

液压技术座谈会

(闭式液压系统介绍及使用)

Zhang Xin (张新)

DCCN-SVH/Pk

Dec.13th.2010



- ◆ 闭式液压系统构成
- ◆ A4VG180EP泵介绍
- ◆ A6VM160EP马达介绍
- ◆ 管路安装
- ◆ 系统清洁度保证
- ◆ A4VG180EP泵常见故障的诊断及排除
- ◆ A6VM160EP马达常见故障的诊断及排除
- ◆ 问题讨论

未来在我们手中
The Future
is in our hands

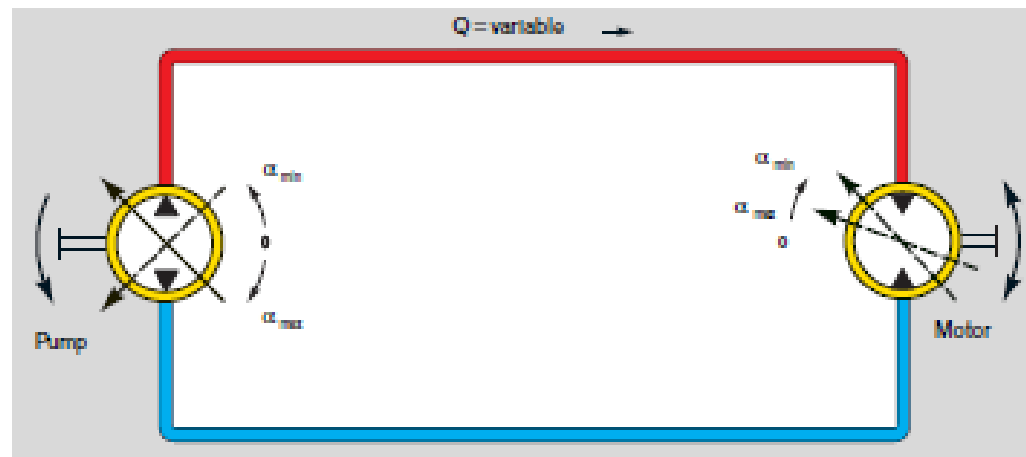
闭式液压系统介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

何谓闭式液压系统

工作介质（液压油或其他）从执行机构直接回到泵



未来在我们手中
The Future
is in our hands

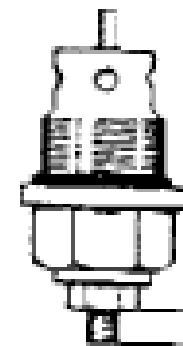
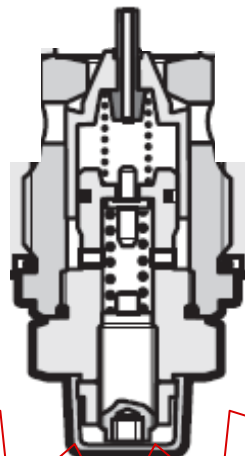
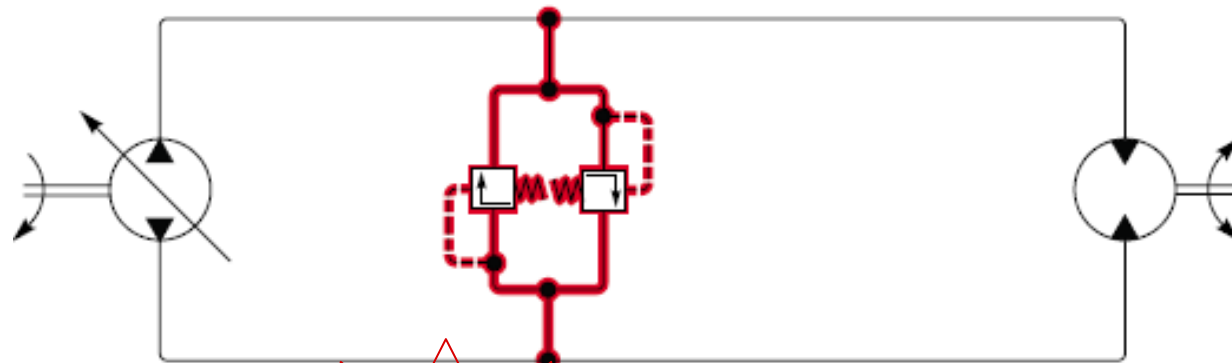
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

闭式液压系统介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

液压系统都需要安全保护元件 ➡ 安全阀



未来在我们手中
The Future
is in our hands

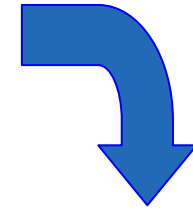
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

闭式液压系统介绍

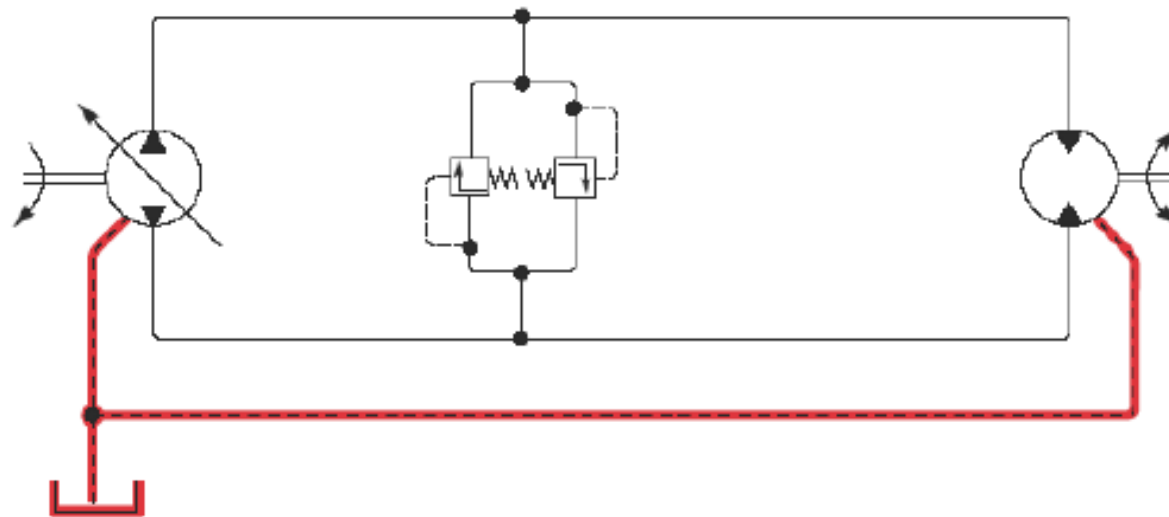
Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

任何液压泵和马达工作时都有漏损（散热，润滑）



增加泄油管路



未来在我们手中

The Future
is in **our hands**

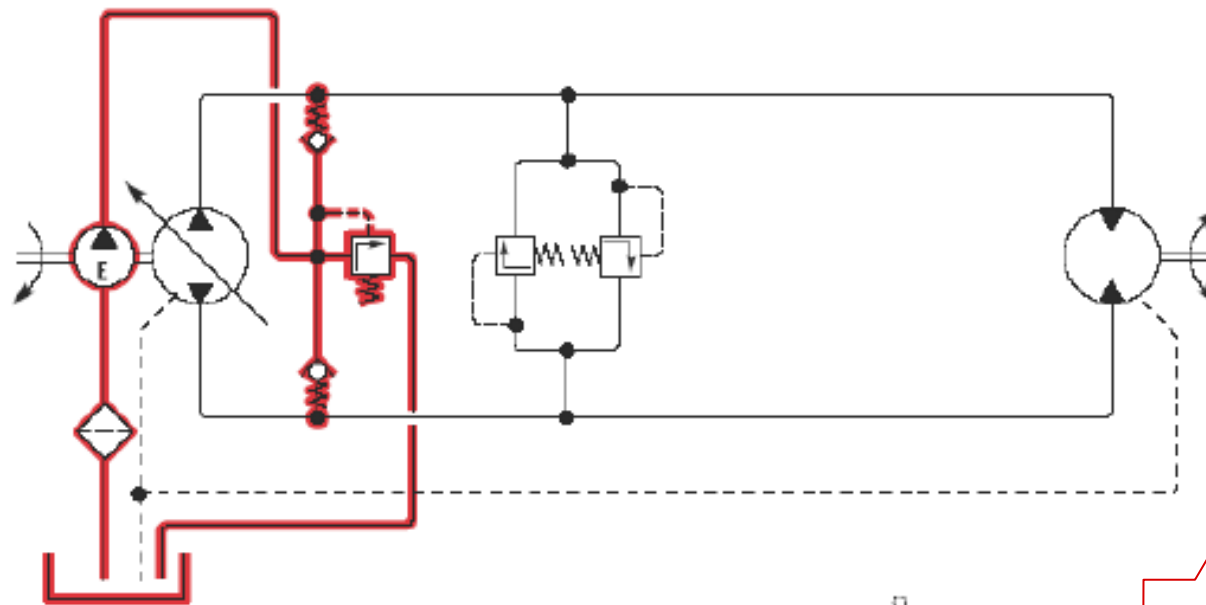
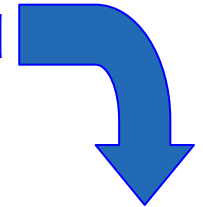
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

闭式液压系统介绍

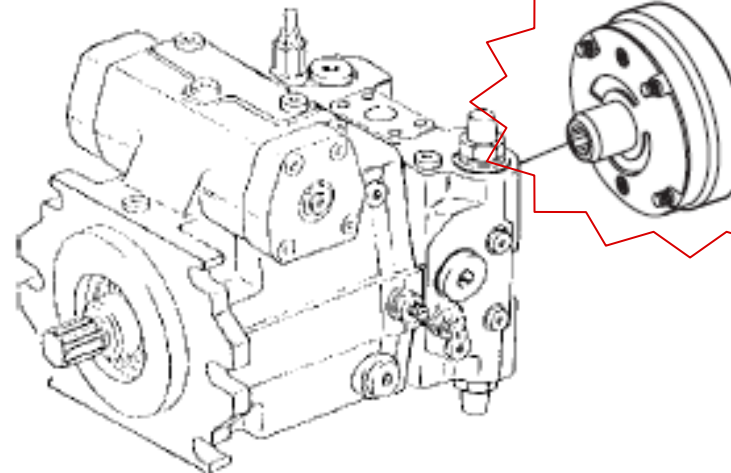
Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

因为漏损且为保证执行机构连续平稳运转，系统需要补油



增加补油泵和
补油阀



未来在我们手中

The Future
is in our hands

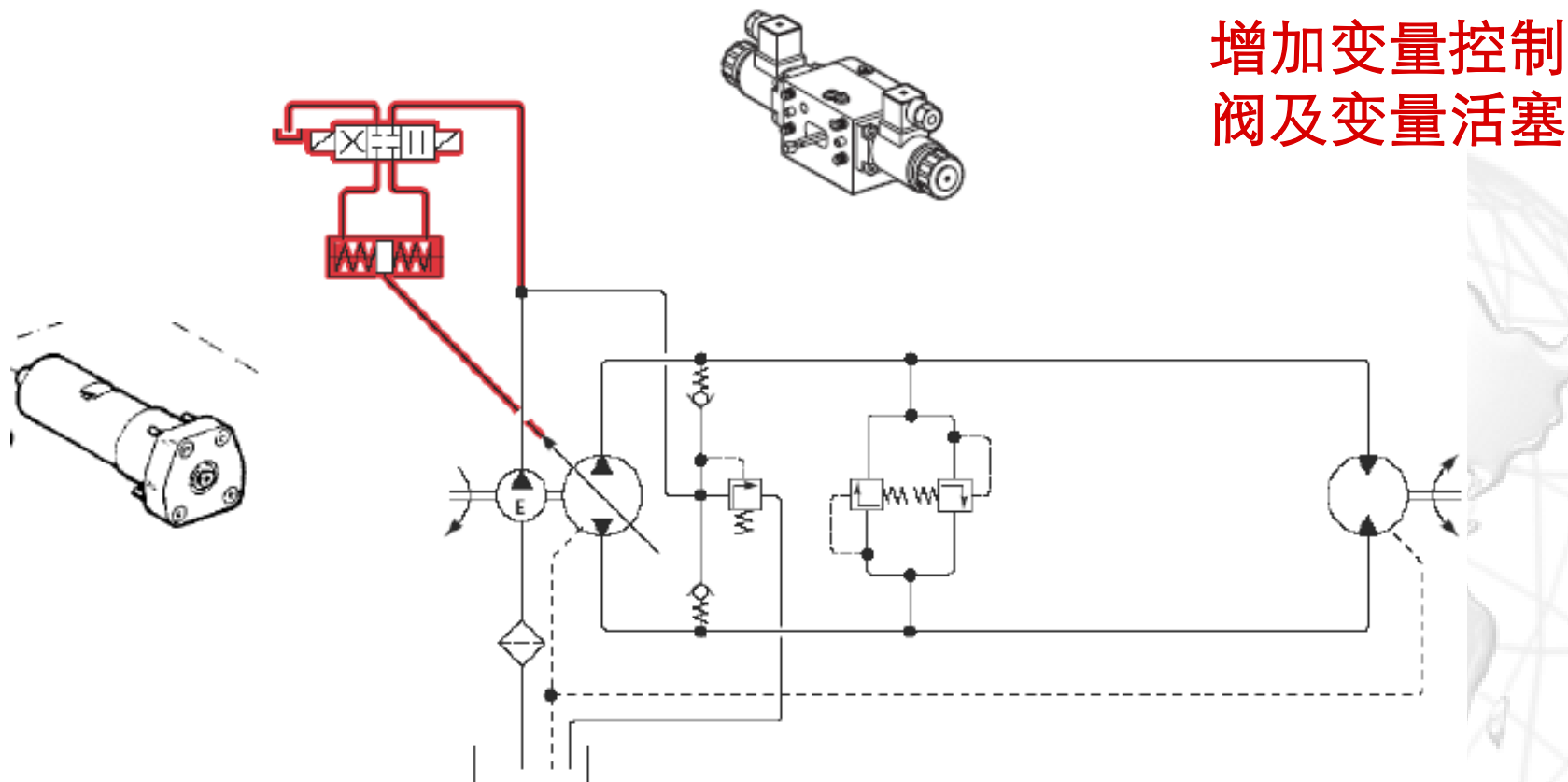
© All rights reserved by Bosch Rexroth AG, even and especially in cases of
We also retain sole power of disposal, including all rights relating to copyr

