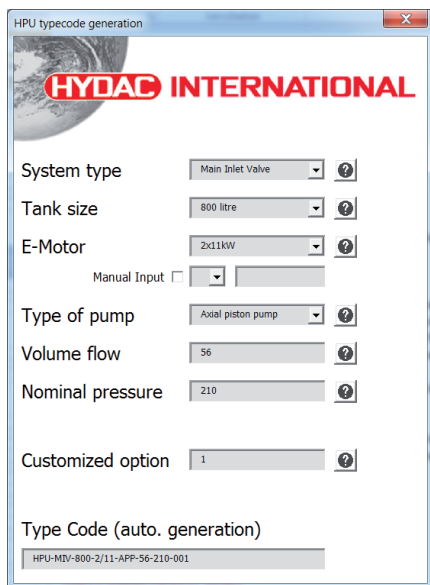


## Hydraulic Unit for Water Power Applications

### Standard HPU

#### General

Hydropower plants today make a vital contribution to the world's sustainable energy supply. HYDAC is determined to play its part in enabling people to gain maximum benefit from hydropower. In controlling and protecting the turbines and generators efficiently. HYDAC proves its expertise with hydraulic and filtration solutions in all sectors. Worldwide. Hydraulic systems, like no other technology driver, provides a high degree of operating safety and power density, compact design, fatigue strength, minimum maintenance and in conjunction with electronics excellent control and monitor ability. We offer power plant technology and service covering all aspects of oil hydraulics, project-specific design of hydraulic and fluid technology solutions in compliance with worldwide power plant standards and regulations.



#### Technical specification

Steel / Stainless steel oil reservoir:	250-2500 l
Pump type:	<ul style="list-style-type: none"> <li>● Internal Gear [PGI]</li> <li>● External Gear [PGE]</li> <li>● Axial Piston [PPV]</li> </ul>
Pump flow:	10-120 l/min 100-250 l/min
Operating pressure:	30-210 bar 30-250 bar on request
Operating fluid:	Mineral oil HLP according to DIN 51524 Part 2, Syntetic oil on request
Operating fluid temperature:	20-70 °C (5 °C)

#### Model Code

Hydraulic Power Unit      HPU – GOV/P – 800 – 2/11 – PGI – 50 – 150

##### System Type

Governing system Pelton = GOV/P  
 Governing system Francis = GOV/F  
 Governing system Kaplan = GOV/K  
 Main inlet valve = MIV  
 Hydro mechanical = HM  
 Other = SO

##### Reservoir size [l]

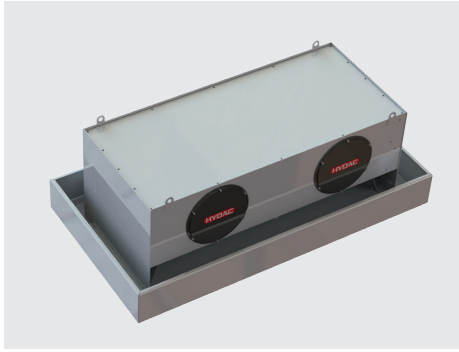
##### Quantity/Motor [kW]

##### Pump type

##### Pump flow [l/min]

##### Pressure rating [bar]

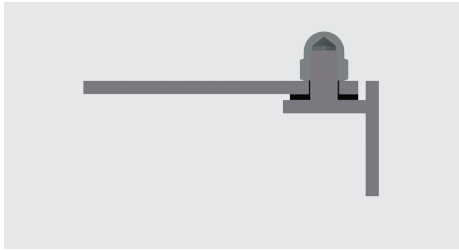
## Reservoir design



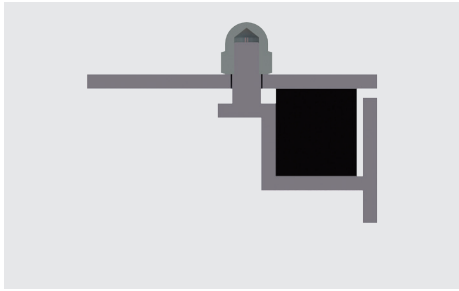
## Reservoir description

Reservoir plate design:

### VERSION A



### VERSION B



### HANDLING:

Lifting lugs are provided to allow easy lifting with standard lifting gear.



