

Resistance Temperature Detectors

Model. DS-3030/3040 Series

DAESHIN

측온저항체의 원리

일반적으로 금속의 전기저항은 온도에 따라 변화합니다. 그 중에서도 고순도의 백금은 이 관계가 다른 금속에 비교하여 직선적이고 온도계수가 커서 온도 측정용으로 적합합니다.

또 화학적 물리적으로도 우수한 성질을 가지고 있어서 공업적으로 쉽게 정밀한 저항 값을 얻을 수 있는 온도 측정용 저항소자로서 장기간 안정된 사용이 가능합니다.

측온저항체의 특성

- ▶ 폭넓은 측정범위
: 외경이 아주 가늘어 작은 측정물에도 간단히 삽입 가능하며 -200°C ~ 600°C까지의 폭넓은 범위에 사용이 가능합니다.
- ▶ 빠른 응답속도
: 극세관형이므로 미세한 온도 변화에도 민감히 응답합니다.



Model. DS-3032W



Model. DS-3043W

Nominal Resistance

Code	Resistance Value (Ω at 0°C)	Resistance Ratio R100 / R0
Pt100	100	1.3850
JPt100	100	1.3916

Operating Temperature Range

	Application	Operating Temperature
L	Low Temperature	-200 ~ +100°C
M	Mid Temperature	0 ~ 350°C
H	High Temperature	0 ~ 650°C

Temperature Tolerance

Measuring Temp.(°C)		-200	-100	0	100	200	300	400	500	600	650
Tolerance Temp.(°C)	Class A	±0.55	±0.35	±0.15	±0.354	±0.55	±0.75	±0.95	±1.15	±1.35	±1.45
	Class B	±1.3	±0.8	±0.3	±1.3	±1.8	±2.3	±2.3	±2.8	±3.3	±3.6

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

Thermowell

Resistance Temperature Detectors

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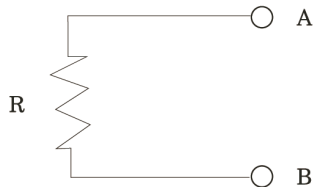
저항소자의 허용치 및 적용 규격표

Code	Class	Tolerance	Rated Current
Pt100	A	$\pm(0.15 + 0.002 t)$	1.2mA
JPt100	B	$\pm(0.3 + 0.002 t)$	1,2,5 mA

- ▶ 허용차란, 저항소자의 지시 저항 값을 기준저항값표에 따라 환산한 값에서 측정온도를 뺀 값의 허용되는 오차의 최대한도의 말합니다.
- ▶ $|t|$ 는 $+$, $-$ 의 기호에 관계없는 온도($^{\circ}\text{C}$)로서 지시하는 측정온도를 말합니다.

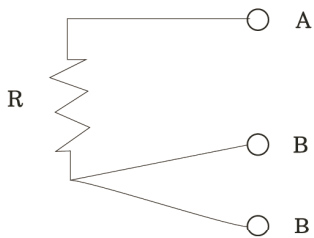
저항소자의 측정방법

- ▶ 온도에 따라 전기저항이 변하는 현상을 이용하는 금속도선을 저항소자라 하며, 보통 백금을 측온 Sensor로 사용합니다. 이것을 흔히 RTD소자 (Resistance Temperature Detector Element)라 부르며, 일반적으로 RTD는 RTD Element, Lead Wires 보호관 및 Terminal로 이루어져 있습니다.



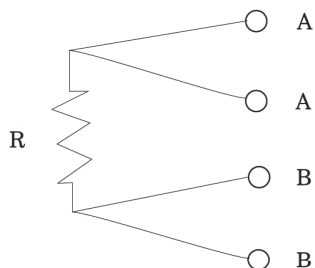
2-Wire Connection ("W" Type)

- ▶ RTD 소자의 두 Terminal에 각각 하나씩의 도선을 접속한 형식으로 비용이 절감되는 효과는 있으나 도선저항의 영향을 받기 때문에 고정도 (High Accuracy)를 요구하는 곳에는 적합하지 않습니다.



3-Wire Connection ("IX" Type)

- ▶ RTD 소자의 한 Terminal에 2개, 다른 한 Terminal 1개의 도선을 접속하여 도선저항의 영향을 제거할 수 있는 형식입니다. 공업용의 계측으로 신뢰성이 제일 높은 계측 방법입니다.



4-Wire Connection

- ▶ RTD 소자의 두 Terminal에 2개의 도선을 접속하여 도선저항의 영향을 제거할 수 있게 한 형식은 특히 고정도의 요하는 곳에는 적합하며, 2도선 식이나 3도선 식에 비하여 가격이 비싼 것이라 것이 단점입니다.

Resistance Temperature Detectors

Model. DS-3030/3040 Series

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Type of Platinum RTD Element

Mica Type Palatinum Rtd Element

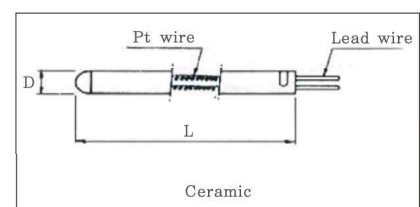
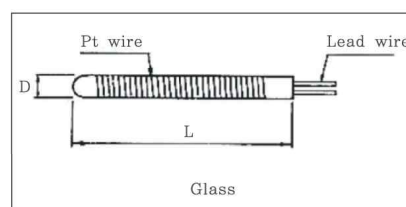
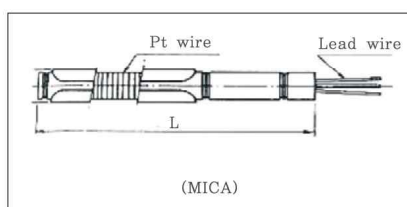
Type	Nominal Resistance (Ω)	Non. Dimensions(mm)		I.D. of Type tube(Ø)	Type	Nominal Resistance (Ω)	Non. Dimensions(mm)		I.D. of Type tube(Ø)
		Length (L)	Length (W)				Length (L)	Length (W)	
M100/30S	100	50	3	4.5	M100/70S	100	50	7.0	8.0
M100/35S	50	50	3.5	4.5	M100/70D	100 x 2	50	7.0	8.0
M100/35D	100 x 2	50	3.5	4.5	M100/80S	100	50	8.0	9.0
M100/40S	100	50	4	5	M100/80D	100 x 2	50	8.0	9.0
M100/40D	100 x 2	50	4	5	M100/90S	50	50	9.0	10.0
M100/50S	100	50	5	6	M100/90D	100 x 2	50	9.0	10.0
M100/50D	100 x 2	50	5	6	M100/100S	100	50	10.0	11.0
					M100/100D	100 x 2	50	10.0	~ 16.0

