Electric Rotary Modules

Rotary Actuators

ROTARY ACTUATORS

MRD-S

Sizes
4 .. 12

Weight
1.2 kg .. 1.8 kg

Max. torque
0.4 Nm .. 1.2 Nm

Max. speed
Max. speed 600 rpm

Max. useful load
1 kg .. 3 kg

Application example

Rotary Gripping Combination with Z-stroke for the rapid handling of workpieces

1. Miniature Rotary Actuators
2. 2-Finger Parallel Gripper MPG 20 with attachment-fingers
3. Short-stroke Module with linear direct drive

Miniature Rotary Actuator

Powerful torque motor with electric and pneumatic rotary feed-through

Area of application

For all applications with exceptional requirements in terms of achievable repeatability, rotary speed, acceleration and tool life.

Your advantages and benefits

Brushless synchronous motor with permanent magnet
for maximum positioning accuracy

Integrated pneumatic and electric rotary feed-through
for modest space requirements and minimized interfering contours

Large number of pole pairs
for a powerful torque even at low speeds

Special motor geometry
for superior dynamics and acceleration

Virtually no wearing parts
for a highly reliable system with long service life

EcoDrive CS drive system
with various standard communication interfaces for easy integration and start-up (Simodrive system available on request)

SYSTEM GAS

Information about the series

Drive
3-phase, electronically commutated AC synchronous motor. The primary part (stator) is a 3-phase Cu coil, the secondary part (rotor) is an iron support with integrated permanent magnet

Measuring system
Non-contact, optical incremental measuring system with extremely high resolution and integrated reference track with reference mark

Media feed-through
4 electric (max. 60 V / 1 A)
2 pneumatic (max. 8 bar)

Bearing arrangement
Preloaded precision ball bearings, free from play, with life-time lubrication

Material
Anodized motor housing, hard-coated rotary table

Operating temperature
From 10 °C to 40 °C

Accessories
EcoDrive CS controllers from Rexroth (other manufacturers on request) Ready-made cable sets in various lengths

Scope of delivery
Centering sleeves, assembly and operating manual with manufacturer's declaration

Warranty
24 months

Function

1 **Housing**
anodized, double-sided mating flange surface with centering rings

2 **Rotary table**
with centering collar

3 **Input rotary transmission leadthrough**
(4x) electrical and (2x) pneumatic

4 **Motorplug**

5 **Connection incremental optical rotary encoder**

6 **Output rotary transmission leadthrough**
(4x) electrically pluggable and (2x) pneumatic

Function description

The unit is driven by a 3-phase brushless synchronous motor with permanent magnet. Mechanical transmission elements such as gears can be completely eliminated. The high positioning accuracy is achieved by means of an incremental, optical shaft encoder with reference mark.

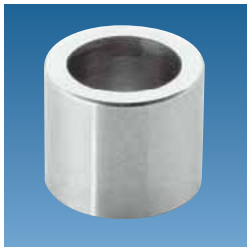
Options and special information

An electric and pneumatic rotary feed-through is integrated as special equipment.

Accessories

Accessories from SCHUNK – the suitable complement for the highest level of functionality, reliability and controlled production of all automation components.

Centering sleeves

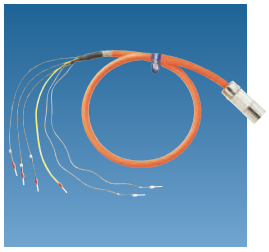


Drive controller

Cable for electric rotary feed-through

Cable for shaft encoder

Motor power cable



Interfaces

Parallel-Interface	Sercos Interface
CANopen	Profibus

Start-up software

ⓘ For the exact size of the required accessories, availability of this size and the designation and ID, please refer to the additional views at the end of the size in question. You will find more detailed information on our accessory range in the „Accessories“ catalog section.

General information on the series

Repeat accuracy

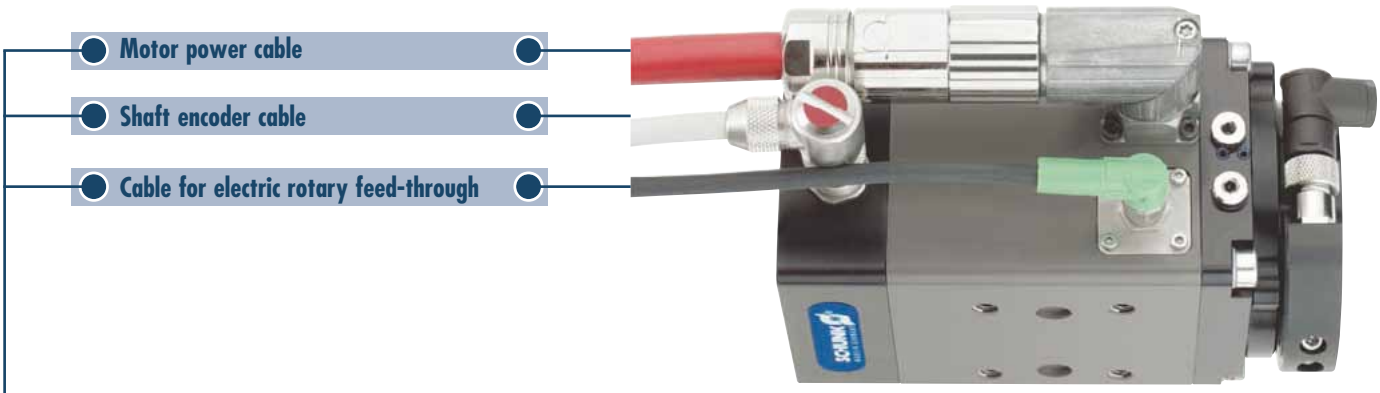
Repeat accuracy is defined as the spread of the target position after 100 consecutive positioning cycles. The target position remains unchanged during these cycles, and is always approached from the same direction.

