Installing the TR3189 Digital Linear Motion Transducer

Introduction

The Doble TR3189 Motion Transducer provides high-accuracy, high-precision, digital motion measurement in a transducer package custom-designed for the ABB HMB 4/8 family of circuit breaker operating mechanisms. Designed for the ABB HMB 4, 8.2, 8.3, 8.7, 8.11, and 8.12 variants with 205 mm stroke, the TR3189 is compatible with Doble circuit breaker test instruments configured with motion inputs.

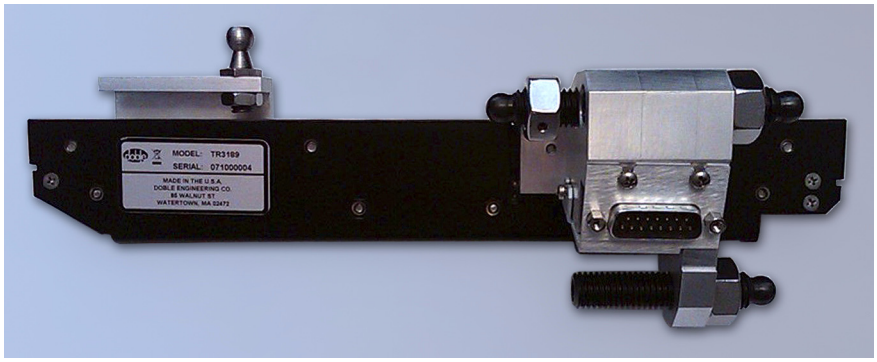


Figure 1. The TR3189

Audience

This application note is intended for anyone who will install the TR3189 in an ABB HMB 4/8 circuit breaker.

Installing the TR3189 Transducer

NOTE! These instructions are generic. Installation technique varies with mechanism type. For assistance, contact Doble and ask for a Circuit Breaker Application Engineer.

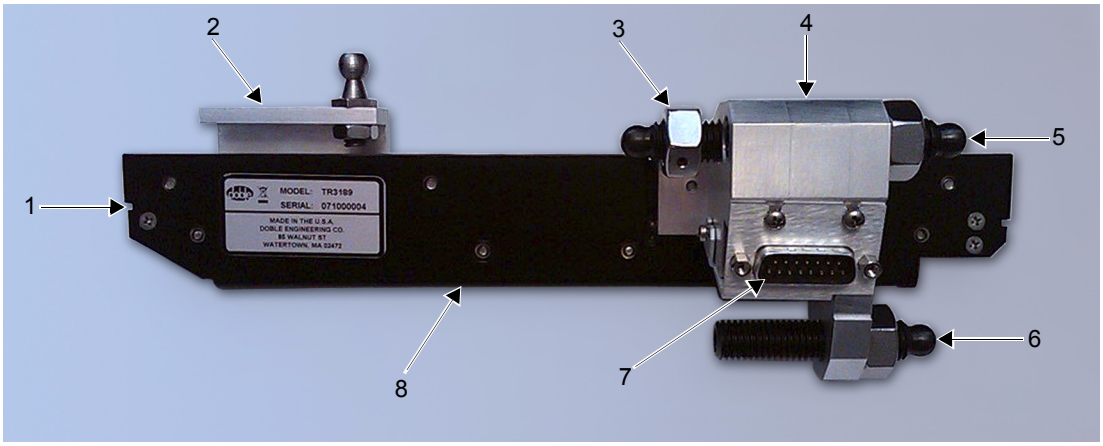
To install the TR3189 transducer:

1. Prepare the breaker.

   WARNING! Follow all factory and local safety precautions for making the breaker mechanism safe before installing, uninstalling, or adjusting the TR3189.

   Put the breaker in the open position. Make all controls safe, remove the outer covers of the HMB mechanism, and de-energize the hydraulic spring using the manual release.

2. Make sure the adjustable mounting post of the transducer is screwed in all the way (not tightened) for maximum clearance during installation. See Figure 2 for the location of the adjustable mounting post.

