roller drive

MRA50

operating manual

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1 General Information

1.1 Documentation

The following applicable documents are an integral part of this product description:

1.2 Terms used and explanation of symbols

Table 1: Signal Words and Warnings

	Pictograms used		Signal words	
Warning of personal injury		High voltage warning	**Danger!**	Warns of an imminently threatening danger. Consequences if disregarded: death or extremely severe injury
		General hazard warning	**Warning!**	Warns of a **possible, very dangerous situation.** Consequences if disregarded: death or extremely severe injury
			Caution!	Warns of a **possible, very dangerous situation.** Possible consequences if disregarded: Slight or minor injuries
Warning of damage to property			**Stop!**	Warns of **possible damage to property**. Possible consequences if disregarded: Damage to the drive unit or its environment
Other information			**Tip!**	Designates a general, useful tip. If followed, you will make handling of the drive system easier

1.3 Legal Provisions

1.3.1 Liability

The information, data and tips provided in these instructions were up-to-date at the time of printing. No claims to make changes to already delivered components may be asserted from the information, illustrations or descriptions contained in these instructions.

The procedural information and wiring extracts presented in these instructions are recommendations only, the transferability of which to a respective application must first be examined. MTA Systems shall make no warranty as to the suitability of the procedures and wiring recommendations.

No liability shall be assumed for damages or malfunctions that arise due to:

- Disregard of the operating instructions
- Arbitrary changes to the product
- Operating errors
- Improper work to and with the products

1.3.2 Warranty

Warranty conditions:

See the terms and conditions of sale and delivery of MTA Systems GmbH.

Report any warranty claims to MTA Systems immediately upon determining the defect or error.

The warranty shall expire in all cases in which no liability claims can also be asserted.

1.3.3 Directives

Responsibility for meeting the EU guidelines for machine usage rests with the downstream user.

Motorized rollers or drum motors are **not** products within the context of the EC Machinery Directive.

Proper use of the drives in machinery or systems is prohibited until the machine or system builder confirms the CE-conformity of the entire machine or system.

Within the meaning of the EMC Directive, the specified devices are not products that can be independently operated. Compliance with the directive presupposes the correct installation of the products, observance of the specific installation information and product documentation.

1.4 Scope of Supply and Accessories

Mating connector and communication cable are not part of the standard scope of supply. They can, however, be ordered as accessories.

2 Safety Information for Electric Drives and Controls

2.1 General Information

MTA Systems GmbH shall assume no liability for damages caused by failure to observe the precautions in these operating instructions.

Prior to initial operation, the chapter 2 titled “Safety Guidelines for Electrical Drive Units and Controllers” as well as the chapter 8 “Information regarding Safe and EMC-Compliant Installation” must be read.

Correct and safe operation of the drive units requires proper and professional transportation, storage, assembly, and installation as well as careful operation and maintenance. Only trained and qualified personnel may be utilized to work with electrical equipment.

Improper handling of the drives and non-observance of the precautions specified herein as well as improper intervention in the safety device may result in damage to property or bodily injury.

2.1.1 Risks due to Improper Use

High voltage and high working current!

Danger to life or serious bodily injury due to electric shock!

High voltage due to incorrect connection!

Danger to life or serious bodily injury due to electric shock!

Safety Information

Risk of injury! Risk of burning!

2.2 Safety Information

2.2.1 General Safety Information

The drive units comply with protection class IP54. Ensure that the environment complies with this protection or contamination class.

The motor controller is IP20.

The drive units and the utilized power supplies must be connected to the grid in accordance with the EN standards and VDE regulations such that they can be disconnected from the grid with suitable releasing devices (e.g. main switch, safety switch, circuit breaker).

As a precaution, prevention measures must be taken for switch panels, e.g. contactors and relays wired with RC elements or diodes.

Safety instructions and regulations of the country in which the device is to be used must be observed.

The environmental conditions specified in the product documentation must be adhered to. Safety-critical applications are not permitted unless expressly approved by the manufacturer.

Information regarding EMC-compliant installation can be found in the chapter 8 “Information regarding Safe and EMC-Compliant Installation”. Compliance with the limit values required by the national regulations is the responsibility of the manufacturer of the system or machine.

