

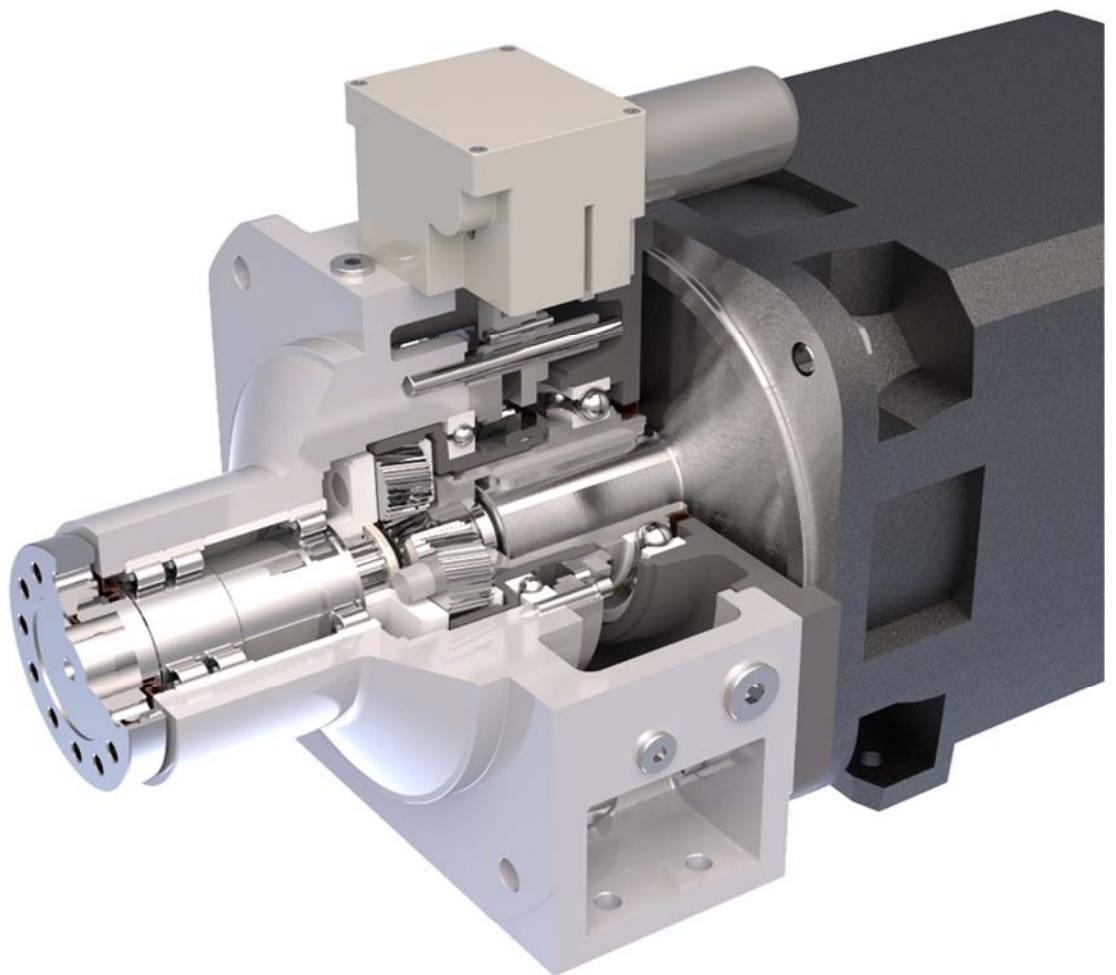


BARUFFALDI

MACHINE TOOL COMPONENTS

2-Speed Planetary Gearboxes **Guide**

雙速行星齒輪箱產品型錄



The Partner for Machine Tool Builders

WWW.BARUFFALDI.IT

台灣區總代理-璽利有限公司

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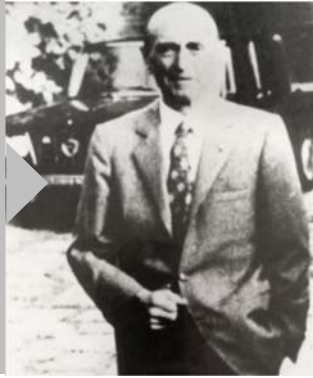


Rev. 02/2023

1927

創立

Baruffaldi 是由
Cesare Boffelli
在 1927 年
於義大利米蘭創立



Eng. Cesare Boffelli

1932

摩托車

公司於 1930 年代開始生產
摩托車煞車



Motorcycle "Certum" '30s

1955

剎車和離合器

在 1950 年代，Baruffaldi 擴
大了其業務領域，為多種工
業應用製造煞車和離合器



Baruffaldi Catalog '50s

1972

工程車

憑藉煞車和離合器方面的高
科技知識，該公司成為卡車
製造商的合作夥伴



Fiat Truck '70s

1975

工具機

1970 年代，它開始為工具機
產業生產自動刀塔等零件



PPL "Galaxy" Lathe '70s

1984

農業與紡織

公司進軍農機、紡織機械業



Agricultural Tractor '80s '70s

2007

新的製造工廠

Baruffaldi 對公司進行了重
組，在米蘭地區設立了新的
製造工廠。
總覆蓋面積為 25.000 平方米



Baruffaldi production units

2013

減速機

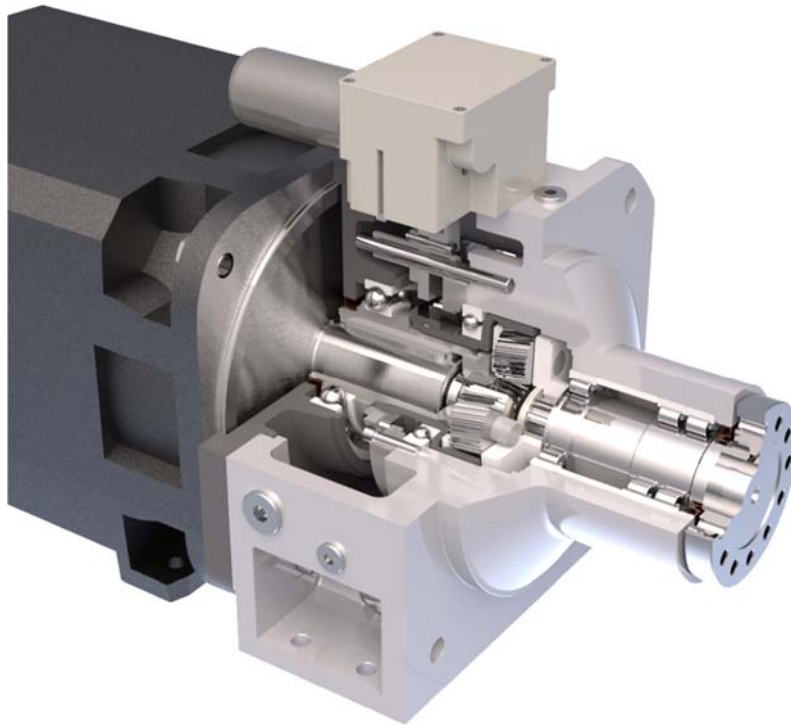
Baruffaldi 設計了新的
2 階和 3 階減速機系列，
適用於食品機械等各種應用



Baruffaldi Decanter Reducers

2- speed planetary gearboxes – CE Series

雙速行星齒輪箱 – CE 系列



Two speed gearboxes are commonly used on machine tools main spindles together with variable speed motors, aiming to extend the constant power field offered by the motor and to increase torque at low speeds.

By using Baruffaldi two speed gearboxes, production flexibility of the machine is increased without affecting precision: high torque is available for hard materials machining and high speed for soft materials.

Main characteristics:

- High functioning speed
- Reduced noise values
- Extension of the constant power range of electric motors
- Fast preparation by connecting a tested series product to a series motor
- High belt tension allowed
- Reduced overall dimensions
- Vibrations and heat considerably reduced near the spindle line due to the decentralization of the driving unit
- Possibility to select a proper lubrication system according to the application

The advantages are:

- Increased spindle motor constant power range
- Increased machine production capacity while maintaining excellent precision
- Possibility to cut soft materials at very high speed and to provide high cutting forces for hard materials machining

雙速齒輪箱被廣泛運用在工具機的主軸與變速馬達上，以擴展馬達提供的持續功率和增加低轉速時的扭力。

使用 Baruffaldi 的雙速齒輪箱可以在不影響精確度的前提下提高機工具機的生產彈性：可提供高扭矩給高硬度材料加工及對軟性材料的高速加工。

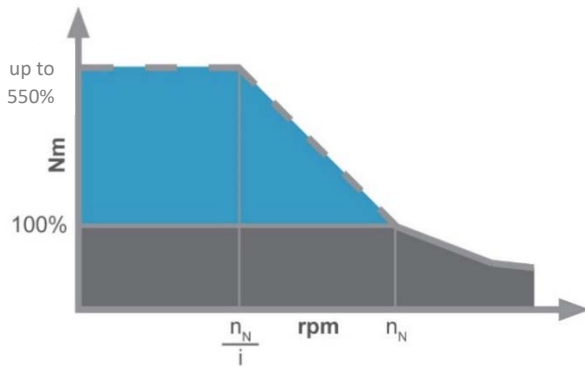
產品特性:

- 高轉速
- 低噪音
- 擴展馬達的額定功率範圍
- 安裝簡易
- 可承受高皮帶拉力
- 可減少整體體積
- 可分散加工時產軸心附近產生的震動與熱
- 根據需求選擇潤滑方式

產品優勢:

- 提升主軸馬達額定功率範圍
- 提升機械性能並維持絕佳的精度
- 可高速切削軟質材料，並提供加工硬質材料時需要的高切削力

Torque / 扭力

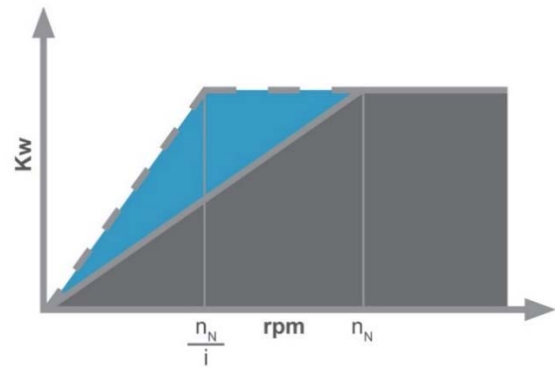


Motor torque increase up to 500% (i=5)
馬達扭力增加 500% (i=5)

Extended range $i > 1$ (low speed)
延伸範圍 $i > 1$ (低速)

$i = 1$ (high speed)
 $i = 1$ (高速)

Power / 功率



Motor constant power range is this increased
馬達持續功率範圍增加

Motor gearbox assembly in $i = 1$ (high speed)
速比等於 1 時，馬達功率 (高速)

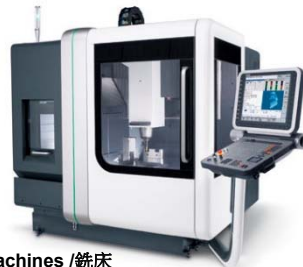
Motor gearbox assembly in $i > 1$ (low speed)
速比大於 1 時，馬達功率 (低速)

2- speed planetary gearboxes – Applications

雙速行星齒輪箱 – 應用範例



Horizontal turning machines / 臥式車床



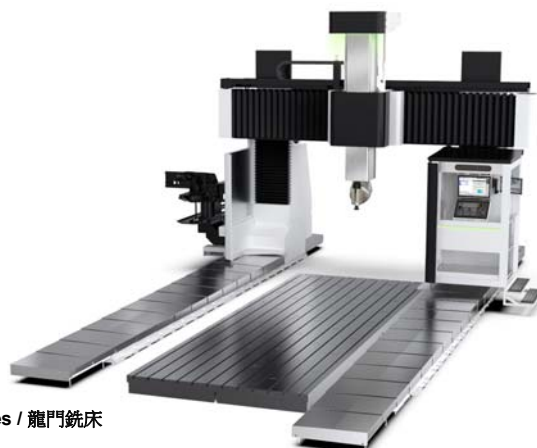
Milling machines / 銑床



Vertical turning machines / 立式車床



Horizontal milling machines / 臥式磨床



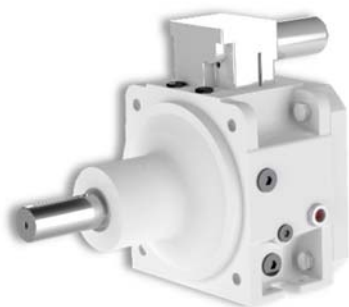
Vertical milling machines / 龍門銑床

2- speed planetary gearboxes – Types

雙速行星齒輪箱 – 型式

CE – 法蘭輸出

適用於具有皮帶輪和高徑向負載的應用的標準輸出解決方案。
法蘭直徑依齒輪箱尺寸而定。

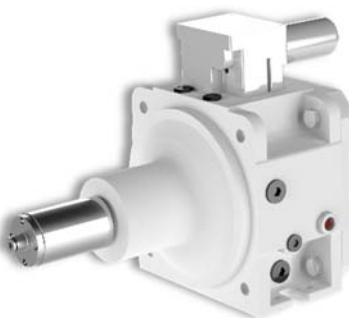
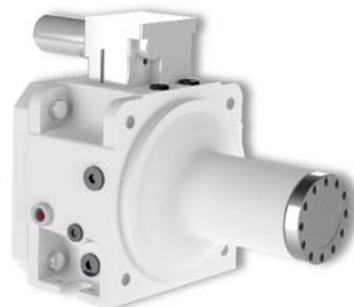


CE – 軸輸出

適用於低和中等徑向負荷的應用。
多種輸出軸版本：普通軸、1 個鍵槽、2 個鍵槽、長軸、短軸等。

CE – 長頸

具有高剛性的長輸出頸，適用於長皮帶輪和高徑向負荷的應用。

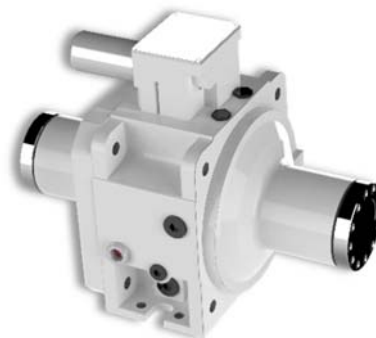


CE CTG – 中心出水齒輪箱

適用於直結輸出且中心出水。
有輸出端含或不含旋轉接頭等不同版本。

CEA – 輸入+輸出

適用於皮帶輸入的齒輪箱。
多種輸出方式可選：法蘭輸出、軸輸出和其他



2-speed planetary gearboxes – Advantages

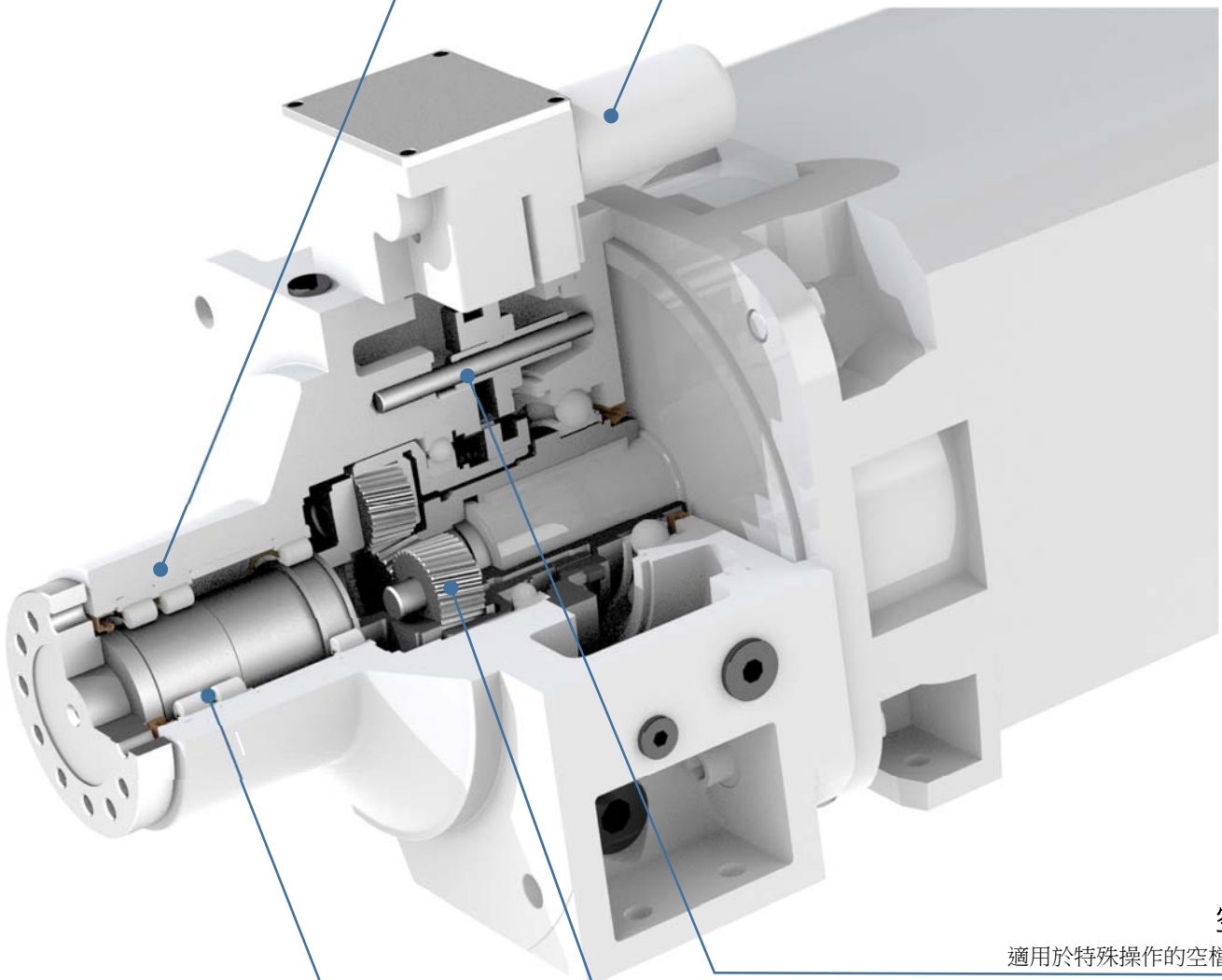
雙速行星齒輪箱-優點

結構

堅固的一體式外殼，具有更高的鋼性和更少的振動

換檔機構

可靠的換檔機構含 DC 馬達 (非電磁式結構)



空檔

適用於特殊操作的空檔選擇

齒輪

更強壯的齒輪，更大的模數和面寬
提供更高的齒輪箱負載扭力

輸出軸承

額外的輸出軸承適用於高皮帶張力
斜角接觸軸承用於軸向負載應用

2- speed planetary gearboxes – Sizes & Performance

雙速行星齒輪箱 – 型號 & 性能

Size	Model	S1 TORQUE	NOMINAL POWER	MAX SPEED
SMALL SIZE	CE11	120Nm	19Kw	8000rpm
	CE12	140Nm	22Kw	8000rpm
	CE13	250Nm	40Kw	7000rpm
MEDIUM SIZE	CE13+	300Nm	47Kw	7000rpm
	CE14	325Nm	51Kw	6300rpm
	CE15	400Nm	55Kw	6300rpm
BIG SIZE	CE16	450Nm	60Kw	5000rpm
	CE18	600Nm	63Kw	5000rpm
	CE20	800Nm	84Kw	5000rpm

