

ABSTRACT TRAINING 3

EASY PUMP SELECTION – THE NEW EXPERTTOOL REFRIGERATION

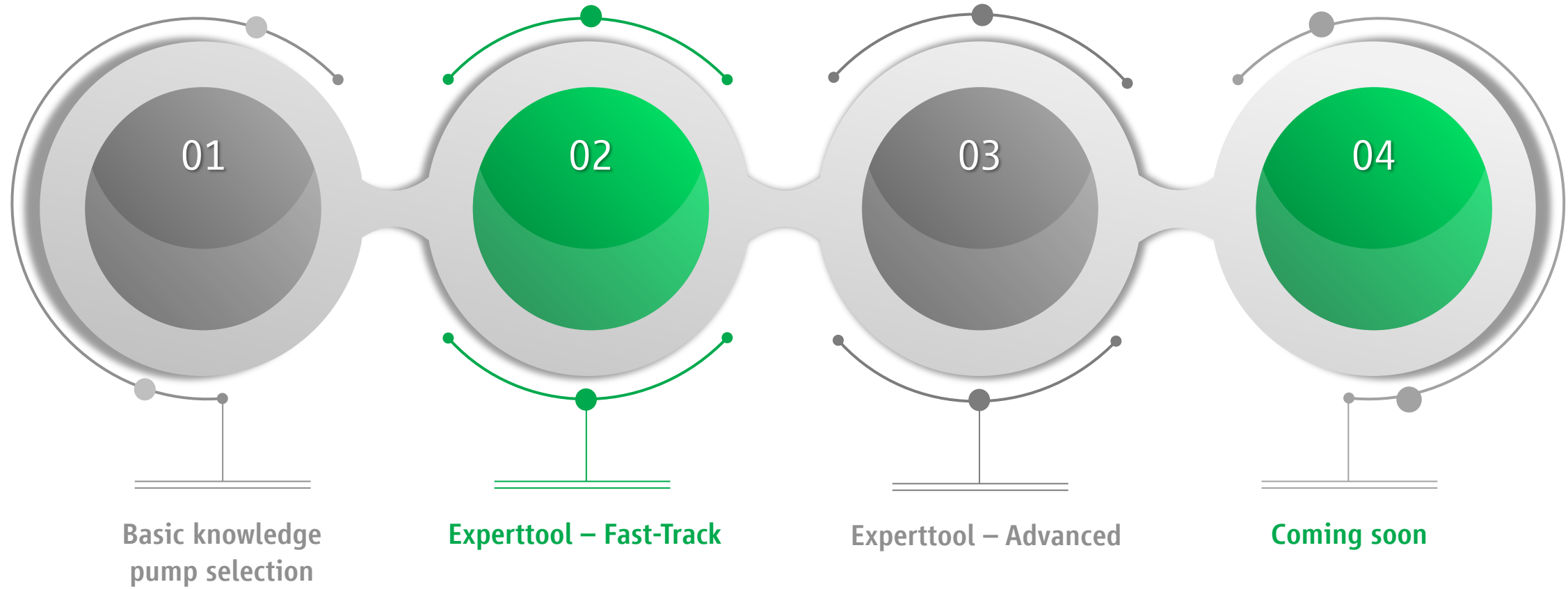
HERMETIC-Pumpen GmbH



Sealless Technology
Unlimited

LEDERLE
Hermetic

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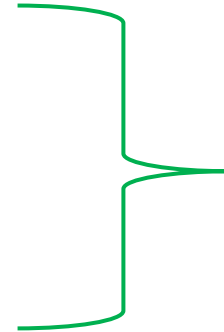




A pump performance curve consists of 3 curves in relation to flow (operating range)

Main information

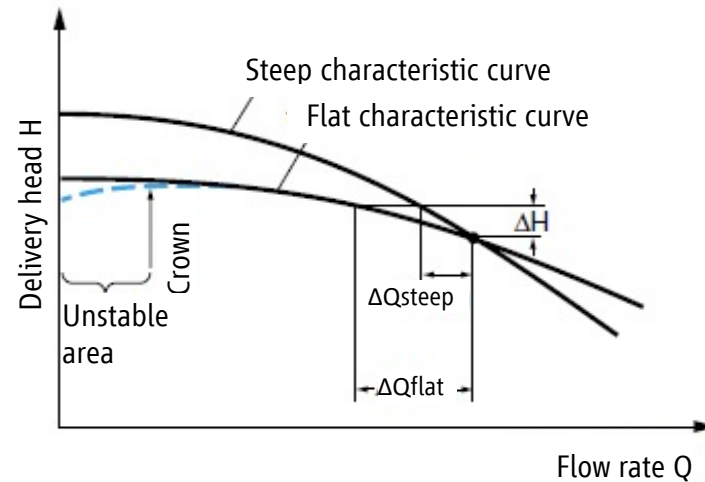
- Differential head H
- Capacity / Flow Q
- Motor power P
- Suction head $NPSH_R$