2.2.2 Safety Information for Assembly and Maintenance

The respective DIN, VDE, EN, and IEC regulations as well as all state and local safety and accident prevention regulations shall apply in all cases for the assembly and maintenance of the system. The system builder or the operator shall be responsible for ensuring compliance with these regulations:

The operation, maintenance and/or repair of the drives may only be carried out by personnel who are trained and qualified for working on or with electrical equipment.

Prevention of accidents, bodily injury and/or damage to property:

The holding torque of the motorized roller is not suitable for personal protection!

Disconnect the electrical equipment from the power supply using the main switch and ensure that it is not turned back on during:

- Maintenance and repair work
- Cleaning procedures
- Long interruptions of operation

Before undertaking maintenance work, it is important to ensure that the power supply is turned off.

Electronic devices are generally not fail-safe. The user shall be responsible for ensuring that his system is put into safe mode if the electrical device fails.

The motorized roller is capable of assuming high temperatures, which may cause bodily burns if touched.

2.2.3 Protection against Contact with Electrical Components

This section pertains only to devices and drive components with voltages over 50 volts. If components with voltages over 50 volts are touched, they can be very dangerous to persons and result in electric shock. When operating electrical equipment, certain components of this equipment must by necessity be under dangerous voltage.

High voltage!

Danger to life, risk of injury due to electric shock or serious bodily injury!

The respective DIN, VDE, EN, and IEC regulations as well as all state and local safety and accident prevention regulations shall apply in all cases of operation. The system builder or the operator shall be responsible for ensuring compliance with these regulations:

Before start-up, attach the covers and safety devices provided for this purpose to the devices for contact protection. For built-in devices, protection against direct contact with electrical components must be ensured by means of an exterior housing, such as a control cabinet.

Always connect the earth wire of the electrical equipment and the devices tightly to the power supply.

In accordance with Standard EN 60617, observe the prescribed minimum copper profile for the protective earth connection over its entire extent!

Before start-up, always connect the earth wire to all electrical devices according to the wiring diagram or connect using an earth conductor, even for short-term measurement and testing purposes. Otherwise, high voltages may occur on the housing, which cause electric shock.

Do not touch electrical connectors of the components when they are turned on.

Disconnect the device from the network or from the voltage source before accessing the electrical components with voltages greater than 50 volts. Ensure that they are not turned back on.

During installation, the intermediate circuit voltage must be taken into account, particularly with respect to insulation and precautionary measures. Provisions must be made for proper grounding, line sizing, and corresponding short-circuit protection.

2.2.4 Protection against Hazardous Movements

Hazardous movements may be caused by faulty activation of connected motors. The various reasons for this might include:

- Soiled or faulty wiring or cabling.

- Error in the operation of components.
- Error in the measuring transducers or signal generators.
- Defective components or components not in compliance with EMC.
- Software errors in the higher-level control system.

These errors may occur directly after start-up or after an undetermined period of time in operation. The monitoring systems in the drive components largely rule out a malfunction in the connected drives. With respect to personal protection, in particular the risk of bodily injury and/or damage to property, one cannot trust in these facts and circumstances alone. Until the installed monitoring systems are up and running, faulty drive movement will occur without a doubt, the extent of which will depend on the type of control and operating condition.

Dangerous movements!

Danger to life, risk of injury, serious bodily injury or damage to property!

Personal protection must be ensured by means of monitoring systems or superseding measures on the part of the system for the reasons mentioned above. They are provided by the system builder according to the specific circumstances of the system risk and error analysis. The safety regulations applicable for the system will also be included. Random movements of the machine or other malfunctions may occur due to any shut-off, circumvention or failure to activate the safety devices.

Warning of rotating components!

When controlled properly, the motorized roller will rotate around its own axis. The system builder or operator is responsible for ensuring correct installation such that injuries or harm to the person or machine may not occur during operation.

2.2.5 Protection against Contact with Hot Components

Hot surfaces are possible on the device housing!

Risk of injury! Risk of burning!

Do not touch housing surface in the vicinity of hot heat sources! Risk of burning!

Before accessing the devices after shutoff, wait about 10 minutes for them to cool down.

