STULZ Explorer WSW

Water-cooled chiller for mission-critical applications
STULZ is a global company with headquarters in Hamburg, Germany, 19 subsidiaries, 7 production sites and distribution and service partners in more than 140 countries.

Intelligent solution for mission-critical applications

The WSW Explorer expands the series of efficient STULZ chillers with applications in the industrial, IT and comfort air conditioning sectors.

Applicable to all WSW Explorers:

Refrigerant R134a
All units of the WSW Explorer product series use R134a refrigerant, which has hardly any effect on the environment and does not damage the ozone layer. In addition, it has lower global warming potential than conventional refrigerants.

Installation in interior spaces
WSW Explorer was designed for installation in interior spaces. The electronic components within the switch cabinet are protected in accordance with protection type IP54. With the available options, the utilization limits of the chiller can be expanded both in the direction of particularly low and also particularly high operating temperatures. Due to these flexible utilization limits, the chillers can be operated with dry coolers (high-temperature) in the same way as with cooling towers (medium-temperature) and well water (low-temperature).
Low noise

WSW Explorers are available as low-noise versions. These versions work particularly quietly due to special noise insulation.

Available for all sizes.

The compressors are the only source of noise with the WSW Explorer chillers. Depending on operating conditions, in the low-noise version the noise level of the chiller can be reduced by up to 10 dB.

Acoustic insulation
The compressors in the WSW Explorer are insulated with a polyester fiber-lined housing. The housing around the compressor is made of metal plate painted in the same color as the chiller. Above the housing, the control box of the compressor remains accessible.

Applications

Data center and telecommunications

Chilled water temperatures (evaporator): Inlet +12°C to +22°C
Outlet +7°C to +18°C

Process and industrial cooling

Chilled water temperatures (evaporator): Inlet +0°C to +30°C
Outlet +5°C to +25°C

Comfort air conditioning

Chilled water temperatures (evaporator): Inlet +12°C to +20°C
Outlet +7°C to +15°C
Options

**Compressor soft start**
This option reduces the starting current to decrease the load on the compressors and the electrical supply line upon start-up.

**Automatic transfer switch**
Three-phase switch without neutral with automatic or manual switching. Special functions for mains applications / power generator, for example functions to check the switchability or the voltage and frequency of the mains power supply. The switch is mounted in the switch gear cabinet and has auxiliary contacts to display the line switching.

**Circuit breakers**
Circuit breakers offer increased protection against current spikes that could otherwise damage the downstream components, e.g. compressors.

**Energy meter**
Option to measure the power consumption of the entire chiller, mounted in the switch gear cabinet. The unit has an LCD display to show the values for current, voltage, moment values of the three phases and also historical maximum and average values. In addition, the energy meter has the option of transmitting the data via ModBus RTU.

**Condensers for phase compensation**
Selected condensers to optimize phase displacement within a cosφ value of 0.95.

**Flow monitor**
Fluid circulation in the water circuit is monitored by the flow monitor. The flow monitor is mounted at the outlet side and is connected to the C2020 controller. An alarm is triggered to prevent damage to the chiller as soon as the minimum flow speed is fallen below.

**Frost protection heating**
The electric heating is controlled by the C2020 controller and prevents freezing of the hydraulic circuit. For operation under extreme conditions, the quantity of ethylene glycol or propylene glycol in the chilled water circuit has to be adapted correspondingly.

**Shipping without refrigerant**
The chiller is delivered without refrigerant and is instead filled with nitrogen. The gas filling is evident from the rating plates on the chiller.

**Container**
The chiller can be transported in a 40 foot high cube container.

**Anti-vibration mounts**
Anti-vibration mounts that are specially adapted to the chiller prevents transmission of the vibration.

**Water filter**
Metal filters that prevent contamination of the evaporator and/or condensers and that guarantee the preservation of energy efficiency. The filters are mounted at the inlet of evaporators and/or condensers using Victaulic® connections.
The WSW Explorer chillers are available in energy efficiency classes A and B. The units were designed and developed to cover a broad spectrum of applications (from the process industry and hospitals up to data centers). They can be operated under extreme environmental conditions or in configurations that work extremely precisely in accordance with application-specific temperature controls. In the case of almost all applications, the thermal loads and environmental temperatures can be set out very variably. The WSW Explorers are optimally suited to any environmental and load conditions and attain high ESEER values of up to > 5.