Mica Type Palatinum Rtd Element

Type	Nominal Resistance (Ω)	Non. Dimensions(mm)		Operating Temp (°C)	Rated Current (mA)	Class
		Length (L)	Length (ØD)			
C100/0915S	100	15	0.9	-200 ~ 800	Below 2	A, B
C100/1215S	100	15	1.2			
C100/1625S	100	25	1.6			
C100/3025S	100	25	3.0	-200 ~ 800	Below 5	A, B
C100/3025D	100 x 2	25	3.0			
C100/4530S	100	30	4.5			
C100/4530S	100 x 2	30	4.5			

Gladss-Sealed Palatinum Rtd Element

Type	Nominal Resistance (Ω)	Non. Dimensions(mm)		Operating Temp (°C)	Rated Current (mA)	Class
		Length (L)	Length (ØD)			
G100/2025S	100	25	2.0	-200 ~ 400	Below 5	A, B
G100/3025S	100	25	3.0			
G100/4025S	100	25	4.0			



Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

Thermowell

Resistance Temperature Detectors

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DAESHIN

Type of Platinum RTD Element

Properties of Insulating Tube

Material	Code	Operating Temp	Maximum Temp	Prooerties
Ceramic 1	PSI	1500°C	1600°C	Highest insulation among insulation material. Solid
Teflon	FEP	200°C	260°C	Excellent resistance to heat, chemicals, etc. Flexible.
Polyimid	PM	200°C	400°C	Characteristics similar to FEP but tougher

Properties of Metal Protection Tube

Material	Code	Operating Temp	Maximum Temp	Prooerties
Copper	CU	250°C	300°C	Good heat conductivity and excellent corrosion- resistance
Brass	BS	250°C	300°C	Similar to Copper and good work ability
304SS	304	900°C	1000°C	High resistance to heat and corrosion
316SS	316	900°C	1000°C	Excellent resistance to heat, acids and alkalis
316LSS	316L	900°C	1000°C	excellent resistance to grain boundary corrosion
Titanium	TI	Oxidizing 250°C	Reducing 1000°C	excellent resistance to corrosion at low temp. but easily oxidized and embrittled at high temperature
Monel	MN	500°C	600°C	excellent resistance to heat, high pressure and corrosion

Surface Coatings

Corrosion Resistance lining & Coating

Coating Material	Thickness(mm)	Structure	Max Oper. Temp	Characteristics
Glass-lining	1~1.2	Steel+Glass	450°C	Good protection against oxidation and gas penetration but poor thermal shock resistance
Teflon(FEP)	0.1~0.7	Metal+FEP	250°C	Suitable in concentrated 2HCl, H2SO4 and HN03 and most of Coating chemicals but depending on temperature conditions

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

Thermowell

Resistance Temperature Detectors

Model. DS-3030 Series

DAESHIN

측온저항체의 원리

일반저항체 (MICA형 측온저항체 소자)를 사용한 저항 온도 Sensor 입니다.

측온저항체의 특징

- ▶ 백금저항선을 사용하고 있기 때문에 고정도의 측온이 가능합니다.
- ▶ 안전성, 재현성이 매우 우수합니다.

내진형 측온저항체

진동이 있는 장소에는 2중 보호관을 사용하여 저항소자 내부도선을 보호하고 내진성을 고려한 구조로 되어 있습니다.

저온처리

저온에 사용하는 경우에는 저온처리를 반드시 표기하여 주십시오.
저온도에는 보호관 내부가 결로상태가 되기 때문에 소자 감온부에 절연저항의 방지조치를 취하게 됩니다.

절연관의 종류 및 특성

- ▶ 자기1종 (PS1) - 상용온도(1500°C), 최고사용온도(1600°C)
: 저항온도계의 온도범위에서는 우수한 절연성을 나타냅니다.
- ▶ Teflon (FEP) - 상용온도(200°C), 최고사용온도(260°C)
: 내열성, 내약품성 전기특성에 대한 우수한 절연재 입니다.
- ▶ Polyimid (PM) - 상용온도(200°C), 최고사용온도(400°C)
: FEP와 동등한 특성을 가졌으나 얇고 강한 Lead선을 통과합니다.

금속 보호관의 종류 및 특성

- ▶ 동 (Cu) - 상용온도(250°C), 최고사용온도(300°C)
: 열전도성이 좋으며 일반적으로 내식성이 우수합니다.
- ▶ 황동 (Bs) - 상용온도(250°C), 최고사용온도(300°C)
: Cu-Zn합금으로 Cu와 같은 특성을 가지나 소화가공이 용이 합니다.
- ▶ SS 304 (304) - 상용온도(900°C), 최고사용온도(1000°C)
: 일반적으로 널리 사용하며 내열, 내식성이 우수합니다.
- ▶ SS 316 (316) - 상용온도(900°C), 최고사용온도(1000°C)
: Mo함유로 내열, 내산 내 Alkali성이 우수합니다.
- ▶ SS 316L (316L) - 상용온도(900°C), 최고사용온도(1000°C)
: 316보다 C의 함유량이 약간 작으므로 미량의 한계부식에 대한 저항이 우수합니다.
- ▶ Titanium (Ti) - 산화 250°C 환원 1000°C
: 저온에서는 내식이 매우 우수하나 고온에서는 산화되기 쉽습니다.
- ▶ Monel (Mn) - 상용온도(500°C), 최고사용온도(600°C)
: Ni 67~70%와 Cu-Fe로 이루어져 있으며 고온고압에 강하며 내식성이 우수합니다.