Touching any hot components of the equipment, such as the device housing in which the cooling elements and resistors are located, may result in burns!

3 Product Description

3.1 General Information

3.1.1 Scope of Application

The MRA50 motorized roller was designed for use in various conveyor systems. Due to the gearless design and based on a direct drive, the MRA50 is used for the continuous control of the speed.

3.1.2 Performance Characteristics

The MRA50 has the following performance features:

- Direct drive, no gears
- Sensorless control of speed
- High torque
- The electronics (MCP, MCL, MCM) are located outside the motorized roller (MRA50)
- A design with integrated electronics is optionally available.
- 5-pin connection line between electronics and motorized roller
- Connection to a higher-level controller, e. g. to an SPS via digital and analog signals.
- For controlling and operation, various electronics are available
    - MCM … external (optionally incorporated into the motorized roller) electronics with setpoint setting via analog inputs
    - MCP … external electronics with speed setting via analog input, digital inputs or fixed speed
    - MCL … external electronics with integrated logistics functionality for zero-pressure accumulation operation

Details regarding the electronic designs MCM, MCP, and MCL can be found in the operating manuals provided for them.

4 Models

4.1 Model code motorized roller MRA50

Example: MRA50-1 1 A

Table 2: Model code MRA50

Model code		**MR**	**A**	**50**	**-**	**1**	**1**	**A**
Motorized roller	MR							
Motor type	A…external rotor sync.							
	I…internal rotor sync.							
	D…three-phase A.C. current							
Size	Diameter in mm							
Motor ID*	Performance gradation							
Voltage**	Rated motor voltage							
Gears***	Size and ratio							

*Motor ID
1…SA47_external rotor 0.8/1.9Nm, 400rpm
2…SA47_external rotor 1.2/2.5Nm, 400rpm
3…SA47_external rotor 1.4/3.0Nm, 1000rpm

**Voltage:
1…intermediate circuit Udc=24VDC
2…intermediate circuit Udc=48VDC
3…intermediate circuit 3x400VAC
4…intermediate circuit 1x230VAC

***Gears:
A… without gears
B… with gears

5 Technical Data

5.1 Environmental Conditions and Certification

Table 3: Technical Data Environmental Conditions

Area	Value
Ambient temperature at nominal capacity	0°C to 40°C (option -30°C to +55°C)
Protection class	IP54 (optionally higher type of protection)

5.2 Performance data motorized roller MRA50

Table 4: Technical Data Performance data motorized roller MRA50

Parameters	MRA50-11A	MRA50-21A	MRA50-31A
Speed	0…1.05m/s	0…1.05m/s	0…2.62m/s
Nominal torque	0.9Nm	1.2Nm	1.4Nm
Max. Torque (depending on I_ max motor controller)	1.7Nm	2.5Nm	2.5Nm
Supply voltage	24VDC		
Insulation class	F		
Clamping length	200mm to 1000mm		
Supporting tube	Bare steel, galvanized 50x1.5mm		
Hub unit side A	Roller inserts antistatic Axle M12x1 including nut Cable length: 500mm		
Hub unit side B	Quick-release axle with M8 female thread		
	Optional: Corrugation profile with roller inserts and M8 female thread		

5.3 Option motor roller MRA50 with integrated elctronics

The motor roller MRA50 can optionally be equipped with integrated electronics. The electonics for the motor regulation are located internally in the motorized roller. Via the M8 connection cable, the electronics

are supplied with the supply voltage and the signals for setpoint (analog 0-10V), direction of rotation and total error are made accessible.

Table 5: Technical specifications: integrated electronics

Parameters	**MCM24**	**limits**	
Supply voltage	24VDC	Upper limit	30VDC
		Lower limit	18VDC
Max. power supply	6A	Version with M8 connector	
Speed control	Without sensors	-	
Analog input Speed setpoint	0…10VDC	Upper limit	30VDC
		Input impedance	10kOhm
Digital input clockwise / counter-clockwise	24VDC	Low (clockwise)	0 bis 3VDC
		High (counter-clockwise)	9 bis 30VDC
		Input impedance	10kOhm
Error output	24VDC	Low	0 - 3VDC
		High	9 - 30VDC
		Input impedance	10kOhm

