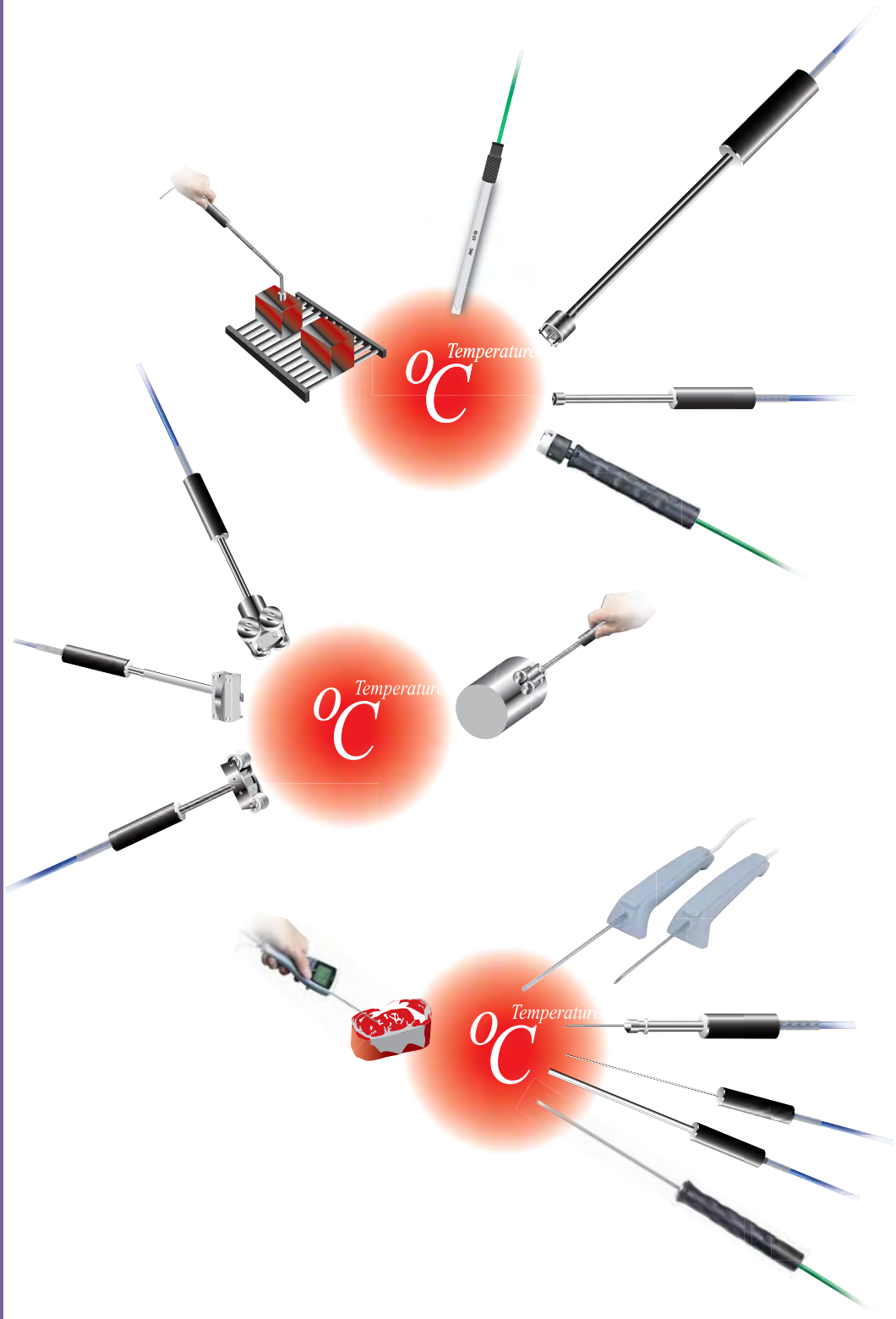
HANDHELD SENSORS

For Handheld Thermometer

Temperature Sensors



RKC INSTRUMENT INC.

For Stationary Surfaces

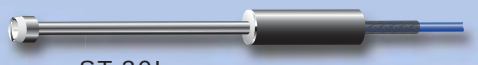
For General Purpose
Maximum Operating Temperature : 300°C

