Norbar Torque Tools

The Voice of Torque Control

MEASUREMENT AND CALIBRATION BROCHURE

2021

LEGEND

GENERIC

Accuracy (%)	Torque & Angle	Digital Display
Single Scale	Dual Scale	Multi Scale
Calibration Certificate	UKAS Accredited Certification	IP Rated
Bluetooth Enabled	Case Included	

SCREWDRIVERS & TORQUE WRENCHES

Ratchet	Torque Handle	Fixed
Adjustment Lock	Declaration of Conformance	Calibration Certificate

MANUAL TORQUE MULTIPLIERS

Adjustable Reaction	Anti Wind-up Ratchet	

POWERED TORQUE TOOLS

Adjustable Reaction	2 Speed	Air Consumption - litres/sec
Lifting Attachment	Bi-Directional	

TORQUE MEASUREMENT INSTRUMENTS

Multi Transducers	Back-up Data	

HARSH ENVIRONMENT INSTRUMENTS

Multi Transducers		

ULTRASONIC MEASUREMENT

Back-up Data		

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TORQUE MEASUREMENT

Norbar started manufacturing electronic torque measuring instruments in the early 1970s and now offers a comprehensive range, from the easy to use, cost-effective TruCheck™ 2 through to the sophisticated T-Box™ 2. Norbar's torque measuring instruments are renowned for high accuracy and superb reliability. Indeed, many of those early instruments are still in regular use today. For our interchangeable transducer instruments, we remain one of the few manufacturers in the world that issue a UKAS accredited calibration certificate both for the instrument and for the torque transducer. In doing so, customers can swap combinations of instrument and transducer while retaining complete traceability.

Norbar's torque transducers have established an excellent reputation based on exceptional quality and accuracy. A very wide torque range is covered, 0.04 to 300,000 N·m and three basic transducer configurations are offered; Static, Impulse Rotary and Annular.

All transducers up to 100,000 N·m are supplied as standard with a UKAS accredited calibration certificate from Norbar's in-house laboratory.

For customers who wish to take advantage of Norbar's transducers but have an existing, non-Norbar display instrument, transducers can be provided with a mV/V calibration.

Norbar's instruments and transducers are complemented by a wide range of ancillary products. Within this group are the products that would be required to set up a torque calibration laboratory, for example, torque wrench calibrators meeting ISO requirements and precision beam and weight systems for calibration of torque transducers.

TRUCHECK™ 2

This cost-effective torque wrench checker has been redesigned to incorporate improved features whilst maintaining ease of use. The TruCheck™ 2 aims to cut the cost of purchasing a torque wrench checking system and remove the fears over the complexity of using such equipment.

- Enables torque wrench performance to be monitored as part of your strategy to keep wrenches in peak condition
- LCD display with clear target indication from colour changing display (Plus version only). Visible in poorly lit work areas.
- Two versions, TruCheck™ 2 and TruCheck™ 2 Plus available
- 'Basic' version has limited settable options. Ideal for non-expert users with click type torque wrenches
- TruCheck™ 2 Plus allows a selection of torque units, three modes of operation (Click, Dial and Track), the ability to store up to 15 targets and select from 12 languages
- Plus version allows operator to set a target value and tolerance
- ±1% of reading accuracy (±2% when below 10% of range for the 10 N·m and 1,100 N·m TruCheck™ 2 model)
- Inbuilt Micro USB 2.0 port enables power from any USB power source. Plus version allows for both power and data transfer simultaneously
- Supplied with traceable calibration certificate in clockwise direction. A counter-clockwise calibration is available at additional cost.
- Software can be updated remotely, without the need to return the product to Norbar

TruCheck™ 2 Plus display showing above target tolerance

TruCheck™ 2 Plus display showing within target tolerance

TruCheck™ 2 Plus display showing below target tolerance

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TRUCHECK™ 2 (0.1 - 30 N·m)

TruCheck™ 2 Plus 3 N·m

TruCheck™ 2 with Torque Screwdriver (not included)

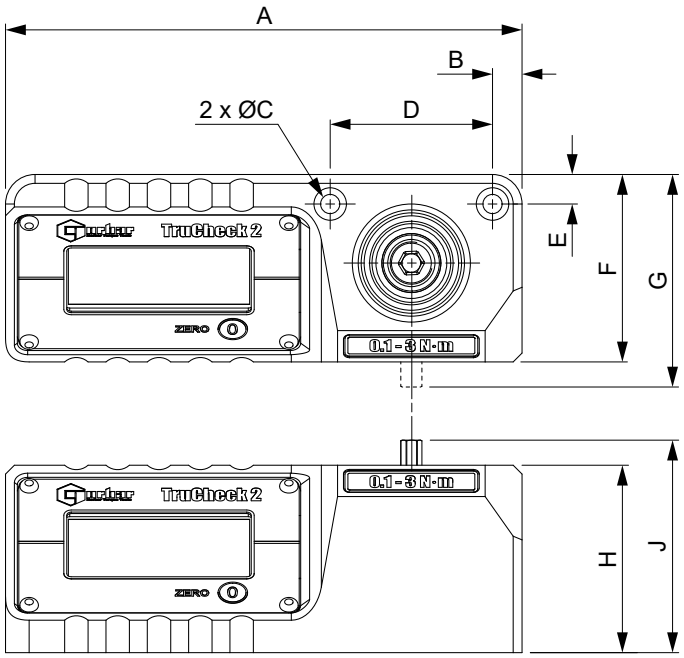
4	TRUCHECK 2 (0.1 - 30 N·m)
43514*	TruCheck 2, 0.1 - 3 N·m
43515*	TruCheck 2 Plus, 0.1 - 3 N·m
43516*	TruCheck 2, 0.5 - 10 N·m
43517*	TruCheck 2 Plus, 0.5 - 10 N·m
43518⁺	TruCheck 2, 1.5 - 30 N·m
43519⁺	TruCheck 2 Plus, 1.5 - 30 N·m
TCACC.CW	UKAS accredited calibration - clockwise
TCACC. CW+CCW	UKAS accredited calibration - clockwise and counter-clockwise

* 43514, 43515, 43516 and 43517 supplied with ¼" male hexagon and ¼" female sq. dr. adapter

⁺ 43518 and 43519 supplied with 10 mm male hexagon, ¼" and ⅜" female sq. dr. adapter

NOTE: If you order a UKAS accredited calibration, this certificate will be provided in place of the traceable calibration certificate and over the operating range as indicated on the device.

Model		TruCheck 2/Plus 0.1 - 3.0 N·m 0.5 - 10 N·m	TruCheck 2/Plus 1.5 - 30 N·m
Part Number		43514, 43515, 43516, 43517	43518, 43519
Range		0.1 - 3.0 N·m 0.5 - 10 N·m	1.5 - 30 N·m
In-Built Transducer Male Hex Drive Size		¼"	10 mm
Dimensions (mm)	A	175	175
	B	10	10
	ØC	6.5	6.5
	D	55	55
	E	10	10
	F	64	64
	G	N/A	72
	H	64	64
	J	72	N/A
Weight (kg)		1.4	1.4



NOTE: The male hexagon on the 3 N·m and 10 N·m models is vertically aligned. The 30 N·m model male hexagon is horizontally aligned.

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TRUCHECK™ 2 (3 - 2,100 N·m)

4	TRUCHECK 2 (3 - 2,100 N·m)
43520*	TruCheck 2, 3 - 65 N·m
43521*	TruCheck 2 Plus, 3 - 65 N·m
43522+	TruCheck 2, 10 - 260 lbf·ft
43523+	TruCheck 2 Plus, 10 - 260 lbf·ft
43524+	TruCheck 2, 10 - 350 N·m
43525+	TruCheck 2 Plus, 10 - 350 N·m
43528@	TruCheck 2, 40 - 800 lbf·ft
43529@	TruCheck 2 Plus, 40 - 800 lbf·ft
43530@	TruCheck 2, 50 - 1,100 N·m
43531@	TruCheck 2 Plus, 50 - 1,100 N·m
43532^	TruCheck 2, 200 - 2,100 N·m
43533^	TruCheck 2 Plus, 200 - 2,100 N·m
TCACC.CW	UKAS accredited calibration - clockwise
TCACC. CW+CCW	UKAS accredited calibration - clockwise and counter-clockwise

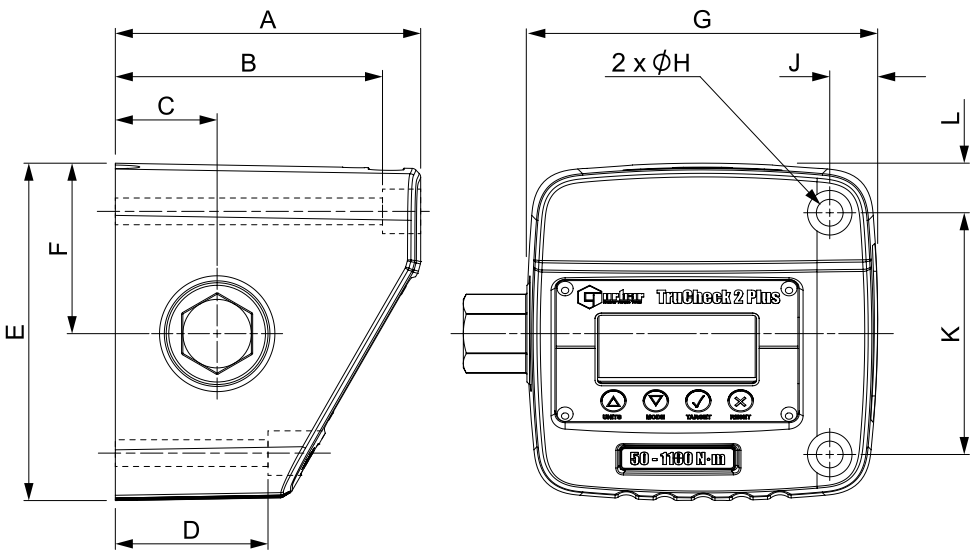
* 43520 and 43521 supplied with ⅜" female square drive
\+ 43522, 43523, 43524 and 43525 supplied with ½" female square drive
@ 43528, 43529, 43530 and 43531 supplied with 27 mm male hexagon plus ¾" female sq. dr. adapter
^ 43532 and 43533 supplied with 27 mm male hexagon plus 1" female sq. dr. adapter

NOTE: If you order a UKAS accredited calibration, this certificate will be provided in place of the traceable calibration certificate and over the operating range as indicated on the device.

TruCheck™ 2 Plus 1100 shown with a Power Tool Test Fixture (not included - see page 25) allowing for cost-effective checking of power tools

TruCheck™ 2 Plus 1,100 N·m

TruCheck™ 2 Plus 350 N·m



Model		TruCheck 2/Plus 3 - 65 N·m 10 - 260 lbf·ft 10 - 350 N·m	TruCheck 2/Plus 40 - 800 lbf·ft 50 - 1,100 N·m 200 - 2,100 N·m
Part Number		43520, 43521, 43522, 43523, 43524, 43525	43528, 43529, 43530, 43531, 43532, 43533
Dimensions (mm)	A	110	120
	B	95	105
	C	40	40
	D	50	60
	E	117	133
	F	59	67
	G	138	138
	ØH	10.5	10.5
	J	19	19
	K	80	95
	L	19	20
Weight (kg)		2.6	3.5

T-BOX™ 2

New Features

61908 TDMS USB Flash Drive

The T-Box™ 2 utilises its powerful processor to provide a seamless and complete torque data collection package. This is capable of tool calibrations, data logging, simultaneous transducer connections and archiving to your PC. As standard T-Box™ 2 is supplied with a UKAS accredited bi-directional calibration certificate recording each input as an independent channel.

- Instrument accuracy of ±0.05% (±0.1% when below 10% of transducer capacity)
- System accuracy with a typical Norbar transducer, ±0.5% from 20% of transducer capacity
- 5 digit resolution when used with any Norbar transducer
- Features a 10.1" multi-touch screen display with on-screen graphic icons for simple and easy tool navigation and selection
- Features Gorilla® Glass with native damage resistance helping to prevent deep chips and scratches appearing on the screens surface
- 2 transducer ports gives you the ability to perform 2 tasks simultaneously e.g. graphing & measuring
- Two task windows allows simultaneous working! Measure against a target while graphing the cycle, take readings from two transducers simultaneously, capture two different graphs at the same time or manage and review readings as they are captured
- The T-Box™ 2 can capture graphs up to 325 Hz, offering the ability to analyse fast moving transients
- User configurable to allow a selection of torque, torque and angle, rate targets and the ability to set thresholds
- Ability to predefine multiple targets
- 2 USB ports, 1 RS-232 serial port and 2 independantly configurable ancillary ports
- Includes 6 modes for torque tool measurement: Track, Click, Dial & Electronic, Stall, Screwdriver and Hydraulic
- File browser/manager for internal storage and USB management giving the user greater ease and flexibility in managing multiple files and folders
- Can export readings and graphs to CSV and JSON format allowing for 3rd party software integration
- Ability to network via USB adapter
- Continuous output of up to 100 readings per second via RS-232 or USB virtual serial devices
- Fast CPU frequency up to 2.3 GHz
- Large capacity memory of 120 GB SSD storage
- 4GB RAM allows for smooth and seamless operation
- Bench stand supplied as standard with an adjustable viewing angle
- Rear panel features 100 mm x 100 mm VESA mounting holes, allowing for easy wall mounting or the use of third party stands / arms
- Software can be updated remotely, without the need to return the product to Norbar
- Fully supports the use of a keyboard and mouse (not supplied)

4	T-BOX 2
43542	T-Box 2 Instrument with TDMS Software

Displaying 2 transducer readings simultaneously

Storage destination (left) file browser (right)

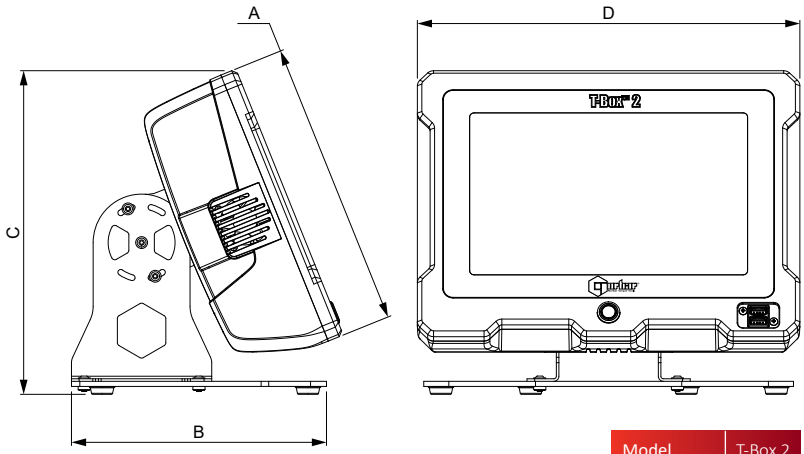
Home menu for 2 separate windows

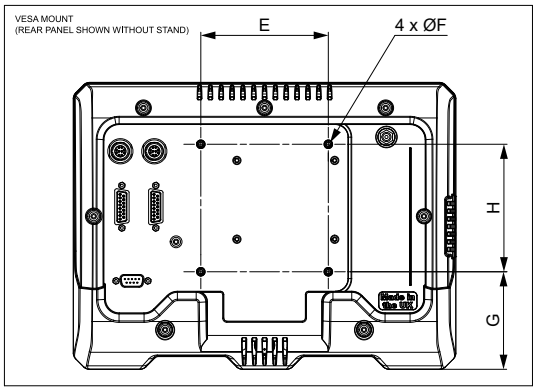
T-BOX™ 2

Norbar's AnB modules are a key differentiator between the T-Box™ 2 and other torque measuring instruments, including others from Norbar. While they may have the appearance of regular transducer inputs, they are actually distinct computing modules which operate independently and contain their own states and settings. For instance, when we talk about mode settings for T-Box™ 2, we do so in the context of each AnB module, as it is the module which is set in that mode and uses those settings. The T-Box™ 2 contains two AnB modules which are displayed separately using a split screen. Where this really comes into its own is when the activity on one AnB needs to be compared, graphed for example, against the activity on the other AnB. A good application for this would be the calibration of hydraulic torque wrenches where one AnB is configured to read a torque transducer and the other is configured to read a pressure transducer, allowing the user to build up a torque versus pressure graph using one instrument.

New software version 1.0.2.X available

- Ability to set up new graph pre-sets and defaults, saving the user time
- New graphing settings allows the user to set a maximum graph duration to stop data capture after a designated time
- Can link targets with the ability to delete previously captured result
- Intelligent target file history memorises the last-used files for individual AnB modules improving convenience when working with two transducers with different sets of targets at once
- Ability to enable or disable implicit AnB selection allowing for greater control when setting or clearing targets in AnB modules
- Users can now toggle serial data output on/off per AnB allowing the ability to suppress output from one AnB and leaving only the data stream from the AnB of interest
- Progressive Reset lets you sweep through a series of Linked Targets for the purpose of rapidly calibrating hydraulic wrenches or gearboxes, (peak-type modes only)
- Broadcast Capture Triggers lets you trigger capture of a reading on the neighbouring AnB when a reading capture is made on the target (peak-type and click modes only; peak-type modes require Progressive Reset to be enabled)
- Combining Progressive Reset and Broadcast Capture Triggers with Linked Targets to capture hydraulic wrench torque at a series of desirable pressure levels for rapid hydraulic wrench calibration. This approach can dramatically reduce calibration times (for instance, from several minutes to under 1 minute)
- Capture large numbers of readings with more fluidity than ever before thanks to performance optimisations in the user interface
- Simplified update procedure allowing for updates within T-Box™ 2 User Interface without the requirement of a keyboard





T-Box™ 2 back panel allows for 2 transducers to connect simultaneously, 1 RS-232 serial port and 2 ancilliary ports

Model		T-Box 2
Part Number		43542
Dimensions (mm)	A	225
	B	200
	C	254
	D	300
	E	100
	ØF	M4
	G	76
	H	100
Weight (kg)		5.2

Displaying transducer reading alongside target selection

T-Box™ 2 at the center of a test bench for manual torque wrenches, powered torque tools and hydraulic torque wrenches

TORQUE SCREWDRIVER TESTER (TST)

The Torque Screwdriver Tester (TST) combines simplicity and functionality to provide a high quality instrument for the testing and calibration of low capacity torque tools.

The TST is supplied as standard with a UKAS accredited torque calibration certificate in CW direction for the complete system i.e. Supplied with Instrument certificate and internal transducer system certificate.

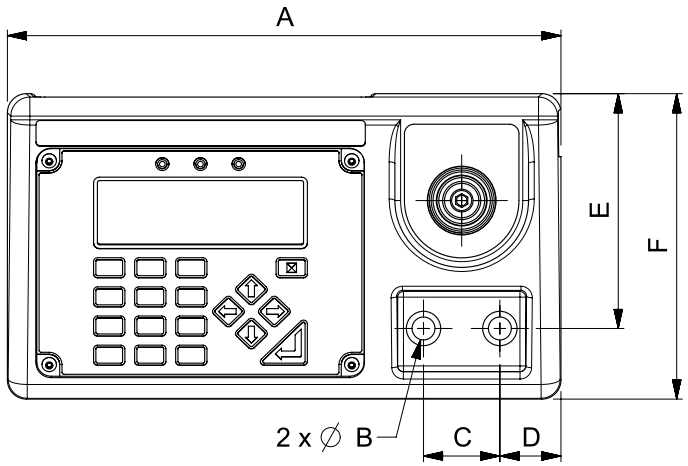
Featuring an internal transducer complete with Rundown Fixture, the TST is available in 3 torque ranges, 0.04 to 2 N·m, 0.5 to 10 N·m and 1.25 to 25 N·m. Class 1 system accuracy over its Primary range (±0.5% of reading from 20% to 100% of full scale).
What makes the TST genuinely versatile is the interface for an external transducer. This interface, accessed by a 2 way switch on the TST, allows the connection of any transducer from Norbar's Smart range and most mV/V calibrated transducers from Norbar or other manufacturers.

