INSTALLATION AND   >>>
OPERATING INSTRUCTIONS

SmartDrive MX
driven by excellence

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General information

Proof of amendment

Version	Date	Changes
1.0	April 2014	Initial preparation
1.1	May 2014	Revision

Copyright

The copyright for this operating manual as well as all rights in case of patent awarding or registration of registered design remain with the manufacturer!

Subject to alterations

The regulations, directives, standards etc. are compliant with the current state of information at the time of development and are not subject to modification service. They must be applied by the operator at his own responsibility in their latest valid version.

Concerning all data, information, and illustrations in this manual we reserve the right of technical modifications and improvements. No claims can be considered for alteration or rework of already delivered linear actuators.

Manufacturer

HORA
Business area Flow Control
Holter Regelarmaturen GmbH & Co. KG
Helleforthstrasse 58–60
33758 Schloss Holte-Stukenbrock

Germany

phone: +49 (0) 5207/8903-0
mail: fc@hora.de
www.hora.de

Content

1 Safety

Please carefully read this operating manual and in particular the following safety notes prior to installation and operation.

⚠ **ATTENTION**

Complete loss of manufacturer's warranty!
- This device must be used according to the installation and operating instructions.
- Any unauthorised modification to or opening of this device, with the exception of the battery compartment, is prohibited for reasons of safety. Furthermore, it will result in complete loss of manufacturer's warranty.

1.1 Proper use

The electronic radiator thermostat SmartDrive MX described in this document has been designed for room temperature control and adapts the heat supply to the requirements of the individual rooms. It is designed exclusively for temperature control in closed interiors.

1.2 In operation

Safe operation is possible only if transport, storage, installation, operation and maintenance are carried out properly and in accordance with safety standards.

1.3 Guidelines

2006/42/EEC, machine safety
DIN EN ISO 12100
DIN EN 60730-1
DIN EN 60730-2-8

99/5/EEC, radio installations and telecommunication facilities
DIN EN 300,220-1
DIN EN 300,220-2
DIN EN 301,489-1
DIN EN 301,489-3

2011/65/EEC, restrictions on the use of hazardous substances in
electrical and electronic devices

Directive 2002/96/EEC (WEEE guideline)
Regulation (EEC) no 1907/2006 (REACH)

