Rinvii angolari
spiral bevel gearboxes
dati tecnici / technical data

Il Rinvio per eccellenza
the unique bevel gearbox
### Programma di vendita e panoramica dei prodotti

**gearbox range overview**

Panoramica dei prodotti: Rinvii angolari, fasatori, ServoFoxx®, riduttori epicicloidali e loro possibili varianti.

*Overview of the spiral bevel, speed modulation, ServoFoxx® and planetary gearbox range with possible variants.*

<table>
<thead>
<tr>
<th>Fasatori</th>
<th>albero in ingresso input shaft</th>
<th>albero cavo brocciato hollow pinion with internal involute spline</th>
<th>flangia in ingresso input flange</th>
<th>flangia in ingresso input flange</th>
<th>albero in uscita output shaft</th>
<th>albero cavo con cava per chiavetta hollow shaft with key way</th>
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<tbody>
<tr>
<td>Rinvii angolari</td>
<td>SK</td>
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<td>Rinvii ad alte prestazioni</td>
<td>HL</td>
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<tr>
<td>Fasatore combinato con rinvio spiral bevel planetary speed modulation gearboxes</td>
<td>SP2</td>
<td>●</td>
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<td>●</td>
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<tr>
<td>Fasatore semplice single stage planetary speed modulation gearboxes</td>
<td>PE2</td>
<td>●</td>
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<tr>
<td>Fasatore doppio double stage planetary speed modulation gearboxes</td>
<td>PD2</td>
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<tr>
<td>Fasatore doppio per alte velocità double stage planetary speed modulation gearboxes</td>
<td>PDS</td>
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<tr>
<td>Fasatore differenziale inline bevel differential speed modulation gearboxes</td>
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</table>

**Serie ServoFoxx®**

*ServoFoxx® gearboxes*

<table>
<thead>
<tr>
<th>Riduttori epicicloidali planetary gearboxes</th>
<th>PL2 FS</th>
<th>PL2</th>
<th>●</th>
<th>●</th>
<th>●</th>
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</thead>
<tbody>
<tr>
<td>Rinvii angolari spiral bevel gearboxes</td>
<td>FS2</td>
<td>●</td>
<td>●</td>
<td>○</td>
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</tr>
<tr>
<td>Riduttori epicicloidali combinati con rinvio planetary spiral bevel gearboxes</td>
<td>PSK2 FS</td>
<td>PSK2</td>
<td>●</td>
<td>●</td>
<td>○</td>
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<tr>
<td>Rinvii combinati con riduttore epicicloidale spiral bevel planetary gearboxes</td>
<td>SKP2 FS</td>
<td>SKP2</td>
<td>●</td>
<td>●</td>
<td>○</td>
</tr>
</tbody>
</table>

**Hypoid hypoid gearboxes**

| HYP FS2 | ○ | ● | ● | ○ |

**Riduttori epicicloidali planetary gearboxes**

| P | ● | | |

**Combinazioni ed esecuzioni speciali**

*gearbox combinations and special gearboxes*

Il sistema modulare TANDLER permette soluzioni illimitate di accoppiamento dei propri rinvii, fasatori e riduttori ServoFoxx®.

The TANDLER modular system of construction provides almost unlimited possibilities. Therefore, the various ranges of spiral bevel, speed modulation and ServoFoxx® gearboxes can be combined together to provide the optimum solution.
Sviluppiamo insieme ai nostri clienti soluzioni speciali atte a soddisfare le loro esigenze tecniche, come, per esempio, riduttori, viti senza fine o riduttori epicycloidali speciali. 

*We will work together with you to develop complete special gearboxes to meet your requirements, such as spur, helical, worm or special planetary gearboxes.*
Il nostro obiettivo è la precisione in ogni applicazione.

Precision is our life’s ambition – and for every application.

Lasciatevi affascinare dalla precisione, dalla qualità e dalla durata dei nostri rinvii.

Let our fascination with precision inspire you and allow you to experience gearboxes of the highest quality and durability.

Rinvii angolari | caratteristiche generali

screw bevel gearboxes | general product characteristics

**Coppie ingranaggi rettificate, massima qualità della dentatura.**

**Qualità dentatura certificata da misurazione fianco del dente.**

**Funzionamento silenzioso.**

**Gioco angolare anche sotto il 1’ minuto.**

**Massima uniformità di rotazione.**

**Cuscinetti precaricati, tutti i lati del rinvio lavorati aventi fori di fissaggio filettati.**

**Nove grandezze, trasmissione di coppia fino a 10.000 Nm.**

**Pluralità di rapporti.**

**Disponibili numerose opzioni speciali quali cuscinetti rinforzati o sistemi di raffreddamento per elevate temperature di esercizio.**

**Rinvii con diverse classi di qualità.**

**Ricchezza di varianti grazie alle diverse disposizioni degli ingranaggi.**

**Coppie ingranaggi in acciaio temprato, elevata durezza superficiale e compattezza del nucleo.**

**Elevata efficienza, fino al 99%.**

**Cuscinetti selezionati di alta precisione SQ47.**

**Generatrice ottimale grazie all’accoppiamento manuale degli ingranaggi.**

**Alberi cavi temprati.**

**Gear sets manufactured from case hardened steel with high surface hardness and core strength.**

**High efficiency, up to 99%.**

**Uses selected bearings with higher accuracy (SQ47).**

**Precision manual assembly optimises tooth contact pattern for maximum load capacity.**

**Hardened hollow shafts.**

**Nine gearbox sizes for output torques up to 10,000 Nm.**

**Almost unlimited ratio possibilities.**

**Numerous special options available, such as reinforced bearings or cooling for operation at high temperatures.**

**Various gearbox quality classes.**

**Large wealth of variations due to numerous gear arrangements.**

**Ground gear sets with highest gear tooth quality.**

**Accuracy of gearing guaranteed by verifiable inspection reports (single flank test).**

**Quiet in operation.**

**Reduced backlash as low as 1 arc min.**

**Highest transmission accuracy.**

**Preloaded bearings, all gearbox faces machined, all faces with tapped mounting holes.**

**Diverse finiture anticorrosione: alluminio, acciaio inossidabile, verniciatura o trattamento Tenifer 30 NO.**

**Sistema modulare, differenti combinazioni possibili.**

**Soluzioni personalizzate ottimali anche per 1 solo pezzo.**

**Versioni speciali come ATEX o per l’industria alimentare.**

**Gear sets manufactured from case hardened steel with high surface hardness and core strength.**

**High efficiency, up to 99%.**

**Uses selected bearings with higher accuracy (SQ47).**

**Precision manual assembly optimises tooth contact pattern for maximum load capacity.**

**Hardened hollow shafts.**

**Nine gearbox sizes for output torques up to 10,000 Nm.**

**Almost unlimited ratio possibilities.**

**Numerous special options available, such as reinforced bearings or cooling for operation at high temperatures.**

**Various gearbox quality classes.**

**Large wealth of variations due to numerous gear arrangements.**

**Ground gear sets with highest gear tooth quality.**

**Accuracy of gearing guaranteed by verifiable inspection reports (single flank test).**

**Quiet in operation.**

**Reduced backlash as low as 1 arc min.**

**Highest transmission accuracy.**

**Preloaded bearings, all gearbox faces machined, all faces with tapped mounting holes.**

**Various corrosion resistant finishes: aluminium, stainless steel, painting or Tenifer 30 NO treatment.**

**Modular system, combinations of various gearbox types are possible.**

**One-off customised solutions to meet your specific application.**

**Versions for special requirements such as ATEX or for use in the food industry.**
Il nostro nome è sinonimo di qualità.

I rinvii angolari Tandler, altamente performanti e prestazionali, trovano impiego a livello mondiale in tutti i settori dell’industria meccanica.

La nostra struttura aziendale ci consente di essere estremamente flessibili e reattivi.

Definiamo, in collaborazione con i nostri clienti, la soluzione tecnica ottimale atta a soddisfare anche le esigenze più particolari.

Our name stands for quality.

High-precision and high performance spiral bevel gearboxes from TANDLER are used worldwide in all industrial sectors of mechanical engineering.

Our comprehensive manufacturing facilities and our in-house heat treatment make us extremely flexible and responsive. We work together in partnership with you, providing advice and assistance for your specific application, guiding you through concept, design and manufacture according to your individual requirements.

Provides invaluable benefits for customised solutions.
Rinvii angolari e varianti / *spiral bevel gearboxes and product variants*

<table>
<thead>
<tr>
<th>Caratteristiche generali / <em>general product characteristics</em></th>
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*performance data for standard version and product variants* | 8 |

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*standard version* | 10 |
|---|---|---|
| HW | albero cavo  
*hollow shaft* | 12 |
| HWS | albero cavo  
*hollow shaft* | 12 |
| HWK | albero rinforzato d₂  
*reinforced shaft d₂* | 14 |
| HWZ | albero rinforzato d₂  
*reinforced shaft d₂* | 14 |
| WV | albero rinforzato d₂  
*reinforced shaft d₂* | 14 |
| HRZ | albero pignone cavo, brocciato  
*hollow pinion* | 16 |
| F | flangia in ingresso  
*input flange* | 18 |
| FS2 | ServoFoxx® Rinvii angolari  
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*stainless steel gearboxes VA* | 26 |

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*switching and reversing gearboxes* | 30 |
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*switching spiral bevel gearboxes* | 32 |

| W | Invertitori  
*reversing spiral bevel gearboxes* | 34 |

| Posizione leva di comando per innesti ed invertitori  
*position of switching lever for switching and reversing gearboxes* | 36 |
| Posizione leva di comando per disinnesti  
*position of switching lever for switch-off spiral bevel gearboxes* | 37 |
| Caratteristiche qualitative | istruzioni  
*characteristics of quality | specifications | 38 |
Sono disponibili i dati inerenti gioco angolare, carico radiale, pesi, lubrificanti, posizione vite carico e scarico olio, posizione spia ed indicatore livello olio alla voce “caratteristiche qualitative | istruzioni” dei rispettivi gruppi di appartenenza dei rinvii. 

For information on backlash, radial load, weights, lubricants, location of the oil filler and drain plugs, arrangement of the oil sight glasses and oil level gauges see “characteristics of quality | Specifications” of each gearbox range.

**Rinvii ad alte prestazioni / PowerMaster gearboxes**

coppie per rinvii ad alte prestazioni

*performance data for PowerMaster gearboxes*

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<table>
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<tbody>
<tr>
<td><strong>HL</strong></td>
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<td>base</td>
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<td></td>
<td>standard</td>
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<tr>
<td>**HL HW</td>
<td>HL HWS**</td>
</tr>
<tr>
<td></td>
<td>albero cavo</td>
</tr>
<tr>
<td></td>
<td>hollow shaft</td>
</tr>
</tbody>
</table>

Caratteristiche qualitative | istruzioni
caracteristics of quality | specifications

**Specifiche tecniche generali / general technical data**

Definizione lati e stampigliatura / designation of gearbox faces, identification

Fattori per la selezione / determination of the application data

Determinazione del rapporto / determination of gearbox ratio

Fattori di servizio per la scelta del rinvio / service factors used in the selection of gearboxes

<p>| | | | | | |</p>
<table>
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<td><strong>VI</strong></td>
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<td>**EA</td>
<td>ZA</td>
<td>DA**</td>
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</tbody>
</table>

Disposizioni degli ingranaggi / Alberi addizionali
gear arrangements / gearboxes with auxiliary shafts

Montaggio verticale / vertical installation

Determinazione classi qualità / definition of quality classes

Accuratezza e certificato / measurement of gearbox accuracy

Protezione anticorrosione
corrosion protection

Opzioni
options

Combinazioni ed esecuzioni speciali
gearbox combinations and special gearboxes

ATEX
ATEX gearboxes

Noi siamo la TANDLER
we are TANDLER

Applicazioni
applications

Rappresentanze nel mondo / worldwide representation
Esempio d’ordine / ordering example
Contatti / contact
Versione base e varianti
standard version and product variants

I rinvii angolari TANDLER sono disponibili nella versione base, con albero cavo, albero cavo con calettatore, con albero in uscita rinforzato, con albero cavo brocciato, con flangia.

The standard version of TANDLER spiral bevel gearboxes are available with hollow shaft, hollow shaft with shrink disk, reinforced through shaft, hollow pinion and flange.

„Versatilità atta a soddisfare le Vostre esigenze.“
„Customisation as standard. We can adapt our gearbox to meet your requirements.“

La nostra versione base, grazie alla possibilità di alberi in uscita aggiuntivi, da uno a tre, ed alle diverse disposizioni degli ingranaggi interni, rende possibile molteplici soluzioni personalizzate.

Additional drive shafts and a choice of internal gear arrangements make the standard version of our spiral bevel gearbox truly adaptable. From one to three additional shafts, you will find the perfect solution.
Varianti
variants

- **albero cavo HW**
  - Hollow shaft HW
  - Rif. 7.1 pag. 12

- **albero cavo con calettatore HWS**
  - Hollow shaft with shrink disc HWS
  - Rif. 7.2 pag. 12

- **albero rinforzato WV**
  - Reinforced shaft WV
  - Rif. 7.3 pag. 14

- **albero cavo brocciato HRZ**
  - Hollow pinion HRZ
  - Rif. 7.4 pag. 16

- **flangia in ingresso F**
  - Input flange F
  - Rif. 7.5 pag. 18

- **rinvii ServoFoxx®**
  - ServoFoxx® spiral bevel gearboxes
  - Rif. 7.6 pag. 19

**Base**
- HW | HWS | HWK | HWZ
- WV
- HRZ
- F
Coppie ammissibili all’albero in uscita d2
permissible torques at output shaft d2

**HL** = Rinvio ad alte prestazioni, per maggiori dettagli vedere pagine 42-47.
**HL** = PowerMaster gearboxes, for more details see pages 42-47.

Higher torques possible with reinforced bearings.

Torques for other ratios on request.

Coppie per altri rapporti su richiesta.

Coppie incrementabili con cuscinetto rinforzato.