Page 6 to 7

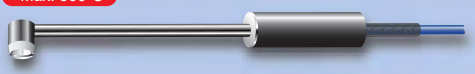
ST-230L
Max. 300°C

Tilting Sensor Head Type ST-230
Max. 300°C

ST-30
Max. 300°C



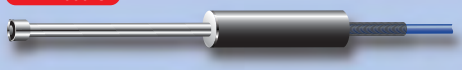
ST-30L
Max. 300°C



For Middle/High Temperature
Maximum Operating Temperature : 600°C

Page 8

ST-32
Max. 600°C



ST-32L
Max. 600°C

For High Temperature
Maximum Operating Temperature : 1000°C

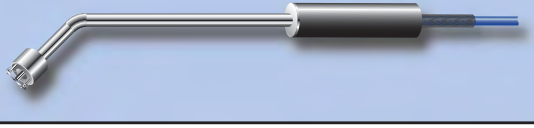
Page 9

ST-29
Max. 800°C

ST-29H
Max. 1000°C

ST-29L
Max. 800°C

ST-29HL
Max. 1000°C

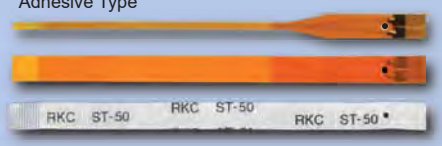


Film Type Temperature Sensors

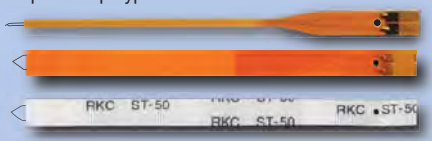
Page 10 to 11

ST-50/50B/51/51S/51SC/51SB/51B
Max. 300°C

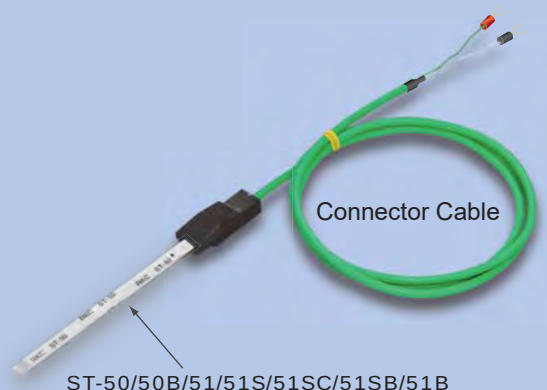
Adhesive Type



Exposed Tip Type



Insulated Type



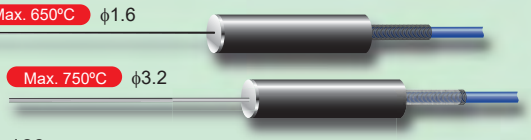
For Semi-solid, Viscous Material and Liquids

For General Purpose

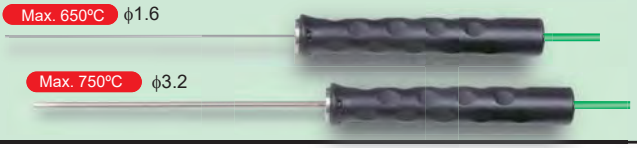
Page 12 to 13

JB-150
Max. 400ºC
(Tip Sharpened Form)

JB-16
Max. 650ºC ϕ1.6
Max. 750ºC ϕ3.2



JB-160
Max. 650ºC ϕ1.6
Max. 750ºC ϕ3.2



For Foods

Page 14

JB-703
Max. 400ºC
IP67 Waterproof
(Tip Sharpened Form)
Polish Finishing

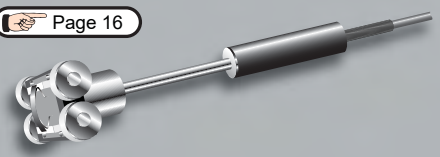
JB-704
Max. 400ºC
IP67 Waterproof
Polish Finishing

For Rotating / Moving Surfaces

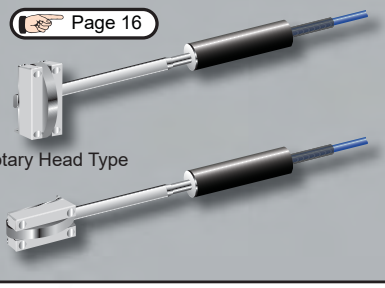
For Roller and Moving Objects (Sheets)

Page 15

ST-41
Max. 300ºC
Page 16
With Distancer



ST-44
Max. 300ºC
Page 16
Rotary Head Type

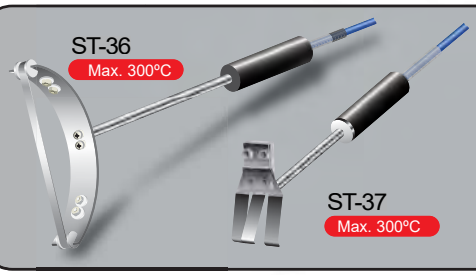


For Roller

Page 16

ST-36
Max. 300ºC

ST-37
Max. 300ºC



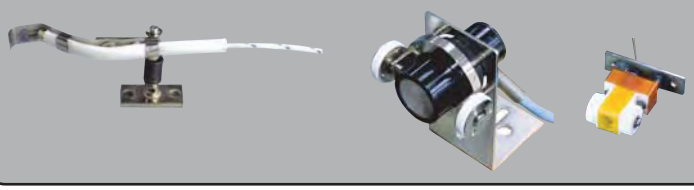
For Roller and Moving Objects (Sheets)

Page 17

Contact / Non-Contact Type (Built-in type)

JBS-3898
Max. 300ºC

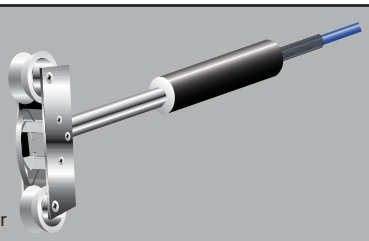
ST-100/100K
Max. 300ºC



For Moving Wire

Page 18

ST-43
Max. 300ºC
With Distancer



Model Code List

JB-150	Internal of Semi-solid, Viscous Material and Liquids (For General Purpose) • Tip Sharpened Form 	Page 12
JB-16	Internal of Semi-solid, Viscous Material and Liquids (For General Purpose) 	Page 12
JB-160	Internal of Semi-solid, Viscous Material and Liquids (For General Purpose) 	Page 13
JB-703	Internal of Semi-solid, Viscous Material and Liquids (For Food) • Tip Sharpened Form 	Page 14
JB-704	Internal of Semi-solid, Viscous Material and Liquids (For Food) 	Page 14
JBS-3898	Moving / Rotating Surfaces (For roller, Built-in type) 	Page 17
ST-230	Stationary Surfaces, Tilting Sensor Head Type (For General Purpose) 	Page 6
ST-230L	Stationary Surfaces, Tilting Sensor Head Type (For General Purpose, L shaped head) 	Page 6
ST-29	Stationary Surfaces (For High Temperature), Max.800ºC 	Page 9
ST-29H	Stationary Surfaces (For High Temperature), Max.1000ºC 	Page 9
ST-29HL	Stationary Surfaces (For High Temperature, L shaped head) Max.1000ºC 	Page 9
ST-29L	Stationary Surfaces (For High Temperature, L shaped head) Max.800ºC 	Page 9
ST-30	Stationary Surfaces (For General Purpose, Small head) 	Page 7
ST-30L	Stationary Surfaces (For General Purpose, Small head, L shaped) 	Page 7
ST-32	Stationary Surfaces (For Middle/High Temperature), Max.600ºC 	Page 8
ST-32L	Stationary Surfaces (For Middle/High Temperature, L shaped head) Max.600ºC 	Page 8
ST-36	Rotating / Moving Surfaces (For Roller) 	Page 16
ST-37	Rotating / Moving Surfaces (For Roller) 	Page 16
ST-41	Rotating / Moving Surfaces (For roller and moving objects [Sheets]) 	Page 15
ST-43	Rotating / Moving Surfaces (For moving wire) 	Page 18
ST-44	Rotating / Moving Surfaces (For roller, Rotary head type) 	Page 15
ST-50	Stationary Surfaces (Adhesive and Exposed Tip Type) 	Page 10 to 11
ST-100	Rotating / Moving Surfaces (For Roller, Built-in Type) • Non-Contact Type, For Metal Surface 	Page 17
ST-100K	Rotating / Moving Surfaces (For Roller, Built-in Type) • Non-Contact Type, For Insulator Surface 	Page 17

How to read this catalog

Structure of sensor head and measuring part

- Shape of sensor is provided only for surface measurement sensors.

