# **HYDAD** INTERNATIONAL

# Fluid/Air Cooling Systems FLKS

	Cooler type	H x W x D [mm]	Cooling capacity max. [kW/K]	Flow rate [l/min]	Tank [I]
	FLKS-1H	405 x 457 x 276	0.13	2 – 15	7.5
	FLKS-1H+	405 x 483 x 395	0.17	5 – 25	7.5
	FLKS-2S	515 x 620 x 315	0.31	5 – 35	19.5
	FLKS-2EC	550 x 620 x 325	0.33	5 – 35	19.5
	FLKS-3S	708 x 500 x 443	0.46	5 – 40	28.5
	FLKS-3EC	708 x 500 x 443	0.50	5 – 40	28.5
	FLKS-4S	813 x 570 x 485	0.65	10 – 55	43
	FLKS-4EC	813 x 570 x 485	0.70	10 – 55	43
	FLKS-5S	983 x 665 x 622	1.05	5 – 100	70
	FLKS-5EC	983 x 665 x 622	1.15	5 – 100	70

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Cooler type	H x W x D [mm]	Cooling capacity max. [kW/K]	Flow rate [I/min]	Tank [I]
FLKS-8EC	2,273 x 809 x 807	2.00	150	110
FLKS-10EC	2,273 x 1,609 x 807	4.00	300	110

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## Cooling capacity FLKS-1S – FLKS-5S



## Cooling capacity FLKS-2EC – FLKS-5EC with speed control



At 50 Hz and max. drive speed

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature





# Fluid/Air Cooling Systems FLKS-1H

## Symbol



## General

The **FLKS-1H** is a compact fluid/air cooling system with a plastic tank housing and integrated air duct. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## **Technical data**

Cooling capacity	Max. 0.130 kW/K (see cooling capacity diagram)			
Flow rate	2 – 15 l/min (see output diagrams)			
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).			
Permitted temperatures Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C				
Tank volume 5.5 – 7.5 l				
Weight	Max. 22 kg			
Noise (acoustic pressure)	70/72 dB(A) at 50/60 Hz (at 1 m)			
Hydraulic connection	Pump P (flow): G¾"			
	Heat exchanger K (return): G¾"			
	If possible, refrain from reducing the size of the line required for the threaded connections.			
Electrical connection	The motors are usually electrically connected using a heavy-duty connector (connection via terminal box available upon request).			
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request.</li> </ul>			

## Cooling capacity



## **Output data**



#### . . .



Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### **Electrical data:**

Permissible voltage range: 380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

Motor capacity (50/60 Hz): Pump: 0.12 / 0.18 kW Fan: 0.11 / 0.15 kW

#### **Electrical data:**

 $\begin{array}{l} \mbox{Permissible voltage range:} \\ 380-415 \ \mbox{V}-50 \ \mbox{Hz}-3 \ \mbox{PH} \\ 380-480 \ \mbox{V}-60 \ \mbox{Hz}-3 \ \mbox{PH} \\ \ \mbox{Voltage tolerance } +5 \ \mbox{/} \ \mbox{/} \ -10 \ \mbox{\%} \end{array}$ 

Motor capacity (50/60 Hz): Pump: 0.17 / 0.27 kW Fan: 0.11 / 0.15 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity.

Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids,

as well as on special voltages or other pumps.

## Electrical connection



The motor is usually electrically connected using a heavy-duty connector.

E.g. Harting housing 09300101541 and insert 09330102716.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	FLKS - 11	<u>1</u> - <u>2.0</u> - <u>W</u>	<u>/</u> - <u>YA0</u> - <u>/</u>	<u>p</u> - <u>p</u>
Туре				
FLKS = fluid/air cooling system				
Size				
Type code				
Operating fluid				
W = water-glycol (standard)				
Pump				
Y = version with pump TKY A = version with pump MTA50 Other pumps on request.				
Motor voltage A = $380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz$ , 3PH (pump TKY and MTA50) See also "electrical data".				
Position of pump connection				
0 = standard				
Coating				
0 = none (FLKS-1: white plastic tank housing)				
Accessories				
0 = none (standard)				
For corresponding accessory number, see table.				

## Accessories



A	Fill level and 60 °C temperature switch		•										•
В	Fill level switch 2 switch points			•					•			•	
D	Flow switch				٠			•			•		
0	Air filter					•		•	•	•	•	•	•
Р	Air duct						٠	•		•		•	
Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105
						· · · · · · · · · · · · · · · · · · ·							

See also "Accessories for FLKS" for more information.

## FLKS-1H standard

Part no.	Designation	Pump	Version
3426850	FLKS-1H/2.0/W/YA0/0/0	ТКҮ	No accessories, fixed speed
3322575	FLKS-1H/2.0/W/AA0/0/0	MTA50	No accessories, fixed speed





# Fluid/Air Cooling Systems FLKS-1H PLUS

## Symbol



## General

The **FLKS-1H PLUS** is a compact fluid/air cooling system with a plastic tank housing and integrated air duct. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## **Technical data**

Cooling capacity	Max. 0.18 kW/K (see cooling capacity diagram)			
Flow rate	5 – 25 l/min (see output diagrams)			
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).			
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C			
Tank volume	5.5 – 7.5 l			
Weight	Max. 26 kg			
Noise (acoustic pressure)	69/71 dB(A) at 50/60 Hz (at 1m)			
Hydraulic connection	Pump P (flow): G <sup>3</sup> / <sub>4</sub> "			
	Heat exchanger K (return): G¾"			
	If possible, refrain from reducing the size of the line required for the threaded connections.			
Electrical connection	The motors are usually electrically connected using a heavy-duty connector (connection via terminal box available upon request).			
Mounting position	Pump vertical			
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request</li> </ul>			

## Cooling capacity



## **Output data**





Operating range: 5 - 25 min Output tolerance:  $\pm 9$ %, pumping head tolerance:  $\pm 7$ % as per DIN EN ISO 9906 Cl. 2, App. A The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

Permissible voltage range: 380 - 420 V - 50 Hz - 3 PH400 - 480 V - 60 Hz - 3 PHVoltage tolerance +5% / -10%

Motor capacity (50/60 Hz): Pump: 0.50 / 0.70 kW Fan: 0.11 / 0.15 kW

#### **Electrical data:**

 $\begin{array}{l} \mbox{Permissible voltage range:} \\ 380-415 \ \mbox{V}-50 \ \mbox{Hz}-3 \ \mbox{PH} \\ 380-480 \ \mbox{V}-60 \ \mbox{Hz}-3 \ \mbox{PH} \\ \ \mbox{Voltage tolerance } +5 \ \mbox{/} \ \mbox{/} \ -10 \ \mbox{\%} \end{array}$ 

Motor capacity (50/60 Hz): Pump: 0.17 / 0.27 kW Fan: 0.11 / 0.15 kW

## Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity.

Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids,

as well as on special voltages or other pumps.

## Electrical connection



The motor is usually electrically connected using a heavy-duty connector.

E.g. Harting housing 09300101541 and insert 09330102716.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions. E 5.818.1.1/08.16

## Model code

<u>FLKS</u> - <u>1H PLUS</u> - <u>2,4</u> - Ψ - <u>601A2</u> - ϼ - ϼ
Туре
FLKS = fluid/air cooling system
Size
Type code
Operating fluid
W = water-glycol (standard)
Pump
601 = version with pump 601 A = version with pump MTA50 Other pumps on request.
Motor voltage A = 380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz, 3PH (pump 601 and MTA50) See also "electrical data".
Position of pump connection
0 = standard 2 = rotated 180°
Coating
0 = none
(FLKS-1: white plastic tank housing)
Accessories
0 = none (standard)
For corresponding accessory number, see table.

## Accessories



Acc	essory number	0	1	44	30	14	36	43	59	82	122	124	105
Р	Air duct						•	•		•		•	
0	Air filter					•		•	•	•	•	•	•
D	Flow switch				•			•			•		
в	Fill level switch 2 switch points			•					•			•	
A	Fill level and 60 °C temperature switch		•										•

See also "Accessories for FLKS" for more information.

## FLKS-1H PLUS standard

Part no.	Designation	Pump	Version
3924557	FLKS-1H PLUS/2.4/W/601A2/0/0	601	No accessories, fixed speed
3908279	FLKS-1H PLUS/2.0/W/AA0/0/0	MTA50	No accessories, fixed speed





# Fluid/Air Cooling Systems FLKS-2S

## Symbol



## General

The **FLKS-2S** is a compact fluid/air cooling system with a plastic tank housing and integrated air duct. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## **Technical data**

Cooling capacity	Max. 0.31 kW/K (see cooling capacity diagram)			
Flow rate	5 – 40 l/min (see output diagrams)			
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).			
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C			
Tank volume	15.0 – 19.5 l			
Weight	Max. 32 kg			
Noise (acoustic pressure)	62/63 dB(A) at 50/60 Hz (at 1 m)			
Hydraulic connection	Pump P (flow): G¾"			
-	Heat exchanger K (return): G¾"			
	If possible, refrain from reducing the size of the line required for the threaded connections.			
Electrical connection	The motors are usually electrically connected using a heavy-duty connector (connection via terminal box available upon request).			
Mounting position	Pump vertical			
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request</li> </ul>			

## Cooling capacity



## **Output data**





The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

**Permissible voltage range:** 380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

**Motor capacity (50/60 Hz):** Pump: 0.50 / 0.70 kW Fan: 0.11 / 0.145 kW

#### **Electrical data:**

Permissible voltage range: 380 – 415 V – 50 Hz – 3 PH 380 – 440 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

Motor capacity (50/60 Hz): Pump: 0.62 / 0.90 kW Fan: 0.11 / 0.145 kW

Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity.

Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids,

as well as on special voltages or other pumps.

## Electrical connection



The motor is usually electrically connected using a heavy-duty connector.

E.g. Harting housing 09300101541 and insert 09330102716.

## Dimensions





#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS - 2S - 1.0 - W - 601A0 - 0 - 0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
601=version with pump 601H2-4=version with pump MTH2-4Other pumps on request.	
Motor voltage A = 380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz, 3PH (pump 601) B = 380 - 415 V - 50 Hz / 380 - 440 V - 60 Hz, 3PH (pump MTH2-4) See also "electrical data".	
Position of pump connection	
0 = standard	
Coating	
0 = none	
(FLKS-2: white plastic tank housing)	
Accessories	
0 = none (standard)	
For corresponding accessory number, see table.	

## Accessories



Р	Air duct					•	•		•		•	
0	Air filter				•		•	•	•	•	•	•
D	Flow switch			•			•			•		
в	Fill level switch 2 switch points		•					•			•	
A	Fill level and 60 °C temperature switch	•										•

See also "Accessories for FLKS" for more information.

## FLKS-2S standard

Part no.	Designation	Pump	Version
3811499	FLKS-2S/1.0/W/601A0/0/0	601	No accessories, fixed speed
3905239	FLKS-2S/1.0/W/H2-4B0/0/0	MTH2-4	No accessories, fixed speed





# Fluid/Air Cooling Systems FLKS-2EC with speed control



## General

The **FLKS-2EC** is a compact fluid/air cooling system with a plastic tank housing, integrated air duct, pump and variable-speed fan. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium. The speed can vary depending on the application.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## **Technical data**

Cooling capacity	Max. 0.33 kW/K (see cooling capacity diagram)					
Flow rate	5 – 40 l/min (see output diagrams)					
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).					
Permitted temperatures Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C						
Tank volume	15.0 – 19.5 l					
Weight	Max. 33 kg					
Noise (acoustic pressure)	< 64 dB(A) at 50/60 Hz (at 1 m)					
Hydraulic connection	Pump P (flow): G¾"					
	Heat exchanger K (return): G¾"					
	If possible, refrain from reducing the size of the line required for the threaded connections.					
Electrical connection	The motors are usually electrically connected using a heavy-duty connector.					
Mounting position	Pump vertical					
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request.</li> </ul>					

## **Speed control**

The temperature sensor of the **FLKS-2EC5** measures the water-glycol outlet temperature from the cooling system. The sensor's 0 – 10 V analogue signal is assigned a temperature range of 25 – 45 °C. The signal is forwarded to the EC fan according to the measured fluid outlet temperature to control the speed. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

Even at low ambient temperatures, the fluid temperature cannot drop below 28 °C given constant power input. This prevents condensation on electrical components.

#### Application:

Specially suited for low air temperatures, e.g. outdoors.



## **Speed control**

The **FLKS-2EC3** also comes with a PID controller (closed loop). The temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the reference value (ambient temperature + set differential D  $\Delta$ T). The PID controller continually adjusts the speed of the fan, in order to align the fluid temperature with the ambient temperature.

The outlet temperature remains at a set differential above the ambient temperature regardless of the input temperature of the fluid (performance of the machine).

#### Application:

Particularly for precision cooling (e.g. in machine tools).

#### Lower fan speed

- = lower sound level
- = lower power consumption
- = lower contamination

## Cooling capacity



## Output data





Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

#### Permitted voltage range:

#### Pump:

380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

#### Fan:

200-240 V - 50/60 Hz - 1 PH Voltage tolerance  $\pm\,10\,\%$ 

Motor capacity (50/60 Hz): Pump: 0.50 / 0.70 kW Fan: 0.14 kW

#### **Electrical data:**

#### Permitted voltage range:

Pump:

380 – 415 V – 50 Hz – 3 PH 380 – 440 V – 60 Hz – 3 PH Voltage tolerance +5% / -10%

**Fan:** 200 – 240 V – 50/60 Hz – 1 PH Voltage tolerance ± 10 %

Motor capacity (50/60 Hz): Pump: 0.62 / 0.90 kW Fan: 0.14 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity. Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids, as well as on special voltages or other pumps.

