

MAGTROL

Series MIC Miniature Couplings



**Mounting and
Operating Instructions**

Purchase Record

Please record all model numbers and serial numbers of your Magtrol equipment, along with the general purchase information. The model number and serial number can be found on either a silver identification plate or white label affixed to each unit. Refer to these numbers whenever you communicate with a Magtrol representative about this equipment.

Model Number: _____

Serial Number: _____

Purchase Date: _____

Purchased From: _____

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National Instruments™ is a trademark of National Instruments Corporation.

Windows® is a registered trademark of Microsoft Corporation.

Safety Precautions



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1. **MAKE SURE THAT ALL MAGTROL TORQUE TRANSDUCERS AND ELECTRONIC PRODUCTS ARE EARTH-GROUNDED, TO ENSURE PERSONAL SAFETY AND PROPER OPERATION.**
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2. **MAKE SURE THAT TORQUE TRANSDUCERS AND MOTORS UNDER TEST ARE EQUIPPED WITH APPROPRIATE SAFETY GUARDS.**
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CAUTION

THIS MOUNTING AND OPERATING MANUAL IS AN ESSENTIAL PART OF MAGTROL'S SHAFT COUPLING. ALWAYS STORE THE COMPLETE MANUAL WELL ACCESSIBLE NEAR THE COUPLING. ALL THOSE CONCERNED WITH THE MOUNTING, OPERATION, MAINTENANCE AND REPAIR MUST HAVE READ AND UNDERSTOOD THE INSTRUCTION. OBSERVE ALL NOTES AND LEGAL SAFETY PRECAUTIONS CONCERNING TECHNICAL EQUIPMENT (EQUIPMENT SAFETY ACT). INSTALLATION OF THE COUPLING MAY ONLY BE CARRIED OUT BY TRAINED TECHNICAL PERSONNEL AND THE DRIVING ELEMENTS MAY SOLELY BE USED IN ACCORDANCE WITH THEIR INTENDED PURPOSE.

Revisions To This Manual

The contents of this manual are subject to change without prior notice. Should revisions be necessary, updates to all Magtrol User's Manuals can be found at Magtrol's web site at www.magtrol.com/support/manuals.htm.

Please compare the date of this manual with the revision date on the web site, then refer to the manual's Table of Revisions for any changes/updates that have been made since this edition.

REVISION DATE

First Edition - revision A – February 2015

TABLE OF REVISIONS

Date	Edition	Change	Section(s)
02/06/15	1st. Edition - rev A	Data sheet updated	1.3
02/06/15	1st. Edition - rev A	Caution note added	5.2

Table of Contents

SAFETY PRECAUTIONS	I
REVISIONS TO THIS MANUAL	II
REVISION DATE.....	II
TABLE OF CONTENTS	III
TABLE OF FIGURES	III
PREFACE	IV
CONVENTIONS USED IN THIS MANUAL	IV
1. INTRODUCTION	1
1.1 FEATURES	1
1.2 SHIPMENT	1
1.3 DATA SHEET.....	2
2. EFFECTIVENESS AND STRUCTURE	5
3. MOUNTING	6
3.0 MOUNTING	6
4. COMMISSIONING - OPERATION	8
4.1 COMMISSIONING	8
4.2 OPERATION	8
5. MAINTENANCE	9
5.0 MAINTENANCE.....	9
5.1 MANUFACTURER'S DECLARATION	9
5.2 TIGHTENING TORQUE.....	9
TIGHTENING TORQUE.....	9
SERVICE INFORMATION	10
RETURNING MAGTROL EQUIPMENT FOR REPAIR AND/OR CALIBRATION	10
RETURNING EQUIPMENT TO MAGTROL, INC. (UNITED STATES).....	10
RETURNING EQUIPMENT TO MAGTROL SA (SWITZERLAND)	10

TABLE OF FIGURES

2. EFFECTIVENESS AND STRUCTURE	
<i>Figure 2-1 Structure</i>	5
<i>Figure 2-2 Offset Display</i>	5
3. MOUNTING	
<i>Figure 3-1 Mounting</i>	7

Preface

CONVENTIONS USED IN THIS MANUAL

The following symbols and type styles may be used in this manual to highlight certain parts of the text:



Note: This is intended to draw the operator's attention to complementary information or advice relating to the subject being treated. It introduces information enabling the correct and optimal functioning of the product to be obtained.



