



BOLT LOAD METER

OPERATORS HANDBOOK (PART NO. 07377)

NORBAR TORQUE TOOLS LTD, Beaumont Road, Banbury, Oxfordshire, OX16 1XJ, UNITED KINGDOM

Tel: + 44 (0) 1295 270333, Fax: + 44 (0) 1295 753643

www.norbar.com

enquiry@norbar.com

BOLT LOAD METER

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THIS OPERATORS HANDBOOK COVERS THE FOLLOWING MODEL NUMBERS

<u>MODEL NO.</u>	<u>DESCRIPTION</u>
22001	MODEL 00 3-6mm Bolt Capacity
22002	MODEL 0 5-11mm Bolt Capacity
22003	MODEL 1 6-16mm Bolt Capacity
22004	MODEL 2 13-32mm Bolt Capacity
22005	MODEL 3 16-32mm Bolt Capacity

OPTIONAL EXTRAS

<u>PART NO.</u>	<u>DESCRIPTION</u>
22270	6mm Bolt Bushing Set BLM 1
22271	7mm 1/4" Bolt Bushing Set BLM 1
22272	8mm 5/16" Bolt Bushing Set BLM 1
22273	3/8" Bolt Bushing Set BLM 1
22274	9mm Bolt Bushing Set BLM 1
22275	10mm Bolt Bushing Set BLM 1
22276	7/16" Bolt Bushing Set BLM 1
22277	12mm 1/2" Bolt Bushing Set BLM 1
22278	14mm 9/16" Bolt Bushing Set BLM 1
22279	16mm 5/8" Bolt Bushing Set BLM 1
22280	12mm 1/2" Bolt Bushing Set BLM 2
22281	14mm 9/16" Bolt Bushing Set BLM 2
22282	16mm 5/8" Bolt Bushing Set BLM 2
22283	18mm Bolt Bushing Set BLM 2
22284	20mm 3/4" Bolt Bushing Set BLM 2
22285	22mm 7/8" Bolt Bushing Set BLM 2
22286	24mm Bolt Bushing Set BLM 2
22287	1" Bolt Bushing Set BLM 2
22288	27mm Bolt Bushing Set BLM 2
22289	1 1/8" Bolt Bushing Set BLM 2
22290	30mm Bolt Bushing Set BLM 2
22291	33mm 1 1/4" Bolt Bushing Set BLM 2

Note: *Bolt Bushing Sets are designated BLM 1 are suitable for use in Bolt Load Meters, 00, 0 and 1. Sets designated BLM 2 are suitable for models 2 and 3.*

22154	Test Bolt Set 5/8" Model 1
22155	Test Bolt Set 7/8" Model 1
22157	Test Bolt Set 1 1/4" Model 2
22158	Test Bolt Set 1 3/8" Model 2
22160	Bolt Load Meter Clamp
22139	5/8" Test Bolt only
22140	7/8" Test Bolt only
22141	1 1/4" Test Bolt only
22142	1 3/8" Test Bolt only
26602	Blue Tool Box AB19

OPERATING INSTRUCTIONS

These robust instruments incorporate a self contained hydraulic load cell which measures directly in lbf, KN and Kg the tension in any bolt tightened in them. When the bolt is tightened there is a transfer of pressure through the hydraulic fluid which indicates on the 4" diameter pressure gauge. Moving parts in the gauge are protected from shock loads by being immersed in a mixture of glycerine and water and the gauge is rubber mounted.

