

Controlflex®



## About us

### Many years of experience

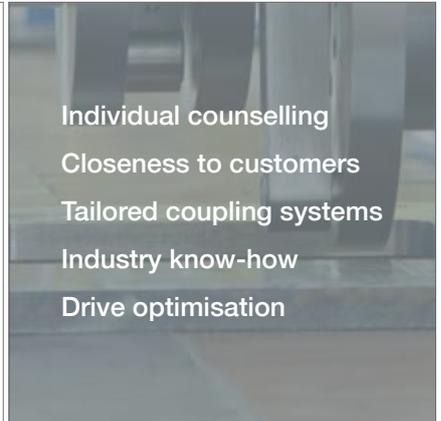
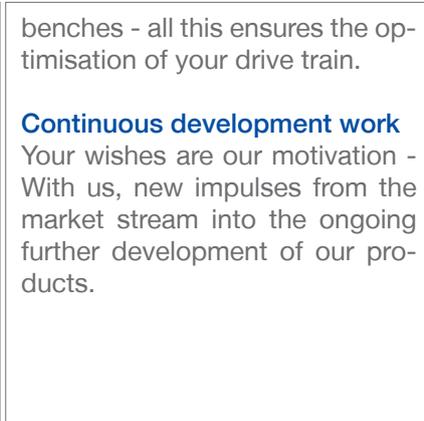
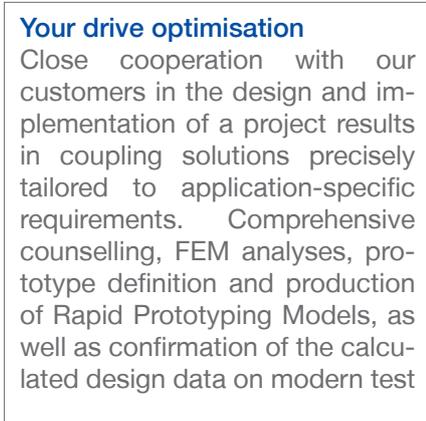
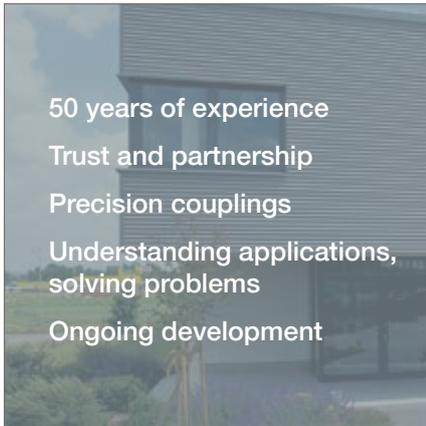
For 50 years, we have been advising machine manufacturers as partners for compact coupling systems. Our experience in power transmission has given us extensive know-how in many industries, as we know and understand the most varied applications, and this allows us to optimally support you. Our products are always a safe

choice. No matter if it is a standard product, a coupling tailored to a specific industry, or a coupling solution designed for a specific application.

### Products with high technical functionality

Our product range includes torsionally stiff couplings which stand out due to their compactness and high

functionality. Their unique technical features offer technical users a variety of practice-oriented advantages. Renowned OEMs from all areas of machinery manufacturing are among our partners.



## Introduction Controflex

The encoder coupling  
Constant angular velocity  
High-precision  
Modular



### The ideal coupling for shaft encoders

Controflex is a precision coupling designed to meet the mechanical and metrological requirements of encoders. Through its unique function element, the compact shaft

encoder coupling combines extremely low restoring force and low stress on the encoder bearings with constant angle-synchronous transmission of the rotary movement. This backlash-free coupling is electrically insulating, easy

to assemble, designed for speeds up to 25,000 min<sup>-1</sup>, and thus the ideal coupling for shaft encoders, encoders and tachometers.

## Technique

### Unique functional element

Controflex has a unique function element made of Delrin, which is characterised by high mechanical strength and rigidity, as well as flexural fatigue resistance. This specially shaped functional element operates according to the principle of the planar parallel crank gear with solid-state hinges, i.e. with two pairs of parallel link rods positioned at 90 degrees one from the other. The bend resilient pairs of link rods are firmly bonded with a rigid ring.

### High displacements - angle synchronisation

Through a unique function element, Controflex offers high displacement capacity - radially e.g. up to 2 mm. Through the permanently existing parallelism of the two pairs of link rods, isogonal transmission of motion is guaranteed regardless of the displacement height.