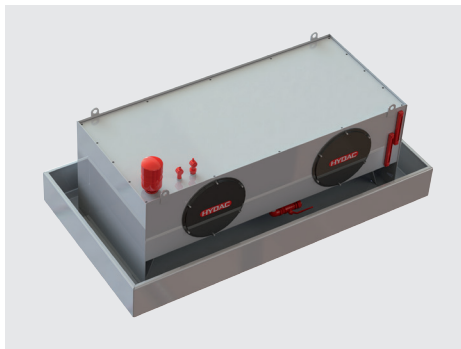
## Reservoir and oil pan dimension

Reservoir				
Type	Capacity [l]	Length [mm]	Width [mm]	Height [mm]
STB-250	250	1010	704	580
OeW-250		1270	950	220
STB-300	300	1150	714	580
OeW-300		1410	960	220
STB-400	400	1514	749	580
OeW-400		1874	1095	220
STB-630	630	1514	959	770
OeW-630		1874	1305	260
STB-800	800	2014	914	770
OeW-800		2374	1260	270
STB-1000	1000	2014	1079	800
OeW-1000		2374	1425	300
STB-1250	1250	2014	1349	800
OeW-1250		On request	On request	On request
STB-1500	1500	2014	1444	850
OeW-1500		On request	On request	On request
STB-2000	2000	2314	1564	900
OeW-2000		On request	On request	On request
STB-2500	2500	2314	1564	1000
OeW-2500		On request	On request	On request

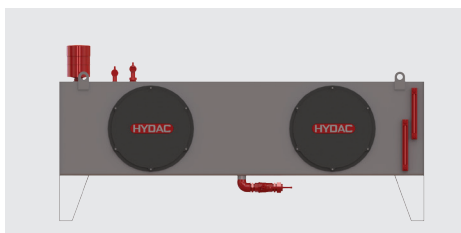
## Technical specification

Reservoir material:	1.0038 1.4301 1.4571
Testing:	Leak test, coating
Surface preparation:	Blast cleaning at least Sa 2½ (ISO 8501) V2A / V4A sandblasted
Prime coat:	Epoxy zinc phosphate nom. DFT 80 µm
Intermediate coat:	Epoxy paint nom. DFT 40 µm
Final coat:	Epoxy paint nom. DFT 40 µm
Total nom. DFT:	160 µm
Handling:	Lifting lugs welded
Cleaning-cover:	RD350 or RD475

## Reservoir accessories



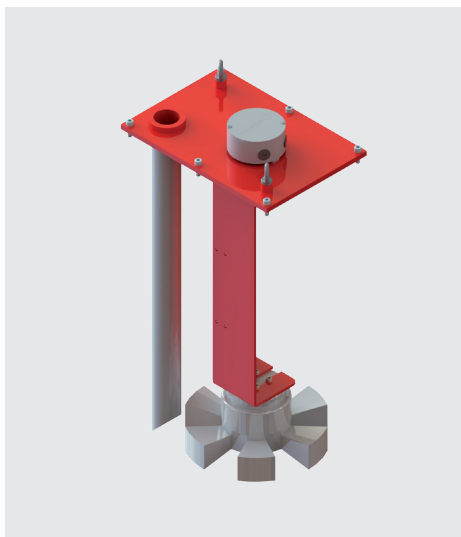
Pressure sensors are mounted directly on manifold or pipe  
(Minimess coupling ISO228-G1/4" M16\*2)



## Reservoir heaters

PTKH 90-G 2"	
Power [W]	Immersion[mm]
500	200
1000	400
1450	600
1950	800
2450	1000
2950	1200
3450	1400
3900	1600
4900	2000

## Heating motors



## Reservoir accessories / Electronic

### RESERVOIR BREATHER WITH DEHUMIDIFIER

- HYDAC TYPE BLT
- HYDAC TYPE BDE

### LOCAL LEVEL INDICATOR

- HYDAC FSA including temperature indicator
- Optional magnetic flap indicator

### LEVEL MEASUREMENT

- HYDAC HNT 3000  
Output: 4-20 mA  
PNP Transistor max 1.2 A  
Optional with temperature switch  
Power supply: 9-35 V DC

### TEMPERATURE INDICATOR

- PT100 including protection sleeve if needed
- HYDAC ETS 1700  
Output: 4 relays and 4-20 mA  
Switching capacity 400VA, 50 W  
Power supply: 2-32 V DC
- HYDAC ETS 3200  
Output: 1-2 transistor switching outputs  
1 transistor switching output and 4-20 mA  
Power supply: 9-32 V DC
- Contamination Sensor  
Particle sensor CS 1000  
Water sensor AS 1000

