

Non-Contact Magnetic Transmission Drives

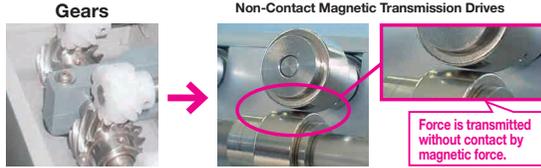
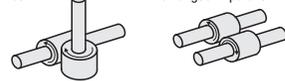
Overview

What are Non-Contact Magnetic Transmission Drives?
Non-Contact Magnetic Transmission Drives are Toothless Magnetic Gears.
 Motive force is transmitted by using magnetic pull / repulsion without any gear engagement or contact.

Fig. 1

Perpendicular Type
 Force is transmitted with TM Magnets arranged at 90°.

Parallel Type
 Force is transmitted with TM Magnets arranged in parallel.



Main Merits of Non-Contact Magnetic Transmission Drive

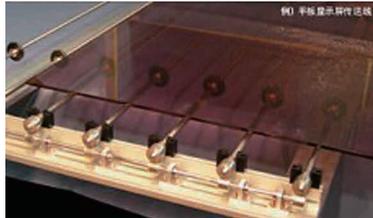
The following merits are realized from non-contact rotation

- ① **Can be used in clean rooms**
 • Ultra low particle generation. Can be used even for Class 1.
- ② **Semi-permanently maintenance free**
 • No need for lubricating grease • No need for replacement due to wearing or damage

Ordering Code

Selection Procedure

- Selection of Transmission Direction (Perpendicular Type or Horizontal Type)
- Selection of Product Type (See Table 1)
- Calculate Qty from work size and conveyance distance
- Calculate the load torque (Refer to the selection example on the right)
- Select the external form size by the load torque required for 1 magnet
- Select inner diameter size from the size of the shaft



Selection Example

Preconditions

- Roller Dia: 50mm • Roller Total Weight: 0.3 kg • Work Weight: 5 kg • Shaft Size: 12φ • Shaft Weight: 0.5 kg • No. of Shafts: 7 • Seal Frictional Coefficient: 0.1
- Transmission Efficiency: 0.9 • Safety Ratio: 3 • Use of Induction Motor
- ① Orthogonal Type ② Select Precision Type from the size of the shaft
- ③ Required Qty: 14 ④ Load Torque Calculation (See the following) ⑤ External Dimension Size: D35
- ⑥ Internal Diameter Size: d12

- * Example of a safety ratio. Set it according to your specifications.
- * Calculate the transmission efficiency by referencing the magnet transmission efficiency.
- * Calculate the seal frictional coefficient from the bearing, etc. that will be used.

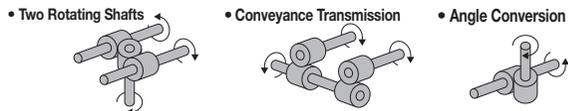
Formula Example

$$F = (\text{Work Weight (kg)} + \text{Shaft Weight (kg)} + \text{Roller Weight (kg)}) \times \text{Seal Frictional Coefficient}$$

$$T = (F (N) \times D (\text{Roller Dia. (m)}) / 2 \times \text{Transmission Efficiency}) \times \text{Safety Ratio}$$

Set the following as prerequisites:
 $F = (5 + 3.5 + 0.3) \times 0.1 = 0.88 \text{ kg} \Rightarrow 8.6 \text{ N}$
 $T = (8.6 \times 0.05 / 2) \times 3 = 0.58 (\text{N} \cdot \text{m})$
 0.58 / Minimum Interlocking Gears When Carrying Work 5 pc = 0.116 (N·m)

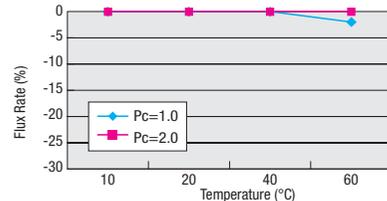
Main Transmission Methods



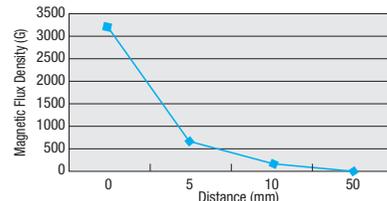
Cautions During Use

- Allowable torque changes depending on the temperature (Design Data 2).
- The following objects are negatively affected by strong magnetic field (Design Data 3).
 Electronic devices such as mobile phones, PCs, watches
 Electronic medical devices such as pacemakers
- No alteration is available for the magnetic parts.
- Strong impact may cause damage and lead to deterioration in magnetic force.
- Due to its non-contact nature, it is not suitable for extremely high-speed rotation (Max. Speed 1500 rpm)

