NOx Sensor
Installation Instruction

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Prior to use, read this Installation Instruction carefully and familiarize yourself with the product. Installation and start-up should not be carried out before reading and understanding this document. Keep this Installation Instruction readily available so that you can reference it as needed.

1.1 What Is the Purpose of this Installation Instruction?
This Installation Instruction serves as an aid for the installation and operation of the product and supports the technical staff with all operating and maintenance tasks to be performed. Furthermore, this manual is aimed at preventing dangers to life and health of the user and third parties.

1.2 Who Is this Installation Instruction Targeted to?
This Installation Instruction provides a code of conduct for personnel tasked with the setup, operation, maintenance, and repair of stationary engines. A certain level of technical knowledge with respect to the operation of stationary engines and basic knowledge of the electronic components used are necessary. Persons who are merely authorized to operate the stationary engine are to be trained by the operating company and explicitly informed of the potential hazards.

1.3 What Symbols Are Used in the Installation Instruction?
The following symbols are used in this manual and must be observed:

**Example**
This symbol indicates examples, which point out necessary handling steps and techniques. In addition, you receive additional information from the examples, which will increase your knowledge.

**Notice**
This symbol indicates important notices for the user. Follow these. In addition, this symbol is used for overviews that give you a summary of the necessary work steps.

**Warning**
This symbol indicates warnings for possible risks of property damage or risks to health. Read these warning notices carefully and take the mentioned precautionary measures.
1 General Information

Danger
This symbol indicates warnings for danger to life, especially due to high voltage. Read these warning notices carefully and take the mentioned precautionary measures.

1.4 Which Abbreviations/Acronyms Are Used in the Operating Manual?
The following abbreviations/acronyms are used in the installation instruction.

<table>
<thead>
<tr>
<th>Abb.</th>
<th>Term</th>
<th>Description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAN</td>
<td>Controller Area Network bus</td>
<td>Bus for control devices / networks</td>
<td>Asynchronous serial connection system for linking control units</td>
</tr>
<tr>
<td>DC</td>
<td>Direct Current</td>
<td>Direct current</td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic Compatibility</td>
<td></td>
<td>Compatibility of electrical or electronic equipment items with their surroundings</td>
</tr>
<tr>
<td>HB</td>
<td>Horizontal Burning</td>
<td>Horizontal burning</td>
<td>Flammability class as per UL 94</td>
</tr>
<tr>
<td>QR</td>
<td>Quick Response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RoHS</td>
<td>Restriction of Hazardous Substances</td>
<td>Restriction of hazardous substances</td>
<td></td>
</tr>
</tbody>
</table>
2.1 General Safety Instructions

MOTORTECH equipment is manufactured as state of the art and therefore safe and reliable to operate. Nevertheless the equipment can cause risks or damage can occur, if the following instructions are not complied with:

- The gas engine must only be operated by trained and authorized personnel.
- Observe all safety instructions of the system and all safety instructions of the system operator.
- Operate the equipment only within the parameters specified in the technical data.
- Use the equipment correctly and for its intended use only.
- Never apply force.
- For all work such as installation, conversion, adaptation, maintenance, and repair, all equipment must be disconnected from the mains and secured against unintentional reactivation.
- Perform only such maintenance and repair work as is described in this installation instruction, and follow the instructions given while working.
- Further work must only be performed by personnel authorized by MOTORTECH. Non-compliance with the instructions will void any warranties for the proper function of the equipment as well as the responsibility for the validity of the certifications.
- Safety devices must not be dismounted or disabled.
- Avoid all activities that can impair the function of the equipment.
- Operate the equipment only while it is in proper condition.
- Investigate all changes detected while operating the gas engine.
- Ensure compliance with all laws, directives, and regulations applicable to the operation of your system, including such not expressly stated herein.
- If the system is not entirely tight and sealed, gas may escape and result in explosion hazard. The inhalation of gas can also lead to death or severe health damages. Therefore, upon completion of all assembly works, always check the system's tightness.
- Always ensure adequate ventilation of the engine compartment.
- Ensure a safe position at the gas engine.
- There is a risk of burning on hot surfaces. Allow the engine to cool down before starting any work.
- Personal protective equipment (PPE), e.g. safety shoes and gloves, must be worn during all work on the engine.
- Noise from the system can cause permanent or temporary damage to your hearing. Wear suitable hearing protection at the system.
- Your behavior can reduce possible residual risks to a minimum. Observe responsible handling of the gas engine and the gas-carrying system.
2 Safety Instructions