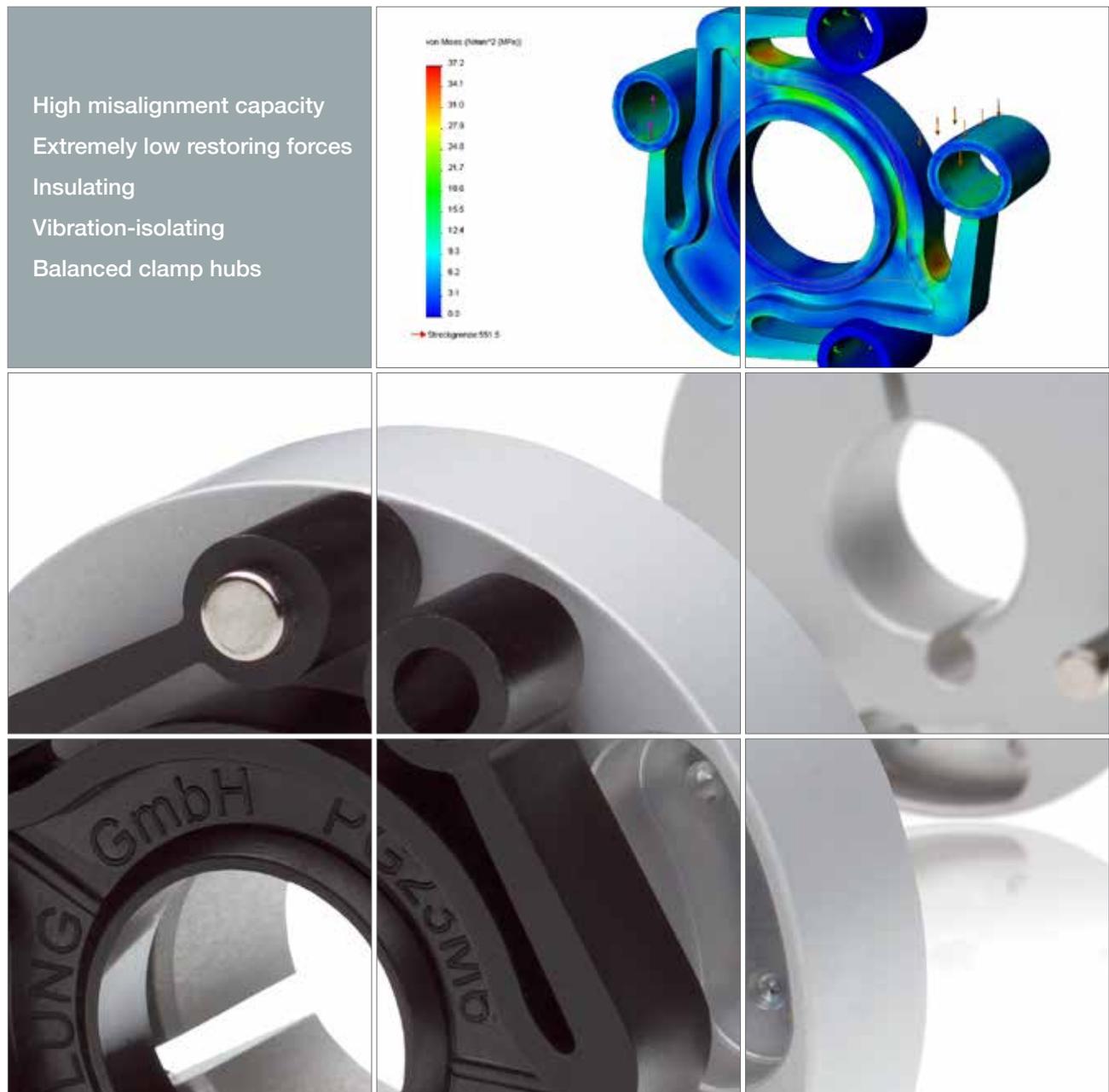
### Low stress on bearings

Controflex displacement compensation occurs with extremely low

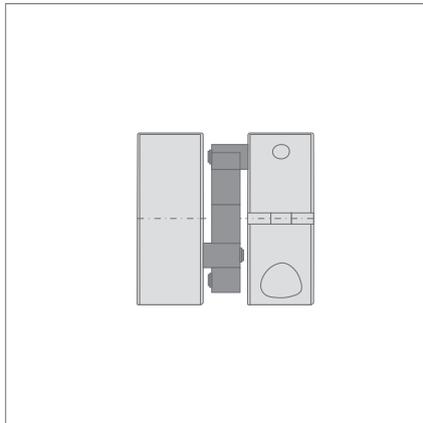
restoring forces. As a result, the sensitive encoders bearings are protected and the long service life of bearings enhanced.

### Electrically insulating

Due to the middle function element material, Controflex is electrically insulating. An important feature when a potential separation between encoder and drive is required in use.

