



**Translation from the original  
Torque transducer  
PLARAD<sup>®</sup> Torque Control TC1  
for PLARAD<sup>®</sup> nut runner**



Store for future reference.

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# 1 Identification

## 1.1 Manufacturer

Manufacturer: Maschinenfabrik Wagner GmbH & Co. KG  
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 Place: 53804 Much, Germany  
 Phone: +49 (2245) 62-0  
 Fax: +49 (2245) 62-22  
 Email: [info@plarad.de](mailto:info@plarad.de)  
 Internet: [www.plarad.de](http://www.plarad.de)

Hereinafter "PLARAD"

## 1.2 Product identification

The PLARAD torque transducer is identified by a type plate.

Machine designation: Torque Control torque transducer  
 Type designation: TC1 11 / 31 / 41 / 55\*  
 \*Hereinafter "TC1".



## 1.3 Document identification

PA No.	Version	Date	Reason for change / comments
69514	1.0	21/12/2016	Initial version / UBR
69514	2.0	14/01/2020	New layout / adjustments / correction / PW

File: 2\_BA\_TC1\_GBR\_V2.0\_69295

## 2 User instructions

### 2.1 Purpose of the document

This operating manual is intended to familiarise the owner/operator with the machine and provide information about its possible applications and intended use. The operating manual contains important information that allows the owner/operator to use the machine safely, correctly and efficiently. Observing this information helps avoid hazards, minimise repair costs and downtimes and increase the reliability and service life of the machine.

#### Information about precautions to be taken by the owner:

- Only entrust personnel who have the necessary qualification for the respective work with tasks on the machine.
- Clearly define the responsibilities and accountabilities of the operating and maintenance personnel.
- Supplement the operating manual by rules arising from national regulations regarding occupational health and safety and the environment (e.g. work organisation).
- Order and occasionally verify compliance with the operating manual and its supplements. Keep a copy of the operating manual at the place where the machine is used at all times!
- Only operate the machine when it is in technically faultless condition and maintain this.

In addition to the operating manual, the mandatory accident prevention regulations applicable in the country and the place where the machine is used must be observed. In addition, all recognised technical rules devised to ensure safe and correct working must be observed.

### 2.2 Target groups

- a) The **owner** as the superior legal person is responsible for the intended use of the machine and the training and deployment of authorised persons. He defines the mandatory competences and authorisations of the authorised personnel for his company.
- b) A **specialist** is defined as a person who is capable of assessing the tasks assigned to him and recognising possible hazards due to his professional training, knowledge and experience. This person is also familiar with all applicable regulations. Only trained specialist personnel or such personnel who have been selected and found capable by the owner are qualified to work with the machine.
- c) A **trained/instructed person** is a person who has been instructed and, if necessary, trained in the assigned tasks and the possible risks for incorrect behaviour. This person has also been informed about the necessary safety devices and protective measures. Personnel to be qualified, trained, instructed or undergoing general job training may only act under the constant supervision of an experienced person.

## 2.3 Re-orders and copyright

Additional copies of this operating manual can be ordered at the address specified in chapter 1.1 "Manufacturer". All rights are expressly reserved. Copying or disclosing the content of this operating manual to third parties - in which form whatsoever - is not permitted without our written approval.

## 2.4 Liability and warranty

All tasks and instructions provided in this operating manual are based on our previous experience and findings and given to the best of our knowledge. The original version of this operating manual was prepared in German and reviewed by us for technical accuracy. The translation into the respective national/contractual language has been prepared by a certified translation agency.

This operating manual has been compiled with the greatest level of care. However, if you discover any parts that are incomplete and/or incorrect, please notify us in writing. Your suggested improvements help us create an operating manual that is more user-friendly.

# 3 Product safety

The prerequisite for the safety-compliant handling and trouble-free operation of this machine is knowledge of the basic safety instructions.

## 3.1 Organisational measures

- a) The operating manual must always be kept in legible condition and readily available at the place where the machine is used!  
The operating manual needs to be supplemented by rules that incorporate the specific conditions present on site (e.g. duty of supervision and obligation to notify the authorities, work organisation, operational procedures, assigned personnel)
- b) The operating manual also needs to be supplemented by mandatory local regulations regarding accident prevention and environmental protection (e.g. handling hazardous materials, disposal of auxiliary and/or operating materials, and the provision/requirement to wear personal protective equipment)!
- c) Personnel must be instructed to observe the operating manual!

Personnel are required to notify the owner or his agent of any defects or hazards they have discovered.

## 3.2 Technically faultless condition

- a) All safety instructions and warnings at / on the machine must be maintained in complete and legible condition!
- b) Do not make any modifications, attachments and conversions to the machine that could impair safety without consultation/agreement with the manufacturer/supplier!