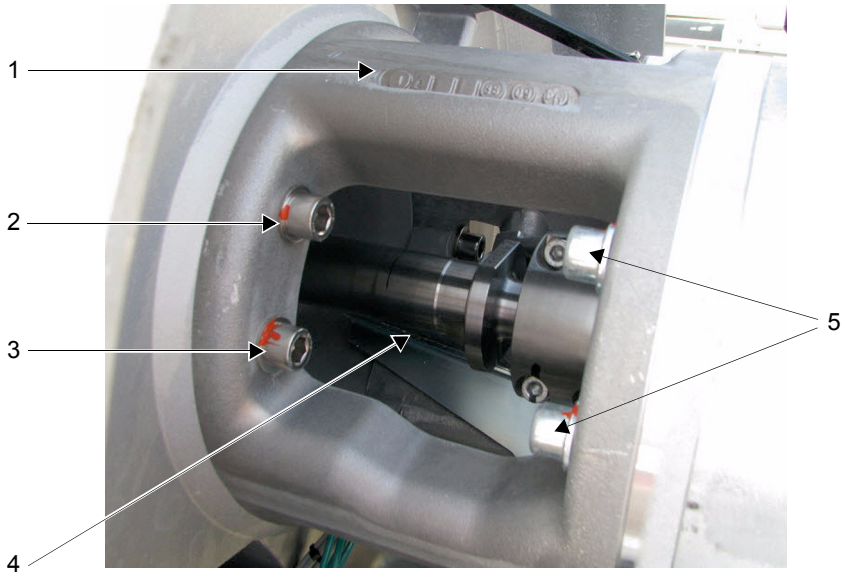


1	Rail nose	5	Fixed mounting post
2	Slide and post	6	Fixed mounting post
3	Adjustable mounting post	7	Motion connector
4	Mounting block	8	Rail body

Figure 2. Parts of the 3189

3. Identify the opening in the coupler housing of the HMB mechanism, and locate the three large hex-head cap bolts that will receive the TR3189 mounting posts (Figure 3).

The fourth bolt is not used for this purpose.



1	Coupler housing
2	Hex cap bolt for transducer mounting
3	Not used
4	Breaker shaft
5	Hex cap bolts for transducer mounting

Figure 3 HMB Coupler Housing

4. Identify the bronze shaft guide on the HMB mechanism, and locate the single hole that will receive the transducer slide post. It is easiest to do this by touch or with an inspection mirror, as the shaft guide is recessed into the housing when the breaker is open.

See Figure 4 and Figure 5 on page 4 for two views of the shaft guide and hole. In both figures, the transducer has been installed for clarity.

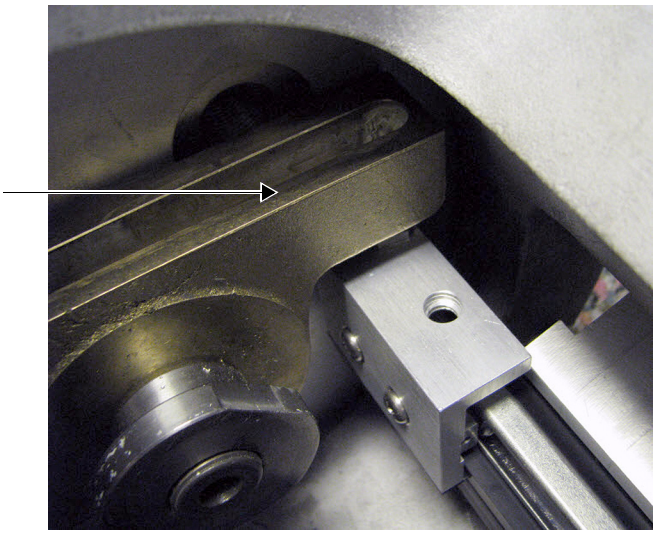


Figure 4. Right View of Shaft Guide (Detail)