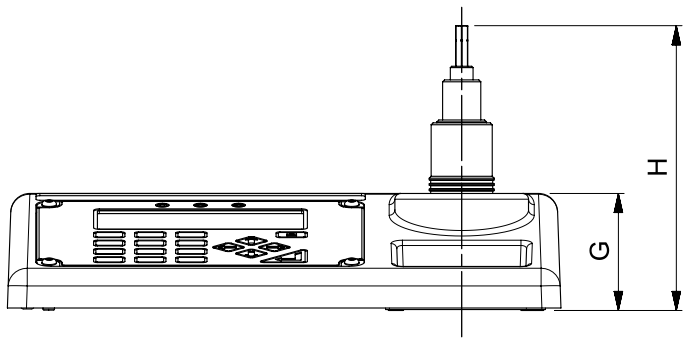
- Instrument accuracy of ±0.05% (±0.1% when below 10% of transducer capacity)
- System accuracy with internal transducer or a typical external Norbar transducer, ±0.5% from 20% of transducer capacity
- Pictorial display panel for easy mode selection
- Limit detection with low, pass and fail indication. Up to 8 target values can be set
- Digital limit state output for control of external tools
- Operation from fast charge internal battery pack (maximum time of 3 hours 20 minutes for full charge) or a.c. supply (90 to 264 Volts)
- RS-232-C serial data interface for connection to a printer or PC. Continuous RS-232 output when used in Track mode (up to 11 readings per second)
- Pulse count feature in Impulse mode and Clutch Tool mode
- Smart intelligence for transducer recognition
- Memory for calibration details of 20 non-Smart mV/V calibrated transducers
- Analogue output allows the instrument to be used as part of a process control system for performance analysis
- User-selectable frequency response for each mode of operation
- All user-selectable features have password protection. The instrument can be issued to users with only the required modes of operation and units of measure enabled. This feature can virtually eliminate operator induced errors
- ¼" female hex to ¼" female square adaptor comes supplied as standard

Model		All Models
Part Number		43212 43213 43214
Dimensions (mm)	A	290
	ØB	10
	C	40
	D	32
	E	123
	F	160
	G	61
	H	149
Weight (kg)		4.7

4	TST SERIES 2
43212	TST 2, 0.04 - 2 N·m
43213	TST 10, 0.5 - 10 N·m
43214	TST 25, 1.25 - 25 N·m
TST.CCW	UKAS-accredited counter-clockwise calibration when ordered with new unit

Above part numbers exclude Transducer lead for external transducer (see page 19).
TST is supplied complete with a Rundown Fixture for joint simulation.
Additional rundowns are available see page 16.





TORQUE TOOL TESTER (TTT)

The Torque Tool Tester (TTT) shares all of the extensive features of the Torque Screwdriver Tester (TST) except that it has no internal transducer. Instead, the TTT offers not one but three external transducer interfaces allowing any three transducers to be simultaneously connected. Selection between the transducers is made by a rotary switch at the back of the instrument case.

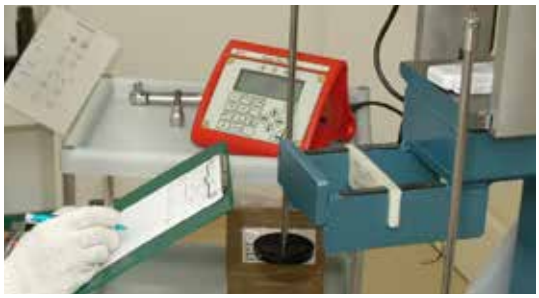
The TTT is supplied as standard with a UKAS accredited calibration certificate in CW direction.

Any transducer from Norbar's Smart range and most mV/V calibrated transducers from Norbar or other manufacturers can be connected to the TTT. The Smart feature means that once a transducer has been connected, the instrument will automatically recognise calibration details such as mV/V output, serial number and capacity.

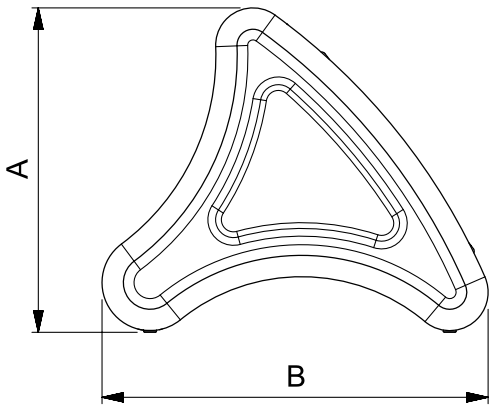
- Instrument accuracy of ±0.05% (±0.1% when below 10% of transducer capacity)
- System accuracy with a typical Norbar transducer, ±0.5% from 20% of transducer capacity
- Pictorial display panel for easy mode selection
- Limit detection with low, pass and fail indication. Up to 12 target values can be set
- Digital limit state output for control of external tools
- Operation from fast charge internal battery pack (maximum time of 3 hours 20 minutes for full charge) or a.c. supply (90 to 264 Volts)
- RS-232-C serial data interface for connection to a printer or PC. Continuous RS-232 output when used in Track mode (up to 11 readings per second)
- Pulse count feature in Impulse mode and Clutch Tool mode
- Smart intelligence for transducer recognition, now displays transducer capacity, units and Serial Number
- Memory for calibration details of 20 non-Smart mV/V calibrated transducers
- Analogue output allows the instrument to be used as part of a process control system for performance analysis
- User-selectable frequency response for each mode of operation
- All user-selectable features have password protection. The instrument can be issued to users with only the required modes of operation and units of measure enabled. This feature can virtually eliminate operator induced errors
- Peak memory modes can now be configured to have auto reset (previously only manual reset was possible)
- Series 3 users can set up their own measurement units, making it possible to interface with non-torque transducers, for example load or pressure

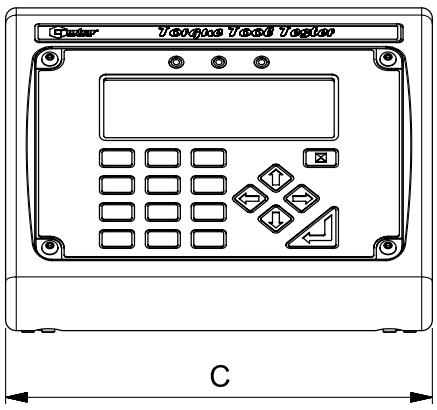
4	TTT SERIES 3
43228	TTT Instrument
TTT.CCW	UKAS-accredited counter-clockwise calibration when ordered with new unit

Above TTT part number excludes Transducer leads (see page 19)



Model		All Models
Part Number		43228
Dimensions (mm)	A	152
	B	181
	C	200
Weight (kg)		4.8





PROFESSIONAL TORQUE TESTER (PRO-TEST)

The Professional Torque Tester (Pro-Test) - Series 2, is an accurate, highly specified and easy to operate instrument for testing and calibrating all types of torque wrench.

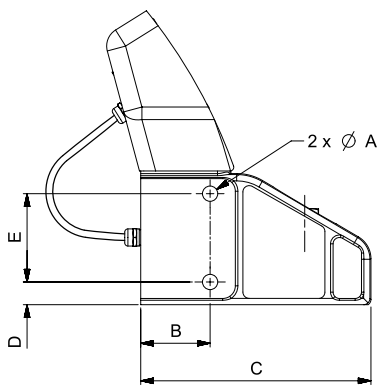
The Pro-Test is supplied as standard with a UKAS accredited calibration certificate.

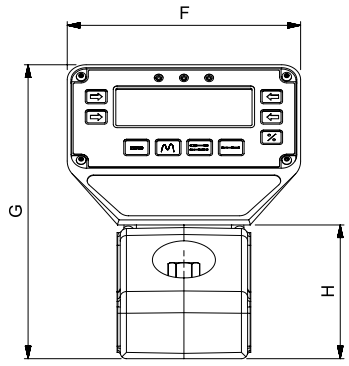
- Pro-Test is priced to make in-house testing a viable proposition even for the smaller industrial and automotive torque wrench user
- Guaranteed classification to BS7882:2017, Class 1 or better over the primary calibration range (20% to 100% of full scale), Class 2 or better over the secondary calibration range (lowest calibrated value to 20% of full scale). Class 1 equates to ±0.5% of reading
- Three essential operating modes allow the Pro-Test to be used with all torque wrench types 'Track' displays the live value, 'Peak Memory' records the highest value and 'First Peak Memory' records the first peak of torque (for click type torque wrenches). Both memory modes can be used with manual or automatic reset
- Large backlit display is easily visible from a distance and in poor light
- Display and transducer are hard-wired together with a 600 mm cable
- All common units of torque measurement are included
- Pictorial mode selection incorporated for ease of use
- User can select the language they wish to work in (most European languages are included)
- Transducer can be mounted for torque wrench operation in the horizontal or vertical plane
- RS-232-C is included for the output of reading to a printer, PC, data capture unit, SPC software etc
- Optional mounting plate gives greater flexibility of mounting options
- All user-settable parameters are menu selectable from the front panel
- Supplied in a robust carry case with a data transfer lead to connect to a PC or printer
- All transducers are supplied as standard with a UKAS accredited calibration certificate in CW direction. For additional counter-clockwise direction order: Part No. PROTEST.CCW

4	PRO-TEST SERIES 2
43218	Pro-Test 60, 1.2 - 60 N·m
43219	Pro-Test 400, 8 - 400 N·m
43220	Pro-Test 1500, 30 - 1,500 N·m

4	ANCILLARY PRODUCTS FOR PRO-TEST
62198.BLK9005	Mounting Bracket
60253	12v DC Power Supply for Series 2
29190	1" x 36 mm socket
29179	¾" x 36 mm socket
29143	½" x 36 mm socket
29083	⅜" x 36 mm socket
PROTEST.CCW	Counter-clockwise calibration when ordered with new unit

Model		Pro-Test 60	Pro-Test 400	Pro-Test 1500
Part Number		43218	43219	43220
Socket(s) provided		¼" to 10 mm Hex ⅜" to 10 mm Hex ½" to 10 mm Hex	⅜" to 22 mm Hex ½" to 22 mm Hex ¾" to 22 mm Hex	¾" to 36 mm Hex
Dimensions (mm)	ØA	12	12	12
	B	55	55	55
	C	183	183	183
	D	18	18	18
	E	70	70	70
	F	185	185	185
	G	233	233	233
	H	106	106	106
Weight (kg)		6.3	6.4	7.3





SPARES FOR INSTRUMENTATION PRODUCTS

8	SPARES FOR INSTRUMENTATION PRODUCTS
38876	Rechargeable Battery Pack for Pro-Log, TST & TTT
29610	¼" Female - ½" Male Sleeve Adaptor
29611	½" Female - ¾" Male Sleeve Adaptor
29612	½" Female - 1" Male Sleeve Adaptor
29613	¾" Female - 1" Male Sleeve Adaptor
29614	⅜" Female - ½" Male Sleeve Adaptor

4	SERIAL DATA LEAD KIT
60248	Serial Data Lead Kit
	Note: Serial Data Lead Kit is not suitable for use with HE Instrument and TruCheck™ 2
60259	USB to Serial Data Lead (Does not work with USM)
	This kit enables Norbar 'CE Marked' instruments (Post January 1996 ETS, TWA and DTS plus all Pro-Test, TST and TTT) to connect to most PCs.

PART NUMBER SUFFIX SYSTEM

Transducers can be ordered for use with Norbar's current range of instruments (TST, TTT, TTL-HE and T-Box™ 2), and as Industry Standard (mV/V calibrated) for certain display instruments from other manufacturers.
A part number suffix system is used to identify the type of calibration required. For example, a 1,000 N·m Static Transducer for use with a TTT instrument would become part number 50772.LOG.

SUFFIX	USAGE
.LOG	TST, TTT, TTL-HE & T-Box™ 2
.IND	Instruments of non Norbar manufacture (check with Norbar for suitability) and TST, TTT, TTL-HE & T-Box™ 2

Where the transducer suffix .LOG is used, the transducer is calibrated with an instrument, as a system, a calibration certificate is provided in torque units. A full scale mV/V figure is also supplied.

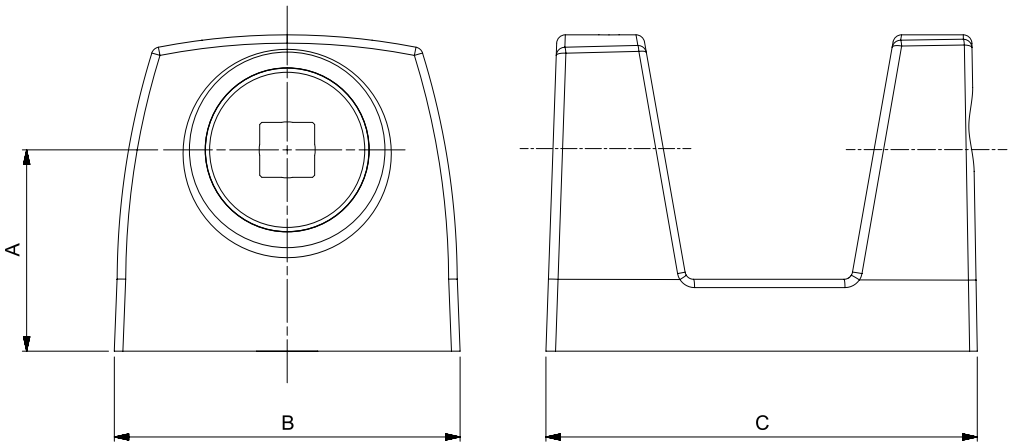
STATIC TRANSDUCER BENCH STANDS

4	BENCH STANDS FOR STATIC TORQUE TRANSDUCERS
50211	Small frame size (10 N·m) ¼" sq.
50212	Small frame size (50 N·m) ⅜" sq.
50213	Small frame size (100/250 N·m) ½" sq.
50220	Large frame size (250/500 N·m) ¾" sq.
50221	Large frame size (1,000/1,500 N·m) 1" sq.
50127.BLK9005*	Extra large size (7,000 N·m) 1½" sq.
52014	¼" Insert for Small Bench Stands
52015	⅜" Insert for Small Bench Stands
52016	½" Insert for Small Bench Stands
52017	¾" Insert for Large Bench Stands
52018	1" Insert for Large Bench Stands

* Dimensions available on request

Bench stands ensure the correct mounting of Norbar's Static Torque Transducers up to 7,000 N·m (5,000 lbf·ft).

Model		Small Frame Size	Large Frame Size
Part Number		50211 50212 50213	50220 50221
Dimensions (mm)	A	50	70
	B	99	120
	C	92	150
Weight (kg)		0.8	2.5



STATIC TRANSDUCERS

The accuracy and quality of the Norbar Static Torque Transducers has made them the first choice of many calibration laboratories throughout the world. Up to 5,000 N·m (5,000 lbf·ft) classified to BS7882:2017, typically better than Class 1 for the primary classification range (±0.5% of reading from 20% to 100% of full scale).

- Robust, heat treated, alloy steel torsion shaft design
- Designed to ignore non-torsional forces
- Operates in clockwise and counter-clockwise directions
- Calibration up to 100,000 N·m with a UKAS accredited Certificate
- Calibrated in clockwise direction as standard. Counter-clockwise provided on request
- Smart transducers have a built in memory circuit which contains essential information about the transducer. This information can be read by Norbar's TST, TTT, TTL-HE & T-Box™ 2 instruments meaning that when the transducer is connected, it is immediately recognised and ready for use
- Smart transducers can also be used with many other instruments, however these will operate as normal ratio calibrated (mV/V) transducers - the Smart data will not be read

Static Transducers ¼" through to 1"

4	STATIC TRANSDUCERS - 0.1 - 1,500 N·m	
50587.xxx*	0.1 - 1 N·m	¼" M/F
50588.xxx	0.25 - 2.5 N·m	¼" M/F
50589.xxx	0.5 - 5 N·m	¼" M/F
50590.xxx	1 - 10 N·m	¼" M/F
50591.xxx	2.5 - 25 N·m	⅜" M/F
50592.xxx	5 - 50 N·m	⅜" M/F
50593.xxx	10 - 100 N·m	½" M/F
50594.xxx	25 - 250 N·m	½" M/F
50701.xxx	25 - 250 N·m	¾" M/F
50849.xxx	35 - 350 N·m	½" M/F
50596.xxx	50 - 500 N·m	¾" M/F
50772.xxx	100 - 1,000 N·m	1" M/F
50766.xxx	150 - 1,500 N·m	1" M/F

4	STATIC TRANSDUCERS - 0.1 - 1,000 lbf·ft	
50611.xxx	0.1 - 1 lbf·ft	¼" M/F
50615.xxx	0.5 - 5 lbf·ft	¼" M/F
50618.xxx	1 - 10 lbf·ft	¼" M/F
50620.xxx	2.5 - 25 lbf·ft	⅜" M/F
50836.xxx	5 - 50 lbf·ft	½" M/F
50624.xxx	10 - 100 lbf·ft	½" M/F
50625.xxx	25 - 250 lbf·ft	½" M/F
50702.xxx	25 - 250 lbf·ft	¾" M/F
50627.xxx	50 - 500 lbf·ft	¾" M/F
50773.xxx	100 - 1,000 lbf·ft	1" M/F

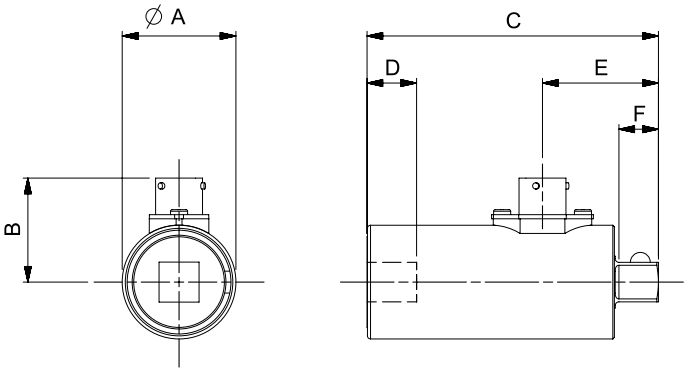
4	STATIC TRANSDUCERS - 1 - 1,000 lbf·in	
50610.xxx*	1 - 10 lbf·in	¼" M/F
50612.xxx	2.5 - 25 lbf·in	¼" M/F
50614.xxx	5 - 50 lbf·in	¼" M/F
50617.xxx	10 - 100 lbf·in	¼" M/F
50619.xxx	25 - 250 lbf·in	⅜" M/F
50621.xxx	50 - 500 lbf·in	⅜" M/F
50623.xxx	100 - 1,000 lbf·in	½" M/F

4	STATIC TRANSDUCERS - 10 - 100 ozf·in	
50609.xxx*	10 - 100 ozf·in	¼" M/F

TD2.CCW	Alternative calibration direction for transducers up to 1,500 N·m / 1,000 lbf·ft when ordered with new unit

xxx Indicates .LOG or .IND versions, please see page 10.
* .LOG versions not suitable for use with TST, TTT or TTL-HE, purchased pre Feb 2016.

Model		¼" M/F	⅜" M/F	½" M/F	¾" M/F	1" M/F
Part Number		50587.xxx 50588.xxx 50589.xxx 50590.xxx 50611.xxx 50615.xxx 50618.xxx 50610.xxx 50612.xxx 50614.xxx 50617.xxx 50609.xxx	50591.xxx 50592.xxx 50620.xxx 50619.xxx 50621.xxx	50593.xxx 50594.xxx 50849.xxx 50836.xxx 50624.xxx 50625.xxx 50623.xxx	50701.xxx 50596.xxx 50702.xxx 50627.xxx	50772.xxx 50766.xxx 50773.xxx
Dimensions (mm)	ØA	36	36	36	54	54
	B	33	33	33	42	42
	C	86	90	93	142	147
	D	10	13	16	24	29
	E	30	34	37	46	51
	F	6.5	10	13	22	26
Weight (kg)		0.6	0.6	0.6	1.5	1.7



STATIC TRANSDUCERS

Static Transducers 1½" through to 3½" Male to Female (M/F)

4	STATIC TRANSDUCERS - 250 - 7,000 N·m	
50703.xxx	250 - 2,500 N·m	1½" M/F
50791.xxx	300 - 3,000 N·m	1½" M/F
50599.xxx	500 - 5,000 N·m	1½" M/F
50669.xxx@	700 - 7,000 N·m	1½" M/F

4	STATIC TRANSDUCERS - 250 - 5,000 lbf·ft	
50704.xxx	250 - 2,500 lbf·ft	1½" M/F
50630.xxx	500 - 5,000 lbf·ft	1½" M/F

TD5.CCW@	Alternative calibration direction for transducers from 1,501 - 7,000 N·m / 1,001 - 5,000 lbf·ft when ordered with new unit

4	STATIC TRANSDUCERS - 1,000 - 100,000 N·m	
50776.xxx	1,000 - 10,000 N·m	2½" M/F
50797.xxx	2,500 - 25,000 N·m	2½" M/F
50781.xxx	5,000 - 50,000 N·m	2½" M/F
50783.xxx	8,000 - 80,000 N·m	3½" M/F
50816.xxx	10,000 - 100,000 N·m	3½" M/F

4	STATIC TRANSDUCERS - 1,000 - 60,000 lbf·ft	
50777.xxx	1,000 - 10,000 lbf·ft	2½" M/F
50798.xxx	2,500 - 25,000 lbf·ft	2½" M/F
50799.xxx	3,000 - 30,000 lbf·ft	2½" M/F
50782.xxx	6,000 - 60,000 lbf·ft	3½" M/F

TD3.CCW+	Alternative calibration direction for transducers from 7,001 - 100,000 N·m / 5,001 - 100,000 lbf·ft when ordered with new unit

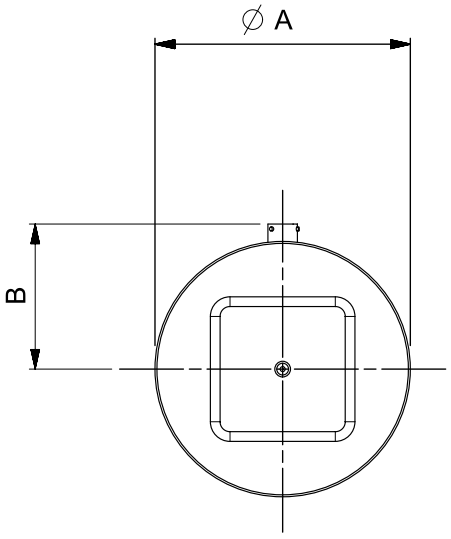
xxx Indicates .LOG or .IND versions, please see page 10.