**Substantial changes to the machine and/or programs may void your warranty claims!**



- c) Observe all intervals for recurring checks/inspections that are required (by law) or set out in the operating manual!
- d) All spare parts used must comply with the technical requirements specified by the manufacturer. This requirement is always satisfied by the use of original spare parts.
- e) When having maintenance work performed independently, make sure to provide the appropriate workshop equipment necessary to complete the work!




## 4 Training of personnel

### 4.1 Selection and qualification of personnel





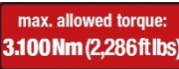
- a) Only reliable personnel are permitted to work on/with the machine. Observe the minimum age requirements stipulated by law!
- b) Only use trained or at least instructed personnel! Instruct and occasionally verify that only authorised personnel are used to work on/with the machine!
- c) Clearly define the responsibilities and accountabilities of the personnel with regard to operation, set-up, maintenance and repair!
- d) Only let personnel undergoing training, instruction or in the context of general training work on the machine while under constant supervision by an experienced person!

## 4.2 Presentation of safety instructions

The operating manual uses the following illustrations to depict safety instructions:






<p><b>Danger:</b> Specifications / instructions and warnings intended to prevent personal injury</p>	 <p>Danger</p>
<p><b>Attention:</b> Particular specifications / instructions and warnings intended to prevent property damage</p>	 <p>Attention</p>
<p><b>Notice:</b> Particular specifications / instructions and warnings regarding the proper and efficient use of the machine</p>	

## 4.3 Symbols and notices on the machine

<p>Read all safety information and instructions. Failure to observe the safety information and instructions can result in electric shock, fire and/or serious injuries.</p>	
<p>Class 2 protective insulation</p>	
<p>This symbol indicates that the product must not be disposed of with regular household waste as specified in the WEEE directive (Waste Electrical and Electronic Equipment Directive, 2002/97/EC) and national laws.</p>	
<p>Service seal specifying the date of the next inspection.</p>	
<p>Notice on the max. permissible load in Nm and ft.lbs</p>	



## 4.4 Personal protective equipment (PPE)

Use gloves	
Use protective footwear	
Wear hearing protection	
Wear protective headgear	
Use protective eye wear	

## 5 Product information

### 5.1. Description

The TC1 merely serves as an accessory for PLARAD nut runners and torque multipliers. The tightening torque is shown on the display.

### Model TC1

All models of the TC1 series have the same functions and properties. The TC1 comes with an LCD graphic display, an integrated battery pack and a serial USB port for using the included software for Windows PCs with an installed copy of Microsoft Office. Its main function is to measure torque data generated during the use of the PLARAD nut runner for tightening an loosening bolted with torque. The data can be saved in the TC1 and transferred to a computer for storage and evaluation with the help of the TC1 Data Trans software.

The TC1 has different modes of operation and is capable of displaying multiple physical units.

## 5.2. Intended use

Within the limits of supply, the machine has been manufactured in accordance with the state of the art and the recognised technical safety rules. Regardless, the use of the machine involves certain risks to the life and limb of the user or third parties as well as the risk of damage to the machine and other material assets.

The machine may only be used if in proper technical condition, in accordance with its intended use, with an awareness of safety and the risks involved and in observance of the operating manual!

It is of particular importance in this regard to have any faults that may affect safety eliminated without delay!

Allow only PLARAD or bodies authorised by PLARAD to install, readjust, modify, expand and repair the device. Use the device only as described in the operating manual. Operating the unit in a safe and reliable manner will otherwise not be possible. Unauthorised modifications may lead to unexpected hazards.

The safety of the operator and the trouble-free operation of the device are only guaranteed if you use original PLARAD components. This applies in particular to parts of the device as well as spare parts. If different components are used, PLARAD cannot guarantee the safe and reliable operation of the device.

The TC1 has been specially designed for nut runners and torque multipliers made by PLARAD and exclusively for the purpose of tightening and loosening bolted joints.

When working on the bolted connection, use only sockets/inserts that are fit to be used with nut runners.

If using other tools or sockets, you need to have them tested and approved for use by the manufacturer. Make sure there is a proper positive connection between the socket and the bolt. Make also sure that there is a proper positive connection between the square drive of the TC1 and the contact surface of the socket.

The TC1 is designed for indoor and outdoor operation within an ambient temperature range of 0 to +50°C. In the case of differences from these conditions, consult the manufacturer before use.

The TC1 may only be used for commercial purposes. Any use deviating from or exceeding the scope of intended use is considered to be improper.

The manufacturer/supplier **cannot** be held liable for any damage resulting from such improper use.

The risk lies solely with the owner.

**Intended use also includes observing the operating manual and the conditions specified for inspections and maintenance.**



## 5.3. Non-intended use

Any use deviating from or exceeding the scope of intended use is considered to be improper. The risk is borne solely by the owner / user.