Technical data / 技術資料

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2-speed planetary gearboxes – Technical data

雙速行星齒輪箱 - 技術資料

Size 型號		CE11		CE12		CE13			CE13+		CE14			
Ratio 速比		i=4	i=4.48	i=4	i=5	i=4	i=4.4	i=4.9*	i=4	i=5.5*	i=4	i=5	i=5.5	
Nominal power 額定功率	Kw	19	19	22	22	40	40	40	47	41	51	44	44	
Nominal speed 額定轉速	RPM	1500												
Nominal input torque 額定輸入扭矩	S1 Nm	120	120	140	140	260	260	260	300	260	325	280	280	
	S6 Nm	150	150	160	160	400	400	400	400	400	400	400	400	
Nominal output torque 額定輸出扭矩	Nm	480	540	560	700	1040	1144	1280	1200	1430	1300	1400	1540	
Max input speed 最大輸入轉速	RPM	8000				7000				6300				
Max permitted input speed*** 最大允許輸入轉速***	RPM	10000									8000			
Mass moment of inertia 質量慣性矩	i=1 (kgcm ²)	134		189		310			315		624			
	output	400	400	378	550	1136	1355	1570	1168	2117	1408	2075	2450	
	input	25	20	23,6	22	71	70	68	73	70	96	90	87	
Max angular backlash 最大角度背隙	α Arcmin	25												
Max radial backlash 最大徑向背隙	X mm	0,03												
Max axial backlash 最大軸向背隙	Y mm	0,25												
Max vibration value 最大振動量	mm/s	1												
At test run speed 測試轉速	RPM	6000												
Weight ca. 重量	kg	45		65		80			88		90			
Oil Type 油品型式	Splash Lubr. 浸油潤滑	HLP68 as per ISO VG68												
	Forced Lubr. 強制潤滑	HLP46 as per ISO VG46												
	Forced lubr.** 強制潤滑**	HLP32 as per ISO VG32												
Oil fill volume**** 充油量****	dm ³	B5	0,6		1,1		2,1			2,8		3,1		
		V1	-		0,5		-			-		1,5		
Oil change interval**** 換油間隔****	h	5000												
Max oil temperature permitted 允許的最高油溫	°C	120												
Min. oil flow for forced lubr. 強制潤滑最少入油量	l/min	1,5												
Max thermal power to be removed 需移除的最大熱功率	Kw	2,5				2,8				3				

* CE13 1:4.9 準確速比 i=128/26 --- CE13+ 1:5.5 準確速比 i=144/26

**使用熱交換機的強制潤滑，根據ISO VG32或HLP32

***此速度僅在部分狀態適用，且客戶需事先提出需求

****僅用於浸油潤滑，大略數值；實際請參考油鏡液面

CE15			CE16		CE18		CE20	Size 型號	
<i>l=4</i>	<i>l=5</i>	<i>l=5.5</i>	<i>l=4</i>	<i>l=5</i>	<i>l=4</i>	<i>l=5</i>	<i>l=4</i>	Ratio 速比	
63	54	54	60	60	63	63	84	Kw	Nominal power 額定功率
1500			1250		1000			RPM	Nominal speed 額定轉速
400	340	340	450	450	600	600	800	S1 Nm	Nominal input torque 額定輸入扭矩
500	425	425	630	630	840	840	900	S6 Nm	
1600	1700	1870	1800	2250	2400	3000	3200	Nm	Nominal output torque 額定輸出扭矩
6300			5000					RPM	Max input speed 最大輸入轉速
-			-					RPM	***Max permitted input speed ***最大允許輸入轉速
680			1587		1630		2066	i=1 (kgcm ²)	Mass moment of inertia 質量慣性矩
1530	2660	2880	6208	9400	6256	9450	6896	output	
96	90	87	388	376	391	378	431	input	
≤ 25								α Arcmin	Max angular backlash 最大角度背隙
0,03								X mm	Max radial backlash 最大徑向背隙
0,25								Y mm	Max axial backlash 最大軸向背隙
1								mm/s	Max vibration value 最大振動量
6000			5000						At test run speed 測試轉速
95			190-230		200-230		205-240	kg	Weight ca. 重量
HLP46 as per ISO VG46			-					Splash Lubr. 浸油潤滑	Oil Type 油品型式
HLP46 as per ISO VG46								Forced Lubr. 強制潤滑	
HLP32 as per ISO VG32								**Forced lubr. **強制潤滑	
3,3			-					B5	****Oil fil volume ***充油量
1,5			-					V1	
5000								h	****Oil change interval ****換油間隔
120								°C	Max oil temperature permitted 允許的最高油溫
1,5			3					l/min	Min. oil flow for forced lubr. 強制潤滑最少入油量
3,2			4		5,5		6,5	Kw	Max thermal power to be removed 需移除的最大熱功率

* CE13 1:4.9 準確速比 i=128/26 --- CE13+ 1:5.5 準確速比 i=144/26

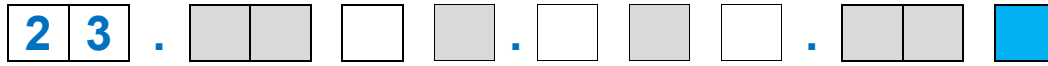
**使用熱交換機的強制潤滑，根據ISO VG32或HLP32



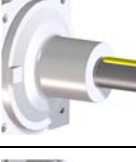
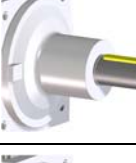


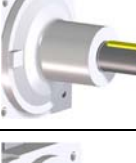
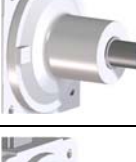

***此速度僅在部分狀態適用，且客戶需事先提出需求

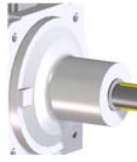








****僅用於浸油潤滑，大略數值；實際請參考油鏡液面

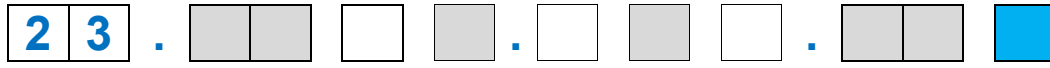
Gerabox product code / 齒輪箱訂購編碼

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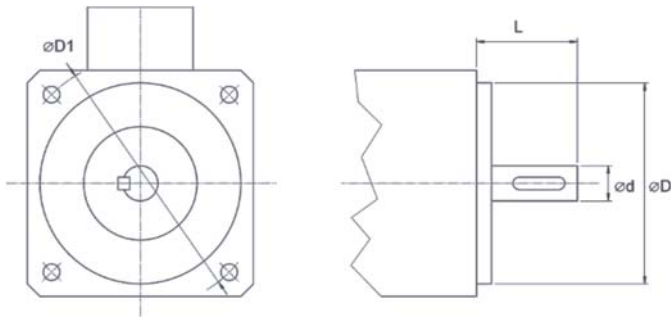


	Output unit 輸出形式	Code
	Flange 法蘭輸出 -CE 11 Ø 100 -CE 12 Ø 100 -CE 13 Ø 118 -CE 13+ Ø 130 -CE 14 Ø 118 (long neck Ø 130) -CE 15 Ø 130 (long neck Ø 130) -CE 16 Ø 140 -CE 18 Ø 150 -CE 20 Ø 180	1
	Shaft without keyway 無鍵-軸輸出 -CE 12 L= 80 Ød=42 k= — -CE 13 L=110 Ød=48 k= — -CE 13+ L=110 Ød=55 k= — -CE 14 L=110 Ød=55 k= — -CE 15 L=110 Ød=55 k= — -CE 16 L=140 Ød=65 k= — -CE 20 L=140 Ød=65 k= —	3
	Shaft - one keyway 單鍵-軸輸出 -CE 11 L= 80 Ød=42 k= 70 -CE 12 L= 80 Ød=42 k= 70 -CE 13+ L=110 Ød=55 k= 100 -CE 14 L=110 Ød=55 k=100 -CE 15 L=110 Ød=55 k=100 -CE 16 L=140 Ød=65 k=125 -CE 20 L=140 Ød=65 k=125	2
	Shaft - one keyway 單鍵-軸輸出 -CE 13 L=110 Ød=48 k= 90	D
	Shaft - double keyway 雙鍵-軸輸出 -CE 13 L=110 Ød=48 k= 90 -CE 13+ L=110 Ød=55 k=100 -CE 14 L=110 Ød=55 k=100 -CE 15 L=110 Ød=55 k=100 -CE 16 L=140 Ød=65 k=125	6
	Special Long shaft without keyway* 無鍵-長軸輸出* -CE 13+ L=128 Ød=55 k= — -CE 14 L=128 Ød=55 k= — -CE 15 L=128 Ød=55 k= —	5
	Special long shaft - one keyway* 單鍵-長軸輸出* -CE 13+ L=128 Ød=55 k=125 -CE 14 L=128 Ød=55 k=125 -CE 15 L=128 Ød=55 k=125 -CE 20 L=160 Ød=65 k=125	4
	Special short shaft without keyway* 無鍵-短軸輸出* -CE 13 L= 70 Ød=42 k= — -CE 13+ L= 70 Ød=42 k= — -CE 14 L= 70 Ød=42 k= — -CE 15 L= 70 Ød=42 k= —	8
	Special short shaft - one keyway* 單鍵-短軸輸出* -CE 13 L= 70 Ød=42 k=60 -CE 13+ L= 70 Ød=42 k=60 -CE 14 L= 70 Ød=42 k=60 -CE 15 L= 70 Ød=42 k=60 -CE 16 L=140 Ød=65 k=125 -CE 20 L=140 Ød=65 k=125	7

	Output unit 輸出形式	Code
	Special short shaft - double keyway* 雙鍵-短軸輸出* -CE 13 L= 70 Ød=42 k=60	9
	Special Flange* 特殊法蘭輸出* -CE13+ Ø 118	F
	Special Big shafts without keyway* 無鍵-特殊大軸輸出* -CE 13 L=110 Ød=55 k= 100 without key	M
	Special big shaft - one keyway* 單鍵-特殊大軸輸出* -CE 13 L=110 Ød=55 k= 100 with keyway	A
	Special big shaft - double keyway* 雙鍵-特殊大軸輸出* -CE 13 L=110 Ød=55 k= 100 with 2 keyway	B
	Special short shaft without keyway (tol. k6)* 無鍵-特殊短軸輸出(k6 公差)* CE13 L=70 Ød=42	H
	Special short shaft with double key (tol. k6)* 雙鍵-特殊短軸輸出(k6 公差)* CE13 L=70 Ød=42 k=60	L
	Special big shaft without key (tol. k6)* 無鍵-特殊大軸輸出(k6 公差)* CE13+ L=110 Ød=55	G
	Special big shaft with double key (tol. k6)* 雙鍵-特殊大軸輸出(k6 公差)* CE13+ L=110 Ød=55 k=100	K



Motor dimensions provided by the manufacturer
馬達製造商提供的尺寸



CE11				
Motor Code 馬達編碼	Diameter 直徑	Lenght 長度	Centering 承靠圓 直徑	Pitch holes 對角螺絲孔 直徑
	d	L	D	D1
0	38	80	180	215
1	32	80	180	215
2	42	110	250	300
3	48	110	180	215
4	48	110	230	265
5	48	110	250	300
7	42	110	230	265
8	38	80	230	265
A	42	113	114,3	200
B	48	110	150	185

CE12				
Motor Code 馬達編碼	Diameter 直徑	Lenght 長度	Centering 承靠圓 直徑	Pitch holes 對角螺絲孔 直徑
	d	L	D	D1
0	38	80	180	215
1	38	80	230	265
2	42	110	250	300
3	48	110	180	215
4	48	110	230	265
5	48	110	250	300
6	28	60	180	215
7	42	110	230	265
8	32	80	180	215
A	55	110	230	265
E	55	110	250	300
F	35	79	114,3	200
G	42	110	180	215

CE13 - CE13+				
Motor Code 馬達編碼	Diameter 直徑	Lenght 長度	Centering 承靠圓 直徑	Pitch holes 對角螺絲孔 直徑
	d	L	D	D1
0	42	110	250	300
1	55	110	230	265
2	55	110	300	350
3	60	140	300	350
4	48	110	250	300
5	48	110	230	265
6	55	110	250	300
7	42	110	300	350
8	42	110	230	265
A	55	110	280	325
B	60	140	350	400 (\varnothing_{ext} 450-8 holes)
C	48	110	300	350

CE14 - CE15				
Motor Code 馬達編碼	Diameter 直徑	Lenght 長度	Centering 承靠圓 直徑	Pitch holes 對角螺絲孔 直徑
	d	L	D	D1
0	42	110	250	300
1	55	110	230	265
2	55	110	300	350
3	60	140	300	350
4	48	110	250	300
5	48	110	230	265
6	55	110	250	300
7	38	80	230	265
8	42	110	230	265
A	48	110	300	350
B	60	140	350	400 (\varnothing_{ext} 450-8 holes)
C	60	140	350	400 (\square 370-4 holes)
D	60	140	300	400

CE16 - CE18 - CE20				
Motor Code 馬達編碼	Diameter 直徑	Lenght 長度	Centering 承靠圓 直徑	Pitch holes 對角螺絲孔 直徑
	d	L	D	D1
0	60	140	300	350
1	65	140	350	400
2	75	140	450	500
3	80	170	350	400
4	75	140	300	350
5	65	140	450	500
6	70	140	350	400
7	55	110	300	350
8	65	140	300	350
A	65	140	300	350
B	60	140	350	400
C	75	140	350	400

Other input solutions can be provided for special motors on demand.
如有特殊馬達，可根據客戶需求訂製。

Main motor specifications

馬達規格

The motors applied to the gearbox should comply with the following specifications:

- Size and power admitted by the gearbox
- Motor form **V1/V3 (with flange and without feet)** for vertical installation position (DIN 42950)
- Motor form **B35 (with flange and feet)** for horizontal installation position (DIN 42950)
- Construction Tolerances according to **DIN 42955-R**
- Vibration level **R**
- Motor with Seal on the shaft (the gearbox seal can have a small normal leakage over time that is drained outside the motor flange)

Coupling between motor and gearbox can be achieved by means of a clamping unit or by a key:

- When using a clamping unit, motor shaft is plain thus self-balanced
- When using a key, motor shaft can be balanced with half key or full key. In this case it is mandatory to state the motor shaft balancing convention (indicated by the motor manufacturer) so that we can supply a properly balanced pinion.

When ordering you need to indicate the way the motor shaft has been balanced:

齒輪箱所用馬達應符合下列規格：

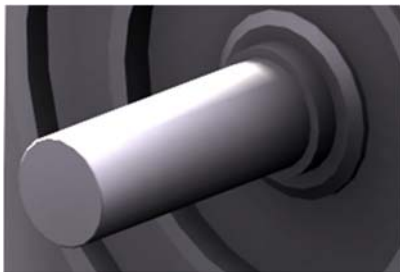
- 齒輪箱允許的尺寸和功率
- V1/V3 型馬達（含法蘭，不含底腳），適用於垂直安裝位置 (DIN 42950)
- B35 型馬達（法蘭和腳），用於水平安裝位置 (DIN 42950)
- 結構公差符合 DIN 42955-R
- 振動等級 R
- 軸上帶有密封件的馬達（隨著時間的推移，齒輪箱密封件可能會出現少量的正常洩漏，該洩漏會從馬達法蘭外部排出）

馬達和齒輪箱之間的結合可以透過夾緊裝置或鍵來實現：

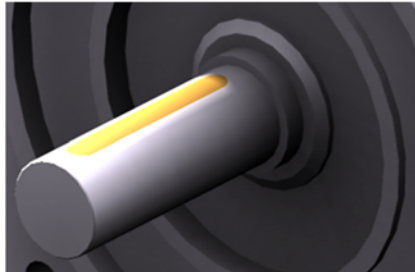
- 使用夾緊裝置時，馬達軸是光滑的，因此可以自我平衡
- 使用鍵時，馬達軸可用半鍵平衡或全鍵平衡。這邊說的半鍵平衡或全鍵平衡是指動平衡的方式（由馬達製造商指定），以便我們可以提供適當平衡的軸套。

訂購時，您需要註明馬達軸的平衡方式：

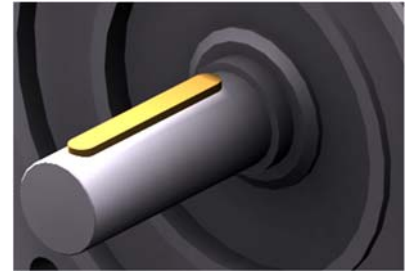
0- Plain (no key) / 光軸



1- Half key / 半鍵動平衡



2- Full key / 全鍵動平衡

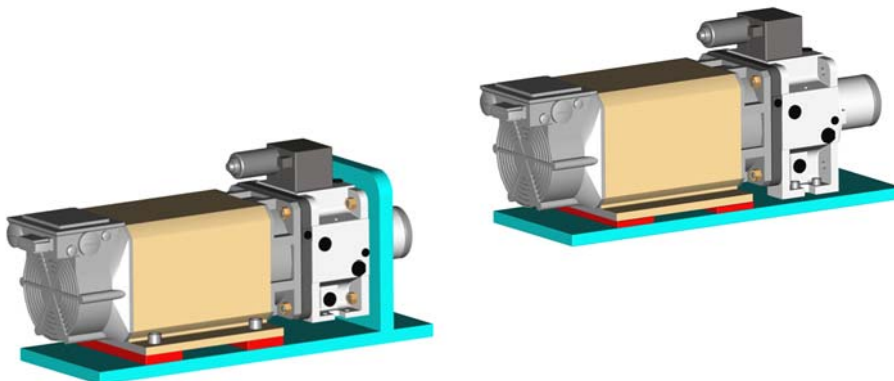


In case of horizontal assembling position, we suggest to additionally support the motor on its feet with using shims (as shown in red colour in the pictures below) to be adapted.

This is useful in order to reduce bending and vibrations.

如果是水平安裝位置，建議在馬達腳上加墊片（如下圖紅色所示）進行適配。

可有效減少彎曲和振動。



Positioning and Lubrication / 安裝方式與潤滑

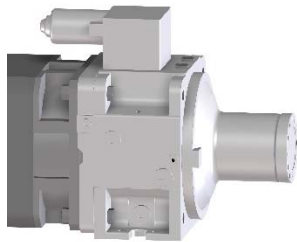
BARUFFALDI

Assembling position and lubrication

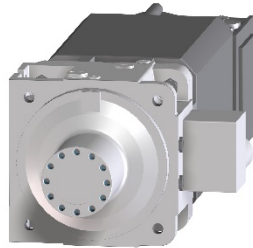
安裝方式與潤滑

The lubrication system is chosen according to the gearbox model, the working speed (RPM) and the different installation positions (assembling positions).