Model. DS-3032W

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

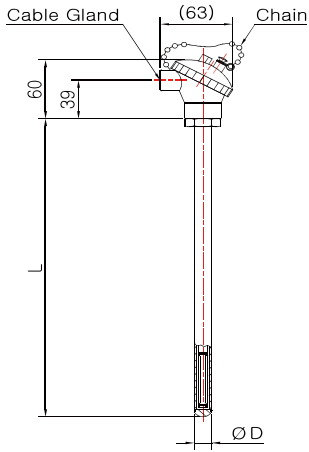
Thermowell

Resistance Temperature Detectors

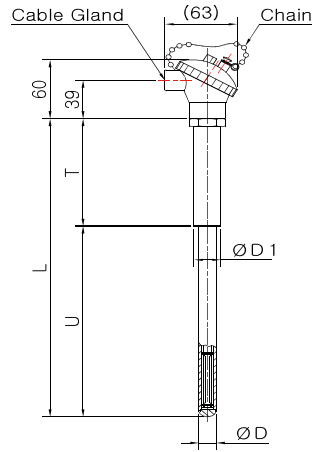
Model. DS-3030 Series

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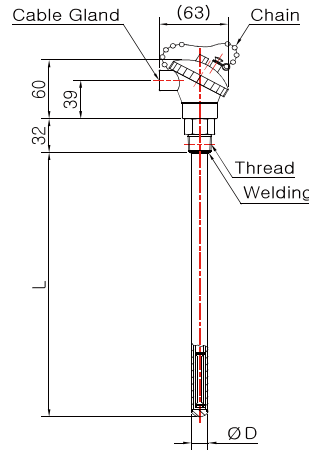
General Purpose Head Type



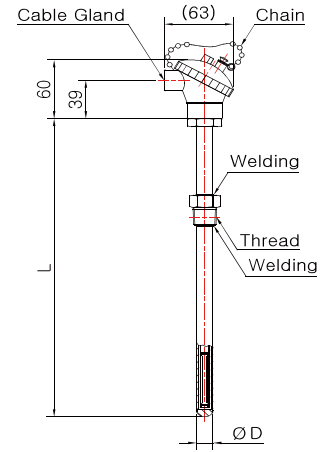
Model No. DS-3031S
(Metal Protection Tube)



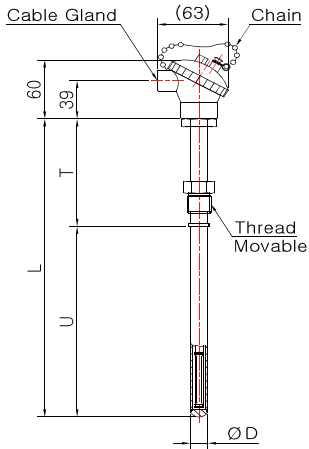
Model No. DS-3031S-2
(Metal Protection Tube)



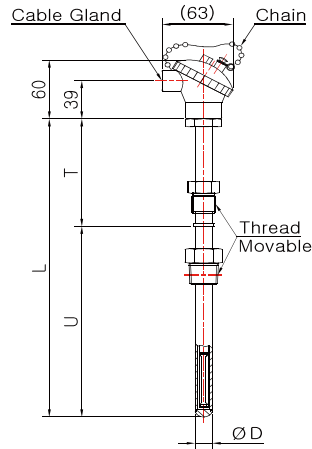
Model No. DS-3032S
(Metal Protection Tube)



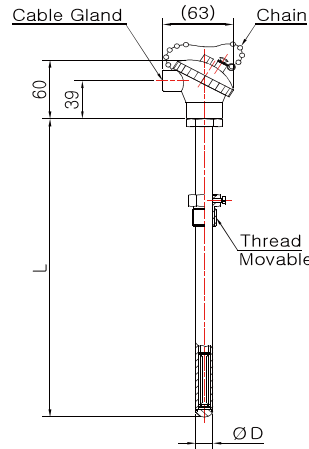
Model No. DS-3032S-1
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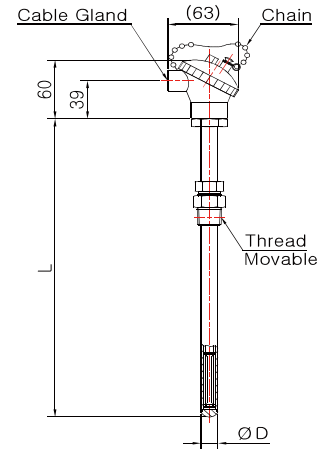
Model No. DS-3032S-2
(Metal Protection Tube)



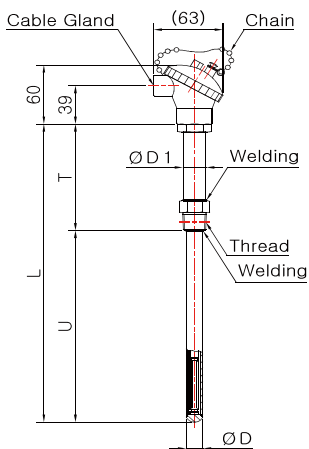
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(Metal Protection Tube)