## 5.4. Other applicable operating manuals

- Operating manual PLARAD Nut Runner DE1/DP1/DA2

## 5.5. Auxiliary and operating materials

**When handling auxiliary and operating materials (e.g. oils, greases and other chemical substances), observe the safety instructions applicable to the product you are using! The information provided in the manufacturer's material safety data sheets must be observed!**



**Attention**

- Material Safety Data Sheet MOBILTEMP SHC 100 (EXXON\_MOBIL)
- Material safety data sheet battery (NiMh)

## 5.6. Technical specifications

<b>Operating ranges</b>	TC1-11: 110 - 1,100 Nm 81 – 811 ft lbs TC1-31: 310 – 3,100 Nm 228 – 2,280 ft lbs TC1-41: 410 – 4,100 Nm 302 – 3,024 ft lbs TC1-55: 550 – 5,500 Nm 405 – 4,056 ft lbs
<b>Power requirement:</b>	Input power – built-in NiMh battery 5-9V DC 150 mA min.
<b>Mains input adapter:</b>	110V – 240V 50/60 Hz
<b>Permissible ambient temperature range:</b>	0°C to 50°C
<b>Weight:</b>	TC1-11: 2.60 kg (5.7 lbs) TC1-31: 4.80 kg (10.58 lbs) TC1-41: 2.70 kg (5.9 lbs) TC1-55: 5.00 kg (11 lbs)
<b>Data transfer:</b>	USB 2.0, type B
<b>Accuracy:</b>	Class 2 (2.0%)
<b>Range</b>	10% to 100% or rated capacity
<b>Display:</b>	4 active digits (positive indicator during clockwise tightening / negative indicator during counter-clockwise tightening, in any units)
<b>Units:</b>	Two available physical units: Ft-lb Nm
<b>Protection rating</b>	IP 20

The technical specifications of accessories and the safety data sheets must be observed as well!



**Attention**

## 5.7. Device assignment

TC1 assignment				
Type/size	TC1-11	TC1-31	TC1-41	TC1-55
Number of teeth (inside and outside)	26	45	26	45
Square (inside and outside)	3/4 "	1 "	1 "	1 1/2 "
DA1-05	X			
DA1-10			X	
DA1-13			X	
DA1-30		X		
DA1-47				X
DP1/DA2 -05	X			
DE1/DP1/DA2 -10	X			
DE1/DP1/DA2 -20			X	
DE1/DP1/DA2 -30			X	
DE1/DP1/DA2 -36			X	
DE1/DP1/DA2 -48				X
DE1/DP1-80				
DE1/DP1-120				
DE/DP08	X			
DE/DP12			X	
DE/DP17			X	
DE/DP28		X		
DE/DP36				X
DE/DP47				X
DE/DP65				
DEDP80				

## 6 Scope of delivery

- Torque Control
- Transport case
- Cable and power supply adapter for charging and data transfer
- USB plug
- Software for data transfer
- Pliers and retaining ring
- Test certificate

Make sure for the proper operation of the TC1 to have read and understood the operating manual of the PLARAD nut runner with which the TC1 is used.

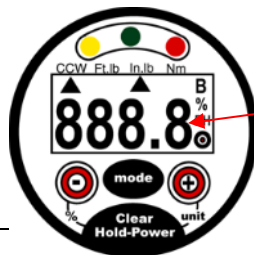


## 7 Description of operation

The display has a 4-digit readout and includes 4 buttons and three LEDs. Some functions of the device require that you press two buttons at the same time. The display can be used in multiple modes of operation, which are described in this document.

### 7.1. Button function

#### 7.1.1. Switch On / Off



a) To switch the TC1 on, press the power button “Clear/Hold/Power”

When not in use for a specified time (adjustable value), the TC1 will switch off automatically to save battery life.

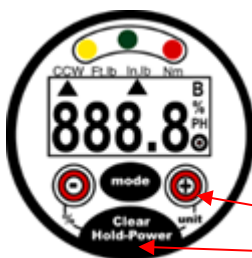
No torque must be applied when you switch on the TC1.

If the TC1 switches off immediately after it was switched on, the device needs to be charged.

All previously made settings (units, setpoint, tolerance %) are stored even if the power supply is shut off and the charge level of the batteries is low.



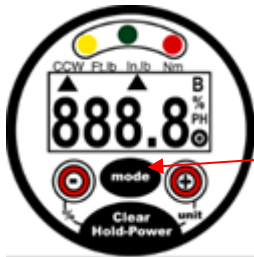
#### 7.1.2. Change units



a) Changing the units requires that you press two buttons at the same time.

b) Start by pressing and holding the “Clear/Hold/Power” before pressing the “+” plus button to change the units.

