildly flammable. Correct precautions are required when handling A2L refrigerants. Ensure that all local building and safety codes, including and not limited to EN-378, are reviewed and followed.

R-454B refrigerant is classified as PED fluid group 1 / Safety class A2L in accordance with Annex E of EN378-1:2016 and PED 2014/68/EU.

As a unit, the YCPB chiller is not an ATEX unit. It is intended for use in normal areas; however, the volume around the emergency outlet, relief valve piping exhaust, opening are zone 2 areas during normal operation.

Under ATEX, areas are classified according to the hazard associated with the flammable gas. The following classification applies per EN 60079-10-1:

- Zone 2 – an area in which an explosive gas atmosphere is not likely to occur during normal operation, and if it does occur, it will exist for a short period of time only.

European Norms or EN standards are typically based on an international standard. ISO and IEC standards are international safety-in-use type standards.

The following table defines the relationship between International and European Union standards.

Table 1: International and European standards

Standard type		**International**	**European**
Refrigerant classification		**ISO 817**	**Follows ISO 817**
Safety in use	General	ISO 5419	EN 378
	Equipment-specific	IEC 60335-2-24	EN 60335-2-24
		IEC 60335-2-40	EN 60335-2-40
		IEC 60335-2-89	EN 60335-2-89

Check your local regulations and the correct standards such as those listed above to verify the allowable filling charge, new equipment design, and safe handling requirements for the intended application.

Where an equipment standard provides guidance for charge limitations, the equipment standard over-rules charge limitations in the general safety standard.

The pressure relief valves fitted to YCPB units with R-454B refrigerant are individually approved in accordance with existing standards under PED from the manufacturer.

In each case, the customer must be asked if special rules apply in the user country for relief valves with release into free air as this area is governed by national and local standards.

Lead notice

⚠ WARNING

To fulfill our obligations towards Article 33, in accordance to European REACH Regulation No 1907/2006 EC, we hereby inform you that this article contains the following Substances of Very High Concern mentioned on the Candidate list:

Lead

Misuse of equipment

The unit is intended for cooling and heating water or glycol solutions and is not suitable for purposes other than those specified in these instructions. Any use of the equipment other than its intended use, or operation of the equipment contrary to the relevant procedures may result in injury to the operator, or damage to the equipment. The unit must not be operated outside the design parameters specified in this manual.

Structural support

Structural support of the unit must be provided as indicated in these instructions. Failure to provide the correct support may result in injury to the operator, or damage to the equipment or building.

Mechanical strength

The unit is not designed to withstand loads or stresses from adjacent equipment, pipework, or structures. Do not mount additional components on the unit. Any such extraneous loads may cause structural failure and may result in injury to the operator, or damage to the equipment.

General access

Potentially hazardous areas or features can cause injury when working on the unit, unless personnel take suitable safety precautions. It is important to ensure access to the unit is restricted to suitably qualified personnel who are familiar with the potential hazards and precautions necessary for safe operation and maintenance of equipment containing high temperatures, pressures, and voltages.

Pressure systems

The unit contains refrigerant vapor and liquid under pressure, release of which can be a danger and cause injury. The user must take care during installation, operation and maintenance to avoid damage to the pressure system. Untrained and unqualified personnel must not attempt to gain access to the component parts of the pressure system. Ensure only suitably trained and qualified personnel access the component parts of the pressure system.

Electrical

The unit must be grounded. Do not attempt installation or maintenance work on the electrical equipment without switching the power off, and isolating and locking-off the power supply. Do not attempt any servicing and maintenance on live equipment. Do not attempt to gain access to the control panel or electrical enclosures during normal operation of the unit.

Rotating parts

Fan guards must be fitted at all times and not removed unless the main power supply has been isolated. If you remove the wire fan guards when fitting ductworks, take alternative safety measures to protect against the risk of injury from rotating fans.

Refrigerants and oils

Refrigerants and oils used in the unit are generally nontoxic, low-flammable, and non-corrosive, and pose no special safety hazards. Wear gloves and safety glasses when working on the unit.

⚠ DANGER

The build up of refrigerant vapor, from a leak for example, poses a risk of asphyxiation in confined or enclosed spaces. Ensure there is good ventilation.

⚠ CAUTION

Use only the refrigerant specifically designated for the unit. Any other type of refrigerant may cause damage to the equipment and will void the warranty.

High temperature and pressure cleaning

Do not use high temperature and pressure cleaning methods, for example steam cleaning, on any part of the pressure system as this may cause operation of the pressure relief devices. Also avoid using detergents and solvents, which may cause corrosion.

Emergency shutdown

In case of emergency, use the non-fused disconnect switch on the power panel as the emergency stop device. When operated, the switch removes the electrical supply to the unit and shuts down the unit.

Refrigerant leak

If a large refrigerant leak or spill occurs, do not attempt to enter the area to repair equipment until the vapors are dispersed, or until you are equipped with correct breathing apparatus. Evacuate everyone until the area has been ventilated. Use blowers or fans to circulate air at the floor level and in any basement or low areas.

⚠ WARNING

Appropriate respiratory protection equipment must be readily available in case of a large release of refrigerant. Personnel must be trained to use this equipment.

ⓘ **Note:** Consult the most recent version of ISO 5149 or EN 378 for additional information.

Safety standards

YCPB heat pumps are designed and manufactured within an EN ISO 9001 accredited organization and in conformity with the following European directives:

- Machinery Directive, 2006/42/EC
- EMC Directive, 2014/30/EU
- Pressure Equipment Directive, 2014/68/EU
- Eco design Directive, 2009/125/EC
- Safety Code for Mechanical Refrigeration, EN 378-2
- Safety of machinery Electrical Equipment of Machine, EN 60204-1
- Generic emissions and immunity standards for industrial environment, EN61000-6-4: 2019 and 61000-6-2: 2019
- ISO 9614 2 Determination of sound power levels of noise sources using sound intensity
- Fluorinated Greenhouse Gases regulation, EU No. 517/2014)
- Conform to CE Testing Services for construction of chillers and provide CE Listed Mark

Warranty

Johnson Controls warrants all equipment and materials against defects in workmanship and materials for a period of eighteen months from date of shipment, unless labor or extended warranty has been purchased as part of the contract.

The warranty is limited to parts only replacement and shipping of any faulty part, or sub-assembly, which has failed due to poor quality or manufacturing errors. All claims must be supported by evidence that the failure has occurred within the warranty period, and that the unit has been operated within the designed parameters specified.

All warranty claims must specify the unit model, serial number, order number and run hours/starts.

Model and serial number information is printed on the unit identification plate.

The unit warranty will be void if any modification to the unit is carried out without prior written approval from Johnson Controls.

For warranty purposes, the following conditions must be satisfied:

- The initial start of the unit must be carried out by trained personnel from an Authorized Johnson Controls Service Centre.
- Only genuine Johnson Controls approved spare parts, oils, coolants, and refrigerants must be used.
- All the scheduled maintenance operations detailed in this manual must be performed at the specified times by suitably trained and qualified personnel.

Note: Failure to satisfy any of these conditions will automatically void the warranty.

Unit information

The YORK YCPB is manufactured to the highest design and construction standards to ensure high performance, reliability, and adaptability to all types of air conditioning installations.

The unit is intended for cooling and heating water or glycol solutions and is not suitable for purposes other than those specified in this manual.

YCPB air-to-water heat pumps are completely factory-assembled with all interconnecting refrigerant piping and wiring ready for field installation. The unit is pressure tested, evacuated, and fully factory-charged with refrigerant R-454B and oil in each of the independent refrigerant circuits. After assembly, perform an operational test with water flowing through the heat exchanger to ensure that each refrigerant circuit operates correctly.

The unit structure is manufactured from heavy-gauge, galvanized steel coated with cured powder paint, Champagne (RAL 7006, Munsell No. 9.8YR4.36/1.2).

This manual contains all the information required for correct installation and commissioning of the unit, together with operating and maintenance instructions. Read the manuals thoroughly before attempting to operate or service the unit.

All procedures detailed in the manuals, including installation, commissioning and maintenance tasks must only be performed by suitably trained and qualified personnel.

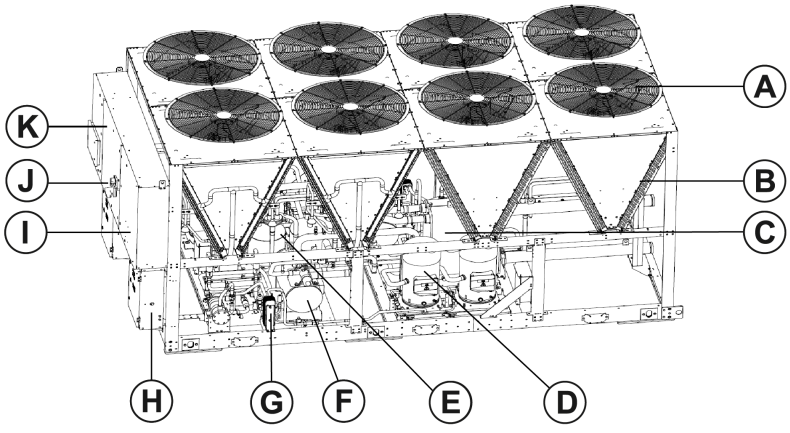
NOTICE

The manufacturer will not be liable for any injury or damage caused by incorrect installation, commissioning, operation or maintenance resulting from a failure to follow the procedures and instructions detailed in the manuals.

System components

Component location diagram

Figure 1: Component location diagram



Callout	Description	Callout	Description
A	Fans	G	Economic BPHX
B	Ambient coils	H	VSD fan panel - H models only
C	BPHX	I	Panel – power side
D	Compressors	J	Non-fused disconnect switch
E	Liquid receiver	K	Panel – control side
F	Suction accumulator		

Compressors

The YCPB has suction-cooled, hermetic scroll compressors with an injection port that enables vapor injection by connecting an intermediate exchanger. High efficiency is achieved through a controlled orbit and the use of advanced scroll geometry. The compressors incorporate a compliant scroll design in both the axial and radial directions. All rotating parts are statically and dynamically balanced.

The compressor motors have integral protection against overloads that automatically reset. Starting is direct on line, and soft start is available as an option.

The compressors are switched on and off by the unit microprocessor to provide capacity control. Each compressor is fitted with a crankcase strap heater. All compressors are mounted on isolator pads to reduce transmission of vibration to the rest of the unit.

The motor terminal boxes have IP54 weather protection.

Refrigerant circuits

Two independent refrigerant circuits are provided on each unit. Each circuit uses copper refrigerant pipe formed on computer controlled bending machines to reduce the number of brazed joints resulting in a high integrity and reliable system.

Each circuit incorporates the following components:

- Suction accumulator
- Liquid receiver
- Four-way reversing valve
- Service valves
- Pressure relief valves
- High absorption removable core filter drier
- Sight glass with moisture indicator
- Dual direction electrical expansion valve

ⓘ **Note:** Suction lines must be covered with closed-cell insulation.

Refrigerant to water heat exchanger

The compact, high-efficiency brazed plate heat exchanger (BPHE) is constructed with 316 stainless steel corrugated channel plates with a filler material between each plate. It offers excellent heat transfer performance with a compact size and low weight, reducing structural steel requirements on the job site.

The heat exchanger is manufactured in a precisely controlled vacuum brazing process that allows the filler material to form a brazed joint at every contact point between the plates, creating complex channels. The arrangement is similar to older plate and frame technology, but without gaskets and frame parts.

The refrigerant side design working pressure of the heat exchanger is 45 bar and the waterside piping design working pressure is 10 bar.

Water connection to the heat exchanger is through Victaulic grooved connections. Victaulic groove-to-flange converters are available as an option. A wye-strainer is provided as standard to provide additional protection at the heat exchanger inlet, particularly at system startup when construction debris may be present in the piping system.

The heat exchanger is equipped with a thermostat controlled heater for frost protection to -25°C ambient temperature and insulated with flexible, closed cell foam.

For the standard unit, a paddle flow switch is provided as standard. There is also a optional thermal dispersion flow switch.

ⓘ **Note:** The wye-strainer and paddle flow switch are shipped loose. The contractor must install them on the pipe section of the evaporator at the job site according to the pipework arrangement drawings.

Ambient coils

The ambient coils are copper tubes, arranged in staggered rows, mechanically expanded into coated aluminium fins. Integral sub-cooling is included.

The ambient coil fans have metal sickle blades integrated into the rotor of motor. They are designed for maximum efficiency, and are statically and dynamically balanced for vibration-free operation. They are directly driven by independent motors, positioned for vertical air discharge. The fan guards are constructed from heavy gauge, corrosion-resistant, coated steel.

The IP54 fan motors are the totally enclosed air over type with permanently lubricated double-sealed ball bearings.

Power and controls panel

All power and controls are contained in an IP54 cabinet with hinged and gasket sealed outer doors.

The power panel includes the following:

- A factory-mounted non-fused disconnect switch with external (red/yellow) lockable handle to enable connection of the unit power supply. The disconnect switch can be used to isolate the power for servicing and as an emergency stop.
- Factory-mounted compressor contactors and compressor circuit breakers provide short circuit protection.

ⓘ **Note:**

- Overload protection for each compressor is provided by inherent motor winding temperature sensing and a trip module.
- Factory-mounted fan contactors and circuit breakers provide short circuit protection.
- Factory-mounted control transformer to convert the unit supply voltage to 220V 1Ø 5 0Hz for the control system.

The control panel includes the following:

- 7 in. liquid crystal display with touch control available for easy viewing and operating.
- Customer terminal blocks for control inputs.

Microprocessor controls

The microprocessor control includes the following:

- Automatic control of compressor start/stop, anti-coincidence and anti-recycle timers, pump unit alarm contacts.

Automatic reset to normal unit operation after power failure. Software is loaded into the microprocessor controller via a USB disk, with programmed setpoints retained in a lithium battery backed real time clock (RTC) memory.

LCD display with description available in English, Swedish, German, Italian, French, Polish, and Spanish.

Nomenclature

Table 2: YCPB example

1	2	3	4	5-8	9	10	11-12	13	14	15
Y	C	P	B	0420	H	J	50	X	B	A

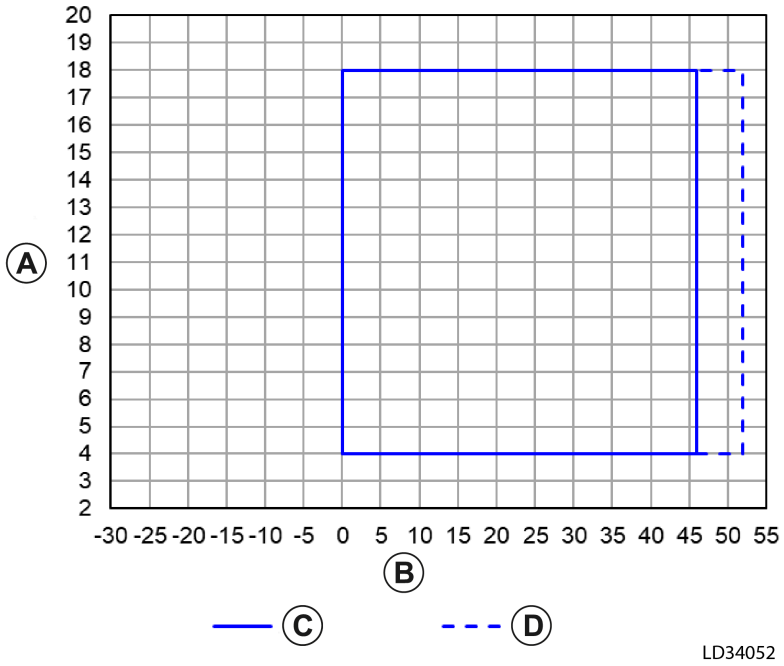
Table 3: YCPB nomenclature

Number	Description	Options
1	Brand	Y: YORK
2	Compressor type	C: Scroll
3	Product type	P: Heat pump
4	Region	B: Europe
5-8	Nominal capacity, in kW	0320, 0420, 0460, 0520, 0600, 0690, 0770
9	Unit designator	H: High efficiency
		S: Standard efficiency
10	Refrigerant	J: R-454B
11-12	Voltage	50: 400 V/3 Ph/ 50 Hz
13	Starter	T: Soft start
		X: Direct on line
14	Heat exchanger	B: Tube and fin
15	Design series	A

Example: YCPB0420HJ50XBA is the YCPB unit with a nominal capacity of 420 kW.

