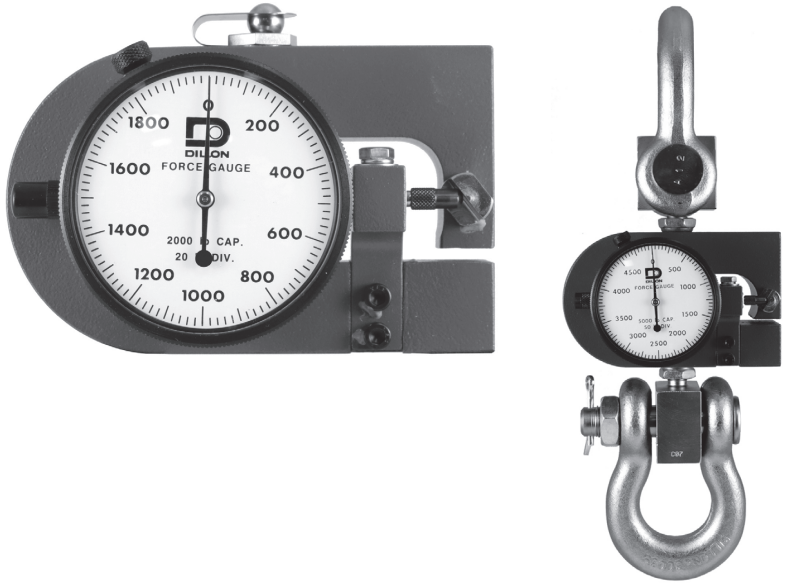
DILLON®

Model X Mechanical Force Gauge



User Instructions

ABQINDUSTRIAL
PRECISION. RELIABILITY. QUALITY.

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1 General information and warnings

1.1 About this manual

This manual is divided into chapters by the chapter number and the large text at the top of a page. Subsections are labeled as shown by the 1.1 and 1.1.1 headings. The names of the chapter and the next subsection level appear at the top of alternating pages of the manual to remind you of where you are in the manual. The manual name and page numbers appear at the bottom of the pages.

1.2 Special messages

Examples of special messages you will see in this manual are defined below. The signal words have specific meanings to alert you to additional information or the relative level of hazard.

WARNING! This is a Warning symbol. Warnings mean that failure to follow specific practices and procedures may have major consequences such as injury or death.

CAUTION! This is a Caution symbol. Cautions give information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

NOTE: This is a Note symbol. Notes give additional and important information, hints and tips that help you to use your product.

1.3 Safe Operation

WARNING: If you overload this force gauge you could suffer severe injuries or death. The total load on the force gauge should NEVER exceed the rated capacity.

Keep all the following in mind as you use the force gauge.

The system capacity is equal to the rating of the force gauges. The shackle rating should not be used to determine lift capacity of the system.

The shackles are rated in metric tons. Thus the 12-ton shackles are rated to 26,450 lbf and are suitable for use on the 25,000 lbf force gauge.

Any zeroed deadload must be considered as part of the ultimate load.

Although this instrument has a substantial overload protection rating, the instrument should not be used above the rated capacity. Doing so can significantly impact fatigue life of the instrument and cause premature and abrupt failure. If a higher capacity reading is needed, Dillon insists that a larger instrument be used.

Safety is always a concern in overhead lifting and tensioning applications. To limit your liability always insist upon factory supplied shackles and pins and factory tested and certified safe optional equipment. All DILLON products are designed to meet the published Safe Working Load (SWL) and Ultimate Safety Factor (USF) standards of the United States Military.

Do not grind, stamp, drill or deform the metal on the force gauge body in any way. Protect the instrument from impact in use and storage.

Any significant damage or deformation to the loading element is cause for evaluation by Dillon.

Relieve all torsional and off axis loads.

Apply load in the center of the shackle bow with this instrument.

Off center loading results in substandard performance.

Instrument requires time to stabilize when changing temperatures.

Use only the hardware supplied with this instrument. If no hardware was supplied, insure that the mating pin and shackle bow is equivalent to the hardware used at calibration. Otherwise substandard performance or failure can result.

Dillon recommends only using qualified rigging hardware and cannot be responsible for unapproved hardware.

This instrument is not designed for applications that see rapid, dramatic temperature swings or thermal shock. Wide variation in readings can occur.

1.4 Routine maintenance

IMPORTANT: This equipment must be routinely checked for proper operation and calibration.

Application and usage will determine the frequency of calibration required for safe operation.

