

Instruction Manual

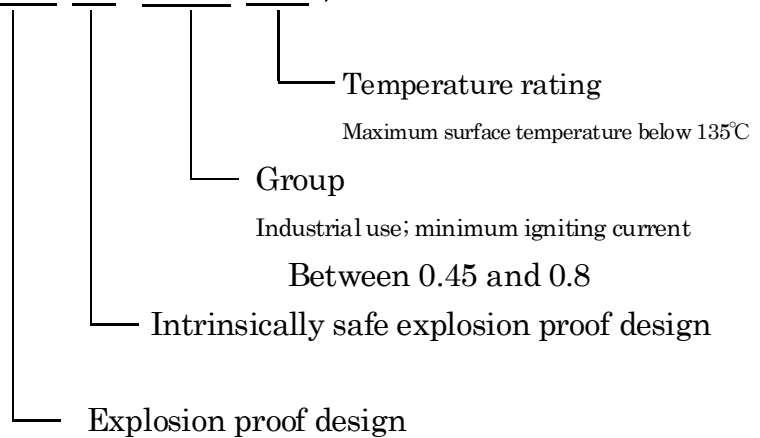
Intrinsically safe explosion-proof

Tension detector

For models: LSP00-Z、LSP01-Z、LSP05-Z、LSP10-Z
(Distortion gauge type)

Certified model number: TC19319

(Ex ia II B T4)



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⊘ Warning ⊘

This unit is a tension detector with an intrinsic safety design.

It can be used in Category 1 and 2 hazardous locations; however, failure to properly assemble and connect the device can cause the anti-explosive features of the product to fail to function and cause major accidents. Exercise extreme caution when wiring the unit.



Warning: Always use the barrier box and detector in conjunction

Each detector must be combined with two of the indicated Zener barriers. Detectors cannot be paired with other barriers.



Warning: Follow the instructions to perform A Class grounding.

The most important step of an intrinsically safe explosion proof structure is proper grounding. The anti-explosive functionality of the device cannot be guaranteed if the device is not grounded.



Cannot be used in Category 0 sites.

Cord coming from the detector makes use of a connector for a relay, so it cannot be used in Category 0 sites.



Warning: Do not alter the device

The detector and Zener barrier should under no circumstances be altered or modified. The anti-explosive functionality cannot be guaranteed if the devices are modified.



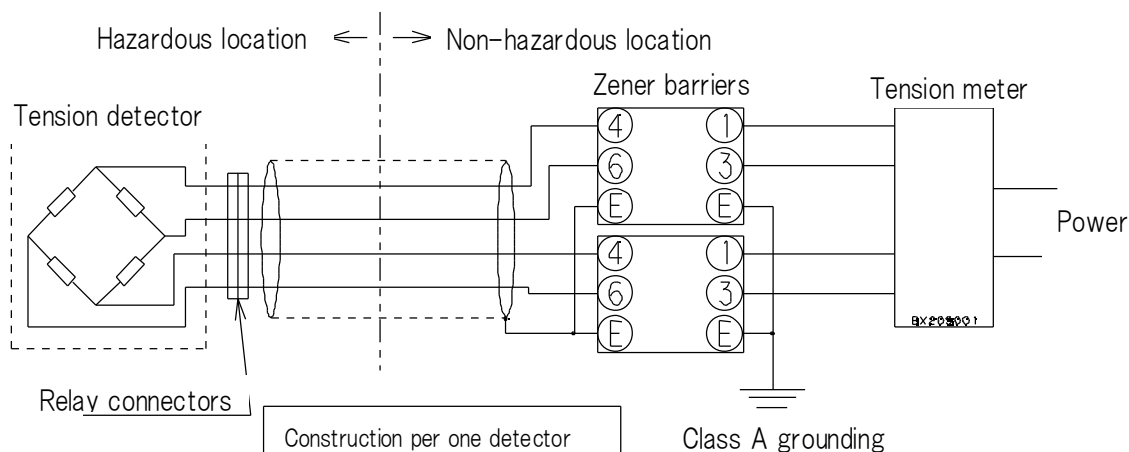
Do not expose the device to water

This device is not waterproof. Do not use it in places or conditions where moisture will collect, nor those with over 80% humidity or the risk of condensation. The unit cannot be used around corrosive gases.

Use the product after fully reading :

1. Detector structure and anti-explosive parameters (Page 3)
2. The Usage Precautions (Page 4).

(1) Structure (the device must be arranged and used as follows):



(2) Installation and wiring parameters

1. Install the barrier box in a non-hazardous location.
The barrier box cannot be installed in a hazardous location.
2. Barrier box grounding should be standalone Class A grounding or equivalent.
Exercise caution to not connect to other ground wires.
Ground wire must be longer than 2mm².
3. Inductance and capacitance for external wiring of the intrinsically safe circuit are as follows:
A) Inductance: under 1mH
B) Capacitance: under 1 μ F
If using a 0.5mm², 4-core shielded wire, keep length within about 200m.
4. Standard devices used connected to the barrier box (tension meters, etc.) should have an input power, internal voltage, etc., that do not exceed AC250V 50/60Hz, DC250V, whether during standard or abnormal operations.
Exercise special care if a high voltage wire is being fed into the control panel, and take measures to ensure that high voltage does not affect the device even when in an abnormal state.
5. Relay connectors must be used only at non-Category 0 sites.
The detector and connector will be proximal, so they cannot, in point of practice, be used at Category 0 sites.
6. The detector, barrier box, and wiring connected to them must be arranged such that they do not impair the intrinsically safe, anti-explosive properties of the device.