CAUTION: THIS IS USED TO DRAW THE OPERATOR'S ATTENTION TO INFORMATION, DIRECTIVES, PROCEDURES, ETC. WHICH, IF IGNORED, MAY RESULT IN DAMAGE BEING CAUSED TO THE MATERIAL BEING USED. THE ASSOCIATED TEXT DESCRIBES THE NECESSARY PRECAUTIONS TO TAKE AND THE CONSEQUENCES THAT MAY ARISE IF THE PRECAUTIONS ARE IGNORED.



WARNING! THIS INTRODUCES DIRECTIVES, PROCEDURES, PRECAUTIONARY MEASURES, ETC. WHICH MUST BE EXECUTED OR FOLLOWED WITH THE UTMOST CARE AND ATTENTION, OTHERWISE THE PERSONAL SAFETY OF THE OPERATOR OR THIRD PARTY MAY BE PUT AT RISK. THE READER MUST ABSOLUTELY TAKE NOTE OF THE ACCOMPANYING TEXT, AND ACT UPON IT, BEFORE PROCEEDING FURTHER.

1. Introduction

1.1 FEATURES

Magtrol's Shaft Coupling is a torsionally stiff and flexible clutch which is constructively designed to compensate for inevitable misalignment and offset during operation. The clutch compensates the angled, radial and axial offset within specified ranges. As a general principle, the couplings ability to compensate is best when misalignment is kept to a minimum at the time of installation. This also ensures better durability and smoothness of operation.

1.2 SHIPMENT

Clutches are delivered partially or fully mounted. Following the incoming good inspection the clutch should be stored in their original packaging until mounting. Remove transportation safety devices at the assembly location only.



CAUTION

CLUTCHES SHOULD ALWAYS BE TRANSPORTED IN A HORIZONTAL AXIS POSITION TO AVOID EXTERNAL INFLUENCING FORCES ON THE COUPLING. THE DRAWING MUST BE PROVIDED TO THE USER DURING INSTALLATION.

1.3 DATA SHEET



MIC Data Sheet

MIC Series Miniature Couplings

FEATURES

- For use with Magtrol TM 301–309 and TMB 303–309 In-Line Torque Transducers, as well as HD, WB and PB Dynamometers
- Torsionally stiff
- Low inertia
- Low weight
- High rotational speed
- Isolate version available (On demand)
- Version with double clamping screws (On demand)



MIC-5 Miniature Coupling

DESCRIPTION

MIC miniature couplings provide the ideal complement to Magtrol’s TM/TMB 301–309 Torque Transducers, when they are to be mounted in a drive train. They can also be used with any Magtrol Hysteresis (HD), Eddy-Current (WB) or Powder Brake (PB) Dynamometer.

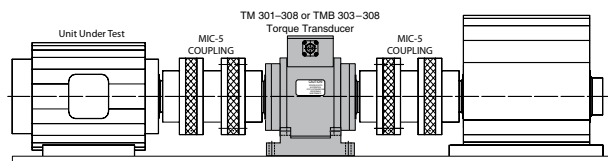
The couplings consist of one (MIC-6) or two (MIC-5) disc packs, two clamping hubs and a spacer. They are both torsionally stiff and flexible in order to compensate for axial and angular misalignment when connecting two shaft ends. The MIC-5 double-element coupling also provides compensation for radial misalignment.