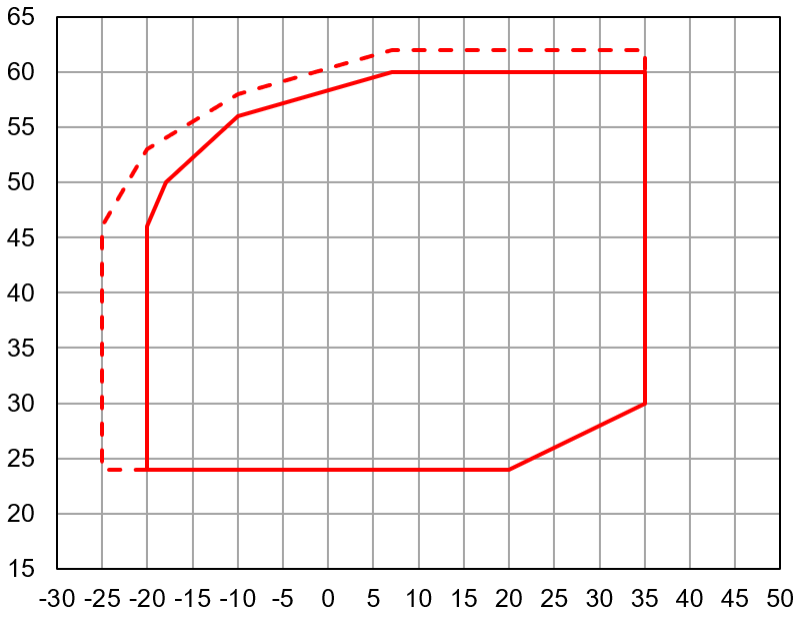
Operating range

Figure 2: Standard efficiency with fixed-speed fans - cooling



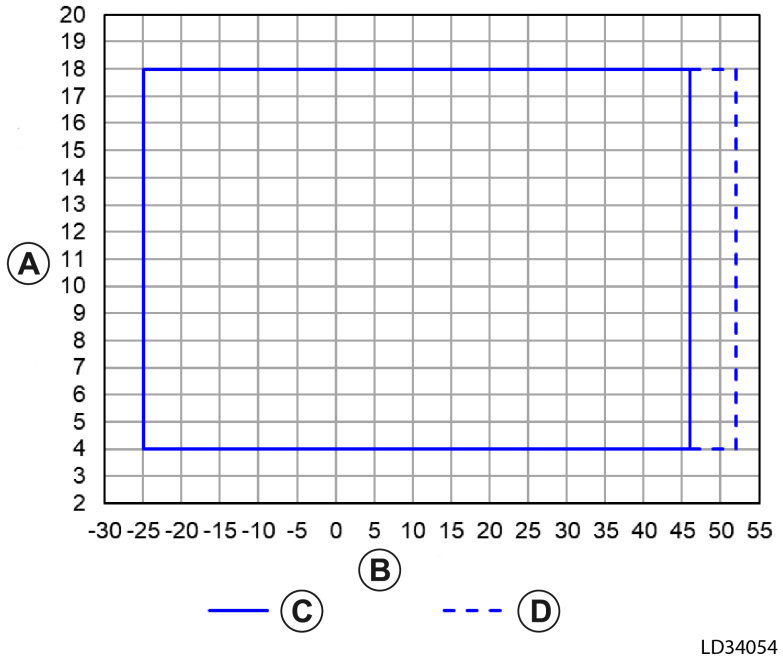
Callout	Description	Callout	Description
A	Leaving water temperature °C	C	Full load
B	Ambient °C	D	Part load

Figure 3: Standard efficiency with fixed-speed fans - heating



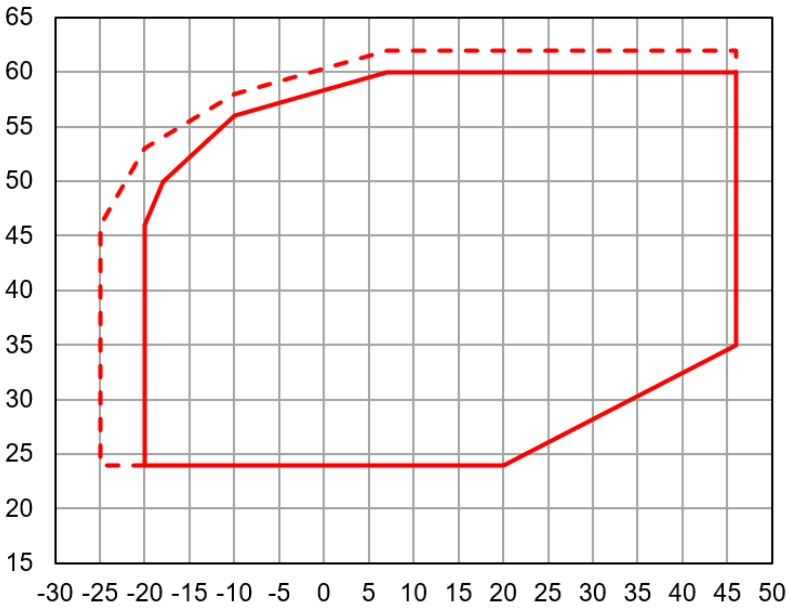
Callout	Desciption	Callout	Description
A	Leaving water temperature °C	C	Full load
B	Ambient °C	D	Part load

Figure 4: High efficiency with VSD fans - cooling



Callout	Description	Callout	Description
A	Leaving water temperature °C	C	Full load
B	Ambient °C	D	Part load

Figure 5: High efficiency with VSD fans - heating



Callout	Description	Callout	Description
A	Leaving water temperature °C	C	Full load
B	Ambient °C	D	Part load

Table 4: Operating range YCPB standard efficiency

Model			YCPB0320S		YCPB0420S		YCPB0520S	
			Min	Max	Min	Max	Min	Max
Cooling mode	Liquid outlet temperature, water	°C	4	18	4	18	4	18
	Liquid outlet temperature range, ΔT	°C	3	11	3	11	3	11
	Air temperature, standard unit	°C	0	46	0	46	0	46
Heating mode	Liquid outlet temperature, water	°C	24	57	24	57	24	57
	Liquid outlet temperature range, ΔT	°C	3	11	3	11	3	11
	Air temperature, standard unit	°C	-20	35	-20	35	-20	35
Heat exchanger flow rate		l/s	4.6	22.8	6.0	30.0	7.5	37.3
Heat exchanger pressure drop		kPa	2.5	50.9	3.2	68.6	3.6	78.6
Maximum water side pressure		bar	10					
Maximum refrigerant side pressure		bar	45					
Power supply voltage		V	400V/3P/50Hz					

Table 5: Operating range YCPB high efficiency

Model			0320H		0420H		0520H	
			Min	Max	Min	Max	Min	Max
Cooling mode	Liquid outlet temperature, water	°C	4	18	4	18	4	18
	Liquid outlet temperature range	°C	3	11	3	11	3	11
	Air temperature, standard unit	°C	-25	46	-25	46	-25	46
Heating mode	Liquid outlet temperature, water	°C	24	57	24	57	24	57
	Liquid outlet temperature range, ΔT	°C	3	11	3	11	3	11
	Air temperature, standard unit	°C	-20	46	-20	46	-20	46
Heat exchanger flow rate		l/s	4.6	22.8	6.0	30.0	7.5	37.3
Heat exchanger pressure drop		kPa	2.5	50.9	3.2	68.6	3.6	78.6

Table 5: Operating range YCPB high efficiency

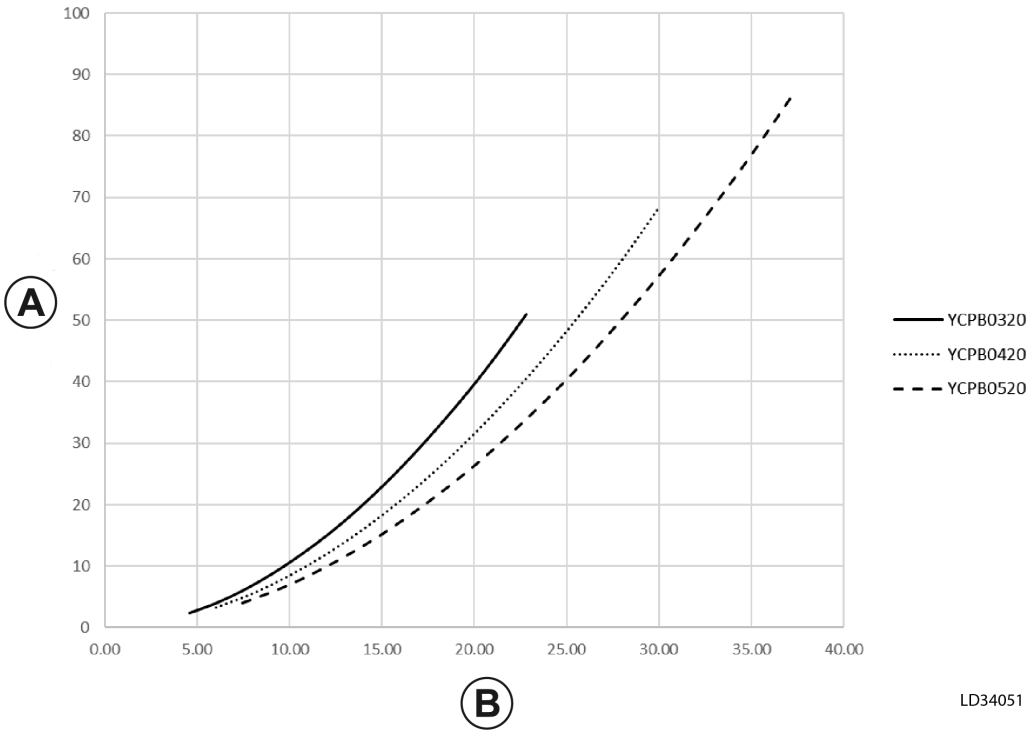
Model		0320H		0420H		0520H	
		Min	Max	Min	Max	Min	Max
Maximum water side pressure	bar	10					
Maximum refrigerant side pressure	bar	45					
Power supply voltage	V	400V/3P/50Hz					

Note:

- In YCPB standard efficiency and YCPB high efficiency, cooling mode air temperature operates unloaded up to 52°C depending on model size and site conditions.
- In YCPB standard efficiency and YCPB high efficiency, heating mode liquid outlet temperature, water, the unit operates unloaded up to 60°C depending on model size and site conditions.
- In YCPB standard efficiency and YCPB high efficiency, heating mode, air temperature, the unit operates unloaded down to -25°C depending on model size and site conditions.
- Power supply voltage tolerance +/-10%.

Refrigerant-to-water heat exchanger pressure drop

Figure 6: Refrigerant to water heat exchanger pressure drop



Callout	Description
A	Pressure drop, kPa
B	Flow rate, l/s

Table 6: YCPB model evaporator pressure drop

Model	Evaporator pressure drop kPa
0320	ΔP=0.0882 x Flow Rate (l/s)^2 + 0.2434 x Flow Rate (l/s) - 0.5832
0420	ΔP=0.0692 x Flow Rate (l/s)^2 + 0.2247 x Flow Rate (l/s) - 0.7102
0520	ΔP=0.0575 x Flow Rate (l/s)^2 + 0.2104 x Flow Rate (l/s) - 0.8211

Technical data

Physical data

Table 7: Physical data YCPB standard efficiency

Model			0320S	0420S	0520S
Number of refrigerant circuits			2		
Refrigerant charge	Circuit 1 / circuit 2	kg	35.6/35.6	54.0/35.6	54.0/54.0
Oil charge	Circuit 1 / circuit 2	L	3.0/3.0	3.5/3	3.5/3.5
Compressor	Number of compressors		2/2	2/2	2/2
	Compressor type		Scroll		
Refrigerant to water heat exchanger	Number		1		
	Type		Brazed plate		
	Water volume	L	40	47	82
	Water connections	in	4	4	4
Ambient coils fans	Number of fans Circuit 1 / circuit 2		2/2	4/2	4/4
	Total air flow - standard models	m^3/s	23.3	35.0	46.6
Dimensions	Length	mm	3703	3703	4820
	Width	mm	2242	2242	2242
	Height	mm	2450	2450	2450
Basic unit weight	Shipping weight	kg	2652	3066	3766
	Operating weight	kg	2692	3113	3826

Table 8: Physical data YCPB high efficiency

Model			0320H	0420H	0520H
Number of refrigerant circuits			2		
Refrigerant charge	Circuit 1 / circuit 2	kg	35.6/35.6	54.0/35.4	54.0/54.0
Oil charge	Circuit 1 / circuit 2	L	3.0/3.0	3.5/3	3.5/3.5
Compressor	Number of compressors		2/2	2/2	2/2
	Type		Scroll		

Table 8: Physical data YCPB high efficiency

Model			0320H	0420H	0520H
Refrigerant to water heat exchanger	Number		1		
	Type		Brazed plate		
	Water volume	L	40	47	82
	Water connections	in	4	4	4
Ambient coils fans	Number of fans Circuit 1 / circuit 2		2/2	4/2	4/4
	Total air flow standard models	m^3/s	23.3	35.0	46.6
Dimensions	Length	mm	3703	3703	4820
	Width	mm	2242	2242	2242
	Height	mm	2450	2450	2450
Basic unit weight	Shipping weight	kg	2716	3113	3836
	Operating weight	kg	2756	3180	3896

ⓘ **Note:** Liquid sub-cooling measured at the liquid line must be between 6°C and 10°C at circuit full load. Sub-cooling is determined by the level of refrigerant charge in each system.

Nominal data

Table 9: Nominal data

Model		Standard efficiency			High efficiency		
		0320S	0420S	0520S	0320H	0420H	0520H
Cooling mode	Capacity kW	274.7	364.2	448.7	274.7	364.2	448.7
	EER	2.89	2.97	2.99	2.89	2.97	2.99
	ηs,c	157.5	157.3	158.6	165.6	167.4	165.4
	SEER	4.01	4.01	4.04	4.22	4.26	4.21
Heating mode	Capacity kW	305.1	406	506.9	305.1	406	506.9
	COP	3.39	3.37	3.3	3.39	3.37	3.3
	ηs,h	149.1	149.9	146.6	160.7	163.2	158.5
	SCOP	3.80	3.82	3.74	4.09	4.16	4.04
Sound power dB(A)		91.5	92.0	92.5	91.5	92.0	92.5

ⓘ **Note:**

- Cooling capacity: At 7°C leaving chilled water and 35 °C ambient according to EUROVENT calculation EN14511.
- EER: Cooling capacity/total kW input from compressors, fans, and controls.
- SEER: Cooling output divided by the total electric energy input during a typical cooling season.
- Heating capacity: At 45°C leaving hot water and 7°C ambient according to EUROVENT calculation EN14511.
- COP: Heating capacity/total kW input from compressors, fans, and controls.
- SCOP: Seasonal Coefficient of Performance according to European Standard EN 14825.
- Sound data in accordance with ISO9614.
- Conditions/ratings according EN 14511.

Unit electrical data

Table 10: Unit electrical data

YCPB unit data using standard fans				
Model		**Nominal running conditions**	**Maximum running conditions**	**Start up amps**
		Amps at 400 V	**Amps at 400 V**	**Direct on line**
0320	Standard	197	238	455
0420	Standard	249	310	588
0460	Standard	269	344	621
0520	Standard	300	383	660
0600	Standard	341	440	660
0690	Standard	89	501	778
0770	Standard	437	561	836

Compressor electrical data

Table 11: Compressor electrical data

Model		Nominal		Maximum		Inrush current at 400 V
		kW	**Amps at 400 V**	**kW**	**Amps at 400 V**	**DOL**
0320 SYS1/2 0420 SYS2	Standard	20.8	38.5	29.3	48.7	290.0
0460 SYS2 / 0600 SYS1+2 0690 SYS2	Standard	27.8	46.6	38.9	63.1	310.0
0420 SYS1 / 0460 SYS1 0520 SYS1+2 0690 SYS1 / 0770 SYS1+2	Standard	34.4	59.5	48.2	80.2	385.0

Fan electrical data

Table 12: Fan electrical data

Fan type	kW	FLA at 400 V	LRA at 400 V
Standard	1.55	3.33	21
VSD	1.55	3.33	21

Note: Values are for each fan. FLA: full load amps, LRA: lock rotor amps.

Refrigerant flow diagrams

There are three operating modes with different refrigerant flows, cooling and defrost mode, heat pump mode, and defrost mode.

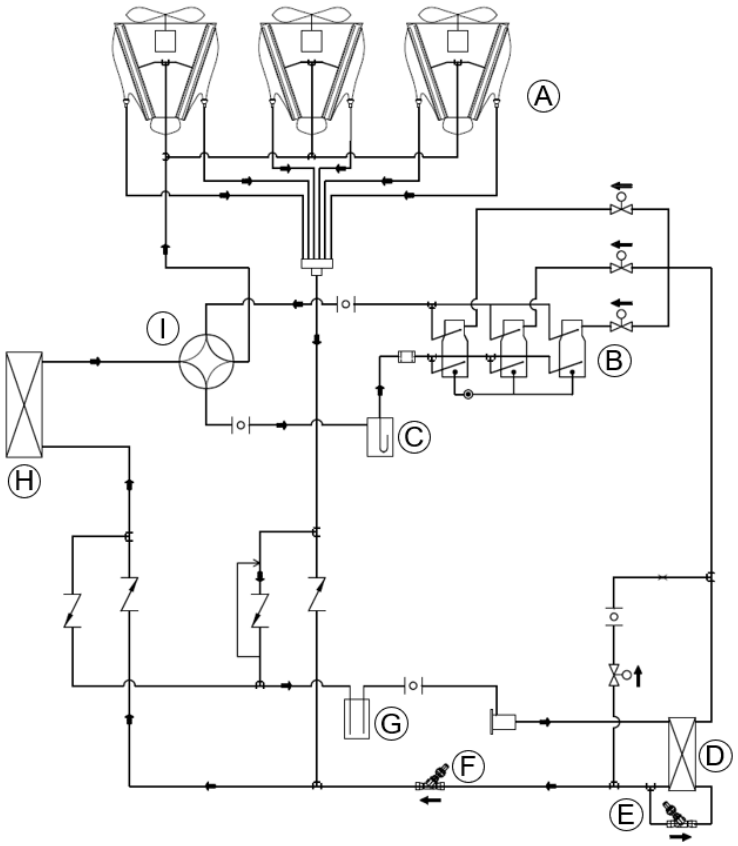
Cooling and defrost mode

Low pressure two-phase refrigerant enters the evaporator BPHE and is evaporated and superheated by the heat energy absorbed from the chilled liquid. Low pressure vapor enters the compressor, through the four-way

reversing valve and accumulator, where pressure and superheat are increased. The high pressure vapor is fed to the ambient coils and fans, through the four-way valve, where heat is removed.

The fully condensed and subcooled liquid passes through the EEV where pressure is reduced and further cooling takes place before returning to the evaporator BPHE.

Figure 7: Cooling and defrost mode

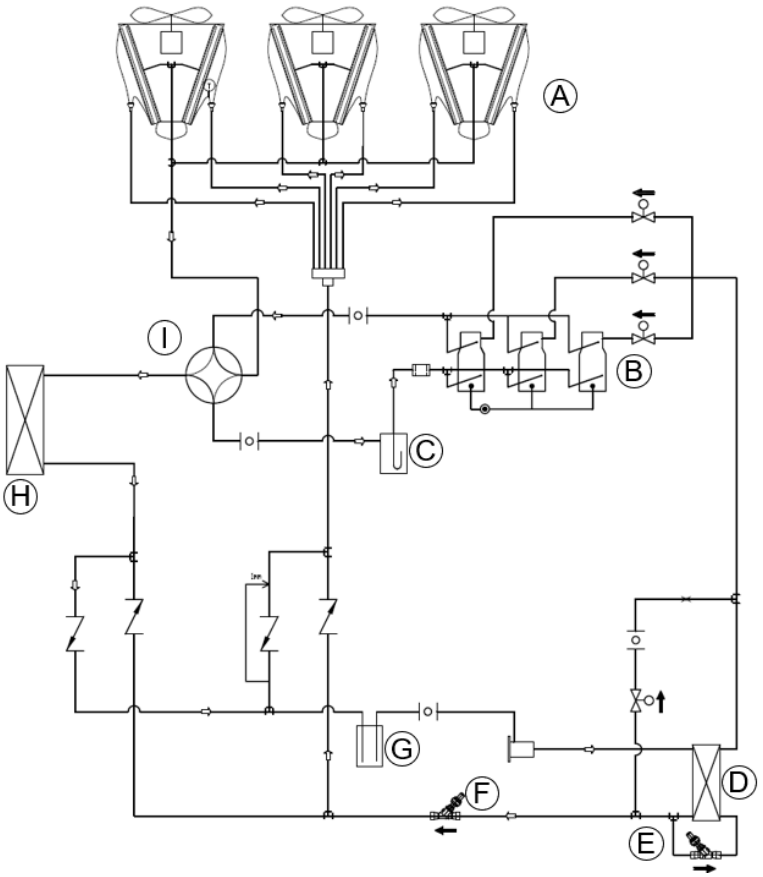


Callout	Description
A	Ambient coils - condenser
B	Compressors
C	Accumulator
D	Economizer BPHE
E	Economizer EEV
F	EEV
G	Receiver
H	BPHE - evaporator
I	Four-way valve

Heat pump mode

Low pressure two-phase refrigerant enters the ambient coil and is fully evaporated and superheated by the energy absorbed from the ambient air. Low pressure vapor enters the compressor, through the four-way valve and accumulator, where pressure and superheat are increased. High pressure superheated refrigerant vapor from the compressor outlet enters the condenser BPHE where heat is rejected to the water. The high pressure liquid refrigerant, leaves the condenser BPHE, passes through the liquid receiver, and enters the EEV where the refrigerant pressure is reduced and subsequently cooled before returning to the ambient coil.