根據齒輪箱型號、工作轉速（RPM）和不同的安裝方式（組裝位置）來選擇潤滑系統。



OPP B5 Horizontal
水平安裝



OPS B5 Horizontal turned
水平側躺安裝



VFB V1 Vertical downward
垂直朝下安裝



VFA V3 Vertical upward
垂直朝上安裝

In order to evaluate the gearbox thermal conditions during working, it is strongly suggested to carry out tests with an ordinary working cycle. The amount of heat developed depends on gearbox turning speed and time.

為了評估齒輪箱工作時的發熱狀況，強烈建議以一般工作循環進行測試。

產生的熱量取決於齒輪箱的轉速和時間。

The gearbox can stand temperatures up to 120 °C (oil 110°C) without problems.

齒輪箱可以承受高達 120°C（油 110°C）的溫度。

All Baruffaldi gearboxes are designed for operation with inner pressure equal to outer (atmospheric) pressure.

所有 Baruffaldi 齒輪箱均設計用於在內壓等於外壓（1 大氣壓）的情況下運作。

Any overpressure will increase seals closing force thus causing a greater friction, higher heat production and early wear.

內壓過高將會對油封產生壓力導致增加摩擦力及廢熱提早磨損。

Any depressure will decrease seals closing force thus allowing oil leakage and internal pollution due to dust, fluids and so on.

內壓過低將使油封的密封性下降導致機油外漏及內部機構遭灰塵或液體等異物汙染。

According to the gearbox model and the assembling position, vent valves are supplied on the gearbox.

Make sure that the air orifice is not stuck.

齒輪箱洩壓閥會因箱型號及組裝位置不同而異。請確認氣孔通暢。


Suitable assembling positions for splash lubrication 適合浸油式潤滑的安裝方式			CE11	CE12	CE13/13+	CE14/15	CE16/18/20
Horizontal standard 標準水平安裝	maximum input speed up to 4500 rpm. 最大輸入轉速 4500 rpm.	B5 OPP	YES	YES	YES	YES	NO
Horizontal turned 水平側躺安裝	maximum input speed up to 4500 rpm. 最大輸入轉速 4500 rpm.	B5 OPS	YES	YES	YES	YES	NO
Vertical downward 垂直朝下安裝	maximum input speed up to 4500 rpm. 最大輸入轉速 4500 rpm.	V1 VFB VPB	NO	YES	NO	YES	NO
Vertical upward 垂直朝上安裝		V3 VFA VPA	NO	NO	NO	NO	NO

It is used in applications with frequent shiftings, speed changes, variable turning speeds and machine downtimes such as, for example, rest for tool changes.

潑濺潤滑適用於頻繁換檔、頻繁變轉速和常有加工間斷的狀況，如更換刀具

Splash lubrication with fixed amount of oil (see table below) is suitable only for applications with maximum input speed up to 4500 rpm and in the following assembling positions.

潑濺潤滑的油量如下表，潑濺潤滑只適用於最大輸入轉速低於4500rpm且下表所示的安裝方向

Assembling position 安裝方式		Approximate oil amount in litres / 大致油量(公升)							Oil level indicator / 油位鏡
		CE11	CE12	CE13	CE13+	CE14	CE15	CE16/18/20	
Horizontal 水平安裝	B5 OPP	0,6	1,1	2,1	2,8	3,1	3,3	NO	
Vertical downward 垂直朝下安裝	V1 VPB	NO	0,5	NO	NO	1,5		NO	

For CE 16-18-20 gearboxes and for vertical upward assembling position, splash lubrication is not allowed.

齒輪箱 CE 16-18-20 和 組裝位置為垂直向上時，不適用潑濺潤滑系統。

For such gearboxes and for all vertical upward assembling positions, only oil recirculating lubrication is allowed.

所有垂直朝上安裝的齒輪箱只適用於循環潤滑系統。

The oil for splash lubrication must have a viscosity according to **ISO VG 68**, must be compatible with seal elements, must have good resistance to aging and develop a high protection towards corrosion and wear.

用於浸油式潤滑的油必須具有符合 ISO VG 68 的黏度，必須與密封元件相容，必須具有良好的抗老化性，並具高抗老化及抗腐蝕的特性。

Fill the gearbox with oil until it reaches the middle of the oil sight-glass or the oil level sensor, when supplied.

為齒輪箱添加機油時將機油加至機油窺視孔或是機油感測器的一半。

The oil amount indicated on the technical information is an indicative value only.

技術資訊表上的機油量為參考值。

WARNING: whenever the gearbox is used in applications that may cause the development of a great amount of heat, recirculating lubrication should be used, whatever the assembling position is: long time rotation without gear change, high rotation speed, short downtimes and so on.

警告:

在以下使用狀況，由於齒輪箱容易產生高熱，不論何種安裝方向都應搭配循環式潤滑系統使用: 如，長時間使用高速檔、高轉速使用、短中斷時間的使用...等狀況。

TYPE OF LUBRICATION	OIL GRADE FOR / 油品等級
Splash lubrication 浸油式潤滑	HLP 68 as per ISO VG 68

Oil recirculating lubrication (forced lubrication)

循環潤滑 (強制潤滑)

Using oil recirculating lubrication, in any assembling positions, improves heat dissipation in the gearbox. In case of continuous use at high rotation speed and with short downtimes, oil recirculating lubrication is necessary.

In order to have a proper recirculating lubrication, there are different holes on the gearbox housing, to be used according to the different assembling positions and working conditions.

Please see "applications" section.

It is essential to avoid oil stagnation into the gearbox, that may cause overheating and reduce gearbox efficiency. Make sure that the air pipe or the breather are free.

In case of oil return by fall-down, follow the instructions on pipe type and dimension. Make sure that the oil input supply as well as the oil output supply (if a suction pump is used) are steady and in accordance with the required values.

Pay attention to the use of the service holes according to the different applications.

不論何種安裝方向，只要使用循環潤滑系統時，都會增加齒輪箱的散熱。在連續高速運轉及短中斷時間的狀況，需使用循環潤滑。

為了適應不同的安裝方式與使用狀況，齒輪箱上設置了多個不同孔位供安裝，請參考下一個章節。

需避免機油在齒輪箱內阻塞，機油阻塞會造成齒輪箱過熱和減少工作效率，確保排氣閥或洩壓閥暢通

如使用自然回流，請參考手冊的油管類型與管徑。確保入油與出油的量穩定且符合需求值。

不同的安裝方向有不同的出入油孔位，請特別注意。

TYPE OF LUBRICATION	OIL GRADE FOR / 油品等級:
Recirculating lubrication with intermediate tank 有中間油箱的循環潤滑	HLP 46 as per ISO VG 46
Rec. lub. with air-oil heat exchange 有空冷型油冷機的循環潤滑	HLP 32 as per ISO VG 32
Recirculating lubrication with cooling heat exchanger (chiller) 有冷卻機的循環潤滑	HLP 32 as per ISO VG 32

If the Oil tank is far from the gearbox, or the oil return pipe can't be straight, the use of a suction pump is strongly suggested.

The suction pump must have a capacity 30/50% more than the lubrication pump.

如果油箱離齒輪箱比較遠，或管線會彎折，強烈建議使用抽油幫浦進行抽油動作。

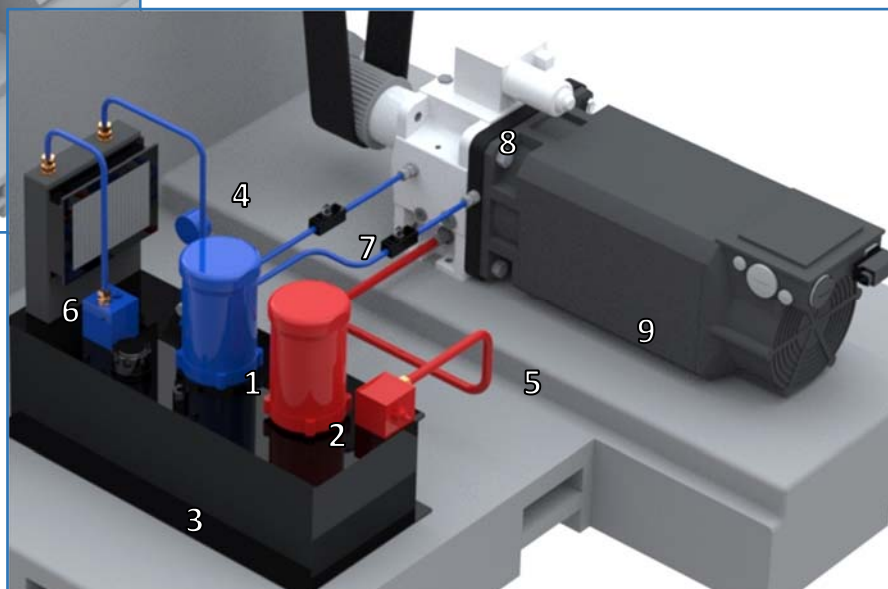
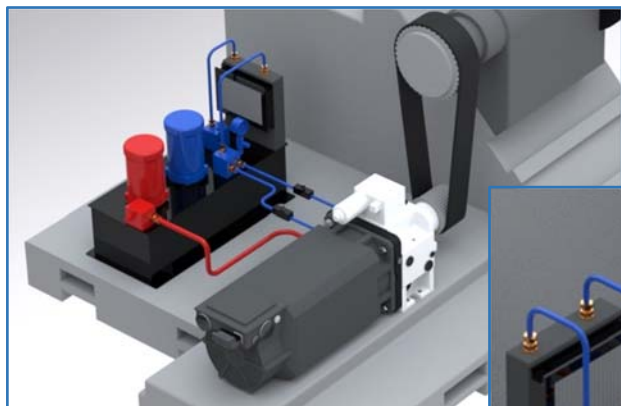
抽油幫浦的功率需要比供油幫浦大 30-50%。

- The oil tank must be placed in a ventilated and cold area
- The tank capacity should be at least 10 times the recirculating oil quantity
- Oil return pipe must be straight, avoiding bends (whenever possible)
- Oil return pipe by fall down diameter \varnothing min=20mm
- Oil back pressure in the return pipe from the gearbox must be avoided
- A 60 μ m filter and a pressure limitation valve should also be used as a safeguard
- **For continuous operation in direct drive, one gear change per hour is mandatory, with a short turning period in reduction ratio**

- 油箱必須放置在陰涼通風處。
- 油箱的容量至少為循環油量的10倍。
- 回油管應盡量避免彎折
- 自然回流的管徑至少為 20mm
- 需避免回油管線產生負壓
- 需設置60 μ m 的過濾器與限壓閥作為保護裝置
- 連續使用高速檔直接傳動時，每小時需必強制切換到低速檔短暫運行，以防止單點過度磨損。

EXAMPLE OF CE13 IN HORIZONTAL POSITION ON A TURNING MACHINE: FORCED LUBRICATION

CE13 水平安裝循環潤滑，應用在臥車的潤滑範例



1. Lubrication Pump 供油幫浦
2. Suction Pump 抽油幫浦
3. Tank 油箱
4. Input Pipes 入油管
5. Output Pipes 出油管
6. Air-Oil Heat Exchanger 油冷機
7. Flow Rate Switch 流量閥
8. Gearbox 齒輪箱
9. Motor 馬達

Gearbox size 齒輪箱規格		CE11/12	CE13/CE13+	CE14	CE15	CE16	CE18	CE20
Max thermal power to be removed* 最大需移除之熱功率	KW	2,5	2,8	3	3,2	4	5,5	6,5

Lubrication accessories

潤滑配件



Oil Level Sensor
23.1400.100.06

For applications with splash lubrication, we suggest to use an “oil level sensor” assembled on the gearbox, in order to monitor the oil level at the machine start up.

針對浸油潤滑的應用，為了監測機械啟動後的油位，我們建議在齒輪箱上安裝“油位感測器”。



Flow Rate Switch
996.002.01468.2 (1.5 l/min)
996.002.01468.2 (3 l/min)

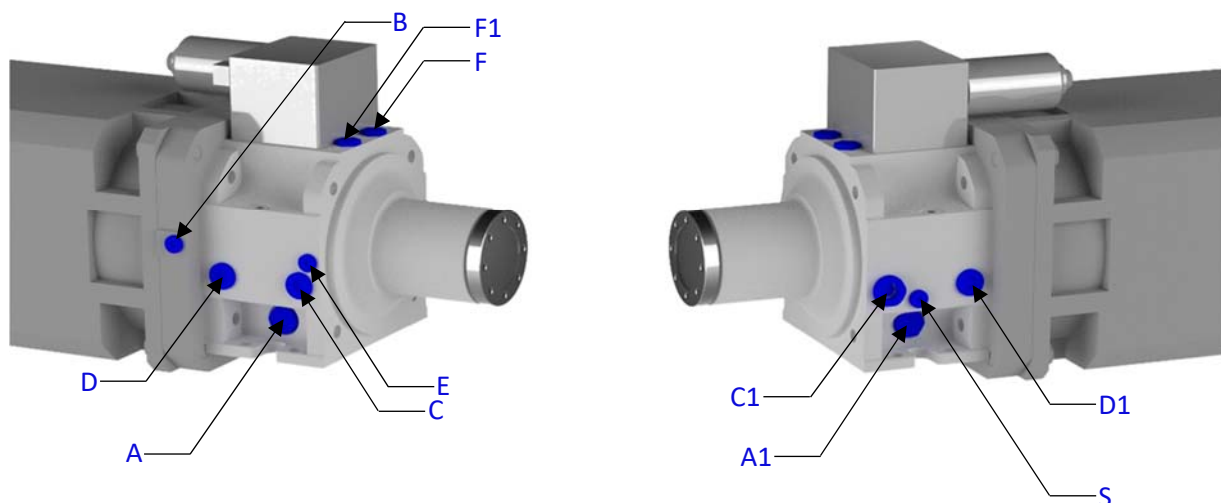
For applications where **forced lubrication** is required, we suggest the use of a flow rate switch to be connected to the oil supply circuit to monitor oil flow over time.





On demand, Baruffaldi can provide a suitable flow indicator.

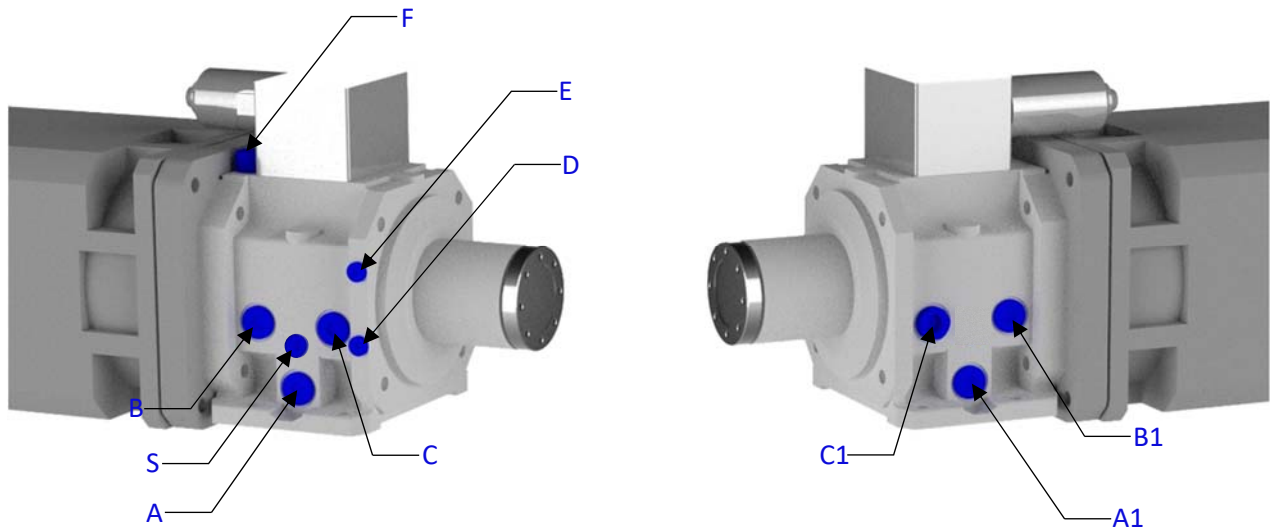
針對循環潤滑的應用，我們建議在供油端使用油量偵測器監控入油的狀況，如有需求Baruffaldi可以提供適用的油量偵測器。





Assembling positions and lubrication – CE11

組裝方式與潤滑 – CE11



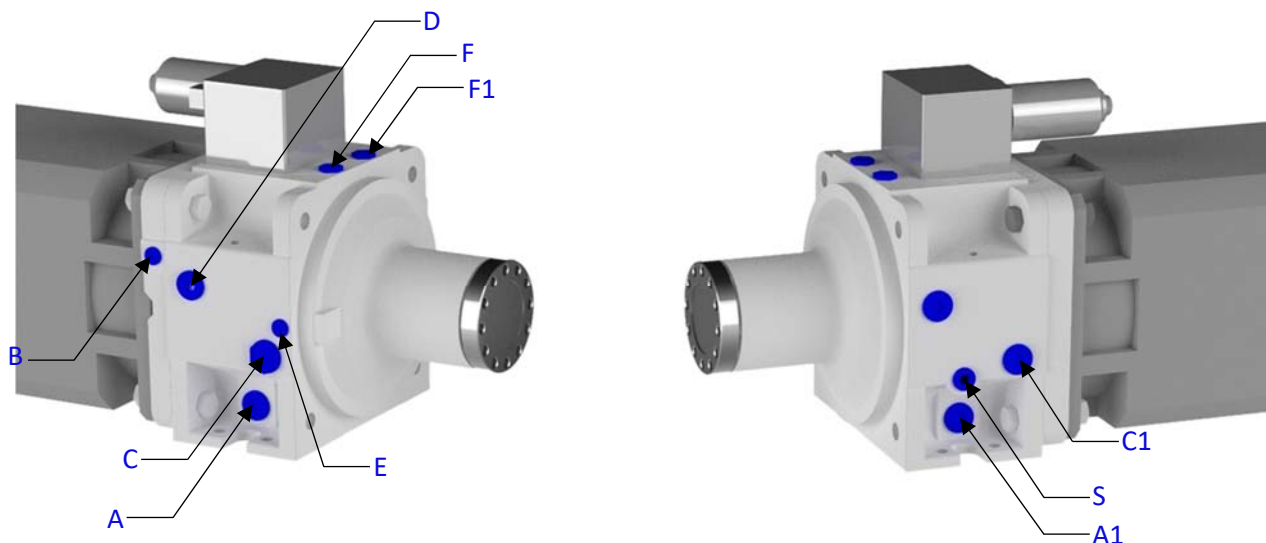
	Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油 位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器
OPP B5 	Splash lubrication 浸油潤滑	F1 F1 3/8" G OIL FILL IN	A or A1 A 1/2" G OIL DRAIN A1 1/2" G OIL DRAIN	x	F F 3/8" G	C or C1 C 1/2" G C1 1/2" G	S S 3/8" G
	Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	A or A1 A 1/2" G A1 1/2" G	C or C1 C 1/2" G C1 1/2" G	F1 F1 3/8" G	x	x
OPS B5 90° 	Splash lubrication 浸油潤滑	A A 1/2" G OIL FILL IN	A1 A1 1/2" G OIL DRAIN	x	C C 1/2" G	x	x
	Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	A1 A1 1/2" G	C1 C1 1/2" G	C C 1/2" G	x	x
VFP VPB V1 	Splash lubrication 浸油潤滑	x	x	x	x	x	x
	Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	C C 1/2" G	C C 1/2" G	D D 1/2" G	x	x
VFA VPA V3 	Splash lubrication 浸油潤滑	x	x	x	x	x	x
	Forced lubrication 強制潤滑	E E 1/4" G 1,5 l/min	D D 1/2" G	B B 1/4" G	C C 1/2" G	x	x


