



# The Refrigeration Software.

Easy. Quick. Precise.



Developed by  
refrigeration experts  
for refrigeration  
experts





## COOLSTAR – the comfortable calculation software for refrigeration and air-conditioning.

With COOLSTAR, you'll quickly receive well-founded and highly precise calculations for your refrigeration systems. Almost all calculations are based on the thermodynamic equations of state for the refrigerants:

R12, R14, R22, R23, R32, R50, R125, R134a, R170, RE170, R227ea, R290, R600, R600a, R601, R601a, R717, R723, R744, R1150, R1224yd(Z), R1233zd(E), R1234yf, R1234ze(E), R1234ze(Z), R1270, R1336mzzZ as well as for all common cooling mixtures from R401A to R472A and R502 to R516A.

### Module 01: Calculation with and without internal heat exchanger

All theoretical values of the single-stage compression are calculated quickly and accurately. The refrigeration circuit can be calculated either with or without pressure drops. The calculated values are displayed graphically in a log(p)-h diagram. By clicking on any point in the diagram, the corresponding values are shown in a table.

### Module 02: Two-stage compression with open intermediate cooler in the log(p)-h diagram

This module is compatible with all refrigerants mentioned above. Additionally, you can select the intermediate pressure. In the log(p)-h diagram, you can click on every point to view the exact values.

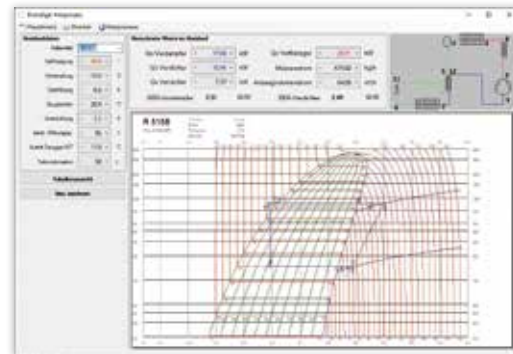
### Module 03: Two-stage compression with intercooler in the log(p)-h diagram

Calculations can be performed with all refrigerants here as well, including graphical representations of the circuit processes in a log(p)-h diagram. A thermodynamic table is also available.

### Module 04: Calculation of piping

COOLSTAR provides all piping for the calculated circuit processes. The geodetic height difference is evaluated as a pressure loss or pressure increase. When selecting the suction or discharge line, COOLSTAR automatically verifies if all conditions for a perfect oil transport are fulfilled. If necessary, line tapering will be suggested. Furthermore, double rising lines can be calculated. The operating points are displayed in an oil diagram for visual control. The system only displays the possible and approved pipe types. All lines can be changed manually by the user.

At the same time, all required components – such as shut-off valves, solenoid valves, non-return valves, expansion valves, dryers and sight glasses – are designed, and the insulation required to prevent the dew point from being undershot is dimensioned. The calculation is rounded off by determining the refrigerant charge. The calculation results are clearly presented in tabular form.



Circuit processes

Refrigerant	Pressure (bar)	Temperature (°C)	Enthalpy (kJ/kg)	Entropy (kJ/kg·K)	Volume (m³/kg)	Density (kg/m³)
R12	1.0	-10.0	200.0	0.70	0.0008	1250.0
R134a	1.0	-26.1	140.0	0.50	0.0009	1100.0
R22	1.0	-40.8	100.0	0.40	0.0008	1250.0
R401A	1.0	-40.8	100.0	0.40	0.0008	1250.0
R404A	1.0	-40.8	100.0	0.40	0.0008	1250.0
R502	1.0	-40.8	100.0	0.40	0.0008	1250.0

Selection of solenoid valves

Line	Refrigerant	Pressure (bar)	Temperature (°C)	Enthalpy (kJ/kg)	Entropy (kJ/kg·K)	Volume (m³/kg)	Density (kg/m³)
1	R12	1.0	-10.0	200.0	0.70	0.0008	1250.0
2	R134a	1.0	-26.1	140.0	0.50	0.0009	1100.0
3	R22	1.0	-40.8	100.0	0.40	0.0008	1250.0
4	R401A	1.0	-40.8	100.0	0.40	0.0008	1250.0
5	R404A	1.0	-40.8	100.0	0.40	0.0008	1250.0
6	R502	1.0	-40.8	100.0	0.40	0.0008	1250.0

