



# USB58

HIGH ACCURACY  
COMPRESSION/TENSION LOADCELL

## OPERATION MANUAL

01AUG2020REV.2.02C

# UNIPULSE

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**For Safety**

- Don't use USB58 in hazardous area. USB58 is not Explosion proof approval product.
- Don't use USB58 for medical use. USB58 is not Medical approval product.
- Don't use USB58 for hoist or crane. USB58 has not break off proof protection.

When an excessive force is loaded, USB58 is broken off and hang object will fall down. For minimize the dangerous, install a proper protection from the falling.

- For repeatable load, using USB58 within the rated (not maximum) capacity in the specification is recommended.

**Product Compliant to RoHS2 Directive**

The parts and attachments (including the instruction manual, packaging box, etc.) used for this unit are compliant with the RoHS2 Directive, restricting the use of hazardous substances with regard to adverse effects on the environment and human body.

**RoHS2 Directive**

It is based on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE). The Directive restricts the use of specific substances in electrical and electronic equipments that could harm environment and human body. The substances are lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers), DEHP (bis(2-ethylhexyl) phthalate), BBP (benzyl butyl phthalate), DBP (dibutyl phthalate), and DIBP (diisobutyl phthalate).

**1. Notes**

- USB58 is designed for static force measuring on compression or tension.
- For dynamic force, the frequency has to be enough low compared with the natural frequency of USB58.
- On USB58, the cable sheath which is made from PCV. They emit small amount of chlorine gas. The gas may cause a bad influence for the clean room for the production of semi-conductor.

\* Please consult with Unipulse for further assistance

**2. Structure and Principle**

USB58 is Bending-Beam type and strain gauges are installed on the spring elements.

The strain gauges, usually four or a multiple of four, are connected into a Wheatstone bridge configuration in order to convert the very small change in resistance into a usable electrical signal. The voltage signal will be output in proportion to the strain and the excitation voltage.

### 3. Environment

#### 3.1 Ambient Temperature

USB58 should be used within the ambient temperature of the specification and at stable temperature.

#### 3.2 Humidity and Corrosion

USB58 is made of aluminum alloy. Corrosion will occur under the condition contacting with the different kind of metals and that electrolyte such as wet to USB58. Dry environment or aluminum alloy base plate prevents the corrosion.

#### 3.3 Keep Clean

Deposit dust may leak the force and disturbs the normal measuring on sensitivity and zero point due to especially sticky dust on USB58.

#### 3.4 Atmospheric Pressure

The accurate measuring of USB58 will not be affected by changing of atmosphere pressure. USB58 is sealed with both side diaphragms symmetrically and the influence is compensated. Internal pressure of USB58 is released to the out through the inside of the cable via connector.

#### 3.5 Vibration

Vibration disturbs measuring force then output signal may be incorrect.

### 4. Mechanical Installation

#### 4.1 Notes for Installation

- Handle USB58 with care. USB58 achieves the accuracy of 1/10000 on Linearity, Hysteresis, and Repeatability. Falling shock or load exceeding the maximum capacity may damage to USB58 and it disturbs the normal operation due to the shift of zero point or degradation of linearity.
- Install USB58 on non vibration area or delicate wiring in the USB58 will be damaged.  
Measuring dynamic force, install USB58 on the static base and the dynamic force should be loaded to the load button.

