

LUX-A, LUX-A-ID LOAD CELL INSTRUCTION MANUAL

Thank you for purchasing LUX-A Tension/Compression Load Cell (hereafter referred to as the LUX-A). Before using the LUX-A, please read this Instruction Manual carefully. Also, keep the manual within easy reach so that you can refer to it whenever necessary.

The following warning symbols and headlines are used to invite the operator's attention. Be sure to observe the accompanying precaution in order to safeguard the operator and preserve the performance of the instrument.



Warning

Improper handling may result in death or severe injury of the operator. To avoid harm, be sure to observe the accompanying instructions.



Caution

Improper handling may result in injury of the operator. To avoid harm, be sure to observe the accompanying instructions.

1. Features

The LUX-A is applicable for measuring and controlling load applied on small pressing machine, press fitting device, etc. Compact and light weight design with screw shape load receiving portion facilitates installation to equipment.

In addition, the connector type cable enables easy replacement. Moreover, TEDS compatible product 'LUX-A-ID' is stored with various data such as serial No. rated capacity, rated output, etc. By combining with measuring instrument provided with TEDS function and conditioners, sensitivity registering is not necessary enabling to prevent erroneous settings.

(TEDS: Transducer Electronic Data Sheet IEEE1451.4)

2. Handling Precautions

- The LUX-A is designed to detect only a force applied to the center axis. Improper installation of the LUX-A may directly affects measurement accuracy. Therefore, carefully install the LUX-A by avoiding slant and lateral loads as well as rotational and bending moments.
- The compensated temperature range of LUX-A sufficiently covers ambient temperature change. Partial exposure to direct heat must be avoided. If not, transient phenomena may occur resulting in deterioration of measuring accuracy. If an ambient temperature unavoidably exceeds the compensated temperature range, protect the whole LUX-A with heat insulation material in order to maintain the temperature within the compensated temperature range.
- When impacts or vibrations are applied to the direction of load, the proper rated capacity of LUX-A cannot be known unless the magnitude of acceleration is known. Expression 'weight (static load) × acceleration' should be considered in addition to dynamic load affected on the LUX-A in order to determine the proper rated load capacity.
- In case LUX-A is used with tension load and compression load repeatedly applied at the same time, fully consider its fatigue life and use the LUX-A with less than the half range of rated capacity.
- Do not disassemble the LUX-A.
- Avoid applying shocks or dropping matters on the LUX-A.
- Do not carry the LUX-A by holding the connector part or connected cable.
- When the LUX-A is used in vibrational environment, fix the cable near the connector part and apply a vibration stopper to the cable.

- The bending radius of the cable must be less than 6 times of cable external diameter.
- Calibration is recommended once a year after the day of purchase.
- In case abnormal output is displayed, immediately stop the measurement. If the LUX-A is used in the system, immediately stop the system operation.

3. Dimensions

External dimensions of the LUX-A are described in Figures 1 and 2.

(Note) Welded part may be discolored but this does not affect specifications of the Load Cell.

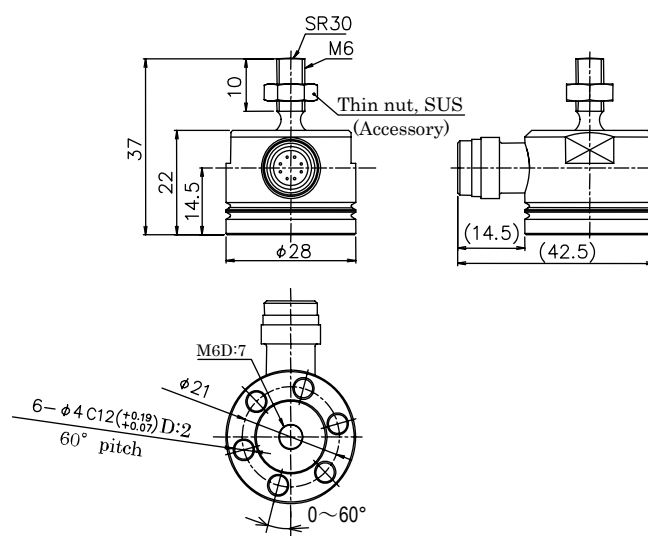


Fig.3-1 LUX-A-500N to 2KN (-ID)