The figure below shows the pin assignement of the M8 connection cable

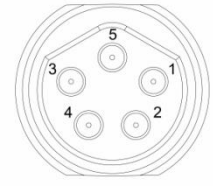

Diagram 1: Pin connnection cable with integrated electronics

Table 6: Connection assignement M8 Connection assignement with integrated electronics

Pin	Wire colour	Function
1	Brown	Supply voltage + 24VDC
2	White	Direction of rotation
3	Blue	Supply voltage GND
4	Black	Error output
5	Gray	Speed setpoint

6 Installation Instructions MRA50-x1A

6.1 Mechanical Installation

6.1.1 Installation of the motorized roller into the conveyor profile

Insert motor cable and motor axle into the hexagonal hole of the conveyor frame designed for this.

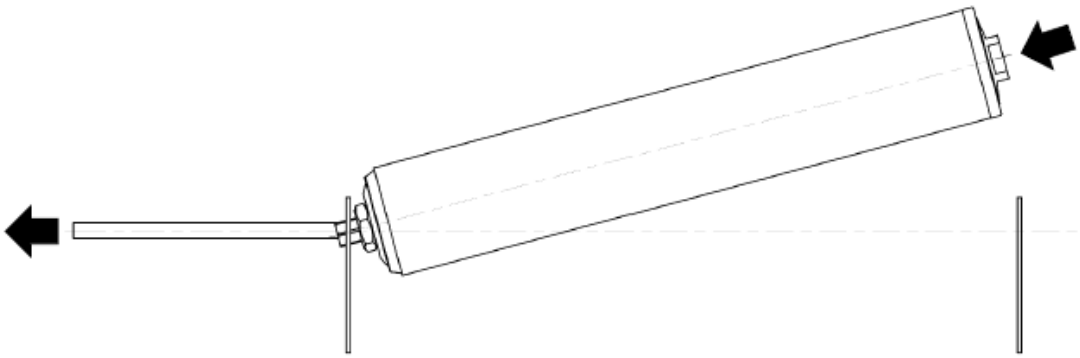

Diagram 2: Pin connnection cable with integrated electronics: Insertion of the motor axle and motor cable into the conveyor profile

The hexagonal axle in the hexagonal hole designed for it serves as a torque support. If there is no hexagonal hole in the conveyor profile, additional measures must be provided for protecting against twisting (lock washers or similar).

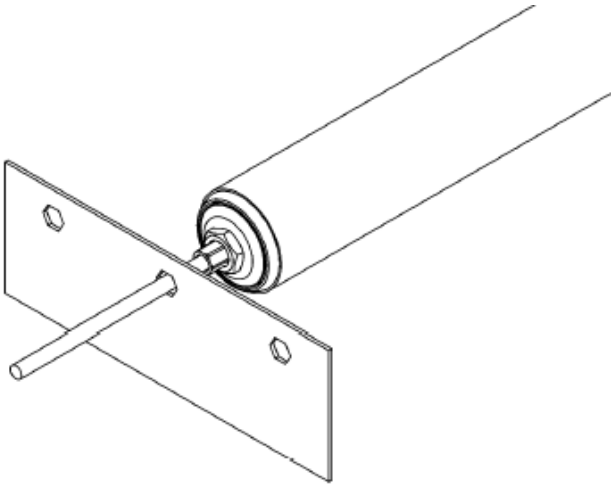

Diagram 3: Detailed depiction hexagonal axle

The motorized roller must be aligned according to the holes in the conveyor profile. For this, an M12 male thread is provided on the hexagonal axle on the side of the motor. On the opposite side, there is an M8 female thread in the roller insert for fastening in the conveyor profile. Additional spring washers must be added for securing on both sides.

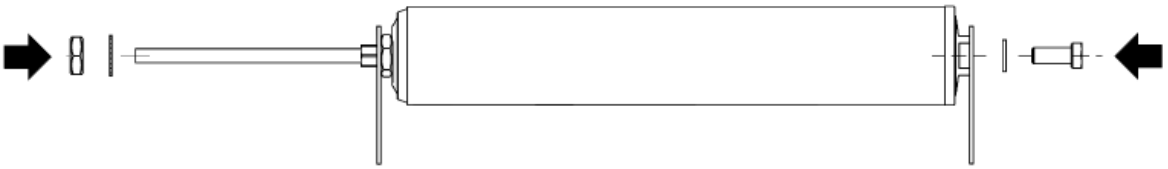

Diagram 4: Fastening in the conveyor profile

The M12 nut on the side of the motor must be fastened with a torque of at least 25Nm. The M8 bolts on the opposite side with a torque of at least 20Nm.