Figure 8: Heat pump mode



Callout	Description
A	Ambient coils - evaporator
B	Compressors
C	Accumulator
D	Economizer BPHE
E	Economizer EEV
F	EEV
G	Receiver
H	BPHE - condenser
I	Four-way valve

Defrost mode

When frost builds up on the ambient coils, defrost is initiated by operating the machine in a cooling mode. Each of the two refrigerant circuits defrost in turn, one circuit at a time. When the defrost mode is active in one of the circuits, the other circuit is operating in heat pump mode for balance. The fluctuation of system hot water temperature is minimized.

Piping and instrumentation diagram

Figure 9: YCPB two-pipe

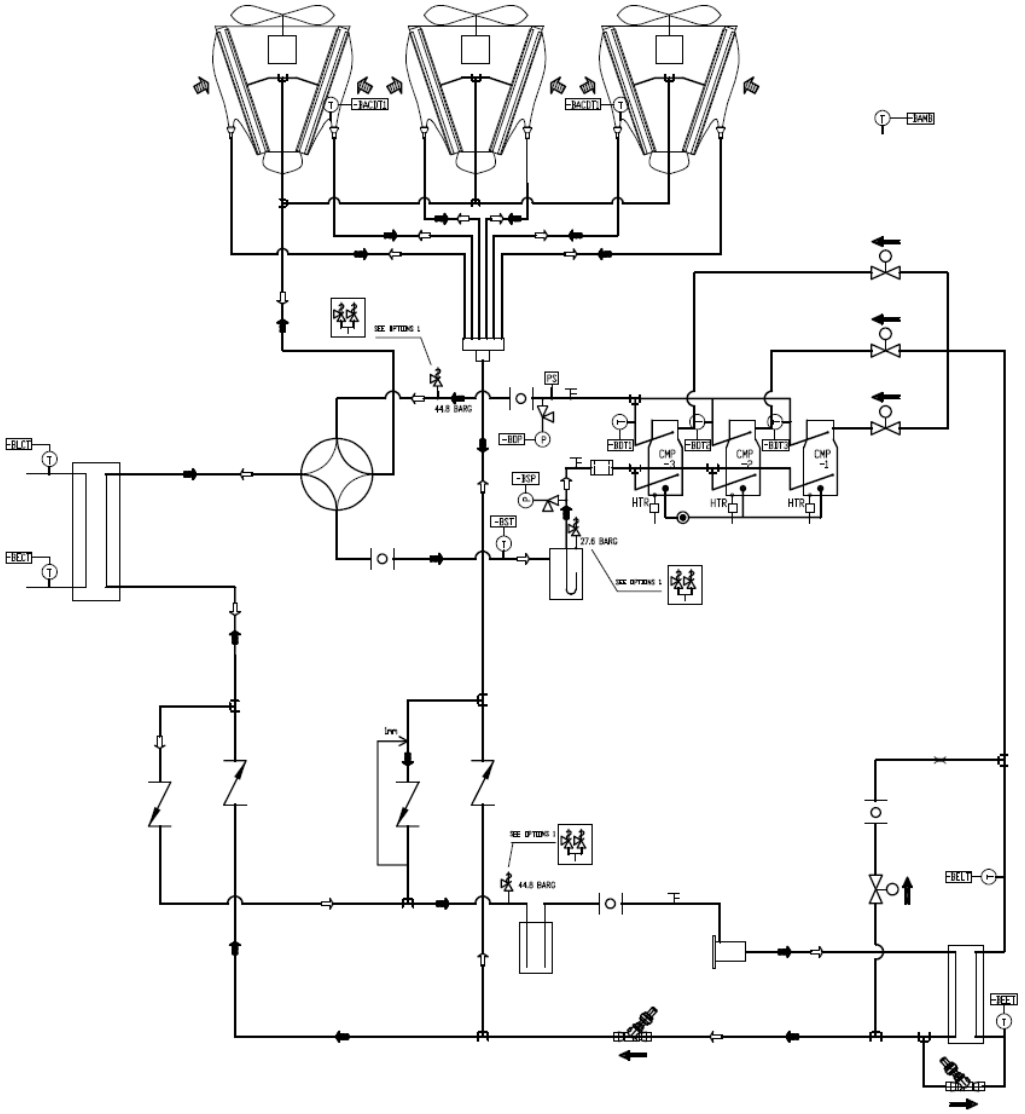
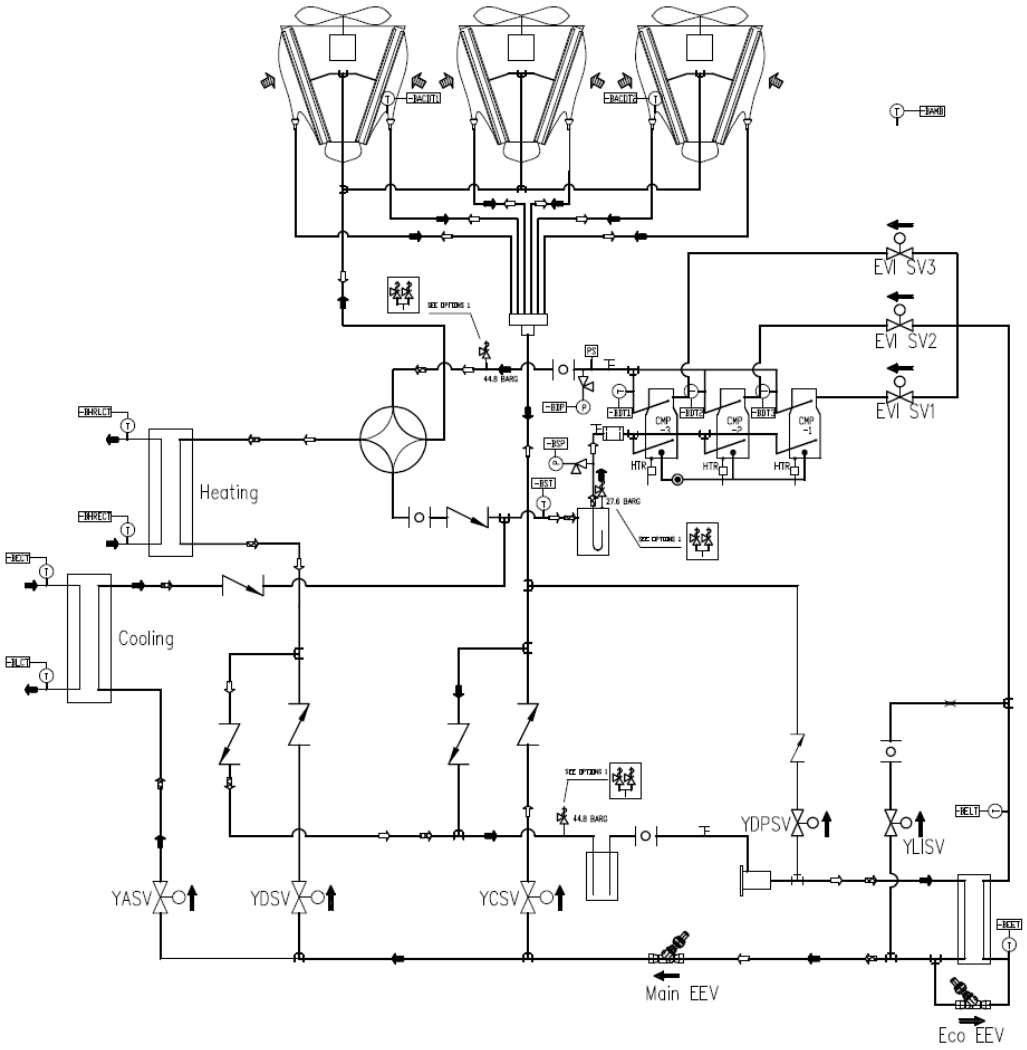


Figure 10: YCPB four-pipe



Callout	Description
A	Heating
B	Cooling

Table 13: Legend

Symbol	Description	Symbol	Description
	Pressure relief valve		Sight glass
	Ball valve		Service valve, angle valve
	Pressure sensor		Solenoid valve
	Expansion valve, electric		Check valve

Table 13: Legend

Symbol	Description	Symbol	Description
	Pressure switch		Refrigerant flow in cooling mode
	Temperature sensor		Refrigerant flow in heating mode
	Replaceable core filter dryer		Refrigerant flow in CH mode

Table 14: Pressure transducers

Name	Description
BDP	Discharge pressure
BSP	Suction pressure

Table 15: Temperature sensors

Name	Description	Name	Description
BAMB	Ambient temperature	BDT	Discharge temperature
BECT	Entering chill temperature	BEET	Eco entering temperature
BLCT	Leaving chill temperature	BELT	Eco leaving temperature
BHRECT	Entering hot temperature	BACDT	Coil temperature
BHRLCT	Leaving hot temperature	BST	Suction temperature

Accessories and options

The following options and accessories are available with the unit.

Dual-pressure relief valves

Two pressure relief valves mounted on a three-way valve in parallel of which one is operational while the other remains inoperative. This feature assists with routine maintenance on the PRVs.

38 mm evaporator insulation

Double-thickness insulation provided for enhanced efficiency, and low temperature applications.

Thermal dispersion flow switch

A thermal dispersion-type flow switch provides accurate, low maintenance flow proving.

Neoprene pad isolators

Recommended for normal installations. Field-mounted.

25 mm spring isolators

Level adjustable, spring and cage-type isolators for mounting under the unit base rails. Field-mounted.

Compressor acoustic blankets

Each compressor is individually enclosed in an acoustic sound blanket. The sound blankets are made with one layer of acoustical absorbent textile fibre of 15 mm thickness and one layer of anti-vibrating heavy material thickness of 3 mm. Both are closed by two sheets of welded PVC, reinforced for temperature and UV resistance.

Fans with VSD control

Factory-fitted, high efficiency VSD-controlled condenser fans. Fan speed varies with system cooling load and ambient conditions. Speed is optimized to ensure highest possible part load efficiency.

Language LCD and touch key press

A 7 in. LCD display is equipped at the electrical panel and touch control. The available languages are English, Swedish, German, Italian, French, Polish, and Spanish. The default language is English.

Wire enclosure panels

Welded wire mesh guards over condenser coils and around the bottom of the unit. Field-mounted or factory-mounted options are available.

Louvered enclosure panels

Louvered panels over condenser coils and around the bottom of the unit. Factory-mounted.

ⓘ **Note:** When this option is installed there is a cooling capacity loss of 1% and an efficiency loss of 2%.

V-type panels

V-type panels covered on the two ends of condenser coil V model. Factory mounted to protect the coil from unexpected damage.

Defrost tray with heater

You can choose the defrost tray option when needed. The tray is a plate with a specially designed shape and it is supplied with the coil base plate to collect the melt water during the heating defrost mode in winter. To avoid the risk of freezing, the defrost tray option is also equipped with two heaters on both sides of the water collecting plate.

To guarantee that the water drains easily, there are several holes reserved at the plate bottom corner.

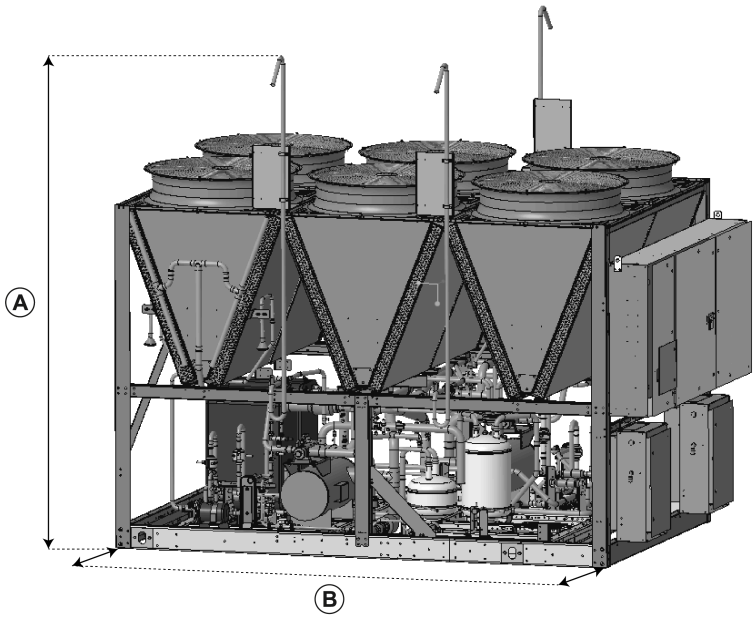
You can choose to connect additional water pipes with the heaters, provided by the third party, to the holes when needed. This leads the water to the correct place at the job site. Ensure that you install a suitable heater around the water pipes to avoid freezing or ice blockages.

Exhaust piping kit

To meet ATEX requirements regarding refrigerant safety, flammability, and relief evaluating management, there is an exhaust piping kit as standard equipment for each YCPB model. The exhaust piping kit is manufactured in the factory and shipped loose with the chiller as a standard accessory of the unit.

ⓘ **Note:** After installation, the piping kit height may exceed the height of the chiller frame.

Figure 11: YCPB with exhaust piping kit



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Callout	Dimensions, mm
A	3307.8
B	403.4

Rigging, handling, and storage

⚠ WARNING

Rigging and lifting must only be done by a professional rigger in accordance with a written rigging and lifting plan.

The most appropriate rigging and lifting method depends on job specific factors, such as the rigging equipment available and site needs.

A professional rigger must determine the rigging and lifting method to be used, and it is beyond the scope of this manual to specify rigging and lifting details.

Failure to follow these instructions could result in death, serious injury or equipment damage.

Other considerations while rigging and lifting the unit include:

- Follow all applicable regulations and safety practices during rigging and lifting.
- Prepare and follow a written rigging and lifting plan.
- Use spread bars that are long enough to prevent the rigging from contacting the unit.
- Use all the designated lifting points according to the unit manual.
- Only use the designated lifting points.
- Locate the center of gravity through trial lifts to account for possible variations in unit configuration.
- Keep the unit stable and level during rigging and lifting.
- Keep clear of the unit when lifting.

Weights distribution

Refer to the unit nameplate for unit shipping weight. See Physical data.

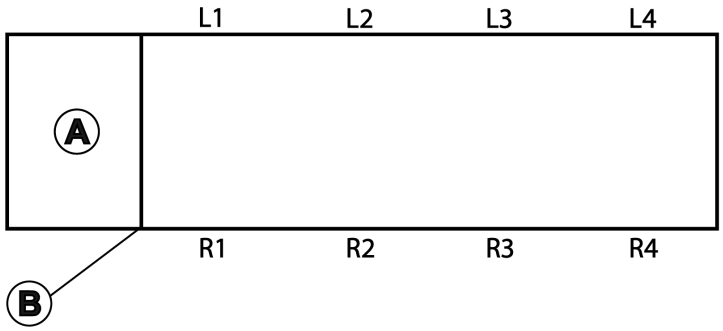
ⓘ **Note:** Weight may vary depending on unit configuration at the time of lifting

Standard weights and weight distribution are given below:

Table 16: Weights distribution

YCPB two-pipe	Weight, kg		Point weight, kg							
	Shipping	Operating	R1	R2	R3	R4	L1	L2	L3	L4
0320S	2656	2696	766	575	—	—	822	493	—	—
0320H	2720	2760	798	575	—	—	854	493	—	—
0420S	3073	3120	883	719	—	—	902	569	—	—
0420H	3140	3187	917	719	—	—	935	569	—	—
0520S	3773	3855	583	643	687	—	650	598	612	—
0520H	3843	3925	618	643	687	—	685	598	612	—

Figure 12: Weights distribution



Callout	Description
A	Control panel
B	Origin, 0.0

Delivery

To ensure consistent quality and maximum reliability, all units are tested and inspected before leaving the factory.

Units are shipped completely assembled and containing refrigerant under pressure.

Units are shipped without export crating unless crating has been specified on the sales order.

Inspecting the delivery

1. Remove any transit packing and inspect the unit to ensure that all components have been delivered and that no damage has occurred during transit.
2. If there is any evident damage, note the damage on the carrier's freight bill and enter a claim in accordance with the instructions given on the advice note.
3. Report any major damage immediately to your local representative.

Moving the unit

Before moving the unit, ensure that the installation site is suitable for installing the unit and is easily capable of supporting the weight of the unit and all associated services.

Lift the unit using lifting lugs and a spreader bar or frame of sufficient width to prevent damage to the unit from the lifting chains.

⚠ CAUTION

The unit must only be lifted by the base frame at the points provided. Never move the unit on rollers, or lift the unit using a forklift truck.

⚠ CAUTION

Ensure care is taken to avoid damaging the ambient coil fins when moving the unit.

Units are provided with lifting holes in the base frame which accept the accessory lifting lug set. Part number for four lug set: 026L00261-000. Part number for six lug set: 026- 45594-000.

Insert the lugs into the respective holes in the base frame and turned so that the spring loaded pin engages into the hole and the flanges on the lug lock behind the hole.

Attach the lugs to the cables or chains using shackles or safety hooks.

Installation

Location requirements

To achieve optimum performance and trouble-free service, it is essential that the proposed installation site meet the location and space requirements for the model being installed. The clearances recommended are nominal for the safe and efficient operation and maintenance of the unit and power and control panels. Local health and safety regulations, or practical considerations for service replacement of large components, may require larger clearances than those given in this manual.

Outside installations

The units can be installed at ground level on a suitable and level foundation easily capable of supporting the weight of the unit, or on a suitable rooftop location. In both cases an adequate supply of air is required.

ⓘ **Note:** Avoid locations where the sound output and air discharge from the unit may be objectionable.

Select the location for minimum sun exposure and away from boiler flues and other sources of airborne chemicals that could attack the ambient coils and steel parts of the unit.

If located in an area accessible to unauthorized persons, take steps to prevent access to the unit by means of a protective fence. This helps to prevent the possibility of vandalism, accidental damage, or possible harm caused by unauthorized removal of protective guards or opening panels to expose rotating or electrically live components.

For ground level locations, the unit must be installed on a suitable flat and level concrete base that extends to fully support the two side channels of the unit base frame. A one piece concrete slab with footings extending below the frost line is recommended.

ⓘ **Note:** To avoid noise and vibration transmission, do not secure the unit to the building foundation.

On rooftop locations, choose a place with adequate structural strength to safely support the entire operating weight of the unit and service personnel.

The unit can be mounted on a concrete slab, similar to ground floor locations, or on steel channels of suitable strength. Space the channels with the same centers as the unit side and front base rails. This will allow vibration isolators to be fitted if required.

ⓘ **Note:** Use isolators for rooftop locations.