On demand, MIC coupling series are available in isolated version, suitable for temperature up to 100°C (125°C survival temperature, short term)

APPLICATIONS

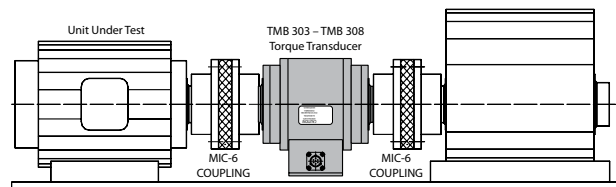
In a drive train installation, double-element miniature couplings are the ideal complement, although single-element couplings can be used for low speed applications in a suspended installation of the torque sensor. The higher the speed of the application, the more care is required in selecting the coupling and assembling (alignment and balancing) the drive train configuration. Your Magtrol sales representative can assist you in choosing the right coupling for your transducer.

SYSTEM CONFIGURATIONS



Supported Installation

Mandatory for high speed applications; uses MIC-5 double-element couplings.



Suspended Installation

For low speed applications only; uses MIC-6 single-element couplings to create a shorter drive train.

Specifications

MIC

RATINGS

Double-Element: Single-Element:	MIC-5-0039 MIC-6-0039	MIC-5-0156 MIC-6-0156	MIC-5-0617 MIC-6-0617	MIC-5-2470 MIC-6-2470	MIC-5-3620 MIC-6-3620
Mounting	MIC-5: fixed mounted MIC-6: floating shaft				
Torque Transducers	TM 301, 302 TMB 301, 302	TM 301, 302, 303 TMB 303	TM 304, 305 TMB 304, 305	(1)TM 306, 307, 308 TMB 306, 307, 308	(1) TM 308, 309 TMB 308, 309
Rated Torque	0.39 N·m	1.56 N·m	6.17 N·m	24.7 N·m	36.2 N·m
Maximum Torque	0.54 N·m	2.19 N·m	8.64 N·m	34.6 N·m	50.7 N·m
Maximum Speed*	50,000 rpm	50,000 rpm	45,000 rpm	35,000 rpm	30,000 rpm
Misalignment, Axial	MIC-5: MIC-6: 0.8 mm	0.8 mm	0.8 mm	0.8 mm	0.8 mm
Misalignment, Radial	MIC-5: MIC-6: 0.48 mm	0.49 mm	0.41 mm	0.36 mm	0.36 mm
Misalignment, Angular	MIC-5: MIC-6: 2°	1.5°	1°	0.7°	0.7°
Torsional Spring Rate	MIC-6: 0.389×10^3 N·m/rad	2.598×10^3 N·m/rad	3.976×10^3 N·m/rad	10.35×10^3 N·m/rad	16.17×10^3 N·m/rad
Moment of Inertia**	MIC-5: MIC-6: 2.33×10^{-6} kg·m ²	14.01×10^{-6} kg·m ²	37.99×10^{-6} kg·m ²	104.28×10^{-6} kg·m ²	203.55×10^{-6} kg·m ²
Balancing Quality*	2.5 Q	2.5 Q	2.5 Q	2.5 Q	2.5 Q

*The specified maximum speed may require specific balancing. By default, Magtrol delivers couplings without balancing.

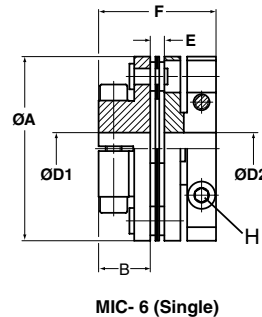
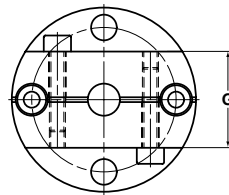
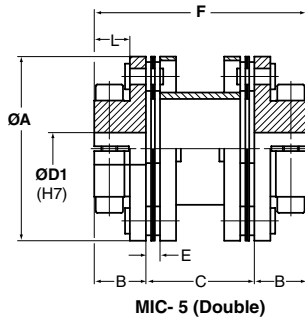
**The given values refer to the maximum possible D2 bore. All ratings listed are Manufacturer's Specifications.

