HOW TO SELECT THE RIGHT COUPLING SIZE

1. **BASED ON APPLICATION DATA**
   Depending on torque, speed, distance between shaft ends and the shaft sizes of the two machines to be connected, a first selection can be made. DLC couplings are limited in torque and bore capacity so for medium to high torque application DMU or DPU series have to be used. For torques > 23100 Nm, DMU is preferred. High Speed applications are, thanks to its concept, best covered by the DPU series. For short DBSE application, DLCC or DMUCC can be selected while for long DBSE application (DBSE > 1000 mm) requiring balancing, escodisc DMU or DPU have to be used. In the below table an overview of the coupling characteristics are given for quick selection.

2. **BASED ON SPECIFIC APPLICATION REQUIREMENTS**
   Specific application requirements can also determine the escodisc type to be used. These requirements might be balancing, conformity to API specifications, non-sparking execution, special materials, assembly, available space etc... In the below table, an overview of the conformity of the DLC/DMU/DPU to specific application requirements can be found.

3. **BASED ON COMMERCIAL REQUIREMENTS**

4. **BASED ON CUSTOMER STANDARDISATION/PREFERENCE**

	DLC	DLCC	DMU	DMUCC	DPU
Torque Capacity (1)	1600	1600	260000	19800	23100
Bore Capacity	105	85	370	170	220
Balancing (2)			Q 2,5		Q 2,5
Short DBSE (<50 mm)		Yes		Yes	
Long DBSE (>1000 mm)			Yes		Yes
Large Hub					Yes
Non Sparking				Optional	Optional
High Speed Applications (>3000 rpm)					Optional
API 610			Yes		Yes
API 671					Optional
Electrical Insulation	Optional		Optional		Optional
Limited End Float			Optional		Optional
Shear Pin Overload Protection					Optional
Esco Torque Overload Protection					Optional
Overload Spacer			Optional		Optional
Vertical Execution					Optional

Remarks: (1) Indicated Torque capacity is for standard range. Larger sizes are available on request.

(2) Indicated balance degree gives the maximum advisable balance degree. Standard couplings are not balanced.

HOW TO SELECT THE RIGHT COUPLING SIZE

1. MISALIGNMENT CAPACITY

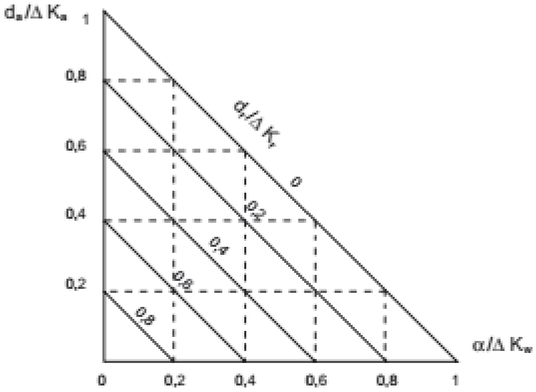
ESCODISC COUPLING CAN ACCOMMODATE 3 TYPES OF MISALIGNMENT:

Axial displacement:
d_a mm per coupling
ΔK_a = max. axial displacement
(see data sheet)

Angular misalignment:
α degree per half coupling:
α = max. (α_1, α_2)
ΔK_w = max. angular misalignment
(see data sheet)

Offset misalignment:
d_r mm per coupling
ΔK_r = max. offset misalignment
(see data sheet) ($\Delta K_r = S \text{ tg } \Delta K_w$)

Max. combined misalignment during operation is calculated by using the graph:



or the formula: $$\frac{d_a}{\Delta K_a} + \frac{\alpha}{\Delta K_w} + \frac{d_r}{\Delta K_r} \leq 1$$

Example:
For ESCODISC DMU 65 - 75, max. values given in data sheet are:
ΔK_a = 2,6 mm; ΔK_w = 0,5°; ΔK_r = 0,8 mm.

Check if actual misalignment values are permissible:
d_a = 0,8 mm; α = 0,15° and d_r = 0,2 mm

$$\frac{d_a}{\Delta K_a} + \frac{\alpha}{\Delta K_w} + \frac{d_r}{\Delta K_r} = \frac{0,8}{2,6} + \frac{0,15}{0,5} + \frac{0,2}{0,8} = 0,85 \leq 1\text{: OK}$$

In case of use in potentially explosive atmospheres (Ex), European Directive 94/9/EC, the combination of misalignement may not exceed 0,8.

$$\frac{d_a}{\Delta K_a} + \frac{\alpha}{\Delta K_w} + \frac{d_r}{\Delta K_r} \leq 0,8$$

At assembly, we however recommend not to exceed 20% of the complete misalignment capacity of the coupling.
See installation and maintenance instructions (IM).

2. TORQUE CAPACITY AND SELECTION

2.1 Tabulated torques are independent from misalignment and speed conditions as far as combined misalignment is within the specified values (see above) and speed does not exceed tabulated values.