#### 4.2 Installation of Base Plate (for 500N only)

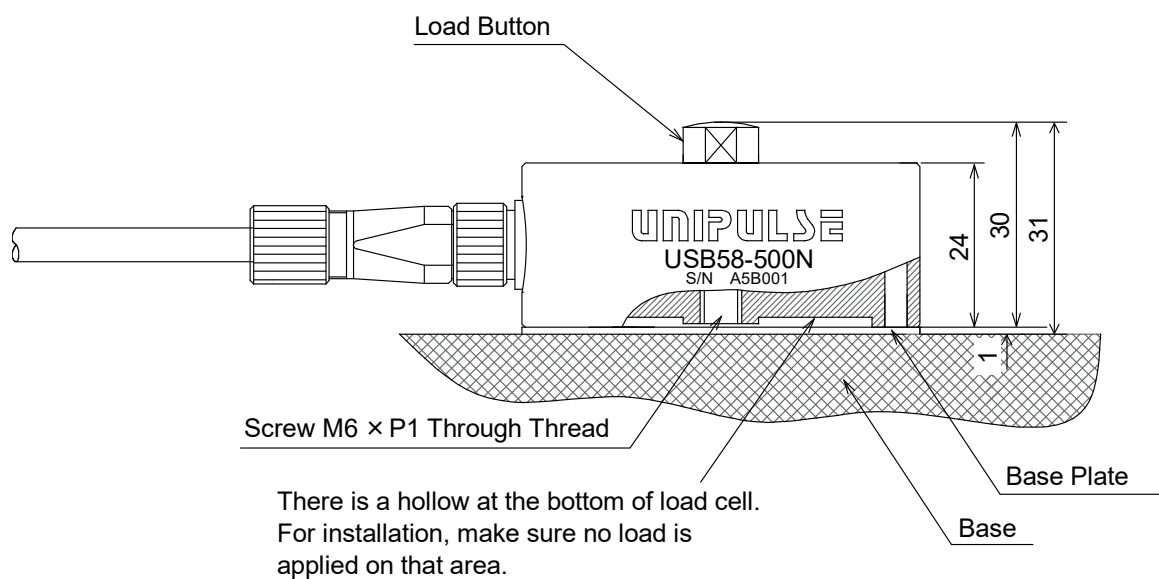
- In case the friction of a base surface makes the accuracy dropdown.  
Base Plate excludes the cause and keeps the good condition.
- The high humidity atmosphere causes USB58 electrolysis corrosion easily. Base Plate made of plastics protects USB58 from the corrosion. If it is necessary to discharge the static electricity or to keep same ground, then use the screws (M3) with washers and the torque should be less than 25N·cm.
- When Base Plate is installed, the total height 30mm stated in the catalog will be increased to 31mm

- USB58-500N is evaluated on Base Plate.

### 4.3 How to Installation

- USB58 should be installed horizontally on an enough rigid and flat base (aluminum plate thickness 10mm or more, flatness 0.005mm or better). Load must be vertical to USB58. Angular misalignment must be less than three degrees and the sensibility will decrease with cosine  $\theta$  in almost proportionally.
- Fixing USB58, assemble with the screws (M3) with washers and the torque should be less than  $25\text{N}\cdot\text{cm}$ .
- In wet atmosphere aluminum alloy screws are recommendable to prevent electrolysis corrosion.
- On load button, maximum torque is  $50\text{N}\cdot\text{cm}$ .

The figure below shows the size of the Base Plate (for 500N only) and the height.



### 5. Wire Connections

Generally load cell is easily affected of its characteristics by machine vibration, electrical induction, static electricity, and dynamic magnetic field.