Drive system

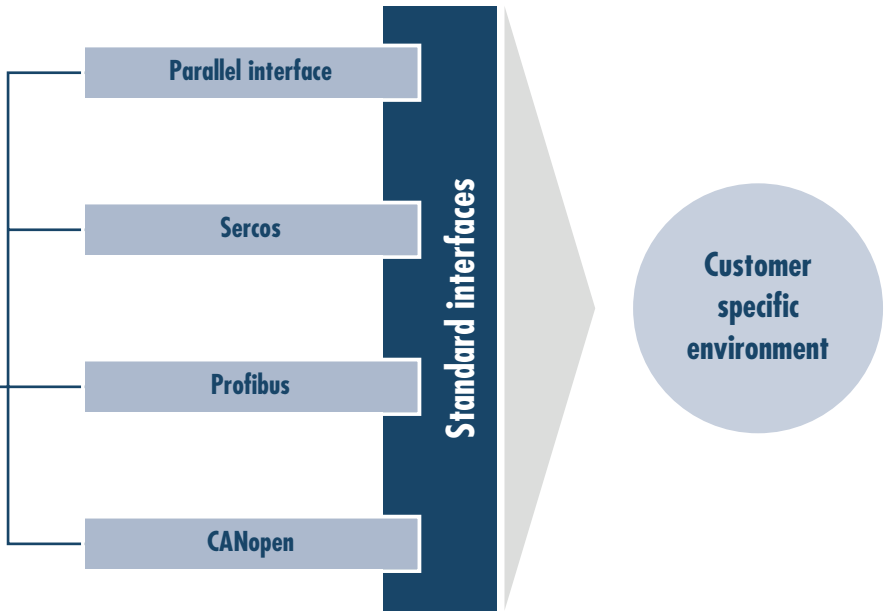
For control of the Miniature Rotary Actuator MRD the proven Rexroth components are used.

Your advantage at a glance:

- Control and adjustment electronics as well as supply unit in one housing
- Four standard communication interfaces as on option
- Comfortable parameterization with a Rexroth-Drive-Top-Software
- World-wide support of Rexroth

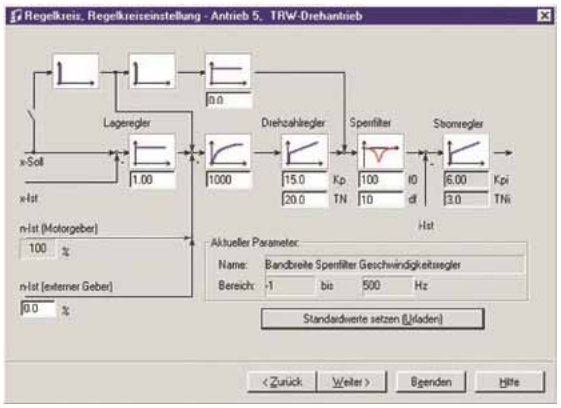


Standard Interfaces EcoDrive CS

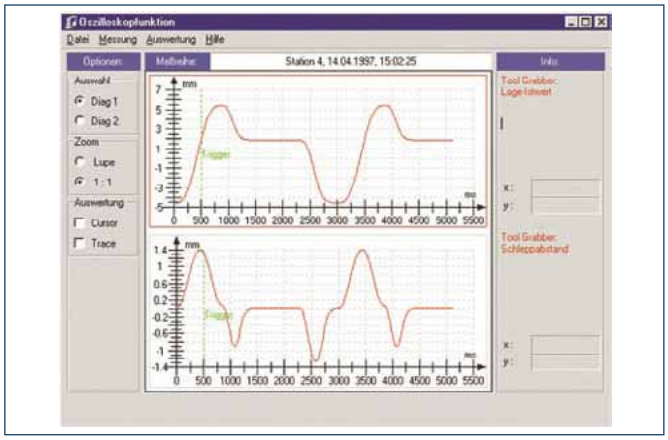


Start-up software DriveTop

The parameterized software DriveTop allows a fast and easy start-up of the actuation system EcoDrive CS from Rexroth.
Operating instructions and a basic parameter file for Miniature Swivel Units with torque motor is be supplied on a data carrier.

