

**OPERATOR'S MANUAL**



# **NORTRONIC<sup>®</sup> ASCII MODE FUNCTION HANDBOOK**



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## INTRODUCTION

By using the ASCII Mode communication protocol, users can directly interface with the NorTronic® using their own software and equipment to control and configure the tool and receive data. This is possible via USB and Bluetooth® (on Bluetooth®-enabled tools).

This is an extremely powerful feature; it's useful if you already have an application and wish to directly integrate data capture and control from the NorTronic®. It's also useful if you want to create a bespoke solution tailored for your requirements, and have the tool work with that.

A great example would be integrating the NorTronic® into a production line, where you want to automatically control the tool target and settings, and guide the operator through tightening all the bolts to the required specifications while capturing the results.

Another example would be if you want to gather readings in a remote environment far away from computers. You could use a phone to read the results from the NorTronic® and send these via the Internet to a remote destination without needing to find a computer to connect to the tool and download everything.

The NorTronic® ASCII Mode interface is designed to be easy to understand and easy for programmers to integrate into their software, and offers a huge range of commands that let you read and modify tool settings, read and set targets, stream live readings from the tool, and more.

This operators' manual documents the functionality provided by the ASCII Interface over USB or Bluetooth® Low Energy (BLE). It commences by exploring the Command for each function and providing a guide to the various parameters required to call each function. Example uses of each function are presented in order to provide the user with assistance when developing a system that incorporates the ASCII Interface. Finally, any necessary information is provided for each of these functions providing implementation advice and common errors which can be avoided.

## Target Configurations

There are 4 configurations of Target that can be sent to the tool which define how the tool will operate when tightening:

- Torque only Target
- Snug Torque followed by Angle Target
- Snug Torque followed by Angle Target along with Final Torque Target
- Audit Torque Target

## Result Data Configurations

There are 3 configurations that control how the tightening result data is delivered from the tool:

- Date and Time stamped results without OK/NOK status
- Results including OK/NOK status
- This mode streams results at approximately 10 readings per second and finishes with the final results including OK/NOK status

## CONNECTION VIA USB

- 1) Power up the NorTronic® by switching on.
- 2) Plug in the USB cable (part # 39678 supplied with NorTronic®) between the mini USB connector on the NorTronic® display panel and the USB Type A connector on a PC or tablet.



**TIP:** The user may need to remove the USB cover from the NorTronic® to achieve this. The USB cover must be fitted for IP44 protection.

At this point the tool should be connected and appear as a virtual serial device on the host system. You may begin using ASCII commands found in this document to communicate directly with the tool.

# CONNECTION VIA BLUETOOTH®

You may connect to the NorTronic® via BLE in order to use the ASCII protocol. This requires a device which contains compatible BLE 4.0 hardware (or newer). Most modern smartphones, tablets and laptops containing Bluetooth® hardware will be compatible.

For convenience, we offer a USB Bluetooth® Adapter which is preconfigured to detect and communicate with NorTronic® tools.



## Bluetooth® via the USB Bluetooth® Adapter

- 1) Plug in the USB Bluetooth® Smart adapter (part # 43513) into a USB port on your PC, Tablet or Host System.

When inserted, this USB adapter appears as a serial port instead of a Bluetooth® device. This is to make it easier for you to interface with it in software, and to prevent it interfering with any existing Bluetooth® hardware and software that may be installed on the system.

The USB Bluetooth® Adapter is controlled by a simple plaintext AT command protocol that lets you scan for and connect to tools.

**IMPORTANT:** YOU MUST SEND THE MODEM THESE AT COMMANDS FOLLOWED BY EITHER A CARRIAGE – RETURN, A NEWLINE, OR BOTH CHARACTERS (AS EXPRESSED VIA THE FOLLOWING ESCAPE SEQUENCES: \r\n).

Once connected the modem will maintain that connection until you order it or the tool to disconnect.

**NOTE:** Only one connection can be made at a time, you cannot simultaneously connect to multiple tools with one Bluetooth® adapter.

- 2) Use the ATS command to scan for tools; the modem will respond with any nearby tools it detects:

### Command

<code>ATS</code>	(Scan for any nearby tools)
------------------	-----------------------------

### Response

<pre>ATS OK RESP 00:07:80:AD:A9:26 00 4E4252 -63 RESP 00:07:80:AD:A9:26 00 4E4252 -53 RESP 00:07:80:AD:A9:26 00 4E4252 -53 RESP 00:07:80:AD:A9:26 00 4E4252 -53 RESP 00:07:80:AD:A9:26 00 4E4252 -53 RESP 00:07:80:AD:A9:26 00 4E4252 -60</pre>	'0007ADA926' is the tools MAC address.
---	--

For each tool detected, this shows the tool MAC address, the BLE ID (4E4252) and a signal strength indicator.

3) Use the ATH command to stop scanning.

#### Command

```
ATH (Hang up and stop searching)
```

#### Response

```
OK
```

4) Select one of the MAC addresses reported by the modem and use the ATD command to connect to it. When the modem successfully connects to the tool, it will respond with the text "DATA\r\n" as shown below.

#### Command

```
ATD 000780ADA926 (To connect to tool 000780ADA926)
```

#### Response

```
ATD 000780ADA926
DATA
```

Now you are connected to the tool, the USB Bluetooth® modem functions as if it were a serial cable connected to the tool (essentially, it functions exactly the same as if you were communicating with the tool via USB). Therefore, you may switch to using ASCII commands found in this document to communicate directly with the tool.