The motorized roller is delivered with a small M12 hexagon nut on the side of the motor. This hexagon nut is located on the inside of the conveyor profile already assembled. With a flattened open-end wrench, this inside nut can be used for securing against twisting while fastening the motorized roller. When tightening the outer M12 nuts on the side of the motor, ensure that the inside nut does not twist.

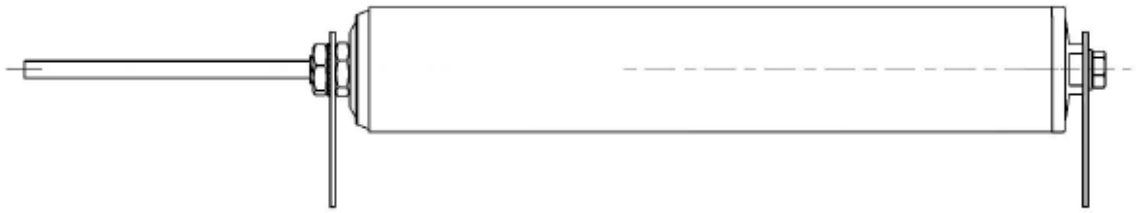

Diagram 5: Motorized roller installed

7 Mechanical designs

7.1 Smooth design, without transfer drive

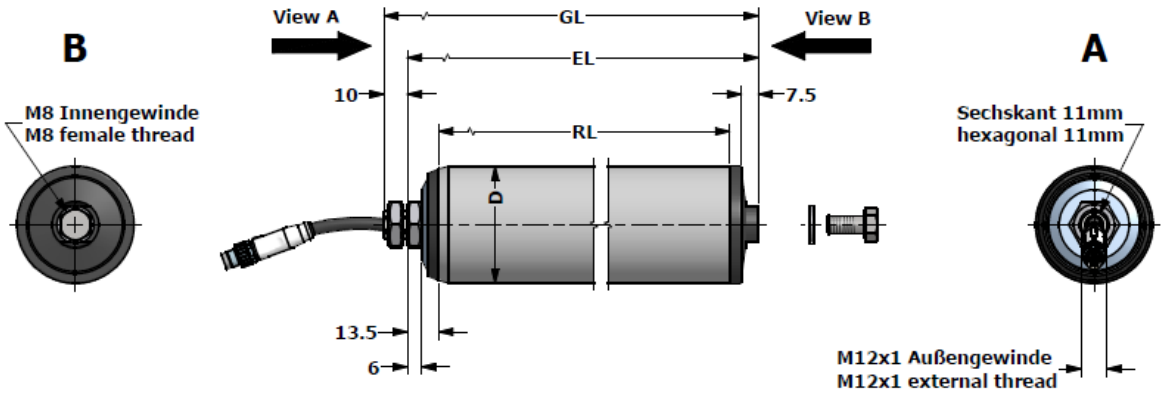

Diagram 6: Smooth design, without transfer drive

7.2 Design with corrugations

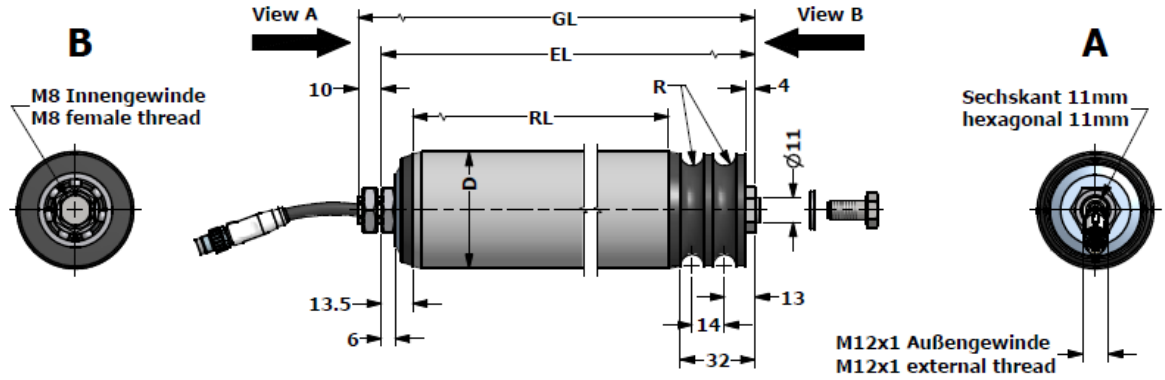

Diagram 7:Design with plastic round belt transfer drive

Alternatively to the plastic corrugated transfer drive (see diagram), the design with corrugated steel pipe is available.

