PRODIGY

Rack Cooling Solution

Prodigy

High density Data Centres produces ever increasing computing power on an ever decreasing floor area, resulting in high specific thermal loads.
To ensure IT equipment reliability an appropriate cooling system is mandatory.
Prodigy modules are the optimal answer to the requirements of modern Data Centres,
in terms of:

Flexibility

- the reduced dimensions allow the installation in every kind of rack, starting from a height of 42U
- two different kinds of cooling system (CW and DX), combined with different cooling capacities,
  make Prodigy suitable both for small server rooms and big Data Centres.
- Prodigy fit into both closed and open loop.
- water and refrigerant connection is available either from bottom or top side.

Code	Type	Width
RAW	WATER	300 mm
RAWE0	WATER	600 mm
RAC	DIRECT EXPANSION connected to external motor-condensing	300 mm
RCM	DIRECT EXPANSION with compressor on board	400 mm

Scalability

Prodigy has a modular structure that can easily fit into a wide range of rack layouts.
This feature allows to quickly increase the computing power without altering the existing structure of server rooms.

Prodigy are designed to be placed beside the racks containing IT equipments.

Open Loop: for Data Centres organized in **hot and cold aisles**. The air heated by the servers is discharged to the hot aisle, and sucked in by the Prodigy unit. After cooling the air is delivered to the cold aisle, ready to be used by the servers again.
The open loop units are equipped with high efficient **EU4 Zig Zag Air Filter**.
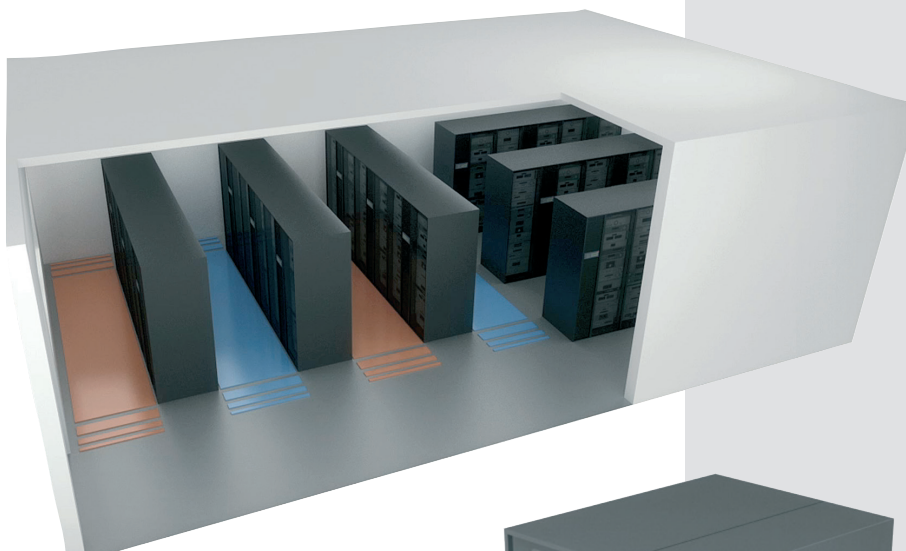
Closed Loop: this configuration is suitable for both "self contained" data centre and high density racks. Heat generated by server remains inside the cabinet and is disposed without entering the room.

Prodigy is equipped with **electronically commutated EC Fans**, optional on RAC and RAW version, standard on RCM and RAWE0. The electronic control adjusts the speed of fans, powered by energy saving motors. EC fans react continously to system changes, keeping **maximum efficiency in every condition.**

Free Cooling, EC fans and proportionally controlled CW valve are the keys to higher performance and efficiency of the air conditionig system, **reducing TCO**.

These three factors contribute to achive an important goal: minimizing the energy absorbed by support equipment (like air conditioners) and maximizing the one used for the operation of the servers.

PUE

PUE (Power Usage Effectiveness) is the ratio of the total power consumed by a Data Centre to the power consumed by the IT equipment that populates the facility.
The goal of a fully efficient Data Center is to reach **a PUE value equal to 1**, that is when the power is entirely used by IT equipment.

$$PUE = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

Presence of Prodigy units in a Data Centre provides a strong contribution to PUE improvement.