IMPACT WRENCH OUTPUT TESTING

ITEMS REQUIRED: Bolt Load Meter and Test Bolt Set

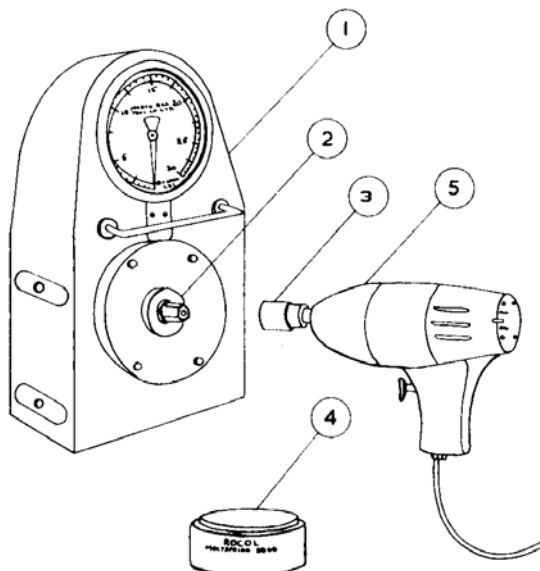
Over a period of time, impact wrenches lose their performance and have to be serviced. The problem is to know when they should be taken out of use for repair, and what standard of performance repaired tools should achieve.

The answer lies in the use of a Bolt Load Meter and Test Bolt Sets. If a new impact wrench, or one that is performing satisfactorily is used to tighten a Test Bolt in the Load Meter, a reading will be shown on the instrument dial. This reading is given in units of Bolt Tension, not torque and is a comparative figure. This test should be repeated several times and an average standard of performance will be established for that size or type of tool. If a permanent record of this value for each tool is kept, the performance of each wrench can be monitored by periodical checks.

To convert the gauge reading from bolt tension into a torque, an accurate dial indicating torque wrench is required.

By tightening the test bolt to the bolt tension figure achieved using the torque wrench and noting the reading, will give this value.

The torque value will only be correct for these particular bolt conditions and if the impact wrench is used on a softer or harder joint or the bolt is tightened into a less rigid structure, the torque output will be of a different value.



<u>Item No.</u>	<u>Description</u>
1	Bolt Load Meter
2	Test Bolt Set
3	Impact Socket
4	Rocol Kilopoise 0868G
5	Impact Wrench

FIG 1

METHOD OF OPERATION

1. Select the correct Bolt Load Meter and Test Bolt Set using the table below.
2. Assemble selected Test Bolt in the Bolt Load Meter ensuring that threads and underside of bolt head are will lubricated with Rocol Kilopoise 0868G provided.
3. Connect air supply to impact wrench.
4. Tighten test bolt with impact wrench using correct size of impact socket.
5. Note Gauge reading.
6. Loosen test bolt and re-tighten three times noting reading each time to obtain an average value.

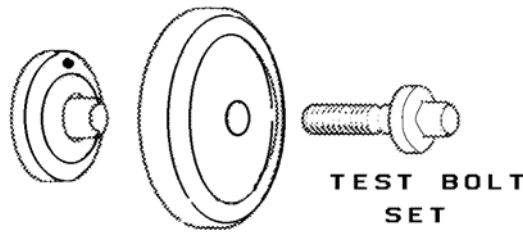


FIG 2

Model	Bolt Capacity		Maximum Load			Average min. grip length		Approximate torque range with test bolt			Test Bolt Hex A/F
	mm	in	kN	lbf.	kgf.	mm	in	Bolt size	N.m	lbf.ft	
00	3-6	1/8-1/4	22	5000	2250	16	5/8	5/8	7-70	5-50	5/8
0	5-11	3/16-7/16	66	15000	7000	17	11/16	7/8	15-200	10-150	7/8
1	6-16	1/4-5/8	130	30000	14000	32	1 1/4	7/8	25-400	20-300	7/8
2	13-32	1/2-1 1/4	350	80000	36000	40	1 9/16	1 1/4	70-1400	50-1000	1 1/4
3	16-32	5/8-1 1/4	500	110000	50000	41	1 5/8	1 3/8	135-2000	100-1500	2 1/4

IMPACT WRENCH CALIBRATION WITH SAMPLE BOLTS

ITEMS REQUIRED: Bolt Load Meter and Bolt Bushing Set.