## **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

Additional 24 V DC control voltage, more information available upon request.

## Dimensions

#### [mm]



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS - 2 - EC3 - 1.0 - W - 601A0 - 0 - 0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Speed control (open-loop/closed-loop)	
EC3 = speed control, closed-loop (with PID controller) EC5 = speed control, open-loop (with temperature sensor)	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
601 = version with pump 601 H2-4 = version with pump MTH2-4 Other pumps on request.	
Motor voltage	
A = 380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz, 3PH (pump 601) 200 - 240 V - 50 / 60 Hz, 1PH (fan) B = 380 - 415 V - 50 Hz / 380 - 440 V - 60 Hz, 3PH (pump MTH2-4 200 - 240 V - 50 (60 Hz - 1PH (fan))	4)
See electrical data.	
Position of pump connection	
0 = standard	
Coating	
0 = none (FLKS-2: white plastic tank housing)	
Accessories	
0 = none(standard)	

For corresponding accessory number, see table.

## Accessories



Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105
Р	Air duct						•	•		•		•	
0	Air filter					•		•	•	•	•	•	•
D	Flow switch				•			•			•		
В	Fill level switch 2 switch points			•					•			•	
A	Fill level and 60 °C temperature switch		•										•

See also "Accessories for FLKS" for more information.

## FLKS-2EC standard

Part no.	Designation	Pump	Version
3900715	FLKS-2EC3/1.0/W/601A0/0/0	601	No accessories, speed control
3951357	FLKS-2EC3/1.0/W/H2-4B0/0/0	MTH2-4	No accessories, speed control





# Fluid/Air Cooling Systems FLKS-3S

## **Symbol**



## General

The **FLKS-3S** is a compact fluid/air cooling system with a plastic tank housing and integrated air duct. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## Technical data

Cooling capacity	Max. 0.46 kW/K (see cooling capacity diagram)				
Flow rate	5 – 40 l/min (see output diagrams)				
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).				
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C				
Tank volume	20.0 – 28.5 l				
Weight	Max. 45 kg				
Noise (acoustic pressure) 64/67 dB(A) at 50/60 Hz (at 1 m)					
Hydraulic connection	Pump P (flow): G¾"				
	Heat exchanger K (return): G¾"				
	If possible, refrain from reducing the size of the line required for the threaded connections.				
Electrical connection	The motors are usually electrically connected using a heavy-duty connector (connection via terminal box available upon request).				
Mounting position	Pump vertical				
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request.</li> </ul>				

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## Cooling capacity



## Output data





Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

**Permissible voltage range:** 380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5% / -10%

**Motor capacity (50/60 Hz):** Pump: 0.50 / 0.70 kW Fan: 0.17 / 0.23 kW

#### **Electrical data:**

Permissible voltage range: 380 – 415 V – 50 Hz – 3 PH 380 – 440 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

Motor capacity (50/60 Hz): Pump: 0.62 / 0.90 kW Fan: 0.17 / 0.23 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity.

Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids,

as well as on special voltages or other pumps.

## Electrical connection



The motor is usually electrically connected using a heavy-duty connector.

E.g. Harting housing 09300101541 and insert 09330102716.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS</u> - <u>3S</u> - <u>3.0</u> - <u>W</u> - <u>601A0</u> - <u>0</u> - <u>0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Type code	
Operating medium	
W = water-glycol (standard)	
Pump	
601 = version with pump 601 H2-4 = version with pump MTH2-4 Other pumps on request.	
Motor voltage A = 380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz, 3PH (pump 601) B = 380 - 415 V - 50 Hz / 380 - 440 V - 60 Hz, 3PH (pump MTH2-4) See also "electrical data".	
Position of pump connection	
0 = standard	
Coating	
0 = none (FLKS-3: white plastic tank housing)	
Accessories	
0 = none (standard)	
For corresponding accessory number, see table.	

## Accessories



٨	Fill lovel and 60 °C												
A	temperature switch		•										•
В	Fill level switch 2 switch points			•					•			•	
D	Flow switch				٠			•			•		
0	Air filter					٠		•	•	•	•	•	•
P	Air duct						•	•		•		•	
Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105

See also "Accessories for FLKS" for more information.

## FLKS-3S standard

Part no.	Designation	Pump	Version
3991017	FLKS-3S/3.0/W/601A0/0/0	601	No accessories, fixed speed
3991211	FLKS-3S/3.0/W/H2-4B0/0/0	MTH2-4	No accessories, fixed speed





В2

# Fluid/Air Cooling Systems FLKS-3EC with speed control

## **Technical data**

Cooling capacity	Max. 0.50 kW/K (see cooling capacity diagram)					
Flow rate	5 – 40 l/min (see output diagrams)					
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).					
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C					
Tank volume	20.0 – 28.5 l					
Weight	Max. 45 kg					
Noise (acoustic pressure)	< 67 dB(A) at 50/60 Hz (at 1 m)					
Hydraulic connection	Pump P (flow): G¾"					
	Heat exchanger K (return): G¾"					
	If possible, refrain from reducing the size of the line required for the threaded connections.					
Electrical connection	The motors are usually electrically connected using a heavy-duty connector.					
Mounting position	Pump vertical					
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request.</li> </ul>					



## General

Symbol

The **FLKS-3EC** is a compact fluid/air cooling system with a plastic tank housing, integrated air duct, pump and variable-speed fan. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium. The speed can vary depending on the application.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

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## **Speed control**

The temperature sensor of the **FLKS-3EC5** measures the water-glycol outlet temperature from the cooling system. The sensor's 0 – 10 V analogue signal is assigned a temperature range of 25 – 45 °C. The signal is forwarded to the EC fan according to the measured fluid outlet temperature to control the speed. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

Even at low ambient temperatures, the fluid temperature cannot drop below 28 °C given constant power input. This prevents condensation on electrical components.

#### Application:

Specially suited for low air temperatures, e.g. outdoors.



## **Speed control**

The **FLKS-3EC3** also comes with a PID controller (closed loop). The temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the reference value (ambient temperature + set differential D  $\Delta$ T). The PID controller continually adjusts the speed of the fan, in order to align the fluid temperature with the ambient temperature.

The outlet temperature remains at a set differential above the ambient temperature regardless of the input temperature of the fluid (performance of the machine).

#### Application:

Particularly for precision cooling (e.g. in machine tools).