Utilize standalone metal conduits or other means to ensure that the wiring spanning the anti-explosive barrier box and tension detector is not subject to interference.

The LSP-Z format detector is a tension pickup that utilizes distortion gauges.

Failure to properly use will not only interfere with the functionality of the device, but it may result in the inability to detect or cause damage, so please strictly follow the instructions below.

(1) There is no internal calibration in the detector. Do not attempt to disassemble it. In particular, the distortion gauge and board feature a coating, and peeling this off will damage the moisture repellence of the unit, ultimately affecting its functionality and ability to properly detect. Do not remove the coating.

Output cords to the axle and detection point are always of the same type and direction. Do not attempt to change the position of the axle alone.

The roller must always be attached to the opposite site of the detection point.

If the detection point is set facing upwards, the roller must be installed below it, [but note that, depending on capacity requirements, the detection point can be designed in reverse, so please contact us.](#)

(2) The LSP-Z format detector can only be connected to tension meters and tension controllers designed for use with tension detectors with dedicated distortion gauges.

Tension meters and controllers designed for LA-format tension detectors will not work. For a list of compatible types, refer to page 9.

(3) Zero calibration of the detector and scale calibration are controlled entirely externally on the tension meter or controller. Please refer to the instruction manual for your respective equipment.

(4) Always apply below the rated capacity. Momentary excess capacity should not exceed 200% of rated capacity. If there is a risk of load exceeding that amount, install an external stopper. People should refrain from standing on the tension detector roller at all times.

(5) The tension roller should be as light as possible and sufficiently calibrated to control for dynamic balance. Note that for high speed machinery, resonance may develop, making it difficult to measure tension. For this reason, the unit has been designed to better cope with eccentric load.

(6) The unit cannot be used amidst corrosive gas or underwater. It also cannot be used in places where it will come into contact with moisture or where humidity exceeds 80%.

(7) When transporting the unit, do not carry it from the external cord. This can cause breakage of the cord.

(8) Mechanical vibration or other phenomena can cause the external cord to vibrate and break. The cord must be stably affixed so as to prevent its vibration.

(9) If, after installation and calibration, the unit manifests any abnormalities, thoroughly re-read the instruction manuals and specifications charts for the detector and the tension meters/controllers you are using.

