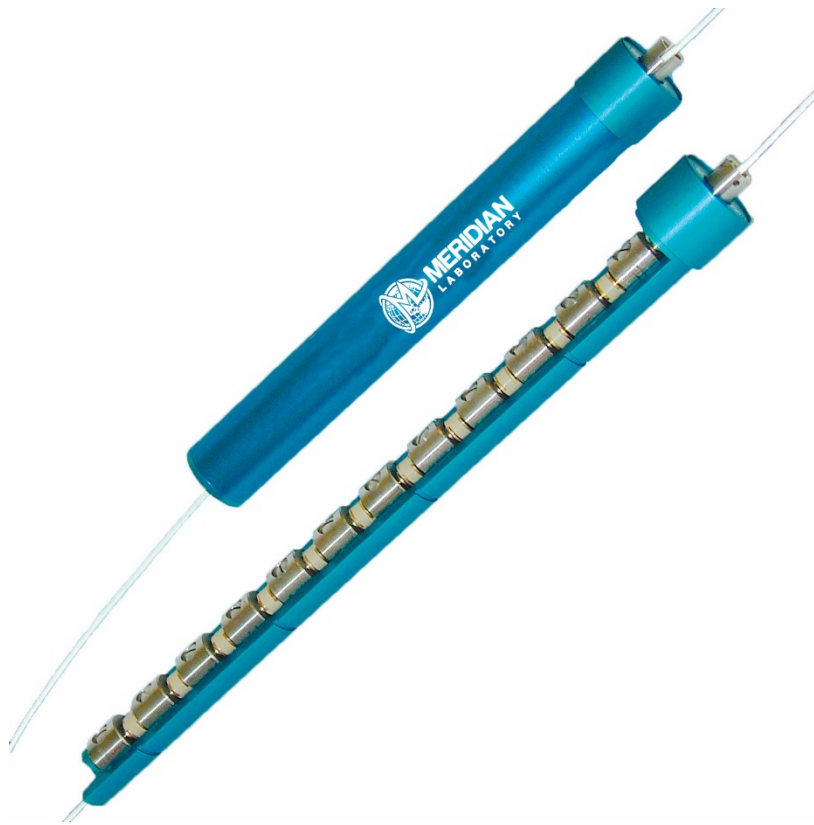


ROTOCON UHS Series

ULTRA HIGH-SPEED SLIP RINGS



User's Manual

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Rev.B - Sept 2020

Revisions to This Manual

The contents of this manual are subject to change without prior notice. Should revisions be necessary, updates to all Meridian Laboratory User's Manuals can be found at Meridian Laboratory's web site at <https://www.meridianlab.com/products/rotocon-uhsseries-ultra-high-speed-slip-ring-alternatives/>

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.

TABLE OF REVISIONS

| DATE | EDITION | CHANGES | SECTION |
|------------|----------------|------------------|-------------|
| Feb. 2020 | First Edition | - | - |
| Sept. 2020 | Second Edition | Adjusted Part #s | DATA SHEETS |

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Preface

PURPOSE OF THIS MANUAL

This manual contains the necessary information regarding the use of ROTOCON UHS Slip Rings. It must be attentively read by the user and placed in a sure place for later consultations.

WHO SHOULD USE THIS MANUAL

This handbook is addressed to any user of ROTOCON UHS Slip Rings.

MANUAL ORGANIZATION

This section gives an overview of the structure of the manual and the information contained in it. Some information has been deliberately repeated in different sections of the document to minimize cross-referencing and to facilitate understanding through reiteration.

Summary of the different chapters:

- Chapter 1: *INTRODUCTION* - Contains the technical data sheet of the ROTOCON UHS Series and gives its technical characteristics as well as a brief overview of the application fields.
- Chapter 2: *INSTALLATION* - Inform of the precautions to be taken at the time of the installation of a brushless slip ring.
- Chapter 3: *MAINTENANCE* - Indicates the procedures of maintenance for the brushless slip rings.

1. Introduction

1.1 DESCRIPTION

Meridian Laboratory Ultra High-Speed Slip Rings are used for signal transmission of transducers on a rotating part (e.g. engine shaft) to a stationary system (measuring instrument or PC). They are exceptionally well-suited for the transmission of low-level electrical signals, such as those from thermocouples, extensometer gauges and strain gauges, as well as transducers to measure oscillation and acceleration. UHS Slip Rings can also provide the power supply signal to each transducer.