闭式液压系统介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

增加变量机构以实现泵的排量和输出方向的变化



未来在我们手中

The Future
is in our hands

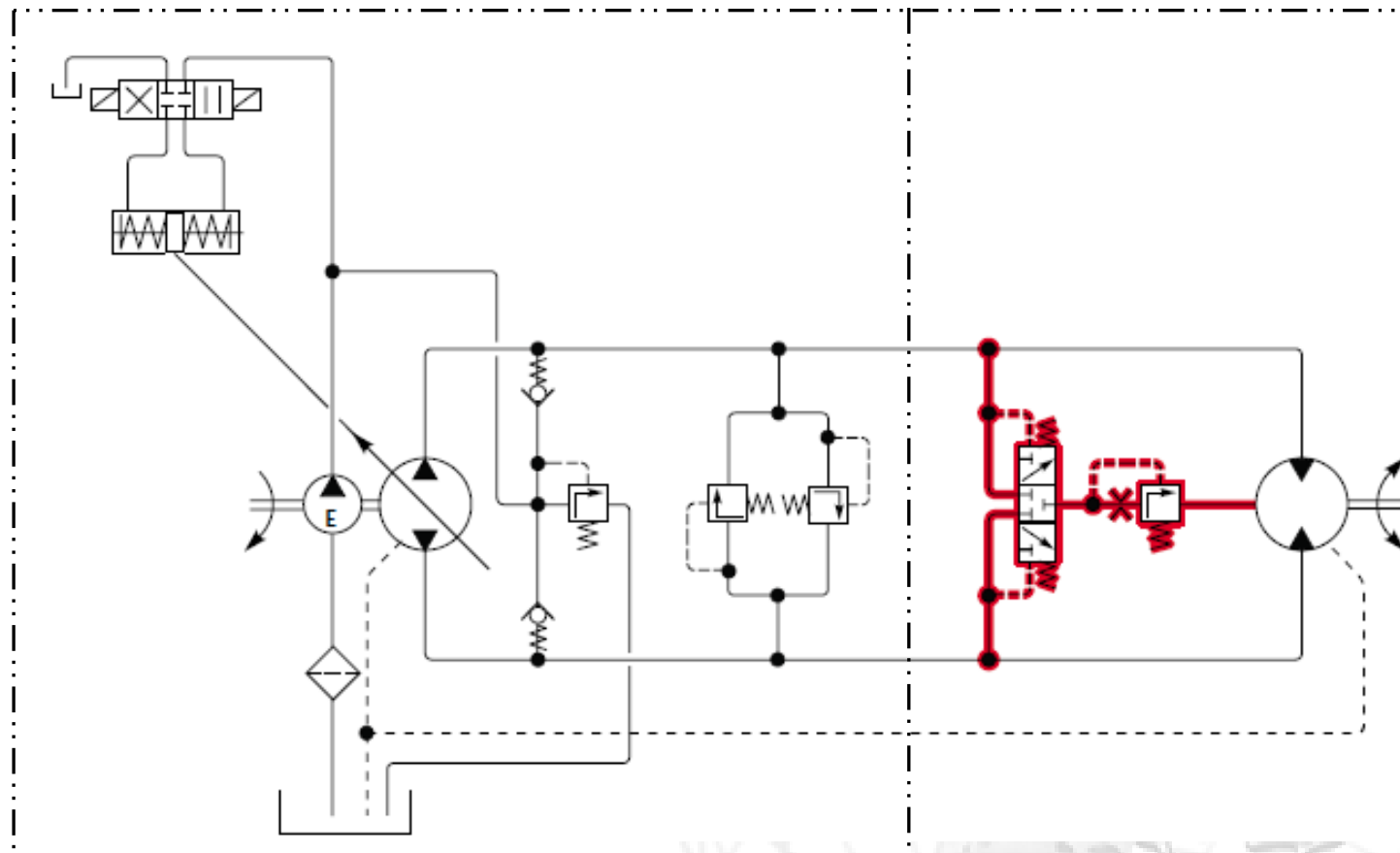
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

闭式液压系统介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

闭式系统易发热，故对于大排量泵和马达构成的闭式系统，常常会增加冲洗油路以加速热交换



增
加
冲
洗
阀

未来在我们手中

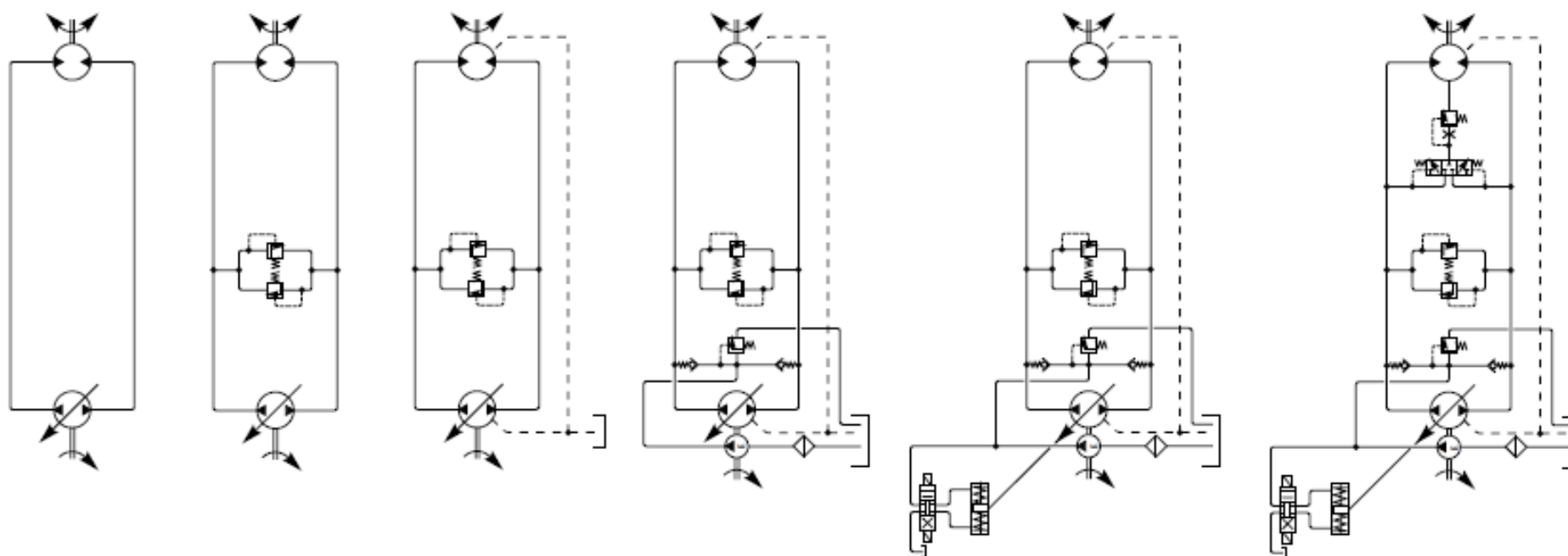
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

闭式液压系统介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10



未来在我们手中

The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

闭式液压系统介绍

闭式系统的特点

- ☞ 方向控制阀：规格小 => 仅进行先导控制；（开式系统中的规格大）
- ☞ 过滤器和散热器：规格小 => 只需与补油泵的流量匹配；
- ☞ 液压油箱：小尺寸 => 只需与补油泵流量匹配；
- ☞ 运转速度：补油泵限制=> 补油泵的结构及连轴套上的平键
- ☞ 安装位置：任意位置
- ☞ 驱动：可逆的 => 泵马达工况可逆，可实现静压制动



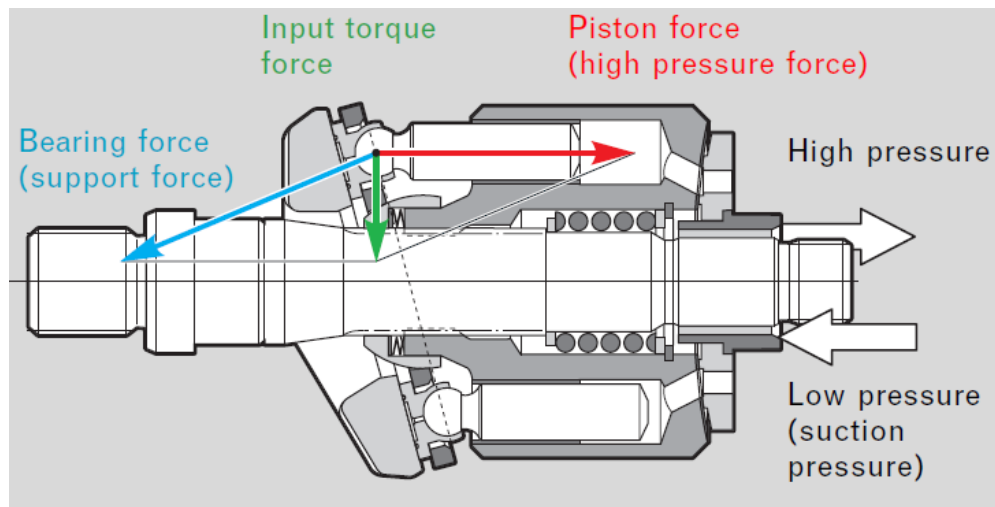
未来在我们手中
The Future
is in our hands

A4VG180EPD泵介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

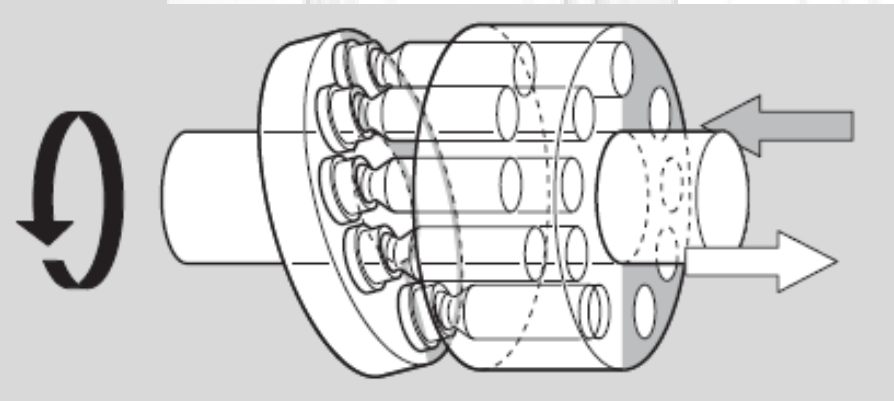
轴向柱塞泵工作原理



容积泵一种

↪ 密封容腔

↪ 容腔体积可变



未来在我们手中

The Future
is in our hands

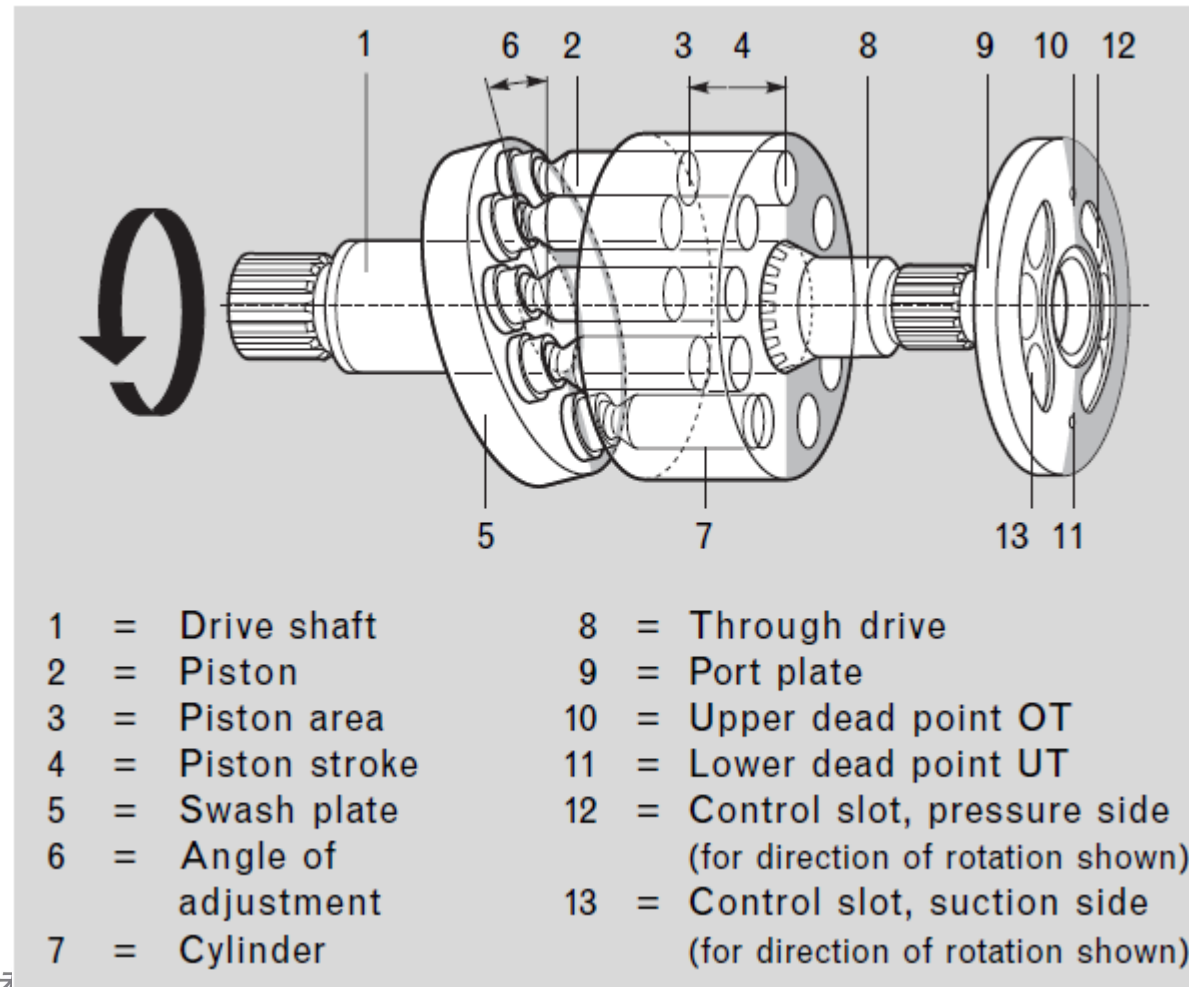
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications. We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A4VG180EPD泵介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