Additional information and data

- Motor speed / rpm
- Impeller diameter or number of stages
- Test liquid properties (typically water)

Flow and head curve – different shapes shown below:



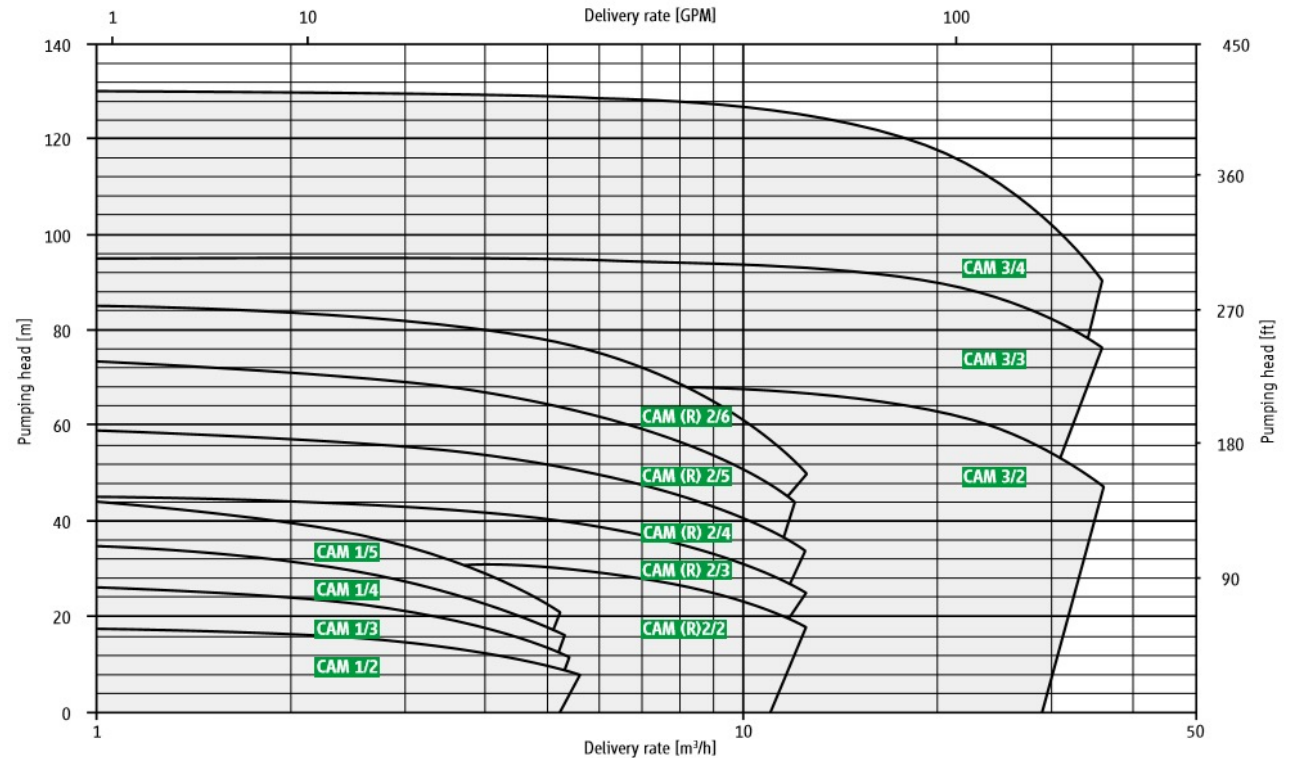
Remark

A flat curve is not desired because it is difficult to operate the pump at the design point



- Pumps are selected within a modular system and can be found out of the many combinations that are shown in the picture.
- The used parameterization can be based on various parameters, such as size, number of stages, nominal nozzle size or nominal impeller diameter.
- Better overview of pump performances

2900 rpm 50 Hz



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NPSH (net positive suction head)

Total holding pressure level or (net) energy level that must be observed in order to bring the liquid to the highest flow velocity prevailing in the rotor blade channel inlet and to overcome friction losses.