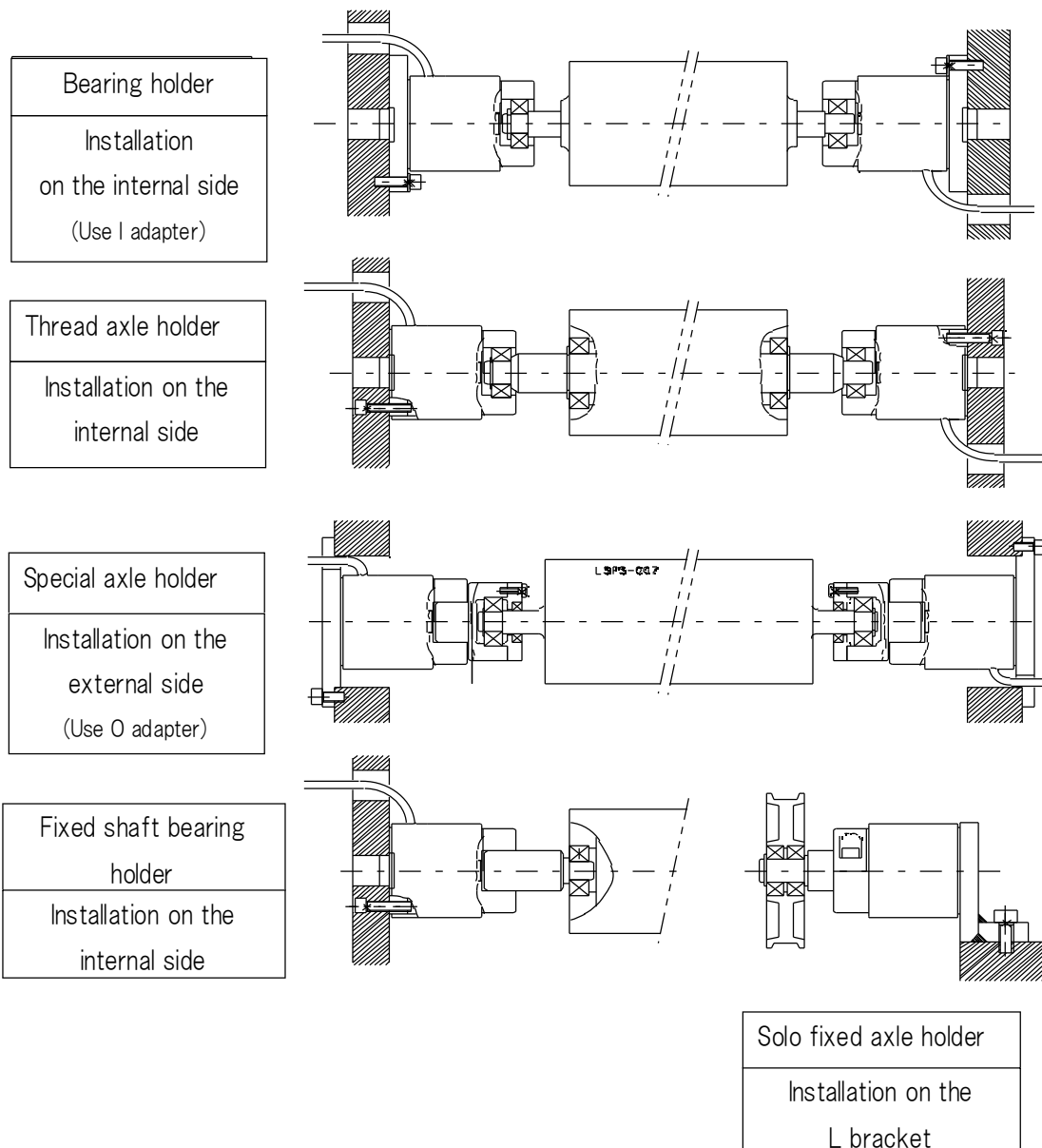
3

Installing the detector

The LSP-Z detector has unique functionality, but failure to install it correctly can render that functionality useless, or, worse, damage the product. Please read the instructions below thoroughly and only install the product after having understood them fully.

(1) Installation example

As described in the figure below, the basic unit can be outfitted with an adapter to install it on either the external or internal side. The installation method should have been determined at the time of design, so please confirm that the adapter you ordered is included.



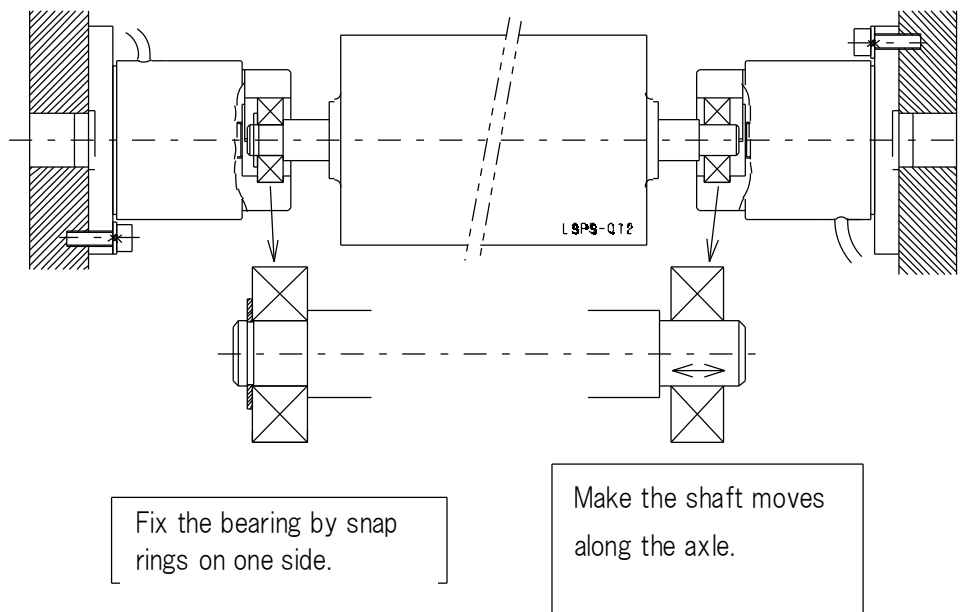
(2) Attaching the roller

The roller axle must be attached on only one side, as described in the figure below. The opposing side should be arranged such that it moves along the axle.

This design is intended to absorb variances in internal frame assembly, roller fidelity, expansion from heat, etc.

If the roller is not installed as in the figure, change your design or make modifications to achieve this structure.

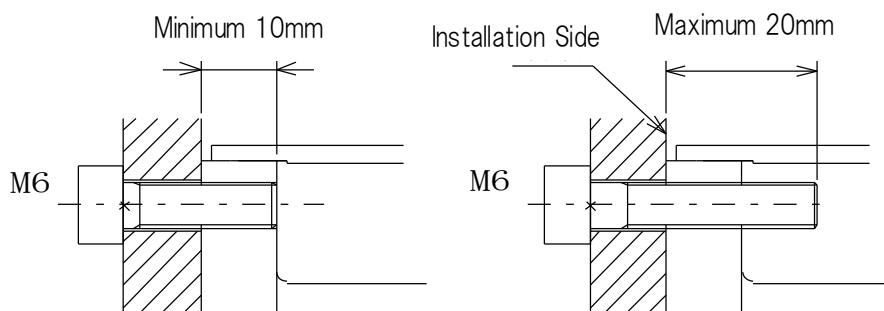
We recommend using automatic aligning bearings.