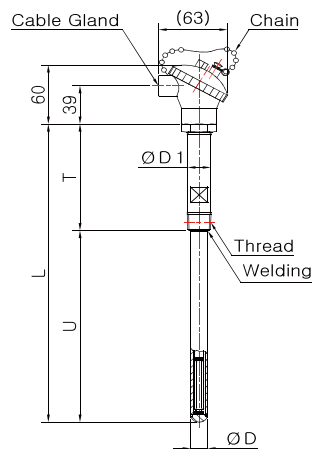
Model No. DS-3032S-4
(Metal Protection Tube)



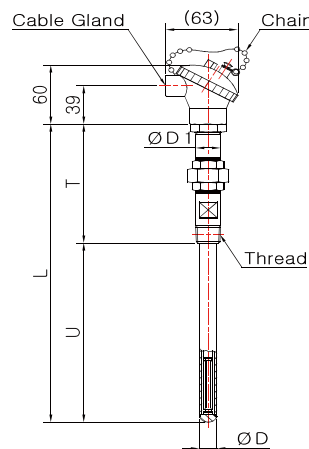
Model No. DS-3032S-6
(Metal Protection Tube)



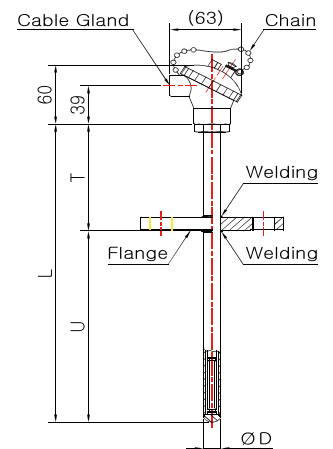
Model No. DS-3033S
(Metal Protection Tube)



Model No. DS-3034S-1
(Metal Protection Tube)



Model No. DS-3034S-2
(Metal Protection Tube)



Model No. DS-3035S
(Metal Protection Tube)

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

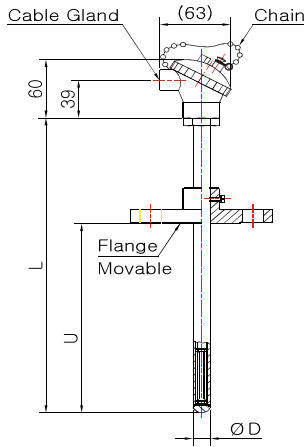
Thermowell

Resistance Temperature Detectors

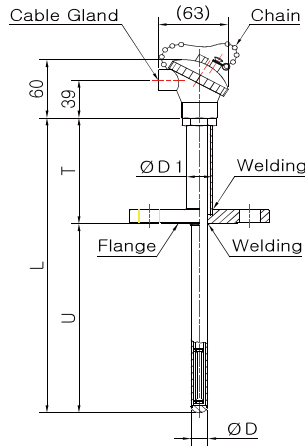
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Model. DS-3030 Series

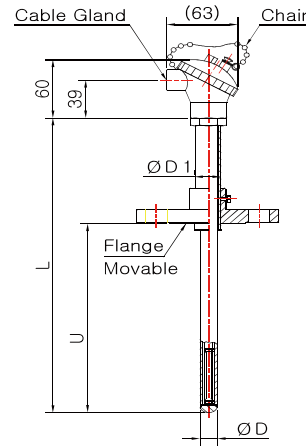
General Purpose Head Type



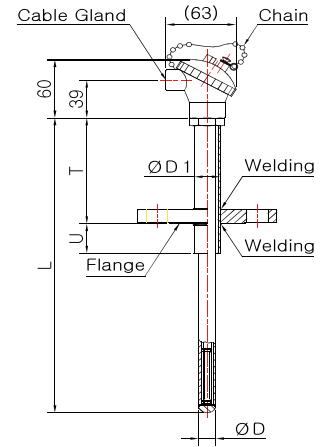
Model No. DS-3035S-1
(Metal Protection Tube)



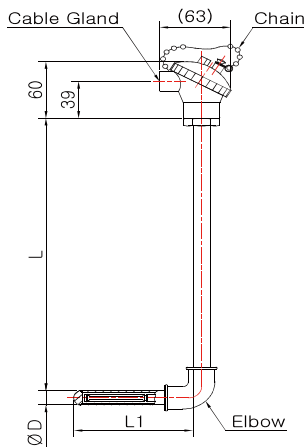
Model No. DS-3036S
(Metal Protection Tube)



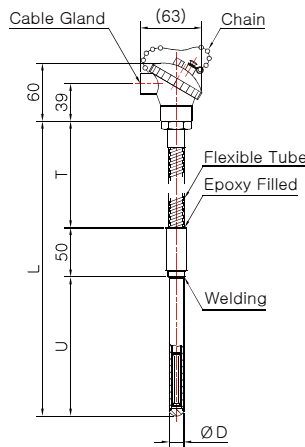
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(Metal Protection Tube)



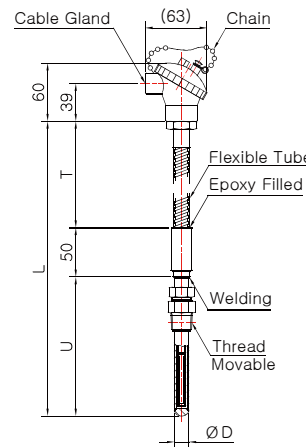
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(Metal Protection Tube)



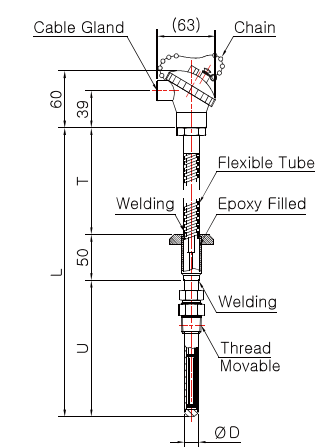
Model No. DS-3037S
(Metal Protection Tube)



Model No. DS-3039S
(Metal Protection Tube)



Model No. DS-3039S-1
(Metal Protection Tube)



Model No. DS-3039S-2
(Metal Protection Tube)