Model code necessary to order sensors

Model code of the sensor described on this page

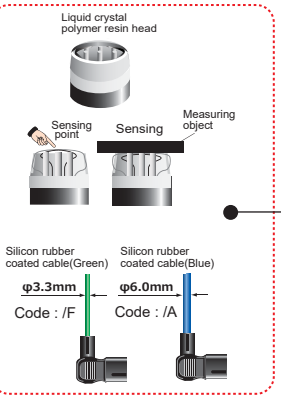
Applicable measured objects and major applications of the sensor

ST-230 Stationary Surfaces For General Purpose Maximum Operating Temperature : 300ºC

ST-230□-K-1000-□□

- /F : Silicon rubber coated cable (Green) Standard type
- /A : Silicon rubber coated cable (Blue)
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- K : Thermocouple K
- No symbol : Straight type
- L : L shaped type

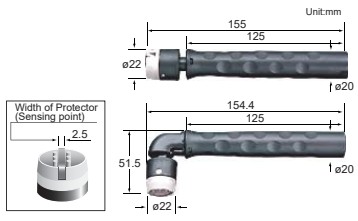
Products with traceability option.



- Tilting sensor head type with free movement head. The temperature can be accurately measured by pressing the temperature sensor against the object under measurement.
- Dimpled processing for grip. Designed for easy grip with or without gloves.
- Temperature sensor has a maximum operating temperature of 300ºC and is designed to measure the surface temperature of metals and insulators. (Temperature Range : -40 to 300ºC)
- The head is made of a liquid crystal polymer resin that does not scratch the measurement object and has little thermal effect.
- More durable "Silicon rubber coated cable(Blue)" is available.

	Response Time: Response of 99%	Response Time: Response of 90%	Resistance value (With cable 1m)	Accuracy (*)
ST-230 ST-230L	1.1 sec (Metal Surface)	0.45 sec (Metal Surface)	7.7Ω	±1.3ºC or ±1.3% of measured temperature (Whichever is larger)

(*) : Accuracy when temperature on copper metal surface is 100°C.



External appearance and selectable connectors (connecting plugs) for the sensor

External Dimensions

Overview of a sensor

Hardware specifications or optional services for a sensor

- #400 Protection tube with #400 buff finish for food application.
- Waterproof (Water washable)
- Products those which traceable documents are available

Specifications

Response Time (95% response)
A time required to indicate 95 % of the temperature range after the sensor has in contact with a measured object.

Time Constant (63% response)
A time required to indicate 63 % of the temperature range after the sensor has in contactd with a measured object.

Resistance value with cable 1m
Total resistance including a sensor itself and lead wire.

Accuracy
Accuracy when temperature on copper metal surface is 100ºC .
- Measurement method depends on the sensor types.

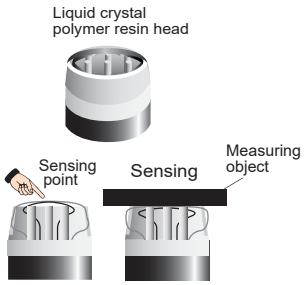
ST-230 Stationary Surfaces For General Purpose

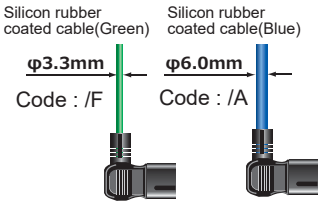
Maximum Operating Temperature : 300ºC

ST-230□-K-1000-□□

- /F : Silicon rubber coated cable (Green) Standard type
- /A : Silicon rubber coated cable (Blue)
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  • Please contact distributors for cable length more than 1m.
- K : Thermocouple K
- No symbol : Straight type
- L : L shaped type

Products with traceability option.



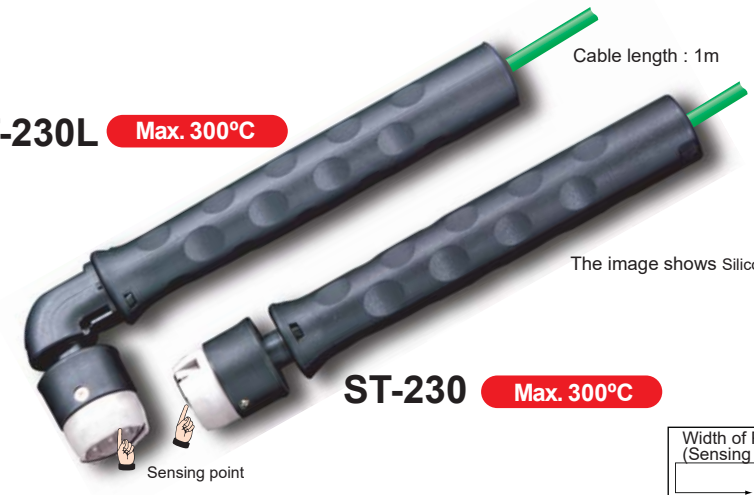


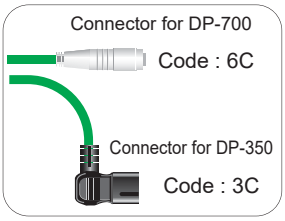
- Tilting sensor head type with free movement head.
  The temperature can be accurately measured by pressing the temperature sensor against the object under measurement.
- Dimpled processing for grip
  Designed for easy grip with or without gloves.
- Temperature sensor has a maximum operating temperature of 300ºC and is designed to measure the surface temperature of metals and insulators. (Temperature Range : -40 to 300ºC)
- The head is made of a liquid crystal polymer resin that does not scratch the measurement object and has little thermal effect.
- More durable "Silicon rubber coated cable(Blue)" is available.