### 7.1.3. Change the mode of operation from Peak Hold to Track

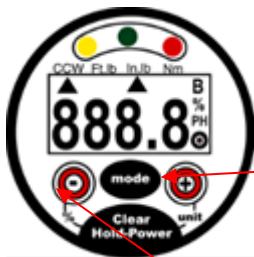


- Press the “mode” to change the measuring mode from Peak Hold (PH) to Track. Pressing the button again will undo the change.
- When operating in Peak Hold (PH) mode, the device will indicate the measured peak value during the tensioning process.
- When operating in Track mode, the device will indicate the current torque throughout the entire tensioning process

The Peak Hold (PH) mode is the most commonly used setting for tensioning processes



### 7.1.4. LCD contrast



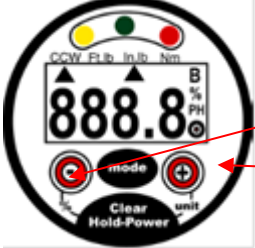

- You can change the contrast of the LCD display (viewing angle) by pressing and holding the “mode” button before pressing the “-” setpoint button.

Normally, this setting does not have to be changed.

The change of the contrast progresses very slowly.

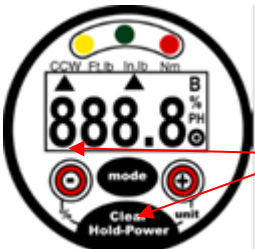



### 7.1.5. View/change the setpoint torque

	<p>a) Hold down the “-“ setpoint button to reduce the current setpoint.</p> <p>b) Hold down the “+” plus button to increase the current setpoint.</p>
<p>Press once on the “+” plus button or the “-“ setpoint button to display the current setpoint without changing it. The setpoint will be displayed for two seconds.</p> <p>The longer you keep the setpoint button depressed, the faster the value will change.</p>	

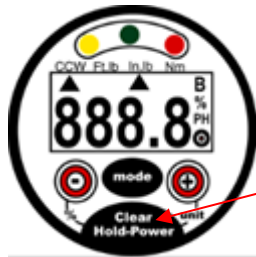
### 7.1.6. Change the setpoint torque tolerance

The tolerance can be set between 1 and 10 % or to OFF:

	<p>a) Press and hold the button “Clear Hold-Power”.</p> <p>b) Press the “-“ at the same time to set the zone from 1% or 10 % or to OFF</p> <p>OFF =&gt; no tolerance control</p>
<p><b>Observe the following when applying a torque with a tolerance range of (1% to 10%):</b></p> <p>If the measured/displayed torque approaches the min. value of the tolerance range, the yellow LED will be lit.</p> <p>If the measured/displayed torque is within the set tolerance range (1% to 10%), the green LED will be lit.</p> <p>If the measured/displayed torque exceeds the max. tolerance range (1% to 10%), the red LED will be lit.</p> <p>If the tolerance is OFF, the LED will not be active.</p>	



### 7.1.7. Save reached torque values



- To save the reached / displayed torque, you must press and hold the "Clear Hold-Power" button. This torque value will be stored in the internal memory of the TC1.
- The memory of the TC1 can store up to 250 torque values.

If you use the WLAN option for wireless data transfer, the storage space depends on the internal memory available on the computer used. The 250 torque values on the TC1 also apply for the wireless version.



### 7.1.8. Calibration mode

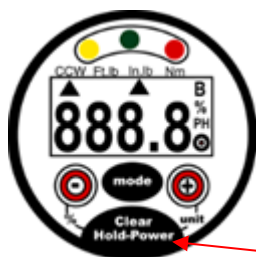


- This mode of operation is used for calibrating the TC1
- This mode of operation is reserved for PLARAD or authorised dealers appointed by PLARAD.

A calibration cannot be performed without the appropriate equipment. If your TC1 requires calibration, return it to PLARAD.

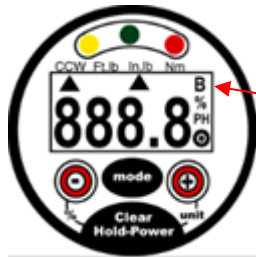


### 7.1.9. Switch Off automatically / manually



- The TC1 switches off automatically when not in use for a specific time (30 minutes by default). This value can be adjusted (between 1 to 30 min.) with the help of the data transfer software.
- Press and hold the power button "Clear Hold-Power" for 3 seconds to switch the TC1 off manually.

## 7.2. Charge the batteries











- a) The display shows an icon to indicate a low charge level of the batteries.
- b) When the charge level of the batteries is low, the icon "B" will light up.
- c) In this case, connect the TC1 to the proper power supply to charge the device.
- d) Return your TC1 to PLARAD or an authorised dealer appointed by PLARAD when the batteries need to be replaced

### Important!

If the TC1 is supposed to be stored for several months, the battery must always be fully charged before the device is put into storage.



