Non-Contact Magnetic Transmission Drives
Overview

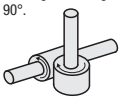
What are Non-Contact Magnetic Transmission Drives?

Non-Contact Magnetic Transmission Drives are Toothless Magnetic Gears.

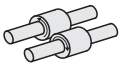
Motive force is transmitted by using magnetic pull / repellence without any gear engagement or contact.

• 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

①Can be used in clean rooms

・Ultra low particle generation. Can be used even for Class 1.

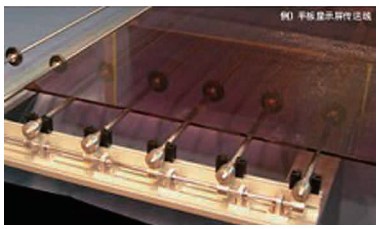
②Semi-permanently maintenance free

・No need for lubricating grease ・No need for replacement due to wearing or damage

Ordering Code

• Selection Procedure

①Selection of Transmission Direction (Perpendicular Type or Horizontal Type)
②Selection of Product Type (See Table 1)
③Calculate Qty from work size and conveyance distance
④Calculate the load torque (Refer to the selection example on the right)
⑤Select the external form size by the load torque required for 1 magnet
⑥Select inner diameter size from the size of the shaft



• Table 1: Differences Between Precision Type and Standard Type

Type	Clean Room	Rotational deviation at low speeds	Price
Precision	Class 1	Small	High
Standard	Class 1	Large	Low

* When the Economy Type is operating at low speed, cogging (rotational deviation) may occur.

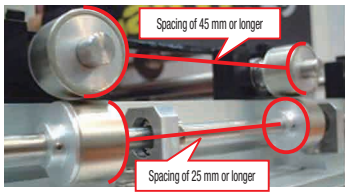
• Cautions when Designing

・When designing shafts in a series, as attraction between two magnets and the displacement of the magnets' positions could occur, make a spacing interval between the transmission surface of the magnets of 45 mm or greater. Also ensure a space between the transverse surfaces of magnets of 25 mm or more. (Photo 1)

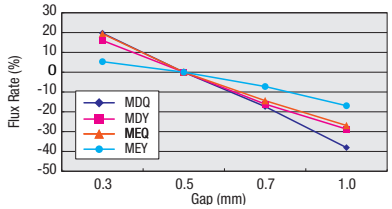
・By adjusting the distance between the magnets, the allowable torque changes. (Design Data 1) The recommended distance is 0.5 mm. Ensure the distance is at least 0.3 mm or more to prevent contact from occurring.

・The magnetic force of the magnet has a maximum attractive force of 7 kgf・cm. Use a bearing holder set, etc. to fix the magnets to prevent them contacting each other.

• Photo 1: Spacing Intervals When Using Shafts in Series



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



Selection Example

Preconditions

・Roller Dia: 50mm ・Roller Total Weight: 0.3 kg ・Work Weight: 5 kg ・Shaft Size: 12Ø ・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
①Orthogonal Type ②Select Precision Type from the size of the shaft
③Required Qty: 14 ④Load Torque Calculation (See the following) ⑤External Dimension Size: D35
⑥Internal Diameter Size: d12

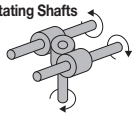
* Example of a safety ratio. Set it according to your specifications.
* Calculate the transmission efficiency by referencing the magnet transmission efficiency.
* Calculate the seal frictional coefficient from the bearing, etc. that will be used.

Formula Example

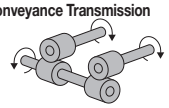
F = (Work Weight (kg) + Shaft Weight (kg) + Roller Weight (kg)) x Seal Frictional Coefficient
T = (F (N) x D (Roller Dia. (m)) / 2 x Transmission Efficiency) x Safety Ratio
Set the following as prerequisites:
F=(5+3.5+0.3)x0.1=0.88kg ⇒ 8.6N
T=(8.6x0.05 / 2x0.9)x3=0.58(N・m)
0.58 / Minimum Interlocking Gears When Carrying Work 5 pc = 0.116 (N・m)