轴向柱塞泵工作原理



The Future
is in our hands

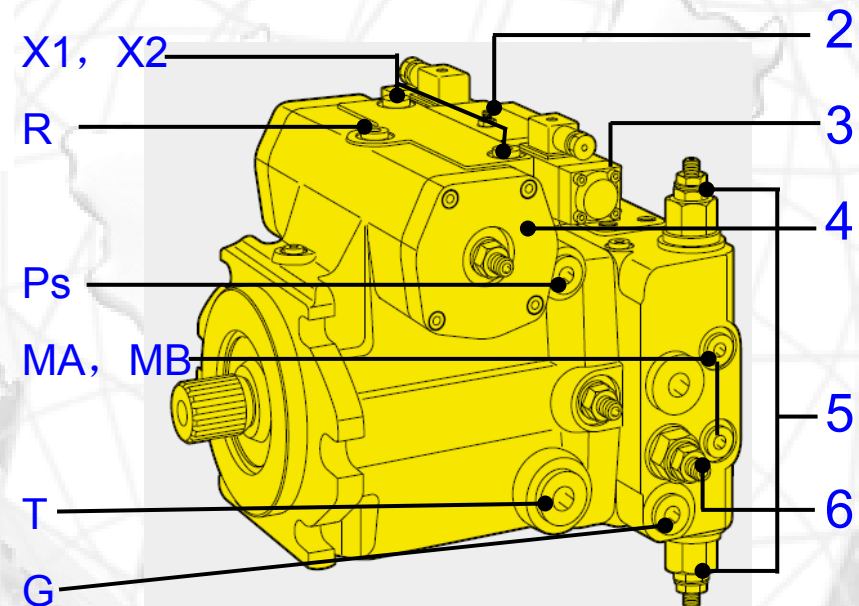
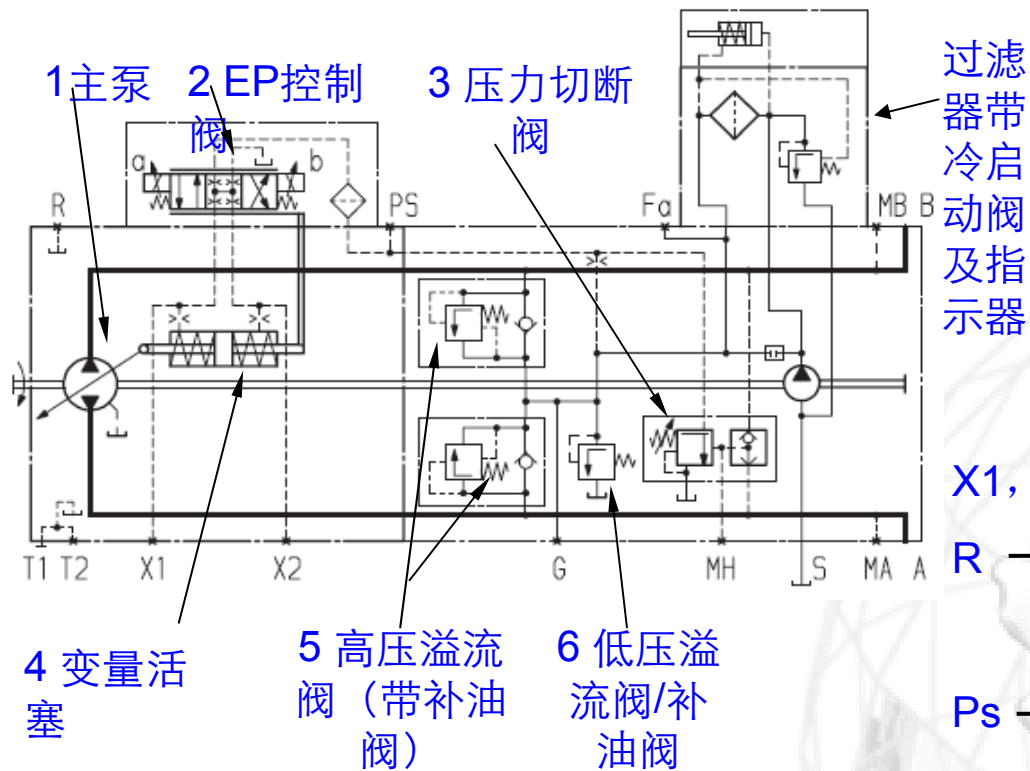
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A4VG180EPD泵介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

A4G180EP泵工作原理



未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A4VG180EPD泵介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

A4G180EP泵使用要求

🔔 轴端无应力安装 => 安装时不可以敲击轴端，放置时不可以轴端着地；

🔔 检查泵的旋向：与电机（发动机）一致

🔔 保证油液清洁度

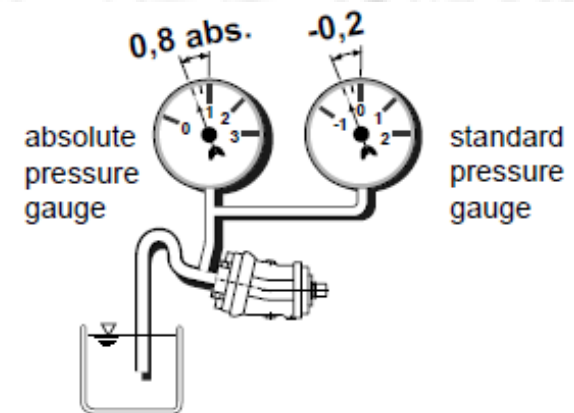
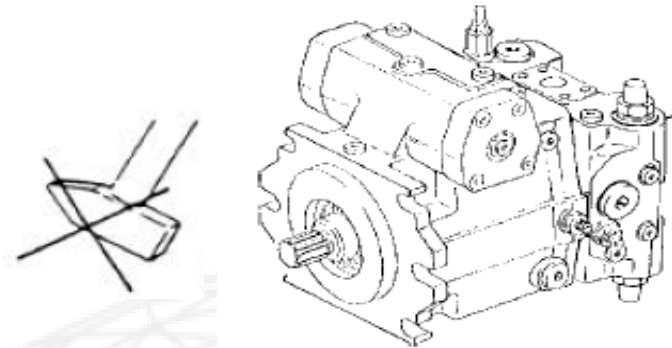
👉 清洁度等级：至少**ISO4406 20/18/15**

👉 油液温度较高时（90度~115度）：
至少**ISO4406 19/17/14**

🔔 保证同轴度 => 联轴器安装时，要根据生产厂家的要求保证同轴度；

🔔 吸油压力：不能低于**0.8bar**（绝对压力），表测压力不低于**-0.2bar**；

🔔 壳体压力：不能高于**3bar**（绝对压力），表测压力不高于**2bar**



A4VG180EPD泵介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

A4G180EP泵保证措施

☞ 壳体加油，排气：向壳体内加满干净的液压油，从高处的油口排气（第一次试车、长时间不用或更换油管后，启机前）

☞ 泄油管连接：

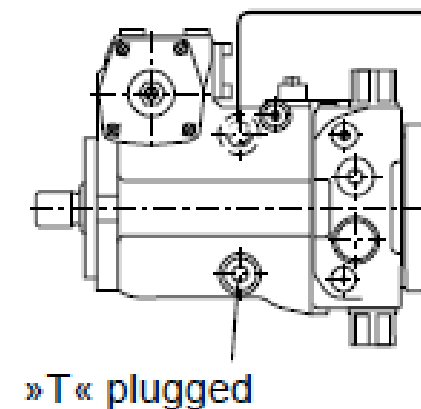
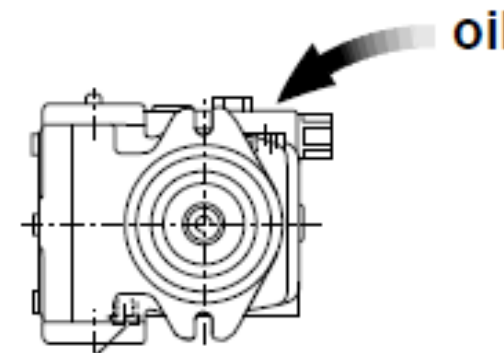
☞ 接在泵壳体上方的T口，直接回油箱；

☞ 接头要符合欧洲标准的超轻型系列

☞ 油管选用单层钢丝的低压油管

☞ 吸油过滤：尽可能不要采用吸油过滤；
如果要用吸油过滤，过滤器精度要大于100U，通流量大于补油泵流量的2.5倍；

📖 有关清洁度的保证措施，后面专门论述



未来在我们手中

The Future
is in our hands

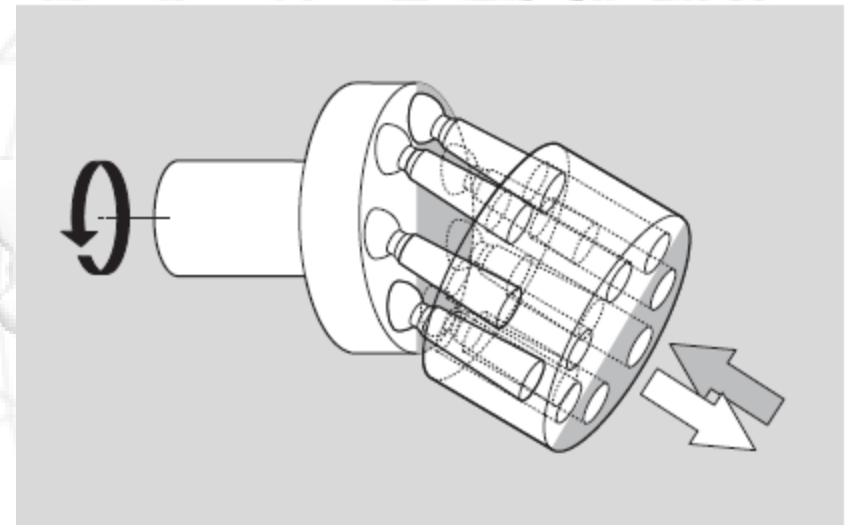
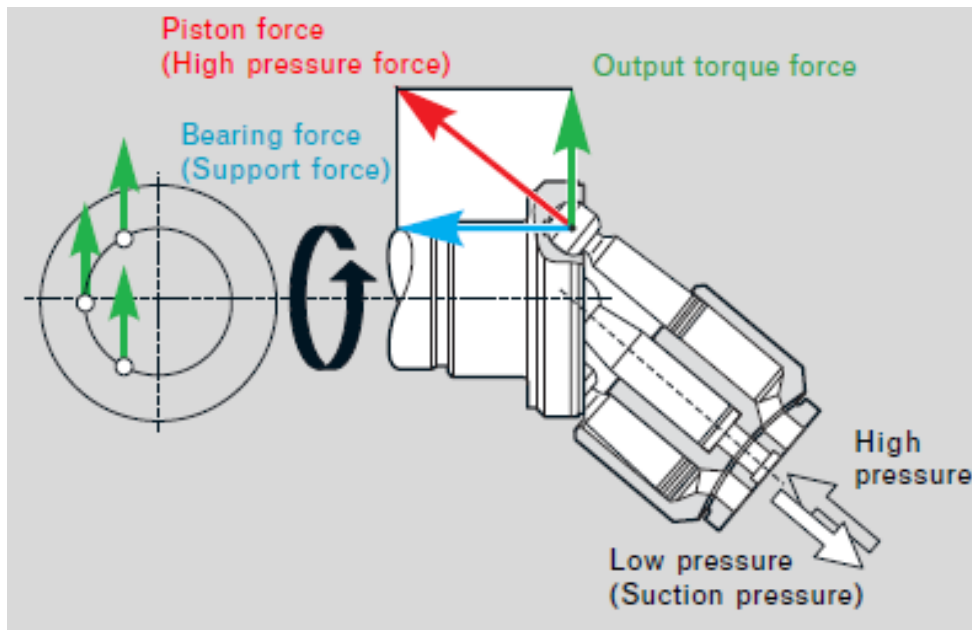
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

轴向柱塞马达工作原理



未来在我们手中
The Future
is in **our hands**

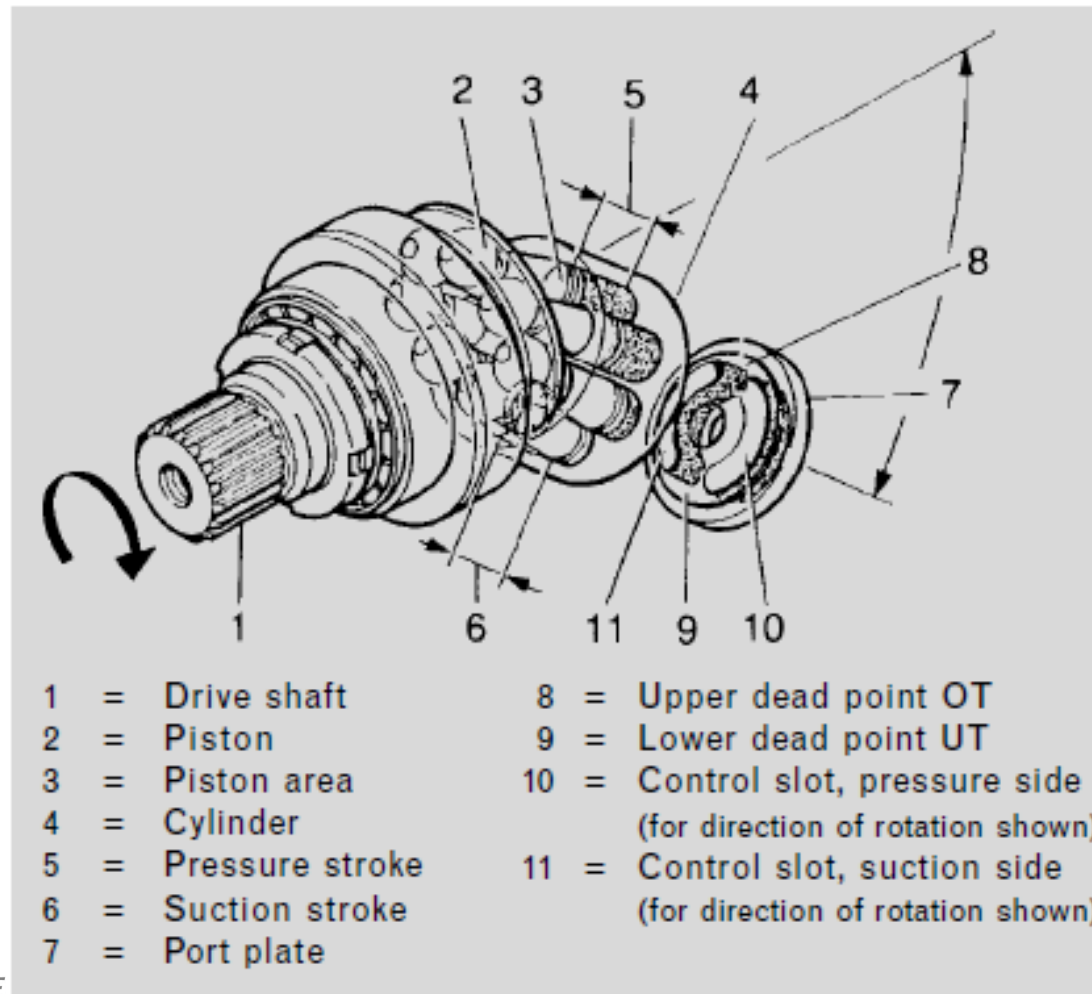
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