2 Product Specification

The SmartDrive MX is designed for efficient room temperature control in private and commercial facilities. It provides wireless communication via bidirectional EnOcean standard radio protocol and boasts a large display screen as well as a dial for conventional manual control. Energy supply is provided by two lithium batteries, type AA / 1.5 V.
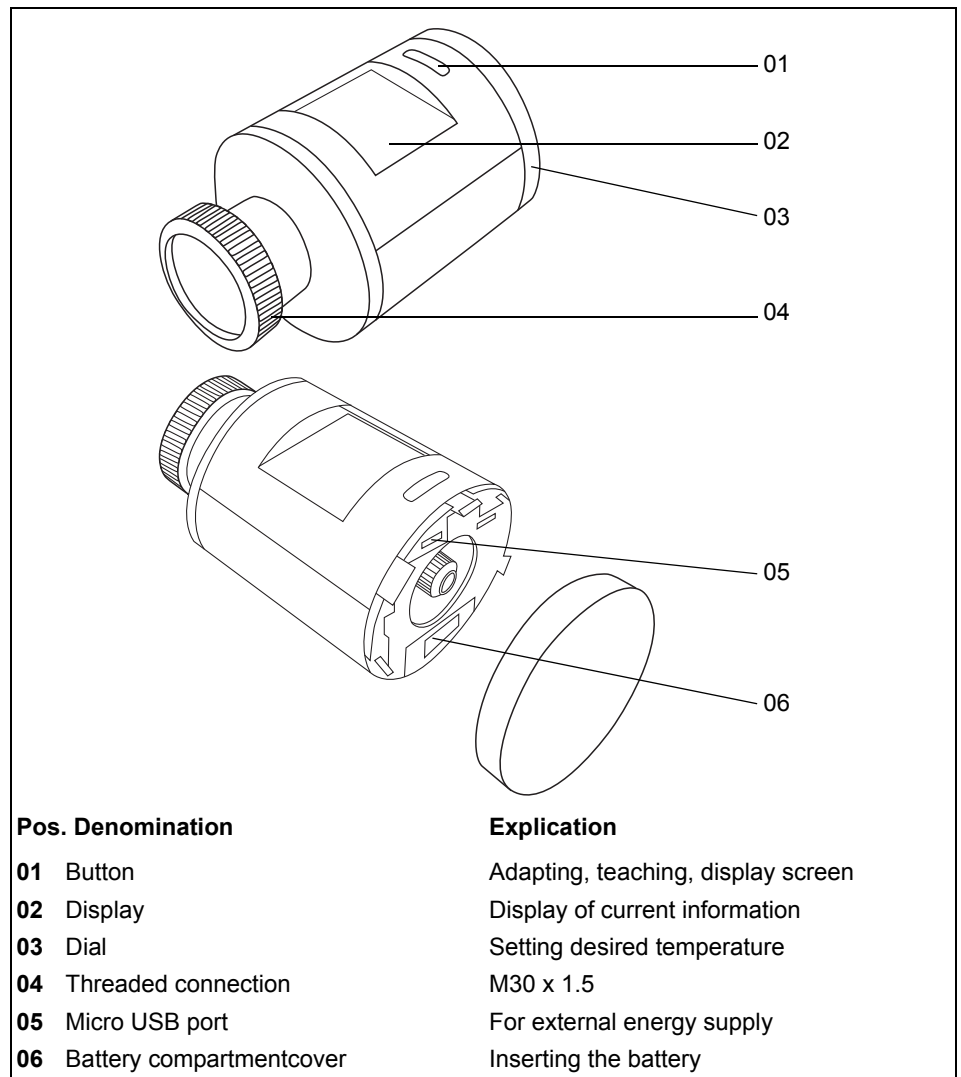
2.1 Component parts

Pos. Denomination		Explication
01	Button	Adapting, teaching, display screen
02	Display	Display of current information
03	Dial	Setting desired temperature
04	Threaded connection	M30 x 1.5
05	Micro USB port	For external energy supply
06	Battery compartmentcover	Inserting the battery

diagram 1 Component part denominations
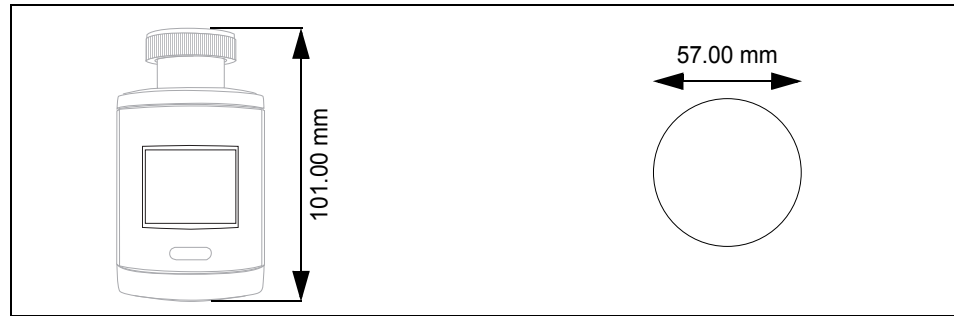
2.2   Dimensions

diagram 2   Dimensions

2.3   Display

The display screen acts as user interface and is sub-divided into two areas.

The upper, narrower area shows the battery, teaching and adapting status. The lower area shows the target temperature and the error message in large characters and numbers, as well as the event symbols.