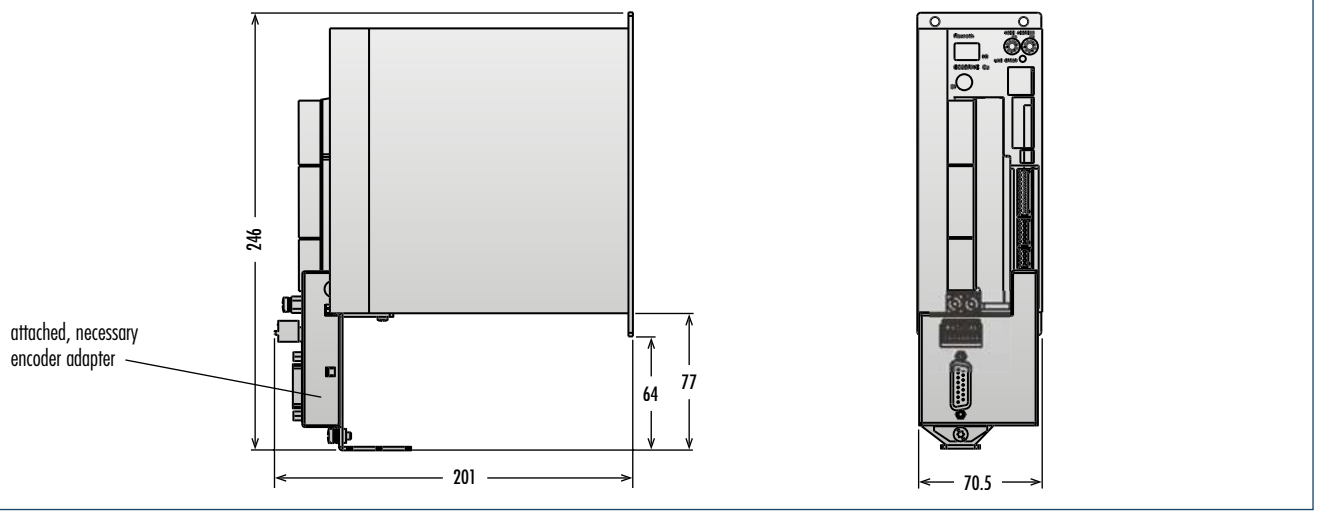


Easy optimization of the control loop adjustment since all the relevant data are visible on a window. Moreover, all parameters can be stored easily for back up in a file. The upload and download of data sets is possible via the RS-232 interface or Feldbus.



Integrated multi-channel oscilloscope for fine adjustment and signal tracing.

Actuation control unit

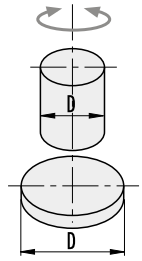


The actuation control units are offered together with the necessary cables and matching programming module as well as the suitable firmware.

Calculation of the mass moment of inertia

The geometry of customized attachments influence dynamics and seating of the MRD-module. Below and on the following page please find the most important standard formulas for calculation of the additional mass moment of inertia. If we should carry out this calculation check for you, please contact us.

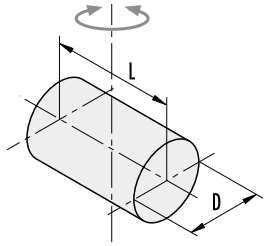
①



$$I = \frac{D^2}{8} \times m$$

Solid cylinder or flat disk, turning around the own axis

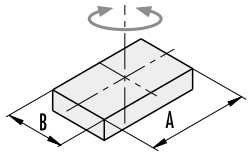
②



$$I = \left(\frac{L^2}{12} + \frac{D^2}{16}\right) \times m$$

Solid cylinder, turning around a cylinder axis vertical and centric to the axis

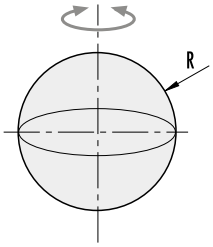
③



$$I = \frac{A^2 + B^2}{12} \times m$$

Rectangular plate of any thickness, turning around a centered axis

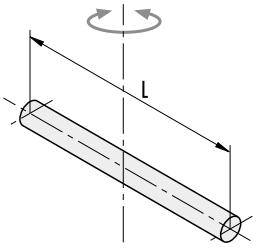
④



$$I = \frac{2 \times R^2}{5} \times m$$

Ball, turning around the own axis

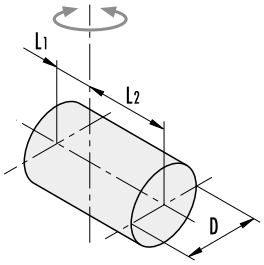
⑤



$$I = \frac{L^2}{12} \times m$$

Long and thin stick of any cross section, turning around a centered axis

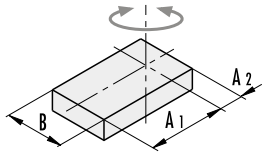
⑥



$$I = \left(\frac{L_1^2}{3} + \frac{D^2}{16}\right) \times m_1 + \left(\frac{L_2^2}{3} + \frac{D^2}{16}\right) \times m_2$$