### ELECTRONIC PRESSURE SWITCH

- HYDAC EDS 8000  
Output: 2 transistor switching outputs  
Power supply: 9.6-32 V DC
- HYDAC EDS 3400  
Output: 1-2 transistor switching outputs  
Optional 4...20 mA/ 0...10 V output  
Power supply: 9-32 V DC
- HYDAC EDS 1700  
Output: 4 relays and 4-20 mA (400VA, 50W)  
Power supply: 22-32VDC
- Deviating HYDAC sensor on request

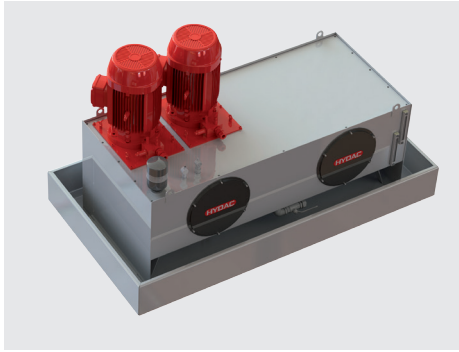
### DRAIN VALVE / BALL VALVE INCLUDING PLUG

- HYDAC KHB 1"

### RESERVOIR HEATER

- PTKH 91 TH  
Power: 0.5 to 4.9 kW  
Immersion depth: 200 to 2000 mm
- Heating Motors  
Type: FZ025-4DA.4C.1 (1.5 kW)  
Type: FZ023-4EA.0C.V7 (0.8 kW)

## Pump design



## Pump description

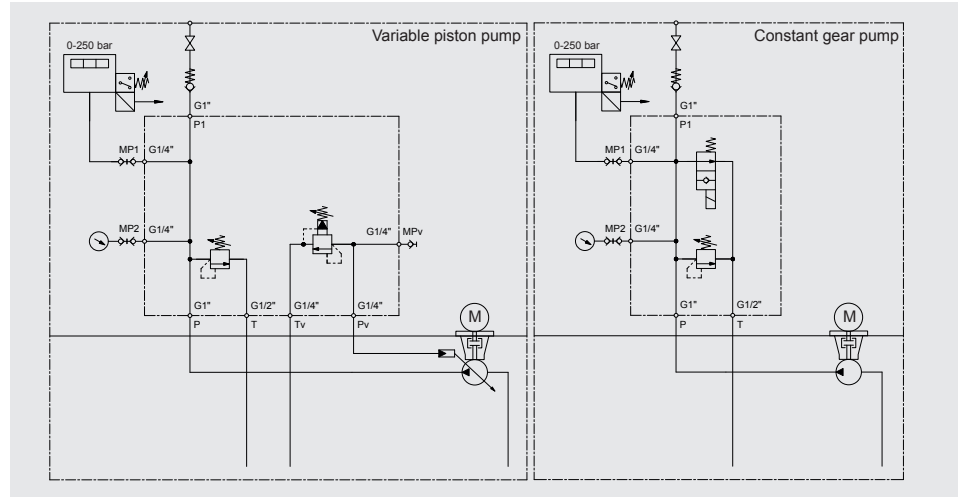
Hydro pumps are mounted under oil in a vertical position. All type of pumps are controlled by the valve block which is located on top of the reservoir.

### PUMP TYPE AND VALVES:

- Axial Piston Pump
- External Gear Pump
- Internal Gear Pump
- Pressure Relief

There are 2 different valve blocks available. One for typical variable flow pumps and one for constant pumps. All valves for flow and pressure adjustments are installed in these blocks and no under oil settings must be done.