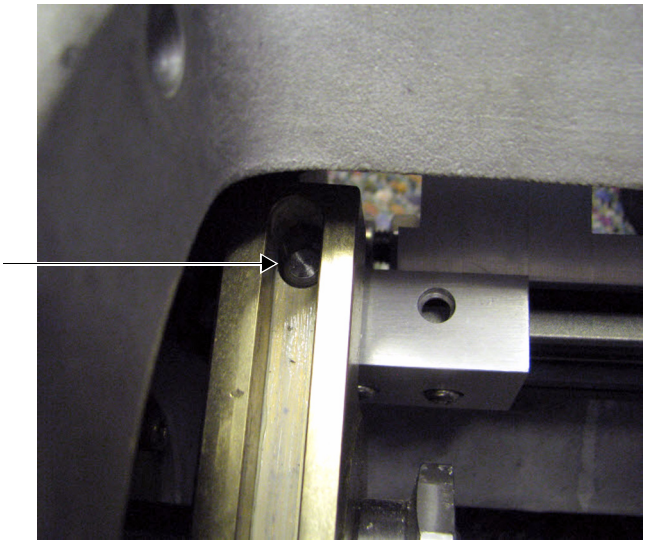


Figure 5. Top View of Hole in Shaft Guide (Detail)

5. Insert the transducer rail nose into the coupler section, being careful at all times not to scratch or otherwise damage the breaker shaft (Figure 6).

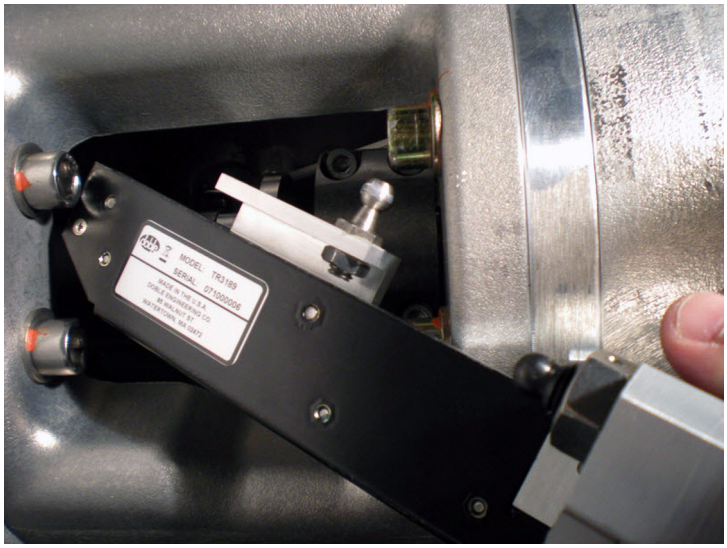


Figure 6 Rail Nose in Coupler Section

6. Maneuver the rest of the transducer rail body into the coupler, and move the transducer slide back toward the bronze shaft guide.
7. Move the transducer and slide as necessary to get the slide post into the hole on the bronze shaft guide.
8. Position the transducer mounting block so that the fixed mounting posts are seated in their respective hex-head cap bolts (Figure 7).

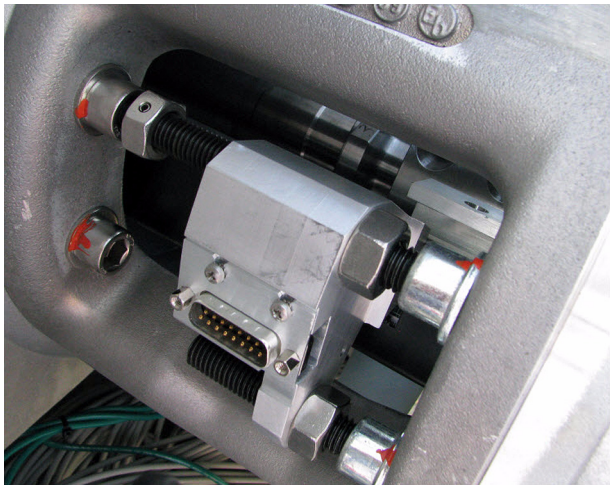


Figure 7 Installed TR3189

9. Unscrew the adjustable mounting post on the transducer until it is fully seated into its corresponding hex-head cap bolt. Hand-tighten the adjustable post, then snug the post into its bolt head using a 19 mm wrench on the post's captive hex nut. A half-turn should be sufficient. Do not over-tighten.
10. Check for secure mounting of the transducer and make sure that all three mounting posts are fully seated. Check that the slide post is correctly engaged in the shaft guide. There should be no linear play in the transducer mounting.

NOTE: It is normal for the mounted transducer to have a very small amount of rotational (pivoting) play. This results from slight differences in the depth of the hex-caps and mounting posts.