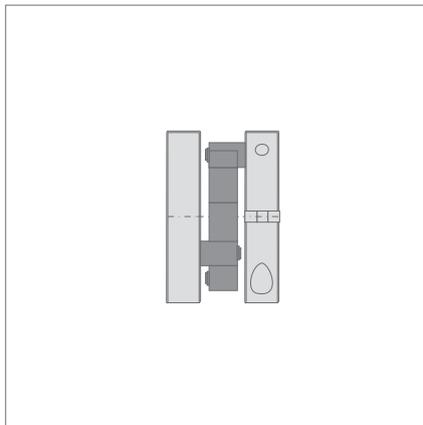


## Product line-up



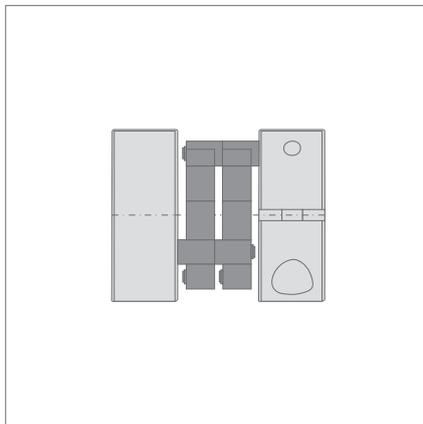
### Standard

The perfect choice for common-practice shaft encoders. This line provides an outstanding combination of precision and minimal restoring forces.



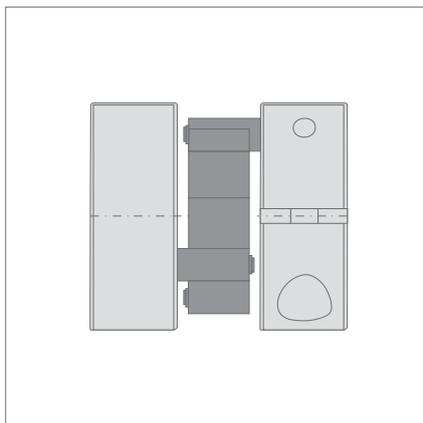
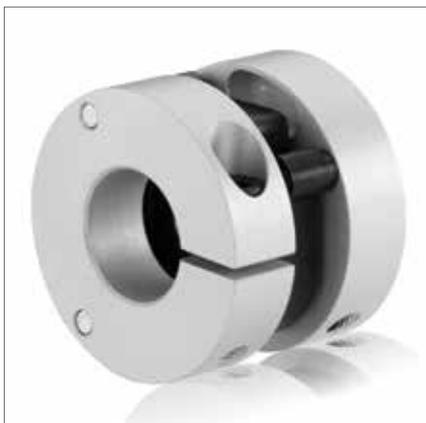
### Compact

Short axial design. This line is specially designed for encoder applications where the coupling must be integrated into an axially limited installation space.



### Impuls Plus

A product line for maximum measuring system resolution. It is perfect for shaft encoders whose high resolution is ensured by fine-tuned signal sequences per revolution.



### Industry

A product line for rugged industrial encoders with large shaft diameters.

## Material



## High misalignment capacity – lowest restoring forces

### Example: Controlflex Standard

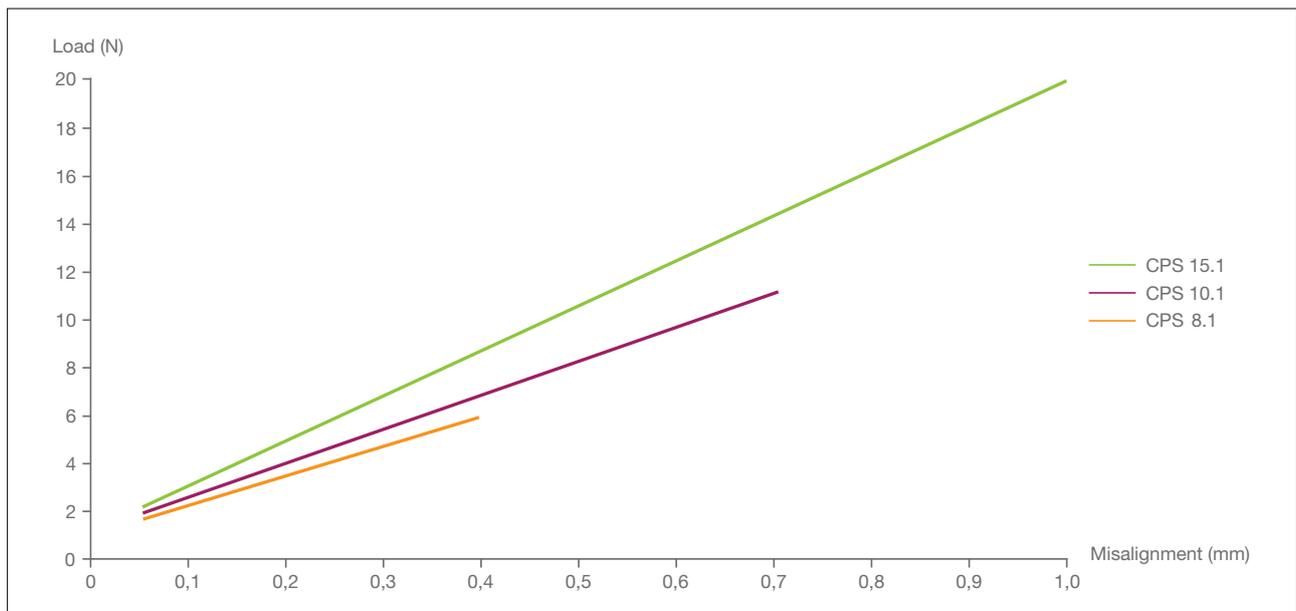
Shaft encoders with integral bearing usually have very sensitive precision ball bearings.