**Energy efficiency**

The energy efficiency ratio (EER) of a chiller describes the ratio of cooling capacity to electric power consumption at a certain operating point. The EER value is e.g. calculated using an ambient air temperature of 35 °C with a water return temperature of 12 °C and a water inlet temperature of 7 °C.

\[
EER = \frac{\text{cooling capacity}}{\text{power consumption}}
\]

**ESEER**

European Seasonal Energy Efficiency Ratio (performance coefficient with partial load conditions in cooling mode)

The performance coefficient with partial load conditions in cooling mode is a coefficient that is used to specify the efficiency of air conditioning systems or chillers. The ESEER coefficient is specified by the certification body Eurovent Certification Company.

\[
ESEER = 0.03 \times EER_{100\%} + 0.33 \times EER_{75\%} + 0.41 \times EER_{50\%} + 0.23 \times EER_{25\%}
\]

**IPLV**

Integrated Part Load Value

The IPLV is a coefficient that was developed by the American Air Conditioning, Heating and Refrigeration Institute (AHRI). This coefficient usually serves to specify the performance of chillers under different conditions. Unlike the EER (Energy Efficiency Ratio) and COP (Coefficient of Performance) coefficients that specify efficiency at full load, this coefficient specifies the efficiency of the chiller in partial load mode.

\[
IPLV = 0.01 \times EER_{100\%} + 0.42 \times EER_{75\%} + 0.45 \times EER_{50\%} + 0.12 \times EER_{25\%}
\]

**Design**

The most important components of the chiller such as condensers, evaporator and compressors are main components of the supporting basic machine structure. Condensers and evaporator support the entire weight of the chiller, even during transportation. The chiller can be lifted by pre-mounted eye bolts that are easily accessible.

**Key features**

- Basic structure made from metal so that no damage occurs when lifting and transporting
- Epoxy paint on the entire metal structure
- Corrosion resistance of all components
- Transportation bolts for secure transportation
- Predefined bores for anti-vibration mounts

Standard color: RAL 7035
Semi-hermetic screw compressors

The STULZ Explorer chillers are based on semi-hermetic screw compressors. The refrigerant is continuously compressed by the compressor design with double screws. In turn, this causes a reduction in the mechanical load on the components, which increases the product’s service life.

Compressor start

The compressors can be delivered with part-winding start (WSW080-250, except WSW140) or star-delta (WSW 140, WSW 265 – 560).

One or two compressors

Depending on the size, the chillers are equipped with one or two screw compressors that attain high cooling capacity with minimum footprint. At partial load they continue to work with high efficiency.

Shell & tube condenser

The shell & tube condensers comprise a steel jacket and copper pipes in the interior. They are coated on the outside with epoxy paint in the same color as the rest of the chiller (standard color: RAL 7035). Victaulic® connections allow fast and easy installation.

The small diameter of the internal copper pipes allows the greatest possible degree of heat exchange between refrigerant and water.

Cooling water throughflow

The hydraulic circuit with double passage leads to small dimensions with the same thermal performance. For easy installation, the cooling water inlet and outlet connections for the water-glycol mixture are located on the same side.
Evaporation of the refrigerant is precisely controlled by finely-regulated expansion valves. The expansion valves use pressure sensors, temperature sensors and the STULZ C2020 controller to optimize heat exchange between the refrigerant and chilled water in the evaporator. This ensures that the upstream and downstream components do not overheat or freeze. The compressor is also protected from drawing in fluid refrigerant.

**Electronic expansion valve**

Evaporation of the refrigerant is precisely controlled by finely-regulated expansion valves. The expansion valves use pressure sensors, temperature sensors and the STULZ C2020 controller to optimize heat exchange between the refrigerant and chilled water in the evaporator. This ensures that the upstream and downstream components do not overheat or freeze. The compressor is also protected from drawing in fluid refrigerant.

**Shell & tube evaporator**

The shell & tube evaporator in the WSW Explorer comprises copper pipes with small diameter in the interior and an external steel jacket. Here, the evaporator comprises two completely separate chilled water circuits and a cooling water circuit that are arranged with respect to one another following the counterflow principle. All heat exchangers have been optimized with regard to low pressure losses.

**Key features**

- **Extended working range** in comparison with conventional thermostatic valves
- **Protection against fluid return**: Pressure sensors and temperature sensors are used to regulate the evaporation temperature and superheating in an energetically-optimized manner.
- **Internal UPS for the expansion valve**: In the event of a power supply failure, the valve is closed completely to avoid fluid refrigerant gaining access to the evaporator.