2.2 Electrostatic Discharge Hazards
Electronic equipment is sensitive to static electricity. To protect these components from damage caused by static electricity, special precautions must be taken to minimize or prevent electrostatic discharge.

Observe these safety precautions while you work with the equipment or in its vicinity.
– Before performing maintenance or repair work, ensure that the static electricity inherent to your body is discharged.
– Do not wear clothing made from synthetic materials to prevent static electricity from building up. Your clothing should therefore be made of cotton or cotton mix materials.
– Keep plastics such as vinyl and Styrofoam materials as far away from the equipment as possible.

2.3 Special Safety Instructions for the Device

Operational safety!
To prevent arcing or sparking and short circuits that can cause electric shock and serious damage to the connected equipment, always switch off the power supply to the sensor before disconnecting its electrical connections.

Explosion hazard!
Only use the NOx sensor for measurement in non-explosive gas mixtures, as explosive gas mixtures can ignite on the hot sensing element. Especially in the case of engine malfunction, make sure that no unburned gas mixture enters the exhaust pipe.

Risk of burning!
There is a risk of burns when touching the sensing element of the NOx sensor because the sensing element becomes hot during operation. Therefore, note the following points:
– Therefore, install the sensing element on the exhaust pipe at a suitable location where people at the plant cannot be burned by it, or attach a protective grid around the sensing element to prevent contact with the sensing element.
– The sensing element must have cooled down sufficiently at the end of operation before you can touch the sensing element again.
2 Safety Instructions

Operational safety!
The chemical elements magnesium (Mg), silicon (Si), phosphorus (P), and sulfur (S) can change the measuring characteristics of the sensor. Make sure that these chemical elements are not present in your application. Do not use sprays containing these chemical elements. Only use material in the exhaust pipe free of these chemical elements.

Operational safety!
To ensure proper functioning of the sensor, the probe must not come into contact with condensation water and other liquid components. The sensor and its electronics must not be painted either. Do not open the cover of the evaluation unit’s connector.

Operational safety!
The sensing element may be mounted and dismounted a maximum of two times. The electrical connection to the sensor’s evaluation unit may be established and disconnected a maximum of 20 times. After that, proper functioning of the sensor can no longer be guaranteed.

2.4 Proper Transport
Let the NOx sensor remain in its original packaging until it reaches its place of use. To prevent damage to the sensor, carry the NOx sensor separately by hand. Make sure that you do not twist the connection cable (max. 180°). Under no circumstances should you wrap the connection cable around the evaluation unit, but wrap the connection cable separately from the evaluation unit and maintain the minimum bending radius of 20 mm (0.79”).

2.5 Proper Disposal
After the expiration of its service life, MOTORTECH equipment can be disposed of with other commercial waste, or it may be returned to MOTORTECH. We will ensure its environmentally friendly disposal.
3 Intended Use

3.1 Functional Description
The NOx sensor measures the nitrogen oxide and oxygen concentration in the exhaust gas of stationary gas engines in industrial environments and transmits the measured values via the CAN bus to a master control.

3.2 Applications
The NOx sensor is designed for use on stationary gas engines in industrial environments in a non-hazardous area.