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

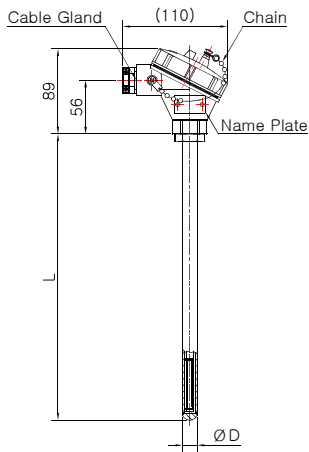
Thermowell

Resistance Temperature Detectors

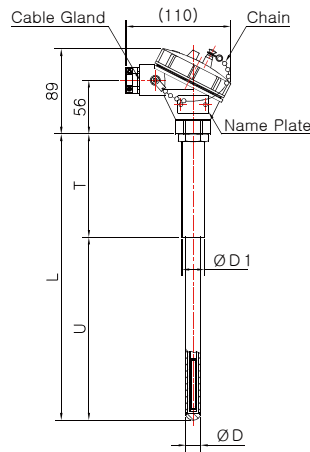
Model. DS-3030W Series

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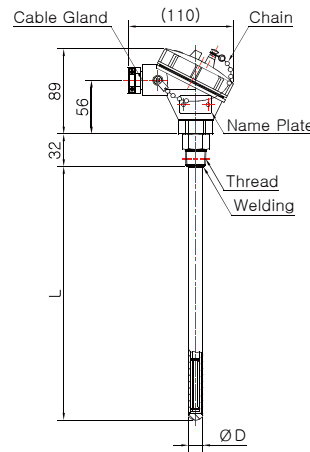
Weather Proof Head Type



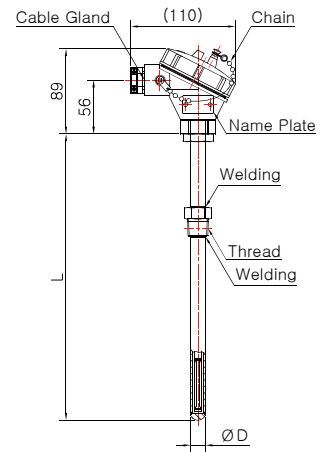
Model No. DS-3031W
(Metal Protection Tube)



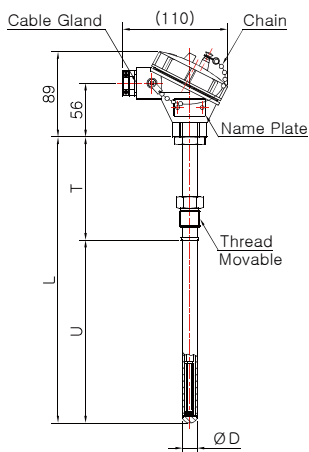
Model No. DS-3031W-2
(Metal Protection Tube)



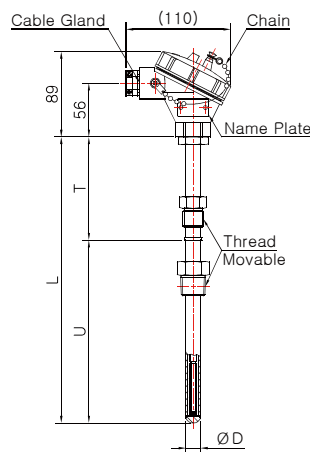
Model No. DS-3032W
(Metal Protection Tube)



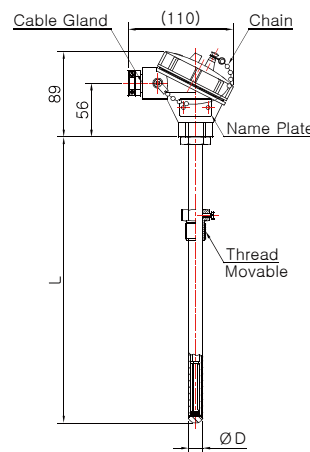
Model No. DS-3032W-1
(Metal Protection Tube)



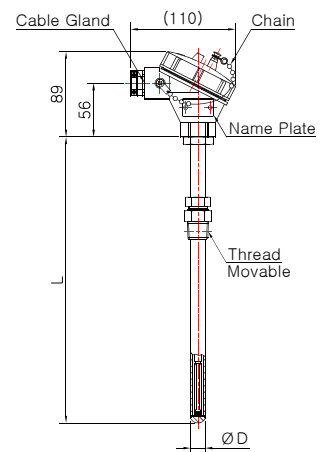
Model No. DS-3032W-2
(Metal Protection Tube)



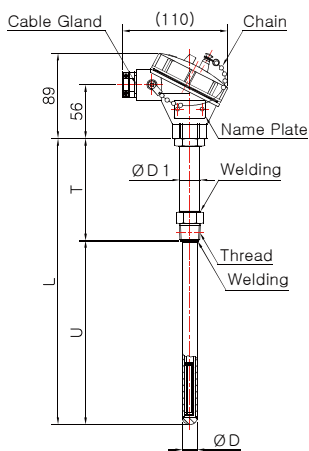
Model No. DS-3032W-3
(Metal Protection Tube)



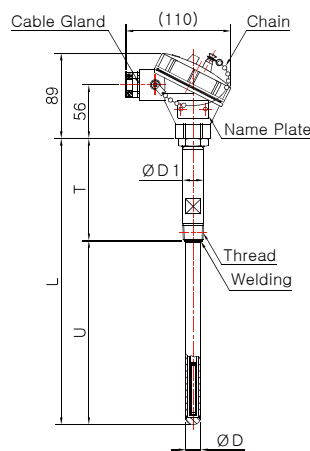
Model No. DS-3032W-4
(Metal Protection Tube)