	Response Time Response of 99%	Response Time Response of 90%	Resistance value (With cable 1m)	Accuracy (*)
ST-230 ST-230L	1.1 sec (Metal Surface)	0.45 sec (Metal Surface)	7.7Ω	±1.3°C or ±1.3% of measured temperature (Whichever is larger)

(*) : Accuracy when temperature on copper metal surface is 100°C.

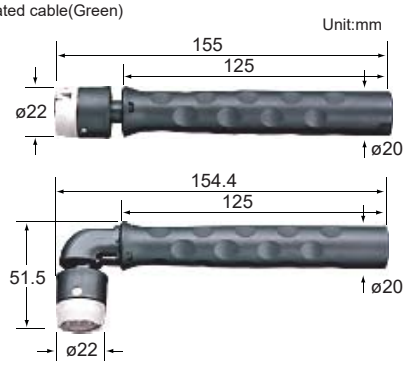
ST-230L Max. 300ºC

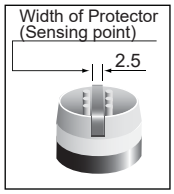


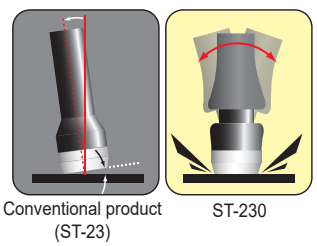


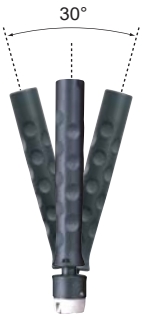
The image shows Silicon rubber coated cable(Green)

ST-230 Max. 300ºC

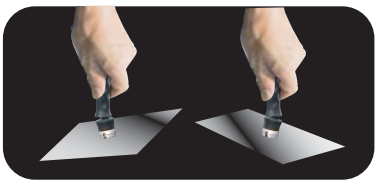








With a conventional sensor, a gap between the sensing element and the measured object caused by unintentional movement results in measurement error.
The ST-230 uses a tilting head structure which keeps a firm contact and minimizes the influence due to unintentional movement of the sensor.

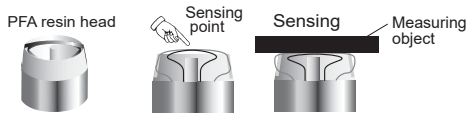


ST-30□-K-1000-□□

- /A : Silicon rubber coated cable (Blue) Standard type
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  • Please contact distributors for cable length more than 1m.
- K : Thermocouple K
- No symbol : Straight type
- L : L shaped type

Products with traceability option.

- Standard temperature sensor for metallic and insulated objects, with a Teflon coated head, for measurement up to 300°C maximum.
- Compact head. Suitable for small area measurement.

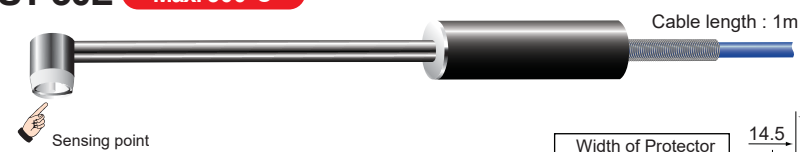


	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)	Accuracy (*)
ST-30 ST-30L	0.6 sec (Metal Surface)	0.2 sec (Metal Surface)	8Ω	±0.5%±1°C

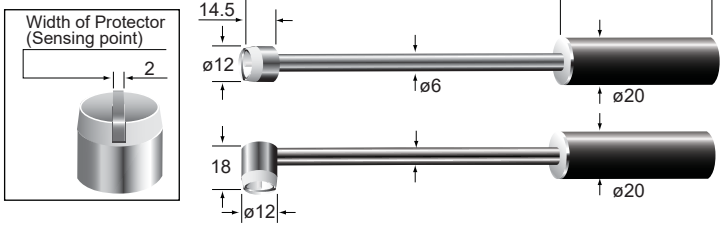
(*) : Accuracy when temperature on copper metal surface is 100°C.

ST-30 Max. 300ºC

ST-30L Max. 300ºC



Unit:mm



ST-32

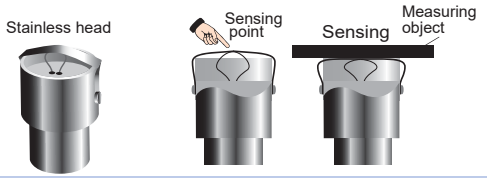
Stationary Surfaces **For Middle/High Temperature** Maximum Operating Temperature : 600ºC

ST-32□-K-1000-□□

- /A : Silicon rubber coated cable (Blue) Standard type
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- K : Thermocouple K
- No symbol : Straight type
- L : L shaped type

Products with traceability option.

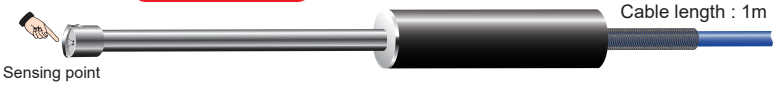
- Standard temperature sensor for metallic objects, for measurement up to 600°C maximum.
- Durable stainless steel head.



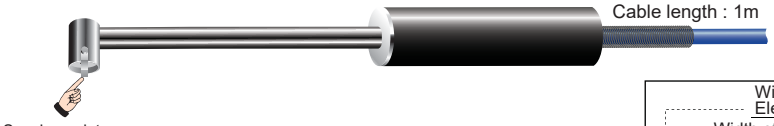
	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)	Accuracy (*)
ST-32	0.7 sec (Metal Surface)	0.2 sec (Metal Surface)	7.5Ω	±0.5%±1°C

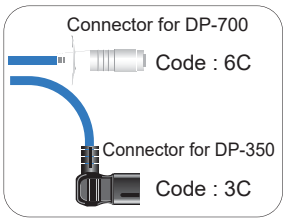
(*) : Accuracy when temperature on copper metal surface is 100°C.