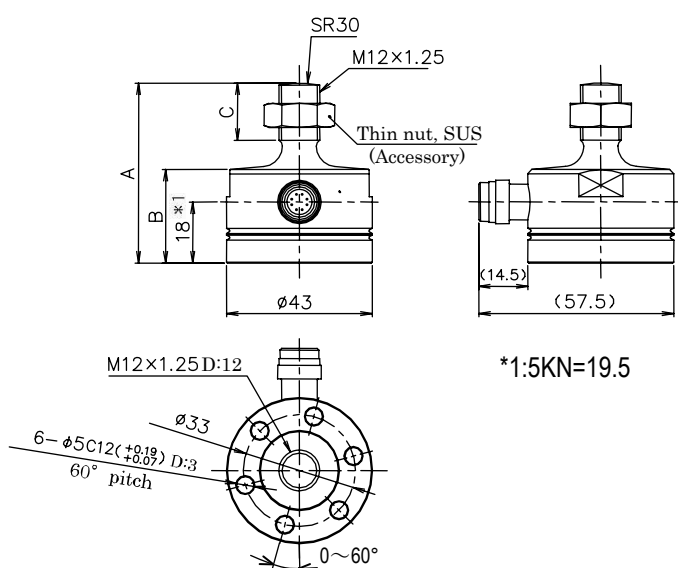


Fig.3-2 LUX-A-5 to 20KN (-ID)

Model	A	B	C
LUX-A-5KN (-ID)	49	26.5	15
LUX-A-10KN(-ID)	51	27.5	16
LUX-A-20KN(-ID)	53		

4. Mounting



Warning

Pay attention to strength of fastened parts which is screwed into the LUX-A. When using the LUX-A with rated capacity more than 2 kN or more, use the fastened parts made of a material with tension strength more than 800N/mm².

Recommended material

SUS630(H900) Hardness: HRC40 to 47

SCM435 Hardness: HRC30 to 38

* Take care and do not apply load exceeding the safe over load. Especially, for tension load measurement, falling of measuring object, etc. may result.

Table 4 Recommended Fastening Torque

Model	Recommended Fastening Torque
LUX-A-500N, 1KN, 2KN(-ID)	10 (N·m)
LUX-A-5KN, 10KN, 20KN(-ID)	80 (N·m)

4-1. Mesuring Compression Load



Caution

- A compression-type Load Cell which is fixed insufficiently may slip when to a lateral load is applied.
- The top of a compression-type Load Cell may collapse when exposed excessive load is applied.

Combination with saddle and mount base CX-4 or CX-6.

- 1) Fix the mount base and the LUX-A with screws and pin holes on the bottom of the LUX-A.
- 2) For a saddle, use CA-2F or steel of hardness of HRC35 to 38 and apply grease to prevent rust.
- 3) Install the LUX-A with only vertical load applied to the center axis only.

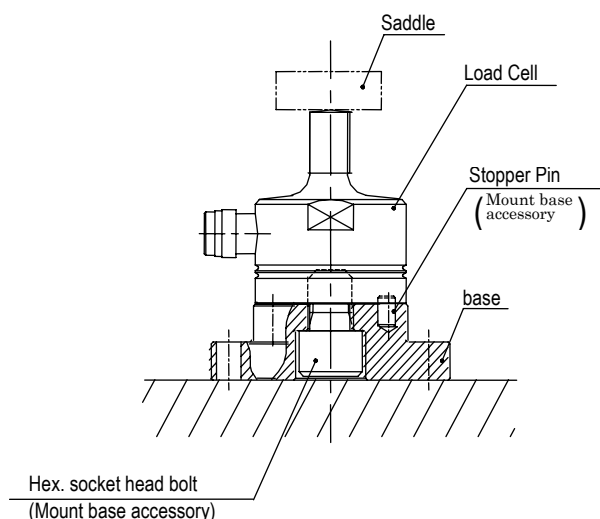


Fig.4-1 Combination with Saddle and Mount Base

4-2. Measuring Tension Load



Caution

- In combination with Ball Joint TU, Whirl-stop Coupling TSC and Whirl-stop Bracket TS should be assembled at our factory.
- In combination with Ball Joint TU, Whirl-stop Coupling TSC and Whirl-stop Bracket TS cannot be used for a compression load.
- Note that the Whirl-stop Bracket TS is not a safety device to be used when exceeding safe over load is applied.
- If exceeding safe over load is applied to the combination with Ball Joint TU, Whirl-stop Coupling TSC and Whirl-stop Bracket TS, falling of measuring object, etc. may result. Take appropriate safety measures for preventing falling of the measuring object, etc. on the customer's side before use.
- Avoid applying rotation and bending moments on the LUX-A. For safety precaution, use the LUX-A with rated capacity by fully considering maximum load and safety.

Combination with Ball Joint TU, Whirl-stop Coupling TSC and Whirl-stop Bracket TS.