<table>
<thead>
<tr>
<th>i = n1 : n2 = 1:1 (Base e /and HL)</th>
<th>i = n1 : n2 = 2:1 (Base e /and HL)</th>
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</thead>
<tbody>
<tr>
<td>Velocità / speed n1 [min⁻¹]</td>
<td>Velocità / speed n1 [min⁻¹]</td>
</tr>
<tr>
<td>F1</td>
<td>F1</td>
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<td>E1</td>
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<tr>
<td>HL C1</td>
<td>HL B1</td>
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<tr>
<td>D1</td>
<td>C1</td>
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<td>HL A1</td>
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<td>HL 01</td>
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<td>Velocità / speed n1 [min⁻¹]</td>
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<td>F1</td>
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</table>
i = n₁ : n₂ = 5:1 (Base)

Coppie incrementabili con cuscinetto rinforzato.
Higher torques possible with reinforced bearings.

Coppie per altri rapporti su richiesta.
Torques for other ratios on request.
Versione base dei rinvii angolari
standard version of spiral bevel gearboxes

I rinvii TANDLER hanno un alto rendimento, un gioco angolare ridotto ed un’accurata trasmissione della potenza. Sono silenziosi, resistenti ai sovraccarichi, altamente affidabili e compatti.

TANDLER spiral bevel gearboxes provide highly efficient, high accuracy torque transmission with minimum backlash. They are quiet, resistant to shocks, highly reliable and compact.

Rapporti da / ratios
\[ i = \frac{n_1}{n_2} = 1:1 \text{ fino a } 6:1 \]
\[ i = \frac{n_1}{n_2} = 1:1 \text{ fino a } 1:2 \] (in funzione della grandezza depending upon gearbox size)

Altri rapporti su richiesta / please enquire for alternative ratios

Fattori per la selezione, ved. pag. 49
application data, see page 49

In fase d’ordine comunicare la posizione di montaggio, ved. pag. 54
when ordering, please specify the mounting position, see page 54

Caratteristiche tecniche, gioco angolare e specifiche, vedere pagine 20-23
performance data, quality characteristics, backlash and specifications, see pages 20-23

Coppie ammissibili, vedere pagine 8-9
permissible torques, see pages 8-9

disposizione raffigurata III, per altre disposizioni vedere pagine 50-53
gear arrangement III is shown, for more gear arrangements see pages 50-53
### Misure generali (eccetto rapporti 1:1,75 e 1:2)

**dimensions not dependent on ratio (except 1:1.75 and 1:2)**

<table>
<thead>
<tr>
<th>Grandezza</th>
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<th>b</th>
<th>c7</th>
<th>e</th>
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<th>m2</th>
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### Misure albero ingresso d1 / input dimensions d1

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### Misure albero uscita d2 / output shaft dimensions d2

**dimensions dependent on ratio**

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Rinvii angolari con albero cavo
spiral bevel gearboxes with hollow shaft

I rinvii angolari con albero cavo sono ideali da connettere direttamente all’albero di comando o per l’inserzione di alberi speciali. Eliminando il giunto si ottiene una soluzione compatta per la trasmissione della coppia. Sono disponibili con cava per chiavetta, brocciatura, calettatore.

Spiral bevel gearboxes with hollow shafts are ideal for direct connection of drive shafts and for the insertion of special connecting shafts. By eliminating couplings, they provide a compact solution to torque transmission in small spaces. Different versions with keyway, straight sided splines, involute splines and shrink disc are available.

HW  

HWS  

HWK  

HWZ  

albero cavo con cava per chiavetta1 / hollow shaft with keyway1 DIN 6885/3

HWS  

HWZ  

HWK  

HW   

albero cavo con calettatore  

Il calettatore viene montato sull’albero d2. Con disposizione degli ingranaggi III (RA III) viene fornito di serie un solo calettatore. Con disposizione degli ingranaggi I o II (RA I e RA II) il diametro dell’albero cavo opposto al calettatore è  

\[ d = d_w + 0.5 \text{ mm} \]

hollow shaft with shrink disk  
The shrink disc is always mounted to the extended hollow shaft d2. The standard version includes the delivery of one shrink disk. With gear wheel arrangements I and II (RA I and RA II) the diameter of the hollow shaft opposite the shrink disc is  

\[ d = d_w + 0.5 \text{ mm} \]

1 tamprato, foro rettificato/ harded, ground  
2 tamprato/ hardened
<table>
<thead>
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<th>Gearbox size</th>
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<th>Output Dimensions d₂</th>
<th>Ratio</th>
<th>Dimensions not dependent on ratio</th>
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**Input Dimensions d₁:**
- Width (W)
- Depth (D)
- Height (H)

**Output Dimensions d₂:**
- Width (W)
- Depth (D)
- Height (H)

**Ratio:**
- i = n₁ : n₂

**Dimensions not dependent on ratio:**
- Width (W)
- Depth (D)
- Height (H)
I rinvii angolari con albero rinforzato sono normalmente utilizzati in linea nelle applicazioni dove la coppia da trasmettere interessa maggiormente l’albero d2 e solo parzialmente resa all’albero d1, si rende pertanto possibile l’impiego di rinvii di taglia inferiore risultando la soluzione più economica.

Spiral bevel gearboxes with reinforced shafts are commonly used in line-shaft drive applications where only a proportion of the full torque is taken off the main drive shaft at various intervals. Because the full torque is not transmitted through the gears,

disposizione raffigurata III, per altre disposizioni vedere pagine 50-53

gear arrangement III is shown, for more gear arrangements see pages 50-53
Coppie massime ammissibili all’albero d2
maximum permitted torque on shaft d2

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Misure generali / dimensions not dependent on ratio

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<th>e</th>
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Misure lato ingresso d1 / input dimensions d1

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Misure lato ingresso d1 / input dimensions d1

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Misure lato ingresso d1 / input dimensions d1

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Le coppie indicate in tabella possono essere trasmesse solo attraverso l’albero d2 (pag. 14, Rif. 14.2/3). Per le coppie trasmissibili valgono i valori indicati nei diagrammi di pagina 8–9.

The torques shown in the table are only for the shaft d2 (p.14, fig. 14.2/3). For the gears, the torques are from the tables on page 8-9.
Rinvii angolari con albero pignone cavo

Spiral bevel gearboxes with hollow pinion, allow direct connection to drive shafts with splines to DIN 5482. No coupling is needed.

Riv. 16.1

Rapporti da / ratios
\[ i = \frac{n_1}{n_2} = 1:1 \text{ fino a } 1:2 \]
(in funzione della grandezza depending upon gearbox size)

Altri rapporti su richiesta / please enquire for alternative ratios

Riv. 16.3

disposizione raffigurata III, per altre disposizioni vedere pagine 50-53

gear arrangement III is shown, for more gear arrangements see pages 50-53

HRZ

Pignone cavo d_1 con profilo secondo DIN 5482\(^1\).

Altri profili e fori con cava per chiavetta su richiesta.

hollow pinion d_1 with internal involute spline according to DIN 5482\(^1\).

other splines and bores with keyway upon request.

\(^1\) temprato / hardened
### Misure generali (eccetto rapporti 1:1,75 e 1:2)
Dimensions not dependent on ratio (except 1:1,75 und 1:2):

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>a</th>
<th>b</th>
<th>c17</th>
<th>e</th>
<th>g</th>
<th>k</th>
<th>Profl./depth = 1,5 • k</th>
<th>l2</th>
<th>m1</th>
<th>m2</th>
<th>o</th>
<th>v</th>
<th>w</th>
<th>d2/6</th>
<th>r</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRZ01</td>
<td>110</td>
<td>145</td>
<td>102</td>
<td>82</td>
<td>14</td>
<td>M8</td>
<td>35</td>
<td>100</td>
<td>222</td>
<td>70</td>
<td>152</td>
<td>150</td>
<td>22</td>
<td>M8</td>
<td>6</td>
<td>6 x 6</td>
</tr>
<tr>
<td>HRZ A1</td>
<td>140</td>
<td>175</td>
<td>130</td>
<td>105</td>
<td>14</td>
<td>M10</td>
<td>45</td>
<td>120</td>
<td>274</td>
<td>90</td>
<td>184</td>
<td>182</td>
<td>32</td>
<td>M10</td>
<td>8</td>
<td>10 x 8</td>
</tr>
<tr>
<td>HRZ B1</td>
<td>170</td>
<td>215</td>
<td>160</td>
<td>130</td>
<td>18</td>
<td>M12</td>
<td>60</td>
<td>150</td>
<td>344</td>
<td>110</td>
<td>224</td>
<td>222</td>
<td>42</td>
<td>M12</td>
<td>12</td>
<td>12 x 8</td>
</tr>
<tr>
<td>HRZ C1</td>
<td>210</td>
<td>260</td>
<td>195</td>
<td>160</td>
<td>18</td>
<td>M16</td>
<td>85</td>
<td>190</td>
<td>440</td>
<td>135</td>
<td>270</td>
<td>268</td>
<td>55</td>
<td>M10</td>
<td>16</td>
<td>16 x 10</td>
</tr>
<tr>
<td>HRZ D1</td>
<td>260</td>
<td>330</td>
<td>245</td>
<td>200</td>
<td>23</td>
<td>M16</td>
<td>100</td>
<td>240</td>
<td>540</td>
<td>150</td>
<td>340</td>
<td>338</td>
<td>65</td>
<td>M11</td>
<td>18</td>
<td>18 x 11</td>
</tr>
<tr>
<td>HRZ E1</td>
<td>330</td>
<td>430</td>
<td>310</td>
<td>260</td>
<td>29</td>
<td>M20</td>
<td>120</td>
<td>315</td>
<td>680</td>
<td>230</td>
<td>440</td>
<td>438</td>
<td>75</td>
<td>M17</td>
<td>20</td>
<td>20 x 12</td>
</tr>
</tbody>
</table>

### Misure albero uscita d2
Output shaft dimensions d2:

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>d2/6</th>
<th>r</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRZ01</td>
<td>16</td>
<td>M6</td>
<td>5 x 5</td>
</tr>
<tr>
<td>HRZ A1</td>
<td>24</td>
<td>M8</td>
<td>8 x 7</td>
</tr>
<tr>
<td>HRZ B1</td>
<td>28</td>
<td>M8</td>
<td>8 x 7</td>
</tr>
<tr>
<td>HRZ C1</td>
<td>38</td>
<td>M10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>HRZ D1</td>
<td>50</td>
<td>M16</td>
<td>14 x 9</td>
</tr>
<tr>
<td>HRZ E1</td>
<td>50</td>
<td>M16</td>
<td>14 x 9</td>
</tr>
</tbody>
</table>

### Misure lato ingresso d1 / input dimensions d1:

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>DIN 5482 su d1</th>
<th>p</th>
<th>s</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRZ01</td>
<td>A 20 x 17</td>
<td>20</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>HRZ A1</td>
<td>A 25 x 22</td>
<td>15</td>
<td>48</td>
<td>70</td>
</tr>
<tr>
<td>HRZ B1</td>
<td>A 30 x 27</td>
<td>15</td>
<td>48</td>
<td>95</td>
</tr>
<tr>
<td>HRZ C1</td>
<td>A 40 x 36</td>
<td>26</td>
<td>48</td>
<td>120</td>
</tr>
<tr>
<td>HRZ D1</td>
<td>A 45 x 41</td>
<td>23</td>
<td>48</td>
<td>150</td>
</tr>
<tr>
<td>HRZ E1</td>
<td>A 48 x 44</td>
<td>40</td>
<td>48</td>
<td>220</td>
</tr>
</tbody>
</table>

### Misure albero uscita d2
Output shaft dimensions d2:

<table>
<thead>
<tr>
<th>Grandezza rinvio gearbox size</th>
<th>l2</th>
<th>m1</th>
<th>m2</th>
<th>o</th>
<th>v</th>
<th>d2/6</th>
<th>r</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRZ01</td>
<td>30</td>
<td>100</td>
<td>212</td>
<td>70</td>
<td>152</td>
<td>16</td>
<td>M6</td>
<td>5 x 5</td>
</tr>
<tr>
<td>HRZ A1</td>
<td>42</td>
<td>120</td>
<td>268</td>
<td>90</td>
<td>184</td>
<td>24</td>
<td>M8</td>
<td>8 x 7</td>
</tr>
<tr>
<td>HRZ B1</td>
<td>50</td>
<td>150</td>
<td>324</td>
<td>110</td>
<td>224</td>
<td>28</td>
<td>M8</td>
<td>8 x 7</td>
</tr>
<tr>
<td>HRZ C1</td>
<td>60</td>
<td>190</td>
<td>390</td>
<td>135</td>
<td>270</td>
<td>38</td>
<td>M10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>HRZ D1</td>
<td>80</td>
<td>240</td>
<td>500</td>
<td>150</td>
<td>340</td>
<td>50</td>
<td>M16</td>
<td>14 x 9</td>
</tr>
<tr>
<td>HRZ E1</td>
<td>90</td>
<td>315</td>
<td>620</td>
<td>230</td>
<td>440</td>
<td>50</td>
<td>M16</td>
<td>14 x 9</td>
</tr>
</tbody>
</table>

Comunicateci le Vostre esigenze.
Svilupperemo una soluzione personalizzata.

Please talk to us about your special requirements. We will be happy to develop an individual solution to meet your needs.
Rinvii angolari con flangia in ingresso
spiral bevel gearboxes with input flange

I nostri rinvii angolari sono accoppiabili a quasi tutti i motori a corrente continua / alternata esistenti sul mercato tramite flange ed albero pignone cavo con cava per chiavetta. Per applicazioni con servo motori consigliamo l’impiego dei Rinvii ServoFoxx®.

Spiral bevel gearboxes with various flange designs and a hollow input shaft with keyway can be assembled to virtually any AC or DC motor available in the market. For highly dynamic servo applications ServoFoxx® gear units are used.