#### Lower fan speed

- = lower sound level
- = lower power consumption
- = lower contamination

## Cooling capacity



## Output data





Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

#### Permitted voltage range:

#### Pump:

380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5% / -10%

#### Fan:

200-240 V - 50/60 Hz - 1 PH Voltage tolerance  $\pm\,10\,\%$ 

Motor capacity (50/60 Hz): Pump: 0.50 / 0.70 kW Fan: 0.165 kW

#### **Electrical data:**

#### Permitted voltage range:

Pump:

 $\begin{array}{l} 380-415 \ V-50 \ Hz-3 \ PH \\ 380-440 \ V-60 \ Hz-3 \ PH \\ \mbox{Voltage tolerance } +5 \ \% \ / \ -10 \ \% \end{array}$ 

Fan: 200 – 240 V – 50/60 Hz – 1 PH Voltage tolerance ± 10 %

Motor capacity (50/60 Hz): Pump: 0.62 / 0.90 kW Fan: 0.165 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity. Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids, as well as on special voltages or other pumps.

## **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

Additional 24 V DC control voltage, more information available upon request.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS</u> - <u>3</u> - <u>EC3</u> - <u>3</u> - <u>Ψ</u> - <u>601A0</u> - <u>0</u> - <u>0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Speed control (open-loop/closed-loop)	
EC3=speed control, closed-loop (with PID controller)EC5=speed control, open-loop (with temperature sensor)	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
601 = version with pump 601 H2-4 = version with pump MTH2-4 Other pumps on request.	
Motor voltage	
A = $380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz$ , 3PH (pump 601) 200 - 240 V - 50/60 Hz, 1PH (fan) B = $380 - 415 V - 50 Hz / 380 - 440 V - 60 Hz$ , 3PH (pump MTH2-4) 200 - 240 V - 50/60 Hz, 1PH (fan)	
See also electrical data.	
Position of pump connection	
0 = standard	
Coating	
0 = none (FLKS-3: white plastic tank housing)	
Accessories	

0 = none (standard) For corresponding accessory number, see table.

## **Accessories**



Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105
Р	Air duct						•	٠		•		•	
0	Air filter					•		٠	•	•	•	•	•
D	Flow switch				•			•			•		
В	Fill level switch 2 switch points			•					•			•	
A	Fill level and 60 °C temperature switch		•										•

See also "Accessories for FLKS" for more information.

## FLKS-3EC standard

Part no.	Designation	Pump	Version
3980425	FLKS-3EC3/3.0/W/601A0/0/0	601	No accessories, speed control
4009719	FLKS-3EC3/3.0/W/H2-4B0/0/0	MTH2-4	No accessories, speed control





# Fluid/Air Cooling Systems FLKS-4S

## **Symbol**



## General

The **FLKS-4S** is a compact fluid/air cooling system with a plastic tank housing and integrated air duct. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## **Technical data**

Cooling capacity	Max. 0.65 kW/K (see cooling capacity diagram)						
Flow rate	5 – 55 l/min (see output diagrams)						
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).						
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C						
Tank volume	31.0 – 43.0 l						
Weight	Max. 49 kg						
Noise (acoustic pressure)	69/72 dB(A) at 50/60 Hz (at 1 m)						
Hydraulic connection	Pump P (flow): G <sup>3</sup> / <sub>4</sub> "						
	Heat exchanger K (return): G¾"						
	If possible, refrain from reducing the size of the line required for the threaded connections.						
Electrical connection	The motors are usually electrically connected using a heavy-duty connector (connection via terminal box available upon request).						
Mounting position	Pump vertical						
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request.</li> </ul>						

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## Cooling capacity



## Output data





The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

**Permissible voltage range:** 380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

Motor capacity (50/60 Hz): Pump: 0.50 / 0.70 kW Fan: 0.45 / 0.70 kW

#### **Electrical data:**

Permissible voltage range: 380 – 415 V – 50 Hz – 3 PH 380 – 440 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

Motor capacity (50/60 Hz): Pump: 0.845 / 1.28 kW Fan: 0.45 / 0.70 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity.

Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids,

as well as on special voltages or other pumps.

## Electrical connection



The motor is usually electrically connected using a heavy-duty connector.

E.g. Harting housing 09300101541 and insert 09330102716.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS</u> - <u>4S</u> - <u>2.0</u> - <u>W</u> - <u>601A0</u> - <u>0</u> - <u>0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
601 = version with pump 601 H2-6 = version with pump MTH2-6 Other pumps on request.	
Motor voltage A = 380 - 420 V - 50 Hz / 400 - 480 V - 60 Hz, 3PH (pump 601) B = 380 - 415 V - 50 Hz / 380 - 440 V - 60 Hz, 3PH (pump MTH2-6) See also "electrical data".	
Position of pump connection	
0 = standard	
Coating	
0 = none	
(FLKS-4: white plastic tank housing)	
Accessories	
0 = none (standard)	
For corresponding accessory number, see table.	

## Accessories



Acce	essory number	0	1	44	30	14	36	43	59	82	122	124	105
Р	Air duct						•	•		•		•	
0	Air filter					•		•	•	•	•	•	•
D	Flow switch				•			•			•		
В	Fill level switch 2 switch points			•					•			•	
Α	Fill level and 60 °C temperature switch		•										•

See also "Accessories for FLKS" for more information.

## FLKS-4S standard

Part no.	Designation	Pump	Version
3951597	FLKS-4S/2.0/W/601A0/0/0	601	No accessories, fixed speed
3932404	FLKS-4S/2.0/W/H2-6B0/0/0	MTH2-6	No accessories, fixed speed




## Fluid/Air Cooling Systems FLKS-4EC with speed control

## **Technical data**

Cooling capacity	Max. 0.70 kW/K (see cooling capacity diagram)					
Flow rate	5 – 55 l/min (see output diagrams)					
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).					
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C					
Tank volume	31.0 – 43.0 l					
Weight	Max. 47 kg					
Noise (acoustic pressure)	< 71 dB(A) at 50/60 Hz (at 1m)					
Hydraulic connection	Pump P (flow): G¾"					
	Heat exchanger K (return): G <sup>3</sup> /4"					
	If possible, refrain from reducing the size of the line required for the threaded connections.					
Electrical connection	The motors are usually electrically connected using a heavy-duty connector.					
Mounting position	Pump vertical					
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request.</li> </ul>					



## General

The **FLKS-4EC** is a compact fluid/air cooling system with a plastic tank housing, integrated air duct, pump and variable-speed fan. This lightweight and robust design makes it suitable for diverse applications.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium. The speed can vary depending on the application.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

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## **Speed control**

The temperature sensor of the **FLKS-4EC5** measures the water-glycol outlet temperature from the cooling system. The sensor's 0 – 10 V analogue signal is assigned a temperature range of 25 – 45 °C. The signal is forwarded to the EC fan according to the measured fluid outlet temperature to control the speed. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

Even at low ambient temperatures, the fluid temperature cannot drop below 28 °C given constant power input. This prevents condensation on electrical components.

#### Application:

Specially suited for low air temperatures, e.g. outdoors.