1. When it is necessary to set impact wrenches to tighten friction grip bolts in steel structures, or for any other application where they must be adjusted to give a known bolt tension, proceed as follows:-
2. Fix Bolt Load Meter onto a convenient beam or stanchion using the clamp (20) or bolt directly using 1/2" socket screws (19) provided.
3. Bolt on correct size of front pressure plate (4).
4. Insert bolt head immobiliser (5) into the back of the piston (14) ensuring that it locates on the dowel (6). Fit retaining circlip (15) into place. Ensure retaining circlip (15) is fitted correctly.
5. Load sample bolt from the back of the meter so that the hexagon head is located across its flats in the immobiliser and the bolt projects through the front pressure plate. Place washer and nut on the bolt spacers if required.
6. Tighten nut with impact wrench and note gauge reading.
7. Adjust torque control mechanism or air pressure by trial and error until the wrench cuts out when the required bolt tension is indicated on the gauge. It is advisable to calibrate so that the wrench is giving approximately 10% more than the stated minimum bolt tension to allow for air pressure fluctuations.
8. It is important that the wrench is tested using the same length of hose from the air supply as the wrench will have on the job.
9. Wrenches should be calibrated daily, or whenever a change is made to a different bolt size.
10. A new bolt should be used for each calibration check.

(Item No.s relate to parts lists on following pages).

DETERMINING TORQUE/TENSION FIGURES

When torque/tension information on a nut and bolt assembly is required, assemble the sample fastener using the correct size of bolt bushing set in an appropriate Bolt Load Meter.

It is important to simulate the application as closely as possible by including any washers or gaskets that will be used on the joint.

Tighten the fastener using an accurate dial type torque wrench until the required bolt tension is reached and note the torque required.

Repeat the test several times using new components each time to establish average torque/tension values.

To carry out accurate torque/tension tests on stud bolts, it is advisable to replace the bolt head immobiliser (5) with a tapped block of the same material being used on the assembly, ie. cast iron, aluminium, etc.

If the correct tension is not known, the nut can be tightened until the bolt is seen to yield; 85% - 90% of this yield point is a good general purpose working load. The yield point is clearly discernible when the pressure gauge needle stops climbing in proportion to the rotation of the nut.