Rapporti da / ratios
\[ i = \frac{n_1}{n_2} = 1:1 \text{ fino a } \frac{1}{2} \]
\[ i = \frac{n_1}{n_2} = 1:1 \text{ fino a } 1:2 \]
(in funzione della grandezza depending upon gearbox size)

Altri rapporti su richiesta / please enquire for alternative ratios

Esempio: rinvio accoppiato tramite flangia porta motore / example: gearbox assembled with flange mounted motor

In fase d’ordine comunicare la posizione di montaggio, ved. pag. 54
when ordering, please specify the mounting position, see page 54

Caratteristiche tecniche, gioco angolare e specifiche, vedere pagine 20-23
performance data, quality characteristics, backlash and specifications, see pages 20-23

Coppie ammissibili, vedere pagine 8-9
permissible torques, see pages 8-9
### Misure generali (eccetto rapporti 1:1.75 e 1:2) / dimensions not dependent on ratio (except 1:1.75 and 1:2)

<table>
<thead>
<tr>
<th>Grandezza rinvio gearbox size</th>
<th>a</th>
<th>b</th>
<th>c7</th>
<th>e</th>
<th>h</th>
<th>Prof/depth ( &gt; 1.5 \cdot k )</th>
<th>( l_2 )</th>
<th>( m_2 )</th>
<th>v</th>
<th>w</th>
<th>( d_{266} )</th>
<th>r</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 00</td>
<td>80</td>
<td>110</td>
<td>74</td>
<td>60</td>
<td>52</td>
<td>M6</td>
<td>30</td>
<td>177</td>
<td>117</td>
<td>115</td>
<td>14</td>
<td>M6</td>
<td>5 x 5</td>
</tr>
<tr>
<td>F 01</td>
<td>110</td>
<td>145</td>
<td>102</td>
<td>82</td>
<td>73</td>
<td>M8</td>
<td>35</td>
<td>252</td>
<td>222</td>
<td>152</td>
<td>150</td>
<td>M8</td>
<td>6 x 6</td>
</tr>
<tr>
<td>F A1</td>
<td>140</td>
<td>175</td>
<td>130</td>
<td>105</td>
<td>105</td>
<td>M10</td>
<td>45</td>
<td>274</td>
<td>184</td>
<td>182</td>
<td>182</td>
<td>M10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>F B1</td>
<td>170</td>
<td>215</td>
<td>160</td>
<td>130</td>
<td>92</td>
<td>M12</td>
<td>60</td>
<td>344</td>
<td>224</td>
<td>222</td>
<td>222</td>
<td>M12</td>
<td>12 x 8</td>
</tr>
<tr>
<td>F C1</td>
<td>210</td>
<td>260</td>
<td>195</td>
<td>160</td>
<td>92</td>
<td>M16</td>
<td>85</td>
<td>440</td>
<td>270</td>
<td>268</td>
<td>268</td>
<td>M16</td>
<td>16 x 10</td>
</tr>
<tr>
<td>F D1</td>
<td>260</td>
<td>330</td>
<td>245</td>
<td>200</td>
<td>115</td>
<td>M16</td>
<td>100</td>
<td>540</td>
<td>340</td>
<td>338</td>
<td>65</td>
<td>M16</td>
<td>16 x 11</td>
</tr>
</tbody>
</table>

### Misure albero pignone cavo \( d_1 \) / dimensions hollow pinion \( d_1 \)

<table>
<thead>
<tr>
<th>Grandezza rinvio gearbox size</th>
<th>( l_1 )</th>
<th>( m_1 )</th>
<th>t</th>
<th>( \varphi^H )</th>
<th>( d_{1H7} )</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 00</td>
<td>30</td>
<td>92</td>
<td>16,3</td>
<td>5</td>
<td>14</td>
<td>5 x 5</td>
</tr>
<tr>
<td>F 01</td>
<td>40</td>
<td>128</td>
<td>21,8</td>
<td>6</td>
<td>19</td>
<td>6 x 6</td>
</tr>
<tr>
<td>F A1</td>
<td>60</td>
<td>150</td>
<td>31,3</td>
<td>8</td>
<td>28</td>
<td>8 x 7</td>
</tr>
<tr>
<td>F B1</td>
<td>60</td>
<td>177</td>
<td>31,3</td>
<td>8</td>
<td>28</td>
<td>8 x 7</td>
</tr>
<tr>
<td>F C1</td>
<td>80</td>
<td>197</td>
<td>41,3</td>
<td>10</td>
<td>38</td>
<td>10 x 8</td>
</tr>
<tr>
<td>F D1</td>
<td>110</td>
<td>245</td>
<td>51,8</td>
<td>14</td>
<td>48</td>
<td>14 x 9</td>
</tr>
</tbody>
</table>

### Misure albero uscita \( d_2 \) / output dimensions \( d_2 \)

<table>
<thead>
<tr>
<th>Grandezza rinvio gearbox size</th>
<th>( l_2 )</th>
<th>( m_2 )</th>
<th>v</th>
<th>( d_{266} )</th>
<th>r</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 00</td>
<td>25</td>
<td>167</td>
<td>117</td>
<td>12</td>
<td>M5</td>
<td>4 x 4</td>
</tr>
<tr>
<td>F 01</td>
<td>30</td>
<td>212</td>
<td>152</td>
<td>16</td>
<td>M6</td>
<td>5 x 5</td>
</tr>
<tr>
<td>F A1</td>
<td>42</td>
<td>268</td>
<td>184</td>
<td>24</td>
<td>M8</td>
<td>8 x 7</td>
</tr>
<tr>
<td>F B1</td>
<td>50</td>
<td>324</td>
<td>224</td>
<td>28</td>
<td>M8</td>
<td>8 x 7</td>
</tr>
<tr>
<td>F C1</td>
<td>60</td>
<td>390</td>
<td>270</td>
<td>38</td>
<td>M10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>F D1</td>
<td>80</td>
<td>500</td>
<td>340</td>
<td>50</td>
<td>M16</td>
<td>14 x 9</td>
</tr>
</tbody>
</table>

### Rinvii angolari ServoFoxx®

ServoFoxx® spiral bevel gearboxes

Per le applicazioni con servomotore consigliamo l’impiego dei rinvii FS2 della serie ServoFoxx®. Differente dalla nostra serie F, la serie FS2 monta un giunto a soffietto, costituito da due elementi, è lubrificata a vita ed ha finitura anticorrosione. Questa serie dispone di una vasta gamma di flange e giunti rendendola accoppiabile a quasi tutti i motori sia servo che standard anche in assenza di albero con chiavetta. Maggiori informazioni sui rinvii della serie FS2 si trovano sia all’interno del catalogo ServoFoxx® che sul sito www.tandler.de.

For servo applications, we recommend our FS2- spiral bevel gearbox from the ServoFoxx® range. In contrast to the flanged gearboxes series F, the input is fitted with a 2 piece bellows coupling, they are lubricated for life and have a corrosion resistant finish. Additionally, the FS2 series, like all gearboxes from the ServoFoxx® range, interchangeable flanges and couplings cater for almost all servo and standard motors, with and without keyed motor shafts. For further information on the FS2 spiral bevel gearboxes see the ServoFoxx® catalogue and www.tandler.de.
Caratteristiche qualitative ed istruzioni per rinvio base e varianti

Per rinvio versione base, rinvio con albero cavo, con albero rinforzato, con albero pignone cavo e con flangia in ingresso.

For standard version spiral bevel gearboxes with hollow shaft, reinforced shaft, hollow pinion and with input flange.

**1. Gioco angolare all’albero d2 / backlash at shaft d2**

<table>
<thead>
<tr>
<th>Grandezza rinvio / gearbox size</th>
<th>000 - B1</th>
<th>C1 - F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gioco angolare standard / standard design [arc min.]</td>
<td>6'</td>
<td>7'</td>
</tr>
<tr>
<td>Esecuzione con gioco angolare ridotto SF / reduced backlash SF</td>
<td>4'</td>
<td>4'</td>
</tr>
</tbody>
</table>

**2. Carico radiale ammissibile / permissible radial load**

<table>
<thead>
<tr>
<th>Carico radiale ammissibile all’albero d2* / permissible radial load at shafts d2*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grandezza gearbox size</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>000 - B1</td>
</tr>
<tr>
<td>000 - B1</td>
</tr>
<tr>
<td>00 - B1</td>
</tr>
<tr>
<td>00 - B1</td>
</tr>
<tr>
<td>01 - B1</td>
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<tr>
<td>01 - B1</td>
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<tr>
<td>A1 - B1</td>
</tr>
<tr>
<td>A1 - B1</td>
</tr>
<tr>
<td>B1 - B1</td>
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<td>B1 - B1</td>
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<td>C1 - B1</td>
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<tr>
<td>D1 - B1</td>
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<td>D1 - B1</td>
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<td>E1 - B1</td>
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<tr>
<td>E1 - B1</td>
</tr>
<tr>
<td>F1 - B1</td>
</tr>
<tr>
<td>F1 - B1</td>
</tr>
</tbody>
</table>

* Valori indicativi validi con funzionamento al 50% della coppia ed al 50% della velocità massima ammesse (vedere diagramma pagine 8-9).
* Values apply for 50% of the allowable torque at 50% of maximum speed (see diagram on page 8-9).
Rinvii angolari | versione base e varianti | caratteristiche qualitative ed istruzioni

spiral bevel gearboxes | standard version and product variants | quality characteristics, specifications

Base
HW | HWS | HWK | HWZ
WV
HRZ
F

3. Posizione vite carico e scarico olio / position of oil filler and drain plugs

![Diagram of oil filler and drain plugs]

**Dimensioni tappo di chiusura / screw plug dimensions**

<table>
<thead>
<tr>
<th>Grandezza</th>
<th>Quantità</th>
<th>Filetto/Pos. 1</th>
<th>Filetto/Pos. 2</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>000</td>
<td>3</td>
<td>M 20 x 1,5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>00</td>
<td>2</td>
<td>R 3/4&quot;</td>
<td>6 M 12 x 1,5</td>
<td>396</td>
<td>396</td>
</tr>
<tr>
<td>01</td>
<td>2</td>
<td>M 30 x 1,5</td>
<td>6 M 12 x 1,5</td>
<td>58</td>
<td>67</td>
</tr>
<tr>
<td>A1</td>
<td>2</td>
<td>M 30 x 1,5</td>
<td>6 M 12 x 1,5</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>B1</td>
<td>2</td>
<td>M 30 x 1,5</td>
<td>6 M 30 x 1,5</td>
<td>100</td>
<td>68</td>
</tr>
<tr>
<td>C1</td>
<td>2</td>
<td>M 30 x 1,5</td>
<td>6 M 30 x 1,5</td>
<td>110</td>
<td>98</td>
</tr>
<tr>
<td>D1</td>
<td>2</td>
<td>M 30 x 1,5</td>
<td>6 M 30 x 1,5</td>
<td>146</td>
<td>134</td>
</tr>
<tr>
<td>E1</td>
<td>2</td>
<td>M 42 x 1,5</td>
<td>6 M 42 x 1,5</td>
<td>180</td>
<td>168</td>
</tr>
<tr>
<td>F1</td>
<td>2</td>
<td>M 48 x 1,5</td>
<td>6 M 48 x 1,5</td>
<td>210</td>
<td>230</td>
</tr>
</tbody>
</table>

Rif. 21.1

**4. Posizione spie livello olio / arrangement of the oil-level gauges**

Nella serie base grandezze 00,01,A1, indipendentemente dal rapporto, la spia è montata in posizione centrale sulla faccia opposta all’albero d1, riempimento olio fino a metà della stessa.

Nelle grandezze B1,C1,D1,E1,F1, con rapporto 1:1, la spia è sempre montata nella posizione più bassa, riempimento olio fino a metà della stessa.

Nei rapporti con $i \neq 1:1$ la spia è montata in posizione centrale. La spia può essere spostata secondo le Vostre esigenze essendo tutte le facce della caraffa dotate di viti di carico e scarico olio aventi stessa filettatura.

Potete comunicare in fase d’ordine la posizione a Voi ottimale della spia livello olio.

For standard gearboxes, sizes 00, 01 and A1, irrespective of ratio, the sight glass is always in the middle of the casing, with the oil level to the middle of the sight glass.

For gearbox sizes B1; C1; D1; E1; F1, with 1:1 ratio, the oil sight glasses are always fitted at the lowest position, with the oil level at the centre of the sight glass.

For gearbox ratios other than 1:1, the oil sight is fitted in the middle of the casing. All gearbox faces are machined and provided with tapped holes for the oil plugs and sight glass to allow for alternative oil sight positions.

Where an alternative position is required, please use the diagram below to establish the designation and indicate it to us on your order.

**Posizioni possibili della spia livello olio (S 506) / possible positions of the oil sight glass (S 506)**

![Possible positions of oil sight glass]

Rif. 21.2
5. Lubrificanti e quantità / lubricants and lubricant quantities

The selection of lubricants and their viscosity is made taking into account the type, scope, speed, backlash and operating temperature of the gearbox. The run-tested spiral bevel gearboxes are supplied filled with the correct quantity of mineral oil CLP to DIN 51517-3 ISO VG 68.

The position of the oil sight glass can be changed to suit the application. The oil sight glass and screw plugs are sealed with O-rings. The oil change intervals are dependent on the operating conditions. To extend the oil change intervals, gearboxes can be supplied filled with fully synthetic oil. For low speeds applications we recommend fluid grease GP 00 according to DIN 51826. All gearboxes can be supplied with food grade oils and greases.

<table>
<thead>
<tr>
<th>Quantità lubrificante / lubricant quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grandezza gearbox size</td>
</tr>
<tr>
<td>i = 1 : 1</td>
</tr>
<tr>
<td>000</td>
</tr>
<tr>
<td>00</td>
</tr>
<tr>
<td>01</td>
</tr>
<tr>
<td>A1</td>
</tr>
<tr>
<td>B1</td>
</tr>
<tr>
<td>C1</td>
</tr>
<tr>
<td>D1</td>
</tr>
<tr>
<td>E1</td>
</tr>
<tr>
<td>F1</td>
</tr>
</tbody>
</table>

le quantità sono indicative
listed quantities are approximate values
6. Indicatore livello olio per rinvio con albero in ingresso addizionale (S 545)

oil gauge for gearboxes with additional shaft extensions (S 545)

Quando il rinvio angolare presenta più alberi posizionati orizzontalmente non è possibile l’utilizzo della spia di livello olio standard. Si potrà utilizzare, su richiesta del cliente, una spia di livello olio angolare come indicato nella figura accanto.

Comunicare la posizione di montaggio della spia di livello olio angolare desiderata (per es. A, vedere figura, foglio S 545).

When gearboxes are specified with additional shaft extensions, and all shafts are in the horizontal plane, it is not possible to use the standard oil sight glass. A special angular oil level indicator (as shown opposite) is recommended.

To ensure that the oil level indicator is visible after installation of the gearbox, the correct position, eg S545-A (as shown in the data sheet S545 and diagram opposite) must be specified.