Only low radial loads may act on the encoder shaft, so that a long bearing service life and thus the whole encoder performance are

guaranteed. Controlflex as an encoder coupling protects the encoder from these loads in case of occurring displacement. Due to its unique function element, Controlflex compensates occurring shaft displacements with low

stress on bearings and minimal restoring forces.

In case of radial displacement in the order of tenths, they tend to zero and are negligible. Even when displacement capacity is fully exploited, they are still very low.



Radial misalignment – radial loads

## Selection sequence

When selecting your Controflex, the various technical parameters play a crucial role. Parameters such as maximum speed, occurring shaft displacements and driving torque should be considered. The required coupling size can be approximately determined as follows:

$$\frac{R_A}{R_K} \cdot \frac{T_A}{T_{KN}} \cdot \frac{n_A}{n_K} \leq 1$$

$R_A$ = Max. occurring displacements for the application,  $R_K$ = Max. permissible displacement values for the coupling,  $T_A$ = Torque of the application,  $T_{KN}$ = Nominal torques of the coupling,  $n_A$ = Max. speed of the application,  $n_K$ = Coupling speed

### Shaft displacements

The max. permissible displacement values for the  $R_K$  coupling result from the radial, axial and angular displacement values. The shaft displacement values specified in the catalogue are maximum values.

### Torque

With encoder applications, only very low torques occur which mostly fall within the Ncm range. Therefore, in encoder applications, the influence of this value on the selection formula is to be regarded as low.

For applications with additional torque (e.g. small stepper motors, etc.):

To calculate the application torque  $T_A$ , please multiply your operating torque by the expected impact factor.

### Impact factor S

	Load uniform	light impacts	medium impacts	strong impacts
Factor S	1	1,5	2	2,5

### Speed

As a general rule: The coupling speed  $n_K$  must not exceed the max. permissible speed established in the catalogue.

## General technical information:

### Material

Aluminium: high-strength aluminium 3.2315 AlMgSi 1 F30

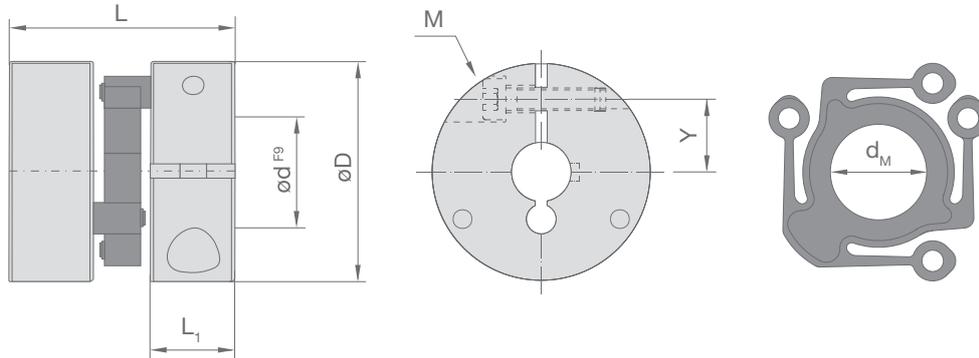
Clamp hubs: DIN 912 12.9

Function element: Polyacetal Delrin

### Temperature range

-30°C to +80°C

## Standard



## Specifications

Size	D mm	L mm	L <sub>1</sub> mm	M	M <sub>A</sub> Nm	Y mm	d <sub>M</sub> mm	m g	T <sub>KN</sub> Nm	T <sub>Kmax</sub> Nm	max rpm min <sup>-1</sup>	Misalignment			C <sub>T</sub> Nm/rad	C <sub>R</sub> N/mm
												angular °	axial mm	radial mm		
CPS 8.1	19	16	5,6	UNC2-56	0,4	6,4	7	8	0,3	0,7	25.000	1,5	0,3	0,4	16	15
CPS 10.1	25	25,5	9,5	M3	1,3	8	8	25	0,7	1	22.000	1,5	0,5	0,7	37,3	17
CPS 15.1	37	30	10	M4	3	12,4	14,3	59	2	3	15.000	1,5	0,7	1	97,4	22