The NOx sensor is suitable for exhaust pipes whose material is free of magnesium, silicon, phosphorus, and sulfur and may only be used for measurements in non-explosive gas mixtures.
4 Product Description

4.1 Technical Data

4.1.1 Certifications
The NOx sensor is certified as follows:

CE
EMC Directive 2014/30/EU
- EN 61326-2-3:2013 – Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configurations, operational conditions and performance criteria for transducers with integrated or remote signal conditioning
  - Group 1, Class A and B

RoHS Directive 2011/65/EU
4 Product Description

4.1.2 Mechanical Data
The NOx sensor has the following mechanical characteristics:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>Length of probe: 25.4 mm (1&quot;)</td>
</tr>
<tr>
<td></td>
<td>Length of sensing element: 96.9 mm (3.82&quot;)</td>
</tr>
<tr>
<td></td>
<td>Evaluation unit (length x width x height): 148 mm x 65 mm x 35.4 mm (5.83&quot; x 2.56&quot; x 1.4&quot;)</td>
</tr>
<tr>
<td></td>
<td>Length of connection cable: 900 mm (35.4&quot;)</td>
</tr>
<tr>
<td>Shape of device</td>
<td>See section Overview Drawings on page 15</td>
</tr>
<tr>
<td>IP protection rating</td>
<td>IP 6K9K with mating plug connected to evaluation unit and sensing element mounted in suitable welding boss from MOTORTECH</td>
</tr>
<tr>
<td>Climatic environmental conditions</td>
<td>Operating temperature evaluation unit: –40 °C to +115 °C (–40 °F to +239 °F)</td>
</tr>
<tr>
<td></td>
<td>Operating temperature hexagon nut: –40 °C to +620 °C (–40 °F to +1,148 °F)</td>
</tr>
<tr>
<td></td>
<td>Operating temperature sensor grommet and connection cable: –40 °C to +200 °C (–40 °F to +392 °F)</td>
</tr>
<tr>
<td></td>
<td>Storage temperature in original packaging with protective cap never removed: –40 °C to +65 °C (–40 °F to +149 °F) for max. 2 years</td>
</tr>
<tr>
<td></td>
<td>Exhaust gas temperature range: –40 °C to +800 °C (–40 °F to 1,472 °F)</td>
</tr>
<tr>
<td></td>
<td>Operating pressure range: 800 mbar abs to 1,600 mbar abs</td>
</tr>
<tr>
<td>Flammability class as per UL 94</td>
<td>Plastic housing parts of the evaluation unit: HB</td>
</tr>
<tr>
<td>Mounting cycles</td>
<td>Max. 2</td>
</tr>
<tr>
<td>Mating cycles evaluation unit</td>
<td>Max. 20</td>
</tr>
<tr>
<td>Service life</td>
<td>6,000 h with average temperature of evaluation unit at 90 °C (194 °F)</td>
</tr>
</tbody>
</table>
4 Product Description

4.1.3 Product Identification – Labeling on the Device

The part number (P/N) of the NOX sensor can be found on the upper label on the bottom side of the evaluation unit.

The date of manufacture and the serial number of the NOX sensor can be read out via the two-dimensional matrix code (Data Matrix) on the connector of the evaluation unit. For this purpose you can use a QR scanner, for example, which can also read Data Matrix codes. You will find the relevant information at the following positions in the read-out 49-character long string:

<table>
<thead>
<tr>
<th>Position</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 + 23</td>
<td>Year of manufacture (3rd and 4th digit)</td>
</tr>
<tr>
<td>24 + 25</td>
<td>Month of manufacture</td>
</tr>
<tr>
<td>26 + 27</td>
<td>Day of manufacture</td>
</tr>
<tr>
<td>28 – 31</td>
<td>Serial number</td>
</tr>
</tbody>
</table>

4.1.4 Electrical Data

The NOX sensor has the following electrical characteristics:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supply</td>
<td>24 V DC (16 V DC to 36 V DC)</td>
</tr>
<tr>
<td>Maximum power consumption</td>
<td>20 W</td>
</tr>
<tr>
<td>Required current</td>
<td>Max. 6.2 A</td>
</tr>
<tr>
<td>Connector evaluation unit</td>
<td>5-pole, connector</td>
</tr>
</tbody>
</table>

