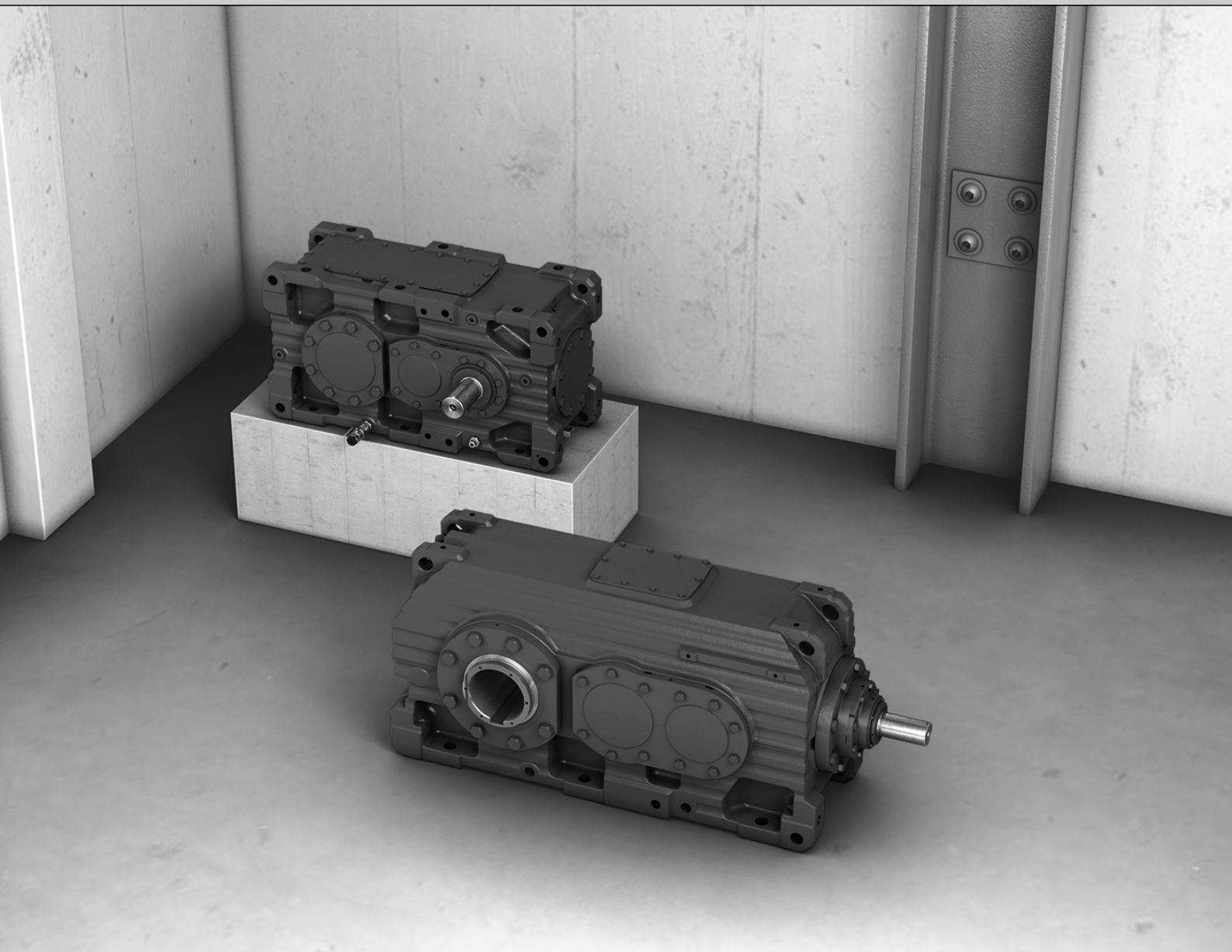




SEW
EURODRIVE

Instrucciones de montaje y funcionamiento



Reductores industriales

Motobomba en caso de lubricación a presión /ONP1



Índice

1	Motobomba en caso de lubricación a presión.....	4
1.1	Estructura/funcionamiento	4
1.2	Esquema de conexiones (representación del principio)	12
1.3	Instalación y montaje	13
1.4	Nota sobre el control del nivel de aceite	16
1.5	Puesta en marcha	17
1.6	Inspección/mantenimiento	18
1.7	Fallos de funcionamiento	19
1.8	Lubricantes admitidos	20
2	Documentación de proveedores	25
2.1	Transfer Gear Pumps - Operating and Maintenance Instructions	26
2.2	Transfer Gear Pumps - Technical data	91
2.3	Pressure Switch - Operating Instructions.....	123
2.4	Bourdon tube pressure gauge - data sheet	125
2.5	Bimetal thermometer - data sheet.....	128
2.6	Flow switch - Operating instructions	134
2.7	Flow switch - data sheet	147
2.8	Pressure sensors - data sheet	150
2.9	Singel Filter - Operating instructions	153
2.10	Filtro Duplex, hoja de datos	161
2.11	Contamination indicator, operating instructions	163

1 Motobomba en caso de lubricación a presión

1.1 Estructura/funcionamiento

1.1.1 Estructura

En el caso de lubricación a presión, una motobomba suministra aceite a través de un sistema de tubos en el interior del reductor a todos los puntos de apoyo y engranajes encima del colector de aceite.

La motobomba se utiliza, p. ej., cuando la velocidad del reductor es $\leq 400 \text{ min}^{-1}$ o en caso de funcionamiento de variador donde el uso de una bomba de extremo del eje solo es posible con limitaciones.

La motobomba se monta externamente al reductor y su velocidad es independiente de la del reductor.

Para los tamaños de reductor X140 - X320 la bomba está dotada de una válvula limitadora de presión integrada.

NOTA



Tenga en cuenta además las instrucciones del correspondiente fabricante de la motobomba.

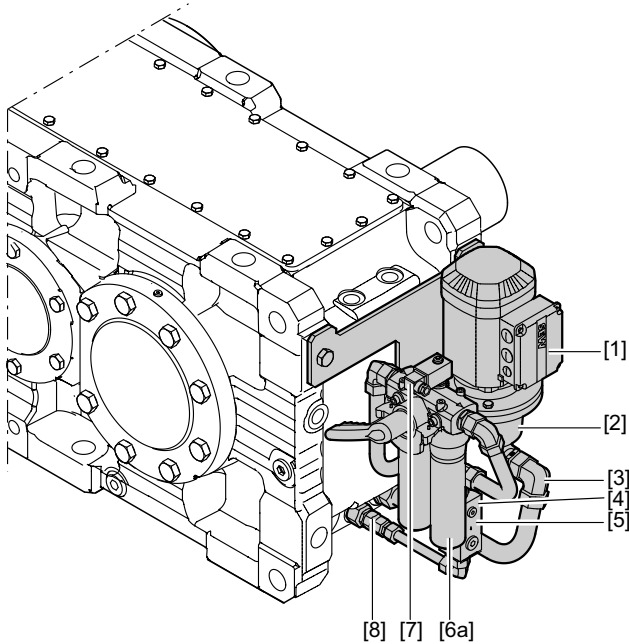
Las siguientes imágenes muestran los reductores en las posiciones de montaje M1 y M5 con las superficies de montaje estándar para la motobomba.

NOTA

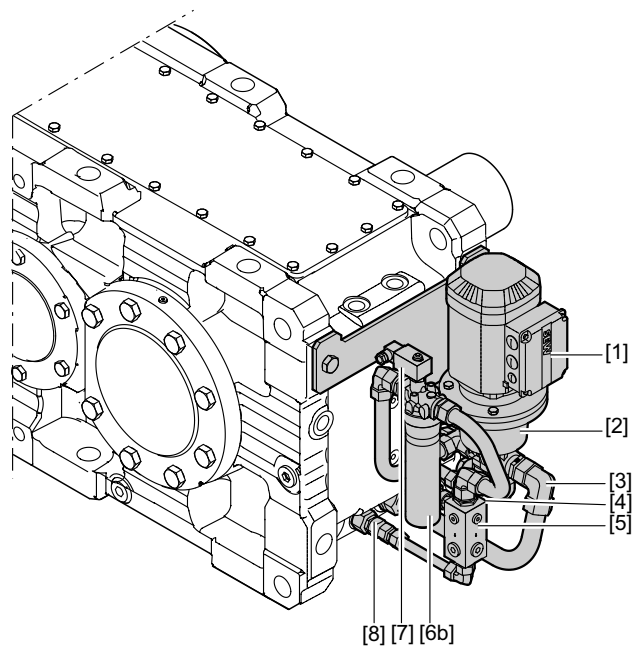


Para utilizar otras superficies de montaje distintas del estándar se precisa un rediseño del juego de entubado. En caso dado, esto puede tener incidencia en la viscosidad mínima del aceite. Es necesaria una comprobación individual exhaustiva. Consulte con SEW-EURODRIVE.

Posición de montaje M1/Superficie de montaje F6

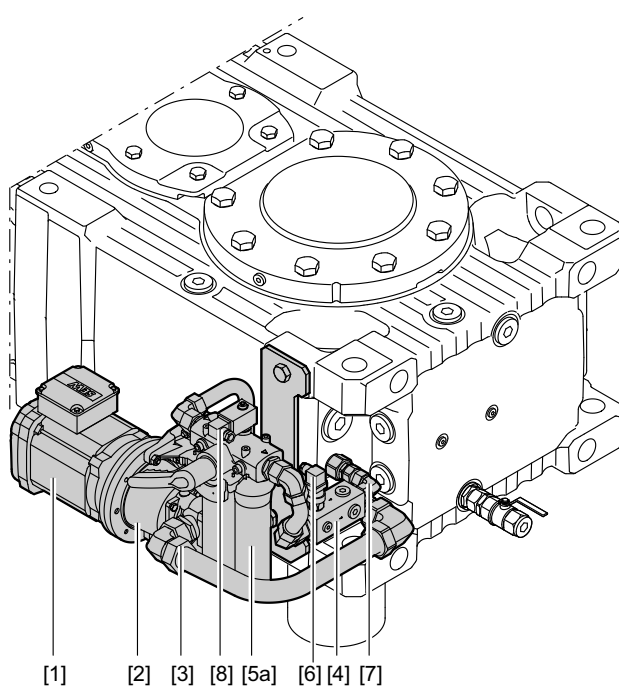


- [1] Motor
- [2] Bomba
- [3] Tubo de aspiración
- [4] Presostato
- [5] Bloque de medición

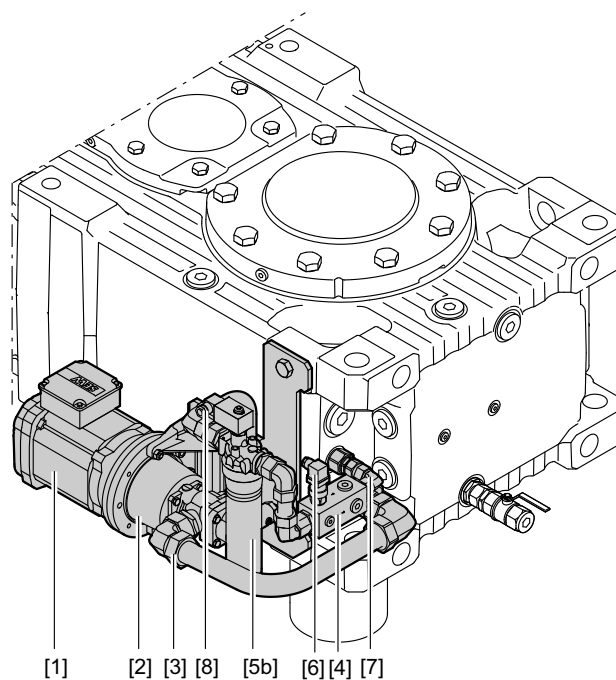


9007218537756939

- [6a] Filtro dúplex
- [6b] Filtro símplex
- [7] Indicador de suciedad
- [8] Tubería de impulsión

Posición de montaje M5/Superficie de montaje F1

- [1] Motor
- [2] Bomba de aceite
- [3] Tubo de aspiración
- [4] Bloque de medición
- [5a] Filtro dúplex

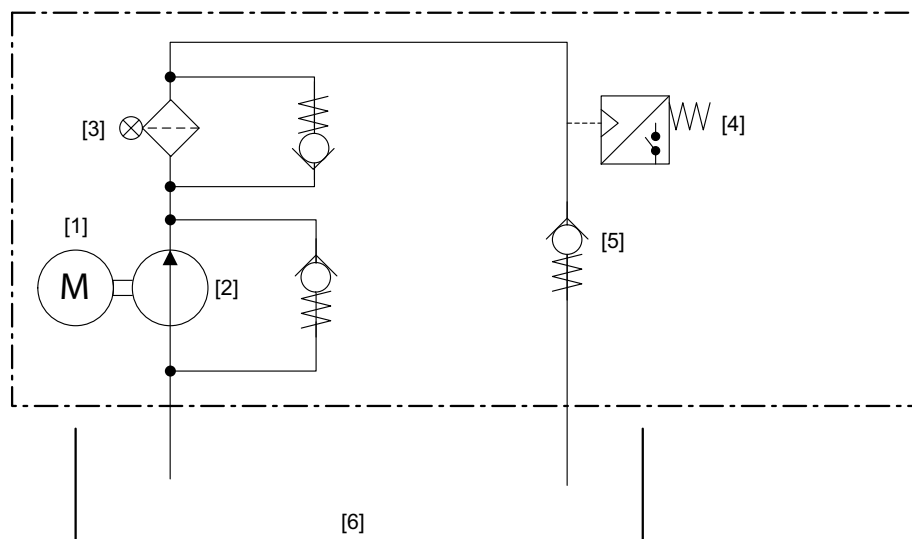


- [5b] Filtro simplex
- [6] Presostato
- [7] Tubería de impulsión
- [8] Indicador de suciedad

9007218537648651

Esquema hidráulico filtro símplex

La siguiente imagen muestra un ejemplo de estructura de unidad estándar de los sistemas de suministro de aceite.



27021617061611787

[1] Motor

[4] Presostato

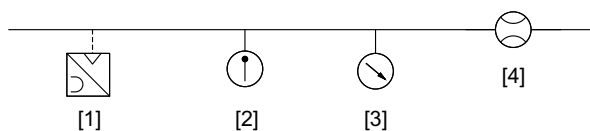
[2] Bomba de aceite

[5] Válvula antirretorno

[3] Filtro símplex

[6] Reductor

La siguiente imagen muestra un resumen de las posibles opciones que se pueden adosar.



9007218072662539

[1] Sensor de presión

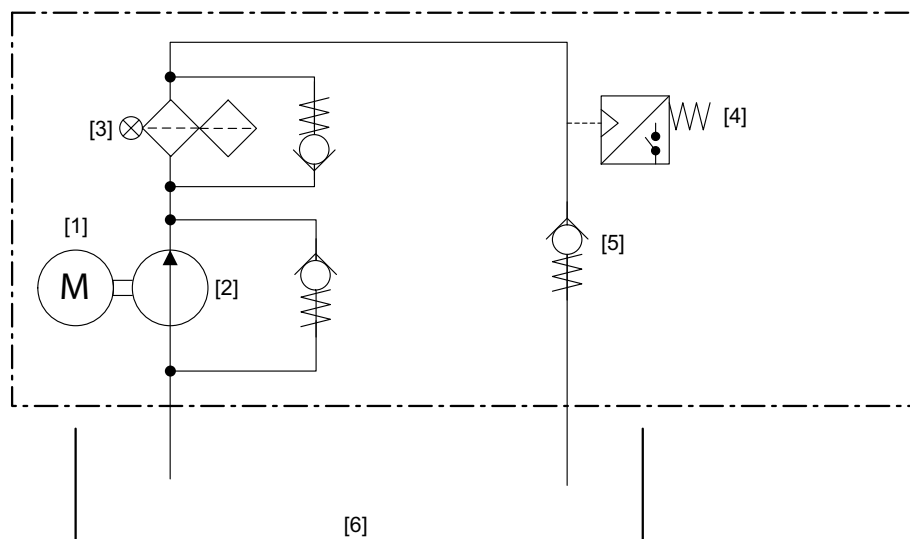
[3] Manómetro

[2] Termómetro

[4] Sensor de caudal

Esquema hidráulico filtro dúplex

La siguiente imagen muestra un ejemplo de estructura de unidad estándar de los sistemas de suministro de aceite.



27021617061608843

[1] Motor

[4] Presostato

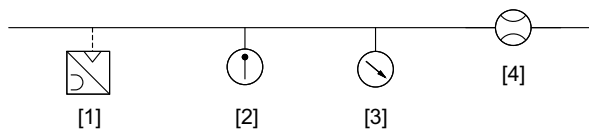
[2] Bomba de aceite

[5] Válvula antirretorno

[3] Filtro dúplex

[6] Reductor

La siguiente imagen muestra un resumen de las posibles opciones que se pueden adosar.



9007218072662539

[1] Sensor de presión

[3] Manómetro

[2] Termómetro

[4] Sensor de caudal

1.1.2 Información general

La motobomba se suministra como unidad completa, pero sin conexiones eléctricas.

Estándar

El contenido del suministro estándar de la motobomba incluye:

- Bomba de aceite con motor asíncrono directamente adosado (**la bomba funciona siempre conjuntamente**)
- Presostato que vigila la presión de la bomba. Señal de aviso o de desconexión con una presión de aceite < 0.5 bar
- Bloque de medición (presostato montado de forma estándar)
- Filtro símplex con indicador de suciedad eléctrico/óptico

Equipamiento opcional

Opcionalmente, la motobomba puede estar equipada con los siguientes componentes:

- Interruptor térmico /NTB con un punto de conmutación para la vigilancia del grupo de refrigeración, es decir, aviso o desconexión del reductor a una temperatura del aceite > 90 °C
- Montados en el bloque de medición:
 - Manómetro
 - Termómetro
 - Sensor de caudal
 - Sensor de presión
- Filtro dúplex con indicador de suciedad eléctrico/óptico

1.1.3 Función

Tenga en cuenta las siguientes instrucciones de manejo para los distintos componentes.

Bomba de aceite

El motor de la bomba se debe conectar 20 s antes del arranque del reductor y funciona conjuntamente siempre durante el funcionamiento del reductor.

Para los tamaños de reductor X140 – 320, la presión del sistema durante el funcionamiento de la bomba se limita mediante una válvula limitadora de presión integrada en la bomba.

NOTA

No se debe cambiar el ajuste de esta válvula en la bomba de aceite.

Unidad de suministro de aceite

La unidad de suministro de aceite funciona conjuntamente al iniciarse el reductor → viscosidad inicial máx. 5000 cSt.

Interruptor térmico /NTB (opcional)

La supervisión de temperatura del sistema se lleva a cabo mediante un interruptor térmico /NTB para conexión a un control del usuario.

- $A T > 90\text{ °C} \rightarrow$ **PARADA REDUCTOR/AVISO**

Filtro

El filtro se vigila ópticamente mediante un indicador de presión diferencial y eléctricamente mediante un control de presión diferencial.

$A \Delta p > 2.2\text{ bares} \rightarrow$ **AVISO** (limpiar filtro)

Información general

Para el presostato se ha de prever un puenteado de arranque de 10 s tras el arranque de la motobomba.

1.1.4 Normativa de bloqueo

Habilitación del reductor

Habilitación del reductor si se cumple la siguiente condición:

- Presión del aceite $p > 0.5$ bares (puenteado de arranque de 10 s)
- Temperatura del aceite $T < 90$ °C (opcional)

PARADA reductor/aviso

PARADA del reductor/aviso si se cumple una de las siguientes condiciones:

- Presión del aceite $p < 0.5$ bares
- Temperatura del aceite $T > 90$ °C (opcional)

1.1.5 Tamaños y selección

Los datos de potencia de la motobomba estandarizada están resumidos en la siguiente tabla.

Tamaño ONP1	Tamaño Bomba de aceite	Datos de motor			Carga conectada Motor de la bomba de aceite en kW	Global motor en Hz	Caudal a 1500 min ⁻¹
		Tipo	Norma IEC	Número de polos			
ONP1 6	KF 6 RF	DRN	80MK	4	0.55	50/60	8.4
ONP1 8	KF 8 RF	DRN	80MK	4	0.55	50/60	10.5
ONP1 10	KF 10 RF	DRN	80M	4	0.75	50/60	13.7
ONP1 12	KF 12 RF	DRN	90S	4	1.1	50/60	17.1
ONP1 16	KF 16 RF	DRN	90S	4	1.1	50/60	21.8
ONP1 20	KF 20 RF	DRN	90L	4	1.5	50/60	27.1
ONP1 25	KF 25 RF	DRN	100L	4	2.2	50/60	34.0

1.3 Instalación y montaje

1.3.1 Conexión mecánica

Conecte la motobomba al circuito de lubricación respetando las marcas de identificación, teniendo en cuenta las prescripciones nacionales vigentes.

Tenga en cuenta las siguientes condiciones:

- Una reducción de las secciones de conducto especificadas no está permitida.
- Tenga en cuenta el grosor de pared y el material adecuados a la hora de seleccionar tubos, tubos flexibles y racores.

1.3.2 Conexión eléctrica

Tenga en cuenta las normativas específicas del país para las conexiones eléctricas.

En la versión estándar, conecte los siguientes componentes:

- Motor
- Interruptor térmico (opcional)
- Presostato
- Indicador de suciedad del filtro de aceite

Tenga en cuenta al respecto las siguientes notas.

- Durante esta operación, compruebe particularmente el correcto sentido de giro de la bomba de aceite.
- Observe la hoja de datos del motor
- El motor de la bomba se debe conectar 20 s antes del arranque del reductor y funciona conjuntamente siempre durante el funcionamiento del reductor.
- El presostato emite una señal de alarma cuando la presión cae por debajo de 0.5 bares.
- El indicador de suciedad del filtro de aceite indica la necesidad de cambiar un elemento filtrante sucio.

En caso de usar opciones:

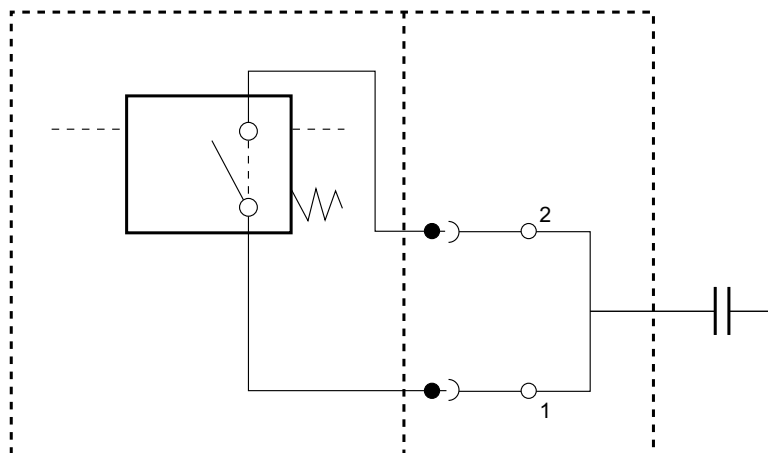
- Conecte el interruptor térmico /NTB al control del usuario.
- Conecte el sensor de caudal al control del usuario.
- Conecte el sensor de presión al control del usuario.

Tenga en cuenta al respecto las siguientes notas.

- En caso de utilizar un interruptor térmico /NTB tiene que integrarlo en el circuito de tal modo que al alcanzar el punto de conmutación de 90 °C se dispare una señal de advertencia o se desconecta el accionamiento principal.

1.3.3 Datos técnicos del indicador de suciedad eléctrico/óptico

La siguiente imagen muestra el esquema de conexiones:



5900838539

La siguiente tabla muestra los datos técnicos:

Tensión máx.	250 V CA / 200 V CC
Corriente de conmutación máx.	1.0 A
Capacidad de conmutación máx.	70 W
Grado de protección	IP 65 en estado enchufado y asegurado
Tipo de contacto	Contacto NA/contacto NC

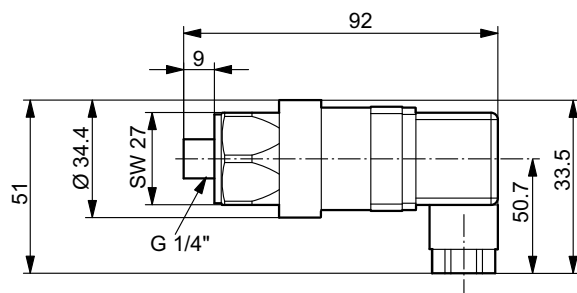
1.3.4 Presostato /PS

El presostato señala que la presión del aceite en el tubo de impulsión es correcta y, con ello, la disponibilidad de la lubricación a presión. Por ello, el cliente debe mantener una vigilancia continua sobre el presostato.

Durante la fase de arranque del reductor con una bomba de extremo del eje, puede producirse un retraso en la generación de presión. La lentitud de la generación de presión en esta fase puede provocar una señal de fallo del presostato que puede puentearse. El puentado temporal del presostato debe limitarse en tal caso a **un máximo de 5 a 10 segundos**.

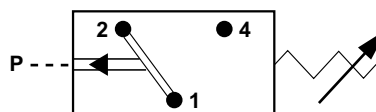
Un retardo adicional en la desconexión puede dañar el reductor y no es admisible.

Medidas



721994635

Conexión eléctrica



722003723

- | | |
|---------|------------------------------|
| [1] [2] | Contacto normalmente cerrado |
| [1] [4] | Contacto normalmente abierto |

Datos técnicos

- Presión de conmutación: 0.5 ± 0.2 bar
- Potencia de conmutación máxima: 4 A - 250 V_{CA}; 4 A - 24 V_{CC}
- Conector enchufable: DIN EN 175301-803
- Par de apriete para el tornillo de fijación de la parte posterior del conector enchufable para la conexión eléctrica = 0.25 Nm

1.3.5 Temperatura límite para el arranque de la motobomba

Para garantizar un funcionamiento correcto de la motobomba, el aceite del reductor debe tener una viscosidad mínima. La viscosidad depende del aceite utilizado y de la temperatura del aceite en los tubos/tubos flexibles conductores de aceite y en la bomba de aceite. Tenga en cuenta el capítulo "Lubricantes admitidos" (→ 20).

Cuando la motobomba se utiliza a temperaturas ambiente frías, puede ser necesario adaptar la motobomba. En caso necesario, póngase en contacto con SEW-EURODRIVE.

1.4 Nota sobre el control del nivel de aceite

El uso de un sistema de suministro de aceite puede alterar el nivel de aceite. Las cantidades de llenado indicadas en la placa de características son valores orientativos y se refieren exclusivamente al reductor. La cantidad de aceite a llenar viene determinada por la marca de la mirilla de aceite, la mirilla del nivel de aceite o la varilla del nivel de aceite.

Tenga en cuenta en las instrucciones de funcionamiento para reductores industriales serie X.. el capítulo "Comprobación del nivel de aceite".

1.4.1 Mayor demanda de aceite de reductor

La cantidad de llenado de lubricante necesaria de la motobomba que debe llenarse adicionalmente en el reductor se indica en la siguiente tabla.

Tamaño	Cantidades de llenado de lubricante en litros
ONP1 6	1.0
ONP1 8	
ONP1 10	
ONP1 12	
ONP1 16	1.5
ONP1 20	
ONP1 25	

1.5 Puesta en marcha

1.5.1 Notas

¡IMPORTANTE!

La puesta en marcha incorrecta de los reductores con lubricación a presión puede provocar daños en el reductor.

Posibles daños materiales.

- Tenga en cuenta las siguientes indicaciones
- Compruebe antes de la puesta en marcha la capacidad de funcionamiento de los dispositivos de supervisión (presostato, sensor de caudal, interruptor térmico / NTB, etc.).
- El reductor no debe ponerse en marcha sin presostato conectado.
- Tenga en cuenta que la bomba de aceite debe funcionar como mínimo durante 10 minutos antes de la primera puesta en marcha del reductor y después de cada cambio de aceite para que todas las cámaras de aceite estén llenas. A continuación, vuelva a desconectar la bomba de aceite y compruebe enseguida el nivel de aceite. Corrija el nivel de aceite de ser necesario.
- Tenga en cuenta que la bomba de aceite debe funcionar durante 20 segundos antes de la puesta en marcha del reductor.
- Recuerde que el reductor con bomba de aceite con temperaturas ambiente muy bajas debe funcionar solo con calentador de aceite. Encontrará más información en el capítulo Temperatura límite para el arranque del sistema de suministro de aceite.

1.5.2 Purgar el aire de la bomba de aceite



⚠ ¡ADVERTENCIA!

Peligro por salida y salpicaduras del aceite de reductor.

Lesiones graves.

- Es obligatorio utilizar gafas protectoras.
- Extreme las precauciones al efectuar la aireación de la bomba de aceite.

Respete el siguiente procedimiento si la bomba de aceite después del arranque de la bomba no bombease aceite inmediatamente:

- Llene la bomba de aceite con aceite.
- Purgue el aire del sistema de suministro de aceite durante el arranque en la parte de impulsión, a ser posible, en el punto más alto.

1 Motobomba en caso de lubricación a presión

Inspección/mantenimiento

1.5.3 Sensor de caudal

Respete el siguiente modo de proceder:

1. Ponga la bomba de aceite en marcha.
2. Conecte el sensor de caudal.
3. Realice el ajuste high flow, tenga en cuenta las notas en la documentación del fabricante (véase anexo).
4. Ponga el punto de desconexión en el sensor de caudal a LED 4 ó 5, tenga en cuenta las notas en la documentación del fabricante.
5. Integre el punto de conmutación de tal modo en el sistema que se produzca una desconexión del reductor al quedar por debajo.

1.6 Inspección/mantenimiento

NOTA



Lea primero las instrucciones de funcionamiento del fabricante del sistema de refrigeración.

1.6.1 Intervalos de inspección y de mantenimiento

Cumpla los siguientes intervalos de inspección y mantenimiento.

Intervalo de tiempo	¿Qué hacer?
• En función de las condiciones de funcionamiento, a más tardar cada 12 meses	• Comprobar el estado de la motobomba, si fuese preciso, sustituir el elemento filtrante
• Depende (en función de las influencias externas)	• Comprobar la estanqueidad de los tubos flexibles existentes El tiempo de uso de los tubos flexibles no debe exceder de seis años después de la fecha de fabricación impresa.

1.6.2 Comprobar tubos flexibles

¡IMPORTANTE!

Aun en caso de un almacenamiento adecuado y esfuerzo permitido, las mangueras y los tubos flexibles están sometidos a un envejecimiento natural. Por este motivo, su vida útil está limitada.

- El tiempo de uso de los tubos flexibles no debe exceder de seis años después de la fecha de fabricación impresa.
- El usuario de la instalación tiene que asegurar que los tubos flexibles se sustituyan en intervalos de tiempo adecuados aun cuando no se puedan percibir deficiencias técnicas de seguridad en los tubos flexibles.
- Encomiende la comprobación de los tubos flexibles al menos una vez al año a un experto en cuanto al estado de funcionamiento seguro de los mismos.

1.7 Fallos de funcionamiento

Fallo	Causa posible	Solución
Bomba de aceite no aspira	- Aire en los tubos - El motor no gira - Sentido de giro del motor erróneo - Falta aceite en el reductor - Tipo de aceite equivocado	- Llenar con aceite el tubo de aspiración y la bomba de aceite - Purgar el aire del tubo de impulsión durante el arranque - Comprobar las conexiones eléctricas - Comprobar las conexiones eléctricas - Comprobar el nivel de aceite en el reductor - Comprobar el tipo de aceite (sobre todo a bajas temperaturas)
Caudal de la bomba de aceite insuficiente	- Velocidad errónea del motor - Circuito de aceite obturado - Depresión de aspiración excesiva - Tipo de aceite equivocado	- Comprobar la velocidad del motor de la bomba - Abrir válvulas y grifos - Aumentar la sección del tubo de aspiración - Reducir la altura de aspiración - Comprobar el tipo de aceite (sobre todo a bajas temperaturas)
Bomba de aceite hace mucho ruido	Depresión de aspiración excesiva	- Aumentar la sección del tubo de aspiración - Reducir la altura de aspiración - Evitar codos bruscos en el tubo de aspiración - Evitar reducciones en el tubo de aspiración
Bomba de aceite transporta espuma	- El tubo de aspiración no es estanco - Falta aceite en el reductor	- Comprobar la estanqueidad de los racores - Comprobar el nivel de aceite en el reductor
El presostato no conmuta	- Aire en los tubos - Presostato mal conectado - Presostato defectuoso	- Llenar con aceite el tubo de aspiración y la bomba de aceite - Purgar el aire del tubo de impulsión durante el arranque - Comprobar la conexión - Cambiar el presostato

1.8 Lubricantes admitidos

En este capítulo se describen los lubricantes admitidos y las temperaturas admisibles durante el uso de los reductores industriales de SEW-EURODRIVE.

NOTA



- Decisivo para la viscosidad y el tipo de aceite es el tipo de aceite seleccionado por SEW-EURODRIVE para el pedido específico (véase confirmación del pedido y placa de características).
- En caso de usar lubricantes biodegradables y aptos para uso alimentario, así como aceites de poliglicol, consulte con SEW-EURODRIVE.
- Compruebe la compatibilidad de la grasa y el aceite utilizados.
- Las tablas contienen los lubricantes autorizados por SEW-EURODRIVE.
- Los aceites de las mismas clases de viscosidad y diferentes fabricantes no tienen las mismas propiedades. Particularmente las temperaturas del baño de aceite mínimas admisibles son específicas del fabricante. Estas temperaturas se representan en las tablas de lubricantes.
- Las temperaturas del baño de aceite mínimas admisibles dependen del tipo de lubricación utilizado. Estas temperaturas se representan en las tablas de lubricantes. Los valores corresponden a la viscosidad máxima de cada uno de los lubricantes.
- Los valores que se indican en las tablas de lubricantes tienen validez en el momento de la impresión de este documento. Los datos de los lubricantes están sometidos a un cambio dinámico por parte del fabricante del lubricante. Las informaciones actuales sobre los lubricantes se encuentran en: www.sew-eurodrive.de/schmierstoffe

1.8.1 Estructura de las tablas y abreviaturas

		DIN (ISO) API	ISO,SAE NLGI					
[2]	CLP			-20	+65	-20	+65	
			-5	-5				
			+5	+5				
				Optigear BM 150	Alpha SP 150			
			S0	S0				
[1]			-15	+75	-15	+75		
			0		0			
			+10		+10			
				Optigear BM 220	Alpha SP 220			
			S0	S0				
			-10	+85	-10	+80		
			+5		+5			
			+15		+15			
				Optigear BM 320	Alpha SP 320			
			S0	S0				

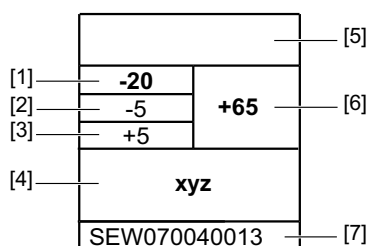
18014416429328523

- [1] Tipo de lubricante
[2] Clase de viscosidad

Abreviaturas

Símbolos	Designación
CLP	= Aceite mineral
CLP HC	= Polialfaolefinas sintéticas (PAO)
E	= Aceite en base a ésteres
	= Lubricante mineral
	= Lubricante sintético
	= Lubricante para la industria alimentaria (conforme a NSF H1)
	= Aceite biodegradable (lubricante para agricultura, silvicultura y gestión de recursos hidráulicos)
1)	= Se pueden utilizar lubricantes únicamente con el factor de servicio $F_s \geq 1.3$

1.8.2 Explicaciones para cada lubricante



18014416413363467

- [1] Temperatura de arranque en frío más baja en °C para lubricación por barboteo¹⁾
- [2] Temperatura de arranque en frío más baja en °C para accionamientos con bombas hasta una viscosidad máx. del aceite de 5000 cSt¹⁾
- [3] Temperatura de arranque en frío más baja en °C para accionamientos con bombas hasta una viscosidad máx. del aceite de 2.000 cSt¹⁾
- [4] Nombre comercial
- [5] Fabricante
- [6] ¡Máxima temperatura de baño de aceite en °C! ¡NO SE DEBE EXCEDER!
- [7] Aprobaciones

1) Si el aceite tiene una temperatura más baja, se debe calentar a la temperatura mínima indicada mediante un calentador de aceite, por ejemplo. La viscosidad del aceite máxima admisible en función del tipo de bomba la puede consultar en el siguiente capítulo.

1.8.3 Explicaciones para sistemas de suministro de aceite y viscosidad del aceite

La motobomba está diseñada para una viscosidad del aceite de **5 000 cSt**.

1.8.4 Tablas de lubricantes

La tabla de lubricantes es válida en la fecha de impresión de este documento, consulte la tabla actual en www.sew-eurodrive.de/schmierstoffe.

[1]	[2]	SEW EURODRIVE	Castrol	FUCHS	Mobil®	KÜBER LUBRICATION	Shell	TOTAL
CLP	VG 150 ¹⁾	-20 -5 +5	-20 -5 +5	-20 -5 +5	-20 -5 +5	-20 -5 +5		
		SEW GearOil Base 150 E ¹	Optigear BM 150	Renolin CLP 150 Plus	Renolin HighGear 150	Mobilgear 600 XP 150	Küberoil GEM 1-150 N	
		SEW070040013		SEW070030013	SEW070030013			
	VG 220	-15 0 +10	-15 0 +10	-15 0 +10	-15 0 +10	-15 0 +10	-15 0 +10	-15 0 +10
		SEW GearOil Base 220 E ¹	Optigear BM 220	Renolin CLP 220 Plus	Renolin HighGear 220	Mobilgear 600 XP 220	Küberoil GEM 1-220 N	Shell Omala Oil F 220
		SEW070040013		SEW070030013	SEW070030013			Carter EP 220
	VG 320	-10 +5 +15	-10 +5 +15	-10 +5 +15	-10 +5 +15	-10 +5 +15	-10 +5 +15	-10 +5 +15
		SEW GearOil Base 320 E ¹	Optigear BM 320	Renolin CLP 320 Plus	Renolin HighGear 320	Mobilgear 600 XP 320	Küberoil GEM 1-320 N	Shell Omala Oil F 320
		SEW070040013		SEW070030013	SEW070030013			Carter EP 320
	VG 460	-5 +10 +20	-5 +10 +20	-5 +10 +20	-5 +10 +20	-5 +10 +20	-5 +10 +20	-5 +10 +20
		SEW GearOil Base 460 E ¹	Optigear BM 460	Renolin CLP 460 Plus	Renolin HighGear 460	Mobilgear 600 XP 460	Küberoil GEM 1-460 N	Shell Omala Oil F 460
		SEW070040013		SEW070030013	SEW070030013			Carter EP 460
	VG 680	0 +15 +25	0 +15 +25	0 +15 +25	0 +15 +25	0 +15 +25	0 +15 +25	0 +15 +25
		SEW GearOil Base 680 E ¹	Optigear BM 680	Renolin CLP 680 Plus	Renolin HighGear 680	Mobilgear 600 XP 680	Küberoil GEM 1-680 N	Carter EP 680
		SEW070040013		SEW070030013	SEW070030013			
	VG 1000	+5 +20 +30	+5 +20 +30					
		Optigear BM 1000						

9007223746196107

6102/50 – SE/16500132

La tabla de lubricantes es válida en la fecha de impresión de este documento, consulte la tabla actual en www.sew-eurodrive.de/schmierstoffe.

[1]	[2]	Castrol	FUCHS	Mobil®	KLÜBER LUBRICATION	Shell	TOTAL
CLP HC	VG 32 ¹⁾			-40 +30 -30 -25 SHC 624			
	VG 68 ¹⁾		-35 +50 -20 -10 Renolin Unisyn CLP 68	-40 +50 -25 -15 SHC 626	-35 +50 -10 Klübersynth GEM 4-68 N	-40 +50 -20 -10 Omala S4 GX 68	
	VG 150 ¹⁾	-25 +70 -10 0 Alphasyn EP 150	-30 +70 -10 +0 Renolin Unisyn CLP 150	-30 +75 -15 -5 SHC Gear 150	-25 +75 -10 0 Klübersynth GEM 4-150 N	-30 +75 -10 0 Omala S4 GX 150	-35 +75 -15 -5 Carter SH 150
	VG 220	-25 +80 -5 +5 Alphasyn EP 220	-25 +80 -5 +5 Renolin Unisyn CLP 220	-25 +85 -10 +5 SHC Gear 220	-25 +80 -5 +5 Klübersynth GEM 4-220 N	-25 +85 -5 +5 Omala S4 GX 220	-25 +80 -5 +5 Carter SH 220
	VG 320	-20 +90 0 +10 Alphasyn EP 320	-20 +90 0 +10 Renolin Unisyn CLP 320	-20 +95 -5 +10 SHC Gear 320	-20 +95 0 +10 Klübersynth GEM 4-320 N	-20 +95 0 +10 Omala S4 GX 320	-20 +90 0 +10 Carter SH 320
	VG 460	-15 +100 +5 +15 Alphasyn EP 460	-15 +100 +5 +15 Renolin Unisyn CLP 460	-15 +105 0 +15 SHC Gear 460	-15 +105 +5 +20 Klübersynth GEM 4-460 N	-15 +105 +5 +15 Omala S4 GX 460	-15 +100 +5 +15 Carter SH 460
	VG 680	-10 +110 +25 Optigear Synthetic X 680	-10 +110 +25 Renolin Unisyn CLP 680	-10 +110 +25 SHC Gear 680	-10 +110 +25 Klübersynth GEM 4-680 N	-10 +110 +25 Omala S4 GX 680	-10 +110 +25 Carter SH 680
	VG 1000			-10 +110 +30 SHC Gear 1000	0 +20 +30 Klübersynth EG4-1000		

24485196299

1 Motobomba en caso de lubricación a presión

Lubricantes admitidos

La tabla de lubricantes es válida en la fecha de impresión de este documento, consulte la tabla actual en www.sew-eurodrive.de/schmierstoffe.

