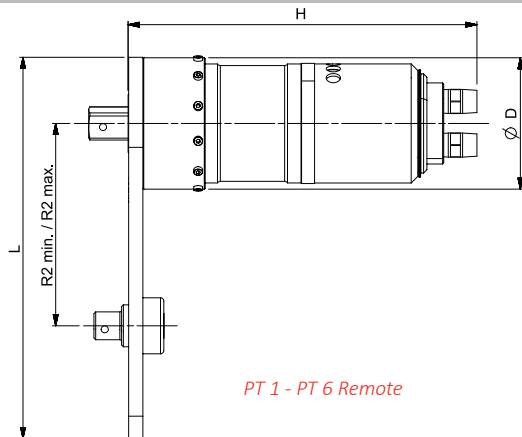




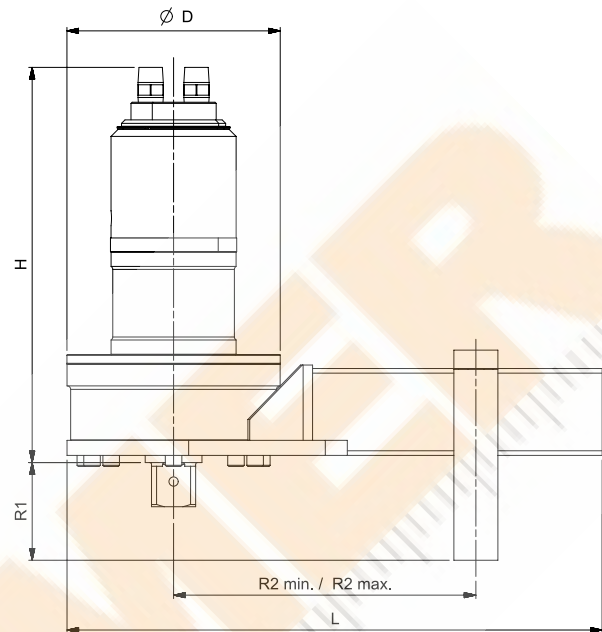
PNEUTORQUE® STANDARD SERIES



PT 1 - PT 6 Remote

PneuTorque® Standard Series Automatic Two Speed - Remote

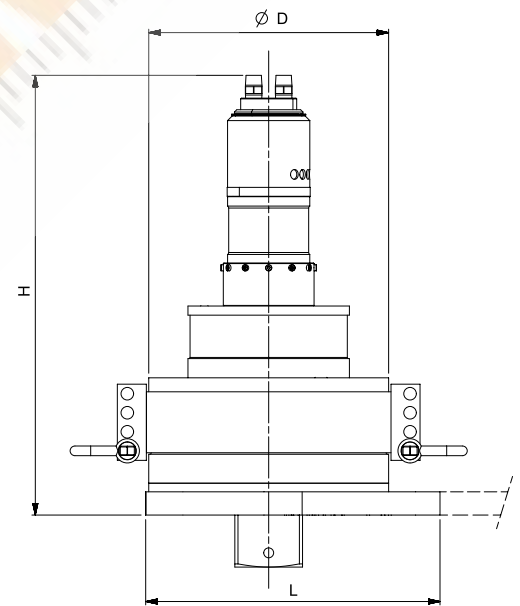
Model	PT 1	PT 1A	PT 2	PT 5	PT 6	PT 7	PT 9
Part Number	16031.XAUT 16011.XAUT	16098.XAUT 16097.XAUT	16013.XAUT	16015.XAUT	16017.XAUT	16066.XAUT	16072.XAUT
Output Speed (rpm)	150	75	45	25	25	12.5	9
Dimensions (mm)	ØD	108	108	108	119	119	144
	H	339	339	339	382	383	412
	L	303	303	303	355	355	423
	R1	N/A	N/A	N/A	N/A	N/A	84
	R2 min.	83	83	83	86	86	150
	R2 max.	216	216	216	263	263	331
Tool Weight (kg)	14.1	14.6	14.6	17.5	17.5	23.2	27.9
Reaction Weight (kg)	2.2	2.2	2.2	2.5	2.5	6.3	8.3



PT 7 - PT 9 Remote (PT 11 Remote supplied with flat reaction)