The ROTOCON UHS Series provides a low transfer resistance and a high insulation resistance. They also significantly reduce the EMF noise generated at the cell connections. These brushless slip rings are therefore arc-free, making them superior to all other slip rings that use rings, brushes, wire loops and similar devices.

Meridian Laboratory Ultra High-Speed slip rings are used wherever measurement of rotating items is needed in research and development laboratories, as well as in duration tests on objects under working conditions. Through high-performance data transmission, Meridian Laboratory UHS Slip Rings enable the measurement of pressure, acceleration, oscillation, vibration, shock, force, torque, temperature and displacement of rotating parts such as: turbines, jet engines, turbocompressors, propellers, motors, machine tools, bearings, tilting pads, molding machine screws and other machines, as well as for running tests on all types of road and rail vehicles.

1.2 OPERATING PRINCIPLES

ROTOCON UHS Slip Rings contain small reservoirs of mercury to make the connection between the stationary system and the rotating part. Each cell in the slip ring contains a reservoir of mercury (see Figure 1-1) into which a hollow shaft, 2 mm in diameter, dips as a contact. Each cell of the slip ring provides one transmission channel.

Within each cell, the reservoir remains fixed while the axis is driven by the rotating part. The cells are electrically insulated from each other and the outside by plastic couplings. The low friction surface between the reservoir and the axis guarantees a minimum heating of the device. This avoids the generation of an EMF due to the Peltier effect, which would be induced by the heating of the contact point between the two metals.

In addition, the insulation resistance between the cells remains intact since there is no formation of vapor that would cause the appearance of leakage currents.

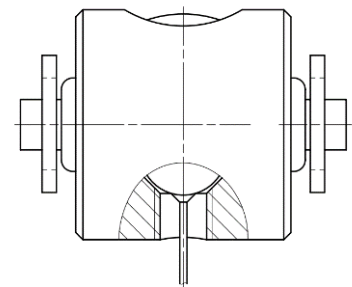


Figure 1-1 Mercury Cell

The slip ring produces a small EMF at high-speeds. To avoid increasing the EMF it is necessary to prevent the rotating part from overheating the slip ring. Increasing the EMF can cause the vaporization of mercury within the cells.

To ensure a long lifetime, it is recommended that the ROTOCON UHS Slip Rings are operated only within the specified temperature range.

The small amount of mercury contained within the slip ring is only a minimum health risk because of the confinement of the liquid metal within a hermetically sealed cell. The seal is guaranteed by PTFE seals even at high speeds. Only extremely pure mercury is used in the manufacture of the ROTOCON UHS Slip Rings to provide maximum conductivity.

These slip rings should not be stored for periods longer than one year. When not in use deposits of mercury oxide can form within the cell causing increased resistance.

ROTOCON UHS Series

Ultra High-Speed Brushless Slip Rings

ROTOCON | BRUSHLESS SLIP RINGS

Features:

- Channels: 1, 4, 8 or 12
- Speed: up to 40,000 RPM
- Resistance: < 0.2 mOhms
- Noise: 25 μ V
- Signal: up to 0.3 A per cell
- 60 Volts AC/DC
- Very low inertia
- Brushless (fluid metal contact)
- Insensitive to electromagnetic disturbance
- Long lifetime

