Intelligent Process Cooling

Frigel
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HVP Industrial Chiller

Air Cooled Chillers

ECO-FRIENDLY
R513A

Product Presentation for commercial use

www.frigel.com

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- CUSTOMER BENEFITS
- TECHINICAL FEATURES
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PRODUCT OVERVIEW

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AIR COOLED WATER CHILLER: POWER & EFFICIENCY

HVP industrial water chillers provide exceptional cooling for your demanding applications. With capacities ranging from 160 to 600 kW, they can handle a wide range of cooling needs.

A true package unit: designed for challenging applications.

Broad Temperature Control: Chill water from -5 ˚C to 25 ˚C ensures precise temperature management for your processes.

Built for Outdoors: These chillers are suited for outdoor installation, handling ambient temperatures up to 45 ˚C without breaking a sweat and in winter conditions they can work until -20 ˚C ambient temperatures.

PRODUCT OVERVIEW

HVP FEATURES RICH FOR ADAPTABILITY AND PLANT UPTIME

- **Unmatched Versatility:** Handles any cooling need, adapting to diverse climates
- **Peak Performance:** Delivers maximum efficiency and reliability at full load
- **Enhanced Efficiency and Stability:** with Electronic
- **Expansion Valve**
- **Environmentally sensible:** Reduced volumes of refrigerant
- **Flexible Installation:** Wide operating temperatures offer superior installation versatility thanks to a large number of variations
- **Proven Reliability:** Built with robust, time-tested components and proven design for industrial applications
- **Serviceability:** Easy to inspect and maintain in both water and refrigeration sections.

CUSTOMER BENEFITS

CUSTOMER BENEFITS: ADOPTION OF R513A

FRIGEL'S POSITION

Frigel's adoption of **R513A** ensures compliance across EMEA and the USA while providing customers with a solution:

- **Reliable**
- **Safe**
- **Efficient**
- **Flexible**

At the same time, Frigel is fully committed to transitioning to **natural refrigerants** to meet and exceed long-term sustainability goals.

CUSTOMER BENEFITS

FOUR MAIN VALUES

1. SUSTAINABILITY AND REGULATORY COMPLIANCE
2. HIGH EFFICIENCY AND OUTSTANDING PERFORMANCE
3. APPLICATION FLEXIBILITY
4. SEMPLIFIED INSTALLATION AND EASE OF USE

CUSTOMER BENEFITS: SUSTAINABILITY

SUSTAINABILITY AND REGULATORY COMPLIANCE

1 The R513A version complies with **European (FGAS) and US regulations**, featuring a low environmental impact thanks to its reduced GWP and **non-flammability**.

Aspect	R513A (Non-Flammable)	R454B (Partially Flammable) or similar
SAFETY	• Classified as **A1**- Non-toxic and non-flammable under standard conditions. • Safer to handle, transport, and store.	• Classified as **A2L** - mildly flammable. • Requires additional safety measures, such as leak detection and fire risk assessments.
COST IMPLICATIONS	• Lower lifecycle costs due to minimal need for specialized equipment and training. • Simplifies installation and maintenance.	• Higher equipment and installation costs due to flammability-related system redesigns. • Maintenance costs increase as technicians require specialized training.
TRANSPORT & LOGISTICS	• No flammability risks, allowing for standard shipping and storage procedures without additional regulatory compliance. • No need for special permits or handling measures during transportation.	• Transportation classified under hazardous material regulations due to A2L flammability. • Requires special permits, labeling, and handling during transport. • Increases logistical costs and complexity.

CUSTOMER BENEFITS: EFFICIENCY

HIGH EFFICIENCY AND OUTSTANDING PERFORMANCE

2

The HVP units deliver exceptional performance using sustainable refrigerants like **R513A**, ensuring output comparable to the versions with **R407C and R410A** versions.