[1]	[2]	[3]				
	CLP HC NSF H1	VG 68 ¹⁾				
	CLP HC NSF H1	VG 220 ¹⁾				
	CLP HC NSF H1	VG 460 ¹⁾				
	CLP HC NSF H1	VG 460				

9007223746212619

6102/50 – SE/16500132

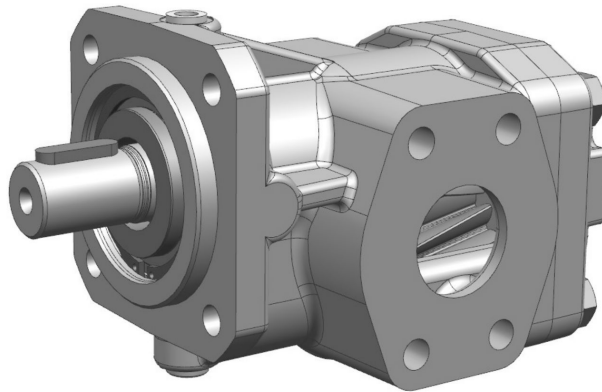
2 Documentación de proveedores

Índice

Transfer Gear Pumps - Operating and Maintenance Instructions.....	26
Transfer Gear Pumps - Technical data	91
Pressure Switch - Operating Instructions	123
Bourdon tube pressure gauge - data sheet.....	125
Bimetal thermometer - data sheet	128
Flow switch - Operating instructions.....	134
Flow switch - data sheet.....	147
Pressure sensors - data sheet	150
Singel Filter - Operating instructions	153
Filtro Duplex, hoja de datos	161
Contamination indicator, operating instructions	163

D.0024710002

Operating instructions (Translation)



Gear pump KF 2.5 - 630

88024710002-26

Englisch

2017-09-12

KRACHT

23100591/ES – 05/2019

Table of Content

1	General	5
1.1	About the documentation	5
1.2	Manufacturer's address	5
1.3	Applicable documents	5
1.4	Symbolism	6
2	Safety	7
2.1	Intended use	7
2.2	Personnel qualification and training	7
2.3	Basic safety instructions	7
2.4	Basic hazards	8
3	Device description	10
3.1	Functional principle	10
3.2	Possible versions	11
3.3	Basic design	12
3.3.1	KF 2.5 - 630 R/L/B (with end cover)	12
3.3.2	KF 2.5 - 630 R/L. -D. (with pressure relief valve)	13
3.3.3	KF 2.5 - 25 U (with universal valve)	14
3.3.4	KF 32 - 80 U (with universal valve)	14
3.4	Rotation and delivery direction	15
3.5	Types of seals	18
3.6	Quench	20
3.7	Type key	21
3.8	Important special numbers	23
4	Technical data	25
4.1	General	25
4.2	Overview nominal sizes	27
4.3	Viscosity - Rotation speed assignment	28
4.4	Permissible pressure range	29
4.4.1	Operating pressure of suction side and pressure side	29

4.4.2	Max. suction side operating pressure for sealing type 1, 2, 7 and 19	30
4.4.3	Differential pressure - viscosity assignment	31
4.5	Permissible temperature range	31
4.6	Material data	32
4.7	Weight	34
4.8	Dimensions	34
5	Transport and storage	35
5.1	General	35
5.2	Transport	35
5.3	Storage	36
6	Installation	38
6.1	Safety instructions for installation	38
6.2	Noise reduction	39
6.3	Mechanical installation	39
6.3.1	Preparation	39
6.3.2	Pumps with free shaft end	39
6.3.3	Coupling Type "R."	41
6.4	Connection lines	45
6.4.1	General	45
6.4.2	Suction line	46
6.4.3	Pressure line	47
6.4.4	Mounting Connection lines	47
6.5	Change of the direction of rotation	48
7	Operation start-up	50
7.1	Safety instructions for start-up	50
7.2	Preparation	50
7.3	Filling the quench chamber	51
7.4	Pressure relief valve adjustment	52
7.5	Further operation start-up	53
8	Removal	54
8.1	Safety instructions for removal	54

8.2	Removal	55
9	Maintenance	56
9.1	Safety instructions for maintenance	56
9.2	Maintenance work	56
9.3	Maintenance instructions	57
10	Repairs	59
10.1	Safety instructions for repair	59
10.2	General	60
10.3	Detecting and eliminating failures	61

Gear pump KF 2.5 - 630

KRACHT

1 General

1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the following device:

Gear pump KF 2.5 - 630

The device is manufactured in different versions. Information about the version concerned in the individual case can be found on the device's type plate.

These operating instructions are a component of the device and must be kept accessible for the personnel near the device at all times.

If you have any questions about these operating instructions, please contact the manufacturer.

1.2 Manufacturer's address

KRACHT GmbH
Gewerbestraße 20
DE 58791 Werdohl
phone: +49 2392 935-0
fax: +49 2392 935-209
email: info@kracht.eu
web: www.kracht.eu

1.3 Applicable documents

1. KTR Kupplungstechnik GmbH, DE 48407 Rheine
 - KTR-N 40210: Coupling operating/assembly instruction Rotex

Excerpts from these documents are included in these operating instructions.

If required, the original documents can be requested from the respective manufacturer.

KRACHT

Gear pump KF 2.5 - 630

1.4 Symbolism



DANGER

Identification of an immediate hazard, which would result in death or severe bodily injury if not avoided.



WARNING

Identification of a potential medium risk hazard, which would lead to death or severe bodily injury if not avoided.



CAUTION

Identification of a low risk hazard, which could lead to minor or medium bodily injury if not avoided.



NOTICE

Flagging of notices to prevent property damage.



Identification of basic safety instructions. Non-compliance can lead to hazards for people and the device.



Flagging of special user tips and other especially useful or important information.

Gear pump KF 2.5 - 630

KRACHT

2 Safety

2.1 Intended use

1. The device has been designed for operation with fluid. Dry operation is not permitted.
2. The device may be operated in filled condition only.
The medium must be compatible with the materials used in the device. The chemical competence is necessary for this. Be careful with ethylene oxide or other cathalytic or exothermic or self-decomposing materials. Please consult the manufacturer in cases of doubt.
3. The device may be operated only in usual industrial atmospheres. If there are any aggressive substances in the air, always ask the manufacturer.
4. Operation of the device is only permissible when complying with the operating instructions and applicable documents.
Deviating operating conditions require the express approval of the manufacturer.
5. In case of any use of the device not according to specification, any warranty is voided.

2.2 Personnel qualification and training

The staff designated to assemble, operate and service the device must be properly qualified. This can be through training or specific instruction. Personnel must be familiar with the contents of this operating instructions.



Read the operating instructions thoroughly before use.

2.3 Basic safety instructions



1. Comply with existing regulations on accident prevention and safety at work along with any possible internal operator regulations.
2. Pay attention to the greatest possible cleanliness.
3. Wear suitable personal protection equipment.
4. Do not remove, make illegible or obliterate type plates or other references on the device.
5. Do not make any technical changes on the device.
6. Maintain and clean the device regularly.
7. Use spare parts approved by the manufacturer only.

88024710002-26 2017-09-12

7

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

2.4 Basic hazards

**DANGER****Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.

**DANGER****Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.

**DANGER****Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Take measures against accidental touching of rotating parts.

**WARNING****Rotating parts!**

Danger of injury from flying parts.

1. Enclose rotating parts so as to avoid any danger from flying parts in the event of breakage or malfunction.

**WARNING****Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.

Gear pump KF 2.5 - 630

KRACHT

 WARNING
Failure of load-carrying parts due to overload! Danger of injury from flying parts. Danger of injury from spurting fluids. 1. Use only connections and lines approved for the expected pressure range. 2. Securely prevent exceeding the permissible pressure, e.g. by using pressure relief valves or rupture discs. 3. Design pipework so that no tensions, e.g. caused by changes in length due to fluctuations in temperature, are transmitted to the device.
 WARNING
Failure of load-carrying parts due to overload! Danger of injury from flying parts. Danger of injury from spurting fluids. 1. Do not operate the device against closed shut-off devices. 2. Do not operate the device in the false direction of rotation.

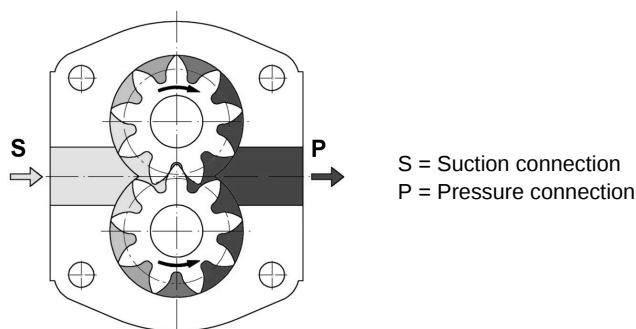
KRACHT

Gear pump KF 2.5 - 630

3 Device description

3.1 Functional principle

KF/KFF series pumps are external gear pump types that work according to the positive displacement principle.



When rotated, two gearwheels meshing together produce a volume enlargement as a result of the opening of the tooth spaces on the suction side (S), so that medium can flow in and so that a corresponding volume is displaced simultaneously by immersion of the teeth into the filled tooth spaces on the pressure side (P). Fluid transport takes place through entrainment in the tooth gaps along the wall of the wheel chamber. The so-called geometric flow rate V_g is being displaced per wheel rotation. A value that is stated in technical documents as rated volume V_{gn} to specify the pump size.

The actually delivered amount of liquid does not correspond with the theoretical value, it is being reduced through losses due to the necessary tolerances. The losses are less the lower the operating pressure and the higher the viscosity of the medium.

Gear pumps are self-priming within wide limits. The displacement cycle describe initially takes place without exhibiting appreciable pressure build-up. Only after setting external loads, for example, through delivery heights, flow resistances, line elements, etc. will the required working pressure arise to overcome these resistances.

As usual with non-axial play compensated pumps, the lateral clearance between gear and front face has been set in such a way that the maximum allowable operating pressure is managed in an adequate and secure way.

Bearing and shaft seal of the device are lubricated by the media. The device's operating life will be reduced if the medium contains abrasive ingredients.

The shaft seal chamber is connected to the device's suction side. The pressure occurring at the shaft seal therefore corresponds to the pressure at the

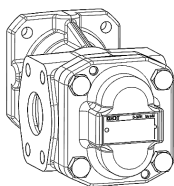
Gear pump KF 2.5 - 630

KRACHT

suction connection of the device. The permissible pressure is determined by the type of sealing.

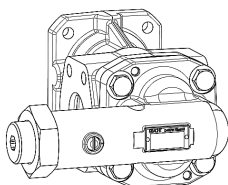
3.2 Possible versions

Gear pump with end cover



Standard

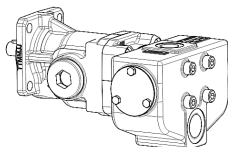
Gear pump with pressure relief valve



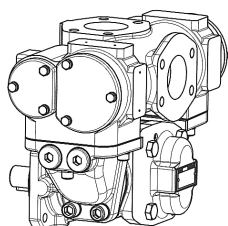
Directly attached pressure relief valves of the series "D" are used exclusively for protection of the gear pumps and may respond on a short-term basis only. Constant triggering of the valve can destroy the gear pump due to overheating.

Gear pump with universal valve

KF 2.5 - 25 U



KF 32 - 80 U



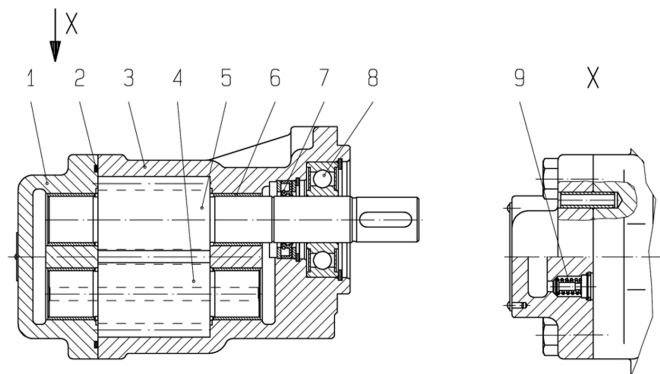
Pumps with universal valve pump to the same pressure connection even when the direction of rotation of the drive shaft changes. Because of the operating principle, the pressure and suction connections remain the same under any direction of rotation. Select the mounting position so that the piston is in a horizontal position and the pressure port is at the top.

KRACHT

Gear pump KF 2.5 - 630

3.3 Basic design

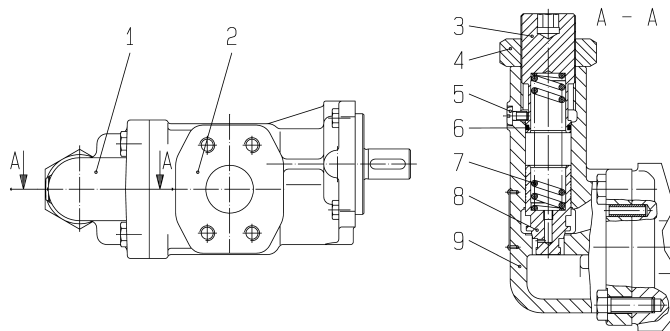
3.3.1 KF 2.5 - 630 R/L/B (with end cover)



Explanation

- | | |
|-----------------------|---------------------------------|
| 1. End cover | 7. Shaft seal |
| 2. O-Ring | (see "Section: Seal types") |
| 3. Housing | 8. Outboard bearing |
| 4. Driven shaft | (Mounting only: G; X) |
| 5. Driving shaft | 9. Valve |
| 6. Plain bearing bush | (Direction of rotation only: B) |

Gear pump KF 2.5 - 630

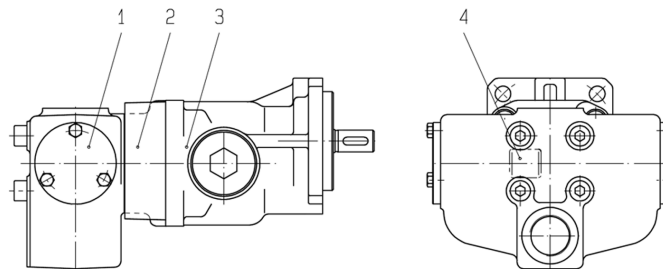
KRACHT**3.3.2 KF 2.5 - 630 R/L. -D. (with pressure relief valve)****Explanation**

- | | |
|--------------------------|-----------------------|
| 1. Pressure relief valve | 6. O-Ring |
| 2. Pump | 7. Compression spring |
| 3. Adjustment screw | 8. Valve cone |
| 4. Hexagonal nut | 9. Housing |
| 5. Retaining screw | |

KRACHT

Gear pump KF 2.5 - 630

3.3.3 KF 2.5 - 25 U (with universal valve)

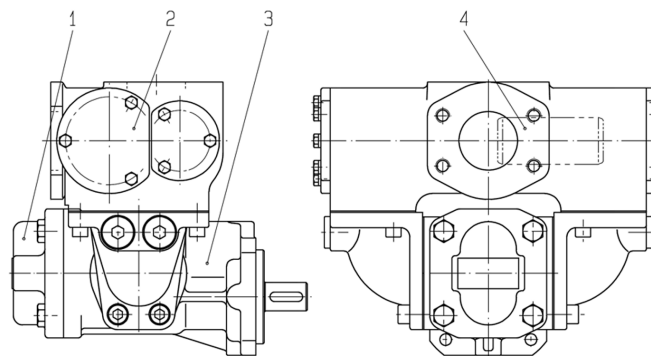


Explanation

- 1. Universal valve
- 2. Adapter

- 3. Pump
- 4. Piston

3.3.4 KF 32 - 80 U (with universal valve)



Explanation

- 1. End cover
- 2. Universal valve

- 3. Pump
- 4. Piston

Gear pump KF 2.5 - 630

KRACHT

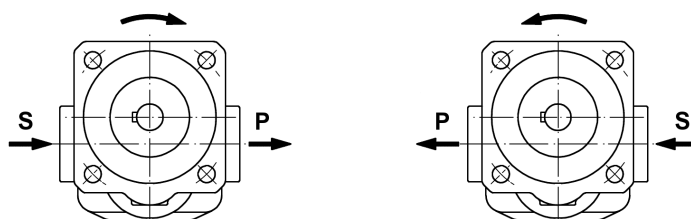
3.4 Rotation and delivery direction

The following definition applies with respect to the rotation and delivery direction of external gear pumps for pump connections positioned below the drive shaft:

Looking at the pump shaft end, the pumping flow is from left to right when the shaft is moving clockwise.

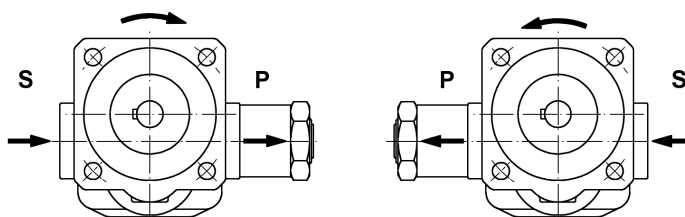
Looking at the pump shaft end, the pumping flow is from right to left when the shaft is moving counter-clockwise.

Gear pump with end cover



S = Suction connection
P = Pressure connection

Gear pump with pressure relief valve



S = Suction connection
P = Pressure connection

The direction of rotation is indicated by the bent arrow.

The flow direction is indicated by the straight arrows.

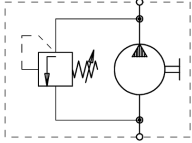
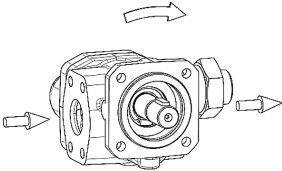
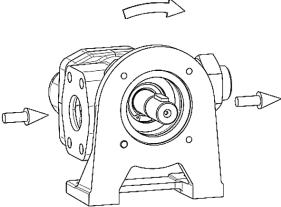
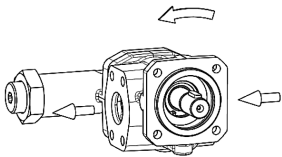
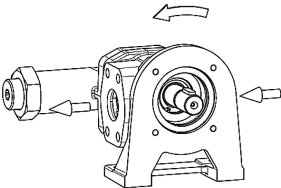
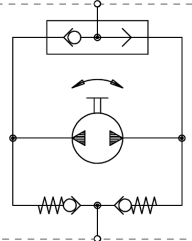
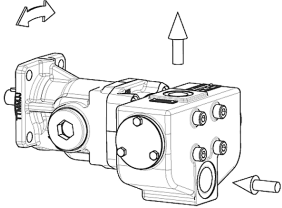
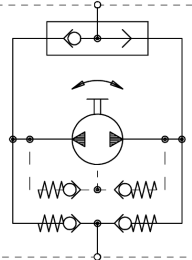
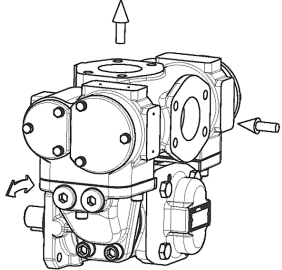
KRACHT

Gear pump KF 2.5 - 630

Hydraulic symbol	Flange mounting	Foot mounting
	Gear pump with end cover	
	KF . R F/G	KF . R W/X
	KF . B F/G	KF . B W/X

Gear pump KF 2.5 - 630

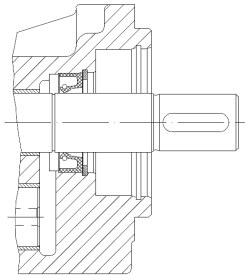
KRACHT

Hydraulic symbol	Flange mounting	Foot mounting
	Gear pump with pressure relief valve	
		
	KF . R F/G. .-D.	KF . R W/X. .-D.
		
	Gear pump with universal valve	
		
	KF 2.5 - 25 U F/G	-
		
		
	KF 32 - 80 U F/G	-

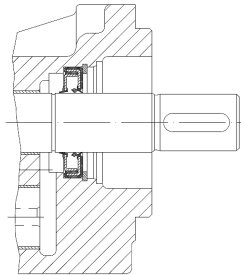
KRACHT

Gear pump KF 2.5 - 630

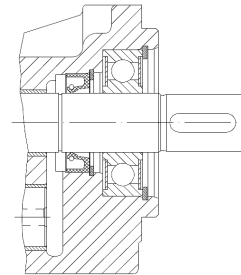
3.5 Types of seals



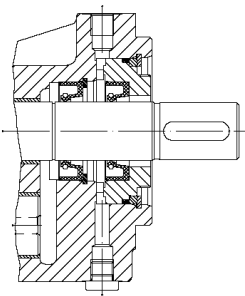
Rotary shaft seal
Seal type: 1; 2; 3; 9; 18; 31



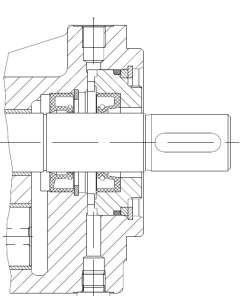
Rotary shaft seal
Seal type: 23



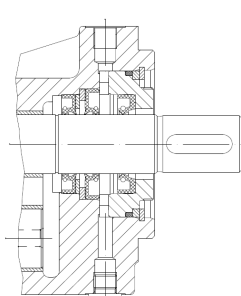
Rotary shaft seal
with outboard bearing
Seal type: 1; 2; 3; 9; 18; 31



Double rotary shaft seal
Connection borehole G1/8 (for
Quench) ⁽¹⁾
Seal type: 4; 7; 19; 32



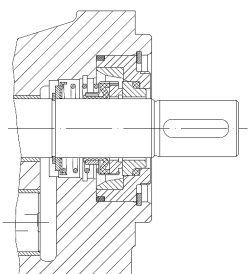
Double rotary shaft seal (for vac-
uum operation)
Connection borehole G1/8 (for
Quench) ⁽¹⁾
Seal type: 4; 7; 19; 32
Special number 74



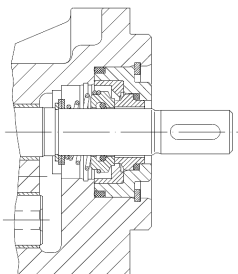
Triple rotary shaft seal (for vac-
uum operation + for normal oper-
ation)
Connection borehole G1/8 (for
Quench) ⁽¹⁾
Seal type: 7
Special number 322
(only KF 32 - 80)

Gear pump KF 2.5 - 630

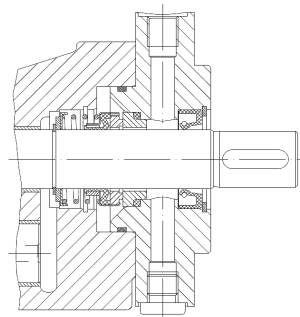
KRACHT



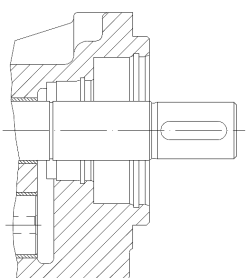
Mechanical seal
Seal type: 5; 40



Mechanical seal
Seal type: 6



Mechanical seal with Quench ⁽¹⁾
KF 2.5 - 25: Connection borehole
G1/8 (for Quench) ⁽¹⁾
KF 32 - 80: Connection borehole
G1/4 (for Quench) ⁽¹⁾
Seal type: 5
Special number 198



without shaft seal
(Leak oil drain through shaft seal-
ing chamber)
Seal type: 30; 36

⁽¹⁾ See section 3.6 "Quench"

KRACHT

Gear pump KF 2.5 - 630

3.6 Quench

Versions with quench are used when absolute leak tightness is required on the shaft seal, e.g. when pumping media

- which cures upon contact with air.
- which crystallises upon contact with air humidity.
- the leakage of which must not be released into the environment.
- are under vacuum and their seal shall be gastight.

Select the mounting position so that the connection for the quench faces up.

Gear pump KF 2.5 - 630

KRACHT

3.7 Type key

Ordering example KF 2.5 - 630												
KF		40		R	F		1	/...	-	D15	-	...
1.		2.		3.	4.		5.	6.		7.		8.

Explanation of type key KF 2.5 - 630			
1.	Product name		
2.	Nominal size (Rated volume)		
	V _{gn}	Size 1: 2.5; 4; 5; 6; 8; 10; 12; 16; 20; 25 Size 2: 32; 40; 50; 63; 80 Size 3: 100; 112; 125; 150; 180; 200 Size 4: 250; 315; 400; 500; 630	
3.	Direction of rotation		
	R	Clockwise	B Clockwise and counterclockwise Flow direction alternating
	L	Counterclockwise	U Clockwise and counterclockwise Flow direction consistent
4.	Fixing type		
	F	DIN flange without outboard bearing	W Mounting angle without outboard bearing (KF 2.5 - 200)
	G	DIN flange with outboard bearing	X Mounting angle with outboard bearing (KF 2.5 - 200)

KRACHT

Gear pump KF 2.5 - 630

Explanation of type key KF 2.5 - 630				
5.	Seal type			
	1	Rotary shaft seal NBR (BABSL)	18	Rotary shaft seal FKM (BAUMX7)
	2	Rotary shaft seal FKM (BABSL)	19	Double rotary shaft seal NBR (BABSL)
	3	Rotary shaft seal PTFE (HN2390)	23	Rotary shaft seal FKM (MSS1) (Low temperature) (KF 2.5 - 80)
	4	Double rotary shaft seal PTFE (HN2390)	30	without shaft seal O-Ring FKM
	5	Mechanical seal with FKM second- ary seals (AX15) C2S2V1G3G1 (KF 2.5 - 200) B10SV1G3G1 (KF 250 - 630)	31	Rotary shaft seal FKM (BABSL) (Low temperature) (KF 32 - 200)
	6	Mechanical contact seal with FFKM secondary seals (AX30) Q2Q2K1G3 (KF 2.5 - 25) Q2B2K1G3 (KF 32 - 200)	32	Double rotary shaft seal EPDM (R02-R) (not resistant to mineral oil)
	7	Double rotary shaft seal FKM (BABSL)	36	without shaft seal O-Ring NBR
	9	Rotary shaft seal EPDM (R02-R) (not resistant to mineral oil)	40	Mechanical seal with FKM second- ary seals (L4) AQ2VFF
6. Special number for special versions				
	See section 3.8 "Important special numbers"			
7. Pressure relief valve (only for direction of rotation R or L)				
D15	Adjustable from 0 - 15 bar	D25	Adjustable from 15 - 25 bar	
D30	Adjustable from 15 - 30 bar			
8. Housing and cover material				
No specifi- cation	EN-GJL-250 (GG-25)			
GJS	EN-GJS-400-15 (GGG-40)			

Gear pump KF 2.5 - 630

KRACHT

3.8 Important special numbers

Special number	Description
74	Double rotary shaft seal (for vacuum operation) Connection borehole G1/8 (for Quench)
158	Housing connection: KF 2.5 - 12: Flange connection SAE 3/4" KF 16 - 25: Flange connection SAE 1"
197	Noise-optimized version for aerated oils ⁽¹⁾
198	Mechanical seal with Quench
232	Housing connection: KF 50 - 80: Flange connection SAE 2" KF 100 - 112: Flange connection SAE 2 1/2" KF 125 - 150: Flange connection SAE 3" KF 180 - 200: Flange connection SAE 3 1/2"
277	Vertical mounting position (shaft end above) Separate lubrication for rotating shaft seal (reduced pumping rate) (Size 4: on request)
304	Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{max} = 10$ bar (Size 4: on request)
317	Noise-optimized version for aerated oils ⁽¹⁾ (197) Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{max} = 10$ bar (304)
322	Triple rotary shaft seal (for normal operation + for vacuum operation) Connection borehole G1/8 (for Quench) Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{max} = 10$ bar (304) Housing connection: KF 32; 40: Flange connection SAE 1 1/2" (Standard) KF 50 - 80: Flange connection SAE 2" (232)
353	Noise-optimized version for aerated oils ⁽¹⁾ (197) Multi layer friction bearings DP4 (lead free) (Size 4: on request)
359	Housing connection: KF 2.5 - 12: Flange connection SAE 3/4" (158) KF 16 - 25: Flange connection SAE 1" (158) Noise-optimized version for aerated oils ⁽¹⁾ (197)
363	Plastic plain bearings Iglidur® X (non-ferrous metal-free), $\Delta p_{max} = 10$ bar (304) Housing connection: KF 2.5 - 12: Flange connection SAE 3/4" (158) KF 16 - 25: Flange connection SAE 1" (158)

88024710002-26 2017-09-12

23

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

Special number	Description
391	Noise-optimized version for aerated oils ⁽¹⁾ (197) Housing connection: KF 50 - 80: Flange connection SAE 2" (232) KF 100 - 112: Flange connection SAE 2 1/2" (232) KF 125 - 150: Flange connection SAE 3" (232) KF 180 - 200: Flange connection SAE 3 1/2" (232)
402	Double rotary shaft seal (for vacuum operation) (74) Connection borehole G1/8 (for Quench) (74) Housing connection: KF 2.5 - 12: Flange connection SAE 3/4" (158) KF 16 - 25: Flange connection SAE 1" (158) KF 50 - 80: Flange connection SAE 2" (232) KF 100 - 112: Flange connection SAE 2 1/2" (232) KF 125 - 150: Flange connection SAE 3" (232) KF 180 - 200: Flange connection SAE 3 1/2" (232)
455	Noise-optimized version for aerated oils ⁽¹⁾ (197) Vertical mounting position (shaft end above) Separate lubrication for rotating shaft seal (reduced pumping rate) (277)
459	Double rotary shaft seal (for vacuum operation) (74) Connection borehole G1/8 (for Quench) (74) Noise-optimized version for aerated oils ⁽¹⁾ (197) Housing connection: KF 2.5 - 12: Flange connection SAE 3/4" (158) KF 16 - 25: Flange connection SAE 1" (158) KF 50 - 80: Flange connection SAE 2" (232) KF 100 - 112: Flange connection SAE 2 1/2" (232) KF 125 - 150: Flange connection SAE 3" (232) KF 180 - 200: Flange connection SAE 3 1/2" (232)
⁽¹⁾ Measures for noise optimisation are only possible for one rotational direction and only effective for aerated oils or vacuum (only in connection with seal versions that are suitable for vacuum operation). Can lead to a reduction of delivery rate.	

Gear pump KF 2.5 - 630

KRACHT

4 Technical data

4.1 General

General information KF 2.5 - 630		
Design	External gear pump	
Fixing type	Flange similar DIN ISO 3019 or Foot mounting	
End of drive shaft	ISO R 775 short-cylindrical	
Housing connection ⁽¹⁾	KF 2.5 - 12	Whitworth pipe thread G3/4
	KF 2.5 - 12 .. /158	Flange connection SAE 3/4"
	KF 16 - 25	Whitworth pipe thread G1
	KF 16 - 25 .. /158	Flange connection SAE 1"
	KF 32 - 80	Flange connection SAE 1 1/2"
	KF 50 - 80 .. /232	Flange connection SAE 2"
	KF 100 - 112	
	KF 100 - 112 .. /232	Flange connection SAE 2 1/2"
	KF 125 - 150	
	KF 125 - 150 .. /232	Flange connection SAE 3"
	KF 180 - 200	
	KF 180 - 200 .. /232	Flange connection SAE 3 1/2"
	KF 250 - 315	Flange connection SAE 3"
	KF 400 - 630	Flange connection SAE 4"
	KF 2.5 - 25 U	Suction connection: Whitworth pipe thread G3/4
		Pressure connection: Whitworth pipe thread G1/2
Mounting position	KF . R/L/B without fluid buffer	Any ⁽²⁾
		Shaft end horizontal, fluid buffer connection top
	KF . U	Piston horizontal Pressure connection on top
External loads on shaft end		See section 4.2 "Overview nominal sizes"
Speed	n	See section 4.2 "Overview nominal sizes" + section 4.3 "Viscosity - Rotation speed assignment"

88024710002-26 2017-09-12

25

23100591/ES - 05/2019

KRACHT

Gear pump KF 2.5 - 630

General information KF 2.5 - 630		
Operating pressure	p_e p_b	See section 4.4 "Permissible pressure range"
Viscosity	v_{min}	See section 4.4.3 "Differential pressure - viscosity assignment"
	v_{max}	20000 mm ² /s
Fluid temperature	ϑ_m	See section 4.5 "Permissible temperature range"
Ambient temperature	ϑ_u	
Material		See section 4.6 "Material data"
Filtering		Filter porosity $\leq 60 \mu m$
Permissible media		Lubricating fluids without abrasive components. (Petrols, solvents, etc. are not permissible.)
⁽¹⁾ Pipe thread: ISO 228-1; Flange connection: ISO 6162-1 (SAE J518) ⁽²⁾ A reduced service life must be expected for the shaft seal in the case of vertical installation (shaft end top).		

Gear pump KF 2.5 - 630

KRACHT

4.2 Overview nominal sizes

Nominal size V _{gn}	Geom. displacement V _g [cm³/rev.]	Speed n		Perm. radial force ⁽¹⁾ F _{radial} [N] (n = 1500 rpm)	Permissible axial force F _{axial} [N] (n = 1500 rpm)	Sound pressure level ⁽²⁾ L _{pA} [dBA]	Mass inertia x10 ⁻⁶ J [kg m ²]
		n _{min} [rpm]	n _{max} [rpm] ⁽³⁾				
2,5	2.55	200	3600	700	-	≤ 67	14.0
4	4.03						15.9
5	5.05						17.8
6	6.38						20.5
8	8.05						24.0
10	10.11						28.4
12	12.58						33.7
16	16.09						42.3
20	20.1						50.8
25	25.1						61.7
32	32.12						≤ 68
40	40.21		254				
50	50.2		299				
63	63.18		368				
80	80.5		443				
100	101.5		≤ 69	741			
112	113.5			806			
125	129.4		≤ 65	1418			
150	155.6			1637			
180	186.6			1911			
200	206.2			2072			
250	245.1		≤ 75	4133			
315	312.9			5011			
400	399.5		≤ 77	6618			
500	496.5			7830			
630	622.5		≤ 80	9591			

⁽¹⁾ Outside forces are only permissible in combination with an outboard bearing. *F_{radial}* on central shaft end.

⁽²⁾ *n* = 1500 rpm ; *v* = 34 mm²/s ; *p* = 5 - 25 bar.

⁽³⁾ Pay attention to the viscosity.

88024710002-26 2017-09-12

27

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

4.3 Viscosity - Rotation speed assignment

Kinematic viscosity ν [mm ² /s]									
100	200	300	500	1000	2000	3000	6000	10000	20000
3600	2900	2300	1800	1200	800	650	450	300	200
Recommended rpm n [rpm]									



Select the speed of rotation so that complete filling of the pump is ensured. This is given if the pressure on the suction side does not fall below the permissible pressure $p_{e \text{ min.}}$

Gear pump KF 2.5 - 630

KRACHT

4.4 Permissible pressure range

4.4.1 Operating pressure of suction side and pressure side

Seal type ⁽¹⁾		Special number	Operating pressure ⁽²⁾			
			Suction side		Pressure side	
			$p_{e \min}$ [bar abs.] ⁽³⁾	$p_{e \max}$ [bar]	p_b [bar] (perm. continuous pressure)	$p_{b \max}$ [bar] (Pressure peaks)
1	WDR (BABSL)	-	0.6 ⁽⁴⁾	See section 4.4.2 "Max. suction side operating pressure for sealing type 1, 2, 7 and 19"	25	40
2	WDR (BABSL)	-				
3	WDR (HN2390)	-		2		
4	DRWDR (HN2390)	-				
		74	0.1	0.2		
5	GLRD (AX15)	-	0.6 ⁽⁴⁾	10		
6	GLRD (AX30)	-				
7	DRWDR (BABSL)	-		See section 4.4.2 "Max. suction side operating pressure for sealing type 1, 2, 7 and 19"		
		74	0.1	0.2		
9	WDR (R02-R)	-	0.6 ⁽⁴⁾	0.5		
18	WDR (BAUMX7)	-				
19	DRWDR (BABSL)	-		See section 4.4.2 "Max. suction side operating pressure for sealing type 1, 2, 7 and 19"		
		74	0.1	0.2		

88024710002-26 2017-09-12

29

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

Seal type ⁽¹⁾		Special number	Operating pressure ⁽²⁾			
			Suction side		Pressure side	
			$p_{e \min}$ [bar abs.] ⁽³⁾	$p_{e \max}$ [bar]	p_b [bar] (perm. continuous pressure)	$p_{b \max}$ [bar] (Pressure peaks)
23	WDR (MSS1)	-	0.6 ⁽⁴⁾	0.5	25 ⁽⁵⁾	-
30	-	-		25	25	40
31	WDR (BABSL)	-		0.5	25 ⁽⁵⁾	-
32	DRWDR (R02-R)	-		0.5	25	40
		74		0.2		
36	-	-		25		
40	GLRD (L4)	-		10		

⁽¹⁾ WDR: Rotary shaft seal, DRWDR: Double rotary shaft seal, GLRD: Mechanical seal
⁽²⁾ bar abs.: absolute pressure, bar: relative pressure
⁽³⁾ KF . U: $p_{e \min} = 0.65$ bar abs.
⁽⁴⁾ Start-up condition: 0.4 bar absolute (max. 30 minutes).
⁽⁵⁾ $\vartheta_m < -20$ °C: 16 bar (Housing material GJL).

4.4.2 Max. suction side operating pressure for sealing type 1, 2, 7 and 19

Speed n [rpm]	$p_{e \max}$ [bar]					
	KF 2.5 - 63	KF 80	KF 100 - 180	KF 200	KF 250 - 315	KF 400 - 630
≤ 750	6	6	6	6	5.5	5
≤ 1000	5	5	5	5	4.5	4
≤ 1500	4	4	3.5	3.5	3	2.5
≤ 2000	3	3	2.5	2.5	2	1.5
≤ 2500	2.5	2.5	2	2	-	-
≤ 3000	2	2	1.5	-	-	-
≤ 3600	1.5	-	-	-	-	-

Gear pump KF 2.5 - 630

KRACHT

4.4.3 Differential pressure - viscosity assignment

Bearing	$\Delta p_{\max}$ [bar]		
	$v \geq 1.4 \text{ mm}^2/\text{s}$	$v \geq 6 \text{ mm}^2/\text{s}$	$v \geq 12 \text{ mm}^2/\text{s}$
Multi layer friction bearings contains lead (Standard) DU, P10	3	12	25
Multi layer friction bearings lead free DP4			
Plastic plain bearings Iglidur® G; X; H370	-	6	10
White-metalled bearing TEGO® V738			

4.5 Permissible temperature range

Sealing material	Fluid temperature ϑ_m ⁽¹⁾	
	$\vartheta_{m \text{ min.}}$ [°C]	$\vartheta_{m \text{ max.}}$ [°C]
NBR	-20	90
PTFE / FEP with FKM-core		200
EPDM		120
FKM		150
FFKM / FEP with FKM-core		200
FKM (Low temperature)	-30	150

⁽¹⁾ Comply with media-specific properties.

Sealing material	Ambient temperature ϑ_u	
	$\vartheta_{u \text{ min.}}$ [°C]	$\vartheta_{u \text{ max.}}$ [°C]
NBR	-20	60
PTFE / FEP with FKM-core		
EPDM		
FKM		
FFKM / FEP with FKM-core		
FKM (Low temperature)	-30	

88024710002-26 2017-09-12

31

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

4.6 Material data

Seal type ⁽¹⁾		Material				
		Shaft seal	O-rings	Housing/End cover	Gears	Bearing
1	WDR (BABSL)	NBR	NBR	EN-GJL-250 (GG-25) - - - EN-GJS-400-15 (GGG-40)	Case-hardened steel (1.7139)	Multi layer friction bearings contains lead (Standard) DU, P10 (Steel, CuSn, PTFE, Pb) - - - Plastic plain bearings non-ferrous metal-free Iglidur® X - - - Multi layer friction bearings lead free DP4 (Steel, CuSn, PTFE) - - - White-metalled bearing TEGO® V738 (Steel, Cu, Sn, Sb, Cd, Ni, As) (only KF 2.5 - 80)
2	WDR (BABSL)	FKM	FKM			
3	WDR (HN2390)	PTFE	FEP with FKM-core			
4	DRWDR (HN2390)	PTFE	FEP with FKM-core			
5	GLRD with FKM secondary seals (AX15)	C2S2V1G3G1 ⁽²⁾ (KF 2.5 - 200)	FKM			
		B10SV1G3G1 ⁽³⁾ (KF 250 - 630)				
6	GLRD with FFKM secondary seals (AX30)	Q2Q2K1G3 ⁽⁴⁾ (KF 2.5 - 25)	FEP with FKM-core			
		Q2B2K1G3 ⁽⁵⁾ (KF 32 - 200)				
7	DRWDR (BABSL)	FKM	FKM			
9	WDR (R02-R)	EPDM	EPDM			
18	WDR (BAUMX7)	FKM	FKM			
19	DRWDR (BABSL)	NBR	NBR			
23	WDR (MSS1)	FKM (Low temperature)	FKM (Low temperature)			

Gear pump KF 2.5 - 630



Seal type ⁽¹⁾		Material				
		Shaft seal	O-rings	Housing/End cover	Gears	Bearing
30	-	-	FKM	EN-GJL-250 (GG-25) - - - EN-GJS-400-15 (GGG-40)	Case-hardened steel (1.7139)	Multi layer friction bearings contains lead (Standard) DU, P10 (Steel, CuSn, PTFE, Pb) - - - Plastic plain bearings non-ferrous metal-free Iglidur® X - - - Multi layer friction bearings lead free DP4 (Steel, CuSn, PTFE) - - - White-metalled bearing TEGO® V738 (Steel, Cu, Sn, Sb, Cd, Ni, As) (only KF 2.5 - 80)
31	WDR (BABSL)	FKM (Low temperature)	FKM (Low temperature)			
32	DRWDR (R02-R)	EPDM	EPDM			
36	-	-	NBR			
40	GLRD with FKM secondary seals (L4)	AQ2VFF ⁽⁶⁾	FKM			
⁽¹⁾ WDR: Rotary shaft seal, DRWDR: Double rotary shaft seal, GLRD: Mechanical seal ⁽²⁾ Metal-impregnated carbon /CrMo-Steel, FKM, CrNiMo-Steel ⁽³⁾ Resin-impregnated carbon , Cr-casting, FKM, CrNiMo-Steel ⁽⁴⁾ SiC/SiC, FFKM, CrNiMo-Steel ⁽⁵⁾ SiC/Resin-impregnated carbon , FFKM, CrNiMo-Steel ⁽⁶⁾ Metal-impregnated carbon /SiC, FKM, CrNi-Steel						

KRACHT

Gear pump KF 2.5 - 630

4.7 Weight

Nominal size V _{gn}	Gear pump [kg]			Added weight Mounting angle [kg]
	with end cover	with D - valve	with universal valve	
2.5	2.9 (KF . /158: +1.3)	3.7 (KF . /158: +1.3)	6.9	1.3
4				
5				
6				
8				
10				
12				
16	3.5 (KF . /158: +1.3)	4.3 (KF . /158: +1.3)	7.5	
20				
25				
32	7.7	9.5	27.5	1.6
40				
50				
63	9.4	11.2	29.5	
80				
100				
112	16.0	18.7	-	3.3
125				
150				
180				
200				
250	44.2	47.2		
315				
400				
500				
630	60.8	64.0		

4.8 Dimensions

Dimensions of the device can be found in the relevant technical data sheets.

Gear pump KF 2.5 - 630

KRACHT

5 Transport and storage

5.1 General

- After receipt, check the device for transport damages.
- If transport damage is noticed, report this immediately to the manufacturer and the carrier. The device must then be replaced or repaired.
- Dispose of packing material and used parts in accordance with the local stipulations.

5.2 Transport

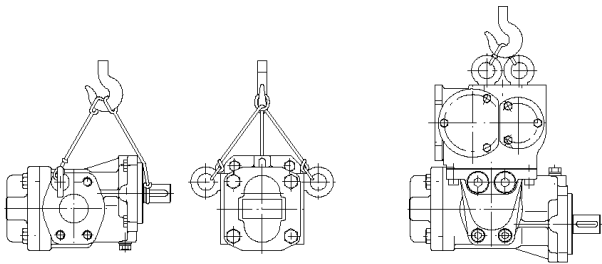

WARNING

Falling or overturning loads!
 Danger of injury while transporting large and heavy loads.