PneuTorque® Standard Series Single Speed - Remote

Model	PT 1	PT 1A	PT 2	PT 5	PT 7	PT 9	PT 11	PT 12	PT 13	PT 14
Part Number	16031.X 16011.X	16098.X 16097.X	16013.X	16015.X	16066.X	16072.X	16046.X	18086.X	16052.X	16045.X
Output Speed (rpm)	30	15	9	5	2.5	1.8	1.2	0.5	0.3	0.2
Dimensions (mm)	ØD	108	108	108	119	144	184	212	248	315
	H	270	270	270	313	343	340	415	456	490
	L	303	303	303	355	423	448	609	325	341
	R1	N/A	N/A	N/A	N/A	84	84	N/A	N/A	N/A
	R2 min.	83	83	83	86	150	175	320	N/A	N/A
	R2 max.	216	216	216	263	331	351	500	N/A	N/A
Tool Weight (kg)	10.6	11.1	11.1	14.0	17.9	24.4	38.6	49.8	102.2	119.4
Reaction Weight (kg)	2.2	2.2	2.2	2.5	6.3	8.3	13.3	6.5	6.9	10.4



PT 12 - PT 14 Remote

PneuTorque® Standard Series Manual Two Speed - Remote

Model	PT 1	PT 1A	PT 2	PT 5	PT 6	PT 7	PT 9	PT 11	PT 12	PT 13	PT 14	PT 15	PT 16	PT 17	PT 18
Part Number	16031.XMSTS 16011.XMSTS	16098.XMSTS 16097.XMSTS	16013.XMSTS	16015.XMSTS	16017.XMSTS	16066.XMSTS	16072.XMSTS	16046.XMSTS	18086.XMSTS	16052.XMSTS	16045.XMSTS	18089.XMSTS	18090.XMSTS	18088.XMSTS	16054.XMSTS
Output Speed (rpm)	150	75	45	25	25	12.5	9	6	2.5	1.5	1	0.5	0.4	0.35	0.3
Dimensions (mm)	ØD	108	108	108	119	119	144	184	212	248	315	*	410	410	520
	H	356	356	356	399	400	429	425	501	542	576	*	786	859	856
	L	303	303	303	355	355	423	448	609	325	341	*	N/A	N/A	N/A
	R1	N/A	N/A	N/A	N/A	N/A	84	84	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	R2 min.	83	83	83	86	86	150	175	320	N/A	N/A	N/A	N/A	N/A	N/A
	R2 max.	216	216	216	263	263	331	351	500	N/A	N/A	N/A	N/A	N/A	N/A
Tool Weight (kg)	14.1	14.6	14.6	17.5	17.5	23.2	27.9	42.1	53.3	105.7	122.9	*	270.0	285.0	380.0
Reaction Weight (kg)	2.2	2.2	2.2	2.5	2.5	6.3	8.3	13.3	6.5	6.9	10.4	N/A	N/A	N/A	N/A

* Available on request



TORQUE REACTION

This page applies to both HandTorque® multipliers and powered torque tools

Principles of Torque Reaction

Newton's law dictates that for every applied force there is an equal and opposite reactive force. For applications requiring relatively low torques that can be applied with a torque wrench, this does not present a problem as the reactive force is absorbed by the operator. However, if the desired torque necessitates the use of a multiplier, the resultant reactive force can only be absorbed using an appropriate reaction device.

For this reason all Norbar multipliers are supplied with a reaction plate or reaction foot fitted as standard.

All of the standard reaction plates and feet supplied with standard Norbar tools have been designed to enable the multiplier's use in a variety of environments. However, due to an infinite number of bolting arrangements, it is impossible to have one reaction device that will satisfy every customer's requirement. See page 70-71 for when the supplied standard reaction is not suitable.



In the above example, 1,000 N·m torque output will result in a reactive force of 6,667 N at a point 0.15 m from the axis of rotation or 2,000 N at 0.5 m.

Avoiding Torque Reaction Problems

It has already been mentioned that the reaction force is equal to the force being applied. However, the magnitude of the reaction force is dependent upon the perpendicular distance between the point of reaction and the centre line of the multiplier, ie. the greater the distance the lower the force.

For this reason the point of reaction should be kept as far away from the centre line of the gearbox as is practical.