1.5 Cleaning the force gauge

Cleaning DOs and DON'Ts

- DO - Wipe down the outside of standard products with a clean cloth, moistened with water and a small amount of mild detergent
- DO NOT - Attempt to clean the inside of the machine
- DO NOT - Use harsh abrasives, solvents, scouring cleaners or alkaline cleaning solutions

1.6 Training

Do not attempt to operate or complete any procedure on a machine unless you have received the appropriate training or read the instructions.

1.7 Declaration of Conformity

DILLON
Force Measurement Equipment

UK Declaration of Conformity

Model / Type: **Dillon 5000kg X Force Gauge**

Serial Number:
X12500 Onwards

Name and address of the manufacturer:
Avery Weigh-Tronix[1]
Foundry Lane
Smethwick
West Midlands
B66 2LP
ENGLAND

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration:
Dillon[2] **X Force Gauge**
5000kg + Kieson

The machinery fulfills all the relevant provisions of the Machinery Directive **2006/42/EC**[3]

The object of the declaration described above is in conformity with the relevant statutory requirements applicable to the specific product:

Statutory Requirements	UK standards or other technical specifications
Electromagnetic Compatibility Regulations 2016	**BS EN61000-6-4:2007 +A1:2011**
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (as amended)	**BS EN 63000:2018**

Additional information:
Note [1]:
ITW Ltd trading as Avery Weigh-Tronix
Reg. Office: Nexus House, Station Road, Egham, Surrey, TW20 9LB, England
Note [2]:
Dillon is part of Avery Weigh-Tronix
Note [3]:
A copy of the Technical File for this equipment is available from M.S. Williams at the address above.

Signed for and on behalf of:
Avery Weigh-Tronix
at
1000 Armstrong Drive, Fairmont, MN, 56031-1439, USA
on
2021-07-16

E. Holland
Director - R&D and Innovation

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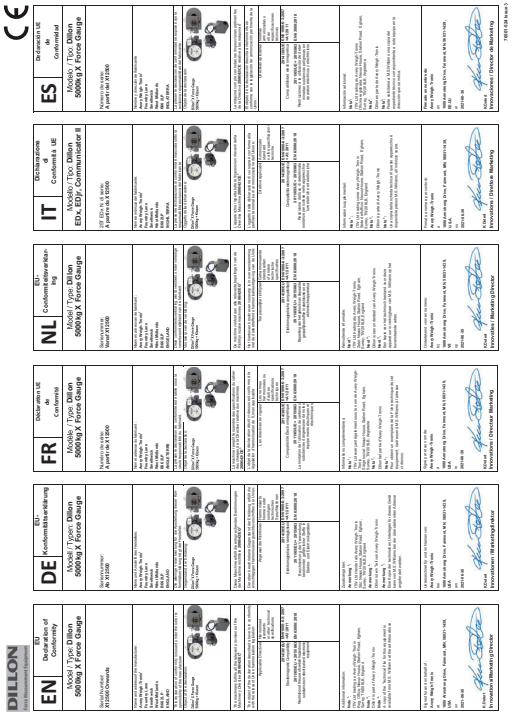

2 Introduction

2.1 General description

The Model X mechanical force gauges measure tension, compression or push/pull. A D-shaped deflection beam is the heart of the Model X force gauge. Machined to close tolerances, beams are heat treated to develop optimum strength and spring characteristics.

A precision dial indicator is mounted on the deflection beam. The indicator plunger rests against a slanted anvil at the open end of the beam. Under compression loads, the two halves of the beam tend to close. Tension force causes them to move apart. This action pushes the plunger inward, as determined by the slant of the anvil. Readings produced on the dial are in direct relation to applied load. The pointer revolves 360° clockwise under compression or tension forces.

Push-pull gauges read half scale (180°) clockwise in compression, and counterclockwise, 180° from center zero under tension loads.

2.2 Description of parts

Figure 2.1 shows you the parts of the force gauge. If you have questions about your force gauge, contact your Dillon service provider and refer to this illustration. A photo or rough sketch of your particular setup will be helpful.

1. “U” shaped deflection beam
2. Dial indicator
3. Bezel (For zero adjustment purposes)
4. Pressure button
5. Anvil
6. Dial indicator gauge movement plunger
7. Anvil set screw
8. Dial indicator mounting bracket
9. Mounting bracket screws
10. Bezel locking screw
11. Loading ball
12. Spring retainer clip

*An optional Maximum Pointer is available but not shown.