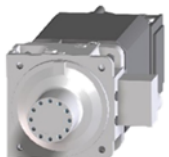




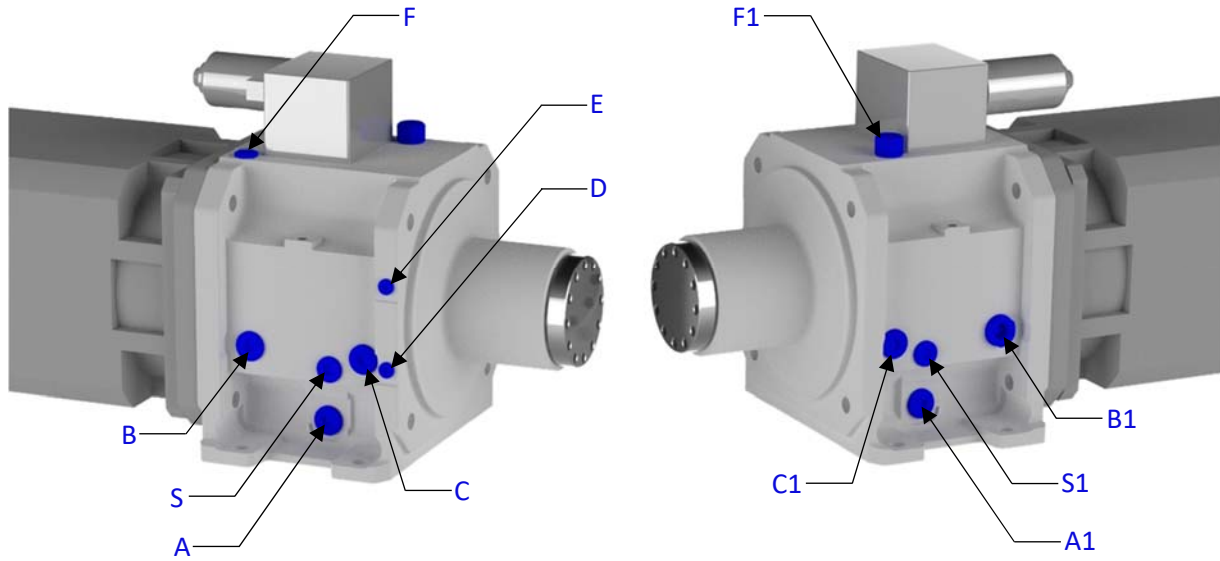
Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器	
Splash lubrication 浸油潤滑	F F 3/8"G OIL FILL IN	A or A1 A 3/4"G OIL DRAIN A1 3/4"G OIL DRAIN	x	F F 3/8"G	C or C1 C 3/4"G C1 3/4"G	S S 3/8"G	 <div style="display: flex; flex-direction: column; align-items: center;"> <div style="background-color: #0070C0; color: white; padding: 2px;">OPP</div> <div style="background-color: #444; color: white; padding: 2px;">B5</div> </div>
Forced lubrication 強制潤滑	B+D+E B 1/4"G 0,5 l/min D 1/4"G 0,5 l/min E 1/4"G 0,5 l/min	A or A1 A 3/4"G A1 3/4"G	C or C1 C 3/4"G C1 3/4"G	F F 3/8"G	x	x	
Splash lubrication 浸油潤滑	A A 3/4"G OIL FILL IN	A1 A1 3/4"G OIL DRAIN	x	A A 3/4"G	x	x	 <div style="display: flex; flex-direction: column; align-items: center;"> <div style="background-color: #0070C0; color: white; padding: 2px;">OPS</div> <div style="background-color: #444; color: white; padding: 2px;">B5 90°</div> </div>
Forced lubrication 強制潤滑	B+D+E B 1/4"G 0,5 l/min D 1/4"G 0,5 l/min E 1/4"G 0,5 l/min	A1 A1 3/4"G	A1 A1 3/4"G	A A 3/4"G	x	x	
Splash lubrication 浸油潤滑	B+B1 B 3/4"G OIL FILL IN B1 3/4"G OIL FILL IN	C+C1 C 3/4"G OIL DRAIN C1 3/4"G OIL DRAIN	x	F F 3/8"G	C or C1 C 3/4"G C1 3/4"G	S F 3/8"G	 <div style="display: flex; flex-direction: column; align-items: center;"> <div style="background-color: #0070C0; color: white; padding: 2px;">VFP VPB</div> <div style="background-color: #444; color: white; padding: 2px;">V1</div> </div>
Forced lubrication 強制潤滑	B+B1+D B 1/4"G 0,5 l/min B1 1/4"G 0,5 l/min D 1/4"G 0,5 l/min	C or C1 C 3/4"G C1 3/4"G	E E 1/4"G	F F 3/8"G	x	x	
Splash lubrication 浸油潤滑	x	x	x	x	x	x	 <div style="display: flex; flex-direction: column; align-items: center;"> <div style="background-color: #0070C0; color: white; padding: 2px;">VFA VPA</div> <div style="background-color: #444; color: white; padding: 2px;">V3</div> </div>
Forced lubrication 強制潤滑	D+E D 1/4"G 0,75 l/min E 1/4"G 0,75 l/min	B or B1 B 3/4"G B1 3/4"G	B or B1 B 3/4"G B1 3/4"G	C or C1 C 3/4"G C1 3/4"G	x	x	





Assembling positions and lubrication – CE13/13+

組裝方式與潤滑 – CE13/13+



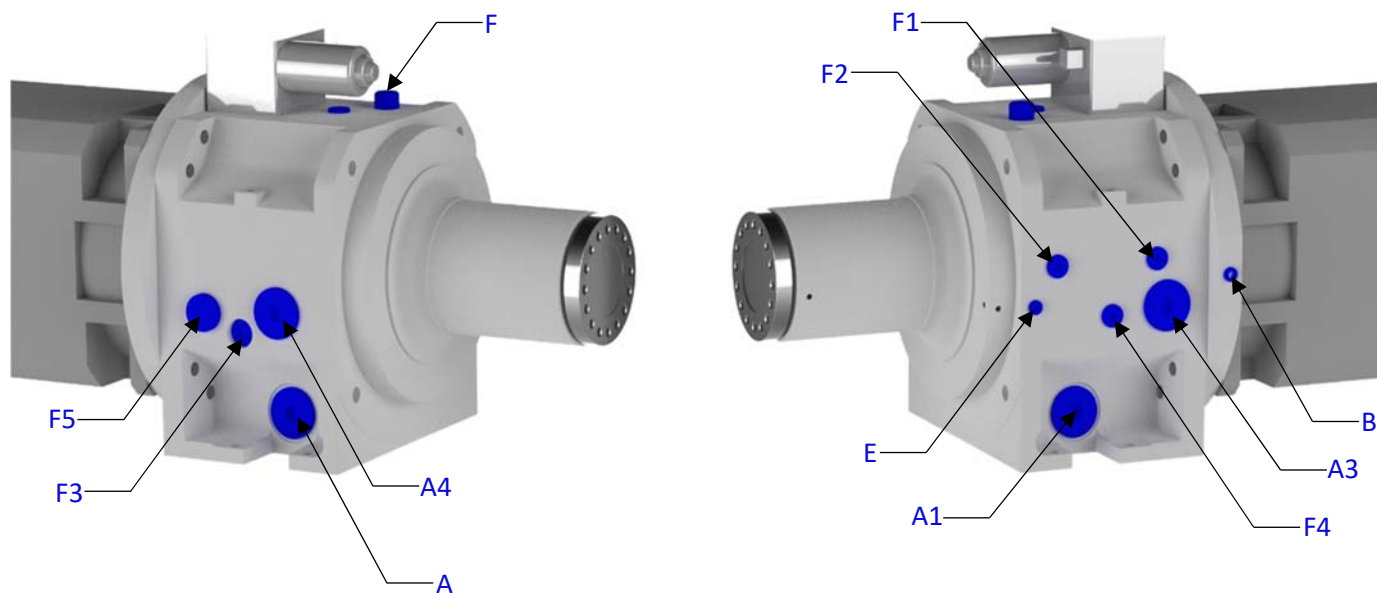
	Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油 位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器
OPP B5 	Splash lubrication 浸油潤滑	F1 F1 3/8" G OIL FILL IN	A or A1 A 3/4" G OIL DRAIN A1 3/4" G OIL DRAIN	x	F F 3/8" G	C or C1 C 3/4" G C1 3/4" G	S S 3/8" G
	Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	A or A1 A 3/4" G A1 3/4" G	C or C1 C 3/4" G C1 3/4" G	F1 F1 3/8" G	x	x
OPS B5 90° 	Splash lubrication 浸油潤滑	A A 3/4" G OIL FILL IN	A1 A1 3/4" G OIL DRAIN	x	C C 3/4" G	x	x
	Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	A1 A1 3/4" G	S S 3/8" G	C C 3/4" G	x	x
VFP VPB V1 	Splash lubrication 浸油潤滑	x	x	x	x	x	x
	Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	C C 3/4" G	C C 3/4" G	D D 3/4" G	x	x
VFA VPA V3 	Splash lubrication 浸油潤滑	x	x	x	x	x	x
	Forced lubrication 強制潤滑	E E 1/4" G 1,5 l/min	D D 3/4" G	B B 1/4" G	C C 3/4" G	x	x







Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器	
Splash lubrication 浸油潤滑	F F 3/8" G OIL FILL IN	A or A1 A 3/4" G OIL DRAIN A1 3/4" G OIL DRAIN	x	F F 3/8" G	C or C1 C 3/4" G C1 3/4" G	S S 3/8" G	 OPP B5
Forced lubrication 強制潤滑	B+D+E B 1/4" G 0,5 l/min D 1/4" G 0,5 l/min E 1/4" G 0,5 l/min	A or A1 A 3/4" G A1 3/4" G	C or C1 C 3/4" G C1 3/4" G	F F 3/8" G	x	x	
Splash lubrication 浸油潤滑	A A 3/4" G OIL FILL IN	A1 A1 3/4" G OIL DRAIN	x	A A 3/4" G	x	x	 OPS B5 90°
Forced lubrication 強制潤滑	B+D+E B 1/4" G 0,5 l/min D 1/4" G 0,5 l/min E 1/4" G 0,5 l/min	A1 A1 3/4" G	S1 S1 3/8" G	A A 3/4" G	x	x	
Splash lubrication 浸油潤滑	B+B1 B 3/4" G OIL FILL IN B1 3/4" G OIL FILL IN	C+C1 C 3/4" G OIL DRAIN C1 3/4" G OIL DRAIN	x	F F 3/8" G	C or C1 C 3/4" G C1 3/4" G	S F 3/8" G	 VFP VPB V1
Forced lubrication 強制潤滑	B+B1+D B 1/4" G 0,5 l/min B1 1/4" G 0,5 l/min D 1/4" G 0,5 l/min	C or C1 C 3/4" G C1 3/4" G	E E 1/4" G	F F 3/8" G	x	x	
Splash lubrication 浸油潤滑	x	x	x	x	x	x	 VFA VPA V3
Forced lubrication 強制潤滑	D+E D 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	B or B1 B 3/4" G B1 3/4" G	B or B1 B 3/4" G B1 3/4" G	C C 3/4" G	x	x	

Assembling positions and lubrication – CE16/18

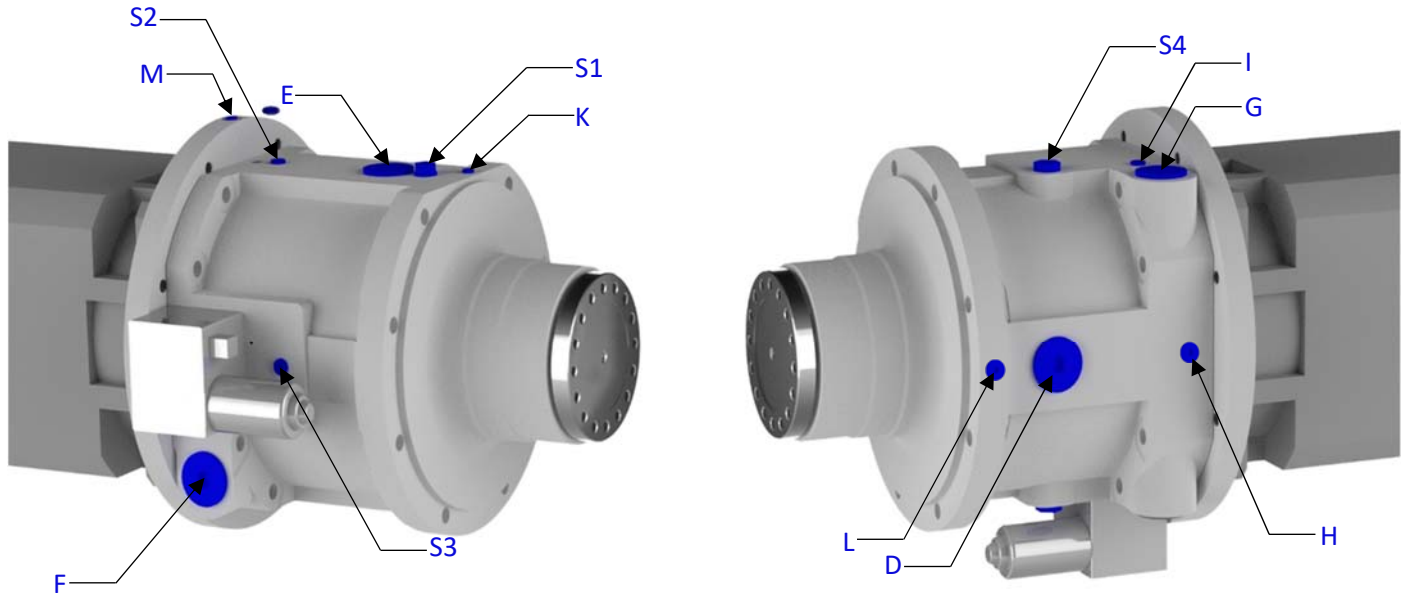
組裝方式與潤滑 – CE16/18







		Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油 位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器
OPP B5		Splash lubrication 浸油潤滑	x	x	x	x	x	x
		Forced lubrication 強制潤滑	B+E B M12X1,5 0,5 l/min E M12X1,5 2,5 l/min	A or A1 A M48X2 A1 M48X2	F3 or F4 F3 3/4"G F4 3/4"G	F F 3/8"G	x	x
OPS B5 90°		Splash lubrication 浸油潤滑	x	x	x	x	x	x
		Forced lubrication 強制潤滑	B+E B M12X1,5 0,5 l/min E M12X1,5 2,5 l/min	A A M48X2	F1 or F2 F1 3/8"G F2 3/8"G	F3 F3 3/8"G	x	x
VFP VPB V1		Splash lubrication 浸油潤滑	x	x	x	x	x	x
		Forced lubrication 強制潤滑	B+E B M12X1,5 0,5 l/min E M12X1,5 2,5 l/min	A4 A4 M48X2	F2 F2 3/8"G	F1 F1 3/8"G	x	x
VFA VPA V3		Splash lubrication 浸油潤滑	x	x	x	x	x	x
		Forced lubrication 強制潤滑	E E M12X1,5 3 l/min	A3 A3 M48X2	F1 F1 3/8"G	F2 F2 3/8"G	x	x

Assembling positions and lubrication – CE20

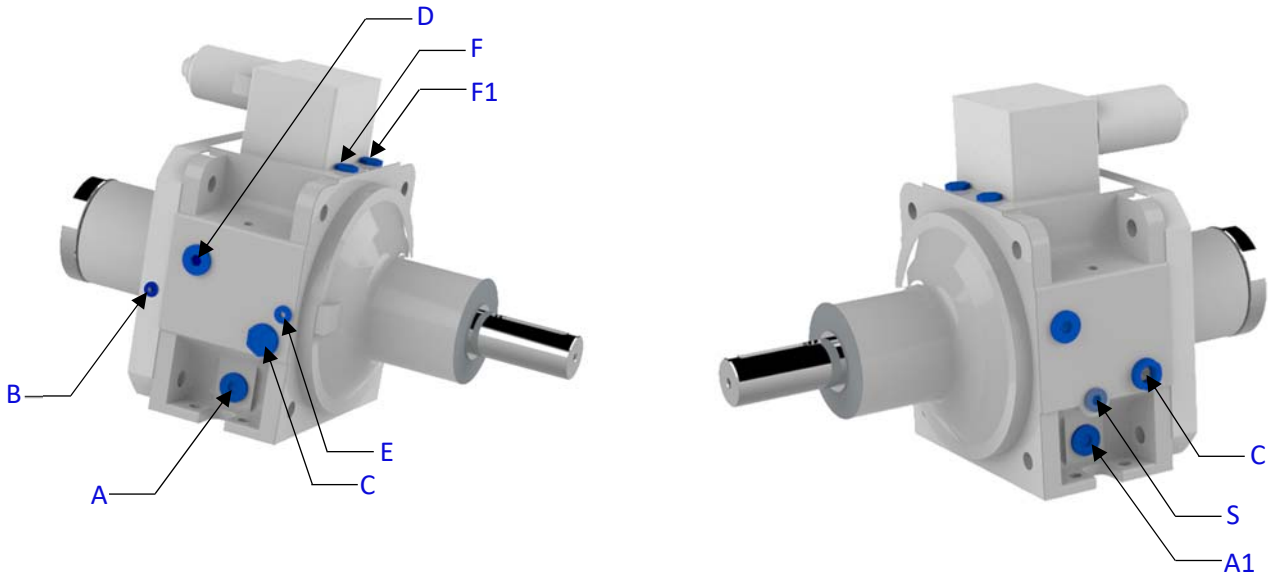
組裝方式與潤滑 – CE20



Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器	
Splash lubrication 浸油潤滑	x	x	x	x	x	x	 OPP B5
Forced lubrication 強制潤滑	M+K M M12X1,5 0,5 l/min K M12X1,5 2,5 l/min	F or G or D F M48X2 G M48X2 D M48X2	L or H L M20X1.5 H M20X1.5	S1 S1 3/8"G	x	x	
Splash lubrication 浸油潤滑	x	x	x	x	x	x	 OPS B5 90°
Forced lubrication 強制潤滑	M+K M M12X1,5 0,5 l/min K M12X1,5 2,5 l/min	G G M48X2	I I M20X1.5	S3 S3 3/8"G	x	x	
Splash lubrication 浸油潤滑	x	x	x	x	x	x	 VFP VPB V1
Forced lubrication 強制潤滑	M+K M M12X1,5 0,5 l/min K M12X1,5 2,5 l/min	E or D E M48X2 D M48X2	S1 S1 3/8"G	S2 S1 3/8"G	x	x	
Splash lubrication 浸油潤滑	x	x	x	x	x	x	 VFA VPA V3
Forced lubrication 強制潤滑	K K M12X1,5 3l/min	F or G F M48X2 G M48X2	H H M20X1.5	S1 S1 3/8"G	x	x	