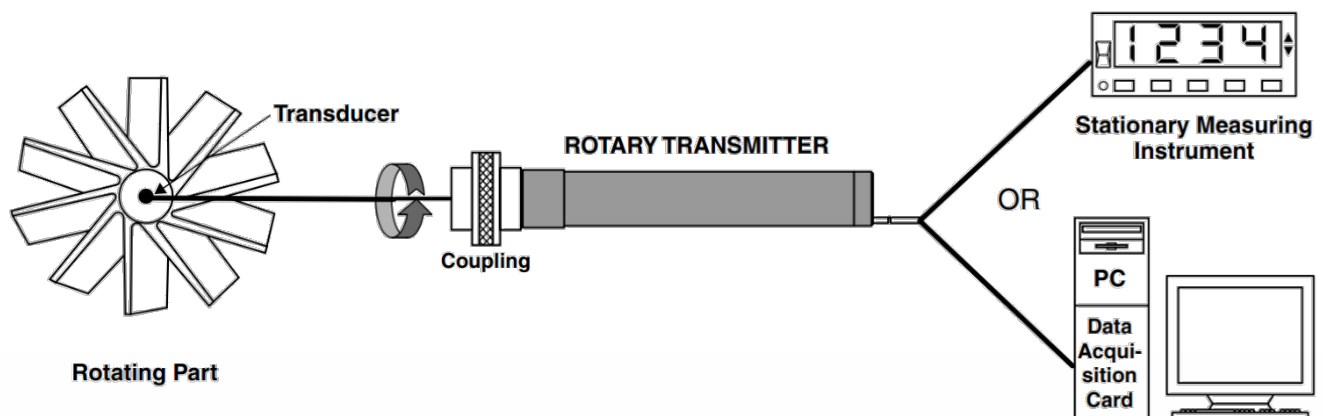
Description

For applications with demanding operating speeds up to 40,000 RPM, Meridian Laboratory offers the ROTOCON UHS Series. With up to 12 contacts available, the ROTOCON UHS Series of ultra high-speed slip rings is capable of transmitting both low current power, as well as signal and data within the same assembly. Like all ROTOCON brushless slip rings, the contact resistance is extremely low, both when stationary and while rotating. The UHS Series of slip rings is especially well utilized in high-speed applications (above 10,000 RPM) and remains unaffected in performance & reliability. If you have limited mounting space and/or require operating speeds at 3,000 to 8,000 RPM, see our MM-Series, Miniature High Speed, ROTOCON rotary electrical connectors.



Applications

ROTOCON UHS Slip Rings are used wherever measurement of rotating items is needed. Whether in research & development laboratories, or in duration tests on objects under working conditions. Through high-performance data transmission, ROTOCON UHS slip rings enable the measurement of pressure, acceleration, oscillation, vibration, shock, force, torque, temperature and displacement of rotating parts such as: turbines, jet engines, turbocompressors, propellers, motors, machine tools, bearings, and other machines, as well as for running tests on all types of road and rail vehicles.

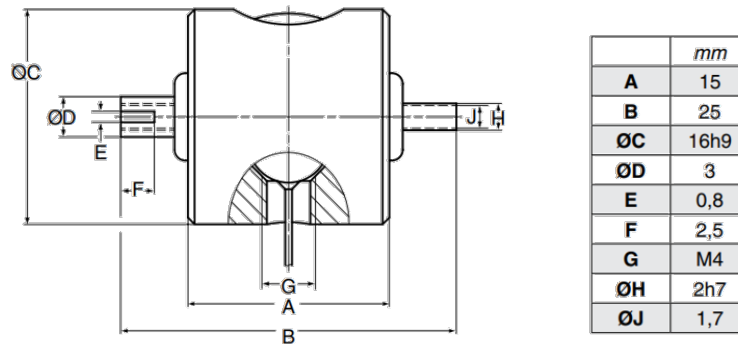


Ratings

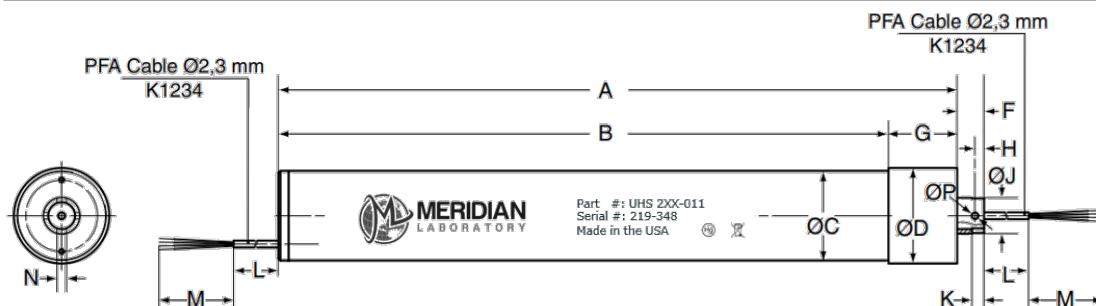
| | Cell | UHS 204 | UHS 208 | UHS 212 |
|----------------------------|-------------------|---|---------|---------|
| Number of Channels | 1 | 4 | 8 | 12 |
| Speed Ranges | | Standard Version : 0 to 20,000 RPM (Part #: UHS 2__ / 011) High-Speed Version : 0 to 40,000 RPM (Part #: UHS 2__ / 111) | | |
| Total Noise | | Typically 25 μ V (max. 50 μ V) with two cells in series at speeds from 0 to 20,000 RPM | | |
| Contact Resistance of Cell | | Max. 0.2 milliohms for 2 cells in series with an instantaneous variation from 0 to 5000 RPM | | |
| Insulation Resistance | | More than 10 GigaOhms for two adjacent cells | | |
| Load Current | | Max. 0,3 A per cell | | |
| Load Voltage | | 60 V AC or DC between two cells or between cell and transmitter housing | | |
| Temperature Range | | -13°F to 140°F (-25°C to 60°C) | | |
| Thermal EMF | | Typically 2 μ V with two cells connected in series and at speeds from 0 to 20,000 RPM; corresponding to a possible error of 0.05% for a constantan-chromium nickel thermocouple, at a temperature difference of 1112°F (600°C) | | |
| Connections (In/Out) | Soldering contact | Cables (400 mm input and 400 mm output cables included) | | |