Location clearances

Adequate clearances around the units are required for the unrestricted air flow for the ambient coils and to prevent recirculation of discharge air back onto the coils. If clearances given are not maintained, airflow restriction or recirculation causes a loss of unit performance, an increase in power consumption, and may cause the unit to malfunction.

Consider the possibility of down drafts, caused by adjacent buildings, which may cause recirculation or uneven unit air flow.

For locations where significant cross winds are expected, such as exposed roof tops, an enclosure of solid or louvre type is recommended to prevent wind turbulence interfering with the unit air flow.

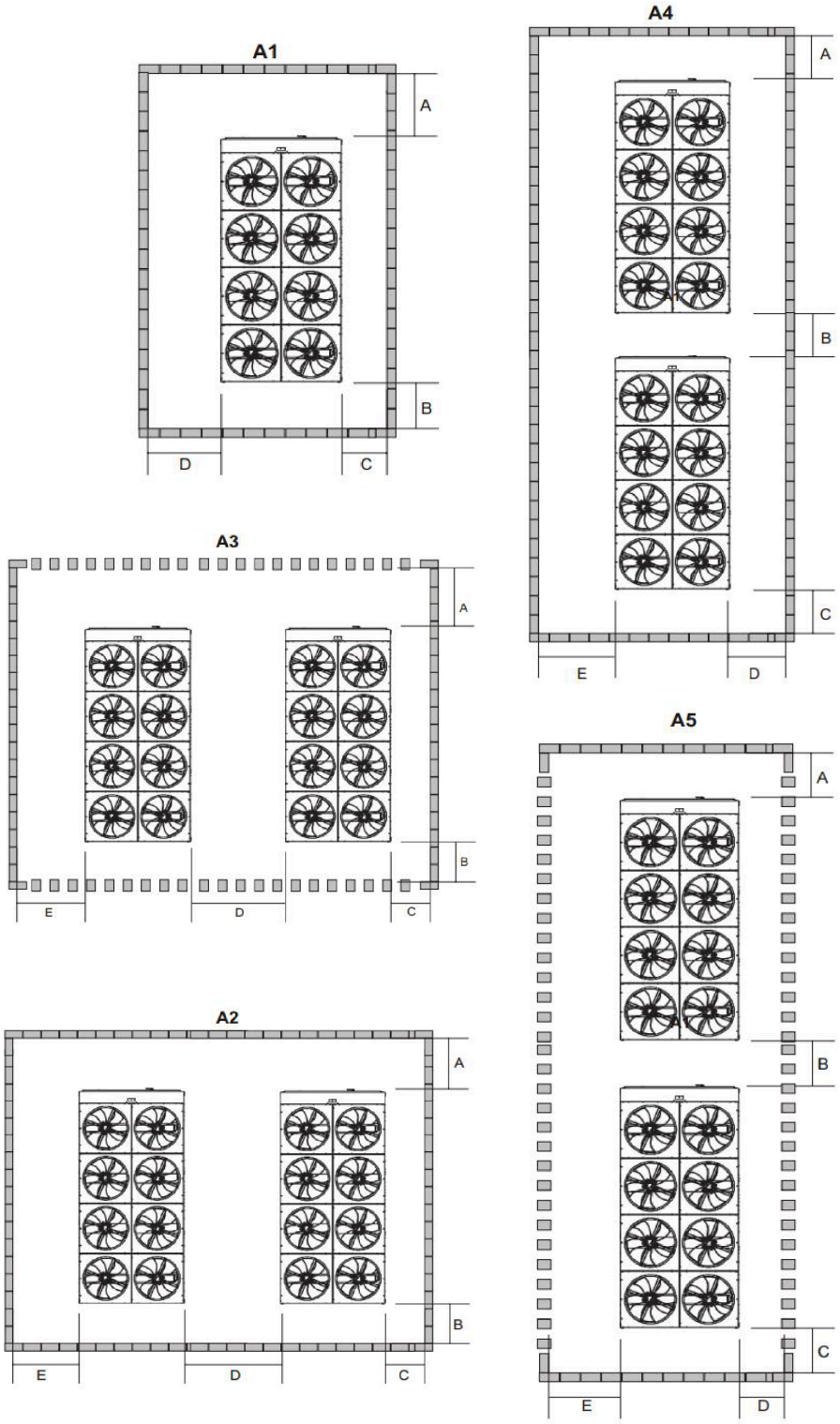
Note:

- When units are installed in an enclosure, ensure the enclosure height does not exceed the height of the unit on more than one side.
- Where accumulation of snow is likely, additional height must be provided under the unit to ensure normal air flow to the unit.

Table 17: Clearances

Unit arrangement	Callout, m	YCPB model					
		0320S	0420S	0520S	0320H	0420H	0520H
A1 solid walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	1.0	1.2
	D	1.4	1.4	1.4	1.4	1.4	1.4
A2 solid walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	1.0	1.2
	D	2.7	2.7	2.7	2.7	3.2	3.2
	E	1.4	1.4	1.4	1.4	1.4	1.4
A3 louvers on two walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	0.8	0.8	0.8	0.8	0.8	0.8
	C	0.8	0.8	0.8	0.8	1.0	1.2
	D	2.3	2.3	2.8	2.3	3.0	3.2
	E	1.4	1.4	1.4	1.4	1.4	1.4
A4 solid walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	1.2	1.2	1.2	1.2	1.2	1.2
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	0.8	0.8	0.8	0.8	1.0	1.2
	E	1.7	1.7	1.7	1.7	1.9	2.1
A5 louvers on two walls	A	1.2	1.2	1.2	1.2	1.2	1.2
	B	1.2	1.2	1.2	1.2	1.2	1.2
	C	0.8	0.8	0.8	0.8	0.8	0.8
	D	0.8	0.8	0.8	0.8	0.8	0.8
	E	1.4	1.4	1.4	1.4	1.4	1.4

Figure 13: Clearances



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Installing anti-vibration isolators

Isolators are shipped fully assembled and must be positioned in accordance with the product drawings or as otherwise recommended.

Note: Read instructions in their entirety before beginning installation.

Neoprene isolators

1. Set isolators on the floor, housekeeping pad, or subbase, ensuring that all isolators centerlines match the equipment mounting holes.
2. Install the isolator base on a level surface.
3. Shim or grout as required, levelling all isolator bases to the same elevation. 6 mm (0.25 in.) is the maximum difference can be tolerated.
4. Bolt or anchor all isolators to supporting structure utilizing base through holes.
5. Remove the top bolt and top washer.
6. Place equipment on top of isolators so that mounting holes in equipment or base line up with threaded hole.
7. Reinstall the top bolt and washer and tighten down.
8. Installation is complete.

25 mm deflection spring isolators

1. Set isolators on floor, hosuekeeping pad or subbase, ensuring that all isolators centerlines match the equipment mounting holes.
2. Install the isolator base on a level surface.
3. Shim or grout as required, levelling all isolator bases to the same elevation. 6 mm (0.25 in.) is the maximum difference can be tolerated.
4. Bolt or anchor all isolators to supporting structure utilizing base slotted holes.
5. Place equipment on top of isolators making sure that mounting holes of the equipment line up with isolator positioning pin.
6. The adjustment process can only begin after the equipment is at its full operating weight.
7. Adjust each isolator in sequence by turning the spring adjusting bolt one full counterclockwise turn at a time.
8. Repeat this procedure on all isolators, one at a time.
9. Continue adjusting each isolator until a minimum of 6 mm (0.25 in.) clearance is achieved between the lower housing and upper housing.
10. Finely adjust the isolators to level equipment.
11. Installation is complete.

Anti-vibration isolators data

Figure 14: Neoprene isolators

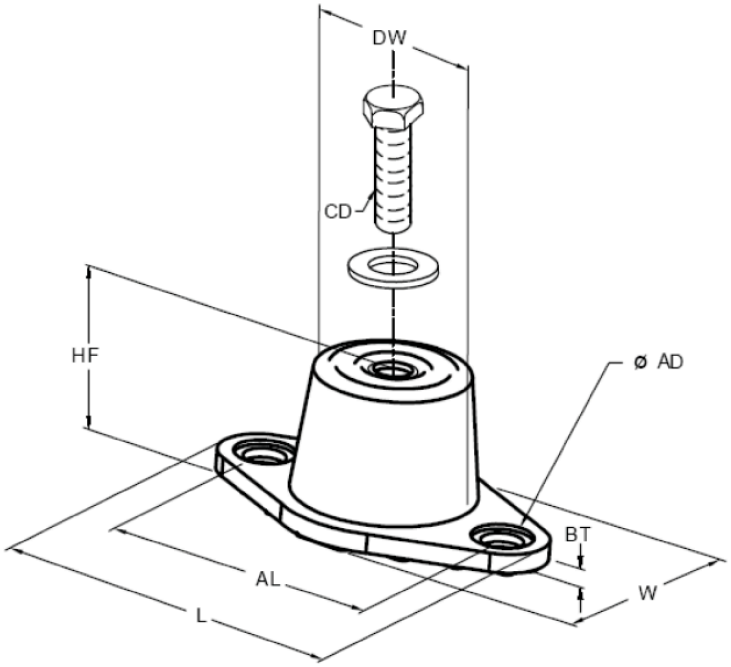

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Table 18: Neoprene isolators dimensions

Mount type	Dimensions, mm							
	L	W	HF	AL	AD	BT	CD, in	DW
RD1-WR	80	44	32	60	9	5	5/16-8 UNC X 3/4	32
RD2-WR	99	60	44	76	9	6	3/8-16 UNC X 1	44
RD3-WR	140	86	73	105	14	6	½-13 UNC X 1	64
RD4-WR	159	118	70	127	14	10	½-13 UNC X 1	76

Table 19: Neoprene isolators data

Weight range, kg	Mount type	Color	Part number
Up to 375	RD3-WR	Charcoal	029-25335-001
375 to 766	RD4-WR	Brick red	029-25335-002
766 to 1814	RD4-WR	Charcoal	029-25335-004

Figure 15: 25 mm deflection spring isolators

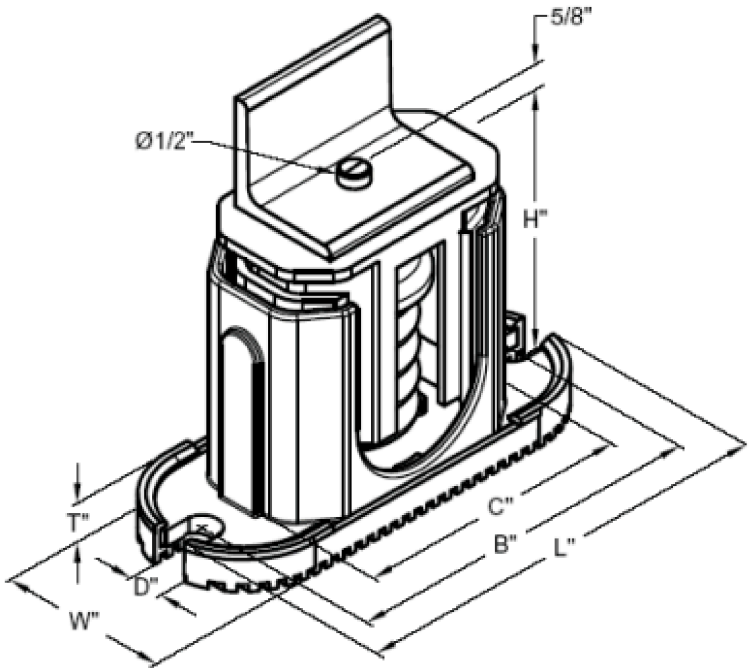

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Table 20: 25 mm deflection spring isolators dimensions

Mount type	Dimensions, mm						
	W	D	L	B	C	T	H
CP1	76	16	197	165	121	13	143
CP2	76	16	267	235	197	14	152

Table 21: 25 mm deflection spring isolators data

Weight range, kg	Mount type	Colour	Part number
Up to 197	CP	Black	029-25334-002
197 to 347		Dark green	029-25334-003
347 to 463		Gray	029-25334-004
463 to 525		White	029-25334-005
525 to 810		Gray or red	029-25334-006
Up to 521	C2P	Dark purple	029-25334-008
521 to 694		Dark green	029-25334-009
694 to 926		Gray	029-25334-010
926 to 1049		White	029-25334-012
1049 to 1619		Gray or red	029-25334-013

AVM locations

Figure 16: 0320H AVM locations

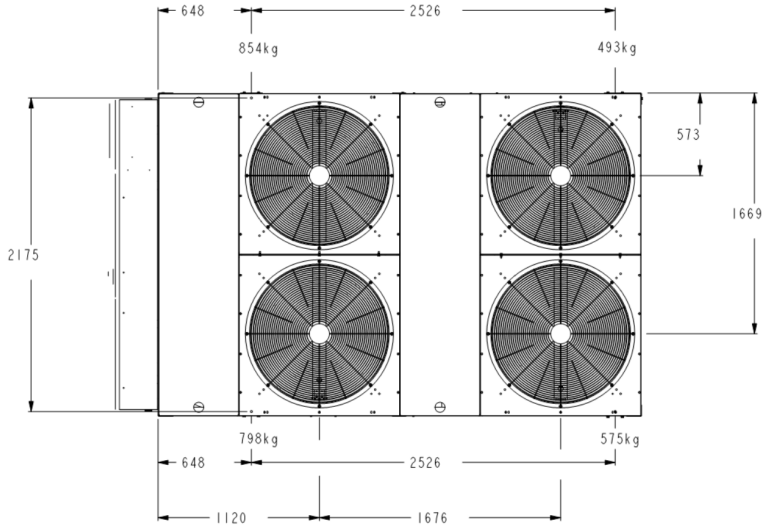


Figure 17: 0320S AVM locations

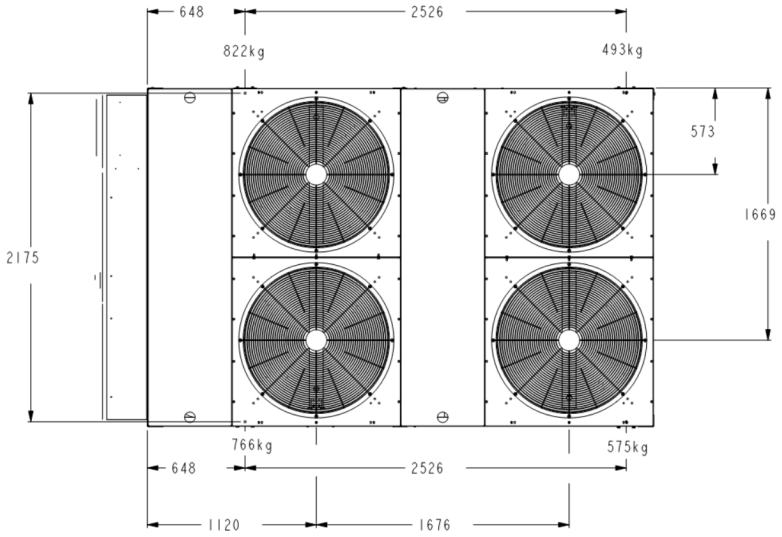


Figure 18: 0420H AVM locations

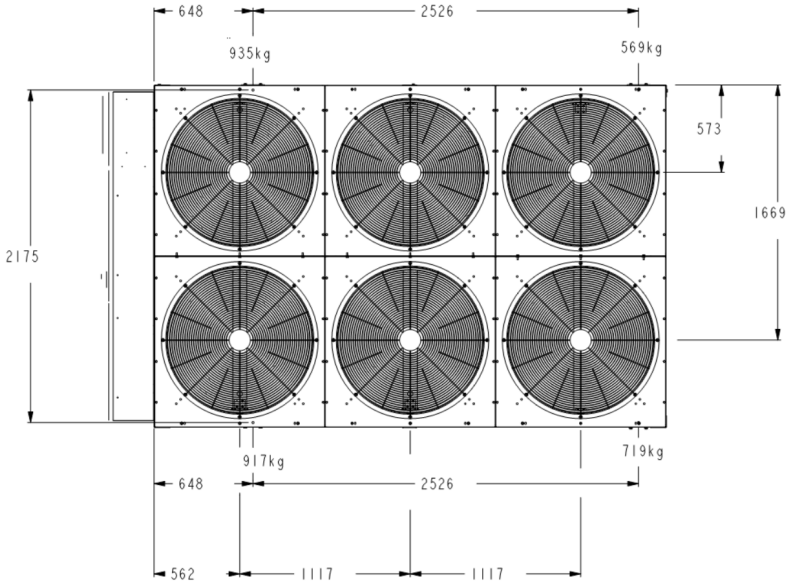


Figure 19: 0420S AVM locations

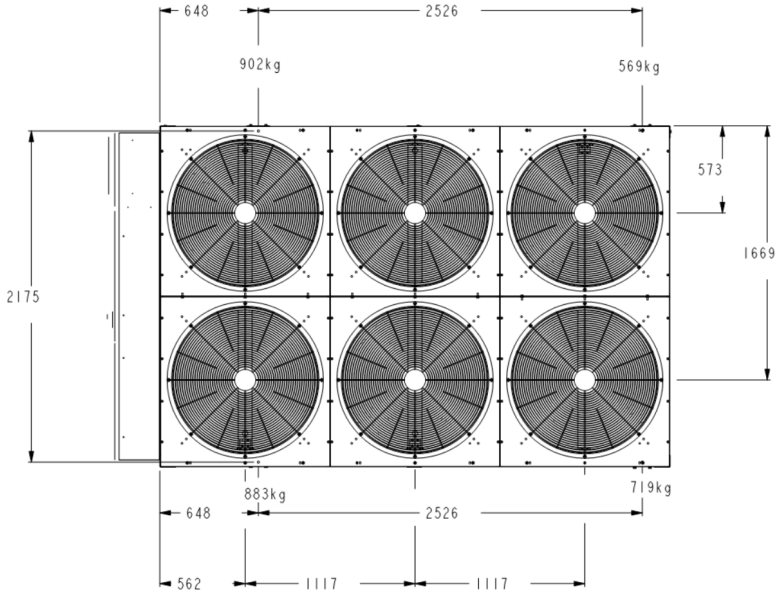


Figure 20: 0520H AVM locations

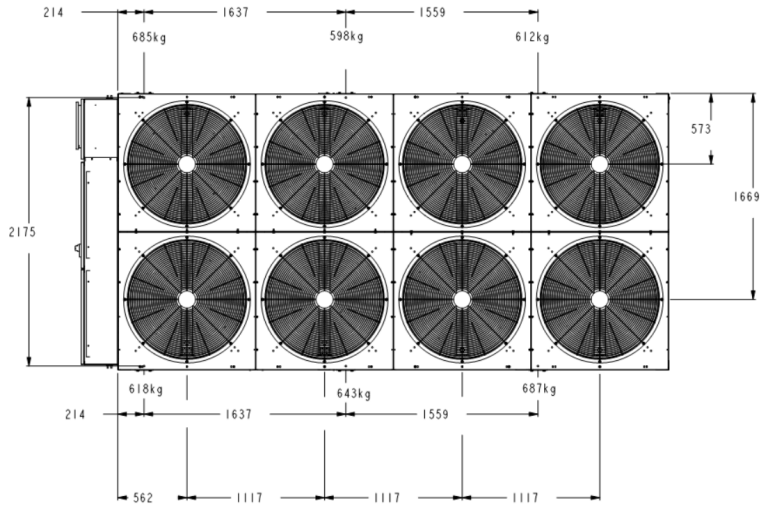
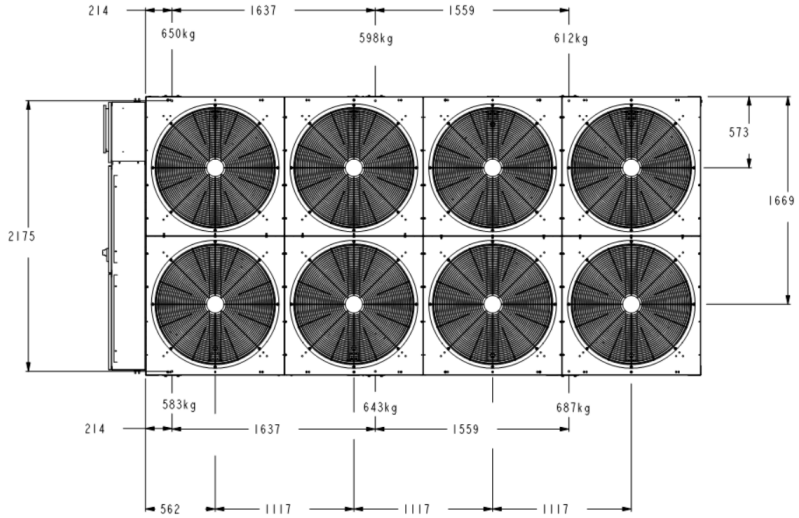


Figure 21: 0520S AVM locations



Pipework connections

WARNING

Failure to follow these recommendations could cause damage to the unit, or loss of performance, and may invalidate the warranty.