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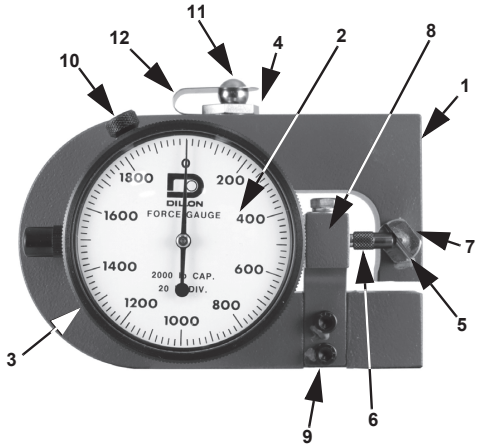

Figure 2.1 Force gauge parts

2.3 Klaxon alarm option

Only the 5,000kg Force Gauge with Klaxon alarm is CE approved. All other models are not CE approved.

The force gauge can be attached to an optional klaxon alarm. See Figure 2.2.

Figure 2.2 Force gauge with optional klaxon alarm

The klaxon alarm is rated at 80db(A) @ 0.6 meters (2 feet).

The klaxon alarm is set off when the adjustment screw shown in Figure 2.2 contacts the switch as the force gauge is compressed. There can be up to four switches installed. This allows you to control up to four different operations as the gauge is compressed. See your Dillon representative for information on these options.

2.4 Operational data

WARNING: Never pick up the force gauge by the dial indicator. This will cause loss of calibration accuracy, loss of operation or non-warranty damage.

Your Dillon Force Gauge is ready to go to work for you without any special assembly. Upon removing it from the storage case, it is only necessary to check the zero setting.

1. Place the unit on a flat table with the pressure button, #4, at the top.
2. The dial bezel, #3, is locked lightly by a knurled thumb screw, #10. Loosen the knurled screw and turn the bezel in either direction, depending upon which way zero may be off. Revolving the bezel causes the dial to follow.
3. With zero positioned directly under the pointer tip, tighten the locking screw (see CAUTION below) and the instrument is ready to use.

CAUTION: When adjusting bezel locking screw, #10, only tighten as much as is necessary to hold bezel in proper position. DO NOT OVERTIGHTEN, as this will distort the thin housing of the dial indicator gauge and affect the smooth action of the movement and produce false readings!

Because of the sensitivity of the Dillon Gauge, zero should always be set with the unit resting on the lower or thicker portion of the deflection beam as illustrated. This is the same position it occupies during calibration. Ordinarily, zero will be retained indefinitely. However, under repeated stress or through accidental banging around, it may go off slightly. Thus, it is a good plan to check zero occasionally.

CAUTION: The small anvil, #6, against which the dial indicator plunger rides, should never be altered except by factory technicians. This anvil has nothing to do with zero setting. By careful adjustment, it has been positioned in such a way that, for full load application within the range of the instrument, the pointer will revolve 360°. TAMPERING WITH THE SETTING OF THIS ANVIL AUTOMATICALLY VOIDS THE ACCURACY GUARANTEE. If the anvil should be accidently thrown out of position by dropping or striking against another object, the entire gauge should be returned to the factory for resetting and calibration check.

2.5 Helpful pointers

- Occasionally test the tightness of the hardened dial indicator plunger, #6. This part is screwed into a finely threaded seat and may sometimes work loose. This would cause the gauge to read high and might be mistaken for an off zero condition. Be sure not to force the plunger tip too tightly when screwing it down since, as explained, the threads are fairly delicate and might break off.
- Note that threaded mounting holes have been provided in opposite faces of the “U” shaped deflection beam, #1. In the upper mounting hole, a spherically recessed pressure button, #4, is screwed. This button is hardened and plated. It receives the loading ball, #11. Force should be applied directly against this ball. In operation, the deflection beam bends inward slightly, and the ball revolves, tending to keep the line of force vertical. A drop of light oil on the ball assists this action.
- Never fasten the “U” shaped deflection beam in such a way that the free movement of the upper portion will be restricted. The lower or thicker “leg”, however, may be tightened as securely as desired, using a stud or bolt through the threaded mounting hole.