Aspect	SCREW	SCROLL
EFFICIENCY AND PERFORMANCE	• High energy efficiency in medium to large capacities. • Superior partial and full-load performance.	• Less efficient in higher capacities or variable load conditions. • Step-wise staging leads to energy losses.
CAPACITY CONTROL	• Precise, seamless modulation - infinity capacity control • Ideal for dynamic systems with fluctuating cooling demands.	• Staged control (on/off) limits flexibility. • Less efficient under part-load conditions.
RELIABILITY AND DURABILITY	• Designed for heavy-duty continuous operation. • Fewer moving parts ensure long lifespan and reduced wear and tear. • It is designed to be repairable, either on-site or in a workshop, and offers greater longevity due to the possibility of overhauls.	• Suitable for smaller, less demanding applications. • Multiple units increase potential failure points. • In case of failure, it almost always needs to be completely replaced. Repairs are rare and often not cost-effective.

CUSTOMERS BENEFITS: FLEXIBILITY

APPLICATION FLEXIBILITY

3

- With capacities ranging from 160 to 600 kW and customizable configurations, the HVP range is suitable for a wide variety of industrial applications.
- **Hydraulic options** include pressurizable tanks and integrated pumps, offering **functionality comparable to centralized systems but at a more competitive cost.**

CUSTOMERS BENEFITS: EASE OF USE

SIMPLIFIED INSTALLATION AND EASE OF USE

4

- The HVP units come **fully assembled** and ready to use, eliminating the need for on-site assembly.
- Compact structures and advanced controls simplify placement and operation, reducing startup and maintenance time.

HVP combines **power, efficiency, and simplicity**,
delivering immediate value through lower operational costs and higher productivity.

TECHNICAL HIGHLIGHTS

TECHNICAL HIGHLIGHTS

STRUCTURE

- Frame made from galvanized steel, painted with epoxy powder coating.
- Control panel is IP44 rated with extended roof lid
- **Frame with various access points for inspection and maintenance**
- Levelling feet available as accessory
- **Compressors circuit section semi-enclosed**, protected by 3 sides panel structure, easily removable for service activities

CONTROL PANEL

The Unit Control Panel is equipped with a dedicated **user interface** and an advanced **logic control board**, designed for optimal user experience and operational efficiency.

FANS

- **AC**: asynchronous on-off fans
  - For temperatures greater than +0 °C
- **EC**: brushless fans with variable speed
  - For ambient temperatures down to -20°C
- High efficiency axial fans with **individual flow partitioning** for improved fan performance, noise reduction and effective head pressure control
- EC fan control with **Dynamic Optimization Logic**

TECHNICAL HIGHLIGHTS

HYDRAULIC CONFIGURATION

- **3 different water configurations:**
  - Without pump: **N**
  - With evaporator pump only: **M**
  - With 2 pumps (process and evaporator) and tank (vented/pressurizable): **S**
- In all configurations a Flow Switch is present as fast acting and reliable protection for the no flow condition on the evaporator.
- The tank is equipped with a small expansion vented tank for **water level management** in open to atmosphere system operation
- **Non ferrous wet construction**

CONDENSER

- All-aluminum alloy **microchannel** refrigerant heat exchangers.
- **Special condenser execution** for heavy duty applications
- Reduced refrigerant charge with increased heat transfer performance
- Increased surface protection from weather elements