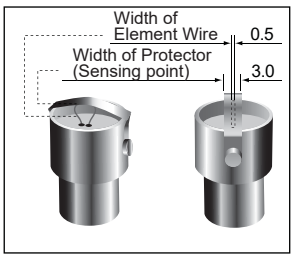
ST-32 Max. 600ºC



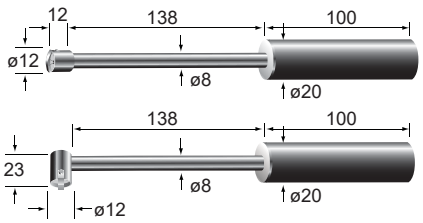
ST-32L Max. 600ºC





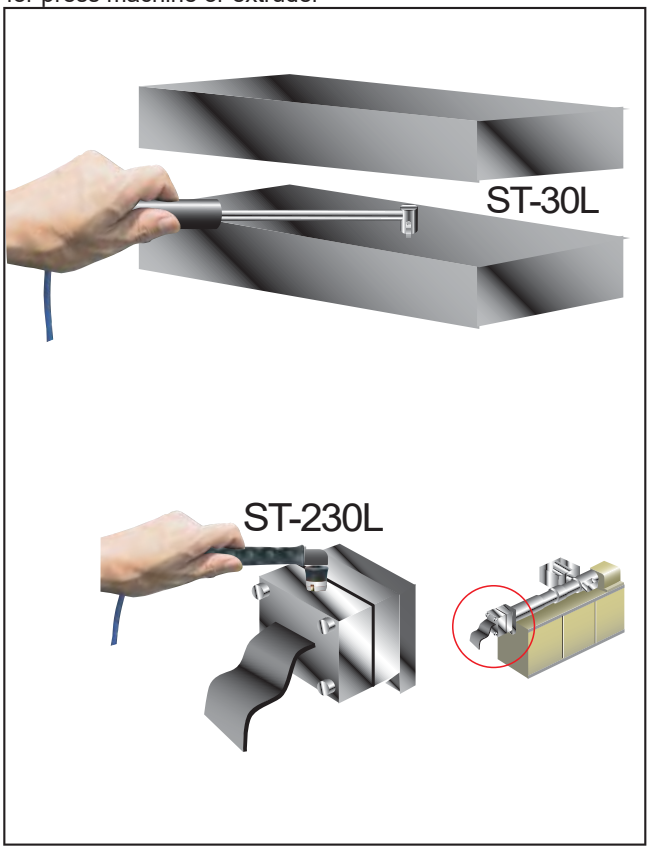


Unit:mm

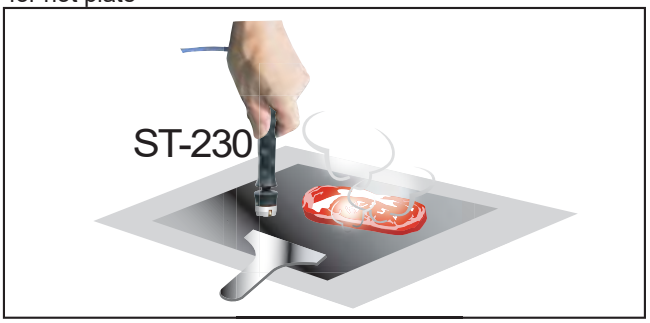


● Applications

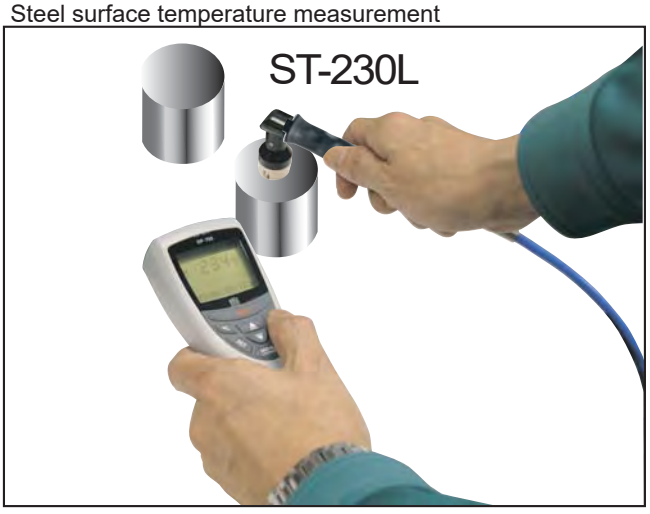
Mold surface temperature measurement for press machine or extruder



Surface temperature measurement for hot plate



Steel surface temperature measurement



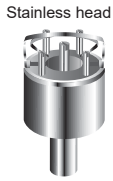
ST-29□-K-1000-□□

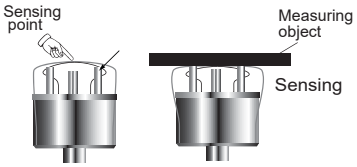
- /A : Silicon rubber coated cable (Blue) Standard type
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- K : Thermocouple K
- No symbol : Straight type
- L : L shaped type (Standard type)
- H : Straight type (For high temperature)
- HL : L shaped type (For high temperature)

Products with traceability option.

- Standard temperature sensor for metallic objects, for measurement up to 800°C maximum.
- Type H measures up to maximum of 1000°C. *

* The measuring part will deteriorate rapidly if used above 1000°C.