Assembling positions and lubrication – CEA13/13+

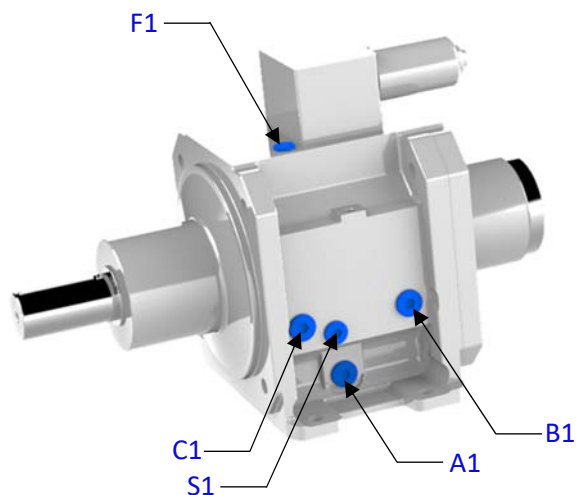
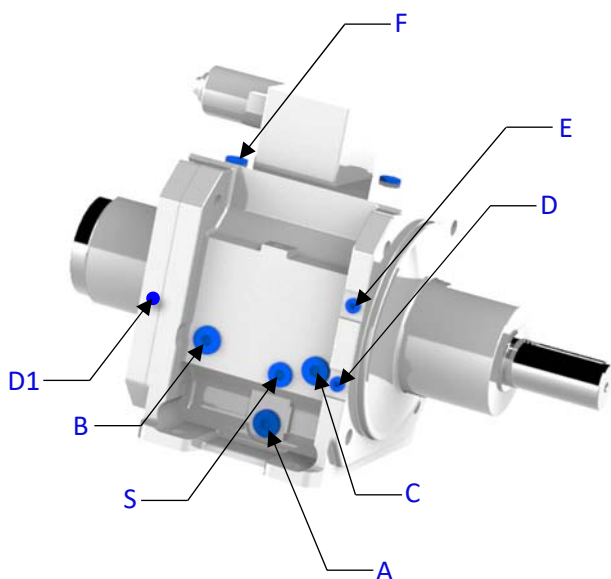
組裝方式與潤滑 – CEA13/13+



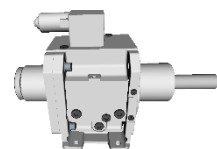
		Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器
OPP B5		Splash lubrication 浸油潤滑	F1 F1 3/8" G OIL FILL IN	A or A1 A 3/4" G OIL DRAIN A1 3/4" G OIL DRAIN	x	F F 3/8" G	C or C1 C 3/4" G C1 3/4" G	S S 3/8" G
		Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	A or A1 A 3/4" G A1 3/4" G	C or C1 C 3/4" G C1 3/4" G	F1 F1 3/8" G	x	x
OPS B5 90°		Splash lubrication 浸油潤滑	A A 3/4" G OIL FILL IN	A1 A1 3/4" G OIL DRAIN	x	C C 3/4" G	x	x
		Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	A1 A1 3/4" G	S S 3/8" G	C C 3/4" G	x	x
VFP VPB V1		Splash lubrication 浸油潤滑	x	x	x	x	x	x
		Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	C C 3/4" G	C C 3/4" G	D D 3/4" G	x	x
VFA VPA V3		Splash lubrication 浸油潤滑	x	x	x	x	x	x
		Forced lubrication 強制潤滑	B+E B 1/4" G 0,75 l/min E 1/4" G 0,75 l/min	D D 3/4" G	D D 3/4" G	C C 3/4" G	x	x

Assembling positions and lubrication – CEA14/15

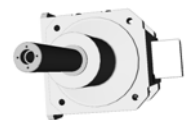
組裝方式與潤滑 – CEA14/15



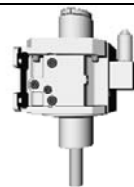
Type of lubrication 潤滑方式	Oil inlet 入油位置	Oil return by fall down* 重力回油位置	Oil return by suction 吸力回油位置	Vent valve 排氣閥	Oil level indicator 油位鏡	Sensor 感測器
Splash lubrication 浸油潤滑	F F 3/8" G OIL FILL IN	A or A1 A 3/4" G OIL DRAIN A1 3/4" G OIL DRAIN	x	F F 3/8" G	C or C1 C 3/4" G C1 3/4" G	S S 3/8" G
Forced lubrication 強制潤滑	D+B+D1 D 1/4" G 0,5 l/min B 1/4" G 0,5 l/min D1 1/4" G 0,5 l/min	A or A1 A 3/4" G A1 3/4" G	C or C1 C 3/4" G C1 3/4" G	F F 3/8" G	x	x
Splash lubrication 浸油潤滑	A A 3/4" G OIL FILL IN	A1 A1 3/4" G OIL DRAIN	x	A A 3/4" G	x	x
Forced lubrication 強制潤滑	D+B+D1 D 1/4" G 0,5 l/min B 1/4" G 0,5 l/min D1 1/4" G 0,5 l/min	A1 A1 3/4" G	S1 S1 3/8" G	C C 3/4" G	x	x
Splash lubrication 浸油潤滑	x	x	x	x	x	x
Forced lubrication 強制潤滑	D+D1 D 1/4" G 0,75 l/min D1 1/4" G 0,75 l/min	C or C1 C 3/4" G C1 3/4" G	E E 1/4" G	F F 3/8" G	x	x
Splash lubrication 浸油潤滑	x	x	x	x	x	x
Forced lubrication 強制潤滑	D+E+D1 D 1/4" G 0,5 l/min E 1/4" G 0,5 l/min D1 1/4" G 0,5 l/min	B or B1 B 3/4" G B1 3/4" G	B or B1 B 3/4" G B1 3/4" G	C C 3/4" G	x	x



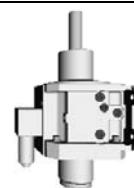
OPP
B5



OPS
B5
90°



VFP
VPB
V1



VFA
VPA
V3

Bearings / 軸承

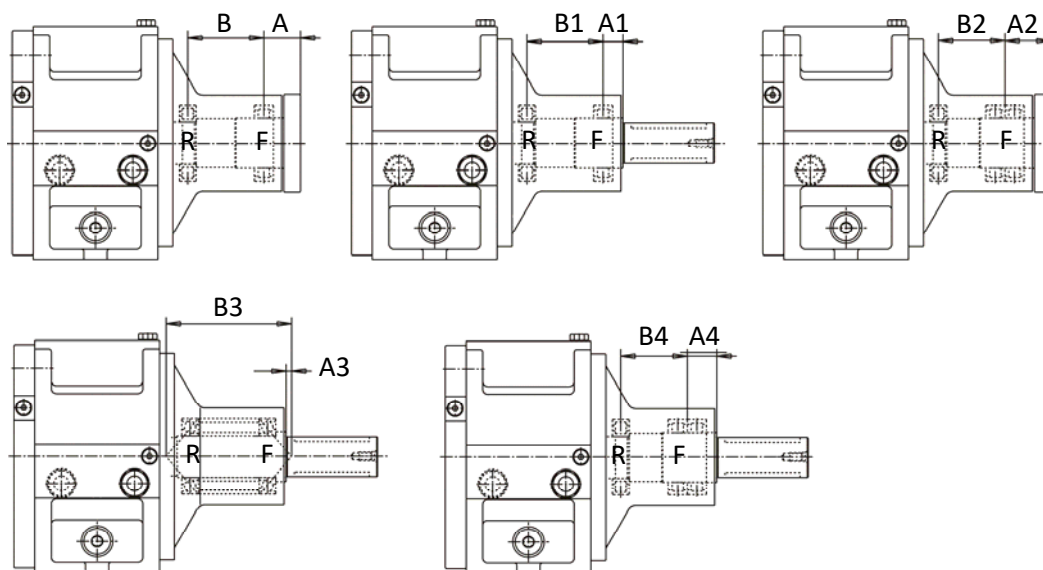
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Table 1 shows bearings mounted on the output shaft and their loading capacity. These data, together with the ones at the bottom of the page, allow bearings lifetime calculation, considering applied load, position of applied load and RPM.

表1為輸出軸的軸承與軸承負載能力。

下表與次頁的資料，可供軸承之壽命計算、負載大小設定、負載位置設定及轉速設定使用。

Table 1	Bearing R 軸承 R			Bearing F Cuscinetto F		Second bearing Secondo cuscinetto	
	Type 形式	Loading capacity N 負載能力N	Type 形式	Loading capacity N 負載能力N	Type 形式	Loading capacity N 負載能力 N	
Standard 標準	CE11	NUP 208 ECP	62.000	NU 2208 ECP	81.500	X	X
	CE12	NUP 208 ECP	62.000	NU 2208 ECP	81.500	X	X
	CE13	NUP 210 ECP	73.500	NU 2210 ECP	90.000	X	X
	CE13+	NUP 211 ECP	96.500	NU 2211 ECP	114.000	X	X
	CE14	NUP 211 ECP	96.500	NU 2211 ECP	114.000	X	X
	CE15	NUP 211 ECP	96.500	NU 2211 ECP	114.000	X	X
Double roller bearings 雙滾柱軸承	CE13	NUP 210 ECP	73.500	NU 2210 ECP	90.000	(+)	NU 2210 ECP 90.000
	CE13+	NUP 211 ECP	96.500	NU 2211 ECP	114.000	(+)	NU 2211 ECP 114.000
	CE14	NUP 211 ECP	96.500	NU 2211 ECP	114.000	(+)	NU 2211 ECP 114.000
	CE15	NUP 211 ECP	96.500	NU 2211 ECP	114.000	(+)	NU 2211 ECP 114.000
	CE16	NUP 2211 EC	114.000	NU 2211 ECP	114.000	(+)	NU 2211 ECP 114.000
	CE18	NUP 2213 ECP	170.000	NU 2213 ECP	170.000	(+)	NU 2213 ECP 170.000
	CE20	21314 E	285.000	NU 314 ECP	236.000	(+)	NU 314 ECP 236.000
Angular contact bearings 斜角滾珠軸承	CE13	7210 BEGAP	40.000	7210 BEGAP	40.000	X	X
	CE13+	7211 BEGAP	49.000	7211 BEGAP	49.000	X	X
	CE14	7211 BEGAP	49.000	7211 BEGAP	49.000	X	X
	CE15	7211 BEGAP	49.000	7211 BEGAP	49.000	X	X
	CE20	7314 BEP	119.000	7314 BEP	119.000	X	X



	CE11	CE12	CE13	CE13+	CE14	CE15
A(mm)	39	39	44	47	47,5	47,5
B(mm)	71,5	71,5	91,5	87	87	87

	CE13	CE13+	CE14	CE15	CE16	CE20
A3(mm)	6,5	6	7	7	4	8
B3(mm)	151	154	154	154	214	175

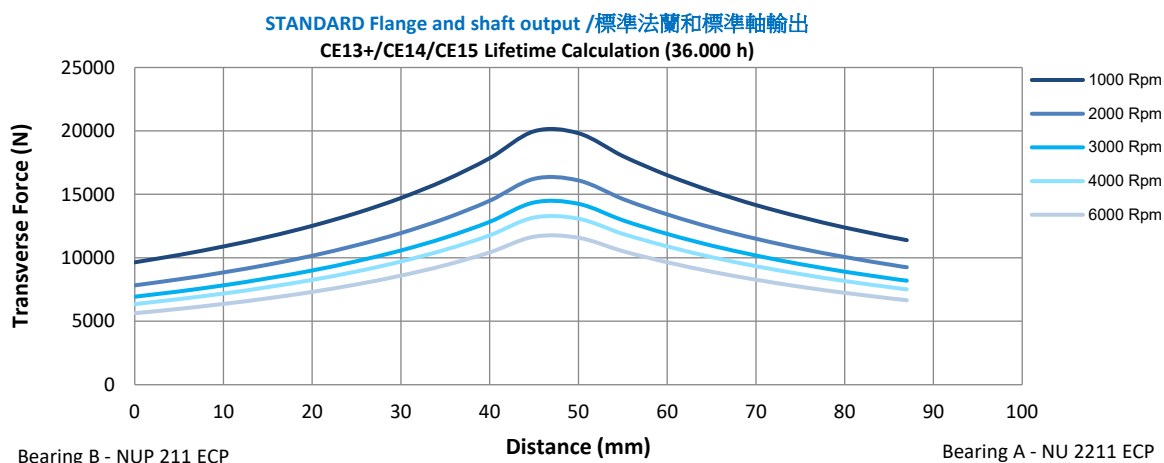
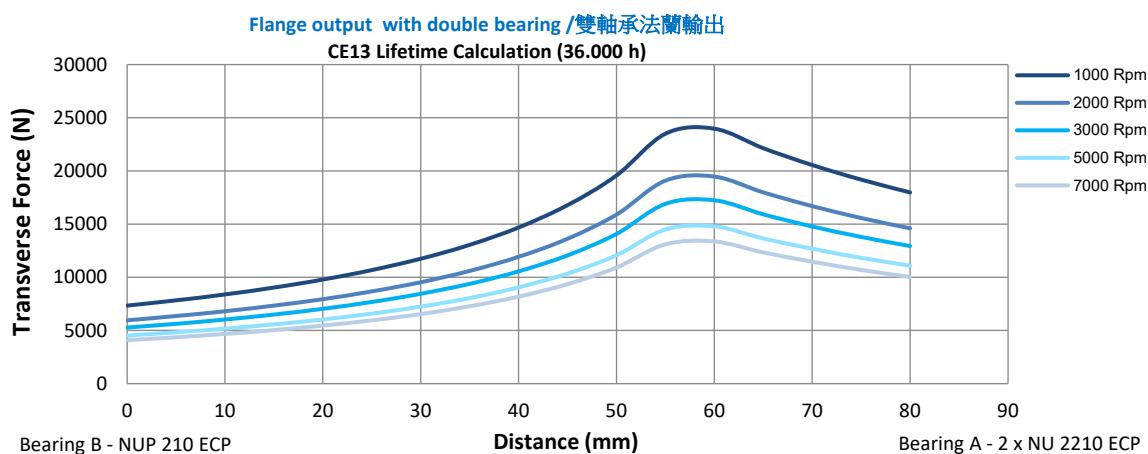
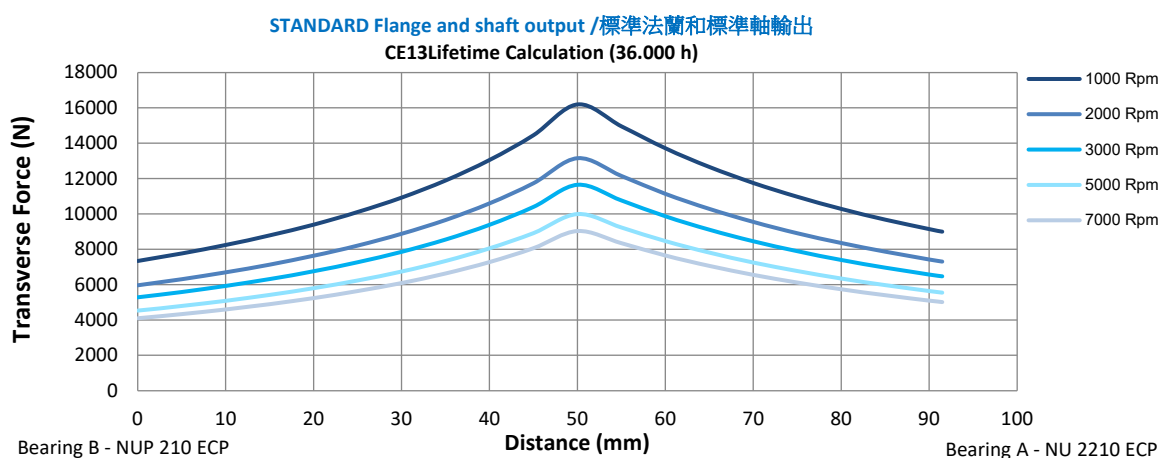
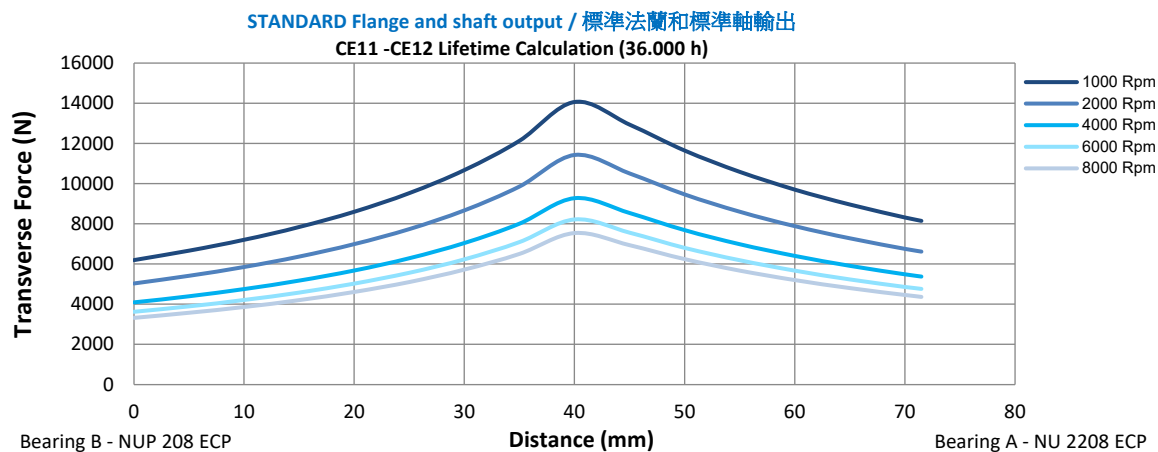
	CE13	CE13+	CE14	CE14 Long neck	CE15	CE16	CE18	CE20
A2(mm)	55,5	60	60	60	60	65	72	79
B2(mm)	80	74,5	74,5	181,5	74,5	173,5	161,5	110,5

	CE11	CE12	CE13	CE13+	CE14	CE15
A1(mm)	24	24	24	28	27,5	27,5
B1(mm)	71,5	71,5	91,5	87	87	87