Mass of coupling size measured at max. bore diameter

M = Size of screw, M<sub>A</sub> = Tightening torque, T<sub>KN</sub> = Nominal torque, T<sub>Kmax</sub> = Maximum torque, m = Mass, C<sub>T</sub> = Torsional stiffness, C<sub>R</sub> = Radial stiffness

## Bore diameters

Size	d mm											
	3	4	6	8	10	12	14	15	16	18	20	
CPS 8.1	■	■	■	■	■							
CPS 10.1			■	■	■	■						
CPS 15.1			■	■	■	■	■	■	■	■	■	

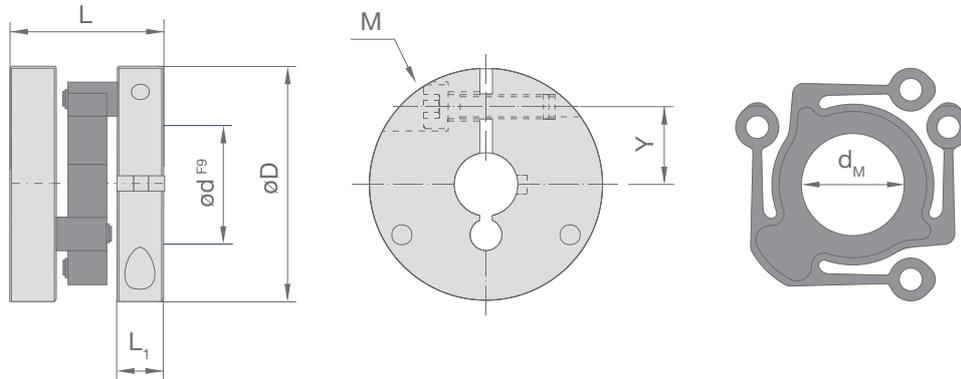
Combinations of different bore diameters are possible. Additionally bore diameters with keyway according to DIN 6885/1 starting from bore diameter 8 mm are available on request. Smaller bore diameters as shown in the table are available on special request as well.

Ordering example:

**CPS 10.1 Ø6 Ø8**

Controlflex CPS 10.1, bore 6, 8 mm

## Compact



## Specifications

Size	D mm	L mm	L <sub>1</sub> mm	M	M <sub>A</sub> Nm	Y mm	d <sub>M</sub> mm	m g	T <sub>KN</sub> Nm	T <sub>Kmax</sub> Nm	max rpm min <sup>-1</sup>	Misalignment			C <sub>T</sub> Nm/rad	C <sub>R</sub> N/mm
												angular °	axial mm	radial mm		
CPS 9.1	25	20,5	7	M2,5	0,7	8	8	18	0,7	1	22.000	1,5	0,5	0,7	37,3	17
CPS 14.1	37	24	7	M3	1,3	14	14,3	42	2	3	15.000	1,5	0,7	1	97,4	22

Mass of coupling size measured at max. bore diameter

M = Size of screw, M<sub>A</sub> = Tightening torque, T<sub>KN</sub> = Nominal torque, T<sub>Kmax</sub> = Maximum torque, m = Mass, C<sub>T</sub> = Torsional stiffness, C<sub>R</sub> = Radial stiffness

## Bore diameters

Size	d mm										
	3	4	6	8	10	12	14	15	16	18	20
CPS 9.1			■	■	■	■					
CPS 14.1			■	■	■	■	■	■	■	■	■

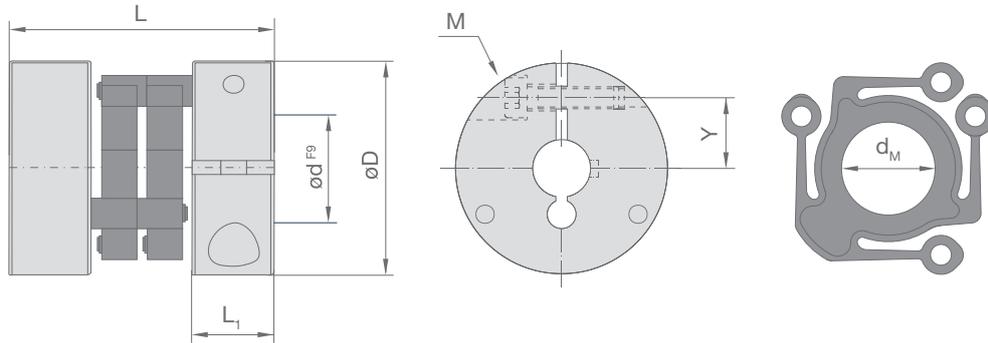
Combinations of different bore diameters are possible. Additionally bore diameters with keyway according to DIN 6885/1 starting from bore diameter 8 mm are available on request. Smaller bore diameters as shown in the table are available on special request as well.