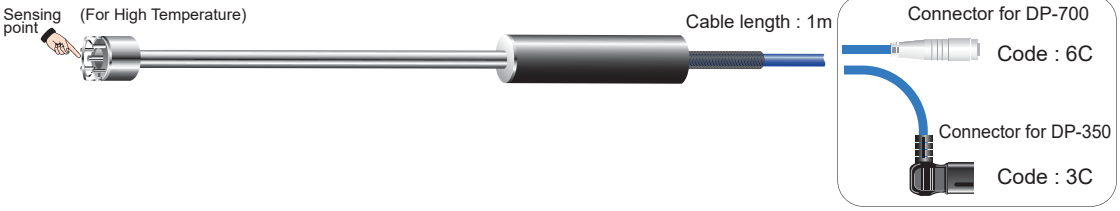


	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)	Accuracy (*)
ST-29 ST-29L	0.5 sec (Metal Surface)	0.1 sec (Metal Surface)	10.0Ω	±0.3%±1°C
ST-29H ST-29HL	1.5 sec (Metal Surface)	0.4 sec (Metal Surface)	2.0Ω	±0.5%±1°C

(*) : Accuracy when temperature on copper metal surface is 100°C.

ST-29 Max. 800ºC
ST-29H Max. 1000ºC

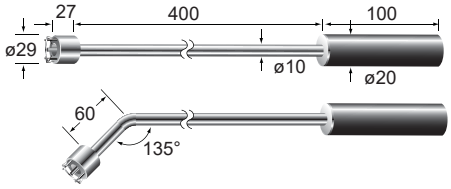
(For High Temperature)

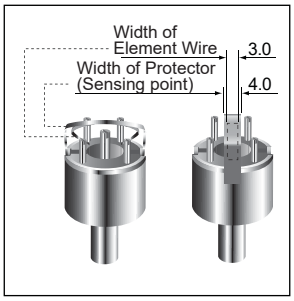


ST-29L Max. 800ºC
ST-29HL Max. 1000ºC

(For High Temperature)

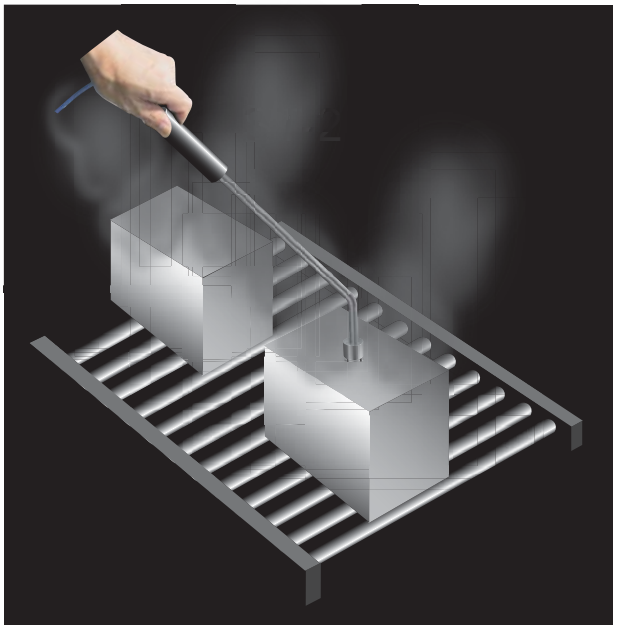
Unit:mm





● Applications

● Surface temperature measurement of a steel material after heat treatment



ST-50 Stationary Surfaces For Extremely Small Surface (Adhesive and Exposed Tip Type)

• A dedicated connecting cable is required. (Sold separately).

<ST-50> Glass cloth base type

ST-50 (Adhesive type)

Model Code	Contents
ST-50	Length : 107mm, Element Wire Diameter 50µm, 5 pieces per set
ST-50-100-D	Length : 107mm, Element Wire Diameter 100µm, 5 pieces per set
ST-50-300	Length : 307mm, Element Wire Diameter 100µm, 1 piece
ST-50-500	Length : 507mm, Element Wire Diameter 100µm, 1 piece

ST-50B (Exposed tip type)

Model Code	Contents
ST-50B-100-04	Length : 104mm, Element Wire Diameter 50µm, 5 pieces per set
ST-50B-100-04-D	Length : 104mm, Element Wire Diameter 100µm, 5 pieces per set
ST-50B-300-04	Length : 304mm, Element Wire Diameter 100µm, 1 piece
ST-50B-500-04	Length : 504mm, Element Wire Diameter 100µm, 1 piece

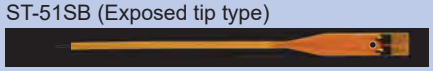
• A dedicated connecting cable is required. (Sold separately).

<ST-51> Polyimide sheet type

ST-51S (Adhesive type)

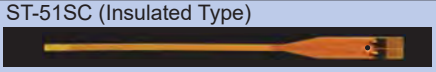
Model Code	Contents
ST-51S-100-C	Length : 107mm, Element Wire Diameter 50µm, 5 pieces per set

ST-51SB (Exposed tip type)



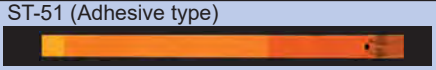
Model Code	Contents
ST-51SB-100-04-C	Length : 107mm, Element Wire Diameter 50µm, 5 pieces per set

ST-51SC (Insulated Type)



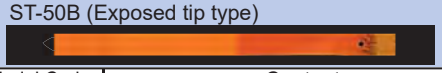
Model Code	Contents
ST-51SC-100-C	Length : 107mm, Element Wire Diameter 50µm, 5 pieces per set

ST-51 (Adhesive type)



Model Code	Contents
ST-51-100-C	Length : 107mm, Element Wire Diameter 50µm, 5 pieces per set

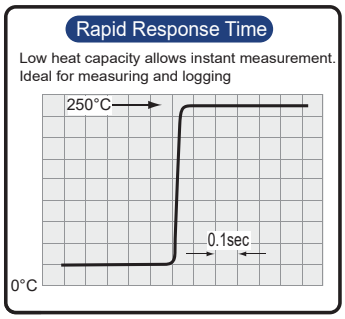
ST-50B (Exposed tip type)



Model Code	Contents
ST-51B-100-04-C	Length : 107mm, Element Wire Diameter 50µm, 5 pieces per set

- Ideal for measuring hard-to-reach target with its thin film design.
- Compatible with all Type K Thermocouple Input instruments.
- Easily stick on target with Self-Adhesive Type or insert between two touching surfaces with Exposed Tip Type. Use Polyimide (PI) Insulated Type for applications where electrical insulation is needed.