Possible errors you can encounter from the modem:

- ERR1 - Unrecognised command
- ERR2 - Unable to process command due to bad state (i.e. ATH when already hung up)
- ERR3 - Command format is wrong or one of the command parameters are invalid



**WARNING: UNLIKE THE MODEM, THE TOOL NEEDS BOTH CARRIAGE RETURN AND NEWLINE CHARACTERS (/r/n, <CR><LF>) BEFORE IT WILL ACCEPT A COMMAND. ONCE YOU ARE CONNECTED TO A TOOL YOU MUST SWITCH TO USING BOTH CHARACTERS.**

## Bluetooth® Via Other Devices Such as Bluetooth® - Enabled Phones and Tablets





It is possible to connect to the NorTronic® using any BLE compliant device. This includes most modern smartphones, tablets and many laptops, as well as computers fitted with modern Bluetooth® hardware.

Because of the massive amount of possibilities, Norbar cannot advise on how to achieve connection this way as there are simply too many options; it will be the responsibility of the user to understand their device and how to write their software to achieve the means of connection.

**NOTE:** However, we can provide information about the NorTronic® Bluetooth® GATT profile, which you will need to form the connection.

Please contact Norbar and ask for details on connecting the NorTronic® Bluetooth® to your own Bluetooth® devices to learn more.

### Icon Colour Connection Table

Interface	Connection Type	Icon Colour	Information
USB	Normal	White 	Connected to PC or Tablet
	TDS®	Green 	Connected to TDS®
	Receive Results	Orange 	TDS® Receive Results mode
Bluetooth®	Connected	White 	Connected via Bluetooth®

### Implementation Advice

- If you have multiple messages to send to the tool, you must wait for the response to each message before sending the second message. This is because the tool will flush its input buffer once it has finished processing the current message.
- The USB Bluetooth® dongle presents itself to the host device (i.e. computer) as a serial port. However, there is no physical serial port hardware, so any attempts to configure serial port parameters will be ignored; for instance, do not attempt to change or set baud rate or parity, as these settings have no effect.
- Do not plug the USB Bluetooth® dongle directly into a PC; this can result in poor Bluetooth® performance because of all the nearby metal. It is advisable to use a USB extension cable and plug the USB Bluetooth® dongle into that.
- Similarly, it is good practice to keep the USB dongle away from potential sources of interference like metal objects and surfaces, Wi-Fi devices, cordless phones, and other Bluetooth® devices. All of these things can negatively impact Bluetooth® performance.

Possible tool errors you can encounter when connected to a tool:

ERR:1 - Means the tool is not displaying the RUN screen, so the command cannot be performed.

ERR:2 - Means the command is unrecognised or command format is wrong or one of the command parameters are invalid (example: TR:P command when no previous target to select)

# SUMMARY OF COMMANDS

- (IDLE) reset tool to idle state, run screen, exit all menus, etc
- (TR:N/TR:P) NEXT/PREVIOUS TARGET
- (TR:C) GET TARGET (tool reports its currently selected target)
- (TR:#) GET READING NUMBER (tool reports the # of readings for a Target and its current reading number)
- (TR:L) LIVE TARGET (push a target to the tool and immediately select it. If the tool runs out of space, overwrite last target)
- (RE:.) RESULT DATA – This has 3 modes RE:0, RE:1 & RE:2 (DT:.) DISABLE/ENABLE TOOL
- (CD) CALIBRATION DATE (Read)
- (RS) READ SERIAL (Read the tools serial #, capacity etc)
- (RC) READ CONFIG (Tool Settings)
- (SC:.) SET CONFIG (Tool Settings)
- (SV) SAVE (mimic save button functionality on tool)
- (DL) DELETE LAST READING (from tools memory)
- (DA) DELETE ALL READINGS (from tools memory)
- (RD) RESTORE DEFAULTS but stay in ASCII mode
- (DC) DECREMENT COUNTER (Target with NUM>1)
- (DAT:S) SET DATE & TIME
- (DAT:C) READ DATE & TIME
- (BS) BATTERY STATUS

## Idle

- The tool will show the run screen (if not already displayed) and select the 1<sup>st</sup> target in memory.

## Command

IDLE

## Response

OK

## Example

IDLE  
OK



## Sending Targets

Targets are set with the “TR:L” message and take effect immediately after they are received. The TR:L message can be used to set any of the target parameters that a user might set via the tool’s menu system, facilitating torque only, torque and angle, torque, angle and final torque, and audit mode targets. This section describes how to use them to set each of the different target types.

### Sending a Torque (only) Target

#### Command

```
TR:L:UNT0,SNG0,ANG0,TRQ234.5,ADT0,NUM3
```

TR:L:	= Accept this target & switch to it
UNT0	= Units (0 = N·m, 1 = dN·m, 2 = cN·m, 3 = kgf·m, 4 = kgf·cm, 5 = gf·m, 6 = lbf·ft, 7 = lbf·in, 8 = ft·lb, 9 = in·lb, 10 = oz·fin, 11 = in·oz (in this case N·m))
SNG0	= Snug Torque value (in this case, 0) <b>Not Enabled</b>
ANG0	= Angle Target (degrees – in this case, 0) <b>Not Enabled</b>
TRQ234.5	= Final Torque Target (in this case, 234.5)
ADT0	= Audit mode (0= disabled, 1= enabled) <b>Not Enabled</b>
NUM3	= Number of Readings for the Target (in this case 3)

#### Response

```
OK:UNT0,SNG0,ANG0,TRQ234.5,ADT0,NUM3
```

#### Example

```
TR:L:UNT0,SNG0,ANG0,TRQ234.5,ADT0,NUM3  
OK:UNT0,SNG0,ANG0,TRQ234.5,ADT0,NUM3
```

### Confirm a Torque (only) Target

#### Command

```
TR:C
```

#### Response

```
OK:UNT0,SNG0,ANG0,TRQ234.5,ADT0,NUM3
```

 (acknowledgement, followed by currently selected target)

#### Example

```
TR:C  
OK:UNT0,SNG0.0,ANG0,TRQ234.5,ADT0,NUM3
```

**NOTE:** The tool will clamp torque targets within a range spanning the tool’s current Active From limit up to the tool’s max capacity. Check the response message to ensure the target you requested was actually set!