TECHNICAL HIGHLIGHTS: REFRIGERATION CIRCUIT

EVAPORATOR

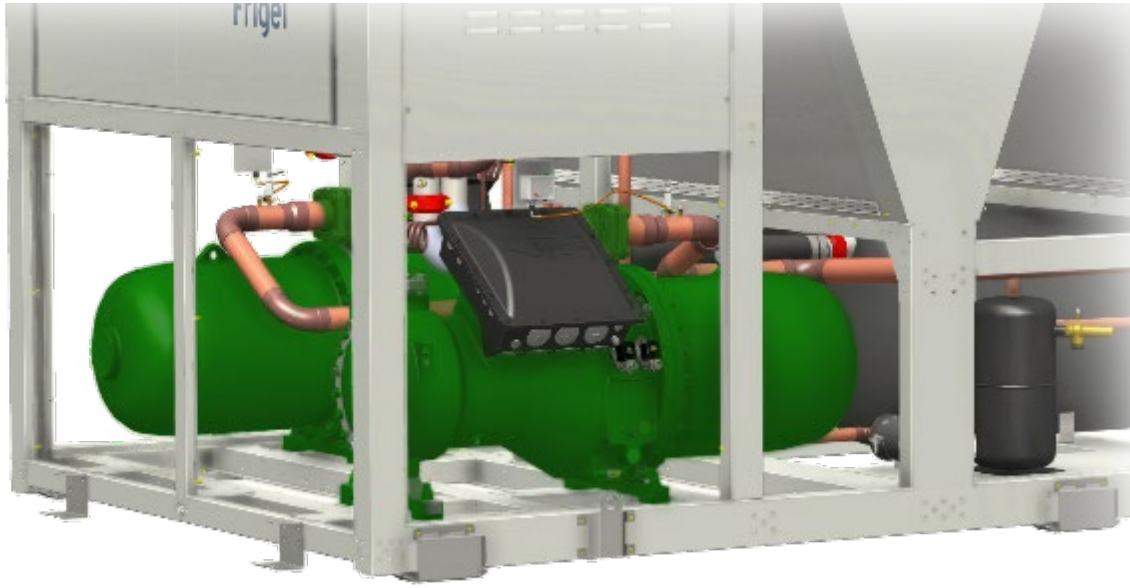
- Brazed plates (BP) or Shell and Tubes (ST)
- BP “dimple” based technology with increased heat-transfer efficiency at part load conditions and reduced refrigerant charge
- **ST available only for water configuration N and M in HVP MS (407C/410A)**

ELECTRONIC EXPANSION VALVE

- True extended temperature range with MOP function
- Improved part load control and efficiency due to better stability and higher evaporating conditions in any ambient temperature

HERMETIC SCROLL COMPRESSORS

- **1 or 2 circuits with TANDEM compressors**
- Scroll compressors are highly efficient at full load (step control) operation, making them ideal for medium-capacity industrial applications.
- Scroll compressors operate with minimal vibration and noise with a simpler design, enabling faster startup times compared to screw compressors.



HIGH EFFICIENCY SCREW COMPRESSORS

- **1 compressor per circuit**
- Screw compressors provide consistent energy efficiency across a wide range of operating conditions, with **stepless (infinite) capacity control.**
- Screw compressors are ideal for applications requiring **variable load conditions due to their ability to modulate capacity efficiently.**
- Screw compressors are robust and suitable for continuous operation in demanding industrial applications.

TECHNICAL HIGHLIGHTS: WHY ELECTRONIC EXPANSION VALVE

MAIN ADVANTAGES OF THIS CHOICE

Extended Operating Range	Improved Energy Efficiency	Enhanced System Stability
The **electronic expansion valve (EEV) allows a wider operating envelope**, providing reliable performance even at high leaving water temperatures (LWT) and low ambient conditions. This adaptability **makes the chiller ideal for various industrial applications**, offering greater flexibility in temperature settings.	By maintaining consistent evaporation conditions, **the EEV reduces fluctuations that typically lead to increased energy consumption** with a higher evaporating pressure and therefore higher efficiency during transient conditions.	The **EEV's precise control over the evaporative process provides stable operating conditions**, reducing stress on components and extending the lifespan of the equipment. This stability is essential in achieving consistent cooling output and maintaining long-term performance.

This stable evaporation process **enhances**
the chiller's energy efficiency by approximately 5 - 7%
compared to mechanical valve systems, optimizing operational costs.