- 1) Refer to Figure 4-2 in combination with Ball Joint TU, Whirl-stop Coupling TSC and Whirl-stop Bracket TS.
- 2) Check the lock pin is installed, external lock bolt is tightly fixed, and dimensions of (*) is approx. 5 mm.
- 3) Do not disassemble Ball Joint TU, Whirl-stop Coupling TSC and Whirl-stop Bracket TS.

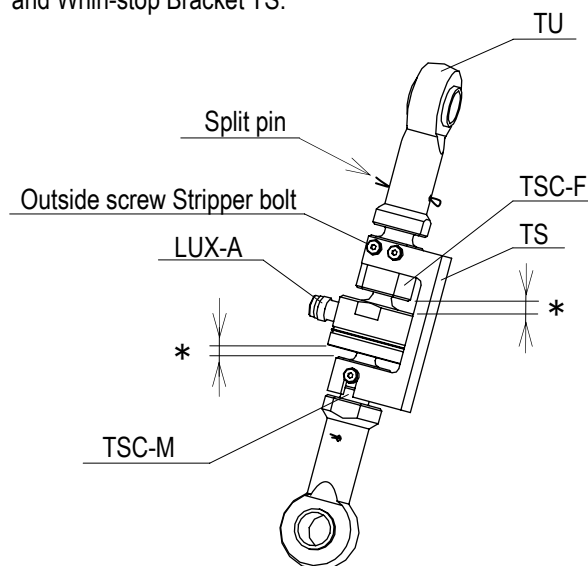


Fig.4-2 Combination with Ball Joint TU

Name	LUX-A-500N to 2KN	LUX-A-5KN to 20KN	Qty
Ball Joint	TU-12B	TU-18B	2
Whirl-stop Coupling	TSC-4F	TSC-6F	1
	TSC-4M	TSC-6M	1
Whirl-stop Bracket	TS-4	TS-6	1
Split pin	1.6 x 25	3.2 x 36	2
Stripper bolt	SMSB5-10	SMSB5-10	3

4-3. Measuring simultaneous load of tension and compression

- 1) Mount the LUX-A using the screws provided on the top and bottom of the load cell.
- 2) Any looseness of the connection screws disables Accurate measurement.
- 3) The LUX-A is intended for measurement of a pure compression load as well as a pure tension load. When set up, the connection screws should provide concentricity and parallelism to avoid slant and lateral loads as well as rotational and bending moments.

4-4. Connecting / Disconnecting Accessory Cable

After mounting the LUX-A on the mount base, connect the accessory cable. Lock mechanism of the connector plug enables connection by only one action. To disconnect the cable, remove the connector by sliding the lock release portion. Connect/Disconnect the cable by referring to the following procedures.

Connecting the cable

- 1) Remove the connector cap from the LUX-A connector portion.

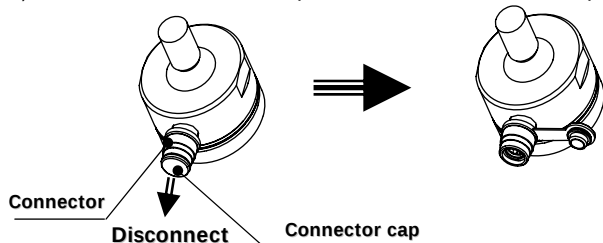


Fig. 4-4-1 Removing the Connector Cap

- 2) Fit the connector inside key and plug key groove, hold the plug lock release portion and plug in.

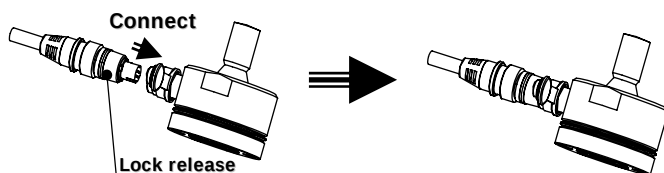


Fig. 4-4-2 Connecting the Connector Cap

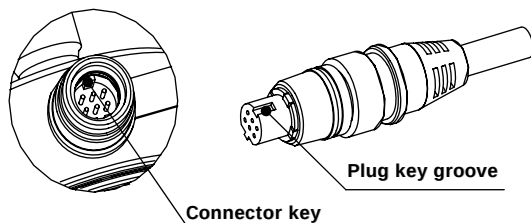


Fig. 4-4-3 Key and Key Groove

Check both connector inside key and plug key groove for connection. Or, plug may break and using the cable may not be available.

