



Monitoring System TAPGUARD® 260

Quick Reference Guide

2349487/01 EN



INDICATION MEASUREMENTS
Pos 15
Dir. str. ins.: Dir. s. ins. 1
Mot. dr. no.: 1023972
OLTC no.: 1024546
OLTC type: OLTAP® M

F1
F2
F3
F4
F5

← → ↶ ↷ ESC MENU TAPGUARD® 260



1 Introduction

This quick reference guide contains information for quick start-up of the device. It does not provide comprehensive operating instructions.

1.1 Manufacturer

The product is manufactured by:

Maschinenfabrik Reinhausen GmbH

Falkensteinstraße 8
93059 Regensburg, Germany
Tel.: (+49) 9 41/40 90-0
Fax: (+49) 9 41/40 90-7001
E-mail: sales@reinhausen.com

Further information on the product and copies of this technical file are available from this address if required.

1.2 Completeness

This technical file is incomplete without the supporting documentation.

1.3 Supporting documents

The following documents apply to this product:

- Operating instructions
- Quick reference guide
- Connection diagrams

Also observe generally valid legislation, standards, guidelines and specifications on accident prevention and environmental protection in the respective country of use.



2 Product description

This chapter contains an overview of the design and function of the product.

2.1 Operating concept

The monitoring system is operated by keys for parameterization and configuration on the front panel of the device. Alternatively, configuration is also possible via the TAPCON®-trol visualization software.



The monitoring system is equipped with a key lock to prevent unintentional operation. To activate or deactivate, press the **ESC** and **F5** keys simultaneously.

Manual mode

Manual mode is an additional safety feature of the monitoring system and protects the parameters from being unintentionally changed.

The following activities cannot be performed until you have activated manual mode:

- Acknowledging events
- Acknowledging maintenance
- Changing parameters



You can change the parameters regardless of manual mode via the visualization software TAPCON®-trol.

To activate manual mode, proceed as follows:

▶ Press .

⇒ The relevant LED lights up.

Manual mode is activated. If no key on the monitoring system has been pressed after more than 5 minutes, manual mode is automatically deactivated.

2.2 Serial interface

The parameters for the device can be set using a PC. The COM 1 (RS232) serial interface on the front panel is provided for this purpose. You can use the connection cable supplied to establish a connection to your PC via the RS232 or USB port (using the optional USB adapter).

TAPCON®-trol software is needed for parameterization via the serial interface. The software and the related operating instructions are contained on the CD provided.

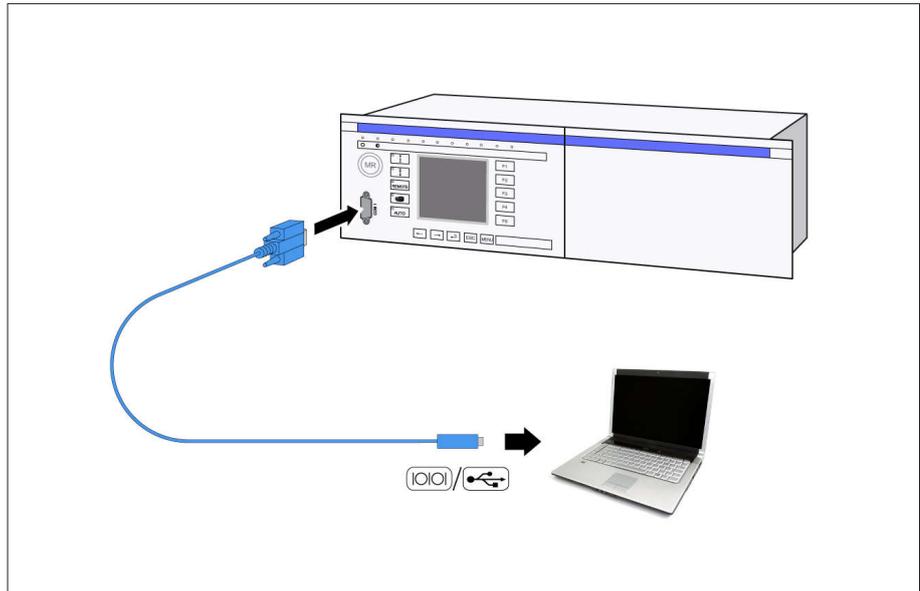


Figure 1: Device connection to a PC

3 Mounting

This chapter describes how to correctly mount and connect the device. Note the connection diagrams provided.