### 7.3. Operation of the transducer in combination with the PLARAD nut runner

<p>Do not work in a way that may endanger safety! Tie back long hair and refrain from wearing loose clothing or jewellery (there is a risk of injury from becoming entangled or drawn in)!</p>	 <b>Gefahr</b>
<p>Do not use the transducer with the nut runner unless it operates in a reliable manner and is in proper condition!</p>	 <b>Gefahr</b>
<p>Before switching the nut runner on, make sure that no one is put at risk by the machine starting up!</p>	 <b>Gefahr</b>
<p>Only use reaction arms or extensions that have been approved by the manufacturer.</p>	 <b>Gefahr</b>
<p>Check the machine for visible external damage and defects at least once per shift! Report any detected changes (including changes in performance) to the supervising staff without delay! If necessary, shut down and secure the machine immediately!</p>	 <b>Achtung</b>
<p>Modifications to the reaction arm can invalidate the included original performance table.</p>	 <b>Achtung</b>
<p>Operate the transducer and the tool as specified in the operating manual; follow control indicators!</p>	
<p>Suitable reaction arms - including custom models - are available on request. Reaction arms must never be modified.</p>	

## 8 Data transfer software for downloading the data

Downloading the values stored on the TC1 requires the use of the *data transfer software*. These values can be exported to multiple file formats (.docx, .xlsx / .csv, .txt) or printed out directly.

The user needs to be logged in as an administrator to install the software.

### 8.1 Start screen of the data transfer software

After installing the software correctly, the user is first presented with the start screen.

You open the individual menus with the corresponding buttons.



### 8.2 Communications connection

The Connection button is used to connect / disconnect the data transfer software with the TC1. The options "Interface" and "Baud rate" must be defined. The default baud rate is 9600. After defining the settings, you need to select the version of the Torque Control (TC1 / TC2).

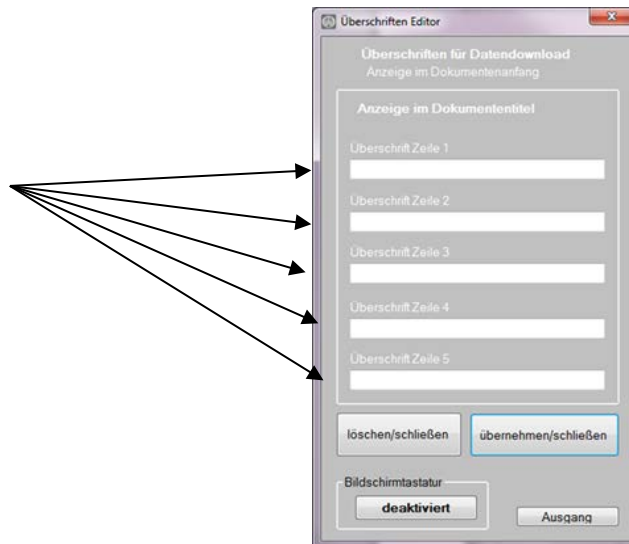
The Refresh button is not required unless you added additional COM ports after launching the software.



## 8.3 Editor for headers

- a) You have the option to add headers / headings to the values you downloaded.
- b) This will not affect the downloaded values. These headers merely contain supplemental information that the user may want to add.

- c) You can add a maximum of five headings/headers.



## 8.4 Save / print TC1 data

- a) The values stored in the TC1 can be exported and saved in three formats.
  - a. Excel (.xlsx / .csv)
  - b. Word (.docx)
  - c. Text (.txt)
- b) The upload of the data stored on the TC1 starts as soon as you press one of the three buttons.
- c) File name and storage location can be set by the user.
- d) It is also possible to view the values in a print preview and/or print out the values directly.  
You will find the corresponding print options under the "Export data" button.



## 8.5 Login as an administrator

This area is reserved for PLARAD.



## 8.6 Language

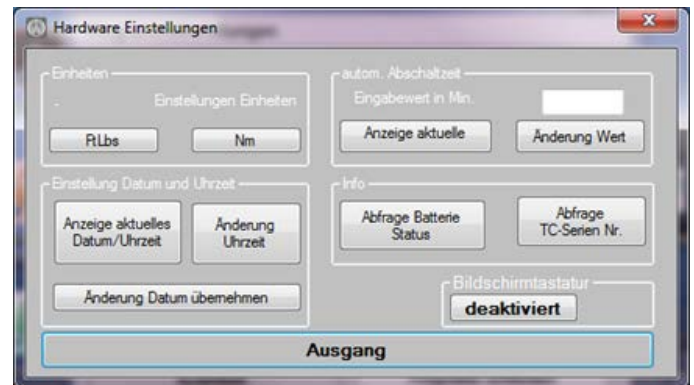
You can change the language in the drop-down menu "Program settings".