Disconnecting the Cable

- 1) Hold and slide the plug lock release portion and disconnect the cable.

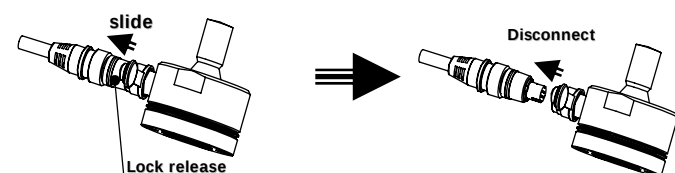


Fig. 4-4-4 Disconnecting the Connector

- 2) Put the cap on the connector.

5. Wiring

- Wiring of the LUX-A cable is described in the following Figures 5-1 and 5-2.
- A shielding wire is not attached to the LUX-A.
- If necessary, make grounding on the amplifier indicator. At this time, if induction or noise is generated, connect an oscilloscope to the output terminal of the amplifier indicator, and while observing the waveform displayed, perform suitable grounding. Note that grounding does not always produce a good result.

LUX-A type

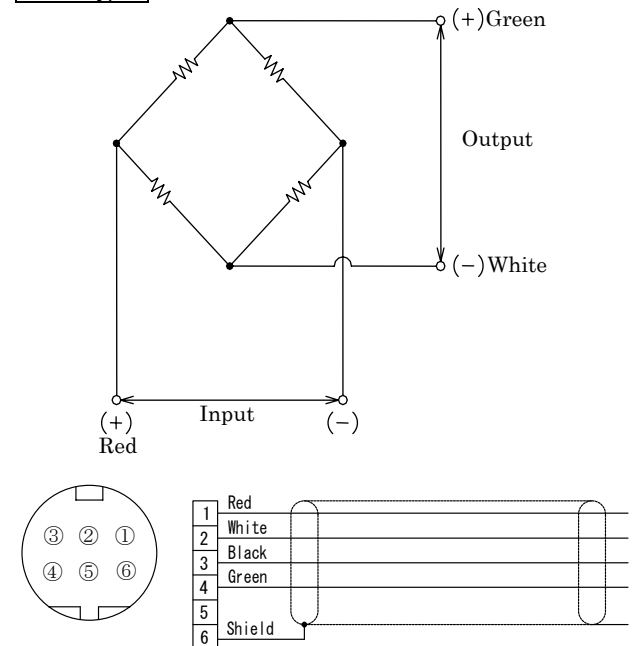


Fig. 5-1 Connection Diagram

(Note) Measuring Method of Data Logger setting CH mode (ex. UCAM-60B and UCAM-500) is "4-gage method (Strain gage transducer)". Select the CH mode from "4-Gage (Constant voltage)".

LUX-A-ID type

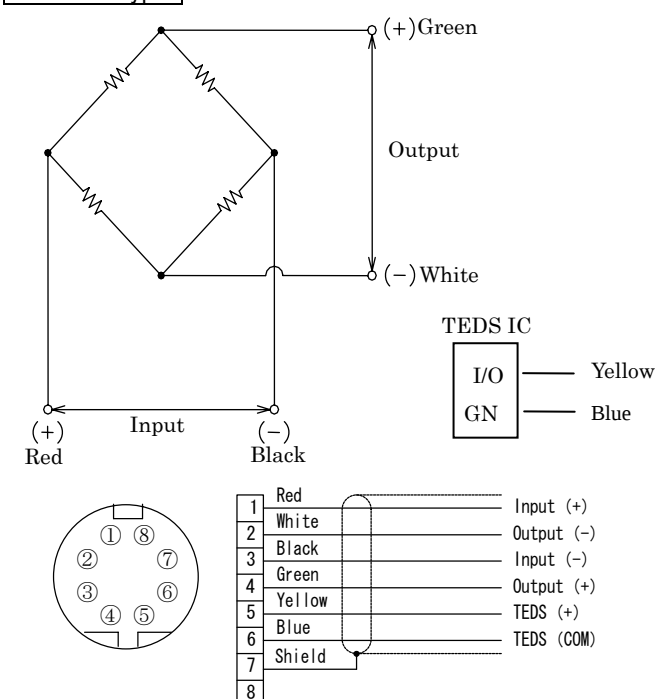


Fig. 5-2 Connection Diagram

6. Conversion

Not required when TEDS function is adopted.