<W-ST50A>
Connector Cable for ST-50/ST-51
(Connecting cable for DP-350 with a 3C plug)



< ST-50B / ST-51B / ST-51SB characteristic curve>

ST-50/51

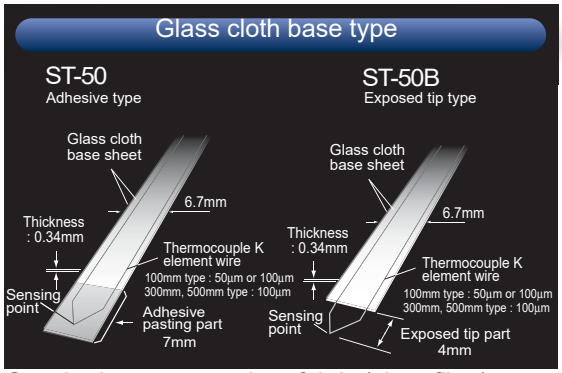
	Response of *1 95.0%	Resistance value (With cable 1m)	Accuracy
ST-51S (50µm element wire)	0.08sec	51Ω	±1.2°C
ST-51SB (50µm element wire)	0.03sec	51Ω	±1.2°C
ST-51SC (50µm element wire)	0.5sec	51Ω	±1.2°C
ST-51 (50µm element wire)	0.08sec	51Ω	±1.3°C
ST-51B (50µm element wire)	0.03sec	51Ω	±1.3°C
ST-50 (50µm element wire)	0.08sec	51Ω	±1.3°C
ST-50-100-D (100µm element wire)	0.08sec	17Ω	±1.5°C
ST-50-300 (100µm element wire)	0.08sec	41Ω	±1.5°C
ST-50-500 (100µm element wire)	0.08sec	66Ω	±1.5°C
ST-50B (50µm element wire)	0.03sec	51Ω	±1.3°C
ST-50B-100-D (100µm element wire)	0.03sec	17Ω	±1.5°C
ST-50B-300 (100µm element wire)	0.03sec	41Ω	±1.5°C
ST-50B-500 (100µm element wire)	0.03sec	66Ω	±1.5°C

*1 : Response when temperature of paraffin is 250°C (482°F).
*2 : Accuracy when temperature on metal surface is 100°C (212°F).

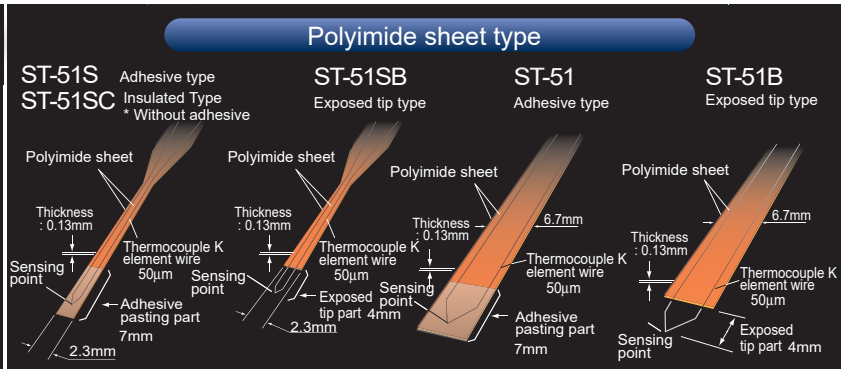
Response of Metal Surface (Adhesive type)

50µm element wire type	0.4sec
100µm element wire type	0.9sec

Glass cloth base type



Polyimide sheet type



Standard non-woven glass fabric (glass fiber) type.
100mm/300mm/500mm types are available.

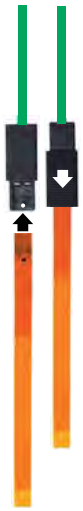
- For a 100mm long thermocouple wire type, available diameter is either 50μm or 100μm.
- For 300mm or 500mm long thermocouple wire types, available diameter is only 100μm.

Thin polyimide resin type (0.13mm thickness)
Low dust emission allows for a clean operating environment.

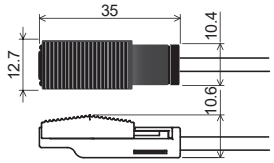
- Please consult with our local distributors for either 300mm or 500mm type requirement

■ Connector Cable Specifications

Connector material	PPS resin
Connector Max. temperature	230°C
Cable	ø3.3 Extended cable, Standard 1m
Cable material	Silicon rubber coated (Green)
Resistance value	7.0Ω or less (1m)
Cable Max. temperature	180°C
Weight	Approx 20g (Cable 1m, Y-sharped terminal lug type)



● Connector External Dimension Unit : mm



■ Sensor Specifications

Sheet Material	ST-50/50B : Glass cloth base sheet ST-51/51S/51B : Polyimide sheet
Operating Temperature	ST-51S/51SC/51SB : -40 to 300°C (-40 to 577°F) ST-50/50B/51S/51B : 0 to 300°C (32 to 577°F)
Adhesive Tape	• Up to 150°C: Can be stuck and peeled off repeatedly. • Up to 200°C: Can be stuck and peeled off repeatedly under the condition that the temperature is not lowered below 150°C. • Up to 250°C: Can be stuck and peeled off repeatedly under the condition that the temperature is not lowered below 200°C. • More than 250°C: Adhesive will burn and harden. Depending upon the environment, the number of times the adhesive can be reused is limited.
Thermocouple	Type K
Sensor Length	ST-50/50B : 100/300/500mm Type ST-51/51S/51B : 100mm Type
Sensor Thickness	ST-50/50B : 0.34mm ST-51/51S/51SC/51SB/51B : 0.13mm
Element wire diameter	ST-50/50B : 50μm/100μm (100mm Type) 100μm (300/500mm Type) ST-51/51S/51SC/51SB/51B : 50μm
Insulation resistance (ST-51SC)	More than 10MΩ at 500V DC
Dielectric voltage (ST-51SC)	500V AC for one minute.