NPSHA (net positive suction head available)

This is the plant or installation value that is available as a minimum

NPSHR (net positive suction height required)

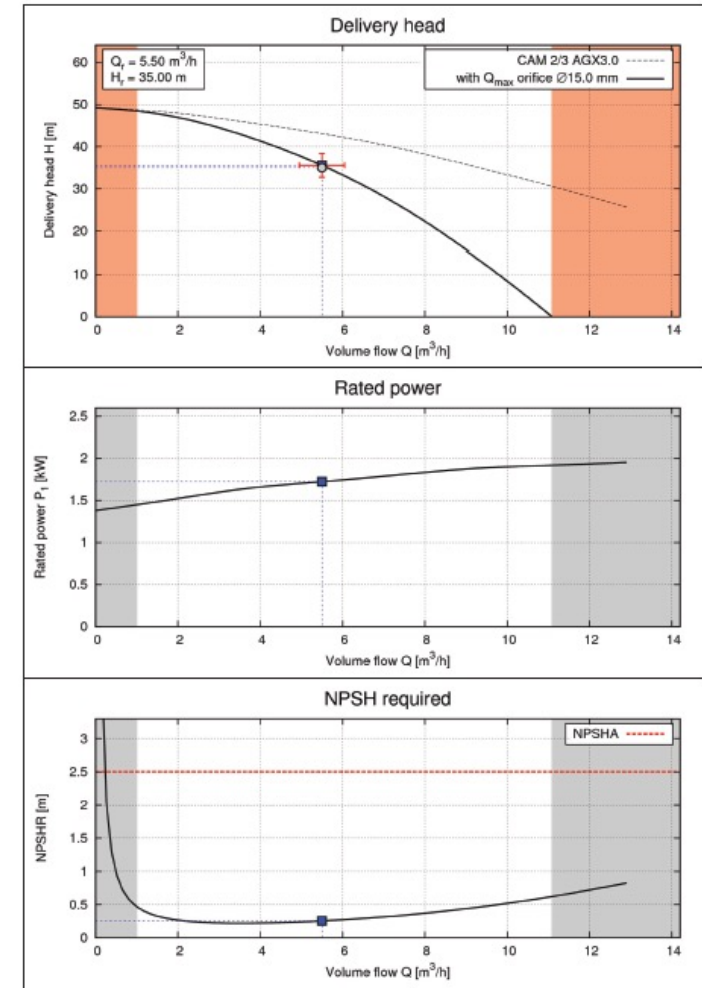
As required for safe and reliable operation of the pump
This is a specific number for each pump and impeller design and depends on the impeller geometry and suction nozzle as well as the casing design

Q-H curve

Performance required motor

NPSH values

Performance curve:





<http://refrigeration.hermetic-tools.de>

CHOOSE APPLICATION: REFRIGERATION CHEMISTRY

Expert tool 4.5 You order · We deliver **S-Line**

Click on **REGISTRATION** to request an access code.

.....

LOGIN

In order to have a flawless experience a modern web browser is recommended. Supported desktop browsers are CHROME 68, EDGE 17, FIREFOX 60, SAFARI 11 and later versions as well as their mobile counterparts on the tablets "iPad Pro" and "MS Surface Pro".

CHOOSE APPLICATION: REFRIGERATION CHEMISTRY

REGISTRATION REFRIGERATION · S-LINE

In order to enter an access code click **LOGIN**.

In order to request an access code please provide correct and complete information. You will receive an e-mail from us with a confirmation link to activate your account. Note that private mail addresses may get rejected by the server.

e-Mail address

Name

Company

Phone number (optional)

Country

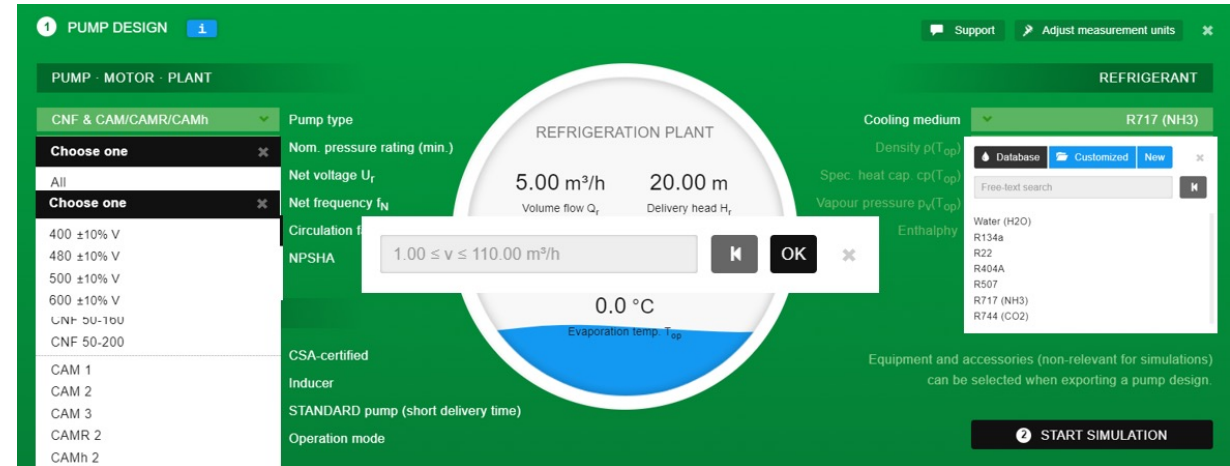
Privacy declaration: By applying for access you consent to the storage of your contact information as well as activities in order to give you the best possible support and advice. A passing on to third parties does not take place. Passing on your access data to third parties is prohibited.