(1) To avoid slipping on TM308 (20 Nm on Ø10 mm), it is recommended to use special couplings with double clamping screws on each side (please contact factory)

Specifications

MIC

DIMENSIONS



*Special version with double clamping screws
See note (1)*

Model	units	ØA	B ⁽¹⁾	C	ØD1 (H7) ØD2 (H7) min – max	E	F ⁽¹⁾	G	H	Fastening Torque H ⁽²⁾	L ⁽¹⁾	Weight
MIC-5-0039	mm	25.4	9	16	3 – 10	2.2	34	13	M2.5	0.76 N·m	6.6	0.028 kg
	in	1	0.35	0.63	0.12 – 0.39	0.09	1.34	0.52			0.26	0.062 lb
MIC-6-0039	mm	25.4	9	N/A	3 – 10	2.2	20.2	13	M2.5	0.76 N·m	6.6	0.022 kg
	in	1	0.35		0.12 – 0.39	0.09	0.79	0.52			0.26	0.048 lb
MIC-5-0156	mm	35.8	13.2	21.6	4 – 14	2.7	48.0	19	M4	3.05 N·m	10.0	0.077 kg
	in	1.409	0.520	0.850	0.16 – 0.55	0.106	1.890	0.75			0.394	0.170 lb
MIC-6-0156	mm	35.8	13.2	N/A	4 – 14	2.7	29.1	19	M4	3.05 N·m	10.0	0.062 kg
	in	1.409	0.520		0.16 – 0.55	0.106	1.146	0.75			0.394	0.137 lb
MIC-5-0617	mm	44.5	13.4	27.2	6 – 18	3.6	54.0	24	M4	3.05 N·m	9.4	0.133 kg
	in	1.752	0.528	1.071	0.24 – 0.71	0.142	2.126	0.94			0.370	0.293 lb
MIC-6-0617	mm	44.5	13.4	N/A	6 – 18	3.6	30.4	24	M4	3.05 N·m	9.4	0.100 kg
	in	1.752	0.528		0.24 – 0.71	0.142	1.197	0.94			0.37	0.220 lb
MIC-5-2470	mm	57.4	16.1	33.8	8 – 24	4.4	66.0	30	M5	6.05 N·m	11.1	0.260 kg
	in	2.260	0.634	1.331	0.31 – 0.94	0.173	2.598	1.18			0.437	0.573 lb
MIC-6-2470	mm	57.4	16.1	N/A	8 – 24	4.4	36.6	30	M5	6.05 N·m	11.1	0.195 kg
	in	2.260	0.634		0.31 – 0.94	0.173	1.441	1.18			0.437	0.430 lb
MIC-5-3620	mm	64	18	35	7.5 – 28	5	71	34	M6	10.5 N·m	13	0.355 kg
	in	2.519	0.708	1.378	0.29 – 1.10	0.196	2.795	1.338			0.512	0.782 lb
MIC-6-3620	mm	64	18	N/A	7.5 – 28	4.4	41	34	M6	10.5 N·m	13	0.278 kg
	in	2.519	0.708		0.29 – 1.10	0.173	1.614	1.338			0.512	0.613 lb

(1) Model ...-2470 and ...-3620, containing 4 clamping screws, are 10 mm longer at dimensions B and L and 20 mm longer at dimension F.

(2) By small range torque sensors (TM / TMB 301, 302, 303), screw tighten of coupling should be done with caution, in order not to damage measuring section of sensor.

ORDERING INFORMATION

When ordering a coupling, please indicate the shaft diameter of the machines to which the transducer will be coupled. In the part number, H7 indicates the manufacturing tolerance of the coupling.

Example:

Shaft diameter of machine No.1 = 14 mm
 Coupling model: MIC-5-0156
 Part number: MIC-5-0156-10H7/14H7

