Racks & Solutions for
Business-Critical Continuity™

Knürr® DCL

Modular Rack Cooling from 6kW to 60 kW

EMERSON
Network Power

Emerson Network Power

Business-Critical Continuity™ – so your success continues!

Core competencies

AC Power
- Connectivity
- DC Power
- Embedded Computing
- Embedded Power
- Infrastructure Management & Monitoring
- Outside Plant
- Power Switching & Controls
- Thermal Management
- **Racks & Solutions**
- Services
- Surge Protection

No company, no matter how big it is, can afford business-critical system failures.

Over the years we at Emerson Network Power have acquired unique know-how, and with our name we represent reliable rack systems, power supply, precision cooling, connectivity and integrated solutions. We can consequently ensure that you generate optimum benefits from your technology investments.

Thanks to Emerson Network Power's technology range and extensive competencies, the entire bandwidth of company-wide solutions is supported for today's critical business requirements.

Customers all over the world build on our support for future-proof investments, because they know that we offer globally specific innovations and optimized solutions from one single source – supported by reliable local service and support.

We can ensure the stable operation of your network infrastructure – regardless of whether voice, data or multimedia content are transmitted.

This is based on a proven, comprehensive portfolio of products, services and systems which supports a multitude of computing, telecommunications, health care and industrial applications. This creates a foundation of trust that is only possible with a partnership with Emerson Network Power.

Our assignment is to prepare you for the unknown and the unexpected. We show you the way against the background of dynamic changes in your business environment.

And we help you to master the requirements this entails and avail of the greatest possible benefits from your technology investments. This is what we mean by Business-Critical Continuity.

Knürr® DCL
Modular Rack Cooling from 6kW to 60kW

Knürr® DCL is the water-cooled high-performance cooling unit for lateral attachment to server cabinets. The next generation of the legendary Knürr® CoolLoop - further optimized in essential features

Modularity

- Two room-neutral architectures for medium to high heat-load density
- Easy to retrofit on site
- Multiple combinations of up to four server racks

Reliability

- N +1 fan redundancy
- Multi-level “fail-safe” controller
- Comprehensive alarm and monitoring functions
- Automatic emergency door opening

Energy efficiency

- Minimized power consumption through controlled EC fans
- Long free cooling times due to a generously dimensioned heat exchanger

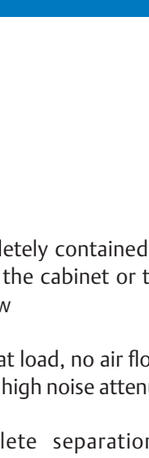
Knürr® DCL with Knürr® DCM rack

Dynamic air supply through high-performance EC fans

Knürr® DCL-L
Closed Loop Cooling Architecture

Modular combination possibilities

- Completely contained air flow inside the cabinet or the cabinet row
- No heat load, no air flow in the room, high noise attenuation
- Complete separation of IT equipment and room, precisely controlled cooling air temperature
- No special requirements on the room - raised floor is not required



Knürr® DCL30L frontview

Knürr® DCL-L

Knürr® DCL-L with one Knürr® DCM

**30/34 kW per rack*

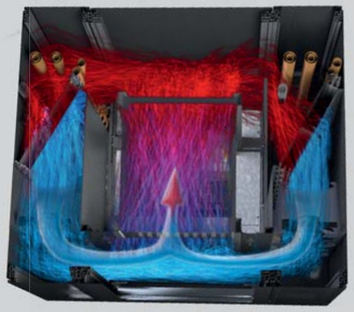
Knürr® DCL-L

2-1 combination

**15/17 kW per rack*

Knürr® DCL-L

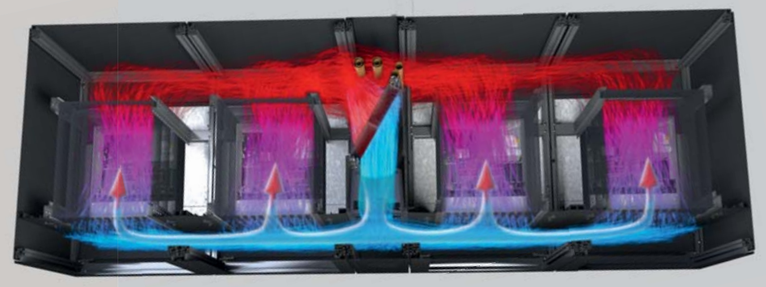
High Density Server Rack cooled by two Knürr® DCL-L