## **Speed control**

The **FLKS-4EC3** also comes with a PID controller (closed loop). The temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the reference value (ambient temperature + set differential D  $\Delta$ T). The PID controller continually adjusts the speed of the fan, in order to align the fluid temperature with the ambient temperature.

The outlet temperature remains at a set differential above the ambient temperature regardless of the input temperature of the fluid (performance of the machine).

### Application:

Particularly for precision cooling (e.g. in machine tools).

#### Lower fan speed

- = lower sound level
- = lower power consumption
- = lower contamination

## Cooling capacity



## Output data





Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

**Permissible voltage range:** 380 – 420 V – 50 Hz – 3 PH 400 – 480 V – 60 Hz – 3 PH Voltage tolerance +5% / -10%

**Motor capacity (50/60 Hz):** Pump: 0.50 / 0.70 kW Fan: 0.53 kW

#### **Electrical data:**

**Permissible voltage range:** 380 – 415 V – 50 Hz – 3 PH 380 – 440 V – 60 Hz – 3 PH Voltage tolerance +5% / -10%

Motor capacity (50/60 Hz): Pump: 0.845 / 1.28 kW Fan: 0.53 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity. Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids, as well as on special voltages or other pumps.

## **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

Additional 24 V DC control voltage, more information available upon request.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS - 4 - EC3 - 2.0 - W - 601A0 - 0 - 0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Speed control (open-loop/closed-loop)	
EC3=speed control, closed-loop (with PID controller)EC5=speed control, open-loop (with temperature sensor)	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
601 = version with pump 601 H2-6 = version with pump MTH2-6 Other pumps on request.	
Motor voltage	
$ \begin{array}{rcl} A & = & 380 - 420 \ V - 50 \ Hz \ / \ 400 - 480 \ V - 60 \ Hz, \ 3PH \ (pump \ 601) \\ B & = & 380 - 415 \ V - 50 \ Hz \ / \ 380 - 440 \ V - 60 \ Hz, \ 3PH \ (pump \ MTH2-6) \\ See \ also \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	
Position of pump connection	
0 = standard	
Coating	
0 = none (FLKS-4: white plastic tank housing)	
Accessories	

0 = none (standard) For corresponding accessory number, see table.

## **Accessories**



A	Fill level and 60 °C temperature switch		•										•
В	Fill level switch 2 switch points			•					•			•	
D	Flow switch				•			•			•		
0	Air filter					٠		٠	٠	٠	•	•	•
Р	Air duct						•	٠		٠		•	
Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105

See also "Accessories for FLKS" for more information.

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## FLKS-4EC standard

Part no.	Designation	Version				
3902038	FLKS-4EC3/2.0/W/601A0/0/0	601	No accessories, speed control			
3901788	FLKS-4EC3/2.0/W/H2-6B0/0/0	MTH2-6	No accessories, speed control			





## Fluid/Air Cooling Systems FLKS-5S/3.x

## Symbol



## General

The **FLKS-5S** is a compact fluid/ air cooling system with a plastic tank housing and integrated air duct. This lightweight and robust design makes it suitable for diverse applications.

For the optional version with two pumps, two cooling circuits with different functions (flow/pressure loss) can be operated.

## Function

The pump conveys the operating fluid from the plastic reservoir over the parts being cooled to the heat exchanger.

The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

## **Technical data**

Cooling capacity	Max. 1.05 kW/K (see cooling capacity diagram)					
Flow rate	5 – 100 l/min (see output diagrams)					
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).					
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C					
Tank volume	55.0 – 70.0 l					
Weight	65 kg					
Noise (acoustic pressure)	69/71 dB(A) at 50/60 Hz (at 1 m)					
Hydraulic connection	Pump P (flow): G <sup>3</sup> / <sub>4</sub> "					
	Heat exchanger K (return): G1"					
	If possible, refrain from reducing the size of the line required for the threaded connections.					
Electrical connection	The motors are usually electrically connected using a heavy-duty connector (connection via terminal box available upon request).					
Mounting position	Pump vertical					
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request</li> </ul>					



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## Cooling capacity



## **Output data**



### MTH4-4 pump version



Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

Permissible voltage range: 380 - 415 V - 50 Hz - 3 PH380 - 440 V - 60 Hz - 3 PHVoltage tolerance +5 % / -10 %

**Motor capacity (50/60 Hz):** Pump: 0.845 / 1.28 kW Fan: 0.45 / 0.70 kW

#### **Electrical data:**

 $\begin{array}{l} \mbox{Permissible voltage range:} \\ 380-415 \ \mbox{V}-50 \ \mbox{Hz}-3 \ \mbox{PH} \\ 380-440 \ \mbox{V}-60 \ \mbox{Hz}-3 \ \mbox{PH} \\ \ \mbox{Voltage tolerance } +5 \ \mbox{/} \ \mbox{-10 \ \mbox{\%}} \end{array}$ 

Motor capacity (50/60 Hz): Pump: 0.96 / 1.51 kW Fan: 0.45 / 0.70 kW

The version with two pumps is available on request.

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The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity.

Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids,

as well as on special voltages or other pumps.

## **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

For PIN configuration see the data sheet or electric diagram of the FLKS.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

<u>FLKS</u> - <u>5S</u> - <u>3.0</u> - Ψ - <u>H4-4B0</u> - ፬ - <u>0</u>
Туре
FLKS = fluid/air cooling system
Size
Type code
Operating fluid
W = water-glycol (standard)
Pump
H2-6 = version with pump MTH2-6 H4-4 = version with pump MTH4-4 Version with two pumps on request.
Motor voltage B = 380 - 415 V - 50 Hz / 380 - 440 V - 60 Hz, 3PH (pump MTH2-6 and pump MTH4-4) See also "electrical data".
Position of pump connection
0 = standard
Coating
0 = none (FLKS-5: white plastic tank housing)
Accessory number
0 = none (standard) For corresponding accessory number, see table.

## Accessories



Α	Fill level and 60 °C temperature switch		•										•
в	Fill level switch 2 switch points			•					•			•	
D	Flow switch				•			•			•		
0	Air filter					•		•	•	•	•	•	•
Р	Air duct						•	•		•		•	
Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105

See also "Accessories for FLKS" for more information.

## FLKS-5S/3.x standard

Part no.	Designation	Pump	Version				
4143591	FLKS-5S/3.0/W/H2-6B0/0/0	MTH2-6	No accessories, fixed speed				
4143682	FLKS-5S/3.0/W/H4-4B0/0/0	MTH4-4	No accessories, fixed speed				





## **Fluid/Air Cooling Systems** FLKS-5EC/3.x with speed control

## **Technical data**

Cooling capacity	Max. 1.15 kW/K (see cooling capacity diagram)						
Flow rate	5 – 100 l/min (see output diagrams)						
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).						
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C						
Tank volume	55.0 – 70.0 l						
Weight	Max. 64 kg						
Noise (acoustic pressure)	< 71 dB(A) at max. drive speed (at 1 m)						
Hydraulic connection	Pump P (flow): G¾"						
	Heat exchanger K (return): G1"						
	If possible, refrain from reducing the size of the line required for the threaded connections.						
Electrical connection	The motors are usually electrically connected using a heavy-duty connector.						
Mounting position	Pump vertical						
Accessories	<ul> <li>Air filter</li> <li>Air duct</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> <li>Combinations and other accessories upon request</li> </ul>						

## Symbol



## General

The **FLKS-5EC** is a compact fluid/air cooling system with a plastic tank housing, integrated air duct, pump and variable-speed fan. This lightweight and robust design makes it suitable for diverse applications.