1. Use only suitable means of conveyance and lifting tackle with sufficient load-bearing capacity.
2. Attach lifting tackle only to suitable load points.
3. Attach the lifting tackle in such a manner that it cannot slip.
4. Pay attention to the load balance point.
5. Always avoid jerks, impacts and strong vibrations during transportation.
6. Never walk under suspended loads, never work under suspended loads.



To transport the device , eyebolts can be screwed into the flange connections.



KRACHT

Gear pump KF 2.5 - 630

5.3 Storage

The device's function is tested in the plant with mineral hydraulic oil. Then all connections are closed. The remaining residual oil preserves the interior parts for up to 6 months.

Metallic exposed exterior parts are protected against corrosion by suitable conservation measures, also up to 6 months.

In case of storage, a dry, dust-free and low-vibration environment is to be ensured. The device is to be protected against influences from weather, moisture and strong fluctuations of temperature. The recommended storage conditions are to be adhered to.

Below the permissible ambient temperature ϑ_u , elastomer seals lose their elasticity and mechanical loading capacity, since the glass transition temperature is fallen below. This procedure is reversible. A force action on the device is to be avoided in case of storage below the permissible ambient temperature ϑ_u .

Devices with EPDM seals are not mineral-oil resistant and are not tested for their function. There is no preservation of the interior parts. If the device is not taken into operation immediately, all corrosion-prone surfaces are to be protected by suitable conservation measures. The same applies for devices which are not tested for other reasons.

When storing for a long period of time (> 6 months), treat all surfaces at risk of corrosion again with suitable preserving agents.

If high air humidity or aggressive atmospheres are expected, take additional corrosion-preventing measures.



Storage in corrosion protection bags (VCI) maximum of 6 months.



NOTICE

Corrosion/chemical impact

Improper storage can render the device useless.

1. Protect endangered surfaces by means of suitable conservation measures.
2. Comply with recommended storage conditions.

Gear pump KF 2.5 - 630

KRACHT



Recommended storage conditions

1. Storage temperature: 5 °C - 25 °C
2. Relative air humidity: < 70 %
3. Protect elastomer parts from light, especially direct sunlight.
4. Protect elastomer parts from oxygen and ozone.
5. Comply with maximum storage times of elastomeric parts:
 - 5 Years: AU (Polyurethane rubber)
 - 7 Years: NBR, HNBR, CR
 - 10 Years: EPM, EPDM, FEP/PTFE, FEPM, FKM, FFKM, VMQ, FVMQ

KRACHT

Gear pump KF 2.5 - 630

6 Installation

6.1 Safety instructions for installation



DANGER

Hazardous fluids!

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.



DANGER

Rotating parts!

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



DANGER

Rotating parts!

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Take measures against accidental touching of rotating parts.



WARNING

Rotating parts!

Danger of injury from flying parts.

1. Enclose rotating parts so as to avoid any danger from flying parts in the event of breakage or malfunction.



WARNING

Unshielded gearwheels!

Gearwheels can trap and crush fingers and hands.

1. Do not engage gearwheels.

Gear pump KF 2.5 - 630

KRACHT



WARNING

Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.

6.2 Noise reduction



Measures for noise reduction

1. Use suction and pressure hoses.
2. Use bell housings with high damping properties (plastic or cast iron).
3. Use of damping rings and damping rods for separation of structure-borne noise.

6.3 Mechanical installation

6.3.1 Preparation

- Check the device for transport damage and dirt.
- Check the device for freedom of movement.
- Remove existing preservatives.
 - Use only those cleaning agents that are compatible with the materials used in the device.
 - Do not use cleaning wool.
- Compare the environmental and ambient conditions at the place of installation to the permissible conditions.
 - Ensure a sufficiently stable and level foundation.
 - Expose the device only to small vibrations, see IEC 60034-14.
 - Secure sufficient access for maintenance and repair.

6.3.2 Pumps with free shaft end

The prerequisite for trouble-free operation is suitable load transmission between the pump and the drive. By default a torsionally flexible claw coupling Type "R" is used for this.

- Pre-mount coupling parts as per manufacturer's specifications.



Torsionally flexible claw coupling type "R.": See section 6.3.3 "Coupling Type "R.""

88024710002-26 2017-09-12

39

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

- Position the pumps and the drive with respect to each other.
 - Comply with the permissible mounting position.
 - Comply with the permissible direction of rotation.



Rotation and delivery direction: See chapter 3 "Device description"

- Tighten all fastening screws with the specified torque.
 - Keep to the permissible displacement values of the coupling.
 - Rule out any distortion of the device.
 - Pay attention to sufficient screw-in depth of the fastening screws.

Tightening torques [Nm]							
Thread size ⁽¹⁾	M6	M8	M10	M12	M16	M20	M24
Counter-thread Aluminium	4.6	11	22	39	95	184	315
Counter-thread Cast iron/Steel	10	25	49	85	210	425	730

⁽¹⁾ Screws/Nuts with min. strength class 8.8/8

- For devices without shaft seals, ensure that the leak oil from the shaft sealing chamber is specifically drained off and cannot get into the environment.
- Make sure no foreign bodies can get into the device.
- Take measures against accidental touching of rotating parts.
- Take measures against accidental touching of hot surfaces (> 60 °C).
- On devices with quench, mount a tank for the liquid seal.
 - Mount the tank above the device.
 - The connection on the device must point upward.
 - Checking the fluid level must be possible at any time.



A second port on the unit enables purging of the quench chamber and draining of the liquid seal.

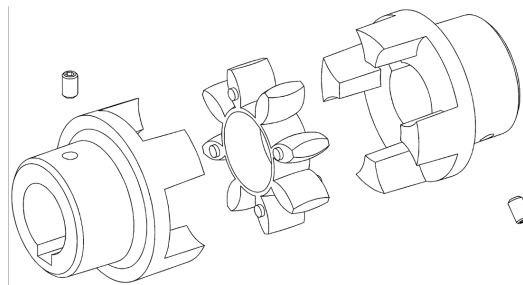
Gear pump KF 2.5 - 630

KRACHT

6.3.3 Coupling Type "R."

Claw couplings Type "R." are torsionally flexible and transmit the torque positive. They are fail-safe. The vibrations and impacts that occur during operation are effectively dampened and reduced.

Claw coupling Type "R."



NOTICE

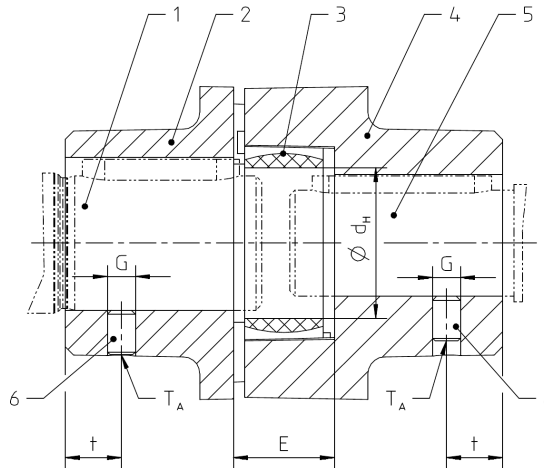
Coupling breakage or increased wear

An overload can lead to premature failure of the coupling.

1. Ensure safe dimensioning when designing the coupling. Take vibrations, torque peaks and temperatures into account.

KRACHT

Gear pump KF 2.5 - 630

Assembly data**Explanation**

- | | |
|-------------------------------|---|
| 1. Shaft projects into spider | 4. Coupling halve |
| 2. Coupling halve | 5. Shaft with parallel key projects into spider |
| 3. Spider | 6. Setscrew |

When installing the coupling, maintain the "E" gap dimension so that the spider remains free during operation. If the shaft diameters are less than (also with parallel key) the dimension d_H of the spider, the shaft ends can protrude out into the spider.

Coupling size ⁽¹⁾	14	19	24	28	38	42	48	55	65	75
	-	19/24	24/28	28/38	38/45	42/55	48/60	55/70	65/75	75/90
Coupling clearance E [mm]	13	16	18	20	24	26	28	30	35	40
d_H [mm]	10	18	27	30	38	46	51	60	68	80
G	M4	M5	M5	M8	M8	M8	M8	M10	M10	M10
t [mm]	5	10	10	15	15	20	20	20	20	25
Tightening torque T_A [Nm]	1.5	2	2	10	10	10	10	17	17	17

⁽¹⁾ Example: R.19-Z25/14-Z25/19 or R.19/24-Z25/14-Z25/24.

Gear pump KF 2.5 - 630

KRACHT



For assembly, the coupling halves can be heated to approx. 80 °C and pushed onto the shaft ends while warm.



CAUTION

Hot surfaces!

Burn injury to skin if touched.

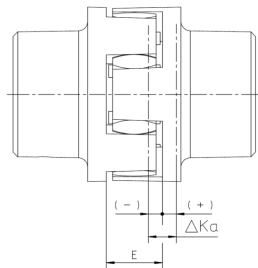
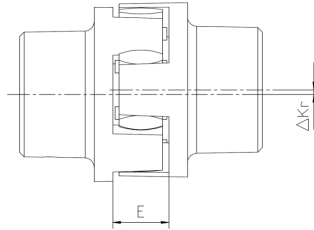
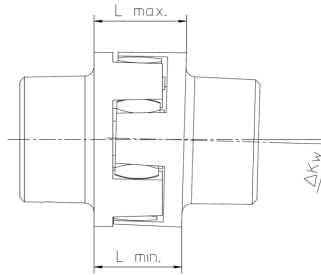
1. Wear protective gloves at temperatures $\geq 48^{\circ}\text{C}$.

- Mount the coupling halves on the shaft ends but avoid impacts on the components.
- Position the coupling halves on the shaft ends so that in later operation the "E" gap dimension is maintained.
- Secure the coupling halves by tightening the setscrews.
- Insert the spider in a coupling half.

KRACHT

Gear pump KF 2.5 - 630

Displacement values

Axial displacement
 ΔK_a Radial displacement
 ΔK_r Angular displacement
 $\Delta K_w/\Delta K_L$ 

$$\Delta K_L \triangleq L_{\max} - L_{\min}$$

Coupling size		14	19	24	28	38	42	48	55	65	75
		-	19/24	24/28	28/38	38/45	42/55	48/60	55/70	65/75	75/90
Coupling clearance E [mm]		13	16	18	20	24	26	28	30	35	40
ΔK_a [mm]		+1.0 -0.5	+1.2 -0.5	+1.4 -0.5	+1.5 -0.7	+1.8 -0.7	+2.0 -1.0	+2.1 -1.0	+2.2 -1.0	+2.6 -1.0	+3.0 -1.5
ΔK_r [mm]	1500 rpm	0.11	0.13	0.15	0.18	0.21	0.23	0.25	0.27	0.30	0.34
	3000 rpm	0.08	0.09	0.1	0.13	0.15	0.16	0.18	0.19	0.21	0.24
ΔK_w [Degree]	1500 rpm	1.1	1.1	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.1
	3000 rpm	1.0	1.0	0.7	0.7	0.8	0.8	0.9	0.9	1.0	1.0
ΔK_L [mm]	1500 rpm	0.57	0.77	0.77	0.90	1.25	1.40	1.80	2.00	2.50	3.00
	3000 rpm	0.52	0.7	0.67	0.80	1.00	1.30	1.60	1.80	2.20	2.70

Gear pump KF 2.5 - 630

KRACHT

Displacement combinations

Examples for displacement combinations shown in the photo opposite:

Example 1:

$\Delta K_r = 30 \%$

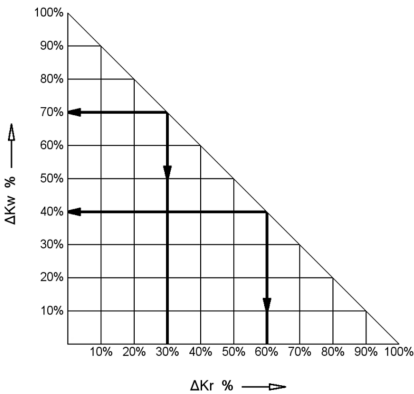
$\Delta K_w = 70 \%$

Example 2:

$\Delta K_r = 60 \%$

$\Delta K_w = 40 \%$

$\Delta K_r + \Delta K_w \leq 100 \%$



6.4 Connection lines

6.4.1 General



WARNING

Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Use only connections and lines approved for the expected pressure range.
2. Securely prevent exceeding the permissible pressure, e.g. by using pressure relief valves or rupture discs.
3. Design pipework so that no tensions, e.g. caused by changes in length due to fluctuations in temperature, are transmitted to the device.



Additional connections

1. Provide measurement connections for pressure and temperature as close as possible to device.
2. If necessary, provide a facility to fill or empty the device and the line system.
3. If necessary, provide a facility to vent the device and the line system.

KRACHT

Gear pump KF 2.5 - 630

6.4.2 Suction line

A less than optimally planned suction line can lead to increased noise emission, cavitation as well as reduction of the delivery rate (caused by not complete filling of the pump).

When designing the line, take the following points into consideration:

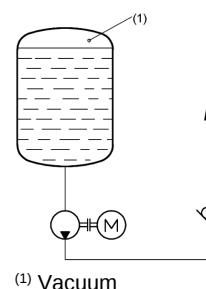
- The suction line must be piped as short as possible and in a straight line.
- Stipulate the nominal width of the suction line so that the permissible operating pressure $p_{e\ min}$ is not exceeded on the suction side.
- Avoid large suction heights.
- Avoid additional pressure loss through line resistances such as fittings, screwed connections, formed parts or suction filters/suction baskets. Ensure that all technically required suction filters/suction baskets are appropriately dimensioned.
- Make sure there is sufficient clearance of the suction port to the bottom and walls of the media container.
- Make sure that the suction opening lies underneath the lowest fluid level in all operating situations.
- When hose lines are used, ensure sufficient stability of the hoses so that they cannot become constricted through the sucking action.
- Comply with the recommended flow velocity in the suction line (max. 1.5 m/s).

Suction line at vacuum operation

If suction from a tank under vacuum is desired, the pump must be arranged approx. 1 m below the tank. The suction line must run in a straight line and without any resistances.

The tank may be subjected to vacuum only then when the pipework and the pump have been filled with liquid.

For this application, only pumps suitable for vacuum operation may be used.

**NOTICE****Cavitation damage**

Undercutting the permissible suction port pressure results in cavitation.

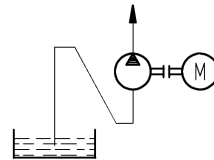
1. Design the suction line so that the pressure arising in operation on the suction side is always higher than the vapour pressure of the pumped medium. At the same time, comply with the installation altitude of the device above mean sea level.
2. For aqueous fluids, mount the device underneath the fluid level, set the operating temperature to 50 °C and limit the speed to 1500 rpm.

Gear pump KF 2.5 - 630

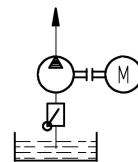
KRACHT

Prevention of suction problems

If there is a possibility that the suction line can run dry if the pump stops, piping the suction line as siphon is an option to avoid suction problems. This way, the pump will remain permanently filled after initial commissioning.



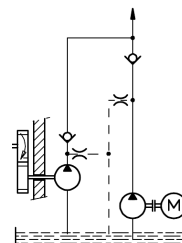
It is appropriate to employ a foot valve or a non-return valve in case of longer suction lines that can run dry while the pump is at rest. These must have been designed for use in suction lines and should offer as low a flow resistance as possible.



During operation of a pump that has to pump media via a non-return valve in a pressurized circuit (e.g. reserve pump in a lubricant circuit), suction problems can occur if the suction line is filled with air.

In this case the pressure pipe must be bled directly upstream of the non-return valve.

If no vent nozzle is used, the volume of the pressure pipe between the pump and the non-return valve must be at least 75 % of the suction line volume.



6.4.3 Pressure line

When designing the line, take the following points into consideration:

- Select the nominal width of the pressure line so that the maximum permissible pressures are not exceeded.
- If necessary, provide a vent nozzle to prevent suction problems.

6.4.4 Mounting Connection lines



Position of the device connections: See chapter 3 "Device description"

- Clean all lines.
 - Do not use cleaning wool.
 - Pickle and flush welded pipes.
- Remove the protective plugs.
- Mount the lines.
 - Comply with the manufacturer's information.
 - Do not use any sealing materials such as hemp, Teflon tape or putty.

88024710002-26 2017-09-12

47

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

6.5 Change of the direction of rotation

For pump types KF . R and KF . L, a change of the direction of rotation is only possible by converting.

The manufacturer normally carries out the conversion work and the customer should do this only in exceptional cases. Please consult the manufacturer about this.



Gear pumps in noise-optimized version cannot be converted. (e.g. special number **197**)



DANGER

Rotating parts!

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.



WARNING

Failure of load-carrying parts due to overload!

Danger of injury from flying parts.
Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.



NOTICE

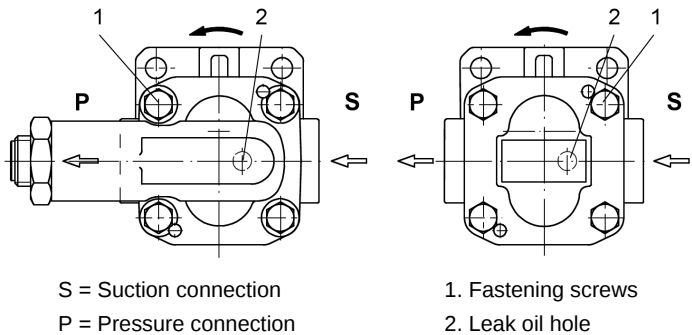
Leaks or increased wear

Damaged sealing surfaces or supports lead to lack of sealing and/or faults in later operation.

1. When assembling or disassembling housing components, be sure not to damage the bearings, e.g. by tilting.
2. When disassembling housing components, do not use screwdrivers or the like as a lever to separate the joints.
3. Do not remove, damage or jam seals.

Gear pump KF 2.5 - 630

KRACHT



To change the direction of rotation of the gear pump, turn the end cover or the pressure relief valve 180°.

- Loose fastening screws.
- Unscrew the end cover or the pressure relief valve of the pump housing and replace it rotated 180°.
- Tighten the fastening screws with the stated torque.

Fastening screws KF 2.5 - 630				
Gear pump	KF 2.5 - 25	KF 32 - 80	KF 100 - 200	KF 250 - 630
Tightening torques [Nm]	25	49	85	215



For pumps with sealing type 6, the lip-type seal must be replaced in addition. During this process, the spring coiling direction must be observed.

When checking, pay attention to the following points:

1. For gear pumps without pressure relief valve, the leak oil hole in the end cover must be placed at the pump's suction side.
2. Gear pumps with pressure relief valve must have their pressure relief valve adjusting screw point toward the pump's pressure side.

KRACHT

Gear pump KF 2.5 - 630

7 Operation start-up

7.1 Safety instructions for start-up

 DANGER
Hazardous fluids! Danger of death when handling hazardous fluids. 1. Comply with the safety data sheets and regulations on handling hazardous fluids. 2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.
 WARNING
Failure of load-carrying parts due to overload! Danger of injury from flying parts. Danger of injury from spurting fluids. 1. Do not operate the device against closed shut-off devices. 2. Do not operate the device in the false direction of rotation.
 CAUTION
Hot surfaces! Burn injury to skin if touched. 1. Wear protective gloves at temperatures $\geq 48^{\circ}\text{C}$.

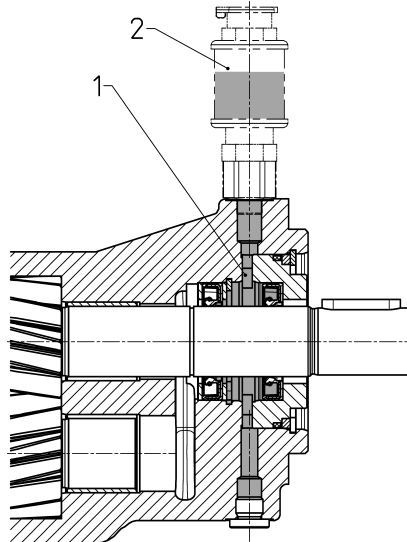
7.2 Preparation

- Before starting the system make sure that a sufficient quantity of the operating fluid is extant to avoid dry running.
Take this into consideration especially with high output volumes.
- Check all fastening screws on the device.
- Fill pump and the suction line with medium.

Gear pump KF 2.5 - 630

KRACHT

7.3 Filling the quench chamber



1. Quench chamber
2. Container for quench-liquid (Accessories)

- For versions with quench, fill the quench chamber with a suitable quench liquid.
 - The filling is implemented through the tank provided for that.
 - Fill fluid until the quench chamber is completely full and the tank is half full.
- Do not apply pressure or vacuum to the quench chamber.



NOTICE

Seal failure due to dry run

A lack of quench liquid can lead to a failure of the seal.

1. Do not put pumps without quench liquid into operation.



A second port on the unit enables purging of the quench chamber and draining of the liquid seal.

KRACHT

Gear pump KF 2.5 - 630

7.4 Pressure relief valve adjustment

Directly attached pressure relief valves of the series "D" are used exclusively for protection of the gear pumps and may respond on a short-term basis only.

The valves are factory set to the rated pressure of each pressure stage. Setting pressures that deviate from this are stated on the rating plate.



NOTICE

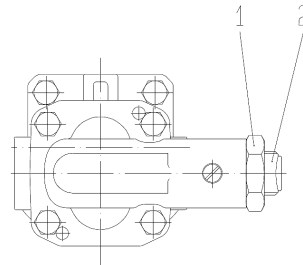
Failure of the pump

Long triggering of the valve can cause the pump to overheat.

1. Only allow intermittent triggering of the valve.



- Lower response pressure
+ Higher response pressure



1. Hexagonal nut
2. Adjustment screw

Pressure setting:

- Remove hexagon nut
- Set the response pressure using the adjusting screw
- Secure the adjusting screw with hexagon nut



WARNING

Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Consider the permissible pressure setting range of the valve.
2. Check the pressure setting (the valve must not block).

Gear pump KF 2.5 - 630

KRACHT

7.5 Further operation start-up

- Open existing shut-off elements upstream and downstream of the device.
- Adjust pressure relief valves in the system installed for lowest opening pressure.
- Allow the device start without or with a low pressure load (jog mode).
 - Flow should have developed after 30 s at the latest.
- Run the device for a few minutes depressurised or with low pressure.
- Vent the system at the highest possible point.
- Gradually increase the pressure load up to the desired operating pressure.
- Operate the system for so long until the final operating state is achieved.
- Check the operating data such as:
 - Discharge flow
 - Operating pressure (as close as possible to device)
 - Fluid temperature (as close as possible to device)
 - Device temperature (in particular in the area of the bearing points)
 - ...
- Document the operating data of the initial start-up for later comparison.
- Check the level of the operating medium in the system.
- Check the filling level of the liquid seal (if existing).
- Check the device for leaks.
- Check all threaded connections for leaks and retighten if necessary.



In order to ensure a constant and reliable function of the device, an initial maintenance of the device is recommended after several hours warm-up time (max. 24 h). Faults can thus be identified at an early stage.

KRACHT

Gear pump KF 2.5 - 630

8 Removal

8.1 Safety instructions for removal

**DANGER****Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.

**DANGER****Rotating parts!**

Danger of death due to body parts, hair or clothing getting trapped or entangled.

1. Before all work, ensure that existing drives are voltage-free and pressure-free.
2. Securely prevent restarting during all work.

**WARNING****Unshielded gearwheels!**

Gearwheels can trap and crush fingers and hands.

1. Do not engage gearwheels.

**WARNING****Failure of load-carrying parts due to overload!**

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Depressurise the device and all connection lines before doing any work.
2. Securely prevent the restoration of pressure while working on the device.

**CAUTION****Hot surfaces!**

Burn injury to skin if touched.

1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.

Gear pump KF 2.5 - 630

KRACHT

**NOTICE****Blocking of the device through hardening medium**

Hardening medium can mechanically jam the device and make it unusable.

1. Clean device immediately after operating with a hardening medium.

8.2 Removal

- Depressurise and de-energize the system.
- Close existing shut-off elements upstream and downstream of the device.
- Open existing drain elements and loosen connection lines. Collect and dispose of discharging medium so that no hazard arises for persons or environment.
- Dismantle the device.
- Clean the device.
- Close the device connections and lines to prevent dirt penetration.

KRACHT

Gear pump KF 2.5 - 630

9 Maintenance

9.1 Safety instructions for maintenance

 DANGER
Hazardous fluids! Danger of death when handling hazardous fluids. 1. Comply with the safety data sheets and regulations on handling hazardous fluids. 2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.
 DANGER
Rotating parts! Danger of death due to body parts, hair or clothing getting trapped or entangled. 1. Before all work, ensure that existing drives are voltage-free and pressure-free. 2. Securely prevent restarting during all work.
 WARNING
Failure of load-carrying parts due to overload! Danger of injury from flying parts. Danger of injury from spurting fluids. 1. Depressurise the device and all connection lines before doing any work. 2. Securely prevent the restoration of pressure while working on the device.
 CAUTION
Hot surfaces! Burn injury to skin if touched. 1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.

9.2 Maintenance work



Checking and documentation of the operating data

Regular checking and documentation of all operating data such as pressure, temperature, current consumption, degree of filter soiling, etc. contributes to early problem detection.

Gear pump KF 2.5 - 630

KRACHT

- Perform maintenance according to specification.
- Replace defective and worn components.
- If required, request spare parts lists and assembly drawings from the manufacturer.
- Document the type and scope of the maintenance work along with the operating data.
- Compare the operating data with the values of the first commissioning. Determine the cause in case of major non-compliances (> 10 %).
- Dispose of packing material and used parts in accordance with the local stipulations.



Barriers and instructions

All barriers and warning signs removed during this must be attached to their original position on completing maintenance and/or repairs.

9.3 Maintenance instructions

The following information provides recommendations on maintenance work and maintenance intervals for the device being used.

Depending on the actually occurring loads in operation, the type, scope and interval of the maintenance work can deviate from the recommendations. The equipment builder/operator shall write an obligatory maintenance plan.



Within the framework of preventive maintenance, it is appropriate to replace wear parts before reaching the wear limit.

With corresponding expertise and sufficient equipment, the replacement can be carried out by the equipment builder/operator. Please consult the manufacturer about this.



Warranty

In case of improper implementation, any warranty is voided.

KRACHT

Gear pump KF 2.5 - 630

Maintenance recommendations Gear pump			
Interval	Maintenance work	Employ-ees	Duration approx. [h]
Firstly: after max. 24 h	Inspection: Discharge flow	1	1
	Inspection: Operating pressure		
	Inspection: Fluid temperature		
	Inspection: Device temperature		
	Inspection: Add-on valve function (if existing)		
	Inspection: Check potential equalisation for firm seating and functionality (if existing)		
	Inspection: Condition of operating fluid		
Daily	Audiometric monitoring: Unusual noise	1	0.1
	Cleaning: Remove dust deposits and dirt with a moist cloth		
	Visual inspection: Leakages		
	Visual inspection: Filling level of liquid seal (if existing)		
3000 Operating hours	Inspection: Discharge flow	1	1
	Inspection: Operating pressure		
	Inspection: Fluid temperature		
	Inspection: Device temperature		
	Inspection: Add-on valve function (if existing)		
	Inspection: Check potential equalisation for firm seating and functionality (if existing)		
	Inspection: Condition of operating fluid		
6000 Operating hours	Visual inspection: Condition of gears	1	2
	Visual inspection: Condition of housing parts		
	Visual inspection: Condition of plain bearings		
	Visual inspection: Condition of shaft seal		
	Visual inspection: Condition of outboard bearings (if existing)		
As required	Replace: Plain bearings (only by manufacturer)	1	2
	Replace: Outboard bearing (if existing)		
	Replace: Shaft seal		
	Replace: Other seals		

Gear pump KF 2.5 - 630

KRACHT

10 Repairs

10.1 Safety instructions for repair

 DANGER
Hazardous fluids! Danger of death when handling hazardous fluids. 1. Comply with the safety data sheets and regulations on handling hazardous fluids. 2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.
 DANGER
Rotating parts! Danger of death due to body parts, hair or clothing getting trapped or entangled. 1. Before all work, ensure that existing drives are voltage-free and pressure-free. 2. Securely prevent restarting during all work.
 WARNING
Failure of load-carrying parts due to overload! Danger of injury from flying parts. Danger of injury from spurting fluids. 1. Depressurise the device and all connection lines before doing any work. 2. Securely prevent the restoration of pressure while working on the device.
 CAUTION
Hot surfaces! Burn injury to skin if touched. 1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.

KRACHT

Gear pump KF 2.5 - 630

10.2 General

The repairs covers:

1. Troubleshooting
Determination of damage, pinpointing and localisation of the damage cause.
2. Elimination of damage
Elimination of the primary causes and replacement or repair of defective components. The repair is generally made by the manufacturer.

Repairs by manufacturer

- Before returning the device, fill in the *return notification* form. The form can be filled in online and is available as a pdf file download.



Device contains hazardous material

If the device was operated with dangerous liquids, it must be cleaned before the return. If this should not be possible, the safety data sheet of the hazardous material is to be provided beforehand.

Repair by equipment builder/operator

If corresponding expertise and sufficient equipment is available, the equipment builder/operator can also make the repairs. Please consult the manufacturer about this.

- If required, request spare parts lists and assembly drawings from the manufacturer.
- Use spare parts approved by the manufacturer only.
- Dispose of packing material and used parts in accordance with the local stipulations.



Warranty

In case of improper implementation, any warranty is voided.



Barriers and instructions

All barriers and warning signs removed during this must be attached to their original position on completing maintenance and/or repairs.

Gear pump KF 2.5 - 630

KRACHT

10.3 Detecting and eliminating failures

Failure	Potential causes	Possible measures
1.1 Increased noise <i>Pump cavitation</i>	Excessive negative pressure (not complete filling of the pump)	Check suction line design Use noise-optimised pump
	Suction line plugged	Clean the suction line
	Suction filter plugged or too small	Clean suction filter or use a larger filter Replace filter element
	Suction basket plugged or too small	Clean intake strainer or dimension larger
	Fluid temperature too low	Adjust the temperature of medium
1.2 Increased noise <i>Foaming or air in medium</i>	Pump sucks air	Check oil level in the tank Check suction line Check the shaft seal
	Shaft seal defective	Replace shaft seal
	Suction connection leaking	Retighten or replace threaded connections Replace seals
	System not vented	Vent system
	Return line ends above the fluid level	Extend return line
	Heavy foaming in the system, e.g. in gears	Use noise-optimised pump
1.3 Increased noise <i>Mechanical vibrations</i>	Incorrectly aligned and/or loose coupling	Correct the alignment of the coupling and secure the coupling halves
	Incorrectly and/or insufficient line fastening	Fixate lines with suitable fastening material (e.g. pipe clamps)
	Wobbling pressure relief valve (if existing)	Increase valve opening pressure
	Not a noise-reducing setup	Use dampers

88024710002-26 2017-09-12

61

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

Failure		Potential causes	Possible measures
2	Pump does not suck	Dry run	Fill pump and the suction line with medium.
		Minimum filling level in the supply tank undercut	Top up medium
		False direction of rotation of the pump	Correct the direction of rotation
		Closed shut-off element in the suction line	Open the shut-off element
		Suction line plugged	Clean the suction line
		The air in the suction line cannot be compressed in the pressure line	Reduce the start-up pressure
			Vent the pressure line
			Increase volume of the pressure line
		Speed of the pump is too low	Check the pump design
			During frequency inverter operation: Check the operation/line frequency
		Geodetic suction head too high	Check installation location
			Provide pre-filling pump

Gear pump KF 2.5 - 630

KRACHT

Failure	Potential causes	Possible measures
3 Insufficient pressure Insufficient pumping flow rate	Excessive negative pressure (not complete filling of the pump)	Check suction line design
	Viscosity too high	Provide pre-filling pump
	Speed of the pump is too low	Check the pump design
		During frequency inverter operation: Check the operation/line frequency
	Throttled shut-off element in the suction line	Open the shut-off element
	Suction line plugged	Clean the suction line
	Suction filter plugged or too small	Clean suction filter or use a larger filter
		Replace filter element
	Suction bascet plugged or too small	Clean intake strainer or dimension larger
	Constant triggering of pressure relief valve (if existing)	Increase valve opening pressure
	Pump sucks air	Check oil level in the tank
		Check suction line
		Check the shaft seal
4 Excessive operating temperature	Wear	Replace the device
	Cooling and heat dissipation insufficient	Increase the cooling capacity
	Not sufficient oil in the system	Check the container layout
	Excess fluid is being delivered into the supply tank via pressure relief valve under load	Check the pump design
5 Impermissible pump heating	Constant triggering of a directly attached pressure relief valve (if existing)	Increase valve opening pressure
	Pressure too high in association with a media viscosity that is too low	Check the system design
	Speed too fast in connection with media viscosity that is too high	Check the system design
	Gland lid overtightened (for gland seal)	Unscrew gland lid and readjust leakage
	Suction pressure too high	Reduce the pressure
	Wear	Replace the device

88024710002-26 2017-09-12

63

23100591/ES – 05/2019

KRACHT

Gear pump KF 2.5 - 630

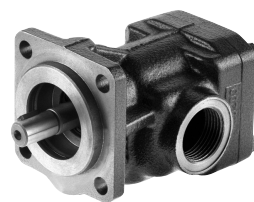
Failure	Potential causes	Possible measures
6 Leakages <i>Seal failure</i>	Poor maintenance	Comply with maintenance plan Replace seals
	Mechanical damage	Replace seals
	Thermal overload	Check the operating datas Replace seals
	Pressure too high	Check the operating datas Replace seals
	Gas content in medium too high	Check the operating datas Replace seals
	Corrosion/chemical impact	Check the material compatibility Replace seals
	Wrong direction of rotation	Correct the direction of rotation Replace seals
	Contaminated medium	Provide filtration Replace seals
	Gland lid not sufficiently tightened (for gland seal)	Retighten gland lid
	Loose threaded connections	Retighten or replace threaded connections
7.1 Coupling <i>Coupling wear</i>	Alignment error	Correct the alignment of the coupling and secure the coupling halves
	Spider overloaded	Check the operating datas Use harder spider
7.2 Coupling <i>Cam break</i>	Spider wear Torque transmission due to metal contact	Adapt maintenance intervals Replace coupling
7.3 Coupling <i>Premature spider wear</i>	Alignment error	Correct the alignment of the coupling and secure the coupling halves Replace spider
	Spider failure due to chemical corrosion	Check the material compatibility Replace spider

Gear pump KF 2.5 - 630

KRACHT

Failure		Potential causes	Possible measures
8	Motor protection switch tripped	Driving power too low	Check the drive design
		Motor incorrectly connected	Check motor connection
		Phase failure	Check feed/supply
		Current consumption too high	Check the operating datas
			Check direction of rotation
	Motor circuit breaker incor- rectly designed	Check the operating datas	
Consult the manufacturer for all unidentifiable failures.			

KRACHT



Transfer Gear Pumps

KF 2.5...200

Transfer Gear Pumps KF 2.5...200

KRACHT

2 KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

23100591/ES – 05/2019

Transfer Gear Pumps KF 2.5...200

KRACHT

Contents

Technical Data

	Page
Applications / Suitable fluids	4
Construction	5
Variants / Direction of rotation	6
ATEX version	6
Materials / Characteristics	7
Shaft end seals / Variants Shaft End Seals	8 – 9
Version noise optimized for medias with increased air content	10
Type key	11
Technical data	12
Discharge flow / Input power	13 – 14

Dimension Sheets

Flange-mounting version with pipe thread	Nominal size 2.5 – 25	15
Flange-mounting version with SAE-connection	Nominal size 2.5 – 200	16
Pump with mounting angle, pipe thread	Nominal size 2.5 – 25	17
Pump with mounting angle, SAE 1 1/2-connection	Nominal size 32 – 80	17
Flange-mounting version with universal arrangement	Nominal size 2.5 – 25	18
Flange-mounting version with universal arrangement	Nominal size 32 – 80	19
Flange-mounting version with universal arrangement U2	Nominal size 32 – 80	19
Flange-mounting version with universal arrangement U2	Nominal size 100/112	21
Couplings		22
Bell housing	Nominal size 2.5 – 200	23
Motor-pump assemblies with pipe thread	Nominal size 2.5 – 25	24 – 25
Motor-pump assemblies with SAE-connection	Nominal size 32 – 80	26 – 27
Motor-pump assemblies with SAE-connection	Nominal size 100...200	28 – 29
Threaded flange / Welding flange / Accessory liquid seal		30 – 31

Transfer Gear Pumps KF 2.5...200

KRACHT

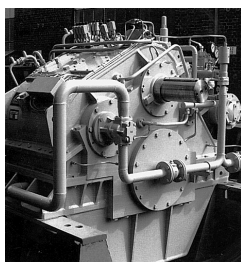
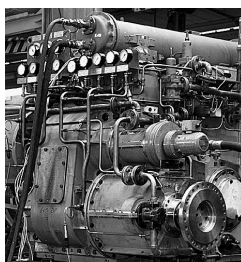
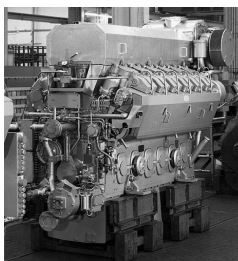
Applications, Suitable Fluids

Applications

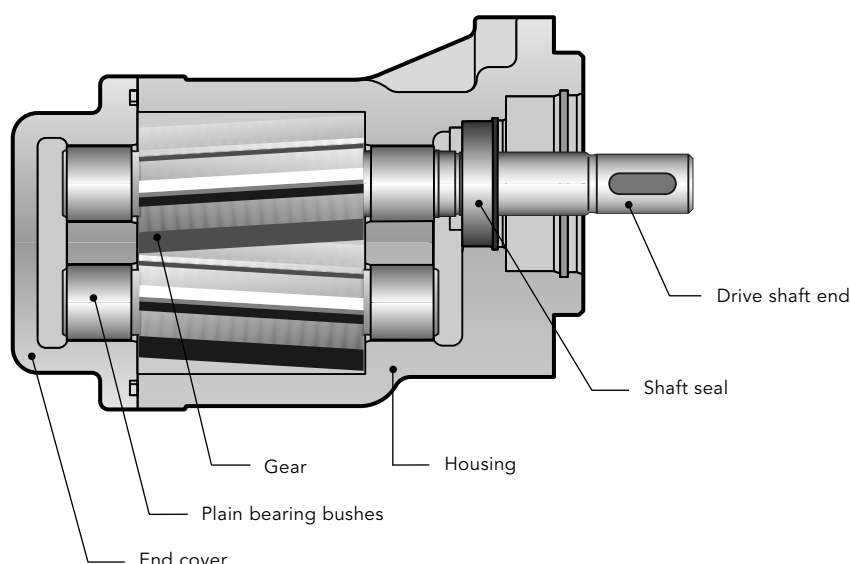
Centrifuge construction,
Coating machines, Compressors
Engine construction
Filling stations, Filter systems
Generator construction
Heat transfer systems, Heavy electrical machines
Lubricant manufacturers, Lubricating oil systems
Machine-building industry, Machine tools,
Manufacture of apparatus,
Marine engine construction,
Metal-forming machines, Metering systems
Paint industry, Plain metal bearing production,
Printing machines, PUR machinery
Refrigerators, Rubber and tire manufacturing
Tank plant construction,
Transmission building
Turbine construction
Vacuum machinery
Waste oil - disposal
- transport
- treatment

Suitable fluids

Adhesives, Antifreeze
Bore oils
Cutting oils
Diesel oils, Drawing compound
Emulsions
Fuel oils, L, EL, H
Gear oils, Grease
Hardening oils, Heat transfer media,
Heavy oils, Hydraulic fluids
Isocyanate
Lubricating oils, Lacquers
Motor oils
Paint, Paraffins, Plastics, Polyols
Printing inks, Processing oils
Resins, Rolling oils
Waste oils, Waxes



Transfer Gear Pumps KF 2.5...200

KRACHT**Construction****Product Features**

Transfer gear pumps KF are used for pumping a wide variety of fluids.

Transfer gear pumps KF are distinguished especially by their wide range of variants which are assembled as required on the modular principle and also permit subsequent upgrade.

The pumps are also suitable for media with low lubricating properties.

The standard housing sections are of grey cast iron.

The gear units are manufactured from high-strength case-hardening steel, hardened and mounted in special multi-compound plain bearing bushes.

The standard drive shaft is sealed by rotary shaft lip-type seal.

All pump sizes incorporate helical tooth system. This feature, combined with special gear geometry, results in extremely low noise levels and reduced pressure pulsation.

Working Notes

- The fluids should ensure a certain minimum lubricating properties, should not contain solids and should be chemically compatible.
- Avoid dry operation.
- The pumps may only be operated in the specified direction of rotation, as otherwise the shaft seal will be destroyed.
- In order to prevent excessive overpressure, a safety valve should be provided in the system or on the pump.
- The pressure relief valve attached to the pump may only be used as safety valve for short-term operation.
- A separate pressure relief valve with return line to the reservoir must be foreseen, if a partial discharge flow has to be drained over a prolonged period.

Transfer Gear Pumps KF 2.5...200

KRACHT

Variants

- Sealing of the drive shaft:
 - Rotary shaft lip-type seal
 - Double rotary shaft lip-type seal (Quench)
 - Mechanical seal
- Outboard bearing to take up input drive-side radial load
- Pressure relief valve for pump and system
- Uniform discharge flow direction with changing direction of rotation by means of flange-mounting valve combination (universal device).

Special Design

Various shafts ends and gear units, as well as flange mounted versions, bearing alternatives, multi-stage pump combinations for your special application are available on request.

Our Sales engineers will be pleased to advise you.

Accessories

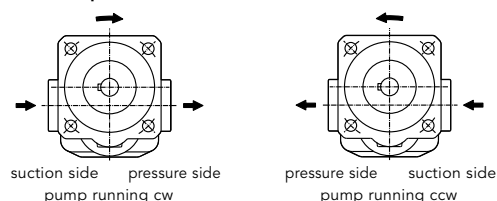
- Connecting flanges
- Couplings
- Bell housing
- Quench tank
- Attenuation elements

Direction of Rotation

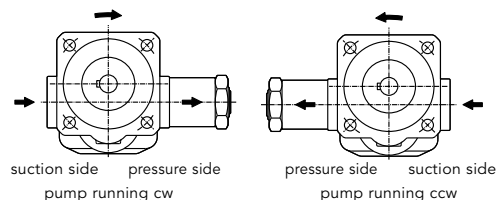
The following should be note for direction of rotation:

- when looking at the pump shaft end, the direction of pumping is from left to right if the shaft rotates **clockwise**.
- when looking at the pump shaft end, the direction of pumping is from right to left if the shaft rotates **counterclockwise**.

Without pressure relief valve



With pressure relief valve



With universal device

Direction of rotation right and left

Direction of rotation consistent, see dimension sheets page 18 to 21.