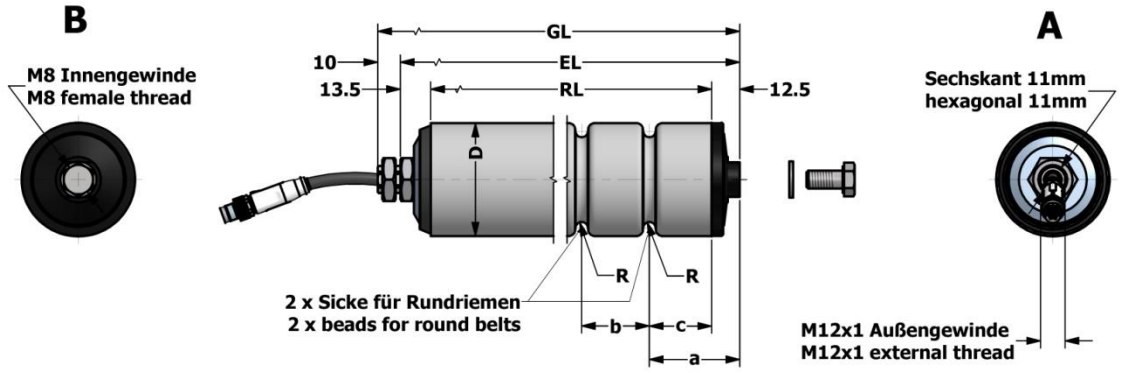

Diagram 8: Design with corrugations

7.3 Design with toothed belts

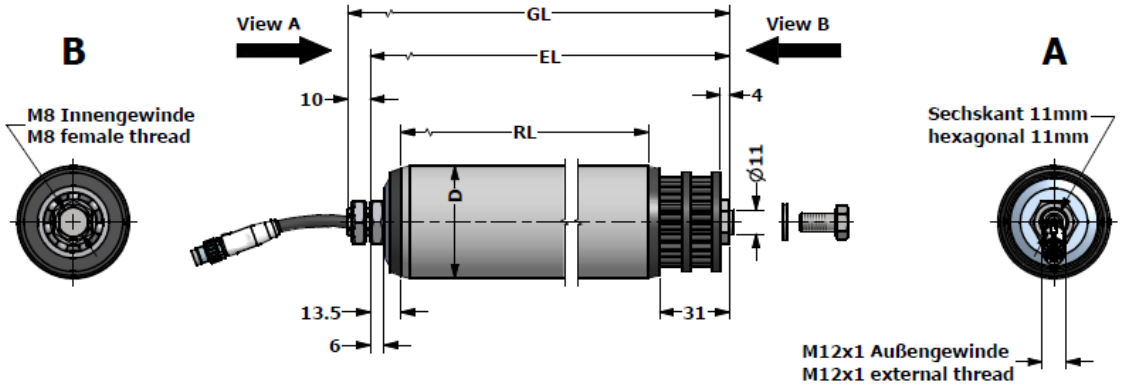

Diagram 9:Design with toothed belts

7.4 Design with flat belts

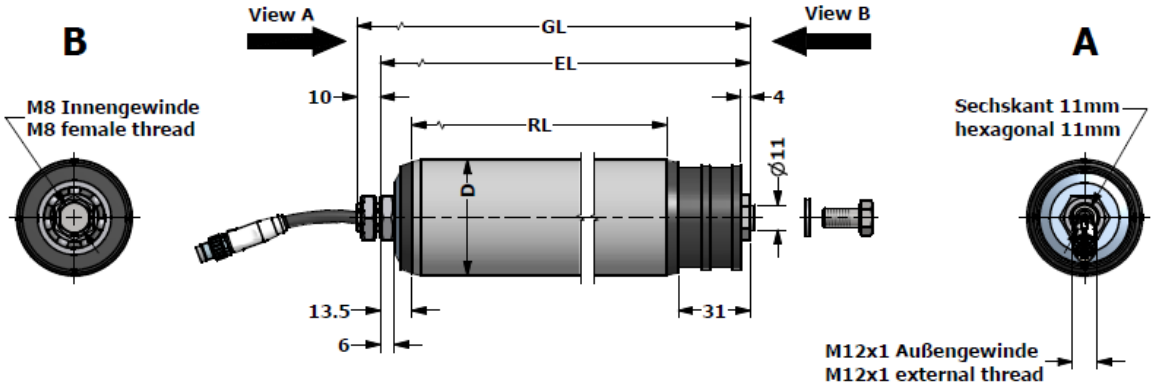

Diagram 10: Design with plastic flat belts transfer drive

8 EMC

8.1 Information on Safe EMC-compliant Installation

8.1.1 General Information on EMC

The interference radiation and interference immunity of a drive unit always depends on the overall design of the drive, which consists of the following components:

- Voltage supply
- Motor control
- Motor
- Electro mechanics
- Type and design of wiring
- Overlaid control system

8.1.2 EMC-Compliant Cabling

Signaling lines must be spaced as far apart as possible from the power cables. They should not be laid in parallel. If junctions are unavoidable, then they must be made vertically (e.g. at a 90° angle) to the extent possible.

For safety reasons, it is essential that all PE ground wires and earth conductors be connected before start-up.

It is essential that the regulations in EN 50178 for protective grounding be observed at the time of installation!

9 Installation

Declaration

Manufacturer:	MTA Systems GmbH Pem-Straße 2 4310 Mauthausen Österreich	**Authorized person for the compilation of technical documents:**	Pankraz Dietmar MTA Systems GmbH: Pem-Straße 2 4310 Mauthausen Österreich

Product Description	Motorized roller, drum motor
Serial / Type Ref.	MRA50-11A, MRA50-21A, MRA50-31A,
Description:	Motor roller, drum motor as drive system