Solid cylinder, turning around a cylinder axis vertical to an excentric axis

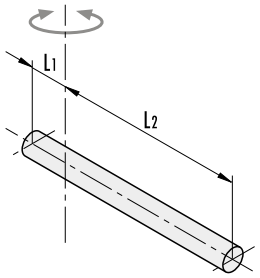
⑦



$$I = \left(\frac{4A_1^2 + B^2}{12}\right) \times m_1 + \left(\frac{4A_2^2 + B^2}{12}\right) \times m_2$$

Rectangular plate of any thickness, turning around an excentric axis

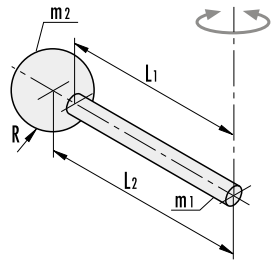
⑧



$$I = \frac{L_1^2}{3} \times m_1 + \frac{L_2^2}{3} \times m_2$$

Long and thin stick of any cross section, turning around an excentric axis

⑨



$$I = \frac{L_1^2}{3} \times m_1 + L_2^2 \times m_2 + K$$

Long and thin stick with an additional mass, turning around an excentric axis

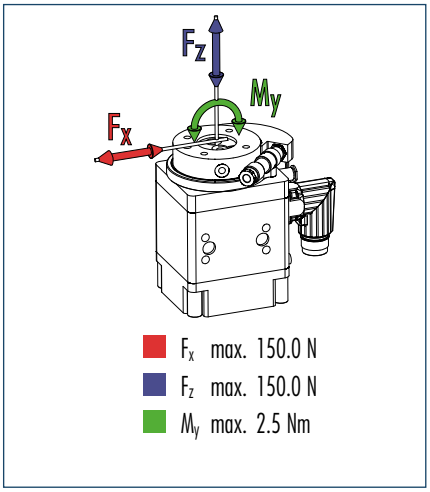
(As value K, the corresponding mass moment of inertia of the additional mass has to be used, as per example 1 to 5. The picture shows example 4)

Caption

I = Mass moment of inertia	[kgm²]
m = Mass of payload	[kg]
A, B, D, L, R = Dimensions	[m]