Ordering example:

**CPS 9.1 Ø6 Ø8**

Controflex CPS 9.1, bore 6, 8 mm

## Impuls Plus



### Specifications

Size	D mm	L mm	L <sub>1</sub> mm	M	M <sub>A</sub> Nm	Y mm	d <sub>M</sub> mm	m g	T <sub>KN</sub> Nm	T <sub>Kmax</sub> Nm	max rpm min <sup>-1</sup>	Misalignment			C <sub>T</sub> Nm/rad	C <sub>R</sub> N/mm
												angular °	axial mm	radial mm		
CPS 8.2	19	20	5,6	UNC2-56	0,4	6,4	7	9	0,6	1,4	25.000	1	0,3	0,4	32	30
CPS 9.2	25	26	7	M2,5	0,7	8	8	20	1,4	2	22.000	1	0,5	0,7	74,5	34
CPS 10.2	25	31	9,5	M3	1,3	8	8	27	1,4	2	22.000	1	0,5	0,7	74,5	34
CPS 14.2	37	32	7	M3	1,3	14	14,3	47	4	5	15.000	1	0,7	1	194,8	44
CPS 15.2	37	38	10	M4	3	12,4	14,3	65	4	6	15.000	1	0,7	1	194,8	44

Mass of coupling size measured at max. bore diameter

M = Size of screw, M<sub>A</sub> = Tightening torque, T<sub>KN</sub> = Nominal torque, T<sub>Kmax</sub> = Maximum torque, m = Mass, C<sub>T</sub> = Torsional stiffness, C<sub>R</sub> = Radial stiffness

### Bore diameters

Size	d mm										
	3	4	6	8	10	12	14	15	16	18	20
CPS 8.2	■	■	■	■	■						
CPS 9.2			■	■	■	■					
CPS 10.2			■	■	■	■					
CPS 14.2			■	■	■	■	■	■	■	■	■
CPS 15.2			■	■	■	■	■	■	■	■	■

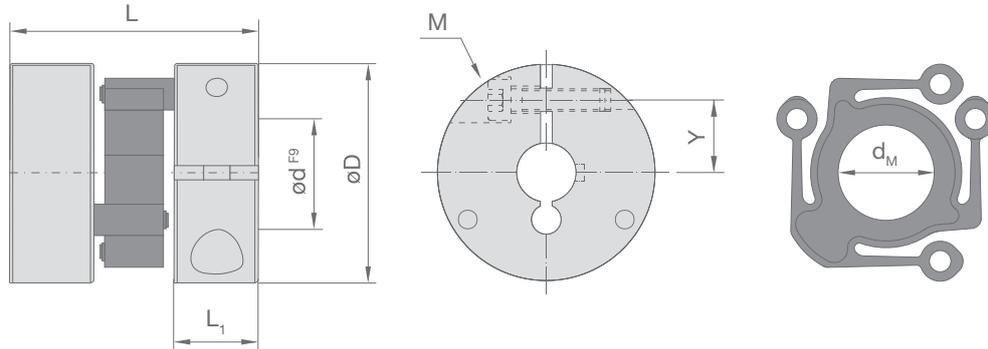
Combinations of different bore diameters are possible. Additionally bore diameters with keyway according to DIN 6885/1 starting from bore diameter 8 mm are available on request. Smaller bore diameters as shown in the table are available on special request as well.

Ordering example:

**CPS 10.2 Ø6 Ø8**

Controlflex CPS 10.2, bore 6, 8 mm

## Industry



## Specifications

Size	D mm	L mm	L <sub>1</sub> mm	M	M <sub>A</sub> Nm	Y mm	d <sub>M</sub> mm	m g	T <sub>KN</sub> Nm	T <sub>Kmax</sub> Nm	max rpm min <sup>-1</sup>	Misalignment			C <sub>T</sub> Nm/rad	C <sub>R</sub> N/mm
												angular °	axial mm	radial mm		
CPS 22.1	56	39	12	M5	5,7	21	18	163	7	10	10.000	1,5	1	1,5	412,6	20
CPS 23.1	56	45	15	M6	8	19,3	18	200	7	10	10.000	1,5	1	1,5	412,6	20
CPS 22.2	56	51	12	M5	5,7	21	18	182	14	16	10.000	1	1	1,5	825	40
CPS 23.2	56	57	15	M6	8	19,3	18	220	14	18	10.000	1	1	1,5	825	40
CPS 30.1	75	57	18	M8	24	25	28,5	430	15	22	7.500	1,5	1,5	2	601,7	50
CPS 30.2	75	73	18	M8	24	25	28,5	475	30	40	7.500	1	1,5	2	1.203,3	100