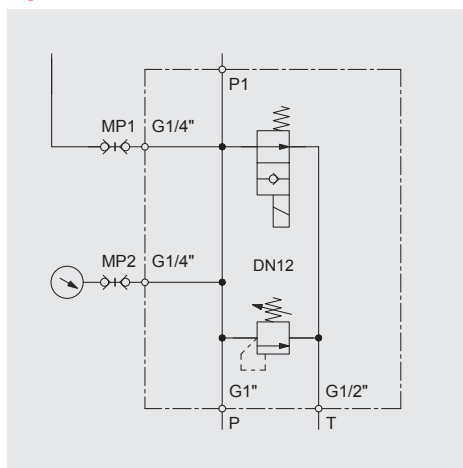
## Pump solution



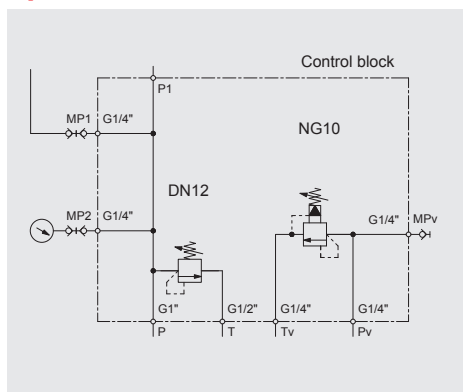
## Technical specification

Motors:	Efficiency: IE2 /IE3 50 Hz/optional 60Hz 4 poles Full load speed 1435-1485rpm Voltage: 230/400V AC IP55 / others on request
Valves:	Manganese phosphate/zinc plated/zinc-nickel plated
Pressure regulation valve:	DB3E
Pressure relief 1:	DB12120A max flow: 120l/min
Pressure relief 2:	DB16P-01 max flow: 300l/min
Unloading valve 1:	WSM xxx 24V or 230VAC or DC
Unloading valve 2:	Cartridge NG25 controlled by DB4E WSM xxx 24V or 230VAC or DC
Check valve:	RVxx-RL/WD (non return valve BSP with captive seal)
Ball valve:	KHB-xxLR or SR, BSP with captive seal
Pressure gauge:	HN-63 (63mm)

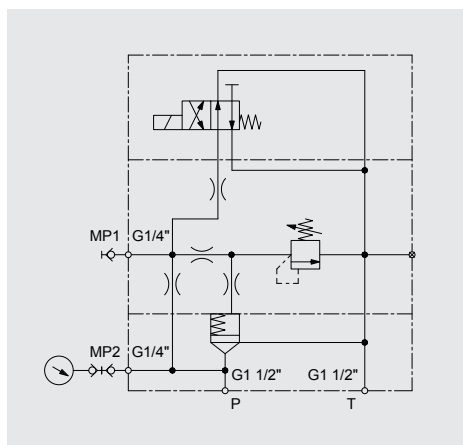
## Manifold for constant pump up to 120 l/min



## Manifold for variable pump up to 120 l/min



## Manifold for 100-250 l/min



## Reservoir accessories / Electronic

Type	Model code	Size	Rating	Max. Pressure	
Axial Piston Pump	PPV100SXX-FR07K1E1C-10-4205	16	16.3 ccm/U	315 bar	
		37	37.1 ccm/U		
		56	56.3 ccm/U		
		71	70.7 ccm/U		
		100	100.5 ccm/U		
External Gear Pump	PGE101-XXXX-RBQ1-N-3700	0100	1 ccm/U	250 bar	
		0125	1.25 ccm/U		
		0160	1.6 ccm/U		
		0200	2 ccm/U		
		0315	3.15 ccm/U		
		0365	3.65 ccm/U		
		0420	4.2 ccm/U		
		0500	5 ccm/U		
	0610	6.1 ccm/U	200 bar		
	0740	7.4 ccm/U	170 bar		
	PGE102-XXXX-RBR1-N-3700	PGE102-XXXX-RBR1-N-3700	0450	4.5 ccm/U	250 bar
			0630	6.3 ccm/U	
			0820	8.2 ccm/U	
			1000	10.0 ccm/U	
			1130	11.3 ccm/U	
1200			12.0 ccm/U		
1400			14.0 ccm/U		
1500			15.0 ccm/U		
1600			16.0 ccm/U		
1730			17.3 ccm/U	220 bar	
1900	19.0 ccm/U	200 bar			
2200	22.0 ccm/U	180 bar			
2500	25.0 ccm/U	160 bar			
2800	28.0 ccm/U	120 bar			
Internal Gear Pump	PGI100-2-XXX-RA04-11-5111	005	5.4 ccm/U	250 bar	
		006	6.4 ccm/U		
		008	7.9 ccm/U		
		011	10.9 ccm/U		
		013	13.3 ccm/U		
		016	15.8 ccm/U		
		019	19.3 ccm/U		
		022	22.2 ccm/U		
		025	25.2 ccm/U		
		PGI101-3-XXX-RK23-10-6100	PGI101-3-XXX-RK23-10-6100		032
	040			24.8 ccm/U	
	064			32.1 ccm/U	
	PGI103-5-XXX-RA23-10-6100	PGI103-5-XXX-RA23-10-6100	080	80.4 ccm/U	210 bar
			100	100.5 ccm/U	
	PGI103-6-XXX-RA23-10-6100	PGI103-6-XXX-RA23-10-6100	125	125.7 ccm/U	250 bar
160			160.1 ccm/U		

## Filter design



Selected designs of this filter range can be supplied with manufacturer's test certificates O and M according to DIN 55350, Part 18. Test certificates 3.1 according to DIN EN 10204 and approval certificates (Type Approval) for different approval authorities.