ATEX-Version

	KF 2,5...112 with lip-type seal	KF 2,5...112 with double lip-type seal
In Ex-area max. suitable for category	EX II 2G T4 EX II 2D T135 °C	EX II 2G T4
Perm. working pressure inlet port in bar	– 0.4 ... + 0.5	– 0.4 ... + 0.5
Perm. working pressure outlet port in bar	25	25
Perm. viscosity in mm ² /s	12 ... 20 000	12 ... 20 000
Max. speed in 1/min (viscosity dependent)	3 000	3 000
Perm. mounting position	Horizontal or shaft end toward bottom	Horizontal quencher up
Perm. media temperatures in °C	– 10 ... + 80	– 10 ... + 80
Perm. ambient temperatures in °C	– 20 ... + 60	– 20 ... + 60
Comments	Vertical mounting with shaft end up on request. In executing with outboard bearing max. speed 1500 1/min. In dust Ex-area, permissible only with non-conductive dusts. Dust-proof capsuling of pump shaft and coupling required.	Not suitable for dust-Ex. Execution with quench feed and quencher.

Additional products available on request.

Transfer Gear Pumps KF 2.5...200

KRACHT

Materials

Housing and cover	EN-GJL-250 (GG 25) EN-GJS-400-15 (GGG 40) on request
Gear	Steel 1.7139
Plain bearing bushes	DU (multi-layer friction-type bearings P 10, DP 4) Bearings free of nonferrous metal on request
Shaft end seals	NBR, FKM, PTFE, EPDM (other sealing materials on request. E.g. HNBR / CR)
O-ring	NBR, FKM, PTFE, EPDM (other sealing materials on request. E.g. HNBR / CR)

Characteristics

Nominal sizes 2.5...200 cm ³	$V_g =$	2.5 / 4 / 5 / 6 / 8 / 10 / 12 / 16 / 20 / 25 / 32 / 40 / 50 / 63 / 80 / 100 / 112 / 125 / 150 / 180 / 200
Mounting position		KF... R/L/B ... without Quench optional KF... R/L/B ... with Quench horizontal, Quench connection above KF... U ... horizontal, Pressure connection above KF... U2...optional
Direction of rotation		right or left right and left
Fixing type		flange
Pipe connection	KF 2.5...25 KF 32...200	Whitworth pipe thread, SAE flange SAE flange
Drive shaft end		ISO R 775 short-cylindrical
Working pressure suction side		see chart page 8
Working pressure pressure side	P_n	25 bar (higher pressures on request)
Speed	KF 2.5... 63 KF 80... 180 KF 200	200 ... 3 600 1/min 200 ... 3 000 1/min 200 ... 2 500 1/min
Recommended speed		The speed of the pump must be chosen in such a way that complete pump filling is guaranteed. This is given if the relative pressure at the pump inlet does not fall below -0.4 bar (-0.6 bar briefly e.g. during cold start).
Viscosity (dependent on pressure and rotational speed)	V_{min} V_{max}	1.4... 12 mm ² /s (see table "permissible differential pressure") 20 000 mm ² /s
Fluid temperature		see chart page 8
Ambient temperature	$\vartheta_u =$	-20 °C ... 60 °C (-4 °F ... 140 °F) -30 °C... 60 °C Sealing type 23 (KF 2.5...80) -30 °C... 60 °C Sealing type 31 (KF 32...200)

Permissible Differential Pressure

Bearing	Δp_{max} [bar]		
	$\geq 1.4 \text{ mm}^2/\text{s}$	$\geq 6 \text{ mm}^2/\text{s}$	$\geq 12 \text{ mm}^2/\text{s}$
Multi-layer plain bearing containing lead ⁽¹⁾ : DU®, P10	3	12	25
Multi-layer plain bearing lead-free ⁽²⁾ : DP4			
Polymer plain bearing ⁽²⁾ : Iglidur® X	-	3	10
White metal plain bearing ⁽²⁾			

(1) Standard (2) Is defined in the special number

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

7

Transfer Gear Pumps KF 2.5...200

KRACHT

Shaft End Seals

	Sealing material	Pressure suction side* (bar)		Fluid temperature	
		KF 2,5...80	KF 100...200	°C	°F
Pump with single rotary shaft lip	NBR/ max. 750 1/min	-0.4...6.0	-0.4...6.0	-10...90-NBR	14...194-NBR
	FKM max. 1000 1/min	-0.4...5.0	-0.4...5.0		
	max. 1500 1/min	-0.4...4.0	-0.4...3.5	-10...150-FKM	14...302-FKM
	max. 2000 1/min	-0.4...3.0	-0.4...2.5		
	max. 3000 1/min	-0.4...2.0	-0.4...1.5		
	FKM (low temperature)	-0.4...0.5		-30**...150	-22**...302
Pump with outboard bearing and single rotary shaft lip	EPDM	-0.4...0.5		-10...120	14...248
	PTFE	-0.4...2.0		-10...200	14...392
	NBR/ max. 750 1/min	-0.4...6.0	-0.4...6.0	-10...90-NBR	14...194-NBR
	FKM max. 1000 1/min	-0.4...5.0	-0.4...5.0		
	max. 1500 1/min	-0.4...4.0	-0.4...3.5	-10...150-FKM	14...302-FKM
	max. 2000 1/min	-0.4...3.0	-0.4...5.5		
Pump with double rotary shaft seal with connection borehole for liquid seal (quench)	max. 3000 1/min	-0.4...2.0	-0.4...1.5		
	PTFE	-0.4...2.0		-10...200	14...392
	NBR/ max. 750 1/min	-0.4...6.0	-0.4...6.0	-10...90-NBR	14...194-NBR
	FKM max. 1000 1/min	-0.4...5.0	-0.4...5.0		
	max. 1500 1/min	-0.4...4.0	-0.4...3.5	-10...150-FKM	14...302-FKM
	max. 2000 1/min	-0.4...3.0	-0.4...2.5		
Pump with double rotary shaft seal for vacuum operation with connection borehole for liquid seal (quench)	max. 3000 1/min	-0.4...2.0	-0.4...1.5		
	PTFE	-0.4...2.0		-10...200	14...392
	NBR	-0.9...0.2		-10...90	14...194
Pump with triple rotary shaft seal for vacuum and normal operation with connection borehole for liquid seal (quench)	FKM	-0.9...0.2		-10...150	14...302
	PTFE	-0.9...0.2		-10...200	14...392
	NBR/ max. 750 1/min	-0.9...6.0	-0.9...6.0	-10...90-NBR	14...194-NBR
Pump with mechanical seal	FKM max. 1000 1/min	-0.9...5.0	-0.9...5.0		
	max. 1500 1/min	-0.9...4.0	-0.9...3.5	-10...150-FKM	14...302-FKM
	max. 2000 1/min	-0.9...3.0	-0.9...2.5		
	max. 3000 1/min	-0.9...2.0	-0.9...1.5		
	FKM	-0.4...10.0		-10...150	14...302
Pump with mechanical seal and connection borehole for liquid seal (quench)	PTFE	-0.4...10.0		-10...200	14...392
	EPDM	-0.4...10.0		-10...120	14...248
	FKM	-0.4...10.0		-10...150	14...302

Speed: KF 2.5... 63 200 ... 3 600 1/min
 KF 80... 180 200 ... 3 000 1/min
 KF 200 200 ... 2 500 1/min

* short term during start-up status: -0.6 bar

** only in connection with housing and cover material EN-GJS-400 (GGG 40)

The indicated maximum values are dependent upon the remaining working conditions.

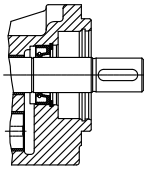
In case of universal devices, pay attention to limitation of $P_{e \text{ min.}}$

Other sealing materials on request.

Transfer Gear Pumps KF 2.5...200

KRACHT

Variants Shaft End Seals



Pump with single
rotary shaft lip

Fixing type: F/W

Sealing materials:

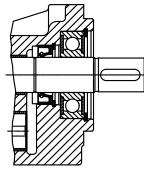
NBR = sealing type 1

FKM = sealing type 2

PTFE = sealing type 3

EPDM = sealing type 9

FKM low temperature
= sealing type 23/31



Pump with outboard
bearing and single
rotary shaft lip

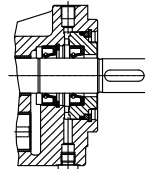
Fixing type: G/X

Sealing materials:

NBR = sealing type 1

FKM = sealing type 2

PTFE = sealing type 3



Pump with double rotary
shaft seal with connection
borehole for liquid seal
(quench)

Fixing type: F/W

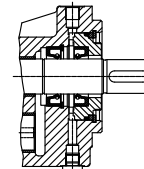
Sealing materials:

NBR = sealing type 19

FKM = sealing type 7

PTFE = sealing type 4

EPDM = sealing type 32



Pump with double rotary
shaft seal for vacuum
operation with connection
borehole for liquid seal
(quench)

Fixing type: F/W

Sealing materials:

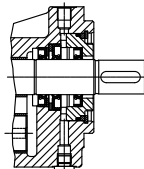
NBR = sealing type 19

FKM = sealing type 7

PTFE = sealing type 4

EPDM = sealing type 32

Special number: 74



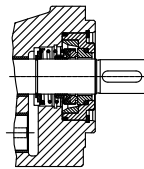
Pump with triple rotary
shaft seal for vacuum
and normal operation
with connection borehole
for liquid seal (quench)

Fixing type: F/W

Sealing materials:

NBR = on request

FKM = on request



Pump with
mechanical seal

Fixing type: F/W

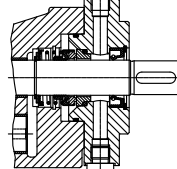
Sealing materials:

FKM = sealing type 5

PTFE = sealing type 6

mechanical seal

= sealing type 40



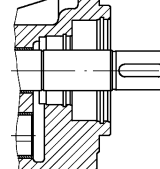
Pump with mechanical seal
and connection borehole
for liquid seal (quench)

Fixing type: F/W

Sealing materials:

FKM = sealing type 5

Special number: 198



Pump without shaft sealing

Fixing type: F/W

Sealing material:

FKM o-ring
= sealing type 30

Transfer Gear Pumps KF 2.5...200

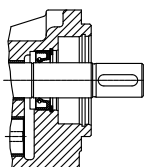
KRACHT

KF 2.5...200 noise optimized for medias with increased air content

The noise optimized pumps in the KF series are designed for conveying for medias with increased air content, predominantly for use as lubricating oil pumps in transmissions. Special measures prevent the otherwise normally increased noise present in auriferous transmission oil. The noise levels do not exceed or only barely exceed the measurements with non-auriferous oils. Also, there is no noise spectrum shift to higher, unpleasant frequencies. In applications without auriferous portions in the media, it is not recommended to use this version as it will not bring about noise reduction effects there.

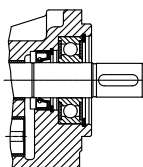
The noise optimized version of the KF pump is marked with the special number **197** at the end of the type key. Pumps with the special number **197** are built as pumps in combination with an electric motor or as mounted pumps. The pump in combination with an electric motor (Fig. 1) does not have an outboard bearing, so it has to be driven via an elastic coupling. The mounted pump (Fig. 2) comes equipped with an outboard bearing to absorb the centrifugal forces such as those which arise when using a flying pinion. Pumps for electric motor drives and mounted pumps are sealed at the shaft end using a lip-type shaft seal.

Fig. 1



Pump with
single rotary shaft lip
Fixing type: F/W
Sealing materials:
NBR = sealing type 1
FKM = sealing type 2
Special number: 197

Fig. 2



Pump with outboard bearing
and single rotary shaft lip
Fixing type: G/X
Sealing materials:
NBR = sealing type 1
FKM = sealing type 2
Special number: 197

The noise optimized version is also available in a ductile cast iron version. We can supply these pumps in the ATEX version also.

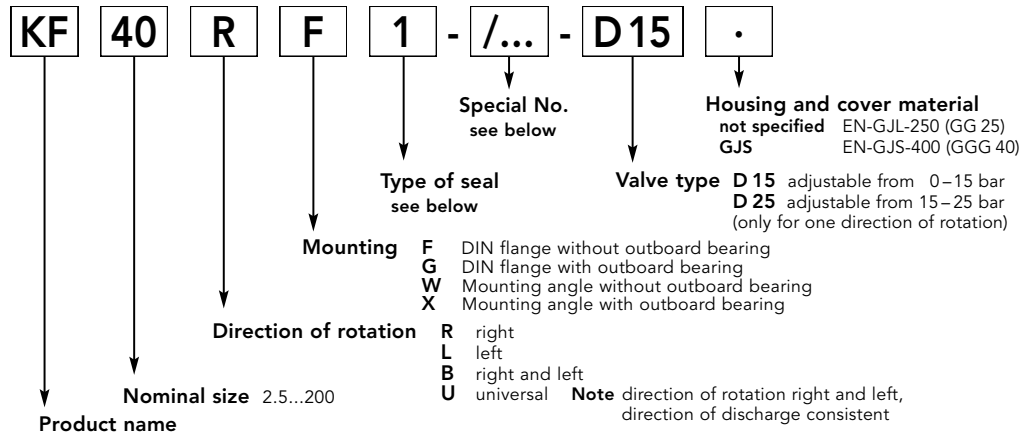
Note

Dimensions conformable standard pumps

Transfer Gear Pumps KF 2.5...200

KRACHT

Type Key (Ordering example)



Type of seal

- 1 Rotary shaft seal BABSL NBR
- 2 Rotary shaft seal BABSL FKM
- 3 Rotary shaft seal PTFE
- 4 Double rotary shaft seal PTFE
- 5 Mechanical seal with FKM secondary seals (C2S2V1G3G1)
- 6 Mechanical seal with FFKM secondary seals Q2Q2K1G3 (KF 2.5... 25) Q2B2K1G3 (KF 32... 200)
- 7 Double rotary shaft seal BABSL FKM
- 9 Rotary shaft seal EPDM (not resistant to mineral oils)
- 19 Double rotary shaft seal BABSL NBR
- 23 Rotary shaft seal MSS-1 FKM (low temperature) (KF 2.5... 80)
- 30 Without shaft seal⁽¹⁾ O-ring FKM
- 31 Rotary shaft seal BABSL FKM (low temperature) (KF 32... 200)
- 32 Double rotary shaft seal EPDM (not resistant to mineral oils)
- 36 Without shaft seal⁽¹⁾ O-ring NBR
- 40 Mechanical seal with FKM secondary seals (AQ2VFF)

⁽¹⁾ Leak oil discharged through the gland pocket

Special No.

- 74 Double rotary shaft seal (for vacuum operation) Connection bore G 1/8" (for liquid seal)
- 158 KF 2.5... 12: Flange connection SAE 3/4" KF 16... 25: Flange connection SAE 1"
- 197 Noise-optimized version for aerated oils and vacuum⁽¹⁾
- 198 Mechanical seal KF 2.5... 25: Connection bore G 1/8" (for liquid seal) KF 32... 80: Connection bore G 1/4" (for liquid seal)
- 232 KF 50...80: Flange connection SAE 2" KF 100...112: Flange connection SAE 2 1/2" KF 125...150: Flange connection SAE 3" KF 180...200: Flange connection SAE 3 1/2"
- 304 Polymer plain bearing iglidur®X (free from non-ferrous metals), $\Delta p_{max} = 10$ bar
- 317 Noise-optimized version for aerated oils and vacuum⁽¹⁾ Polymer plain bearing iglidur®X (free from non-ferrous metals), $\Delta p_{max} = 10$ bar
- 322 Triple rotary shaft seal (for normal operation + for vacuum operation) Connection bore G 1/8" (for liquid seal) Polymer plain bearing iglidur®X (free from non-ferrous metals), $\Delta p_{max} = 10$ bar KF 50... 80: Flange connection SAE 2"
- 353 Noise-optimized version for aerated oils and vacuum⁽¹⁾ Multi-layer plain bearing DP4 (lead-free)
- 355 Polymer plain bearing iglidur®X (free from non-ferrous metals), $\Delta p_{max} = 10$ bar Housing connection: KF 2.5... 25: as special number 158
- 363 Version for low-viscous media (housing and cover material = GJS) Polymer plain bearing iglidur®X (free from non-ferrous metals), $\Delta p_{max} = 10$ bar Housing connection: KF 2.5... 25: as special number 158 KF 50... 200: as special number 232
- 391 Noise-optimized version for aerated oils and vacuum⁽¹⁾ Housing connection: KF 50... 200: as special number 232
- 425 Shaft end with centre hole DIN 322-D Outboard bearing with steel cage

⁽¹⁾ There can be a reduction in pumping capacity. Measures for noise optimisation are only feasible for one rotational direction and only effective for aerated oils or vacuum.

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

11

Transfer Gear Pumps KF 2.5...200

KRACHT

Technical Data

Nominal size	geom. displacement	Working pressure*	Maximum pressure (pressure peaks)	Speed range		Permissible load ** (n = 1500 1/min)	Sound level dB (A)		
	V _g cm ³ /r			p _b bar	p _{max} bar		n _{min} 1/min	n _{max} 1/min	F _{radial} N
2.5	2.55	25	40	200	3600	700	≤ 65	≤ 66	≤ 67
4	4.03								
5	5.05								
6	6.38								
8	8.05								
10	10.11								
12	12.58								
16	16.09								
20	20.1								
25	25.1								
32	32.12				1500	≤ 67	≤ 68	≤ 68	
40	40.21								
50	50.2								
63	63.18								
80	80.5								
100	101.5								
112	113.5								
125	129.4								
150	155.6								
180	186.6								
200	206.2	2500	≤ 65	≤ 65	≤ 65				

Remark

* Working pressure p_b = perm. sustained pressure
(higher pressures on request)

** Permissible load only for version with outboard bearing. F_{radial} at centre of shaft end.

For certain working conditions, the minimum or maximum characteristics should not be used.

For example, the max. working pressure is not permissible in combination with low speed and low viscosity.

In such limit ranges, please consult us.

Sound level measured in dB(A) at 1 m distance

Sound level measured with drive motor,
installation site:

Works hall, quiet sound level = 40 dB(A)

Pump assembly on rigid fastening angle,

Suction and pressure conduits: Hose

Measured with transmission oil,

Oil viscosity $\nu = 34 \text{ mm}^2/\text{s}$,

Speed $n = 1500$ 1/min.

Transfer Gear Pumps KF 2.5...200

KRACHT

Power Consumption

Speed n = 950 1/min

Discharge Q in l/min	Pressure p _b in bar								Nominal size		Pressure p _b in bar								Power consumption P in kW
	2	4	6	8	10	15	20	25			2	4	6	8	10	15	20	25	
	2.5	3.7	4.6	5.8	7.3	9.2	11.4	14.2	18	22.8	29	36	45	57	74	92	102	114	
	2.4	3.7	4.6	5.7	7.3	9.1	11.3	14	17.6	22.5	28	36	44	56	73	90	99	112	
	2.3	3.6	4.5	5.6	7.1	8.9	11.1	13.8	17.3	22.3	27	35	43	54	72	88	97	109	
	2.2	3.6	4.5	5.5	7.1	8.8	11	13.6	16.9	22	27	34	42	53	71	86	94	106	
	2.1	3.5	4.4	5.5	7.1	8.8	11	13.4	16.6	21.7	26	34	41	52	70	87	94	103	
	2	3.4	4.2	5.3	6.8	8.5	10.8	12.9	15.7	21.1	25	32	40	50	67	84	91	96	
	1.8	3.3	4.1	5.1	6.6	8.2	10.5	12.3	14.9	20.4	23	30	38	46	62	77	84	89	
	2.5	4	5	6	8	10	12	16	20	25	32	40	50	63	80	100	112	125	
	0.03	0.04	0.06	0.07	0.09	0.1	0.12	0.15	0.18	0.21	0.3	0.4	0.5	0.6	0.8	1	1.2	1.4	
	0.04	0.05	0.07	0.08	0.1	0.12	0.14	0.17	0.21	0.29	0.38	0.47	0.56	0.74	0.92	1.14	1.2	1.4	
	0.04	0.06	0.08	0.1	0.11	0.14	0.17	0.21	0.25	0.36	0.47	0.58	0.7	0.92	1.14	1.2	1.4	1.5	
	0.05	0.07	0.09	0.12	0.14	0.19	0.25	0.3	0.39	0.48	0.7	0.92	1.14	1.2	1.4	1.5	1.8	2.3	
	0.06	0.08	0.1	0.12	0.14	0.19	0.25	0.3	0.39	0.48	0.7	0.92	1.14	1.2	1.4	1.5	1.8	2.3	
	0.08	0.1	0.11	0.14	0.17	0.24	0.31	0.45	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	
	0.09	0.13	0.16	0.2	0.25	0.38	0.47	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	
	0.11	0.16	0.2	0.25	0.31	0.45	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	
	0.13	0.16	0.2	0.25	0.31	0.45	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	
	0.16	0.2	0.25	0.31	0.45	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	
	0.19	0.25	0.31	0.45	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	
	0.25	0.3	0.38	0.47	0.6	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	
	0.3	0.4	0.5	0.6	0.8	1	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	
	0.38	0.47	0.56	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	
	0.47	0.58	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	
	0.58	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	
	0.74	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	
	0.92	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	9	
	1.14	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	9	9	
	1.2	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	9	9	9	
	1.4	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	9	9	9	9	
	1.5	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	9	9	9	9	9	
	1.8	2.3	3	3.7	4.5	5.2	6.1	7.2	8.1	9	9	9	9	9	9	9	9	9	
	2.1	2.8	3.4	4	5.7	7.3	9												

Speed n = 1450 1/min

Discharge Q in l/min	Pressure p _b in bar								Nominal size		Pressure p _b in bar								Power consumption P in kW
	2	4	6	8	10	15	20	25			2	4	6	8	10	15	20	25	
	3.6	3.6	3.5	3.5	3.5	3.4	3.3	3.2	2.5	0.04	0.05	0.08	0.1	0.12	0.14	0.16	0.2		
	5.7	5.7	5.6	5.6	5.5	5.4	5.4	5.3	4	0.06	0.08	0.16	0.12	0.15	0.2	0.25	0.3		
	6.9	6.8	6.8	6.7	6.7	6.6	6.5	6.4	5	0.07	0.1	0.12	0.15	0.19	0.27	0.35	0.43		
	8.9	8.8	8.8	8.7	8.6	8.4	8.2	8	6	0.08	0.11	0.115	0.18	0.22	0.32	0.39	0.47		
	11.3	11.2	11.1	11	10.9	10.8	10.6	10.4	8	0.09	0.14	0.18	0.22	0.26	0.37	0.47	0.58		
	14.2	14.1	14.1	13.8	13.7	13.4	13.1	12.8	10	0.11	0.16	0.21	0.27	0.32	0.45	0.58	0.72		
	17.6	17.5	17.4	17.3	17.2	16.9	16.7	16.5	12	0.12	0.19	0.26	0.32	0.39	0.55	0.72	0.89		
	22.2	21.9	21.7	21.4	21.2	20.5	19.9	19.3	16	0.16	0.26	0.37	0.47	0.57	0.82	1.08	1.33		
27.9	27.5	27.1	26.8	26.4	25.5	24.5	23.6	20	0.17	0.28	0.39	0.49	0.6	0.87	1.14	1.41			
35.3	35	34.7	34.4	34.1	33.3	32.6	31.8	25	0.24	0.34	0.47	0.61	0.74	1.08	1.41	1.75			
45	44	43	43	42	41	39	37	32	0.3	0.5	0.7	0.8	1	1.4	1.9	2.3			
57	56	55	55	54	52	50	48	40	0.4	0.6	0.9	1.1	1.3	1.8	2.3	2.9			
70	69	68	67	66	64	61	58	50	0.5	0.8	1.1	1.3	1.6	2.3	2.9	3.6			
88	87	86	85	84	81	78	75	63	0.7	1	1.3	1.7	2	2.9	3.7	4.5			
114	113	112	111	110	107	105	103	80	0.94	1.35	1.8	2.2	2.6	3.6	4.6	5.7			
144	142	140	138	137	131	128	126	100	1.2	1.6	2	2.5	3	4.3	5.7	7			
161	159	157	154	152	147	142	138	112	1.4	2	2.6	3.1	3.7	5.2	6.7	8.2			
181	178	175	172	169	162	155	147	125	1.7	2.3	2.9	3.6	4.2	5.8	7.4	9			
218	216	213	211	209	203	197	191	150	2	2.7	3.5	4.2	5	6.9	8.9	11			
264	261	257	254	251	242	234	226	180	2.3	3.2	4.1	5	5.9	8.2	10.4	12.7			
293	290	287	283	280	272	264	256	200	2.6	3.6	4.6	5.6	6.6	9.1	11.6	14			

Transfer Gear Pumps KF 2.5...200

KRACHT

Discharge Flow / Input Power

Calculation

$$P_{1Pu} = P_{tab} \cdot \frac{n}{1450} + f_v \cdot Q$$

P_{1Pu} = pump power consumption (kW)
 P_{tab} = power consumption per table (kW) at 1450 1/min
 n = speed (1/min)
 dependent on viscosity!
 (see speed recommendation)
 f_v = viscosity factor $\left[\frac{\text{kW}}{\text{l/min}} \right]$
 (see diagram)
 Q = discharge flow (l/min) with $Q = \frac{V_g \cdot n}{1000}$
 V_g = geometrical displacement (cm³/r)

Example: Pump type KF 80

Viscosity $v = 3000 \text{ mm}^2/\text{s}$
 Working pressure $p = 15 \text{ bar}$
 at $P_{tab} = 3.6 \text{ kW}$
 $n = 500 \text{ 1/min}$
 $f_v = 0.017 \frac{\text{kW}}{\text{l/min}}$
 $Q = \frac{80.5 \cdot 500}{1000} = 40 \text{ l/min}$
 becomes
 $P_{1Pu} = \left(3.6 \cdot \frac{500}{1450} + 0.017 \cdot 40 \right) \text{ kW}$
 $P_{1Pu} = 1.92 \text{ kW}$
 Motorpower output: $P_{2Mot} = 1.2 \cdot P_{1Pu} = 2.3 \text{ kW}$
 Select helical geared motor with
 $P = 3.0 \text{ kW}$
 $n = 500 \text{ 1/min}$

Conversion factors

$1 \text{ bar} \triangleq 14.5 \frac{\text{lb}}{\text{in}^2} = 14.5 \text{ psi}$
 $1 \frac{\text{l}}{\text{min}} \triangleq 0.220 \frac{\text{gal}}{\text{min}} = [\text{U.K.}]$
 $1 \frac{\text{l}}{\text{min}} \triangleq 0.264 \frac{\text{gal}}{\text{min}} = [\text{US}]$

Input Power

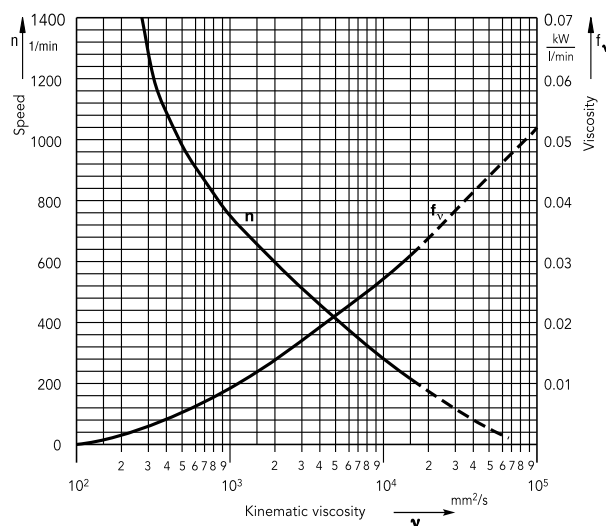


Diagramm: $n, f_v = f(v)$

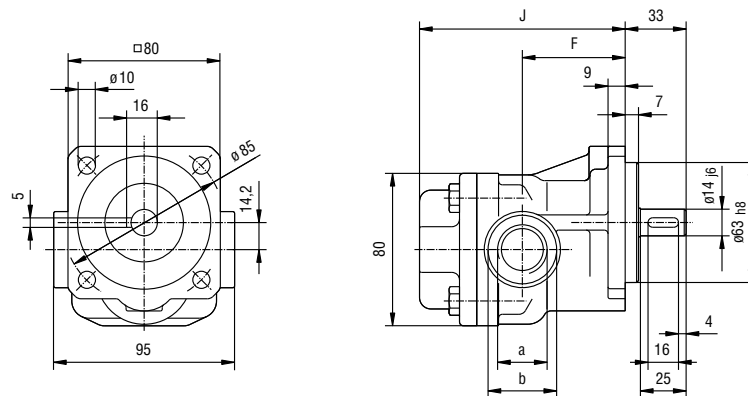
Note:
To determine the power consumption, always take the max. working viscosity at starting state into consideration. The power of the drive motor should be selected 20 % higher than the value determined.

Transfer Gear Pumps KF 2.5...200

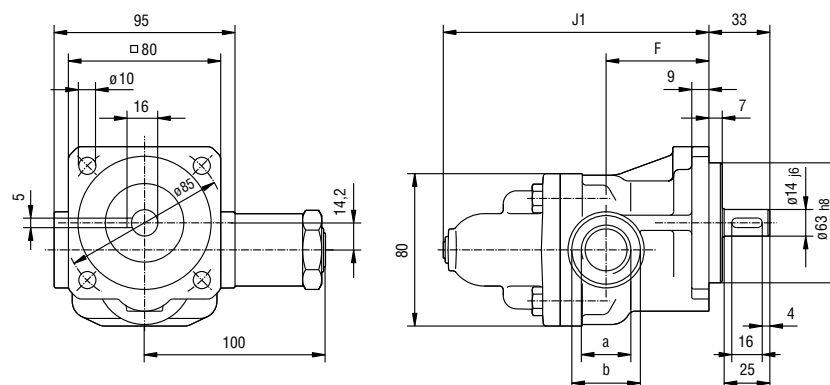
KRACHT

Flange-Mounting Version with Pipe Thread

KF 2.5...25



KF 2.5...25 with pressure relief valve



Nominal size	Suction and pressure connection		F	J	J ₁	Weight in kg	
	a	b				without valve	with valve
2,5...12	G 3/4 17 deep	Ø 36	54	109	140	2.9	3.7
16...25	G 1 19 deep	Ø 42	63	131	161	3.5	4.3

(Dimensions in mm)

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

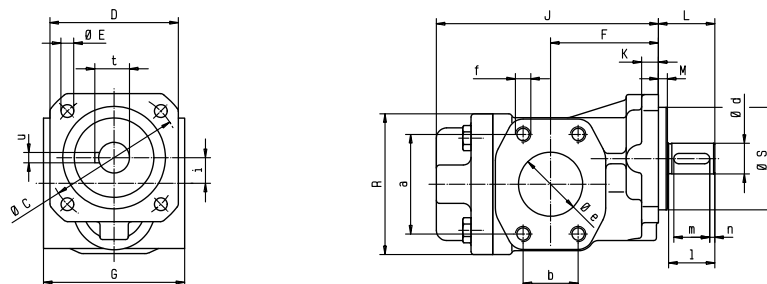
15

Transfer Gear Pumps KF 2.5...200

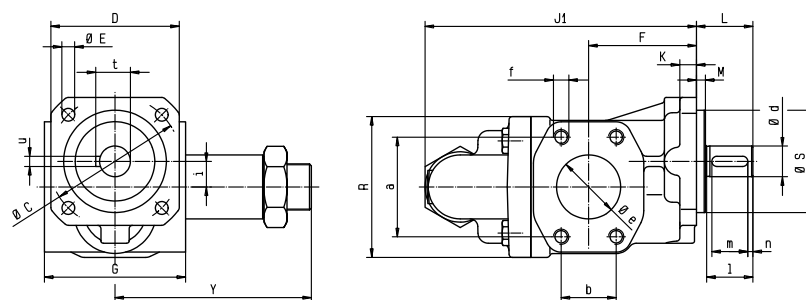
KRACHT

Flange-Mounting Version with SAE-Connection

KF 2.5...200



KF 2.5...200 with pressure relief valve



Nominal size	Sp.-No.	SAE	Seal	Suction- and pressure connection				Pump sizes													Shaft end							Weight in kg	
				a	b	e	f	C	D	E	F	G	J	J ₁	K	L	M	R	S _{h8}	i	Y	d _h	l	m	n	t	u	without valve	with valve
2.5...12	158	3/4"	-	47.6	22.2	19.5	M10-15 deep	85	80	10	54	109	140		9	33	7	80	63	14.2	100	14	25	16	4	16	5	4.2	5.0
16...25	158	1"	-	52.4	26.2	25.0	M10-17 deep				63	100	131	162														4.8	5.6
32...50	-	1 1/2"	-	69.9	35.7	38.0					84	110	173	212														7.7	9.5
63/80	-	1 1/2"	-								100		208	247														9.4	11.2
50	232	2"	-			50.0					84		173	212														7.7	9.5
63/80	232	2"	-	77.8	42.9						100		208	247														9.4	11.2
100/112	-	2"	-			50.8									60								28	50	40	5	31		
100/112	-	2"	31												46								24	36	28	4	27		
100/112	232	2 1/2"	-								102	130	220.5	262.5	17								28	50	40	5	31		
100/112	232	2 1/2"	31	88.9	50.8	63.5									46								24	36	28	4	27		
125/150	-	2 1/2"	-												60								28	50	40	5	31		
125/150	-	2 1/2"	31												46								24	36	28	4	27		
125/150	232	3"	-								145	135	14	120	245.0	282.0							28	50	40	5	31		
125/150	232	3"	31	106.4	61.9	76.2									60								24	36	28	4	27		
180/200	-	3"	-												18	46		159					28				31		
180/200	-	3"	31																				24				27		
180/200	232	3 1/2"	-	120.7	69.9	88.9									60								50	40	5		31		
180/200	232	3 1/2"	31																				24				27		

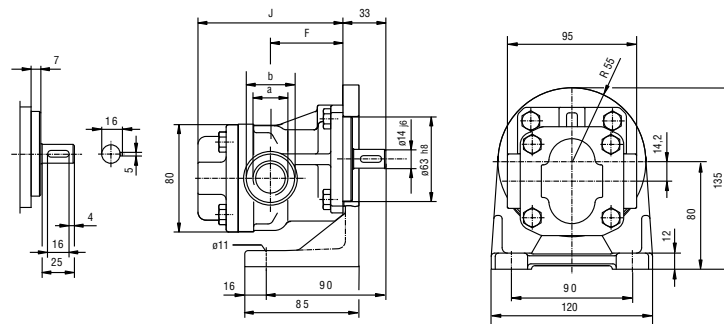
(Dimensions in mm)

Transfer Gear Pumps KF 2.5...200

KRACHT

Pump with Mounting Angle, Pipe Thread

KF 2,5...25

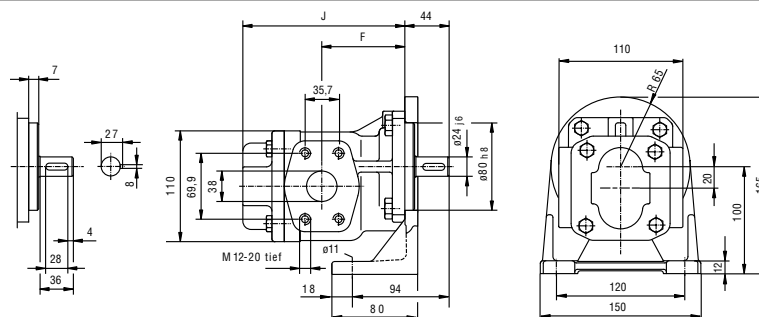


Nominal size	Suction and pressure connection		F	J	Weight in kg
	a	b			
2,5...12	G $\frac{3}{4}$ 17 deep	Ø 36	54	109	4,2
16...25	G 1 19 deep	Ø 42	63	131	4,8

(Dimensions in mm)

Pump with Mounting Angle, Pipe Thread, SAE 1 ½-connection

KF 32 ... 80



Nominal-size		F	J	Weight in kg
32...50	SAE 1 ½	84	173	9.5
63/80	SAE 1 ½	100	208	11.2

(Dimensions in mm)

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

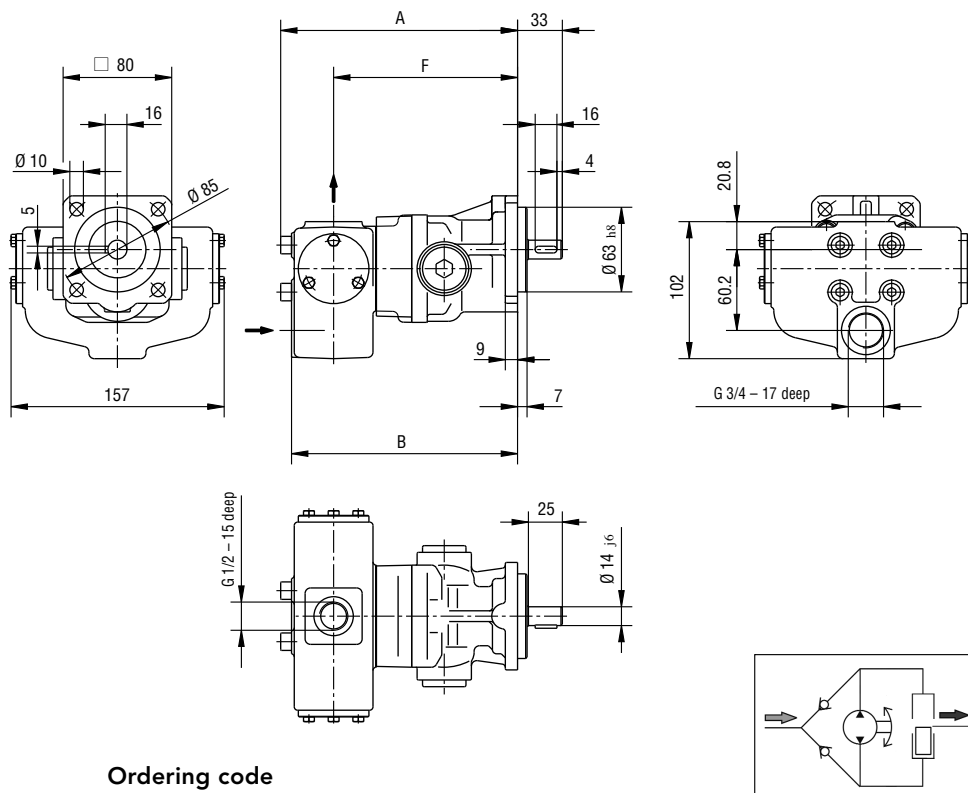
17

Transfer Gear Pumps KF 2.5...200

KRACHT

Flange-Mounting Version with Universal Arrangement

KF 2.5...25



Ordering code

KF . UF .

Seals $\frac{1}{2}$

Nominal size	A	B	F	Weight in kg	Perm. manometr. low pressure at the pump suction connection p_e bar
2.5					0.35
4					
5					
6	174.5	166.5	135.5	6.9	
8					
10					
12					
16	196.5	188.5	157.5	7.5	
20					
25					

(Dimensions in mm)

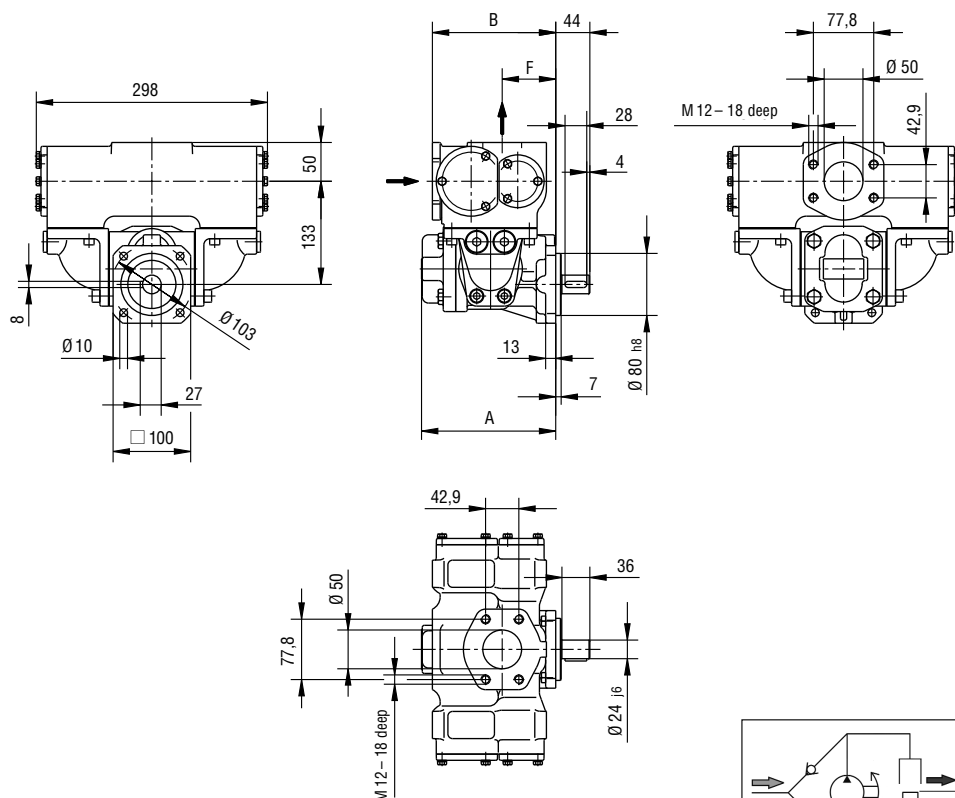
Mounting position horizontal, Pressure connection above

Transfer Gear Pumps KF 2.5...200

KRACHT

Flange-Mounting Version with Universal Arrangement

KF 32 ... 80



Ordering code

KF . UF .