Mass of coupling size measured at max. bore diameter

M = Size of screw, M<sub>A</sub> = Tightening torque, T<sub>KN</sub> = Nominal torque, T<sub>Kmax</sub> = Maximum torque, m = Mass, C<sub>T</sub> = Torsional stiffness, C<sub>R</sub> = Radial stiffness

## Bore diameters

Size	d mm													
	10	12	14	15	16	18	20	24	28	30	32	34	36	40
CPS 22.1	■	■	■	■	■	■	■	■	■	■	■	■		
CPS 23.1	■	■	■	■	■	■	■	■	■	■				
CPS 22.2	■	■	■	■	■	■	■	■	■	■	■	■		
CPS 23.2	■	■	■	■	■	■	■	■	■	■				
CPS 30.1			■	■	■	■	■	■	■	■	■	■	■	■
CPS 30.2			■	■	■	■	■	■	■	■	■	■	■	■

Combinations of different bore diameters are possible. Additionally bore diameters with keyway according to DIN 6885/1 starting from bore diameter 8 mm are available on request. Smaller bore diameters as shown in the table are available on special request as well.

Ordering example:

**CPS 30.1 Ø20 Ø30**

Controflex CPS 30.1, bore 20, 30 mm

## Controlflex coupling solutions

In addition to standard products, SCHMIDT-KUPPLUNG manufactures industry-specific versions and application-specific coupling solutions of the Controlflex line. These are, for example:



### Extra short and for direct flanging

Version for very narrow mounting situations in a very compact design, and for direct flanging onto customer-specific add-on parts. Here: Version which is also axially fixed for absorbing slight, axial push and pull forces, and impact

resistant. Delivery as a so-called 2/3 coupling with driving pins for direct integration into customer-specific add-on parts is also possible.



### Safety-demanding applications

Versions with additional interlocking (feather key groove, D shaft, etc.) and rupture-proof ones for

shaft encoders and cam limit switches for stage equipment and lifting devices.



### Variable axial travel

Versions with large axial shifting variability for shafts with significant axial movement. Here: 10-mm variable axial distance with

subsequent retention limit through appropriate axial fixation at the end of the maximum possible axial travel.



### Connection types

Versions with different connection types such as expanding shafts, pins, split clamp hubs for radial mounting; connecting discs for D shafts, for expanding shafts, for

connection to very large shafts, with adapters for connection to customer-specific shafts and much more.



### Special structural lengths

Versions with tailored, customer-specific length dimensions for

mounting in predefined installation space.

## Installation instructions

### General

Controflex couplings are generally installed as complete units. If the coupling is initially connected in parts to the shafts, then care must be taken to ensure that the driving pins are run into the corresponding bores of the central element. The attachments of the central element serve as spacers and are mounted in the direction of the hub to be connected.

### Inserting shafts in the functional area

Should a shaft end extend into the range of motion of the central ele-

ment, it must be ensured that the shaft diameter is smaller than the inner diameter of the central element by the double dimension of the possible radial offset (dimension dM in the relevant table pages).

### Tolerances and fits

The shaft ends and hub bores to be connected must be clean, dry and burr-free. Check shaft connection dimensions and tolerances. Bores are supplied in fit F9. For our fit F9 bore, we recommend a fit h7 shaft to our customers. In addition, shaft fits j6, k6, m6 as well as  $\leq$ h9 can be used without restriction. Clamp

screws must be tightened to the recommended driving torque according to size (values are listed in the corresponding tables).

## Applications



Absolute value encoders  
Incremental encoders  
Encoders  
Resolvers  
Sensor technology  
and much more

### We speak your language

Every industry has its own peculiarities. Understanding this is a key task for the successful implementation of industry-specific applications.

For 50 years, the release of countless applications in various

industries has given us the experience and know-how to implement, jointly with our customers, the most suitable and efficient coupling solution for each application.

No matter whether you deal with assembly or exposure systems for

PCB production, medical technology or process engineering, forming or machine tools: We speak your language!