2. Effectiveness and Structure

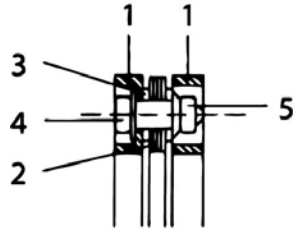


Figure 1

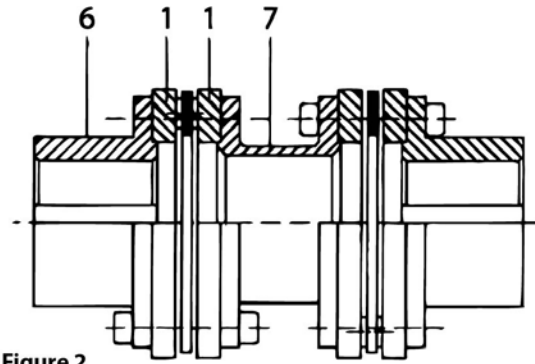


Figure 2

Figure 2-1 Structure

Flange

- 2 Disc Pack
- 3 Washer
- 4 Screw
- 5 Locknut
- 6 Hub
- 7 Centerpiece

Figure 2

In this model the disk pack is directly screwed with the hub or centerpiece. Generally the disk pack is screwed with the centerpiece when shipped leaving the user to only secure the hubs with the supplied screws and washers (as a separators from the disc pack).



CAUTION THIS MODEL ALLOWS THE SPECIFIED AXIAL AND ANGULAR DEVIATION TO BE USED SIMULTANEOUSLY.

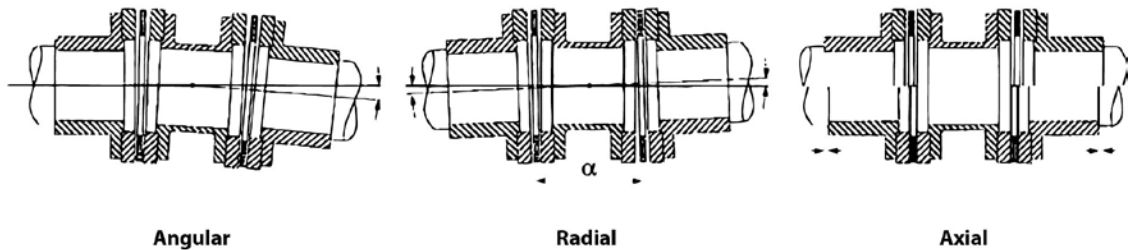


Figure 2-2 Offset Display

3. Mounting

3.0 MOUNTING

- Note the assembly dimensions and mounting position as specified in the drawing.
- The clutch ends and hubs must be clean, deburred and free of dirt and corrosion particles. If a feather key connection has been provided, then a feather key must be inserted. Check connection dimensions and tolerances!
- Should finish boring and connecting dimensions be customized by the user, specified tolerances (including concentricity and perpendicularity) must not be exceeded. Contact Magtrol customer service for further information.
- Do not alter the delivery condition of the clutch, especially the disc pack and refer to the drawing when using the supplied screws/nuts and washers. Install only parts of the original shipment according to the mounting instructions and use the equipment only for the intended purpose.
- Flange units may not be taken apart (Fig. 1).
- Hubs must be mounted and secured according to the hub/shaft connection. For special connection adapters such as flanges, taper bores, oil pressure unions etc. dimensions specified in the drawing must be observed.
- After mounting the hubs, the drive and output side machine part must be aligned properly for the centerpiece of the clutch to be installed. Again inserting dimension, position and permitted displacement must comply with our drawing.
- The center section of the clutch can only be mounted with the flange units.
- All connections such as screws and nuts are tightened to the specified torque according to the drawing.
- The alignment of the clutch is carried out after assembly. The smaller the misalignment, the greater the lifetime, the operational smoothness and the compensation capacity during operation. Initially check the axial displacement and equalize. Specified dimensions can be found in the drawing. Deviations from the operating or ambient temperature from a room temperature of 20°C can result in unwanted axial displacement. This requires the presetting of a definite axial displacement to ensure optimal axial displacement at operating temperature. This improves the lifetime, smoothness of running and displacement compensation. Such cases should be clarified before contract award. This is followed by the inspection and alignment of angle and parallel displacement which can be done manually or visually. Maximum tolerable deviations can be found in the drawing.