Seals $\frac{1}{2}$

Nominal size	A	B	F	Weight in kg	Perm. manometr. low pressure at the pump suction connection p_e bar
32 40 50	173	159	69	27.5	0.35
63 80	208	175	85	29.5	

(Dimensions in mm)

Mounting position horizontal, Pressure connection above

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

19

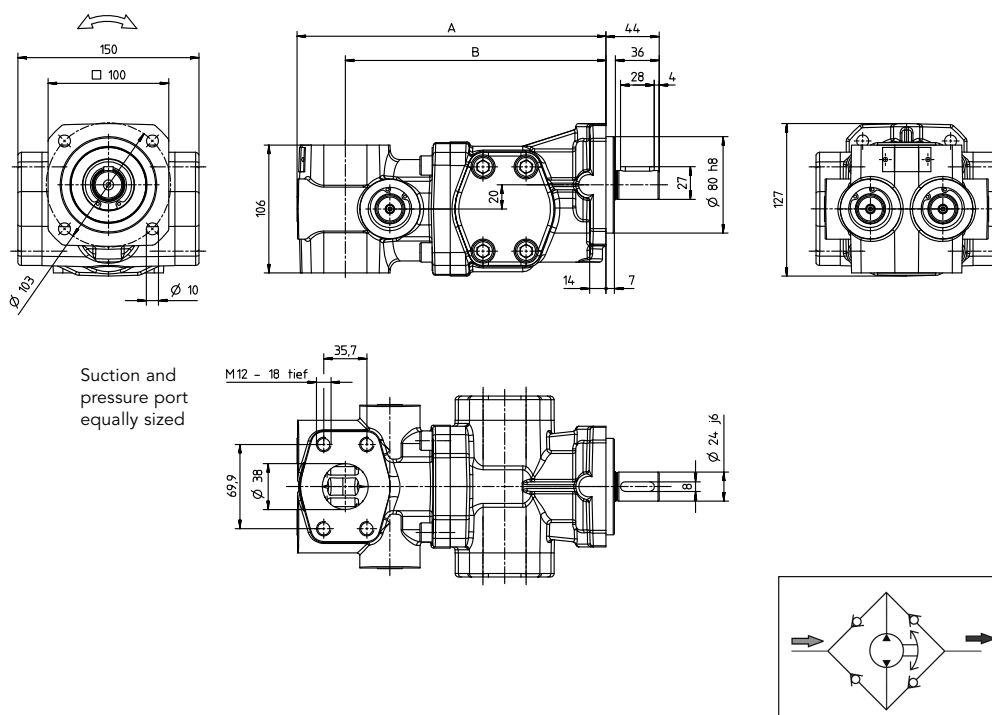
23100591/ES – 05/2019

Transfer Gear Pumps KF 2.5...200

KRACHT

Flange-Mounting Version with Universal Arrangement U2

KF 32...80



Nominal displacement	A	B	Weight in kg
32 40 50	256	216	15.5
63 80	291	251	17.5

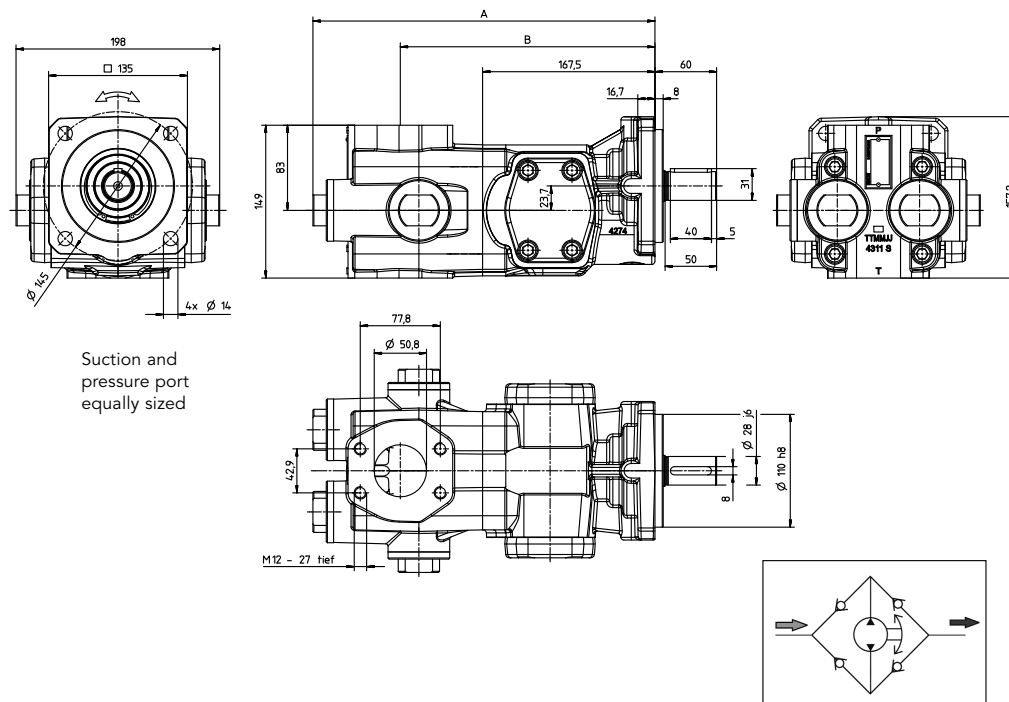
(Dimensions in mm)
Mounting position optional

Transfer Gear Pumps KF 2.5...200

KRACHT

Flange-Mounting Version with Universal Arrangement U2

KF 100/112



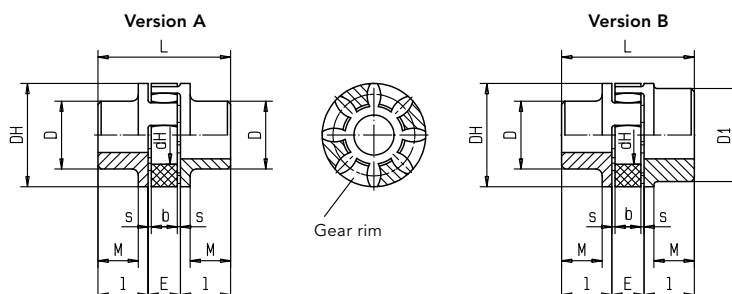
Nominal displacement	A	B	Weight in kg
100	312,5	247,5	21.6
112			

(Dimensions in mm)
Mounting position optional

Transfer Gear Pumps KF 2.5...200

KRACHT

Accessory Couplings



	Ordering code	Coupling size	Weight kg	Moment of inertia kgm²	Pre bore		Finished bore		Dimensions (in mm)											
					part 1	part 2	min.		max.		l	E	s	b	L	M	DH	D	D ₁	dh
							part 1	part 2	part 1	part 2										
Version A	RA 19-Z25/...Z25/..	19	0.117	0.00003	4	–	6	–	19	–	25	16	2	12	66	20	40	32	–	18
	RA 24-Z30/...Z30/..	24	0.24	0.00008	6	–	8	–	24	–	30	18	2	14	78	24	55	40	–	27
	RA 28-Z30/...Z30/..	28	0.39	0.0002	8	–	10	–	28	–	30	20	2.5	15	80	28	65	48	–	30
Version B	RA 19/24-Z25/...Z25/..	19/24	0.129	0.00004	4	17	6	19	19	24	25	16	2	12	66	20	40	32	–	18
	RA 24/28-Z30/...Z30/..	24/28	0.26	0.0001	6	22	8	24	24	28	30	18	2	14	78	24	55	40	–	27
	RA 28/38-Z35/...Z35/..	28/38	0.46	0.0003	8	26	10	28	28	38	35	20	2.5	15	90	28	65	48	–	30
	RA 38/45-Z45/...Z45/..	38/45	0.89	0.0008	10	36	12	38	38	45	45	24	3	18	114	37	80	66	–	38
	RA 42/55-Z50/...Z50/..	42/55	1.39	0.0018	12	40	14	42	42	55	50	26	3	20	126	40	95	75	–	46
	RG 42/55-Z50/...Z75/..	42/55	3.57	0.005	12	40	14	42	42	55	50/75	26	3	20	151	40	95	75	–	46

Type Key KF Coupling

Ordering example

R.* 38 - Z 45/38 - Z 45/38

↓ ↓ ↓
Coupling size Pump side Motor side
 cylindrical cylindrical
coupling hub lengt and hub bore

.*	Hub material
A	AL
G	GG

Working temperature:
–20 °C to +80 °C (–4 °F to 176 °F)
(short duration temperature peaks
up to 120 °C / 248 °F are permissible).

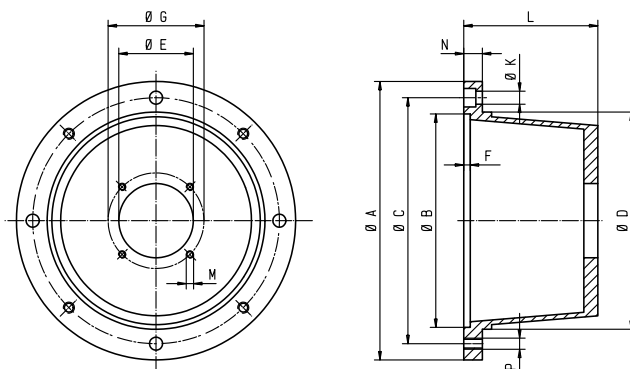
Weights and mass moments of inertia refer
to max. finish machined bore without slot.
Finish-machined bores to ISO Fit H7,
parallel key slots in accordance with DIN 6886 Sh.1.

Transfer Gear Pumps KF 2.5...200

KRACHT

Bell Housing

KF 2,5 ... 25 Aluminum bell housing



	Motor size	Bell housing	Coupling	Dimensions (in mm)													Weight
				A	B	C	D	E	F	G	K	L	M	N	P	kg	
KF 2.5...25	71 S	PT160-A-063-80	RA19-Z25/14-Z25/14	160	110	130	110	63	7	85	9	80	M8	13	M8	1.01	
	71																
	80 S	PT200-A-063-100	RA19-Z25/14-Z25/19	200	130	165	145	63	7	85	11	100	M8	16	M10	1.06	
	80																
	90 S	PT200-A-063-100	RA19/24-Z25/14-Z25/24	200	130	165	145	63	7	85	11	100	M8	16	M10	1.06	
	90 L																
	100 L S	PT250-A-063-120	RA24/28-Z30/14-Z30/28	250	180	215	190	63	7	85	14	120	M8	19	M12	1.75	
100 L																	
112 M																	
KF 32...80	80 S	PT200-A-080-100	RA19/24-Z25/24-Z25/19	200	130	165	145	80	7	103	11	100	M8	16	M10	1.41	
	80																
	90 S	PT200-A-080-110	RA24-Z30/24-Z30/24	200	130	165	145	80	7	103	11	110	M8	16	M10	1.19	
	90 L																
	100 L S	PT250-A-080-124	RA24/28-Z30/24-Z30/28	250	180	215	190	80	7	103	14	124	M8	19	M12	1.42	
	100 L																
	112 M																
	132 S	PT300-A-080-144	RA28/38-Z35/24-Z35/38	300	230	265	234	80	7	103	14	144	M8	20	M12	2.10	
	132 M																
160 M	PT350-A-080-188	RA38/45-Z45/24-Z45/42	350	250	300	260	80	7	103	18	188	M8	26	M16	3.05		
160 L																	
KF 100...200	100 L	PT250-A-110-135	RA24/28-Z30/28-Z30/28 * RS24/28-Z30/24-Z30/28	250	180	215	190	110	7	145	14	135	M12	18	M12	1.4	
	112 M																
	132 S	PT300-A-110-168	RA28/38-Z35/28-Z35/38	300	230	265	234	110	7	145	14	168 * 144	M12	20	M12	2.0 * 1.6	
	132 M	* PT300-A-110-144	* RS28/38-Z35/24-Z35/38														
	132	** PT300-A-110-168	** RS28-Z35/24-Z60/38														
	160 M	PT350-A-110-188	RA38/45-Z45/28-Z45/42 * RS38/45-Z45/24-Z45/42	350	250	300	260	110	7	145	18	188	M12	26	M16	2.9	
	160 L																
	180 M	PT350-A-110-204	RA42/55-Z50/28-Z50/48 * RG42/55-Z50/24-Z75/48 ** RG42/55-Z50/24-Z50/48	350	250	300	260	110	7	145	18	204	M12	26	M16	3.0	
	180 L																
180																	

* Version seal 31 (KF 100... 150) ** Version seal 31 (KF 180... 200)

23

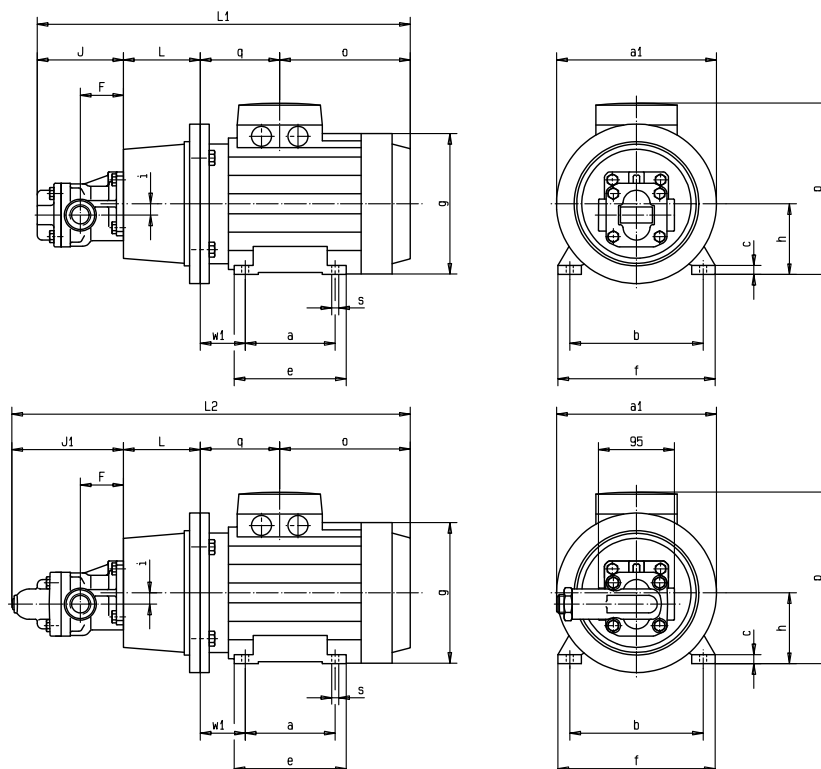
KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

Transfer Gear Pumps KF 2.5...200

KRACHT

Motor-Pump Assemblies with Pipe Thread

KF 2.5 ... 25



with pressure relief valve

KF 2.5 ... 25 Pump sizes (in mm)

Nominal size	Pump sizes		
	F	J	J ₁
2.5 ... 12	54	109	140
16 ... 25	63	131	162

Transfer Gear Pumps KF 2.5...200

KRACHT

Motor-Pump Assemblies with Pipe Thread

KF 2.5 ... 25

Frame size	Power Motor 6 pole	Speed 1/min	Power Motor 4 pole	Speed 1/min	Bell housing	Coupling	Total weight * kg	
	kW	1/min	kW	1/min			Nominal size 4...12	16...25
71	0.18	880	0.25	1350	PT160-A-063-80	RA19-Z25/14-Z25/14	11.5	12.1
71	0.25	900	0.37	1370			11.5	12.1
80	0.37	900	0.55	1370	PT200-A-063-100	RA19-Z25/14-Z25/19	13.5	14.1
80	0.55	900	0.75	1420			15.5	16.1
90 S	0.75	935	1.1	1425	PT200-A-063-100	RA19/24-Z25/14-Z25/24	17.5	18.1
90 L	1.1	935	1.5	1420			20.5	21.1
100	1.5	940	2.2	1430	PT250-A-063-120	RA24/28-Z30/14-Z30/28	25.5	26.1
100	–	–	3	1430			28.5	29.1
112	2.2	940	4	1435			35	35.6

* with pressure relief valve add, weight 0.8 kg

KF 2.5 ... 25 Dimensions

Frame size	Dimensions (in mm)																			
	4...12 16...25		4...12 16...25																	
	L ₁ *	L ₁ *	L ₂ *	L ₂ *	L	i	a ₁	a	b	c*	e*	f*	g*	h	o*	p*	q*	ø s*	w ₁	
71	414	436	445	467	80	14.2	160	90	112	10	105	132	145	71	158	188	67	7	45	
80	459	481	490	512	100	14.2	200	100	125	10	130	160	165	80	170.5	217	79.5	10	50	
90 S	469	491	500	522	100	14.2	200	100	140	12	130	175	185	90	177.5	235	82.5	10	56	
90 L	494	516	525	547	100	14.2	200	125	140	12	155	175	185	90	202.5	235	82.5	10	56	
100	555	577	586	608	120	14.2	250	140	160	14	176	196	205	100	247.5	252	78.5	12	63	
112	564	586	595	617	120	14.2	250	140	190	14	180	220	230	112	247.0	292	88	12	70	

Note: Flange connection same outer dimensions as for pipe connection

Note

* Dimensions dependent on motor typ
(drawing: manufacture ADDA).

Other manufactures motors can be supplied on request.

Motor frame sizes are based on DIN 42673/677.

All pump and motor sizes can be combined.

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49(0)23 92/935-0 · fax +49(0)23 92/935 209 · mail info@kracht.eu · web www.kracht.eu

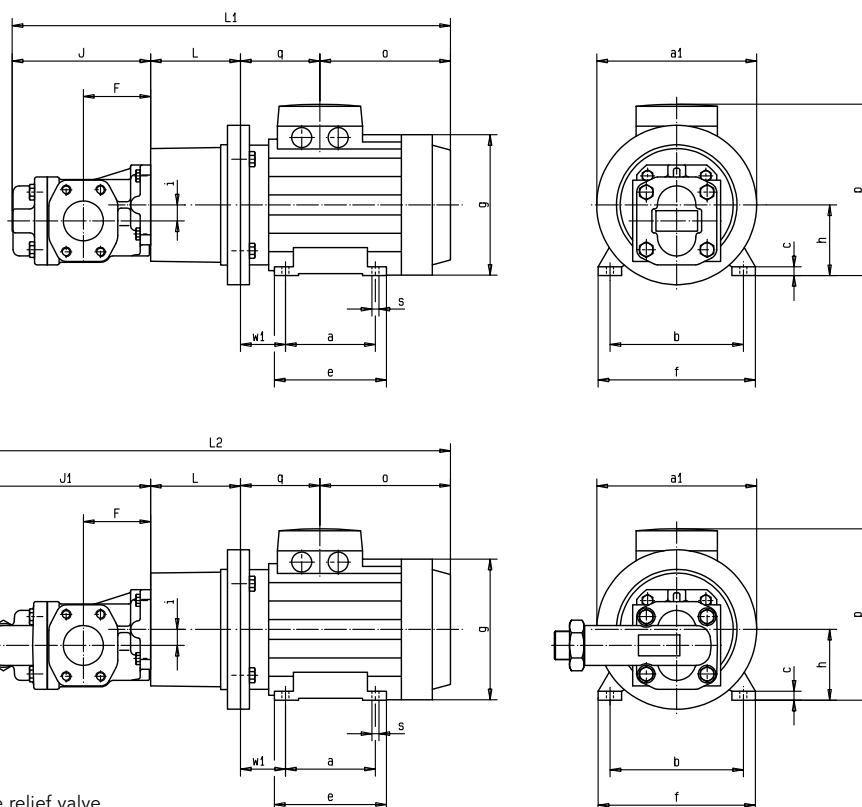
25

Transfer Gear Pumps KF 2.5...200

KRACHT

Motor-Pump Assemblies with SAE-Connection

KF 32... 80



with pressure relief valve

KF 32... 80 Pump sizes (in mm)

Nominal size	F	J	J ₁
32...50	84	173	212
63 / 80	100	208	247

Transfer Gear Pumps KF 2.5...200

KRACHT

Motor-Pump Assemblies with SAE-Connection

KF 32... 80

Frame size	Power Motor 6 pole		Speed Motor 4 pole		Bell housing	Coupling	Total weight * kg	
	kW	1/min	kW	1/min			Nominal size 32...50 63...80	
80	0.37	900	0.55	1370	PT200-A-080-100	RA19/24-Z25/24-Z25/19	18.5	19.5
80	0.55	900	0.75	1420			19.5	21
90 S	0.75	935	1.1	1425	PT200-A-080-110	RA24-Z30/24-Z30/24	21	23
90 L	1.1	935	1.5	1420			23.5	25.5
100	–	–	2.2	1430	PT250-A-080-124	RA24/28-Z30/24-Z30/28	29.5	31
100	1.5	940	3	1430			32	34
112	2.2	940	4	1435			38.5	40
132 S	3	940	5.5	1430	PT300-A-080-144	RA28/38-Z35/24-Z35/38	49.5	51.5
132 M	4	945	7.5	1430			59	60.5
132 L	5.5	945	–	–			61	62.5
160 M	7.5	955	11	1440	PT350-A-080-188	RA38/45-Z45/24-Z45/42	81	82.5
160 L	11	960	15	1445			101	102.5

* with pressure relief valve add. weight 1.8 kg

KF 32... 80 Dimensions

Frame size	Dimensions (in mm)																			
	32...50 63...80				32 - 80															
	L ₁ *	L ₁ *	L ₂ *	L ₂ *	L	i	a ₁	a	b	c*	e*	f*	g*	h	o*	p*	q*	ø s*	w ₁	
80	523	558	562	597	100	20	200	100	125	10	130	160	165	80	170.5	217	79.5	10	50	
90 S	543	578	582	617	110	20	200	100	140	12	130	175	185	90	177.5	235	82.5	10	56	
90 L	568	603	607	642	110	20	200	125	140	12	155	175	185	90	202.5	235	82.5	10	56	
100	623	658	662	697	124	20	250	140	160	14	176	196	205	100	247.5	252	78.5	12	63	
112	532	567	571	606	124	20	250	140	190	14	180	220	230	112	247	252	88	12	70	
132 S	673	708	712	747	144	20	300	140	216	16	176	252	270	132	262	325	94	12	89	
132 M	712	747	751	786	144	20	300	178	216	16	213	252	270	132	301	325	94	12	89	
160 M	891	926	930	965	188	20	350	210	254	17	262	290	320	160	394	390	136	14.5	108	
160 L	891	926	930	965	188	20	350	254	254	17	306	290	320	160	394	390	136	14.5	108	

Note

* Dimensions dependent on motor typ
(drawing: manufacture ADDA).
Other manufactures motors can be supplied on request.
Motor frame sizes are based on DIN 42673/677.

All pump and motor sizes can be combined.

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

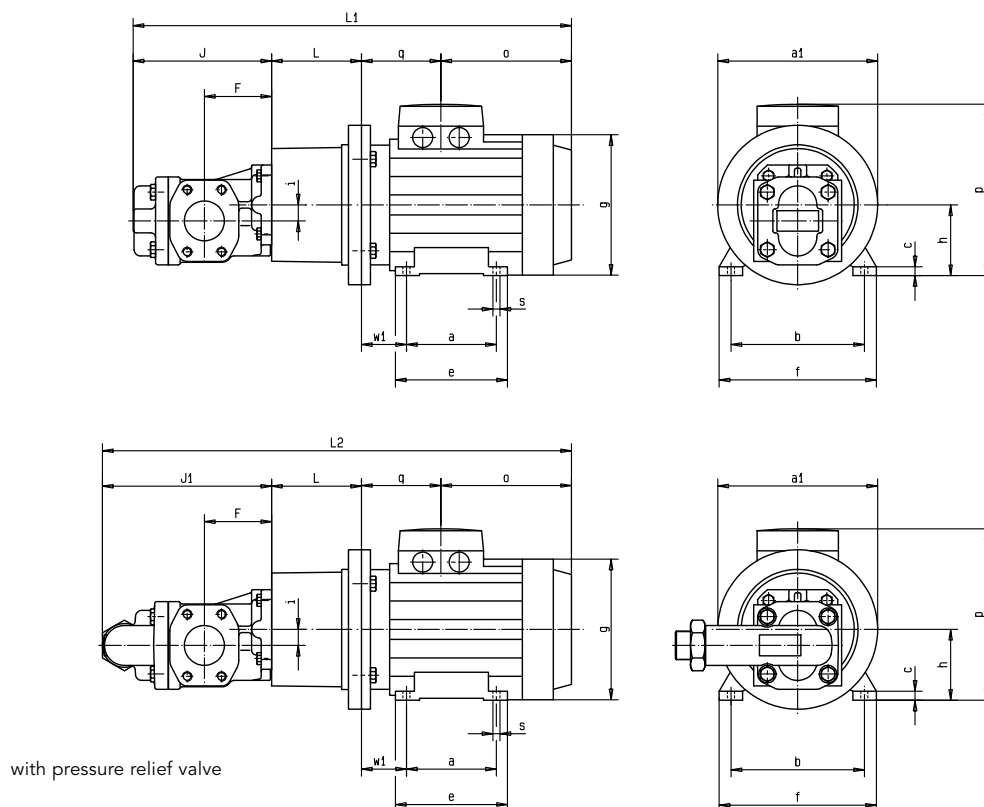
27

Transfer Gear Pumps KF 2.5...200

KRACHT

Motor-Pump Assemblies with SAE-Connection

KF 100...200



KF 100...200 Pump sizes (in mm)

Nominal-size	F	J	J ₁
100/112	102	220.5	262.5
125/150	120	245	282
180/200	130	261.5	298.5

Transfer Gear Pumps KF 2.5...200

KRACHT

Motor-Pump Assemblies with SAE-Connection

KF 100...200

Frame size	Power Motor 6 pole	Speed pole	Power Motor 4 pole	Speed pole	Bell housing	Coupling	Total weight * kg		
	kW	1/min	kW	1/min			Nominal size		
							100/112	125/150	180/200
100 L	—	—	2.2	1430	PT250-A-110-135	RA24/28-Z30/28-Z30/28	37.5	43.5	46.5
100 L	1.5	940	3	1430		**RA24/28-Z30/24-Z30/28	40.5	46.5	49.5
112 M	2.2	940	4	1435			47.5	53.5	56.5
132 S	3	940	5.5	1430	PT300-A-110-168	RA28/38-Z35/28-Z35/38	58	64	67
132 M	4	945	7.5	1430		**PT300-A-110-144	**RA28/38-Z35/24-Z35/38	67	73
132 L	5.5	945	—	—			69	75	78
160 M	7.5	955	11	1430	PT350-A-110-188	RA38/45-Z45/28-Z45/42	89	95	98
160 L	11	960	15	1140		**RA38/45-Z45/24-Z45/42	109	115	118
180 M	—	—	18.5	1445	PT350-A-110-204	RA42/55-Z50/28-Z50/48	129	135	138
180 L	15	960	22	1460		**RG42/55-Z50/24-Z50/48	139	145	148

* * with pressure relief valve KF 100-200 add. weight 2.7 kg

** Sealing version 31

KF 100 ... 200 Dimensions

Frame size	Dimensions (in mm)																			
	100/112 125/150 180/200						100/112 125/150 180/200													
	L ₁ *	L ₁ *	L ₁ *	L ₂ *	L ₂ *	L ₂ *	L	a ₁	a	b	c*	e*	f*	g*	h	o*	p*	q*	ø s*	w ₁
100	670.5	695	711.5	712.5	754	770.5	124	250	140	160	14	176	196	205	100	247.5	252	78.5	12	63
112	579.5	604	620.5	621.5	663	679.5	124	250	140	190	14	180	220	230	112	147	292	88	12	70
132 S	720.5	745	761.5	762.5	804	820.5	144	300	140	216	16	176	252	270	132	262	325	94	12	89
132 M	759.5	784	800.5	801.5	843	859.5	144	300	178	216	16	213	252	270	132	301	325	94	12	89
160 M	938.5	963	979.5	980.5	1022	1038.5	188	350	210	254	17	262	290	320	160	394	390	136	14.5	108
160 L	938.5	963	979.5	980.5	1022	1038.5	188	350	254	254	17	306	290	320	160	394	390	136	14.5	108
180 M	1001.5	1026	1042.5	1043.5	1085	1101.5	204	350	279	279	27	300	348	360	180	336	450	241	15	121
180 L	1039.5	1064	1080.5	1081.5	1123	1139.5	204	350	279	279	27	338	348	360	180	354	450	261	15	121

Note

* Dimensions dependent on motor typ
(drawing: manufacture ADDA).

Other manufactures motors can be supplied on request.

Motor frame sizes are based on DIN 42673/677.

All pump and motor sizes can be combined.

KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

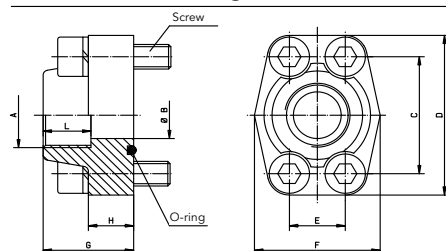
29

Transfer Gear Pumps KF 2.5...200

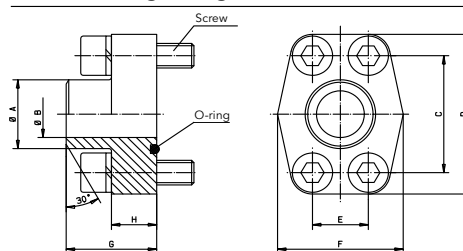
KRACHT

Accessory Connections

SAE-Threaded Flange



SAE-Welding Flange



SAE-Threaded Flange Dimensions (in mm)

Nominal size SAE	DN	A	B max.	C	D*	E	F*	G	H*	L min.	Screws 10.9	O-ring	Working pressure max.**	Weight ca. [kg]
3/4"	13	G1/2"	13	47.63	65	22.23	50	36	18	14	M 10 x 35	24.99 x 3.53	350	0.54
	19	G3/4"	19							16				0.51
1"	13	G1/2"	13							14				0.64
	19	G3/4"	19	52.37	70	26.19	55	38	18	16	M 10 x 35	32.92 x 3.53	315	0.61
	25	G1"	25							18				0.58
1 1/4"	19	G3/4"	19							16				0.92
	25	G1"	25	58.72	79	30.18	68	41	21	18	M 10 x 40	37.69 x 3.53	250	0.88
	32	G1 1/4"	32							20				0.79
1 1/2"	25	G1"	25							18				1.36
	32	G1 1/4"	32							20				1.30
	38	G1 1/2"	38	69.85	93	35.71	78	45	25	22	M 12 x 45	47.22 x 3.53	200	1.25
2"	25	G1"	25							18				1.64
	32	G1 1/4"	32							20				1.60
	38	G1 1/2"	38	77.77	102	42.88	90	45	25	22	M 12 x 45	56.74 x 3.53	200	1.45
	51	G2"	51							26				1.39
2 1/2"	51	G2"	51							26				1.65
	64	G2 1/2"	63	88.90	114	50.80	105	50	25	30	M 12 x 45	69.44 x 3.53	160	1.60
3"	64	G2 1/2"	63							30				2.68
	76	G3"	73	106.38	134	61.93	124	50	27		M 16 x 50	85.32 x 3.53	138	2.58
3 1/2"	76	G3"	73											2.93
	89	G3 1/2"	89	120.65	152	69.85	136	48	27	30	M 16 x 50	98.02 x 3.53	35	2.83

SAE-Welding Flange Dimensions (in mm)

Nominal size SAE	DN	A*	B max.	C	D*	E	F*	G	H*	Screws 10.9	O-ring	Working pressure max.**	Weight ca. [kg]
3/4"	19	28.0	19	47.63	65	22.23	50	36	18	M 10 x 35	24.99 x 3.53	350	0.51
1"	25	34.0	25	52.37	70	26.19	55	38	18	M 10 x 35	32.92 x 3.53	315	0.58
1 1/4"	32	42.8	32	58.72	79	30.18	68	41	21	M 10 x 40	37.69 x 3.53	250	0.79
1 1/2"	38	48.6	38	69.85	93	35.71	78	44	25	M 12 x 45	47.22 x 3.53	200	1.25
2"	51	61.0	51	77.77	102	42.88	90	45	25	M 12 x 45	56.74 x 3.53	200	1.39
2 1/2"	64	77.0	63	88.90	114	50.80	105	50	25	M 12 x 45	69.44 x 3.53	160	1.60
3"	76	92.0	73	106.38	134	61.93	124	50	27	M 16 x 50	85.32 x 3.53	138	2.58
3 1/2"	89	103.0	89	120.65	152	69.85	136	48	27	M 16 x 50	98.02 x 3.53	35	2.83

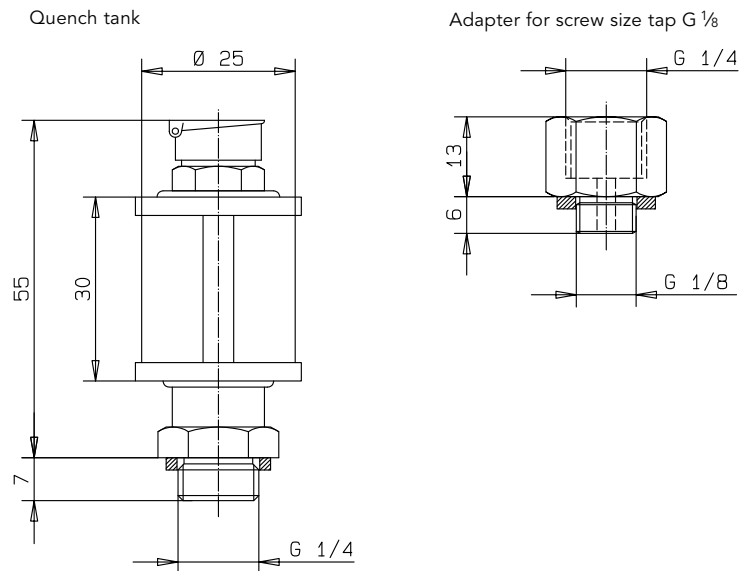
* Dimensions depending on the manufacturer
Material: Steel S355J2G3 or equivalent

** O-ring material with hardness 90 Shore A
Stainless steel 1.4404 or equivalent 316L

Transfer Gear Pumps KF 2.5...200

KRACHT

Accessory Quench Chamber



KRACHT GmbH · Gewerbestr. 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209 · mail info@kracht.eu · web www.kracht.eu

31

Product Portfolio

Transfer Pumps

Transfer pumps for lubricating oil supply equipment, low pressure filling and feed systems, dosing and mixing systems.

Mobile Hydraulics

Single and multistage high pressure gear pumps, hydraulic motors and valves for construction machinery, vehicle-mounted machines.

Flow Measurement

Gear and turbine flow meters and electronics for volume and flow metering technology in hydraulics, processing and laquering technology.

Industrial Hydraulics / Test Bench Construction

Cetop directional control and proportional valves, hydraulic cylinders, pressure, quantity and stop valves for pipe and slab construction, hydraulic accessories for industrial hydraulics (mobile and stationary use).

Technology Test benches / Fluid Test benches.



KF2.5...200/GB/06.14

KRACHT

KRACHT GmbH · Gewerbestraße 20 · 58791 Werdohl, Germany · fon +49 (0) 23 92 / 935-0 · fax +49 (0) 23 92 / 935 209
mail info@kracht.eu · web www.kracht.eu

Bedienungsanleitung

Für künftige Verwendung bitte aufbewahren

Membran-/Kolbendruckschalter mit Gerätesteckdose Baureihe 0184 Serie 0185

Einbau und Inbetriebnahme sind nach dieser Bedienungsanleitung und nur von autorisiertem Fachpersonal vorzunehmen.



SUCO Robert Scheuffele GmbH & Co. KG
Koplenstraße 12-14
74321 Bietigheim-Bissingen, Germany
Telefon: +49-7142-597-0
Telefax: +49-7142-980151
E-Mail: info@suco.de
www.suco.de



Funktion und Anwendung

Die Baureihe 0184/0185 öffnet oder schließt einen elektrischen Stromkreis beim Erreichen eines einstellbaren Druckwerts. Durch das Ansteigen des Drucks wird eine Membrane bzw. ein Kolben bewegt. Die Auslenkung der Membrane bzw. der Hub des Kolbens hängt von der Druckkraft und der einstellbaren Federoversion ab. Bei einer definierten Auslenkung der Membrane bzw. einem definierten Hub des Kolbens wird ein Mikroschalter betätigt, der die elektrischen Kontakte öffnet bzw. schließt (Wechsler).

Der Druckschalter überwacht einen eingestellten Druckwert.

Voraussetzungen für den Produkteinsatz

- Allgemeine, stets zu beachtende Hinweise für den ordnungsgemäßen und sicheren Einsatz des Druckschalters:
- Beachten Sie unbedingt die Warnungen und Hinweise in der Bedienungsanleitung.
- Beachten Sie die Vorschriften der Berufsgenossenschaften, des Technischen Überwachungsvereins (TÜV) oder die entsprechenden nationalen Bestimmungen.
- Der Druckschalter ist für die Überwachung von flüssigen und gasförmigen Medien bestimmt.
- Halten Sie die angegebenen Grenzwerte wie z.B. Drücke, Kräfte, Momente und Temperaturen ein.
- Berücksichtigen Sie die vorherrschenden Umgebungsbedingungen (Temperatur, Luftfeuchte, Luftdruck etc.).
- Setzen Sie den Druckschalter niemals starken Stößen oder Vibrationen aus.
- Verwenden Sie das Produkt nur im Originalzustand. Nehmen Sie keine eigenmächtige Veränderung vor.
- Entfernen Sie alle Transportverklebungen wie Schutzfolien, Kappen oder Kartonsagen.
- Die Entsorgung der einzelnen Werkstoffe in Recycling-Sammelbehältern ist möglich.

Betriebsbedingungen

- Bei Medientemperaturen außerhalb der Raumtemperatur (20 °C):
 - Extreme Temperatureinflüsse (abweichend von der Raumtemperatur) können zu einer starken Schaltpunktabweichung oder zum Ausfall des Druckschalters führen.
- **Schaltzeit IP65:**
 - Die Typenprüfung ist nicht uneingeschränkt auf alle Umweltbedingungen übertragbar.
 - Die Überprüfung, ob die Steckverbindung anderen als den angegebenen Bestimmungen und Vorschriften entspricht bzw. ob diese in speziellen, von uns nicht vorgesehenen Anwendungen eingesetzt werden kann, obliegt dem Anwender.

Sauerstofftauglichkeit

Membrandruckschalter: Beim Einsatz von Sauerstoff sind die einschlägigen Unfallverhütungsvorschriften zu beachten. Außerdem empfehlen wir, einen maximalen Betriebsdruck von 10 bar nicht zu überschreiten.

Kolbendruckschalter: Kolbendruckschalter sind für gasförmige Medien, insbesondere für Sauerstoff, nicht geeignet.

Druckstöße: In den Technischen Daten ist die statische Überdrucksicherheit angegeben. Sie bezieht sich auf den hydraulischen bzw. pneumatischen Teil des Druckschalters. Der dynamische Wert ist 30 bis 50% niedriger.

Technische Daten

Bemessungsbetriebsspannung U_N	Bemessungsbetriebsstrom I_N	Gebrauchskategorie
250 Volt AC 50/60 Hz	4 Ampere	AC 12
250 Volt AC 50/60 Hz	1 Ampere	AC 14
30 Volt DC	4 / 4 Ampere	DC 12 / DC 13
50 Volt DC	2 / 1 Ampere	DC 12 / DC 13
75 Volt DC	1 / 0,5 Ampere	DC 12 / DC 13
125 Volt DC	0,3 / 0,2 Ampere	DC 12 / DC 13
250 Volt DC	0,25 / 0,2 Ampere	DC 12 / DC 13
Bemessungsisolationsspannung U_i	300 Volt	
Bemessungsspannungsfestigkeit U_{imp}	2,5 kV	
Konventioneller thermischer Strom I_{th}	5 Ampere	
Schaltüberspannung:	< 2,5 kV	
Bemessungsfrequenz:	DC und 50/60 Hz	
Nennstrom der Kurzschlusseinrichtung:	bis 5 Ampere	
Bedingter Kurzschlussstrom:	< 350 Ampere	
IP-Schutzart nach EN 60 529-1991:	IP65 mit Stecker	
Anzugsdrehmoment der Anschlusschrauben:	< 0,35 Nm	
Anschlussquerschnitt:	0,5 bis 1,5 mm ²	

Bitte wenden

Technische Änderungen zur Produktverbesserung vorbehalten.

Zeichenerklärung:

⚠ Achtung ⚠ Hinweis, Bemerkung ♻ Recycling ⚠ Gefahr

Operating Instructions

Please keep carefully for future use

Diaphragm-/Piston Pressure Switch with connector Series 0184 Series 0185

Installation and commissioning must be carried out in accordance with these Operating Instructions and by authorized, qualified personnel only.



SUCO Robert Scheuffele GmbH & Co. KG
Koplenstraße 12-14
74321 Bietigheim-Bissingen, Germany
Phone: +49-7142-597-0
Fax: +49-7142-980151
E-Mail: info@suco.de
www.suco.de



Operation and use

The series 0184/0185 switch opens or closes an electrical circuit when a certain (adjustable) pressure is reached. A diaphragm or piston is moved by the increase in pressure. The amount of diaphragm deflection or piston travel depends on the force of the pressure applied and the (adjustable) spring tension. At a predetermined deflection of the diaphragm or movement of the piston, a microswitch is actuated which opens or closes the electrical contacts (changeover).

The pressure switch monitors a preset pressure.

Conditions governing the use of the product

- The following general instructions are to be observed at all times to ensure the correct, safe use of the pressure switch:
- Observe without fail the warning notices and other instructions laid down in the operating instructions.
- Observe the applicable safety regulations laid down by the regulatory bodies in the country of use.
- Use the switch only for monitoring fluid and gaseous media.
- Do not exceed the specified limits for e.g. pressures, forces, moments or temperatures under any circumstances.
- Give due consideration to the prevailing ambient conditions (temperature, atmospheric humidity, atmospheric pressure, etc.).
- Never expose the pressure switch to severe side impacts or vibrations.
- Use the product only in its original condition. Do not carry out any unauthorized modifications.
- Remove all items providing protection in transit such as foils, caps or cartons.
- Disposal of the above-named materials in recycling containers is permitted.

Operating conditions

- Media temperatures other than room temperature (20 °C):
 - The effects of extreme temperatures (relative to room temperature) can lead to pronounced variations in the switching point or the failure of the pressure switch.

Type of protection IP65:

Type testing does not apply to all ambient conditions without limitations. The user is responsible for verifying that the plug-and-socket connection complies with the specified rules and regulations of CE, or whether it may be used for specialized purposes other than those intended by us.

Use with oxygen:

Diaphragm Pressure Switch: If oxygen is used, the applicable accident prevention regulations must be observed. In addition, we recommend a maximum operating pressure of 10 bar, which should not be exceeded.

Piston Pressure Switch:

Piston Pressure Switches are not suitable for gaseous media, particularly oxygen.

Protection against overpressure:

The static overpressure safety is included in the technical data. The overpressure safety corresponds to the hydraulic, pneumatic part of the pressure switch. The dynamic rating of the overpressure safety is smaller than 30 to 50%.

Technical data

Rated operating voltage U_N	Rated operating current I_N	Utilization category
250 Volt AC 50/60 Hz	4 Ampere	AC 12
250 Volt AC 50/60 Hz	1 Ampere	AC 14
30 Volt DC	4 / 4 Ampere	DC 12 / DC 13
50 Volt DC	2 / 1 Ampere	DC 12 / DC 13
75 Volt DC	1 / 0,5 Ampere	DC 12 / DC 13
125 Volt DC	0,3 / 0,2 Ampere	DC 12 / DC 13
250 Volt DC	0,25 / 0,2 Ampere	DC 12 / DC 13
Rated insulation voltage U_i	300 Volt	
Rated surge capacity U_{imp}	2,5 kV	
Rated thermal current I_{th}	5 Ampere	
Switching overvoltage:	< 2,5 kV	
Rated frequency:	DC und 50/60 Hz	
Rated current of short-circuit protective device:	Up to 5 Ampere	
Rated short-circuit current:	< 350 Ampere	
IP-protection to EN 60 529-1991:	IP65 with plug	
Tightening torque for terminal screws:	< 0,35 Nm	
Connection size:	0,5 to 1,5 mm ²	

PTO

Continuing development sometimes necessitates specification changes without notice.

Key to drawings:

⚠ Caution ⚠ Note ♻ Recycling ⚠ Danger

Mode d'emploi

A conserver pour toute utilisation ultérieure

Pressostat à membrane/ou à piston avec connecteur Série 0184 Série 0185

Montage et mise en service sont à entreprendre d'après le présent mode d'emploi et par le personnel autorisé seulement.