**60 kW per rack*

Knürr® DCL-L

4-1 combination



**6/7 kW per rack*

** Top view cross-section air flow pattern*

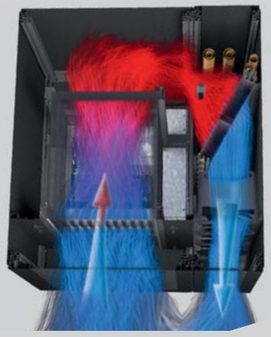
Knürr® DCL-H
Hybrid Cooling Architecture

Modular combination possibilities

- “Hybrid” configuration - air flow is contained in the cabinet or the cabinet row and room
- Cooling units and cabinets are open at the front and closed at the back.
- No heat load into the room, warm air remains inside cabinets
- Distribution of cold air across the room, cold air reserve in case of cooling system failure
- The better alternative to hot aisle containment
- No raised floor required

Knürr® DCL-H

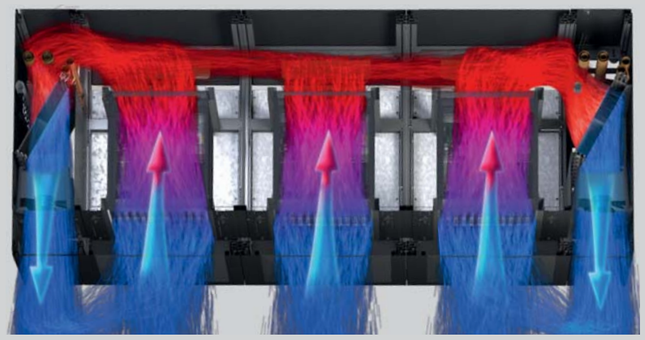
1-1 Knürr® DCL H application



** 30/34 kW per rack*

Knürr® DCL-H

1-3-1 combination

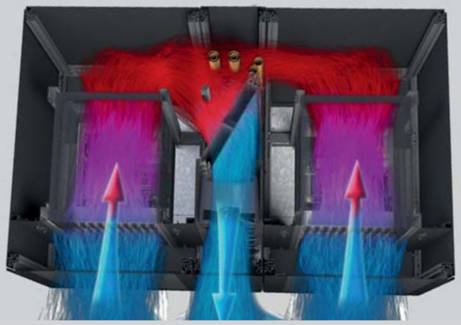


**8kW per rack for n+1 redundancy*

Knürr® DCL- H front view

Knürr® DCL-H

2-1 Knürr® DCL H application



** 15 kW per rack*

Knürr® DCL-R

- Row cooling units for use in Smart Aisle cold aisle containments
- Alternative to Liebert CRV030/034 when the same controller as in Knürr® DCL-L or Knürr® DCL-H is required
- Simple conversion to Knürr® DCL-L or Knürr® DCL-H through conversion of doors and replacement of the side-panels.

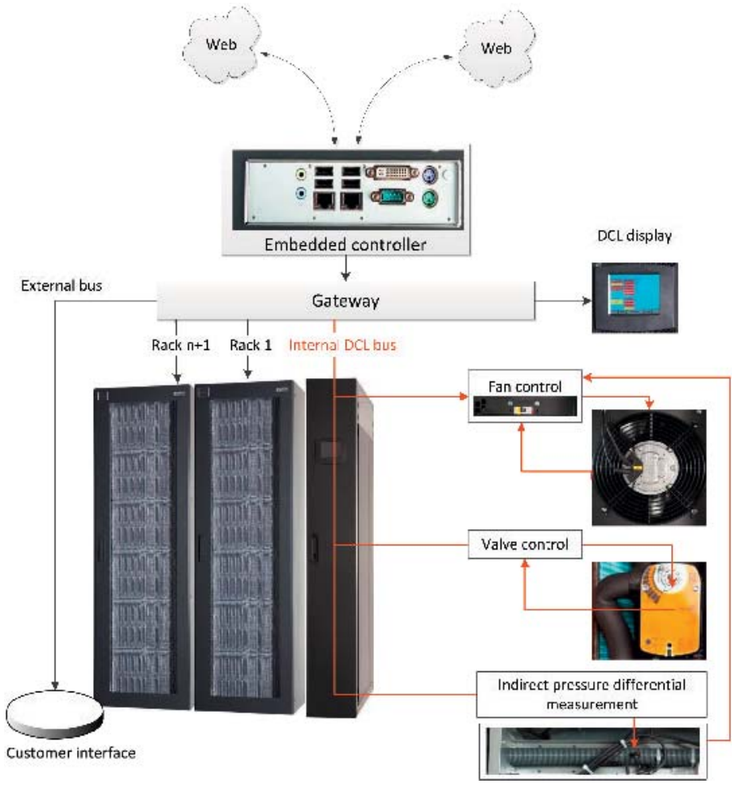
Knürr® DCL-R in row with Knürr® DCM

** Top view cross-section air flow pattern*

Availability

An essential requirement for data center operators is to ensure uninterrupted availability. Knürr guarantees this by means of