## Sending a Snug Torque + Angle Target

### Command

```
TR:L:UNT0,SNG123.4,ANG30,TRQ0,ADT0,NUM3
```

TR:L:	= Accept this target & switch to it
UNT0	= Units (0 = N·m, 1 = dN·m, 2 = cN·m, 3 = kgf·m, 4 = kgf·cm, 5 = gf·m, 6 = lbf·ft, 7 = lbf·in, 8 = ft·lb, 9 = in·lb, 10 = oz·fin, 11 = in·oz (in this case N·m)
SNG123.4	= Snug Torque value (in this case, 123.4)
ANG30	= Angle Target (degrees – in this case, 30)
TRQ0	= Final Torque Target (in this case, 0) <b>Not Enabled</b>
ADT0	= Audit mode (0= disabled, 1= enabled) <b>Not Enabled</b>
NUM3	= Number of Readings for the Target (in this case 3)

### Response

```
OK:UNT0,SNG123.4,ANG30,TRQ0,ADT0,NUM3
```

### Example

```
TR:L:UNT0,SNG123.4,ANG30,TRQ0,ADT0,NUM3  
OK:UNT0,SNG123.4,ANG30,TRQ0,ADT0,NUM3
```

## Confirm a Snug Torque + Angle Target

### Command

```
TR:C
```

### Response

```
OK:UNT0,SNG123.4,ANG30,TRQ0,ADT0,NUM3
```

### Example

```
TR:C  
OK:UNT0,SNG123.4,ANG30,TRQ0,ADT0,NUM3
```

**NOTE:** The tool will clamp snug torque within a range spanning the tool's current Active From limit up to the tool's max capacity. Check the response message to ensure the target you requested was actually set!

## Sending a Snug Torque + Angle with Final Torque Target

### Command

```
TR:L:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3
```

TR:L:	= Accept this target & switch to it
UNT0	= Units (0 = N·m, 1 = dN·m, 2 = cN·m, 3 = kgf·m, 4 = kgf·cm, 5 = gf·m, 6 = lbf·ft, 7 = lbf·in, 8 = ft·lb, 9 = in·lb, 10 = oz·fin, 11 = in·oz (in this case N·m)
SNG123.4	= Snug Torque value (in this case, 123.4)
ANG30	= Angle Target (degrees – in this case, 30)
TRQ234.5	= Final Torque Target (in this case, 234.5)
ADT0	= Audit mode (0= disabled, 1= enabled) <b>Not Enabled</b>
NUM3	= Number of Readings for the Target (in this case 3)

### Response

```
OK:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3
```

### Example

```
TR:L:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3  
OK:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3
```

### Remarks

You will see the following if you try to send a Target whilst NOT displaying the RUN screen.

```
TR:L:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3  
ERR:1
```

## Confirm a Snug Torque + Angle with Final Torque Target

### Command

```
TR:C
```

### Response

```
OK:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3 (acknowledgement, followed by currently selected target)
```

### Example

```
TR:C  
OK:UNT8,SNG123.4,ANG30,TRQ234.5,ADT0,NUM3
```

**NOTE:** The tool will clamp snug and torque targets within a range spanning the tool's current Active From limit up to the tool's max capacity. Check the response message to ensure the target you requested was actually set!

## Sending an Audit Torque Target

### Command

```
TR:L:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
```

TR:L: = Accept this target & switch to it  
UNT0 = Units (0 = N·m, 1 = dN·m, 2 = cN·m, 3 = kgf·m, 4 = kgf·cm, 5 = gf·m, 6 = lbf·ft, 7 = lbf·in, 8 = ft·lb, 9 = in·lb, 10 = oz·fin, 11 = in·oz (in this case N·m))  
SNG0 = Snug Torque value (in this case, 0) **Not Enabled**  
ANG3 = Angle Target (degrees – in this case, 3)  
TRQ234.5 = Final Torque Target (in this case, 234.5)  
ADT1 = Audit mode (0= disabled, 1= enabled) **Enabled**  
NUM3 = Number of Readings for the Target (in this case 3)

### Response

```
OK:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
```

### Example

```
TR:L:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3  
OK:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
```

## Confirm an Audit Torque Target

### Command

```
TR:C
```

### Response

```
OK:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
```

### Example

```
TR:C  
OK:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
```

**NOTE:** The tool will clamp torque targets within a range spanning the tool's current Active From limit up to the tool's max capacity. Check the response message to ensure the target you requested was actually set!

## Receiving Results from the NorTronic®

The ASCII mode interface is a “live” interface; results are gathered and reported as they happen, so it is intended that the tool remain connected to the host device while performing work. In applications such as production lines, this lets the host device control tool behaviour such as by locking it to prevent further work if a mistake was made on a joint.

There are three different “verbosity” levels for the results which can be configured by the user depending on requirements:

**RE:0** - Returns timestamped readings and current target when a joint is finished

**RE:1** - Returns current target when joint begins, final result when finished, plus OK/NOK assessment

**RE:2** - Returns current target when joint begins, a live stream of readings during the joint, then the final result when it is finished, plus OK/NOK assessment

Once configured, the setting persists until the next time you change it. Therefore, it is not necessary to set it before every joint the tool performs.