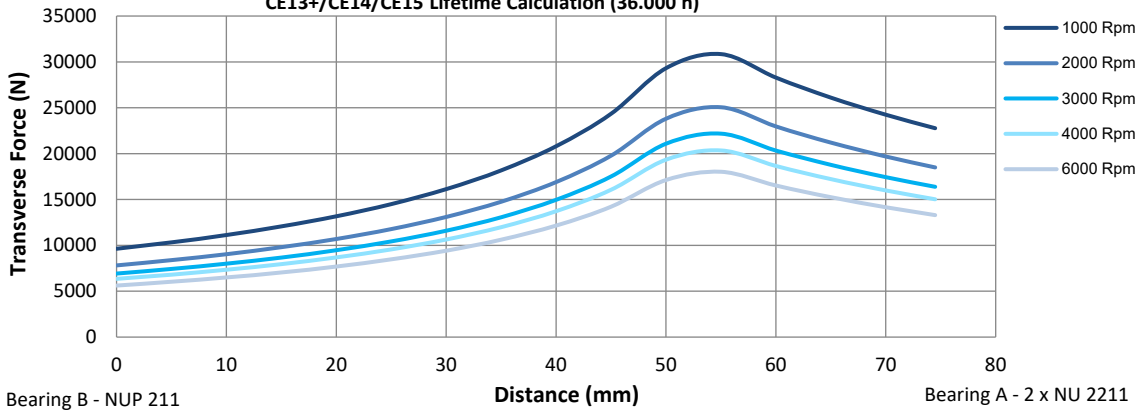
	CE13	CE13+	CE14	CE15	CE16	CE18	CE20
A4(mm)	35,5	40	40	40	44	44,5	56
B4(mm)	80	74,5	74,5	74,5	133	161,5	110,5

Gearbox output bearings

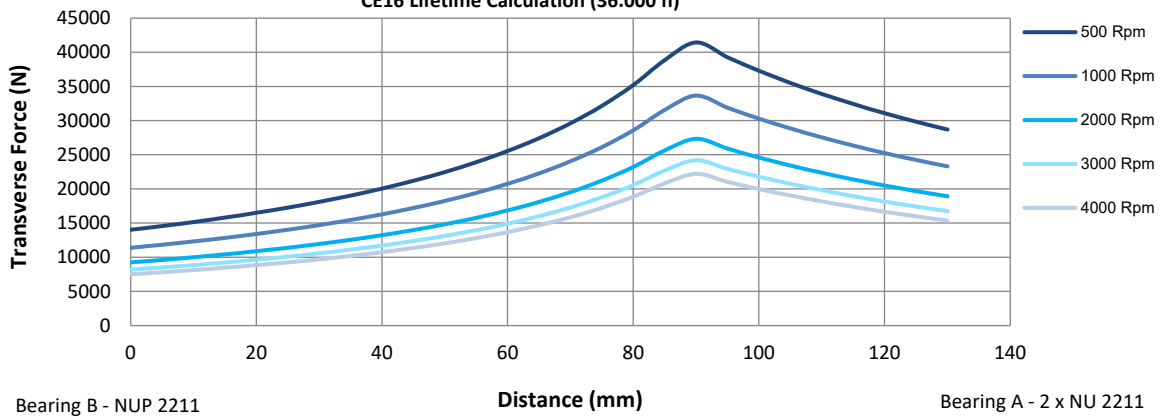
齒輪箱輸出軸承



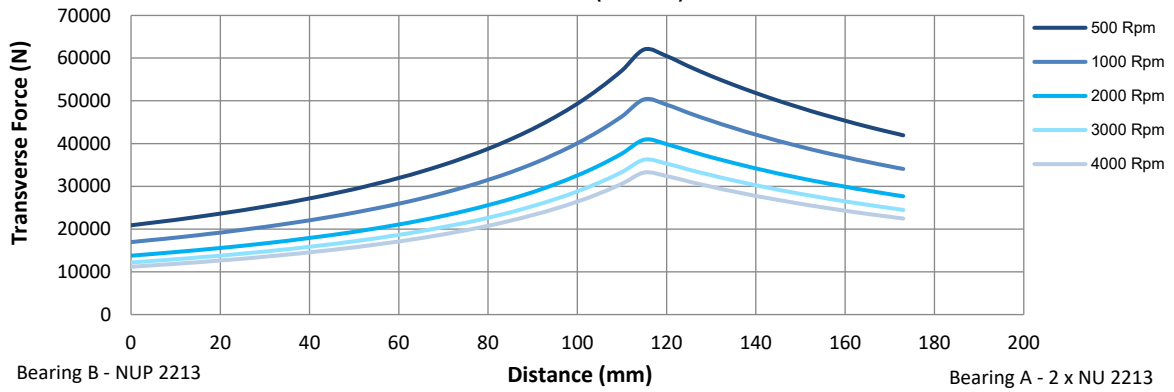
Flange output with double bearing / 雙軸承法蘭輸出
CE13+/CE14/CE15 Lifetime Calculation (36.000 h)



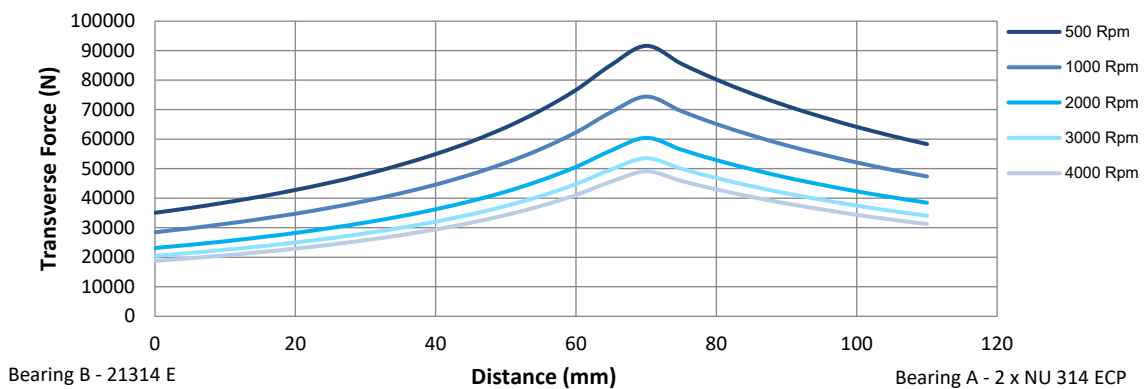
Flange and shaft output with double bearing / 雙軸承法蘭輸出和雙軸承軸輸出
CE16 Lifetime Calculation (36.000 h)



Flange and shaft output with double bearing / 雙軸承法蘭輸出和雙軸承軸輸出
CE18 Lifetime Calculation (36.000 h)



Flange and shaft output with double bearing / 雙軸承法蘭輸出和雙軸承軸輸出
CE20 Lifetime Calculation (36.000 h)



Shifting Mechanism / 換檔機構

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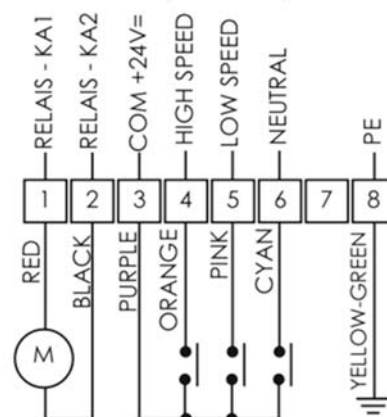
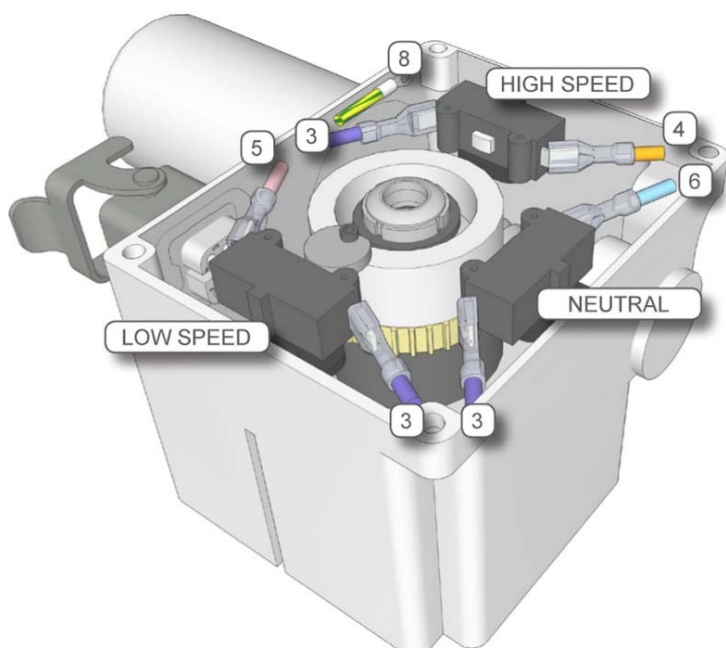
Actuator (electromechanical shifting unit)

換檔機構 (機電變速裝置)

The gearbox actuator is an electro-mechanical shifting unit used to switch between low speed / neutral / high speed. This unit is designed according to the easiest and most durable solution.

齒輪箱換檔機構是電動機構換檔元件,用於切換齒輪箱的高檔、低檔與空檔。

此機構是根據最簡單耐用的原則設計而成的換檔機



Actuator Electrical data/換檔機構電氣數據

Nominal voltage DC/標稱直流電壓	24V±10%(min 6A)
Nominal current/標稱電流	2,5 A
Starting current/啟動電流	8,5 A
Inner clutch slipping current 內離合器滑差電流	3,5±0,5 A

Advantages of Baruffaldi actuator:

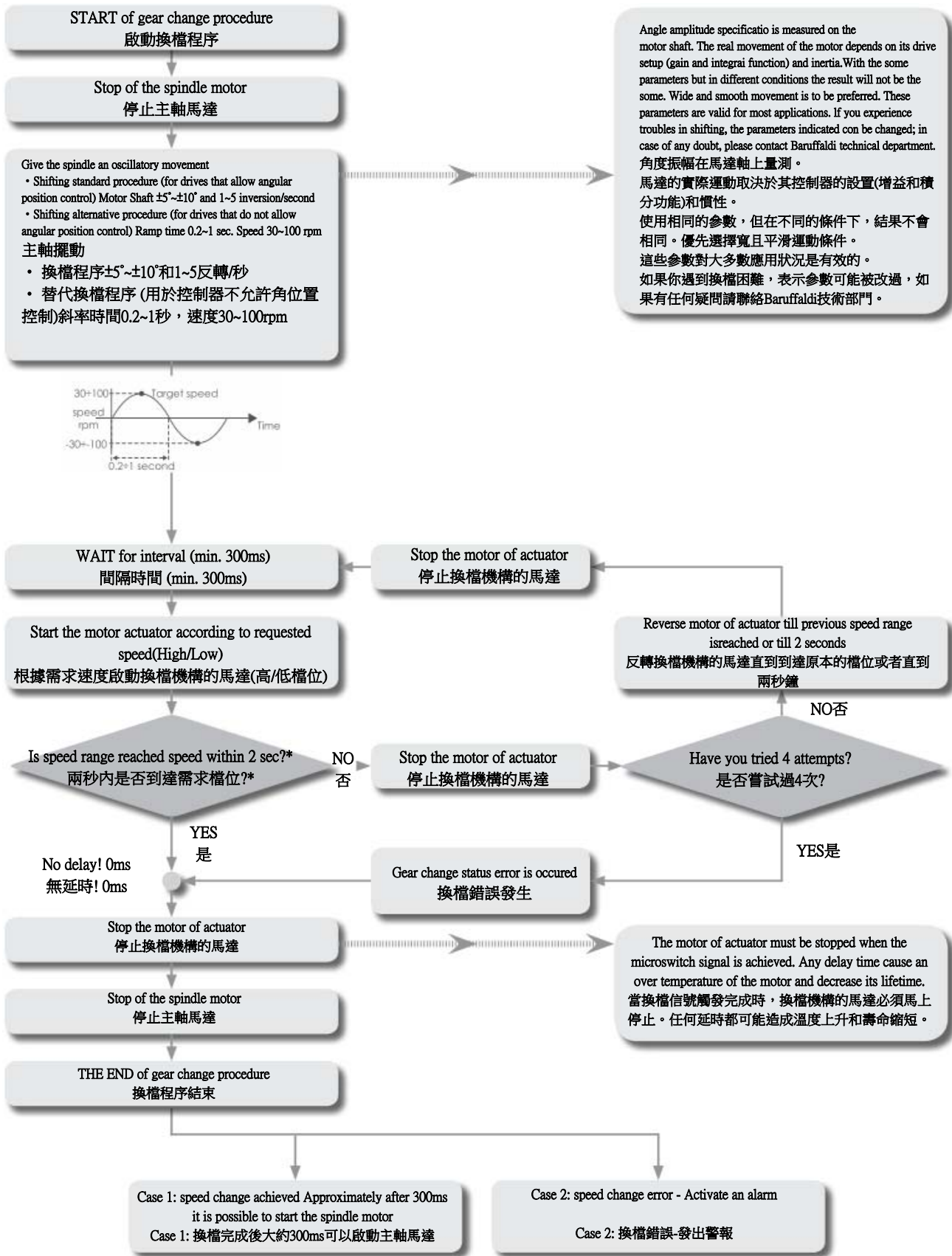
- Easy PLC setting
- Easy electrical connection (with pin connectors)
- Electromechanical Unit (no electro-magnet)
- Neutral position possible
- High reliability and performance
- Compact design

Baruffaldi換檔機構優點:

- PLC設定簡單
- 連接電路簡單(使用PIN接頭)
- 使用電機原件(無電磁鐵)
- 預留空檔可以使用
- 可靠度高、性能穩定
- 設計緊湊

Shifting and operating sequence

換檔和操作時序圖



* The changed speed is signalized from the actiavation of a microswitch.

*檔位的判定是由近接開關的訊號觸發控制

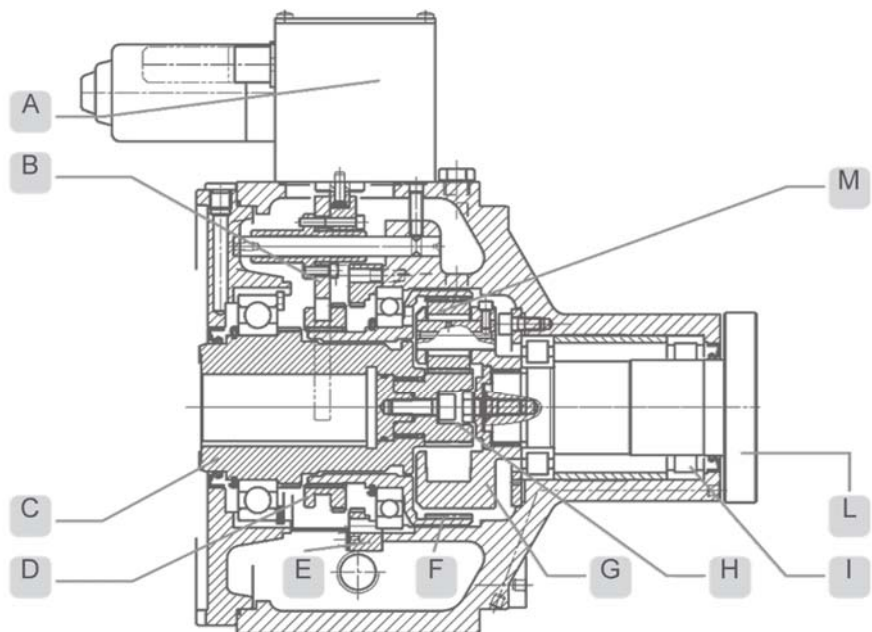
Drawings / 圖面

BARUFFALDI

Gearbox construction CE11-CE13-CE13+

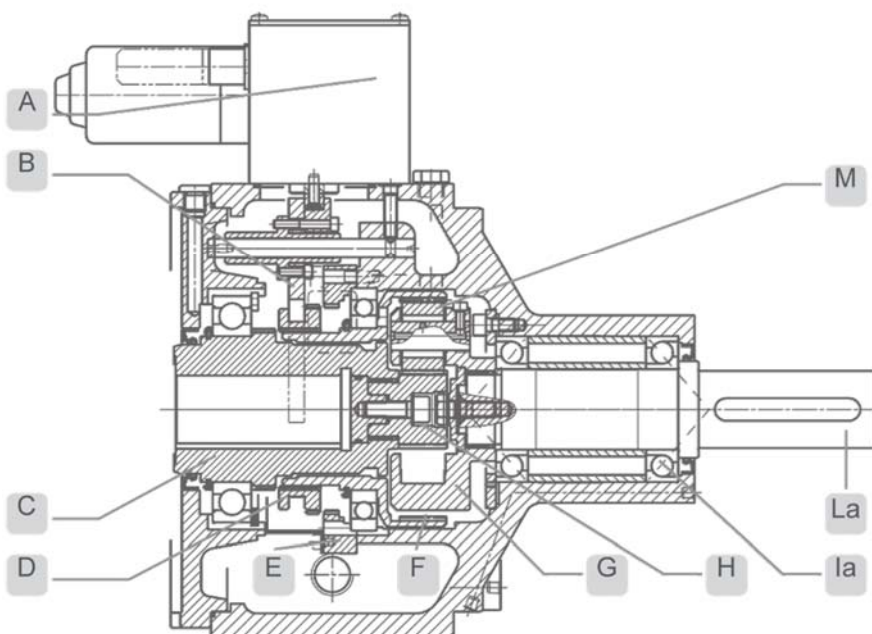
齒輪箱結構 CE11-CE13-CE13+

FLANGE OUTPUT / 法蘭輸出



- A = actuator
- B = fork
- C = pinion (connected to the motor)
- D = sliding sleeve
- E = fixed splined ring
- F = ring gear
- G = planet gears carrier
- H = sun gear (connected to the pinion)
- I = output roller bearings
- Ia = output angular contact ball bearings
- L = output flange
- La = output shaft
- M = planet gears