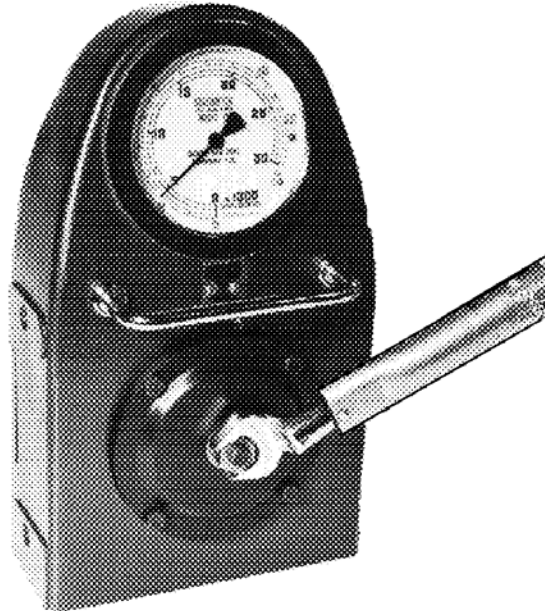


FIG 3

HOW THE BOLT LOAD METER WORKS

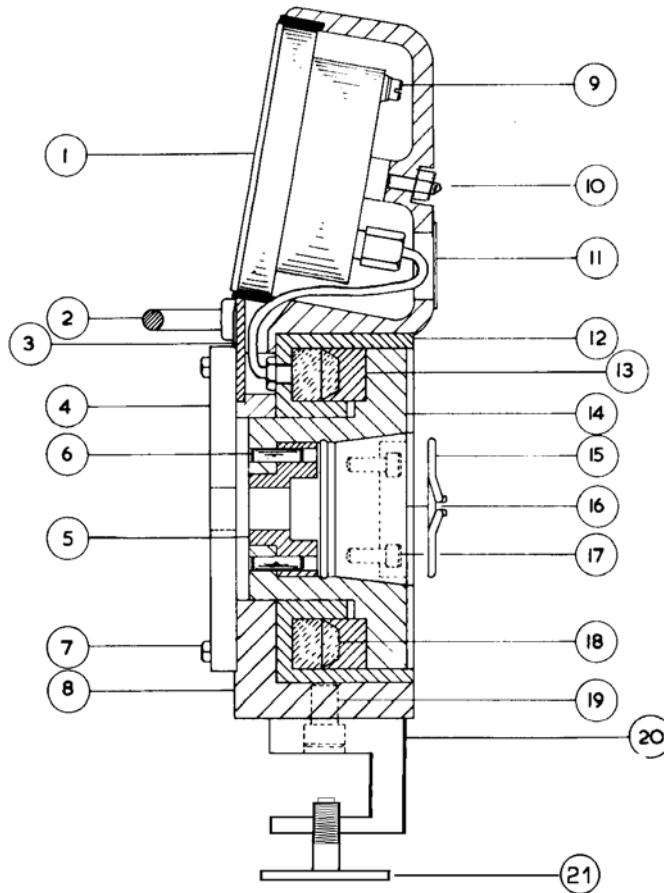


FIG 4

When any torque is applied to a bolt inserted in the Bolt Load Meter, it pulls the piston (14) against the pressure ring (13).

This in turn compresses the hydraulic sac (18) and forces fluid along the copper tube and into the rear of the pressure gauge (1).

This fluid movement causes a banana shaped pressure tube within the gauge to straighten and this imparts movement onto a small gear train which then moves the needle within the gauge and gives a reading of bolt tension.

The gauge itself is filled with a mixture of glycerine and water and set on rubber mountings to protect it from shock loads.

PARTS LIST FOR SIZE NO. 1 BOLT LOAD METERS

Model 00, Model 0, Model 1

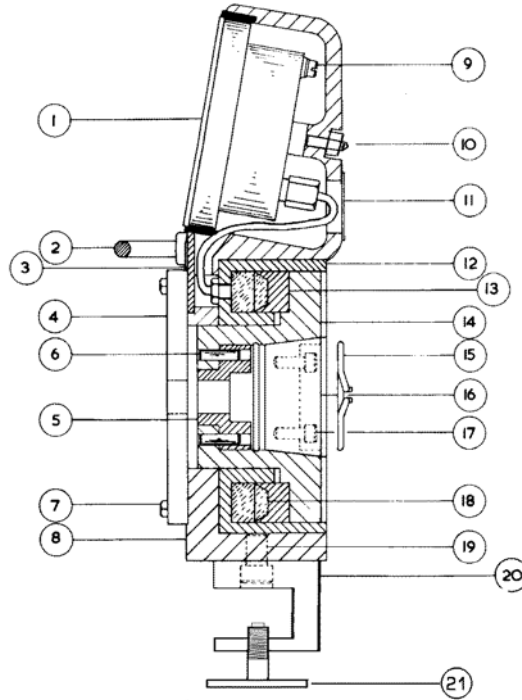


FIG 5
BLM shown with 'Bolt Bushing Set' fitted.

ITEM NO.	DESCRIPTION	PART NO.S			QUANTITY
		MODEL 00	MODEL 0	MODEL 1	
1	Pressure Gauge	27611	27612	27613	1
2	Handle	22166	22166	22166	1
3	Cover Plate	22167	22167	22167	1
4	Front Pressure Plate	See Norbar Price List			1
5	Bolt Head Immobiliser				
6	Dowel Pins	22169	22169	22169	1
7	1/4 unc bolts x 5/8"	25524.10	25524.10	25524.10	4
8	Meter Casing	22175	22175	22175	1
9	Gauge Filling Screws	Supplied	With	Gauge	2
10	Rubber Mounts	22178	22178	22178	2
11	Serial No. Plate	22164	22164	22164	1
12	Case Liner	22171	22171	22171	1
13	Pressure Ring	22188	22188	22188	1
14	Piston	22173	22173	22173	1
15	Circlip	26413	26413	26413	1
16	Keep Plates	22168	22168	22168	2
17	5/16 UNF Socket Screws	25180.12	25180.12	25180.12	4
18	Hydraulic Sac	27652	27652	27652	1
19	1/2 UNC Socket Screw	25245.16	25245.16	25246.16	2
20	Clamp Bracket	22160	22160	22160	1
21	'T' Bolts	22161	22161	22161	2