### Command

```
RE:0
```

### Response

```
OK:0
```

The above example shows selecting RE:0 as the verbosity for results. To use RE:1 or RE:2, just change the 0 to the appropriate number. The tool will respond with the appropriate OK:x number to match. The next time the tool is used to apply torque, the new output format will be used.

**NOTE:** A joint is considered as “beginning” when the torque rises above the Active From threshold on the tool. If the torque does not rise above this point there will be no output from the tool regardless of the RE verbosity level.

**NOTE:** OK/NOK assessments provide the tool’s opinion as to whether the work was successfully completed, bad, or unfinished.

## Result Data (RE:0)

- Torque & Angle Results are output after each successful 'End of Test' in the following format:  
`15/12/16 13:13:31,0,3,234.5,Y,N·m,239.5,2`  
Date, Time, Snug Torque Target, Angle Target, Final Torque Target, Audit Status, Units, Torque Result, Angle Result

### Example 1

```
TR:L:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
OK:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM3
RE:0
OK:0
15/12/16 13:13:31,0,3,234.5,Y,N·m,226.5,2
15/12/16 13:14:01,0,3,234.5,Y,N·m,226.9,1
15/12/16 13:14:29,0,3,234.5,Y,N·m,221.7,3
```

### Remarks

When torque goes above 'Active From': N/A

During tightening: N/A

End of Test: `15/12/16 13:13:31,0,3,234.5,Y,N·m,226.5,2` (Normal CSV output )

### Example 2 (*Reading # = 0*)

```
TR:L:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM0
OK:UNT0,SNG0,ANG3,TRQ234.5,ADT1,NUM0
RE:0
OK:0
15/12/16 13:13:31,0,3,234.5,Y,N·m,226.5,2
15/12/16 13:14:01,0,3,234.5,Y,N·m,226.9,1
15/12/16 13:14:29,0,3,234.5,Y,N·m,221.7,3
```

### Remarks

When torque goes above 'Active From': N/A

During tightening: N/A

End of Test: `15/12/16 13:13:31,0,3,234.5,Y,N N·m,226.5,2` (Normal CSV output )

## Result Data (RE:1)

This mode returns the current target when joint begins, the final result when finished, plus OK/NOK assessment.

When the torque goes above 'Active From', the tool will output the current active Target preceded by "RE:T:" in the following format once per event: `RE:T:UNT0 , SNG0 , ANG3 , TRQ234 . 5 , ADT1 , NUM3`

**RE:T:,Target Units, Snug Torque, Target,Angle, Target,Final, Torque Target, Audit Status, # of results for Target.**

When the joint has been finished Torque & Angle Results are output preceded by "RE:F:". They are combined with the OK/NOK assessment for each part of the result in the following format:

`RE:F: 226 . 5 , C , OK , 30 , OK , 1 , NOK`

**RE:F:,Torque Result, Torque Direction, Torque Status OK/NOK, Angle Result, Angle Status OK/NOK, Result Count, Result Count OK/NOK.**

This provides not only the result readings, but an assessment of whether each individual part of the result is OK.

**Torque Direction** is either "A" for anticlockwise or "C" for clockwise.

**Angle Result** is always a positive integer; please use Torque Direction to infer direction of rotation.

**Torque Status** is OK if the torque is within the upper and lower torque limits as defined in tool settings.

**Angle Status** is OK if the angle is within the upper and lower angle limits as defined in tool settings.

**Result Count** is OK if no repetitions were defined, or if the number of requested repetitions is reached.

### Example 1

```
RE:1
OK:1
RE:T:UNT0 , SNG0 , ANG3 , TRQ234 . 5 , ADT1 , NUM3
RE:F: 226 . 5 , C , OK , 30 , OK , 1 , NOK
RE:T:UNT0 , SNG0 , ANG3 , TRQ234 . 5 , ADT1 , NUM3
RE:F: 226 . 1 , C , OK , 30 , OK , 2 , NOK
RE:T:UNT0 , SNG0 , ANG3 , TRQ234 . 5 , ADT1 , NUM3
RE:F: 228 . 5 , C , OK , 30 , OK , 3 , OK
```

## Result Data (RE:2)

This mode returns the current target when joint begins, a stream of readings as the joint progresses, and the final result when finished, plus OK/NOK assessment.

Just like with RE:1, when the torque goes above 'Active From', the tool will output the current active Target preceded by "RE:T:" in the following format once per event:

```
RE:T:UNT0 ,SNG0 ,ANG3 ,TRQ234 . 5 ,ADT1 ,NUM3
```

**RE:T: Target Units, Snug Torque, Target, Angle, Target, Final, Torque Target, Audit Status, # of results for Target.**

Once the RE:T message is sent, it will then proceed to stream approximately 10 live readings per second, preceded by the live data marker "RE:D:" until the 'End of Test' condition: `RE:D: 218 . 7 , C , 2`

### RE:D: Torque Reading, Torque Direction, Angle Reading

This can be used for monitoring purposes by a remote device, for instance to show a live readout of torque on a mobile phone as the operator performs the work. It can also be used for graphing purposes, or to observe the rate of progression of a joint.

**Torque Reading** is the latest reading from the tool transducer

**Torque Direction** is the either "A" for anticlockwise or "C" for clockwise

**Angle Reading** is the latest angle reading from the tool

When the joint has been finished, just like with RE:1, Torque & Angle Results are output preceded by "RE:F:." in the following format: `RE:F: 225 . 9 , C , OK , 3 , OK , 1 , NOK`

**RE:F: Torque Result, Torque Direction, Torque Status OK/NOK, Angle Result, Angle Status OK/NOK, Result Count, Result Count OK/NOK.**

This provides not only the result readings, but an assessment of whether each individual part of the result is OK.