⇨ *table 1 Symbol explanation* on page 6

For energy saving reasons, display periods are kept short but additional readings can be taken by pressing the key.
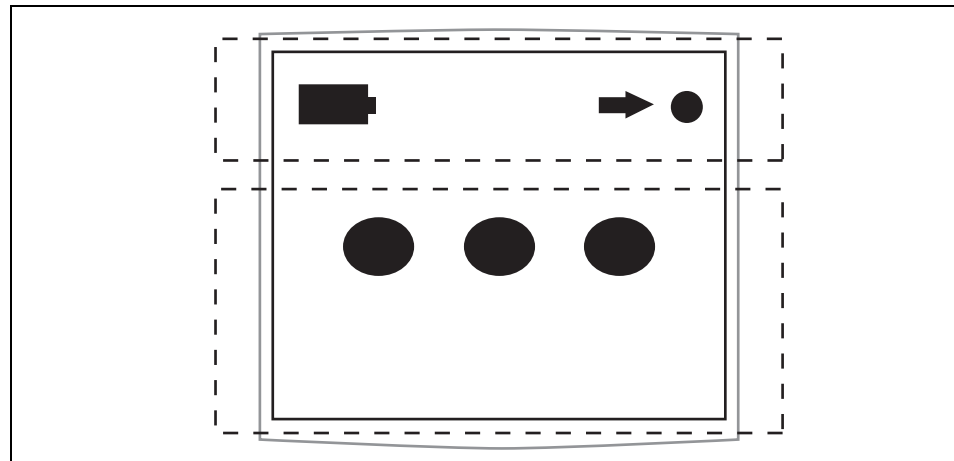
diagram 3   Display

Symbol	Explication
● ● ●	Moving to installation position
➡ ●	Adapting
➡ ⬅	Teaching
➡✕⬅	Reset to default setting
⧗	Waiting for symbol display
🔋	Empty battery
🔒	Keyboard lock

table 1   Symbol explanation

2.4 Functions

- **Actuating distance and limit position scanner**
  The calculation of the available lifting stroke is based on the detection of the two limit positions by the SmartDrive MX patented actuating distance scanner. The corresponding valve position can be transmitted via the associated EnOcean protocol to a master controller/gateway.

- **Battery warning**
  The moment the battery drops below a critical voltage the SmartDrive MX will transmit an error code to a master controller. Furthermore, the battery symbol will appear on the display screen. From that moment onwards you have 30 days left before the batteries need changing.
  The symbol for "adapted" will disappear. You have to readapt the SmartDrive MX after a battery replacement by pressing the key (See 5.1)

- **Emergency actuating function**
  The SmartDrive MX opens the valve 100% as soon as the battery voltage drops below a critical value.

- **Internal PI controller**
  The moment the SmartDrive MX loses continuous radio contact (three times wake-up without reception) to its taught controller / gateway the internal PI controller will take over and will adjust the temperature according to the set temperature value. A parallel option is local adjustability of target temperature by operating the dial.
  Additionally, the display screen shows the symbol ->><-. A message sent by the controller may appear on the smartphone/PC. Simultaneously the SmartDrive MX uses the reclaim telegrams to check the availability of the controller at every wake-up. The centre will reassume control as soon as connection has been re-established.

- **Radio interface**
  The SmartDrive MX comprises an EnOcean radio interface based on 868.3 MHz, as per ISO/IEC 14543-3-10 featuring extremely low energy consumption. The EEP belonging to the SmartDrive MX is A52004.

- **Manual setting of target temperature manually**
  The manual setting option for target temperature is available via the dial at all times. As soon as the dial is turned the SmartDrive MX will wake up and show the set target value on the display. This temperature is shown for a range of 10°C to 30°C in 0.5°C steps.

- **Room and supply temperature detection**
  Supply and room temperature are both detected by an integrated temperature sensor. A specially developed correction algorithm clears the measured values of other temperature influences. Thus, actual temperature values are determined and forwarded for further processing.

- **Frost protection**
  The lowest adjustable target temperature is 10°C. As soon as the actuator has been taught and connection to the controller has been established, the room temperature will not drop below 10°C. If the actuator detects via the internal sensor that the room temperature has dropped below a value of 10°C, the controller will receive additional communication. (error telegram 0x14 -> !20). If radio connection is interrupted permanently, the internal PI controller will take over on reaching the temperature threshold of 10°C and control the room temperature in such a way that it reaches 10°C.
  A precondition for this control is, however, that sufficient heating performance is in place.