MRD-S 4

Shaft load



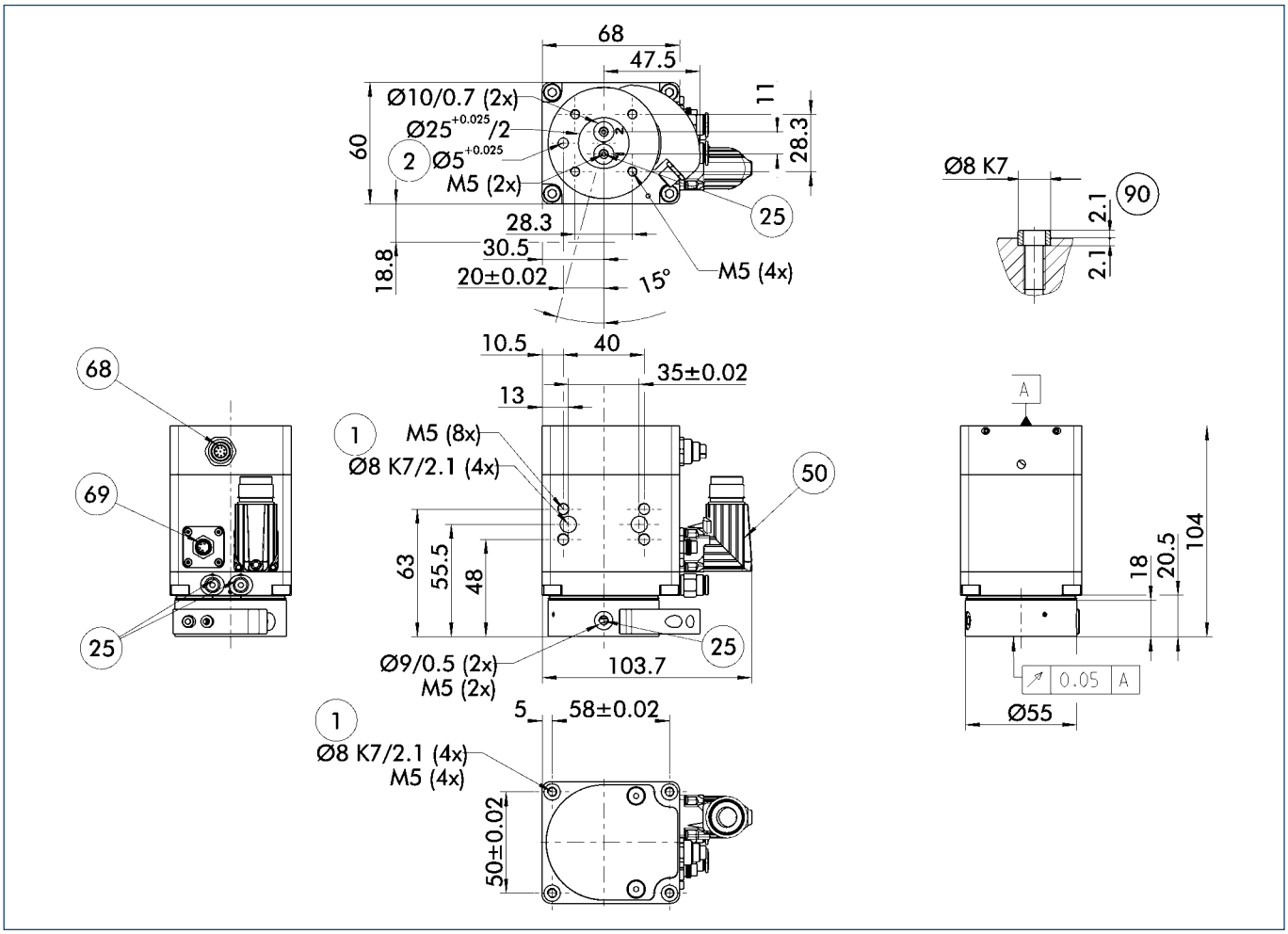
Technical data

Description		MRD-S 4 IP 40 ED with rotary transmission leadthrough	MRD-S 4 IP 40 without rotary transmission leadthrough
	ID	0331340	0331341
Mechanical operating data			
Max. torque	[Nm]	1.2	1.2
Nominal torque (with rotary feed-through)	[Nm]	0.4	0.4
Max. speed	[1/min]	600.0	600.0
Max. acceleration	[°/s²]	24000.0	24000.0
Max. additional moment of inertia	[kg mm²]	500.0	500.0
Rotor moment of inertia	[kg mm²]	84.0	84.0
Weight	[kg]	1.2	1.2
Repeat accuracy	[°]	0.001	0.001
Measuring system resolution	[arcsec]	0.038	0.038
Max. surface temperature	[°C]	70.0	70.0
Max. ambient temperature	[°C]	40.0	40.0
Electrical operating data			
Permissible power loss	[W]	54.2	54.2
Max. current	[A]	2.0	2.0
Nominal power current	[A]	0.71	0.71
Nominal voltage	[VDC]	230.0	230.0
Phase-phase resistance at 25 °C	[Ω]	70.8	70.8
Phase-phase inductance	[mH]	62.5	62.5
Tightness according to		IP 40	IP 40

Feed-through		4 electric / 2 pneumatic
Max. current	[A]	1
Maximum voltage	[V]	60
Max. operating pressure	[bar]	8

ⓘ The repeat accuracy stated here applies at constant ambient temperatures!

Main views



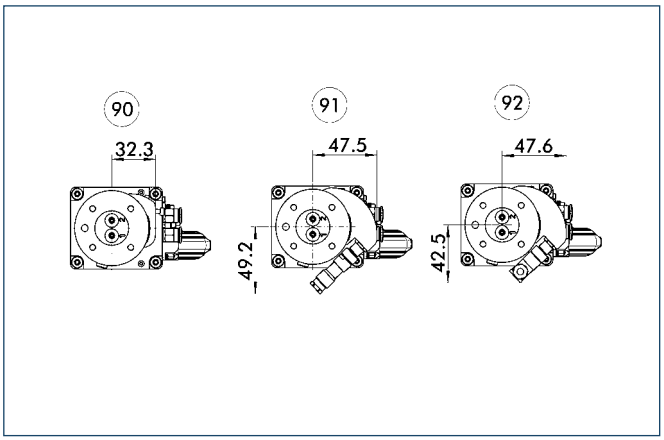
1 Connection of rotary actuator
2 Attachment connection
25 Fluid feed-through
50 Electronics connection
68 Shaft encoder connection
69 Connection for electric feed-through
90 Center sleeves bore in adapter plate

Cable sets

ⓘ The scope of delivery of the cable set includes: 1 power cable, 1 shaft encoder cable, 1 cable for connecting the electric rotary feed-through

	ID	Cable length
KSRD 5	0331330	5.0 m
KSRD 10	0331331	10.0 m
KSRD 15	0331332	15.0 m
KSRD 20	0331333	20.0 m

Plug connector



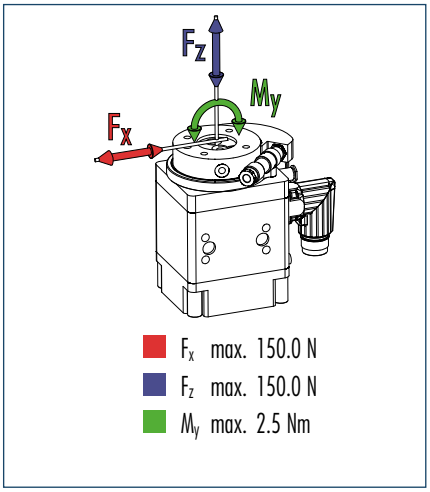
90 Version without electric through
91 Version with electric through (straight line plug)
92 Version with electric through (angle plug)