轴向柱塞马达工作原理



未来在

The Future
is in our hands

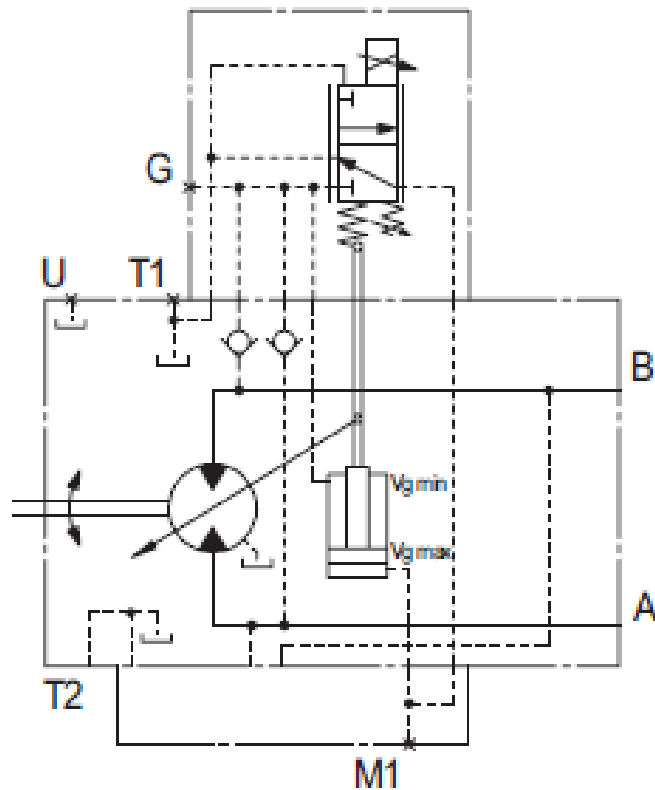
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达介绍

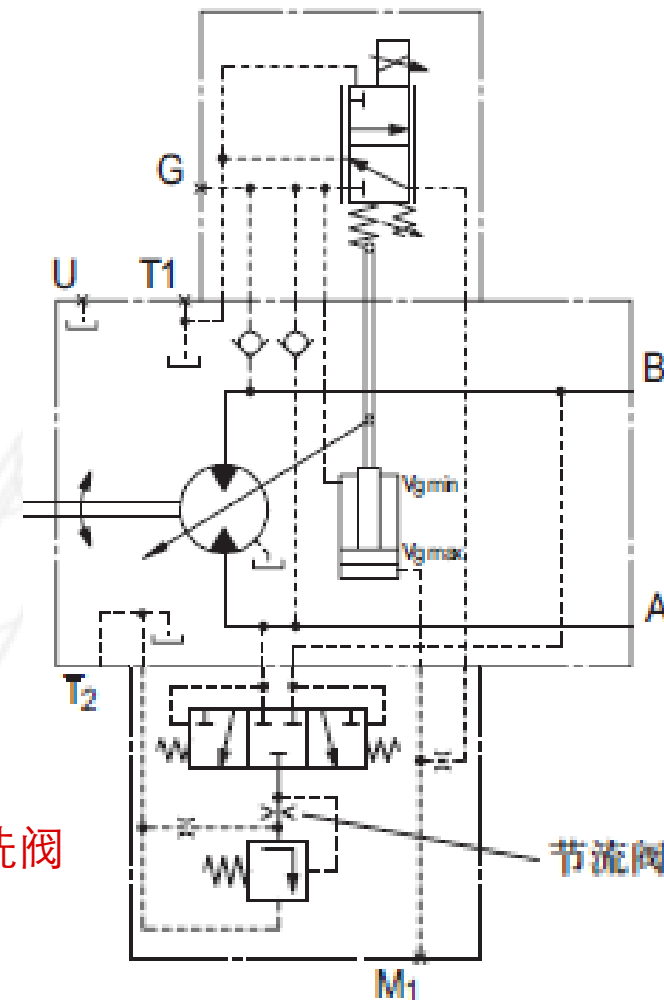
Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

A6VM160EP马达工作原理



带冲洗阀



未来在我们手中

The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达介绍

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

A6VM160EP马达使用要求

🔔 轴端无应力安装 => 安装时不可以敲击轴端，放置时不可以轴端着地；防止顶轴

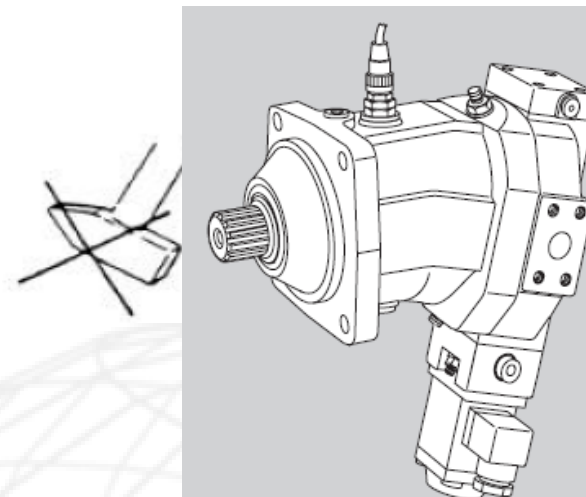
🔔 保证油液清洁度

👉 清洁度等级：至少ISO4406
20/18/15

👉 油液温度较高时（90度~115度）：
至少ISO4406 19/17/14

🔔 保证同轴度 => 联轴器安装时，要根据生产厂家的要求保证同轴度；

🔔 壳体压力：不能高于3bar（绝对压力），表测压力不高于2bar



未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达介绍

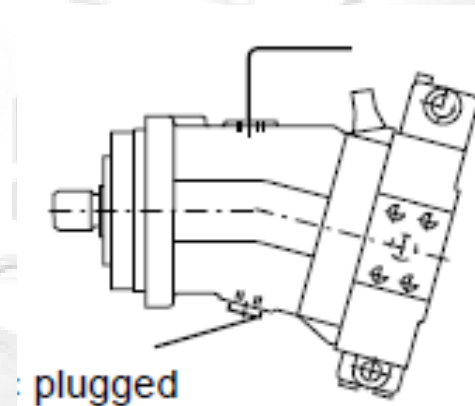
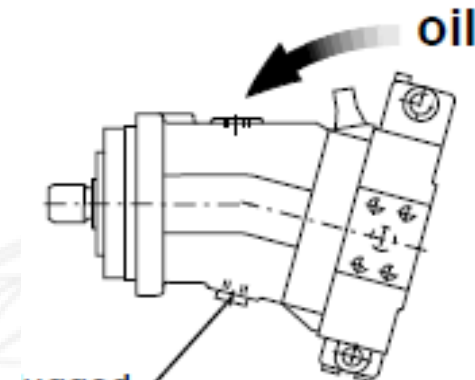
Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

A6VM160EP马达使用要求

🔔 壳体加油：试车时壳体内要加满干净的液压油，将马达壳体内气排净

🔔 泄油管：要求同前面泵的要求



未来在我们手中
The Future
is in **our hands**

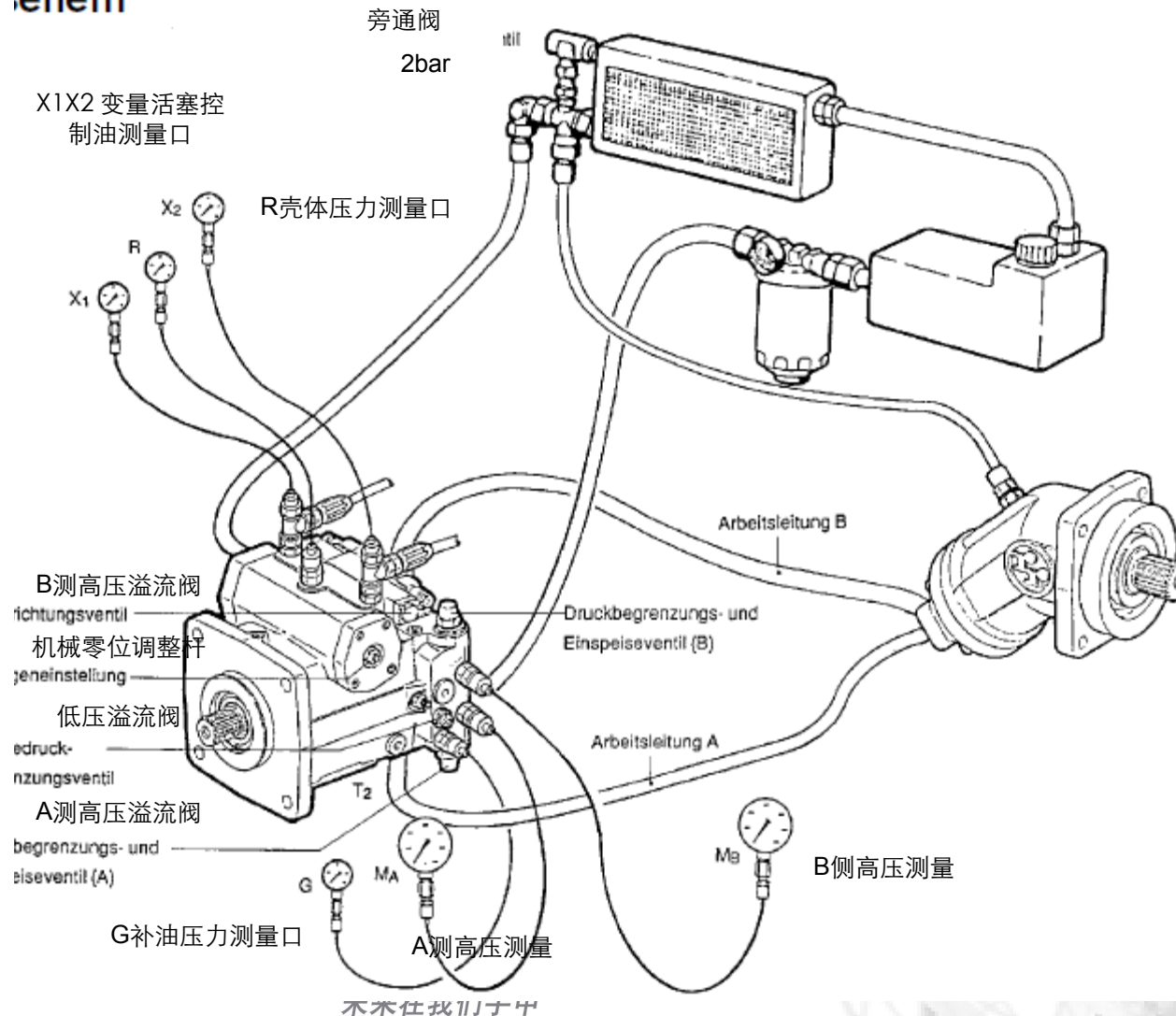
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A4VG180泵与A6VM160马达组成的闭式液压系统

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

enem



泵上各油口尺寸

Anschlüsse A4VG/DA	NG 71	NG 90	NG 125	NG 180
A,B Arbeitsleitungen	SAE 1"	SAE 1"	SAE 1 1/4"	SAE 1 1/4"
G Druckanschluß für Hilfskreise	M 18x1,5	M 18x1,5	M 22x1,5	M 22x1,5
T ₁ (T ₂) Öleinfüllung und Rücklauf	M 26x1,5	M 26x1,5	M 33x2	M 42x2
T ₁ (T ₂) Ölablaß	M 26x1,5	M 26x1,5	M 33x2	M 42x2
S Sauganschluß	M 42x2	M 42x2	M 48x2	M 48x2
M _A /M _B Arbeitsleitung Messanschlüsse	M 12x1,5	M 12x1,5	M 12x1,5	M 12x1,5
R Entlüftung	M 12x1,5	M 16x1,5	M 16x1,5	M 16x1,5
X ₁ /X ₂ Steuerdruck	M 12x1,5	M 16x1,5	M 16x1,5	M 16x1,5
P _s Stelldruckversorgung	M 14x1,5	M 18x1,5	M 18x1,5	M 14x1,5

各测量口用压力表量程

Meßstellen A4VG/DA - A6VM/DA	Manometer (Druckbereich)
M _A Arbeitsleitung A	600 bar
G _{A6VM} Arbeitsleitung A/B	600 bar
M _B Arbeitsleitung B	600 bar
G _{A4VG} Speisedruck	40 bar
R Gehäusedruck	10 bar
S Saugunterdruck	1 bar (absolut)
X ₁ /X ₂ Steuerdruck	40 bar
G* Stelldruck	600 bar

The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications. We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

管路准备及安装时一般性要求

- 🔔 在储存、运输的过程中，油管开口要用干净的塑料堵等密封保护；
- 🔔 最好使用没有经过涂敷的无氧化皮的；
- 🔔 锯完后，应仔细去除毛刺；
- 🔔 冷态折弯
- 🔔 尽可能避免焊接接头。若无法避免，在焊接时要考虑焊杂的易处理；
- 🔔 不要使用棉纱和废布清理管路，最好使用绸缎；
- 🔔 对于液压油箱，一定要认真处理掉焊渣，并用面沾干净油箱的内部

未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

Rexroth
Bosch Group

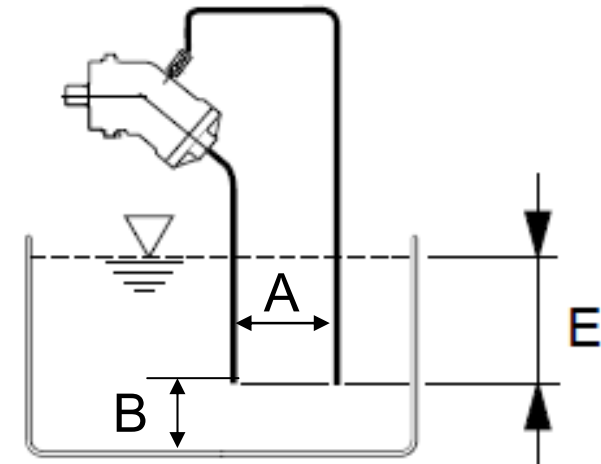
DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