(3) Penetration depth of attachment bolt

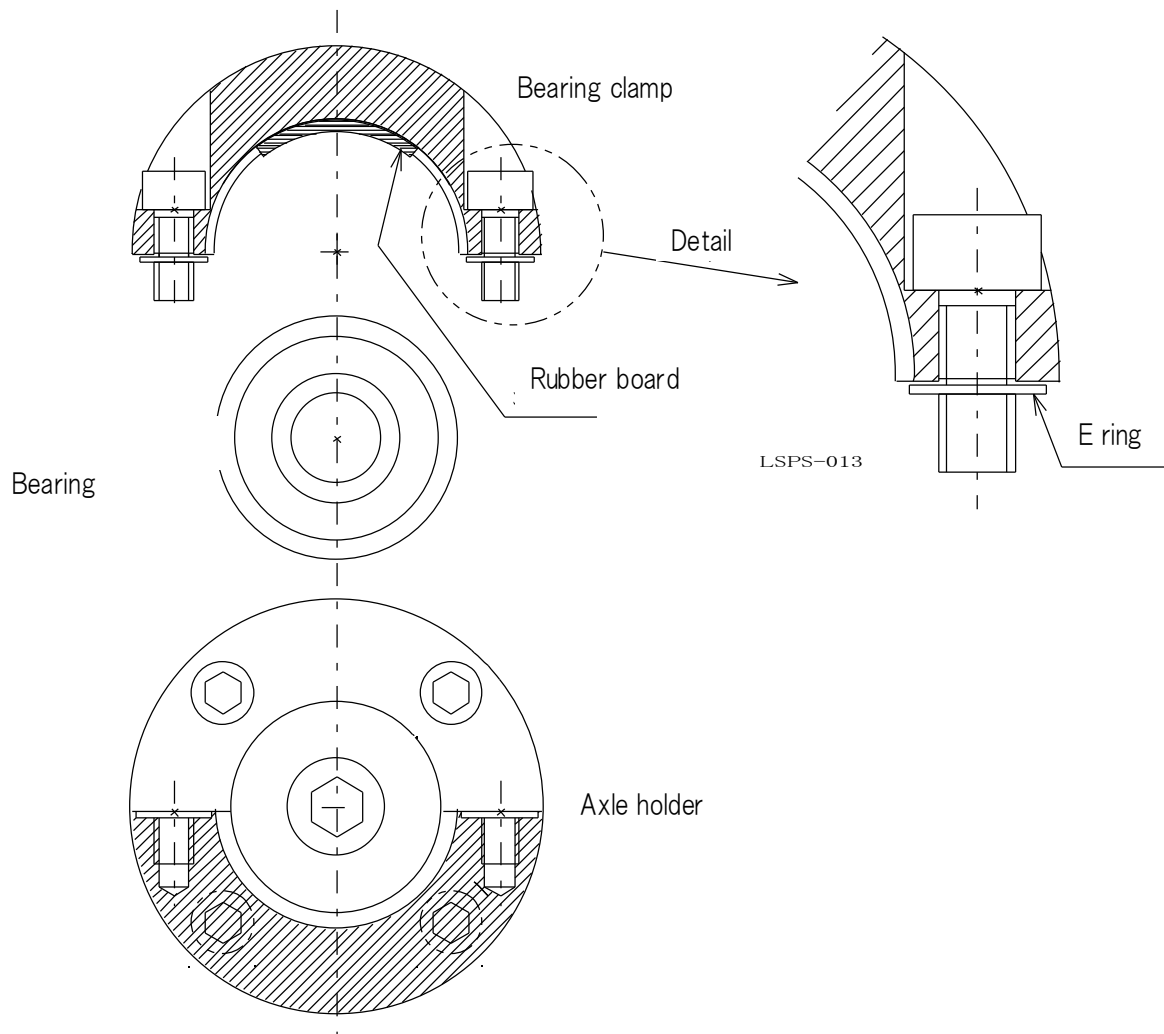
The attachment bolts for the standard tension detector should be attached with a depth between 12-20mm, as described in the figure below.

- A depth below 12mm can cause the screw to break.
- A depth over 20mm can cause damage to the tension detector interior.



4) Attaching and removing the bearing clamp (axle clamp)

Bearing clamp structure:



As pictured above, the bearing clamp is designed to use an E ring to prevent the attachment bolt from loosening. When removing or attaching, rotate the left and right bolts slightly.

The bearing clamp interior is also outfitted with high resilience polyurethane rubber. This is designed to absorb machining variance and achieve compatibility, and is required. Do not remove the polyurethane rubber.

(5) Coupling alignment

As described in the installation example on page 3, if spigot joints are used, coupling alignment is unnecessary.

However, if the aperture on the frame used for determining positioning is shifted, or if parallelism of the attachment face is not achieved, coupling alignment will be required.

In these cases, remove the boss and realign.

If using an adapter attached to the frame exterior, you will be required to reverse the orientation of the spigot joint or take other measures.

Note: when aligning the coupling, under no circumstances should you strike the detector axle (where the bearing is attached).

Use a plastic board or other soft item and tap a spot near the attachment point, ensuring that the detector itself does not sustain damage.

• If the left and right sides of the attachment face are not parallel, the unit may have become twisted when the roller was attached. This may cause any of the phenomena below:

1. The zero point is widely misaligned;
2. Zero calibration becomes impossible;
3. No linearity of output;
4. Scale cannot be calibrated

If any of the above occurs, insert a spacer or take other measures to adjust the surface.

You can perform a check to determine whether there is any twisting to the detector.

1. Attach the detector and roller. Do not firmly affix the bearing clamp; attach it loosely for the time being.
2. Calibrate both the L and R sides.
3. Proceed by firmly affixing the bearing clamp into place.
4. Check changes to the zero point; a wide shift indicates twisting.