**Torque Direction** is either "A" for anticlockwise or "C" for clockwise.

**Angle Result** is always a positive integer; please use Torque Direction to infer direction of rotation.

**Torque Status** is OK if the torque is within the upper and lower torque limits as defined in tool settings.

**Angle Status** is OK if the angle is within the upper and lower angle limits as defined in tool settings.

**Result Count** is OK if no repetitions were defined, or if the number of requested repetitions is reached.

### Example 1

```
RE: 2
OK: 2
RE:T:UNT0 ,SNG0 ,ANG3 ,TRQ234 . 5 ,ADT1 ,NUM3
RE:D: 0 . 0 , C , 0
RE:D: 181 . 4 , C , 0
RE:D: 186 . 5 , C , 0
.
.
.
RE:D: 218 . 2 , C , 2
RE:D: 218 . 5 , C , 2
RE:D: 225 . 8 , C , 3
RE:F: 225 . 8 , C , OK , 3 , OK , 1 , NOK
```



## Get Reading Number (TR:#)

### Command

TR:# (Report reading number)

### Response

OK:1,3 (Confirm current reading number, total number of readings for the Target)

### Example

```
TR:#  
OK:1,3
```

## Next/Previous Target (TR:N/TR:P)

- These commands are used when the tool has multiple Targets in memory (that are not linked). Sending these commands cycles between available standalone targets by deactivating the current Target, then displaying and activating the next Target.

### Command

TR:N (For next target)  
TR:P (For previous target)

### Response

OK: UNT0,SNG0,ANG5,TRQ700,NUM0 (The currently selected Target)

### Remarks

- The Response is the currently selected Target.

## Disable Tool (DT)

- When a tool has been Disabled, the tool can be on, but will not operate and will display the following screen. The red border will constantly flash until the tool is Enabled again.

This is to be preserved over power cycles.



### Command

DT:1	(Disable tool)
DT:0	(Enable tool)

### Response

OK:1	(Tool Disabled)
OK:0	(Tool Enabled)

### Example

DT:1
OK:1
DT:0
OK:0

## Calibration Date (CD)

- Read the Tool's Calibration date and return the result in the following format (dd/mm/yy hr:min:sec)

### Command

```
CD
```

### Response

```
OK:26/01/17
```

### Example

```
CD  
OK:22/11/17
```

## Read Serial (RS)

- Read the tools serial #, Capacity etc (Factory Configuration)

### Command

```
RS
```

### Response

```
Serial number      :  
Part number       :  
Version number    :  
Wireless          :  
Capacity (Units)  :
```

### Example

```
RS  
Serial number      : 2018/TESTBOX  
Part number       : 504030  
Version number    : 2.14  
Wireless          : 868MHz  
Capacity (Units)  : 200 N.m
```

## Read Config (RC)

Read Tool settings.

### Command

RC

### Response

EOM Character	(EOM): None	
Auto Disable	(AUD): 0	
Units	(UN):	<i>(show the chosen Unit of operation.)</i>
Torque High Limit	(THL):4	
Torque Low Limit	(TLL):4	
Angle High Limit	(AHL):4	
Angle Low Limit	(ALL):4	
Sleep After	(SA) :120	
Angle Display	(AD) :ON	
Auto Zero	(AZ) :ON	
Active From	(AF) :7.0	
Vibrate	(VB) :ON	
Wireless	(WL) :ON	<i>(Bluetooth® &amp; non-Bluetooth® tools; enable/disable wireless)</i>
Node Number	(NN) :2	<i>(Non-Bluetooth® tools only)</i>
Bluetooth® Key	(NN) :4e4252	<i>(Bluetooth® tools only)</i>
Auto Reset	(AR): OFF	
Hold Time	(HT): 4	
Inverse Display	(ID) : OFF	
Multiplier Ratio	(MR) :1.000	
Complete Display	(CD) : ON	
Warnings Display	(WD) : ON	
Torque CRS	(TC) :31.8	<i>(dependant on Tool Torque Capacity)</i>
Date format	(DF): 0	
Tool lock	(TL): 0	
Auto Gyro Drift Comp	(AGD): ON	
Live Data Format	(LDF): LEGACY	

## Set Config (SC)

This lets you change the various settings seen in the RC read settings command. You may change one setting at a time.

### End Of Message Character (EOM)

- Sets or clears an optional final character to be sent when a message from the tool ends (this only affects ASCII mode messages; legacy messages always end with an ETX byte).
- The EOM character is an optional extra character; if set, it will be transmitted after the normal end of an ASCII message.

#### Command

<code>SC:EOM:?</code>	Set EOM character (0 = cleared, anything else sets the character)
-----------------------	---

#### Response

<code>OK:NONE</code>	Confirm EOM character is cleared
----------------------	----------------------------------

#### Response

<code>OK:SET</code>	Confirm EOM character is designated
---------------------	-------------------------------------

#### Example

<code>SC:EOM:0</code> <code>OK:NONE</code>
---

## Auto Disable (AUD)

- This command configures the Auto Disable feature
- The Auto Disable feature is useful in situations where the tool is being managed by controller software, such as in a factory production line environment; it causes the tool to automatically lock up (disable itself) after each cycle is completed
- This allows the controlling software to decide if the operator is allowed to proceed to the next bolt before unlocking the tool
- This also prevents an operator from doing work if the connection with the controlling software is lost, therefore preventing readings from being lost (at most, one bolt could be tightened before the tool would lock)
- The automatic locking and subsequent unlocking of a tool can happen extremely quickly, quite likely going unnoticed by the operator, so they do not need to change or extend their workflow to use this feature.
- Depending on AUD setting, unlocking is performed either manually (by using the Disable Tool command to remove the disabled state), or automatically by sending a new TR:L tool target. See the different modes below.