**Key features**

- **Two refrigerant circuits** to optimize heat exchange between chilled water and refrigerant
- **A chilled water circuit** with low hydraulic pressure losses
- **Steel jacket and copper pipes**
- **Completely insulated** with special thermal insulating material.
- **Differential pressure monitor (standard)** to continuously monitor the throughflow of the evaporator and to protect the evaporator from damage by freezing.
- **Victaulic® connections** for rapid installation
- **Low pressure losses**
The WSW chillers are controlled by the STULZ C2020 controller, which was specially developed to exploit the full performance of each individual component and to control this in an optimum manner due to the high computing power and storage capacity.

The numerous adjustable parameters and available functions are combined onto a few concise screens, via which the user can control the entire chiller.

**Touch display**
The STULZ C2020 has a 7-inch LCD touch display and can be operated intuitively via a clear menu structure. It is possible to check the functional status, operating hours, alarm progression and alarm signals of the chiller via the controller. In addition, the controller serves for switching on and off, and to adjust the operating parameters of the chiller.

The menus are available in different languages: Italian, English, German, French, Russian and Spanish.

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**Controller STULZ C2020**

The C2020 controller is equipped with the following pre-installed functions:

- **Series circuit** to connect several chillers and to manage the components as with one single chiller
- **Redundancy** to switch to another chiller if one chiller fails, to ensure uninterrupted operation
- **Emergency cooling** to switch redundant chillers in the same line in the event that the active chiller is not in a position to provide the necessary cooling capacity
- **Modbus RTU** to control and read out the chiller data
- **STULZ protocol** to connect the chiller with monitoring systems from STULZ

The C2020 manages:

- **Compressors**
  Starting, switching off and controlling the output within prescribed thresholds
- **Electronic expansion valve** Control of the evaporation of refrigerant to guarantee the required cooling capacity with minimal electrical power consumption of the components
- **Pumps (option)**
  The controller manages redundant operation when using two pumps to guarantee uniform distribution of the operating hours between the pumps

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**Switch gear cabinet**

The switch gear cabinet is on the longitudinal side of the chiller and was generously dimensioned so that all deliverable options as well as customer-specific adaptations can be integrated therein. The components in the switch gear cabinet control the entire functional scope of the chiller. The switch gear cabinet has two or three doors, is ventilated and is equipped with a load-break switch including door blocking and a display for the controller.

The chiller is supplied with power via a three-phase terminal (400 V / 50 Hz or 460 V / 60 Hz). Secondary units are additionally supplied via an internal 230 V transformer.

Components and design fulfill the requirements of CEI EN 60335-2-40, CEI EN 61000-6-1/2/3/4 and the EMC Directive (2014/30/EU).

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**Key features**

- Protection type IP54
- Generous dimensions, so that all available options as well as customer adaptations can be integrated
- Touch display with transparent protective cover
- Load-break switch including door blocking to guarantee the safety of the user
- Visual separation of the load and control circuit

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- Protection type on front side IP66
- Operating thresholds from –20 to +60 °C
- Acoustic signal
- Four display LEDs
Transport

Lifting
The WSW chillers can be lifted via a load lifting beam by using a crane. In order to guarantee secure lifting, the chillers are equipped as standard with transportation eyes.

Transportation on pallet
The chiller can be transported by means of a suitable pallet and materials handling equipment.

Shipping in containers
The WSW chillers can be transported in containers with a length of 20 or 40 feet. For this, a pallet must be placed under the chiller. STULZ recommends transportation in wooden crates to provide additional protection to the chiller.

Refrigerant circuit

![Refrigerant circuit diagram]

**Key**
- Refrigeration pipe
- Water circuit
- Signals
- Non-return valve
- Separable connection
- Semi-hermetic screw compressor
- Tank
- Separable shut-off valve
- Filter
- Electronic thermostatic valve
- Temperature sensor
- Safety pressure monitor
- Differential pressure monitor
- Motorised valve
- Separable non-return valve
- Safety valve
- Frost protection resistance
**Technical data**

### Nameplate power rating of single-circuit machines

<table>
<thead>
<tr>
<th>WSW-XXX</th>
<th>080</th>
<th>090</th>
<th>110</th>
<th>125</th>
<th>140</th>
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<tr>
<td>Cooling capacity kW</td>
<td>230</td>
<td>286</td>
<td>310</td>
<td>352</td>
<td>429</td>
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<tr>
<td>Power consumption kW</td>
<td>45</td>
<td>55</td>
<td>60</td>
<td>69</td>
<td>83</td>
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<tr>
<td>EER</td>
<td>5.06</td>
<td>5.15</td>
<td>5.13</td>
<td>5.06</td>
<td>5.12</td>
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<tr>
<td>ESEER (ISO 14511)</td>
<td>7.11</td>
<td>7.11</td>
<td>6.87</td>
<td>7.02</td>
<td>6.92</td>
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<tr>
<td>Filling quantity of refrigerant kg</td>
<td>61</td>
<td>76</td>
<td>82</td>
<td>93</td>
<td>113</td>
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<tr>
<td>Sound power level[dB(A)]</td>
<td>89.8</td>
<td>89.8</td>
<td>90.2</td>
<td>91.2</td>
<td>90.5</td>
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### Dimensions / weight