(6) Cover

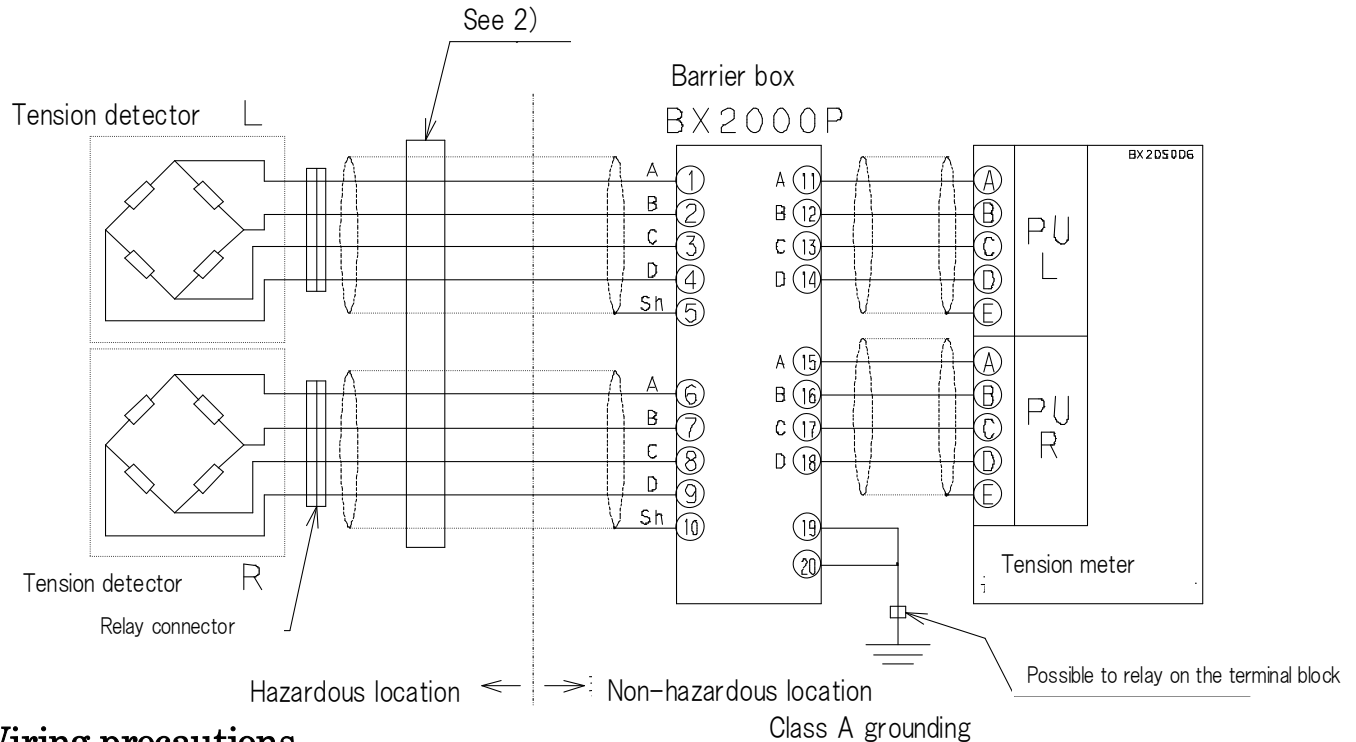
If there is a risk of items bumping into the detector, water droplets splashing on it, or of people standing on top of it, install a cover over the entirety of the detector. There may be cases where a crane wire is attached to the detector when in transit. Utilize a sufficiently protective cover and the warning or take other measures.

(7) Compatibility

All detectors of the same type are manufactured equally, with no internal calibration points. Therefore, if you have a device of the same type, it is compatible. If the device is made to the same specifications, it can be attached anywhere. This unit also has general compatibility with the LS formfactor.

However, when swapping out detectors, a slight variance may develop, so we recommend calibration.

Perform wiring for the tension detector, barrier box, tension meter, and controller as described in the figure below.



Wiring precautions

- 1) Use 4-core shielded wiring over 0.5mm^2 for the connection between the detector and barrier box.
- 2) Detector cord relay is permitted for non-hazardous location and hazardous locations that exclude Category 0.
If using a relay, use an IP20 or higher relay box and connect it to the bright blue terminal block if possible. Write “intrinsically safe circuit” on the relay box surface for identification purposes.
- 3) For hazardous locations, terminal blocks connected to non-intrinsically safe circuits (standard circuits) cannot be outfitted in the same relay box as that containing intrinsically-safe circuit terminals.
- 4) The barrier box must be installed in a non-hazardous location.
- 5) Terminal 19 or 20 of the barrier box must be A Class grounded. Use a green wire over 2mm^2 ; if performing a relay, use a terminal block. Terminals 19 and 20 are connected internally.
- 6) When connecting multiple barrier boxes, terminals 19 and 20 can be used for crossover wiring.
- 7) Connection to a tension meter or tension controller is made via terminals 11 through 18 on the barrier box, as pictured above. Refer to the instruction manuals and specification charts for the destination device.