Altre posizioni su richiesta.

Further positions on request.

7. Pesi in kg / weights in kg

<table>
<thead>
<tr>
<th>Grandezza rinvio</th>
<th>Versione base basic model</th>
<th>Serie HW / HWK / HWZ series HW / HWK / HWZ</th>
<th>Serie HWS series HWS</th>
<th>Serie WV series WV</th>
<th>Serie HRZ series HRZ</th>
<th>Serie F series F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Versione standard standard Version</td>
<td>Versione alluminio aluminium Version</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>000</td>
<td>2,5 2,5</td>
<td>HW 000 2,5</td>
<td>HWS 000 2,5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>01</td>
<td>5 5</td>
<td>HW 01 5</td>
<td>HW 01 11</td>
<td>WV 00 5,2</td>
<td>-</td>
<td>160 F01 6,5</td>
</tr>
<tr>
<td>11</td>
<td>7 7</td>
<td>HW 01 11</td>
<td>HWS 01 11,5</td>
<td>WV 01 12,5</td>
<td>-</td>
<td>160 F01 14</td>
</tr>
<tr>
<td>21</td>
<td>21 20</td>
<td>HW 01 21</td>
<td>HWS 01 21</td>
<td>WV 01 22,5</td>
<td>HRZ 01 10,5</td>
<td>200 FA1 26</td>
</tr>
<tr>
<td>36</td>
<td>34 36</td>
<td>HWS B1 35</td>
<td>WV B1 38,5</td>
<td>HRZ B1 35</td>
<td>200 FB1 42</td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>59 61</td>
<td>HWS C1 61</td>
<td>WV C1 67</td>
<td>HRZ C1 61</td>
<td>300 FC1 74</td>
<td></td>
</tr>
<tr>
<td>124</td>
<td>- 116</td>
<td>HWS D1 120</td>
<td>WV D1 131</td>
<td>HRZ D1 119</td>
<td>350 FD1 130</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>- 241</td>
<td>HWS E1 247</td>
<td>WV E1 266</td>
<td>HRZ E1 242</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>455</td>
<td>- 422</td>
<td>HWS F1 429</td>
<td>WV F1 460</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

sono possibili modeste variazioni del peso / small deviations of the weights are possible

8. Ulteriori dati tecnici / Momento d’inerzia / Forze esterne

further technical data / mass moments of inertia / external loads

Su richiesta forniamo i dati tecnici a Voi necessari, per esempio momento d’inerzia, o ulteriori informazioni sui carichi radiali ed assiali ammissibili. Questi ultimi sono strettamente correlati alle condizioni d’uso quali velocità e coppia trasmessa.

Le richieste tecniche vengono evase celermente.

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.
Protezione anticorrosione ed igiene sono i requisiti attualmente richiesti soprattutto nel settore alimentare; i nostri rinvii sono ora disponibili, in funzione della grandezza, del rapporto e della serie, in acciaio inossidabile. Vengono forniti con olio per il settore alimentare o altro lubrificante indicato dal cliente. Tutte le dimensioni corrispondono a quelle della serie base di riferimento e delle sue varianti.

Di serie forniamo i nostri rinvii in acciaio inossidabile con un solo tappo di chiusura per lato della carcassa, senza spia di livello dell’olio e senza fori di fissaggio. I fori di fissaggio del rinvio vengono eseguiti sul lato indicato dal cliente (ved. definizione lati a pag. 26, Rif. 26.3). Si prega di comunicare il lato in fase di richiesta d’offerta e/o in fase d’ordine.

Today there are many industries, particularly the food industry, which place great emphasis on corrosion resistance and hygiene. To meet these requirements we produce stainless steel gearboxes, dependent on size, ratio and configuration. These are factory filled with food grade oil or other lubricants if desired. All the dimensions of the stainless steel gearboxes are the same as the standard spiral bevel gearboxes and their variants.

As standard, our stainless steel gearboxes have only one screw plug per housing face, no oil sight glass and no mounting holes. Mounting holes are machined as per customer requirements in the specified face (for definition of faces see page 26, Fig 26.3). Please specify the face on your enquiry and/or order.
Coppie per rinvii in acciaio inossidabile VA

performance data for gearboxes in stainless steel VA

Coppie ammissibili all’albero in uscita d₂

permissible torques at output shaft d₂

\[ i = n_1 : n_2 = 1:1 \text{ (VA)} \]

\[ i = n_1 : n_2 = 2:1 \text{ (VA)} \]

\[ i = n_1 : n_2 = 3:1 \text{ (VA)} \]
Rinvii angolari in acciaio inossidabile VA

spiral bevel gearboxes in stainless steel VA

I nostri rinvii in acciaio inossidabile sono disponibili anche in altre varianti, per esempio con albero cavo o con albero rinforzato, vedere da pag. 12.

I fori di fissaggio vengono eseguiti unicamente sul lato o sui lati indicati dal cliente (ved. definizione lati Rif. 26.3, sotto).

The stainless steel gearboxes are also available in other variants, like the standard spiral bevel gearboxes, such as with hollow shaft or reinforced shaft, see page 12.

Mounting holes are machined as per customer specification in the required mounting face or faces. See definition of mounting faces, Fig. 26.3 below.

Definizione lati

(secondo la norma TANDLER TN 1)

designation of gearbox faces

(according to TANDLER standard TN 1)

I fori di fissaggio k

Vengono eseguiti unicamente sul lato o sui lati della carcassa indicati dal cliente.

Utilizzare illustrazione a fianco (Rif. 26.3) di definizione lati.

mounting holes k

are machined as per customer specification in the required mounting face or faces. To determine the correct mounting face definition, see the next illustration (Figure 26.3).
### Misure generali

**Dimensions not dependent on ratio**

<table>
<thead>
<tr>
<th>Grandezza/ Size</th>
<th>a</th>
<th>b</th>
<th>c7</th>
<th>e</th>
<th>k⁺/ Prof. depth</th>
<th>l₂</th>
<th>m₂</th>
<th>v</th>
<th>w</th>
<th>d₂/k6</th>
<th>r</th>
<th>Chiavetta/key</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA 000</td>
<td>60</td>
<td>73</td>
<td>59</td>
<td>46</td>
<td>M 5</td>
<td>23</td>
<td>132</td>
<td>86</td>
<td>84</td>
<td>12</td>
<td>M 5</td>
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<tr>
<td>VA 00</td>
<td>80</td>
<td>110</td>
<td>74</td>
<td>60</td>
<td>M 6</td>
<td>30</td>
<td>177</td>
<td>117</td>
<td>115</td>
<td>14</td>
<td>M 6</td>
<td>5 x 5</td>
</tr>
<tr>
<td>VA 01</td>
<td>110</td>
<td>145</td>
<td>102</td>
<td>82</td>
<td>M 8</td>
<td>35</td>
<td>222</td>
<td>152</td>
<td>150</td>
<td>22</td>
<td>M 8</td>
<td>6 x 6</td>
</tr>
<tr>
<td>VA A1</td>
<td>140</td>
<td>175</td>
<td>130</td>
<td>105</td>
<td>M 10</td>
<td>45</td>
<td>274</td>
<td>184</td>
<td>182</td>
<td>32</td>
<td>M 10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>VA B1</td>
<td>170</td>
<td>215</td>
<td>160</td>
<td>130</td>
<td>M 12</td>
<td>60</td>
<td>344</td>
<td>224</td>
<td>222</td>
<td>42</td>
<td>M 12</td>
<td>12 x 8</td>
</tr>
</tbody>
</table>

* vedere pagina 26 in basso, fori di fissaggio k / see page 26 below, mounting holes k

### Misure albero ingresso d₁ / input dimensions d₁

**1:1 | 2:1**

<table>
<thead>
<tr>
<th>Grandezza/ Size</th>
<th>g</th>
<th>l₁</th>
<th>m₁</th>
<th>o</th>
<th>d₁/k6</th>
<th>r</th>
<th>Chiav./key</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA 000</td>
<td>11</td>
<td>23</td>
<td>89</td>
<td>42</td>
<td>12</td>
<td>M 5</td>
<td>4 x 4</td>
</tr>
<tr>
<td>VA 00</td>
<td>13</td>
<td>30</td>
<td>110</td>
<td>52</td>
<td>14</td>
<td>M 6</td>
<td>5 x 5</td>
</tr>
<tr>
<td>VA 01</td>
<td>14</td>
<td>35</td>
<td>135</td>
<td>70</td>
<td>22</td>
<td>M 8</td>
<td>6 x 6</td>
</tr>
<tr>
<td>VA A1</td>
<td>14</td>
<td>45</td>
<td>165</td>
<td>90</td>
<td>32</td>
<td>M 10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>VA B1</td>
<td>18</td>
<td>60</td>
<td>210</td>
<td>110</td>
<td>42</td>
<td>M 12</td>
<td>12 x 8</td>
</tr>
</tbody>
</table>

**3:1**

<table>
<thead>
<tr>
<th>Grandezza/ Size</th>
<th>g</th>
<th>l₁</th>
<th>m₁</th>
<th>o</th>
<th>d₁/k6</th>
<th>r</th>
<th>Chiav./key</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA 000</td>
<td>11</td>
<td>19</td>
<td>83</td>
<td>42</td>
<td>9</td>
<td>M 4</td>
<td>3 x 3</td>
</tr>
<tr>
<td>VA 00</td>
<td>13</td>
<td>25</td>
<td>105</td>
<td>52</td>
<td>12</td>
<td>M 5</td>
<td>4 x 4</td>
</tr>
<tr>
<td>VA 01</td>
<td>14</td>
<td>35</td>
<td>135</td>
<td>70</td>
<td>22</td>
<td>M 8</td>
<td>6 x 6</td>
</tr>
<tr>
<td>VA A1</td>
<td>14</td>
<td>45</td>
<td>165</td>
<td>90</td>
<td>32</td>
<td>M 10</td>
<td>10 x 8</td>
</tr>
<tr>
<td>VA B1</td>
<td>18</td>
<td>55</td>
<td>205</td>
<td>100</td>
<td>36</td>
<td>M 10</td>
<td>10 x 8</td>
</tr>
</tbody>
</table>
The selection of lubricants and their viscosity is made taking into account design, circumferential speed of the gears, backlash and the operating temperature of the gearbox. The run–tested VA stainless steel gearboxes are supplied with the required filling of food grade NSF–H1 synthetic oil. Under normal operating conditions, (gearbox temperature up to 80°C), TANDLER stainless steel gearboxes VA are lubricated for life.
La quantità lubrificante / lubricant quantities

<table>
<thead>
<tr>
<th>Grandezza rinvio</th>
<th>Grandezza rinvio</th>
<th>Grandezza rinvio</th>
</tr>
</thead>
<tbody>
<tr>
<td>润滑油</td>
<td>Olio /oil [Ltr]</td>
<td>Grasso /grease [kg]</td>
</tr>
<tr>
<td>i = 1 : 1</td>
<td>i = 1 : 1</td>
<td>i = 1 : 1</td>
</tr>
<tr>
<td>VA 000 0,04</td>
<td>0,05</td>
<td></td>
</tr>
<tr>
<td>VA 00 0,10</td>
<td>0,15</td>
<td></td>
</tr>
<tr>
<td>VA 01 0,20</td>
<td>0,45</td>
<td></td>
</tr>
<tr>
<td>VA A1 0,40</td>
<td>1,00</td>
<td></td>
</tr>
<tr>
<td>VA B1 0,80</td>
<td>1,60</td>
<td></td>
</tr>
</tbody>
</table>

Il testo è indicativo / listed quantities are approximate values

Lubrificazione a sbattimento / splash lubrication

Adatta fino a velocità periferica dell’ingranaggio di 15 m/s. Sopra i 15 m/s è consigliata la lubrificazione forzata.
La velocità periferica può essere calcolata usando il diametro primitivo dell’ingranaggio d0 a pagina 54.
Suitable for peripheral speed of spiral bevel gears up to 15 m/sec. Above 15 m/sec forced lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d0 given on page 54.

Primo riempimento standard / standard initial fill:
Olio sintetico secondo NSF-H-1
Lubrication with synthetic oil to NSF-H-1 specification

Dove acquistare / where to buy
TANDLER Zahnrad- und Getriebefabrik GmbH & Co. KG

Lubrificazione a grasso / grease lubrication

Adatta fino a velocità periferica dell’ingranaggio di 3 m/s. La velocità periferica può essere calcolata usando il diametro primitivo dell’ingranaggio d0 a pagina 54.
For peripheral speed of spiral bevel gears up to 3m/sec, grease lubrication is recommended. The peripheral speed can be calculated using the gear pitch circle diameter d0 given on page 54.

Primo riempimento standard / standard initial fill:
Grasso sintetico secondo NSF-H-1
Lubrication with synthetic grease to NSF-H-1 specification

Dove acquistare / where to buy
TANDLER Zahnrad- und Getriebefabrik GmbH & Co. KG

5. Pesi in kg / weights in kg

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>Versione base basic model</th>
<th>Serie HW</th>
<th>HWK</th>
<th>HWZ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Serie HWS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA 000 2,2</td>
<td>VA HW 000 2,2</td>
<td>VA HWS 000 2,2</td>
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<td></td>
</tr>
<tr>
<td>VA 00 5,5</td>
<td>VA HW 00 5</td>
<td>VA HWS 00 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VA 01 12,5</td>
<td>VA HW 01 11</td>
<td>VA HWS 01 11,5</td>
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<td></td>
</tr>
<tr>
<td>VA A1 24</td>
<td>VA HW A1 20,5</td>
<td>VA HWS A1 21,5</td>
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<tr>
<td>VA B1 43</td>
<td>VA HW B1 34</td>
<td>VA HWS B1 35</td>
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<td></td>
</tr>
</tbody>
</table>

Sono possibili modeste variazioni del peso / small deviations of the weights are possible

6. Ulteriori dati tecnici / Momento d’inerzia / Forze esterne

Su richiesta forniamo i dati tecnici a Voi necessari, per esempio momento d’inerzia, o ulteriori informazioni sui carichi radiali ed assiali ammissibili. Questi ultimi sono strettamente correlati alle condizioni d’uso quali velocità e coppia trasmessa.
Le richieste tecniche vengono evase celermente.