### Command

SC:AUD:0	(Disable AUD)
SC:AUD:1	(Enable AUD – tool will lock after a joint is completed)
SC:AUD:2	(Enable AUD, mode 2 – tool will lock after a joint is completed; auto-unlock when a new target is transmitted)

### Response

OK:0	(AUD Disabled)
OK:1	(AUD Enabled, mode 1)
OK:2	(AUD Enabled, mode 2)

### Example

SC:AUD:0 OK:0
------------------

## Units (UN)

- Set Unit and display torque in these units when in the RUN screen.

0 =	N·m,
1 =	dN·m
2 =	cN·m
3 =	kgf·m
4 =	kgf·cm
5 =	gf·m
6 =	lbf·ft
7 =	lbf·in
8 =	ft·lb
9 =	in·lb
10 =	oz·fin
11 =	in·oz

- Set the units in which the tool is operating.

### Command

SC:UN:?

### Response

OK:?

### Example

```
SC:UN:1
OK:1
```

## Torque High Limit (THL)

- This setting is used to define the Upper Set Limit (USL) for a Torque Target. The set value is a percentage of the Torque Target, so for a Target of 200 with a Torque High Limit of 5% the USL = 210.0. This value is used for PASS/FAIL (OK/NOK) of the torque result.

### Command

SC:THL:?	Set Torque Tolerance (1 – 20%)
----------	--------------------------------

### Response

OK:?	Confirm Set Torque Tolerance (1 – 20%)
------	--

### Example

SC:THL:3 OK:3
------------------

## Torque Low Limit (TLL)

- This setting is used to define the Lower Set Limit (LSL) for a Torque Target. The set value is a percentage of the Torque Target, so for a Target of 200 with a Torque Tolerance of 5% the LSL = 190.0. This value is used for PASS/FAIL (OK/NOK) of the torque result.

### Command

SC:TLL:?	Set Torque Tolerance (1 – 20%)
----------	--------------------------------

### Response

OK:?	Confirm Set Torque Tolerance (1 – 20%)
------	--

### Example

SC:TLL:3 OK:3
------------------



## Angle High Limit (AHL)

- This setting is used to define the Upper Set Limit (USL) for a Angle Target. The set value is in degrees, so for a Target of 90 with an Angle High Limit of 4° the USL = 94. This value is used for PASS/FAIL (OK/NOK) of the angle result.

### Command

SC:AHL:?	Set Angle Tolerance (0 – 20°)
----------	-------------------------------

### Response

OK:?	Confirm Set Angle Tolerance (0 – 20°)
------	---------------------------------------

### Example

SC:AHL:2
OK:2

## Angle Low Limit (ALL)

- This setting is used to define the Lower Set Limit (LSL) for a Angle Target. The set value is in degrees, so for a Target of 90 with a Angle Low Limit of 4° the LSL = 86. This value is used for PASS/FAIL (OK/NOK) of the angle result.

### Command

SC:ALL:?	Set Angle Tolerance (0 – 20°)
----------	-------------------------------

### Response

OK:?	Confirm Set Angle Tolerance (0 – 20°)
------	---------------------------------------

### Example

SC:ALL:2
OK:2

## Sleep After (SA)

- This is the period of inactivity before the tool goes to Sleep.

### Command

<code>SC:SA:??</code>	Set Sleep After- (default 120, range 0 – 300). 0 = Never (always on)
-----------------------	--

### Response

<code>OK:??</code>	Confirm Sleep After time
--------------------	--------------------------

### Example

<code>SC:SA:30</code> <code>OK:30</code>
---

## Angle Display (AD)

- Used to enable or disable the Angle Display.

### Command

<code>SC:AD:0</code>	(Set Angle Display OFF)
<code>SC:AD:1</code>	(Set Angle Display ON)

### Response

<code>OK:0</code>	(OFF)
<code>OK:1</code>	(ON)

### Example

<code>SC:AD:0</code> <code>OK:0</code> <code>SC:AD:1</code> <code>OK:1</code>
--

## Auto Zero (AZ)

- Used to enable or disable the Auto Zero when the tool powers up or resumes from sleep.

### Command

SC:AZ:0	(Set Auto Zero OFF)
SC:AZ:1	(Set Auto Zero ON)

### Response

OK:0	(OFF)
OK:1	(ON)

### Example

```
SC:AZ:0
OK:0
SC:AZ:1
OK:1
```

## Active From (AF)

- The value which the torque must reach (as a percentage of tool capacity) for the memory modes to become active.

### Command

SC:AF:??	Set Active From- (default 7.0, range 1.8 – 100.0)
----------	---

### Response

OK:??	Confirm Sleep After time
-------	--------------------------

### Example

```
SC:AF:10
OK:10.0
```

## Vibrate (VB)

- Turn Tool vibration on/off when reaching a target.

### Command

SC:VB:0	(Set Vibrate OFF)
SC:VB:1	(Set Vibrate ON)

### Response

OK:0	(OFF)
OK:1	(ON)

### Example

```
SC:VB:1
OK:1
SC:VB:0
OK:0
```

## Wireless (WL)

- Non-Bluetooth® tools: Turns wireless functionality on or off.
- Bluetooth® tools: Turns Bluetooth® functionality on or off.