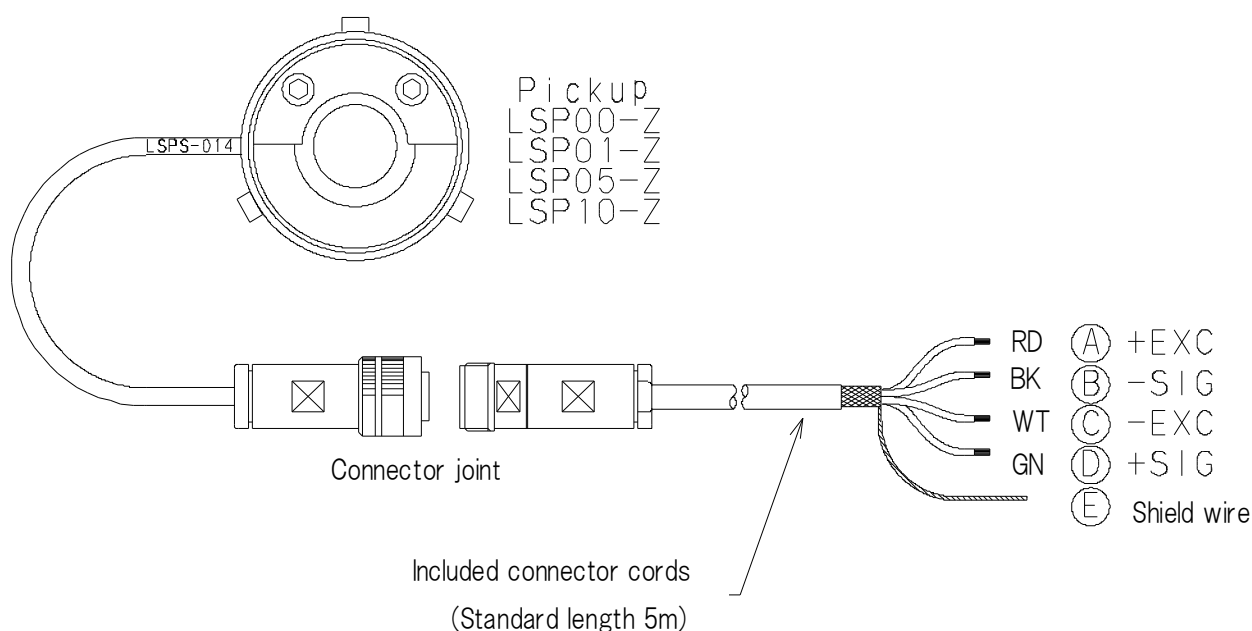
- 8) Do not connect the ground terminals from the tension meter or controller directly to the ground terminals in the barrier box. They must be separated from the ground wires used in the intrinsically safe circuit.
- 9) If only using one detector, connect to either the L or R side.
- 1 0) If relaying the detector cord into a control panel, use a bright blue terminal block.
- 1 1) If the output cord from the detector vibrates, fix it in place.
- 1 2) Wiring should be performed by a dedicated technician or expert.

Output cords explained

The figure below describes the relationship between detector cord colors and signals.

The relationship between A, B, C, and D herein and the signals to which they correspond is constant.

- (1) Use the included connector cords for wiring. The connectors are waterproof.
- (2) If extending the cord, install a terminal box and connect it to the terminal block.
- (3) If extending the cord, use a 4-core shielded wire that exceeds 0.5mm^2 and wire it within 50m of the power line. Use metal conduit wiring if possible.
- (4) For wiring connections to tension meters and controllers, refer to their respective instructional manuals and specification charts.
- (5) If the output cord from the detector vibrates, fix it in place.



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Calibration

There are no internal points of calibration on the tension detector.

Tension calibration is performed entirely on the tension meters or controllers attached to the device.

Please refer to the instruction manual for the devices you attach.

☆Because this detector uses Zener barriers, its output is about 70% that of standard LSP detectors, but this is not in error.

If you are unable to calibrate scale, increase the scale of the attached tension meters or controllers.

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Layout

As the figure below describes, there are four distortion gauges affixed to the parallel element.

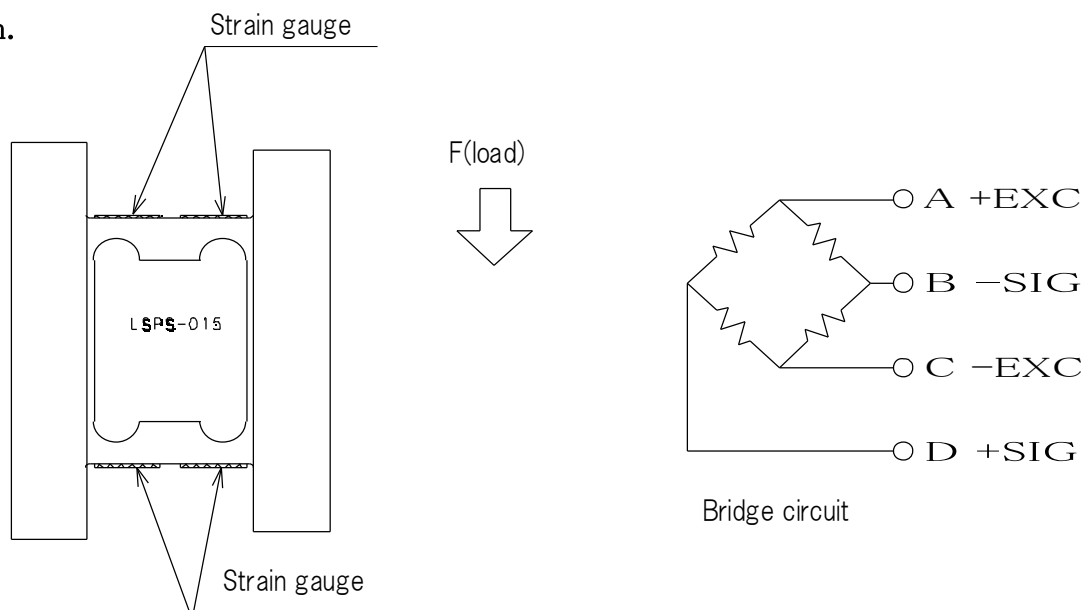
Each gauge is composed of a bridge circuit as described at right.

When load is applied, the element bows slightly, and the distortion becomes resistance on the gauge, which is then detected via the bridge circuit in the form of a voltage signal.