- "Fail-safe“ function ("safe despite faults") of the control valve: in the event of a power failure or interruption in the control line, the control valve switches the full volume of the chilled water flow to heat exchangers.
- Rack cooling controller hardware guarantees autonomous continued operation of the control in the event of a component failure. Components continue to operate in a controlled way in "fail-safe" mode.
- Access control and data security guaranteed by means of HTTPS and SNMP V3.
- Alarm management can be integrated into DCIM (Data Center Infrastructure Management).
- Rack cooling controller implements the patented concept of regulating the fan speeds based on indirect differential pressure measurement.
- Rack cooling controller ensures traceability of all settings changes by means of login logging and event logging.



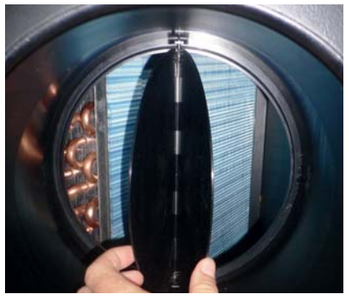
Rack cooling controller architecture

Rack cooling controller

Rack cooling controller display output

- Precise control of cooling air temperature and air flow control through patented concept
- Even air distribution to all internal IT component
- Even temperature profile in the air supply
- n+1 fan redundancy means that the remaining fans support the volume flow required for cooling in the event of a fan failure.
- In the event of
  - planned downtime or maintenance
  - or unnecessary cooling power, non-return values ensure that hot air can flow from the hot aisle into the cold zone of the data center.
- Redundant A/B power supply with automatic operation
- Dual-circuit heat exchanger option ensures redundancy of the water supply if two independent chilled water circuits are installed
- Optional integration into Knürr® CoolVac systems guarantees leak proofing (patent pending).
- The automatic door opening provides additional overheating protection in case of cooling system failure.

Automatic emergency door opening option for server rack



Non-return flap open

Non-return flap closed

Knürr® DCL

Efficiency

Simple fan change

Knürr® DCM server rack for cooling with Knürr® DCL, Liebert® power distribution modules and integrated cable management.

In today's competition, no data center operator can leave the issue of costs untouched. Anyone who only thinks about the upfront costs or wants to cut costs at the expense of reliability will be in for unpleasant surprises later on. Clever decision-makers will consider Knürr experience in ensuring lower running costs with maximum availability.

- Greater power density in the data center results in better utilization of space and reduced building costs.
- Reduced running costs through customized operation.
- High chilled water supply temperature increases the proportion of free cooling during refrigeration and improves the energy efficiency rating (EER) of the chiller.
- The control valve adjusts cold water volume flow for the current operational situation.
- Low water-side pressure drop leads to lower pump power consumption.
- Energy cost savings by adjusting the fan speed to the actually required air flow using the embedded controller
- Low air pressure drop leads to lower power consumption of the fans.
- EC fans guarantee energy-efficient operation with maximum performance over the entire range of fan speeds.
- Operator support through the ability to display the "cooling power" efficiency value (ratio of electrical power consumption of the servers to fans)
- Future-proof cooling solution because Knürr EC fans already comply with the energy efficiency requirements for CE approval that will apply from 2015.
- Cooling power and energy efficiency (fan/pump power consumption for cold water connection) confirmed by independent institutions

Adaptability

Fans in Knürr® DCL

2/3-way valve changeover

- Minimum possible investment for cooling components through the ability to use up to four server racks per Knürr® DCL
- Facilitates data center upgrade through gradual expansion of the data center with no new investment in different cooling infrastructure.
- Can be adapted to different geometries
  - Height 2,000mm and 2,200 mm
  - Depth in 100mm increments from 1,000mm to 1,300mm.
- Same base unit can be used for aisle cooling concepts and rack cooling with minimum conversion cost.
- Simple switchover between 2-way and 3-way valve by means of a ball valve in the bypass line