- **Valve blocking protection**
  The blocking protection prevents a locking of the cone during longer valve shut down. Variable definitions of cycle as well as route are available with the help of the controller.

- **Micro USB interface**
  The micro USB interface can be used for providing the SmartDrive MX with energy.

- **Keyboard lock**
  It is possible for the SmartDrive MX to receive a command for key locking via the controller. In that case, you will no longer be able to set the target temperature for the SmartDrive MX manually. If key lock is enabled during the emptying of the batteries, it will be disabled for the new adapting process. If the SmartDrive MX will loose the connection to the controller, the input lock will be disabled to allow a manual temperature control.

- **Transmitting cycle**
  The SmartDrive MX spends the greater part of its operating time in deep sleep mode so as to keep energy consumption as low as possible. You can select the periods for deep sleep mode by using a radio telegram from a selection of 63 time cycles. The predefined times for the deep sleep mode range from 10s to 42h. If the index of this field variable is set to 50 or above, the actuator will interpret this as a command for changing to so-called summer mode.

- **Summer mode**
  Summer mode is characterized by deep sleep mode that from now on will last at least 3h. The moment this mode is enabled, the valve will open completely, thus conserving the valve seal among other things. You can exit summer mode by reducing the cycle period for the deep sleep mode to an index that is smaller than 50. Afterwards, you must re-adapt the actuator to the valve so as to re-establish reliable operation.

- **Error messages**
  Various errors may occur during normal operation or commissioning. Error messages are displayed on the display screen and communicated to the controller by radio.
  For possible error messages, see checklist.

2.5   Data Transfer

The SmartDrive MX comprises a bidirectional EnOcean interface. This allows data transmission in either direction between the SmartDrive MX and the centre.

■   **The following data can be sent by SmartDrive MX :**
*   Current valve position
    The current valve position is transmitted as a percentage value ranging from 0% to 100%.
*   Supply temperature
    The current supply temperature is transmitted, ranging from 20 °C to 80 °C.
*   Target temperature
    The target temperature set manually at the SmartDrive MX is transmitted, ranging from 10 °C to 30 °C.
*   Room temperature
    The current room temperature is transmitted, ranging from 10 °C to 30 °.
*   Error codes
    The SmartDrive MX can send error messages to a remote computer.
    ⇨ *8 Trouble shooting* on page 15
*   Teaching telegram
    Additionally, there is the option of sending a teaching telegram (according to EnOcean Smart Acknowledge-Standard) in order to connect the SmartDrive MX to a controller.

■   **The following data can be received by the SmartDrive MX:**
*   Target valve position
    The target valve position is transmitted as percentage value, ranging from 0% to 100%.
*   Target temperature
    The target temperature, ranging from 10 °C to 30 °C can be transmitted by a centre to the SmartDrive MX .
*   Transmitting cycle
    The transmission cycle can be adjusted with the help of a command. Possible time values have been defined for that purpose.
*   Adaptation
    You can introduce a new adaptation process with the help of a command.
*   Assembly status
    To facilitate assembly or disassembly you can use a command that makes the thermostat tappet retract completely.
*   Input lock
    You can use a telegram from a centre that disables or enables local entries by dial or control key.
*   Temperature Measurement
    Temperature monitoring can be disabled by telegram. (if using a separate, external temperature senor)
*   Summer / winter function
    Switching between summer and winter function

Hint: EnOcean Equipment Profile (EEP code) and transmission cycle available on request