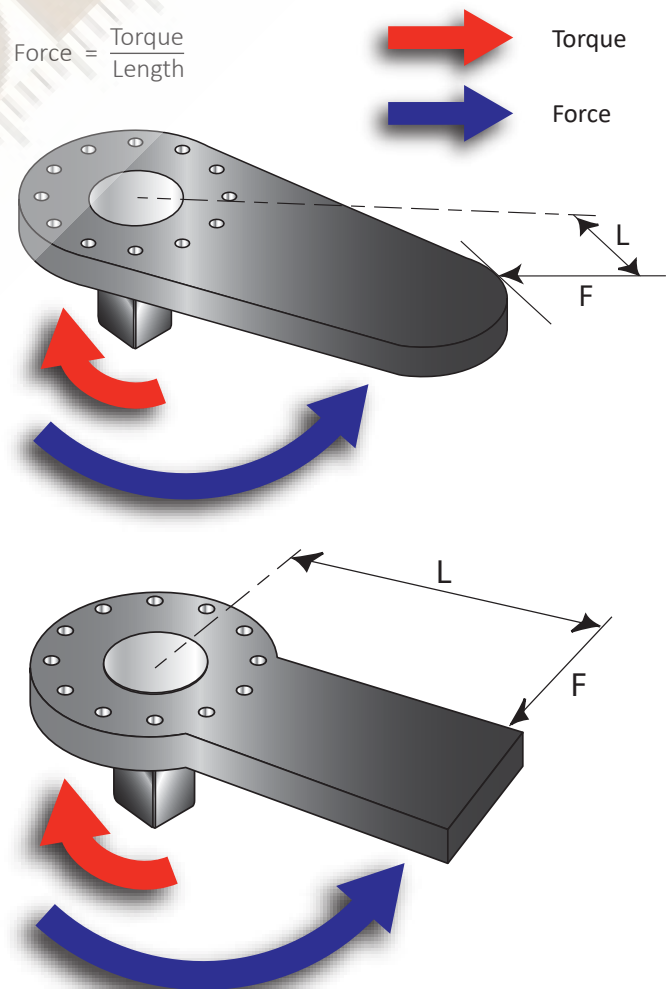
Customers using or modifying reaction plates for Standard Series multipliers up to a capacity of 3,400 N·m should note that if the reaction is taken on the radiused part, the reaction force is perpendicular to the tangent of the curve. Consequently, the further around the radius the reaction is taken, the smaller the perpendicular distance and therefore the greater the force.

Although a longer reaction plate may mean lower forces, the bending moment close to the multiplier will increase.

Customers extending the length of Norbar's standard reaction plates should be aware that an increase in overall length will result in a larger induced bending stress and should not assume that because the reaction plate is strong enough at one length it will remain so when extended.

Excessive side loading, resulting from poor reaction, increases frictional forces inside the multiplier. This can lead to lower multiplication ratios (outside $\pm 4\%$).

The ideal reaction arrangement has the centre of the reaction bar and the centre of the nut on a perpendicular line to the centre line of the tool.





TORQUE REACTION

This page applies to both HandTorque® multipliers and powered torque tools



Signs of poor reaction are evident on this damaged foot. Reaction was taken at the wrong point on the foot and burring indicates that the foot was slipping off the reaction point.

Points to remember

- Take the reaction as far away from the multiplier as practical
- Ensure that the reaction point remains square to the multiplier wherever possible as this will minimise any additional stress in the output square, which could result in premature failure. If the multiplier tilts under load, the reaction may not be square
- For applications that do not allow the reaction to be taken securely it is advisable to use a double-sided or balanced reaction plate

Reaction Force

When using multipliers and PneuTorques the reaction point must be capable of withstanding the reaction force. Therefore, great care must be exercised where the reaction is taken when applying high torques to studs and bolts.

By using the following formula you can calculate the force at the point of reaction. The greater the distance the lower the force.

D = Stud Diameter

$$\text{Formula to calculate Area of Stud} = \frac{\pi \times D^2}{4}$$

$$\text{Formula to calculate shear force: Shear Force} = \frac{\text{Reaction Force}}{\text{Area of Stud}}$$

What to do if the standard reaction device is not suitable

For those applications that do not permit the use of a standard reaction plate the customer has three options.