#### 5.1 Technique of Connection

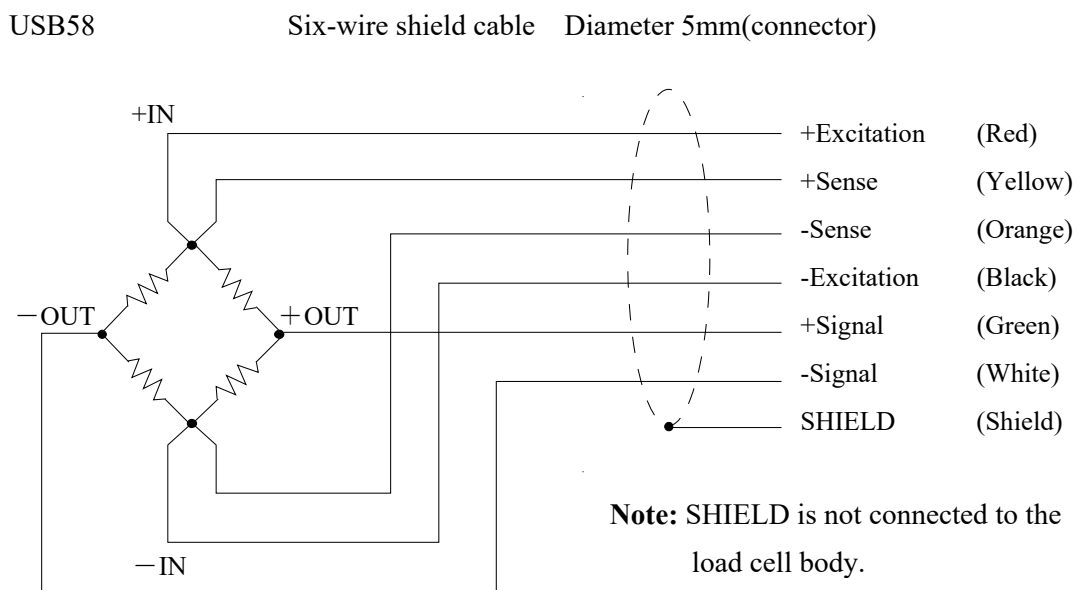
The induction and static electricity may disturb the measuring circuit and cause noisy signal.

Lay the cable of USB58 not parallel to power cable or hi-volt cable.

For hooking up with instruments one point ground is recommended on the circuit.

The wire which is vibrated may generate piezoelectricity; Lay the cable on the quiet location.

#### 5.2 Assignment

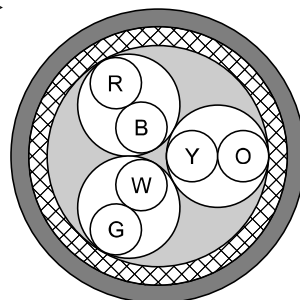


#### 5.3 Cable Extension

It is necessary to use three twisted pair six-wire cable with shield. Good insulation and low resistance at the connections are also required. To locate the connections at dry environment is recommended. It is better to use the long cable with the connector.