吸油、泄油和回油管路安装的具体要求

🔔 任何时候，吸油和泄油管都要在液面下至少**2.5倍**的管子直径；但不能小于**100mm**；（防止起泡）

🔔 泄油管（或回油管）要高于吸油管，并注意：回油不可以直接被吸走

🔔 吸油管，回油管和泄油管的油口间的距离要大于**200mm**；



$E_{min} \geq 2.5 \text{ 倍管径 (100mm)}$

$A_{min} \geq 200\text{mm}$

$B_{min} \geq 200\text{mm}$

未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

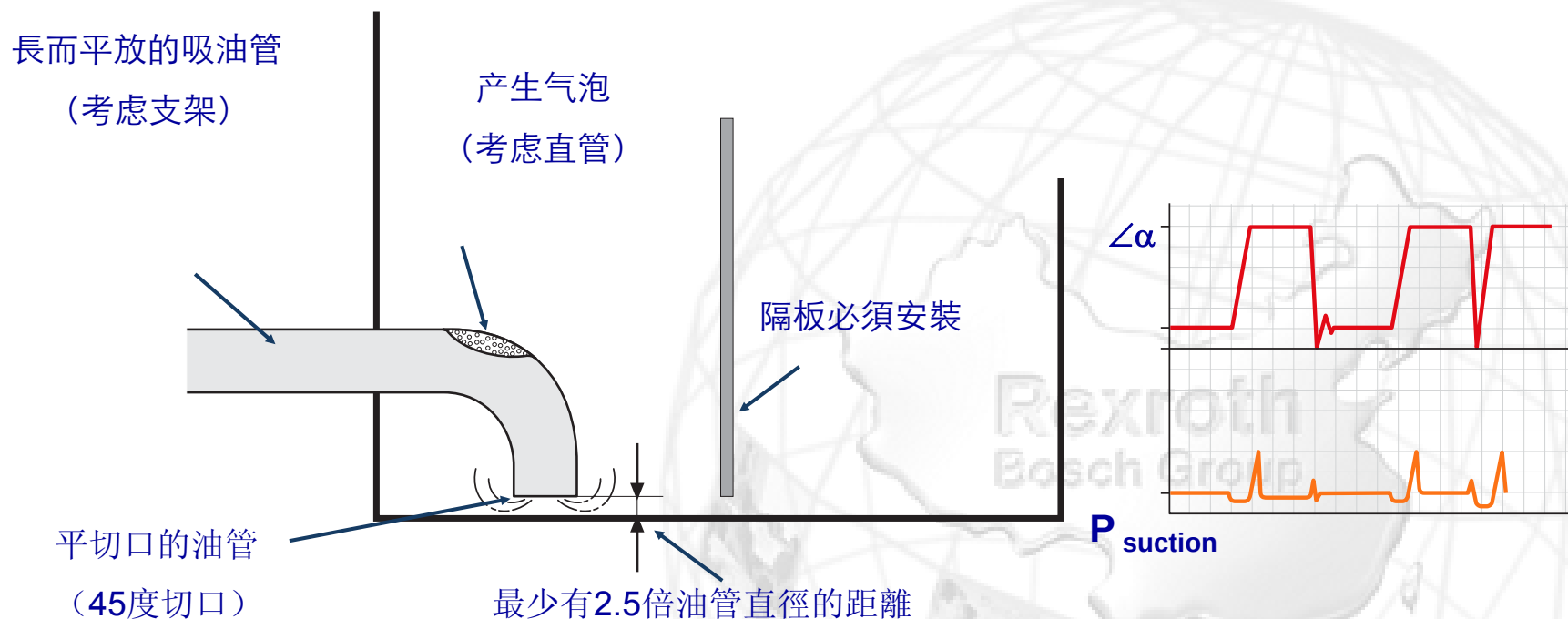
Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

吸油管的不良安装

吸油区的油液不可以急速流动

紊流区



未来在我们手中

The Future
is in our hands

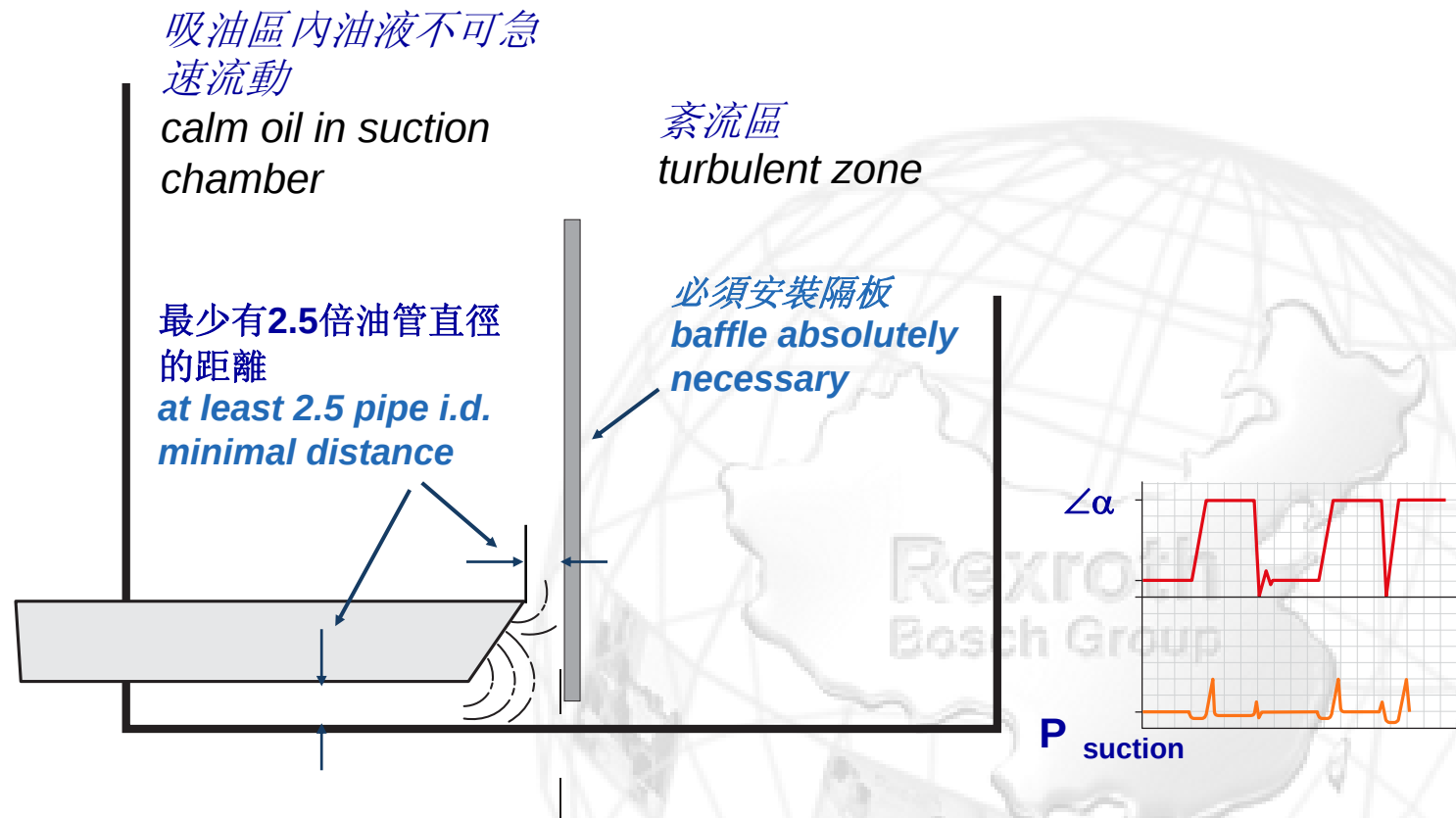
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

吸油管的不良安装



未来在我们手中

The Future
is in our hands
Allg. 090.10 VST1/VST6 09.AA

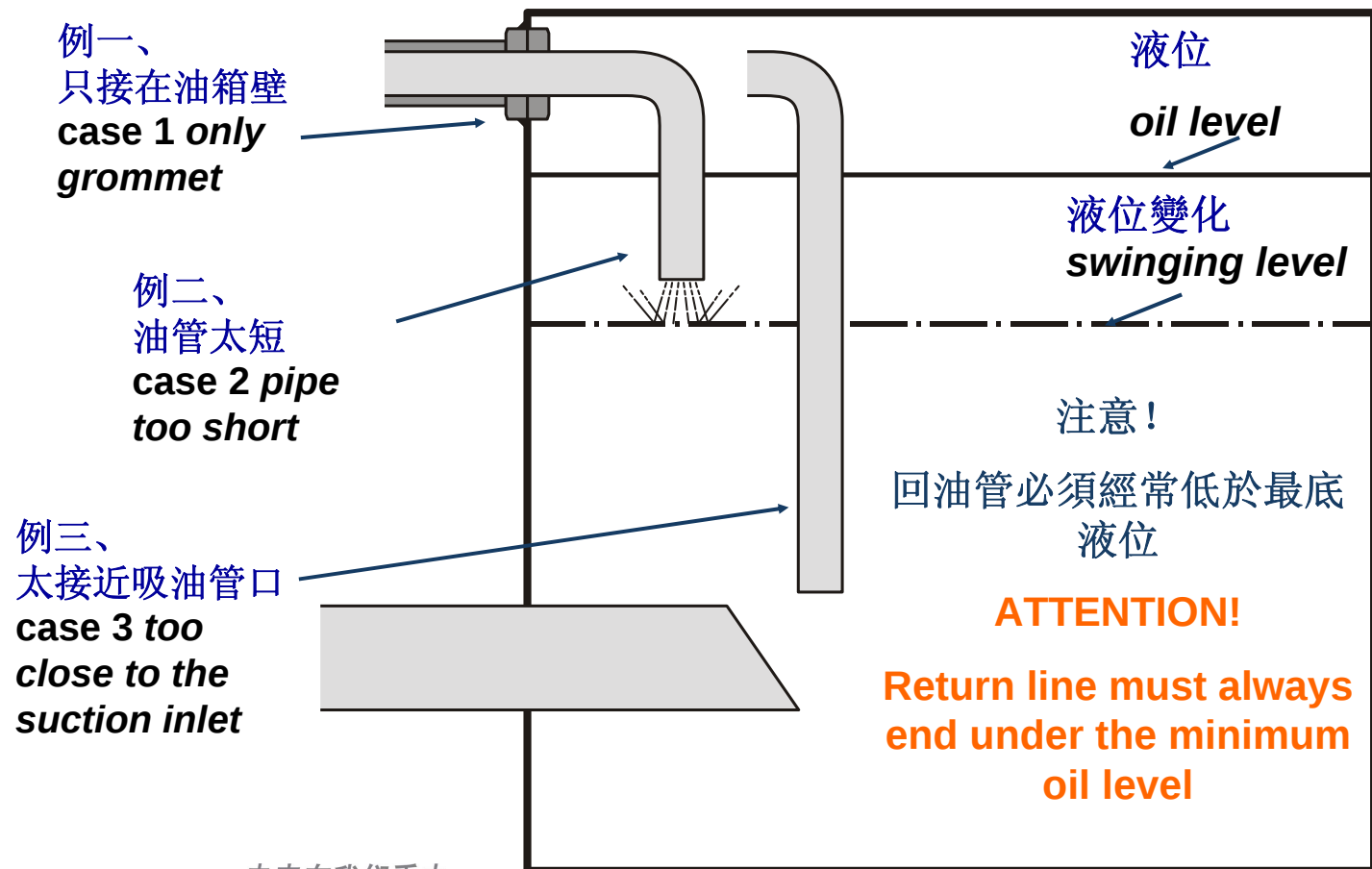
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

吸油管的不良安装



未来在我们手中

The Future
is in **our hands**

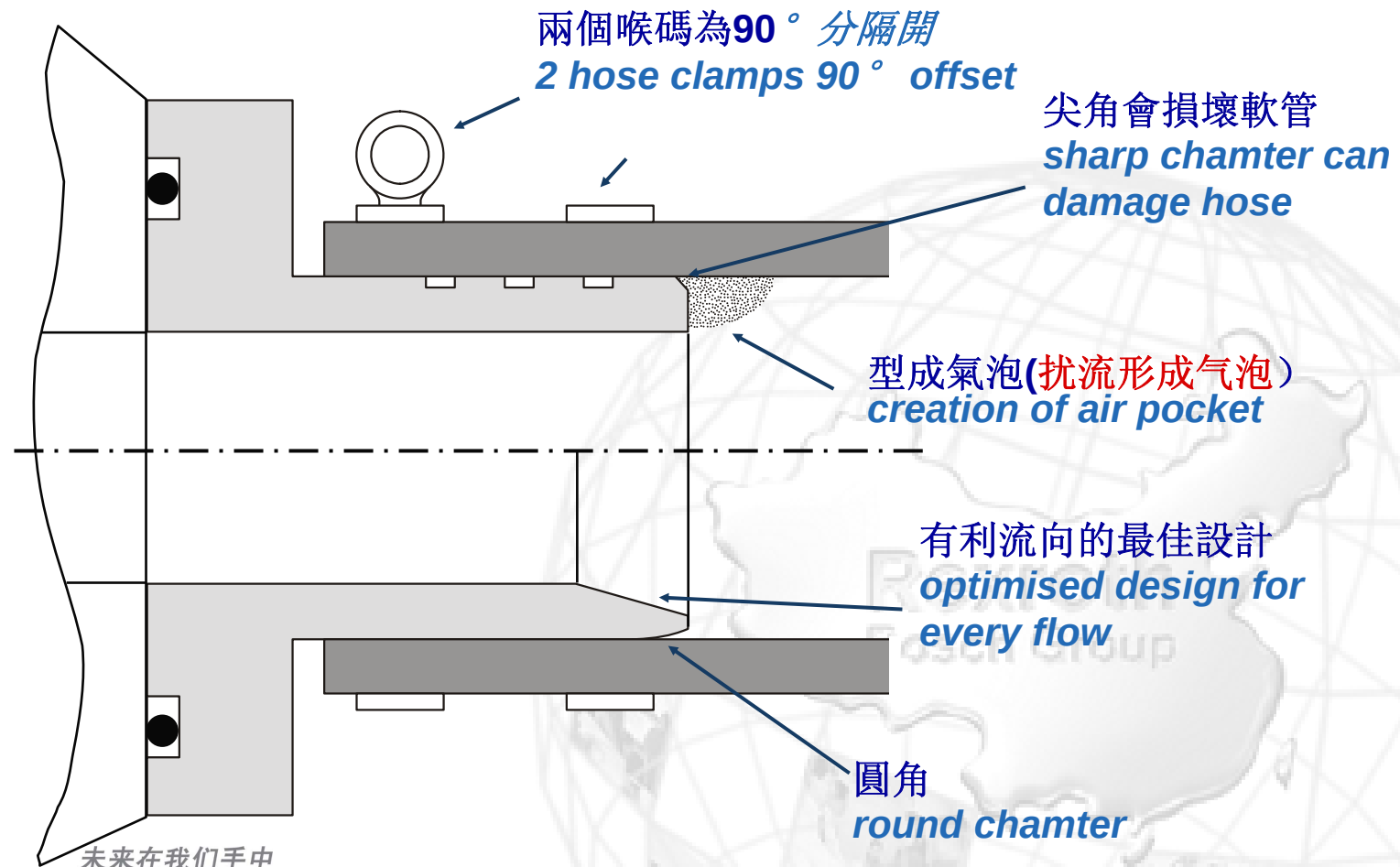
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