Calculation of piping

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## Module 05: Calculation of piping network

This module is specifically developed for compound systems. Within a very short time, you can design all refrigerant-containing piping in compound systems with up to 100 cooling units and up to 20 compressors, including suitable solenoid, expansion and shut-off valves. The system only displays the possible and approved pipe types. The suction line can be calculated with two different evaporating temperatures, especially for booster systems.

All other fittings for the compound (check valves, driers, sight glasses, etc.) are calculated as well. Pipe lengths and rising lines can be changed directly in the pipe diagram. Like in the calculation of pipelines, rising lines are verified for optimal oil transport; if necessary, the lines are tapered or split. Both the number of existing or required compressors and the factor of simultaneousness can be selected.

COOLSTAR draws up a list of material for the calculation, a list of piping for your fitters on the building site, a list of components for each cooling unit and a list of rising lines with the required double rising lines. Verifying calculations of existing piping networks are possible as well.

## Module 06: Design of solenoid valves

COOLSTAR allows you to calculate solenoid valves from the manufacturers ALCO, CASTEL, CEODEUX, DANFOSS, EGELHOF, GSR, HONEYWELL, MOHRMANN, ODE, OFFENWANGER, PARKER and SPORLAN for liquid, suction gas and pressure gas lines. Valve images are displayed in the results lists and the documentation can be opened directly. Valves are selected covering the cv value and considering the minimum pressure drop for servo-controlled valves. Besides it is also possible to recalculate existent valves.

## Module 07: Design of expansion valves

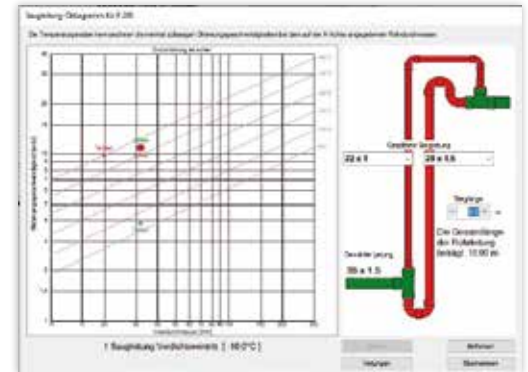
Products from manufacturers ALCO, CAREL, DANFOSS, EGELHOF, HONEYWELL and SIEMENS are included. COOLSTAR allows you to calculate the most common valves from the above manufacturers. Valve images are displayed in the results lists and the documentation can be opened directly.

## Module 08: Design of check valves

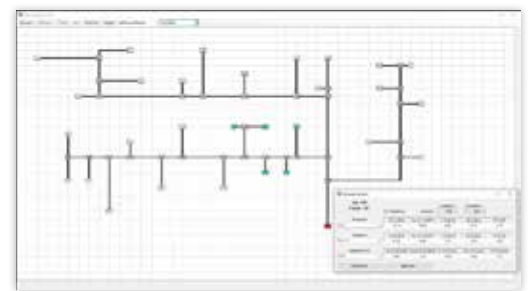
This module includes products from ALTENBURGER, AWP, CARLY, CASTEL, DANFOSS, GMC, HENRY und HONEYWELL. Similar to expansion valves, check valves are selected covering the cv value and considering the minimum pressure drop. Recalculation of existing valves is possible as well. Valve images are displayed in the results lists and the documentation can be opened directly.