Main Transmission Methods

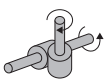
• Two Rotating Shafts



• Conveyance Transmission



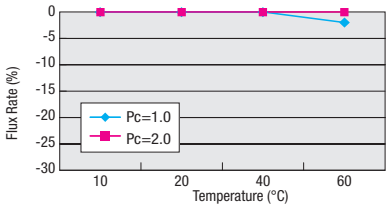
• Angle Conversion



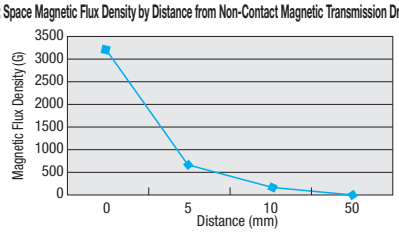
• Cautions During Use

・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)



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

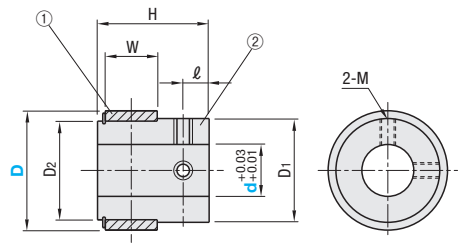
■Q&A can be viewed regarding the TM Magnets from the URL on the right. http://jp.misumi-ec.com/mech/product/ro/tm.html
■**Features:** Rotational displacement is unlikely to occur even at low-speed rotation.

■Standard Type



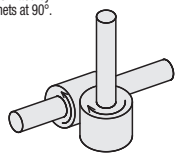
RoHS10

Type		Combined Type	Material ① Magnet Section	Material ② Holder Section	Surface Treatment ① Magnet Section	Surface Treatment ② Holder Section
Standard Type	MDQ	Perpendicular Type	Neodymium Sintered Magnet	EN AW-5056 Equiv.	Out-gassing Prevention Treatment	Corrosion Resistant Anodizing
	MDY	Parallel Type				

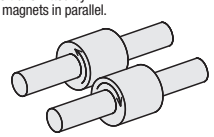


Maximum Rotational Speed: 1500rpm
Operating Temperature: 0 ~ 60°C

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) Standard Torque MDQ	* Allowable Torque (N·m) Standard Torque MDY	Unit Price
Perpendicular Type MDQ / Parallel Type MDY	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	
	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.

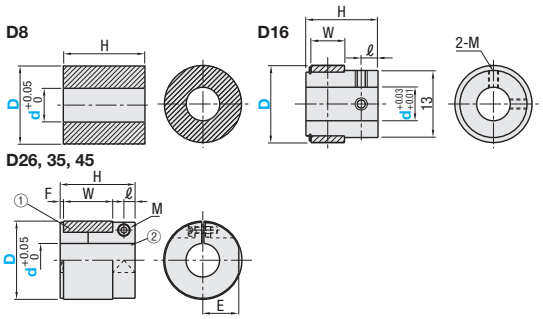
■Features: This type is made of plastic and more economical than the Standard Type. Suitable for use in normal atmosphere. Equiv. allowable torque to the Standard Type.

■Economy Type



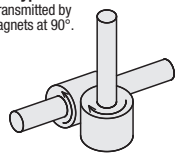
RoHS10

Type		Combined Type	Material ① Magnet Section	Material ② Holder Section	Surface Treatment ① Magnet Section	Surface Treatment ② Holder Section
Economy Type	MEQ	Perpendicular Type	Neodymium Bonded Magnet	Polyacetal (D16:EN AW-5056 Equiv.)	Electrostatic Paint	-
	MEY	Parallel Type				

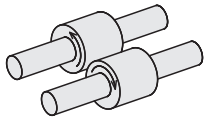


Maximum Rotational Speed: 1500rpm
Operating Temperature: 0 ~ 60°C

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) M	Locking Screw (D16: Set Screw) Tightening Torque (N·m)	F	E	* Allowable Torque (N·m) MEQ	* Allowable Torque (N·m) MEY	Unit Price MEQ	Unit Price MEY
Perpendicular Type MEQ / Parallel Type MEY	8	5	8	-	-	-	-	-	-	0.0058	0.0078		
	16	6 8	19.5	8	5	M3	1.5	1.5	-	0.015	0.021		
	26	12 15	25.5	14		M2.5	0.333		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