WARNING



Electric shock

Danger of death due to electrical voltage.

- ▶ De-energize device and system periphery and lock to prevent switching back on again.

3.1 Installing and wiring temperature sensors

The following sections describe how to install and wire the temperature sensors for the diverter switch oil and the transformer oil.

3.1.1 Connecting temperature sensor for on-load tap-changer oil

A temperature sensor is mounted in the on-load tap-changer head cover in each on-load tap-changer. You have to perform the wiring in accordance with the connection diagram that came with the motor-drive unit. Please observe the following:



Do not loop the temperature sensor connecting leads when laying because this may cause voltage coupling and result in measurement errors.

To connect the temperature sensor for the on-load tap-changer oil, proceed as follows:

1. Place the shielding of the sensor connecting lead on the grounding rails in the motor-drive unit.
2. Connect the sensor connecting lead to the terminals in the motor-drive unit as shown in the connection diagram.

- Remove the temperature sensor cover on the on-load tap-changer head cover.

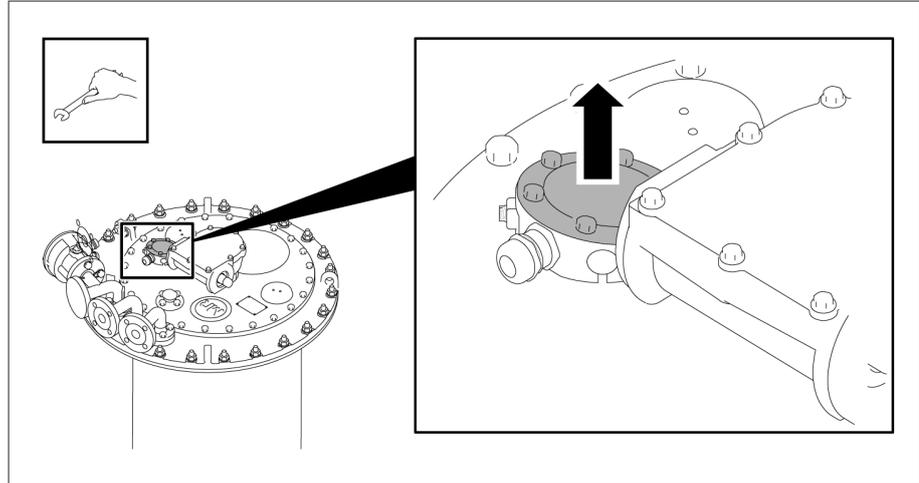


Figure 2: Removing temperature sensor cover

- Remove the shielding of the sensor connecting lead on the temperature sensor.
- NOTICE!** Do not place shielding in temperature sensor. Insulate temperature sensor connecting leads using shrink tubing such that the shielding is no longer exposed. If this is not done, current may flow via the shielding and the device may be damaged.

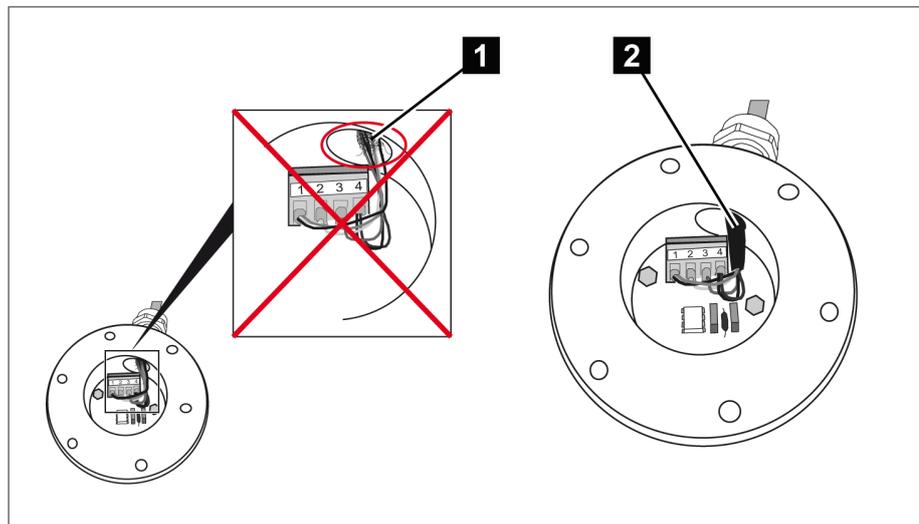


Figure 3: Correct insulation of connecting lead shielding

1 Exposed shielding

2 Correctly insulated connecting lead

- NOTICE!** Guide connecting leads into temperature sensor. Ensure that the cable entry point is watertight. If not, the temperature sensor may be damaged.