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.
Technical questions will be answered in a timely manner.
Invertitori ad ingranaggi conici, innesti e disinnesti

switching and reversing spiral bevel gearboxes

Gli invertitori Tandler, siano innesti o disinnesti, grazie alla loro affidabilità ed all’accuratezza della trasmissione, vengono impiegati per l’interruzione o l’inversione del moto ove necessario.

Vengono inoltre impiegati come comandi ausiliari e/o di emergenza; trovano anche applicazione nell’industria agraria. I componenti vengono controllati singolarmente dal ns. personale per garantirne affidabilità ed accuratezza.

Il Disinnesto può essere azionato da sistemi elettromeccanici o pneumatici, particolarmente laddove il posizionamento sia manualmente inaccessibile.

La nostra gamma consta di tre versioni: la versione AS che innesta e disinnesta l’albero d₂; la versione S che oltre ad innestare e disinnestare l’albero d₂ ne consente l’inversione del senso di rotazione; la versione W innesta, disinnesta ed inverte indipendentemente il senso di rotazione dell’albero coassiale d₂.

TANDLER switching and reversing spiral bevel gearboxes provide a high accuracy, reliable means of disconnecting or reversing individual machine elements.

In other areas of application such as in auxiliary or emergency drives or in the agricultural industry the use of these gearboxes provides an economic solution. Component parts from the switching arrangement are individually adjusted by our fitters on assembly to ensure safe, reliable operation.

Special options such as electro-mechanical or pneumatic operation of the switch lever provide alternative methods of operation which enable the gearboxes to be installed in inaccessible locations.

You have the choice of three variants of switching and reversing gearboxes. The AS version allows the d₂ shaft to be disengaged. The S version allows the d₂ shaft to be disengaged and to have its direction of rotation reversed. Finally, the W version has a two piece through shaft which can be disengaged or reversed in direction.
Coppie per invertitori ad ingranaggi conici, innesti e disinnesti

performance data for switching and reversing gearboxes

Coppie ammissibili all’albero in uscita d2

permissible torques at shaft d2

1. $i = n_1 : n_2 = 1:1$

2. $i = n_1 : n_2 = 2:1$

3. $i = n_1 : n_2 = 3:1$

Coppie per altri rapporti su richiesta.

Torques for other ratios on request.
Innesti e disinnesti ad ingranaggi conici

Spiral bevel gearboxes where the output shaft can be disengaged from the input shaft (series AS). The S series adds the capability to reverse the direction of the output shaft relative to the input shaft.

Serie S
reversing gearbox type S

Serie AS
disengaging gearbox type AS

Rapporti da / ratios
i = n₁ : n₂ = 1:1 fino a / up to 3:1
(in funzione della grandezza depending upon gearbox size)

Altri rapporti su richiesta / please enquire for alternative ratios

Disposizioni possibili (RA) I e III
gear arrangements I and III are possible

Opzioni di comando
Oltre all’inversione manuale tramite apposita leva, possiamo proporre comando pneumatico, idraulico, elettrico ed elettromeccanico.

switching options
In addition to the conventional manual operation of the switch lever, we can offer pneumatic, hydraulic, electric and electromechanical switching options.
### Misure generali / dimensions not dependent on ratio

<table>
<thead>
<tr>
<th>Grandezza</th>
<th>a</th>
<th>b</th>
<th>d7</th>
<th>e</th>
<th>k Prof./depth</th>
<th>l2</th>
<th>m2</th>
<th>v</th>
<th>w</th>
<th>d2</th>
<th>r</th>
<th>Chiavetta/key DIN 6885/1</th>
</tr>
</thead>
<tbody>
<tr>
<td>S/AS 01</td>
<td>110</td>
<td>145</td>
<td>102</td>
<td>82</td>
<td>M 8</td>
<td>35</td>
<td>222</td>
<td>152</td>
<td>150</td>
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### Misure albero uscita d2 / output shaft dimensions d2

<table>
<thead>
<tr>
<th>Grandezza</th>
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<th>b</th>
<th>d7</th>
<th>e</th>
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<th>m2</th>
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<tr>
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### Misure lato ingresso d1 / input dimensions d1

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### Misure lato ingresso d1 / input dimensions d1

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<th>r</th>
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<td>800</td>
<td>75</td>
<td>M 20</td>
<td>20 x 12</td>
</tr>
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</table>

### Angolo di sgancio tra 70° e 80° dalla Pos. 0

- **Switch angle** 70° to 80° from 0-position

### Attenzione:

Operazioni di innesto, disinnesto ed inversione sono da effettuare da fermo e senza carico!

**Please note:**

Gearbox must be stationary, with no load, before switching.

### Per altre esecuzioni vedere pagine 36-37

**Further ratios see page 36 and 37**
Invertitori ad ingranaggi conici
reversing spiral bevel gearboxes

A seconda della posizione della leva di comando gli alberi d₂ ruotano nello stesso senso o in senso contrario. L’invertitore può essere fornito con o senza albero d₁.

With a constant direction of input shaft d₁, the direction of rotation of the through shaft (d₂ loose gear) can be switched to rotate in the same or opposite directions. The gearbox can be supplied either with or without shaft d₁.

Rapporti da / ratios
\[ i = n₁ : n₂ = 1:1 \text{ fino a } 2:1 \]
(in funzione della grandezza depending upon gearbox size)

Altri rapporti su richiesta/ please enquire for alternative ratios

Serie W
reversing gearbox W

Albero d₂ diviso in due parti.
spiral bevel gearbox with a two part shaft d₂

Disponibile anche senza albero pignone d₁
also available without pinion shaft d₁

Opzioni di comando
Oltre all’inversione manuale tramite apposita leva, possiamo proporre comando pneumatico, idraulico, elettrico ed elettromeccanico.

switching options
In addition to the conventional manual operation of the switch lever, we can offer pneumatic, hydraulic, electric and electromechanical switching options.
### Misure generali / dimensions not dependent on ratio

| Grandezza gearbox size | a  | b  | c  | e  | g  | h2 | k  | l1 | m1 | m2 | n  | o  | p  | v  | w  | d1 | d2 | r  | Chiavetta/key DIN 6885/1 |
|------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------------------------|
| W01                    | 110| 145| 102| 82 | 14 | 47,5| M 8| 35 | 135| 310| 65 | 70 | 255| 240| 161| 22 | M 8 | 6 x 6                     |
| WA1                    | 140| 175| 130| 105| 14 | 60,5| M 10| 45 | 165| 386| 65 | 90 | 300| 296| 185| 32 | M10 | 10 x 8                    |
| WB1                    | 170| 215| 160| 130| 18 | 69,5| M 12| 60 | 210| 474| 80 | 110| 375| 354| 228| 42 | M12 | 12 x 8                    |
| WC1                    | 210| 260| 195| 160| 18 | 73,0| M 16| 85 | 275| 576| 80 | 135| 460| 406| 272| 50 | M16 | 14 x 9                    |
| WD1                    | 260| 330| 245| 200| 23 | 94,0| M 16| 95 | 335| 708| 80 | 150| 545| 518| 344| 60 | M16 | 18 x 11                   |

### Posizione standard della leva di comando

**standard position of switch lever**

**Series W / disposizione RA III / leva di comando in posizione standard**

**reversing spiral bevel gearboxes W / gear arrangement III / standard switch lever position**

![Diagram](image)

**Per altre esecuzioni vedere pagine 36-37**

**further ratios see page see 36 and 37**

**Angolo di sgancio tra 70° e 80° dalla Pos. 0**

**switch angle 70° to 80° from 0-position**

**Attenzione:**

**Operatori di innesto, disinnesse ed inversione sono da effettuare da fermo e senza carico!**

**Please note:**

**Gearbox must be stationary, with no load, before switching.**
In general, the switch lever of a standard gearbox is assembled at the lower position, on the face opposite the pinion shaft $d_1$. For special assembly conditions the switch lever may also be assembled as shown. In the order, please define the position as follows: S 507 U2.

**S 507 N1**
- Posizione standard N1
- switch lever position N1

**S 507 O1 o / or O2**
- Posizione sopra O1
- switch lever position O1
- Posizione sopra O2
- switch lever position O2

**S 507 U1 o / or U2**
- Posizione sotto U1
- switch lever position U1
- Posizione sotto U2
- switch lever position U2
Posizione leva di comando per invertitori ad ingranaggi conici secondo foglio S 507

position of switch lever for disengaging gearboxes according to dimension sheet S 507

AS  con disposizione (RA) I o II
with gear wheel arrangement I or II

S 507 N1
Posizione standard N1
switch lever position N1

Posizione standard N1
switch lever position N

S 507 O1 o / o R2
Posizione sopra O1
switch lever position O1

Posizione sopra O2
switch lever position O2

S 507 U1 o / U2
Posizione sotto U1
switch lever position U1

Posizione sotto U2
switch lever position U2

AS  con disposizione (RA) III
with gear wheel arrangement III

S 507 N1
Posizione standard N1
switch lever position N1

S 507 O1 o / o R2
Posizione sopra O1
switch lever position O1

Posizione sopra O2
switch lever position O2

S 507 U1 o / U2
Posizione sotto U1
switch lever position U1

Posizione sotto U2
switch lever position U2
Caratteristiche qualitative ed istruzioni per invertitori ad ingranaggi conici

quality characteristics, specifications for disengaging and reversing gearboxes

<table>
<thead>
<tr>
<th>Indice / contents</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gioco angolare all’albero $d_2$ / backlash at shaft $d_2$</td>
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<td>38</td>
</tr>
<tr>
<td>2. Posizione vite carico e scarico olio / positions of oil screw plugs</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>3. Posizione spia livello olio / arrangement of the oil-level gauges</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>4. Lubrificanti e quantità / lubricants and lubricant quantities</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>5. Indicatore livello olio per invertitori con albero in ingresso addizionale (S 545) / oil gauge for gearboxes with additional shaft extensions (S 545)</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>6. Pesi in kg / weights in kg</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>7. Ulteriori dati tecnici / additional technical data</td>
<td>41</td>
<td>41</td>
</tr>
</tbody>
</table>

1. Gioco angolare all’albero $d_2$ / backlash at shaft $d_2$

<table>
<thead>
<tr>
<th>Grandezza invertitore / gearbox size</th>
<th>01 - B1</th>
<th>C1 - F1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gioco angolare standard / standard design [arc min.]</td>
<td>9’</td>
<td>10’</td>
</tr>
<tr>
<td>Esecuzione con gioco angolare ridotto SF / reduced backlash SF</td>
<td>6’</td>
<td>8’</td>
</tr>
</tbody>
</table>

2. Posizione vite carico e scarico olio / position of oil filler and drain plugs
3. **Posizione spie livello olio** / *arrangement of the oil-level gauges*

Negli invertitori serie S, AS e W la spia è montata in posizione centrale a 90° dall’albero d1, riempimento olio fino a metà della stessa.

La spia può essere spostata secondo le Vostre esigenze essendo tutte le facce della carcassa dotate di viti di carico e scarico olio aventi stessa filettatura.

Potete comunicare in fase d’ordine la posizione a Voi ottimale della spia livello olio facendo riferimento al disegno sottostante.

**With disengaging and reversing gearboxes, the oil sight glass is mounted in the middle of the casing side at 90° to shaft d1. Irrespective of the gear ratio, the oil is filled to the middle of the sight glass.**

All gearbox faces are machined and provided with tapped holes for the oil plugs and sight glass to allow for alternative oil sight positions.

**Where an alternative position is required, please use the diagram below to establish the designation and indicate it to us on your order.**

---

**Posizioni possibili della spia livello olio (S 506) / possible positions of the oil sight glass (S 506)**

<table>
<thead>
<tr>
<th>Grandezza / gearbox size</th>
<th>Referenza</th>
</tr>
</thead>
<tbody>
<tr>
<td>01; A1</td>
<td>Ref. 39.1</td>
</tr>
<tr>
<td>B1 - F1</td>
<td></td>
</tr>
</tbody>
</table>

![Diagrama de posiciones de la visera de nivel de aceite (S 506)](image)
4. Lubrificanti e quantità / lubricants and lubricant quantities

The selection of lubricants and their viscosity is made taking into account the type, scope, speed, backlash and operating temperature of the gearbox. The run-tested spiral bevel gearboxes are supplied filled with the correct quantity of mineral oil CLP to DIN 51517-3 ISO VG 68.

The position of the oil sight glass can be changed to suit the application. The oil sight glass and screw plugs are sealed with O-rings. The oil change intervals are dependent on the operating conditions. To extend the oil change intervals, gearboxes can be supplied filled with fully synthetic oil. For low speeds applications we recommend fluid grease GP 00 according to DIN 51826, which can be filled by the customer. All gearboxes can be supplied with food grade oils and greases.

Lubrificazione a sbattimento / splash lubrication

Adatta fino a velocità periferica dell’ingranaggio di 15 m/s. Sopra i 15 m/s è consigliata la lubrificazione forzata.

La velocità periferica può essere calcolata usando il diametro primitivo dell’ingranaggio a pagina 54.

Suitable for peripheral speed of spiral bevel gears up to 15 m/sec. Above 15 m/sec forced lubrication is recommended.

The peripheral speed can be calculated using the gear pitch circle diameter given on page 54.

Primo riempimento standard / standard initial fill:
Olio minerale CLP secondo DIN 51517-3 ISO VG 68

mineral oil CLP to DIN 51517-3 ISO VG 68

Primo riempimento opzionale / optional initial fill:
Oli sintetici, anche per settore alimentare
synthetic, food grade or other special oils

Dove acquistare / where to buy
TANDLER Zahnrad- und Getriebefabrik GmbH & Co. KG

<table>
<thead>
<tr>
<th>Quantità lubrificante / lubricant quantities</th>
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<td>Grandezza gearbox size</td>
</tr>
<tr>
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</tr>
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<td>D1</td>
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<tr>
<td>E1</td>
</tr>
<tr>
<td>F1</td>
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</table>

Le quantità sono indicative / listed quantities are approximate values
5. Indicatore livello olio per invertitori con albero in ingresso addizionale (S 545)

oil gauge for gearboxes with additional shaft extensions (S 545)

Quando l’invertitore presenta più alberi posizionati orizzontalmente non è possibile l’utilizzo della spia di livello olio standard. Si potrà utilizzare, su richiesta del cliente, una spia di livello olio angolare come indicato nella figura accanto.