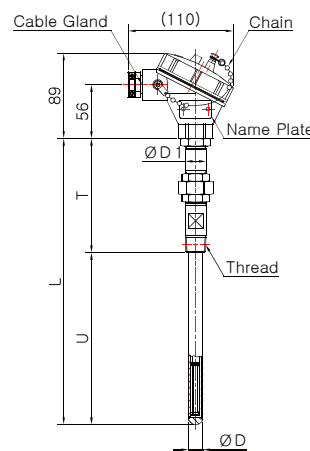
Model No. DS-3032W-6
(Metal Protection Tube)



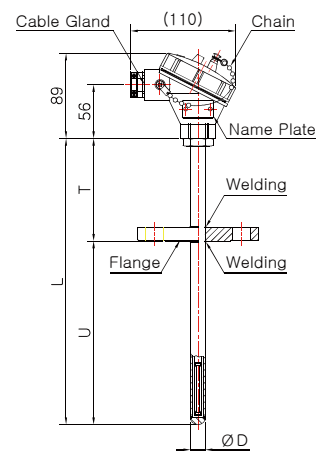
Model No. DS-3033W
(Metal Protection Tube)



Model No. DS-3034W-1
(Metal Protection Tube)



Model No. DS-3034W-2
(Metal Protection Tube)



Model No. DS-3035W
(Metal Protection Tube)

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

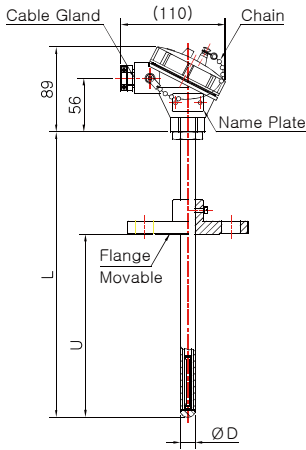
Thermowell

Resistance Temperature Detectors

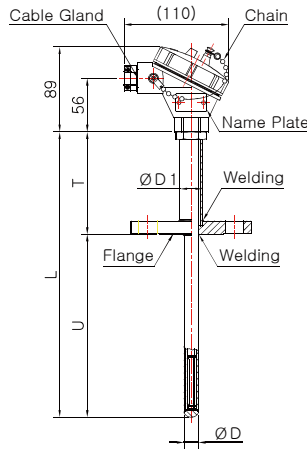
Model. DS-3030W Series

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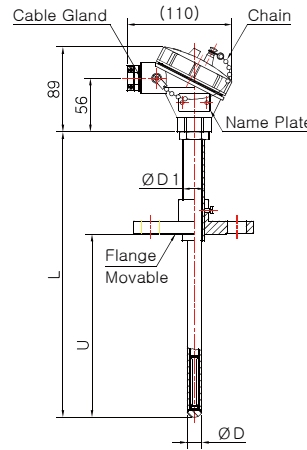
Weather Proof Head Type



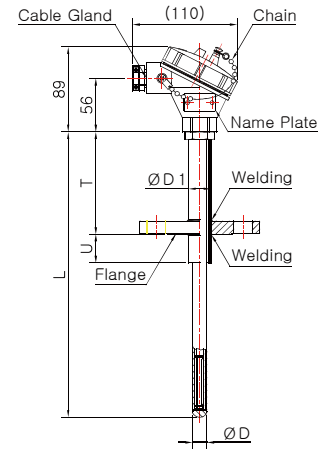
Model No. DS-3035W-1
(Metal Protection Tube)



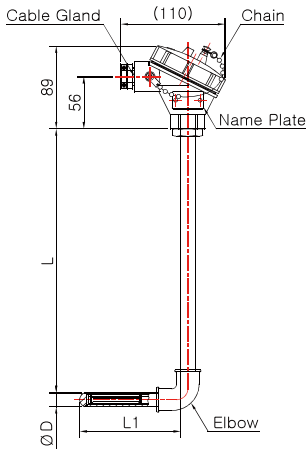
Model No. DS-3036W
(Metal Protection Tube)



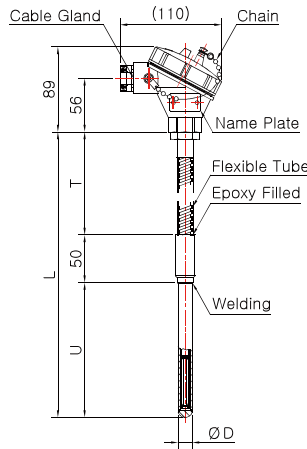
Model No. DS-3036W-2
(Metal Protection Tube)



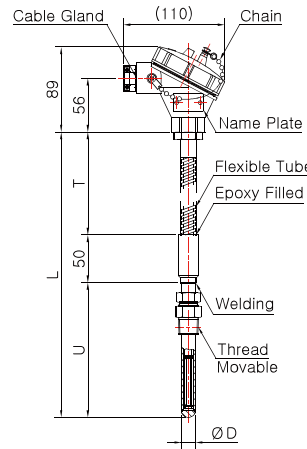
Model No. DS-3036W-3
(Metal Protection Tube)



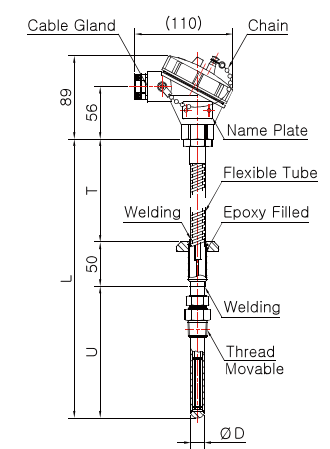
Model No. DS-3037W
(Metal Protection Tube)



Model No. DS-3039W
(Metal Protection Tube)



Model No. DS-3039W-1
(Metal Protection Tube)



Model No. DS-3039W-2
(Metal Protection Tube)