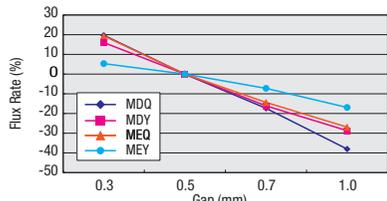
Design Data 2: Magnetic Flux Variation Rate by Temperature (Reference)



Design Data 3: Space Magnetic Flux Density by Distance from Non-Contact Magnetic Transmission Drive (Reference)



Design Data 1: Torque Variation by Distance Change (Reference)



Non-Contact Magnetic Transmission Drives / Non-Contact Magnetic Transmission Drives Economy Type

Q&A can be viewed regarding the TM Magnets from the URL on the right. <http://jp.misumi-ec.com/mech/product/ro/tm.html>
Features: Rotational displacement is unlikely to occur even at low-speed rotation.

Standard Type

Type	Combined Type	Material		Surface Treatment	
		① Magnet Section	② Holder Section	① Magnet Section	② Holder Section
Standard Type	MDQ	Perpendicular Type	Neodymium Sintered Magnet	A5056	Out-gassing Prevention Treatment
	MDY	Parallel Type	Neodymium Sintered Magnet	A5056	Corrosion Resistant Anodizing

Maximum Rotational Speed: 1500rpm
 Operating Temperature: 0 ~ 60°C

Perpendicular Type
 Motive force is transmitted by arranging TM magnets at 90°.

Parallel Type
 Motive force is transmitted by arranging TM magnets in parallel.

Part Number	Type	D	d Selection				D1	D2	H	W	l	M	* Allowable Torque (N·m)		Unit Price
			6	8	10	12							MDQ	MDY	
Perpendicular Type MDQ		16	6	8			13	12	19.5	8	5	M3	0.013	0.032	
		22	8	10	12	18	17	23.5	12	0.050			0.105		
		26	10	12	15	22	20	25.5	14	0.068			0.186		
Parallel Type MDY		35			12	15	20	32	29	34.0	22	M4	0.245	0.558	

- ⊗ Perpendicular Type and Parallel Type cannot be used in combination.
 - ⊗ Cannot be combined with other manufacturer's products. Please be sure to order in sets of the compatible product types.
 - ⊗ Drives with different diameters cannot be used in combination. Combine the drives of same diameter.
- * Allowable Torque values are for reference at 0.5mm gap.

Features: This type is made of plastic and more economical than the Standard Type. Suitable for use in normal atmosphere. Equivalent allowable torque to the Standard Type.

Economy Type

Type	Combined Type	Material		Surface Treatment	
		① Magnet Section	② Holder Section	① Magnet Section	② Holder Section
Economy Type	MEQ	Perpendicular Type	Neodymium Bonded Magnet	Polyacetal (D16:A5056)	Electrostatic Paint
	MEY	Parallel Type	Neodymium Bonded Magnet	Polyacetal (D16:A5056)	Electrostatic Paint

Maximum Rotational Speed: 1500rpm
 Operating Temperature: 0 ~ 60°C

Perpendicular Type
 Motive force is transmitted by arranging TM magnets at 90°.

Parallel Type
 Motive force is transmitted by arranging TM magnets in parallel.

Part Number	Type	D	d Selection				H	W	l	Locking Screw (D16: Set Screw)		F	E	* Allowable Torque (N·m)		Unit Price	
			M	Tightening Torque (N·m)	MEQ	MEY				MEQ	MEY						
Perpendicular Type MEQ		8	5				8	-	-	-	-	-	-	0.0058	0.0078		
		16	6	8		19.5	8		M3	1.5	-	-	-	0.015	0.021		
Parallel Type MEY		26		12	15		25.5	14	5	M2.5	0.333	1.5	11.5	0.098	0.167		
		35		15	20		33.5	22		M3	0.422		16	0.221	0.515		
		45			20		45	30	6.35	M5	0.784	2	20.5	0.804	-	-	

- ⊗ Perpendicular Type and Parallel Type cannot be used in combination.
 - ⊗ Cannot be combined with other manufacturer's products. Please be sure to order in sets of the compatible product types.
 - ⊗ Drives with different diameters cannot be used in combination. Combine the drives of same diameter.
 - ⊗ D diameter 45 is available for Perpendicular Type only.
 - ⊗ D8 does not have the ② holder section. Use adhesive to fix.
 - ⊗ The holder section of D16 is tightened with a set screw. (Set screw included)
- * Allowable Torque values are for reference at 0.5mm gap.

Ordering Example

Part Number	-	d
MDQ22	-	8
MEQ35	-	20