⚠ CAUTION

During cold weather when there is a risk of freezing, leave the chiller power switched on to provide the freeze protection function unless the liquid systems are drained.

The following piping recommendations are intended to ensure satisfactory operation of the unit.

- A flow switch must be installed in the customer pipework at the outlet of the heat exchanger, as shown in the arrangement diagrams, and wired back to the control panel using screened cable. This is to prevent damage to the heat exchanger caused by inadequate liquid flow. To prevent turbulent flow, there must be straight pipework either side of the flow switch equal in length to at least five times the diameter of the pipe.
- The flow switches used must have gold plated contacts for low voltage/current operation.
- Ensure the liquid pumps installed in the pipework systems discharge directly into the unit heat exchanger sections of the system. The pumps require an autostarter, supplied by others, to be wired to the control panel.
- Pipework and fittings must be separately supported to prevent any loading on the heat exchangers.
- Flexible connections are recommended which also minimizes transmission of vibrations to the building. Flexible connections must be used if the unit is mounted on anti-vibration mounts as some movement of the unit can be expected in normal operation.
- Ensure pipework and fittings immediately next to the heat exchangers are readily demountable to enable cleaning prior to operation, and to facilitate visual inspection of the exchanger nozzles.
- Each heat exchanger must be protected by a strainer, preferably of 20 mesh, fitted as close as possible to the liquid inlet connection, and provided with a means of local isolation.
- The heat exchangers must not be exposed to flushing velocities or debris released during flushing. It is recommended that a suitably sized bypass and valve arrangement be installed to allow flushing of the pipework system. The bypass can be used during maintenance to isolate the heat exchangers without disrupting flow to other units.
- Thermometer and pressure gauge connections must be provided on the inlet and outlet connections of each heat exchanger.
- Drain and air vent connections must be provided at all low and high points in the pipework to permit drainage of the system, and to vent any air in the pipes.
- Ensure liquid systems at risk of freezing due to low ambient temperatures are protected using insulation and heater tape or a suitable glycol solution. The liquid pumps must also be used to ensure liquid is circulated when the ambient temperature approaches freezing point. Install insulation around the heat exchanger nozzles.
- Heater tape of 21 W/m under the insulation is recommended. The heat exchanger is protected by a heater mat placed under the insulation. The mat is powered from the unit control system power supply.

Pipework arrangement

The following are suggested pipework arrangements for single unit installations. For multiple unit installations, pipe each unit as shown. These are recommendations of the Building Services Research Association. See Figure 22 for actual flow direction.

Figure 22: Pipework arrangement

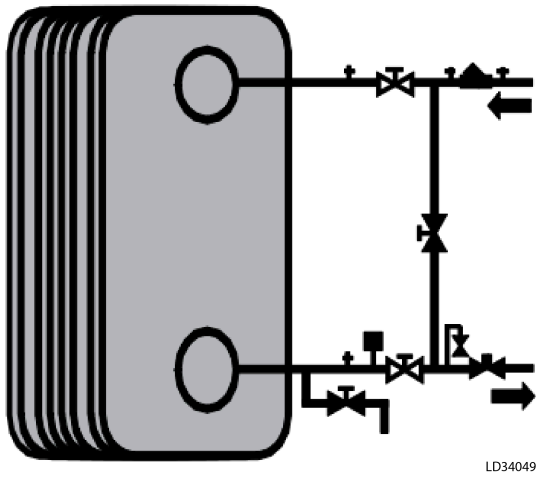


Table 22: Legend

Symbol	Description	Symbol	Description
	Pressure tapping		Isolating valve - normally closed
	Air vent		Flow regulating valve
	Flow switch		Strainer
	Isolating valve - normally open		Flow direction

Connection types

Standard pipework connections are of the Victaulic groove type.

For connection sizes relevant to individual models, see Physical data.

Water treatment

The unit performance given in the design guide is based on a fouling factor of 0.018 m² °C/kW.

⚠ CAUTION

Dirt, scale, grease and certain types of water treatment adversely affect the heat exchanger surfaces and therefore unit performance. Foreign matter in the water systems can increase the pressure drop, reducing the flow rate and causing potential damage.

⚠ CAUTION

Aerated, brackish or salt water is not recommended for use in the water systems.

Johnson Controls recommends that a water treatment specialist be consulted to determine whether the proposed water composition will not affect the heat exchanger materials of carbon steel and copper.

Note: The pH value of the water flowing through the unit must be kept between 7 and 8.5.

Water quality requirements

The water used in the unit liquid system must meet the requirements detailed in the table below:

Table 23: Water quality requirements

Item	Unit	Allowable value	Potential problems	
			Corrosion	Fouling
pH (25°C)	pH	7.0 to 8.5	Yes	
SO_4	ppm	<100	Yes	
HCO_3/SO_4	ppm	>1,0	Yes	
Cl	ppm	<50	Yes	
PO_4	ppm	<2.0	Yes	
NH_3	ppm	<0.5	Yes	
Free Cl	ppm	<0.5	Yes	
Fe^{+++}	ppm	<0.5	Yes	
Mn^{++}	ppm	<0.05	Yes	
CO_2	ppm	<10	Yes	
H_2S	ppm	<50	Yes	
Temperature	°C	<65	Yes	Yes
O content	ppm	<0.1	Yes	
Hardness	dH	4.8 to 8.5		Yes

Note: Inspect water quality before unit installation. Perform regular inspections during unit operation. The water quality must meet the limits above.

Note: If parameters are not in the limits the heat exchanger may leak or have problems with scale formation. These problems may result in the unit not operating normally, excessive heat exchanger pressure drops, and reduced nominal capacities.

Refrigerant relief valve piping

The heat exchanger is protected against internal refrigerant overpressure by refrigerant relief valves. A pressure relief valve is mounted on each of the main refrigerant lines connecting the heat exchanger to the compressors.

For indoor installations, pipe the pressure relief valves to the exterior of the building.

Note: The size of any pipework attached to a relief valve must be of sufficient diameter so as not to cause resistance to the operation of the valve. For critical or complex installations, refer to EN13136.

Unless otherwise specified by local regulations, the internal diameter depends on the length of pipe required and can be estimated with the following formula:

D5=1.447 x L

Where:

D = minimum pipe internal diameter, cm

L = length of pipe, m

Note: If relief pipework is common to more than one valve, its cross-sectional area must be at least the total required by each valve. Do not mix valve types on a common pipe.

Note: Take precautions to ensure that the exit of relief valves and vent pipe remain clear of obstructions at all times.

Electrical connection

The following connection recommendations are intended to ensure safe and satisfactory operation of the unit.

WARNING

Failure to follow these recommendations could cause harm to persons, or damage to the unit, and may invalidate the warranty.

WARNING

Do not mount additional controls, such as relays, in the control panel.

Do not run power and control wiring not connected to the control panel, through the control panel.

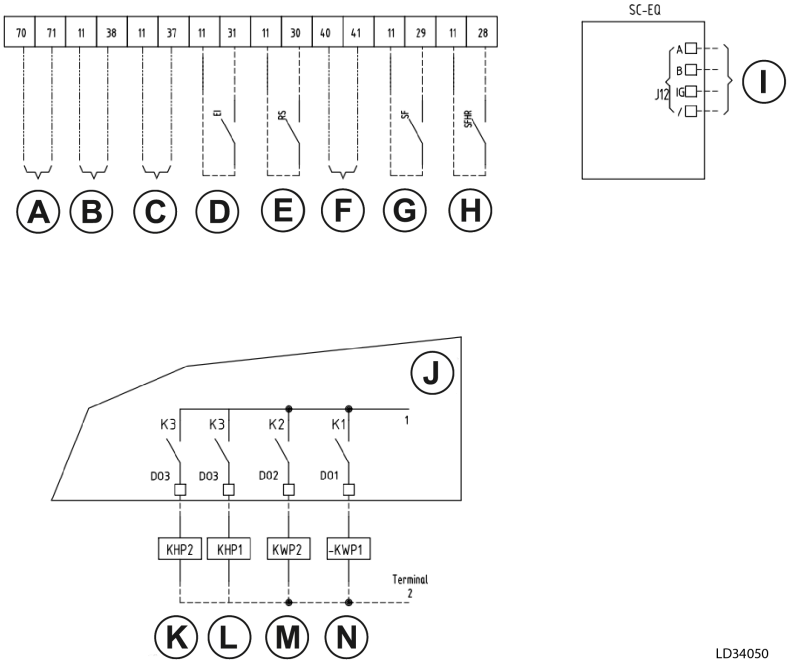
If these precautions are not followed it could lead to a risk of electrocution.

CAUTION

Electrical noise can cause malfunctions or damage the unit and its controls.

Electrical connection diagram

Figure 23: Connection diagram



Callout	Description	Callout	Description
A	Alarm status	H	Hot water switch four-pipe
B	SG ready control 2 option	I	Customer BAS. See SE-EQ manual.
C	SG ready control 1 option	J	Main control board YORK IPU3
D	External interlock	K	Hot water pump control MHP2
E	Remote start	L	Hot water pump control MHP1
F	Electronic flow switch power supply option	M	Pump control MWP2
G	Flow switch	N	Pump control MWP1

Power wiring

CAUTION

YCPB units are suitable for 400 V, three-phase, 50Hz nominal supplies only.

All electrical wiring must be carried out in accordance with local regulations. Route correctly sized cables to the cable entries in the bottom of the power panel.

In accordance with EN 60204 it is the responsibility of the user to install over current protection devices between the supply conductors and the power supply terminals on the unit.

To ensure that no eddy currents are set up in the power panel, the cables forming each three-phase power supply must enter through the same cable entry.

WARNING

All sources of supply to the unit must be taken through a common point of isolation, not supplied by Johnson Controls.

Single-point power supply wiring

All models require one field-provided 400 V, 3Ø, 50 Hz + PE (Protected Earth) supply to the unit with circuit protection.

Connect the three-phase supply to the non-fused disconnect switch located in the power panel using M10 lugs for YCPB0320 and YCPB0420 or using M12 lugs for YCPB0520~YCPB0770.

Connect the earth wire to the main protective earth terminal located in the power panel using M10 or M12 terminals.

Control circuit transformer

The control circuit transformer providing the 220 V, 1Ø, 50 Hz supply to the unit control system is fitted in a separate enclosure.

Control wiring

CAUTION

The following precautions must be taken to avoid electrical noise that could cause a malfunction or damage to the unit and its controls.

Voltage-free contact

All wiring to the voltage free contact terminal block requires a supply provided by the customer maximum voltage 254 VAC.

Take particular care deriving the supplies for the voltage-free terminals with regard to a common point of isolation. These circuits must be fed through the common point of isolation so the voltage to these circuits is removed when the common point of isolation to the unit is opened. This common point of isolation is not supplied by Johnson Controls.

In accordance with EN 60204 it is recommended that the customer wiring to these terminals uses orange wires. This will ensure that circuits not switched off by the units supply disconnecting device are distinguished by color, so that they can easily be identified as live even when the unit disconnecting devices are off. The YORK voltage free contacts are rated at 220 V.

All inductive devices (relays) switched by the YORK voltage free contacts must have their coil suppressed using standard RC suppressors. If these precautions are not followed, electrical noise could cause malfunctions or damage to the unit and its controls.

System inputs

All wiring to the control terminal block (nominal 30 VDC) must be run in screened cable, with the screen earthed at the panel end only. Run screened cable separately from mains cable to avoid electrical noise pick up.

The voltage free contacts must be suitable for 30 VDC (gold contacts recommended).

If the voltage free contacts form part of a relay or contactor, the coil of the device must be suppressed using a standard RC suppressor.

Flow switch

A chilled liquid flow switch of suitable type must be connected to terminals 11 and 29 to provide adequate protection against loss of liquid flow.

Remote start/stop

Connect a remote switch to terminals 11 and 30 to provide remote start/stop control if required.

Modbus, BACnet MS/TP and N2

Enable communications with building protocol systems using Modbus, BACnet or N2 protocol. Connect through standard RS485 port.

Hot water switch - four-pipe

A chilled liquid flow switch of suitable type must be connected to terminals 11 and 28 to provide adequate protection against loss of liquid flow.

External interlock

External interlock with other equipment can be accomplished by connecting a voltage-free contact to terminals 11 and 31 on the customer terminal block.

Liquid pump control

When one liquid pump is equipped to the chiller, liquid pump control terminal DO1 on PCB YORK IPU3 XTB9 energizes the customer-supplied liquid pump control relay when required. IPU3 switching contacts are rated at 1 A at 220 VAC.

When two liquid pumps are equipped to the chiller, liquid pump control terminal DO1 and DO2 on PCB YORK IPU3 XTB9 energizes the customer-supplied liquid pump control relay when required.

ⓘ **Note:** IPU3 switching contacts are rated at 1 A at 220 VAC.

Hot water liquid pump control

When one hot water liquid pump is equipped to the chiller, hot water liquid pump control terminal DO3 on PCB YORK IPU3 XTB9 energizes the customer-supplied hot water liquid pump control relay when required.

When two hot water liquid pumps are equipped to the chiller, hot water liquid pump control terminal DO3 and DO4 on PCB YORK IPU3 XTB9 energizes the customer-supplied hot water liquid pump control relay when required.

Note: IPU3 switching contacts are rated at 1 A at 220 VAC.

Anti-freeze

Wrap the chilled water lines exposed to outdoor ambients with a supplemental heater cable to insulate and protect against freeze-up during low ambient periods. This also prevents condensation formation on lines in warm humid locations. Alternatively, add ethylene glycol to protect against freeze-up during low ambient periods. You must install a chilled water switch, provided by Johnson Controls or another third-party company, on the water piping that leaves the cooler. If you do not select the Johnson Controls factory wired switch and extension pipe kit, you must install the switch to ensure a straight horizontal run of at least 5 diameters on each side of the switch.

Adjust the switch paddle to the size of the pipe. For more information, refer to the manufacturer's instructions provided with the switch. Wire the switch if there is a possibility of liquid freezing due to low ambient temperatures. If the chiller stops for a long term, ensure to drain all liquid out. If chiller stops for a short term, and the liquid remains inside, keep the chiller powered on to ensure the anti-freeze function is available. If the chiller does not control the liquid pump, ensure the pump is operational to circulate the liquid.

Commissioning

WARNING

Rigging and lifting must only be done by a professional rigger in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method depends on job-specific factors, such as the rigging equipment available and site needs. A professional rigger must determine the rigging and lifting method.

It is beyond the scope of this manual to specify rigging and lifting details.

DANGER

Failure to follow these instructions could result in death, serious injury, or equipment damage.

Preparation

WARNING

Commissioning of this unit must only be carried out by Johnson Controls authorized personnel.

The unit power switch is located at the first line of the display main interface. This switch must remain grey in color, preventing running of the unit until commissioned by authorized personnel.

If the switch has been green in color before commissioning then it must be reported to Johnson Controls otherwise the warranty may be invalidated.

Prestart checks

The following checks must be made with the customer supply to the unit switched OFF.

1. Inspect the unit for installation damage. If damage is found, take action and repair as appropriate.
   Units are normally shipped as standard with a full refrigerant operating charge.
2. **Refrigerant charge:** Check that refrigerant pressure is present in both systems and that no leaks are apparent. If no pressure is present a leak test must be undertaken, the leaks located and repaired. Repaired systems must be evacuated with a suitable vacuum pump/recovery unit as appropriate to below 100 microns before charging.

   ⓘ **Note:**
   - Do not charge liquid refrigerant with static water in the heat exchanger.
   - Care must also be taken to charge liquid refrigerant slowly to avoid excessive thermal stress at the charging point.
3. Once the vacuum is broken, charge with the full operating charge as given in Technical data.

   ⓘ **Note:**
   - Ensure liquid subcooling measured at the liquid line is between 6°C and 8°C when unit is operating in cooling mode and fully loaded.
   - Subcooling is determined by the level of refrigerant charge in each system.
4. **Valves:** Ensure that the compressor discharge and suction service valves are set correctly (OPEN).
5. **Compressor oil:** The oil level in multiple scroll compressors (piped in parallel) must be checked directly after all compressors are shut down and have been allowed time to stabilize.
   The oil level must be between the bottom and middle of the oil sight glass mounted in the oil equalizing line between the compressors.
6. **Fans:** Check that all fans are free to rotate and are not damaged. Ensure blades are at the same height when rotated. Ensure fan guard is securely fixed.
7. **Isolation:** Verify that all sources of electrical supply to the unit are taken from a point of isolation.
8. **Control panel:** Check the panel to see that it is free of foreign materials (wire, metal chips, and so on) and clean out if required.
9. **Power connections:** Check the customer power cables are connected correctly. Ensure that connections of power cables within the power panel to the non-fused switch disconnects are tight.
10. **Earthing:** Verify that the unit earth terminal is properly connected to a suitable earthing point. Ensure that all unit internal earth connections are tight.
11. **Supply voltage:** Verify that the site voltage supply corresponds to the unit requirement and is within the limits given in Technical data. The phase imbalance must less than 2% of the average voltage.
12. **Switch settings:** Ensure that the unit power switch is set to OFF (in grey color). The customers disconnection devices can now be set to ON.

⚠ WARNING
The machine is now live.