manufacturable connectors for electrical rotary feed-through

	ID
straight	9940786
angulate	9941590

MRD-S 8

Shaft load



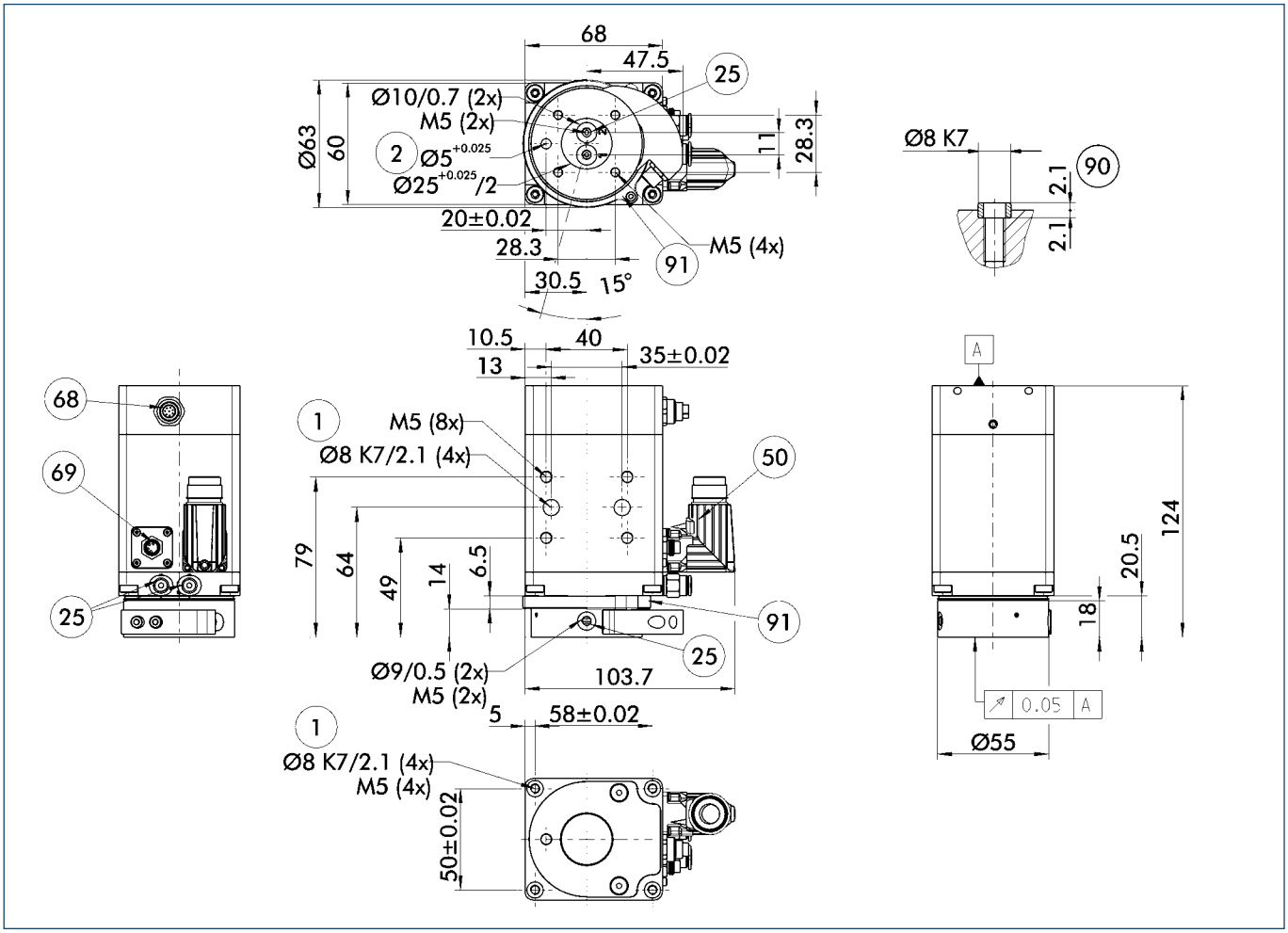
Technical data

Description		MRD-S 8 IP 40 ED	MRD-S 8 IP 40	MRD-S 8 IP 54 ED	MRD-S 8 IP 54
		with rotary transmission leadthrough	without rotary transmission leadthrough	with rotary transmission leadthrough	on request
	ID	0331350	0331351	0331352	0331353
Mechanical operating data					
Max. torque	[Nm]	2.4	2.4	2.1	2.1
Nominal torque (with rotary feed-through)	[Nm]	0.8	0.8	0.5	0.5
Max. speed	[1/min]	600.0	600.0	600.0	600.0
Max. acceleration	[°/s²]	36923.0	36923.0	36923.0	36923.0
Max. additional moment of inertia	[kg mm²]	700.0	700.0	700.0	700.0
Rotor moment of inertia	[kg mm²]	98.0	98.0	98.0	98.0
Weight	[kg]	1.5	1.5	1.5	1.5
Repeat accuracy	[°]	0.001	0.001	0.001	0.001
Measuring system resolution	[arcsec]	0.038	0.038	0.038	0.038
Max. surface temperature	[°C]	70.0	70.0	70.0	70.0
Max. ambient temperature	[°C]	40.0	40.0	40.0	40.0
Electrical operating data					
Permissible power loss	[W]	59.1	59.1	59.1	59.1
Max. current	[A]	3.8	3.8	3.8	3.8
Nominal power current	[A]	1.3	1.3	1.3	1.3
Nominal voltage	[VDC]	230.0	230.0	230.0	230.0
Phase-phase resistance at 25 °C	[Ω]	22.6	22.6	22.6	22.6
Phase-phase inductance	[mH]	27.4	27.4	27.4	27.4
Tightness according to		IP 40	IP 40	IP 54	IP 54

Feed-through		4 electric / 2 pneumatic
Max. current	[A]	1
Maximum voltage	[V]	60
Max. operating pressure	[bar]	8

ⓘ The repeat accuracy stated here applies at constant ambient temperatures!