The PCB features temperature correction circuits that are, like the distortion gauges, silicon coated.

Exercise caution to ensure that the silicon coating is not removed.

Warning: this is an intrinsically safe explosion proof design, so any modification is forbidden.



Detector specifications, characteristics

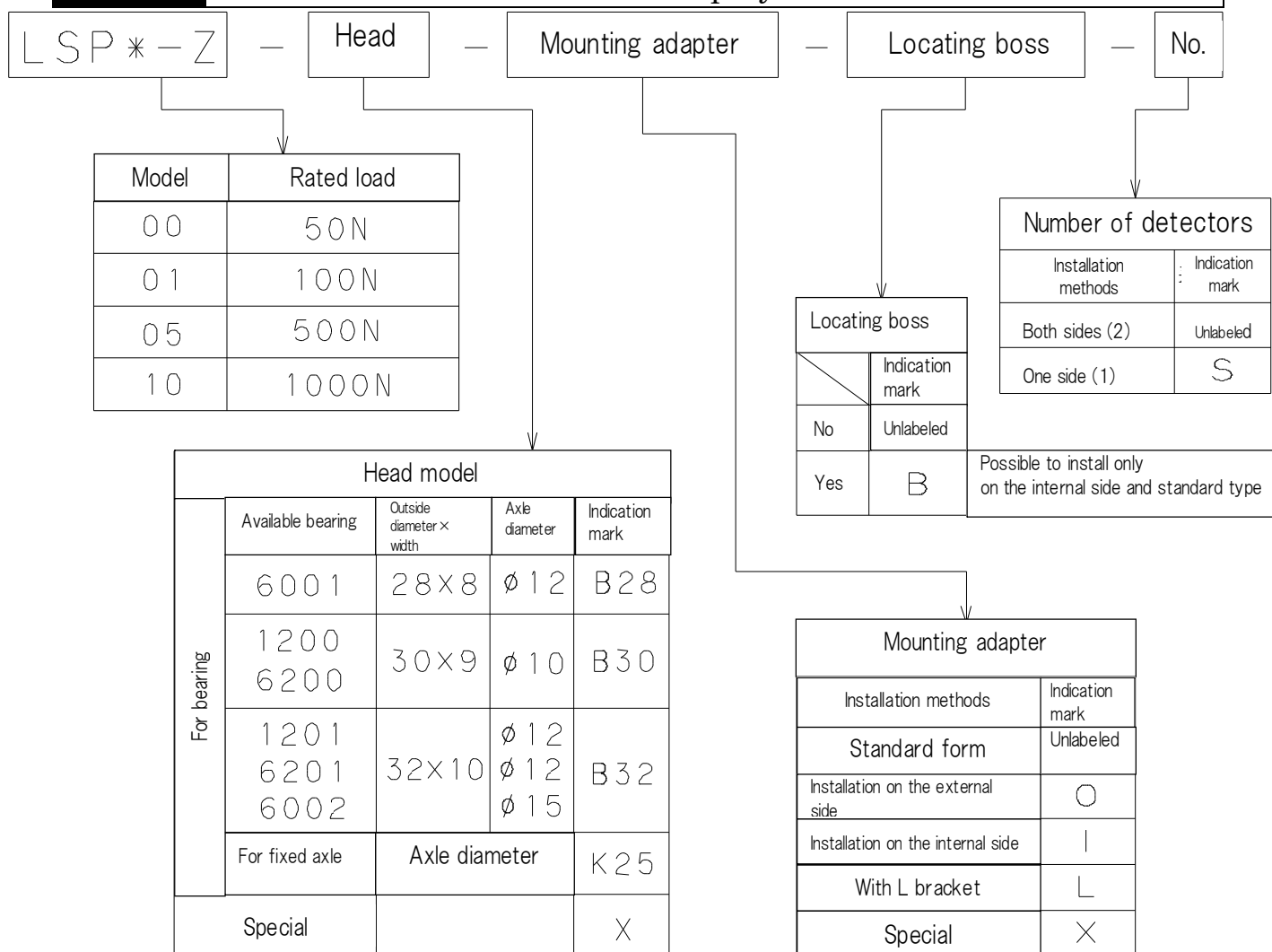
	Value for standalone detector				Value when attached to barrier box
	LSP00 -Z	LSP01 -Z	LSP05 -Z	LSP10 -Z	
Rated capacity (R.C) (per 1 detector)	50N	100N	500N	1000N	←
Rated output (R.O)	Approx. 1.5mV/V				Approx. 1.1mV/V
Non-linearity	0.1 % R.O				←
Hysteresis	0.1 % R.O				←
Repeatability	0.05 % R.O				←
Displacement	0.08 mm R.O				←
Input resistance	750 ± 10 Ω				990 ± 12 Ω
Output resistance	750 ± 5 Ω				990 ± 7 Ω
Applied voltage	10 V				10 V (± 5 V)
Maximum applied voltage	15 V				12 V (± 6 V)
Allowable temperature range	0 ~ 40 °C				←
Allowable humidity range	Under 80% (avoid condensation)				←
Temperature effect on zero	±0.06 % R.O / 10 °C				←
Output temperature drift	±0.06 % LOAD / 10 °C				←
Allowable overload	200 % R.C				
Required Zener barrier connection	Barrier box BX2000P 1 unit/two detectors				
Compatible tension meters	<ul style="list-style-type: none"> • TCS-550HG • Multi-channel tension meter (Model MSM) • T300 				
Tension controller	<ul style="list-style-type: none"> • C500 				