2.6 Technical data

Type	Electromechanical
Place of application	Dry rooms
Movement type	Linear
Threaded connection	M30 x 1.5
Admissible supply temperature	to 90 °C
Actuating time	3,3 s/mm
Actuating force	100 N
Actuating lift	5.5 mm
Stroke resolution	< 0.033 mm/step
Detection of final positions	both-sided
Fail safe function	existing
Control range	10 °C to 30 °C
Target value sensor	Step-by-step from 10 °C to 30 °C in 0.5 K steps
Radio interface frequency	868.3 MHz
Radio interface protocol	EnOcean, Smart Acknowledge
Function interface telegram structure	Bi-directional EnOcean Equipment Profile
Range	30 m inside building, dependent on building material
Wake-up time	process and time controlled (variable adjustable)
Transmitting cycle	process and time controlled (variable adjustable)
Protection	IP30, protection class III
Energy supply	Batteries 2 x 1.5 V, type AA
Reverse battery protection	existing
Battery life	approx. 4 years
Input power standby	2µW
Input power maximum	Active$_{max}$ 450 mW
Display screen	Adaptation Teaching mode Battery status Keyboard lock Target value Error codes Connection interrupted
Display size (active area)	1.68" 33.02 x 26.955 mm (W x H)
Material characteristics	Case ABS, PA6.6, PMMA Valve connection MS 58 (2.0401) Cap nut MS 58 (2.0401)
Weight (including batteries)	approx. 250 g
Noise output level	< 30 dB (A)

table 2   Technical data

2.7   Environmental conditions

Ambient temperature	Operation	+5 °C to +40 °C
	Storage	-15 °C to + 60 °C
	Transport	-15 °C to +60 °C
Humidity	Operation	5% to 80% r.f. (non-condensing)
	Storage	5% to 80% r.f. (non-condensing)
	Transport	5% to 80% r.f. (non-condensing)

table 3   Environmental conditions

3   Transportation & Storage

- Avoid impacts, blows, vibrations and similar to the SmartDrive MX.
- Store the SmartDrive MX in a dry place.
- Please pay due attention to transport and storage temperatures.

4   Assembly

The Smart-Drive MX is easy to install. You do not have to drain the heating system, nor are there any interruptions to the heating system. The SmartDrive MX is suitable for all commercially available valves with M30x1.5 connection.
The scope of delivery includes 2 batteries, type AA.

Before you install the SmartDrive MX:

⇨ *4.1 Checking the scope of delivery* on page 11

The following sequence of operations is part of the SmartDrive MX:

⇨ *4.2 Insert batteries* on page 12
⇨ *4.3 Assembling the SmartDrive MX* on page 13

4.1   Checking the scope of delivery

1   Check the packaging for damage.
2   Dispose of packaging in an environmentally friendly manner.
3   Check the delivered items against the delivery note in order to see whether the delivery is complete.
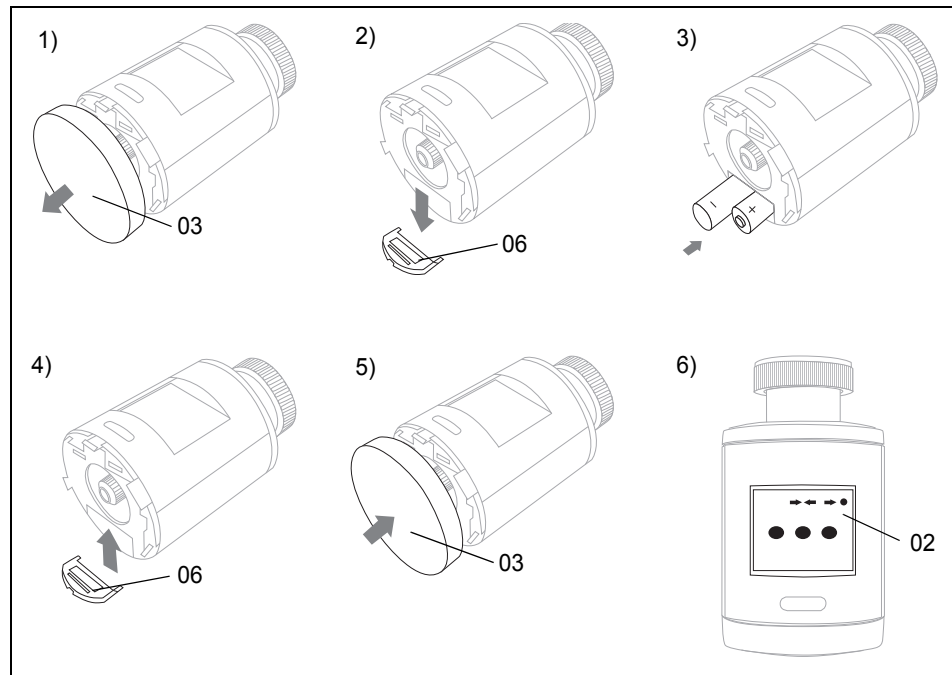4   Report any missing or damaged products to the manufacturer.