Main views



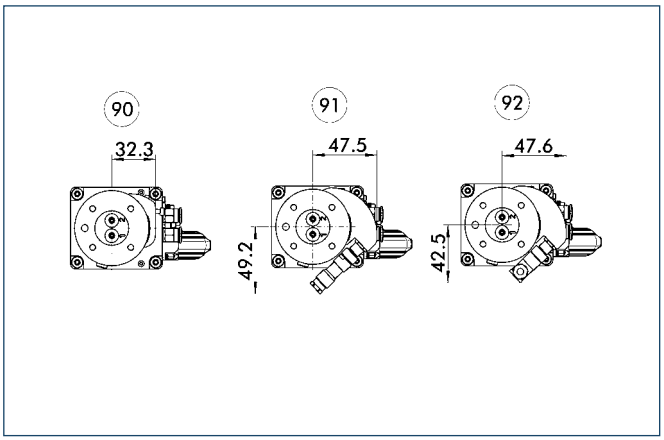
① Connection of rotary actuator
② Attachment connection
㉕ Fluid feed-through
㊿ Electronics connection
㊽ Shaft encoder connection
㊾ Connection for electric feed-through
㊿ Center sleeves bore in adapter plate
㊶ Only by sealed version

Cable sets

ⓘ The scope of delivery of the cable set includes: 1 power cable, 1 shaft encoder cable, 1 cable for connecting the electric rotary feed-through

	ID	Cable length
KSRD 5	0331330	5.0 m
KSRD 10	0331331	10.0 m
KSRD 15	0331332	15.0 m
KSRD 20	0331333	20.0 m

Plug connector



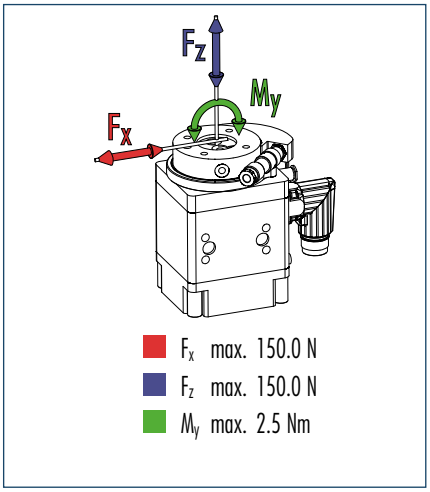
㊿ Version without electric through
㊶ Version with electric through (straight line plug)
㊷ Version with electric through (angle plug)