## The optimal solution for every application

### Shaft encoders in all industries

In virtually every industry, shaft encoders and sensors monitor the precise work flow in a variety of processes. Controflex is the shaft encoder coupling for absolute and incremental encoders with integral bearing - no matter whether with solid shaft or hollow shaft. With its unique function element, it combines extremely low restoring force and low stress on the encoder bearings with constant angle-synchronous transmission of the rotary movement, regardless of the height of displacement. As a result, it steadily guarantees the exact and precise recording and transmission of measurement pulses. The coupling is electrically insulating, easy to assemble and designed for speeds up to 25,000 min<sup>-1</sup>.

In addition to standard designs, customised Controflex versions fulfil countless applications in sensor technology and measurement systems with special requirements.

### Lifting equipment and stage technology

Lifting equipment and stage technology place special demands on

machines and machine elements due to safety aspects. Thanks to its accuracy, Controflex is used as a connecting element for shaft encoders and cam limit switches in these applications. Equipped with an additional interlock as feather key groove in tolerance P9 and rupture-proof with rotary protection, it meets the highest safety requirements of this industry.

### Densitometry

During offset printing, the print sheet is constantly checked visually. Densitometry is a method by which a sensor quantitatively measures colour density at various measurement positions. Using these measurements, the colour film density can be regulated to achieve an effect on the colour thickness, and thus on the overall quality of the printed product during the printing process. Controflex guarantees a precise approach to the individual measuring points in the drive of the sensor head during its travel.

### Register control in printing machines

In printing machines, register controls often occur also in the longi-

tudinal direction. In this case, the measuring instruments should be mounted flexibly via more or less complicated processes to perform this lateral travel. To minimise construction work, the shaft encoders are securely mounted on the housing, without joining in the axial shift of the drive unit and compression roll. In the lateral adjusting movement in the machines, a special Controflex version with adjusted axial travel absorbs the corresponding axial extension movement. At the end of the maximum axial travel referred to, limitation is performed by a corresponding axial fixation.

### Food industry

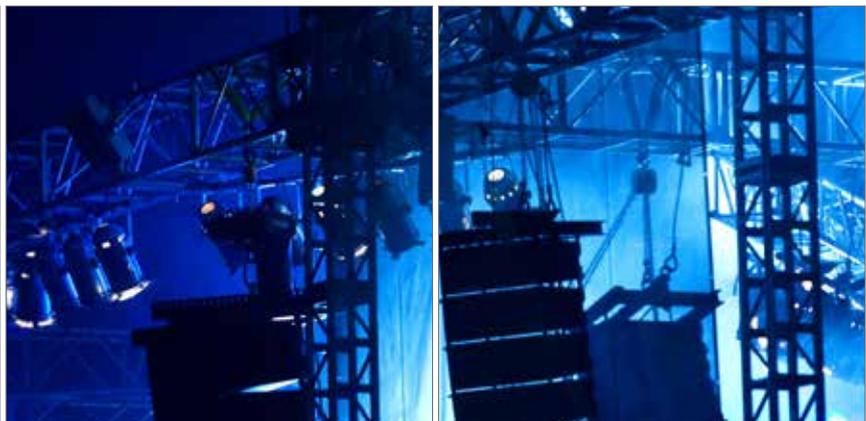
In food industry packaging machines, specific hygiene requirements must be complied with. This also applies to the shaft encoders and couplings of these systems. Here, the Controflex with stainless steel hubs is available for connection to encoders which are generally encapsulated in a stainless steel housing. As a result, also frequent cleaning processes of the systems cannot be harmful.

Lifting equipment and stage technology

Densitometry

Register control

Food industry and much more



## Product Overview



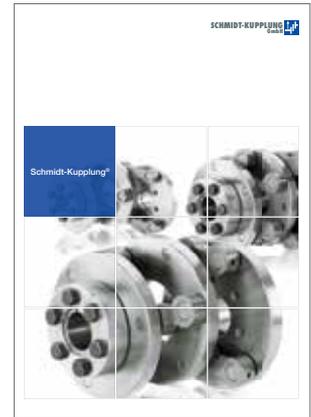
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*Catalogue Controlflex*



*Catalogue Semiflex*



*Catalogue Schmidt-Kupplung*



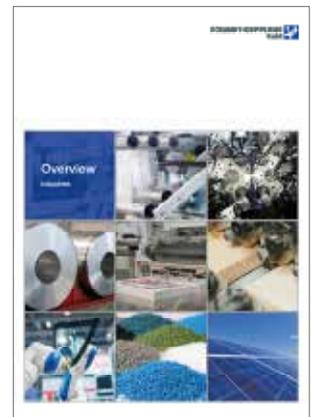
*Catalogue Servoflex*



*Catalogue Loewe GK*



*Catalogue Omniflex*



*Overview Industries*

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