Comunicare la posizione di montaggio della spia di livello olio angolare desiderata (per es. A, vedere figura, foglio S 545).

When gearboxes are specified with additional shaft extensions, and all shafts are in the horizontal plane, it is not possible to use the standard oil sight glass. A special angular oil level indicator (as shown opposite) is recommended.

To ensure that the oil level indicator is visible after installation of the gearbox, the correct position, eg SS45-A (as shown in the data sheet SS45 and diagram opposite) must be specified.

6. Pesi in kg / weights in kg

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>Serie S</th>
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7. Ulteriori dati tecnici / Momento d’inerzia / Forze esterne

further technical data/mass moments of inertia/external loads

Su richiesta forniamo i dati tecnici a Voi necessari, per esempio momento d’inerzia, o ulteriori informazioni sui carichi radiali ed assiali ammissibili. Questi ultimi sono strettamente correlati alle condizioni d’uso quali velocità e coppia trasmessa.

Le richieste tecniche vengono evase celermente.

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.
Rinvii ad alte prestazioni
PowerMaster gearboxes

I rinvii ad alte prestazioni trasmettono coppie quasi doppie rispetto alla stessa grandezza dei nostri rinvii tradizionali.

Caratteristiche dei rinvii angolari ad alte prestazioni
- Coppie estremamente elevate
- Alta capacità di assorbire i sovraccarichi
- Albero cavo maggiorato, anche con cava per chiavetta
- Ingombri contenuti

Compared to our well-known spiral bevel gearboxes the PowerMaster gearboxes of the same size can transmit up to double the torque.

Advantages of PowerMaster Gearboxes
- extremely high torque capacity
- high permitted overloads for rough service conditions
- bigger hollow shaft diameters, also with keyway
- small space envelope

“Potente e preciso.
Compatto e performante.”

„Strong as a bear and precise. Our PowerMaster gearboxes transmit the highest torques in the smallest space.”
Coppie per rinvii ad alte prestazioni
*performance data for PowerMaster gearboxes*

Coppie ammissibili all’albero in uscita d2
*permissible torques at outputshaft d2*

Torques for other ratios on request.

---

### i = \( n_1 : n_2 \) = 1:1

<table>
<thead>
<tr>
<th>Velocità ( n_1 ) [min⁻¹]</th>
<th>Coppia ( M_2 ) [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.000</td>
</tr>
<tr>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>100</td>
<td>1.000</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

---

### i = \( n_1 : n_2 \) = 2:1

<table>
<thead>
<tr>
<th>Velocità ( n_1 ) [min⁻¹]</th>
<th>Coppia ( M_2 ) [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.000</td>
</tr>
<tr>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>100</td>
<td>1.000</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>

---

### i = \( n_1 : n_2 \) = 3:1

<table>
<thead>
<tr>
<th>Velocità ( n_1 ) [min⁻¹]</th>
<th>Coppia ( M_2 ) [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.000</td>
</tr>
<tr>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>100</td>
<td>1.000</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>1.000</td>
<td>1.000</td>
</tr>
</tbody>
</table>
**Versione base rinvii ad alte prestazioni**

*PowerMaster gearboxes standard*

La versione base dei rinvii angolari ad alte prestazioni monta alberi maggiorati sia in ingresso che in uscita. Vengono impiegati laddove necessitino coppie elevate con minimi ingombri.

The standard version of the PowerMaster gearbox has large diameter input and output shafts. These gearboxes are used where the requirement is for high torque transmission within a small space envelope.

![Image](image.png)

**Disposizione raffigurata III, per altre disposizioni vedere pagine 50-53**

**Gear arrangement III is shown, for more gear arrangements see pages 50-53**

<table>
<thead>
<tr>
<th>Grandezza rinvio</th>
<th>a</th>
<th>b</th>
<th>cₚ</th>
<th>e</th>
<th>g</th>
<th>h</th>
<th>k Prof/depth = 1,5 × k</th>
<th>l₁</th>
<th>l₂</th>
<th>m₁</th>
<th>m₂</th>
<th>o</th>
<th>v</th>
<th>w</th>
<th>y</th>
<th>d₁j₆</th>
<th>r</th>
<th>Chia. [key DIN 6885/1]</th>
<th>d₂j₆</th>
<th>r</th>
<th>Chia. [key DIN 6885/1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL 00</td>
<td>80</td>
<td>92</td>
<td>79</td>
<td>64</td>
<td>5</td>
<td>49</td>
<td>30</td>
<td>30</td>
<td>119</td>
<td>177</td>
<td>60</td>
<td>117</td>
<td>115</td>
<td>43</td>
<td>16</td>
<td>M 6</td>
<td>5 × 5</td>
<td>16</td>
<td>M 6</td>
<td>5 × 5</td>
<td></td>
</tr>
<tr>
<td>HL 01</td>
<td>110</td>
<td>127</td>
<td>108</td>
<td>86</td>
<td>8</td>
<td>77,5</td>
<td>43</td>
<td>43</td>
<td>175,5</td>
<td>245</td>
<td>86</td>
<td>159</td>
<td>157</td>
<td>68,5</td>
<td>26</td>
<td>M 8</td>
<td>8 × 7</td>
<td>26</td>
<td>M 8</td>
<td>8 × 7</td>
<td></td>
</tr>
<tr>
<td>HL A1</td>
<td>140</td>
<td>155</td>
<td>138</td>
<td>110</td>
<td>8</td>
<td>87</td>
<td>60</td>
<td>60</td>
<td>217</td>
<td>308</td>
<td>108</td>
<td>188</td>
<td>186</td>
<td>78</td>
<td>36</td>
<td>M 10</td>
<td>10 × 8</td>
<td>36</td>
<td>M 10</td>
<td>10 × 8</td>
<td></td>
</tr>
<tr>
<td>HL B1</td>
<td>170</td>
<td>192</td>
<td>168</td>
<td>134</td>
<td>9</td>
<td>105</td>
<td>73</td>
<td>73</td>
<td>263</td>
<td>372</td>
<td>128</td>
<td>226</td>
<td>224</td>
<td>95</td>
<td>46</td>
<td>M 12</td>
<td>14 × 9</td>
<td>46</td>
<td>M 12</td>
<td>14 × 9</td>
<td></td>
</tr>
<tr>
<td>HL C1</td>
<td>210</td>
<td>236</td>
<td>208</td>
<td>166</td>
<td>13,5</td>
<td>125</td>
<td>M 16</td>
<td>95</td>
<td>95</td>
<td>325</td>
<td>468</td>
<td>154</td>
<td>278</td>
<td>276</td>
<td>110,5</td>
<td>60</td>
<td>M 16</td>
<td>18 × 11</td>
<td>60</td>
<td>M 16</td>
<td>18 × 11</td>
</tr>
</tbody>
</table>

**Rapporti da / ratios**

\[ i = n₁:n₂ = 1:1 \text{ fino a } 3:1 \]

Altri rapporti su richiesta /
please enquire for alternative ratios
Rinvii ad alte prestazioni con albero cavo

PowerMaster gearboxes with hollow shaft

I rinvii angolari ad alte prestazioni con albero cavo sono ideali da connettere direttamente all’albero di comando assicurando una soluzione compatta per la trasmissione della coppia; disponibili con cava per chiavetta e con calettatore.

High performance gearboxes with hollow output shaft suitable for direct connection of machine elements, ensuring transmission of torque with small installation space. Versions with keyway and shrink disk connection are available.

Rapponti da / ratios

i = n1:n2 = 1:1 fino a / up to 3:1

(in funzione della grandezza depending upon gearbox size)

Altri rapporti su richiesta/ please enquire for alternative ratios

Fattori per la selezione, ved. pag. 49

application data, see page 49

In fase d’ordine comunicare la posizione di montaggio, ved. pag. 54

when ordering, please specify the mounting position, see page 54

Caratteristiche tecniche, gioco angolare e specifiche, vedere pagine 46-47

performance data, quality characteristics, backlash and specifications, see pages 46-47

Coppie ammissibili, ved. pag. 43

permissible torques, see page 43

HL HW

albero cavo con cava per chiavetta

hollow shaft with keyway

DIN 6885/3

HL HWS

albero cavo con calettatore

hollow shaft with shrink disk

Il calettatore viene montato sull’albero d2. Con disposizione degli ingranaggi III (RA III) viene fornito di serie un solo calettatore. Con disposizione degli ingranaggi I o II (RA I e RA II) il diametro dell’albero cavo opposto al calettatore è d2 = dw + 0,5 mm.

The shrink disc is always mounted to the extended hollow shaft d2. The standard version includes the delivery of one shrink disk. With gear wheel arrangements I and II (RA I and RA II) the diameter of the hollow shaft opposite the shrink disk = dw + 0,5 mm.

albero cliente da collegare / customer shaft

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>HL HW</th>
<th>HL HWS</th>
<th>albero cliente da collegare / customer shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d2H7</td>
<td>D</td>
<td>m2</td>
</tr>
<tr>
<td>HL 00</td>
<td>14</td>
<td>22</td>
<td>117</td>
</tr>
<tr>
<td>HL 01</td>
<td>22</td>
<td>35</td>
<td>159</td>
</tr>
<tr>
<td>HL A1</td>
<td>32</td>
<td>45</td>
<td>188</td>
</tr>
<tr>
<td>HL B1</td>
<td>42</td>
<td>60</td>
<td>226</td>
</tr>
<tr>
<td>HL C1</td>
<td>52</td>
<td>72</td>
<td>278</td>
</tr>
</tbody>
</table>

1 tempreto, foro rettificato hardened, bore ground
1. Gioco angolare all’albero d₂ / backlash at shaft d₂

<table>
<thead>
<tr>
<th>Grandezza rinvio / gearbox size</th>
<th>HL 00 - HL C1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gioco angolare standard / standard design [arc min.]</td>
<td>6'</td>
</tr>
<tr>
<td>Esecuzione con gioco angolare ridotto SF / reduced backlash SF [arc]</td>
<td>4'</td>
</tr>
<tr>
<td>Gioco angolare di 1' ottenibile in funzione dell’applicazione / depending on the application 1 arc minute may also be possible</td>
<td></td>
</tr>
</tbody>
</table>

2. Carico radiale ammissibile / permitted radial load

| Carico radiale ammissibile all’albero d₂ * / permissible radial load at shafts d₂ * |
|---------------------------------|---------------------------------|
| Grandezza gearbox size | Rapporto i=n₁:n₂ / ratio i=n₁:n₂ | Fₚ [N] | Fₚ [N] |
| HL 00 | 1:1 | 1300 | 1700 |
| HL 00 | 2:1 | 1800 | 1900 |
| HL 00 | 3:1 | 2100 | 2200 |
| HL 01 | 1:1 | 2300 | 4000 |
| HL 01 | 2:1 | 3000 | 4300 |
| HL 01 | 3:1 | 3800 | 4800 |
| HL A1 | 1:1 | 3300 | 6100 |
| HL A1 | 2:1 | 4300 | 6500 |
| HL A1 | 3:1 | 5500 | 7200 |
| HL B1 | 1:1 | 5000 | 9700 |
| HL B1 | 2:1 | 6100 | 10300 |
| HL B1 | 3:1 | 7800 | 11500 |
| HL C1 | 1:1 | 8500 | 13300 |
| HL C1 | 2:1 | 10100 | 14000 |
| HL C1 | 3:1 | 12400 | 15300 |

* valori indicativi validi con funzionamento al 50% della coppia ed al 50% della velocità massima ammesse (vedere diagramma pagine 43).

Values apply for 50% of the allowable torque at 50% of maximum speed (see diagram on page 43).
3. Lubrificanti e quantità / lubricants and lubricant quantities

La scelta del lubrificante e della sua viscosità è guidata dal tipo di rinvio, dalla velocità periferica, dal gioco e dalla temperatura d’esercizio.

Non è richiesto un controllo del livello del lubrificante. I rinvii angolari ad alte prestazioni utilizzati al di sotto delle normali condizioni d’esercizio (max 90°C di temperatura del rinvio) sono lubrificati a vita. In presenza di basse velocità si consiglia l’utilizzo di grasso liquido GP 00 secondo DIN 51826. I rinvii possono essere montati in tutte le posizioni.

La scelta del lubrificante e della sua viscosità è guidata dal tipo di rinvio, dalla velocità periferica, dal gioco e dalla temperatura d’esercizio.

Non è richiesto un controllo del livello del lubrificante. I rinvii angolari ad alte prestazioni utilizzati al di sotto delle normali condizioni d’esercizio (max 90°C di temperatura del rinvio) sono lubrificati a vita. In presenza di basse velocità si consiglia l’utilizzo di grasso liquido GP 00 secondo DIN 51826. I rinvii possono essere montati in tutte le posizioni.

The selection of lubricants and their viscosity is made taking into account the type, scope, speed, backlash and operating temperature of the gearbox. The run-tested PowerMaster gearboxes are supplied filled with the correct quantity of synthetic oil CLP to DIN 51517-3 ISO VG 68.

A check of the oil level is not required. PowerMaster gearboxes, used under normal conditions, (max 90°C gearbox temperature) are lubricated for life. At low speeds, we recommend fluid grease GP 00 according to DIN 51826. The gearboxes are universal and can be mounted in any position.

### Quantità lubrificante / lubricant quantities

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>Olio / oil [l.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL 00</td>
<td>0,06</td>
</tr>
<tr>
<td>HL 01</td>
<td>0,25</td>
</tr>
<tr>
<td>HL A1</td>
<td>0,55</td>
</tr>
<tr>
<td>HL B1</td>
<td>1,10</td>
</tr>
<tr>
<td>HL C1</td>
<td>2,0</td>
</tr>
</tbody>
</table>

Le quantità sono indicative / listed quantities are approximate values.