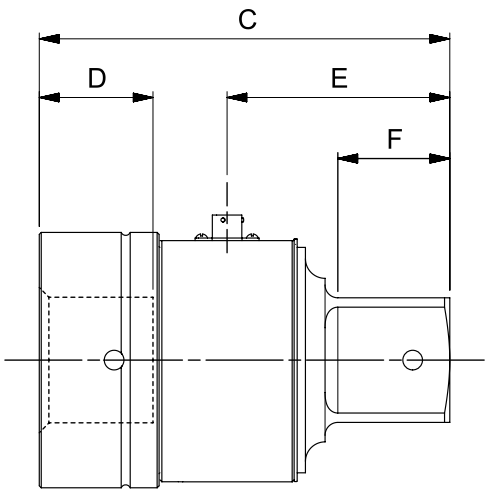
* .LOG versions not suitable for use with TST, TTT or TTL-HE, purchased pre Feb 2016.

@ UKAS accredited calibration up to 6,000 N·m. A non-accredited value at 7,000 N·m is extrapolated and provided for reference only.

\+ UKAS accredited calibration up to 80,000 lbf·ft. A non-accredited value at 100,000 lbf·ft is extrapolated and provided for reference only.

Model		1½" M/F	2½" M/F	3½" M/F
Part Number		50703.xxx 50791.xxx 50599.xxx 50669.xxx 50704.xxx 50630.xxx	50776.xxx 50797.xxx 50781.xxx 50777.xxx 50798.xxx 50799.xxx	50783.xxx 50816.xxx 50782.xxx
Dimensions (mm)	ØA	95	130	160
	B	59	80	107
	C	160	209	292
	D	41	59	91
	E	85	114	147
	F	38	57	76
Weight (kg)		4.5	11.5	16.5





STATIC TRANSDUCERS

Static Transducers 2½" through to 3½" Male to Male (M/M)

4	STATIC TRANSDUCERS - 2,500 - 100,000 N·m	
50603.xxx	2,500 - 25,000 N·m	2½" M/M
50794.xxx	5,000 - 50,000 N·m	3½" M/M
50796.xxx	10,000 - 100,000 N·m	3½" M/M

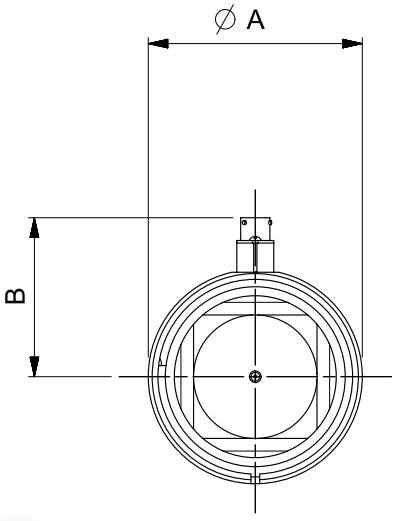
4	STATIC TRANSDUCERS - 2,500 - 100,000 lbf·ft	
50635.xxx	2,500 - 25,000 lbf·ft	2½" M/M
50795.xxx	5,000 - 50,000 lbf·ft	3½" M/M
50637.xxx+	10,000 - 100,000 lbf·ft	3½" M/M

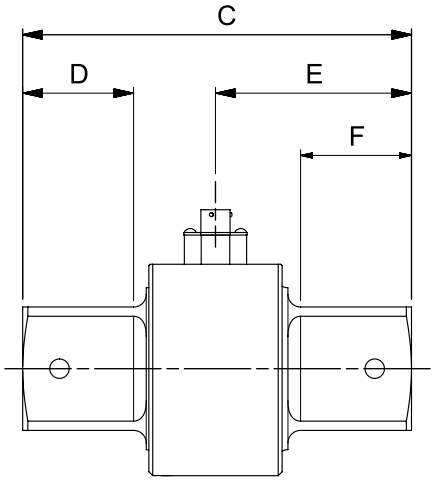
TD3.CCW+	Alternative calibration direction for transducers from 7,001 - 100,000 N·m / 5,001 - 100,000 lbf·ft when ordered with new unit

4	STATIC TRANSDUCERS - 15,000 - 200,000 N·m	
-	15,000 - 150,000 N·m	4½" M/M
-	20,000 - 200,000 N·m	4½" M/M

xxx Indicates .LOG or .IND versions, please see page 10.
* .LOG versions not suitable for use with TST, TTT or TTL-HE, purchased pre Feb 2016.
@ UKAS accredited calibration up to 6,000 N·m. A non-accredited value at 7,000 N·m is extrapolated and provided for reference only.
\+ UKAS accredited calibration up to 80,000 lbf·ft. A non-accredited value at 100,000 lbf·ft is extrapolated and provided for reference only.

Model		2½" M/M	3½" M/M
Part Number		50603.xxx 50635.xxx	50794.xxx 50796.xxx 50795.xxx 50637.xxx
Dimensions (mm)	ØA	110	165
	B	82	95
	C	200	271
	D	57	76
	E	100	135
	F	57	76
Weight (kg)		11.5	16.5





4	STATIC TRANSDUCERS
SECCAL.CW	Secondary calibration in one direction on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit
SECCAL.CW+CCW	Secondary calibration in two directions on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit
ADDCALPOINTS.NEW	Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7,000 N·m (5,000 lbf·ft) when ordered with new unit

ROTARY TRANSDUCERS

Rotary transducers are designed to measure the torque from continuously rotating shafts such as impulse power tools and certain non-impulse tools with a severe clutch action.

This range offers class-leading performance with impulse tools and will be supplied with a UKAS accredited calibration certificate from Norbar's laboratory.

These transducers are known as Smart transducers. They have built-in intelligence in the form of a memory circuit which contains essential information about the transducer which can be read by the appropriate type of instrument (TST, TTT, TTL-HE & T-Box™ 2), thus reducing set-up time.

They will also work with instruments that cannot read the memory information, by inputting the relevant calibration details manually.

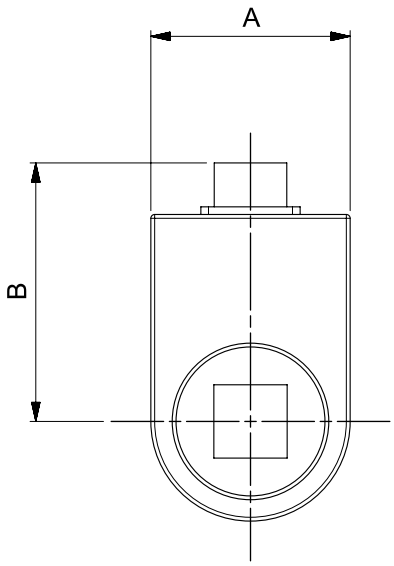
Note: Not for use with Impact Tools.

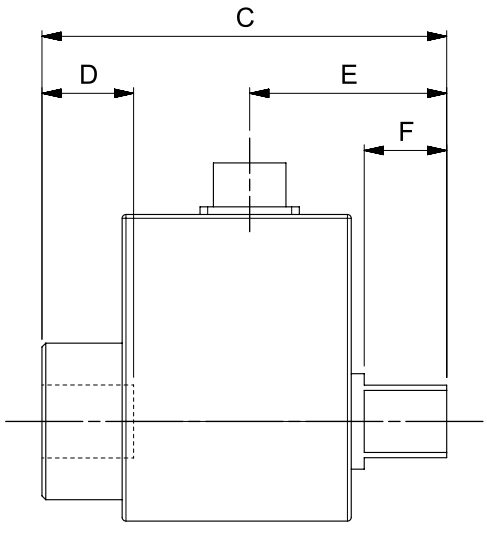
Angle measurement also available.

4	ROTARY TRANSDUCERS
50708.xxx	0.25 - 5 N·m ¼" M/F Hex
50709.xxx	1 - 20 N·m ¼" M/F Hex
50710.xxx	1 - 20 N·m ¼" M/F sq. dr.
50719.xxx	0.75 - 15 lbf·ft ¼" M/F sq. dr.
50711.xxx	3.75 - 75 N·m ⅜" M/F sq. dr.
50720.xxx	2.5 - 50 lbf·ft ⅜" M/F sq. dr.
50712.xxx	10 - 200 N·m ½" M/F sq. dr.
50721.xxx	7.5 - 150 lbf·ft ½" M/F sq. dr.

4	ROTARY TRANSDUCERS
50713.xxx	12.5 - 250 N·m ¾" M/F sq. dr.
50722.xxx	10 - 200 lbf·ft ¾" M/F sq. dr.
50714.xxx	25 - 500 N·m ¾" M/F sq. dr.
50723.xxx	15 - 300 lbf·ft ¾" M/F sq. dr.
50715.xxx	75 - 1,500 N·m 1" M/F sq. dr.
50724.xxx	50 - 1,000 lbf·ft 1" M/F sq. dr.
TD2.CCW	Counter-clockwise calibration.

Angle options available, contact Norbar.





Model		¼" M/F Hex	¼" M/F sq. dr.	⅜" M/F sq. dr.	½" M/F sq. dr.	¾" M/F sq. dr.	1" M/F sq. dr.
Part Number		50708.xxx 50709.xxx	50710.xxx 50719.xxx	50711.xxx 50720.xxx	50712.xxx 50721.xxx	50713.xxx 50714.xxx 50722.xxx 50723.xxx	50715.xxx 50724.xxx
Dimensions (mm)	A	30	30	30	42	52	63
	B	58	58	62	67	73	79
	C	116	72	77	87	106	125
	D	N/A	10	13	16	24	29
	E	49	33	36	42	51	61
	F	26	7	11	15	21	26
Weight (kg)		0.2	0.2	0.2	0.4	0.8	1.5

FLANGE MOUNTED TRANSDUCERS (FMT)

FMT 2 N·m

4	FMT
50671.xxx*	0.04 - 2 N·m ¼" sq. dr. with Joint Simulator
50672.xxx	0.5 - 10 N·m ¼" sq. dr. with Joint Simulator
50673.xxx	1.25 - 25 N·m ¼" + ⅜" sq. dr. with Joint Simulator
50677.xxx*	0.4 - 20 lbf·in ¼" sq. dr. with Joint Simulator
50678.xxx	5 - 100 lbf·in ¼" sq. dr. with Joint Simulator
50679.xxx	12.5 - 250 lbf·in ¼" + ⅜" sq. dr. with Joint Simulator

FMT 150 N·m

4	FMT
50844.xxx	3 - 60 N·m ½" + ⅜" sq. dr. with Joint Simulator
50674.xxx	7.5 - 150 N·m ½" + ⅜" sq. dr. with Joint Simulator
50680.xxx	5 - 100 lbf·ft ½" + ⅜" sq. dr. with Joint Simulator
50675.xxx	20 - 400 N·m ½" + ¾" sq. dr.
50681.xxx	12.5 - 250 lbf·ft ½" + ¾" sq. dr.

Flange Mounted Transducers (FMT) incorporate mounting points for securely fixing the transducer to the working surface. The transducer lead which comes attached to the transducer, is fitted with a high quality connector, suitable for attachment to TST, TTT and T-Box™ 2 instruments. FMTs are provided with precision square drive adaptors suitable for the calibration of torque wrenches.

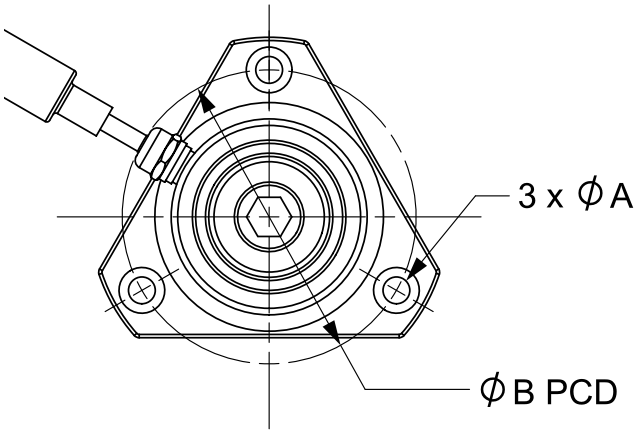
FMT 1,500 N·m

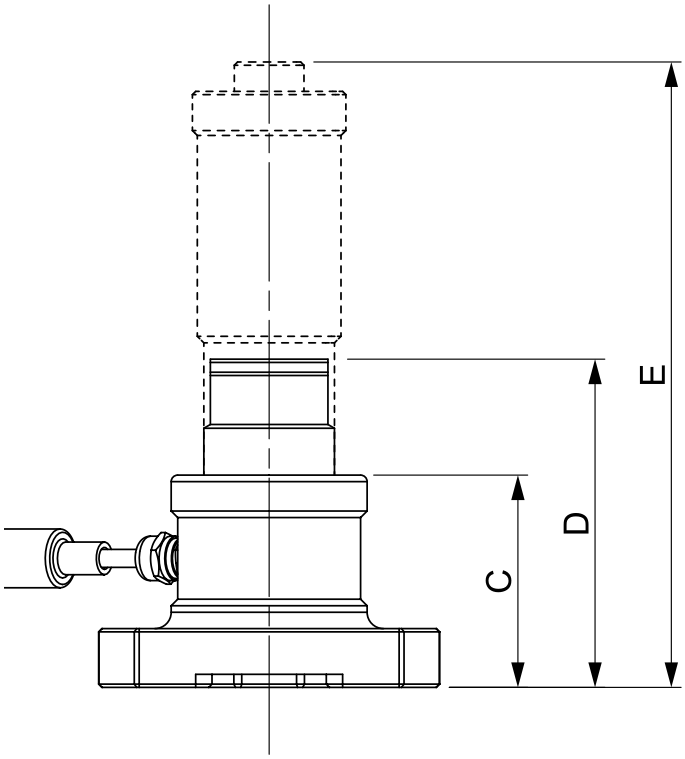
4	FMT
50676.xxx	30 - 1,500 N·m ½", ¾" + 1" sq. dr.
50682.xxx	20 - 1,000 lbf·ft ½", ¾" + 1" sq. dr.
TD1.CCW	Counter-clockwise calibration for FMT & STB when ordered with new unit

xxx Indicates .LOG or .IND versions, please see page 10.
* If using this transducer with a Series 1 TST or TTT (Part No.s 43198 - 43201) or a Pro-Log Display instrument, please contact Norbar.
Includes integral transducer lead with connector to suit TST, TTT and T-Box™ 2. Additional lengths can be accommodated, consult Norbar for details.

FLANGE MOUNTED TRANSDUCERS (FMT)

Model		FMT (2 N·m - 25 N·m)	FMT (60 N·m - 400 N·m)	FMT (1,500 N·m)
Part Number		50671.xxx 50672.xxx 50673.xxx 50677.xxx 50678.xxx 50679.xxx	50844.xxx 50674.xxx 50680.xxx 50675.xxx 50681.xxx	50676.xxx 50682.xxx
Dimensions (mm)	ØA	5.5	8.5	12
	ØB	64	90	150
	C	63	65	84
	D	83 (¼"), 86 (⅜")	92 (¼"), 95 (⅜"), 101 (½")	128 (½"), 138 (¾"), 138 (1")
	E	132	192 (60 N·m, 150 N·m & 100 lbf·ft) N/A (400 N·m & 250 lbf·ft)	N/A
Weight (kg)		0.8 (2 N·m & 20 lbf·in) 0.8 (10 N·m & 100 lbf·in) 0.9 (25 N·m & 250 lbf·in)	3.3 (60 N·m, 150 N·m & 100 lbf·ft) 1.5 (400 N·m) 2.7 (250 lbf·ft)	7.0





FMT 400 N·m shown with case

4	FMT (Ancillary Section)
50539	2 N·m Joint Simulator (also fits TST)
50540	10 N·m Joint Simulator (also fits TST)
50541	25 N·m Joint Simulator (also fits TST)
50845	60 N·m Joint Simulator
50692	150 N·m Joint Simulator
50819	400 N·m Joint Simulator

52236	¼" Hexagon - ¼" Square Drive Adaptor
52237	¼" Hexagon - ⅜" Square Drive Adaptor
52251	⅜" Female Square - 22 mm Bi-Square Adaptor
52246	½" Female Square - 22 mm Bi-Square Adaptor
52245	¾" Female Square - 22 mm Bi-Square Adaptor
52254	½" Female Square - 35 mm Bi-Square Adaptor
52241	¾" Female Square - 35 mm Bi-Square Adaptor
52242	1" Female Square - 35 mm Bi-Square Adaptor

FMT Mounting Brackets

4	FMT Mounting Brackets
62221.BLK9005	FMT Mounting Bracket 2 - 400 N·m
62220.BLK9005	FMT Mounting Bracket 150 - 1,500 N·m

ANNULAR TRANSDUCERS

These Annular Transducers are designed to fit directly to Norbar torque multipliers and will accurately measure the torque output from the gearbox, via a display instrument (instrument supplied separately, see pages 5 - 6 & 8).

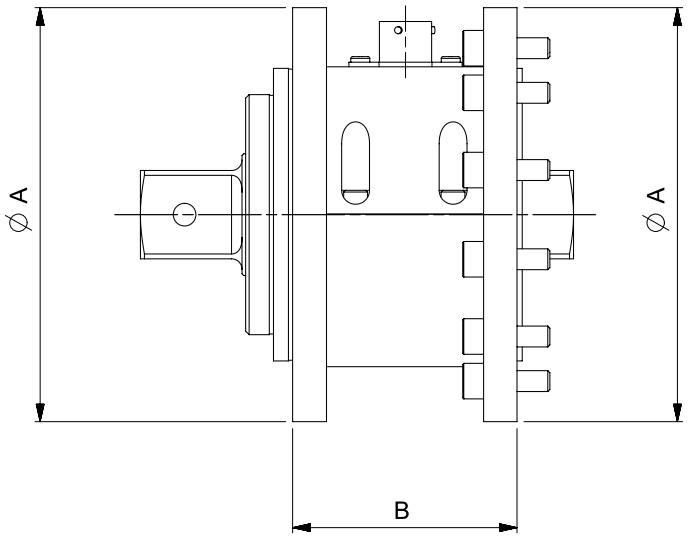
- Up to 6,000 N·m classified to BS7882:2017, typically better than Class 1 for the primary classification range (±0.5% of reading from 20% to 100% of full scale)
- Robust heat treated alloy steel torsion tube design
- Designed to ignore non-torsional forces
- Smart transducers have a built in memory circuit which contains essential information about the transducer. This information can be read by Norbar's TST, TTT, TTL-HE & T-Box™ 2 instruments meaning that when the transducer is connected, it is immediately recognised and ready for use
- Smart transducers can also be used with many other instruments, however, these will operate as normal ratio calibrated (mV/V) transducers - the Smart data will not be read

4	ANNULAR TRANSDUCERS FOR STANDARD SERIES GEARBOX
Suitable for PT1, PT1A and PT2	
50638.xxx	100 - 1,000 N·m ¾" sq. dr.
50648.xxx	100 - 1,000 lbf·ft ¾" sq. dr.
Suitable for heavy duty HT2, PT1, PT1A and PT2	
50639.xxx	150 - 1,500 N·m 1" sq. dr.
50649.xxx	150 - 1,500 lbf·ft 1" sq. dr.
TD2.CCW	Alternative calibration direction for transducers up to 1,500 N·m / 1,000 lbf·ft when ordered with new unit
Suitable for HT5 and PT5	
50640.xxx	250 - 2,500 N·m 1" sq. dr.
50650.xxx	250 - 2,500 lbf·ft 1" sq. dr.
50641.xxx	350 - 3,500 N·m 1" sq. dr.
Suitable for HT6 and PT6	
50700.xxx	350 - 3,500 N·m 1½" sq.dr.
Suitable for HT7 and PT7	
50643.xxx	500 - 5,000 N·m 1½" sq. dr.
50652.xxx	500 - 5,000 lbf·ft 1½" sq. dr.
TD5.CCW@	Alternative calibration direction for transducers from 1,501 - 7,000 N·m / 1,001 - 5,000 lbf·ft when ordered with new unit

4	ANNULAR TRANSDUCERS FOR STANDARD SERIES GEARBOX
Suitable for HT9 and PT9	
50644.xxx	1,000 - 10,000 N·m 1½" sq. dr.
50653.xxx	700 - 7,000 lbf·ft 1½" sq. dr.
Suitable for HT11 and PT11	
50645.xxx	2,000 - 20,000 N·m 2½" sq. dr.
50654.xxx	1,500 - 15,000 lbf·ft 2½" sq. dr.
Suitable for HT12 and PT12	
50764.xxx	3,500 - 35,000 N·m 2½" sq. dr.
50765.xxx	2,500 - 25,000 lbf·ft 2½" sq. dr.
Suitable for HT13 and PT13	
50646.xxx	5,000 - 50,000 N·m 2½" sq. dr.
Suitable for PT14	
50647.xxx	10,000 - 100,000 N·m 3½" sq. dr.
TD4.CCW	Alternative calibration direction for transducers from 7,001 - 100,000 N·m / 5,001 - 75,000 lbf·ft when ordered with new unit
Suitable for PT18.MTS	
-	30,000 - 300,000 N·m

Standard calibration is performed loading counter-clockwise only.