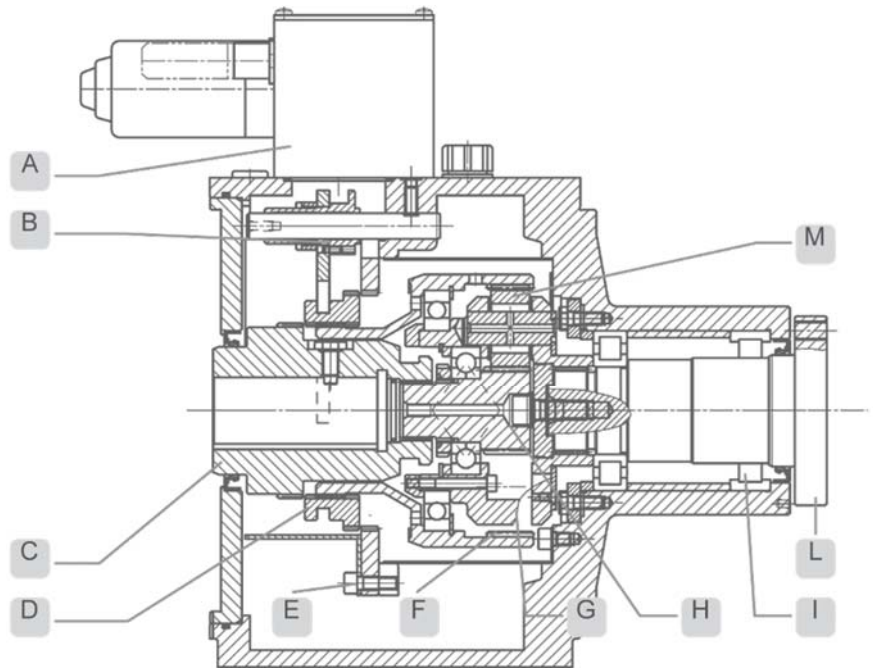
SHAFT OUTPUT / 軸輸出



- A = 換檔機構
- B = 撥叉
- C = 連接軸(與馬達連接)
- D = 滑套
- E = 固定齒
- F = 環齒
- G = 行星架
- H = 太陽齒(與連接軸對接)
- I = 輸出滾柱軸承
- Ia = 輸出斜角滾珠軸承
- L = 輸出法蘭
- La = 輸出軸
- M = 行星齒

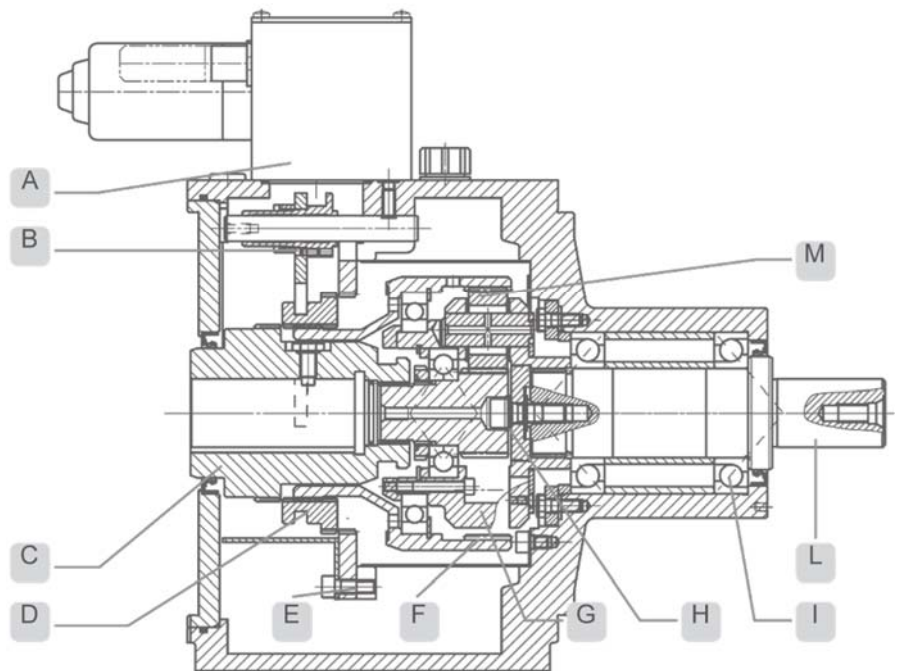
FLANGE OUTPUT / 法蘭輸出

- A = actuator
- B = fork
- C = pinion (connected to the motor)
- D = sliding sleeve
- E = fixed splined ring
- F = ring gear
- G = planet gears carrier
- H = sun gear (connected to the pinion)
- I = output roller bearings
- la = output angular contact ball bearings
- L = output flange
- La = output shaft
- M = planet gears



SHAFT OUTPUT / 軸輸出

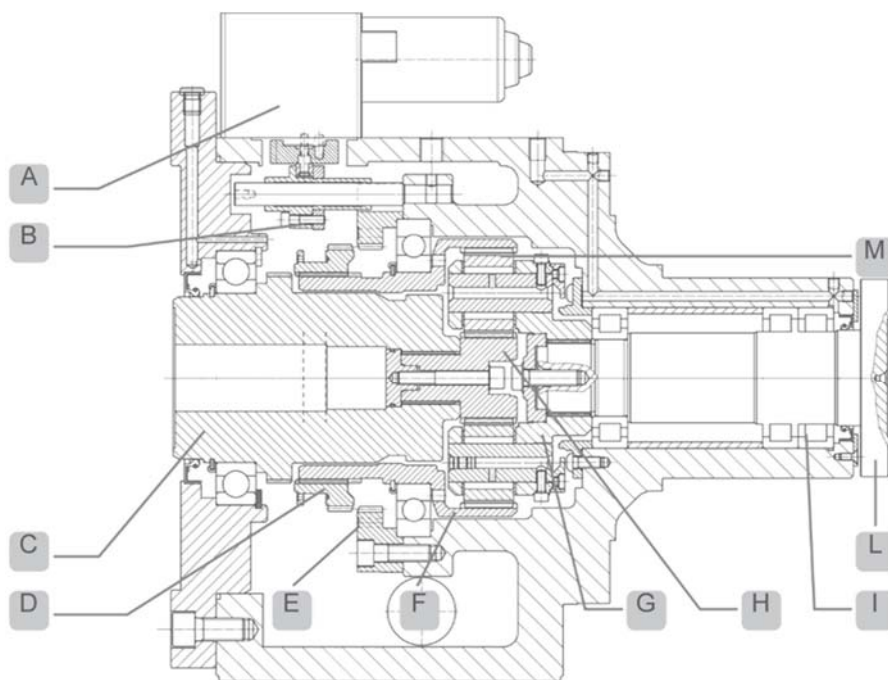
- A = 換檔機構
- B = 撥叉
- C = 連接軸(與馬達連接)
- D = 滑套
- E = 固定齒
- F = 環齒
- G = 行星架
- H = 太陽齒(與連接軸對接)
- I = 輸出滾柱軸承
- la = 輸出斜角滾珠軸承
- L = 輸出法蘭
- La = 輸出軸



Gearbox construction CE16-CE18

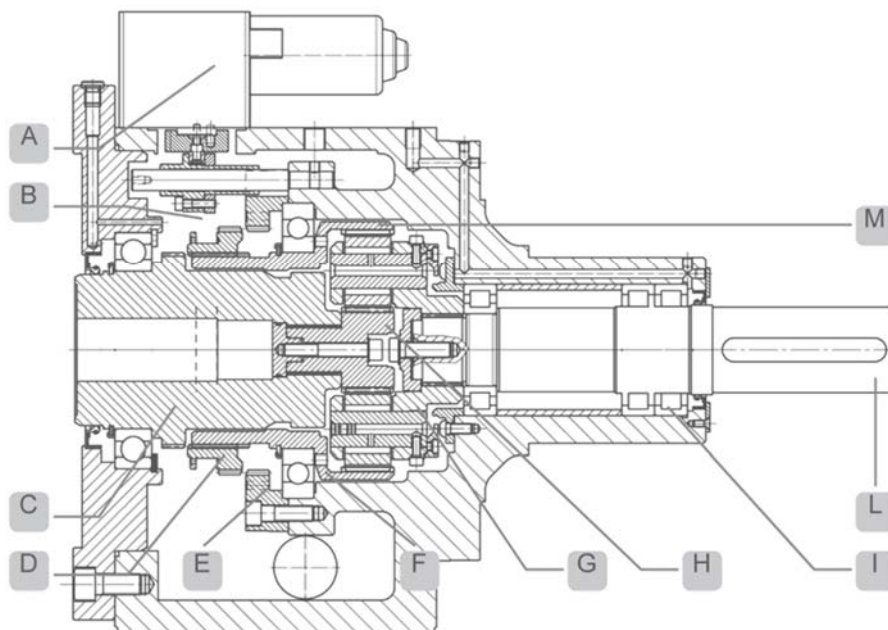
齒輪箱結構 CE16-18

FLANGE OUTPUT / 法蘭輸出



- A = actuator
- B = fork
- C = pinion (connected to the motor)
- D = sliding sleeve
- E = fixed splined ring
- F = ring gear
- G = planet gears carrier
- H = sun gear (connected to the pinion)
- I = output roller bearings
- Ia = output angular contact ball bearings
- L = output flange
- La = output shaft
- M = planet gears

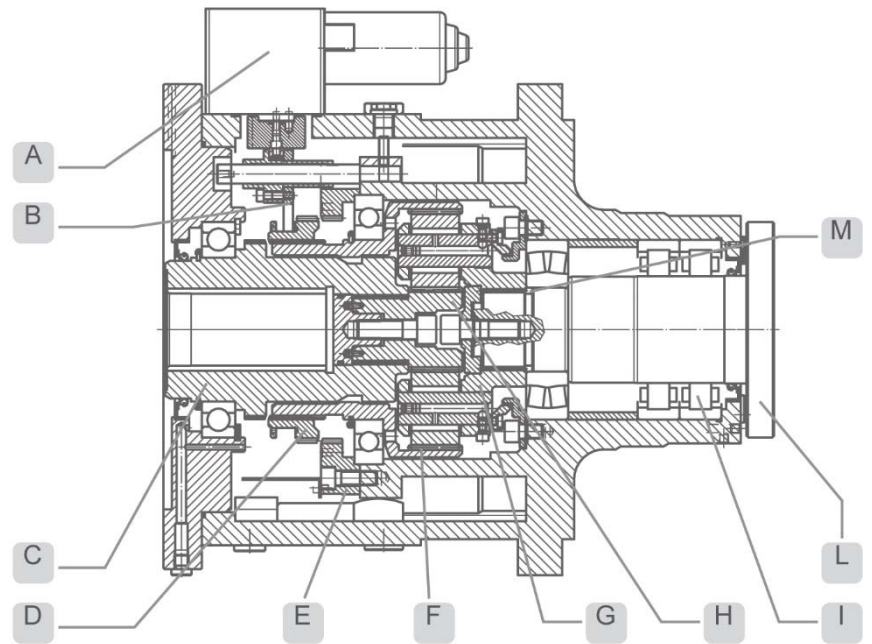
SHAFT OUTPUT / 軸輸出



- A = 換檔機構
- B = 撥叉
- C = 連接軸(與馬達連接)
- D = 滑套
- E = 固定齒
- F = 環齒
- G = 行星架
- H = 太陽齒(與連接軸對接)
- I = 輸出滾柱軸承
- Ia = 輸出斜角滾珠軸承
- L = 輸出法蘭
- La = 輸出軸
- M = 行星齒

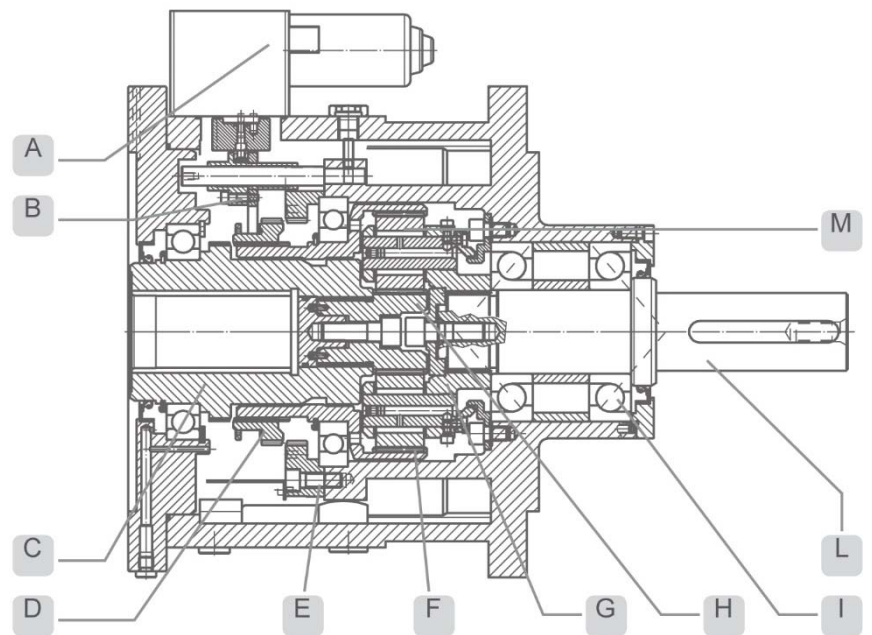
- A = actuator
- B = fork
- C = pinion (connected to the motor)
- D = sliding sleeve
- E = fixed splined ring
- F = ring gear
- G = planet gears carrier
- H = sun gear (connected to the pinion)
- I = output roller bearings
- la = output angular contact ball bearings
- L = output flange
- La = output shaft
- M = planet gears

FLANGE OUTPUT / 法蘭輸出

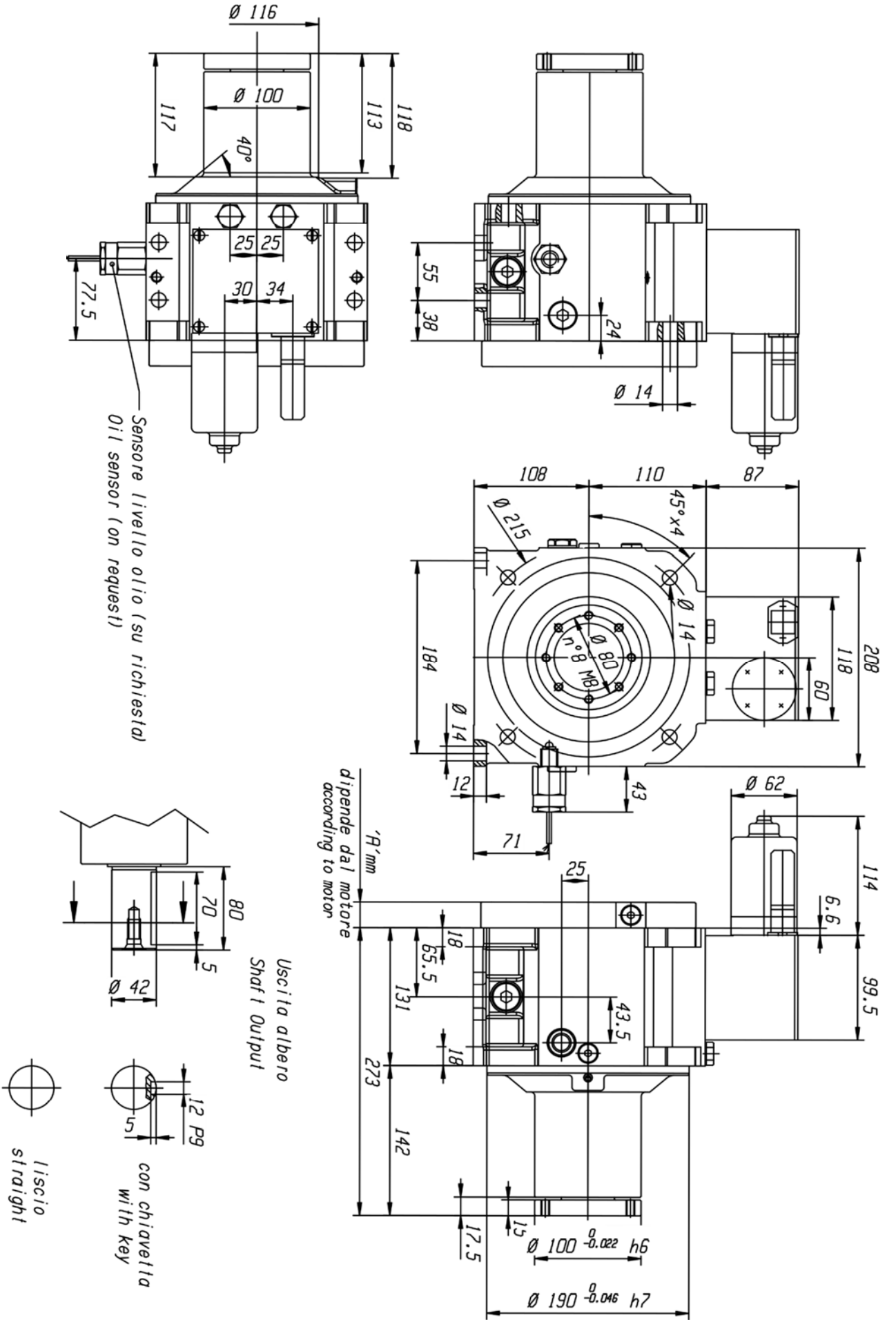


- A = 換檔機構
- B = 撥叉
- C = 連接軸(與馬達連接)
- D = 滑套
- E = 固定齒
- F = 環齒
- G = 行星架
- H = 太陽齒(與連接軸對接)
- I = 輸出滾柱軸承
- la = 輸出斜角滾珠軸承
- L = 輸出法蘭
- La = 輸出軸
- M = 行星齒