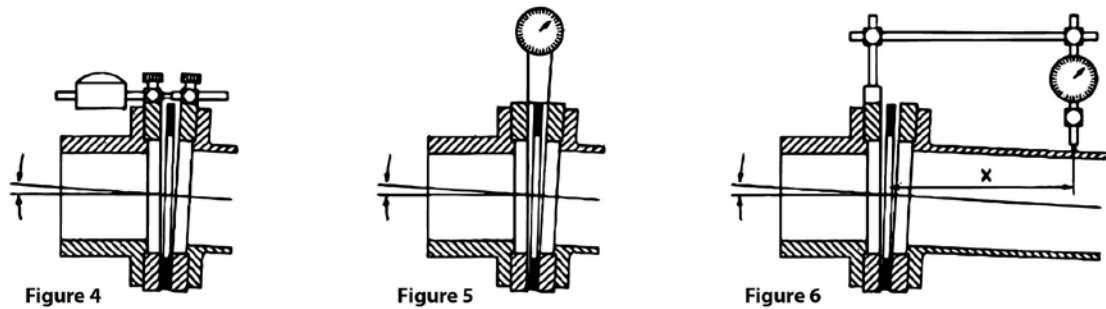


Figure 3-1 Mounting

Figure 4: Place the dial gauge and straight edge. The measuring point is close to the exterior diameter of the clutch. Turn the clutch 360°. The deflection of the dial gauge should not exceed 0,015 mm per 10 mm exterior diameter.

Example: Exterior diameter 150 mm: $15 \times 0,015 \text{ mm} = 0,225$ maximum dial gauge deflection.

Drive and output sides are to be adjusted to each other until the maximum value is exceeded or falls short of it.

Figure 5: Dial gauge with button: Description as in figure 4 but the gauge diameter is the exterior diameter.

Figure 6: Dial gauge with adapter: Description as in figure 4 but the maximum permitted deflection of 0,015 mm per 10 mm length «x» applies.

Example: $x = 300 \rightarrow 30 \times 0,015 \text{ mm} = 0.45 \text{ mm}$ maximum dial gauge deflection

If the adjustment process is complete then the drive and output side machine parts are to be fixed and fastened to prevent alteration of the clutch position. Recommendation: Check the clutch after fastening a second time according to figure 4 to 6.

In general: Once the alignment of the installed condition on-site is complete the disk must be a torsion-free and homogeneous pack unless a set axial displacement was predetermined.

4. Commissioning - Operation

4.1 COMMISSIONING



CAUTION	ROTATING CLUTCHES ARE HAZARDOUS LOCATIONS. THE OPERATOR MUST ENSURE APPROPRIATE SAFETY MEASURES. DO NOT TOUCH THE OPERATING AREA OF THE CLUTCH AS LONG AS IT IS IN MOTION. SECURE THE MACHINE AGAINST UNINTENDED SWITCH-ON DURING ASSEMBLY WORK.
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The system with the clutch will undergo a test run according to device safety law. After a one to two hour test run under regular operating conditions the screw and nut tightening torque must be checked and, if necessary, retightened. The clutch is to be observed during the test run. Irregularities, particularly regarding the smoothness of operation are an indication for insufficient or incorrect adjustment. It can also refer to subsequent changes for example the “setting” of the drive and output. The system must be stopped immediately to check the alignment, the assembly dimensions and assembly position (see also 4. Mounting) and to correct the adjustment accordingly.

4.2 OPERATION

First inspection of the clutch after approximately 500 operating hours. The following points should be clarified.

- Screw and nut tightening torque still correct?
- Is the clutch still properly aligned? It should be noted that potentially the displacement values cannot be maximized simultaneously.
- Is the disk pack still at level, still a torsion-free and homogeneous pack?
- Conduct necessary corrections in accordance with the instructions in Section 4 Mounting.
- After the initial inspection the clutch is subject to regular inspections of the system as specified. These inspections must follow the procedures as described above. We imply the following inspection and maintenance intervals:
- Once a year in one-shift operation
- Twice a year in two-shift operation
- Three times a year in three-shift operation

5. Maintenance

5.0 MAINTENANCE

The most important functional component of the clutch is the flange unit or disk pack. Visible deformations of the disk pack during the inspection such as disk pack breakage and corrosion indicate a component overload or shaft displacement outside the permissible value. The complete flange unit must be exchanged. Before the exchange the cause of the overload must be determined.