## 8.7 Hardware settings

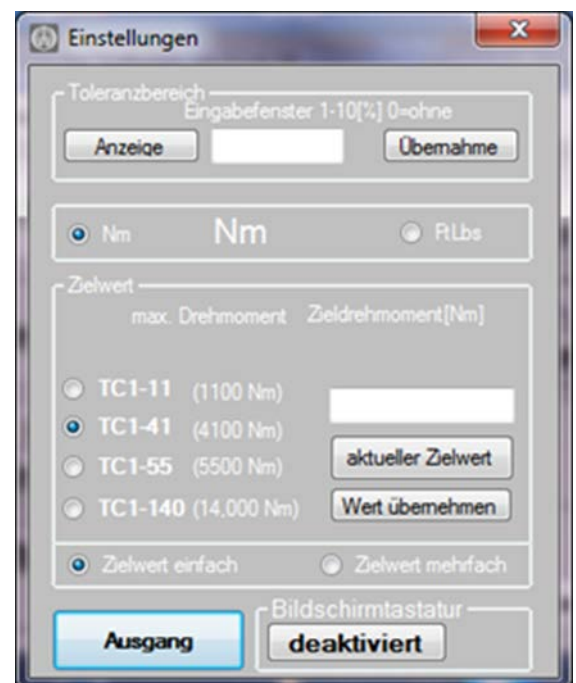
The screen Hardware settings is used to adjust the TC1 display.

1. Units  
To set / change the measuring units.
2. automatic shut-off time  
For setting the automatic shut-off time (1 to 30 min.) of the TC1 when it is not in use.
3. Set date and time  
For setting the system time and the system date in the TC1. This function is only available in the TC1.
4. Information  
For checking the serial number of the TC1 and the current battery charge level.



## 8.8 Basic/default settings

1. Tolerance range  
This function is used to change the tolerance of the setpoint torque between  $\pm 1\%$  and 10%. If there is no tolerance, the value is set to "0" (tolerance off).
2. Units  
For setting / changing the measuring unit
3. Target value  
For selecting the connected TC version and the size.  
For setting the setpoint.
4. Multiple targets (only for TC1)  
Multiple targets are preset torque values that cannot be changed during the operation of the TC1. A change at the TC1 can then only be made between the preset values.  
Changing / deleting these values requires a connection between the TC1 and the data transfer software.



## 9 Mounting the TC1 to the PLARAD nut runner

The TC1 has been correctly mounted to the PLARAD nut runner when the clamping element has locked into place.

To secure this position, you need to screw in the locking screw all the way (hand-tight).

Otherwise, the TC1 may come loose unintentionally.



Attention!

1. The TC1 is installed between the PLARAD nut runner and the existing reaction arm.

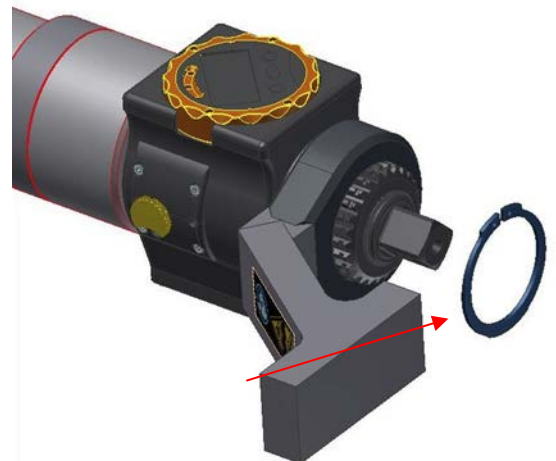
Rotary knob  
Locking screw



2. To lock the TC1 in place on the PLARAD nut runner, you need to use the "PULL" knob on the TC1, which is used to release and attach the device. To secure the "PULL" knob (engaged clamping element), you need to screw in the screw all the way by hand. This is a safety measure that must be put in place!



3. Use a retaining ring to secure the reaction arm on the TC1.





4. Secure the socket with a suitable snap ring.

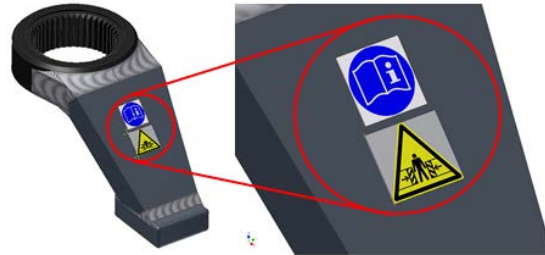


5. Image of the PLARAD nut runner, TC1 with locked reaction arm



Unsecured components or tools may come loose and lead to injury.

- **Secure reaction arm and impact socket insert (socket) prior to start-up!**
- Follow the instructions and warnings provided on the tool and the accessories.



**Warning!**

## 10 Support scenario

### 10.1 Optimum support scenario

Make sure the supporting plate rests fully against the surface.