### FILTER TYPE:

- LF
- DF
- DFDK
- FMND
- RFN
- Clogging indicator
- Filter Selection Tool "Filter IT"

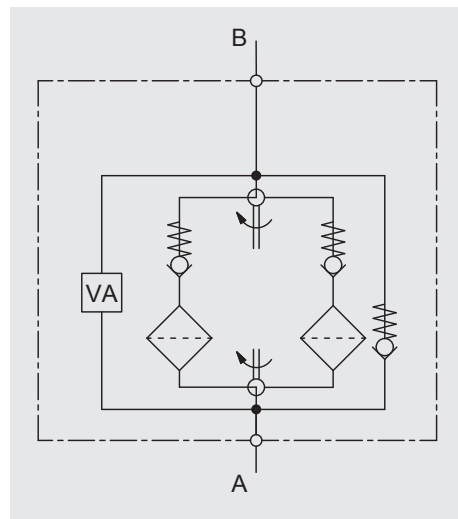


## Filter solution

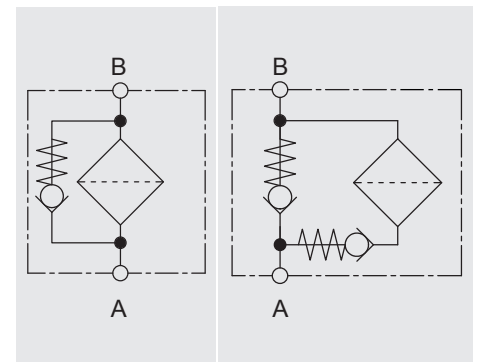
Description	Type	Size	Mesh size*	Nom. Pressure	Flow Rating	Δp at 46 [cSt]
Inline Filter	LF XXX I X 10 A 1.0	30	10 μm	100 bar	25	1,0 bar
		60			50	1,0 bar
		110			75	1,0 bar
		160			130	1,0 bar
		240			155	1,0 bar
		330			225	1,0 bar
		660			380	1,0 bar
Pressure Filter	DF XXX T X 10 A 1.0	60	10 μm	420 bar	50	1,0 bar
		140			85	1,0 bar
		160			145	1,0 bar
		240			170	1,0 bar
		280			255	1,0 bar
		330			240	1,0 bar
		500			360	1,0 bar
		600			410	1,0 bar
Change-over inline filter	DFDK XXX QLX 10 A 1.X	60	10 μm	315 bar	48	1,5 bar
		140			65	1,5 bar
		240			100	1,5 bar
		280			115	1,5 bar
Change-over inline filter	FMND XX MDX 10 A 1.0	100	10 μm	250 bar	60	1,0 bar
		160		210 bar	135	1,0 bar
		250		165	1,0 bar	
		400		185	1,0 bar	
Return Filter	RFM XXX B X 10 A 1.0	90	10 μm	10 bar	50	0,5 bar
		150			70	0,5 bar
		185			100	0,5 bar
		210			180	0,5 bar

\* other mesh sizes on request

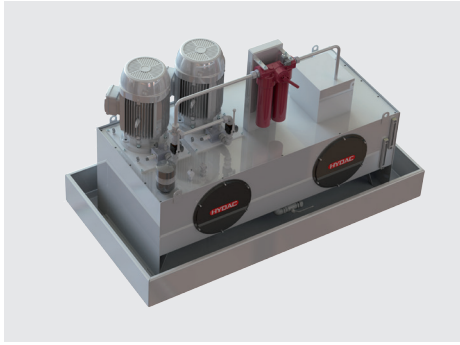
### HYDAC Change-over inline filter



### HYDAC Pressure filtration examples

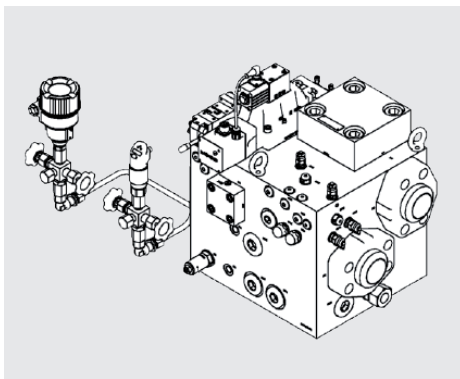


## Manifold Design



The Control manifold is custom built to meet specified requests and customer needs. The customizing ensures that the hydraulics perfectly fit into the given application without losses in performance while maintaining low costs