For the optional version with two pumps, two cooling circuits with different functions (flow/pressure loss) can be operated.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium. The speed can vary depending on the application.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

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## **Speed control**

The temperature sensor of the **FLKS-5EC5** measures the water-glycol outlet temperature from the cooling system. The sensor's 0 – 10 V analogue signal is assigned a temperature range of 25 – 45 °C. The signal is forwarded to the EC fan according to the measured fluid outlet temperature to control the speed. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

Even at low ambient temperatures, the fluid temperature cannot drop below 28 °C given constant power input. This prevents condensation on electrical components.

#### Application:

Specially suited for low air temperatures, e.g. outdoors.



## **Speed control**

The **FLKS-5EC3** also comes with a PID controller (closed loop). The temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the reference value (ambient temperature + set differential D  $\Delta$ T). The PID controller continually adjusts the speed of the fan, in order to align the fluid temperature with the ambient temperature.

The outlet temperature remains at a set differential above the ambient temperature regardless of the input temperature of the fluid in the cooler (power of the machine).

### Application:

Particularly for precision cooling (e.g. in machine tools).

#### Lower fan speed

- = lower sound level
- = lower power consumption
- = lower contamination

## Cooling capacity



## **Output data**



#### MTH4-4 pump version



Output tolerance: ±9%, pumping head tolerance: ±7% as per DIN EN ISO 9906 Cl. 2, App. A

The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

**Permissible voltage range:** 380 – 415 V – 50 Hz – 3 PH 380 – 440 V – 60 Hz – 3 PH Voltage tolerance +5 % / -10 %

**Motor capacity (50/60 Hz):** Pump: 0.845 / 1.28 kW Fan: 0.45 / 0.70 kW

#### Electrical data:

Permissible voltage range: 380 - 415 V - 50 Hz - 3 PH380 - 440 V - 60 Hz - 3 PHVoltage tolerance +5 % / -10 %

Motor capacity (50/60 Hz): Pump: 0.96 / 1.51 kW Fan: 0.45 / 0.70 kW

The version with two pumps is available on request.

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity. Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids, as well as on special voltages or other pumps.

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## **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

For PIN configuration see the data sheet or electric diagram of the FLKS.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

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## Model code

	<u>FLKS - 5 - EC3 - 3.0 - W - H4-4B0 - 0 - 0</u>
Туре	
FLKS = fluid/air cooling system	
Size	
Speed control (open-loop/closed-loop)	
EC3 = speed control, closed-loop (with PID controller)	
EC5 = speed control, open-loop (with temperature sensor)	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
H2-6 = version with pump MTH2-6	
H4-4 = version with pump MTH4-4	
Version with two pumps on request.	
Motor voltage	
B = 380 – 415 V – 50 Hz / 380 – 440 V – 60 Hz, 3PH (pump MTH2-6	and pump MTH4-4)
See also "electrical data".	
Position of pump connection	
0 = standard	
Coating	
0 = none	
(FLKS-5: white plastic tank housing)	

## Accessory number 0 = none (

0 = none (standard) For corresponding accessory number, see table.

## **Accessories**



A	Fill level and 60 °C temperature switch		•										•
в	Fill level switch 2 switch points			•					•			•	
D	Flow switch				•			•			•		
0	Air filter					•		•	•	•	•	•	•
Р	Air duct						•	•		•		٠	
Acce	ssory number	0	1	44	30	14	36	43	59	82	122	124	105

See also "Accessories for FLKS" for more information.

## FLKS-5EC/3.x standard

Part no.	Designation	Pump	Version
4143685	FLKS-5EC3/3.0/W/H2-6B0/0/0	MTH2-6	Speed control
4143691	FLKS-5EC3/3.0/W/H4-4B0/0/0	MTH4-4	Speed control





## Fluid/Air Cooling Systems FLKS-8EC with speed control

## **Technical data**

Cooling capacity	Max. 2.00 kW/K (see cooling capacity diagram)						
Flow rate	max. 150 l/min (see output diagrams)						
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).						
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C						
Tank volume	70 / 110 l						
Weight	Max. 235 kg (open version) Max. 275 kg (closed version)						
Noise (acoustic pressure)	< 77 dB(A) at max. drive speed (at 1 m)						
Hydraulic connection	Pump P (flow): G <sup>3</sup> / <sub>4</sub> " / G2"						
	Heat exchanger K (return): G1¼"						
	If possible, refrain from reducing the size of the line required for the threaded connections.						
Electrical connection	The motors are usually electrically connected using a heavy-duty connector.						
Mounting position	Pump vertical						
Accessories	<ul> <li>Air filter (optional for open version, standard for closed version)</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> </ul>						

Combinations and other accessories upon request.



## General

The **FLKS-8EC** is a fluid/air cooling system with reversing pump, plastic tank, heat exchanger and variable-speed fan. This FLKS was specially designed for high flow rates and high cooling capacities.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium. The speed can vary depending on the application.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

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## Versions

In addition to the standard upright and open version, the FLKS-8EC is also available with a closed housing and in a horizontal version.



## **Speed control**

The temperature sensor of the **FLKS-8EC5** measures the water-glycol outlet temperature from the cooling system. The sensor's 0 – 10 V analogue signal is assigned a temperature range of 25 – 45 °C. The signal is forwarded to the EC fan according to the measured fluid outlet temperature to control the speed. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

Even at low ambient temperatures, the fluid temperature cannot drop below 28 °C given constant power input. This prevents condensation on electrical components.

### Application:

Specially suited for low air temperatures, e.g. outdoors.



## **Speed control**

The **FLKS-8EC3** also comes with a PID controller (closed loop). The temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the reference value (ambient temperature + set differential D  $\Delta$ T). The PID controller continually adjusts the speed of the fan, in order to align the fluid temperature with the ambient temperature.

The outlet temperature remains at a set differential above the ambient temperature regardless of the input temperature of the fluid in the cooler (power of the machine).

### Application:

Particularly for precision cooling (e.g. in machine tools).