@ UKAS accredited calibration up to 6,000 N·m. A non-accredited value at 7,000 N·m is extrapolated and provided for reference only.



PT 18 fitted with 300,000 N·m Annular Transducer and square drive

Model		Annular Transducers for use with Standard Series Multipliers		
Part Number		50638.xxx 50648.xxx 50639.xxx 50649.xxx	50640.xxx 50650.xxx 50641.xxx 50700.xxx	50643.xxx 50652.xxx
Dimensions (mm)	ØA	108	119	144
	B	60	65	71
Weight (kg)		1.4	2.6	3.6

ANNULAR TRANSDUCERS

4 TORQUE & ANGLE ANNULAR TRANSDUCERS - FIXED CONNECTOR

Suitable for heavy duty PT1, PT1A and PT2

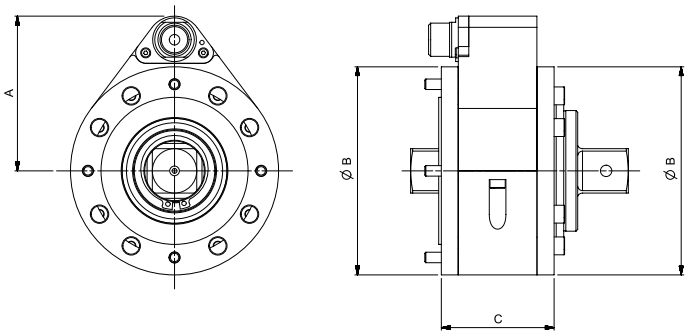
50820.LOGA*	100 - 1,000 N·m ¾" sq. dr.
50821.LOGA*+	150 - 1,500 N·m 1" sq. dr.

* Can only be used with remote/plain sleeve motors i.e. not a standard PT handle, due to cable interference

\+ Only fits to PT with HD final stage carrier having 1" female sq. dr.

Suitable for HT5 and PT5

50822.LOGA	350 - 3,500 N·m 1" sq. dr.



Model		Torque & Angle Annular Transducers with Fixed Connector
Part Number		50820.LOGA 50821.LOGA 50822.LOGA
Dimensions (mm)	A	89
	ØB	119
	C	65
Weight (kg)		1.4

Fixed Connector

4 TORQUE & ANGLE ANNULAR TRANSDUCERS - 180° SWIVEL CONNECTOR

Suitable for HT7 and PT7

50834.LOGA	500 - 5,000 N·m 1½" sq. dr.

Suitable for HT9 and PT9

50824.LOGA	1,000 - 10,000 N·m 1½" sq. dr.

Suitable for HT11 and PT11

50825.LOGA	2,000 - 20,000 N·m 2½" sq. dr.

Suitable for HT12 and PT12

50826.LOGA	3,500 - 35,000 N·m 2½" sq. dr.

Suitable for HT13 and PT13

50827.LOGA	5,000 - 50,000 N·m 2½" sq. dr.

Suitable for HT14 and PT14

50828.LOGA	10,000 - 100,000 N·m 3½" sq. dr.

PT13 & PT14 require special front cover plate with added dowel clearance holes

Suitable for HT15 and PT15

50832.LOGA	15,000 - 150,000 N·m 4½" sq. dr.

Suitable for HT16 and PT16

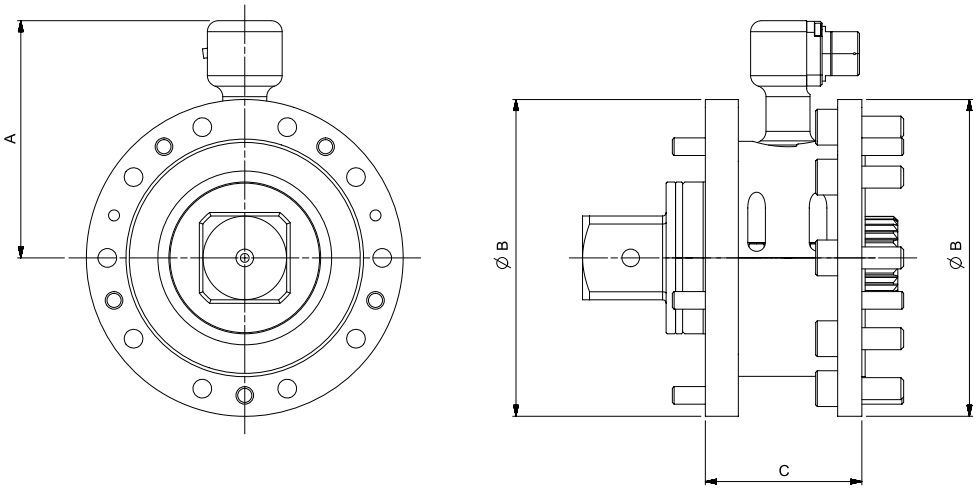
50829.LOGA	20,000 - 200,000 N·m 5" sq. dr.

Suitable for HT17 and PT17

50830.LOGA	25,000 - 250,000 N·m 6" sq. dr.

Suitable for HT18 and PT18

50831.LOGA	30,000 - 300,000 N·m 6" sq. dr.



180° Swivel Connector

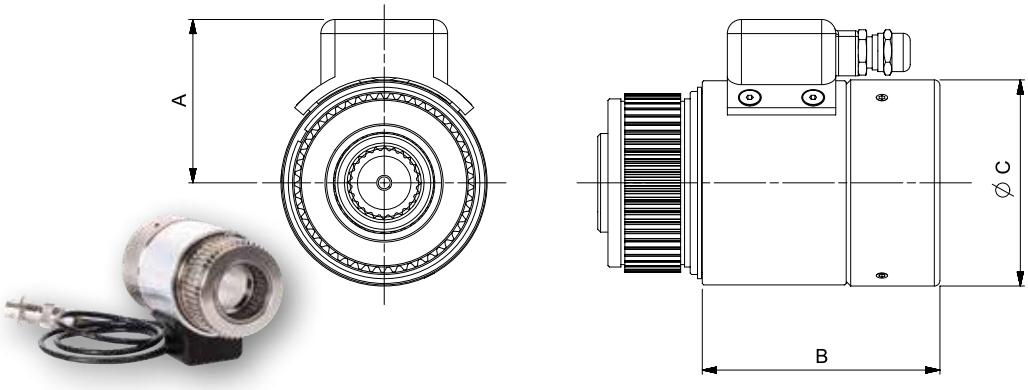
Model		Torque & Angle Annular Transducers with Swivel Connector									
		5,000 N·m	10,000 N·m	20,000 N·m	35,000 N·m	50,000 N·m	100,000 N·m	150,000 N·m	200,000 N·m	250,000 N·m	300,000 N·m
Part Number		50834.LOGA	50824.LOGA	50825.LOGA	50826.LOGA	50827.LOGA	50828.LOGA	50832.LOGA	50829.LOGA	50830.LOGA	50831.LOGA
Dimensions (mm)	A	108	120	140	151	186	186	*	*	*	289
	ØB	144	178	212	248	315	315	*	*	*	520
	C	144	184	212	240	315	315	*	*	*	520
Weight (kg)		7.0	10.0	15.0	29.3	43.5	46.6	*	*	*	149.5

* Available on request

ANNULAR TRANSDUCERS

4	ANNULAR TRANSDUCERS FOR 72 mm SERIES GEARBOX (HT & PT) (Not suitable for PTS/PTM tools)
Suitable for PT-72 mm Remote Series and HT-72	
50666.xxx	100 - 1,000 N·m
50667.xxx	150 - 1,500 N·m
50668.xxx	200 - 2,000 N·m

Standard calibration is performed loading counter-clockwise only.



4	ANNULAR TRANSDUCERS FOR PTS/PTM 72
Suitable for PTS/PTM-72 mm Series	
50840.xxx	100 - 1,000 N·m
50841.xxx	150 - 1,500 N·m
50842.xxx	200 - 2,000 N·m
50846.LOGA	100 - 1,000 N·m with Angle

Model		Annular Transducers for use with 72 mm Series Multipliers	Annular Transducers for use with 72 mm Series Multipliers
Part Number		50666.xxx 50667.xxx 50668.xxx 50840.xxx 50841.xxx 50842.xxx	50846.LOGA
Dimensions (mm)	A	58	85
	B	84	93
	ØC	72	73
Weight (kg)		1.5	3.1

Torque and Angle Annular Transducer Note:

- 5,000 N·m and above include dowels on both mounting faces
- Angle resolution < 1° when used with T-Box™ 2
- CW+CCW calibration is standard
- Use 60308.xxx series lead for direct connection to T-Box™ 2 for torque and angle/turns monitoring and storage
- PT square drive and other parts may require removal to fit transducer
- All the above are standard construction. Harsh Environment models are available on request
- '.INDA' versions are available on request

Note: PTS™ and reactions with dowel holes can be supplied at an extra cost on request. Request details on PneuTorque® Type '.XD'

4	ANNULAR TRANSDUCERS
SECCAL.CW	Secondary calibration in one direction on annular transducers for HT/PT9 & HT/PT11 to extend the range below 10% of the rated capacity, when ordered with new unit
SECCAL.CW+CCW	Secondary calibration in two directions on annular transducers for HT/PT9 & HT/PT11 to extend the range below 10% of the rated capacity, when ordered with new unit
ADDCALPOINTS.NEW	Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7,000 N·m (5,000 lbf·ft) when ordered with new unit

TRANSDUCER LEADS

If ordering a static, annular or rotary transducer you will also require a corresponding lead (see list below).
To comply with the latest calibration standards, most new transducer leads will have a suffix to indicate the length in centimetres.

4	TRANSDUCER LEADS
60216.200	PRO-LOG, TST, TTT, T-Box XL & T-Box 2 to 10 Way Transducer for use with Norbar Rotary Transducers
60217.200	PRO-LOG, TST, TTT, T-Box XL & T-Box 2 to 6 Way Transducer for use with Norbar Static & Annular Transducers
60223.200	PRO-LOG, TST, TTT, T-Box XL & T-Box 2 to no connector
60224.200	10 Way Transducer to no connector
60225.200	6 Way Transducer to no connector
51067.225	ETS to Transducer (Pre 1994) + 5 way (60055)
60152.225	ETS to Transducer (Post 1994) + 5 way (60163)
60308.400	PRO-LOG, TST, TTT, T-Box XL & T-Box 2 to Torque & Angle Annular Transducers

4	TRANSDUCER LEADS
60308.600	PRO-LOG, TST, TTT, T-Box XL & T-Box 2 to Torque & Angle Annular Transducers
60308.1000	PRO-LOG, TST & TTT to Torque & Angle Annular Transducers

Other lengths can be ordered at an additional cost.

Note: The system should be calibrated with the increased length lead, as calibration may be effected.

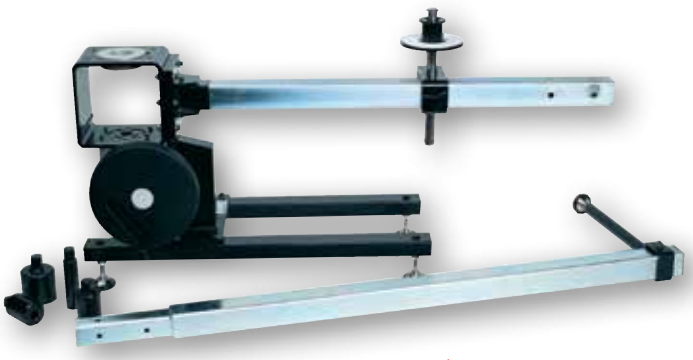
Note: The maximum permissible cable length is 15 m for TST, TTT or T-Box™ 2 and 7 m with a T-Box™ XL. Contact Norbar for further details.

ISO 3000 LOADER

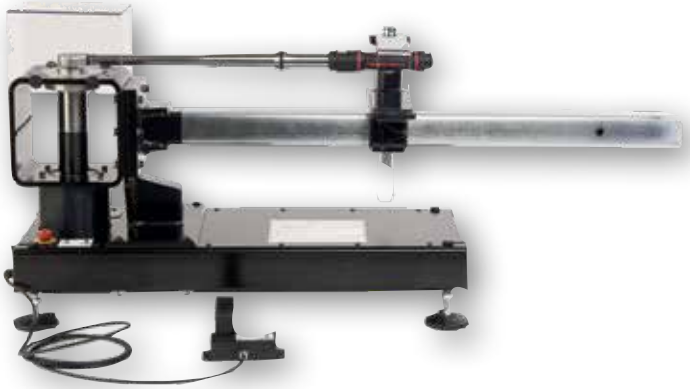
These loaders allow torque wrenches to be tested or calibrated to relevant ISO standards when used in an appropriate temperature controlled environment. Their function is to take full advantage of the accuracy of Norbar's torque measuring system by reducing operator induced variations in the calibration process.

- The high ratio, 1250:1 gearbox allows high torques to be applied with minimal effort
- Used with a T-Box™ 2 instrument, the timer feature will allow the rate of torque application to meet the requirement of ISO6789:2017
- The design allows for easy interchange of transducers using the Norbar Static Transducer system
- Floating reaction point minimises side loads on the wrench. It is a requirement of ISO6789:2017 that parasitic forces on the wrench under test are minimised
- Reaction extension bar allows wrenches up to 2,200 mm to be tested. This can be removed to save space. Wrenches up to 1,100 mm can be tested when the extension bar is not fitted

4	TORQUE WRENCH LOADERS
20505	Loader, ISO 3,000 N·m
20506	Motorised ISO 3,000 N·m

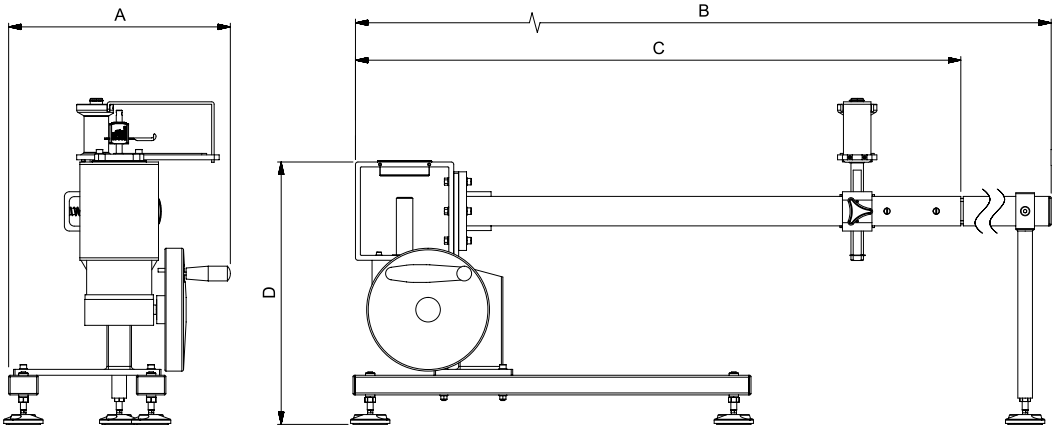


20505 ISO 3,000 N·m Loader



20506 ISO 3,000 N·m Motorised Loader

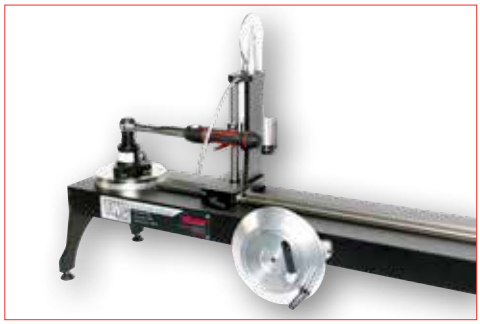
Model		ISO 3000 N·m	Motorised ISO 3000 N·m
Part Number		20505	20506
Dimensions (mm)	A	451	363
	B	2,440	2,440
	C	1,232	1,232
	D	534	554
Weight (kg)		55.0	40.0



TORQUE WRENCH CALIBRATOR - MANUAL

Torque Wrench Calibrator (TWC) 400 N·m Manual

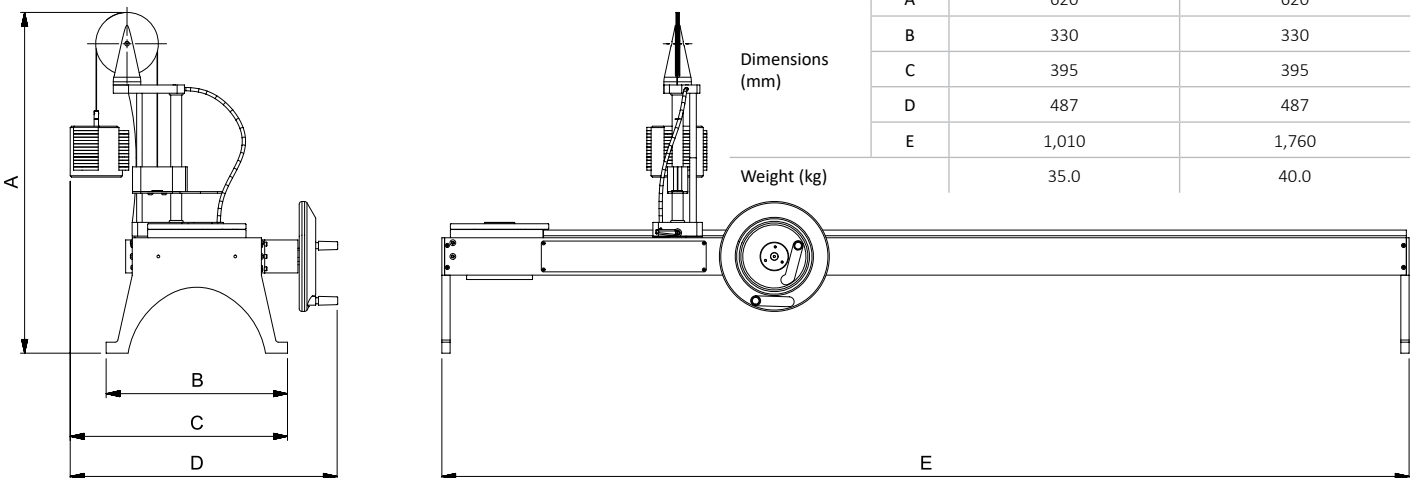
- Enables torque wrench calibration or testing in accordance with ISO 6789-2:2017 if used with T-Box™ 2
- Also in accordance with BS EN 26789:2003, ISO 6789-1:2017
- Counterbalance Reaction system is designed to support the weight of the wrench so that the weight does not become a parasitic force within the calibration system. The floating nature of the support means that the wrench is able to find its own natural level rather than being constrained as in many other loading devices. Any such constraint will be a parasitic force within the system (Patents apply)
- Lightweight alloy construction ensures the TWC is easily transported, making it well suited for mobile laboratory applications
- Two speed gearbox designed for a sufficient balance of speed and control by allowing for both fast loading of the torque wrench and a slower more precise loading
- Works with Flange Mounted Transducers, Static Transducers (when using part number: 60318), T-Box™ 2, TST, TTT and Pro-Test (when using part number: 60323)
- During calibration the TWC maintains a fixed position on the handle of the torque wrench
- Rotating transducer design ensures that the load is applied 90° to the torque wrench handle. The benefit of this precise alignment is that forces are applied squarely to the load point of the handle
- When testing for conformity or calibrating to ISO6789:2017 any transducer must not be used below 5% of its capacity when used with TWC. This statement does not apply to a TWC when used in a accredited laboratory



Torque Wrench Calibrator (TWC) Manual shown with a Flange Mounted Transducer and a Model 100 torque wrench (not included)

4	TORQUE WRENCH CALIBRATOR (TWC)
60331	Torque Wrench Calibrator 400 N·m Manual
60332	Torque Wrench Calibrator 1,500 N·m Manual

Model		TWC 400	TWC 1500
Part Number		60331	60332
Wrench Length (Torque Radius)	Min	135	135
	Max	750	1,500
Dimensions (mm)	A	620	620
	B	330	330
	C	395	395
	D	487	487
	E	1,010	1,760
Weight (kg)		35.0	40.0



Patented in the UK, Germany, France and Italy (EP2864745) and in the USA (US9921122).