diagram 4   Insert batteries

4.2   Insert batteries

⇨ *diagram 4* on page 12

■   **How to insert the batteries**

1   Remove the cover from the dial **(03)**.

2   Remove the cover from the **(06)** battery compartment.

3   Insert the batteries.

⚠ **ATTENTION**

Do not use rechargeable batteries!
•   Do not use rechargeable batteries as their voltage is insufficient.
•   When inserting the batteries pay attention to their polarity.

4   Reattach the cover **(06)** of the battery compartment.

5   A concluding symbol will appear on the display screen **(02)**.
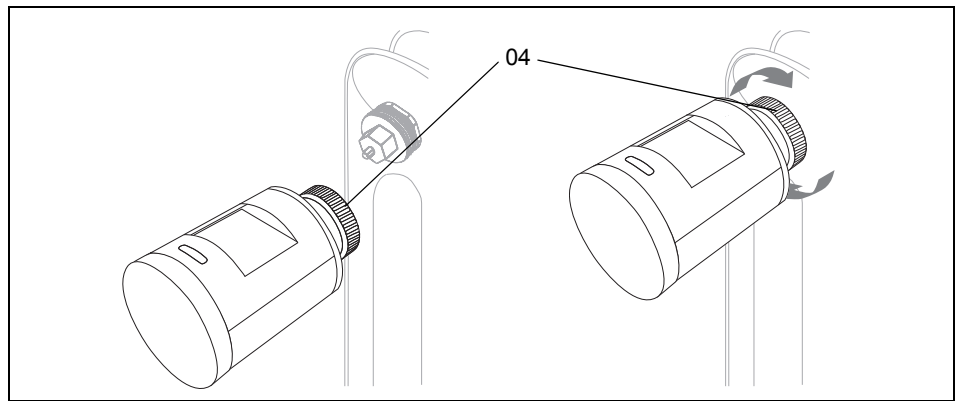
6   Reattach the dial **(03)**.