### Command

SC:WL:0	(Set Wireless OFF)
SC:WL:1	(Set Wireless ON)

### Response

OK:0	(OFF)
OK:1	(ON)

### Example

```
SC:WL:1
OK:1
SC:WL:0
OK:0
```

## Bluetooth® Key (BK)

- Bluetooth® tools only; lets you specify a new BLE ID (or “key”) for the tool.
- Modems scanning for tools can see the BLE ID as well as the tool’s MAC address.
- You can use the BLE ID for whatever you wish. A great example is so that your software knows to only connect to tools with a certain ID. This lets you segregate tools without needing to preconfigure your software to only connect to certain MAC addresses.

### Command

<code>SC:BK:??????</code>	Set Bluetooth Key (BLE ID) (6 digits, 0-F characters only allowed)
---------------------------	--

### Response

<code>OK:??????</code>	Confirm Bluetooth Key Set
------------------------	---------------------------

### Example

<pre>SC:BK:111111 OK:111111</pre>
-----------------------------------

## Wireless Node Number (NN)

- Non-Bluetooth® tools only; lets you specify a wireless node number for the tool.
- Each tool within range of a USB wireless dongle must have a unique wireless node number to be addressable.

### Command

<code>SC:NN:???</code>	Set node number (numbers only, 1-254)
------------------------	---------------------------------------

### Response

<code>OK:???</code>	Confirm node number set
---------------------	-------------------------

### Example

<pre>SC:NN:108 OK:108</pre>
-----------------------------

## Auto Reset (AR)

- With Auto Reset on, the tool automatically resets after the Hold Time has expired on completion of a successful tightening.

### Command

SC:AR:0	(Set Auto Reset OFF) <i>Default</i>
SC:AR:1	(Set Auto Reset ON)

### Response

OK:0	(Auto Reset OFF)
OK:1	(Auto Reset ON)

### Example

SC:AR:1
OK:1
SC:AR:0
OK:0

## Hold Time (HT)

- The length of time (in seconds) the display will be held after the completion of a successful tightening and before resetting. Only applicable if Auto Reset is On.
- Set Hold Time (1 – 10) secs

### Command

SC:HT:?	Set Hold Time- (default 4, range 1 – 10)
---------	--

### Response

OK:1 – OK:10
--------------

### Example

SC:HT:2
OK:2

## Inverse Display (ID)

- When Inverse Display is on, the colours on the display are changed to black numbers and letters on a white background.

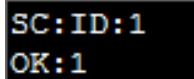
### Command

SC:ID:0	(Set Inverse Display OFF) <i>Default</i>
SC:ID:1	(Set Inverse Display ON)

### Response

OK:0	(OFF)
OK:1	(ON)

### Example



SC:ID:1  
OK:1

## Multiplier Ratio (MR)

- This setting is used in conjunction with an external mechanical gearbox so that the tool displays the extrapolated gearbox output.

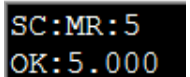
### Command

SC:MR:?	Set Multiplier Ratio 1:? - (default 1.000, range 1.000 – 1000.000)
---------	--

### Response

OK:?
------

### Example



SC:MR:5  
OK:5.000

## Complete Display (CD)

- Used to enable or disable the displaying of the Complete screen on the tool when using a Target with the # of readings set > 1 and saving the results to the tool.

### Command

SC:CD:0	(Set Display Complete OFF)
SC:CD:1	(Set Display Complete ON)

### Response

OK:0	(OFF)
OK:1	(ON)

### Example

```
SC:CD:0
OK:0
SC:CD:1
OK:1
```

## Warnings Display (WD)

- Used to enable or disable the displaying of the Warnings screens on the Tool when either (or both) the Multiplier Ratio or Torque CRS settings have been changed from default.

### Command

SC:WD:0	(Set Display Warnings OFF)
SC:WD:1	(Set Display Warnings ON)

### Response

OK:0	(OFF)
OK:1	(ON)

### Example

```
SC:WD:0
OK:0
SC:WD:1
OK:1
```



## Torque CRS (TC)

- The Torque Centres setting is used if an extension is fitted to increase the torque output of the tool.

### Command

<code>SC:TC:?</code>	Set Torque Centres (mm) - (default 31.8 for 50 N·m & 200 N·m, 35.0 for 330 N·m & 400 N·m). Minimum = 0.1 mm, Maximum = 999.9 mm
----------------------	---

### Response

<code>OK:?</code>
-------------------

### Example

<code>SC:TC:123.4</code> <code>OK:123.4</code>
---

## Date Format (DF)

### Command

<code>SC:DF:0</code>	(Set Date Format DDMMYY)
<code>SC:DF:1</code>	(Set Date Format MMDDYY)
<code>SC:DF:2</code>	(Set Date Format YYMMDD)

### Response

<code>OK:0</code>	(DDMMYY)
<code>OK:1</code>	(MMDDYY)
<code>OK:2</code>	(YYMMDD)

### Example

<code>SC:DF:1</code> <code>OK:1</code>
---

### Remarks

## Tool Lock (TL)

Unlock the tool or Lock the tool from user adjustment.

- TL:0 – Tool Unlocked
- TL:1 – Tool Locked.
  - No access to Tool SET UP, DATA STORE - Erase results
  - Allowed to select other Targets (if populated on the tool) with the UP/DOWN buttons, but NOT allowed to change their values via “TARGET” on the menu
- TL:2 - Tool Locked.
  - Up, Down and Exit buttons disabled whilst in the Run Screen
  - Not Allowed to select other Targets with the ‘Up/Down’ buttons (if populated on the tool)
  - Not allowed to Exit the Run screen with the ‘X’ button

### Command

SC:TL:0	Tool Unlocked (Lock level 0)
SC:TL:1	Tool Locked (Lock level 1)
SC:TL:2	Tool Locked (Lock level 2)

### Response

OK:0	Confirm Tool Unlocked
OK:1	Confirm Tool Locked to Level 1
OK:2	Confirm Tool Locked to Level 2

### Example

SC:TL:1
OK:1

## Auto Gyro Drift Compensation (AGD)

- Used to enable or disable the automatic drift compensation (where the tool says “Do Not Move” and a progress bar then moves across the screen while it detects any drift). AGD usually activates when turning on a tool, or if the tool has been asleep for a while, or if there has been a large temperature change. By default AGD is enabled.