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

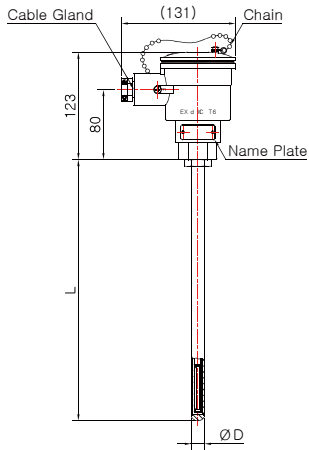
Thermowell

Resistance Temperature Detectors

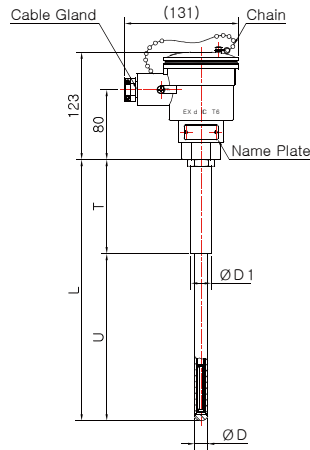
Model. DS-3030E Series

DAESHIN

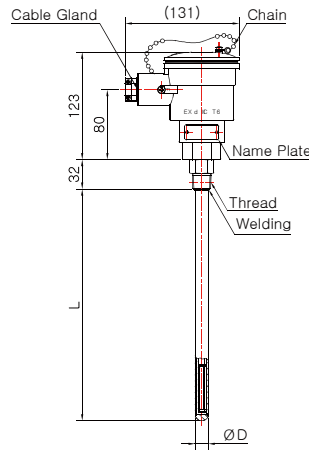
Explosion Proof Head Type



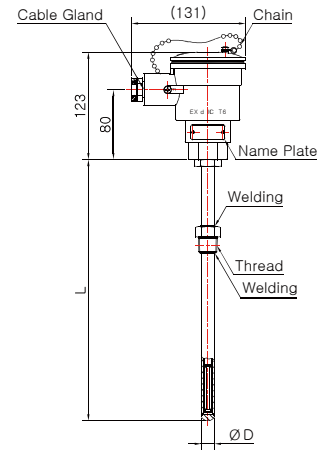
Model No. DS-3031E
(Metal Protection Tube)



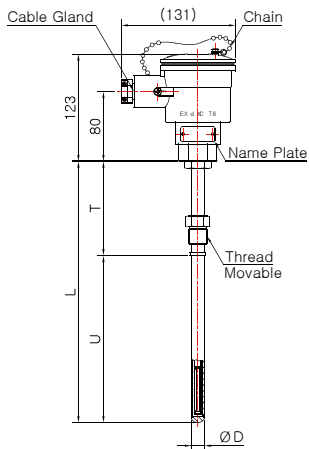
Model No. DS-3031E-2
(Metal Protection Tube)



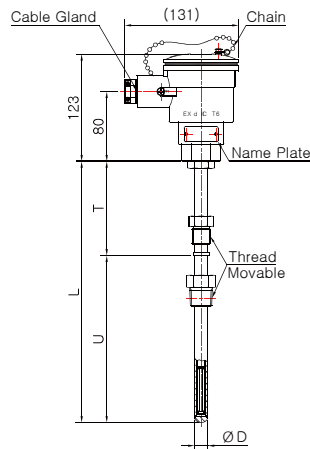
Model No. DS-3032E
(Metal Protection Tube)



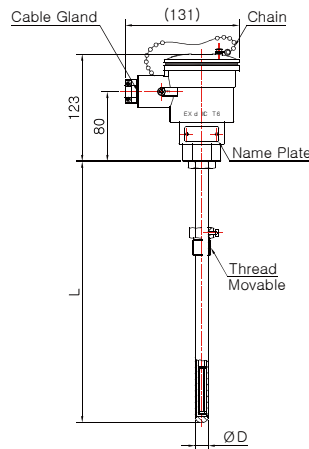
Model No. DS-3032E-1
(Metal Protection Tube)



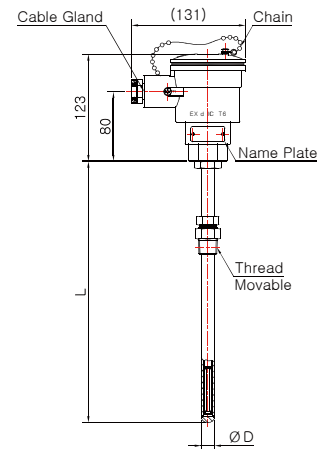
Model No. DS-3032E-2
(Metal Protection Tube)



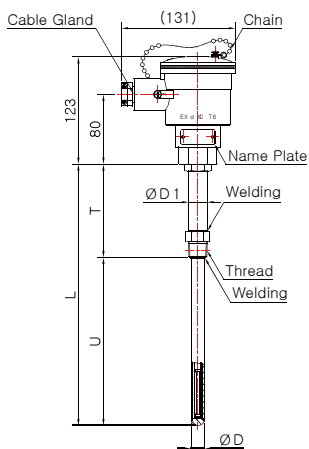
Model No. DS-3032E-3
(Metal Protection Tube)



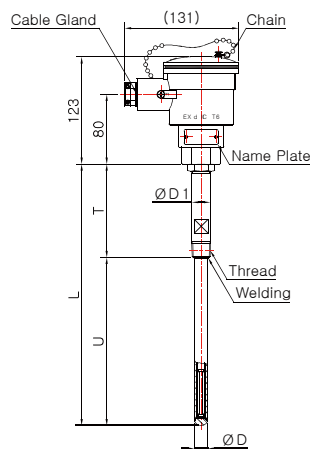
Model No. DS-3032E-4
(Metal Protection Tube)



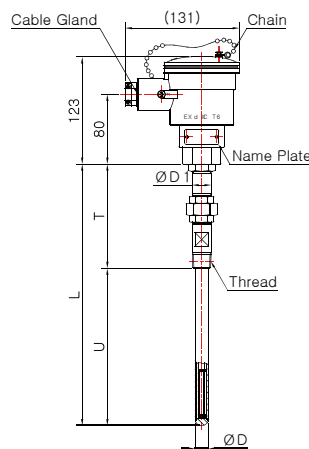
Model No. DS-3032E-6
(Metal Protection Tube)