13. **Crankcase heaters:** Verify the heaters are powered.

NOTICE

Depending upon the ambient temperature the crankcase heaters must be on for 12 to 24 hours before startup.

14. **Water system:** Verify that the chilled liquid system has been installed correctly and has been commissioned with the correct direction of water flow through the evaporator. The inlet must be at the refrigerant pipework connection end of the evaporator. Purge the air from the evaporator using the air vent mounted in the pipework.

⚠ CAUTION

Flow rates and pressure drops must be within the limits given in Technical data. Operation outside of these limits could cause damage.

15. **Flow switch:** Verify a chilled liquid flow switch is correctly fitted in the customer's pipework on the cooler outlet, and wired into the control panel correctly.
16. **Temperature sensors:** Ensure the leaving and entering liquid temperature sensors are coated with heat conductive compound (Part No. 013- 00989-000) and are inserted in the water inlet and outlet sensor pockets of the cooler.
17. **Control supply:** Verify the control panel display is illuminated.
18. **HP cut-out reset:** Check that the hand reset mechanical high pressure cut-outs mounted on the discharge lines are at the correct setting and are reset.
19. **Programmed options:** Verify that the options factory programmed into the Microprocessor Control Centre are in accordance with the customer's order requirements by pressing the **OPTIONS** key on the display and reading the settings from the display.
20. **Programmed settings:** Ensure the system cut-out and operational settings are in accordance with operational requirements by pressing the **SETTING** key in the display after entering service mode.
21. **Date and time:** Press the **HOME** key and then choose **SCHEDULE** key to set the date and time.
22. **Start/Stop schedule:** Program the daily and holiday start/stop by pressing the **SCHEDULE** key.
23. **Setpoints:** Set the required leaving chilled liquid temperature setpoint and control range using the **SETTING** key.
24. **Mode selection:** To choose target operating mode by HOME → SETTING→UNIT → RUN MODE. The chiller operating mode can not be changed when the chiller is operating.
25. **Compressor operation:** Use the **SETTING** key enter subordinate setting interface. Then choose **System** and select ON/OFF to switch off each refrigerant system in turn. And then check the compressors on the active system.
26. Connect a manifold gauge to each refrigerant circuit suction and discharge service valves and temporarily start each compressor. Check that the discharge pressure rises and the suction pressure decreases to ensure that the compressors are operating in the correct direction. Any faults found must be corrected before starting the unit. After completing the checks on both circuits, set both systems to on by **SETTING-SYSTEM-ON-COMFIRM**.

Start-up checks

⚠ CAUTION

During the commissioning period, there must be sufficient heat load to run the unit under stable full load operation to enable the unit controls, and system operation, to be set up correctly and a commissioning log taken.

Read the following section, then proceed step by step as follows.

1. **Interlocks:** Verify that liquid is flowing through the evaporator and that heat load is present. Ensure that any remote run interlocks are in the run position and that the run schedule requires the unit to run or is overridden.
2. **Startup:** Set the unit power switch to be ON (green color) to start the unit. Be ready, when each compressor starts, to press the unit off immediately if any unusual noises or other adverse conditions develop.
3. **Refrigerant flow:** When a compressor starts a flow of liquid refrigerant is seen in the liquid line sight glass. After several minutes operation and providing a full charge of refrigerant is in the system, the bubbles disappear and are replaced by a solid column of liquid. Check that the moisture indicator is satisfactory (Green).
4. **System operation:** Use the **STATUS** key to check the system pressures and temperatures.
5. **Suction superheat:** Check suction superheat at steady full system load only. It is important that no bubbles show in the liquid line sight glass. Measure suction temperature on the copper line about 150 mm before the compressor suction service valve. Measure suction pressure at the compressor service valve. Superheat should be 5°C to 7°C.
6. **Subcooling:** Check liquid subcooling at steady full compressor load only. Measure liquid line temperature on the copper line beside the main liquid line service valve. Measure liquid pressure at the liquid line service valve. Subcooling should be 6°C to 8°C. If subcooling is out of range, add or remove refrigerant as required.

   ⚠ WARNING

   Do not overcharge the unit.

7. **General operation:** After completion of the above checks for System 1 repeat the process for system 2. In addition, check that general operation is correct.

First start-up

Perform the following steps on first start-up:

1. Check the main power supplies to the unit are set to **ON**, all refrigerant service valves are open, and chilled liquid flow has been established.

   ⓘ **Note:** If the unit chilled liquid pump start control is in use, ensure the pump supply is on.
2. Ensure that the system switches under the **STATUS** are set to **ON**.
3. Touch the HMI display to turn on the display and enter the main interface.
4. Turn the unit on by switching the power switch to green.
5. The controller performs a pre-check to ensure that the daily/holiday schedule and any remote interlocks allow the unit to run, all safety cut-outs are satisfied, and that cooling or heating load is required. The required chilled or hot liquid temperature is outside the set limits.

6. Any problems found by the pre-check are displayed if present. If no problems are present and cooling or heating duty is required, the system works by starting the compressors in turn as software required.
7. The water pump energizes first and 15 s later the chiller compressor can be started if no liquid pump related warning or fault.

Operation

YCPB units are designed to work independently, or in conjunction with other equipment through a Johnson Controls building management system or other automated control system.

When operating, the unit controls monitor the chilled liquid system temperatures at the unit and take the appropriate action to maintain the temperatures within required limits. This action involves running one or more compressors to match the cooling effect of the refrigerating systems to the heat load on the liquid system. The heat removed from the chilled liquid is then rejected from the air cooled condenser coils.

The following sections give a brief overview of the operation of the unit. This is followed by detailed operating information.

Normal running and cycling

After the unit has been started, all operations are fully automatic. After an initial period of operation with the first compressor, the control system adjusts the unit load depending on the chilled liquid temperature and rate of temperature change.

If a high heat load is present, the controller increases the capacity of the unit and starts up the next compressor.

If very little cooling or heating load is present, the first compressor started may continue to operate or may stop again to avoid overcooling or overheating the liquid. If the latter is the case, one compressor restarts automatically when the liquid temperature rises or drops out of range again.

When a compressor is running, the controller monitors suction pressure and various other system parameters such as discharge pressure, coil temperature and leaving liquid temperature.

If a problem occurs, the control system immediately takes appropriate action and displays the nature of the fault to protect the chiller.

All the fault information is visible on the HMI display.

Prevent frequency loading and unloading

If the compressor loads and unloads frequently, select **Setting** > **Unit** > **Cool Ctrl Mode/Heat Ctrl Mode** > **ECHLT CTRL** to check the water volume and water flow.

Shutdown

The unit can be stopped at any time by pressing the power switch in the HMI main display.

1. When the chiller receives a SHUTDOWN message, the system stops and executes the shut down procedure. The water pump stays running for 60 s after the chiller is shut down to avoid risk of freezing in BPHE.
2. Under normal conditions the unit can also be closed by changing the systems state at **SETTING** interface.
3. The compressor heaters energize to prevent refrigerant condensing in the compressor rotors and to prevent the compressor oil becoming saturated with refrigerant
4. In an emergency situation, the chiller can also be shut down directly by rotating the SP NF Disconnect Switch (standard) or SP Circuit Breaker (optional) on the control panel.

ⓘ **Note:** This method is not suitable for shutting down the chiller during normal operation.

⚠ CAUTION

To prevent damage to the unit the control supply to the compressor heaters must not be switched off, even when the unit is not required to run.

5. If mains power must be switched off for extended maintenance or a shutdown period, close the compressor suction, discharge and liquid line service valves on both systems by turning clockwise.

   ⓘ **Note:** Drain the cooler and condenser if there is a possibility of liquid freezing due to low ambient temperatures.

6. Open the valves, refill the cooler and condenser, and switch the power on for at least 8 hrs before the unit is restarted. The preheat time extends if the power is off for more than 2 hours. If the preheat time does not complete before power turns off, the preheat time automatically sets to 2 hours when next powered on. The HMI main page shows the preheat status.

Capacity adjusting map for heating and cooling mode

Capacity control of both cooling mode and heating mode is according to the following table:

Table 24: Capacity control

ΔTs / ΔTw	(-∞,-D-1)	(-D-1,-D)	(-D,-D/2)	(-D/2, 0)	(0, D/2)	(D/2,D)	(D,2D)	(2D, -∞)
[N, ∞)	unload, 4t	keep, 4t	keep, 4t	load, 4t	load, 4t	load, 2t	load, 2t	load, 2t
[N/2, N)	unload, 4t	keep, 4t	keep, 4t	keep, 4t	load, 4t	load, 4t	load, 2t	load, 2t
[0, N/2)	unload, 4t	unload, 4t	keep, 4t	keep, 4t	keep, 4t	load, 4t	load, 4t	load, 2t
[-N/2, 0)	unload, 2t	unload, 4t	unload, 4t	keep, 4t	keep, 4t	keep, 4t	load, 4t	load, 4t
[-N,-N/2)	unload, 2t	unload, 2t	unload, 4t	unload, 4t	keep, 4t	keep, 4t	keep, 4t	load, 4t
(-∞,-N)	unload, t	unload, 2t	unload, 2t	unload, 4t	unload, 4t	keep, 4t	keep, 4t	load, 4t

ⓘ **Note:**

- t-control time can be set from 10 s to 120 s and default setting is 20 s.
- D-cooling offset D1 or heating offset D2 can be set from 1°C to 3°C and default setting is 2°C.
- N-Liquid Rate Sensitivity: To show the change rate of liquid temperature, can be set from 0.1°C to 3°C and default setting is 1°C.

In each control time, the control system detects Twi and Twi-1, calculating liquid temperature change rate ΔTw, and then check the table above to adjust capacity by loading or unloading or keep current state.

The actual loading/unloading cycle interval can be t/2t/4t.

ⓘ **Note:** If the chiller is operating at heating and cooling mode, capacity control see Fixed-speed fan control stage.

Capacity adjusting requirement (loading/unloading/keep + adjusting cycle interval: t/2t/4t) separately by cooling and heating condition.

HMI display

The user can enter a different service code on the control panel's HMI display to set or read all chiller related parameters. The default main page appears 37s after HMI controller powers on. Observer is the system's default access level. The observer access level enables users to read and review parameters only.

Figure 24: HMI main display

Callout	Name	Description
A	Fault label	When there is a fault in the chiller, the user can view a fault label in any page from HMI display.
B	Access level	Can change the access users have to view and change different parameters. See Access level for more information
C	Navigation button	The user can use the navigation button On any interface at any level. When clicked on the home page, the system enters into function page. On the function page, there are six function blocks: • Status • Diagnosis • Setting • History • Schedule • Human-machine interface Click the relevant icon to enter into the corresponding page. Different access rights and visible functional modules vary on each page.
D	Switch button	The user can use the switch button On any interface at any level. When clicked, a confirmation dialog box appears. Click confirm to switch the status. If there is no safety fault and the unit can start, tap the button and click Confirm. The button turns green and enters the start-up phase. When the unit stops manually or due to a fault, the button turns gray.
E	Operating status list	The displayed parameters on the operating status list differ based on the model type. See Operating status for more information.
F	Date and Time	Indicates the current date and time of the system, accurate to the minute.
G	Current fault label	Indicates if there is a fault or not in the system. If there is a fault, the user can view the mark in the display. If there is no fault, the display only shows the unit power on/off status.

Operating status

The displayed parameters on the operating status list differ based on the model type.

Table 25: Operating status list (read only)

Description	2-piping	4-piping
Status	Refrigerant Type	Refrigerant Type
	Run Mode	Run Mode
	SYS1 State	SYS1 State
	SYS2 State	SYS2 State
	Fan Ctrl Type	Fan Ctrl Type
	Anti-Freeze	Anti-Freeze
	Preheat	Preheat
	AI1 Amb Temp	AI1 Amb Temp
	AI2 Entering Liquid Temp	AI2 Entering Liquid Temp
	AI3 Leaving Liquid Temp	AI3 Leaving Liquid Temp
		AI4 Entering Liquid Temp
		AI5 Leaving Liquid Temp

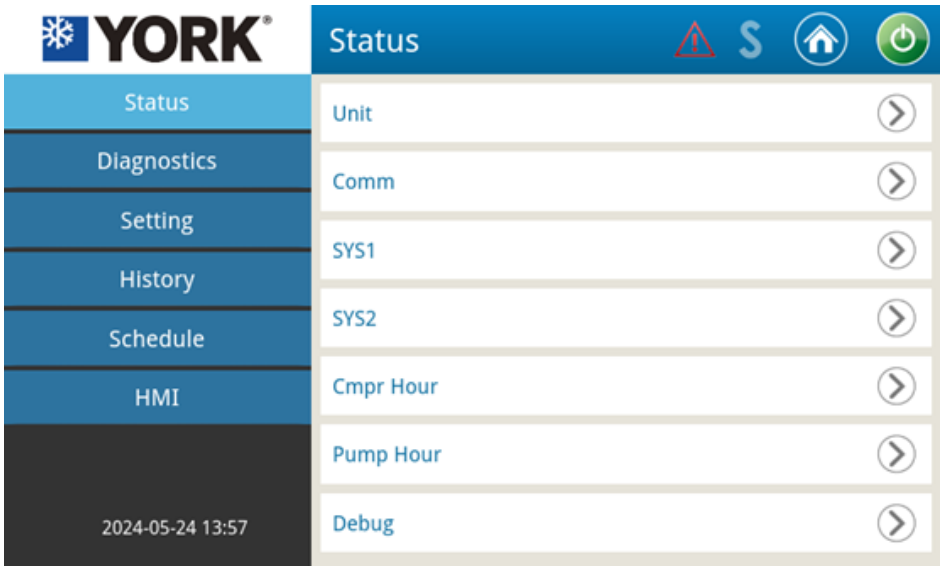
Access level

1. To change system setpoints, log in with an appropriate access level. Viewer is the system's default access level when the power is on. Users at this access level can only view partial operation data. They cannot change or view settings to related parameters
2. To switch access the level to check and view the interface and parameters of a higher level, click the level identification icon in the top right corner of the page. If the system is at higher access level than viewer, the user can switch back to viewer level by logging out.
   - The V icon indicates that current access level is Viewer
   - The O icon indicates that current access level is Operator
   - The S icon indicates that current access level is Service
3. Click the icon to open the confirmation dialog box. To exit the current level and return to the viewer level, click the log out button to exit.
4. To open the password input page dialog box and change the access level, click the Change user button.
5. The user can enter into the relevant level by inputting the relevant password. If the user enters the correct password, the appropriate level of access is granted. If the user enters an incorrect password, the access level does not change. If the user enters the password incorrectly, a warning dialog box pops up. If the user enters the password incorrectly 5 times, they cannot log in for 15 minutes. The operator access password is 9017.

Status and diagnostics page

On the status and diagnostics page, there is variable information on the upper right corner of the display. The displayed details differ based on unit type and access level. The user can use the navigation arrows to scroll up and down to view all the information.

Figure 25: Status and diagnostics page



Status tabs page

Table 26: Status tabs

Tab	2-Pipe	4-Pipe	Value	V	O	S
Unit	AI1 Amb Temp	AI1 Amb Temp	?x10	√	√	√
	AI2 Entering Liquid Temp	AI2 Entering Chilled Liquid Temp	?x10	√	√	√
	AI3 Leaving Liquid Temp	AI3 Leaving Chilled Liquid Temp	?x10	√	√	√
		AI4 Entering Hot Liquid Temp	?x10	√	√	√
		AI5 Leaving Hot Liquid Temp	?x10	√	√	√
	YCPB Version	YCPB Version	x100	√	√	√
	Unit Model	Unit Model		√	√	√
	Unit Switch	Unit Switch	1-ON	√	√	√
			0-OFF			
	Run Mode	Run Mode	0?Cool	√	√	√
			1?Heat			
			2?Cool+Heat			
	Unit Run Time	Unit Run Time		√	√	√
	SG Ready State	SG Ready State	00:10	√	√	√
			01:00			
			02:01			
			03:11			
			4: Disabled			
		SYS1 Cool Cap	XXX/XXX	√	√	√
		SYS2 Cool Cap	XXX/XXX	√	√	√
		SYS1 Heat Cap	XXX/XXX	√	√	√
		SYS2 Heat Cap	XXX/XXX	√	√	√
	Act CHLT Setp	Act CHLT Setp	?x10	√	√	√
	Act HLT Setp	Act HLT Setp	?x10	√	√	√
		SYS1 Cooling Hours	hx1	√	√	√
		SYS1 Heating Hours	hx1	√	√	√
		SYS2 Cooling Hours	hx1	√	√	√
		SYS2 Heating Hours	hx1	√	√	√
Comm	Fan VSD1 COMM	Fan VSD1 COMM	1-ON / 0-OFF	√	√	√
	Fan VSD2 COMM	Fan VSD2 COMM	1-ON / 0-OFF	√	√	√
	SYS1EcoEEV COMM	SYS1EcoEEV COMM	1-ON / 0-OFF	√	√	√
	SYS2EcoEEV COMM	SYS2EcoEEV COMM	1-ON / 0-OFF	√	√	√

Table 26: Status tabs

Tab	2-Pipe	4-Pipe	Value	V	O	S
System 1	AI6 SYS1 Dsch Press	AI6 SYS1 Dsch Press	kPax1	√	√	√
	AI8 SYS1 Suct Press	AI8 SYS1 Suct Press	kPax1	√	√	√
	AI12 SYS1 Eco In Temp	AI12 SYS1 Eco In Temp	?x10	√	√	√
	AI13 SYS1 Eco Out Temp	AI13 SYS1 Eco Out Temp	?x10	√	√	√
	AI16 SYS1 Coil Temp1	AI16 SYS1 Coil Temp1	?x10	√	√	√
	AI17 SYS1 Coil Temp2	AI17 SYS1 Coil Temp2	?x10	√	√	√
	AI20 SYS1 Suct Temp	AI20 SYS1 Suct Temp	?x10	√	√	√
	AI20 SYS1 Suct Temp	AI10 1-1 Dsch Temp	?x10	√	√	√
	AI22 1-2 Dsch Temp	AI22 1-2 Dsch Temp	?x10	√	√	√
	AI24 1-3 Dsch Temp	AI24 1-3 Dsch Temp	?x10	√	√	√
	SYS1 MEEV Cmd	SYS1 MEEV Cmd	%x10	√	√	√
	SYS1 EcoEEV Step	SYS1 EcoEEV Step	x1	√	√	√
	SYS1 State	SYS1 State	0?Standby	√	√	√
			1?Cool			
			2?Heat			
			3?Defrost			
			4?Cool+Heat			
	SYS1 Sat Dsch Temp	SYS1 Sat Dsch Temp	?x10	√	√	√
	SYS1 Sat Suct Temp	SYS1 Sat Suct Temp	?x10	√	√	√
	SYS1 Suct Sheat	SYS1 Suct Sheat	?x10	√	√	√
	SYS1 Fan Freq(Stage)	SYS1 Fan Freq(Stage)	Hzx1(x1)	√	√	√
	AI26 SYS1 Leakage	AI26 SYS1 Leakage	%x10	√	√	√
	1-1 Dsch Sheat	1-1 Dsch Sheat	?x10	√	√	√
	1-2 Dsch Sheat	1-2 Dsch Sheat	?x10	√	√	√
	1-3 Dsch Sheat	1-3 Dsch Sheat	?x10	√	√	√