## Module 09: Calculation of refrigerant compressors

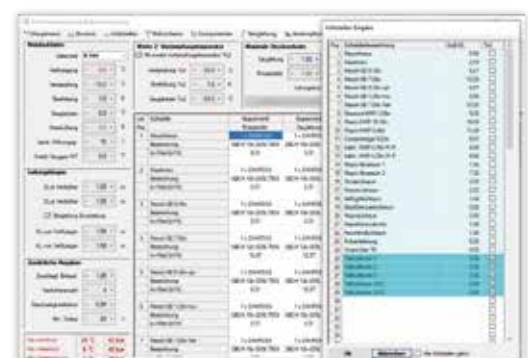
This module allows you to calculate refrigerant compressors from BITZER and BOCK. Typically, two compressors are suggested for selection, making it easy and quick for you to choose the most suitable compressor.



Oil diagram



Piping network



Calculation of piping network





## Module 10: Calculation of cold rooms

The calculation of cold rooms allows you to quickly determine the required refrigeration capacity. With this module, you can calculate coolers up to a dimension of 100m x 100m x 100m.

COOLSTAR includes the data of about 150 different cooling goods, so that the required information can be retrieved for almost any type of product. Calculations using data from your own goods is also possible.

The air change is calculated using either the BÄCKSTRÖM or TAMM formula, and you can also input your own values. When calculating the required refrigeration capacity, COOLSTAR automatically considers the effects of fan and defrost heaters, eliminating the need for tedious adjustments to account for effective operating hours.

## Module 11: Calculation of air-conditioning (heat load)

This module allows you to calculate the cooling load of air-conditioned rooms. Ground plans of any shape can be entered. The program takes into account the adaptation of indoor conditions to fluctuating outdoor temperatures, as well as factors like outside air change rate, glazing, number of people and sun protection. For July and September, the development of thermal loads in the air-conditioned rooms is shown.

## Module 12: Calculation of chilled-water network

COOLSTAR allows for the calculation of water networks with up to 100 cooling units, including the required components (shut-off valves, solenoid valves, check valves, circuit control valves, filters, two-way or three-way control valves).

COOLSTAR supports calculations with the specific data of the following refrigerants and brines:

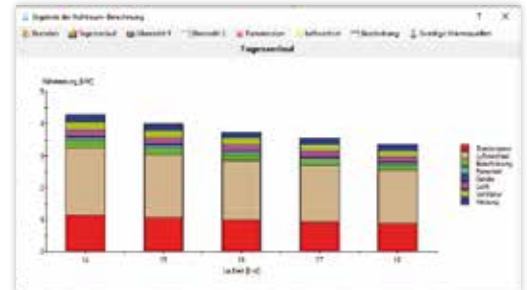
Water, Antifrogen N, Antifrogen L, Antifrogen KA, Antifrogen KF, Fragoltherm oils, Fragol W-ECO Neo, HYCOOL 20 bis 50, Freezium, Glykosol N, Pekasol L, Pekasol 2000, Syltherm XLT, Temper -10 bis -60, Therminol D12, Thermogen, Tyfocor, Tyfocor L, Tyfoxit, Tyfoxit F, Zitrec MC, Zitrec LC.

The module includes components from the following manufacturers: ARI, BELIMO, BELVEN, BENDER, CIRCOR RTK, DANFOSS, ESBE, GEORG FISCHER, HERZ, HONEYWELL, MEIBES, NICAB, OEVENTROP, PARKER, RAMSAYER, SAUTER, SIEMENS, TACO, and TICOM. You can also enter your own data.

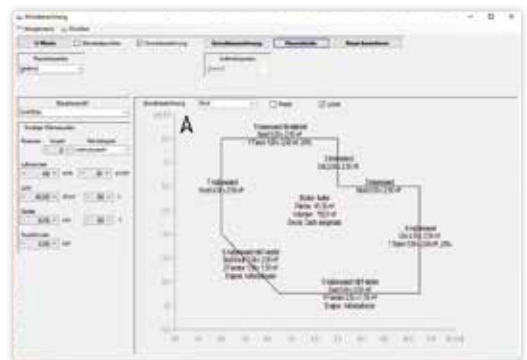
The piping network can be calculated with the help of pressure drop or flow velocity. The system only displays possible and approved pipe types. The loss of pressure of the respective heat exchanger is also taken into account.