@ REQUEST ACCOUNT REGISTRATION



1. Step: Enter relevant data

- Enter your refrigeration plant data in the middle
- Chose your refrigerant out of catalog
- Selection options:
 - Pump type
 - Pressure
 - Voltage / Frequency
 - Circulation factor
 - NPSHA
 - CSA certification
 - Inducer
 - Q_{max} orifice / flow control valve
 - Standard / Variation





2. Step: Select your pump – your options

- a) Change the units
- b) Get more information
- c) Get in contact with our support
- d) Select your list regarding:
 - Motor power P1
 - Price
 - NPSH
 - Delivery time
- e) Selected pump list – Choose your pump
- f) Go on to Export

The screenshot shows the Hermetic software interface with several key areas highlighted by red boxes and letters:

- f**: The 'EXPORT' button in the top navigation bar.
- a**: The settings icon in the top right corner.
- b**: The 'FAST TRACK' button in the top right corner.
- d**: The 'MATCH: Smart' and 'PRIORITIZATION PREFERENCES' section at the bottom, showing sliders for Price, Delivery time, and P₁.
- e**: The 'PUMP LIST' table, which is highlighted with a red box. The table contains the following data:

Pump	Motor	P ₁ kW	Price	NPSHR m
CAM 2/2	AGX3.0	1.34	*	0.25
CAMR 2/2	AGX3.0	1.34	*	0.25
CAMR 2/3	AGX3.0	1.68	*	0.25
CAM 2/3	AGX3.0	1.68	*	0.25
CAM 2/4	AGX3.0	2.01	*	0.24
CAM 2/3	AGX4.5	2.08	*	0.25

The 'THEORETICAL CURVES' section on the right shows three stacked graphs: H [m], NPSHR [m], and P₁ [kW] versus Q [m³/h]. A vertical dashed line indicates the operating point at Q_r = 5.0 m³/h. Below the graphs, a table lists parameters for different flow rates:

Parameter	Q _{min,ad}	Q _r	Q _r / Q _{opt}	Q _{max,ad}	MU
Volume flow Q	1.00	5.00	5.00	9.84	m ³ /h
Delivery head H	48.68	35.12	35.12	0.00	m
NPSHR	0.57	0.25	0.25	0.51	m
Input power P ₁	1.43	1.68	1.68	1.86	kW
Speed n	2940	2925	2925	2914	min ⁻¹



3. Step: Select accessories and get PDF

- a) Choose accessories for the selected pump
- b) Quick selection of recommended packages
- c) Write a comment
- d) Choose between download PDF and send PDF via mail

3 DATA EXPORT FOR SELECTED PUMP Support ✕

In this panel you have the option to generate a PDF report that can afterwards either be downloaded or mailed. OPTIONAL: If necessary, adjust the standard settings for equipment and accessories. Your choices are included in the report. **Please note that the selection of features marked in red imply longer delivery times and ETO surcharges.**

RECOMMENDED OPERATION MODE PACKAGE ACTIVE b

DELIVERY TIME: 15 weekdays

COMPONENT LIST

EQUIPMENT		
Pump	CAM 2/2, AGX3.0 - Standard pump	K0033B
CSA	-	
Deviation pipe	-	
Inducer	-	
40 bar nominal pressure	-	
Drain	-	

Write an optional comment (up to 350 characters). It will be stored together with your pump design. c

PDF REPORT FOR DOWNLOAD d1

PDF REPORT VIA MAIL d2

03

Additional options

- Configure your customized cooling medium
- The Experttool automatically considers required pressures
- The Experttool automatically selects the right article numbers for CSA pumps