#### Lower fan speed

- = lower sound level
- = lower power consumption
- = lower contamination

## Cooling capacity



## **Output data**





The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### Electrical data:

#### Permissible voltage range: 380 - 415 V - 50 Hz - 3 PHVoltage tolerance +5% / -10%

Motor capacity (50 Hz): Pump: 1.34 kW Fan: 0.98 kW

#### Electrical data:

Permissible voltage range: 380 – 415 V – 50 Hz – 3 PH Voltage tolerance +5% / -10%

Motor capacity (50 Hz): Pump: 2.20 kW Fan: 0.98 kW

#### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity. Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids, as well as on special voltages or other pumps.

### **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

Additional 24 V DC control voltage, more information available upon request.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	<u>FLKS</u> - 8 - <u>EC5</u> - <u>1.1</u> - <u>W</u> - <u>H4-6C3</u> - 2 - 0
Туре	
FLKS = fluid/air cooling system	
Size	
Speed control (open-loop/closed-loop)	
EC3 = speed control, closed-loop (with PID controller)	
EC5 = speed control, open-loop (with temperature sensor)	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
H4-6 = version with pump MTH4-6	
R10-6 = version with pump MTR10-6	
Motor voltage	
C = 380 – 415 V – 50 Hz (pump MTH4-6 and pump MTR10-6)	
See also "electrical data".	
Position of pump connection	
3 = rotated by 270° (clockwise)	
Coating	
2 = Light grey RAL 7035	
Accessory number	
0 = none (standard)	
For corresponding accessory number, see table.	

## **Accessories**



в	Fill level switch 2 switch points		٠				•			•
D	Flow switch			•		•			•	
0	Air filter				•	•	•	•	•	•
Accessory number		0	44	30	14	43	59	82	122	124

See also "Accessories for FLKS" for more information.

## FLKS-5EC standard

Part no.	Designation	Pump	Version
4037512	FLKS-8EC5/1.1/W/H4-6C3/2/0	MTH4-6	Open, upright version, speed control, open-loop
4108524	FLKS-8EC6/2.0/W/H4-6C2/2/14	MTH4-6	Closed, upright version, speed control, open-loop
4153106	FLKS-8EC5/3.1/W/H4-6C3/2/0	MTH4-6	Open, horizontal version, speed control, open-loop





## Fluid/Air Cooling Systems FLKS-10EC with speed control

## **Technical data**

Cooling capacity	Max. 4.00 kW/K (see cooling capacity diagram)
Flow rate	max. 300 l/min (see output diagrams)
Operating fluid	Version with water glycol (W): Potable water with 35 – 40 % ethylene glycol-based or propylene glycol-based antifreeze and anti-corrosion concentration. Other fluids on request (e.g. mineral oil).
Permitted temperatures	Fluid temperature: max. +60 °C Ambient temperature: 0 °C to +45 °C
Tank volume	110 l
Weight	Max. 400 kg (open version) Max. 485 kg (closed version)
Noise (acoustic pressure)	< 80 dB(A) at max. drive speed (at 1 m)
Hydraulic connection	Pump P (flow): G2"
	Heat exchanger K (return): G11/2"
	If possible, refrain from reducing the size of the line required for the threaded connections.
Electrical connection	The motors are usually electrically connected using a heavy-duty connector.
Mounting position	Pump vertical
Accessories	<ul> <li>Air filter (optional for open version, standard for closed version)</li> <li>Fill level switch</li> <li>Fill level and temperature switch</li> <li>Flow switch</li> </ul>

Combinations and other accessories upon request.

## General

The **FLKS-10EC** is a fluid/air cooling system with reversing pump, plastic tank, heat exchanger and variable-speed fan. This FLKS was specially designed for high flow rates and high cooling capacities.

## Function

The pump conveys the operating medium from the tank through the part being cooled to the heat exchanger. The axial fan provides the necessary air flow through the heat exchanger to cool the operating medium. The speed can vary depending on the application.

## Field of application

- Liquid-cooled drives: motor spindles, torque motors, servo motors, linear motors
- Inverter cooling
- Gearbox cooling and lubrication
- Bearing cooling
- Tool cooling

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## Versions

In addition to the standard upright and open version, the FLKS-10EC is also available with a closed housing.

Open version, upright



#### Closed version, upright



## **Speed control**

The temperature sensor of the **FLKS-10EC5** measures the water-glycol outlet temperature from the cooling system. The sensor's 0 – 10 V analogue signal is assigned a temperature range of 25 – 45 °C. The signal is forwarded to the EC fan according to the measured fluid outlet temperature to control the speed. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

Even at low ambient temperatures, the fluid temperature cannot drop below 28 °C given constant power input. This prevents condensation on electrical components.

#### Application:

Specially suited for low air temperatures, e.g. outdoors.



## **Speed control**

The **FLKS-10EC3** also comes with a PID controller (closed loop). The temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the reference value (ambient temperature + set differential D  $\Delta$ T). The PID controller continually adjusts the speed of the fan, in order to align the fluid temperature with the ambient temperature.

The outlet temperature remains at a set differential above the ambient temperature regardless of the input temperature of the fluid in the cooler (power of the machine).

### Application:

Particularly for precision cooling (e.g. in machine tools).

#### Lower fan speed

- = lower sound level
- = lower power consumption
- = lower contamination

## Cooling capacity



## **Output data**





The cooling capacity is calculated via the following formula:

 $P[kW] = P_{spec.}[kW/K] \times ITD[K]$ 

ITD (inlet temperature difference) = cooler inlet temperature of operating medium – air inlet temperature

#### **Electrical data:**

#### Permissible voltage range: 380 - 415 V - 50 Hz - 3 PHVoltage tolerance +5% / -10%

Motor capacity (50 Hz): Pump: 2.20 kW Fan: 2 x 0.98 kW

#### Electrical data:

Permissible voltage range: 380 – 415 V – 50 Hz – 3 PH Voltage tolerance +5% / -10%

Motor capacity (50 Hz): Pump: 4.00 kW Fan: 2 x 0.98 kW

### Note:

The operating point of the pump (flow rate) depends on the characteristic curve (line sizes, line lengths, screwing elements). In general, the less the system loses, the greater the flow rate and the greater the cooling capacity. Please contact Technical Sales with questions on cooling capacity and output data with other operating fluids, as well as on special voltages or other pumps.

## **Electrical connection**

The motor is usually electrically connected using a heavy-duty connector.

Additional 24 V DC control voltage, more information available upon request.

## Dimensions



#### Note:

We recommend maintaining the specified minimum distance to ensure an unimpeded air inlet and air outlet. Anything below the minimum distance can affect cooling capacity and noise emissions.