7. Wire sensor connecting lead in the temperature sensor as shown in the connection diagram.
8. Close temperature sensor cover.



When you close the temperature sensor cover, make sure that the seal is correctly positioned and that no connecting leads are wedged in.

9. Ground the temperature sensor housing on the on-load tap-changer using the grounding cable.

The temperature sensor is connected. Please continue with the next section to connect the transformer oil sensor.

3.1.2 Connecting temperature sensor for transformer oil

You have to perform the wiring in accordance with the connection diagram that came with the motor-drive unit.



Do not loop the temperature sensor connecting leads when laying because this may cause voltage coupling and result in measurement errors.

1. Open the transformer thermometer case.
2. Fill the thermometer case with oil until the heat conduction sensor is completely immersed in oil.
3. Place the shielding of the sensor connecting lead on the grounding rails in the motor-drive unit.
4. Connect the sensor connecting lead to the terminals in the motor-drive unit as shown in the connection diagram.
5. Remove the temperature sensor cover.
6. Remove the shielding for the sensor connecting lead on the transformer oil sensor.
7. **NOTICE!** Do not place shielding in temperature sensor. Insulate temperature sensor connecting leads using shrink tubing such that the shielding is no longer exposed. If this is not done, current may flow via the shielding and the device may be damaged.
8. **NOTICE!** Guide connecting leads into temperature sensor. Ensure that the cable entry point is watertight. If not, the temperature sensor may be damaged.
9. Wire sensor connecting lead in the temperature sensor as shown in the connection diagram.
10. Mount the temperature sensor cover.



When you close the temperature sensor cover, make sure that the seal is correctly positioned and that no connecting leads are wedged in.

3.1.3 Checking temperature sensors

After connecting the temperature sensors, check the values measured. To do so, proceed as follows:

MEAS. VALUES	
Load current	750 A
Mot. dr. temp.	??? °C
Ambient temp.	??? °C
Transf. oil temp.	??? °C
Div. sw. oil temp.	??? °C
F1 / F5: back / forward	
< 00 1 / 1 >	

1. Switch on device and wait until the operating screen appears.
2. **MENU** > **F5** Info > **F3** Meas. values.
⇒ Measured values.
▶ Compare the "Transf. oil temp." and "OLTC oil temp." measured values shown with the real values.

3.2 Connecting tap-change supervisory control

The tap-change supervisory control is integrated in the tap changer. The connecting leads are led out through a terminal box on the tap changer head's pipe connection.



Do not loop the tap-change supervisory control connecting leads when laying because this can cause voltage coupling and result in measurement errors.

To connect the tap-change supervisory control to the device, proceed as follows:

1. Remove terminal box cover.
2. Remove connecting lead shielding.
3. **NOTICE!** Do not place shielding in terminal box. Insulate tap-change supervisory control's connecting leads with a shrink-fit hose such that the shielding is not exposed. If this is not done, current may flow via the shielding and the device may be damaged.

4. Insert connecting lead through terminal area into terminal box.

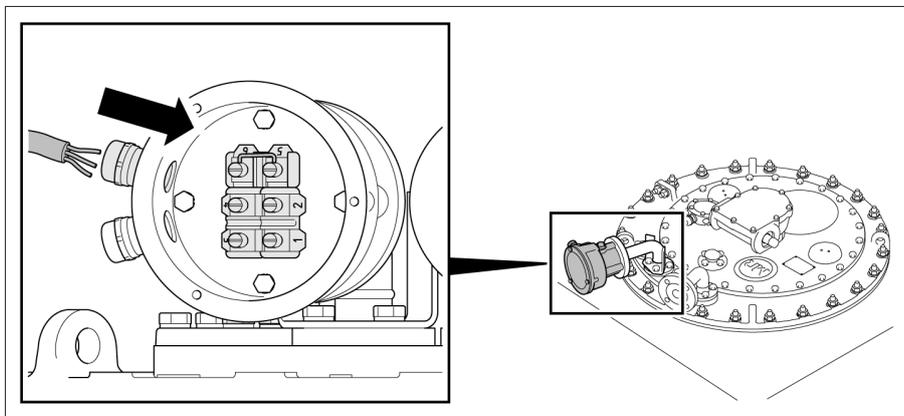


Figure 5: Connection of the tap-change supervisory control

5. Wire connecting lead in accordance with motor-drive unit's connection diagram.
6. Fit terminal box cover.



When you close the temperature sensor cover, make sure that the seal is correctly positioned and that no connecting leads are wedged in.