- Norbar or an authorised Norbar distributor will design and manufacture a special purpose reaction plate to the customer's requirements
- The customer can modify the standard reaction plate to suit their requirements
- The customer can fabricate their own reaction device after liaison with Norbar's technical department or a Norbar distributor

Customers wishing to either modify the original reaction plate or fabricate their own device should read the above information on how to avoid common torque reaction problems.



TORQUE REACTION

A variety of reaction plates, manufactured in Steel or Aluminium for HandTorque®, EvoTorque®, EvoTorque® Battery Tool and PneuTorque®. Norbar also offer a range of specific reactions for the Wind Energy Generation Industry.

11 REACTION FOR HT/PTS/PTM-52 SERIES

18646 Steel Cranked Reaction for 52 mm

11 REACTION FOR ET/EBT/PTS/PTM-68 SERIES

19611 Steel Cranked Reaction for 68 mm



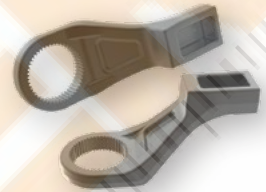
Steel Cranked Reaction
for 68 mm Gearbox

11 SPLINED REACTION FOR HT/ET/EBT/PTS/PTM-72 & 80 SERIES

19289 Steel Cranked Reaction
for 72 mm and 80 mm

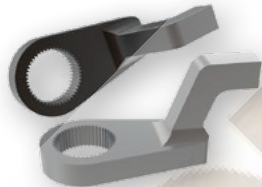


18494 Aluminium Cranked Reaction
for 72 mm and 80 mm



11 SPLINED REACTION FOR HT/ET/EBT/PTS/PTM-92 SERIES

19291 Steel Cranked Reaction
for 92 mm

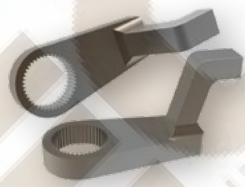


18936 Aluminium Cranked Reaction
for 92 mm

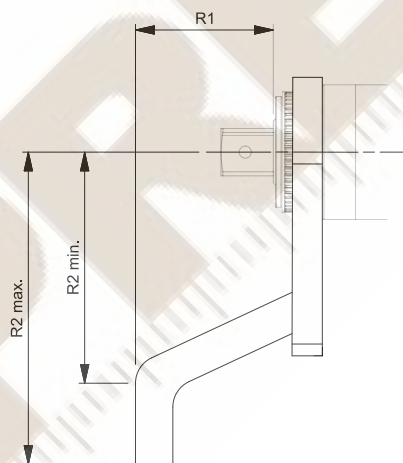


11 SPLINED REACTION FOR HT/ET/EBT/PTS/PTM-119 SERIES

19293 Steel Cranked Reaction
for 119 mm (Max. 7,000 N-m)



18961 Aluminium Cranked Reaction
for 119 mm (Max. 6,000 N-m)



11 SPECIAL SPLINED REACTION FOR HT/ET/EBT/PTS/PTM-92 SERIES

78028 Steel Cranked Reaction for 92 mm

11 SPECIAL SPLINED REACTION FOR HT/ET/EBT/PTS/PTM-119 SERIES

78027 Steel Cranked Reaction for 119 mm

11 SPECIAL SPLINED REACTION FOR API FLANGES

78029 HT/ET/EBT/PTS/PTM-72 & 80 Series Steel Crowfoot Reaction for 1½" – 1½"(M30 – M39) nuts/bolts

78028 HT/ET/EBT/PTS/PTM-92 Series Steel Cranked Reaction (see image above) for 1½" – 1½"(M42 – M48) nuts/bolts

78030 HT/ET/EBT/PTS/PTM-119 Series Steel Crowfoot Reaction for 2" – 2½"(M52 – M64) nuts/bolts

Part Number	R1	R2 min	R2 max
18646	59 mm	71 mm	131 mm
19611	75 mm	120 mm	165 mm
19289	76 mm	124 mm	167 mm
18494	68 mm	91 mm	165 mm
19291	70 mm	125 mm	175 mm
18936	87 mm	115 mm	205 mm
19293	90 mm	160 mm	210 mm
18961	118 mm	150 mm	199 mm

Part Number	R1	R2 min	R2 max
78027	90 mm	148 mm	248 mm
78028	70 mm	57 mm	145 mm
78029	76 mm	45 mm	115 mm
78030	110 mm	70 mm	156 mm