Table 26: Status tabs

Tab	2-Pipe	4-Pipe	Value	V	O	S
System 2	AI7 SYS2 Dsch Press	AI7 SYS2 Dsch Press	kPax1	√	√	√
	AI9 SYS2 Suct Press	AI9 SYS2 Suct Press	kPax1	√	√	√
	AI14 SYS2 Eco In Temp	AI14 SYS2 Eco In Temp	?x10	√	√	√
	AI15 SYS2 Eco Out Temp	AI15 SYS2 Eco Out Temp	?x10	√	√	√
	AI18 SYS2 Coil Temp1	AI18 SYS2 Coil Temp1	?x10	√	√	√
	AI19 SYS2 Coil Temp2	AI19 SYS2 Coil Temp2	?x10	√	√	√
	AI21 SYS2 Suct Temp	AI21 SYS2 Suct Temp	?x10	√	√	√
	AI11 2-1 Dsch Temp	AI11 2-1 Dsch Temp	?x10	√	√	√
	AI23 2-2 Dsch Temp	AI23 2-2 Dsch Temp	?x10	√	√	√
	AI25 2-3 Dsch Temp	AI25 2-3 Dsch Temp	?x10	√	√	√
	SYS2 MEEV Cmd	SYS2 MEEV Cmd	%x10	√	√	√
	SYS2 EcoEEV Step	SYS2 EcoEEV Step	x1	√	√	√
	SYS2 State	SYS2 State	0?Standby	√	√	√
			1?Cool			
			2?Heat			
			3?Defrost			
			4?Cool+Heat			
	SYS2 Sat Dsch Temp	SYS2 Sat Dsch Temp	?x10	√	√	√
	SYS2 Sat Suct Temp	SYS2 Sat Suct Temp	?x10	√	√	√
	SYS2 Suct Sheat	SYS2 Suct Sheat	?x10	√	√	√
	SYS2 Fan Freq(Stage)	SYS2 Fan Freq(Stage)	Hzx1(x1)	√	√	√
	AI27 SYS2 Leakage	AI27 SYS2 Leakage	%x10	√	√	√
	2-1 Dsch Sheat	2-1 Dsch Sheat	?x10	√	√	√
	2-2 Dsch Sheat	2-2 Dsch Sheat	?x10	√	√	√
	2-3 Dsch Sheat	2-3 Dsch Sheat	?x10	√	√	√
Cmpr Hour	SYS1 Cmpr1 Hours	SYS1 Cmpr1 Hours	hx1	√	√	√
	SYS1 Cmpr1 Starts	SYS1 Cmpr1 Starts	x1	√	√	√
	SYS1 Cmpr2 Hours	SYS1 Cmpr2 Hours	hx1	√	√	√
	SYS1 Cmpr2 Starts	SYS1 Cmpr2 Starts	x1	√	√	√
	SYS1 Cmpr3 Hours	SYS1 Cmpr3 Hours	hx1	√	√	√
	SYS1 Cmpr3 Starts	SYS1 Cmpr3 Starts	x1	√	√	√
	SYS2 Cmpr1 Hours	SYS2 Cmpr1 Hours	hx1	√	√	√
	SYS2 Cmpr1 Starts	SYS2 Cmpr1 Starts	x1	√	√	√
	SYS2 Cmpr2 Hours	SYS2 Cmpr2 Hours	hx1	√	√	√
	SYS2 Cmpr2 Starts	SYS2 Cmpr2 Starts	x1	√	√	√
	SYS2 Cmpr3 Hours	SYS2 Cmpr3 Hours	hx1	√	√	√
	SYS2 Cmpr3 Starts	SYS2 Cmpr3 Starts	x1	√	√	√

Table 26: Status tabs

Tab	2-Pipe	4-Pipe	Value	V	O	S
Pump Hour	Pump1 Hours	Chilled Pump1 Hours	hx1	√	√	√
	Pump1 Starts	Chilled Pump1 Starts	x1	√	√	√
	Pump2 Hours	Chilled Pump2 Hours	hx1	√	√	√
	Pump2 Starts	Chilled Pump2 Starts	x1	√	√	√
		Hot Pump1 Hours	hx1	√	√	√
		Hot Pump1 Starts	x1	√	√	√
		Hot Pump2 Hours	hx1	√	√	√
		Hot Pump2 Starts	x1	√	√	√
DI	DI1~DI19	DI1~DI19	0-OFF / 1-ON	√	√	√
DO	M-DO1~DO8	M-DO1~DO8	0-OFF / 1-ON	√	√	√
	EX2-DO1~DO16	EX2-DO1~DO16	0-OFF / 1-ON	√	√	√
	EX1-DO1~DO16	EX1-DO1~DO16	0-OFF / 1-ON	√	√	√

Settings page

The system configuration page is only accessible at the operator or service level. The user can modify various system parameters from the system configuration page.

All configuration items consist of the following types: option type, open or close type, and number filling type.

Option type

To modify any parameters belonging to option type, the user can only select a suitable option from the list of dialog box pop ups.

There are three options in the dialog box. The user can select the relevant option based on their needs:

- Cool
- Heat
- Cool + Heat

Open or close type

There are two options in the dialog box:

- Open
- Close

Click the parameter to modify. A conformation dialog box appears. If the user clicks Confirm, the parameter turns from close state to open state or turns from open state from close state.

Number filling type

The user needs to use numbers for this configuration item. Click the parameters that belong to the relevant configuration item number, a dialog box appears. Input the relevant numbers and click Confirm to execute the change.

Table 27: Number filling tabs

Tab	Item	Min	Max	Default	Access Level	Notes
Unit	Unit Model			As required	Service	
	Run Mode	COOL/HEAT		COOL	Operator	2-Pipe
	Run Mode	COOL/HEAT/COOL+HEAT		COOL+HEAT	Operator	4-Pipe
	Cool Ctrl Mode	LCHLT CTRL /ECHLT CTRL/Variable LCHLT		ECHLT CTRL	Operator	
	Heat Ctrl Mode	LCHLT CTRL /ECHLT CTRL/Low LCHLT/ Medium LCHLT		ECHLT CTRL	Operator	
	Fault Reset	--/Unit/SYS1/SYS2		---	Operator	
	Cool LCHLT Setp(?)	3	18	7	Operator	
	Cool ECHLT Setp(?)	10	20	12	Operator	
	Heat LCHLT Setp(?)	24	61	45	Operator	
	Heat ECHLT Setp(?)	22	58	40	Operator	
	Modbus Address	1	255	1	Operator	
	On/Off Ctrl Channel	LOCAL/REMOTE/MODBUS		LOCAL	Operator	
	SG Ready	Enable/Disable		Disable	Operator	
	SG offset1(?)	0	10	5	Operator	
	SG offset2(?)	0	10	2	Operator	
	SYS1 Switch	Switch On/Switch Off		Switch On	Operator	
	SYS2 Switch	Switch On/Switch Off		Switch On	Operator	
	Cool Adjust Factor(?)	1	2.5	1.5	Service	
	Heat Adjust Factor(?)	1	2.5	1.5	Service	
	Liquid Rate Sensitivity N(?)	0.1	3	3	Service	
	Cool Offset D1(?)	1	3	2	Service	
	Ctrl Time t(s)	10	120	20	Service	
	Heat Offset D2(?)	1	3	2	Service	
Option	Pump Selection	External/Pump1/Pump2/Dual Auto		As required	Operator	
	Hot Pump Selection	External/Pump1/Pump2/Dual Auto		As required	Operator	4-Pipe
	Power Failure Restart	Enable/Disable		Disable	Operator	
	Fan Ctrl Type	Stage Fan/VSD Fan		As required	Service	2-Pipe
	Fan Ctrl Type	VSD Fan		VSD Fan	Service	4-Pipe
	Refrigerant Type	R410A/R454B		R454B	Service	
	HMI Display Units	SI/IP		SI	Service	only SI
	BAS Display Units	SI/IP		SI	Service	only SI
	Soft Start	Enable/Disable		As required	Service	
	Sound Enclosure	Enable/Disable		As required	Service	
	Log Sampling Interval	1	10	1	Service	
	Data Logging	Stop/Start/No USB Detected		Start	Service	

Table 27: Number filling tabs

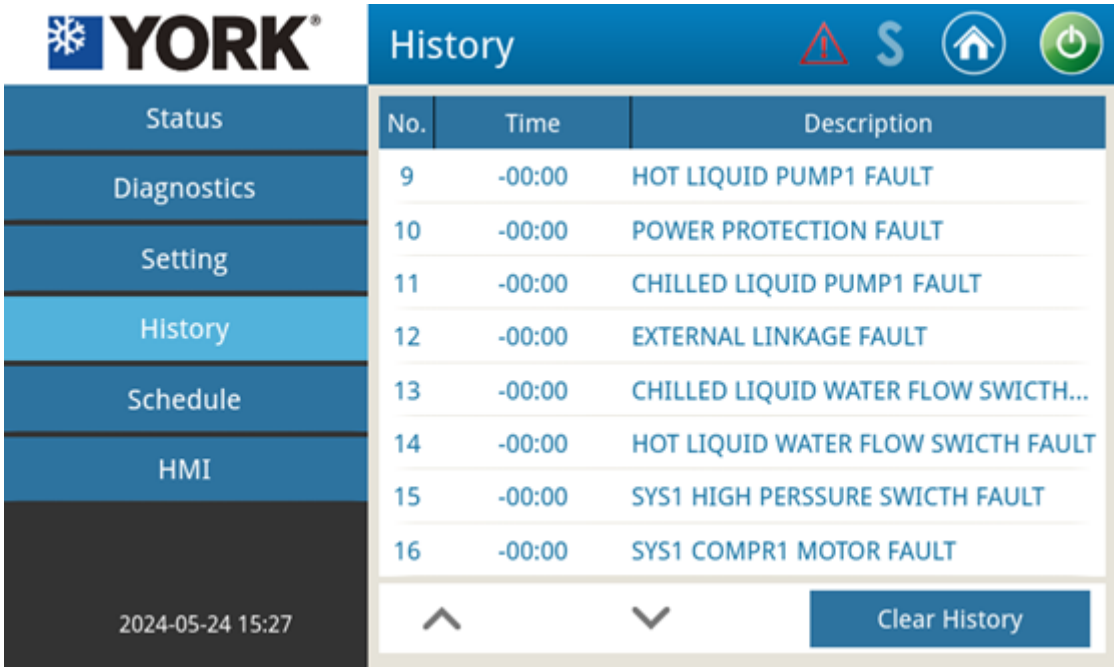
Tab	Item	Min	Max	Default	Access Level	Notes
System	Cool Suct Press Cutout(kPa)	534(R410A)	777(R410A)	590(R410A)	Service	
		479(R454B)	702(R454B)	530(R454B)	Service	
	Dsch Press Cutout(kPa)	3400(R410A)	4100(R410A)	4100(R410A)	Service	
		3130(R454B)	3781(R454B)	3781(R454B)	Service	
	Cool Suct Sheat Setp(?)	3	8	5	Service	
	Heat Suct Sheat Setp(?)	3	8	6	Service	
	Eco Sheat Setp(?)	3	8	4	Service	
	Eco Sheat Range(?)	0	5	4	Service	
	EEV MOP Setp(?)	12	20	15	Service	
	Low LCHLT Cutout(?)	2	4	3	Service	
	High LCHLT Cutout(?)	55	63	62	Service	
	Cmpr Min Stop Time(s)	40	90	60	Service	
	Cmpr Restart Interval(s)	180	600	300	Service	
	Sys Min Run Time(s)	180	300	240	Service	
	Dfst Min Interval(min)	25	60	40	Service	
	Dfst Exit Time(s)	240	600	300	Service	
	High AMT Dfst Temp Offset(?)	3	12	12	Service	
	Low AMT Dfst Temp Offset(?)	3	12	7	Service	
	Dfst Exit Temp(?)	5	20	10	Service	
	Manual Defrost	---/SYS1/SYS2		---	Operator	
	Clear Cmpr Hours	---/Clear		---	Service	
	Clear Cmpr Starts	---/Clear		---	Service	
	Clear Fault	---/Clear		---	Service	
	Default Setp	---/yes		---	Service	
	Cmpr Min Run Time(s)	60	300	180	Service	
	Sys Restart Interval(s)	120	300	180	Service	
	Sys Switch Interval(s)	120	600	300	Service	4-Pipe
	EEV Stop Step	0	100	55	Service	
	Oil Preheat Time(min)	0	600	60	Service	
	Cmpr Ctrl Interval(s)	40	120	60	Service	2-Pipe
Sensor Correction	SYS1 Dsch Press Offset(kPa)	-100	100	0	Service	
	SYS2Dsch Press Offset(kPa)	-100	100	0	Service	
	SYS1Suct Press Offset(kPa)	-50	50	0	Service	
	SYS2Suct Press Offset(kPa)	-50	50	0	Service	
	LCHLT Sensor Offset(?)	-3	3	0	Service	
	ECHLT Sensor Offset(?)	-3	3	0	Service	
	LHLT Sensor Offset(?)	-3	3	0	Service	4-Pipe
	EHLT Sensor Offset(?)	-3	3	0	Service	4-Pipe
	SYS1 SucT Offset(?)	-3	3	0	Service	
	SYS2 SucT Offset(?)	-3	3	0	Service	

History page

The history page displays the fault information, with the maximum of 30 previous faults. Each fault displays with details of date, time, and fault description.

Fault list

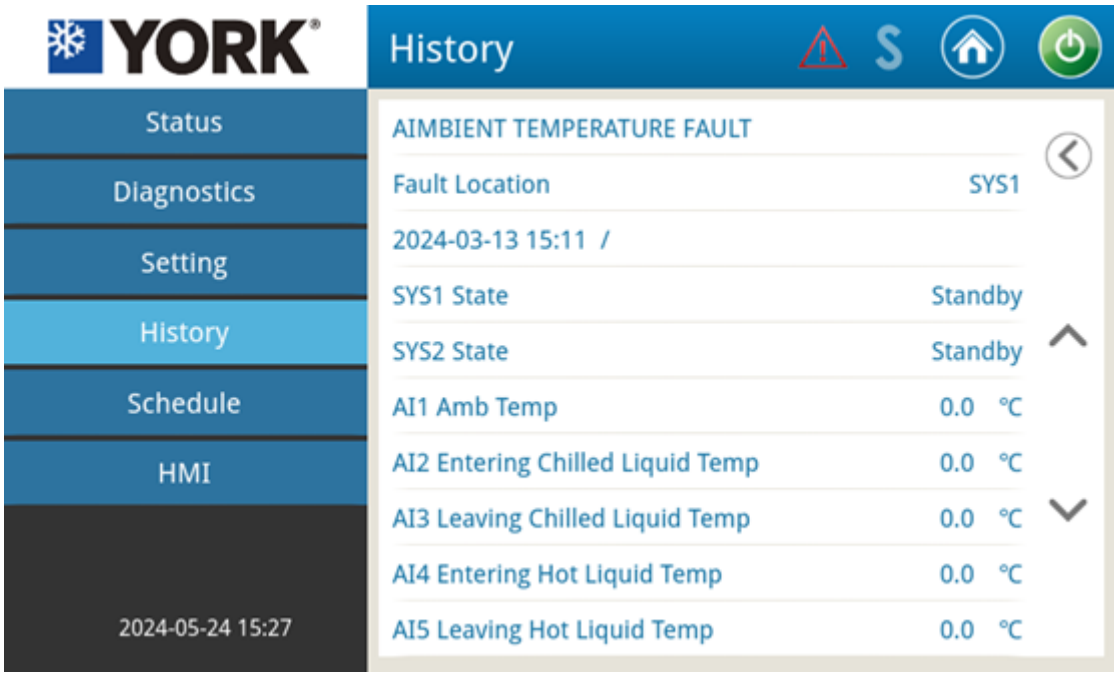
Figure 26: Fault history information



To clear all the fault records, click Clear History at the bottom of the fault page. The Clear History button is enabled for users with Service access level permission only. Users with other access level permissions cannot clear the fault history.

Fault details

Figure 27: Fault details information



The user can click the fault record to enter the detailed display page of the fault. On this page, the user can view the recorded values of different variables and parameters when the fault occurs.

Schedule page

Figure 28: Schedule page information

Users can visit the schedule page with Operator or Service access levels. Different timing switch maneuvers can be set up on the schedule page.

There are two options on the top left of the schedule main page:

- Schedule setting
- Holiday setting

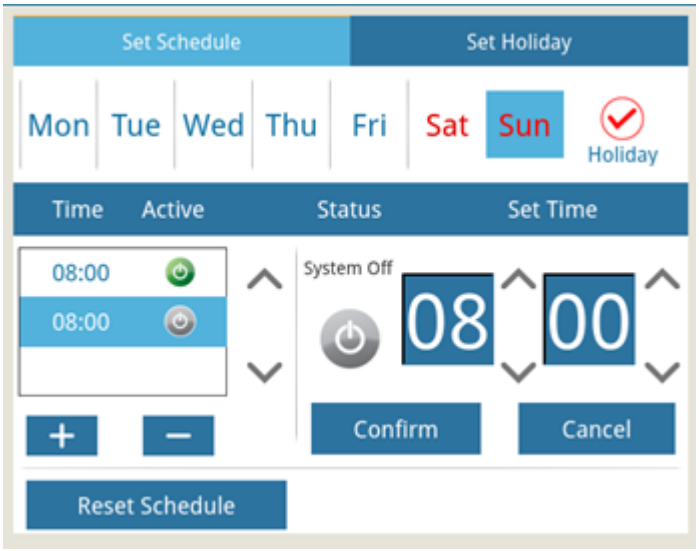
Click the relevant option to enter the corresponding setting page.

Schedule setting

The schedule setting refers to switching the unit on or off at a specific time on a specific date. The settings range from Monday to Sunday, a total of, with a maximum of eight dates including holidays. The unit can switch on or off automatically a maximum of four times on each date.

1. To add a new auto-switch time item, click **+** > **Setting status** to set the on/off and setting time. To remove an auto-switch time item, click **—**.
2. To set whether the unit turns on or off automatically, click the power button.
3. Click **Set Time** and use the navigation arrows to set the preferred time.
4. Click **Confirm**. To reset the scheduled settings, click **Reset Schedule** > **Confirm**.