The screenshot displays the 'REFRIGERATION PLANT' configuration screen. A central circular gauge shows the following parameters:

- Volume flow Q_r : 5.00 m³/h
- Delivery head H_r : 20.00 m
- Refrigerating capacity Q_0 : 0.95 kW
- Pressure drop Δp_r : 0.108 MPa
- Evaporation temp. T_{op} : 10.0 °C

To the right, a table lists refrigerant properties for 'Customized liquid':

REFRIGERANT	
Cooling medium	Customized liquid
Density $\rho(T_{op})$	550.0 kg/m ³
Spec. heat cap. $c_p(T_{op})$	5.000 kJ/kgK
Vapour pressure $p_v(T_{op})$	0.500 MPa
Enthalphy	5000

At the bottom right, there is a 'START SIMULATION' button with a '2' icon. A note below the table states: 'Equipment and accessories (non-relevant for simulations) can be selected when exporting a pump design.'



Additional options

- a) Modes: Fast-track or Expert mode
- b) Make your own prioritization
- c) Design your own simulation page
- d) Choose between different pump selection lists
- e) Adjust operating point – Get direct selection in characteristic map

The screenshot displays the Hermetic software interface with the following components:

- Top Bar:** Includes navigation icons, 'PUMP DESIGN', 'SIMULATION', and 'EXPORT' buttons. A dropdown menu is open, showing 'K0034 - CAM 2/3, AGX3.0' and 'EXPERT' mode selected.
- DESIGN DATA:** A sidebar on the left containing various parameters for the refrigerant (R717 (NH3)), operating point (40.00 m @ 5.00 m³/h), refrigerating plant, and pump (CAM 2/3).
- PUMP LIST:** A central table listing pump models and their characteristics. A red box labeled 'b' highlights the columns for Power (P₁ kW), Head (H₀ m), and Flow (Q_{max} m³/h).
- CURVE H(Q) [m] x [m³/h]:** A graph on the right showing head vs. flow curves. A red box labeled 'e' highlights the operating point selection area, showing H₀ = 54.5 m and Δp_s = 0.341. Another red box labeled 'e' highlights the flow selection area, showing Q₀ = 11.3 m³/h and Q₂ = 832.
- Bottom Bar:** Includes 'S-LINE XT 3.10 © 2020', 'SUPPORT', 'PUMP DISPLAY: INDUCER: No', 'OPERATION MODE: *', 'PUMP: *', 'MATCH: manual', and 'MATCH: Test'.

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Additional options in the future

- More languages like Spanish and French
- Put several pumps together at the same time

The screenshot displays the 'PUMP DESIGN' software interface for configuring a 'REFRIGERATION PLANT'. The interface is divided into several sections:

- PUMP · MOTOR · PLANT:** A list of parameters including CNF & CAM/CAMR, 400 ±10% V, 50 Hz, 1.600 MPa, 4, and 2.00 m, with corresponding labels like Pump preselection, Net voltage U_r , Net frequency f_N , System pressure p_N , Circulation factor k , and NPSHA.
- EQUIPMENT:** A list of options including No, Simulate for all variants, and STANDARD pump (short delivery time), with labels like CSA-certified, Inducer, and Limitation.
- REFRIGERANT:** A table showing properties for R717 (NH3):

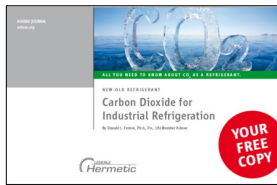
Property	Value
Cooling medium	R717 (NH3)
Density $\rho(T_{op})$	638.6 kg/m ³
Spec. heat cap. $c_p(T_{op})$	4.616 kJ/kgK
Vapour pressure $p_v(T_{op})$	0.429 MPa
Enthalphy	1262250
- REFRIGERATION PLANT Summary:** A central circular gauge displays:
 - Volume flow Q_v : 5.0 m³/h
 - Delivery head H_r : 20.00 m
 - Refrigerating capacity Q_0 : 279.87 kW
 - Pressure drop Δp_r : 0.125 MPa
 - Evaporation temp. T_{op} : 0.0 °C
- START SIMULATION:** A button with a gear icon and the text 'START SIMULATION'.

Webinars for Refrigeration Industry

Additional webinars in different languages will follow soon

Download Whitepaper


CO₂ and everything you need to know about the natural refrigerant



Important regulations for water pumps in Railway applications



New webinars, digital tools and updates – stay up to date with the [HERMETIC Newsletter](#).

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Thank you!