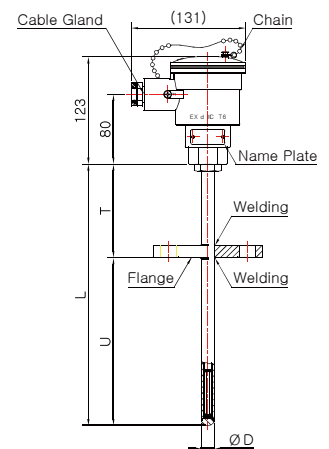
Model No. DS-3033E
(Metal Protection Tube)



Model No. DS-3034E-1
(Metal Protection Tube)



Model No. DS-3034E-2
(Metal Protection Tube)



Model No. DS-3035E
(Metal Protection Tube)

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

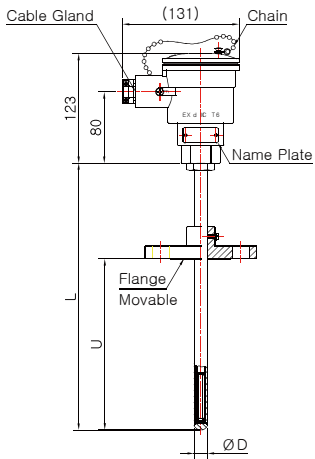
Thermowell

Resistance Temperature Detectors

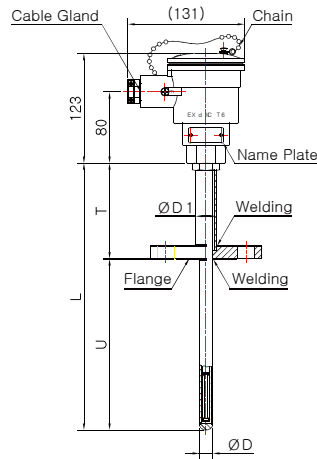
Model. DS-3030E Series

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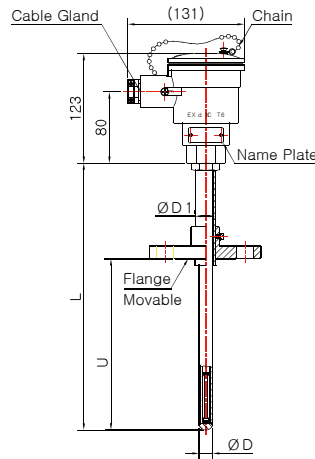
Explosion Proof Head Type



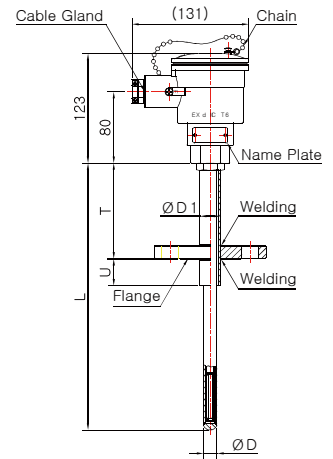
Model No. DS-3035E-1
(Metal Protection Tube)



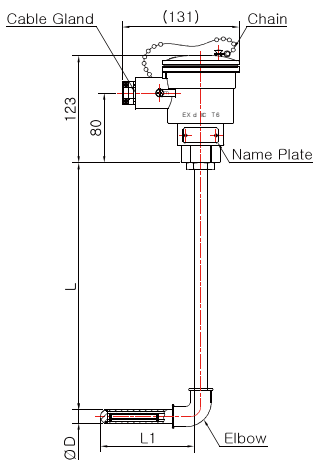
Model No. DS-3036E
(Metal Protection Tube)



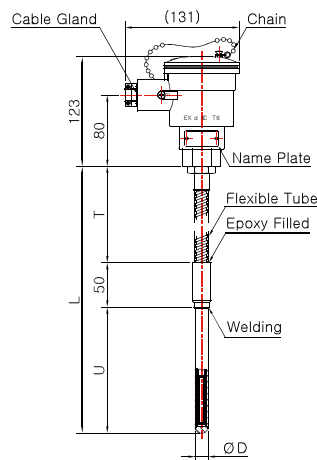
Model No. DS-3036E-2
(Metal Protection Tube)



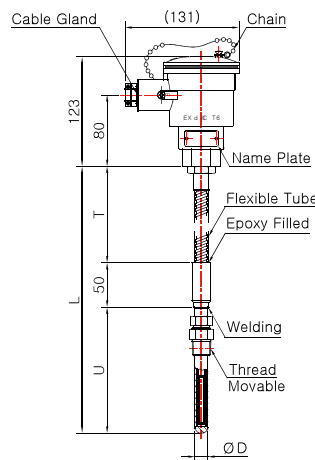
Model No. DS-3036E-3
(Metal Protection Tube)



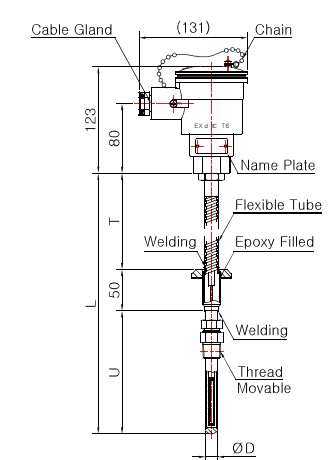
Model No. DS-3037E
(Metal Protection Tube)



Model No. DS-3039E
(Metal Protection Tube)



Model No. DS-3039E-1
(Metal Protection Tube)



Model No. DS-3039E-2
(Metal Protection Tube)

Pressure Gauge

Accessories

Thermometer

Thermocouple & R.T.D

Thermowell