11. Connect the motion cable from the Doble test equipment to the motion connector on the transducer (Figure 8).

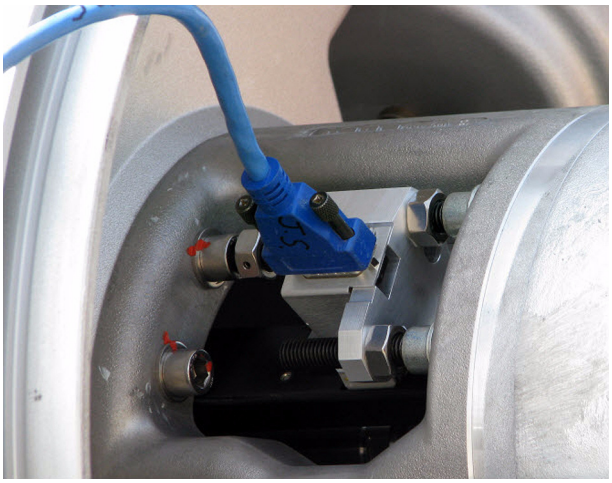


Figure 8 Ready for Testing

Testing Notes

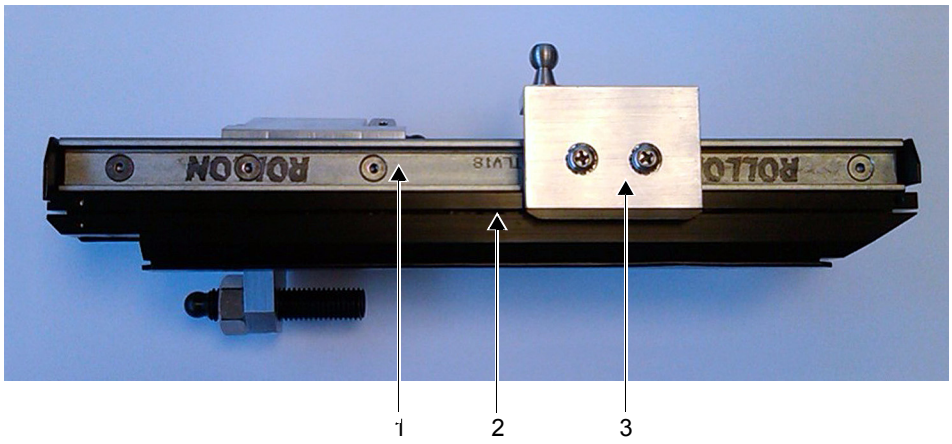
Inspect the mounting of the transducers after the first couple of tests to ensure that the mounting posts are still firmly engaged and no linear play has developed. During testing, the entire breaker mechanism is subjected to mechanical shock and vibration.

If you are performing numerous test sequences, check the transducer mounting periodically.

TR3189 Care and Maintenance

The TR3189 Digital Linear Motion Transducer is a precision instrument containing electronic circuitry and optical sensors. Exposure to excessive moisture, dust, or other contaminants may affect performance. Though mechanically rugged, it should be kept in a clean, dry environment when not in use. Please keep the following maintenance tips in mind:

- Bearings are permanently lubricated and there is no need to lubricate them.
- Keep the transducer in its custom transport/storage case until ready for use.
- If the sensor array is exposed to excessive dust, use only low-pressure, high-volume compressed air for dust removal. Do not use aerosol dust remover products. See Figure 9 for the location of the sensor array.



1	Slide rail (full length)
2	Sensor array (full length)
3	Slide (bearings hidden)

Figure 9 Sensor Array, Slide Rail, and Slide

- If the slide mechanism is exposed to dust or other contaminants, wipe the slide rail clean with a lint-free cloth. Lightly apply a medium-viscosity, general-purpose, lithium-based bearing grease to the slide rail and remove the excess with a clean cloth to leave a thin film on all surfaces of the rail.

TR3189 Technical Specifications

Table 9-1 provides the specifications for the TR3189.

Table 9-1 TR3189 Specifications

Specification	Value
Measurement Resolution	0.03175 mm (0.00125 in)
Accuracy	±0.1% of value ±0.01 in maximum error
Velocity	15 m/s (50 ft/sec) maximum
Acceleration	1200 g for 50 µs maximum