diagram 5   Assembling the SmartDrive MX

4.3   Assembling the SmartDrive MX

⇨ *diagram 5* on page 13

■   **How to assemble the SmartDrive MX**

1   Screw the SmartDrive MX threaded connection **(04)** onto the heating valve.

2   Tighten the threaded assembly.

5   Commissioning

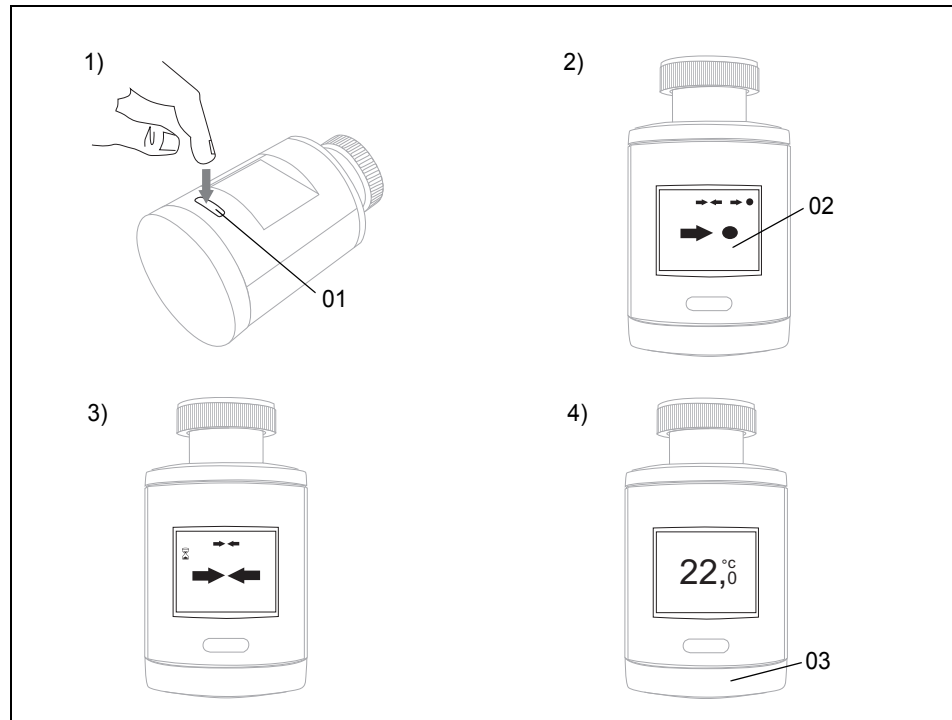Make sure that the SmartDrive MX is properly screwed down.

diagram 6   Initialisation

5.1   Initialisation

⇨ *diagram 6* on page 14

■ **How to start the initialisation**

1   Operate the key **(01)** briefly.

2   The adaptation process will be starting**.** Wait until the adaptation process has been completed and the symbol on the display screen has disappeared.**(02)**

3   The SmartDrive MX is ready for operation.

4   Press and hold the key **(01)** until the teaching symbol on display of SmartDrive MX appears. The SmartDrive MX will then send the teaching telegram to the master central unit.

5   Optionally you can set a comfortable temperature with the help of the dial **(03)**.

6   Maintenance

Apart from battery replacement the SmartDrive MX does not require any maintenance by the user. Replace the batteries as soon as a weak battery status is indicated by the display or via the main device. The SmartDrive MX does not require continuous or periodical maintenance.

Do not clean the surface by using sponges or abrasive cleaners as this results in scratches or a matt surface. For cleaning, use a damp, non-fluffy cloth without scouring or cleaning agents.

7 Disposal

SmartDrive MX and batteries do not belong in domestic waste. They must be disposed of according to country-specific guidelines and laws. That way, you contribute to the protection of the environment and support sustainable recycling of raw materials.

8 Trouble shooting

If the SmartDrive MX does not work properly follow the sequence of operations described below in order to remedy the fault:

1 Check whether the SmartDrive MX was correctly assembled.

2 Remedy the fault by following the check list.

8.1 Check list for breakdown on page 15

8.1 Check list for breakdown

Message	Error / possible cause	Rectification
!17	Measurement failed / an error occurred during temperature detection.	☐ If this error happens repeatedly, get in contact with customer services.
!18	Batteries empty / predefined voltage threshold not reached	☐ Replace the batteries
!20	Frost protection / Temperature has dropped below 10 °C.	☐ Insufficient heating performance Close the window or check the heating system, as the case may be.
!33	Problems with lift adjustment; blocked valve actuator	☐ Check, whether the valve tappet is running well; contact customer services, as required
!36	Error during adapting; tappet contact was not triggered / blocked valve actuator or valve not running properly	☐ Check, whether the valve tappet is running well; contact customer services, as required
!40	Error during adapting; valve was not detected / limit position was not detected / valve not running properly or unsuitable	☐ Check, whether the SmartDrive MX was mounted rigidly; contact customer services, as required.
!49	No controller; address not known at centre	☐ Carry out reset, repeat teaching process; contact customer services, as required
!53	Telegram not fetched / connection to centre interrupted	☐ Change the position of the central unit or use a repeater.
!54	Storage of centre address failed / teaching process unsuccessful	☐ Contact a service representative

table 4 Check list breakdown

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