Detail of Knürr® DCL Datacenter Setup

Knürr® DCL
Basic specification, Order table

Knürr® DCL basic specification

Cooling performance/specifications		Knürr® DCL 30 KW	Knürr® DCL 34 KW
Product name Knürr® DCL for rack cooling		Knürr® DCL30L	Knürr® DCL34L
Product name Knürr® DCL for hybrid solution		Knürr® DCL30H	Knürr® DCL34H
Product name Knürr® DCL for aisle cooling		Knürr® DCL30R	Knürr® DCL34R
Nominal cooling power*		30 kW	34 kW
Air flow		5,000 m³/h	6,000 m³/h
Water flow		4.5 m³/h	5.0 m³/h
Max. water pressure		10 bar (145 PSI)	10 bar (145 PSI)
Number of fans		5	6
Fans power consumption max.		5 x 170 W	6 x 170 W
Dimensions	Height	2,000 mm	2,200 mm
	Width	300 mm	
Depth		DCL - L	1,200 mm - 1,300 mm
		DCL - H	1,100 mm - 1,300 mm
		DCL - R	1,000 mm - 1,300 mm

* Sensible cooling, at 16°C / 22°C (61°F / 72°F) water temperature, and 43°C (109°F) air inlet temperature

Knürr® DCL with Knürr® DCM

Knürr® DCL unit configuration number

Model number - Part 1/2										Model details											Part 2/2			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
D	C	L	3	0	L																			
D	C	L	3	4	H																			
D	C	L	3	0	R																			

1.-3. DCL (Data center rack cooling solution)
DCL – Data Center Loop

4.-5. Nominal cooling capacity
30 – 30 kW (2,000 mm / 42U)
34 – 34 kW (2,200 mm / 47U)

6. Type of application
L – closed loop architecture (without external panels)
H – hybrid architecture (without external panels)
R – in row cooling (with external panels)

7. Depth
1 – 1,000 mm (DCL-R version only)
R – 1,100 mm (not for DCL-L version)
2 – 1,200 mm
H – 1,300 mm

8. Mechanical options
0 – none (two units per pallet possible)
D – caster bracket (only one unit per pallet)

9. Electrical connection
2 – 230V AC 1-phase 50/60Hz CE
4 – 230V AC 1-phase 50/60Hz CE with A/B-transfer switch
A – 230V AC 1-phase 50/60Hz 2-pole CE
B – 230V AC 1-phase 50/60Hz 2-pole CE with A/B-transfer switch
P – 208 / 230V AC 2-pole 50/60Hz CSA
S – 208 / 230V AC 2-pole 50/60Hz CSA with A/B-transfer switch

10. Water connection / hex
Z – bottom
Y – top
9 – top and bottom
V – redundant bottom

11. Filter
N – no filter
A – MERV 1 (NA for 1,000 mm depth)
C – MERV 1, clog switch (NA for 1,000 mm depth)

12. Display
0 – none
Y – 5.7" display (14.5 cm)

13. Preparation for automatic door release system
0 – none
1 – prepared

14. Chilled water monitoring
0 – none
T – temperature sensor inlet/outlet
4 – calorific meter
5 – condensate pump
6 – temperature sensor inlet/outlet + condensate pump
7 – calorific meter + condensate pump

15. Environment monitoring
0 – none
S – smoke detection
H – humidity monitoring
B – smoke detection and humidity monitoring

16. Color
1 – RAL 7021 (grey - black)
G – RAL 7035 (light grey)
2 – non standard color (SFA)

17. – 18. Free

19. Communication
0 – standard (HTTPS, SSH, MODBUS TCP, SNMP)
D – input/output customer
M – Modbus RTU
B – Bacnet
V – input/output customer + Modbus RTU
W – input/output customer + Bacnet

20. Server rack monitoring
0 – none
1 - door contact 1 rack
2 - door contact 2 racks
3 - 2 temperature sensors 1 rack
4 - 2x2 temperature sensors 2 racks
7 - door contact + temperature sensor 1 rack
8 - door contact + temperature sensor 2 racks

21. Packaging
P = Land freight – short distance (pallet, shrink wrap, cardboard protection)
S = Seaworthy (air freight) – long distance (wooden crate)

22. Special features
A = No SFAs, standard unit
X = SFA included

23. – 25. Factory configuration number

Emerson Network Power, a business of Emerson (NYSE:EMR), protects and optimizes critical infrastructure for data centers, communications networks, healthcare and industrial facilities.

The company provides new-to-the-world solutions, as well as established expertise and smart innovation in areas including AC and DC power and renewable energy, precision cooling systems, infrastructure management, embedded computing and power, integrated racks and enclosures, power switching and controls, and connectivity. Our solutions are supported globally by local Emerson Network Power service technicians. Learn more about Emerson Network Power products and services at

www.EmersonNetworkPower.com

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