manufacturable connectors for electrical rotary feed-through

	ID
straight	9940786
angulate	9941590

MRD-S 12

Shaft load



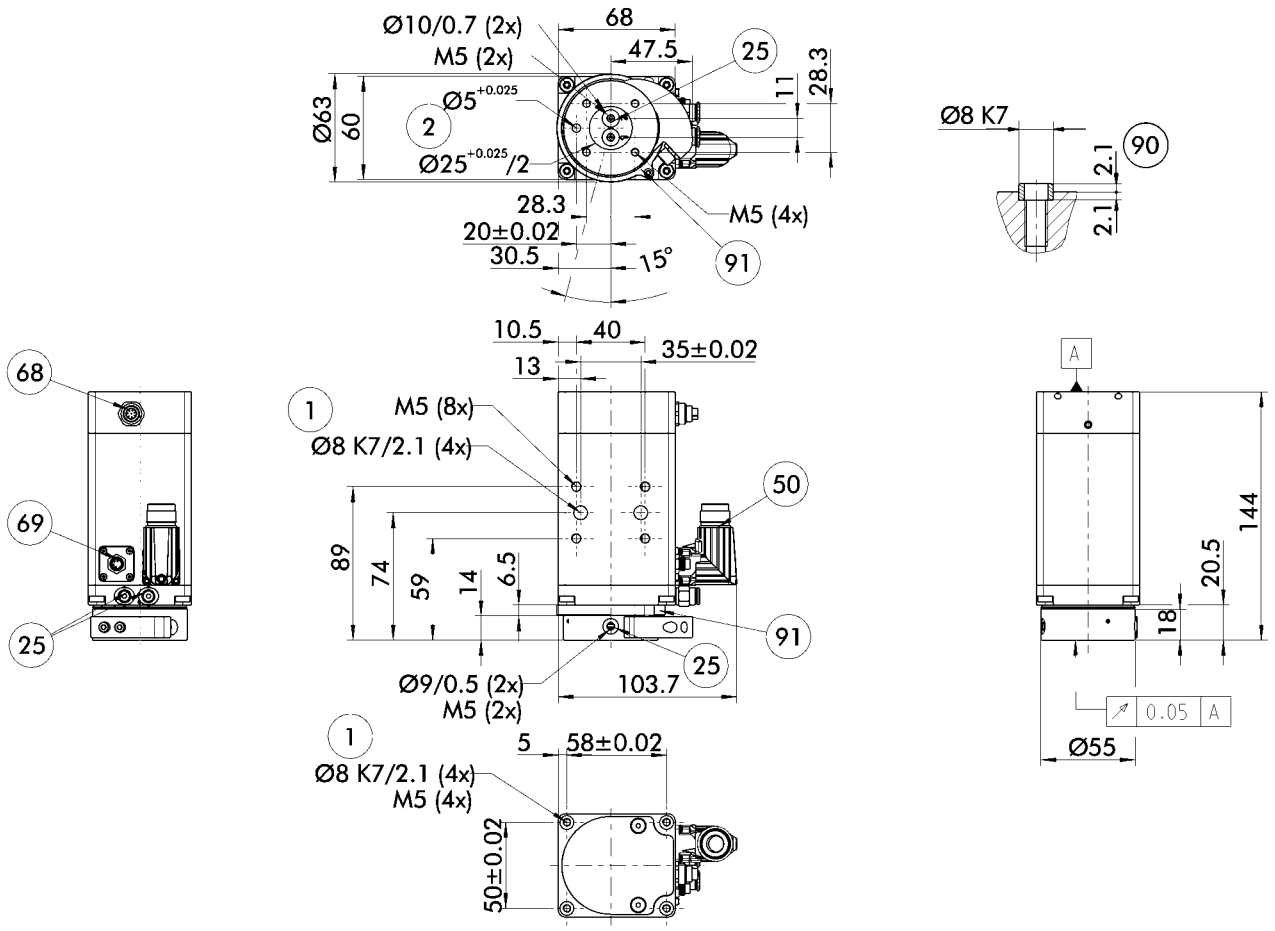
Technical data

Description		MRD-S 12 IP 40 ED	MRD-S 12 IP 40	MRD-S 12 IP 54 ED	MRD-S 12 IP 54
		with rotary transmission leadthrough	without rotary transmission leadthrough	with rotary transmission leadthrough	on request
	ID	0331360	0331361	0331362	0331363
Mechanical operating data					
Max. torque	[Nm]	3.6	3.6	3.3	3.3
Nominal torque (with rotary feed-through)	[Nm]	1.2	1.2	0.9	0.9
Max. speed	[1/min]	600.0	600.0	600.0	600.0
Max. acceleration	[°/s²]	45000.0	45000.0	45000.0	45000.0
Max. additional moment of inertia	[kg mm²]	900.0	900.0	900.0	900.0
Rotor moment of inertia	[kg mm²]	113.0	113.0	113.0	113.0
Weight	[kg]	1.8	1.8	1.8	1.8
Repeat accuracy	[°]	0.001	0.001	0.001	0.001
Measuring system resolution	[arcsec]	0.038	0.038	0.038	0.038
Max. surface temperature	[°C]	70.0	70.0	70.0	70.0
Max. ambient temperature	[°C]	40.0	40.0	40.0	40.0
Electrical operating data					
Permissible power loss	[W]	65.0	65.0	65.0	65.0
Max. current	[A]	5.1	5.1	5.1	5.1
Nominal power current	[A]	1.6	1.6	1.6	1.6
Nominal voltage	[VDC]	230.0	230.0	230.0	230.0
Phase-phase resistance at 25 °C	[Ω]	16.9	16.9	16.9	16.9
Phase-phase inductance	[mH]	16.0	16.0	16.0	16.0
Tightness according to		IP 40	IP 40	IP 54	IP 54

Feed-through		4 electric / 2 pneumatic
Max. current	[A]	1
Maximum voltage	[V]	60
Max. operating pressure	[bar]	8

ⓘ The repeat accuracy stated here applies at constant ambient temperatures!

Main views



(1) Connection of rotary actuator
(2) Attachment connection
(25) Fluid feed-through
(50) Electronics connection
(68) Shaft encoder connection
(69) Connection for electric feed-through
(90) Center sleeves bore in adapter plate
(91) Only by sealed version

Cable sets

ⓘ The scope of delivery of the cable set includes: 1 power cable, 1 shaft encoder cable, 1 cable for connecting the electric rotary feed-through

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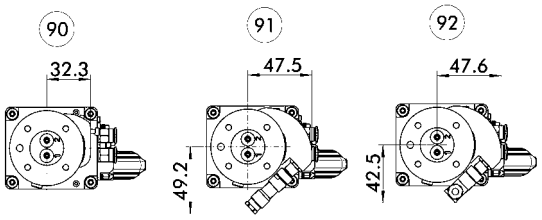
KSRD 5	0331330	5.0 m
KSRD 10	0331331	10.0 m
KSRD 15	0331332	15.0 m
KSRD 20	0331333	20.0 m

Plug connector



(90) Version without electric through
(91) Version with electric through (straight line plug)
(92) Version with electric through (angle plug)

manufacturable connectors for electrical rotary feed-through

	ID
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angulate	9941590