# MSD48.2.122

## Hydraulic Bolt Tensioner

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# Operation Manual

**Pingyuan Jingke Hydraulic Co., Ltd.**

# Catalogue



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# I. Introduction

MSD48 multi-stage hydraulic bolt tensioner is a high-quality hydraulic bolt pre-tightening and disassembly tool, which accurately controls and guarantees the pre-tightening force of bolt connections. It is an ideal tool to improve the quality of bolt connections and increase labor efficiency. The multi-stage hydraulic tensioner has a small diameter and a large tensile force, which is suitable for pre-tightening bolts in small spaces, especially suitable for pre-tightening imported bolts (10.9 bolts). It is widely used in the assembly, installation and maintenance of machinery and equipment such as metallurgy, machinery, chemical industry, power station, shipbuilding, cement, coal, and pressure vessels.

The MSD multi-stage hydraulic bolt tensioner is made of high-quality alloy steel, and its maximum working pressure is 150MPa. The pre-tightening force is displayed by the pressure gauge of the special hydraulic pump station, and it can be used to tighten or remove nuts. The high-pressure hose is connected by a quick connector, which is easy to operate and use. The same two-stage hydraulic tensioner can be equipped with tie rods of different specifications to apply to bolts of different specifications, so as to reduce the number of tensioners as much as possible, thereby reducing economic costs.

## II. Technical parameters

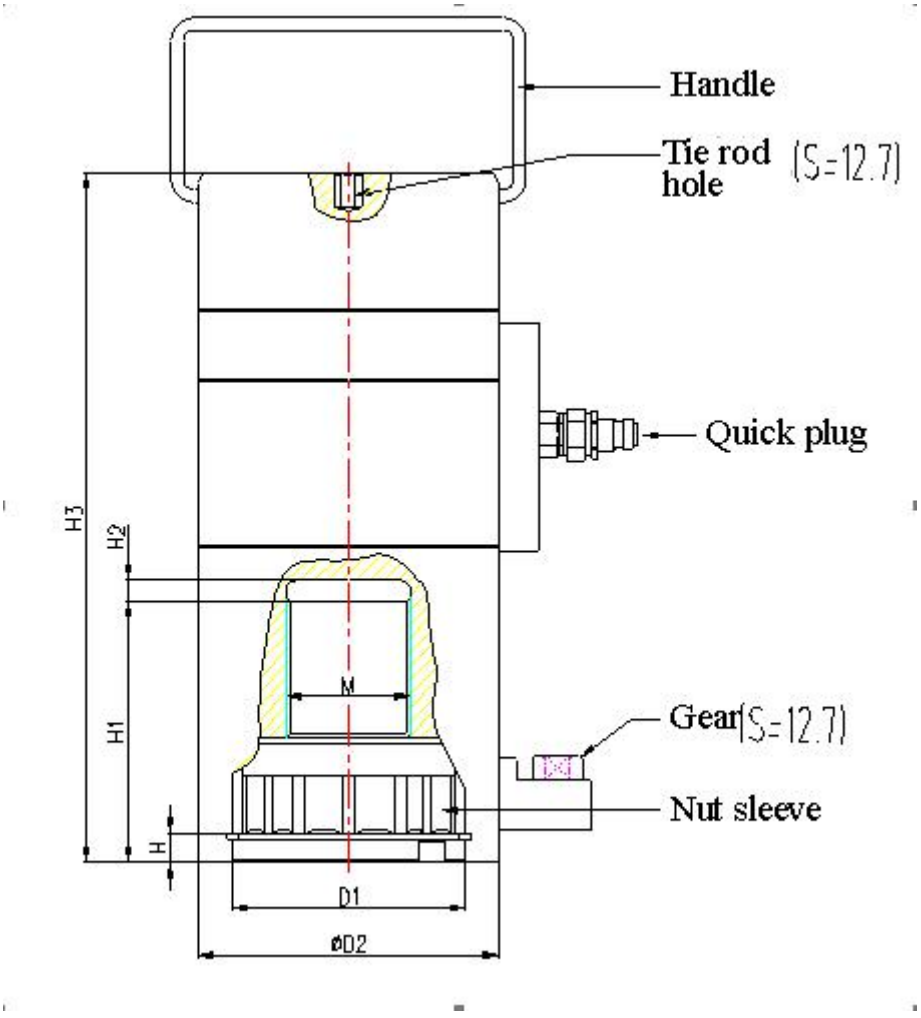


Figure 1

Technical Parameters

| Model | Bolt specification M | ΦD1 (mm) | ΦD2 (mm) | H (mm) | H1 (mm) | H2 (mm) | Stroke (mm) | Cylinder area（$mm^2$） | Pressure (MPa) | Stretching force (KN) |
|---|---|---|---|---|---|---|---|---|---|---|
| MSD 48 | M48×5 | 94 | 122 | 20 | 100 | 25 | 12 | 9858.03 | 150 | 1478 |