SUCO Robert Scheuffele GmbH & Co. KG
Koplenstraße 12-14
74321 Bietigheim-Bissingen, Germany
Téléphone: +49-7142-597-0
Fax: +49-7142-980151
E-Mail: info@suco.de
www.suco.de



Fonctionnement et applications

Les séries 0184/0185 ouvrent ou ferment un circuit électrique dès qu'une valeur de pression pré-réglée est atteinte. La montée en pression agit sur une membrane ou un piston. L'ampleur de la déformation subie par la membrane ou la course du piston dépend de la pression exercée et de la précontrainte pré-réglée sur un ressort. Par une déformation de la membrane ou une course du piston donnée, le microinterrupteur est actionné; il ouvre ou il ferme le circuit électrique (inverseur).

Le pressostat contrôle une valeur de pression pré-réglée!

Consignes relatives à la mise en service

- Remarques d'ordre général, mais dont il faut toutefois toujours tenir compte, pour obtenir un fonctionnement fiable et sûr du pressostat:
- Impérativement respecter les avis et les remarques données dans le mode d'emploi.
- Toujours respecter les prescriptions et directives des Chambres syndicales, des Services de contrôle technique ainsi que les dispositions légales nationales.
- Utiliser le pressostat exclusivement avec des fluides liquides ou gazeux.
- Respecter les valeurs seuils indiquées (pressions, forces, moments, températures, par exemple).
- Tenir compte des conditions environnementales rencontrées (température ambiante, humidité atmosphérique, pression atmosphérique, etc.).
- Veillez à ce que le pressostat ne soit jamais soumis à des fortes accélérations, vibrations, et des chocs forts.
- N'utiliser le produit que dans son état original. Ne jamais entreprendre des modifications quelconques sur celui-ci.
- Retirer tous les éléments de protection nécessaire pour le transport, telles que emballages, capuchons ou cartons.
- Tous les matériaux susmentionnés sont recyclables et peuvent être déposés dans des conteneurs prévus à cet effet!

Conditions d'utilisation

- En présence de températures des fluides autres que la température ambiante (20 °C):
 - Des températures ambiantes extrêmes peuvent provoquer une forte dérive du point de commutation ou une défaillance du pressostat.
- **Indice de protection IP65:**
 - Cet indice est fortement dépendant de l'environnement dans lequel travaille le pressostat.
 - L'utilisateur est tenu de vérifier si le connecteur répond aux prescriptions et règlements autres que ceux indiqués dans la notice, ou s'il peut être utilisé pour des applications non prévues par nous.

Utilisation avec l'oxygène:

Pressostat à membrane: Pour la manipulation d'oxygène, la réglementation afférente à la Sécurité de Travail et à la Prévention d'Accidents devra impérativement être respectée. Nous recommandons en outre de ne pas dépasser une pression de service de 10 bar maximum.

Pressostat à piston:

Les pressostats à piston ne sont pas appropriés à la manipulation de fluides gazeux, l'oxygène en particulier.

Souage de surpression:

La valeur admise de surpression statique est exprimée dans les caractéristiques techniques. Elle se réfère à la valeur hydraulique ou pneumatique du pressostat. La valeur dynamique est de 30% jusqu'à 50% inférieure.

Caractéristiques techniques

Tension de assignées d'emploi U_N	Intensité de service de référence I_N	Catégorie de service
250 V CA 50/60 Hz	4 Ampère	CA 12
250 V CA 50/60 Hz	1 Ampère	CA 14
30 V CC	4 / 4 Ampère	CC 12 / CC 13
50 V CC	2 / 1 Ampère	CC 12 / CC 13
75 V CC	1 / 0,5 Ampère	CC 12 / CC 13
125 V CC	0,3 / 0,2 Ampère	CC 12 / CC 13
250 V CC	0,25 / 0,2 Ampère	CC 12 / CC 13
Tension d'isolement de référence U_i :	300 V	
Résistance de référence aux ondes de surtension U_{imp} :	2,5 kV	
Courant thermique nominal I_{th} :	5 Ampère	
Surtension de commutation:	< 2,5 kV	
Fréquence de référence:	CC et 50/60 Hz	
Courant nominal de protection contre les court-circuits:	jusqu'à 5 Ampère	
Courant de court-circuit conditionnel:	< 350 Ampère	
Protection IP selon EN 60 529-1991:	IP65 avec connecteur	
Couple de serrage des vis de raccordement:	< 0,35 Nm	
Section de raccordement:	0,5 à 1,5 mm ²	

T.S.V.P.

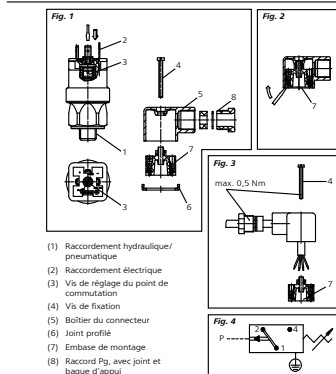
Soucieux d'apporter une amélioration continue à nos produits, les caractéristiques peuvent évoluer sans préavis.

Explication des symboles:

⚠ Attention ⚠ Nota, remarque ♻ Recyclage ⚠ Danger

Presse-étoupe:	Pg 9
Connecteur DIN 43650 lumineux à LED:	Pg 11
Diamètre du câble:	Pg 9: 6 à 9 mm Pg 11: 6 à 11 mm
Fréquence de commutation:	< 200 mm ²
Hystérésis:	10 à 30% réglable en usine
Durée de vie mécanique (pour des pressions de commutation jusqu'à 50 bar):	10 ⁶ cycles de manoeuvre
Versions à membrane (0184):	10 ⁶ cycles de manoeuvre
Versions à piston (0184):	10 ⁶ cycles de manoeuvre
Corps:	acier zingué, nickelé (Fe/ZnNi(12)/6/A/T2)
Tenue à la température:	NBR -40 °C à +100 °C EPDM -30 °C à +120 °C FKM -5 °C à +120 °C
Sécurité de surpression	100 bar (0,3 à 1,5 bar)
Pressostat à membrane (0184):	300 bar (autres plages)
Pressostat à piston (0185):	600 bar

Éléments de manœuvre et de raccordement



Montage

Mécanisme pneumatique/hydraulique:
A l'aide d'une clé plate de 27 (DIN 894 ou analogue), visser par l'embout 6 dans le pressostat en le raccordant à la pression prévue (couples dynamométriques: voir le tableau suivant).

Attention: ne jamais serrer le pressostat en le saisissant par ses parties en plastique! Risque de détérioration!

Filetage du raccord	Couple dynamométrique
M10 x 1 conique et NPT 1/8	Visser jusqu'à ce que le système soit hermétique
M10 x 1 cylindrique	35 Nm
Autres	45 Nm

Électrique

Utiliser que le connecteur fourni par nos services.
S'assurer que le câble électrique soit exempt:
- d'écralements,
- de courbes trop prononcées
- qu'il soit installé de manière à ne pas pouvoir s'allonger.

Câblage avec le connecteur

- Oter la vis de fixation (4) présente à l'extrémité (la conserver en lieu sûr).
- Démontez l'embase de montage (7) ainsi libérée (Fig. 3).
- Raccordez les conducteurs (section maxi: 1,5 mm²) sur les bornes prévues à cet effet (Fig. 4).
- Réengager l'embase de montage (7) dans le boîtier (5), remettre la vis de fixation (4) en place. Engager la prise de courant sur le pressostat et serrer fermement la vis de fixation (4).
- Procéder aux vérifications suivantes:
 - Le câblage correspond-il au schéma de la figure 4?
 - Les câblages sont-ils pondés sans risque d'écralement?
 - Les couples dynamométriques (Fig. 3) sont-ils respectés?

Veiller à ce que le joint profilé (6) soit correctement positionné et à ce que le raccord Pg (8) soit en place comme il faut, faute de quoi l'indice de protection spécifié (IP65) ne serait pas obtenu.

Mise en service

- Dévisser la vis de fixation (4) et la retirer.
- Relier les bornes 1 et 4 avec un multimètre (Fig. 4).
- Si l'on se sert d'une lampe en tant que contrôleur de passage, il faut veiller à respecter la puissance de commutation maximale admise (voir caractéristiques techniques).
- Tout d'abord visser la vis de réglage (3) à fond.
- Utiliser pour cela un tournevis avec une largeur de lame de 2,5 mm.
- Alimenter le pressostat avec la pression de commutation souhaitée (un manomètre de contrôle est nécessaire).
- Tenir compte du fait que la vis de réglage (4) n'a une butée que pour le serrage.
- Dévisser la vis de réglage (3) jusqu'à ce que le pressostat commutent (la lampe de contrôle réagit).
- Contrôler le cas échéant la pression de commutation en agissant en conséquence sur la vis de réglage (3).
- Engager finalement la prise de l'appareil sur le pressostat (respecter le schéma de raccordement).

Le réglage des seuils de contact selon les points 3, 4, 5 et 6 ci-dessus peut également être entrepris, la prise de courant étant engagée sur le pressostat. Pour cela, oter la vis de fixation (4). On aura ainsi accès à la vis de réglage (3), avec un tournevis d'une largeur de lame de 2,5 mm, introduit par cet orifice à l'intérieur de la prise.

Procéder comme décrit points 3, 4, 5, 6 ci-dessus.

A la mise en service du pressostat, tenir compte des prescriptions et directives correspondantes données par les Chambres syndicales concernées, ainsi que les dispositions nationales respectives.

Le réglage de l'hystérésis est fait par l'usine. Une utilisation abusive pourrait endommager le pressostat.

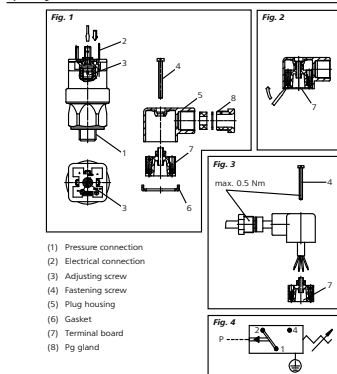
Démontage

- Avant de démonter le pressostat il est très important de tenir compte des points suivants:
- Il est impératif que le système sur lequel le pressostat est monté soit au préalable mis hors pression et hors tension.
 - A l'aide d'une clé plate de 27 (DIN 894 ou analogue), dévisser par l'embout 6 dans le pressostat du raccord de pression sur lequel il a été monté.
 - De même, les prescriptions inhérentes à la sécurité doivent impérativement être respectées.

Néanmoins dévisser le pressostat en le saisissant par ses parties en plastique, facile de quoi enrouler le risque de l'endommager.

Cable screw coupling:	Pg 9
Connector with LED:	Pg 11
Cable size:	Pg 9: 6 to 9 mm Pg 11: 6 to 11 mm
Operating frequency:	< 200 mm ²
Switching hysteresis:	10 to 30% adjustable
by the factory	10 to 30% adjustable
Mechanical life	10 ⁶ operating cycles
Diaphragm type (0184):	(at a trip pressures up to 50 bar)
Piston type (0184):	10 ⁶ operating cycles
Body material:	Zinc-plated steel (Fe/ZnNi(12)/6/A/T2)
Temperature range:	NBR -40 °C to +100 °C EPDM -30 °C to +120 °C FKM -5 °C to +120 °C
Overpressure safety	100 bar (0.3 to 1.5 bar)
Diaphragm Pressure Switch (0184):	300 bar (residual pressure)
Piston Pressure Switch (0185):	600 bar

Operating controls and connections



Installation

Mechanical/pneumatic/hydraulic:
With a size 27 open-ended wrench (to DIN 894 or similar), install the pressure switch, by means of the hexagon connector, in the corresponding pressure socket (for torque specification, see following table).

For sealing the system, use a standard copper gasket of the appropriate dimensions.

Connecting thread	Torque
M10 x 1 tap, and NPT 1/8	Tighten until system is hermetically sealed
M10 x 1 cyl.	35 Nm
Remaining	45 Nm

Electrical

Use the connector supplied.
Take care to ensure that the cable is laid in such a way that it is not:
- pinched
- kinked
- under tension.

Connection to the connector

- Remove the fastening screw (4) from the head end (set aside for later use).
- Remove the released terminal board (7) (Fig. 2).
- Connect the cable (max. lead cross-section 1,5 mm²) to the screw terminals provided (Fig. 4).
- Reinstall the terminal board (7) in the plug housing (5). Install the fastening screw (4) in the plug housing (5). Install the fastening screw (4). Install the connector on the pressure switch and tighten the fastening screw (4).
- Pay attention to the following points:
 - Wiring in accordance with connection diagram (Fig. 4)
 - Cabling laid free of pinching, chafing, etc.
 - Torque specifications (Table 3)

Take care to ensure that the gasket (6) and Pg gland (8) are correctly installed, otherwise the conditions specified for protection category IP65 will not be achieved.

Entry into service

- Remove the connector.
- Using a continuity tester, wire up the electrical connections 1 and 4 (Fig. 4).
- If using a testing lamp as a continuity tester, observe the maximum permissible switching capacity (see Technical Data).
- First screw in the adjusting screw (3) as far as it will go. To adjust the pressure switch, use a screwdriver with a 2,5 mm wide blade.
- Adjust the pressure switch to the desired switching pressure (a test pressure gauge required).
- Take care to ensure that the adjusting screw (3) does not seize at any point other than when it is fully tightened down.
- Ease off the adjusting screw (3) to a sufficient extent to cause the pressure switch to trip (continuity tester reacts).
- If necessary, adjust the trip pressure setting by turning the adjusting screw (3).
- Push the connector onto the pressure switch (observe the connection diagram).

Adjustment of the trip pressure setting in accordance with points 3, 4, 5 and 6 can also be carried out with the connector installed. In this case, first remove the fastening screw (4). With a screwdriver (blade width 2,5 mm), you can now reach the adjusting screw (3) through the aperture in the connector. Now proceed in accordance with points 3, 4, 5 and 6 above.

When putting the pressure switch into service, please observe the applicable safety regulations laid down by the governing bodies in the country of use.

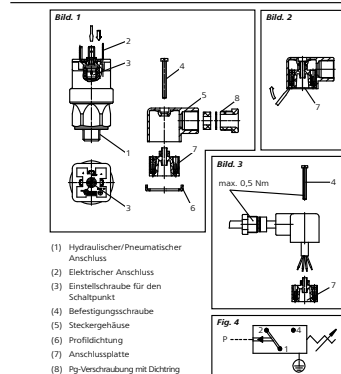
The adjustment of hysteresis can only be carried out in the factory. If this is unexpectedly undertaken, damage may be caused to the pressure switch.

Removing the pressure switch

- When removing the pressure switch, observe the following important instructions:
- The pressurized system from which the pressure switch is intended to be removed must be entirely relieved of pressure.
 - All the relevant safety regulations must be observed.
 - Use a size 27 open-ended wrench (to DIN 894 or similar), to remove the pressure switch.
 - Do not attempt to turn the switch by means of the plastic collars, otherwise it could be damaged beyond further use.

Kabelverschraubung:	Pg 9
Gerätesteckdose mit LED:	Pg 11
Klemmbereich:	Pg 9: 6 bis 9 mm Pg 11: 6 bis 11 mm
Schaltfrequenz:	<200 mm ²
Schalthysterese:	10 bis 30% im Werk einstellbar
Mechanische Lebensdauer	10 ⁶ Schaltspiele
Membranausführung (0184):	10 ⁶ Schaltspiele (bei Schalldrücken bis 50 bar)
Kolbenausführung (0184):	10 ⁶ Schaltspiele
Gehäusewerkstoff:	verzinkter Stahl (Fe/ZnNi(12)/6/A/T2)
Temperaturbeständigkeit:	NBR -40 °C bis +100 °C EPDM -30 °C bis +120 °C FKM -5 °C bis +120 °C
Überdrucksicherheit	100 bar (0,3 bis 1,5 bar)
Membrandruckschalter (0184):	300 bar (restl. Druckbereich)
Kolbendruckschalter (0185):	600 bar

Bedienteile und Anschlüsse



Einbau

Mechanisch/pneumatisch/hydraulisch:
Drehen Sie den Druckschalter an dem sechskantförmigen Ansatz mit einem Maulschlüssel der Schlüsselweite 27 (nach DIN 894 o.ä.) in den vorgesehenen Druckanschluss (Anzugsdrehmomente siehe nachfolgende Tabelle).

Zum Abdichten des Systems verwenden Sie einen Standard-Kupferdichtung mit den entsprechenden Abmessungen.

Anschlussgewinde	Drehmoment
M10 x 1 kegl. und NPT 1/8	Einschrauben bis System abgedichtet ist
M10 x 1 zyl.	35 Nm
Restliche	45 Nm

Elektrisch

Verwenden Sie die mitgelieferte Gerätesteckdose.
Stellen Sie sicher, dass das Kabel:
- quetschfrei,
- knickfrei,
- dehnungsfrei verlegt ist.

Verkabelung des Gerätesteckdoses

- Lösen Sie die Befestigungsschraube (4), und ziehen Sie diese am Kopf ende ganz heraus (gut aufführen).
- Demontieren Sie die gelaste Anschlussplatte (7) (Bild 2).
- Schließen Sie die Kabel (max. Leistungsschnitt 1,5 mm²) an den dafür vorgesehenen Schraubklemmen an (Bild 4).
- Anschlussplatte (7) wieder in das Steckergehäuse (5) schieben. Befestigungsschraube (4) montieren. Gerätesteckdose auf den Druckschalter stecken und Befestigungsschraube (4) anziehen.
- Achten Sie auf folgende Punkte:
 - Verkabelung nach Anschlussbild (Bild 4)
 - quetschfreie Kabelführung
 - Anzugsdrehmomente (Bild 3)

Achten Sie auf die ordnungsgemäße Lage der Profildichtung (6) und auf eine sachgemäße Montage der Pg-Verschraubung (8), da sonst die Schutzart IP65 nicht erreicht wird.

Inbetriebnahme

- Lösen Sie die Befestigungsschraube (4), und ziehen Sie die Gerätesteckdose ab.
- Verbinden Sie die elektrischen Anschlüsse 1 und 4 mit einem Durchgangsprüfer (Bild 4).
- Bei Verwendung einer Prüflampe als Durchgangsprüfer: Achten Sie auf die max. zulässige Schaltleistung (siehe technische Daten).
- Drehen Sie die Einstellschraube (3) zunächst ganz ein. Verwenden Sie zum Einstellen des Druckschalters einen Schraubendreher mit 2,5 mm Klingbreite.
- Bewachen Sie bitte, dass die Einstellschraube (3) nur beim Einziehen einen Anschlag besitzt.
- Drehen Sie die Einstellschraube (3) so weit heraus, bis der Druckschalter umschaltet (Durchgangsprüfer reagiert).
- Kongressen Sie gegebenenfalls den Schalldruck durch Verdröhen der Einstellschraube (3).
- Schieben Sie die Gerätesteckdose auf den Druckschalter (Anschlussbild beachten).

Das Einstellen des Schaltpunkts nach den Punkten 3, 4, 5 und 6 kann auch mit aufgesetzter Gerätesteckdose durchgeführt werden. Hierzu entfernen Sie bitte die Befestigungsschraube (4). Nun können Sie mit einem Schraubendreher (Klingbreite 2,5 mm) durch die Durchgangsbohrung der Gerätesteckdose die Einstellschraube (3) erreichen. Verfahren Sie nun wie in Punkt 3, 4, 5 und 6 des Kapitels „Inbetriebnahme“ beschrieben.

Bei Inbetriebnahme des Druckschalters beachten Sie bitte die entsprechenden Sicherheitsvorschriften der Berufsgenossenschaft oder die entsprechenden nationalen Bestimmungen.

Die Einstellung der Hysteresis ist nur werkseitig durchführbar. Bei unsachgemäßer Vorgehensweise kann der Druckschalter beschädigt werden.

Ausbau

- Beachten Sie folgende wichtige Punkte beim Ausbau des Druckschalters:
- Das Drucksystem, aus dem der Druckschalter ausgebaut werden soll, muss sich im drucklosen Zustand befinden.
 - Es müssen alle relevanten Sicherheitsbestimmungen beachtet werden.
 - Drehen Sie den Druckschalter mit einem Maulschlüssel der Schlüsselweite 27 (nach DIN 894 o.ä.) aus dem Druckanschluss.
 - Drehen Sie den Druckschalter niemals an den Kunststoffansätzen heraus, da Zerstörungsgefahr für den Druckschalter besteht.

Mechanical pressure measurement

Bourdon tube pressure gauge Model 213.53, liquid filling, stainless steel case

WIKA data sheet PM 02.12



for further approvals
see page 2

Applications

- For measuring points with high dynamic pressure loads or vibrations
- For gaseous and liquid media that are not highly viscous or crystallising and will not attack copper alloy parts
- Hydraulics
- Compressors, shipbuilding

Special features

- Vibration and shock resistant
- Especially sturdy design
- NS 63 and 100 with German Lloyd and Gosstandart approval
- Scale ranges up to 0 ... 1,000 bar



Bourdon tube pressure gauge, model 213.53.100,
lower mount

Description

Design
EN 837-1

Nominal size in mm
50, 63, 100

Accuracy class
NS 50, 63: 1.6
NS 100: 1.0

Scale ranges
NS 50: 0 ... 1 to 0 ... 400 bar
NS 63, 100: 0 ... 0.6 to 0 ... 1,000 bar
or all other equivalent vacuum or combined pressure and vacuum ranges

Pressure limitation

NS 50, 63: Steady: 3/4 x full scale value
Fluctuating: 2/3 x full scale value
Short time: Full scale value
NS 100: Steady: Full scale value
Fluctuating: 0.9 x full scale value
Short time: 1.3 x full scale value

Permissible temperature

Ambient: -20 ... +60 °C
Medium: +60 °C maximum

Temperature effect

When the temperature of the measuring system deviates from the reference temperature (+20 °C):
Max. ±0.4 %/10 K of the span

Ingress protection

IP 65 per EN 60529 / IEC 60529

WIKA data sheet PM 02.12 · 03/2015

Page 1 of 3

Data sheets showing similar products:
Standard version with liquid filling; model 113.53; see data sheet PM 01.08



Standard version

Process connection

Copper alloy,
lower mount (LM) or back mount (BM),
NS 50, 63: G ¼ B (male), 14 mm flats
NS 100: G ½ B (male), 22 mm flats

Pressure element

NS 50:
Copper alloy, C-type or helical type

NS 63:
≤ 400 bar: Copper alloy, C-type or helical type
> 400 bar: Stainless steel 316L, helical type

NS 100:
< 100 bar: Copper alloy, C-type
≥ 100 bar: Stainless steel 316L, helical type

Movement

Copper alloy

Dial

NS 50, 63: Plastic ABS, white, with pointer stop pin
NS 100: Aluminium, white, black lettering

Pointer

NS 50, 63: Plastic, black
NS 100: Aluminium, black

Window

Plastic, crystal-clear

Case

Natural finish stainless steel, with blow-out device with
NS 50: in case back, 12 o'clock
NS 63, 100: at case circumference, 12 o'clock
O-ring seal between case and connection.
Scale ranges ≤ 0 ... 16 bar with compensating valve to vent case.

Bezel ring

Crimp ring, glossy finish stainless steel, triangular bezel

Filling liquid

Glycerine

Options

- Other process connection
- Sealings (model 910.17, see data sheet AC 09.08)
- Measuring system and movement from stainless steel (model 233.53)
- NS 100: Zero adjustment (in front)
- Increased medium temperature with special soft solder
 - NS 50, 63: 100 °C
 - NS 100: 150 °C
- Ambient temperature resistant -40 ... +60 °C with silicone oil filling
- NS 50: Higher scale ranges up to 0 ... 1,000 bar
- Panel mounting flange, stainless steel, for back connection
- Surface mounting flange, stainless steel (not NS 50)
- Mounting clamp (for back connection)

CE conformity

Pressure equipment directive

97/23/EC, PS > 200 bar, module A, pressure accessory

Approvals

- GL, ships, shipbuilding (e.g. offshore), Germany
- EAC, import certificate, customs union Russia/Belarus/Kazakhstan
- GOST, metrology/measurement technology, Russia
- KBA, automotive, European Community
- CRN, safety (e.g. electr. safety, overpressure, ...), Canada

Certificates ¹⁾

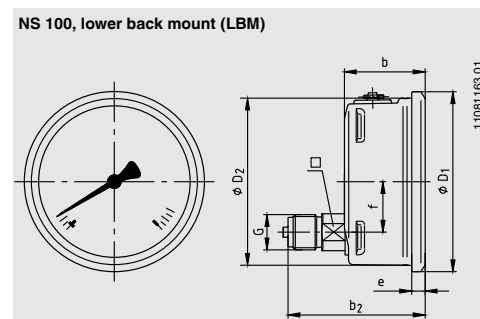
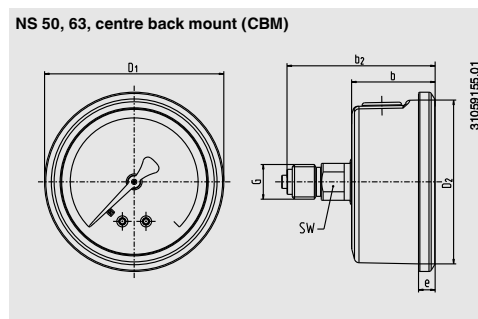
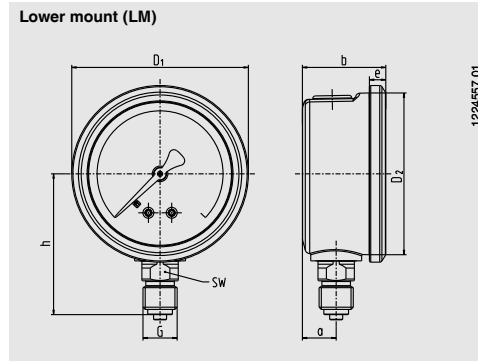
- 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy)
- 3.1 inspection certificate per EN 10204 (e.g. indication accuracy)

¹⁾ Option

Approvals and certificates, see website

Dimensions in mm

Standard version



NS	Dimensions in mm										Weight in kg
	a	b ±0.5	b ₂ ±0.5	D ₁	D ₂	e	f	G	h ±1	SW	
50	12	30	55	55	50	5.5	-	G ¼ B	48	14	0.15
63	13	32	56	68	62	6.5	-	G ¼ B	54	14	0.21
100	15.5	48	81.5	107	100	8	30	G ½ B	87	22	0.80

Process connection per EN 837-1 / 7.3

Ordering information

Model / Nominal size / Scale range / Connection size / Connection location / Options

© 2008 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.
The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.

WIKA data sheet PM 02.12 · 03/2015

Page 3 of 3



WIKAL
WIKAL Alexander Wiegand SE & Co. KG
 Alexander-Wiegand-Straße 30
 63911 Klingenberg/Germany
 Tel. +49 9372 132-0
 Fax +49 9372 132-406
 info@wika.de
 www.wika.de

Mechanical
temperature measurement**Bimetal thermometer
Model 52, industrial series**

WIKA data sheet TM 52.01

for further approvals
see page 6**Applications**

- A wide range of applications in machine building, vessel, piping and apparatus construction
- Heating technology

Special features

- Scale ranges from -30 ... +500 °C
- Large choice of nominal sizes from 25 ... 160 mm
- Case and stem from stainless steel
- 5 different connection designs



Fig. left: model A52.100, back mount

Fig. right: model R52.100, lower mount

Description

The model 52 bimetal thermometer is the entry-level model among process thermometers. The target markets of this thermometer are air-conditioning and machine building.

Model 52 is manufactured in accordance with EN 13190 and already offers a stainless steel case and accuracy class 1 for nominal sizes > 60 mm.

Especially noteworthy is the large number of stem lengths and nominal sizes. This enables the individual adaptation to the target applications.

WIKA data sheet TM 52.01 · 01/2016

Page 1 of 6



23100591/ES – 05/2019

Standard version

Measuring element

Bimetal coil

Nominal size in mm

25, 33, 40, 50, 63, 80, 100, 160

Connection designs

- S Standard (male threaded connection)
- 1 Plain stem (without thread)
- 2 Male nut ¹⁾
- 3 Union nut ¹⁾
- 4 Compression fitting (sliding on stem) ¹⁾

¹⁾ Not for NS 25, 33, 40, 50

Model overview

Model	NS	Design
A52.025	25	Back mount (axial)
A52.033	33	
A52.040	40	
A52.050	50	
A52.063	63	
A52.080	80	
A52.100	100	
A52.160	160	
R52.063	63	Lower mount (radial)
R52.080	80	
R52.100	100	
R52.160	160	

Accuracy class

NS 25, 33: ±5 % of scale range
 NS 40, 50: 2 per EN 13190
 NS 63, 80, 100, 160: 1 per EN 13190

Working range

Continuous loading: Measuring range per EN 13190
 Short time (24 h max.): Scale range per EN 13190

Case, bezel ring, stem, process connection and spacer

Stainless steel

Elbow behind the case

Aluminium, only with lower mount version

Dial

Aluminium, white, black lettering

Window

Instrument glass
 NS 33: polycarbonate

Pointer

NS 25, 33, 40: Aluminium, black
 NS 50, 63, 80, 100, 160: Aluminium, black, adjustable pointer

Permissible operating pressure at the stem

NS 25, 33, 40, 50: max. 6 bar, static
 NS 63, 80, 100, 160: max. 25 bar, static

Ingress protection

NS 25, 33, 40: IP54 per EN 60529 / IEC 529
 NS 50, 63, 80, 100, 160: IP43 per EN 60529 / IEC 529

Options

- Scale range °F, °C/°F (dual scale)
- Other scale ranges
- Other connection types

Scale ranges, measuring ranges ²⁾, error limit (EN 13190) Scale graduation per WIKA standard

Scale range in °C	Measuring range in °C	Scale spacing in °C		Error limit ±°C	
		up to NS 63	from NS 80	up to NS 50	from NS 63
-30 ... +50	-20 ... +40	1	1	2	1
-20 ... +60	-10 ... +50	1	1	2	1
0 ... 60	10 ... 50	1	1	2	1
0 ... 80	10 ... 70	1	1	2	1
0 ... 100	10 ... 90	2	1	2	1
0 ... 120	10 ... 110	2	1	4	2
0 ... 160	20 ... 140	2	2	4	2
0 ... 200 ³⁾	20 ... 180	5	2	4	2
0 ... 250 ³⁾	30 ... 220	5	2	5	2.5
0 ... 300 ⁴⁾	30 ... 270	5	2	-	5
0 ... 400 ⁴⁾	50 ... 350	5	5	-	5
0 ... 500 ⁴⁾	50 ... 450	5	5	-	5

2) The limits of the measuring range are indicated on the dial by two triangular marks.
Only within this range is the stated error limit valid per EN 13190.

3) Not for NS 33

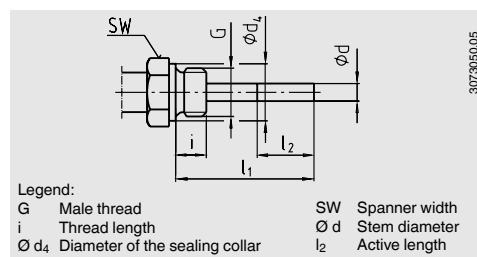
4) Not for NS 25 to NS 50

Connection designs

Standard design (male thread connection)

Standard insertion length $l_1 = 63, 100, 160, 200, 250$ mm

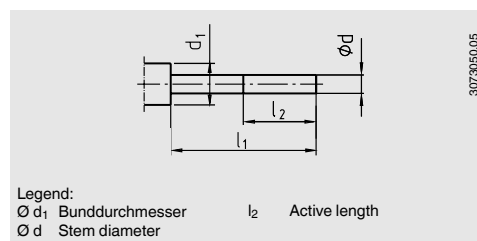
Nominal size	Process connection		Dimensions in mm			
	G	i	SW	Ø d ₄	Ø d	
25, 33	M8 x 1.25	8	12	-	4	
	G ½ B	8	12	-	4	
	G ¼ B	8	17	-	4	
40, 50	M8 x 1.25	8	12	-	4	
	G ½ B	8	17	-	4	
	G ¼ B	8	17	-	4	
	G ½ B	12	22	-	4	
63, 80, 100, 160	G ¼ B	12	19	18	6 or 8	
	G ½ B	14	27	26	6 or 8	
	M18 x 1.5	12	24	23	6 or 8	
	½ NPT	19	22	-	6 or 8	



Bauform 1, Anschluss glatt (ohne Gewinde)

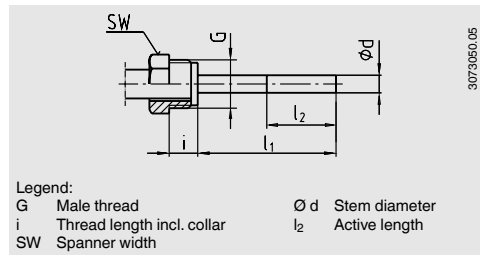
Standard-Einbaulänge $l_1 = 45, 63, 100, 140, 160, 200, 240, 290$ mm

Nominal size	Dimensions in mm	
	d ₁	Ø d
25, 33	8	4
40, 50	12	4
63, 80, 100, 160	18	6 or 8

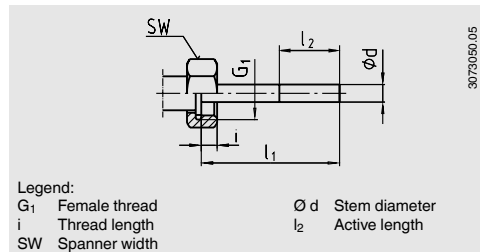


Design 2, male nutStandard insertion length $l_1 = 80, 140, 180, 230$ mm

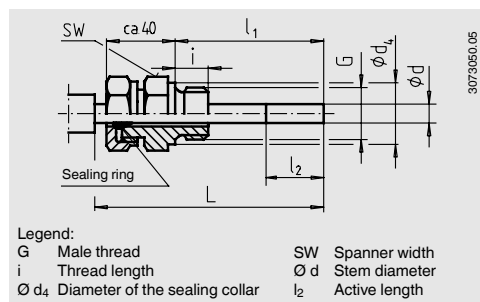
Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d$	
63, 80, 100, 160	G $\frac{1}{2}$ B	20	27	6 or 8	
	M18 x 1.5	17	22	6 or 8	

**Design 3, union nut**Standard insertion length $l_1 = 89, 126, 186, 226, 276$ mm

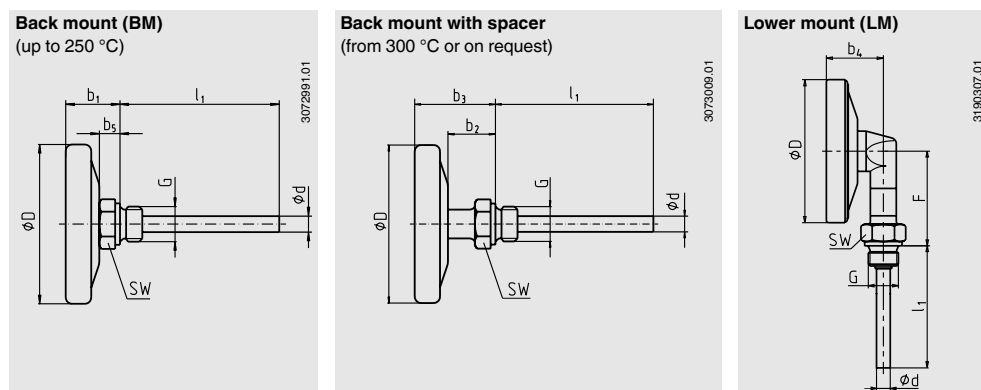
Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d$	
63, 80, 100, 160	G $\frac{1}{2}$	8.5	27	6 or 8	
	G $\frac{3}{4}$	9.5	32	6 or 8	

**Design 4, compression fitting (sliding on stem)**Insertion length l_1 = variableLength $L = l_1 + 40$ mm

Nominal size	Process connection		Dimensions in mm		
NS	G	i	SW	$\varnothing d_4$	$\varnothing d$
63, 80, 100, 160	G $\frac{1}{4}$ B	8	22	18	6 or 8
	G $\frac{1}{2}$ B	14	27	26	6 or 8
	M18 x 1.5	12	24	23	6 or 8
	$\frac{1}{2}$ NPT	19	22	-	6 or 8
	G $\frac{3}{4}$ B	16	32	32	6 or 8
	$\frac{3}{4}$ NPT	20	30	-	6 or 8



Dimensions in mm



NS	Dimensions in mm							Weight in kg		
	b ₁	b ₂	b ₃	b ₄	b ₅	Ø D	F	R	RD	U
25	16	-	-	-	6	25	-	0.035	-	-
33	16	-	-	-	6	33	-	0.040	-	-
40	21	-	-	-	8	40	-	0.050	-	-
50	21	-	-	-	8	50	-	0.060	-	-
63	29	30 ¹⁾	46	34	13	63	47	0.160	0.200	0.220
80	30	30 ¹⁾	47	36	13	80	56	0.200	0.240	0.270
100	35	30 ¹⁾	52	40	13	100	66	0.250	0.290	0.330
160	39	30 ¹⁾	57	42.5	13	160	96	0.450	0.490	0.560

1) from 300 °C or on request
R Back mount (BM)
RD Back mount with spacer
U Lower mount (LM)

Thermowell

In principle, the operation of a mechanical thermometer without a thermowell with low process-side loading (low pressure, low viscosity and low flow velocities) is possible.

However, in order to enable exchanging the thermometer during operation (e.g. instrument replacement or calibration) and to ensure a better protection of the instrument and also the plant and the environment, it is advisable to use a thermowell from the extensive WIKA thermowell portfolio.

For further information on the calculation of the thermowell, see Technical information IN 00.15.

Approvals

Logo	Description	Country
	GOST (option) Metrology, measurement technology	Russia
-	CRN (option) Safety (e.g. electr. safety, overpressure, ...)	Canada

Certificates (option)

2.2 test report

Approvals and certificates, see website

Ordering information

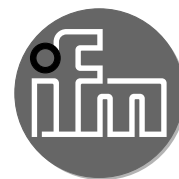
Model / Connection design / Scale range / Process connection / Stem diameter, material / Insertion length / Options

© 2004 WIKA Alexander Wiegand SE & Co. KG, all rights reserved.
The specifications given in this document represent the state of engineering at the time of publishing.
We reserve the right to make modifications to the specifications and materials.



WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Straße 30
63911 Klingenberg/Germany
Tel. +49 9372 132-0
Fax +49 9372 132-406
info@wika.de
www.wika.de

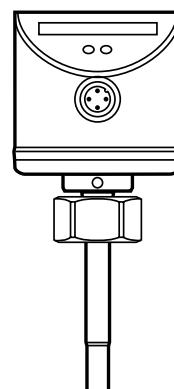
ifm electronic



Operating instructions
Flow monitors

efector300[®]**SI5000****SI5001****UK**

704056 / 03 08 / 2010



23100591/ES – 05/2019

Contents

1 Safety instructions	3
2 Functions and features	4
2.1 Application area	4
2.2 Operating principle flow monitoring	4
3 Installation	5
3.1 Installation location	5
3.2 Sources of interference in the pipe system	6
3.3. Mounting operation.....	6
4 Electrical connection.....	7
5 Operating and display elements	7
6 Set-up and settings for water.....	8
6.1 Change the switch point (optional)	8
6.2 High flow adjustment (optional)	9
7 Additional settings (optional).....	9
7.1 Low flow adjustment	9
7.2 Configure the switching output	9
7.3 Restore the factory setting (reset)	10
7.4 Lock / unlock the unit.....	10
8 Error during adjustment.....	10
9 Operation.....	11
10 Maintenance	11
11 Scale drawing	12
12 Technical data.....	12

Preliminary note

- An instruction is indicated by "►":
Example: ► Check whether the unit operates correctly.
- A reaction to the action is indicated by ">":
Example: > LED 9 lights.

1 Safety instructions

- Please read the product description prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- The unit conforms to the relevant regulations and EC directives.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application.
- That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.

UK

For the scope of validity cULus:

The device shall be supplied from an isolating transformer having a secondary Listed fuse rated as noted in the following table.

Overcurrent protection		
Control-circuit wire size		Maximum protective device rating Ampere
AWG	(mm ²)	
26	(0.13)	1
24	(0.20)	2
22	(0.32)	3
20	(0.52)	5
18	(0.82)	7
16	(1.3)	10

2 Functions and features

2.1 Application area

The unit monitors the flow of liquid and gaseous media.

2.2 Operating principle flow monitoring

- The unit detects the flow speed to the calorimetric measuring principle and switches the output:
 - output closed if medium is flowing / output open if no medium is flowing.This applies to the unit on delivery: output = normally open. In case of need you can change the output to normally closed (→ 7.2). It then applies: output open if medium is flowing.
- If the flow speed increases, the switching status changes when the switch point is reached.
- If the flow speed falls again, the switching status changes if the value "SP minus hysteresis" is reached.

The hysteresis changes with the flow speed and it is essentially influenced by the set monitoring range.

It is 2...5 cm/s for the setting 5...100 cm/s (= factory setting), it increases with higher flow speeds.
- The typical response time of the unit is 1...10 s. It can be influenced by the setting of the switch point:
 - Low switch point = quick reaction with rising flow.
 - High switch point = quick reaction with falling flow.

3 Installation

Using process adapters the unit can be adapted to different process connections.

- Adapters have to be ordered separately as accessories.
A correct fit of the unit and ingress resistance of the connection are only ensured using ifm adapters.
- For small flow rates ifm adapter blocks are available.

3.1 Installation location

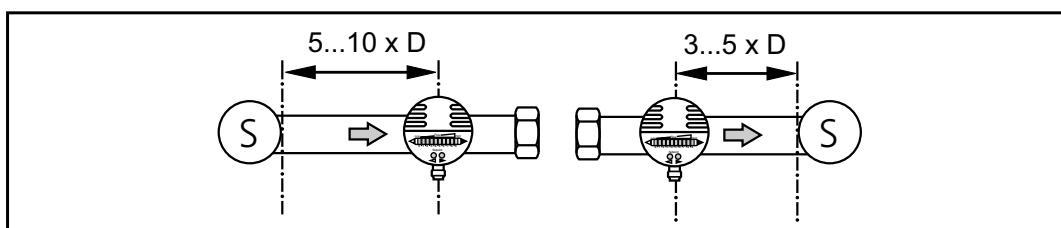
General • The sensor tip is to be completely surrounded by the medium. • Insertion depth of the sensor: minimum 12 mm.		
Recommended • For horizontal pipes: mounting from the side. • For vertical pipes: mounting in the rising pipe.		
Conditional • Horizontal pipe /mounting from the bottom: if the pipe is free from build-up. • Horizontal pipe /mounting from the top: if the pipe is completely filled with medium.		
To avoid • The sensor tip must not be in contact with the pipe wall. • Do not mount in downpipes that are open at the bottom!		

UK

3.2 Sources of interference in the pipe system

Components integrated in the pipes, bends, valves, reductions, etc. lead to turbulence of the medium. This affects the function of the unit.