TORQUE WRENCH CALIBRATOR - ANCILLARIES

There are a wide range of accessories available for the TWC that will allow the user greater flexibility.

- 60322 Quick Release Kit allows for a more streamlined and efficient calibration laboratory
- 60324 Hexagon Adaptor Kit for use with the TWC Manual allows users to speed up the workflow by implementing their own solution to rapidly manoeuvre the wrench up to the reaction point
- 60330 Offset Angle Plate Kit allows for greater flexibility when calibrating fixed head torque wrenches

8	TWC ANCILLARIES
60318	Static Transducer Support Kit
60319	Short Length Reaction Post
60322*	Quick Release FMT Kit
60323	Pro-Test and Static Torque Block Adaptor Kit
60324	Hexagon Adaptor Kit
60327	FMT 2 to FMT 25 Adaptor Kit
60329	3 kg Mass Weight
60330	Offset Angle Plate Kit
29214	1" Male to ¾" Female Flanged Square Drive Adaptor
29215	1" Male to ½" Female Flanged Square Drive Adaptor
29216	1" Male to ⅜" Female Flanged Square Drive Adaptor
29217	1" Male to ¼" Female Flanged Square Drive Adaptor

* Kit contains two Quick Release FMT plates

60318 Static Transducer Support Kit and 60319 Short Length Reaction Post

60322 Quick Release FMT Kit

60330 Offset Angle Plate Kit

60323 Pro-Test and Static Torque Block Adaptor Kit

29214 Flanged Square Drive Adaptor

60324 Hexagon Adaptor Kit

60329 3 kg Mass Weight

TORQUE WRENCH CALIBRATOR - AUTO

For a complete torque wrench calibration system, just add the transducer range appropriate for the wrenches you wish to calibrate and accessories from page 22.

- Enables torque wrench calibration or testing in accordance with ISO 6789:2017 Part 1 and 2
- Counterbalance Reaction system is designed to support the weight of the wrench so that the weight does not become a parasitic force within the calibration system. The floating nature of the support means that the wrench is able to find its own natural level rather than being constrained as in many other loading devices. Any such constraint will be a parasitic force within the system (Patents apply)
- Lightweight alloy construction ensures the TWC is easily transported, making it well suited for mobile laboratory applications
- Works with Flange Mounted Transducers and Static Transducers
- During calibration, the TWC maintains a fixed position on the handle of the torque wrench
- Rotating transducer design ensures that the load is applied 90° to the torque wrench handle. The benefit of this precise alignment is that forces are applied squarely to the load point of the handle
- Supplied with a powerful yet simple touchscreen User Interface (UI) (keyboard and mouse also supported if desired)
- Flexible tool template system; minimises number of templates required to cover a wide range of tools, aiding efficient use
- Programmable calibration workflow for each template, can be pre-set to ISO compliant flow for the given tool for a faster set-up or can also support bespoke workflows
- Calibration job management; book calibrations, track progress of previous bookings and resume them
- Automated management of calibration and conformance workflows for non-indicating tools
- Intelligent rate control system ensures fast cycling of tools while maintaining compliance with 2017 standards
- Environmental monitoring (humidity/temperature) to assist compliance with calibration standards
- Automated management of uncertainty data for ISO 6789-2:2017 calibrations, guiding the user through the process using dynamically generated instructions based on the current tool's ISO classification and workflow
- Inbuilt data analysis and certification generation seamlessly move from calibration/conformance procedure to certificate generation, no third-party software required
- A substantial amount of inbuilt storage allowing for several years' worth of calibration data through normal use
- The TWC control Box is supported by a UKAS accredited certificate of calibration, we remain one of the few manufacturers in the world that issue a UKAS accredited calibration certificate both for the instrument and for the torque transducer. In doing so, customers can swap combinations of instrument and transducer while retaining complete traceability
- When testing for conformity or calibrating to ISO6789:2017 any transducer must not be used below 5% of its capacity when used with TWC. This statement does not apply to a TWC when used in a accredited laboratory

5	TORQUE WRENCH CALIBRATOR (TWC)
60312	Torque Wrench Calibrator 400 N·m Auto
60313	Torque Wrench Calibrator 1,500 N·m Auto

Torque Wrench Calibrator (TWC) Auto shown with a Professional Model 200 and a Static Transducer with support kit (not included)

TORQUE WRENCH CALIBRATOR - AUTO

Software Screen Shots:

Main menu

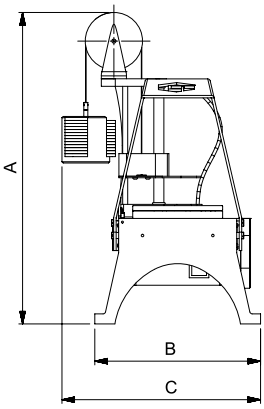
Tool template editor

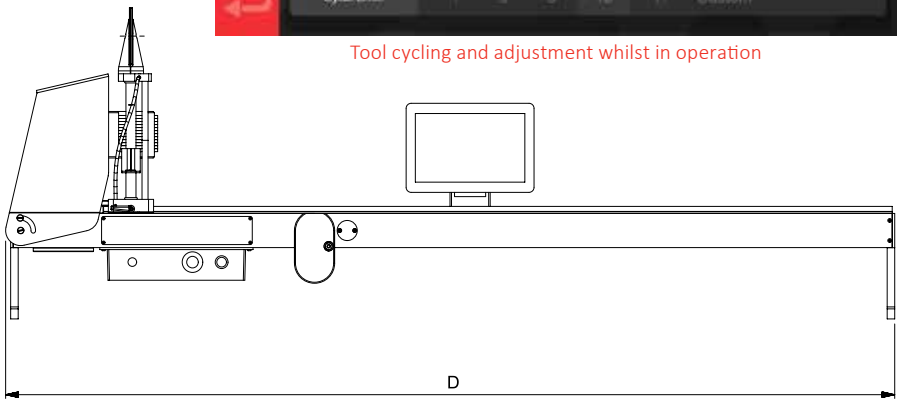
Calibration job booking / editor

Tool cycling and adjustment

Model		TWC Auto 400	TWC Auto 1500
Part Number		60312	60313
Wrench Length (Torque Radius)	Min	135	135
	Max	750	1,500
Dimensions (mm)	A	620	620
	B	330	330
	C	395	395
	D	1,019	1,769
Weight (kg)		40.0	45.0

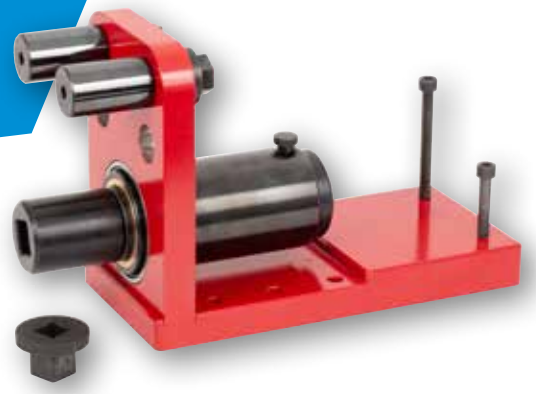
Tool cycling and adjustment whilst in operation





Patented in the UK, Germany, France and Italy (EP2864745) and in the USA (US9921122).

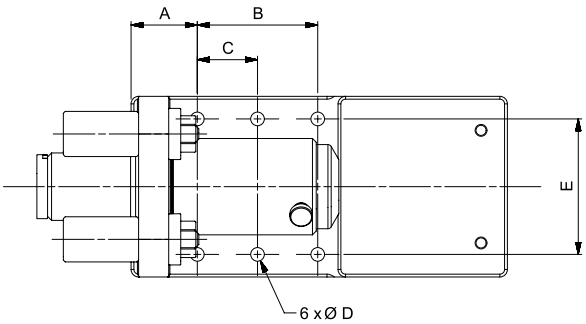
New

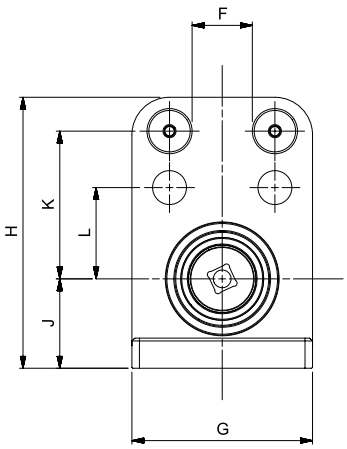


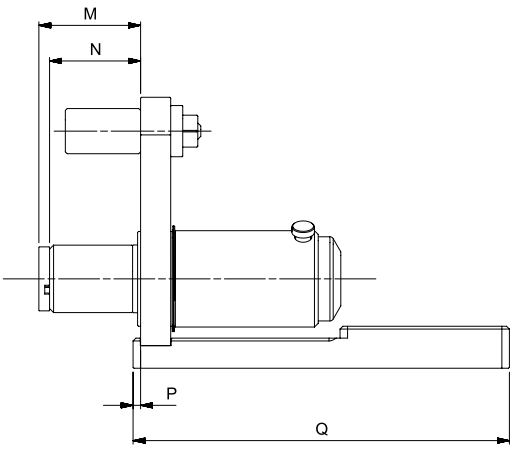
The Power Tool Test Fixture for TruCheck™ 2 is a simple, robust device that allows non-impacting power tools up to 2,100 N·m to be tested. A system comprises the Test Fixture with a TruCheck™ 2 Plus (to be ordered separately), either the 1,100 N·m or 2,100 N·m models, depending on the torque capacity required. The universal torque reaction arrangement will suit reaction arms supplied as standard with most Norbar and other pneumatic, electric and cordless torque tools.

NOTE: This Test Fixture is not suitable for TruCheck™ version 1.

4	POWER TOOL TEST FIXTURE FOR TRUCHECK 2
80033	Power Tool Test Fixture for use with TruCheck 2
81043	Spacer Sleeve
81044	Bellville Washer Stack (pack of 8 washers)
81045	Replacement Rundown Screw & Nut







Model		Power Tool Test Fixture for TruCheck 2
Part Number		80033
Dimensions (mm)	A	56
	B	102
	C	51
	ØD	11.5
	E	114
	F	51
	G	152
	H	229
	J	75
	K	125
	L	77
	M	86
	N	76
	P	6
	Q	318
Weight (kg)		24.5

The Norbar Joint Simulation Rundown Assemblies are designed to simulate the working conditions of screwed or bolted joints. Used in conjunction with a Norbar transducer and display instrument, the output of torque controlled power tools can be measured against a range of simulated joint rates, from hard through to soft.

4	JOINT SIMULATION RUNDOWN ASSEMBLIES
50313	0.2 - 2 N·m (2 - 20 lbf·in)
50251	2 - 10 N·m (20 - 100 lbf·in)
50252	5 - 50 N·m (5 - 50 lbf·ft)
50253	10 - 100 N·m (10 - 100 lbf·ft)
50254*	100 - 500 N·m (100 - 500 lbf·ft)

The above are for use with Norbar static square to square transducers and bench stands, see page 10 & page 11.

* To be used with large frame size bench stands, all others to be used with small frame bench stands.

NOTE: Spare washer stacks are available for use with Joint Simulation Rundown Assemblies, contact Norbar

50693	10 - 140 N·m (10 - 100 lbf·ft)
50694	100 - 700 N·m (70 - 500 lbf·ft)

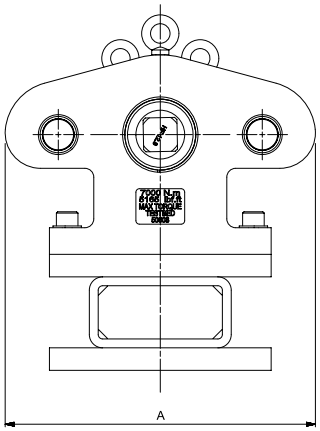
The above are for use with the Norbar Smart Torque Block (STB) 1000.

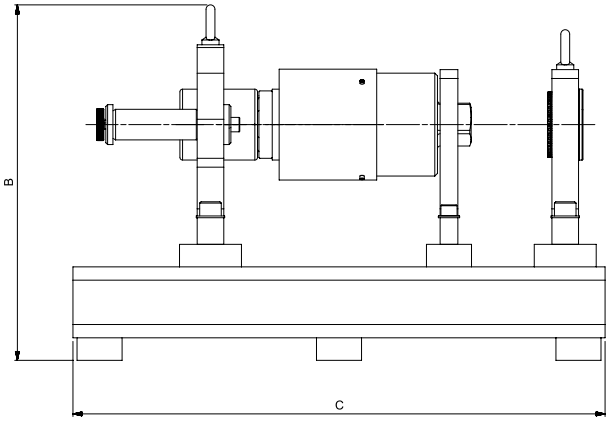
Power Tool Test Rig shown with 1½" M/F Static Transducer (not included)

4	ET/EBT/PT POWER TOOL TEST RIG
50800	7,000 N·m ET, EBT, PT Power Tool Test Rig (supplied with the 8 reaction plates on page 27 (excluding blank reaction plate) and ¾", 1" and 1½" sq. dr. adaptors)
50803	7,000 N·m ET, EBT, PT Power Tool Test Rig without Reaction Plates (supplied with ¾", 1" and 1½" sq. dr. adaptors)

Note: The static transducer 50669.LOG does not come supplied as standard with the tool test rig. The standard range of 700 - 7,000 N·m will not cover the full powered multiplier range, additional calibration may be required, please see below:

ADDCALPOINTS.NEW
Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7,000 N·m (5,000 lbf·ft) when ordered with new unit

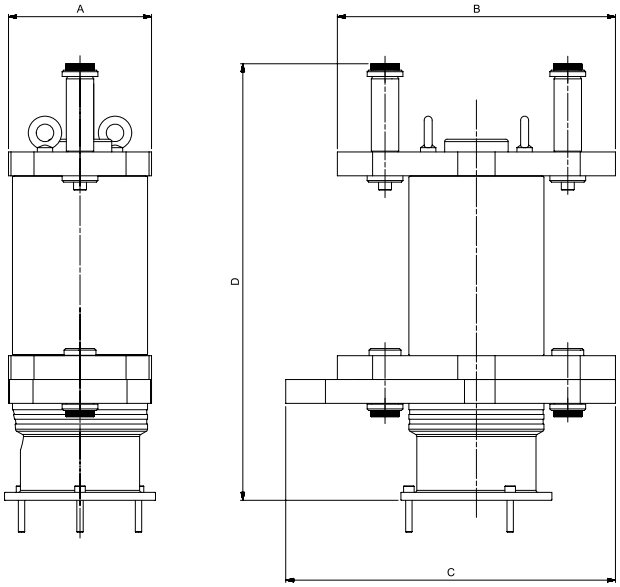




Model		Power Tool Test Rig
Part Number		50800 50803
Dimensions (mm)	A	350
	B	401
	C	600
Weight (kg)		TBC

Universal Tool Test Rig (1½" *M/F Static Transducer required (not included)*)

Model		Universal Tool Test Rig
Part Number		50801, 50804
Dimensions (mm)	A	180
	B	350
	C	415
	D	550
Weight (kg)		73.0



4	7,000 N·m UNIVERSAL TOOL TEST RIGS
50801	Universal 7,000 N·m ET, EBT, PT & Hydraulic Tool Test Rig (supplied with the 8 reaction plates on page 27 (excluding blank reaction plate) and ¾", 1" and 1½" sq. dr. adaptors)
50804	Universal 7,000 N·m Test Rig without Reaction Plates (supplied with ¾", 1" and 1½" sq. dr. adaptors)

Power Tool Test Rig
with Reaction Plates (50800)

Universal Hydraulic Tool Test Rig
with Reaction Plates (50801)

4	SPARES FOR 50800, 50801, 50803 & 50804
50800.29	2" AF Socket 1½" sq. dr.
50800.28	2" AF Socket 1" sq. dr.
50800.27	2" AF Socket ¾" sq. dr.

81041	Nut and bolt set for 7,000 N·m Power Tool Test Rigs
50548.4	Washer Stack Kit 100 - 7,000 N·m (Also for use with RD5000)

See page 29 & page 31 for accessories for use with Hydraulic Tool Calibration Fixture.

4	REACTION PLATES FOR USE WITH 50803 & 50804

81024	Suitable for ET/EBT/PTS/PTM 119, PT 4500 and PT 5500

81025	Suitable for ET/EBT/PTS/PTM 92

81026	Suitable for ET/EBT/PTS/PTM 72

81027	Suitable for PTS/PTM 52

81028	Suitable for PT 2700

81029	Suitable for PT 1, PT 1A and PT 2

81030	Suitable for PT 5 and PT 6

81031	Suitable for PT 7

81032	Blank Reaction Plate for Universal Test Rigs

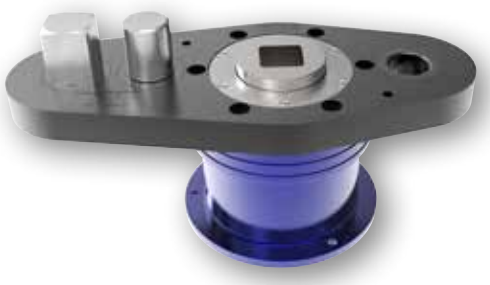
NOTE: Reaction plate dimensions can be found by searching their part number on the Norbar website.

HYDRAULIC TOOL CALIBRATION FIXTURES

Norbar's Hydraulic Tool Calibration Fixture is a robust device that allows accurate testing of hydraulic torque wrenches. A system comprises of a Calibration Fixture and Transducer, also required is a torque measuring instrument and transducer cable.

- Bearing support for transducer gives improved accuracy
- Interchangeable stainless steel square and round reaction posts
- Hardened steel inserts to location reaction posts in two positions: suits most hydraulic wrenches
- Optimised material sections for robust but portable design
- For hexagon link wrenches, a wide range of hexagon to square adaptors are available

HYDRAULIC TOOL CALIBRATION FIXTURES



80031 Hydraulic Tool Calibration Fixture shown with Transducer (Transducer not included)

4	CALIBRATION FIXTURES
80031	Hydraulic Calibration Fixture up to 7,000 N·m
80029	Hydraulic Calibration Fixture up to 50,000 N·m
80032	Hydraulic Calibration Fixture up to 80,000 N·m
81022	Reaction Bar for 80031
81023	Reaction Bar for 80029

4	TRANSDUCERS FOR USE WITH 80031 / 80030
50703.xxx*	250 - 2,500 N·m 1½" sq. dr. M/F
50704.xxx*	250 - 2,500 lbf·ft 1½" sq. dr. M/F
50599.xxx*	500 - 5,000 N·m 1½" sq. dr. M/F
50630.xxx*	500 - 5,000 lbf·ft 1½" sq. dr. M/F
+50669.xxx*	700 - 7,000 N·m 1½" sq. dr. M/F

+ UKAS accredited calibration up to 6,000 N·m. A non-accredited value at 7,000 N·m is extrapolated and provided for reference only.

4	TRANSDUCERS FOR USE WITH 80029 / 80030
50776.xxx@	1,000 - 10,000 N·m 2½" sq. dr. M/F
50777.xxx@	1,000 - 10,000 lbf·ft 2½" sq. dr. M/F
50797.xxx@	2,500 - 25,000 N·m 2½" sq. dr. M/F
50781.xxx@	5,000 - 50,000 N·m 2½" sq. dr. M/F
50798.xxx@	25,000 lbf·ft 2½" sq. dr. M/F

4	TRANSDUCERS FOR USE WITH 80032
50782.xxx	6,000 - 60,000 lbf·ft 3½" sq. dr. M/F
50783.xxx	8,000 - 80,000 N·m 3½" sq. dr. M/F

Harsh Environment Transducers available on request.