## III. Instructions

### 1、 Operation steps

**(1) Place the tensioner.**

Place the tensioner on the bolt, use a ratchet wrench (Square S=12.7-Self-provided) to move the tie rod, so that the thread of the tie rod and the bolt thread are screwed together; then use the ratchet wrench to turn the gear so that the nut sleeve is slowly covered on the nut; rotate the tie rod again, the base of the tensioner is fully supported on the workpiece.

**(2) Pre-tightening bolt**

After connecting the two-stage hydraulic tensioner and the pumping station with a high-pressure hose (see Figure 2), lock the unloading handle on the pumping station, operate the pressure lever, and observe the pressure gauge pointer at the same time, when the pressure gauge pointer points to the required pressure at this time, loosen the pressure lever and use a ratchet wrench to rotate the shift lever (clockwise direction is to lock the bolt, counterclockwise direction is to loosen the bolt), at this time the gear drives the nut sleeve to rotate the nut. After the nut and the workpiece are seamed, the unloading handle can be loosened and the bolt has reached the predetermined pre-tightening effect.

**(3) Pre-tightening bolt**

If the tensioner has reached the maximum stroke (i.e. have seen the red warning line), immediately stop pressing, use a ratchet wrench to rotate the gear, after the nut is seam with the supporting surface, loosen the unloading handle on the pump station, and then use the ratchet wrench Rotate the pull rod, turn the pull rod downwards, and then tighten the unloading handle. Repeat step (2) until the pump station pressure reaches the required pressure.

**(4) Remove the tensioner**

When the bolt reaches the pre-tightening requirement, loosen the unloading handle on the pump station, first rotate the pull rod clockwise, after the piston

is fully reset, then rotate the pull rod counterclockwise to remove the tensioner.

**Warning: It is strictly prohibited to work beyond the warning line and work overpressure**

- **Note: Before the tensioner is connected with the bolt to be pre-tensioned, it is strictly forbidden to press up the pump station**
- **Note: When the tensioner is placed horizontally, it is strictly forbidden to stand in front of it**

**2、 Connect**

As shown in Figure 2, after the multi-stage hydraulic bolt tensioner is placed, connect the tensioner and the hydraulic pump station with a high-pressure hose. One hydraulic pump station can drive multiple tensioners.

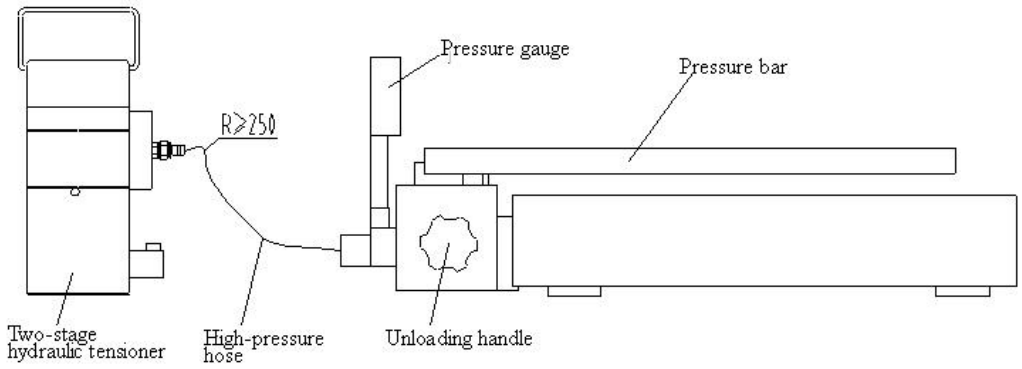


Figure 2 Connection diagram of hydraulic pump station and tensioner

## IV. Precautions

1. When stretching, the lift of the tensioner must be less than the stroke of the tensioner, otherwise it will affect the use of the stretcher, get a false stretch force value, or even damage the tensioner. Be sure to pay attention: when you see the red warning line, you must stop pressing up immediately;

2. The threaded length of tie rods and bolts must be greater than the bolt diameter;

3. When pre-tightening and disassembling nuts, the working pressure of the system must not exceed 150MPa;

4. The high-pressure hose should be in a free state and must not be bent into a circle with a diameter less than 500mm.

5. When the tensioner is run idly (that is, before the tensioner is connected with the bolt to be pre-tightened), the pump station is strictly forbidden to press up.