- Use the calibration factor described in the calibration sheet to convert a reading into a load value.
- When a strain amplifier is in use, output reads in $\mu\text{m/m}$ equivalent strain ($\times 10^{-6}$ equivalent strain). Find a load value corresponding to $\mu\text{m/m}$. Then, obtain a load value through multiplication using the following equation.

$$[\text{Load value (N)}] = [\text{Strain amplifier's output } (\mu\text{m/m})] \times [\text{Calibration factor (N/}\mu\text{m/m)}]$$

- When using other types of amplifiers or recorders, first find the exact bridge excitation voltage. Load value corresponding to 1 μV output voltage against 1V bridge excitation voltage is stated in the Calibration Sheet. Then obtain the load value through multiplication using the following equation.

$$[\text{Load value (N)}] = [\text{Bridge output voltage } (\mu\text{V})] \div [\text{Bridge excitation voltage (V)}] \times [\text{Calibration factor (N/}\mu\text{V/V)}]$$

Correction of Lowered Sensitivity due to Cable Extension

If a cable is extended for measurement using strain gage transducers/signal conditioners/digital indicators/strain amplifiers, resistance generated from the extended cable may lowers the sensitivity. This is because voltage applied to the LUX-A is lowered by the cable resistance. Rated output that lowers the sensitivity is obtained by the following equation.

$$[\epsilon_0] = [R] \times [\epsilon_i] \div [R + (r \times L)]$$

where,

R: Input resistance of the LUX-A(Ω)

r: Reciprocating resistance of the extended cable per m(Ω/m)

L: Extended cable length(m)

ϵ_i : Rated output in Calibration Sheet.

7. Maintenance Precautions and Inspection

- Avoid water, dust, and oil from the connector portion and cable end.
- If an initial value or reading appears to be faulty, measure input resistance($375\Omega \pm 1.5\%$), output resistance($350\Omega \pm 1\%$) as well as insulation resistance(100 M Ω or more).
- If abnormal resistance is found , the LUX-A may be faulty. At this time, contact KYOWA's representative for necessary inspection.

Caution

To measure insulation resistance, use an insulation resistance tester with applied voltage lower than 50V. When using the TEDS compatible LUX-A-ID, do not apply voltage of the isolation resistance tester to conductors (yellow and blue) of the TEDS IC.

8. Specifications

●Specifications

Rated capacity : See below table.

Rated output : See below table.

Non-linearity : Within $\pm 0.1\%$ RO

Within 0.15% RO for less than 2KN

Hysteresis : Within $\pm 0.1\%$ RO

Within 0.15% RO for less than 2KN

Repeatability : 0.05%RO or less

●Environmental Characteristics

Safe temperature range : -20 to 80 $^{\circ}\text{C}$

Compensated temperature range : -10 to 70 $^{\circ}\text{C}$

Thermal effect on zero balance : Within $\pm 0.005\%$ RO/ $^{\circ}\text{C}$

Thermal effect on output : Within $\pm 0.005\%$ / $^{\circ}\text{C}$

●Electric Characteristics

Safe excitation voltage : 15V AC or DC

Recommended excitation voltage : 1 to 10V AC or DC

Input resistance : $375\Omega \pm 1.5\%$

Output resistance : $350\Omega \pm 1\%$

Cable

●LUX-A accessory cable: TE-35

4-conductor (0.08 mm²) chloroprene shield cable,

4 diameter by 3 m long, bare at the tip

●LUX-A-ID cable: TE-45

6-conductor (0.08mm²) chloroprene shield cable,

4.4 diameter by 3 m long, bared at the tip

●Mechanical Characteristics

Safe overload rating : 150%

Natural frequency : See below table

Materials : SUS

Weight : Approx 0.1 kg (500N to 2KN),

Approx 0.3 kg (5KN to 20KN)

Structure : IP67 (JIS C0920)

Table 8 Specification Chart

Model	Rated Capacity (Ref.)	Rated Output	Natural Frequency (Approx. kHz)
LUX-A-500N LUX-A-500N-ID	$\pm 500\text{N}$ (± 50.99 kgf)	0.9 mV/V or more (1800 $\mu\text{m/m}$ or more)	16 kHz
LUX-A-1KN LUX-A-1KN-ID	± 1 kN (± 102.0 kgf)		21 kHz
LUX-A-2KN LUX-A-2KN-ID	± 2 kN (± 203.9 kgf)	1.3mV/V or more (2600 $\mu\text{m/m}$ or more)	27 kHz
LUX-A-5KN LUX-A-5KN-ID	± 5 kN (± 509.9 kgf)		18 kHz
LUX-A-10KN LUX-A-10KN-ID	± 10 kN (1.020 tf)		21 kHz
LUX-A-20KN LUX-A-20KN-ID	± 20 kN (2.039 tf)		25 kHz