4	DUAL CALIBRATION FIXTURE
80030	Dual Calibration Fixture

Note: Houses 1 transducer up to 7,000 N·m and 1 transducer up to 50,000 N·m in a bench top plate.

Dual Calibration Fixture
Part No. 80030

T-Box™ 2 at the center of a test bench for hydraulic torque wrenches

Rapid hydraulic wrench calibrations are (for instance, from several minutes to under a minute) are possible when a Hydraulic Tool Calibration Fixture is used with a T-Box™ 2 running version 2 software (see page 5) and Norbar's integrated hydraulic controls.

Fixture shown with Hydraulic Torque Wrench

9	ADDITIONAL CALIBRATION

The transducers shown include clockwise only calibration from 10% to 100% of rated capacity. For other calibration options, see below:

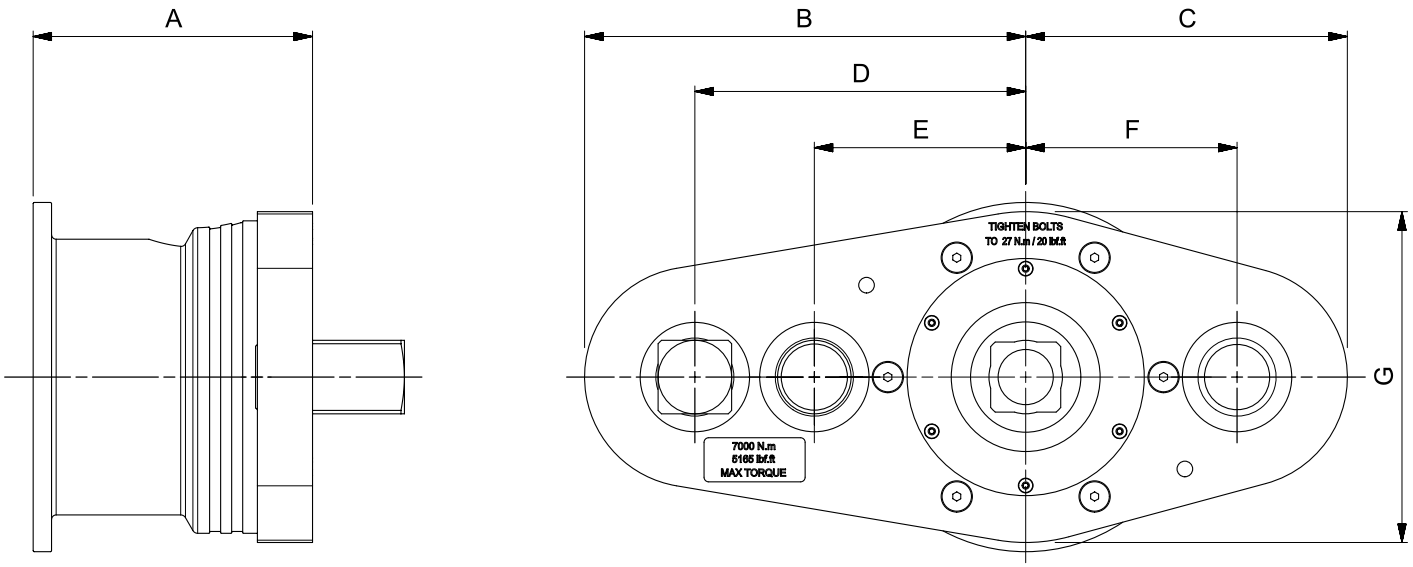
***ADDCALPOINTS.NEW**
Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7,000 N·m (5,000 lbf·ft) when ordered with new unit

@SECCAL.CW
Secondary calibration in one direction on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit

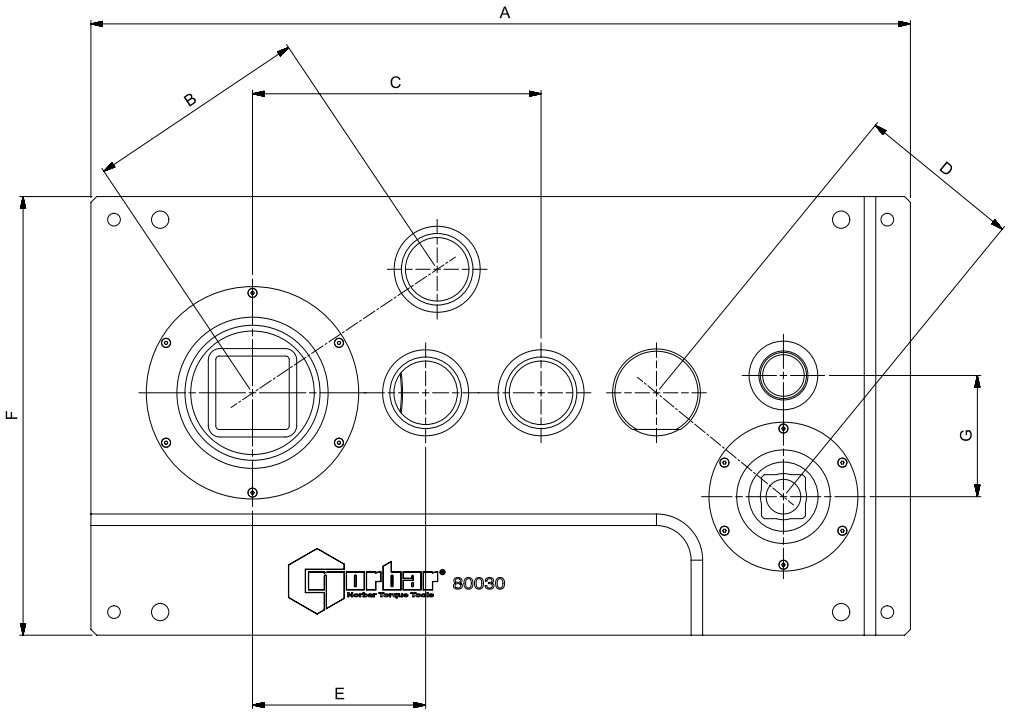
SECCAL.CW+CCW
Secondary calibration in two directions on static transducers with 2½" square drives to extend the range below 10% of the rated capacity, when ordered with new unit

HYDRAULIC TOOL CALIBRATION FIXTURES

Model		Hydraulic Calibration Fixture up to 7,000 N·m	Hydraulic Calibration Fixture up to 50,000 N·m	Hydraulic Calibration Fixture up to 80,000 N·m
Part Number		80031	80029	80032
Dimensions (mm)	A	202	208	292
	B	240	325	450
	C	175	125	170
	D	180	150	260
	E	115	250	350
	F	115	N/A	N/A
	G	180	250	340
Weight (kg)		TBC	TBC	TBC



Model		Dual Calibration Fixture
Part Number		80030
Dimensions (mm)	A	710
	B	193
	C	250
	D	142
	E	150
	F	380
	G	105
Weight (kg)		140.0



HEXAGON TO SQUARE ADAPTORS

9	HEXAGON TO SQUARE ADAPTORS - METRIC
29619.24	24 mm Hex to 1½" sq. dr. (Max 3,000 N·m)
29619.27	27 mm Hex to 1½" sq. dr. (Max 4,000 N·m)
29619.30	30 mm Hex to 1½" sq. dr. (Max 4,000 N·m)
29619.32	32 mm Hex to 1½" sq. dr. (Max 4,900 N·m)
29619.36	36 mm Hex to 1½" sq. dr. (Max 7,000 N·m)
29619.41	41 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.46	46 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.50	50 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.55	55 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.60	60 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.65	65 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.70	70 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.75	75 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29619.80	80 mm Hex to 1½" sq. dr. (Max 8,700 N·m)
29620.50	50 mm Hex to 2½" sq. dr. (Max 18,500 N·m)
29620.55	55 mm Hex to 2½" sq. dr. (Max 25,000 N·m)
29620.60	60 mm Hex to 2½" sq. dr. (Max 32,000 N·m)
29620.65	65 mm Hex to 2½" sq. dr. (Max 36,000 N·m)
29620.70	70 mm Hex to 2½" sq. dr. (Max 36,000 N·m)
29620.75	75 mm Hex to 2½" sq. dr. (Max 36,000 N·m)
29620.80	80 mm Hex to 2½" sq. dr. (Max 59,000 N·m)
29620.85	85 mm Hex to 2½" sq. dr. (Max 59,000 N·m)
29620.90	90 mm Hex to 2½" sq. dr. (Max 59,000 N·m)
29620.95	95 mm Hex to 2½" sq. dr. (Max 59,000 N·m)
29620.100	100 mm Hex to 2½" sq. dr. (Max 52,000 N·m)
29620.105	105 mm Hex to 2½" sq. dr. (Max 52,000 N·m)
29620.110	110 mm Hex to 2½" sq. dr. (Max 52,000 N·m)
29620.115	115 mm Hex to 2½" sq. dr. (Max 52,000 N·m)
29620.130	130 mm Hex to 2½" sq. dr. (Max 52,000 N·m)

Hexagon to Square Adaptor

9	HEXAGON TO SQUARE ADAPTORS - IMPERIAL
29623.I20	1¼" Hex to 1½" sq. dr. (Max 4,900 N·m)
29623.I23	1$^{7}/_{16}$" Hex to 1½" sq. dr. (Max 7,000 N·m)
29623.I26	1⅝" Hex to 1½" sq. dr. (Max 8,700 N·m)
29623.I29	1$^{13}/_{16}$" Hex to 1½" sq. dr. (Max 8,700 N·m)
29623.I32	2" Hex to 1½" sq. dr. (Max 8,700 N·m)
29623.I35	2$^{3}/_{16}$" Hex to 1½" sq. dr. (Max 8,700 N·m)
29623.I38	2⅜" Hex to 1½" sq. dr. (Max 8,700 N·m)
29623.I41	2$^{9}/_{16}$" Hex to 1½" sq. dr. (Max 8,700 N·m)
29624.I35	2$^{3}/_{16}$" Hex to 2½" sq. dr. (Max 25,000 N·m)
29624.I38	2⅜" Hex to 2½" sq. dr. (Max 32,000 N·m)
29624.I41	2$^{9}/_{16}$" Hex to 2½" sq. dr. (Max 36,000 N·m)
29624.I44	2¾" Hex to 2½" sq. dr. (Max 36,000 N·m)
29624.I47	2$^{15}/_{16}$" Hex to 2½" sq. dr. (Max 36,000 N·m)
29624.I50	3⅛" Hex to 2½" sq. dr. (Max 59,000 N·m)
29624.I56	3½" Hex to 2½" sq. dr. (Max 59,000 N·m)
29624.I62	3⅞" Hex to 2½" sq. dr. (Max 52,000 N·m)
29624.I68	4¼" Hex to 2½" sq. dr. (Max 52,000 N·m)
29624.I74	4⅝" Hex to 2½" sq. dr. (Max 52,000 N·m)
29624.I80	5" Hex to 2½" sq. dr. (Max 52,000 N·m)
29624.I86	5⅜" Hex to 2½" sq. dr. (Max 52,000 N·m)
29624.I98	6⅛" Hex to 2½" sq. dr. (Max 52,000 N·m)

Sleeve Adaptors

9	SLEEVE ADAPTORS
86034.4	Adaptor 1½" Male sq. dr. ¾" Female sq.
21214	Adaptor 1½" Male sq. dr. 1" Female sq.
290100	Adaptor 2½" Male sq. dr. ¾" Female sq.
290101	Adaptor 2½" Male sq. dr. 1" Female sq.
29617	Adaptor 2½" Male sq. dr. 1½" Female sq.
290103	Adaptor 3½" Male sq. dr. 1½" Female sq.
29618	Adaptor 3½" Male sq. dr. 2½" Female sq.

Special 'Engineer to Order' hexagon and square adaptors available on request.

HARSH ENVIRONMENT INSTRUMENTS

Norbar has worked closely with the oil and gas industry to produce a range of torque instruments and transducers suitable for use in the harshest environments such as ship decks, oil rigs and refineries. Norbar uses a variety of corrosion resistant materials, high specification connectors and sealing techniques meaning that products in our HE range can be used in such environments without impairing their performance or life span. Although originally designed to meet the needs of the oil and gas industry, Norbar's HE range is the ideal choice whenever it is necessary to apply or measure torque outdoors in potentially wet or dusty conditions.

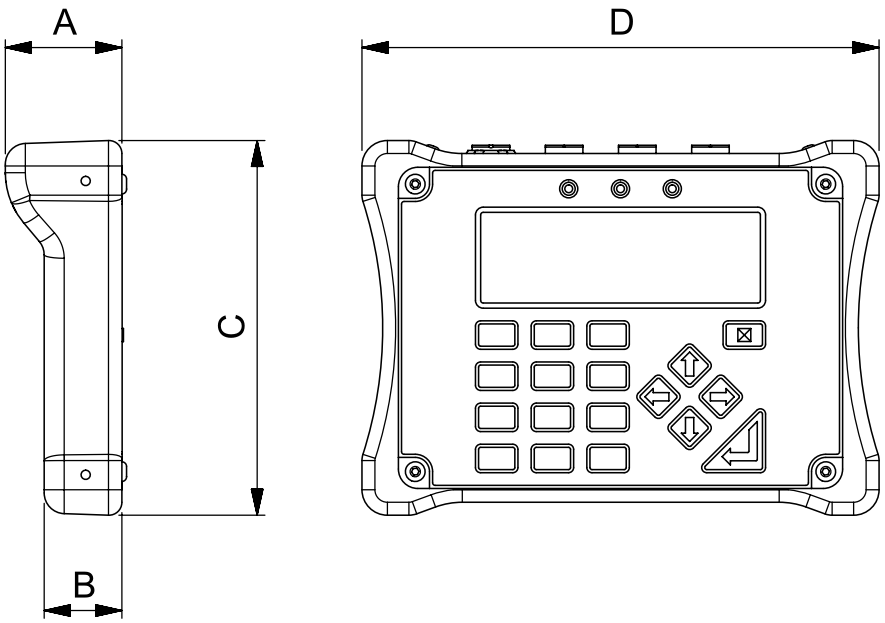
HARSH ENVIRONMENT INSTRUMENT

4	HARSH ENVIRONMENT RANGE
43217	TTL-HE Instrument (inc. IP67 rated carry case)

Supplied with clockwise and counter-clockwise calibration

TTL-HE is a portable torque measuring instrument designed for use in harsh environments. The TTL-HE operating on battery power with one of the 'HE' range of transducers connected, has an ingress protection rating of IP65/IP67. Typical operating environments are where high humidity, water or salt water spray and dust may be an issue. Features include; 10 measurement modes, 13 units of torque (with additional user units feature), 12 pairs of limits and text displayed in 11 languages.

- Instrument accuracy of ±0.05% (±0.1% when below 10% of transducer capacity)
- System accuracy with a typical Norbar transducer, ±0.5% from 20% of transducer capacity
- IP65/67 rated
- Bi-directional calibration
- Battery power use in harsh environments (mains supply for charging)
- All features are in common with TST and TTT instruments
- Supplied in IP67 rated carry case
- 5 digit resolution for all Norbar transducers
- 240 x 64 pixel dot matrix display with update rate of twice per second
- Please contact Norbar for full details of available transducers



Model		TTL-HE
Part Number		43217
Dimensions (mm)	A	45
	B	30
	C	145
	D	200
Weight (kg)		4.9

TTL-HE INSTRUMENT AND TRANSDUCER KITS

4	TTL-HE INSTRUMENT AND TRANSDUCER KITS	
60287.LOG	5,000 N·m M/M TTL-HE Kit, inc. Lead	(Class 4)
60295.LOG	10,000 N·m M/M TTL-HE Kit, inc. Lead	(Class 5)
60296.LOG	15,000 N·m M/M TTL-HE Kit, inc. Lead	(Class 6)
60289.LOG	40,000 N·m M/M TTL-HE Kit, inc. Lead	(Class 7)

Note: Kits for use with Intervention Tool Test Pots

HARSH ENVIRONMENT TRANSDUCERS

The accuracy and quality of the Norbar torque transducers has made them the first choice of many calibration laboratories throughout the world. The Harsh Environment range of transducers has been specifically designed for use with the Norbar TTL-HE instrument.

- Class 1 accuracy over the 'Primary' classification range (±0.5% of reading from 20 to 100% of full scale)
- IP65/IP67 rated
- Stainless steel design with Smart intelligence
- Bi-direction calibration as standard

4	STATIC TRANSDUCERS
50787.xxx	300 - 3,000 N·m 1½" M/F sq. dr.
50751.xxx*	300 - 3,000 N·m 1½" M/M sq. dr.
50705.xxx	500 - 5,000 N·m 1½" M/F sq. dr.
50729.LOG	500 - 5,000 N·m 1½" M/M sq. dr.
50706.xxx	500 - 5,000 lbf·ft 1½" M/F sq. dr.
50728.xxx	1,000 - 10,000 N·m 2½" M/F sq. dr.
50788.xxx	1,000 - 10,000 N·m 2½" M/ 2" M sq. dr.
50789.xxx	1,500 - 15,000 N·m 2½" M/ 2⅝" M sq. dr.
50726.xxx	2,500 - 25,000 N·m 3½" M/M sq. dr.
50727.xxx	4,000 - 40,000 N·m 3½" M/M sq. dr.
50743.xxx+	10,000 - 100,000 lbf·ft 3½" M/M sq. dr.

* Suitable for use in Hydraulic Test Pots.

+ UKAS accredited calibration up to 80,000 lbf·ft. A non-accredited value at 100,000 lbf·ft is extrapolated and provided for reference only. Static Transducers 3,000 N·m and above supplied in carry case.

Designed for use with the Harsh Environment Instrument range (TTL-HE) of products

4	INSTRUMENTATION LEADS
60245.200	TTL-HE to HE Transducer
60250.200	TTL-HE to Norbar Static & Annular Transducers
60263.200	TTL-HE to Rotary Transducers
60266.200	HE Transducer to TTT, TST and T-Box 2
60261.200	Serial Data Lead for TTL-HE

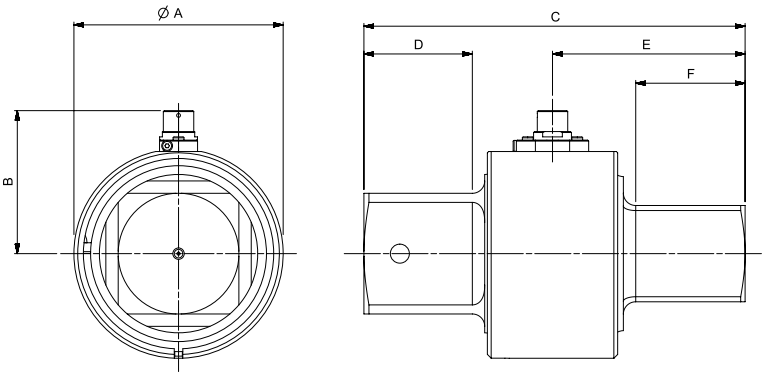
Other lengths can be ordered at an additional cost.

Note: The system should be calibrated with the increased length lead, as calibration may be affected.

Note: The maximum permissible cable length 15 m for Transducer Leads, 7 m if using 60266 with a T-Box™ XL. Contact Norbar for further details.