The measuring probe of the NOX sensor has the following characteristics:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range nitrogen oxide (NOX)</td>
<td>0 ppm to 1,500 ppm</td>
</tr>
<tr>
<td>Measuring accuracy nitric oxide (NO)</td>
<td>See table 1</td>
</tr>
<tr>
<td>Response time nitrogen oxide (NOX)</td>
<td>t_{10–90}: max. 5,300 ms</td>
</tr>
<tr>
<td>Cross sensitivity NOX measurement</td>
<td>Ammonia (NH₃) typ. 100 %</td>
</tr>
<tr>
<td>Sensitivity NOX measurement</td>
<td>Nitrogen dioxide (NO₂) typ. 80 %</td>
</tr>
</tbody>
</table>
4 Product Description

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range oxygen (O₂)</td>
<td>0 % to 20.9 %</td>
</tr>
<tr>
<td>Measuring accuracy oxygen (O₂)</td>
<td>See table 2</td>
</tr>
<tr>
<td>Exhaust gas velocity</td>
<td>Min. 10 m/s</td>
</tr>
<tr>
<td>Pressure pulsation</td>
<td>Max. 130 mbar peak-to-peak above 10 Hz</td>
</tr>
</tbody>
</table>

**Measuring accuracy**

The measuring accuracy of the NOx sensor can be affected negatively by pressure pulsations above 130 mbar peak-to-peak in the frequency range above 10 Hz. Therefore, only use the NOx sensor outside this range.

Table 1: Measuring accuracy nitric oxide (NO)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>–40 °C to +105 °C (–40 °F to +221 °F)</th>
<th>+106 °C to +115 °C (+222.8 °F to +239 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO ≤ 100 ppm</td>
<td>± 10 ppm</td>
<td>± 15 ppm</td>
</tr>
<tr>
<td>100 ppm &lt; NO ≤ 500 ppm</td>
<td>± 10 %</td>
<td>± 10 % ± 5 ppm offset</td>
</tr>
<tr>
<td>500 ppm &lt; NO ≤ 1,500 ppm</td>
<td>± 15 %</td>
<td>± 15 % ± 5 ppm offset</td>
</tr>
</tbody>
</table>

Table 2: Measuring accuracy oxygen (O₂)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>–40 °C to +105 °C (–40 °F to +221 °F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₂ ≤ 5 %</td>
<td>± 2,500 ppm abs</td>
</tr>
<tr>
<td>5 % &lt; O₂ ≤ 20.9 %</td>
<td>± 5 % rel</td>
</tr>
</tbody>
</table>

4.1.5 Interfaces

**CAN Bus Interface**

- Network protocol: SAE J1939
- Transmission rate: 250 kbit/s
4 Product Description

4.1.6 Overview Drawings

Dimensions

[Diagram showing dimensions of the product]
5 Mounting Instruction

5.1 Preparation
Make sure that your application meets the following requirements.

5.1.1 External Power Supply
The NOx sensor is designed for operation in circuits with protected extra-low voltage (PELV) with safe electrical isolation. The voltages in these circuits must not exceed 50 V AC or 75 V DC. To protect the circuit against overload and short circuits, the supply voltage cable must be secured with a suitable fuse.

5.1.2 Mounting Position of Sensing Element
The mounting position of the sensing element must be defined in such a way that no condensation water is able to collect in the protective tube of the sensing element. The possible tilt angles depend on the course of the exhaust pipe. Mounting in a vertical exhaust pipe is not recommended by MOTORTECH.

Horizontal exhaust pipe tilt angles

Vertical exhaust pipe tilt angles

To ensure proper functioning of the connection cable, the minimum bending radius of the connection cable of 20 mm (0.79") must be observed at the mounting place and the angle of the cable outlet at the sensor grommet must be less than 15°.
5 Mounting Instruction

The sensing element becomes hot during operation. Therefore, the sensing element must be installed on the exhaust pipe at a suitable location where people at the plant cannot be burned by it, or a protective grid must be attached around the sensing element to prevent contact with the sensing element.

5.1.3 Mounting Position of Evaluation Unit
To prevent the formation of discharge sparks or electric shock when touching the housing, the evaluation unit of the NOx sensor must be mounted on a grounded mounting plate.

5.2 Unpacking
Before unpacking, please observe the instructions in section Proper Transport on page 9.

To prevent condensation from forming in the NOx sensor, you should avoid any temperature shocks when opening the shipping unit. Before opening, allow the shipping unit to adjust to the mounting temperature by storing it at mounting temperature for at least one day.