### EXAMPLES OF MANIFOLDS:



## Manifold solution

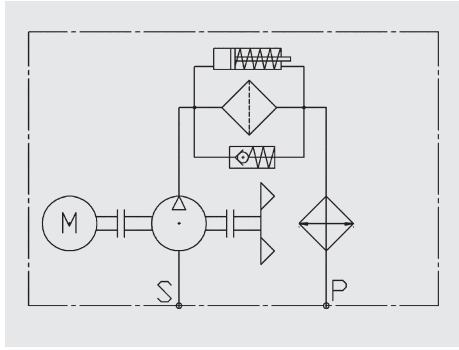
### Technical specification

Manifold material:	EN-GJS-400-15/EN-JS1030 Dustile cast iron and others on request
Protection:	Nickel plated (12 µm) and others on request

All manifolds flushed according to HYDAC cleanliness standards for industrial hydraulics.

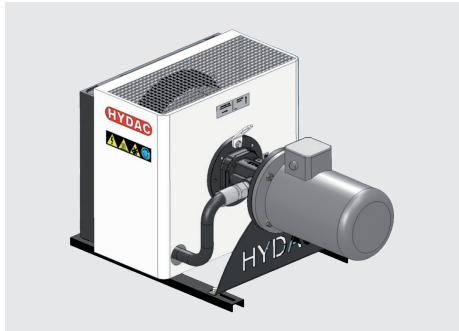
Additional information available under:  
<http://www.hydac.com/de-en/products/heat-exchangers-coolers.html>

## Cooler Design

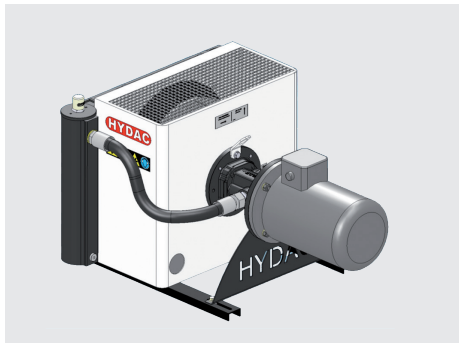


Installed off-line, the OSCAF provides efficient cooling and filtration of the hydraulic fluid regardless of the duty cycle of the hydraulic system.

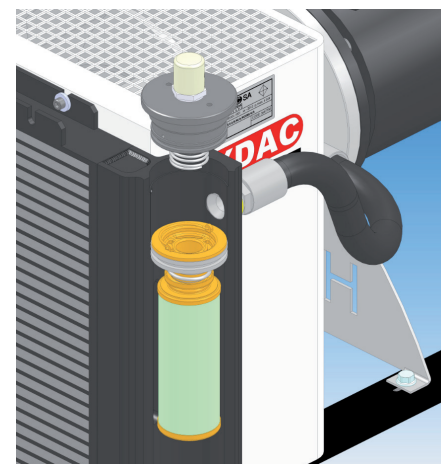
- Low-noise screw pump
- Small insize and low in weight
- Integration of several features in one unit: pumping, cooling, filtration
- Compact: filter integrated in heat exchanger



OSCA: air cooler with pump



OSCAF: with pump + filter



## Operating Data

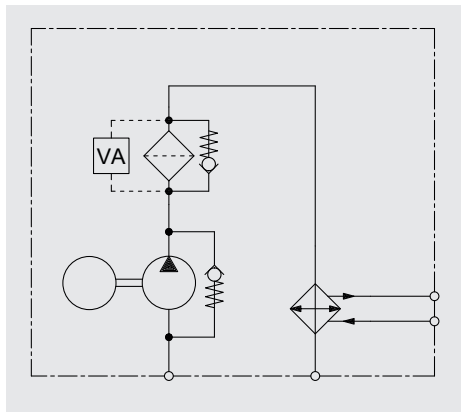
Oil:	Oils (mineral oils, synthetic oils, high viscosity oils, biological oils, phosphate ester)
Viscosity:	500 mm <sup>2</sup> /s
Oil temperature:	+20 °C ... +90 °C
Ambient temperature:	-20 °C ... +40 °C
Motor:	Three-phase electric motor Efficiency class IE2 (only ≥ 0.75 kW) Insulation class: F Protection class: IP55
Pump:	Screw pump Operating pressure: max. 10 bar Negative suction pressure: max. -0.4 bar