TECHNICAL HIGHLIGHTS

A TRUE PACKAGE UNIT DESIGNED FOR CHALLENGING APPLICATIONS

- **Single point of connection:** one power line, two pipes and water make up.
- **Fully factory assembled,** charged and tested
- **Integral hydronic features** and functionalities for primary-secondary flow systems
- Accumulation volume, air separator and expansion tank for applications with **small mold changes and variable loads**
- **Single point control and monitoring** for the whole plant
- **Realtime digital monitoring:** for full process water and refrigeration

HVP SERIES IS A REPLACEMENT LIKE FOR LIKE
OF TRADITIONAL FRIGEL CHILLER SYSTEM

Plus easily integrable into:

- ➔ Modular central chiller system with 3PR4.0 and GPx products
- ➔ Free-cooling systems with 3DK and 4DK

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TECHNICAL HIGHLIGHTS: TYPE FRAME

TWO TYPES OF FRAME

FRAME TYPE SV (single V)

- LONG V HE positioning
- Models: 151 and 181
- 2 fans

FRAME TYPE MV (multiple V)

- WIDE HE positioning
- Models: 241, 301, 302, 362, 482, 602
- 3/4, 6, 8 fans

TECHNICAL HIGHLIGHTS

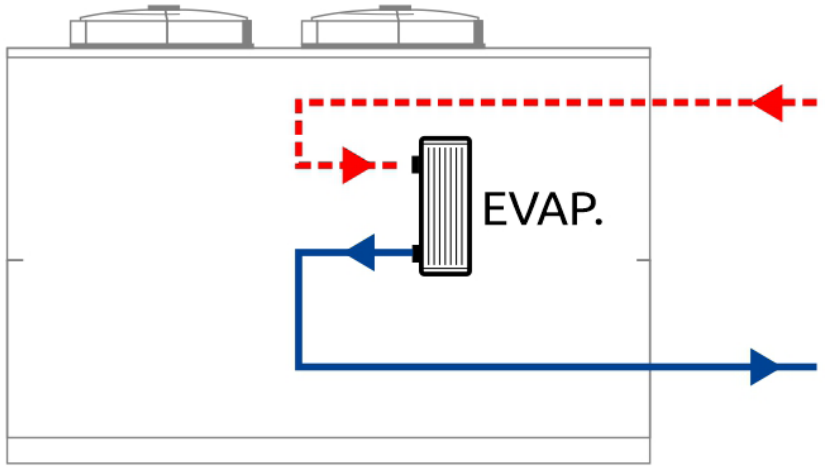
ENVELOPE OF HVP CHILLERS

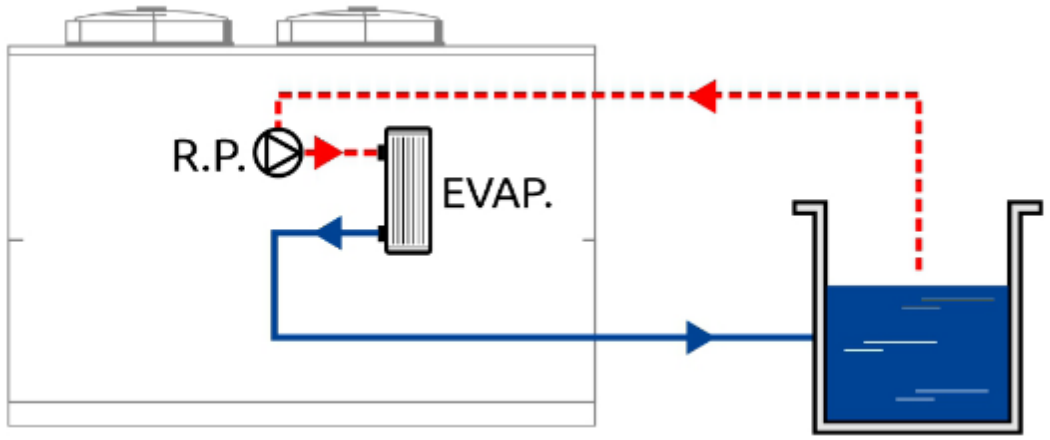
	REFRIGERANT	R407C/R410A	R313A
AMBIENT	Max Ambient T	+45° C	+45° C
	Min Ambient T Standard – (Z)	0° C	0° C
	Min Ambient EC Fans + EEV – (Y)	-20° C	-20° C
WATER	Max LWT	+25° C	+25° C
	Min LWT – no Glycol	+7° C	+7° C
	Min LWT – with Glycol	-5° C	-5° C