After opening the shipping unit, avoid temperature changes of more than ± 5 °C (9 °F). The NOx sensor must not be taken out of its packaging in polluted air and under bad weather conditions (e.g. oil, water, snow, dust, sand, smoke).

Do not remove the protective cap until you are instructed to do so within this installation instruction (see section Mounting on page 18).

5.3 Material Needed
For mounting the NOx sensor, you need the following material:

- Suitable welding boss from MOTORTECH
- Suitable harness from MOTORTECH for connecting the NOx sensor to the master control

If you have any questions about the needed material, contact your MOTORTECH contact person (see Customer Service Information on page 22).
5 Mounting Instruction

5.4 Mounting

Operational safety!

To safely mount the sensor, be sure to observe the following:

– To protect the sensor and yourself, wear ESD-compliant work gloves. To protect the sensor against electrostatic discharge, also comply with IEC 61340-5-1 and IEC TR 61340-5-2 in their respective valid versions.

– Under no circumstances touch the probe while mounting.

– If mechanical shock to the sensor occurs (e.g. drop on the floor), the sensor must not be used under any circumstances and must be disposed of. In cases of doubt, contact your MOTORTECH contact person (see Customer Service Information on page 22).

Before mounting, it is essential to observe the instructions in the section Preparation on page 16.

Make sure that the engine is switched off when mounting. Also make sure that the exhaust pipe has cooled down sufficiently and that there are no exhaust gases in the exhaust pipe.

If you want to replace an identical NOx sensor from MOTORTECH already mounted in the exhaust pipe and continue to use the welding boss already welded into the exhaust pipe, dismount the previously used NOx sensor as described in the section Dismounting on page 20. Then install the new NOx sensor as described in this section beginning with step 3.

The sensing element of the NOx sensor is screwed into the exhaust pipe via a suitable welding boss made of stainless steel (material number 1.4301) from MOTORTECH and connected to the master control via a suitable harness from MOTORTECH. Proceed as follows:

1. At the selected mounting position in the exhaust pipe, drill a hole with a diameter of 23 mm ± 1 mm (0.9” ± 0.04”) into the exhaust pipe.

2. Weld the MOTORTECH stainless steel welding boss (material number 1.4301) into this hole with a suitable welding filler.
3. Remove the protective cap from the probe. Do not pull on the connection cable, but hold the sensing element only by its metal body. Also make sure that no dirt or dust gets deposited in or on the probe while mounting.

4. Insert the sensing element into the welding boss and screw the sensing element into the welding boss via its hexagon nut by hand first. The outgoing cables must not twist by more than 180°. Therefore counter the sensing element with your hand.

5. Then tighten the sensing element using a calibrated torque tool with a tightening torque of 50 Nm ± 10 Nm (36.9 lb-ft ± 7.4 lb-ft) over its hexagon nut. Make sure that the minimum bending radius of the connection cable of 20 mm (0.79") is observed at the mounting position and that the angle of the cable outlet at the sensor grommet is less than 15°.

6. Then mount the evaluation unit of the NOx sensor with two suitable screws onto a grounded mounting plate. The diameter of the mounting holes is 8.3 mm (0.33").

7. Make sure that there are no particles in the five-pin connector of the NOx sensor’s evaluation unit and that the five-pin connector is dry.

8. Then connect the five-pin connector of the evaluation unit to the power supply for the NOx sensor and the master control. Use a suitable harness from MOTORTECH for this purpose and observe the enclosed wiring diagram. The wiring harness should be laid in such a way that there is no pull on it. If you use cable fasteners, they should not exert any force on the wiring harness.
   ▶ The NOx sensor is mounted.