\* Please consult with Unipulse for further assistance

< Colors of twist pair wires >

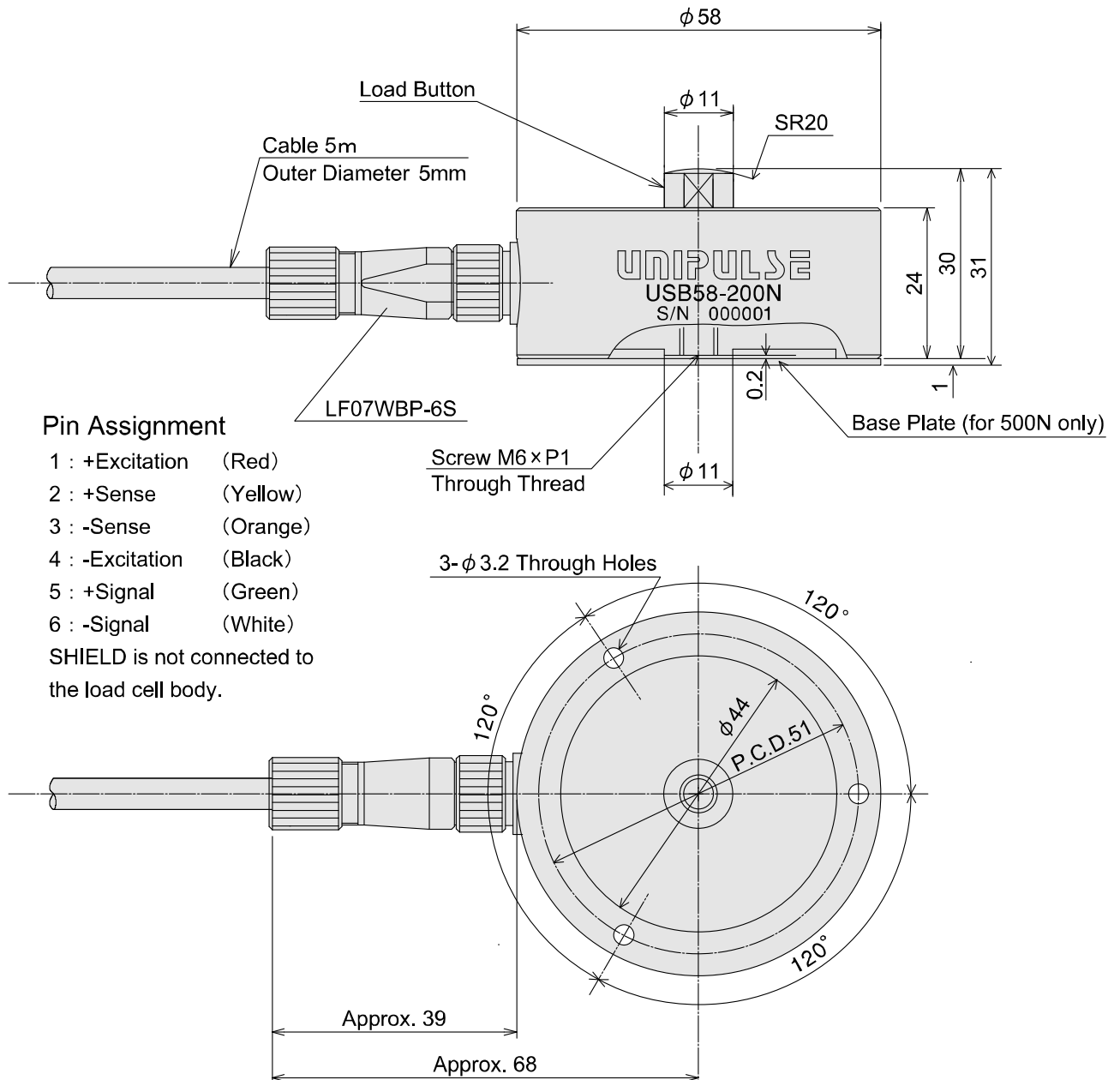


R : Red    &    B : Black  
Y : Yellow    &    O : Orange  
W : White    &    G : Green

### 6. Dimensions (mm)

Cable : Robot cable (three twisted pair six-wire cable with shield) 5m

Connector : LF07WBP-6S (HRS)



**7. Specifications**Testing with Mass Gravitational Acceleration 9.79846 m/s<sup>2</sup> at Testing Site

(Geographical Survey Institute.)

Type		USB58-200N/500N	
Rated capacity (R.C.)	(Compression)	195.97(20kg)/489.92(50kg)	N
Rated output (R.O.)	(at 23℃)	1±1 %	mV/V
Non-linearity	(at 23℃)	0.01	% R.O.
Hysteresis	(at 23℃)	0.01	% R.O.
Repeatability	(at 23℃)	0.01	% R.O.
Creep (30min)	(at 23℃)	0.03	%
Zero balance	(at 23℃)	2	% R.O.
Compensated temperature range		0~+40	℃
Operating range		-30~+80	℃
Temperature effect on zero		0.015	% R.O./10℃
Temperature effect on sense.		0.015	% R.O./10℃
Input resistance	(at 23℃)	1050±15 %	Ω
Output resistance	(at 23℃)	1050±1 %	Ω
Maximum excitation voltage		20 (reference 10)	V
Insulation resistance	(DC50V)	More than 1000	MΩ
Maximum measuring load		150	% R.C.
Ultimate load		200	% R.C.
Off center error	(referring)	approx. 0.1	%/mm
Misalignment	(referring)	3	degree
Nominal deflection		Approx.0.025	mm
Natural frequency	(at 23℃)	Approx. 2	kHz
Cable	(Connector)	5 φ 5mm, 6 cores with shield	m
Material		Aluminum alloy	
Mass		approx.120 (not include the cable)	g



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