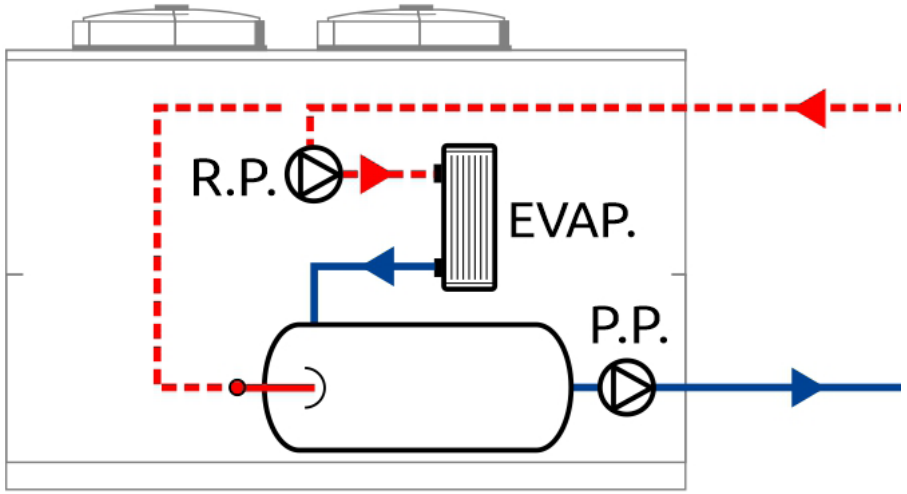
TECHNICAL HIGHLIGHTS: HYDRAULIC SECTION

3 DIFFERENT WATER CONFIGURATIONS

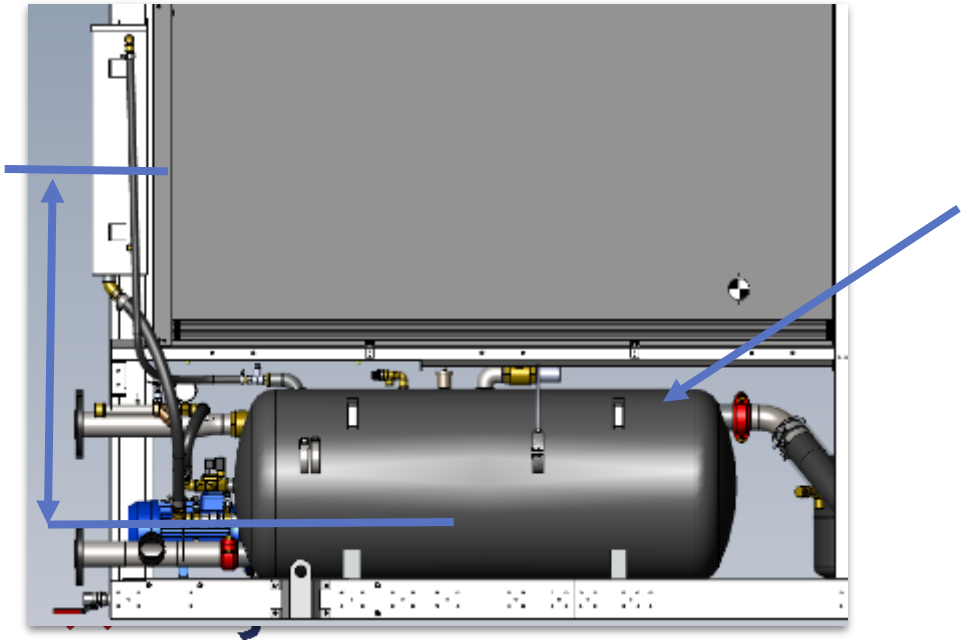
- Without pump – N
- With evaporator pump only – M
- Two pumps vented tank – pressurizable - S