吸油管喉箍设计



未来在我们手中

The Future
is in **our hands**
Allg. 090.6 VST1/VST6 06.AA

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统管路及油箱的安装

Rexroth
Bosch Group

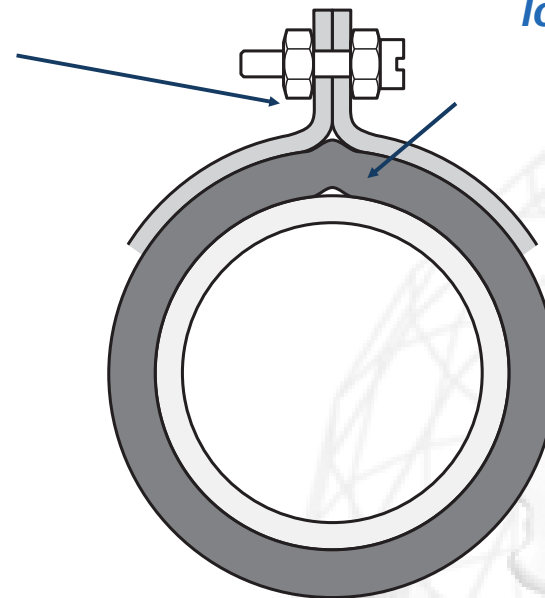
DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

吸油管喉箍设计

使用兩個喉碼時必須
分開安裝

**When using two
hose clamps,
mounting needs to
be offset**

氣谷
longitudinal airgap



安裝一對喉碼須以
90° 分隔開

**Hose clamps have
to be assembled
with a set of 90°**

未来在我们手中

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

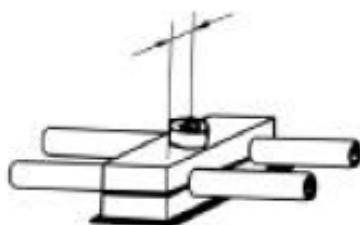
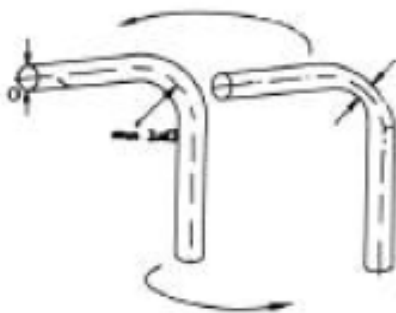
系统管路及油箱的安装

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

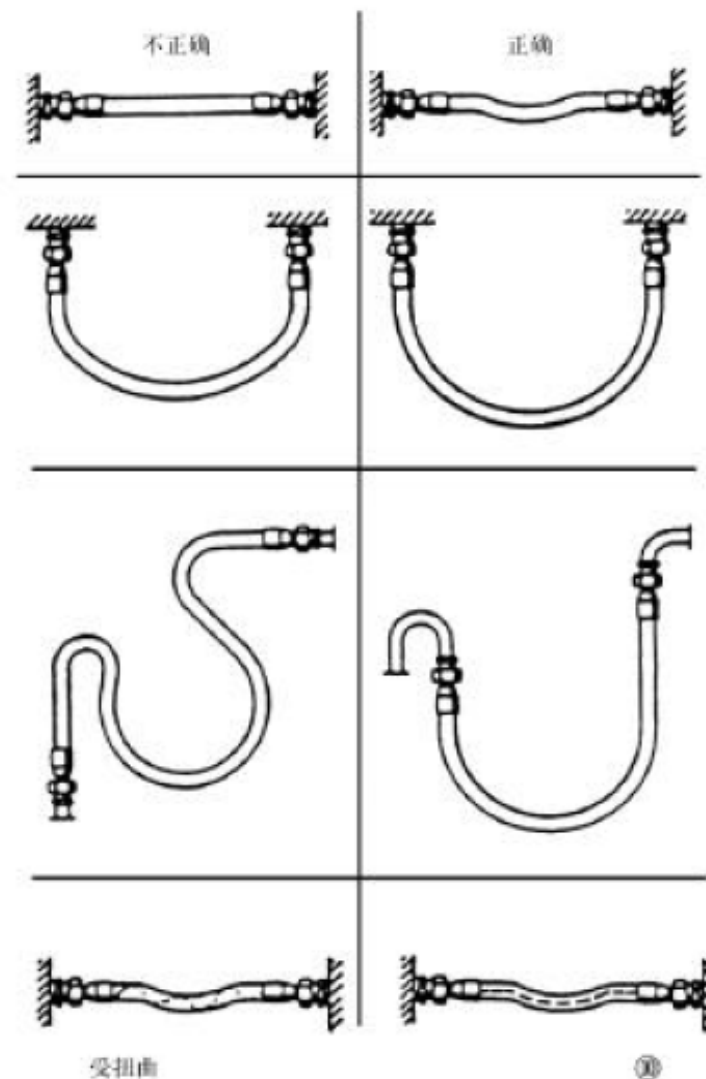
无应力安装

折弯半
径3倍
于管径



未来在我们手中

The Future
is in our hands

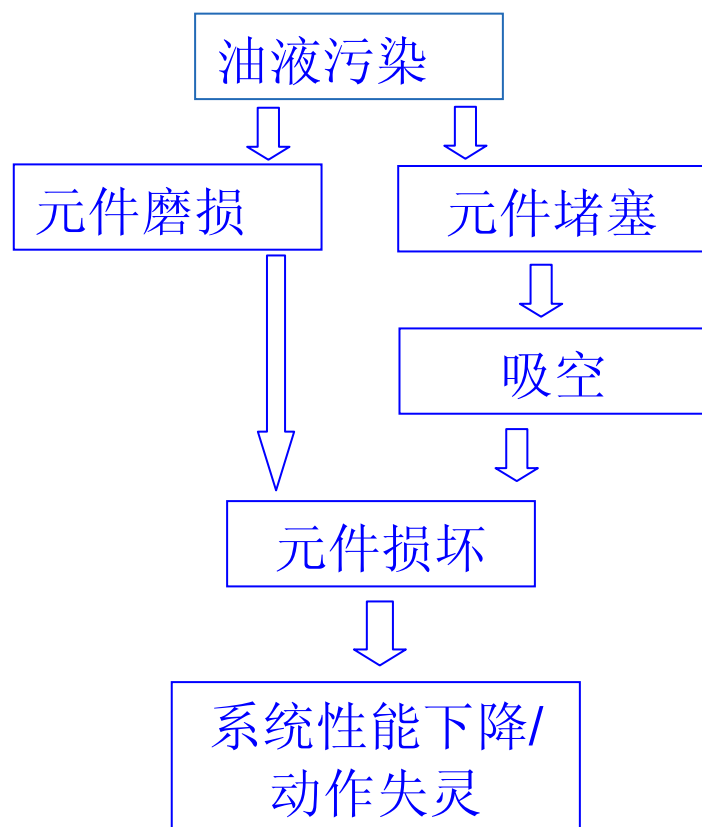


系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

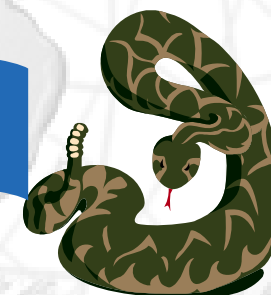
保证系统油液清洁度的重要性



油液污染

液压系统
两大天敌

系统吸空



未来在我们手中

The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

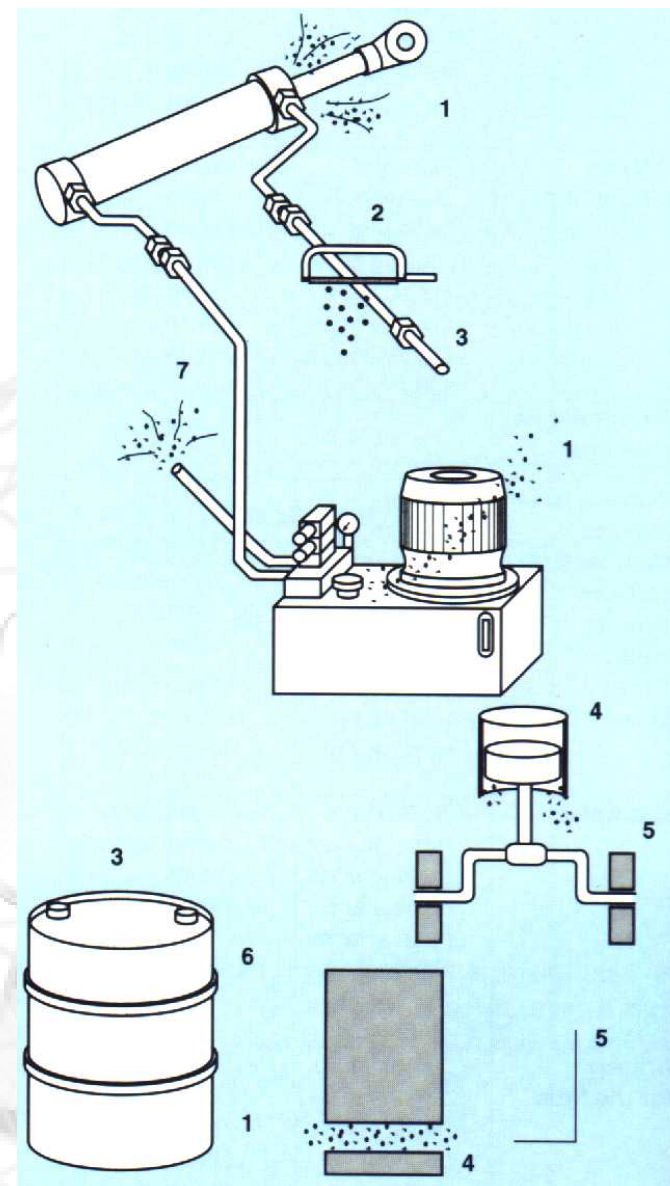
系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

液压系统污染的来源

1. 外部污染
2. 装配时造成污染
3. 启动系统时造成的污染
4. 内部污染
5. 磨损
6. 新的油液
7. 维修造成的污染



未来在我们手中

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统油液清洁度的控制

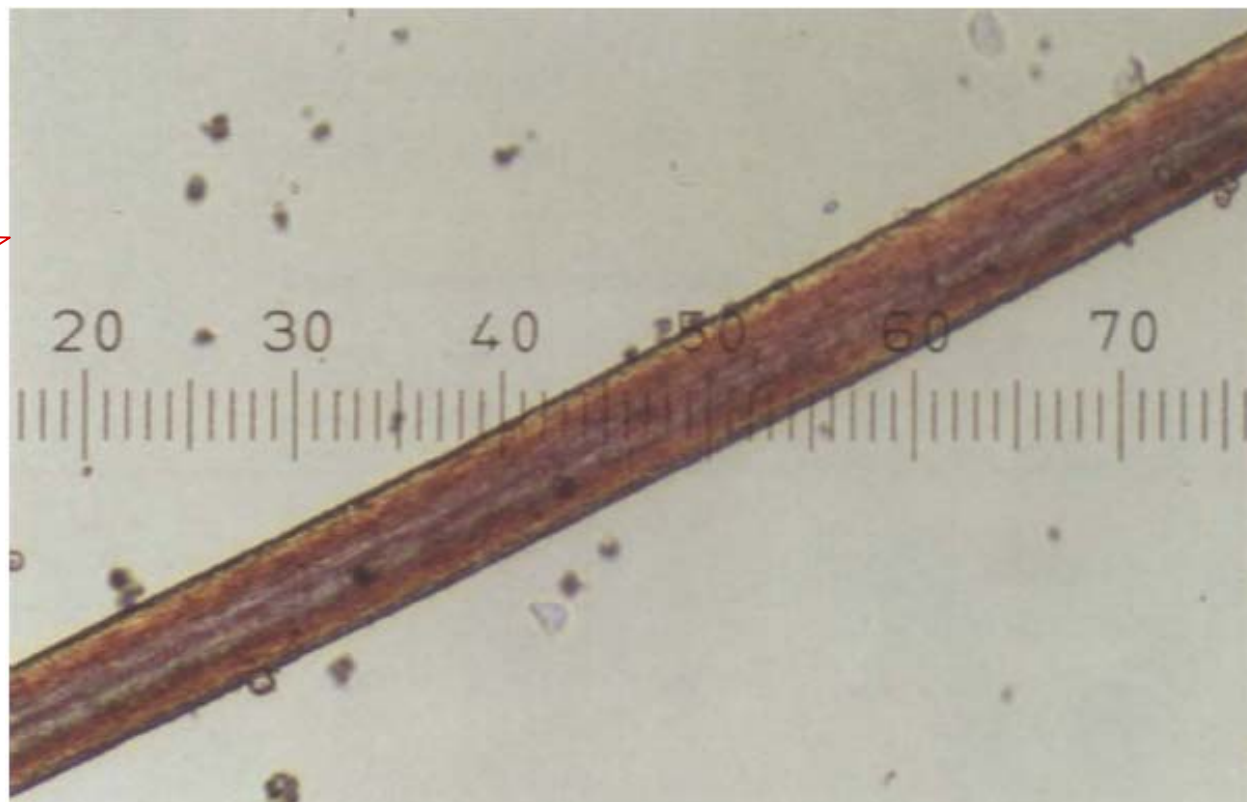
Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