### Lubrificazione ad olio / oil lubrication

- **Primo riempimento standard**
  - Castrol Alphasyn HTX 68

- **Primo riempimento opzionale**
  - oli sintetici, anche per settore alimentare
  - synthetic, food grade or other special oils

- Dove acquistare
  - TANDLER Zahnrad- und Getriebe fabrik GmbH & Co. KG

### Lubrificazione a grasso / grease lubrication

- **Primo riempimento standard**
  - Aral Aralub FDP 00

- **Primo riempimento opzionale**
  - grassi sintetici, anche per settore alimentare
  - synthetic, food grade or other special greases

- Dove acquistare
  - TANDLER Zahnrad- und Getriebe fabrik GmbH & Co. KG

### 4. Pesi in kg / weights in kg

<table>
<thead>
<tr>
<th>Grandezza gearbox size</th>
<th>Serie HL series HL</th>
<th>Serie HL HW series HL HW</th>
<th>Serie HL HWS series HL HWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HL 00</td>
<td>HL 00</td>
<td>HL HW 00</td>
<td>HL HWS 00</td>
</tr>
<tr>
<td>HL 01</td>
<td>HL 01</td>
<td>HL HW 01</td>
<td>HL HWS 01</td>
</tr>
<tr>
<td>HL A1</td>
<td>HL A1</td>
<td>HL HW A1</td>
<td>HL HWS A1</td>
</tr>
<tr>
<td>HL B1</td>
<td>HL B1</td>
<td>HL HW B1</td>
<td>HL HWS B1</td>
</tr>
<tr>
<td>HL C1</td>
<td>HL C1</td>
<td>HL HW C1</td>
<td>HL HWS C1</td>
</tr>
</tbody>
</table>

### 5. Ulteriori dati tecnici / Momento d’inergia / Forze esterne

**further technical data/mass moments of inertia/external loads**

Su richiesta forniamo i dati tecnici a Voi necessari, per esempio momento d’inergia, o ulteriori informazioni sui carichi radiali ed assiali ammissibili. Questi ultimi sono strettamente correlati alle condizioni d’uso quali velocità e coppia trasmessa.

Le richieste tecniche vengono evase celermente.

On request, we can provide further data such as inertia or more information regarding radial and axial loads, which are dependent on operating conditions such as speed and torque transmitted.

Technical questions will be answered in a timely manner.
Seguono nelle prossime pagine informazioni generali sui nostri rinvii.

Si resta a disposizione per qualsiasi richiesta.

Nelle pagine precedenti, alla voce “caratteristiche qualitative ed istruzioni”, sono disponibili i dati inerenti gioco angolare, carico radiale, pesi, lubrificanti, posizione vite carico e scarico olio e posizione spia livello olio.

On the following pages you will find general information and data about our spiral bevel gearboxes.

Should you have any questions, please contact us.

For information on torque capacity, radial load, weights, lubricants, position of filler and drain plugs, arrangement of the oil sight glasses or angular oil level indicators see “quality characteristics | specifications”, in the particular gearbox range.

Definizione lati / identificazione
(secondo la norma TANDLER TN 1)

designation of gearbox faces / identification
(according to TANDLER standard TN 1)

I nostri rinvii riportano stampigliatura identificativa completa di numero seriale sul lato A, Rif. 48.1. As standard, the spiral bevel gearbox identification details are marked on gearbox side A (fig. 48.1). Here you will find the gearbox type, specification and serial number.
**Fattori per la selezione / determination of application data**

Potenza / power \( P \ [\text{[kW]}] \) \( 1 \text{ kW} = 1,36 \text{ PS} \)

Coppia / torque \( M \ [\text{[Nm]}] \) \( 1 \text{ Nm} = 0,102 \text{ kpm} \)

Velocità / speed \( n \ [\text{[min}^{-1}]\) \( 1 \text{ min}^{-1} = 0,1047 \text{ rad/s} \)

Carichi radiali / radial load \( F_R \ [\text{[N]}] \)

Peso / weight \( m \ [\text{[kg]}] \)

\[
M = \frac{30,000 \times P}{\pi} \approx 9550 \times P
\]

**Determinate del rapporto / determination of the ratio**

Generalmente si considera / generally applicable:

\[
i = \frac{n_1}{n_2} = \frac{\text{velocità albero } d_1}{\text{speed of shaft } d_1} / \frac{\text{velocità albero } d_2}{\text{speed of shaft } d_2}
\]

Nota: specificare sempre se si desidera rapporto in moltiplicazione o in riduzione.

esempio / example:

velocità \( n_1 \) all’albero \( d_1 \) / speed \( n_1 \) of shaft \( d_1 \) = 1500 min\(^{-1}\)

velocità \( n_2 \) all’albero \( d_2 \) / speed \( n_2 \) of shaft \( d_2 \) = 750 min\(^{-1}\)

\[
i = \frac{n_1}{n_2} = \frac{1500}{750} = \frac{2}{1}
\]

dicasi rapporto in riduzione / i. e. relative to \( n_1 \), speed reduction

When placing an order, the ratio specified by TANDLER must be observed. To avoid errors TANDLER will assume that \( n_1 \) applies to shaft \( d_1 \) (flange side) and \( n_2 \) applies to shaft \( d_2 \).

**Fattori di servizio per la scelta del rinvio / service factors used in the selection of gearboxes**

Se il rinvio viene selezionato in base alla coppia nominale del motore di comando è necessario tenere conto del tipo di applicazione utilizzando la tabella dei fattori di servizio (c).

*Where the gearbox is selected on basis of the nominal torque of the motor, the driving as well as the driven machines have to be taken into consideration (factor c).* Thus, the following formula applies:

\[
M_2 > M_1 \times i \times c
\]

Se il carico è noto, non serve utilizzare la tabella dei fattori di servizio, ma è indispensabile che la coppia massima necessaria sia inferiore alla coppia trasmissibile del rinvio.

*Where the actual application torque is used for gearbox selection, this factor does not have to be taken into consideration. It is evident that the maximum calculated torque must be lower than the gearbox torque capacity.*

\[
M_2 > M_{\text{eff}} \times i
\]

<table>
<thead>
<tr>
<th>Applicazione / operation</th>
<th>Fattore di servizio (c) / applikation factor (c)</th>
<th>Macchina comandata / machine (examples)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I senza controcoppia / almost shockfree</td>
<td>1</td>
<td>Motori elettrici (funzionamento costante), generatori di potenza, trasportatori a vite, impianti di sollevamento leggeri, avanzamenti su macchine utensili, ventilatori, mescolatori. Electric motor (smooth operation), power generator, screw conveyors, lightly loaded elevators, feed drives for machine tools, fans, lathes</td>
</tr>
<tr>
<td>II leggeri controcoppia / moderate shocks</td>
<td>1,5</td>
<td>Motori elettrici (funzionamento dinamico), comandi principali macchine utensili, trasportatori per unità di carico, pistoni o pompe centrifughe, argani, carrelli. Electric motor (irregular operation), main drive for machine tools, conveyors for unit loads, piston or centrifugal pumps, winches, trolleys</td>
</tr>
<tr>
<td>III pesanti controcoppia / heavy shocks</td>
<td>2</td>
<td>Motori ad un pistone, macchina lavorazione legno, laminatori, elevatori, pressi. Single-cylinder piston engine, woodworking machine, light timber mill, blooming mill, hoist, screw press</td>
</tr>
<tr>
<td>IIII forti controcoppia / strong shocks</td>
<td>2,5</td>
<td>Excavators, heavy ball mill, crusher (stone, ore), mechanical hammers</td>
</tr>
</tbody>
</table>

In presenza di carico oscillante, causato da un elevato numero di inversioni di coppia, si consiglia di utilizzare albero in uscita con calettatore.

When the load on the output shaft is oscillating due to a high number of torque reversals, please use a plain output shaft without key and a shrink disk connection.
Disposizioni degli ingranaggi

*gear arrangements*

Raffigurazione schematica delle possibili disposizioni degli ingranaggi (RA) nei rinvii.

**Standard / tutti i rapporti**

*standard / all ratios*

1 albero pignone addizionale EA / tutti i rapporti

*1 additional auxiliary shaft extension EA / all ratios*

Rapporto fisso: \( n_1 : n_5 = 1:1 \)

Fixed ratios: \( n_1 : n_5 = 1:1 \)
1 albero pignone addizionale ZA / rapporto da \( n_1 : n_2 \) \textit{in riduzione}

1 additional auxiliary shaft/gear ratio speed \textit{reducing} \( n_1 : n_2 \)

Rapporto fisso:
\[ i = n_1 : n_3 = n_1 : n_4 = 1:1 \]

fixed ratios:
\[ i = n_1 : n_3 = n_1 : n_4 = 1:1 \]

1 albero pignone addizionale ZA / rapporto da \( n_1 : n_2 \) \textit{in moltiplica}

1 additional auxiliary shaft/gear ratio speed \textit{increasing} \( n_1 : n_2 \)

Rapporto fisso:
\[ i = n_1 : n_3 = n_1 : n_4 = 1:1 \]

fixed ratios:
\[ i = n_1 : n_3 = n_1 : n_4 = 1:1 \]
Disposizioni degli ingranaggi

2 alberi pignone addizionali ZA / rapporto da n1:n2

2 additional auxiliary shafts / gear ratio speed

in riduzione

Reducing

n1:n2

Rapporto fisso:

i=n1:n3:n4=1:1

fixed ratios:

i=n1:n3:n4=1:1

Rif. 52.2

2 alberi pignone addizionali ZA / rapporto da n1:n2

2 additional auxiliary shafts / gear ratio speed

in moltiplica

Increasing

n1:n2

Rapporto fisso:

i=n2:n3:n4=1:1

fixed ratios:

i=n2:n3:n4=1:1

Rif. 52.3
3 alberi pignone addizionali DA / rapporto da \( n_1:n_2 \) \textit{in riduzione}

3 additional auxiliary shafts / gear ratio speed \textit{reducing} \( n_1:n_2 \)

Lubrificato a vita, senza spia di livello olio, consentite tutte le posizioni di montaggio

Lifetime lubricated, without oil-level gauge as standard all mounting positions possible

Rapporto fisso:
\[ i=n_1:n_3:n_4:n_5=1:1 \]

\textit{fixed ratios:}
\[ i=n_1:n_3:n_4:n_5=1:1 \]

Rapporto \( i=n_1:n_2 \) = 1:1 non consentito

Ratio \( i=n_1:n_2 = 1:1 \) is not possible

3 alberi pignone addizionali DA / rapporto da \( n_1:n_2 \) \textit{in moltiplica}

3 additional auxiliary shafts / gear ratio speed \textit{increasing} \( n_1:n_2 \)

Lubrificato a vita, senza spia di livello olio, consentite tutte le posizioni di montaggio

Lifetime lubricated, without oil-level gauge as standard all mounting positions possible

Rapporto fisso:
\[ i=n_1:n_5=1:1 \]

\textit{fixed ratios:}
\[ i=n_1:n_5=1:1 \] and
\[ i=n_2:n_3:n_4=1:1 \]

Rapporto \( i=n_1:n_2 \) = 1:1 non consentito

Ratio \( i=n_1:n_2 = 1:1 \) is not possible
Montaggio verticale (S 515) / vertical installation (S 515)

Comunicare la posizione di montaggio. Con albero in posizione verticale il rispettivo cuscinetto non è sufficientemente lubrificato.

Montaggio standard
(tutti gli alberi orizzontali)

Montaggio S 515 d1
(d1 verticale verso l’alto)

Montaggio S 515 d2L
(d2 verticale, coppia conica sotto)

Montaggio S 515 d2R
(d2 verticale, coppia conica sopra)

Definizione della classe qualitativa di controllo / definition of quality class

Standard
Rinvii standard, fornibili su richiesta con gioco ridotto, senza certificato di controllo.

Classe di qualità 2 (G2)
Rinvii di precisione con coppie coniche selezionate, fornibili su richiesta con gioco ridotto, si rilascia certificato di controllo.

Classe di qualità 1 (G1)
Rinvii di massima precisione con coppie coniche appositamente realizzate, fornibili su richiesta con gioco ridotto, si rilascia certificato di controllo.

I valori per la classe di qualità 1 valgono per tutti i rapporti. Regola per rinvii standard e rinvii con classe di qualità 2: nei rapporti con i ≠ 1:1 il valore F1 può differire fino a 2’ minimi. Nei rapporti maggiori non è possibile raggiungere i valori indicati a causa dei limiti di lavorazione dei macchinari.

The values for class 1 shall apply to all ratios. For standard gearboxes and class 2 gearboxes, where the ratio i ≠ 1:1, the value of F1 as specified in the table may differ by up to 2 arc minutes. At higher ratios, it may not be possible to achieve the values indicated due to limitations of machining.
Il nostro reparto di controllo è climatizzato ed attrezzato con i più moderni macchinari per la misurazione degli ingranaggi e dei rinvii. Possiamo per esempio fornire certificato indicante l’uniformità di rotazione così come il gioco angolare.

In our climate controlled inspection department, equipped with the most up to date inspection equipment, we can precisely measure our gears and gearboxes. In this way we can, for example, provide single flank test reports on assembled gearboxes and accurate information regarding backlash.

Generatrice / contact pattern

Per un’ottimale trasmissione della coppia i nostri ingranaggi vengono abbinati in funzione della generatrice ideale.

Our gear boxes are individually assembled with the gears set to the correct contact pattern to achieve the optimum torque transmission.
Progettazione customizzata.

*We make the gearbox you need.*

Cuscinetto rinforzato, alte temperature ambiente, applicazione nel settore alimentare o protezione anticorrosione; ogni Vostra esigenza è soddisfacente grazie alle nostre opzioni, combinazioni ed esecuzioni speciali.

Whether your requirement is for reinforced bearings, high ambient temperatures, for use in the food industry or corrosion protection. With our special options, gearbox combinations or special gearboxes, we can match your needs.

„Insieme progetteremo il rinvio su misura per Voi.“

*We will work together with you to produce the ideal gearbox to suit your application.*
Protezione anticorrosione

corrosion protection

Rinvii acciaio inossidabile (VA)
stainless steel gearboxes (VA)

Protezione anticorrosione ed igiene sono attualmente i requisiti richiesti soprattutto nel settore alimentare. E’ disponibile una nuova linea di rinvii in acciaio inossidabile, riempimento con olio per settore alimentare o altro lubrificante indicato dal cliente. Maggiori dettagli a pag. 24.

Today there are many industries, particularly the food industry, which place great emphasis on corrosion resistance and hygiene. To meet these requirements we produce stainless steel gearboxes, dependent on size, ratio and configuration. These are factory filled with food grade oil or other lubricants if desired. See page 24.

Rinvii in alluminio (AL)
aluminium gearboxes

Se necessitate un rinvio il più leggero possibile Vi consigliamo l’esecuzione in alluminio. A seconda della grandezza il peso risulterà inferiore del 40%. Si assicura protezione contro la corrosione tramite verniciatura o anodizzazione delle superfici.