## V. Maintenance

1. All parts of the tensioner should be kept clean, and there should be no dust and dirt around the oil pump, oil cylinder and hose.

2. The working fluid is L-HM32 or L-HM46 hydraulic oil. It is strictly prohibited to use alcohol, water, glycerin, brake fluid, ordinary engine oil, etc. as working fluid.

3. The working fluid should be replaced once a year, and it must be filtered and cleaned with a 120-200 mesh filter.

4. When not in use, the levers and gears should be avoided from being damaged, and should be stored in a dry and suitable temperature room.

5. The high-pressure oil pipes should be properly kept and not corroded by corrosive gases and liquids. The hose is prone to ageing due to long-term use and storage, and should be checked and replaced regularly. The hose shall be subjected to a pressure test once a year.

6. When replacing the cylinder seal, the seal must be put into the seal groove, otherwise the pressure cannot be built up.

## VI. Bolt pre-tightening force (for reference)

1. The conditions for using Table 2 are:

1) The thread complies with GB/T196-1981;

2) When pre-tightening, lubricate the bearing surface of the thread, bolt head and nut.

2. For fasteners with soft material, in order to avoid excessive loss of pre-tightening force, special washers for high-strength bolts should be installed under the bolt heads or nuts.

Table 2：

| Strength level | | 4.8 | 6.8 | 8.8 | 10.9 | 12.9 |
|---|---|---|---|---|---|---|
| Min. breaking strength | | 400 MPa | 600 MPa | 800 MPa | 1000 MPa | 1200 MPa |
| Material | | General structural steel | Steel for mechanical structure | Chrome Molybdenum Alloy Steel | Nickel-chromium-molybdenum alloy steel | Nickel-chromium-molybdenum alloy steel |
| Bolt | Opposite side | KN | KN | KN | KN | KN |
| M16 | 24 | 30 | 45 | 60 | 85 | 102 |
| M18 | 27 | 37 | 55 | 74 | 104 | 125 |
| M20 | 30 | 47 | 71 | 94 | 132 | 159 |
| M22 | 32 | 58 | 87 | 117 | 164 | 197 |
| M24 | 36 | 68 | 102 | 135 | 190 | 228 |
| M27 | 41 | 88 | 132 | 176 | 248 | 298 |
| M30 | 46 | 108 | 161 | 215 | 303 | 363 |
| M33 | 50 | 133 | 200 | 266 | 375 | 449 |
| M36 | 55 | 157 | 235 | 314 | 441 | 529 |
| M39 | 60 | 187 | 281 | 375 | 527 | 632 |
| M42 | 65 | 215 | 323 | 430 | 605 | 726 |
| M45 | 70 | 251 | 376 | 502 | 705 | 846 |
| M48 | 75 | 283 | 424 | 566 | 796 | 955 |
| M52 | 80 | 338 | 506 | 675 | 949 | 1139 |
| M56 | 85 | 390 | 585 | 780 | 1096 | 1315 |
| M60 | 90 | 454 | 680 | 907 | 1275 | 1531 |
| M64 | 95 | 514 | 771 | 1028 | 1445 | 1734 |
| M68 | 100 | 587 | 880 | 1173 | 1650 | 1980 |
| M72 | 105 | 664 | 996 | 1329 | 1868 | 2242 |
| M76 | 110 | 747 | 1120 | 1494 | 2100 | 2520 |
| M80 | 115 | 834 | 1251 | 1668 | 2346 | 2815 |
| M85 | 120 | 950 | 1425 | 1900 | 2672 | 3206 |
| M90 | 130 | 1073 | 1610 | 2147 | 3019 | 3623 |
| M100 | 145 | 1343 | 2014 | 2686 | 3777 | 4533 |
| M110 | 155 | 1643 | 2464 | 3285 | 4620 | 5544 |
| M120 | 175 | 1973 | 2959 | 3945 | 5548 | 6657 |
| M125 | 180 | 2149 | 3223 | 4298 | 6043 | 7252 |