10um的颗粒放大100倍

人肉眼可分辨的最小尺寸为**40um**

人头发直径约**75um** ➡



10um的颗粒与人头发放大100倍图像

未来在我们手中
The Future
is in our hands

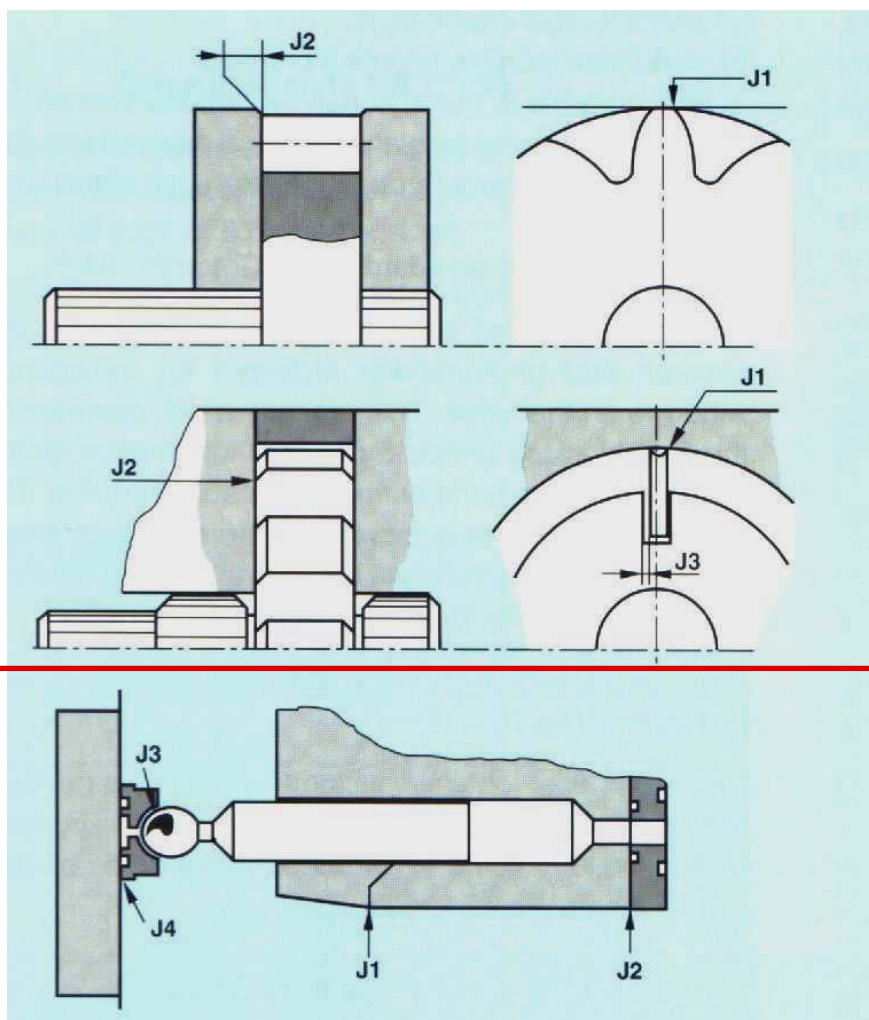
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

常用液压件间隙尺寸



1 齿轮泵

J1 从 0.5 到 5 微米
J2 从 0.5 到 5 微米

2 叶片泵

J1 从 0.5 到 5 微米
J2 从 5 到 20 微米
J3 从 30 到 40 微米

3 柱塞泵

J1 从 5 到 40 微米
J2 从 0.5 到 1 微米
J3 从 20 到 40 微米
J4 从 1 到 25 微米

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

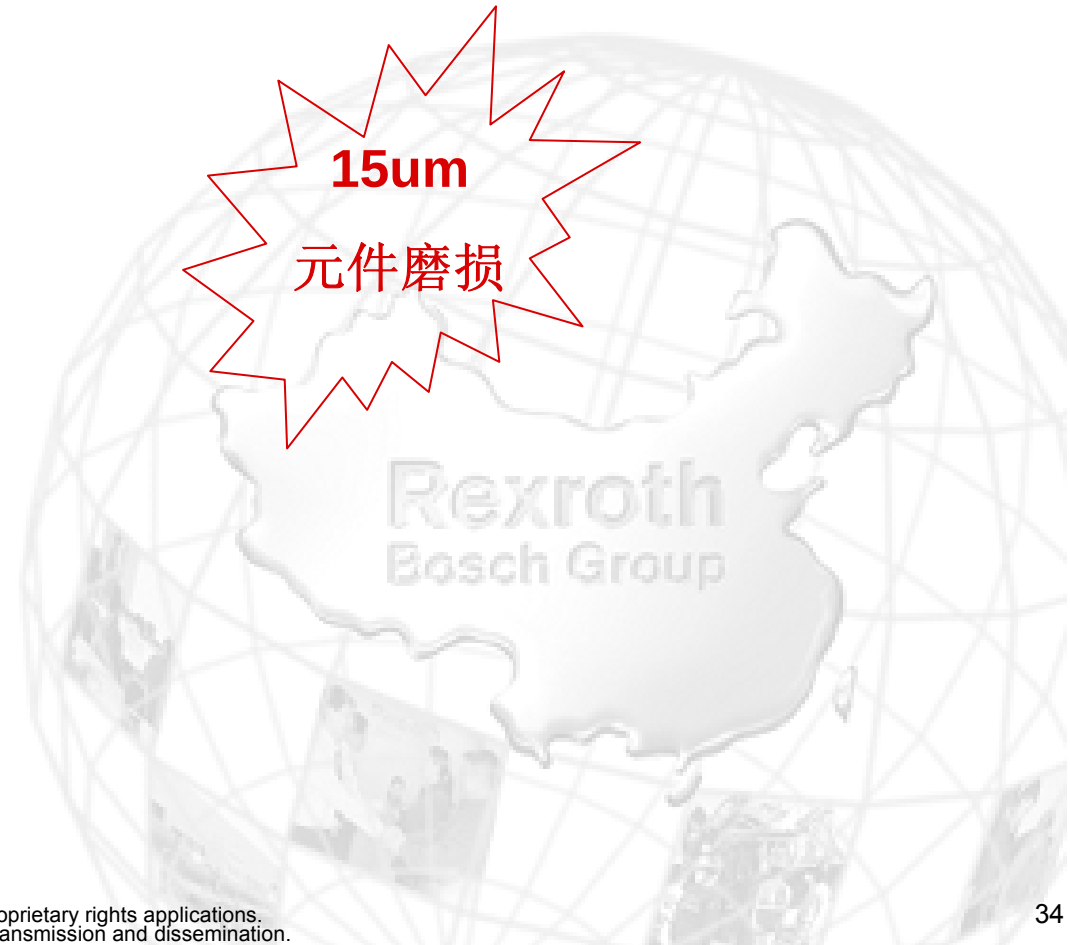
系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10



两种尺寸的颗粒危害最大



未来在我们手中

The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

不同清洁度液压油比较

油桶里新的液压油



ISO4406 22/20/18 级
(NAS12级)

新油液是不
干净的

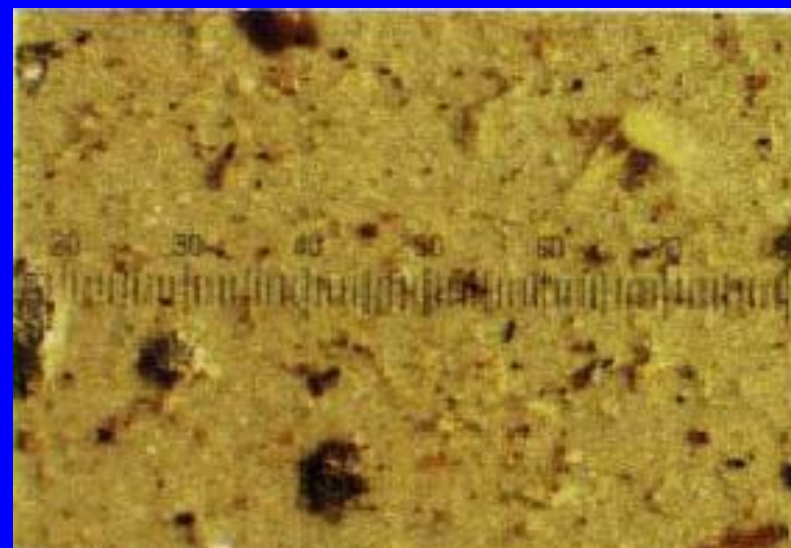
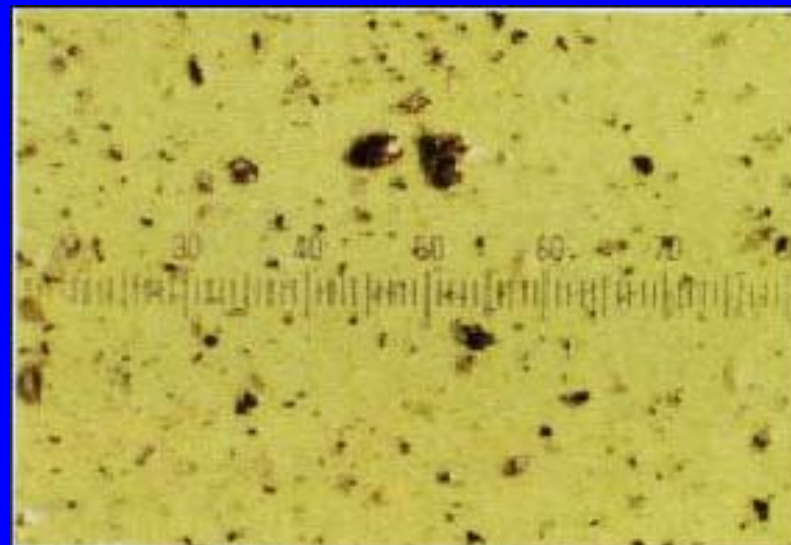
新安装系统内的污染



ISO4406 23/22/20
(大于NAS12级)

未来在我们手中

The Future
is in **our hands**



系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

不同清洁度液压油比较

经常规过滤器过滤的液压油 

ISO4406 20/18/16

(NAS 9级)

柱塞泵和
马达的最
低要求

经过 $\beta_3 > 200$ 的精过滤器 

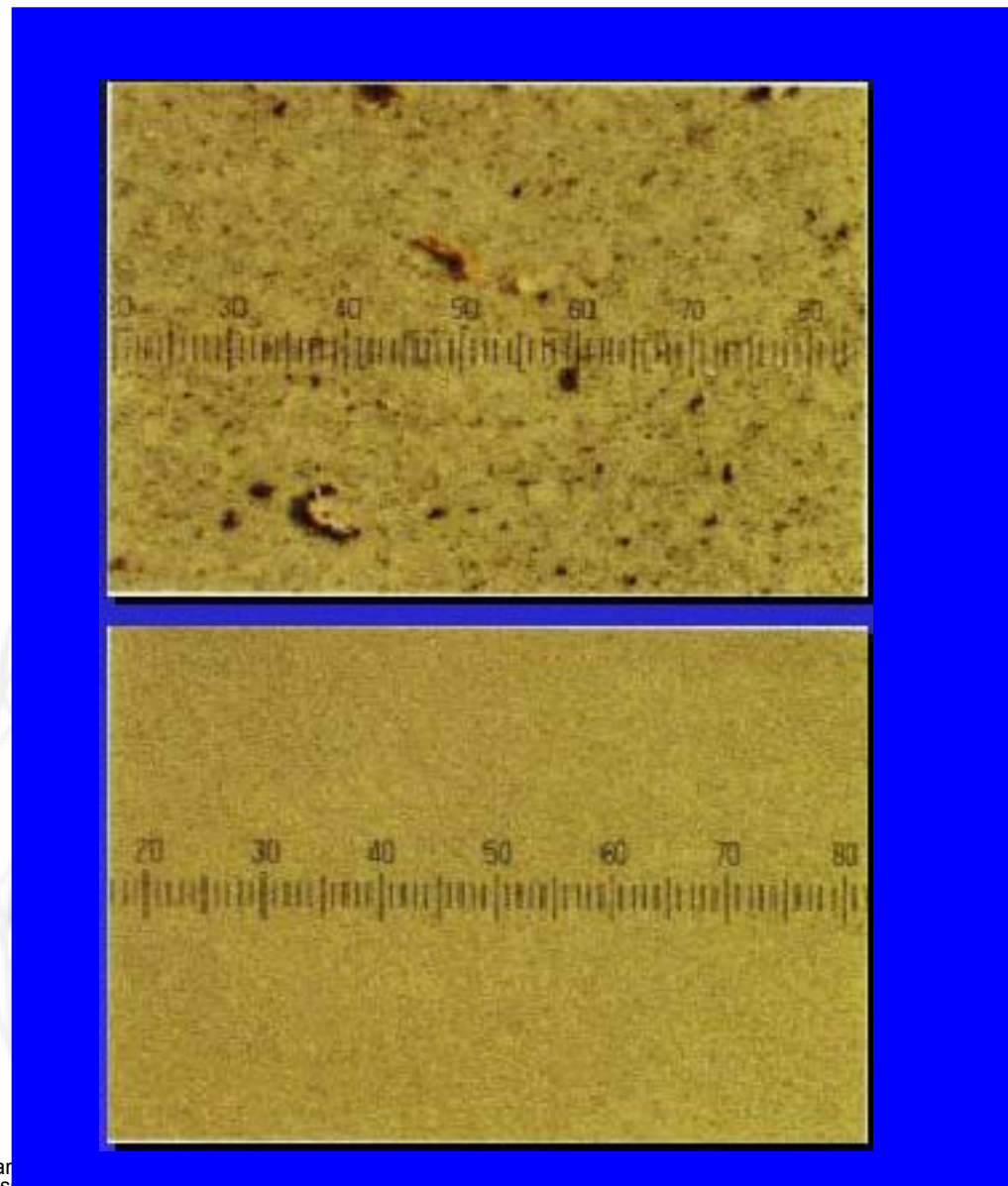
过滤的油液

ISO4406 14/13/11

(NAS4级)