PARTS LIST FOR SIZE NO. 2 BOLT LOAD METER

Model 2, Model 3

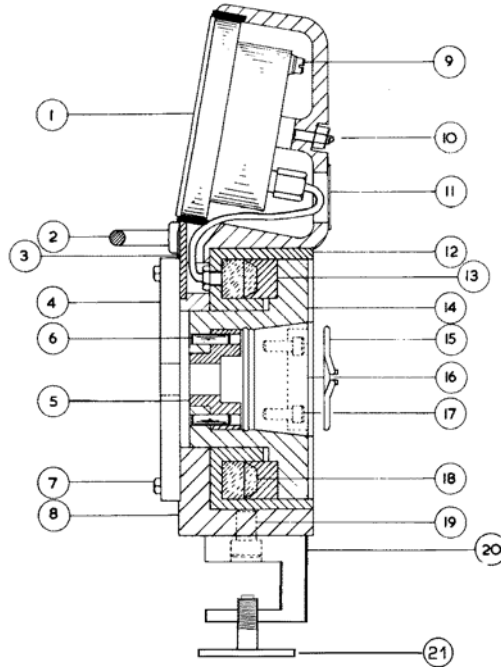


FIG 6

BLM shown with 'Bolt Bushing Set' fitted.

ITEM NO.	DESCRIPTION	PART NO.S		QUANTITY
		MODEL 2	MODEL 3	
1	Pressure Gauge	27614	27615	1
2	Handle	22166	22166	1
3	Cover Plate	22167	22167	1
4	Front Pressure Plate	See Norbar Price List		1
5	Bolt Head Immobiliser			1
6	Dowel Pins	22169	22169	2
7	1/4 unc bolts x 5/8"	25524.10	25524.10	4
8	Meter Casing	22176	22176	1
9	Gauge Filling Screws	Supplied with gauge		2
10	Rubber Mounts	22178	22178	2
11	Serial No. Plate	22164	22164	1
12	Case Liner	22172	22172	1
13	Pressure Ring	22189	22189	1
14	Piston	22174	22174	1
15	Circlip	26414	26414	1
16	Keep Plates	22168	22168	2
17	5/16 UNF Socket Screws	25180.12	25180.12	4
18	Hydraulic Sac	27653	27653	1
19	1/2 UNC Socket Screw	25245.16	25245.16	2
20	* Clamp Bracket	22160	22160	1
21	* 'T' Bolts	22161	22161	2

* Please note that although the clamp fits all models it is not recommended for the Model No. 3 because of the high torques involved.

FAULT FINDING

LIQUID LOSS FROM GAUGE FACE: _____

1. Remove pressure gauge from housing by undoing the two M10 nuts (10).
2. Re-fill gauge with 3 to 1 mixture of glycerine and distilled water through filling holes sealed by two screws (9).
3. Tighten gauge bezel using a strap wrench.
4. Refit gauge to housing and replace screws (9).

It is not detrimental if a small air bubble remains in the gauge face, but a piece of wire pushed through the filling hole to gently push the plastic dial face forward will release most of the air.

GAUGE NEEDLE REMAINS OFF ZERO WITHOUT PRESSURE ON LOAD CELL _____

This indicates a basic fault and the instrument should be returned to Norbar or your nearest distributor for servicing.

VERY LOW PRESSURE BEING RECORDED _____

1. Bolt being tightened has run out of threads.
2. Bolt head immobiliser (5) has been incorrectly positioned and dowel pins (6) are being crushed between part (5) and the front pressure plate (4).
3. Hydraulic system has lost fluid; return to Norbar or your nearest distributor for servicing.