Recommendation: Adhere to the distances between sensor and sources of interference:

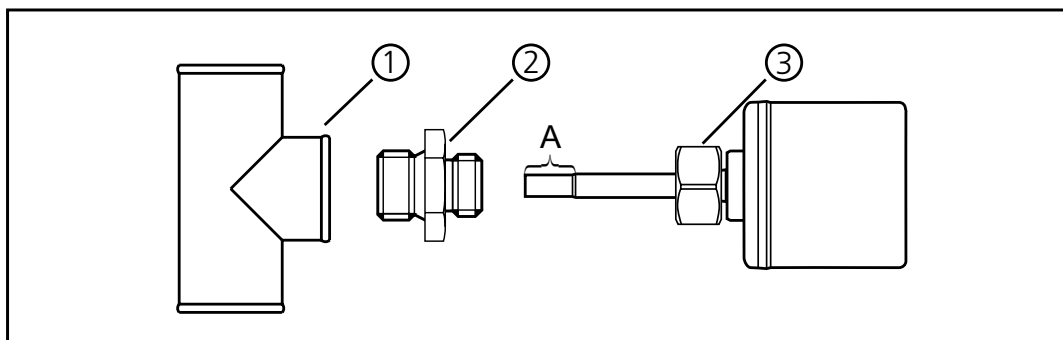


D = pipe diameter; S = sources of interference

3.3. Mounting operation



- ▶ Ensure that the system is free of pressure during installation.
- ▶ Ensure that no media can leak at the mounting location during installation.



- ▶ Grease the threads of the process connection (1), adapter (2) and nut (3).
Note: The sensor tip (A) must not be in contact with grease.
- ▶ Screw the suitable adapter into the process connection.
- ▶ Place the flow monitor onto the adapter and tighten the nut. Tightening torque 25 Nm. Ensure that the unit is correctly oriented.

4 Electrical connection

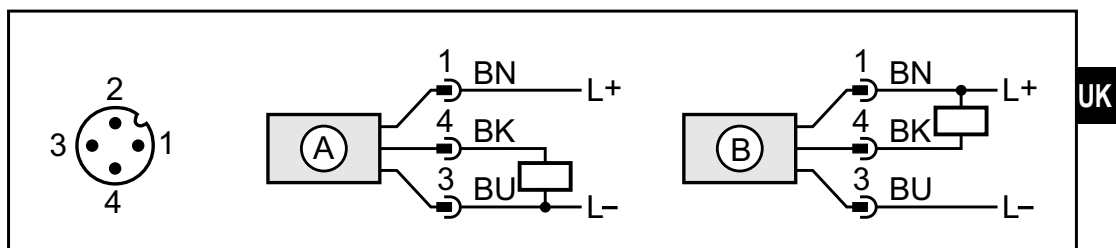


The unit must be connected by a qualified electrician.

The national and international regulations for the installation of electrical equipment must be adhered to.

Voltage supply to EN 50178, SELV, PELV.

- ▶ Disconnect power.
- ▶ Connect the unit as follows:

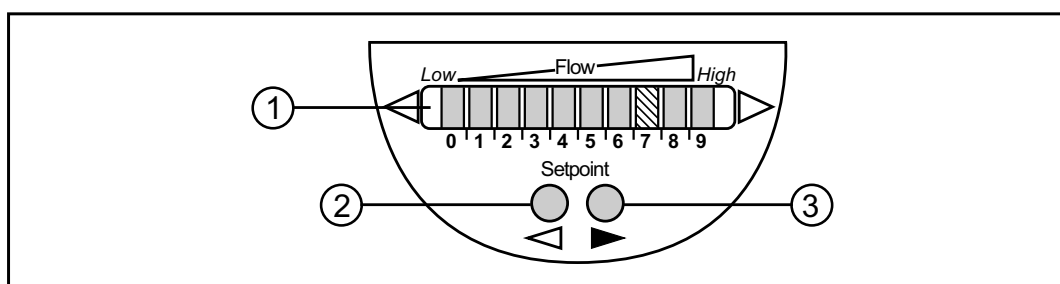


A: SI5000 (positive switching); B: SI5001 (negative switching)

Core colours of ifm sockets:

1 = BN (brown), 3 = BU (blue), 4 = BK (black)

5 Operating and display elements



1: Operation display

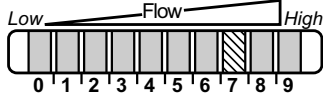
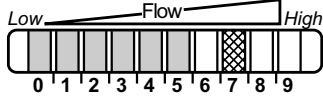
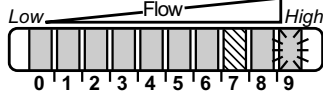
- The green LEDs indicate the current flow (the LEDs 0 to 9 represent the range between no flow and maximum flow).
- A lighting LED indicates the position of the switch point (orange = output closed, red = output open).

2, 3: Setting buttons for adjustment and configuration

6 Set-up and settings for water

(For media other than water → 7.1: Low flow adjustment).

- ▶ Switch on the supply voltage.
- > All LEDs light and go out again step by step. During this time the output is closed (if configured as normally open). The unit is in the operating mode.
- ▶ Let the normal flow circulate in the installation.
- ▶ Check the display and determine further actions.

1		The factory setting is suitable for the application. ▶ No further settings are required.
2		Your normal flow is below the representation range of the display. 2 setting options: ▶ Change the switch point (→ 6.1). ▶ Carry out high flow adjustment (→ 6.2).
3		Your normal flow exceeds the representation range of the display (LED 9 flashes). ▶ Carry out high flow adjustment (→ 6.2).

You can restore the factory setting any time. (→ 7.3).

6.1 Change the switch point (optional)

For the factory setting the switch point is at LED 7. A change makes sense if:

- the display shows example 2.
- the flow fluctuates much or pulsates.
- if a faster response time of the unit is requested (low switch point = fast response with rising flow, high switch point = fast response with falling flow).
- ▶ Briefly press the pushbutton ◀ or ▶.
- > The switch point LED flashes.
- ▶ Press the pushbutton ◀ or ▶ as often as required. Each press of the pushbutton shifts the LED by one position in the indicated direction.

Note: If no pushbutton is pressed for 2 s, the unit returns to the operating mode with the newly set value.

6.2 High flow adjustment (optional)

The unit determines the existing flow as normal flow and adapts the display representation (all LEDs except the switch point LED light green).

- ▶ Let the normal flow circulate in the installation.
- ▶ Press the pushbutton  and keep it pressed.
- > LED 9 lights, after approx. 5 s it flashes.
- ▶ Release the pushbutton.

The unit is now adapted to your flow conditions. It passes into the operating mode, the display should now show example 1.

UK

Note: The adjustment affects the switch point: It is increased proportionally (maximum up to LED 7).

7 Additional settings (optional)

7.1 Low flow adjustment

If the unit is used in media other than water, you should additionally adapt the unit to the minimum flow.

Note: The following adjustment must only be carried out after the high flow adjustment.

- ▶ Let the minimum flow circulate in the installation or ensure flow standstill.
- ▶ Press the pushbutton  and keep it pressed.
- > LED 0 lights, after approx. 5 s it flashes.
- ▶ Release the pushbutton. The unit adopts the new value and passes into the operating mode.

7.2 Configure the switching output

The unit is delivered as normally open. In case of need you can change the output to normally closed:

- ▶ Press the pushbutton  for at least 15 s.
- > LED 0 lights, after approx. 5 s it flashes.
- > After 10 s the current setting is displayed: LEDs 5...9 light orange (= output normally open).
- > After approx. 15 s LEDs 0...4 flash orange.
- ▶ Release the pushbutton. The output is changed to normally closed operation.

For a new changeover repeat the operation.

7.3 Restore the factory setting (reset)

- ▶ Press the pushbutton ► for at least 15 s.
- > LED 9 lights, after approx. 5 s it flashes.
- > After approx. 15 s LEDs 0...9 flash orange.
- ▶ Release the pushbutton. All settings are reset to the factory setting:
 - operating area: 5 ... 100 cm/s for water
 - switch point: LED 7
 - output function: NO
 - unlocked.

7.4 Lock / unlock the unit

The unit can be locked electronically to prevent unintentional settings.

- ▶ Press both setting pushbuttons simultaneously for at least 10 s in the operating mode.
- > The indication goes out, the unit locks or unlocks.

On delivery: unlocked.

8 Error during adjustment

If no adjustment is possible, all LEDs flash red. The unit then passes into the operating mode with unchanged values.

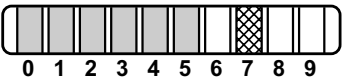
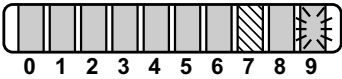
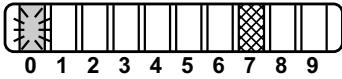
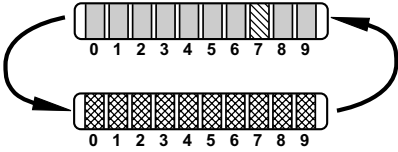
Possible cause /aid:

Error during installation.	▶ Read chapter 3 Installation. Check whether all requirements have been met.
The difference between maximum flow and minimum flow is too small.	▶ Increase the flow difference and carry out the adjustment once again.
The sequence high flow /low flow adjustment was not adhered to.	▶ Carry out the two adjustment operations again in the right sequence.

9 Operation

After every power on all LEDs light and go out again step by step (during this time the output is closed if configured as normally open). The unit is then ready for operation.

In case of power failure or interruption all settings remain.

Operating indicators	
	Green LED bar: Current flow within the representation range. Indication of the switch point (SP): - LED orange: output closed. - LED red: output open.
	LED 9 flashes: current flow above the representation range.
	LED 0 flashes: current flow far below the representation range.
Interference indicators	
	Short circuit at the switching output: The operating indicator and red LEDs light alternately. If the short circuit has been rectified, the unit immediately passes into the normal operating state. The current operating state is displayed.
Display OFF (no LED lights):	Operating voltage too low (< 19 V) or failed. Ensure a correct voltage supply.

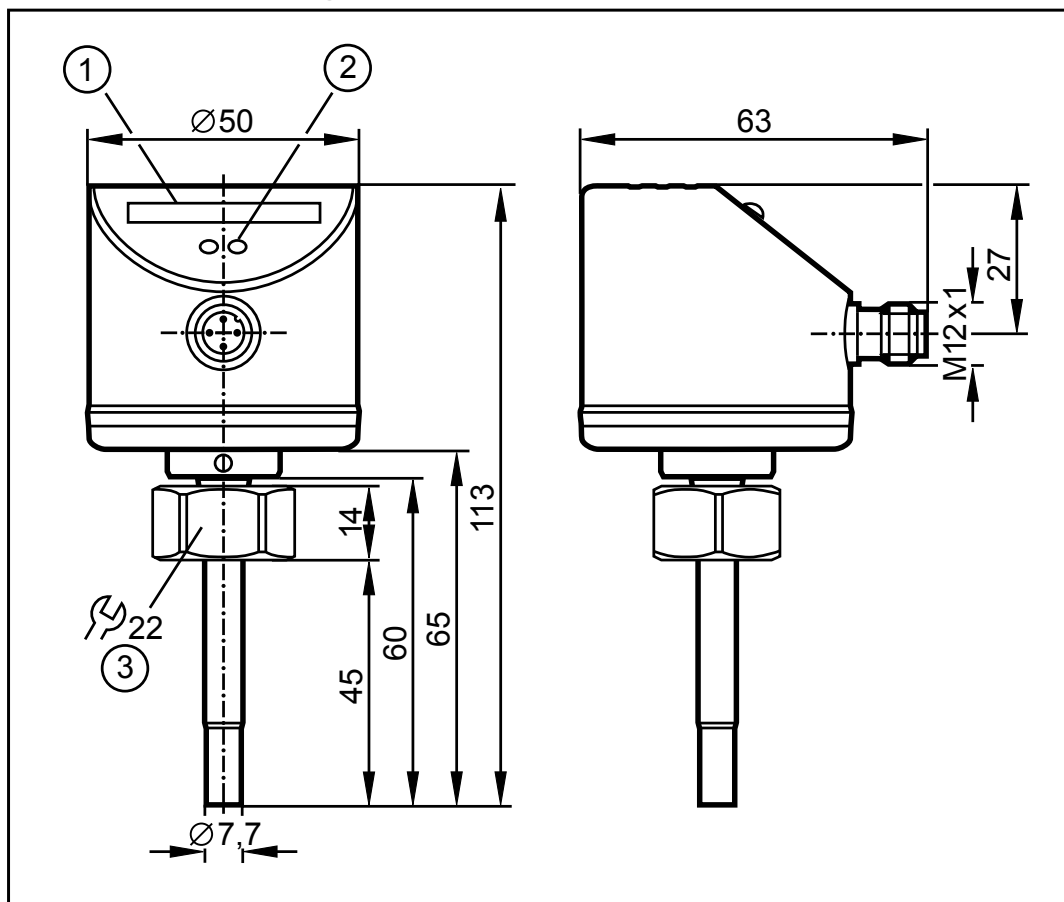
UK

10 Maintenance

Recommended maintenance:

- Check the sensor tip for build-up from time to time.
- Clean it using a soft cloth. Stubborn build-up (e.g. lime) can be removed using a common vinegar cleaning agent.

11 Scale drawing



- 1: LED bar display
 2: set button
 3: tightening torque 25 Nm

12 Technical data

Application area.....	Liquids and gases
Operating voltage [V].....	19 ... 36 DC ¹⁾
Current rating [mA]	250
Short-circuit protection, pulsed; reverse polarity / overload protection	
Voltage drop [V]	< 2.5
Current consumption [mA]	< 60
Power-on delay time [s].....	10, optically indicated

Liquids	
Medium temperature [°C]	-25 ... +80
Setting range [cm/s].....	3 ... 300
Greatest sensitivity [cm/s]	3...100
Temperature gradient [K/min]	300
Gases	
Medium temperature [°C]	-25 ... +80
Setting range [cm/s].....	200 ... 3000
Greatest sensitivity [cm/s].....	200 ... 800
Switch point accuracy [cm/s]	± 2...± 10 ²⁾
Hysteresis [cm/s]	2...5 ²⁾
Repeatability [cm/s]	1...5 ²⁾
Temperature drift [cm/s x 1/K].....	0.1 ³⁾
Response time [s].....	1 ... 10
Pressure resistance [bar].....	30
Operating temperature [°C]	-25 ... +80
Protection rating	IP 67
Protection class	III
Shock resistance [g]	50 (DIN / IEC 68-2-27, 11 ms)
Vibration resistance [g]	20 (DIN / IEC 68-2-6, 55-2000 Hz)
Housing materials.....	stainless steel 316L / 1.4404; stainless steel 304 / 1.4301; PC (Makrolon); PBT-GF 20; EPDM/X (Santoprene)
Materials (wetted parts).....	stainless steel 316L / 1.4404; O-ring: FPM 8x1.5 gr 80° Shore A
EMC	
EN 61000-4-2 ESD:	4 kV CD / 8 kV AD
EN 61000-4-3 HF radiated:	10 V/m
EN 61000-4-4 Burst:	2 kV
EN 61000-4-6 HF conducted:	10 V

UK

¹⁾ to EN50178, SELV, PELV;

²⁾ for water; 5...100 cm/s; 25°C (factory setting)

³⁾ for water; 5...100 cm/s; 10...70°C

The sensor conforms to the standard EN 61000-6-2

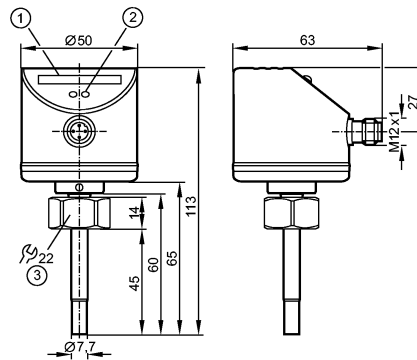
More information at www.ifm.com

efector300**SI5000**

SID10ABBFPG/US-100



Flow sensors



- 1: LED display
2: setting pushbutton
3: tightening torque 25 Nm

**Product characteristics**

Flow monitor

Compact type for adapter

Process connection: internal thread M18 x 1.5 for adapter

Probe length: 45 mm

Setting range: 3...300 cm/s (liquids)

Application

Application liquids and gases

Pressure rating [bar] 30

Medium temperature [°C] -25...80

Electrical data

Electrical design DC PNP

Operating voltage [V] 19...36 DC

Current consumption [mA] < 60

Protection class III

Reverse polarity protection yes

Outputs

Output function normally open / closed programmable

Current rating [mA] 250

Voltage drop [V] < 2.5

Short-circuit protection pulsed

Overload protection yes

Measuring / setting range

Liquids

Setting range [cm/s] 3...300

Greatest sensitivity [cm/s] 3...100

Gases

Setting range [cm/s] 200...3000

Greatest sensitivity [cm/s] 200...800

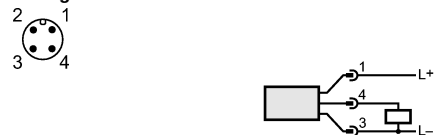
efector300

SI5000

SID10ABBFPGK/US-100



Flow sensors

Accuracy / deviations		
Switch point accuracy	[cm/s]	± 2...± 10 *)
Hysteresis	[cm/s]	2...5 *)
Repeatability	[cm/s]	1...5 *)
Temperature drift	[cm/s x 1/K]	0.1 **)
Max. temperature gradient of medium	[K/min]	300
Reaction times		
Power-on delay time	[s]	10
Response time	[s]	1...10
Software / programming		
Adjustment of the switch point		pushbuttons
Environment		
Ambient temperature	[°C]	-25...80
Storage temperature	[°C]	-25...100
Protection		IP 67
Tests / approvals		
EMC	EN 61000-4-2 ESD: EN 61000-4-3 HF radiated: EN 61000-4-4 Burst: EN 61000-4-6 HF conducted:	4 kV CD / 8 kV AD 10 V/m 2 kV 10 V
Shock resistance	DIN IEC 68-2-27:	50 g (11 ms)
Vibration resistance	DIN EN 60068-2-6	20 g (55...2000 Hz)
MTTF	[Years]	298
Mechanical data		
Process connection		internal thread M18 x 1.5 for adapter
Materials (wetted parts)		stainless steel 316L / 1.4404; O-ring: FKM 8 x 1.5 gr 80° Shore A
Housing materials		stainless steel 316L / 1.4404; stainless steel / 301 / 1.4310; PC (polycarbonate); PBT-GF 20; EPDM/X
Probe length L	[mm]	45
Weight	[kg]	0.235
Displays / operating elements		
Function display	LED	10 LEDs, three-colour
Electrical connection		
Connection		M12 connector
Wiring 		
Remarks		
Remarks		*) for water; 5...100 cm/s; 25°C (factory setting) **) for water; 5...100 cm/s; 10...70°C
Pack quantity	[piece]	1

23100591/ES – 05/2019

efector300**SI5000**

SID10ABBFPKG/US-100

**Flow sensors**

ifm electronic gmbh • Friedrichstraße 1 • 45128 Essen — We reserve the right to make technical alterations without prior notice. — GB — SI5000 — 09.07.2013

PT5403

Seite 1 von 3

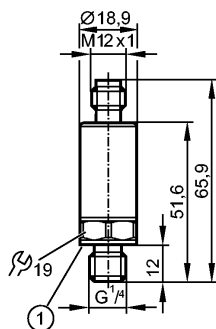
efectorson



PT5403

PT-025-SEG14-A-ZVG/US/ /W

Pressure sensors



1: Process connection sealing FKM / DIN 3869



Product characteristics	
Electronic pressure sensor	
for industrial applications	
Process connection: G 1/4 A (according to DIN EN ISO 1179-2)	
Analog output	
Measuring range: 0...25 bar	
Application	
Application	Type of pressure: relative pressure Group 2 fluids according to the Pressure Equipment Directive (PED), group 1 fluids on request
Pressure rating [bar]	65 (static)
Bursting pressure min. [bar]	600
Vacuum resistance [mbar]	-1000
Medium temperature [°C]	-40...90
Electrical data	
Electrical design	DC
Operating voltage [V]	8.5...36 DC
Insulation resistance [MΩ]	> 100 (500 V DC)
Protection class	III
Reverse polarity protection	yes
Outputs	
Output	Analog output
Output function	4...20 mA analog
Short-circuit proof	yes
Overload protection	yes
Analog output	4...20 mA
Max. load [Ω]	(Ub - 8.5 V) / 21.5 mA; 720 at Ub = 24 V
Measuring / setting range	
Measuring range [bar]	0...25
Accuracy / deviations	

file:///D:/NotesData/VSTemp/PT5403.hta

17.11.2016

23100591/ES - 05/2019

PT5403

Seite 2 von 3

**Accuracy / deviations
(in % of the span)**

Characteristics deviation *)	< ± 0.5
Linearity	< ± 0.1 (BFSL) / < ± 0.2 (LS)
Hysteresis	< ± 0.2
Repeatability **)	< ± 0.05
Long-term stability ***)	< ± 0.1

Temperature coefficients (TEMPCO) in the temperature range -40...90° C (in % of the span per 10 K)

Greatest TEMPCO of the zero point + span	< 0.1 (-25...90 °C) / < 0.2 (-40...-25 °C)
--	--

Reaction times

Step response time analogue output [ms]	1
---	---

Environment

Ambient temperature [°C]	-40...90
Storage temperature [°C]	-40...100
Protection	IP 67 / IP 69K

Tests / approvals

Pressure equipment directive	sound engineering practice	
EMC	DIN EN 61000-6-2	
	DIN EN 61000-6-3	
Shock resistance	DIN EN 60068-2-27	50 g (11 ms)
Vibration resistance	DIN EN 60068-2-6	20 g (10...2000 Hz)
MTTF [Years]	686	

Mechanical data

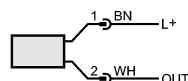
Process connection	G ¼ A (according to DIN EN ISO 1179-2)	
Process connection sealing	FKM (to DIN 3869)	
Materials (wetted parts)	1.4542 (17-4 PH / 630) ²	
Housing materials	1.4542 (17-4 PH / 630) ² ; stainless steel (316L / 1.4404); PEI	
Min. pressure cycles	60 millions in the course of the lifetime (at 1.2 times the nominal pressure)	
Tightening torque [Nm]	25...35 (recommended tightening torque ¹)	
Restrictor element integrated	no	
Weight [kg]	0.056	

Electrical connection

Connection	M12 connector
------------	---------------

Wiring

Core colors
BN brown
WH white



OUT: 4...20 mA

The following pin connection is available on request:

pin 1: L+, pin 3: OUT

Colours to DIN EN 60947-5-2

Remarks

Remarks	*) incl. drift when overtightened, zero point and span error, non-linearity, hysteresis **) with temperature fluctuations < 10 K ***) in% of the span / 6 months
---------	--

file:///D:/NotesData/VSTemp/PT5403.hta

17.11.2016

23100591/ES – 05/2019

		¹⁾ Depends on lubrication, seal and pressure rating ²⁾ Characteristics similar to stainless steel (e.g. 304/1.4301) but higher strength. BFSL = Best Fit Straight Line / LS = Limit Value Setting
Pack quantity	[piece]	1
ifm efector, inc. • 1100 Atwater Drive • Malvern • PA 19355 — We reserve the right to make technical alterations without prior notice. — US — PT5403-01 — 07.09.2015		

MAHLE

Driven by performance

Low Pressure Filter Pi 200

Nominal pressure 32/63 bar (460/910 psi), nominal size up to 600

1. Features

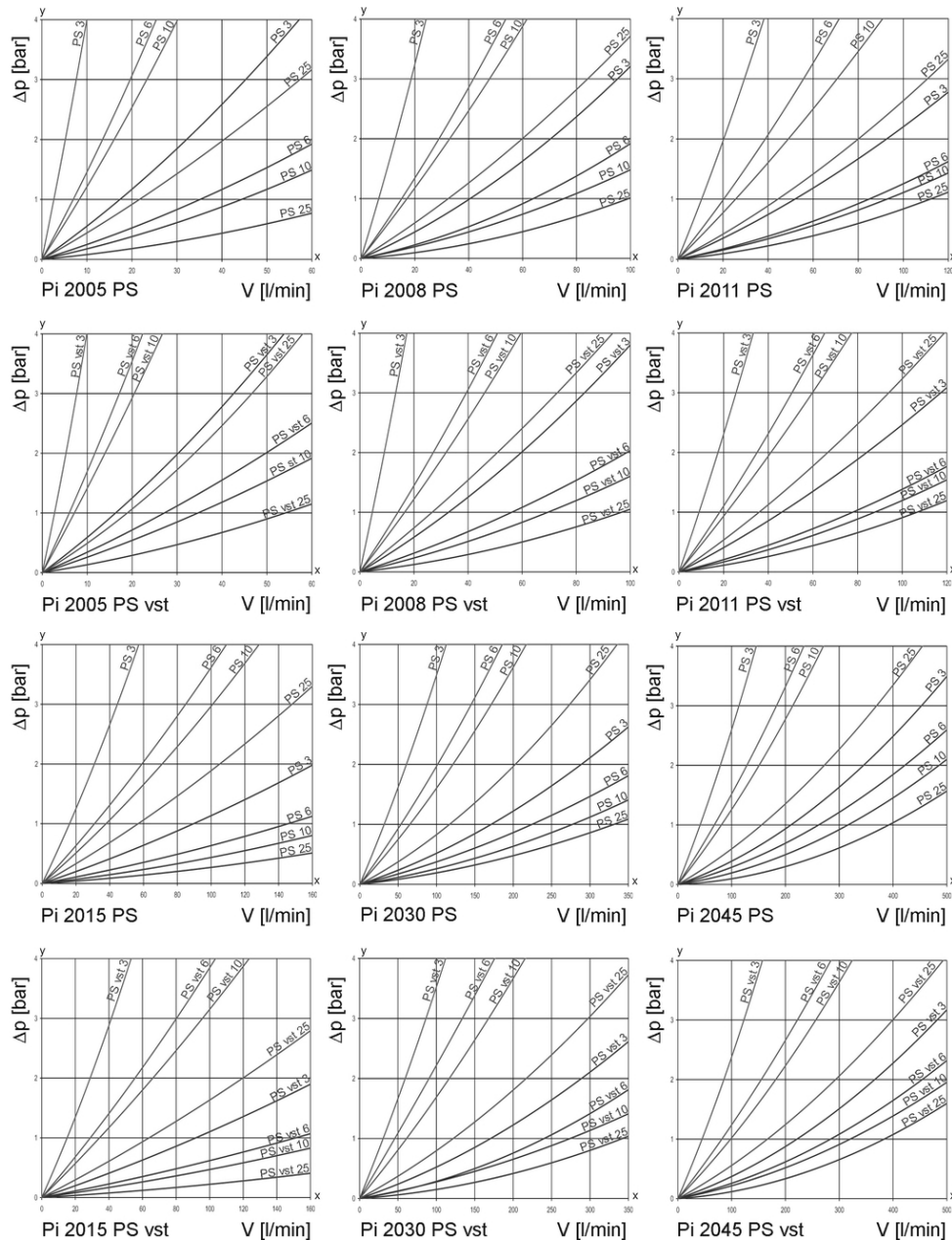
High performance filters for modern hydraulic systems

- Provided for pipe installation
- Modular system
- Compact design
- Minimal pressure drop through optimal flow design
- Visual/electrical/electronic maintenance indicator
- Threaded connections
- Quality filters, easy to service
- Equipped with highly efficient glass fibre PS filter elements
- Beta rated elements according to ISO 16889 multipass test
- Elements with high differential pressure stability and dirt holding capacity
- Other connections on request
- Worldwide distribution



2. Flow rate/pressure drop curve (filter housing incl. element)

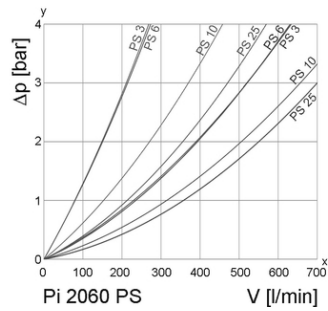
190 mm²/s
33 mm²/s



Low Pressure Filter Pi 200 up to NG 600

2

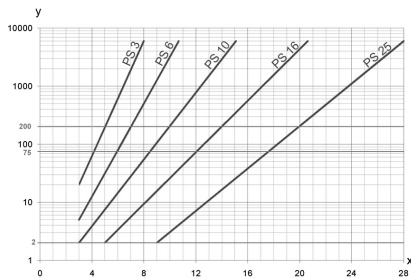
23100591/ES – 05/2019



y = differential pressure Δp [bar]
x = flow rate V [l/min]

Calculation of individual filter under www.industrialfiltration-catalogue.mahle.com

3. Separation grade characteristics



y = beta-value
x = particle size μm

determined by multipass tests (ISO 16889)
calibration according to (NIST)

4. Filter performance data

tested according to ISO 16889 (multipass test)

PS elements with			PS vst elements with		
max. Δp 20 bar			max. Δp 210 bar		
PS	3	$\beta_{5(C)} \geq 200$	PS vst	3	$\beta_{5(C)} \geq 200$
PS	6	$\beta_{7(C)} \geq 200$	PS vst	6	$\beta_{7(C)} \geq 200$
PS	10	$\beta_{10(C)} \geq 200$	PS vst	10	$\beta_{10(C)} \geq 200$
PS	25	$\beta_{20(C)} \geq 200$	PS vst	25	$\beta_{20(C)} \geq 200$

values guaranteed up to
10 bar differential pressure

values guaranteed up to
20 bar differential pressure

5. Quality assurance

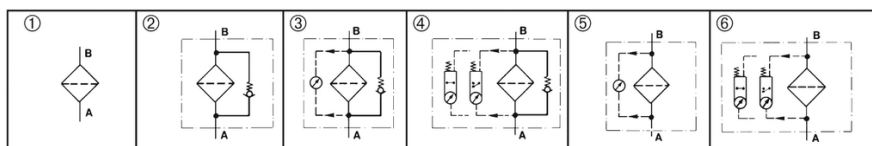
MAHLE filters and filter elements are produced according to the following international standards:

Norm	Designation
DIN ISO 2941	Hydraulic fluid power filter elements; verification of collapse/burst resistance
DIN ISO 2942	Hydraulic fluid power filter elements; verification of fabrication integrity
DIN ISO 2943	Hydraulic fluid power filter elements; verification of material compatibility with fluids
DIN ISO 3723	Hydraulic fluid power filter elements; method for end load test
DIN ISO 3724	Hydraulic fluid power filter elements; verification of flow fatigue characteristics
ISO 3968	Hydraulic fluid power-filters-evaluation of pressure drop versus flow characteristics
ISO 10771.1	Fatigue pressure testing of metal containing envelopes in hydraulic fluid applications
ISO 16889	Hydraulic fluid power filters-multipass method for evaluation filtration performance of a filter element

Low Pressure Filter Pi 200 up to NG 600

3

6. Symbols



7. Order numbers

Example for ordering filters:

1. Filter housing	2. Filter element
V = 80 l/min and visual/electrical maintenance indicator Type: Pi 2008-069 Order number: 77665284	PS vst 3 Type: Pi 2208 PS vst 3 Order number: 77680200

7.1 Housing design

Nominal size NG [l/min]	Order number	Type	① no options	② with bypass valve	③ with bypass valve and visual indicator	④ with bypass valve and electrical indicator	⑤ with visual indicator	⑥ with electrical indicator
50	77665144	Pi 2005-060						
	77665110	Pi 2005-056						
	77665128	Pi 2005-057						
	77665136	Pi 2005-058						
	77665169	Pi 2005-068						
	77665177	Pi 2005-069						
80	77665235	Pi 2008-060						
	77665201	Pi 2008-056						
	77665219	Pi 2008-057						
	77665227	Pi 2008-058						
	77665276	Pi 2008-068						
	77665284	Pi 2008-069						
110	78205114	Pi 2011-060						
	78205122	Pi 2011-056						
	78205130	Pi 2011-057						
	78205148	Pi 2011-058						
	78205155	Pi 2011-068						
	78205163	Pi 2011-069						
150	77840580	Pi 2015-060						
	76165203	Pi 2015-056						
	76165211	Pi 2015-057						
	79320748	Pi 2015-058						
	76165229	Pi 2015-068						
	78396616	Pi 2015-069						
300	77665474	Pi 2030-060						
	77665441	Pi 2030-056						
	77665458	Pi 2030-057						
	77665466	Pi 2030-058						
	77665516	Pi 2030-068						
	77665532	Pi 2030-069						

Low Pressure Filter Pi 200 up to NG 600

4

23100591/ES – 05/2019

7.1 Housing design								
Nominal size NG [l/min]	Order number	Type	① no options	② with bypass valve	③ with bypass valve and visual indicator	④ with bypass valve and electrical indicator	⑤ with visual indicator	⑥ with electrical indicator
450	77664881	Pi 2045-060						
	77664873	Pi 2045-056						
	77664865	Pi 2045-057						
	77664857	Pi 2045-058						
	77664923	Pi 2045-068						
	77664931	Pi 2045-069						
600	70576046	Pi 2060-060						
	70576045	Pi 2060-056						
	70534876	Pi 2060-057						
	79714171	Pi 2060-058						
	78205254	Pi 2060-068						
	70576047	Pi 2060-069						

When filter with non bypass configuration is selected, the collapse pressure of the element must not be exceeded.

7.2 Filter elements (a wider range of element types is available on request)					
Nominal size NG [l/min]	Order number	Type	Filter material	max. Δp [bar]	Filter surface [cm²]
50	77680135	Pi 2105 PS 3	PS 3	20	590
	77943509	Pi 5105 PS 6	PS 6		590
	77680325	Pi 3105 PS 10	PS 10		590
	77680440	Pi 4105 PS 25	PS 25		590
	77680192	Pi 2205 PS vst 3	PS vst 3	210	425
	77943533	Pi 5205 PS vst 6	PS vst 6		425
	77680382	Pi 3205 PS vst 10	PS vst 10		425
	77680507	Pi 4205 PS vst 25	PS vst 25		425
80	77680143	Pi 2108 PS 3	PS 3	20	1150
	77943517	Pi 5108 PS 6	PS 6		1150
	77680341	Pi 3108 PS 10	PS 10		1150
	77680457	Pi 4108 PS 25	PS 25		1150
	77680200	Pi 2208 PS vst 3	PS vst 3	210	850
	77943541	Pi 5208 PS vst 6	PS vst 6		850
	77681190	Pi 3208 PS vst 10	PS vst 10		850
	77680515	Pi 4208 PS vst 25	PS vst 25		850
110	77680150	Pi 2111 PS 3	PS 3	20	1700
	77943525	Pi 5111 PS 6	PS 6		1700
	77680333	Pi 3111 PS 10	PS 10		1700
	77680465	Pi 4111 PS 25	PS 25		1700
	77680218	Pi 2211 PS vst 3	PS vst 3	210	1275
	77943558	Pi 5211 PS vst 6	PS vst 6		1275
	77680390	Pi 3211 PS vst 10	PS vst 10		1275
	77680523	Pi 4211 PS vst 25	PS vst 25		1275
150	77680168	Pi 2115 PS 3	PS 3	20	2425
	77955099	Pi 5115 PS 6	PS 6		2425
	77680358	Pi 3115 PS 10	PS 10		2425
	77680473	Pi 4115 PS 25	PS 25		2425

Low Pressure Filter Pi 200 up to NG 600

5

7.2 Filter elements (a wider range of element types is available on request)					
Nominal size NG [l/min]	Order number	Type	Filter material	max. Δp [bar]	Filter surface [cm²]
150	77680226	Pi 2215 PS vst 3	PS vst 3	210	2010
	77955123	Pi 5215 PS vst 6	PS vst 6		2010
	77680408	Pi 3215 PS vst 10	PS vst 10		2010
	77680531	Pi 4215 PS vst 25	PS vst 25		2010
300	77680176	Pi 2130 PS 3	PS 3	20	4620
	77955107	Pi 5130 PS 6	PS 6		4620
	77680366	Pi 3130 PS 10	PS 10		4620
	77680481	Pi 4130 PS 25	PS 25		4620
	77680234	Pi 2230 PS vst 3	PS vst 3	210	3800
	77955131	Pi 5230 PS vst 6	PS vst 6		3800
	77680416	Pi 3230 PS vst 10	PS vst 10		3800
	77680549	Pi 4230 PS vst 25	PS vst 25		3800
450	77680184	Pi 2145 PS 3	PS 3	20	6865
	77955115	Pi 5145 PS 6	PS 6		6865
	77680374	Pi 3145 PS 10	PS 10		6865
	77680499	Pi 4145 PS 25	PS 25		6865
	77680242	Pi 2245 PS vst 3	PS vst 3	210	5600
	77955149	Pi 5245 PS vst 6	PS vst 6		5600
	77680424	Pi 3245 PS vst 10	PS vst 10		5600
	77680556	Pi 4245 PS vst 25	PS vst 25		5600
600	70346506	Pi 2160 PS 3	PS 3	20	9398
	76114318	Pi 5160 PS 6	PS 6		9398
	79393380	Pi 3160 PS 10	PS 10		9398
	79748047	Pi 4160 PS 25	PS 25		9398

8. Technical specifications

Design: in-line filter

Nominal pressure:

Pi 2005 - 2011 10⁷ load changes 63 bar (900 psi)

Pi 2015 - 2060 10⁷ load changes 25 bar (360 psi)

2x 10⁶ load changes 32 bar (460 psi)

Test pressure:

Pi 2005 - 2011 95 bar (1370 psi)

Pi 2015 - 2060 48 bar (690 psi)

Temperature range: -30 °C to +120 °C

survival temperature -40 °C (other temperature ranges on request)

Bypass setting: Δ p 3.5 bar ± 10 %

Filter head material: GDAL

Filter housing material: AL/St

Sealing material: NBR/AL

Maintenance indicator setting: Δ p 2.2 bar ± 10 %

Electrical data of maintenance indicator:

Max. voltage: 250 V AC/200 V DC

Max. current: 1 A

Max. current: 70 W

Type of protection: IP 65 in inserted and secured status

Contact: normally open/closed

Cable sleeve: M20x1.5

The switching function can be changed by turning the electric upper part by 180° (normally closed contact or normally open contact). The state on delivery is a normally closed contact. By inductivity in the direct current circuit the use of suitable protection circuit should be considered. Further maintenance indicator details and designs are available in the maintenance indicator data sheet.

We draw attention to the fact that all values indicated are average values and do not always occur in specific cases of application. Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer you advice.

We recommend you to contact us concerning applications of our filters in areas governed by the EU Directive 94/9 EC (ATEX 95). The standard version can be used for liquids based on mineral oil (corresponding to the fluids in Group 2 of Directive 97/23 EC Article 9). If you consider to use other fluids please contact us for additional support.

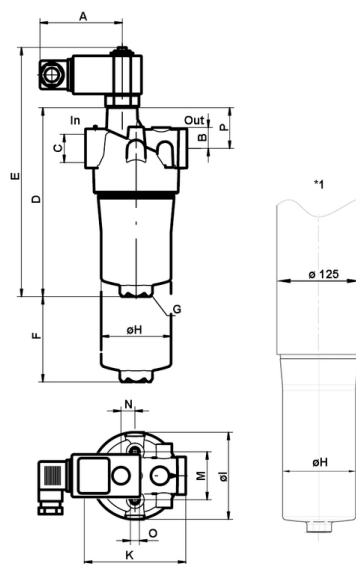
Subject to technical alteration without prior notice.

Low Pressure Filter Pi 200 up to NG 600

6

23100591/ES - 05/2019

9. Dimensions



In Inlet

Out Outlet

*1 Housing design for NG 600

All dimensions except "C" in mm.

Type	A	B	C*	D	E	F	G SW	H	I	K	M	N	O	P	Weight [kg]
Pi 2005	78	19	G½	186	240	80	27	66	80	95	45	13.0	M8x10	37.5	0.9
Pi 2008	78	19	G¾	243	300	80	27	66	80	95	45	13.0	M8x10	37.5	1.0
Pi 2011	78	19	G¾	333	393	80	27	66	80	95	45	13.0	M8x10	37.5	1.1
Pi 2015	78	30	G1¼	268	326	110	32	109	128	150	60	24.5	M12x15	43.5	2.3
Pi 2030	78	30	G1¼	363	421	110	32	109	128	150	60	24.5	M12x15	43.5	2.5
Pi 2045	78	30	G1¼	509	566	110	32	109	128	150	60	24.5	M12x15	43.5	7.4
Pi 2060	78	30	G1¼	615	672	110	32	109	128	150	60	24.5	M12x15	43.5	5.5

* NPT and SAE connections on request

Low Pressure Filter Pi 200 up to NG 600

7

10. Installation, operating and maintenance instructions

10.1 Filter installation

When installing the filter make sure that sufficient space is available to remove filter element and filter housing.

Preferably the filter should be installed with the filter housing pointing downwards.

The maintenance indicator must be visible.

10.2 Connecting the electrical maintenance indicator

The electrical indicator is connected via a 2-pole appliance plug according to DIN EN 175301-803 with poles marked 1 and 2. The electrical section can be inverted to change from normally open position to normally closed position or vice versa.

The state on delivery is a normally closed contact

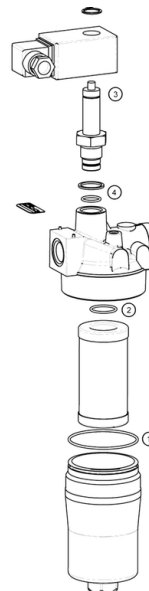
10.3 When should the filter element be replaced?

- Filters equipped with visual and electrical maintenance indicator:
During cold starts, the indicator may give a warning signal. Press the red button of the visual indicator once again only after operating temperature has been reached. If the red button immediately pops up again and/or the electrical signal has not switched off after reaching operating temperature, the filter element must be replaced after the end of the shift.
- Filters without maintenance indicator:
The filter element should be replaced after the trial run or flushing of the system. Afterwards follow instructions of the manufacturer.
- Please always ensure that you have original MAHLE spare elements in stock: Disposable elements cannot be cleaned.

10.4 Element replacement

- Stop system and relieve filter from pressure.
- Unscrew the filter housing by turning counter-clockwise. Clean the housing using a suitable cleaning solvent.
- Remove element by pulling down carefully.
- Check O-ring on the filter housing for damage. Replace, if necessary.
- Make sure that the order number on the spare element corresponds to the order number of the filter name-plate.
To ensure no contamination occurs during the exchange of the element first open the plastic bag and push the element over the spigot in the filter head. Now remove plastic bag.
- Lightly lubricate the threads of the filter housing a little bit and screw into the filter head. Maximum tightening torque for NG 50 to 110 = 60 Nm, for NG 150 to 600 = 100 Nm.

MAHLE Industriefiltration GmbH
Schleifbachweg 45
D-74613 Öhringen
Phone +49 7941 67-0
Fax +49 7941 67-23429
industriefiltration@mahle.com
www.mahle.com
78356446.04/2015



11. Spare parts list

Order numbers of spare parts		
Position	Type	Order number
① - ②	Seal kit for filter	
	Pi 2005 - Pi 2011	
	NBR	77550213
	FPM	77845795
	EPDM	77845803
	Pi 2015 - Pi 2060	
	NBR	77550221
③	FPM	77845811
	EPDM	77845829
	Maintenance indicator	
	Visual PiS 3098/2,2	77669971
④	Electrical PiS 3097/2,2	77669948
	Electrical upper section only	77536550
	Seal kit for maintenance indicator	
	NBR	77760309
	FPM	77760317
	EPDM	77760325

Low Pressure Filter Pi 200 up to NG 600

8

MAHLE*Industrial Filtration***Filtro Duplex
Pi 210**

Presión nominal 25/63 bar, hasta tamaño nominal 450

Instrucciones de montaje, servicio y mantenimiento



23100591/ES – 05/2019

1. Instrucciones de montaje, servicio y mantenimiento

1.1 Montaje del filtro

Montaje del filtro como esta enseñado la dirección de circulación. Para la sujeción se encuentran agujeros de rosca en la cabeza del filtro. Asegúrese de que el montaje se efectúa dejando el suficiente espacio para que se pueda sacar el elemento filtrante y el vaso del filtro. Es preferible montar el filtro con el vaso del filtro hacia abajo. El indicador de mantenimiento tiene que estar a la vista.