未来在我们手中

The Future
is in **our hands**



系统油液清洁度的控制

Rexroth
Bosch Group

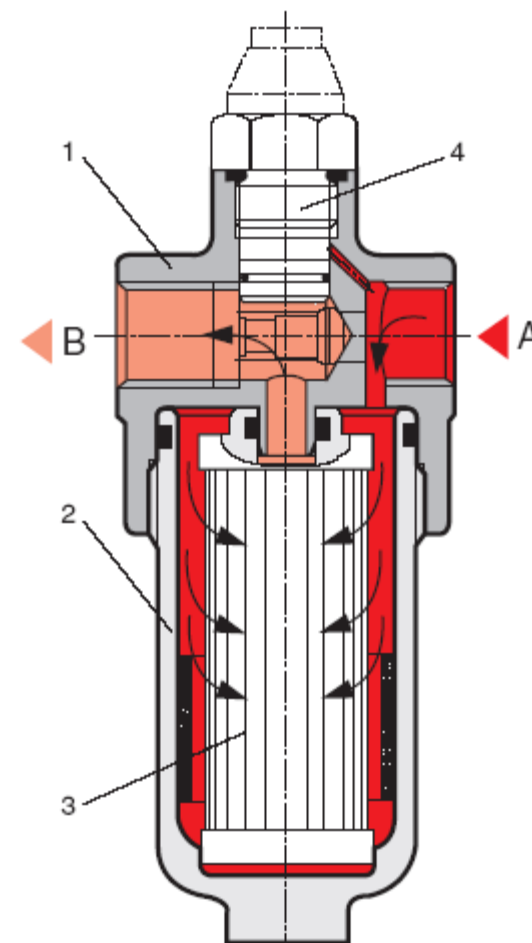
DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

衡量过滤器的三大指标

👍 过滤精度

👍 压差特性

👍 纳污能力



未来在我们手中

The Future
is in our hands

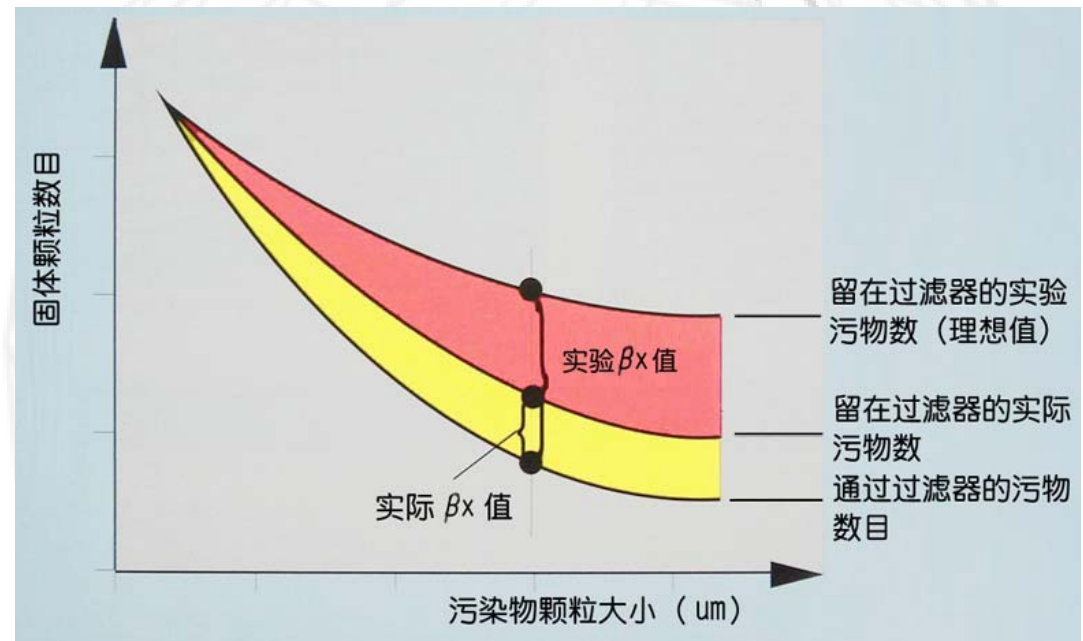
© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

过滤精度

- 📖 反应的是过滤器对不同直径颗粒的过滤能力
- 📖 为检验其性能，人为规定的指标；是在特定的条件下通过试验测得的；
- 📖 这一指标越高，其过滤能力越强；但它无法表征出过滤器在系统中的真实净化能力（受多种因素影响）

国际通用的过滤精度表示方法

$\beta_x = 75$ 的X值



未来在我们手中

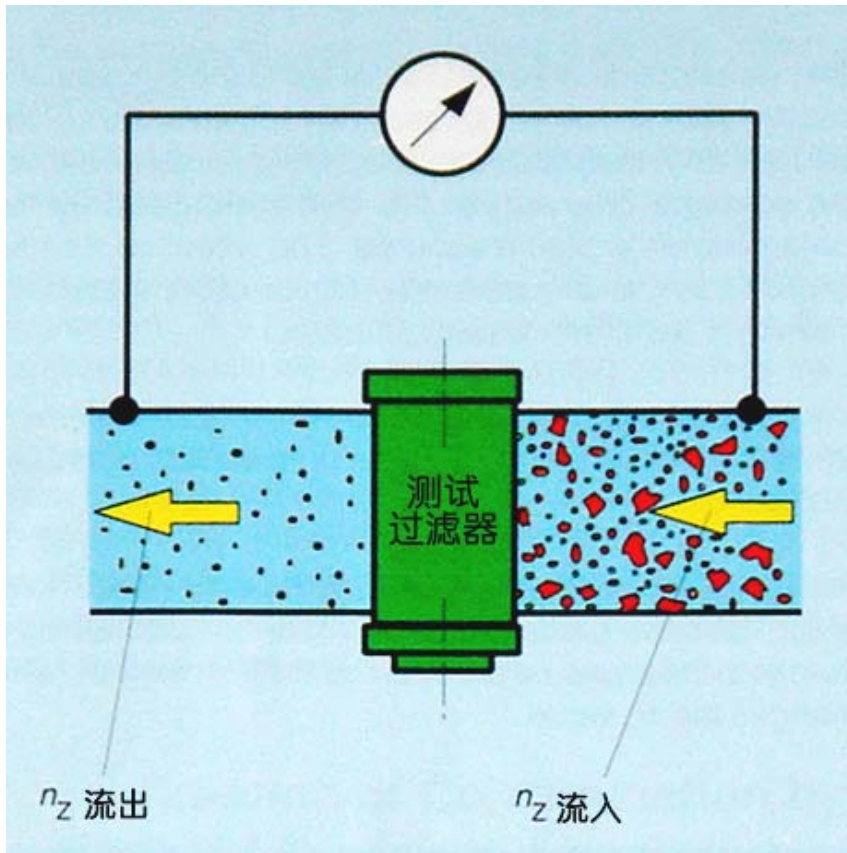
The Future
is in our hands

系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

过滤精度



1000 颗粒
 $\geq 10 \mu\text{m}/100\text{ml}$
 $= 0,08 \text{ mg/l (ACFTD)}$

100 000 颗粒
 $\geq 10 \mu\text{m}/100\text{ml}$
 $= 10 \text{ mg/l (ACFTD)}$

$$\beta_x = \frac{n_{\text{流入} \geq X \mu\text{m}}}{n_{\text{流出} \geq X \mu\text{m}}}$$

数字例

$$\beta_{10} = \frac{100\,000}{1000} = 100$$

用 μm 表示的颗粒大小

$\beta_x = 2$ 50 % 过滤率

$\beta_x = 20$ 95 % 过滤率

$\beta_x = 75$ 98,6 % 过滤率

$\beta_x = 100$ 99 % 过滤率 (绝对过滤 (滞留) 率)

未来在我们手中

The Future
is in our hands

系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

过滤精度举例

平均过滤比	2	10	75	100	200	1000
颗粒尺寸	-	7.80	13.7	14.6	15.9	18.7

该过滤器的精度为：14 μm

油液的清洁度

≠

过滤器精度

两者没有一一对应的关系

未来在我们手中

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

压差特性

📖 进出口的压力差，是油液黏度、流量、孔径、孔形状、过滤面积的函数

📖 压差越小越好

未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

纳污能力

- 📖 进出口的压力达到极限压差时，过滤器吸纳的污物的量；
- 📖 它是衡量过滤器寿命的重要指标

过滤器的滤芯不可以清洗，只能更换

未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

系统油液清洁度的控制

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

保证油液清洁度建议

- 👉 安装前所有管路进行清洗；
- 👉 油箱内一般不要涂油漆，安装前仔细去除焊渣，用面沾，最好采用不锈钢油箱；
- 👉 换油时要彻底清洗油箱和管路，加油时采用过滤精度10um的滤油机加注；
- 👉 吸油管、泄油管、回油管要正确安装（方法参考前面）；必要时可在系统的高处设置放气阀；
- 👉 保证油箱温升不超过液压油规定，一般不得超过70度（超过80度后，每增加10度，元件损坏的速度呈指数级增加）；
- 👉 及时更换不良密封（防止系统进气），及时更换水冷却器等（防止系统进水）；



未来在我们手中

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A4VG180EP泵故障诊断

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

泵异响

- a> 油液不足；吸油不畅
- b> 磨损严重，内泄过大；
- c> 系统排气不彻底；
- d> 联轴器安装不合适；

泵工作无压力或流量异常

- a> 电气故障（电磁阀未能送上电）
- b> 补油压力异常（补油溢流阀卡滞，补油泵磨损）
- c> 磨损，内泄过大；
- d> 切断压力设定不合适（或切断阀芯被异物卡住）
- e> 马达工作异常造成（马达磨损，冲洗阀异常）



未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

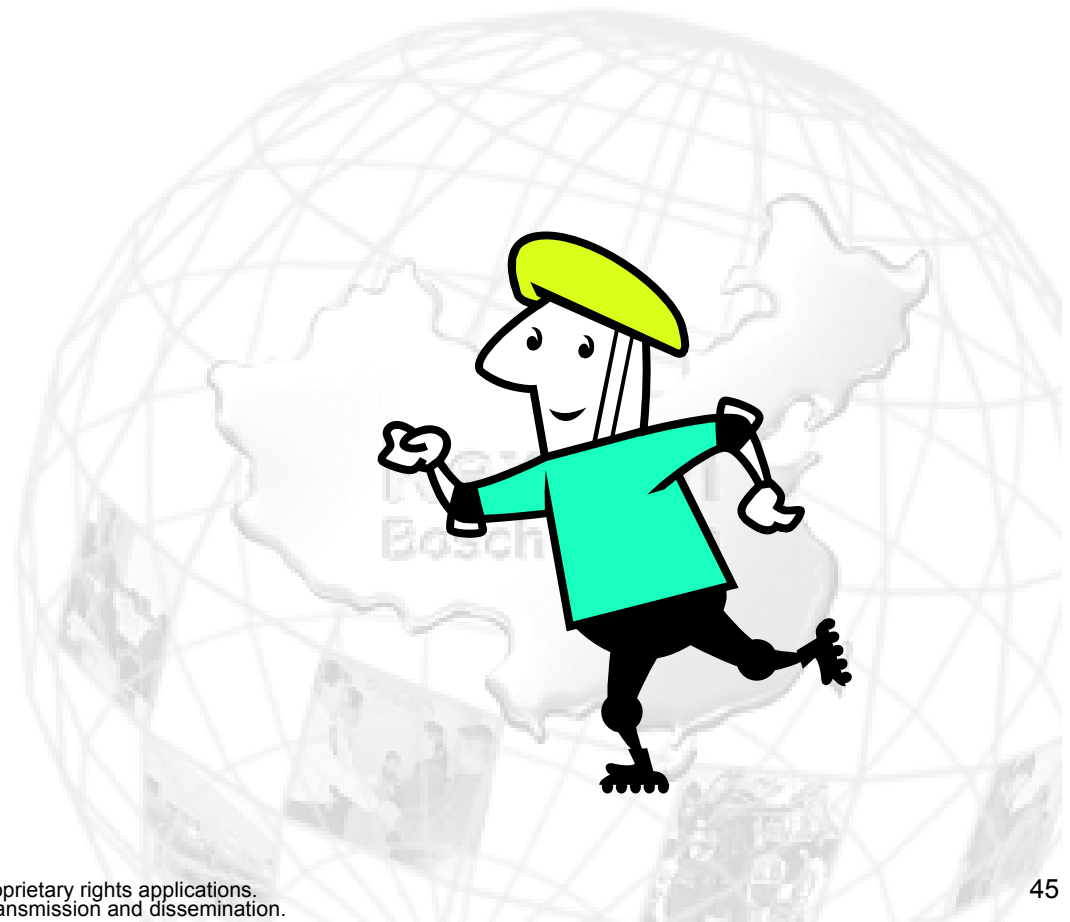
A4VG180EP泵故障诊断

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

💣 泵壳体温度过高

- a> 内泄，泄油管堵塞；
- b> 磨损；
- c> 溢流阀故障；



未来在我们手中
The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达故障诊断

Rexroth
Bosch Group

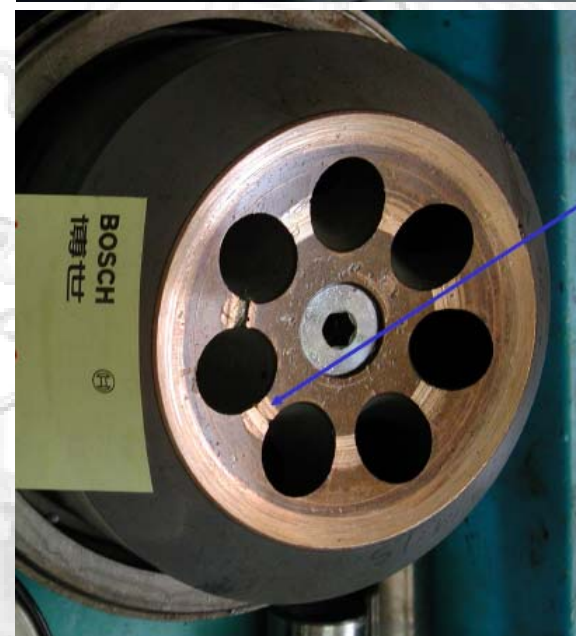
DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

💣 马达异响

- a> 油液不足;
- b> 磨损严重, 内泄过大;
- c> 超速;
- d> 过载, 溢流阀溢流;
- e> 制动响声;

💣 马达工作无力或压力异常

- a> 磨损内泄过大;
- b> 溢流压力设定不合适 (或阀芯被异物卡住)
- c> 泵工作异常造成;



未来在我们手中

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

A6VM160EP马达故障诊断

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

💣 马达无法变排量

- a> EP阀电器故障;
- b> 控制油路堵塞;
- c> 变量机构卡滞;
- d> 变量活塞密封磨损;

💣 马达壳体温度过高

- a> 内泄, 泄油管堵塞;
- b> 磨损;
- c> 排量选择不合适, 过小;



未来在我们手中

The Future
is in **our hands**

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

问题讨论

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10



未来在我们手中

The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.

结束

Rexroth
Bosch Group

DCCN/SVH-001-PR-F15
Edition: 1 2009-12-10

Thank you for your attention!



The Future
is in our hands

© All rights reserved by Bosch Rexroth AG, even and especially in cases of proprietary rights applications.
We also retain sole power of disposal, including all rights relating to copying, transmission and dissemination.