Dimensions

Cell



Models UHS 204, 208, 212



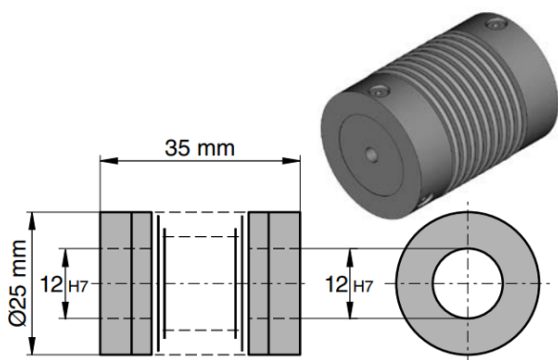
| Model | A | B | ØC | ØD | F | G | H | ØJ | K | L | M | N | ØP |
|---------|-------|-------|----|------|---|----|---|------------------|---|-----|----|----------------|-----|
| UHS 204 | 131,6 | 108,6 | 30 | 32h6 | 9 | 23 | 3 | 12 -0,05 -0,1 | 4 | 375 | 25 | 3,1 +0,01 0 | 2,2 |
| UHS 208 | 227,6 | 204,6 | 30 | 32h6 | 9 | 23 | 3 | 12 -0,05 -0,1 | 4 | 375 | 25 | 3,1 +0,01 0 | 2,2 |
| UHS 212 | 323,6 | 300,6 | 30 | 32h6 | 9 | 23 | 3 | 12 -0,05 -0,1 | 4 | 375 | 25 | 3,1 +0,01 0 | 2,2 |

Options & Ordering Information

| | |
|------------------------------|-----------------------------|
| MODEL NUMBER: | UHS 2 __ __ / __ 11 |
| UHS Slip Ring with: | |
| NUMBER OF CHANNELS | |
| • 4 channels | 0 4 |
| • 8 channels | 0 8 |
| • 12 channels | 1 2 |
| HIGH-SPEED CAPABILITY | |
| • without (standard) | 0 |
| • with (option) | 1 |
| Slip Ring Cell: | P/N 198-101-010-011V |

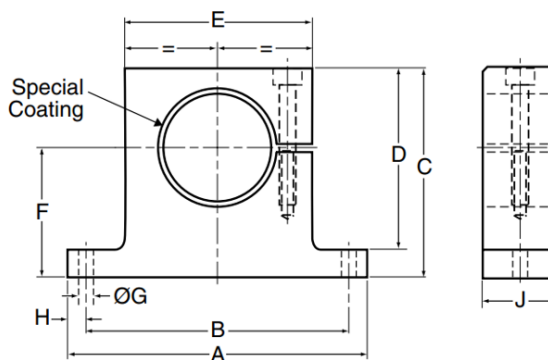
Accessories

Miniature Flexible Couplings



| Coupling Model Number | Fits Rotary Transmitter |
|------------------------|-------------------------|
| MK1/20/35/12H7/12H7 | 2XX-011 (standard) |
| MK1/20/35/12H7/12H7/HS | 2XX-111 (high-speed) |

Mounting Bracket



| A | B | C | D | E | F | ØG | H | J |
|------|------|------|------|------|------|-----|-----|------|
| 80,0 | 70,0 | 57,0 | 49,0 | 50,0 | 35,0 | 4,3 | 5,0 | 20,0 |

Part Number: 198-102-955-011

CAUTION: ROTOCON UHS Slip Rings contain mercury. The cells are hermetically sealed and should not be opened. In lieu of disposing the slip ring, please return it to Meridian Laboratory for recycling.

*UHS-201/F = 198-204-030-011V = 198-101-010-011V; these part numbers come with flanges on both ends
 Part # 198-204-03VS004 does not have flanges on both ends*

Due to the continual development of our products, we reserve the right to modify specifications without forewarning.