RAW - Chilled Water unit

Prodigy RAW units use chilled water,
supplied by an indoor or outdoor chiller. In presence of a
free cooling system, external air cools water through a heat
exchanger.
Thus, working time of energy-intensive compressor cooling
is drastically reduced.
**Prodigy units are particularly suitable for systems with
free cooling**, due to their high performance in heat load
disposal. Their very efficient coil allows an efficient cooling
also at high entering water temperature (up to15°C),
thus maximizing the use of the free cooling.
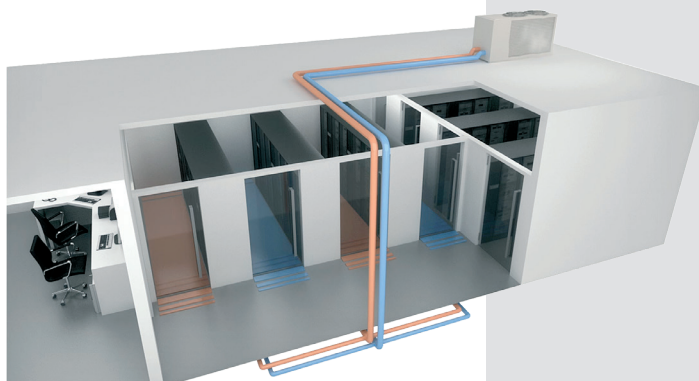
Chilled water Prodigy units are equipped with:

Dual Power: in case of main power supply lack, units are provided with automatic switching
on an emergency line.

Fan Hot Swap: through fan switches on a "multi-
switch bar, power supply of each single fan can be
interrupted to allow maintenance operations, while
the other fans keep on working.

CW valve with proportional control: receives a modulating
signal from C2020 to vary the water flow through the heat
exchanger, in order to adjust the unit cooling capacity to the
actual heat load. CW valve is available in two versions: **3 way**
valve for constant flow system, and **2 way** for variable flow
system.

Manual operation of CW valve: when
the valve actuator is broken, the valve
can be adjusted manually, modulating
cooling capacity with fans speed.

RAC - Direct Expansion unit

Direct Expansion DX units (open and closed loop) are a suitable solution for data centres of any size.
The heat load absorbed by the refrigerant gas is released to the external environment through modular motor-condensing units, with cooling capacity from 4 kW to 20 kW.
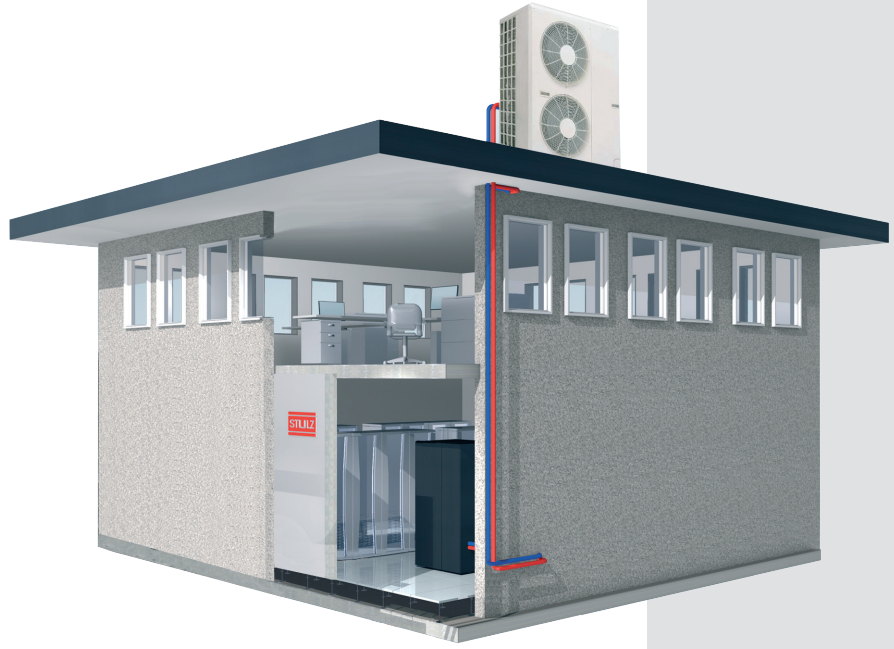
Direct expansion Prodigy units are equipped with:

- **Fan Hot Swap**: on "multi- switch bar
- **Temperature probes** on return air
- Fixed or variable **fans speed** according to set point
- **Humidity Sensor** for dehumidification mode.
- **External motor-condensing unit** with **inverter compressor**.

RCM - Direct Expansion unit with on board compressor

Prodigy DX units are also available with on board compressor.

- EC compressor, with **brushless motor** , is continuously adjusted by an on board inverter, allowing a perfect correspondence between the cooling capacity and the actual thermal load.

- The electronic expansion valve improves the performance and the efficiency of the cooling system, thanks to an accurate control of the flow rate and of the refrigerant gas pressure.

- Zig-zag G4 protection filter in metallic structure (washable)

- 5 EC fans electronically commutated, which reacts continuosly to power requirements changes. EC fans can be controlled independently from one another.

RCM units, like other Prodigy units, can be configured to have both frontal and lateral air flow, and must be connected to a remote condenser for heat disposal.
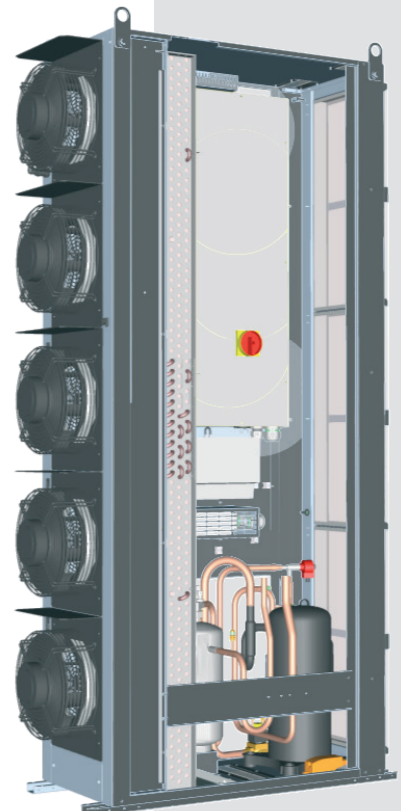
Technical Data

Prodigy RAW - Chilled Water

Model	Loop	Power Supply [V/ph/Hz]	Cooling Capacity [kW]	Air flow [m³/h]	Dimensions [h/l/p]	Connection [in]
RAW A1	Open	230/1/50	12,3	2600	1870x290x750 (770 with EC)	1
RAW A7	Open	230/1/50	16,0	3800	1870x290x750 (770 with EC)	1
RAW B1	Open	230/1/50	19,5	3800	1870x290x750 (770 with EC)	1
RAW A6	Closed	230/1/50	22,6	2800	1870x290x702 (722 with EC)	1
RAW B2	Closed	230/1/50	31,0	4400	1870x290x702 (722 with EC)	1
RAW C4	Closed	230/1/50	37,7	4400	1870x290x702 (722 with EC)	1
RAWE0	Open	230/1/50	41,3	8500	1943x590x927 (AC version) 1870x590x982 (EC version)	1

Nominal Conditions
Closed Loop: T return air 45°C / RH 15%
Open Loop: T return air 30°C / RH 30%
EWT = 7°C
Water ΔT = 5°C

Air flow on closed loop models refers to unit not installed in racks

Prodigy RAC - Direct Expansion

Model	Loop	Power Supply [V/ph/Hz]	Max Nominal Cooling Capacity [kW] *	Air Flow [m³/h]	Dimensions [h/l/p]	Motor-condensing
RAC 80	Open	230/1/50-60	4,4 8,0	2600	1870x290x750 (770 with EC)	SCR40ZIX-S FDC71VN
RAC A2	Open	230/1/50-60	10,3 12,2 21,5	2800	1870x290x750 (770 with EC)	FDC100VN FDC125VN FDC200VS
RAC 80	Closed	230/1/50-60	4,5 8,4	2800	1870x290x702 (722 with EC)	SCR40ZIX-S FDC71VN
RAC A2	Closed	230/150-60	11,2 14,0 23,3	4400	1870x290x702 (722 with EC)	FDC100VN FDC125VN FDC200VS