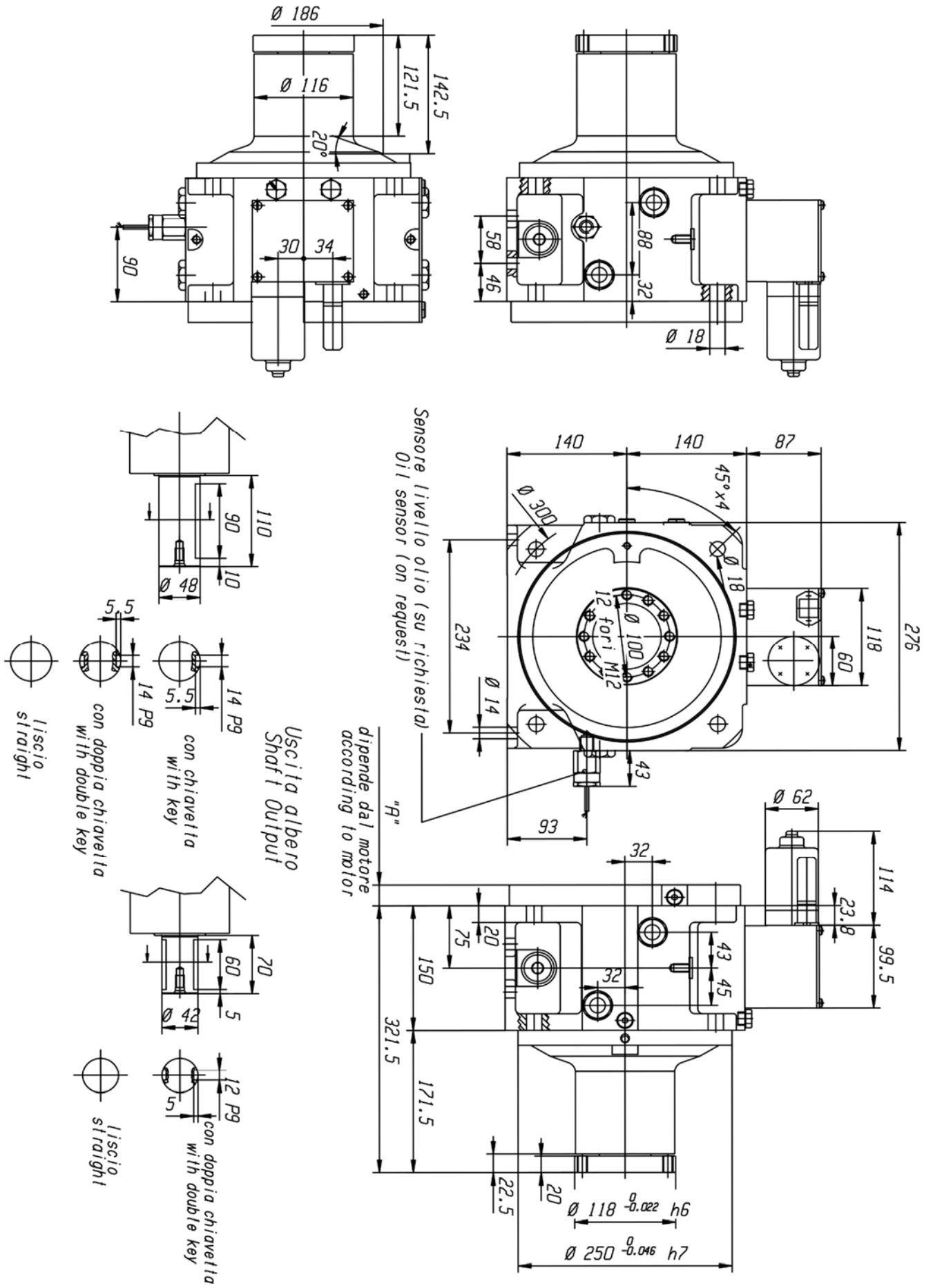
SHAFT OUTPUT / 軸輸出



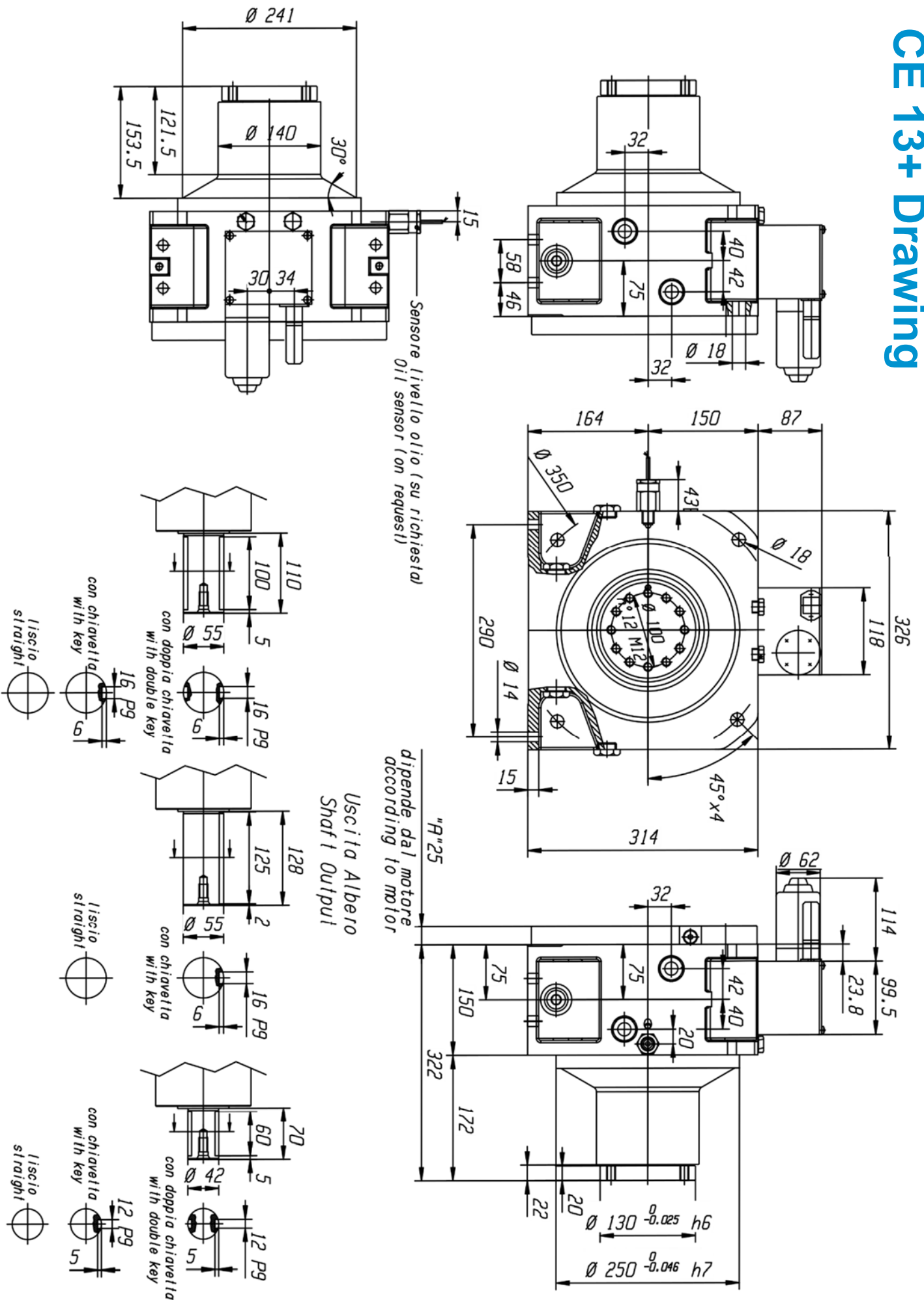
CE 11 Drawing



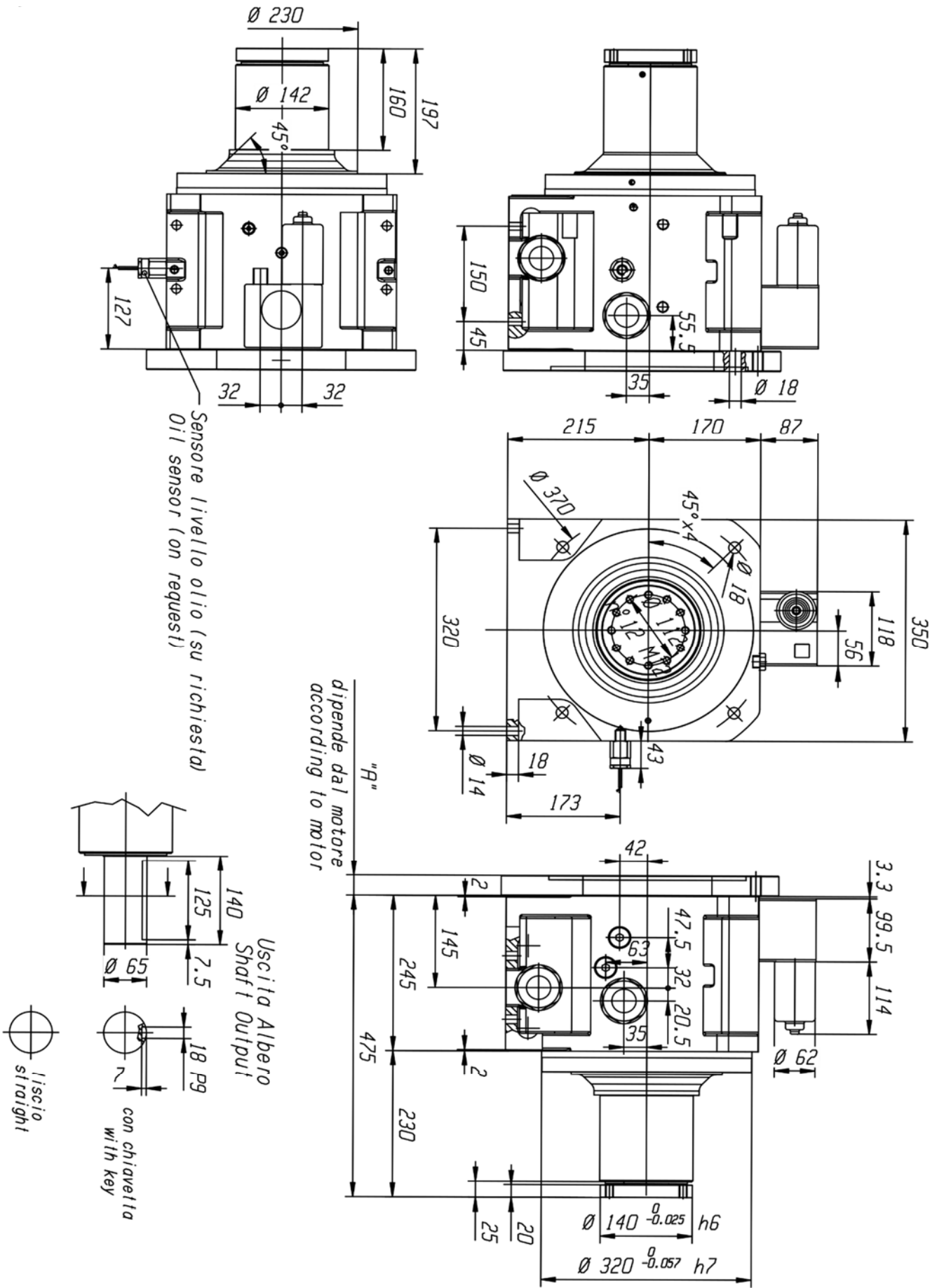
CE 13 Drawing



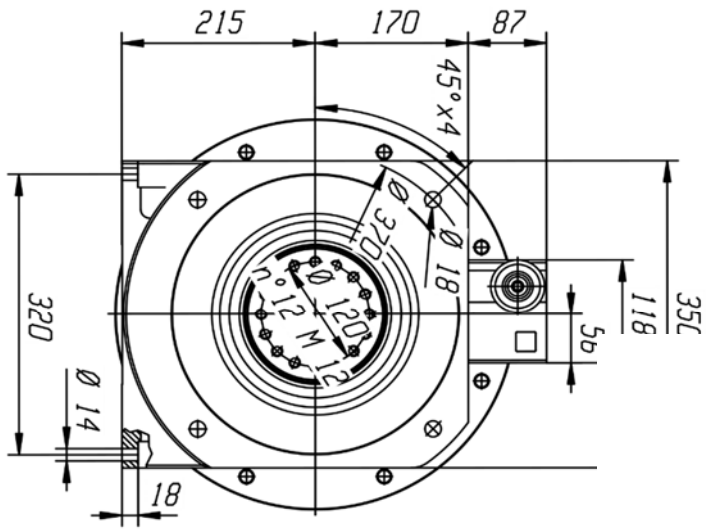
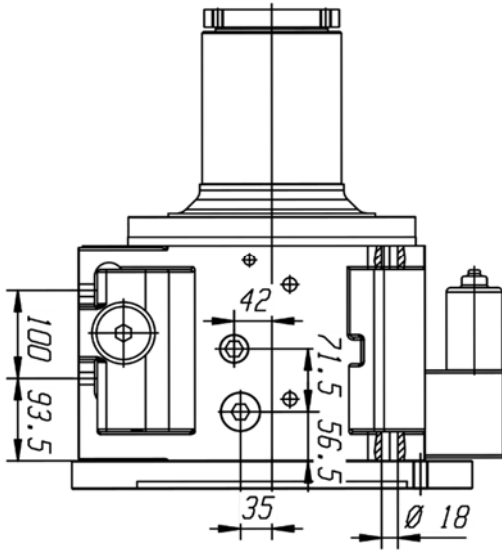
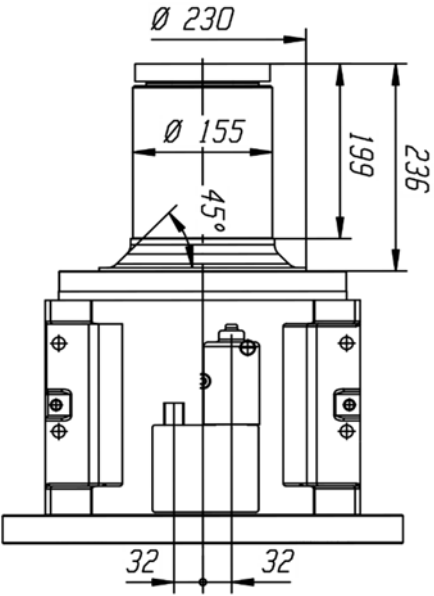
CE 13+ Drawing



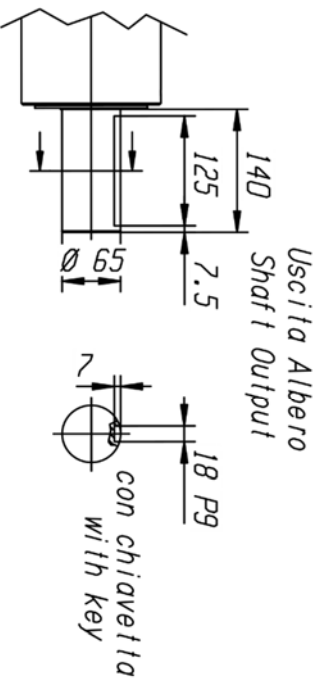
CE 16 Drawing



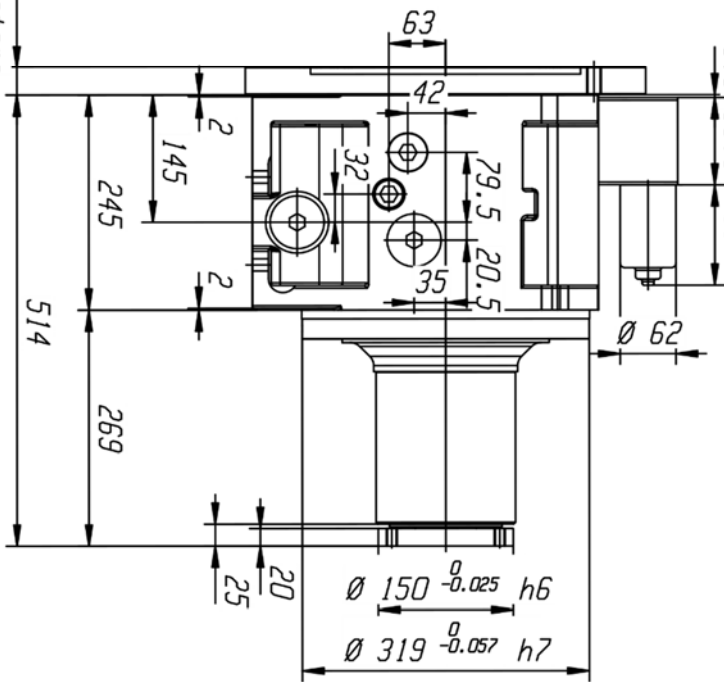
CE 18 Drawing



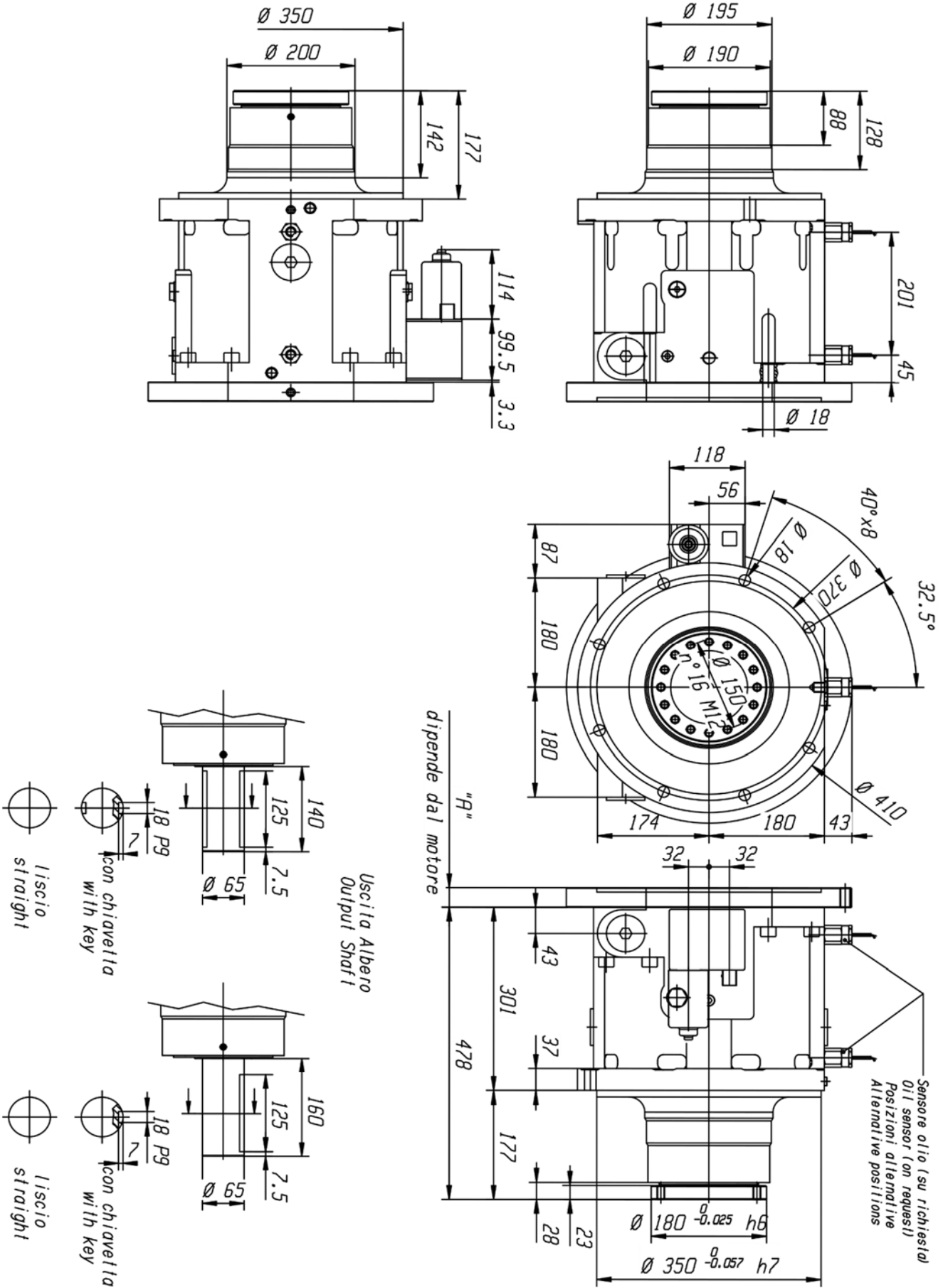
dipende dal motore
according to motor
"P"



liscio
straight



CE 20 Drawing

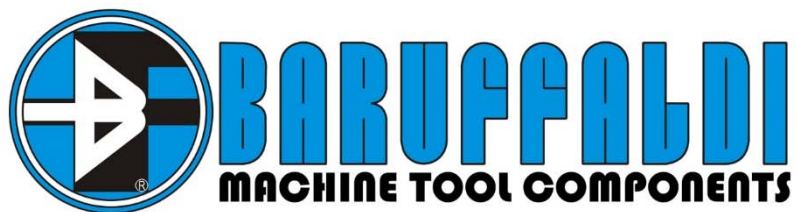




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