5.5 Setting CAN Identifier
Two CAN identifiers are predefined in the NOx sensor so that a maximum of two NOx sensors can be operated on one CAN bus. The CAN identifier is selected externally via pin 5 of the NOx sensor’s connector.
   – 0x18F00E51 = Parameter group number 61454, source address 81: Pin 5 is connected to ground.
   – 0x18F00F52 = Parameter group number 61455, source address 82: Pin 5 is open.
5 Mounting Instruction

5.6 Setting up Master Control
If you are using a master control from MOTORTECH that is prepared for use with the NOx sensor (e.g. EasyNOx), you must in certain cases still configure it before you can carry out measurements with the NOx sensor. Further information on this can be found in the operating manual of the master control from MOTORTECH.

5.7 Dismounting

Operational safety!
To safely dismount the sensor, be sure to observe the following:

– To protect the sensor and yourself, wear ESD-compliant work gloves. To protect the sensor against electrostatic discharge, also comply with IEC 61340-5-1 and IEC TR 61340-5-2 in their respective valid versions.

– Under no circumstances touch the probe while dismounting.

– The sensor must not be live during dismounting and must have cooled down for at least 15 minutes after its last operation. Otherwise, touching the sensing element may cause burns, the sensing element may burn, and serious damage to the connected equipment due to arcing, sparking or short circuit may occur.

– If mechanical shock to the sensor occurs (e.g. drop on the floor), the sensor must not be used under any circumstances and must be disposed of. In cases of doubt, contact your MOTORTECH contact person (see Customer Service Information on page 22).

Make sure that the engine is switched off while dismounting. Also make sure that the exhaust pipe has cooled down sufficiently and that there are no exhaust gases in the exhaust pipe.

To dismount the NOx sensor, proceed as follows:

1. Make sure that the NOx sensor is not live. Then disconnect the harness from the connector of the NOx sensor's evaluation unit.

2. Dismount the evaluation unit from the mounting plate.

Risk of destruction!
To avoid destroying the NOx sensor, do not hit with a hammer when dismounting. In case the thread of the sensing element is stuck, use only oils without silicon or magnesium for loosening.
3. Make sure that the sensing element has not been in operation for at least 15 minutes. Then unscrew the sensing element from the welding boss using a 22 mm (0.87") wrench. The outgoing cables must not twist by more than 180°. Therefore counter the sensing element with your hand.
   ▶ The NOx sensor has been dismounted.

If you do not screw a suitable sensing element into the welding boss after having removed the NOx sensor, you may only restart the engine after having closed the opening in the exhaust pipe.
6 Errors

6.1 Customer Service Information
You can reach our customer service during business hours at the following phone and fax number, or by email:

Phone: +49 5141 93 99 0
Fax: +49 5141 93 99 99
Email: service@motortech.de

6.2 Returning Equipment for Repair/Inspection
To return the device for repair and inspection, obtain a return form and return number from MOTORTECH.

Fill out the return form completely. The completely filled out return form guarantees fast, uncomplicated processing of your repair order.

Send the device and the return form to one of the two addresses below or to the nearest MOTORTECH representative:

MOTORTECH GmbH
Hogrevestr. 21-23
29223 Celle
Germany
Phone: +49 5141 93 99 0
Fax: +49 5141 93 99 98
www.motortech.de
motortech@motortech.de

MOTORTECH Americas, LLC
1400 Dealers Avenue, Suite A
New Orleans, LA 70123
USA
Phone: +1 504 355 4212
Fax: +1 504 355 4217
www.motortechamericas.com
info@motortechamericas.com

6.3 Instructions for Packaging the Equipment
For return shipment, equipment should be packaged as follows:

– Use packaging material that does not damage the equipment surfaces.
– Wrap the equipment with sturdy materials and stabilize it inside the packaging.
– Use sturdy adhesive film to seal the packaging.
7 Maintenance

7.1 Cleaning
The NOx sensor must not be cleaned with mechanical means or cleaning agents, as this may destroy the sensor or mechanically damage the labels. The NOx sensor including its electrical connection must not come into contact with liquids.

If necessary, clean the NOx sensor with a soft, dry cloth. If you clean the NOx sensor when it is not mounted, make sure that the probe remains free of dirt.

7.2 Spare Parts and Accessories
For spare parts and accessories, please refer to our current Product Guide, which is available for you to download on the internet at www.motortech.de.
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