2.2 How to select?

A. First select the size of ESCODISC coupling that will accommodate the largest shaft diameter.

B. Make sure this coupling has the required nominal torque capacity according to the formula: Torque in Nm = $\frac{9550 \times P \times F_u \times F_{Ex}}{n}$

Where P = Power in kW, n = speed in min^{-1}.
F_U = Service factor depending on the connected machine (see below).
F_{Ex} = 1,5 in case of use in potentially explosive atmospheres (Ex). In normal atmospheres, F_{Ex} = 1.

The coupling selected per A must have an equal or greater nominal torque capacity T_n (see planographs A104 to A121) than the result of the formula B. If not, select a larger size coupling.

C. Check that the selected coupling has the required peak torque capacity according to the following formula :
Calculated peak torque= Peak torque of the application x F_{Ex} ; F_{Ex}, see above (Point B)
For application with direct starting of an AC motor, the transmitted peak torque has to be calculated with the following formula :

$$\text{Calculated Peak Torque} = 7 \times T_{nm} \times \frac{J_2}{(J_1 + J_2)} F_{Ex}$$

where T_{nm} = nominal torque of motor (Nm)
J_1 = inertia of motor (kgm^2)
J_2 = inertia of the driven machine (kgm^2)
F_{Ex} = see above (point B).

For application using a brake, calculated peak torque = brake torque x 1,5 x F_{Ex}.
Peak torque capacity Tp of the coupling (see planographs A105 to A121) must be higher than the calculated peak torque. If not, select a larger coupling.

D. Check if shaft/hub assembly will transmit the torque. (If in doubt, please consult Esco).

E. Read carefully assembly and maintenance instructions (IM).

2.3 Service factor F_u

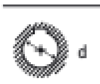
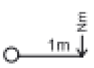
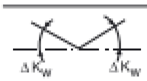
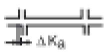
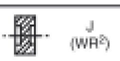
Service factor depends on coupled machines (driver and driven = F_M) and on the working condition (F_W). $F_u = F_M \cdot F_W$

	DRIVER MACHINE	DRIVEN MACHINE
$F_M = F_N$	Electric and hydraulic motors, Turbines	See tabulation
$F_M = F_N + 0,4$	Piston engine with 4 cylinders and more	
$F_M = F_N + 0,9$	Piston engine with 1 to 3 cylinders	below for F_N

$F_W = 1$ for non reversing applications — $F_W = 1,25$ for reversing applications — for more than 2 starts per min.

DRIVEN MACHINE	F_N	DRIVEN MACHINE	F_N
<u>Agitators</u>		<u>Handling equipment</u>	
- High inertia * and/or heavy liquids	1,75	- Conveyor	1,75
- Low inertia and light liquids	1	- Crane	2
<u>Compressors</u>		- Elevator	1,5
- Centrifugal	1,5	- Hoist	1,75
- Reciprocating	2,5	<u>Machines - Various</u>	
<u>Generators</u>		- laundry washer	1,75
- Continuous duty	1	- packing and bottling	1,5
- Welding	1,75	- paper and textile	2
<u>Machine tool</u>		- rubber mill	2
- Auxiliary drives	1	- wood and plastic	1,5
- Main drives	1,75	<u>Metallurgy</u>	
<u>Pumps</u>		- Continuous casting	2,5
- Reciprocating	2,5	- Convertor	2,5
- Gears	1,5	- Shear, Stripmill	2,25
- Centrifugal		<u>Mining, cement, briquetting</u>	
- High inertia * and/or heavy liquids	1,75	- Crusher	3
- Low inertia and light liquids	1	- Mixer (concrete)	1,75
- Propeller	1,25	- Rotating oven	2
- Waterjet pump	1,25	<u>Wire drawing</u>	2
<u>Ventilators, axial or radial blowing</u>			
- Great capacity *, cooling tower	2		
- Low inertia	1		

* If $J_1 < 2 J_2$ with J_1 = inertia of electric motor and J_2 = inertia of the driven machine.

LEGEND OF USED PICTOGRAM		
 d Ømax.		MAXIMUM BORE (mm)
Ømin.		MINIMUM BORE (mm)
 Tn		MAXIMUM NOMINAL TORQUE (Nm)
Tp		MAXIMUM PEAK TORQUE (Nm)
		MAXIMUM SPEED (rpm)
		MAXIMUM ANGULAR MISALIGNMENT (degree)
		MAXIMUM OFFSET MISALIGNMENT (mm)
		MAXIMUM AXIAL MISALIGNMENT (mm)
		INERTIA (kgm^2)
		WEIGHT (kg)

Notes for series DL — DMU — DPU

1 For key according to ISO R 773.

2.1 Maximum transmissible torque for:

$\% \Delta K_w + \% \Delta K_a + \% \Delta K_r \leq 100\%$ or 80% in atmosphère

3 Higher speed on special request.

3.3 Depend on S.

4 For solid bore.

5 For pilot bored hubs.

8 Values for S minimum. S maximum depends on torque and speed.

11 For larger S, contact us.

12 Following DIN 740.

13 $\Delta K_r \equiv S \times tg \Delta K_w$

** Max. torque, speed and misalignment tabulated values may not be cumulated. See IM/A100-2, -3, -4.*