3.3 Connecting load current measurement

You have to perform the wiring for the load current measurement in accordance with the connection diagram that came with the motor-drive unit. The following signals can be wired:

- 4...20 mA (AD8 card)
- 0.2 A, 1 A or 5 A (MI card)

To connect the load current measurement, proceed as follows:

1. Wire load current measurement in accordance with motor-drive unit's connection diagram.
2. Only with load current measurement via MI card: Remove short-circuiting jumper (see connection diagram, terminals X1:255 and X1:256 in standard version).
3. Check load current shown on device display by pressing the  key in the main screen.



- ⇒ If, after a minute, a value for the load current is displayed that does not equal the on-load tap-changer's maximum current, the connections are correctly wired.



A load current is only displayed when there is a valid signal at the input used for the load current measurement (> 0 A when measuring via MI card or > 4 mA when measuring via AD8 card). If there is no valid signal, the maximum on-load tap-changer current is displayed.

3.4 Wiring status relay

The status relay reports the current status of the device. Maschinenfabrik Reinhausen recommends transferring the signal to your control room. To do so, proceed as follows:

- ▶ Wire status relay IO-X1:01/02/03 to your control room in accordance with the connection diagram.

4 Commissioning

You need to set several parameters and perform function tests before commissioning the device. These are described in the following sections.

NOTICE

Damage to device and system periphery

An incorrectly connected device can lead to damages in the device and system periphery.

- ▶ Check the entire configuration before commissioning.
- ▶ Prior to commissioning, be sure to check the actual voltage and operating voltage.

4.1 Setting COM1 baud rate

You can use the baud rate parameter Baud rate to set the COM1 interface's baud rate. You can select various baud rates.

To set the baud rate, proceed as follows:



1. Press .
 - ⇒ The manual mode is active and the associated LED lights up.
2.  >  General > Press  until the desired display appears.
 - ⇒ COM1 setting.
3. Press  or  to set the option you want.
4. Press .
 - ⇒ The baud rate is set.

4.2 Setting date and time

You must set the system date and system time on the device. You must set the date and time in the following formats:

Date	Time
DD.MM.YY	HH:MM:SS

Table 1: Formats



The time does not switch from daylight saving time to standard time and back automatically. You have to change the time manually.

To set the time, proceed as follows:



1. Press .
 - ⇒ The manual mode is active and the associated LED lights up.
2.  >  > General > Press  until the desired display appears.
 - ⇒ Date and time
3. Press  to highlight a digit.
 - ⇒ The desired position is highlighted and the value can be changed.
4. Press  to increase the value or  to reduce it.
5. Press .
 - ⇒ The date and time are set.

4.3 Setting the language

You can use this parameter to set the display language for the device. To set the language, proceed as follows:

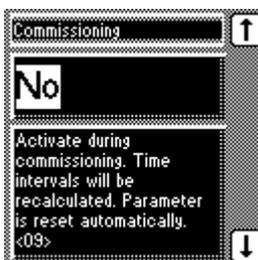


1. Press .
 - ⇒ The manual mode is active and the associated LED lights up.
2.  >  General.
 - ⇒ Language
3. Press  or  to select the required language.
4. Press .
 - ⇒ The language is set.

4.4 Activating commissioning mode

When commissioning the transformer at the installation site, you must use the parameter to activate commissioning mode. This resets the maintenance intervals.

To activate commissioning mode, proceed as follows:



1. Press .
 - ⇒ The manual mode is active and the associated LED lights up.
2.  >  General > Press  until the desired parameter is displayed.
 - ⇒ Commissioning
3. Press  to select the Yes option.
4. Press .
 - ⇒ The maintenance intervals are reset.



4.5 Setting communication interface

The following section describes how to configure the communication interface.