2. Installation/Configuration

2.1 MECHANICAL MOUNTING

To avoid subjecting the cells to vibration, the slip ring must be connected to the rotating part by a flexible coupling. This will increase the lifespan of the slip ring's cells.

There are two types of flexible couplings available:

- MK1/20/35/12H7/12H7 couplings are used in the standard UHS 2XX-011 with operating speeds of up to 20,000 tmin-1.
- MK1/20/35/12H7/12H7/HS couplings are used in the highest-speed UHS 2XX-111 with operating speeds of up to 40,000 tmin-1.

The coupling is attached to the slip ring by the included clamping screws.

For proper mounting of the slip ring, use of the original fixture support is recommended (part number 198-102-955-011). This support has a special coating which protects the slip ring housing and assures its electrical insulation. Proper alignment of the slip ring is necessary to avoid vibration or side loads to the flexible coupling.

In addition, at high rotation speeds the alignment of the slip ring must be very precise. For applications with speeds up to 40000 tmin-1, it is advised to have a precision of alignment of about 0.05 mm.

The slip ring produces a small EMF at high-speeds. To avoid increasing the EMF it is necessary to prevent the rotating part from overheating the slip ring. Increasing the EMF can cause the vaporization of mercury within the cells.

To ensure a long lifetime, it is recommended that the ROTOCON UHS Brushless Slip Rings are operated only within the specified temperature range.

2.2 ELECTRICAL INSTALLATION

Each wire color corresponds to a cell of the slip ring according to the wiring diagram below:

| Cell | Wire Color |
|------|-------------|
| 1 | green |
| 2 | red |
| 3 | blue |
| 4 | black |
| 5 | transparent |
| 6 | pink |
| 7 | purple |
| 8 | white |
| 9 | brown |
| 10 | gray |
| 11 | yellow |
| 12 | orange |

The color code is the same as for the cables on both sides of the slip ring.

In order to reduce the electrical noise, the slip ring cables are insulated. Be sure that the wires are properly fixed to the part in rotation to prevent the connection from being damaged or broken by vibrations.

The wires can be shortened as needed. However, if the wires are cut too short, their replacement requires a complete disassembling of the slip ring. Replacement of the wires can only be carried out by the manufacturer and is quite complicated, thus it is inevitably expensive.

3. Maintenance

3.1 GENERAL INFORMATION

Meridian Laboratory Ultra High-Speed Brushless Slip Rings contain maintenance-free ball bearings. No additional lubrication is required.

When in-use on a high-speed system, it is recommended that the slip ring undergo a routine maintenance check every two to three years. However, if the slip ring is being used for a very high-speed application, more frequent maintenance may be necessary.

Do not attempt to dismantle the slip ring for any reason.

Please return the ROTOCON UHS Series Slip Ring directly to the manufacturer for proper disposal and recycling.

If the slip ring has not been in use for a long period of time the dynamic transfer resistance may increase above the specifications for the unit. This is caused by a clogging of the cells due to deposits of mercury oxide within the slip ring. The slip ring should be returned to Meridian Laboratory for cleaning and maintenance.

4. Limited Warranty

Seller warrants to the original purchaser that the Products will be free from manufacture defects for a period of one (1) year following the date of delivery. Seller will, at its option, repair or replace any part or component covered by this limited warranty which, following examination by Seller or its authorized representatives, is found to be defective under normal use and service.

Seller's replacement parts and components will be warranted for 30 days from the date of purchase, or the remainder of the original equipment warranty period, whichever is longer. No claim under this warranty will be valid unless Seller is notified in writing of the warranty claim prior to the expiration of the warranty period. This warranty is not transferable. This warranty does not apply to Products or parts or components thereof which have been subjected to abnormal wear and tear, accident, misuse, abuse or unauthorized modifications, or which have been repaired with parts or components which are not of a quality equivalent to those provided by Seller.

IN ADDITION, THE FAILURE OF BUYER TO FOLLOW SELLER'S WRITTEN INSTRUCTIONS REGARDING THE SET-UP, OPERATION AND/OR MAINTENANCE OF THE PRODUCTS VOIDS THIS WARRANTY.

It is Buyer's responsibility to keep adequate records to show that the Products have been properly maintained. There is no express representation or warranty other than the foregoing warranty. THERE ARE NO IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR OF NON-INFRINGEMENT. Neither this warranty nor the exclusions, limitations and reservations contained herein may be modified or enlarged, except in writing signed by a duly authorized officer of Seller.

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