Figure 29: Schedule setting page

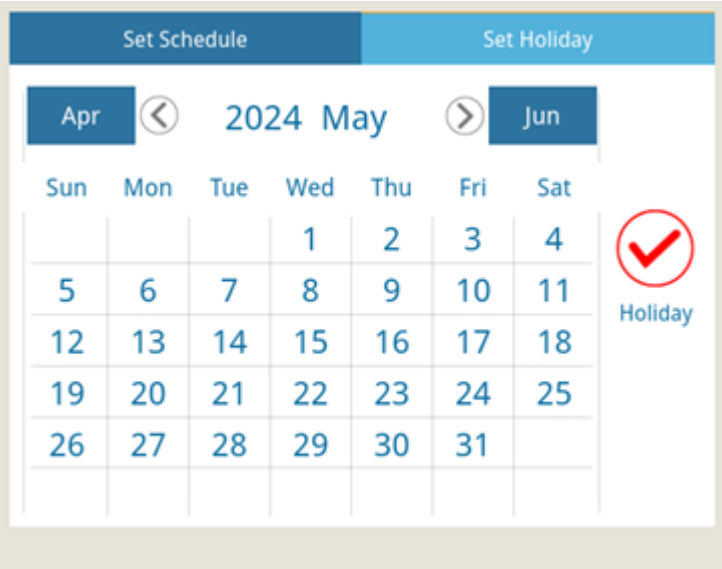


Holiday setting

Holiday setting refers to setting a specific date for holidays. The unit can be switched on or off automatically on the selected date. The user can set the holiday setting up to two years in advance from the current year.

1. To schedule the holiday setting, click **Holiday Setting** on the setting page.
2. To select the relevant date, use the navigation arrows to change the calendar year or month.
3. To confirm, click the √ icon. The selected dates turn red. Users can set a maximum of 30 holiday dates.

Figure 30: Holiday setting page



Maximum hot leaving water temperature setpoint

Due to the limitation of the compressor operating envelope, the actual hot leaving water temperature setpoint LWTset can be confirmed by formula (1) and LWTspset (hot leaving water temp setpoint at **SETTING** page) together.

Formula (1):

If -26°C≤OAT≤-20°C,

LWTspmax = round(1.6*OAT + 86);

If -20°C < OAT ≤ -10°C,

LWTspmax = round (0.5*OAT + 64);

If -10°C < OAT ≤ 7°C,

LWTspmax = round (0.1*OAT + 60);

If OAT > 7°C,

LWTspmax = 61°C.

ⓘ **Note:** The actual water temperature setting point can differ from the setting on the HMI due to the frequency of compressor start-stop and the chiller operating map. Users can view the actual water temperature setting point on the HMI status page unit. In addition, users can view other actual water temperature setting points under the following:

- **Cooling mode**: Act CHLT Setp
- **Heating mode**: Act HLT Setp
- **Heating and cooling mode**: Act CHLT Setp and Act HLT Setp

Fixed-speed fan control stage

For two-fan systems;YCPB0320HE SYS1 and SYS2, and YCPB0420HE SYS2, fans are distributed as below:

Table 28: Two-fan system control map point

Step	DO points	
	Fan 1	Fan 2
	(1)	(1)
0	OFF	OFF
1	ON	OFF
2	ON	ON

For three-fan systems; YCPB0460HE SYS2, fans are distributed as below:

Table 29: Three-fan system control map point

Step	DO points		
	Fan 1	Fan 2	Fan 3
	(1)	(1)	(1)
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	ON	ON	OFF
3	ON	ON	ON

For four-fan systems; YCPB0420HE SYS1,YCPB0460HE SYS1, YCPB0520HE SYS1 and SYS2, YCPB0600HE SYS1 and SYS2, YCPB0690HE SYS2, fans are distributed as below:

Table 30: Four-fan system control map point

Step	DO points		
	Fan 1	Fan 2	Fan 3
	(1)	(1)	(1)
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	ON	ON	OFF
3	ON	OFF	ON
4	ON	ON	ON

For six-fan systems; YCPB0690HE SYS1, YCPB0770HE SYS1 and SYS2, fans are distributed as below:

Table 31: Six-fan system control map point

Step	DO points		
	Fan 1	Fan 2	Fan 3
	(1)	(1)	(1)
0	OFF	OFF	OFF
1	ON	OFF	OFF
2	OFF	ON	OFF
3	ON	ON	OFF

Table 31: Six-fan system control map point

Step	DO points		
	Fan 1	Fan 2	Fan 3
	(1)	(1)	(1)
4	ON	OFF	ON
5	OFF	ON	ON
6	ON	ON	ON

Activating the manual defrost

The function of force the chiller switch to defrost mode manually is available for YCPB models.

It can be entered at **SETTING** page in HMI display.

Variable water outlet mode

To set the heat control mode in HMI, click **Setting** > **Unit** > **Heat Ctrl Mode**. If the heat control mode is set to Low LCHLT, setup Act HLT Setp in accordance with the following table based on outside air temperature.

Table 32: Low LCHLT control mode

Outside air temperature	LWT set
OAT < = -9.0 °C	35.0 °C
-9.0 °C < = OAT < -5.0 °C	34.0 °C
-5.0 °C < = OAT < 4.0 °C	30.0 °C
4.0 °C < = OAT < 9.0 °C	27.0 °C
OAT > = 9.0 °C	24.0 °C

If the heat control mode in HMI is set to Medium LCHLT, setup Act HLT Setp in accordance with the following table based on outside air temperature.

Table 33: Medium LCHLT control mode

Outside air temperature	LWT set
OAT < = -9.0 °C	55.0°C
-9.0 °C < = OAT < -5.0 °C	52.0°C
-5.0 °C < = OAT < 4.0 °C	42.0°C
4.0 °C < = OAT < 9.0 °C	36.0°C
OAT > = 9.0 °C	30.0°C

To set the cool control mode in HMI, click **Setting** > **Unit** > **Cool Ctrl Mode**. If the cool control mode is set to Variable LCHLT, setup Act CHLT Setp in accordance with the following table based on outside air temperature.

Table 34: Variable LCHLT control mode

Outside air temperature	LWT set
OAT < = -32.5 °C	7.0°C
27.5 °C < = OAT < 32.5°C	8.5°C
22.5 °C < = OAT < 4.0°C	10.0°C
OAT > = 22.5 °C	11.5°C

SG ready

Users can choose from several SG ready state options. To set the SG ready state in HMI, click **Setting** > **Unit** > **SG Ready**.

Table 35: SG ready state options

Option	Description
SG Ready Disable	Ignore the SG Ready dry contact signal and the SG Ready setpoint offset. The unit operates completely under the existing control mode.
SG Ready Enable	To enable SG ready function, wire the dry contacts to XT terminal 11 to 37 (DI18) for SSG1 and 11 to 38 (DI19) for SSG2. See the unit wiring diagram for more information.
Switch-off command state (SSG1:SSG2 = 1:0)	The unit is in the shutdown status, except for the pump. If the signals from HMI, BAS, and the remote control are in the power on state then the water pump operates. If the signals from HMI, BAS, and the remote control are in the power off state the water pump stops.
Standard operation state (SSG1:SSG2 = 0:0)	If the signals from HMI, BAS, and remote control are in the power on state the unit is in the normal operating state. If the signals from HMI, BAS, and remote control are in the power off state both the unit and the water pump are off, similar to the SG ready not enable operation mode.
Switch-on command state (SSG1:SSG2 = 1:1)	Whether the signals from HMI, BAS, and remote control are in power on or off status, the unit keeps running. The final target water temperature does not exceed the operating temperature limit.
Power failure restart	To set the Power Failure Restart in HMI, click **Setting** > **Option** > **Power Failure Restart**. If it is set to Enable, auto restart occurs after the unit turns again and meets the start requirement.

Maintenance

YCPB units are designed to operate continuously provided they are regularly maintained and operated within the limitations given in this manual.

Include each unit in a routine schedule of daily maintenance checks by the operator or customer, backed up by regular service inspection and maintenance visits by a suitably qualified Service Engineer.

⚠ WARNING

It is entirely the responsibility of the owner to provide for these regular maintenance requirements or enter into a maintenance agreement with a Johnson Controls service organization to protect the operation of the unit.

⚠ WARNING

If damage or a system failure occurs due to incorrect maintenance during the warranty period, Johnson Controls shall not be liable for costs incurred to return the unit to satisfactory condition.

ⓘ **Note:** This maintenance section applies to the basic unit only and may, on individual contracts, be supplemented by additional requirements to cover any modifications or ancillary equipment as applicable.

⚠ WARNING

Read the Safety Section of this manual carefully before attempting any maintenance operations on the unit. Read this section in conjunction with the Operation section.

Daily maintenance checks

Perform the following maintenance checks on a daily basis.

ⓘ **Note:** Please note that the units are not user-serviceable. Do not attempt to rectify faults or problems found during daily checks unless competent and equipped to do so. If in any doubt, contact your local Johnson Controls Service Centre.

- **Unit status:** Click the HMI display to enter the main page and ensure there are no fault messages displayed.
- **Operating conditions:** Read the operating pressures and temperatures on the control panel using the **STATUS** page and check that these are within the operating limitations given in .
- **Refrigerant leaks:** Visually inspect the heat exchanger, ambient coils, compressors and pipework for damage and gas leaks.
- **Ambient coil fan motors:** The fan motors are permanently lubricated and require no maintenance.
- **Airflow obstructions:** Check the ambient coil air intakes and adjacent areas are clear of foreign materials or obstructions such as paper or leaves.
- **Compressor oil level:** Check the compressor oil level when the compressor is operating normally.

  ⓘ **Note:** The oil level should be between the ½ and ¾ in the oil sight glass.

  ⓘ **Note:** At shutdown the oil level can fall to the lower limit of the oil sight glass.
- **Compressor oil quality:** The oil used in the compressors is pale in color. If the oil color darkens or exhibits a change in color, this may be an indication of contaminants in the refrigerant system. If this occurs, take an oil sample analyze it. If contaminants are present, the system must be cleaned to prevent compressor failure.
- **Refrigerant charge:** When a system starts up, or sometimes after a change of capacity, a flow of bubbles will be seen in the liquid line sight glass. After a few minutes of stable operation, the bubbles should clear leaving just liquid refrigerant showing in the sight glass.

⚠ CAUTION

In addition to the checks listed above, perform periodic inspections of the unit to ensure proper equipment operation. Investigate loose equipment, component operation, or unusual noises and correct them immediately.

Scheduled maintenance

A qualified service engineer must perform the maintenance operations detailed in the following table on a regular basis.

ⓘ **Note:** The interval necessary between each minor and major service can vary depending on application, site conditions, and expected operating schedule.

ⓘ **Note:** A minor service must be carried out every three to six months and a major service, once a year.

ⓘ **Note:** It is recommended that your local Johnson Controls Service Centre is contacted for recommendations for individual sites.

Table 36: Scheduled maintenance

Service schedule	Minor service	Major service
Unit	• Check thermal insulation • Check vibration isolators	• Check main structure • Check paint-work
Refrigerant systems	• Check relief valves • Check for pipwork damage • Check for leaks • Check moisture indicator • Check suction superheat • Check liquid subcooling	Check solenoid valves
Compressors	• Check oil level • Check condition of oil	—
Heat exchanger	• Check water flow • Check pressure drop • Check heater mats	Check water pH or glycol strength
Ambient coils	• Check for airflow obstructions • Check fins • Check fans and fan guards	• Check brush fins • Check fan motor bearings
Power and control system	• Check panel condition • Check mains and control wiring • Check sensor locations • Check mechanical HP cut-outs	• Check all connections • Check compressor contactors • Check fan contactors • Check sensor or transducer calibration • Check motor protectors • Check contactor contacts
Microprocessor controls	• Check fault history • Check program settings • Check HP or LP cut-out functions • Check load or unload function	• Check fan control function • Check ambient cut-out function

Heat exchanger in-service inspection

If there is no corrosion present, an in-service inspection on the refrigerant side is not necessary.

On the water side, if the water used is treated in accordance with Water treatment, in-service inspection is not necessary.

In the design of the vessels used in the unit, a 1 mm corrosion allowance has been used to consider slight corrosion on the water side. This allowance is sufficient to cover the lifetime of the unit.

Note: Johnson Controls believes that periodic in service proof testing, such as hydro tests, is not required. However, Johnson Controls recognizes that national regulations may require such testing to be conducted.

Spare parts

Contact your local Johnson Controls Sales and Service Centre for information and quote the unit model number and serial number.

The correct type of oil must be used in the unit as shown on the unit data plate and labels. Standard units use the following oil:

Refrigerant	Compressor oil
R-454B	160SZ

Table 37: Associated drawings

Wiring diagrams	
Models	**All**
Schematic	035-29144-001~015
Legend/Notes	035-29144-031~040

Troubleshooting

Table 38: Troubleshooting

Problem	Possible cause	Action
No display on panel — Unit will not operate	Mains supply to unit off.	Switch on mains supply if safe to do so.
	Emergency stop device off.	Check if emergency stop device is in the 'OFF' position. Turn to 'ON' position if safe to do so.
	No supply to -T1.	Check wiring from XBTF-1 to -T1 microprocessor board.
	No 24 VAC supply to microprocessor board.	Check wiring from -T1 to TB6 microprocessor board.
	No 24 VAC output from Transformer -T1.	Change transformer -T1
	Short circuit in wiring to temperature sensors or pressure transducers.	Unplug connections at microprocessor board to isolate.
	Defective microprocessor board or display board.	Replace board after contacting Johnson Controls Service.
Chilled flow switch disconnected	No liquid flow through the liquid heat exchanger	Ensure that liquid pumps are running, valves are correctly set and flow is established.
	Flow switch contacts are not made.	Check the flow switch is functional and is installed according to the manufacturers instructions. ⓘ **Note:** On some systems the pump starter may be wired to the unit and controlled to start by the unit.
	Defective flow switch.	Replace flow switch.
UNIT FAULT: LOW AMBIENT TEMP or **HIGH AMBIENT TEMP** displayed	Ambient air temperature is lower than the programmed operating limit.	Check the displayed paremeter to confirm if OAT displayed value is approximately correct. The warning message should clear when the ambient air temperature reaches the programmed operating limit.
	Measured temperature is incorrect.	Check sensor calibration, location, and wiring.
Lack of cooling effect	Fouled cooler surface. Low suction pressure.	Contact the local Johnson Controls service representative.
	Incorrect flow through the cooler	Reduce flow to within unit design specification
	Low refrigerant charge. Low suction pressure will be observed.	• Check subcooling and add charge as needed. • Check for leaks.

Table 38: Troubleshooting

Problem	Possible cause	Action
Compressors do not start	Demand not sufficient.	No problem.
	Defective water temperature sensor.	• Compare the display with a thermometer. • Should be within +/- 2 degrees. • Refer to BLCT calibration charts
	Contactor failure.	Replace defective part.
	Compressor failure.	Diagnose cause of failure and replace.
SYS X LOW SUCT PRESS displayed	Suction pressure cut-out incorrectly set.	Adjust in accordance with recommended setting.
	Faulty EEV	Replace valve
	Reduced cooler performance.	• Check for restricted chilled liquid flow. • Check for fouled tube surfaces.
	Low refrigerant charge.	Check for leaks
	Restricted refrigerant flow.	• Check for blocked filter or drier. • Check for moisture in the system.
	Measured pressure incorrect.	• Check suction pressure transducer calibration or pressure switch and wiring
SYS X HIGH DSCH PRES displayed	Discharge pressure cut-out incorrectly set.	Adjust in accordance with recommended setting.
	Poor airflow through the condenser coils.	• Check for airflow restrictions caused by blockages on intake faces of air coils. • Check for damaged fins.
	Condenser fans not operating or operating backwards	• Check fan motor, fuses and contactors. • Check fan airflow is upward.
	Air in refrigerant system.	• Check for non-condensables (air) in system. • Evacuate and recharge system.
	Excessive refrigerant charge.	Remove refrigerant
	Measured pressure is incorrect.	Check discharge transducer calibration and wiring.

System safeties

The following causes individual system to perform auto-shutdown and require a manual reset in the event of three trips in a 120 min period:

- High discharge pressure
- Low suction pressure
- Low discharge superheat
- High discharge temperature

- Motor protector
- High pressure switch

The following causes individual system to perform an auto-shutdown, and require a manual reset:

- Discharge pressure sensor fault
- Suction pressure sensor fault
- Discharge temperature sensor fault
- Economic BPHE inlet temperature sensor fault
- Economic BPHE outlet temperature sensor fault
- Ambient coil temperature sensor fault
- Suction temperature sensor fault

Unit safeties

The following faults automatic reset and cause the compressor to shut down:

- Low ambient temperature
- High ambient temperature

The following faults cause the unit to perform an auto-shutdown and require a manual reset:

- Power protector disconnected
- External linkage disconnected
- Low leaving hot liquid temperature
- Incorrect liquid temperature

The following faults cause both systems to shut down and require manual reset in the event of three trips in a 120 min period:

- Ambient temperature sensor fault
- Water flow switch disconnected
- Entering liquid temperature fault
- Leaving liquid temperature fault
- Low leaving liquid temperature
- High leaving liquid temperature

Decommissioning, dismantling, and disposal

Unless otherwise indicated, the operations described below can be performed by any correctly trained maintenance technician.

⚠ WARNING

Never release refrigerant to the atmosphere when emptying the refrigerating circuits. Suitable retrieval equipment must be used. If reclaimed refrigerant cannot be reused, it must be returned to the manufacturer.

⚠ WARNING

Never discard used compressor oil, as it contains refrigerant in solution. Return used oil to the oil manufacturer.

1. Isolate all sources of electrical supply to the unit including any control system supplies switched by the unit.
2. Ensure that all points of isolation are secured in the OFF position.
3. The supply cables can then be disconnected and removed. to Installation Section.

   ⓘ **Note:** For connection points refer to Pipework connections.
4. Remove all refrigerant from each system of the unit into a suitable container using a refrigerant reclaim or recovery unit. This refrigerant can then be reused, if appropriate, or returned to the manufacturer for disposal.

⚠ WARNING

Never vent refrigerant to the atmosphere.

Drain the refrigerant oil from each system into a suitable container and dispose of according to local laws and regulations governing the disposal of oily wastes.

Any spilt oil must be mopped up and similarly disposed of.

5. Isolate the unit heat exchanger from the external water systems and drain the heat exchanger section of the system. If no isolation valves are installed it may be necessary to drain the complete system.

⚠ WARNING

If glycol or similar solutions have been used in the water system, or chemical additives are contained, the solution must be disposed of in a suitable and safe manner.

Do not, under any circumstances, drain any system containing glycol or similar solutions directly into domestic waste or natural water systems.

6. After draining, disconnect and remove the water pipework.
7. Packaged units can generally be removed in one piece after disconnection as above. Remove any fixing down bolts and lift the unit from position using the points provided and equipment of adequate lifting capacity
8. Units which cannot be removed in one piece after disconnection as above must be dismantled in position. Take care regarding the weight and handling of each component.

   ⓘ **Note:** Where possible, dismantle units in the reverse order of installation.

⚠ WARNING

Residual refrigerant oil and glycol or similar solutions may remain in some parts of the system. These must be mopped up and disposed of as described above.

9. It is important to ensure that while components are being removed the remaining parts are supported in a safe manner.

⚠ WARNING

Only use lifting equipment of adequate capacity.

10. After removal from position the unit parts must be disposed of according to local laws and regulations.