## Technical Data

Type of cooler	SAP Code	Heat dissipation at @dT=40 °C [kW]	Pressure drop [bar] at 30 mm <sup>2</sup> /s	Displacement [cm <sup>3</sup> /U]	Oil flow [l/min] [40 cSt - 4 bar]	Motor: N° of poles / Size	Motor: Power [kW]	Nominal current [A] @ 400 V 50 Hz	Noise level at 1 m distance at 50 / 60 Hz [dB (A)]	Size of filter [-]	Weight [kg]
OSCA 0L	3926218	1.5	0.11	10	10	6/71	0.25	1.0	56/60	-	20
OSCA 0S	3926219	1.8	0.19	10	15	4/71	0.37	1.2	63/67	-	20
OSCAF 0L	3926223	1.5	0.11	10	10	6/71	0.25	1.0	56/60	LF60	25
OSCAF 0S	3926222	1.8	0.19	10	15	4/71	0.37	1.2	63/67	LF60	25
OSCA 1L	3768893	3.7	0.08	10	10	6/71	0.25	1.0	59/63	-	28
OSCA 1S	3684999	4.3	0.12	10	15	4/71	0.37	1.2	66/70	-	28
OSCAF 1L	3769020	3.7	0.13	10	10	6/71	0.25	1.0	59/63	NG080	31
OSCAF 1S	3708807	4.3	0.18	10	15	4/71	0.37	1.2	66/70	NG080	31
OSCA 2L	3647770	7.0	0.30	28	28	6/90	0.75	2.0	60/64	-	40
OSCA 2S	3647749	9.2	0.45	28	40	4/90	1.10	2.5	69/73	-	40
OSCAF 2L	3647771	7.0	0.50	28	28	6/90	0.75	2.0	60/64	NG080	43
OSCAF 2S	3647750	9.2	0.85	28	40	4/90	1.10	2.5	69/73	NG080	43
OSCA 3L	3764555	11.6	0.25	28	28	6/90	1.10	2.7	67/71	-	63
OSCA 3S	3672255	15.0	0.38	28	40	4/90	1.80	3.7	77/81	-	63
OSCAF 3L	3764557	11.6	0.44	28	28	6/90	1.10	2.7	67/71	NG080	66
OSCAF 3S	3675061	15.0	0.75	28	40	4/90	1.80	3.7	77/81	NG080	66



## Cooler Design



The UKF unit is a compact, easy-to-install system for offline filtration cooling circuits. It consists of a low-noise feed pump, a filter and a plate heat exchanger.

Continuous cooling and offline filtration extend the service life of the oil and of the hydraulic system. The offline unit ensures constant oil temperature – regardless of the cycle times of the hydraulic systems. Furthermore, consistent flow rates prevent pressure spikes in the heat exchanger.



UKF-1



UKF-2

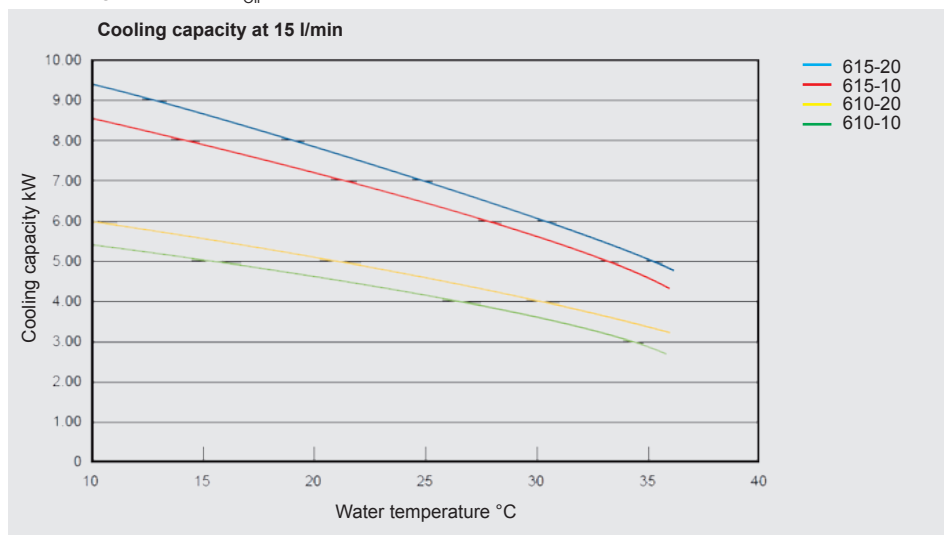
## Manifold solution

### Operating Data

Oil:	Mineral oil according to DIN 51524 Part 1 and Part 2 +10 °C ... +80 °C
Water:	Water glycol (HFC), Water, Oils +5 °C ... +60 °C
Motor:	Three-phase electric motor Insulation class: F Protection class: IP55 Speed: 1,500 / 1,800 1/min (50/60Hz)
Pump Flow:	UKF 1: 5-15 l/min = up to 10kW UKF 2: 15-60 l/min = up to 30kW
Plate Heat Exchanger HYDAC HEX S:	Plate material: stainless steel, vacuum-brazed with copper Operating pressure: max. 30 bar Sizes: 610, 615 (see also diagrams below)
Filtration:	3, 5, 10, 20 µm
Clogging indicator:	visual-electrical