- Since the deflection beam is hardened, it is not possible nor would it be recommended, to drill and tap it once it is in the field. If special mounting holes are desired, these can be provided during early stages of manufacture, but must be specified at that time.
- If a particular test calls for load application through a pulley, roller or chuck, etc., due care should be taken to see that the load is applied in a true vertical line through the center of the top mounting hole #4. Off-center loading would introduce leverage, thereby increasing or decreasing readings from their true value. Universal joints or hinged fittings should be carefully machined to obviate side slop or play. If in doubt about the best method of applying load for specific arrangement, don't hesitate to consult our Engineering Department. Remember, a rough pencil sketch or snapshot will aid tremendously in understanding your problem. Never oil the dial indicator at any point. It is unnecessary. If oil or other fluids should get on the unit, wipe off gently, but well. Foreign matter lodging on the plunger, #6 will retard its free action, resulting in inaccurate readings.
- If accidental overload is anticipated, a solid steel rod about 3/4 inch in diameter can be inserted at the center point of the Gauge between the "U" shaped bar. Length of this rod should be figured so that the upper, flexible half of beam will bottom against it, once the full capacity of the instrument has been reached. Further load will then pass through this solid path without harm to the Force Gauge. Note the method of mounting the dial indicator to the supporting bracket on the reverse side of the case. Allen screws are used. Be sure to check these screws at intervals, making sure that they are always tight. Vibration may in time loosen them slightly, and it is best to take this precaution.

2.6 Tensile Model

Generally speaking, the same requirements and suggestions applying to the compression model force gauge also apply to the tensile unit, shown in Figure 2.3. The main exception, of course, is that on the tensile model, load is applied through the use of special end rod bearings.

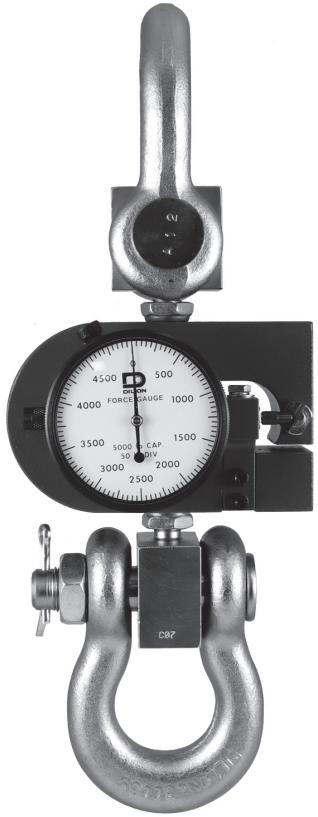

Figure 2.3 Tensile model with adapters and shackles

These bearings are available for all tensile models as standard equipment. They are a perfect fit and without any side play. Bearing pins can be machined from drill rod to suit your particular test plan. Remember that if you require a special adapter of some kind in place of these bearings, be sure that such adapters are self-aligning so that applied force is always able to assume a vertical line.

CAUTION: Because there is the possibility that in service the ball-socket connectors can become unscrewed from the beam, the operator should check these parts at intervals to make sure that some of the threaded shank is ALWAYS showing on the inside of the "U" shaped beam. If it is not showing, no further loads should be applied until the connector is screwed down to its normal position.

Do not attempt to weld, cotter pin, or otherwise make tensile connectors a solid part of the bar since every requirement is different as to the length of the shank that has to be used.

Dillon will not be liable for any incident that might result from accidental or intentional screw-out or break-away of the ball-socket connectors. For your own protection, keep these parts properly seated at all time.

Tare settings cannot be made on the Force Gauge without a slightly resultant loss in accuracy. This is due to the fact that the dial layout is not 100% linear. Each unit is individually machined and thus must be individually calibrated. While this makes for split-hair accuracy, division marks are not equidistant and hence do not lend themselves to tare adjustment. Instead, any tare weight encountered in a typical test should simply be deducted.

2.7 Push-Pull model

There is one more type of force gauge, a push-pull model, shown in Figure 2.4.

Figure 2.4 Push-pull model force gauge

This model can be used for both tension and compression situations. As you can see the dial can go in two directions.

2.8 Maintenance and handling

The Dillon force gauge is a precision instrument and will provide many years of dependable service if given reasonable care and suitable protection. Many firms make it a regular practice to return force gauges to their distributors at 6 to 8 month intervals (depending upon how much they are used) to have accuracy recertified. We recommend this at least once a year. Consult with your Dillon distributor concerning any questions you may have about recalibration intervals. Your area may require periodic proof testing. Consult your local regulations.

Transport and store the force gauge in the supplied storage case when not in use.