TECHNICAL HIGHLIGHTS: HYDRAULIC SECTION



VENTED TANK DESIGN ADVANTAGES

- No back-pressure (static)
- Less critical piping design and construction
- More intuitive to manage
- Enables mold drain features

PRESSURIZED TANK DESIGN ADVANTAGES

- Ensures optimal pump suction head performance
- Allows effective volume utilizations of cylindrical tank
- Prevents free surface vortex formation with air core intake
- Avoid air oxygenation

OUR PIEZOMETRIC TANK SOLUTION ENSURES:

- ➔ Natural air evacuation and expansion volume
- ➔ Minimum free-surface and reduced air oxygenation
- ➔ Evaporator discharge under water
- ➔ Full tank utilization
- ➔ Maximum pump head
- ➔ No free surface for vortexing
- ➔ 65 Lt extra volume for mold changes

★ **RELIABLE PUMPING SYSTEM PERFORMANCE UNDER MOLD CHANGING CONDITIONS** (-> system opening -> air introduction).

★ **PRESSURIZABLE IF/AS NEEDED BY CLOSING (2) VALVES AND ADDING A PROPERLY SIZED EXPANSION TANK WITH BLADDER.**

TECHNICAL HIGHLIGHTS

EVAPORATOR PROTECTION BASED ON THE PRESSURE DIFFERENTIAL SWITCH

- The differential pressure switch is an effective protection
- ***Advantages***: Fast acting, reliable for no flow evaporator protection

TAMB SENSOR (included with EC fans) - Winter protection

- Pumps only mode/auto-on logic with low ambient temperature (software function)
- ***Advantages***: pumps provide “heating” function, water circulates through all circuit

ANTIFREEZE PROTECTION WITH WATER SENSOR: LWT and TS temperature sensors

- **TS** used for the control, after accumulation tank (true process supply temperature)
- **LWT** used for the evaporator antifreeze protection and evaporator performance monitoring
- Additional anti-freeze protection based on SP (compressor suction pressure)

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TECHNICAL HIGHLIGHTS: UNIT CONTROL PANEL

The HVP units are equipped with a dedicated **user interface** and an advanced **LOGIC CONTROL BOARD**, designed for optimal user experience and operational efficiency.

- **Interface Board**
  - This robust, industrial-grade interface board offers a user-friendly design that allows for intuitive navigation.
  - Quick setup and troubleshooting processes ensure the machine can be configured and maintained efficiently.
  - Alarms are prominently displayed with dedicated codes, allowing for immediate access and easy identification of issues to support rapid troubleshooting.
- **Control Board**
  - The control board is specifically engineered for control functions and I/O connections, providing precise and reliable machine operation.

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EXECUTIVE SUMMARY

HVP INDUSTRIAL CHILLER

A TRUE PACKAGED UNIT

- **Sustainability and Regulatory Compliance** - The range complies with regulations, featuring a low environmental impact thanks to its reduced GWP and non-flammability.

- **High Efficiency and Outstanding Performance** - The HVP units deliver exceptional performance using sustainable refrigerants like R513A, Screw compressors and EEV. Comparable performance are provided also with Scroll compressors.

- **Functionality comparable to centralized systems** - with 3 options, the Hydraulic section include pressurizable tanks and integrated pumps

- **Full system integration** - HVP units can be easily integrated into a chiller system solution with a master control panel

- **Simplified Installation** - Fully factory assembled, charged and tested

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Intelligent Process Cooling

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