The manufacturer declares that the above-named product is an incomplete machine within the meaning of Machinery Directive 2006/42/EC. The product specified above is only intended for installation in a machine or incomplete machine. The product complies with the following essential requirements according to Annex I of the above directive: 1.1.2, 1.1.3, 1.1.5, 1.5.8, 1.5.9, 1.6.4, 1.7.2, 1.7.3

The special technical documents in accordance with Appendix VII Part B were created. The person authorized for compiling the technical documents can present the documents within a suitable period of time upon request.

The incomplete machine may only be put into operation when it has been determined that the machine, in which the incomplete machine is to be installed, corresponds to the Machinery Directive.

The above-named product meets the requirements of the directives and harmonized standards mentioned below:

Applied EC Directives

- Machinery Directive 2006/42/EC
- EMC Directive 2004/108/EC
- RoHS

Applied harmonized standards:

- EN ISO 12100:2010 Safety of Machinery – General Principles for the Design of Machinery and Risk Assessment and Risk Reduction

Mauthausen, March, 28 2017

Dietmar Pankraz

Managing Director

10 List of changes

Table 7: List of changes

Version	Date	Change / annotation
V1.0	12/13/2014	Initial preparation
V2.1	04/02/2014	Expansion mechanical installation
V3.0	05/12/2015	Motorized roller types added, general revision
V4.0	05/16/2016	Option integrated electronics
V5.0	11/29/2016	Imprint, new address
V6.0	02/23/2017	Installation declaration extended with motor type MRA50-31A
V7.0	03/28/2017	Correction installation declaration
V8.0	11/21/2017	Corrections
V9.0	04/04/2018	Correction integrated controller

11 Imprint

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