1.2 Conexión del indicador de mantenimiento eléctrico

La conexión del indicador eléctrico se efectúa a través de un conector de dos polos según DIN EN 175301-803-650, los polos están indicados con 1 y 2. La pieza de conmutación se aplica según se desea como "abrir" o "cerrar".

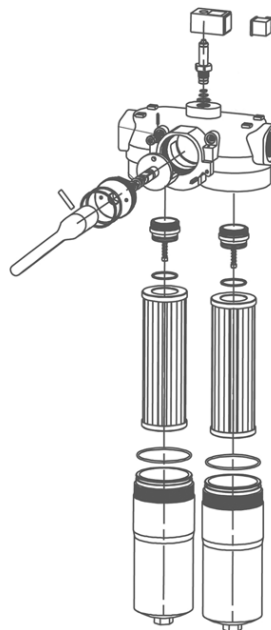
1.3 Cuando debe cambiarse el elemento filtrante?

1. Filtros con indicador visual o eléctrico:
En el momento del arranque en frío puede ocurrir que el indicador produzca una señal eléctrica. Cuando la temperatura de servicio haya sido alcanzada, pulsar de nuevo el botón rojo. Si sobresale inmediatamente o si la señal eléctrica no deja de dar señal. Cuando la temperatura de trabajo ha sido alcanzada, proceda al cambio del elemento filtrante al final de la jornada de trabajo.
2. Tengan siempre en su almacén elementos originales de repuesto MAHLE. Los elementos de un sólo uso (Sm-x) no se pueden limpiar.

1.4 Cambio de los elementos

Atención: El indicador de mantenimiento controla la parte del filtro que esta en función. La palanca de cambio señala a la parte del filtro que no esta en función. Antes de empezar el mantenimiento se debe de conmutar el filtro. La señal del indicador se apaga y se puede pulsar de nuevo el botón rojo.

1. Accionar y mantener en posición la palanca de compensación de presión que se encuentra en la palanca de cambio. Mover la palanca y enclavar el dispositivo de la fijación en el lado limpio del filtro. Dejar una bandeja debajo para recoger las gotas de aceite.
2. Aflojar el tornillo de purga del lado que no funciona girando un máximo de dos o tres vueltas hacia fuera, contra el tope de seguridad.
3. Desenroscar el vaso del filtro y limpiarlo con un fluido adecuado.
4. Sacar el elemento filtrante moviéndolo lateralmente y hacia abajo.
5. Examinar las juntas, aros de apoyo etc. Si están dañados, cambiar las piezas defectuosas.
6. Comparar el número en el elemento de repuesto con el número en la etiqueta para asegurarse que se usa el material correcto. Abrir las bolsas de plástico y montar el elemento sobre la pieza de recepción. Sacar la bolsa de plástico totalmente.
7. Terminar el montaje roscando el vaso del filtro hasta el tope. Entonces retroceder desenroscando el vaso entre una 1/8 hasta 1/2 vuelta.
8. Para llenar de nuevo la cámara del filtro actuar la palanca de compensación de presión hasta que el fluido salga sin burbujas por el agujero de purga. Apretar el tornillo de purga. Mover la palanca de compensación de presión otra vez para comprobar que el filtro cierra herméticamente.



2. Lista de piezas de recambio

Número de pedido para piezas de recambio		
Pos.	Tipo	Número de pedido
① - ⑦	Juego de juntas para carcasa	
	Pi 2105 - Pi 2111	
	NBR	79761271
	FPM	79761289
	EPDM	79761297
	Pi 2115 - Pi 2145	
⑧ - ⑩	NBR	79761230
	FPM	79761248
	EPDM	79761255
	Juego de juntas para indicador de mantenimiento	
⑪	NBR	77760309
	FPM	77760317
	EPDM	77760325
	Indicadores de mantenimiento	
⑫	Visual PiS 3098/2.2	77669971
	Eléctrico PiS 3097/2.2	77669948
	Sólo parte eléctrica	77536550

MAHLE Filtersysteme GmbH
Industriefiltration
Schleifbachweg 45
D-74613 Öhringen
Phone +49 (0) 7941/67-0
Fax +49 (0) 7941/67-23429
industriefiltration@mahle.com
www.mahle-industriefiltration.com
04/2010

Filtro Duplex Pi 210 NG 450

2

23100591/ES – 05/2019

MAHLE

Industrial Filtration

Contamination Indicator

1. Features

Filter elements are economically used only if their dirt holding capacity is fully exploited. This is achieved by using filter housings with a contamination indicator.

MAHLE manufactures contamination indicators of the following designs:

- Differential pressure indicators
- Pressure indicators/Pressure switches
- Vacuum switches/manometers

With any filter element the collection of dirt particles continuously reduces the number of open pores or, in other words: The open cross section for allowing the liquid to flow continuously reduced. Thus the pressure on the upstream side of the element (dirt side) increases continuously.

With pressure filters, the pressure is measured upstream and downstream of the filter element (differential pressure). With return line filters the pressure is measured only on the upstream side because, depending on the tank design, atmospheric pressure exits on the downstream side of the filter element is measured analog.

A piston with attached magnet is moved against the force of a spring, with which the indicating point is determined by the piston surface.

A homopolar poled magnet is fitted in the outer part in the indicating button.

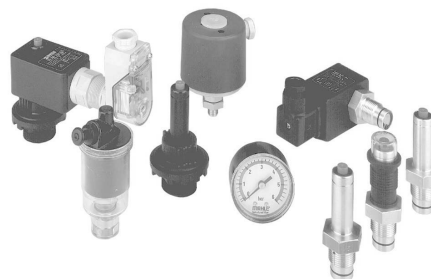
The closer the pole-springs move towards each other, the stronger is the force with the magnet mutually repel, until finally the red button on the indicator pops out.

This red button remains visible until it is pushed in during daily check which is to be performed while the plant is at operating temperature. If the red button pops out immediately after being pushed in, the filter element must be replaced after the end of the shift.

This optical function may also be used for generating contactless electrical signals. For this purpose an electrical upper part incorporates all electrical switching elements.

- Optical and electrical indicator with standard check function
- Normally open/normally closed combination - standard feature
- Electrical function, easy to install at a later time
- Two-step indication, at 75 % and 100 % optional
- Signal lock out up to approx. 30 °C optional
- Pressure resistance, up to 10 bar (pressure/differential pressure), up to 160 bar (differential pressure), up to 450 bar (differential pressure)
- Rugged, non-bypass design
- Optimal element exploitation

Worldwide distribution



2. Differential pressure indicator

Differential pressure indicator									
Operating pressure	Temperature resistance	Type	Order number	Indicator setting [bar]	Indication	Contact type*	Fig.	Material lower section	Material upper section
10	- 10 to + 120 °C	PiS 3087	77738990	1.2	opt.	-	1	Al	PA 6
		PiS 3086	77737513		opt./electr.	1	1 + 1a		
		PiS 3104	78236994		opt./electr.	4	1 + 3a		
160	- 10 to + 120 °C	PiS 3098	77669971	2.2	opt.	-	2 + 2a	Al	PA 6
		PiS 3097	77669948		opt./electr.	1	2 + 2a		
		PiS 3116	78308074		opt./electr.	3	2 + 2a		
		PiS 3119	78309122	1.7/2.2	opt./electr.	2	2 + 2a		
		PiS 3012	78308454		opt./electr.	4	3 + 3a		
		PiS 3124	78383655		opt./electr.	5	3 + 3a		
		PiS 3098	77938582	3.5	opt.	-	2		
		PiS 3097	78236648		opt./electr.	1	2 + 2a		
		PiS 3098	77669989	5.0	opt.	-	2 + 2a		
		PiS 3097	77669955		opt./electr.	1	2 + 2a		
		PiS 3116	78308082		opt./electr.	3	2 + 2a		
		PiS 3119	78309130	3.7/5.0	opt./electr.	2	2 + 2a		
		PiS 3012	78308447		opt./electr.	4	2 + 2a		
		PiS 3124	78383663		opt./electr.	5	2 + 2a		
400	- 10 to + 120 °C	PiS 3093	77669898	2.2	opt.	-	2 + 2a	CuZn	PA 6
		PiS 3092	77669856		opt./electr.	1	3 + 3a		
		PiS 3115	78308041		opt./electr.	3	3 + 3a		
		PiS 3105	77970387	1.7/2.2	opt./electr.	2	3 + 3a		
		PiS 3102	77942139		opt./electr.	4	3 + 3a		
		PiS 3122	78383630		opt./electr.	5	3 + 3a		
		PiS 3093	77669914	5.0	opt.	-	2		
		PiS 3092	77669864		opt./electr.	1	2 + 2a		
		PiS 3115	78308058		opt./electr.	3	2 + 2a		
		PiS 3105	77970395	3.7/5.0	opt./electr.	2	2 + 2a		
		PiS 3102	77942147		opt./electr.	4	3 + 3a		
		PiS 3122	78383648		opt./electr.	5	3 + 3a		
		PiS 3093	77669880	8.0	opt.	-	2		
		PiS 3092	77669872		opt./electr.	1	2 + 2a		
		PiS 3115	78308066		opt./electr.	3	2 + 2a		
450	- 10 to + 120 °C	PiS 3193	77844061	2.2	opt.	-	2	1.4301	PA 6
		PiS 3192	78308488		opt./electr.	1	2 + 2a		
		PiS 3193	78308538	5.0	opt.	-	2		
		PiS 3192	78308546		opt./electr.	1	2 + 2a		

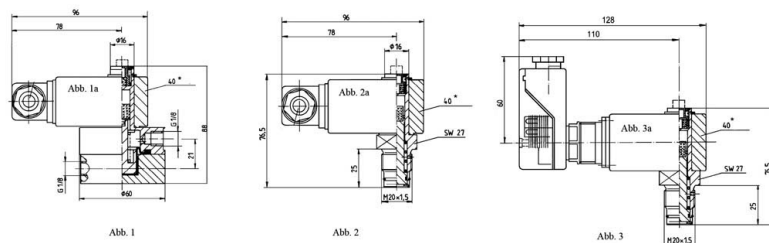
* Contact type:

- 1) Normally open/normally closed, wiring box DIN EN 175301-803, max. 250 V AC/200 V DC, max. 1 A
- 2) Normally closed, 2 setting points (75 %/100 %); wiring box DIN EN 175301-803, max. 150 V, max. 1 A
- 3) Change over contact; wiring box DIN EN 175301-803, max. 150 V, max. 1 A
- 4) Change over contact; 2 setting points; LED; Mercedes-Benz-Norm DBL 9666 EA; wiring box DIN EN 175201-804, max. 150 V, max. 1 A
- 5) Normally closed; 2 setting points, signal suppression; wiring box DIN EN 175201-804, max. 10-30 V, max. 1 A

Contamination Indicator

2

2. Differential pressure indicator



*wide

3. Pressure indicator/pressure switch

Pressure indicator/pressure switch									
Operating pressure	Temperature resistance	Type	Order number	Indicator setting [bar]	Indication	Contact type*	Fig.	Material Lower section	Material upper section
10	- 10 to + 80 °C	PiS 3084	77669781	1.2	opt.	-	4	PA 66	PA 6
		PiS 3085	77669807		opt./electr.	1	4 + 4a		
		PiS 3125	78308033		opt./electr.	3	4 + 4a		
		PiS 3106	78309155	0.9/1.2	opt./electr.	2	4 + 4a		
		PiS 3103	77942170		opt./electr.	4	4 + 3a		
		PiS 3123	78383671		opt./electr.	5	4 + 3a		
		PiS 3084	77737802	2.2	opt.	-	4		
		PiS 3085	77738032		opt./electr.	1	4 + 4a		
		PiS 3125	78308108		opt./electr.	3	4 + 4a		
		PiS 3106	78308850	1.7/2.2	opt./electr.	2	4 + 4a		
		PiS 3103	77970429		opt./electr.	4	4 + 3a		
		PiS 3123	78383689		opt./electr.	5	4 + 3a		
10	- 25 to + 85 °C	DSS/1.2	77863814	1.2	electr.	normally open	5	galvanized steel	delivered with protection cap
		DSO/1.2	77870587		electr.	normally closed	5		
		DSS/2.2	77845845	2.2	electr.	normally open	5		
		DSO/2.2	77870595		electr.	normally closed	5		
		DSS/5	77863822	5.0	electr.	normally open	5		
		DSO/5	77870603		electr.	normally closed	5		

*Contact type:

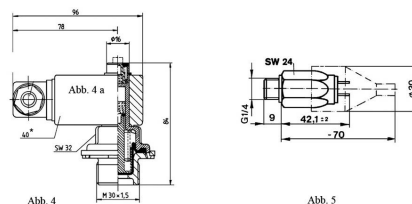
1) normally open/normally closed, wiring box DIN 43650, max. 230 V, max. 2.5 A

2) normally closed, 2 setting points (75 %/100 %); wiring box DIN 43650, max. 150 V, max. 1 A

3) change over contact; wiring box DIN 43650, max. 150 V, max. 1 A

4) change over contact; 2 setting points (75 %/100 %); 3 LED; wiring box DIN 43651. 10–30 V, max. 1 A

5) normally closed, 2 setting points (75 %/100 %), signal suppression;
wiring box DIN 43651, 10–30 V, max. 1 A

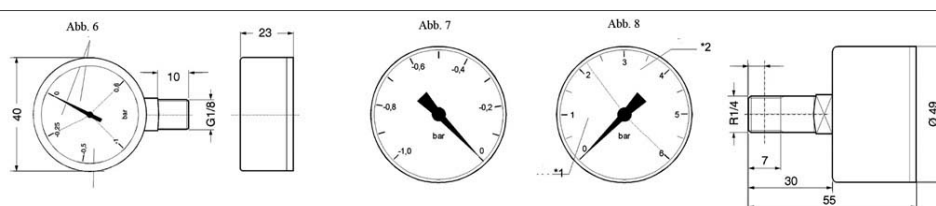


Contamination Indicator

3

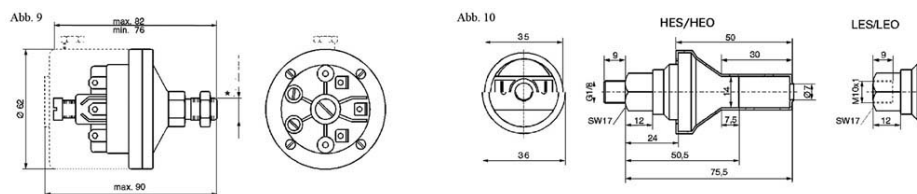
4. Vacuum meter/manometer

Vacuum meter/manometer							
Nominal size (NG) [mm]	Specification	Indicating range [bar]	Fig.	Connection size	Order-number	Class	Dial face
40	Vacuum meter	- 1 to + 1.5	6	R 1/8 (conical)	76388714	min 2.5	white
		- 1 to + 0.6		G 1/8	77545908		Red/Green area, sep. line 0.25 bar
50	Manometer	0 to - 1	7	R 1/4 (conical)	77617558		white
		0 to 6	8		78381998		Red/Green area, sep. line 0.25 bar



5. Vacuum switch

Vacuum switch									
Permissible over-pressure max.	Temperature resistance	Indicator setting	Contact type	Fig.	Connection size	Type	Order Number	Material lower section	Material upper section
0.5 bar	- 10 to + 70 °C	- 10 to - 80 mbar	single pole	9	G 1/4	PiS 3070	77669690	GD-Al	PA 6
1 bar		- 50 to - 600 mbar	double-throw cut-out switch		G 1/8		77669724	GD-Al	PA 6
0.1 bar	- 20 to + 80 °C, 120 °C	- 200 mbar ± 10	normally open	10	G 1/8 (outside)	HES 2200 BP	78308892	GD-ZnAl	Polycarbonat
		- 200 mbar ± 10	normally closed			HEO 2200 BP	78308900	GD-ZnAl	Polycarbonat
		- 50 mbar ± 4	normally open		M 10 x 1 (inside)	LES 250 I	78308918	GD-ZnAl	Polycarbonat
		- 50 mbar ± 4	normally closed			LEO 250 I	78308926	GD-ZnAl	Polycarbonat



* connection G

Types HES/HEO for hydraulic application, Types LES/LEO for air application

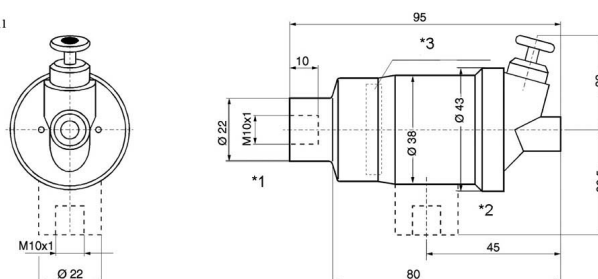
Contamination Indicator

4

6. Vacuum indicator/air filter

Vacuum indicator/air filter						
Indicator setting ± 10 %	Temperature resistance	Fig.	Execution	Type	Order-number	Indication
- 50 mbar	- 40 to + 110 °C	11	1	TB 745	78309056	optical indication - self locking -
- 65 mbar			2	TB 745/1	78309064	
				TB 746/1	78309049	

Abb. 11



*1 Execution 2

*2 Execution 1

*3 Indication: Position of display at nominal value in mbar

Standard sealing material: NBR

Sealing material types LES/LEO: Silicone rubber

7. Accessories

7.1 Seal kits			
Type	Order number NBR	Order number FPM	Order number EPDM
PiS 3092, 3093, 3102, 3105, 3115, 3122, 3192, 3193	77760275	77760283	77760291
PiS 3012, 3019, 3024, 3097, 3098, 3116	77760309	77760317	77760325
PiS 3084, 3085, 3103, 3106, 3123, 3125	78383382	78383390	78383408
PiS 3086, 3087, 3104	77760242	77760259	

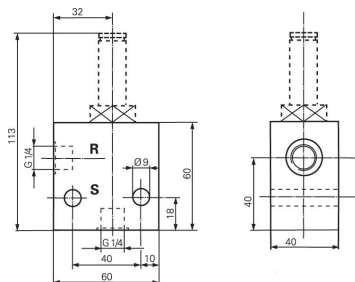
7.2 Electrical upper sections	
Specification	Order number
Electrical upper section normally open/ normally closed for PiS 3084, 3087, 3093, 3098, 3193 (Contact type 1)	7536550
Wiring box with lamp insert 12 - 230 V for electrical upper section normally open (according to DIN EN 175301-803)	8307548
Electrical upper section Change over contact for PiS 3084, 3087, 3093, 3098, 3193 (Contact type 3)	8308017
Wiring box with 2 LEDs 10 - 30 V for electrical upper section Change over contact (according to DIN EN 175301-803)	8308025
Electrical upper section normally closed with signal suppression PiS 3003	7765357

Contamination Indicator

5

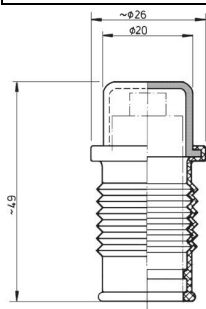
7. Accessories

7.3 Mounting block for differential pressure indicators (M 20 x 1,5)	
Specification	Order number
Mounting block (Material St)	77809098
Mounting block (Material 1.4301), 450 bar	77698517



R = clean side
S = dirt side

7.4 Protection cap	
Specification	Order number
Protection cap for all optical differential pressure and pressure indicators: Resistant to: gasoil, purifying agent, insolation, dust, salt, water, concret Temperature range: - 20 °C to + 80 °C	78285330

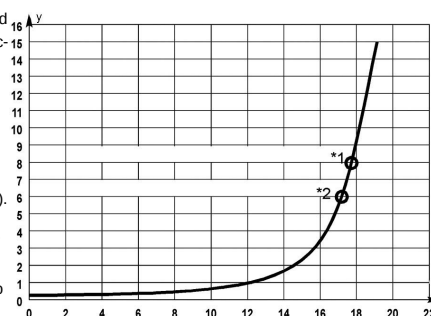


8. Function

The magnetic field as previously described, contactless operates reed contacts in the electrical upper part. The desired contact type is selected by inverting upper part. Another option keeping the electrical signal electronically suppressed up to 30 °C operating temperature is also available. This eliminates false electrical signal during the cold start phase.

For efficient servicing it is desirable to have a pre-warning device (so that the filter element can be replaced, e.g. with the next tool change). For this purpose electrical upper parts with two indicating points, i.e. at 75 % and at 100 % of the indicator setting are available. Pressure/vacuum manometers give an analog reading of the existing state of contamination of the filter elements. They require continuous control to ensure that the service time and reserve capacity are not unduly exceeded. If the contamination signal is disregarded, the filter element may collapse or, if a bypass valve is installed, part of the contamination fluid may reach the hydraulic components via the bypass valve and cause failure of the hydraulics.

Pressure/vacuum switches are provided with snap action switches, which ascertains that signal are issued only when the limit values have been fully reached.



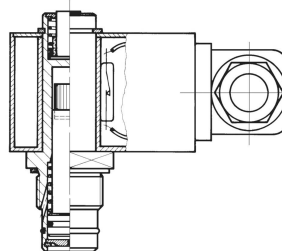
Dirt holding capacity - Δp curve

x = dirt holding capacity [g]

y = differential pressure Δp

*1 signal step contamination indicator 100 %

*2 signal step contamination indicator 75 %



Contamination Indicator

6

9. Specifications

9.1 Contact type normally open/ normally closed

250 V AC/200 V DC

Types PiS 3085, 3086, 3092, 3097,
3192

Maximum voltage:

1 A

Maximum current on contact:

70 W

Maximum contact load:

Protection type:

IP 65 when inserted
and secured

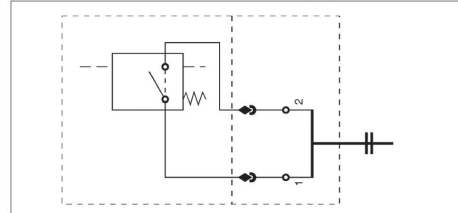
Contact type:

normally open/
normally closed

Cable connection:

M 20 x 1,5

The switching function can be changed by turning the electric upper part by 180° (normally open contact or normally closed contact). The state on delivery is a normally closed contact. The use of quenching circuits must be checked in case of inductivity in the DC current circuit. Electrical parts are isolated (plastic casing).

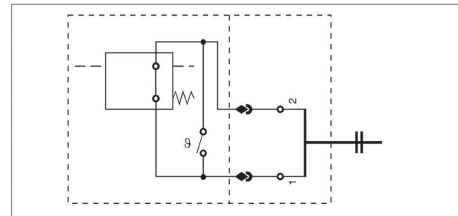


9.2 Contact type normally closed/signal lock-out

Type PiS 3003

Signal lock-out by thermorelay.

Signal is released at + 30 °C,
for further technical detail see 9.1



9.3. Contact type normally closed 2 step

Types PiS 3105, 3106, 3199

1. Indicating at 75 %

2. Indicating at 100 % of the indica-
ting pressure

Maximum voltage:

150 V AC/DC

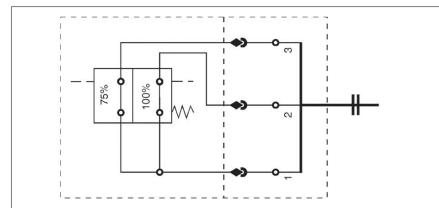
Maximum current on contact:

1 A

Maximum contact load:

20 VA/20 W

for further technical details see 9.1



9.4 Contact type normally closed 2 step/signal lock-out

Types PiS 3122, 3123, 3124

Maximum voltage:

10 - 30 V AC/DC

Maximum current on contact:

1 A

Maximum contact load:

20 W

Signal lock-out by thermorelay

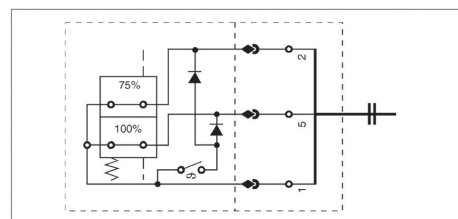
Signal is released at + 30 °C

Reset at + 20 °C

1. Indicating at 75 %

2. Indicating at 100 % of the indica-
ting pressure

for further details see 9.1



Contamination Indicator

7

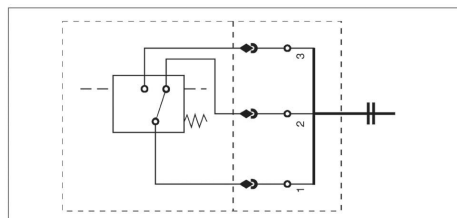
9. Technische Daten

9.5 Contact type change-over contact

Types PiS 3115, 3116, 3125

Maximum voltage:
Maximum current on contact:
Maximum contact load:
for further details see 9.1

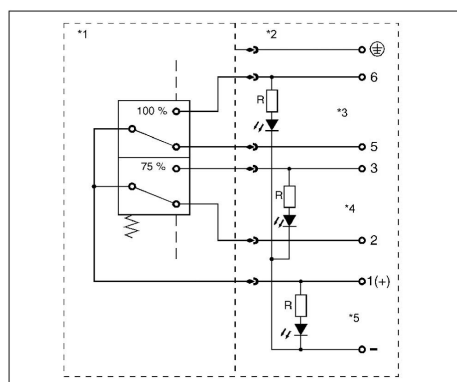
150 V AC/DC
1 A
20 VA/20 W

**9.6 Contact type change-over contact/2step LED**

Types PiS 3012, 3102, 3103

Maximum voltage:
Maximum current on contact:
Maximum contact load:
1. Indicating at 75 %
2. Indicating at 100 % of the indicating pressure
for further details see 9.1

10 - 30 V DC
1 A
20 VA/20 W

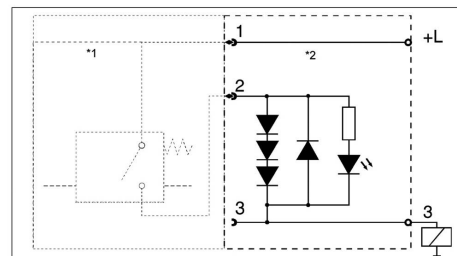


*1 switch over *2 connector
*3 indicator setting 100 % LED red
*4 indicator setting 75 % LED red
*5 stand-by indication LED green

9.7 Wiring box with lamp insert

Will be supplied instead of standard connection.
Voltage:
Not to combine with indicators with 2 setting points

12 - 230 V AC/DC

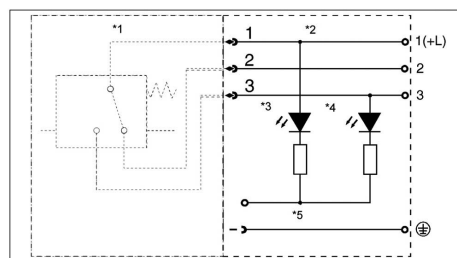


*1 switch cover
*2 connector

9.8 Wiring box with lamp insert

Will be supplied instead of standard connection plug.
Voltage:
To combine with PiS 3115, 3116, 3125

10 - 30 V DC



*1 switch cover
*2 connector
*3 green
*4 yellow
*5 screw clamp

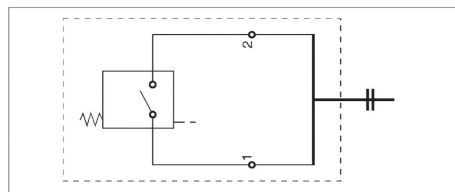
Contamination Indicator

8

9. Specifications

9.9 Vacuum switch HES/LES

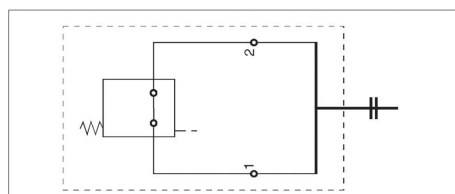
Contact type: normally open
 Contact load: HES: 42 V/6W at resistive
 Maximum contact load: load
 Type of protection: LES: 24 V/6W at resistive
 Electrical connection: load
 IP 54 - with protecting cap
 AMP 6.3 DIN 46248,
 DIN 46247



9.10 Vacuum switch HEO/LEO

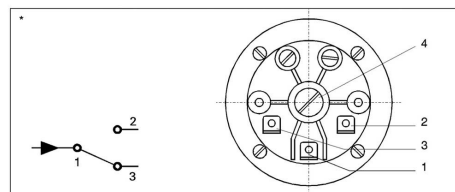
Contact type: normally closed
 Contact load: HEO: 42 V/6W at resistive
 Maximum contact load: load
 Type of protection: LEO: 24 V/6W at resistive
 Electrical connection: load

for further technical detail see 9.9



9.11 Vacuum switch PiS 3070

Maximum voltage: 230 V AC/DC
 Maximum current on contact.: 6A
 Contact type: single pole changeover switch
 Electrical connection: AMP 6,3 DIN 46248,
 DIN 46247
 individual (with adjusted set-
 ting point,
 position of installation needs
 to adviced)
 Type of protection: IP 00 - without cover
 IP 54 - with cover



* Connection scheme:

1. Supply line
2. Operating contact
3. Normally closed contact
4. Adjusting screw

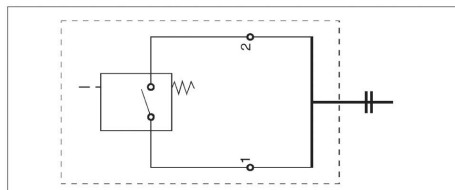
Contamination Indicator

9

9. Specification

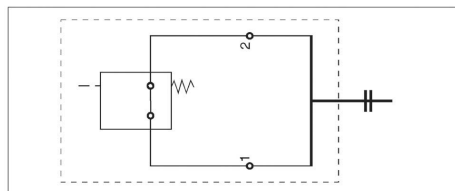
9.12 Pressure switch DSS

Contact type: normally open
 Maximum voltage: 42 V
 Maximum current on contact: 2 A
 Contact load: 100 VA
 Duty classification: 200 / min
 Type of protection: IP 65 - with protecting cap
 Electrical connections: AMP 6,3 DIN 46248
 for attachable sleeve
 according to DIN 46247,
 (switching mode bi-pole)



9.13 Pressure switch DSO

Contact type: normally closed
 for further information see 9.12



Contamination indicators PiS 3084, 3087, 3093, 3098, 3193 can be mounted in 45°.

We draw attention to the fact that all values indicated are average values which do not always occur in specific cases of application: Our products are continually being further developed. Values, dimensions and weights can change as a result of this. Our specialized department will be pleased to offer you advice.

When using our filters in areas which are to be classified according to EU directive 94/9 EG (ATEX), we recommend prior discussion with us. The standard version can be used for liquids based on mineral oil /corresponding to the fluids in Group 2 of Directive 97/23 EG Article 9). Please consult with us if using other media.

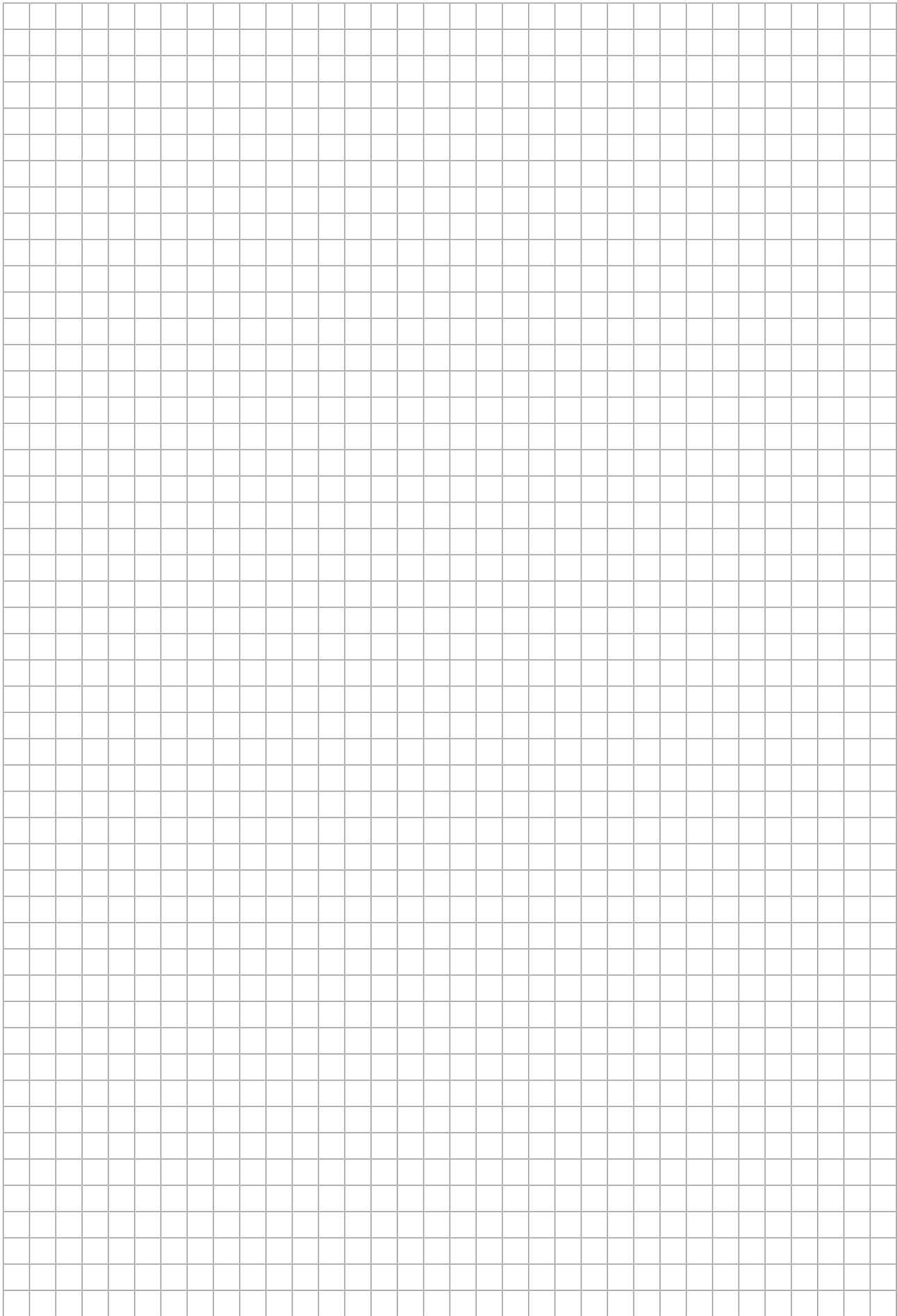
Subject to technical alterations without prior notice.

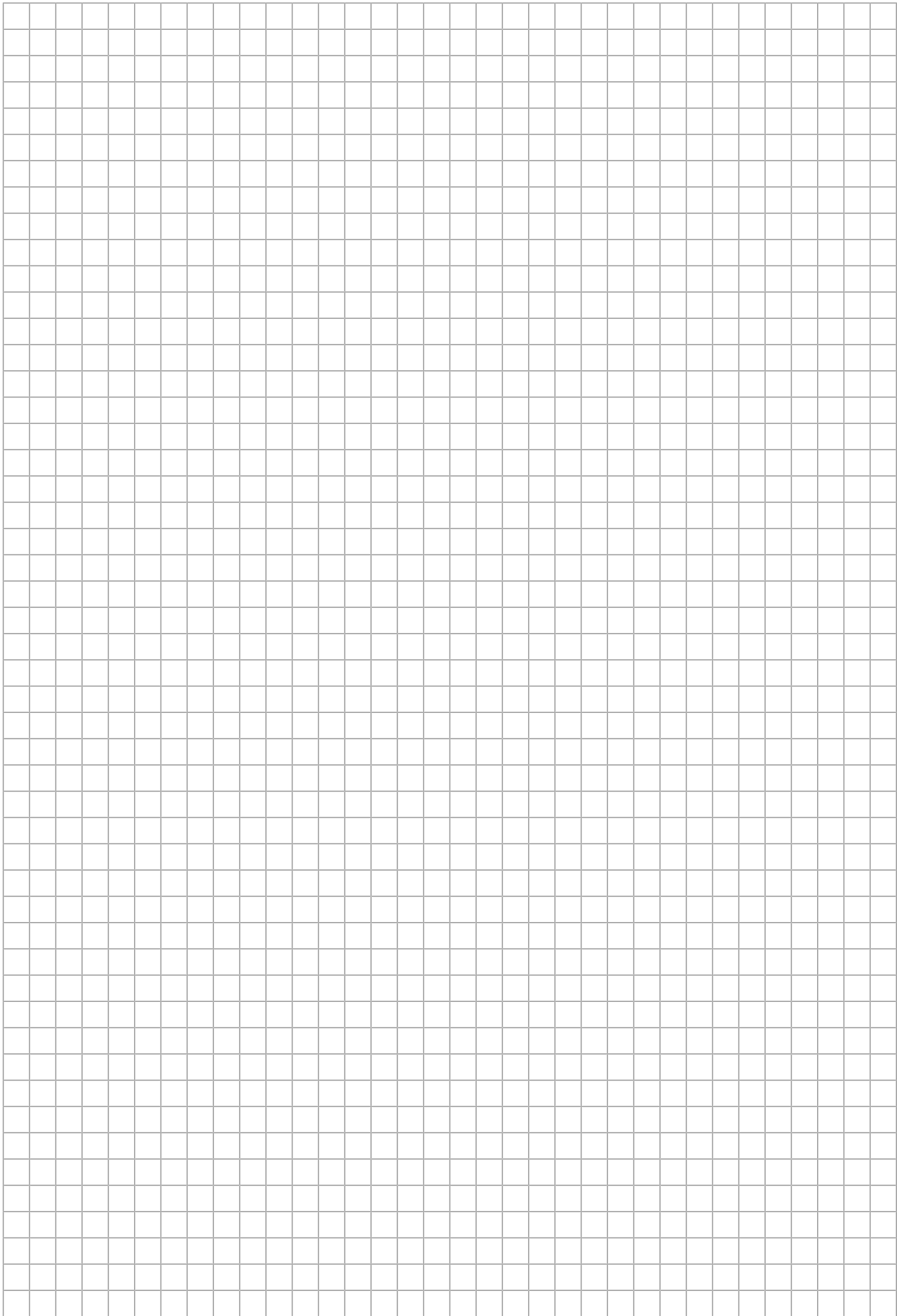
MAHLE Filtersysteme GmbH
 Industriefiltration
 Schleifbachweg 45
 D-74613 Öhringen
 Phone +49 (0) 7941/67-0
 Fax +49 (0) 7941/67-23429
 industriefiltration@mahle.com
 www.mahle-industriefiltration.com
 78357428.11/2006

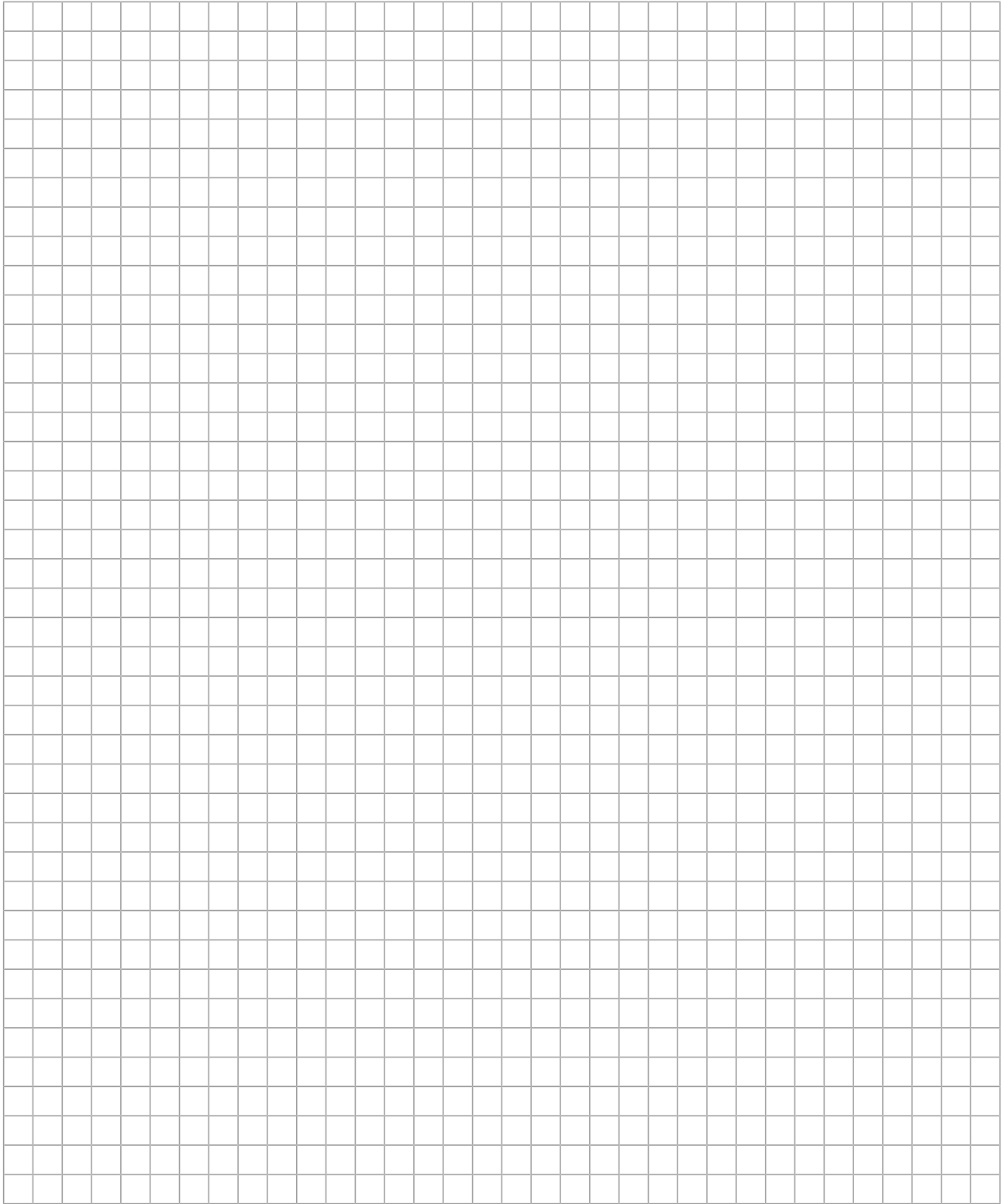
Contamination Indicator

10

23100591/ES – 05/2019









SEW-EURODRIVE
Driving the world

SEW
EURODRIVE

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Str. 42
76646 BRUCHSAL
GERMANY
Tel. +49 7251 75-0
Fax +49 7251 75-1970
sew@sew-eurodrive.com
→ www.sew-eurodrive.com