## Model code

	FLKS - 10 - EC2 - 2.0 - W - R10-6C3 - 2 - 0
Туре	
FLKS = fluid/air cooling system	
Size	
Speed control (open-loop/closed-loop)	
EC2=speed control, closed-loop (with PID controller)EC5=speed control, open-loop (with temperature sensor)	
Type code	
Operating fluid	
W = water-glycol (standard)	
Pump	
R10-6 = version with pump MTR10-6 R15-4 = version with pump MTR15-4 Version with two pumps on request.	
Motor voltage	
C = $380 - 415 \text{ V} - 50 \text{ Hz}$ (pump MTR10-6 and pump MTR15-4) See also "electrical data".	
Position of pump connection	
3 = rotated by 270° (clockwise)	
Coating	
2 = Light grey RAL 7035	
Accessory number	
0 = none (standard)	
For corresponding accessory number, see table.	

## **Accessories**



в	Fill level switch 2 switch points		•				•			•
D	Flow switch			•		•			•	
0	Air filter				•	•	•	•	•	•
Accessory number		0	44	30	14	43	59	82	122	124

See also "Accessories for FLKS" for more information.

## FLKS-10EC standard

Part no.	Designation	Pump	Version
4051523	FLKS-10EC5/1.0/W/R10-6C3/2/0	MTR10-6	Open, upright version, speed control, closed-loop
4115359	FLKS-10EC2/2.0/W/R10-6C3/2/0	MTR10-6	Closed, upright version, speed control, closed-loop

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## **FLKS Accessories**





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## **Fill Level and Temperature Switch**

For monitoring the level and temperature of the operating medium in the tank.

- 1 fill level switch point
- 1 fixed temperature switch point of 60 °C

Accessory number: 1

## Fill Level Switch (2 switch points)

For monitoring the level of the operating medium in the tank. Accessory number: 44



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## **Flow Switch**

For monitoring the continuous flow of the operating medium. Accessory number: 30



## Air Filter Grid

Mounted in front of the heat exchanger to prevent dust and dry particles from entering that could contaminate the heat exchanger. Accessory number: 14

## Air Duct

For directing the flow of air upward. Accessory number: 36

## Possible accessory combinations

Fill level and 60 °C temperature switch		•										•
Fill level switch 2 switch points			•					٠			•	
Flow switch				•			•			•		
Air filter					•		•	•	•	•	•	•
Air duct						•	•		•		•	
Accessory number in model code	0	1	44	30	14	36	43	59	82	122	124	105

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## Fluid/Air Cooling Systems

Systems with closed-loop speed control FLKS-2EC, FLKS-3EC, FLKS-4EC, FLKS-5EC, FLKS-8EC and FLKS-10EC



#### Lower speed

- = lower noise level
- = lower power consumption
- = lower contamination level
- = no condensation in electrical components at low ambient temperatures

The FLKS-EC HYDAC Cooling series offers various possibilities for open-loop and closed-loop control. This means the right solution can be found for every application.

Available in the sizes: FLKS-2EC, FLKS-3EC, FLKS-4EC, FLKS-5EC, FLKS-8EC and FLKS-10EC.

## FLKS – systematic closed-loop control

Noise reduction and energy savings - these are two of the biggest issues of the future in mechanical engineering.

FLKS - Fluid-air cooling systems - are cooling, as the name indicates, with air. A fan ensures that the necessary air flow is present to cool down the warm fluid in the cooling element. In a conventional fan with a fixed speed, the fan begins to run as soon as the cooling system starts up, irrespective of the ambient temperature and the power input from the consumer. This fan constantly uses energy and creates permanent noise.

Systems with open-loop and closed-loop speed control can change this: at low ambient temperatures the fan still runs but at a low speed; if the inlet temperature to the cooler is only just over the needed outlet temperature (e.g if the machine is at a standstill due to a tool change and therefore only a little heat is fed into the medium), the speed is also reduced.



## FLKS with constant speed (FLKS-xS)

The FLKS with AC fan drive operates with a constant speed and is therefore ideally suited to use in air-conditioned machine halls.





#### FLKS with AC fan drive:

Temperature response at decreasing ambient temperature and constant power input.

The medium's temperature curve follows the ambient temperature (at distance  $\Delta T$ ).

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## FLKS with open-loop speed control (FLKS-xEC5)

The FLKS with an EC fan drive is also equipped with a temperature sensor. The sensor's 0 - 10 V analogue signal is assigned a temperature range of 25 – 45 °C. An analogue signal is forwarded to the EC fan for open-loop control according to the measured fluid outlet temperature. The fan switches on at 1.5 V (= 28 °C) and reaches its maximum speed at 10 V (= 45 °C).

This FLKS is particularly suited to outdoor installation (e.g. for inverter cooling in cogeneration plants).



## FLKS with closed-loop speed control (FLKS-xEC3)

Closed-loop control is when measurements are continually taken to determine to what extent the control variable corresponds with the guide value and - in contrast to open-loop control - a deviation automatically leads to adjustment of the control variable.

A temperature sensor measures the fluid outlet temperature (variable). This temperature is continuously compared with the guide value (ambient temperature + set differential  $\Delta T$ ). The PID controller continually adjusts the speed of the fan, in order to align the outlet temperature with the ambient temperature.

The FLKS with closed-loop speed control is mainly used in machine tools where high fluid temperature accuracy is required.



## Note

Medium inlet and outlet are considered with regard to the cooling system, i.e. inlet from the consumer to the FLKS, outlet from the FLKS to the consumer.

The diagrams on the FLKS with constant speed and with open-loop speed control were created from tests in the cold chamber; the diagrams on closedloop speed control were created from measuring results from practical tests on a machine tool.

## Fluid / Air Cooling System (FLKS) design sheet

	<b>,</b>		-			
Project:						
Contact:						
Telephone:						
E-mail:						
Author:				Date:		
Application:						
Operating fluid:	O Water glycol	% gl	ycol: %			
	O Mineral oil	ISC	VG			
	Viscosity at 10 °C:		cSt			
	Viscosity at 40 °C:		cSt			
	0					
	0					
Operating fluid temperature:	Input flow to consumer:		°C			
	Return flow to consumer: (where required)		°C			
Required cooling capacity:		kW				
Flow rate of operating medium:		l/min				
Pressure differential of operating medium:		bar	At flow rate	:	l/min	
Max. permitted pressure		bar				
Ambient temperature:	min.:	°C	max.:		°C	
Altitude:		m abo	ve sea level			
Place of installation:	O Indoors		O Ou	tdoors		
Cavity:	Height:	mm	Width:	mm	Depth:	mm
Electrical data:	Voltage:	_V	Frequency:	Hz		
Temperature regulation of operating medium:	○ None					
	O Open-loop speed contro	ol (FLKS-	xEC5) e.g. for outo	loors		
	O Closed-loop speed con	trol (FLK	S-xEC3)			
Accessories:	○ Fill level and temperature switch					
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	<ul> <li>Fill level switch</li> <li>Flow switch</li> <li>Air filter</li> </ul>					
	◯ Air duct					
	O Other					
Other requirements:						
A 1 11 1						
Annual unit qty.:						

## Note

The information in this brochure relates to the operating conditions and applications described.

For applications and operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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