**IMPORTANT: IF YOU DISABLE AGD, YOU MAY REDUCE THE ACCURACY OF ANGLE MEASUREMENTS.**

### Command

```
SC:AGD:0 (Set Auto Gyro Drift Compensation OFF)
SC:AGD:1 (Set Auto Gyro Drift Compensation ON)
```

### Response

```
OK:0 (OFF)
OK:1 (ON)
```

### Example

```
SC:AGD:0
OK:0

SC:AGD:1
OK:1
```

## Live Data Format (LDF)

- Used to change the RE:D live data messages between legacy and normal formats. The default is “legacy” so as to remain compatible with TDS. (see Result Data, RE:2 to see differences between formats)

**IMPORTANT: IF YOU CHANGE TO “NORMAL” FORMAT, THE TDS GRAPHING FEATURE WILL NOT SHOW ANY ANGLE DATA.**

### Command

```
SC:LDF:0 (Set Live Data Format to NORMAL)
SC:LDF:1 (Set Live Data Format to LEGACY)
```

### Response

```
OK:0 (NORMAL)
OK:1 (LEGACY)
```

### Example

```
SC:LDF:0
OK:0

SC:LDF:1
OK:1
```

## Save (SV)

- Save, Toggle between ON/OFF (Auto Reset mode only)– Save displayed peak reading if sent in Manual Reset mode.

### Command

SV

### Response

OK:1                      Save ON (Auto Reset mode only)  
OK:0                      Save OFF (Auto Reset mode only)

### Example

```
SV
OK:1
SV
OK:0
```

## Delete Last (DL)

### Command

DL                      Delete Last reading (from tool memory)

### Response

OK                      Confirm Last reading deleted

### Example

```
DL
DL
OK
```

### Remarks

- If there is no reading to delete, you will see ERR:2.
- This only works if the tool has not been power cycled between the last reading being saved on the tool and the command being sent to the tool.

## Delete All (DA)

### Command

DA	Delete All readings (from tool memory)
----	--

### Response

OK:0	Confirm All readings deleted
------	------------------------------

### Example

DA OK:0
------------

## Decrement Counter (DC)

### Command

DC	Decrement Counter by 1. Used when a Target with NUM>1 is active on the
----	--

### Response

OK:X	Confirm last reading number decremented
------	---

### Example

DC OK:
-----------

## Restore Defaults (RD)

- Restores default Tool Settings.
- This also clears any Targets on the tool.


### Command

RD	Factory Reset (Tool settings), but stay in ASCII mode i.e. Output Format = USER
----	--

### Response

OK	Confirm Restore Defaults (Factory Reset)
----	--

### Example


---

### Remarks

- Below are the NorTronic® default settings.

EOM Character	(EOM): None	
Auto Disable	(AUD): 0	
Units	(UN):	<i>show the chosen Unit of operation</i>
Torque High Limit	(THL):4	
Torque Low Limit	(TLL):4	
Angle High Limit	(AHL):4	
Angle Low Limit	(ALL):4	
Sleep After	(SA) :120	
Angle Display	(AD) :ON	
Auto Zero	(AZ) :ON	
Active From	(AF) :7.0	
Vibrate	(VB) :ON	
Wireless	(WL) :ON	<i>(Bluetooth® &amp; non-Bluetooth® tools; enable/disable wireless)</i>
Node Number	(NN) :2	<i>(Non-Bluetooth® tools only)</i>
Bluetooth® Key	(NN) :4e4252	<i>(Bluetooth® tools only)</i>
Auto Reset	(AR): OFF	
Hold Time	(HT): 4	
Inverse Display	(ID) : OFF	
Multiplier Ratio	(MR) :1.000	
Complete Display	(CD) : ON	
Warnings Display	(WD) : ON	
Torque CRS	(TC) :31.8	<i>(dependant on Tool Torque Capacity)</i>
Date format	(DF): 0	
Tool lock	(TL): 0	

## Set Date & Time (DAT:S)

### Command

`DAT:S:X,X,X,X,X,X` Set the tools Date & Time

### Response

`OK:X,X,X,X,X,X` Confirm Date & Time settings

### Example

```
DAT:S:17,03,17,11,45,00
OK:17/03/17 11:45:00
```

### Remarks

- The order you provide dd,mm,yy is the same as the tool setting (so if you've set the date format to be YYYYMMDD then the command is SD:yy,mm,dd)
- The command reports current date / time in the usual format e.g. 01/12/16 16:15 - you can use ":" as a delimiter but you cannot include "/" or " " as delimiters because that may interfere with setting tool name if you want to use those characters in the name.

## Read Date & Time (DAT:C)

### Command

`DAT:C` Read the tools Date & Time

### Response

`OK:X/X/X X:X:X` Report the Tools current Date & Time

### Example

```
DAT:C
OK:16/04/18 10:04:24
```

## Battery Status (BS)

### Command

BS	Report the tools current battery status
----	---

### Response

OK	Battery Normal
LO	Battery Low
CT	Battery Critical

### Example

BS OK
----------

### Remarks



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