The calculation of the chilled-water receiver is dynamic, depending on the coolant volume in the piping network. The required circulation pump's data is determined, and all selected heat exchanger components are adjusted accordingly.

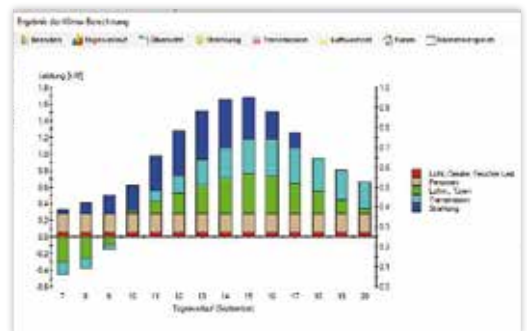
COOLSTAR also calculates the insulation required to prevent falling below the dew point (AEROFLEX, ARMAFLEX, ISOPIPE, KAIFLEX, THERMAFLEX, and WÜRTH).



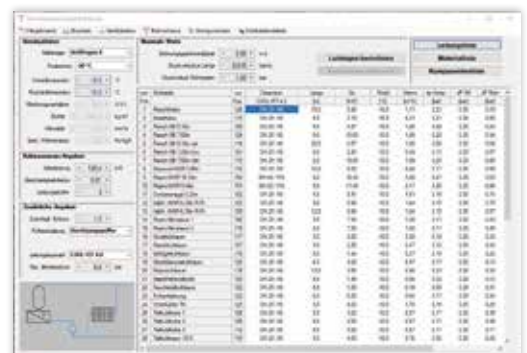
Calculation of cold rooms



Calculation of air-conditioning



Result of a calculation of air-conditioning



Chilled-water network

## Module 13: Calculation of evaporators

This module allows you to design evaporators manufactured by CONTARDO, ECO, GÜNTNER and ROLLER. The selection is made under consideration of construction type and rib distance. The calculation can be done following DTm or DT1.

## Module 14: Calculation of piping for flooded pump operation

The module has the same functionality as module 5 "Calculation of piping network", with the difference that only one evaporation temperature can be selected and the circulation factor and the pump pressure difference must be specified.

The pump flow and return lines are dimensioned according to the pipe network and the height difference between the cooling point and the separator. The return line can be divided into up to 3 partial lines at riser points. The boiling delay due to the pressure loss of the pipe network is determined at all cooling points. The valve stations for flow and return are designed for each cooling point. Up to 10 heat exchangers can be connected downstream of the valve stations.

## Module 15: Flooded pump systems in the log(p)-h diagram

Using this module, you can show the theoretical compression for pump refrigeration plants in a log(p)-h diagram. Calculation can be made for any refrigerant without temperature glide.

## Module 16: H-X diagram (Mollier)

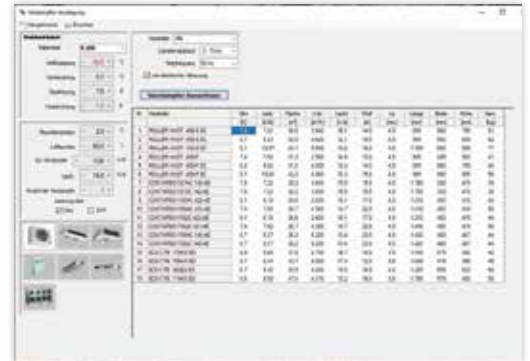
Pre-adjustments can be made in the following ranges:

- air pressure from 100 to 10,000 mbar
- temperature from -50 °C to +80 °C
- specific humidity from 0 to 250 g/kg