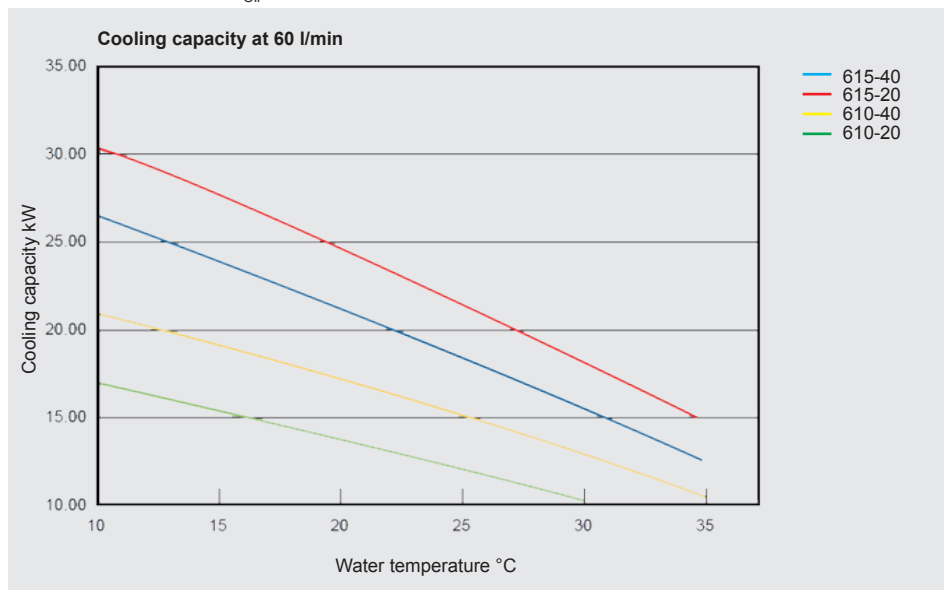
#### UKF-1:

Operating condition:  $T_{oil} = +55\text{ °C}$ ; oil ISOVG46;  $Q_{Oil} / Q_{Water} = 1$



#### UKF-2:

Operating condition:  $T_{oil} = +55\text{ °C}$ ; oil ISOVG46;  $Q_{Oil} / Q_{Water} = 4$



Additional information available under:

<http://www.hydac.com/de-en/products/heat-exchangers-coolers/pump-transfer-cooler-filtration-units.html>

## Declaration of Conformity

### GENERAL P&ID

The power units are manufactured in accordance with the harmonized standards DIN EN ISO 4413, DIN EN ISO 12100 and DIN EN 60204-1. The hydraulic power unit constitutes partly completed machinery in the sense of the EC Machinery Directive 2006/42/EC. It is exclusively intended for integration into a machine or system or to be assembled with other components to form a completed component in the sense of the EC Machinery Directive 2006/42/EC

## General technical information

- Tube forming system for fittings with 24° cone connection or double-edge cutting ring according to ISO 8434 part 1 (DIN 2353) light/heavy series according to the technical possibilities
- Piping Cr(VI)-free
- Option: Walform, Inox piping, welded piping
- All components with standard painting from manufacturer
- Noise Level < 80 db(A)
- All components with nameplates as specified
- Basic painting 160 my
- Blocks, manifolds, ball and check valves are galvanized
- Tac numbers glued

## HYDAC Standard Documentation

Basically the documentation is according to EC Machinery Directive 2006/42/EC for partly completed machinery:

- Part list
- Dimensional drawing
- P&ID
- Handling and lifting instruction
- Manual for supplied HPU
- Customer specific documentation on request

## HYDAC Standard test procedure

**The unit gets completely tested by HYDAC:**

1. Cleaning/flushing until specified cleanliness class has been achieved
2. Pressure testing of the motor-pump-group. Flow and leakage test on request
3. Pressure and leakage test of the HPU
4. Testing of all valves and their functions
5. Every unique system will receive its own test protocol
6. Unloading and cleaning before transport
7. Optional approval process on request

## Packaging / Transport

- Optional packaging (ready for truck transport)
- Optional seaworthy packaging