Anti-explosive barrier specifications

Model: NZB2-10R120E |
Certified number: TC19319

Intrinsically safe circuit rated value	
Maximum voltage	17.64V
Maximum current	321mA
Maximum power	710mW
Non-intrinsically safe circuit rated value	
Allowable voltage	AC250V 50／60Hz DC250V

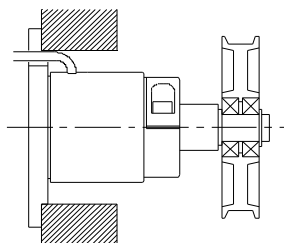
model display chart



Indication example

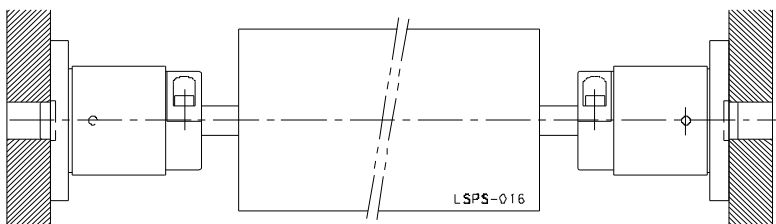
LSP05-Z-K25-O-S

For fixed axle
Installation on the external side
One side

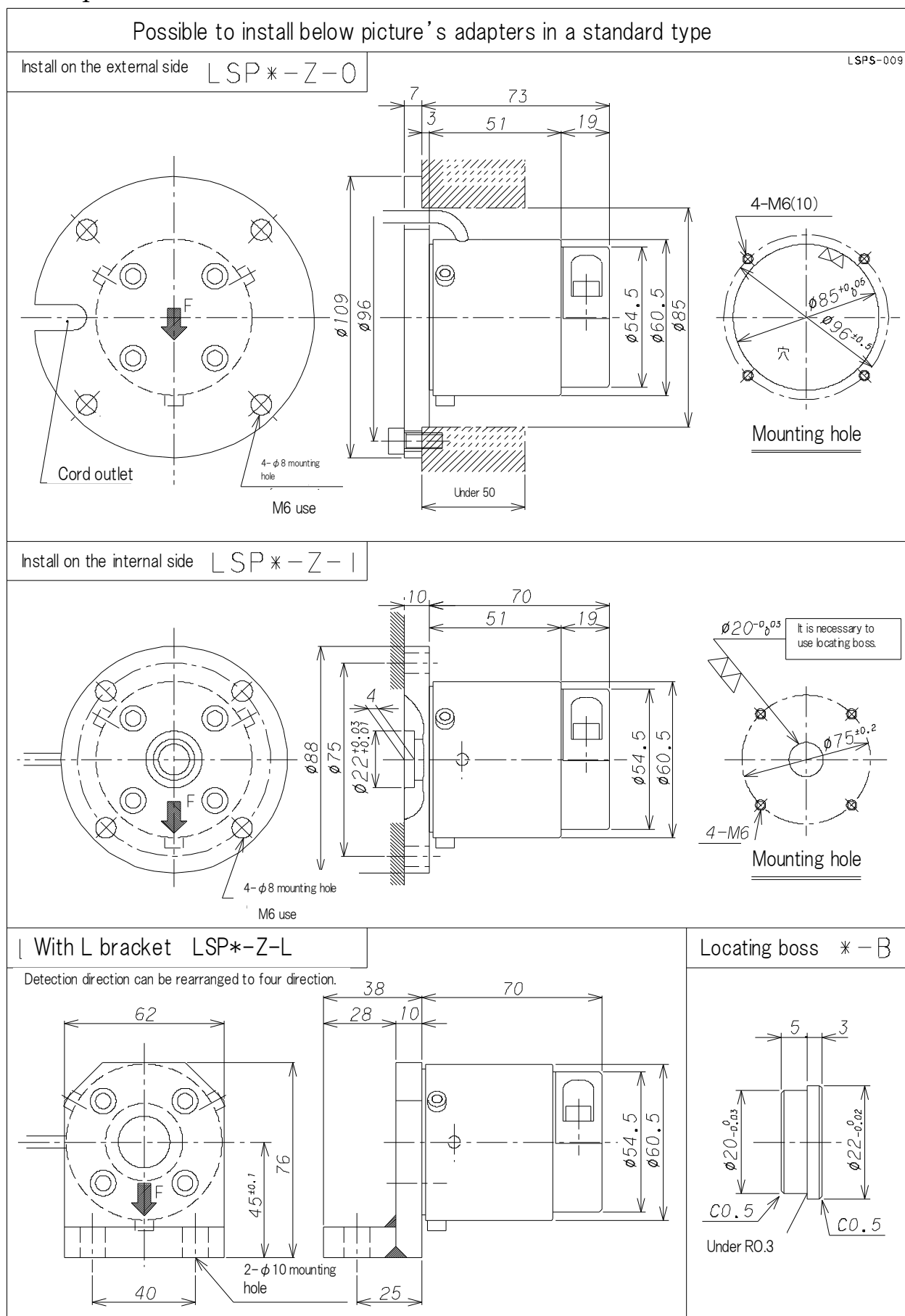


LSP10-Z-B32-I-B

For bearing
Installation on the internal side
Having locating boss
Both sides



2. Adapter dimensions



Model: BX2000P (with four Zener barriers)