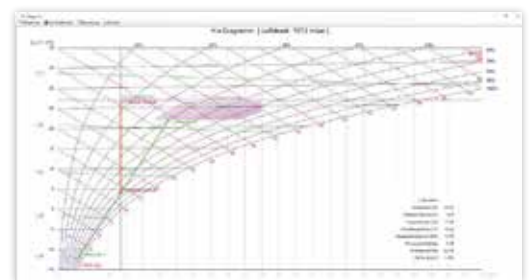
For every air condition, values for temperature, relative humidity, specific humidity, water vapour pressure, enthalpy and density, dew point and wetbulb temperature are shown. By entering two values, all other values are automatically calculated. The module calculates the following changes of the air: heating, cooling, dehumidifying, humidifying with scrubber or steam and mixing. In all calculations, the target value can be selected (air admittance and outlet, volume flow, or performances). Subsequent calculations can also be made. In this case, the air outlet value is taken as air admittance value of the subsequent calculation (e.g. mixing, heating, humidifying). The changes of state are displayed both in charts and tables.

## Module 17: Transcritical CO<sub>2</sub> process

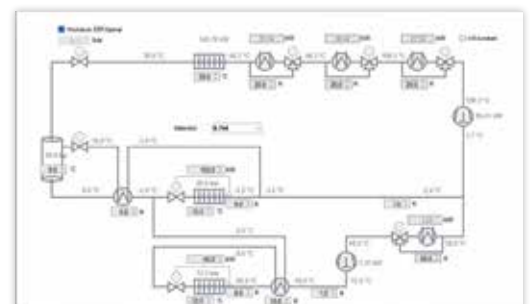
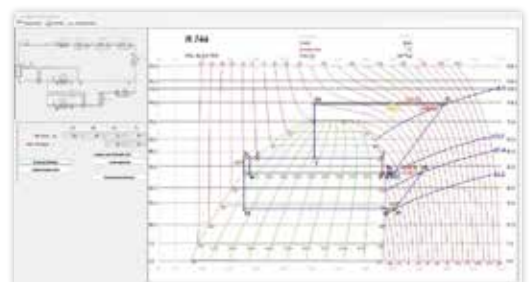
This module is designed for R744 (CO<sub>2</sub>), R23, and R170 only. The circuit process can be calculated as either subcritical or transcritical, with or without gas bypass. The system may include an internal heat exchanger and/or pressurised gas heating, with COP-optimised high pressure. Pipework is designed for maximum operating pressures. The circuit diagram can include a TC booster, pressure maintenance valve, or satellite compressor. In the NK circuit, heat exchangers can be selected for gas cooling or liquid subcooling, with up to three desuperheaters for heat recovery. In the TK circuit, heat recovery and an internal heat exchanger can be integrated. Pipework and components are dimensioned, allowing parallel connections of control or non-return valves.



### Selection of evaporators



H-X diagram



### Transcritical CO<sub>2</sub> process



## COOLSTAR – developed by refrigeration experts for refrigeration experts.

### Manufacturer independent

COOLSTAR is a very flexible program. With the module master data, you are able to adapt the calculations of COOLSTAR to your specific needs. You may – e.g. in the calculation of a piping network – enter your preferred manufacturers, so that the results of calculation only include these components. Pipe data can be adapted to your requirements, so that only the diameters you use every day will be proposed. Article numbers can be stored in the pipe master.

### Multilingual

COOLSTAR is available in four languages: German, English, French and Dutch.

### Easy

COOLSTAR is as simple as efficient. You will become a proficient user in no time. COOLSTAR is intuitive, user-friendly and interactive.

### Flexible

COOLSTAR allows calculations in different units. In other words: the program is flexible to use.

### Automatic data transfer

COOLSTAR offers automatic data transfer from previous calculations, minimising the need for new entries in most cases.

### Variable output

COOLSTAR calculations can be exported as PDF, XLS or WMF files. The Excel results include article numbers, with lists created on separate sheets (lines, components, material, etc.).

### Context-sensitive help

COOLSTAR offers a context-sensitive help system, allowing you to quickly find useful information directly on your screen.

### Database of components

The new database system enables faster calculations, especially when accessing the server. With just one click, you can open the product documentation of the component and access the necessary information for your application.

### Always up to date

COOLSTAR allows for the alteration and adaptation of the included component databases. This ensures that your program is always up to date.

### Excellent price/performance ratio

For COOLSTAR you pay less than you'd expect!