**Note: The value in the table is measured when the bolt reaches 60% of the yield limit. The recommended bolt pre-tightening force is: the data in the table×(70～80)%.**

**For example: M48, 8.8 grade bolt, the bolt pre-tightening force is: 566×(70～80)% = 396～453 KN.**

## VII. Comparison table of stretching force and pressure

| Pressure (MPa) | Stretching force (KN) | Pressure (MPa) | Stretching force (KN) | Pressure (MPa) | Stretching force (KN) | Pressure (MPa) | Stretching force (KN) |
|---|---|---|---|---|---|---|---|
| 20 | 197.2 | 53 | 522.5 | 86 | 847.8 | 119 | 1173.1 |
| 21 | 207.0 | 54 | 532.3 | 87 | 857.6 | 120 | 1183.0 |
| 22 | 216.9 | 55 | 542.2 | 88 | 867.5 | 121 | 1192.8 |
| 23 | 226.7 | 56 | 552.0 | 89 | 877.4 | 122 | 1202.7 |
| 24 | 236.6 | 57 | 561.9 | 90 | 887.2 | 123 | 1212.5 |
| 25 | 246.5 | 58 | 571.8 | 91 | 897.1 | 124 | 1222.4 |
| 26 | 256.3 | 59 | 581.6 | 92 | 906.9 | 125 | 1232.3 |
| 27 | 266.2 | 60 | 591.5 | 93 | 916.8 | 126 | 1242.1 |
| 28 | 276.0 | 61 | 601.3 | 94 | 926.7 | 127 | 1252.0 |
| 29 | 285.9 | 62 | 611.2 | 95 | 936.5 | 128 | 1261.8 |
| 30 | 295.7 | 63 | 621.1 | 96 | 946.4 | 129 | 1271.7 |
| 31 | 305.6 | 64 | 630.9 | 97 | 956.2 | 130 | 1281.5 |
| 32 | 315.5 | 65 | 640.8 | 98 | 966.1 | 131 | 1291.4 |
| 33 | 325.3 | 66 | 650.6 | 99 | 975.9 | 132 | 1301.3 |
| 34 | 335.2 | 67 | 660.5 | 100 | 985.8 | 133 | 1311.1 |
| 35 | 345.0 | 68 | 670.3 | 101 | 995.7 | 134 | 1321.0 |
| 36 | 354.9 | 69 | 680.2 | 102 | 1005.5 | 135 | 1330.8 |
| 37 | 364.7 | 70 | 690.1 | 103 | 1015.4 | 136 | 1340.7 |
| 38 | 374.6 | 71 | 699.9 | 104 | 1025.2 | 137 | 1350.6 |
| 39 | 384.5 | 72 | 709.8 | 105 | 1035.1 | 138 | 1360.4 |
| 40 | 394.3 | 73 | 719.6 | 106 | 1045.0 | 139 | 1370.3 |
| 41 | 404.2 | 74 | 729.5 | 107 | 1054.8 | 140 | 1380.1 |
| 42 | 414.0 | 75 | 739.4 | 108 | 1064.7 | 141 | 1390.0 |
| 43 | 423.9 | 76 | 749.2 | 109 | 1074.5 | 142 | 1399.8 |
| 44 | 433.8 | 77 | 759.1 | 110 | 1084.4 | 143 | 1409.7 |
| 45 | 443.6 | 78 | 768.9 | 111 | 1094.2 | 144 | 1419.6 |
| 46 | 453.5 | 79 | 778.8 | 112 | 1104.1 | 145 | 1429.4 |
| 47 | 463.3 | 80 | 788.6 | 113 | 1114.0 | 146 | 1439.3 |
| 48 | 473.2 | 81 | 798.5 | 114 | 1123.8 | 147 | 1449.1 |
| 49 | 483.0 | 82 | 808.4 | 115 | 1133.7 | 148 | 1459.0 |
| 50 | 492.9 | 83 | 818.2 | 116 | 1143.5 | 149 | 1468.8 |
| 51 | 502.8 | 84 | 828.1 | 117 | 1153.4 | 150 | 1478.7 |
| 52 | 512.6 | 85 | 837.9 | 118 | 1163.2 | | |