### 10.2 Impermissible support scenario

If the reaction arm rests only partially against the surface at the corners of the reaction foot, considerable forces can impact the tool. The tool accessories may break, and the tool may be flung out. **Do not support tool on the corners of the support feet!**

**Only support tool on the surfaces of the support feet!**






Incorrect support at the corner of the foot.



**Warning!**

## 11 Operation

### 11.1 Safety information

<div style="text-align: center;">  </div> <p><b>Danger from a falling tool!</b></p> <ul style="list-style-type: none"> <li>• Only use suitable aids to lift larger tools.</li> <li>• When working overhead, secure the tool and wear protective headgear and safety footwear.</li> </ul>	 <b>Warning!</b>
<div style="text-align: center;">  </div> <p><b>Hearing damage from noise!</b></p> <ul style="list-style-type: none"> <li>• Regardless of your nut runner setting and the noise level to which the user is exposed, wear well-fitting personal hearing protection during operation.</li> <li>• It is the owner's responsibility to select and provide the correct kind of equipment.</li> </ul>	 <b>Warning!</b>
<p>Check if valid torque tables are available for the tool. The serial number of the appropriate torque table is specified on the type plate of the tool and included in the "Technical Data Sheet - Wrench".</p> <ul style="list-style-type: none"> <li>• <b>When setting the torque, strictly ensure that the maximum permissible torque of the tool and the accessories is not exceeded.</b></li> </ul>	 <b>Attention!</b>

## 11.2 Bolting process

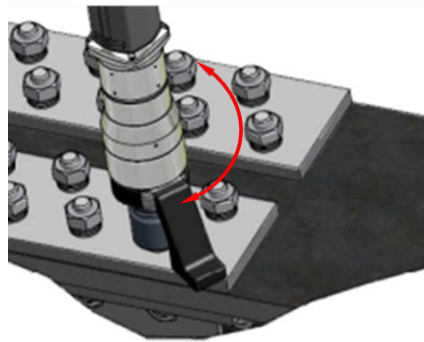
1. Place the nut runner on top of the bolting so that the bolt head/nut is captured in its entirety by the socket or the hexagon socket insert. If this is not possible, you may only subject the accessories to reduced torque or use a special socket/different accessories.
2. Bring the nut runner with the supporting plate into contact with the thrust bearing against the desired rotational direction of the nut runner. Make sure it rests against the entire surface.

The tool can exceed the specified torque if the starting rotation angle (reaction arm + bolt) is too small.

Recommended values:

DE1 / DE1plus:

- 10 (W) 60°
- 20 (W) 60°
- 25 J (W) 60°
- 30 (W) 30°
- 36 (W) 30°
- 48 (W) 30°
- 80 (W) 30°



**Attention!**

Components or the bolted connections may tear during work. The tool can be flung out of the bolting position.

- **Do not subject tool and accessories to more than the permissible torque.**



**Warning!**

### 11.3 Check lists for the operation of the TC1




Prior to operation	During operation	Following operation
<p><b>Visual inspection:</b></p> <ul style="list-style-type: none"> <li>□ All parts must be mounted / connected correctly</li> <li>□ The clamping element must have properly locked into place</li> <li>□ The locking screw must be screwed in all the way (hand-tight)</li> <li>□ The max. permissible torque of the TC1 must be greater than the setpoint torque set for the PLARAD nut runner</li> </ul> <p><b>Function test:</b></p> <ul style="list-style-type: none"> <li>□ Check all moving parts for proper operation prior to use</li> <li>□ Socket and reaction arm must be approved for use</li> <li>□ Rotational direction set correctly</li> </ul>	<p><b>Bolting:</b></p> <ul style="list-style-type: none"> <li>□ Torque set correctly</li> <li>□ Approve the socket for use (permissible torque, size) The permissible torque of the TC1 must be greater than the torque set for the PLARAD nut runner</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>□ Attachments points correct and providing enough stability</li> <li>□ Proper position connection between reaction arm and attachment point</li> </ul>	<p><b>Visual inspection:</b></p> <ul style="list-style-type: none"> <li>□ No damage on bolting and attachment point</li> <li>□ No damage on TC1 and PLARAD nut runner including accessories</li> </ul> <p><b>Measures following operation:</b></p> <ul style="list-style-type: none"> <li>□ Clean TC1 and PLARAD nut runner</li> <li>□ Check all moving parts</li> <li>□ Make sure socket and reaction arm are undamaged</li> <li>□ Store the TC1 in a dry location and at temperatures of 5 °C to 25°C</li> </ul>