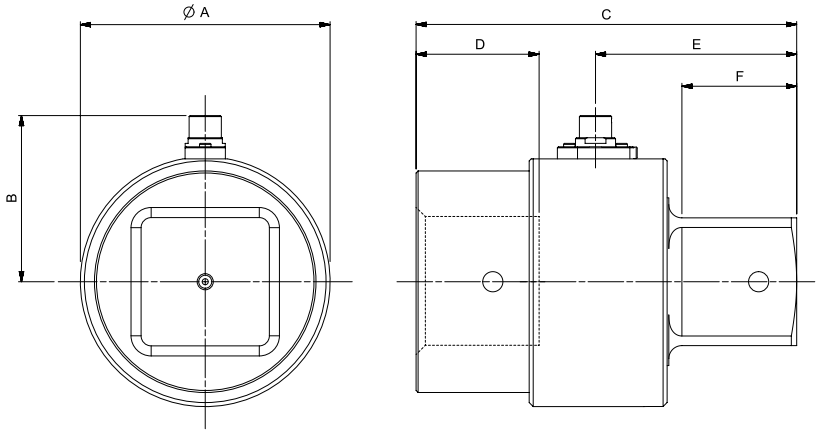
Static Transducers - Male to Male (M/M) Square Drives

Model		3,000 N·m 5,000 N·m	10,000 N·m	15,000 N·m	25,000 N·m 40,000 N·m 100,000 lbf·ft
Part Number		50751.xxx 50729.xxx	50788.xxx	50789.xxx	50726.xxx 50727.xxx 50743.xxx
Dimensions (mm)	ØA	95	110	110	164
	B	68	75	75	103
	C	168	200	225	271
	D	38	57	57	76
	E	84	101	101	135
	F	38	57	58	76
Weight (kg)		3.4 (3,000 N·m) 5.0 (5,000 N·m)	11.4	11.4	21.5 (25,000 N·m) 22.0 (40,000 N·m) 25.0 (100,000 lbf·ft)



Static Transducers - Male to Female (M/F) Square Drives

Model		3,000 N·m 5,000 N·m 5,000 lbf·ft	10,000 N·m
Part Number		50787.xxx 50705.xxx 50706.xxx	50728.xxx
Dimensions (mm)	ØA	95	110
	B	68	83
	C	160	189
	D	41	59
	E	84	100
	F	38	57
Weight (kg)		5.0	9.1



INTERVENTION TOOL TEST POTS

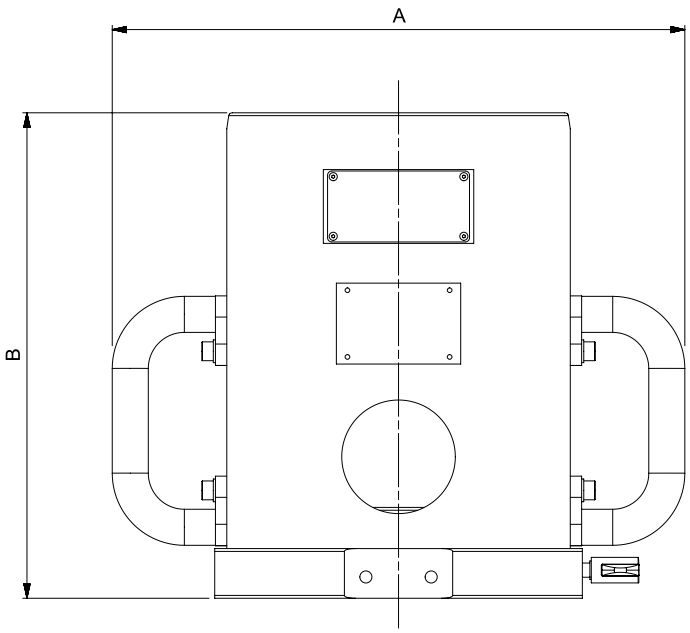
From left to right Intervention Tool Test Pots 80019, 80024, 80025 and 80020

These reaction pots allow for the accurate testing of API rotary intervention tools.

- Conform to ISO 13628-8:2002 and API 17D
- Customer specific solutions also available
- Lightweight all aluminium construction
- Incorporated lifting handles
- Eye bolts provided on larger units

4	INTERVENTION TOOL TEST POTS
80019	ISO 13628-8:2002 Class 4 Intervention Tool Test Pot
80024	ISO 13628-8:2002 Class 5 Intervention Tool Test Pot
80025	ISO 13628-8:2002 Class 6 Intervention Tool Test Pot
80020	API 17D Class 7 Intervention Tool Test Pot
81018	Deck Mount Kit for API Verification Pot

Model		Class 4	Class 5	Class 6	Class 7
Part Number		80019	80024	80025	80020
Dimensions (mm)	A	372	403	428	425
	B	215	246	326	326
Weight (kg)		17.5	22.0	51.0	48.0



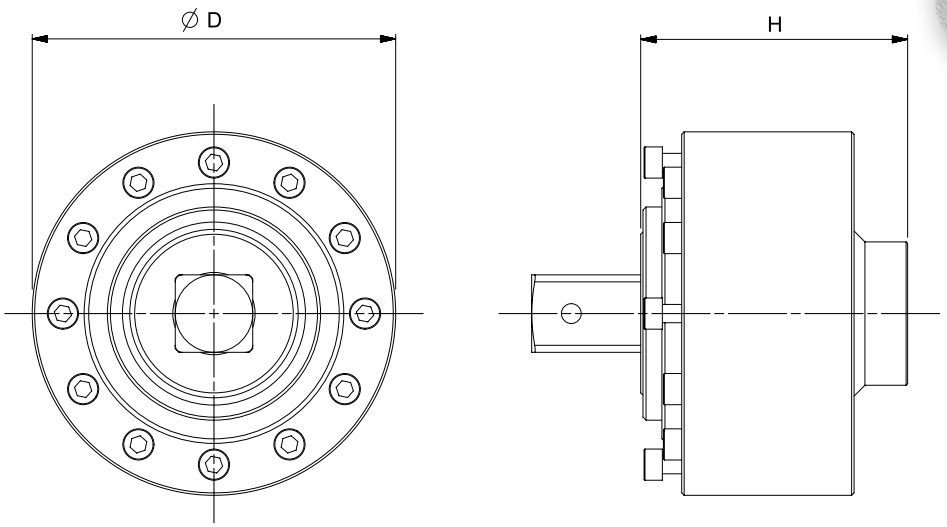
INTERVENTION TOOL VERIFICATION KITS

4	INTERVENTION TOOL TORQUE VERIFICATION KIT
60278.xxx	3,000 N·m ISO 13628 Class 4 Intervention Tool Torque Verification Kit
60281.xxx	10,000 N·m ISO 13628 Class 5 Intervention Tool Torque Verification Kit
60282.xxx	15,000 N·m ISO 13628 Class 6 Intervention Tool Torque Verification Kit
60279.xxx	25,000 N·m API 17D Class 7 (short) Intervention Tool Test Kit
60280.xxx	40,000 N·m API 17D Class 7 (short) Intervention Tool Test Kit

Other test pots and Torque Verification Kits are available for standard and non-standard API Intervention tool test and verification.
Please contact Norbar.

MULTIPLIERS FOR SUBSEA

4	MULTIPLIERS FOR INTEGRATION INTO SUBSEA INTERVENTION TOOLS
77331	HT5 5:1 for Subsea Intervention Tools
77301	HT5 5:1 for Subsea Splined Output



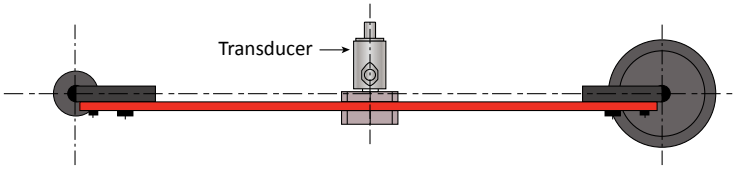
Model		HT5 5:1 Subsea
Part Number		77331 77301
Dimensions (mm)	D	119
	H	88
Weight (kg)		TBC

CALIBRATION BEAMS & WEIGHTS

Designed to remove potential sources of measurement error, these beams can be used to calibrate Norbar torque transducers, and torque transducers from other manufacturers (where design permits), as well as mechanical test devices. A UKAS accredited calibration certificate for the measurement of the torque radius is provided with each beam. Note: A temperature controlled environment is essential for use of these beams. The selection of weights will be influenced by gravitational constant at the proposed laboratory site.

CALIBRATION BEAMS & WEIGHTS - PRINCIPLES OF OPERATION

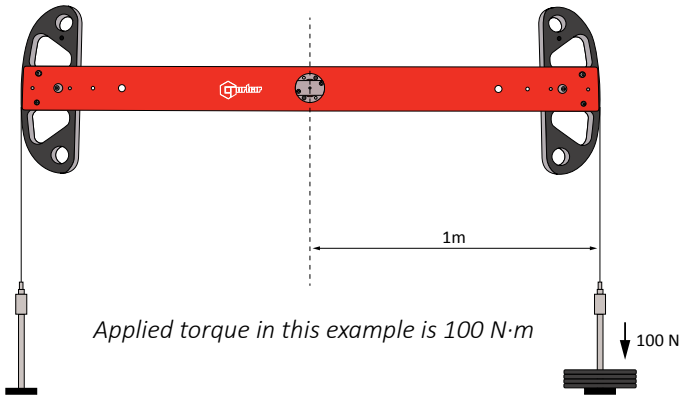
Norbar's test beams are designed for the static calibration of torque transducers. They are ideally suited to Norbar's transducers, but can be employed on other manufacturer's equipment.



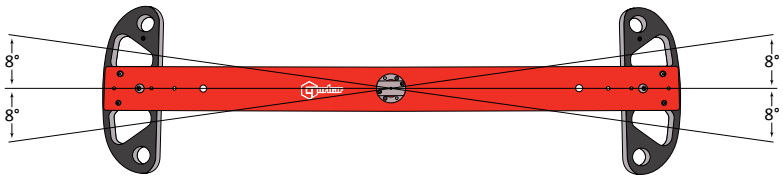
Torque is generated by the application of a known force at a known radius from the centre of rotation of the torque transducer.

The beams are designed with square drives machined to the top limit of ISO 1174. This minimises any play between the beam and the transducer. However, a combination of square drive tolerances, misalignment of fittings and elastic rotation of the transducer shaft inevitably cause the beam to rotate from the horizontal under load.

Norbar's radius ended beams are designed with a ±8˚ usable arc. Using the full 8˚, calibrations to a best class of 0.5 can be carried out. With the additional use of Transducer Calibration Fixtures and 3° Angled Plate (see page 40), a best class of 0.1 can be achieved.



Applied torque in this example is 100 N·m



Additionally, the beams are designed to apply load on a vertical plane which cuts through the square drive inside the transducer. This minimises bending moments on the transducer and for safe operation, ensures that the beam will not fall out of the transducer.

Gravitational Effects

It is very important that the gravitational value for the laboratory is established. The effect of not doing this could be a variation in the force produced by the weight of perhaps 0.5% of reading.

It is therefore strongly recommended that you establish the local value of gravity (g) for your laboratory and use weights that have been calibrated at that gravitational constant.

Norbar will supply weights calibrated to gravitational constants specified by the customer. However, if the customer does not specify a value for 'g' they will have been calibrated at an estimated gravitational constant for the customers' location.

Buoyancy Effects

The Norbar system uses calibrated weights to generate a downwards force.

This means that Archimedes' principle applies, ie. air pressure under the weights causes an upwards force. This reduces the effective force generated by the weights and therefore the mass must be increased to allow for this.

Under standard conditions (i.e. air density 1.2 kg/m3 and 20° centigrade and working in conventional mass terms) the increase required is by a factor of 0.015%.

Weights purchased from Norbar will already have this factor taken into account.

Weights that are calibrated to standard procedures do not have this factor taken into account because the air buoyancy affects both sides of the mass balance and can be ignored. It is important that weights used for torque transducer calibration are adjusted for air buoyancy.

It should also be noted that the double ended beam design employed by Norbar means that each half of the beam is balanced with regard to buoyancy of the beam. This is a significant advantage over single-arm counterbalanced systems.

CALIBRATION BEAMS & WEIGHTS - METRIC

9	METRIC - NEWTON METRE SIZES	
21400	3 N·m	Torque Radius Disc (100 mm)
21429	60 N·m	Radius Ended Beam (0.25 m)
21421	150 N·m	Radius Ended Beam (0.5 m)
21427	500 N·m	Radius Ended Beam (0.5 m)
21428	1,500 N·m	Radius Ended Beam (1.0 m)
21842	7,000 N·m	Free Standing Beam

With the exception of 21842 all calibration beams are supplied in a protective case. A UKAS accredited calibration certificate for the measurement of the torque radius is provided with each beam.

9	WEIGHTS FOR THE DISC 21400
21452.NAM	Brass weight set to give 0.5 N·m (10 x 0.5 N)
21450.NAM	Brass weight set to give 1.0 N·m (10 x 1.0 N)
21479.NAM	Brass weight set to give 2.5 N·m (10 x 2.5 N)

9	WEIGHTS FOR THE BEAM 21429
21476.NAM	Cast iron weight set to give 5 N·m (10 x 2 N)
21454.NAM	Cast iron weight set to give 10 N·m (10 x 4 N)
21458.NAM	Cast iron weight set to give 50 N·m (10 x 20 N)
Q2343.NAM	Cast iron weight set to give 60 N·m (1 x 4.8 N, 1 x 7.2 N, 1 x 12 N, 1 x 24 N, 4 x 48 N)

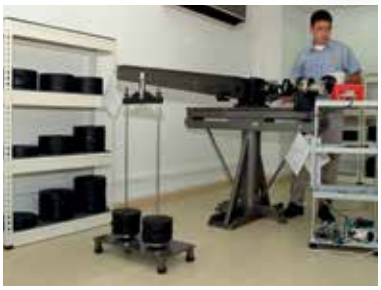
9	WEIGHTS FOR THE BEAM 21421
21477.NAM	Cast iron weight set to give 50 N·m (10 x 10 N)
21458.NAM	Cast iron weight set to give 100 N·m (10 x 20 N)

9	WEIGHTS FOR THE BEAM 21427/21428
21459.NAM	Cast iron weight set to give 250/500 N·m (1 x 10 N, 10 x 50 N)
21460.NAM	Cast iron weight set to give 500/1,000 N·m (1 x 10 N, 10 x 100 N)
21483.NAM	Cast iron weight set to give 500/1,000 & 1,500 N·m (14 x 100 N, 1 x 50 N, 2 x 20 N, 1 x 10 N)

e.g. set 21459.NAM will give 250 N·m on a 21427 beam and 500 N·m on a 21428.

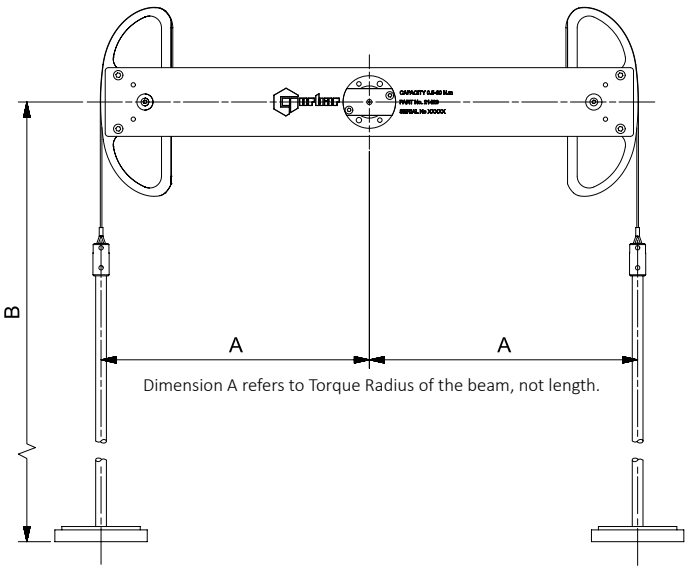
9	WEIGHTS FOR THE BEAM 21842
21469.NAM	Cast iron weight set to give 7,000 N·m (20 x 50 lbf)

All weight sets come with traceable UKAS accredited calibration certificate. This requires the customer to provide the value for 'g' (local gravity) for the intended place of use when ordering.



Model		100 mm Disc	0.25 m Beam	0.5 m Beam	0.5 m Beam	1 m Beam	Free Standing Beam
Part Number		21400	21429	21421	21427	21428	21842
Minimum Torque (N·m)		0.05	0.5	5	50	10	350
Dimensions (mm)	A	100	250	500	500	1,000	* 1,573.66
	B max.	295	650	755	1,015	1,015	1,070
Weight (kg)		0.5	1.9	5.0	17.0	25.0	270.0

* A max. Torque Radius for 7,000 N·m beam



CALIBRATION BEAMS & WEIGHTS - IMPERIAL

9	IMPERIAL - POUNDS FEET SIZES	
21400	25 lbf·in	Torque Radius Disc (100 mm)
21430	500 lbf·in	Radius Ended Beam (10")
21424	100 lbf·ft	Radius Ended Beam (12")
21425	500 lbf·ft	Radius Ended Beam (24")
21426	1,000 lbf·ft	Radius Ended Beam (48")
21842	5,000 lbf·ft	Free Standing Beam

With the exception of 21842 all calibration beams are supplied in a protective case. A UKAS accredited calibration certificate for the measurement of the torque radius is provided with each beam.

9	WEIGHTS FOR THE DISC 21400
21455.NAM	Brass weight set to give 50 ozf·in (10 x 1.27 ozf)
21453.NAM	Brass weight set to give 100 ozf·in (10 x 2.54 ozf)
21451.NAM	Brass weight set to give 160 ozf·in (10 x 4.064 ozf)

9	WEIGHTS FOR THE BEAM 21430
21465.NAM	Cast iron weight set to give 100 lbf·in (10 x 1 lbf)
21466.NAM	Cast iron weight set to give 500 lbf·in (10 x 5 lbf)

9	WEIGHTS FOR THE BEAM 21424
21467.NAM	Cast iron weight set to give 100 lbf·ft (10 x 10 lbf)

9	WEIGHTS FOR THE BEAM 21425
21468.NAM	Cast iron weight set to give 500 lbf·ft (10 x 25 lbf)

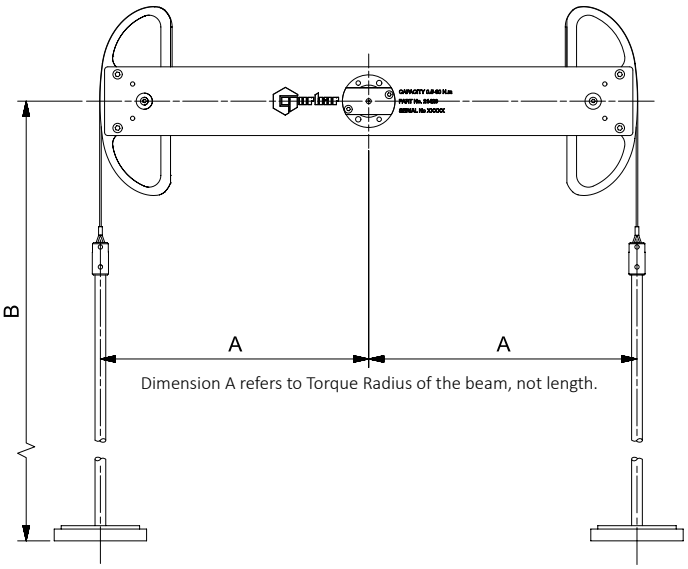
9	WEIGHTS FOR THE BEAM 21426
21468.NAM	Cast iron weight set to give 1,000 lbf·ft (10 x 25 lbf)

9	WEIGHTS FOR THE BEAM 21842
21469.NAM	Cast iron weight set to give 5,000 lbf·ft (20 x 50 lbf)

All weight sets come with a traceable UKAS accredited calibration certificate. This requires the customer to provide the value for 'g' (local gravity) for the intended place of use when ordering.

Model		100 mm Disc	10" Beam	12" Beam	24" Beam	48" Beam	Free Standing Beam
Part Number		21400	21430	21424	21425	21426	21842
Minimum torque		0.44 lbf·in	10 lbf·in	10 lbf·ft	50 lbf·ft	100 lbf·ft	300 lbf·ft
Dimensions (mm)	A	100	254	305	610	1,219	* 1,524
	B max.	295	650	690	965	1,015	1,070
Weight (kg)		0.5	1.2	3.7	17.3	26.4	270.0

* A max. Torque Radius for 5,000 lbf·ft beam



Dimension A refers to Torque Radius of the beam, not length.

9	ANCILLARY PRODUCTS FOR CALIBRATION BEAMS
J2676	1,500 N.m Calibration Pedestal
J2329	Pro-Test Calibration Test Rig Assembly
80005	Adjustable Angle Attachment

9	CALIBRATION FIXTURES
J2239	Transducer calibration fixture ¼" sq
J2237	Transducer calibration fixture ⅜" sq
J2244	Transducer calibration fixture ½" sq
J2240	Transducer calibration fixture ¾" sq
J2241	Transducer calibration fixture 1" sq
J3305	3° Angled Plate for use with calibration fixtures

CALIBRATION CERTIFICATES

As a UKAS accredited calibration Laboratory No. 0256, Norbar is required to calibrate torque measuring devices that are within the laboratory's scope, in accordance with BS 7882:2017. See the 'UKAS Schedule of Accreditation' on the 'Calibration Services' page of our website, www.norbar.com.

Norbar can provide a comprehensive range of calibrations including increasing and decreasing torques; clockwise and counter-clockwise; in either SI or English torque units, or in mV/V or Volts.

The sections below summarise the main features of BS 7882:2017, but purchase and careful study of the standard is advised for those who wish to have more detailed information.