4.5.1 Setting CIC1 card and CIC2 card

Depending on the control system protocol, you have to set the following parameters:

Parameters	IEC 60870-5-101	IEC 60870-5-103	MODBUS ASCII/RTU	DNP3	ABB SPA	TAP-CON®-trol
Communication port	X	X	X	X	X	X
Baud rate communication	X	X	X	X	X	X
Network address	-	-	X	X	-	X
TCP port	-	-	X	X	-	X
OF light on/off	X	X	X	X	X	-
MODBUS ASCII/RTU	-	-	X	-	-	-
Local SCADA address	X	X	X	X	X	-
SCADA master address	-	-	-	X	-	-
Unrequested messages	-	-	-	X	-	-
Repeatedly unrequested messages	-	-	-	X	-	-
Appl. confirm. time exceeded	-	-	-	X	-	-
RS485 transmit delay time	X	X	X	X	X	X

Table 2: Device parameters

To set the parameters, proceed as follows:

- ▶ **MENU** > **F4** Configuration > **F5** Continue > **F5** Continue > **F4**
Comm. interface 1 or **F5** Comm. interface 2 > Press **→** until the desired parameter is displayed.

4.5.2 Setting SID card

The SID card interface is used to connect the device via the IEC 61850 control system protocol. You must set the following parameters for this:

- Network address
- Network mask
- Gateway
- Time server address
- IED name

To set the parameters, proceed as follows:

- ▶ **MENU** > **F4** Configuration > **F3** Communication > Press **→** until the desired parameter is displayed.

4.6 Restarting device

Once the communication interfaces have been set, you must restart the device.

4.7 Checking event LED

For commissioning, check the device's event LED. This LED must light up green. If the LED lights up yellow or red, proceed as follows:

1. Call up Events [▶ 17] menu.
 2. Perform troubleshooting and countermeasures in accordance with list of events in operating instructions.
 3. Acknowledge event [▶ 18].
- ⇒ The event LED lights up green.

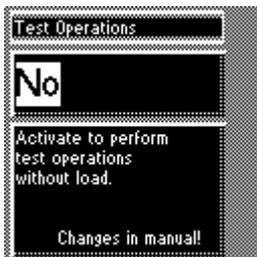
4.8 Performing test operations

In order to complete the commissioning of the TAPGUARD® 260, you have to perform test operations. The device has a "Test operations" parameter. If this parameter is activated, the wear and soot from the subsequently performed tap-change operations are not taken into account. The "Test operations" LED lights up if the parameter is activated.

The "Test operations" mode is automatically deactivated under the following conditions:

- A load current was measured for more than 1 minute.
- 8 hours after the parameter was activated.

To carry out the test operations, proceed as follows:



1. Press **☞**.
⇒ The manual mode is active and the associated LED lights up.
2. **MENU** > **F2** General > Press **→** until the desired display appears.
⇒ Test operations.
3. Press **F1** or **F5** to set the option you want.
4. Press **←**.
⇒ The "Test operations" parameter is activated.
5. Switch through the entire regulating range twice.



- ⇒ No events may occur.
- ⇒ The torque curve characteristic must be at least 50 Nm below the red signal line.
- ⇒ The tap position designations shown in all positions must match those of the motor-drive unit.

4.9 Cooling system control

When supplied, the parameters of the cooling system control are set to defaults. To commission the cooling system control, set these parameters in accordance with your system configuration.

You will find a description of how to configure the cooling system control in the operating instructions provided.

5 Operation

5.1 Maintenance

5.1.1 Confirming maintenance

If maintenance was performed, this must be confirmed in the monitoring system. Only confirmed maintenance work does not result in new maintenance events. As soon as maintenance work is confirmed, a corresponding note is written in the maintenance history database.



The wear values of the on-load tap-changer contacts measured during maintenance work on the abrasion parts must be entered in the corresponding Menu prior to confirming maintenance.

Depending on the scope of maintenance work undertaken, you must confirm the following maintenance on the TAPGUARD® 260:

Maintenance	Criterion for confirmation
Abrasion parts	Maintenance was performed in accordance with the MR standards.
Oil change + cleaning	An oil change and cleaning of diverter switch insert, oil compartment and oil conservator was performed.
Diverter switch insert replacement	A new diverter switch insert was inserted.
Tap selector inspection	A tap selector inspection was undertaken.
Oil sample	After maintenance: The oil was changed and the limit values for filled insulating oil specified by MR were adhered to. During operation: An oil sample was taken and analyzed; the limit values for filled insulating oil specified by MR were adhered to.
No. on-site tap-change operations	Depending on criteria of operator. You can undertake the setting on site.
On-site time	Depending on criteria of operator. You can undertake the setting on site.
Oil filter change	Only if oil filter unit is fitted: A new oil filter was fitted into the oil filter unit.