Do you need the lightest possible gearbox? We recommend that the aluminium version of our gearbox is used. Depending on the size a weight reduction of up to 40% can be achieved. Together with lacquered or anodized surfaces protection against corrosion is also guaranteed.

Rinvii con trattamento Tenifer 30 NO (S 1544)
gearbox with Tenifer 30 NO treatment (S 1544)

Il trattamento Tenifer 30 NO rende resistente alla corrosione i rinvii ed e’ una moderna ed economica alternativa alla verniciatura o brunitura dei pezzi. Le superfici vengono trattate nel nostro reparto di tempra assumendo una colorazione nera; esternamente vengono utilizzate viti nichelate.

The Tenifer 30 NO process offers a modern, cost effective and corrosion-resistant alternative to conventional methods such as painting or plating. The surface treatment is carried out in our in-house heat treatment plant. After the process, the parts have a black finish. In addition nickel-plated screws are used.

Rinvii verniciati
painted gearboxes

Naturalmente potete richiedere tutti i nostri rinvii verniciati con la tonalità da Voi desiderata. Vi proponiamo anche vernici protettive speciali per il settore alimentare.

Naturally you can order all gearboxes from our range finish painted to your requirements. Let us know the colour you need and we will take care of the rest. In addition we can also provide you with custom paint finishes for example for use in the food industry.
Rinvii angolari | opzioni
spiral bevel gearboxes | options

Opzioni
options

Rinvii con lamelle di raffreddamento
gearboxes with cooling ribs

Per ridurre la temperatura d’esercizio possiamo applicare delle lamelle di raffreddamento alla carcassa del rinvio (ved. Rif. 58.1). Questo sistema di dissipazione del calore è particolarmente indicato quando il rinvio è montato in ambiente ventilato naturalmente o forzatamente tramite ventola.

To reduce the operating temperature, cooling fins (see fig. 58.1) can be fitted to the gearbox casing. This method is particularly effective when the gearbox is installed in a stream of air or can be blown by a fan.

Rinvii per alte temperature (S 502)
gearboxes for high temperatures (S 502)

Per alte velocità o collocazione in ambiente con temperature elevate utilizziamo lubrificanti e guarnizioni speciali. In determinate applicazioni consigliamo il montaggio di uno sfiato (S 1545) o di un raffreddamento addizionale esterno.

For high speeds, or operation at high ambient temperatures, we use special lubricants and seals. In some cases, the fitting of a breather (S 1545) is recommended. In addition, there are various methods of external cooling which can be employed.

Piastre per raffreddamento ad acqua (S 1519)
gearboxes with plates for water cooling (S 1519)

Le piastre, montate su una faccia del rinvio (Rif. 58.2) e collegate ad un circuito di raffreddamento ad acqua, sono proposte in alternativa alle lamelle di raffreddamento. Questo sistema risulta migliore per la dissipazione del calore.

As an alternative to cooling fins, cross drilled aluminium plates (see fig. 58.2) can be mounted to the gearbox casing for connection to a water cooling circuit. This results in even better heat dissipation.

Lubrificazione forzata (S 535 / S 537)
circulating oil lubrication (S 535 / S 537)

Con condizioni operative estreme consigliamo la lubrificazione forzata del rinvio (ved. Rif. 58.3). Nella versione semplificata (S 535) vengono montati dei raccordi che consentono il sistema di riciclo dell’olio utilizzando le sedi dei tappi di carico e scarico. La versione (S 537), studiata per esigenze particolari, mira alla lubrificazione diretta dei cuscinetti e degli ingranaggi del rinvio.

Su richiesta forniamo il sistema completo di raccordi, filtri, pompa e radiatore.

Under extreme operating conditions, we recommend a forced lubrication system (see fig. 58.3). In the simple version (S 535), we replace the lubrication plugs with fittings so that they can be connected directly to a recirculating oil cooling system. Even more effective is the custom version (S 537), in which, depending on the installation position, oil inlets in the optimum position can be incorporated in the gearbox casing, so that oil is injected where it is needed, directly into the gear mesh and the bearings.

On request, we can provide external piping and the complete cooling unit including filter, pump and radiator.
Rinvii con cuscinetto rinforzato (S 522 / S 523)
gearboxes with reinforced bearings (S 522 / S 523)

In determinate condizioni operative, in presenza di picchi di carico o di carichi esterni, potrebbe rendersi necessario montare un cuscinetto rinforzato sull’albero d₁ (S 522) e/o sull’albero d₂ (S 523).

In certain operating conditions, when there are high shock loads or external loads, it may be useful to use heavy duty bearings on shaft d₁ (S 522) and/or shaft d₂ (S 523).

Rinvii per alti carichi assiali sull’albero d₂ (S 521)
gearboxes for increased axial loads on shaft d₂ (S 521)

In presenza di forti carichi radiali all’albero d₂, impiego simile al martinetto (Rif. 59.1), si utilizza un cuscinetto speciale, cosicché non risulti necessario un cuscinetto addizionale esterno. Combinando un albero cavo o cavo flangiato, predisposto per avvitare direttamente la chiocciola, offriamo una variante al martinetto meccanico a vite rotante.

To cater for high axial loads on shaft d₂, which, for example, occur in spindle drives (as shown in fig. 59.1), we can provide our gearboxes with a special bearing assembly, so that no additional external support bearing is necessary. In combination with hollow shafts, we can offer a variant of a machine tool spindle. Another possible variation is a hollow shaft with flange to allow a lead screw nut to be screwed directly to the gearbox.

Rinvii con albero liscio, senza cava per chiavetta (S 500 / S 529)
gearboxes without keyways in the shafts (S 500 / S 529)

Tutti i nostri rinvii possono essere forniti con alberi lisci. Si può o prevedere il riempimento della cava e levigarla (S 529) o realizzare alberi speciali senza cava (S 500).

All spiral bevel gearboxes can be supplied without keyways in the shafts. Either with the keys fitted and ground flush with the shaft (S 529), or specially-made components produced without keyways (S 500).

Coperchietti per guarnizioni albero (S 539)
cover plates for radial shaft seals (S 539)

Per l’utilizzo in ambienti fortemente inquinati si consiglia la copertura delle guarnizioni degli alberi radiali per proteggerle da corpi estranei e contaminazioni.

I rinvii possono essere personalizzati con opzioni quali tolleranze speciali della carcassa, diversificate posizioni della chiavetta, coppie ingranaggi rinforzate fino ad arrivare ad esecuzioni completamente speciali.

When used in a severely contaminated environment, cover plates are used to protect the radial shaft seals from contamination or damage from foreign bodies.

We also offer many other options such as special housing tolerances, defined key positions, high torque or high accuracy gear sets to enhance our gearbox range.

Certificato d’ispezione, certificato di controllo, certificato del materiale
test certificate, inspection report, material certificate

Su richiesta forniamo i certificati che necessitate.

On request, a wide range of certification and reports are available and can be provided to meet your needs.
Combinazioni e rinvii speciali

Il sistema modulare TANDLER consente infinite possibilità di combinazione tra i suoi prodotti; si possono così abbinare e collegare tra loro rinvii, fasatori, ServoFoxx nonché riduttori epicicloidali al fine di ottenere l'esecuzione ottimale per Voi.

Possiamo sviluppare per Voi prodotti completamente speciali siano essi rinvii, fasatori, riduttori, viti senza fine o epicicloidali.

Esecuzioni in miniatura

Riduttore in linea
The TANDLER modular system provides almost unlimited possibilities of gearbox combinations. Gearboxes from the various ranges of spiral bevel, speed modulation and ServoF Oklahoma® gearboxes can be combined together to provide the optimum solution. Additionally, we offer a variety of special options and special solutions, tailored specifically for individual applications.

Working together with you, we will develop complete special gearboxes such as spur, helical, worm or planetary solutions to meet your needs. So that you always get the optimum product and secure a competitive advantage.
Noi siamo la TANDLER.  
We are TANDLER.

Servizio di prima classe, consulenza professionale e garanzia ricambistica.
We guarantee first-class service, fast, professional advice and spare parts.

Sinonimo di qualità e longevità.
We believe in quality and durability.

Dal 1949 i nostri clienti si affidano alla nostra esperienza e capacità innovativa. Sviluppiamo prodotti di altissimo livello soggetti, ad ogni passaggio, a rigorosi controlli di qualità. Customers have relied on our experience and innovative flair since 1949. We develop our products to the highest standards, and every step in the process is accompanied by stringent quality controls.

Parlerete direttamente con i nostri ingegneri ricevendo esattamente il prodotto realizzato per la Vostra applicazione. Facciamo fronte alle richieste di un mercato sempre più esigente con prodotti altamente performanti. Garantiamo la massima disponibilità dei nostri esperti che troveranno la soluzione ideale per Voi. Saremo il Vostro partner professionale, svelto e flessibile.
You can speak directly to our engineers, and your gearbox will be custom built precisely for your application. With speeds, revolution frequencies and temperatures always on the increase, we’re compelled to make optimal use of materials and components. Our experienced specialists develop our products on the basis of your wishes and requirements – the right way to ensure that your machines have a high level of availability. At the same time, our collaborative working method and flat hierarchy make us quick and flexible. You, too, can rely on our 200-odd employees.
Grazie al nostro moderno parco macchine lavoriamo e produciamo tutti i particolari al nostro interno. Oltre alle classiche macchine utensili disponiamo di frese a 5 assi, torini CNC e relativa utensileria, asse Y, macchine dentatrici e profilatrici nonché sofisticate machine di misurazione; inoltre il trattamento termico avviene al nostro interno nel nostro reparto de tempra. La nostra struttura ci consente di realizzare, con la medesima elasticità, produzione seriale sia di grandi quantità sia di un unico pezzo.

Our production is nearly 100% vertically integrated. Our state-of-the-art machine park enables us to carry out all the stages of manufacture in-house – from raw material to finished product. For this we have 5-axle milling machines, CNC lathes with power tools and y-axis, gear cutting and profile grinding machines, high-precision measurement technology – and much more – all at our disposal. The heat treatments are carried out in our in-house hardening shops. Our set-up makes us perfectly equipped for small, customer-specific series of one unit upwards, but also for our medium-sized standard series.

Le nostre competenze ci hanno permesso di produrre ingranaggi anche per auto sportive d’epoca; promuoviamo in collaborazione con le squadre di Formula studentesche lo sviluppo di auto da corsa elettriche.

As a gearing manufacturer, we produce gearwheels for historic racing cars, and promote the development of electrically powered formula cars in partnership with teams from Formula Student.

Collaborare con le università ci dà slancio per il futuro.

Our collaborations with universities give us incentives for the future.
Siamo presenti in tutti i settori.
There is hardly any industry which we are not involved in.

I prodotti TANDLER trovano applicazione nei più svariati settori dell’industria, anche in condizioni estreme, soddisfando sempre le Vostre esigenze.

TANDLER gearboxes are used everywhere. In a variety of industries and under extreme conditions, tailored to meet your individual requirements.

macchine riempitrici
filling machines
automazione
automation
technologia per palcoscenico
stage technology
macchine da stampa
printing machines
veicoli elettrici
electric vehicles
industria per l’elettronica
electronics production
industria automobilistica
vehicle manufacturing
produzione industriale
process industries
trasportatori
conveyors
autootture storiche da corsa
historic motor sport
industria aerospaziale
aerospace
industria medica
dental
industria alimentare
medical
industria petrolchimica
food processing machinery
industria farmaceutica
nuclear industry
macchine trasformazione carta
paper processing machines
industria tessile
pharmaceutical industry
tecnologia subacquea
locks and waterways
macchina per l’imballaggio
textile industry
macchine utensili
subsea technology
 turbine
packaging machines
machine tools
wind turbines
**Diamo il meglio per Voi.**

*We give our all for your application.*

Sotto il ghiaccio, nel deserto, in contatto con alimenti, in ambiente silenzioso o in qualsiasi altra particolare condizione Vi soddisferemo.

*Whether it’s for use beneath pack ice or in the desert, for the foodstuffs industry or needs to be especially quiet – we provide your gears with the qualities your application demands.*

- silenzioso / low noise
- a tenuta stagna / waterproof
- leggero / low weight
- su misura / precise
- igienico / food safe
- ampia gamma di ingranaggi / wide range of gearing types
- resistente alle temperature estreme / resistant to extreme temperatures
The company | worldwide representation

Azienda di famiglia, un organico di 200 persone, produce da sempre rinvi, ingranaggi e riduttori anche speciali per la propria clientela. L’alta qualità caratterizza la produzione, completamente interna, dei prodotti TANDLER.

The family owned company with approximately 200 employees, produces gearboxes and geared components specifically tailored to the requirements of our customers. The company places special emphasis on high quality production. 100% of the gearbox components (except standard parts) are produced in-house.

Our offices around the world are on six continents. Their contact details can be found at www.tandler.de/contact/representatives

Rappresentanze nel Mondo | worldwide representation

Rappresentata nei sei continenti, vedere i nominativi all’indirizzowww.tandler.de/kontakt/vertretungen

Our offices around the world are on six continents. Their contact details can be found at www.tandler.de/contact/representatives

www.tandler.de
Ordine
ordering

An ordering example is shown below. The following important additional information is also required to complete your order:

Ulteriori informazioni a completamento:
Additional information for your order:

1. Velocità
2. Posizione di montaggio (alberi orizzontali o verticali)
3. Condizioni ambientali inusuali

Should you have any questions, please give us a call and we will be happy to be of assistance!

Esempio d'ordine / ordering example

On ordering, each new design is issued with a unique special design number, which is advised to you in the order confirmation. For subsequent orders, please specify the special design number.

Contatti
contact

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E-Mail: favari@favari.it

Rappresentante
TANDLER per l'Italia
representation of TANDLER in Italy
Cataloghi / catalogues

Rinvii angolari
spiral bevel gearboxes

Rinvii ad alte prestazioni
PowerMaster gearboxes

Fasatori
speed modulation gearboxes

ServoFoxx®
ServoFoxx® gearboxes

Riduttori epicicloidali P
planetary gearboxes P

Ingranaggi speciali
gear production

Tempratura
heat treatment

Rappresentante TANDLER per l'Italia
representation of TANDLER in Italy

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