Procedure

- The 'device' is defined as all parts of a system, e.g. Display, Transducer cable and Transducer. Transducer cables will therefore be serial numbered if they are separate items.
- The output of the device is defined as 'deflection'.
- It is preferable to calibrate all parts of a system together. If a transducer is sent for calibration without its normal display unit, an equivalent calibrated display held in the laboratory will be used. The normal display must also be in a calibrated state or the certification for the transducer is invalidated.
- Norbar is currently the only laboratory accredited by UKAS for the calibration of Electrical Torque Measuring Indicators.
- Before any calibration or recalibration the torque measuring device is preloaded three times in succession to the maximum applied torque of the device. Each preload is maintained for a minimum of 30 seconds to exercise the device and stabilise it in the calibration fixture.
- The device is calibrated with at least five approximately equal steps from 20% to 100% of maximum torque. Lower values are allowed as long as they meet certain criteria for resolution.
- For classes 0.05 and 0.1, it is mandatory to calibrate the torque measuring device in four different mounting positions each rotated 90° about the measurement axis. For all other classes the device is calibrated at a minimum of two different mounting positions at least 90° apart.
- Two series of readings are taken, and the device is then disturbed, generally by being disconnected from the calibration fixture and rotated through 90°. The device is then preloaded once to full scale. A third series of readings are then taken. This process is repeated until readings have been recorded in all required orientations.
- If reversibility is required, a single series of decreasing torques are applied at the end of the last increasing series.
- Should calibration be required in both directions, the series of readings are repeated in the opposite direction.
- The calibration data is then analysed to establish the following parameters.

Repeatability

The variation between the indicated deflection from series 1 and 2, expressed as a percentage of the mean of the two readings.

Reproducibility

The maximum variation between series 1, 2 and 3, or series 1, 2, 3, 4 and 5 expressed as a percentage of the mean indicated deflection calculated from series 1, 3 or series 1, 3, 4, and 5.

Error of Indication

Where the results are expressed in units of torque, the errors of indication are the variation between each applied torque and the mean indicated deflection at that torque.

Error of Zero Torque

The maximum zero reading recorded after each loading series is expressed as a percentage of the maximum mean indicated deflection.

Error of Interpolation

Where the results are expressed in volts or units other than torque units, a second order polynomial equation (best fit line) is established and the difference in deflection from the computed value is expressed as a percentage of the computed value.

Reversibility

The variation between the readings from the last torque series applied in an increasing mode and the readings for the same given torque applied in a decreasing mode. Reversibility is expressed as a percentage of the deflection of the last increasing series for the given torque.

Classification

- The parameters are each compared with a table to establish the device's classification. Class 0.05 is the highest performance, and class 5 is the lowest defined by the standard. The overall class reported will be that of the lowest performing parameter. For example reproducibility may be a class 1 when all other parameters meet class 0.5. The device will be classified as 1.
- Additionally the uncertainty of measurement of the applied torque must be five times better than the overall class reported. Norbar's uncertainty of measurement (typically 0.02%) allows classification to Class 0.1 devices.
- Different classes may be quoted for ranges below 20% of maximum capacity.

Relative Measurement Uncertainty Interval

The relative measurement uncertainty interval of the device is also calculated by combining the relative mean deviation with the relative expanded uncertainty.

Effectively the uncertainty interval encompasses all of a transducers reported errors and uncertainty of calibration, providing the user with a maximum error value of the calibrated device.

Accredited calibrations performed to BS 7882:2017 meet the requirements of BS EN ISO6789-2:2017 clause 4.3 and annex C 7.3, and BS EN ISO 6789-1:2017 clause 6.1.

CALIBRATION SERVICES

CALIBRATION SERVICES

Devices sent in for UKAS accredited calibration certification will be calibrated and the 'As Found' readings recorded. The calibration will be performed to the appropriate standard as specified in our schedule of accreditation.

a) Should the device be in specification 'As Found', a certificate will be raised and the device returned.
b) Should the device be out of specification, but capable of adjustment, it will be adjusted, 'As Left' readings taken, and one certificate raised with 'As Found' and 'As Left' readings on it.
c) Should the device require repair that is not covered by a combined calibration and service, we will do so where possible, after consultation with the customer.

Norbar are accredited by UKAS for torque measurements between 0.005 N·m and 108,500 N·m or the imperial equivalents. Our Schedule of Accreditation gives further details (please refer to www.norbar.com).

UKAS accredited calibration certificates are issued under the authority of the United Kingdom Accreditation Service.

Norbar can calibrate non-Norbar Torque products, please contact us with the details of your equipment.

A calibration 'priority booking' service is available, please contact the Customer Relations Department a minimum of one month prior to the required recalibration due date.

- **Tel: +44 (0)1295 753635**
- **Fax: +44 (0)1295 753636**
- **Email: service@norbar.com**

DECLARATION OF CONFORMANCE

TORQUE WRENCH DECLARATION OF CONFORMANCE (DOC)

ONE DIRECTION	
DOC1.CW	Up to 400 N·m / 300 lbf·ft
DOC2.CW	Up to 1,000 N·m / 750 lbf·ft
DOC3.CW	Up to 1,500 N·m / 1,100 lbf·ft

ONE DIRECTION & REPAIR COMBO	
RCDOC1.CW	NorTorque and Professional wrenches up to 400 N·m
RCDOC2.CW	Industrial wrenches 2R - 5R & 3AR-N - 5R-N
RCDOC3.CW	Industrial wrench 5AR & 5AR-N
RCDOC4.CW	Large Professional 550 & 650 N·m
RCDOC5.CW	Large Professional 800 - 1,500 N·m

TWO DIRECTIONS	
DOC1.CW+CCW	Up to 400 N·m / 300 lbf·ft
DOC2.CW+CCW	Up to 1,000 N·m / 750 lbf·ft
DOC3.CW+CCW	Up to 1,500 N·m / 1,100 lbf·ft

TWO DIRECTIONS & REPAIR COMBO	
RCDOC1.CW+CCW	NorTorque and Professional wrenches up to 400 N·m
RCDOC2.CW+CCW	Industrial wrenches 2R - 5R & 3AR-N - 5R-N
RCDOC3.CW+CCW	Industrial wrench 5AR & 5AR-N
RCDOC4.CW+CCW	Large Professional 550 & 650 N·m
RCDOC5.CW+CCW	Large Professional 800 - 1,500 N·m

UKAS ACCREDITED CALIBRATION CERTIFICATION

TORQUE WRENCH, UKAS ACCREDITED CALIBRATION CERTIFICATION

On receipt an 'As Found' calibration certificate will be carried out where possible. If the results do not fall within specification the wrench will be adjusted and if the adjustment does not bring the wrench back within specification then it will either be repaired or a service replacement will be offered.
Calibration certificates are in accordance with the current standard for hand torque tools BS ISO 6789-2:2017. The certificate shows the nominal torque applied and the measured torque readings.
For guidance on Norbar's procedure for wrenches sent in for repair, see page 42. If the same tool is required to be returned, i.e. if you do not want the tool to be service replaced, then this should be made clear on the purchase order which accompanies the tool.

ONE DIRECTION	
TWCC1.CW	Up to 400 N·m / 300 lbf·ft
TWCC2.CW	Up to 1,000 N·m / 750 lbf·ft
TWCC3.CW	Up to 3,000 N·m / 2,200 lbf·ft

TWO DIRECTIONS	
TWCC1.CW+CCW	Up to 400 N·m / 300 lbf·ft
TWCC2.CW+CCW	Up to 1,000 N·m / 750 lbf·ft
TWCC3.CW+CCW	Up to 3,000 N·m / 2,200 lbf·ft

NORTRONIC UKAS ACCREDITED CALIBRATION CERTIFICATION

ONE DIRECTION & ANGLE	
NTCC1.CW	NorTronic all sizes

TWO DIRECTIONS & ANGLE	
NTCC1.CW+CCW	NorTronic all sizes

MANUAL TORQUE MULTIPLYING GEARBOXES, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for Certification 'As Found',

ONE DIRECTION	
HTCC1.CW	Up to 6,000 N·m / 5,000 lbf·ft

TWO DIRECTIONS	
HTCC1.CW+CCW	Up to 6,000 N·m / 5,000 lbf·ft

UKAS ACCREDITED CALIBRATION CERTIFICATION

ELECTRONIC DEVICES

In accordance with the current standards for calibration of torque measurement devices, it is desirable to calibrate transducers with the display that is normally used. In this case the 'system' is calibrated. If it is not possible to supply the display unit, an equivalent calibrated display unit from the laboratory will be used. The calibration will then be valid for the transducer with the original display as long as the original display has been calibrated within the last 12 months.

Calibration certificates are in accordance with the current standard for torque measuring devices BS 7882:2017, and show the nominal torque applied, and the measured torque readings. Measured readings may be given in mV/V on request. Details of the standard are available on request.

It is not our intention to offer a full repair service for torque devices from other manufacturers. Where a device is in need of repair, the customer is advised to have this performed by an approved service agent or the manufacturer before submitting the device for UKAS accredited calibration. Some electronic transducer systems from other manufacturers may incur an additional calibration cost; the electronics department repair technicians will clarify this point if required. Occasionally it will be necessary to manufacture special adaptors to enable the calibration to be performed. This will of course affect the price and delivery, and will be discussed with the customer as the need arises.

CALIBRATION TO BS7882:2017 CLASS 0.1

Norbar's UKAS accredited laboratory performs standard calibrations on torque measuring devices to BS 7882:2017 class 0.2 increasing torques only. However the laboratory is able to calibrate devices to class 0.1 at the customer's request. Class 0.1 requires calibration in four different mounting positions each rotated 90° about the measurement axis. Classification to class 0.1 is dependent on the devices performance. Calibrations including a decreasing series of torques can also be provided if required. A price for these services is available on request.

This section contains combined calibration and service fixed details for Norbar products. Other manufacturers' equipment will be handled by individual quotation. Provided that the product is in serviceable condition*, we guarantee to carry out all calibration, function checks and repair work in order to bring the equipment back to its original functionality.

*Product would be regarded as unserviceable if either it or the components required for the repair are obsolete or unavailable. Serviceability also implies that the product is capable of repair without complete replacement.

Service replacements are available for some products.

ELECTRONIC TORQUE TRANSDUCERS, UKAS ACCREDITED CALIBRATION CERTIFICATION (WITH SQUARE DRIVE, FLANGE MOUNTED & PRE 2004 ROTARY)

The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION	
TDCCS1.CW	Up to 1,500 N·m / 1,000 lbf·ft
TDCCS5.CW@	From 1,501 to 7,000 N·m / 1,001 - 5,000 lbf·ft
TDCCS3.CW+	Square/Splined Drive From 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft
TDCCS4.CW+	Flange Drive From 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft
ADDCALPOINTS.CCS	Additional calibration steps below 10% of rated capacity to 2% for transducers up to 7,000 N·m (5,000 lbf·ft)

TWO DIRECTIONS	
TDCCS1.CW+CCW	Up to 1,500 N·m / 1,000 lbf·ft
TDCCS5.CW+CCW@	From 1,501 to 7,000 N·m / 1,001 - 5,000 lbf·ft
TDCCS3.CW+CCW+	Square/Splined Drive From 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft
TDCCS4.CW+CCW+	Flange Drive From 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft

@ UKAS accredited calibration up to 6,000 N·m. A non-accredited value at 7,000 N·m is extrapolated and provided for reference only.

+ UKAS accredited calibration up to 80,000 lbf·ft. A non-accredited value at 100,000 lbf·ft is extrapolated and provided for reference only.

For part numbers TDCCS3.CW and TDCCS4.CW, static transducers with 2½" square drives and annular transducers to fit HT/PT 9 & HT/PT 11, a secondary calibration to extend the range below 10% of the rated capacity may be ordered using part number TDCCS5.CW

For part numbers TDCCS3.CW+CCW and TDCCS4.CW+CCW, static transducers with 2½" square drives and annular transducers to fit HT/PT 9 & HT/PT 11, a secondary calibration to extend the range below 10% of the rated capacity may be ordered using part number TDCCS5.CW+CCW

UKAS ACCREDITED CALIBRATION CERTIFICATION

ROTARY TRANSDUCERS (2004 ONWARDS), UKAS ACCREDITED CALIBRATION CERTIFICATION (PART CODE 50708.XXX-50724.XXX)

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left'

ONE DIRECTION	
TDCCS2.CW	Up to 1,500 N·m / 1,000 lbf·ft

TWO DIRECTIONS	
TDCCS2.CW+CCW	Up to 1,500 N·m / 1,000 lbf·ft

TRUCHECK VERSIONS 1 & 2

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left'

ONE DIRECTION	
TCCCS1.CW	TruCheck versions 1 & 2 All Sizes up to 1,500 N·m (UKAS Accredited Calibration Certification)
TCCCS3.CW	TruCheck versions 1 & 2 All Sizes over 1,500 N·m (UKAS Accredited Calibration Certification)
TCCCS2.CW*	TruCheck versions 1 & 2 All Sizes up to 1,500 N·m
TCCCS4.CW*	TruCheck versions 1 & 2 All Sizes over 1,500 N·m

TWO DIRECTIONS	
TCCCS1.CW+CCW	TruCheck versions 1 & 2 All Sizes up to 1,500 N·m (UKAS Accredited Calibration Certification)
TCCCS3.CW+CCW	TruCheck versions 1 & 2 All Sizes over 1,500 N·m (UKAS Accredited Calibration Certification)

*Issued with traceable certification.

PRO-TEST, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left'

ONE DIRECTION	
PROCCS.CW	Pro-Test All sizes

TWO DIRECTIONS	
PROCCS.CW+CCW	Pro-Test All Sizes

PRO-LOG, TTT, T-BOX, T-BOX XL, T-BOX 2 & TTL-HE, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left'

ONE DIRECTION	
INSTCCS3.CW	Pro-Log or TTT

TWO DIRECTIONS	
INSTCCS3.CW+CCW	Pro-Log or TTT
INSTCCS4.CW+CCW	TTL-HE, T-Box, T-Box XL or TWC Auto Control Box
INSTCCS5.CW+CCW	T-Box 2

TST, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left' This includes both an instrument and system calibration

ONE DIRECTION	
TSTCCS.CW	TST

TWO DIRECTIONS	
TSTCCS.CW+CCW	TST

Section with combined calibration & service ends here

CALIBRATION BEAMS & WEIGHTS, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for Length Certification, 'As Found' and 'As Left'

CBLC1	Disc or Beam up to 150 N·m / 100 lbf·ft
CBLC2	Disc or Beam up to 1,500 N·m / 1,000 lbf·ft
CBLC3*	Disc or Beam up to 6,800 N·m / 5,000 lbf·ft
WEIGHT.CC1	Calibration of Weights up to 25 kgf / 245 N / 55 lbf

UKAS ACCREDITED CALIBRATION CERTIFICATION

MECHANICAL TORQUE TESTING DEVICES, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left'

ONE DIRECTION	
MCCS1.CW	Up to 5,000 N·m / 5,000 lbf·ft

TWO DIRECTIONS	
MCCS1.CW+CCW	Up to 5,000 N·m / 5,000 lbf·ft

TWA, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for Combined Calibration and Service, 'As Found' and 'As Left'

ONE DIRECTION	
TWACCS.CW	TWA All Sizes

TWO DIRECTIONS	
TWACCS.CW+CCW	TWA All Sizes

ETS, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for combined calibration and service,
'As Found' and 'As Left'

INSTCCS1.CW	ETS

DTS, UKAS ACCREDITED CALIBRATION CERTIFICATION

ONE DIRECTION	
DTSCCS1.CW@	DTS up to 7,000 N·m or 5,000 lbf·ft
DTSCCS2.CW+	DTS from 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft Square and Spline drive
DTSCCS3.CW+	DTS from 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft Flange drive

TWO DIRECTIONS	
DTSCCS1.CW+CCW@	DTS up to 7,000 N·m or 5,000 lbf·ft
DTSCCS2.CW+CCW+	DTS from 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft Square and Spline drive
DTSCCS3.CW+CCW+	DTS from 7,001 to 100,000 N·m / 5,001 to 100,000 lbf·ft Flange drive

@ UKAS accredited calibration up to 6,000 N·m. A non-accredited value at 7,000 N·m is extrapolated and provided for reference only.

\+ UKAS accredited calibration up to 80,000 lbf·ft. A non-accredited value at 100,000 lbf·ft is extrapolated and provided for reference only.

ETTA, UKAS ACCREDITED CALIBRATION CERTIFICATION

The part numbers shown below are for combined calibration and service, 'As Found' and 'As Left'

ETTACCS.CW	ETTA

GENERAL DEVICES, UKAS ACCREDITED CALIBRATION CERTIFICATION

EMCC	Mechanical Enclosure Meter Calibration (CW + CCW)

OTHER CERTIFICATION

EVOTORQUE AND PNEUTORQUE CERTIFICATES

These devices are outside the scheduled accreditation issued by UKAS.

HTCERT	Compact Series Calibration
PTCERT	PneuTorque Calibration
PTICEC	PTM IC/EC Certificate of air pressure vs torque
ETCERT	EvoTorque 1, 2 & EBT Certificate of torque and angle

USM CERTIFICATES

These devices are outside the scheduled accreditation issued by UKAS.

USMCC	Ultrasonic Stress Meter certificate of calibration

GENERAL DEVICES

These devices are outside the scheduled accreditation issued by UKAS.

Weight Set Certificates accredited by UKAS or other certified bodies	
ETSDPFT	ETS Data Printer. Function Test
ETSBPUFT	ETS Battery Power Unit. Function Test
FWSUFT	ETS or ETTA 5 Way Switch Unit. Function Test
TWSUFT	ETS or ETTA 2 Way Switch Unit. Function Test

TRANSDUCER CONVERSIONS

SQ8888	ETS Transducer conversion to Smart Transducer (does not include calibration)
SQ2005	ETTA Transducer conversion to Smart Transducer (does not include calibration)

GLOBAL SERVICE

Norbar is the only torque equipment manufacturer capable of offering tool and instrument calibration services to the original factory standard on four continents.

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Accredited laboratories in Australia, USA, Singapore, China and India operate the same equipment and procedures as the UKAS accredited laboratory within our headquarters in the UK.

TORQUE MEASUREMENT

Measurement and Calibration - Glossary of Terms

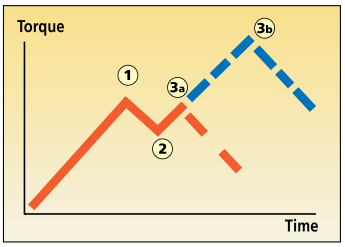
The following information may help in selecting the appropriate measuring device for your needs.

Accuracy

The precision of the instrument which can be reported in three ways:

1. By quoting the guaranteed tolerance as a percentage of the reading or indicated value (eg. '0.5% of reading').
2. By quoting the guaranteed tolerance as a percentage of the full scale value of the instrument (eg. 0.1% FS or 0.1% FSD).
3. By quoting a 'class' of device in accordance with BS7882:2017 'Method for calibration and classification of torque measuring devices'.

Modes of Operation



1 = Torque wrench activates
2 = 'Click' heard
3a = Wrench released quickly
3b = Wrench released slowly

First Peak of Torque - when a 'click type' torque wrench signals that the set torque has been achieved, the applied torque will momentarily drop before climbing again. Generally the fastener stops rotating at point 1 and from a standstill, the breakaway torque to achieve further rotation of the fastener will be higher than point 3b. Only if the operator is very insensitive to the break point will the final tightening effort be incorrect.

'First Peak of Torque' mode will detect the break point of the torque wrench, not the highest torque applied.

Peak Torque - this mode of operation will record the highest torque applied. In the case of a 'click type' torque wrench this may be higher than the actual break point if the wrench continues to be loaded beyond the break.

Consequently, Peak Torque is more useful for calibrating devices without a break signal such as dial or electronic wrenches.

Track - this mode has no memory at all. When the load is removed the display will return to zero.

Track is used for calibrating the device itself or for monitoring a fluctuating torque.

Resolution

The smallest measurement interval that can be determined on the indicating device. This applies to analogue and digital devices.

Number of Digits

Digital displays are described as having a certain number of 'digits' or 'active digits'. Half digits can be used to increase the resolution of a device without the expense of going to an additional full active digit.

Example 1. 1,000 N·m displayed on a 4 digit system would read 1000 (resolution = 1 N·m).

Example 2. 1,000 N·m displayed on a 4½ digit system would read 1000.0 (resolution = 0.1 N·m).

Active digits change as the torque changes. Non-active digits only assist in showing the magnitude of the torque. For example, 10,000 N·m requires 5 digits to display it's magnitude.

Example 3. With 4 active digits (and 1 passive digit), 10,000 N·m would change in steps of 10 N·m.

Example 4. With 4½ or 5 active digits, 10,000 N·m would change in steps of 1 N·m.

Signal Processing

Electronic circuitry falls broadly into two types, analogue and digital, with most electronic measurement systems comprising a mixture of the two. There are also whole analogue electronic systems, but these are rare in torque measurement. Most systems start with an analogue signal. The point at which the signal is converted defines the type.

Analogue systems – one in which the signal is processed before being converted to digital.

Digital systems – the original analogue signal is converted to digital before processing.

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