#### Height

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<th>mm</th>
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</table>

#### Transportation weight kg

| 2625 | 2992 | 3029 | 3166 | 3640 |

#### Operating weight kg

| 2755 | 31425 | 3190 | 3350 | 3824 |

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### Nameplate power rating of dual-circuit machines

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<th>160</th>
<th>180</th>
<th>220</th>
<th>260</th>
<th>265</th>
<th>280</th>
<th>320</th>
<th>360</th>
<th>420</th>
<th>480</th>
<th>560</th>
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</thead>
<tbody>
<tr>
<td>Cooling capacity kW</td>
<td>459</td>
<td>570</td>
<td>616</td>
<td>704</td>
<td>780</td>
<td>856</td>
<td>974</td>
<td>1104</td>
<td>1261</td>
<td>1376</td>
<td>1529</td>
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<tr>
<td>Power consumption kW</td>
<td>90</td>
<td>110</td>
<td>120</td>
<td>139</td>
<td>154</td>
<td>167</td>
<td>189</td>
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<td>6.93</td>
<td>6.56</td>
<td>6.55</td>
<td>6.55</td>
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<tr>
<td>Filling quantity of refrigerant kg</td>
<td>15 +15</td>
<td>75 + 75</td>
<td>81 + 81</td>
<td>92 + 92</td>
<td>103 + 103</td>
<td>113 + 113</td>
<td>128 + 128</td>
<td>145 + 145</td>
<td>160 + 160</td>
<td>180 + 180</td>
<td>200 + 200</td>
</tr>
<tr>
<td>Sound power level[dB(A)]</td>
<td>92.8</td>
<td>90.1</td>
<td>93.2</td>
<td>94.2</td>
<td>93.9</td>
<td>93.5</td>
<td>93.7</td>
<td>96.1</td>
<td>95.4</td>
<td>97.8</td>
<td>97.2</td>
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#### Height

|----|------|------|------|------|------|------|------|------|------|------|------|

#### Width

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<th>4745</th>
<th>4856</th>
<th>5278</th>
<th>4683</th>
<th>5096</th>
</tr>
</thead>
</table>

#### Transportation weight kg

| 3818 | 4420 | 4735 | 5069 | 5555 | 6073 | 6487 | 6738 | 7194 | 7578 | 7800 |

#### Operating weight kg

| 4036 | 4663 | 5030 | 5335 | 5898 | 6442 | 7010 | 7269 | 7775 | 8206 | 8672 |

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1. All data apply with: cooling water inlet: +30°C, cooling water outlet: +35°C; chilled water inlet: +12°C, chilled water outlet: +7°C

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### Highest level of operational reliability

Care was taken during development and construction of the units that they would deliver maximum reliability. This not only guarantees the problem-free condition of the chiller during transportation on the road or in a container, it also ensures reliable operation over many years. The arrangement of the components allows easy maintenance.

The chiller can be adapted to different thermal loads due to the refrigerant circuit with screw compressors including output slider.

### The quality of STULZ

All chillers have been developed and produced in accordance with the following directives and standards:

- UNI EN ISO 9001: Quality management system
- UNI EN ISO 14001: Environmental management
- 2006/42/EC: Machinery directive
- 2014/35/EU: Low-voltage directive
- 2014/30/EU: EMC directive
- 2014/68/EU: Pressure equipment directive
- EN 378-1, 2, 3, 4: Chilling systems and heat pumps
- DIN EN ISO 12100: Safety of machines
- EN ISO 13857: Safety of machines – safety clearances
- EN 60204-1: Safety of machines – electrical equipment
- EN 61000-6-2: Fault-free operation for industrial areas
- EN 61000-6-4: Generic standards – emitted interference for industrial areas

In all phases of project planning and production, maintenance of these directives and laws was checked by an independent quality system.

All components that are installed in STULZ Explorer chillers are subjected to quality control.

The finished chillers are subjected to functional testing and leakage tests as standard. These include:

- Leakage test of the refrigerant and hydraulic circuit
- Checking of control parameters of the STULZ C2020
- Check of the calibration of sensors and gages
- Test of functions and alarms
- The inspection certificate is contained in the documentation package.

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