* according to the motor-condensing used

Nominal Conditions
T return air 35°C / RH 30%
T external air 35°C
EWT = 7°C
Water ΔT = 5°C

Prodigy RCM - Direct Expansion

Model	Loop	Power Supply [V/ph/Hz]	Max Nominal Cooling Capacity [kW] *	Air Flow [m³/h]	Dimensions [h/l/p]
RCMB4	Open/Closed	200-277/1/50-60	22,5	4300	1892x390x978 (993 with EC)

* Nominal Conditions:
T return air 35°C
Return air RH 30%
Refrigerant R410A
Condensate Temperature 45°C

C2020 Control System

C2020 is an IO controller installed on board the air conditioning unit, to manage all the functions . The Keypad is the user interface, which allows to display operating states and alarms.

Controlling the various operating models

- Compressor operation with enabling signal to the external motor-condensing unit (only for DX models)
- Hotspot mode (enabled by an external thermostat): fans rotate at maximum speed to prevent excessive temperatures in particularly critical areas of the room.
- Dehumidification

Step by step operator guidance via keypad

- USER: to change set point, access alarm history and counters of working hours.
- SERVICE: for the start-up and maintenance of the unit.
- MANUFACTURER: for factory setting.

Multilingual Display

- The keypad offers a choice of seven languages for the display of user menu, alarms, setpoints.

Flash EPROM for easy configuration and software updates

- Units configuration via laptop
- Hardware key for uploading and downloading software without a laptop and for copying the configuration to other units.

## Individual forwarding of alarms

- Via bus / BMS system (opt)
- Via voltage free contacts (std)
- High or low priority can be assigned to the alarms.

Energy-saving mode

- Different kinds of capacity modulation (with valve opening and fan speed) aimed to energy saving.

Network Management

STULZ solutions for networking allows a continuous and efficient monitoring for air conditioning systems. Network management allows the adjustment of set points, plant monitoring and display of operating parameters on two different control units, PC or on-site BMS.
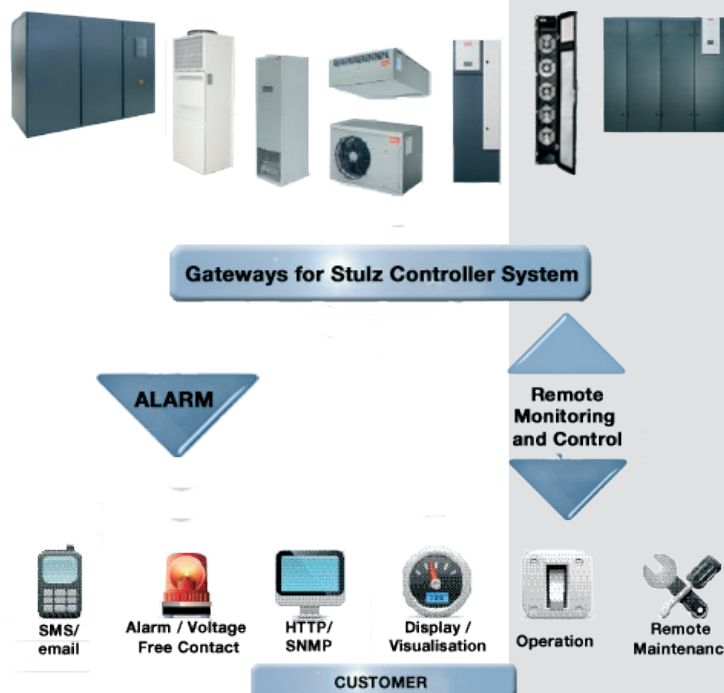
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