Table 3: Maintenance and associated criteria for confirmation

To confirm maintenance, proceed as follows:



1. Press .
 - ⇒ The manual mode is active and the associated LED lights up.
2. > Configuration > 6 x > Service > Press until the desired display appears.
 - ⇒ Reset abrasion parts.
3. Press to select the Yes option.
4. Press .
 - ⇒ A security question appears.
5. Simultaneously press and to confirm maintenance.
 - ⇒ Maintenance is confirmed.

5.1.2 Confirming maintenance event

Maintenance events can be acknowledged just like normal event messages. You can find the description of the procedure in the Acknowledging event messages [► 18] section.



In order to reset a maintenance event permanently, maintenance has to be performed and confirmed. Otherwise, the event reoccurs after a certain number of tap-change operations. The number of tap changes can be defined using the "Max. tap changes after ack." parameter.

5.2 Event messages

The monitoring system monitors various events during operation and issues corresponding event messages. After an event occurs, the event message is immediately displayed on the monitoring system.

If an event message is displayed, this can be hidden by pressing the key. The events are recorded and can be displayed in an event overview.

Possible events are, for example, general status reports, when limit values are exceeded or function faults. You can find a detailed list of the possible event messages in the operating instructions provided.

The events are marked in color depending on their priority:

Green	General status message.
Yellow	Announcement or advance warning. Determine the cause of the event message. You can continue to operate the on-load tap-changer without any limitations.
Red	Immediate activity by the service team is required. You cannot continue to operate the on-load tap-changer.

Table 4: Color coding of the events



If a red event appears, the "Red alarm message" relay is triggered. This blocks further tap-change operations in the motor-drive unit.

NOTICE

Damage to the transformer and/or on-load tap-changer after a red event.

Performing additional tap-change operations on the motor-drive unit without analyzing the cause of the red event can lead to on-load tap-changer and/or transformer damage.

- ▶ Check what caused the red event, decide whether to continue operating the on-load tap-changer depending on the cause.
- ▶ Contact Maschinenfabrik Reinhausen's Technical Service department.

5.2.1 Displaying event messages

The recorded event messages can be displayed in an overview.

To call up the event overview, proceed as follows:



- ▶ **MENU** > **F5** Info > **F4** Events.
- ⇒ Event overview.

By pressing the **→** key, you can display the events in detail. In doing so, the red events are displayed first and then the yellow events.

5.2.2 Acknowledging event messages

The monitoring system sorts the events into confirmable events and non-confirmable events.

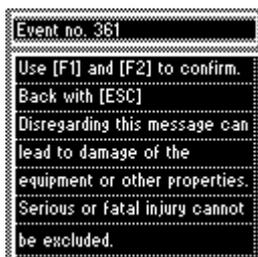
As a rule, non-confirmable events are events that are based on signals on inputs. These events acknowledge themselves as soon as the signal resumes a valid value. All other events have to be acknowledged by the operator.

If you acknowledge an event message, this is no longer displayed in the event overview. If the cause of the event message is not remedied, the event message reappears immediately.



Contact Maschinenfabrik Reinhausen before acknowledging a red event. If the event message has been caused by a hardware defect, you first have to remedy the defect before acknowledging the event message.

To acknowledge an event, proceed as follows:



1. Press .
 - ⇒ The manual mode is active and the associated LED lights up.
2.  >  Info >  Events.
3. Press  until the desired event message appears.
4. Press  to acknowledge the event.
 - ⇒ A warning notice is displayed.
5. Press  and  at the same time to acknowledge the event.
 - ⇒ The event is acknowledged.

5.2.3 Changing event text

The event texts can be adapted to meet customer requirements. To do so, the TAPCON®-trol visualization software is needed.

The process is described in the operating instructions of the TAPCON®-trol visualization software that comes with TAPGUARD® 260.

5.3 Displaying firmware version and device ID

To display the firmware version and device ID, proceed as follows:



- ▶  >  Info >  Gen. information.
- ⇒ The firmware version (date) is shown in the 3rd line.
The device ID is shown in the 4th line (e.g. 01E4)



6 Checklist

Observe the following checklist to perform commissioning:

No	Description	Complete
1	Connect and check temperature sensors	
2	Connect tap-change supervisory control	
3	Connect and check load current measurement	
4	Wire status relay	
5	Set COM1 baud rate	
6	Set date and time	
7	Set language	
8	Set communication interfaces (optional)	
9	Restart device	
10	Activate commissioning mode	
11	Perform test operation	
12	Check event LED	

Table 5: Checklist

MR worldwide

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