Should this damage occur please check all components of the clutch thoroughly. Please contact Magtrol customer service for further information. Provisioning of the flange unit through the installation operator can be an option to eliminate the faults quickly.

5.1 MANUFACTURER'S DECLARATION

In terms of the Machinery Directive (2006/42/EG Annex IIB) shaft couplings are classified as components for installation into machines. Commissioning is prohibited until the component is installed in the end product in compliance with the requirements of the Machinery Directive.

5.2 TIGHTENING TORQUE

TYPE	SCREW	TIGHTENING TORQUE
MIC-5-0039 - MIC-6-0039	M2,5x12	0.76 N·m
MIC-5-0156 - MIC-6-0156	M4x16	3.05 N·m
MIC-5-0617 - MIC-6-0617	M4x20	3.05 N·m
MIC-5-2470 - MIC-6-2470	M5x25	6.05 N·m
MIC-5-3620 - MIC-6-3620	M6x30	10.5 N·m



CAUTION BY SMALL RANGE TORQUE SENSORS (TM / TMB 301, 302, 303), SCREW TIGHTEN OF COUPLING SHOULD BE DONE WITH CAUTION, IN ORDER NOT TO DAMAGE MEASURING SECTION OF SENSOR.

Service Information

RETURNING MAGTROL EQUIPMENT FOR REPAIR AND/OR CALIBRATION

Before returning equipment to Magtrol for repair and/or calibration, please visit Magtrol's Web site at <http://www.magtrol.com/support/rma.htm> to begin the Return Material Authorization (RMA) process. Depending on where the equipment is located and which unit(s) will be returned, you will be directed to either ship your equipment back to Magtrol, Inc. in the United States or Magtrol SA in Switzerland.

Returning Equipment to Magtrol, Inc. (United States)

When returning equipment to Magtrol, Inc.'s factory in the United States for repair and/or calibration, a completed Return Material Authorization (RMA) form is required.

1. Visit Magtrol's Web site at <http://www.magtrol.com/support/rma.htm> to begin the RMA process.
2. Complete the RMA form online and submit.
3. An RMA number will be issued to you via e-mail. Include this number on all return documentation.
4. Ship your equipment to:
MAGTROL, INC.
70 Gardenville Parkway
Buffalo, NY 14224
Attn: Repair Department
5. After Magtrol's Repair Department receives and analyzes your equipment, a quotation listing all the necessary parts and labor costs, if any, will be faxed or e-mailed to you.
6. After receiving your repair estimate, provide Magtrol with a P.O. number as soon as possible. A purchase order confirming the cost quoted is required before your equipment can be returned.

Returning Equipment to Magtrol SA (Switzerland)

If you are directed to ship your equipment to Switzerland, no RMA form/number is required. Just send your equipment directly to Magtrol SA in Switzerland and follow these shipment instructions:

1. Ship your equipment to:
MAGTROL SA
After Sales Service
Route de Montena 77
1728 Rossens / Fribourg
Switzerland
VAT No: 485 572
2. Please use our forwarder : TNT • 1-800-558-5555 • Account No 154033
Only ship ECONOMIC way (3 days max. within Europe)
3. Include the following documents with your equipment:
 - Delivery note with Magtrol SA's address (as listed above)
 - Three pro forma invoices with:
 - Your VAT number
 - Description of returned goods
 - Noticed failures
 - Value - for customs purposes only
 - Origin of the goods (in general, Switzerland)
4. A cost estimate for repair will be sent to you as soon as the goods have been analyzed. If the repair charges do not exceed 25% the price of a new unit, the repair or calibration will be completed without requiring prior customer authorization.

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Testing, Measurement and Control of Torque-Speed-Power • Load-Force-Weight • Tension • Displacement

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of Sales Agents