## 11.4 Operating specifications for TC devices

Mode of operation	Please note	Possible consequences of non-compliance	Remedy
Constant load	During continuous operation with the TC1, keep the load at no more than 90% and only subject the device to the maximum load in exceptional cases.	The TC1 may suffer increased wear or even damage if the device is subjected to the maximum torque or an even higher torque.	Select a different TC1 size with an adequate torque range
Retighten previously tensioned bolts	The TC1 is suitable for this purpose, but the suitability of the PLARAD nut runner for this application must be verified	Damaged PLARAD nut runner	If retightening or pretensioning is necessary, make sure to select a speed for the PLARAD nut runner that is as low as possible in order to prevent blows
Absorbing the reaction momentum	Observe the specifications for the PLARAD nut runner provided in this operating manual	Overload of the square drive caused by transverse forces  Deformation of the reaction arm  Reduced torque output or incorrect torque values	Make sure that the reaction arm / the support conditions correspond to the specifications set out in this operating manual and the operating manual of the PLARAD nut runner
Normal operation	Observe the maintenance intervals specified in this operating manual	Functional defects on the TC1. Incorrectly measured and displayed torque values	Note and observe the correct intervals for maintenance and calibration

## 12 Maintenance / Service

### 12.1 Operating specifications

<p><b>Performing regular maintenance and inspections on the machine is of great importance. This minimises the occurrence of faults and increases operational reliability.</b></p>	
<p><b>Auxiliary and operating materials as well as cleaning agents and replacement parts need to be disposed of in a safe and environmentally compliant manner! Follow the instructions of the manufacturer when dealing with hazardous materials!</b></p>	
<p><b>Service work may only be performed by the manufacturer. Only allow Maschinenfabrik Wagner or bodies authorised by Maschinenfabrik Wagner to install, readjust, modify, expand and repair the tool.</b></p> <p>The safety of the operator and the trouble-free operation of the device are only guaranteed if you use original PLARAD components. This applies especially to machine components and spare parts.</p> <p>If different components are used, PLARAD cannot guarantee the safe and reliable operation of the device.</p>	 <p><b>Attention!</b></p>

### 12.2 Service intervals

The TC1 needs to be serviced on a regular basis depending on the frequency with which it is used.

The service intervals specified here merely serve for orientation. The service intervals need to be shortened if the machine is used in particularly harsh and demanding work environments.

Determine the service interval that fits your operating conditions best in a consultation with one of our representatives or customer service technicians. Following a consultation, maintenance can be performed at our customer service / repair workshop.

The following service intervals must be observed depending on the conditions of use:

#### Every 3 months:


- In extreme usage conditions
- If application frequency is high / multi-shift operation
- If used continuously for work in the upper torque range

#### Every 6 months:

- In normal usage conditions
- If application frequency is medium
- If used for work in the medium torque range

#### Every 12 months:

- If use is infrequent

Cleaning	Visual inspection	Function test	Storage
- Clean the surface of the transducer	- Damage	- Check all moving and rotating parts for proper operation	- Prior to extended interruptions of operation, lubricate all interior parts of the TC1 to prevent the formation of rust
- Remove superficial rust	- Leaks	- Drive square (AF) and reaction arm without damage	- Store the TC1 in dry rooms only
		- Check the slide bearings and replace them if necessary	- Recommended storage temperature 5°C to 25°C
		- Re-apply lubricant to the slide bearings of the drive shaft	
		- Check the TC1 for damage	
		- Calibrate the TC1	
		- Function test	
<p><b>Calibration by PLARAD: every 10,000 bolted connections / within the service intervals recommended above - whichever occurs first</b></p>			 <b>Attention!</b>

### 12.3 Lubrication

Although regular lubrication is not required, the device can be lubricated to ensure maximum operating performance and torque precision.

**Lubricant to be used: Tribol TR 3020/ 1000-0**



## 12.4 Spare and wear parts





All spare parts used must correspond to the technical requirements stipulated by us. This requirement is satisfied by the use of original spare parts. We only grant a warranty on the original spare parts we supply. The installation and/or use of spare parts not supplied by us may have a negative impact on the specified design properties, thereby impairing active and/or passive safety. We do not assume any liability and warranty for any damage that can be attributed to the use of spare parts / accessories other than those supplied by us.

We require the following information to process your order in an efficient and expedient manner:

1. Client
2. Serial number of the device
3. Designation of the desired spare part
4. Desired units
5. Desired shipping method

Refer to chapter 1.1 "Manufacturer" for our address

### 13 Instructions on disposal

<p>All materials used need to be disposed of in a safe and environmentally compatible way. Observe all applicable national regulations!</p>	 <b>Attention!</b>
<p>The device must not be disposed of with regular household waste as specified in the WEEE directive (Waste Electrical and Electronic Equipment Directive, 2002/97/EC) and national laws.</p>	
<p>Dispose of this product at an authorised waste collection facility. Return the product if, for example, purchasing a similar product or take it to a waste collection facility that is authorised to recycle waste electrical and electronic equipment.</p>	 <b>Attention!</b>
<p>Turn to your local administration office, your public waste disposal authority, a facility that is authorised to dispose of waste electrical and electronic equipment or your waste management company.</p>	 <b>Attention!</b>