■ Connector Cable Model Code

- A dedicated connecting cable is necessary for use with ST-50/51/50B/51B sensors. (Sold separately)

ST-50/51/51S/50B/51B

Connector Cable

Cable length : 1m (Standard)

- Please consult with our local distributors for cable length more than 1m.

Connector for DP-350

Handheld Thermometer

DP-350 DP-700

W-ST50A-1000-3C

Connector for DP-700

W-ST50A-1000-6C

Indicator, Controller, Recorder

Y-shaped terminal lug

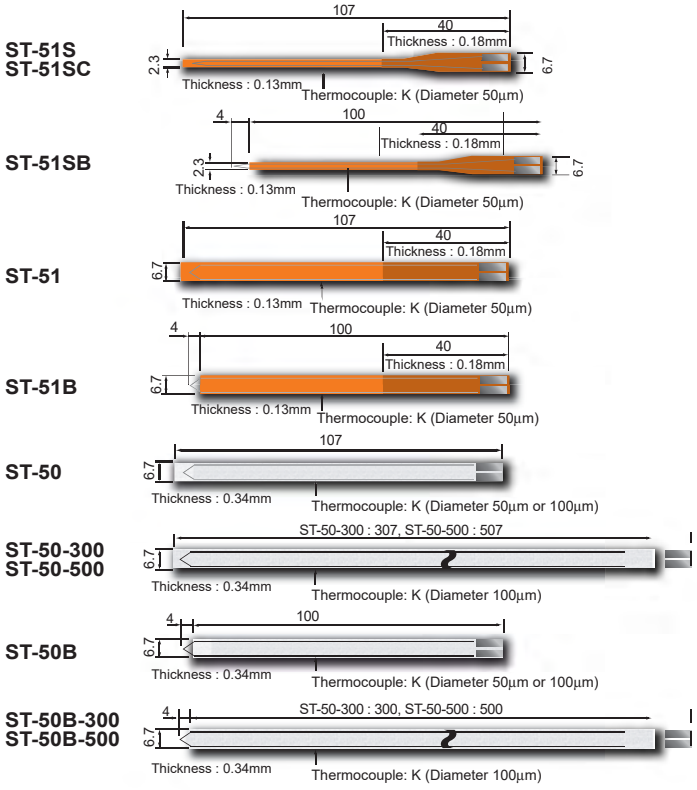
W-ST50A-1000-Y3

AG500 VGR Series

- Cable termination: soldered or bare end, with a TC connector to order.

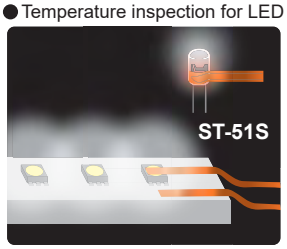
Temperature measuring instrument (Thermocouple K input type)

● Sensor External Dimension Unit : mm

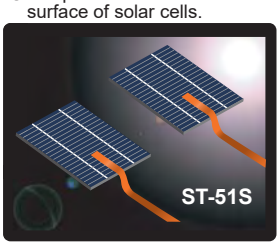


● Applications

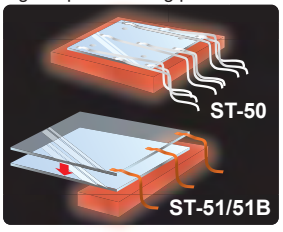
● Temperature inspection for LED



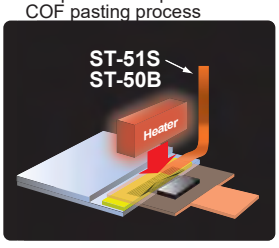
● Temperature distribution on the surface of solar cells.



● Temperature inspection for glass plate heating process



● Temperature inspection for COF pasting process



JB-150 / JB-16

For Semi-solid, Viscous Material and Liquids

For General Purpose

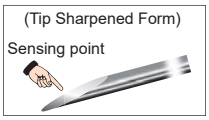
JB-150-K-□-1000-□□

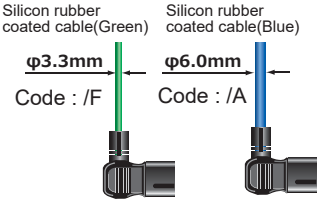
- /F : Silicon rubber coated cable (Green) Standard type
- /A : Silicon rubber coated cable (Blue)
- 3C : Connector for DP-350
  6C : Connector for DP-700
- 1000 : Cable length 1m
  • Please contact distributors for cable length more than 1m.
- 50 : Protection tube 50mm
- K : Thermocouple K

Products with traceability option.

• A needle type temperature sensor. Its needle shaped protection tube tip can be stuck into a semi-solid object.
• More durable "Silicon rubber coated cable(Blue)" is available.

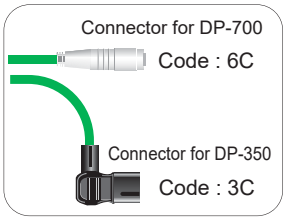
(Tip Sharpened Form)





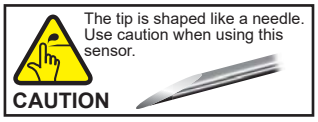
JB-150 Max. 400°C

The image shows Silicon rubber coated cable(Green)



	Response of 90%	Resistance value (With cable 1m)
JB-150	0.6 sec (Boiling Water)	11Ω

Accuracy
Less than 333°C : ±2.5°C
More than 333°C : ±0.0075•\|t\|
(t=Measured temperature)



JB-16-K-□-□-1000-□□

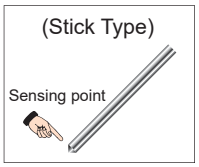
- /A : Silicon rubber coated cable (Blue) Standard type
  /C : Spiral cable
- 3C : Connector for DP-350
  6C : Connector for DP-700
- 1000 : Cable length 1m
  • Please contact distributors for cable length more than 1m.
- 100: Protection tube 100mm (Standard)
  • Please contact distributors for protection tube more than 100mm.
- 1.6 : Protection tube diameter : ø1.6 (*)
  3.2 : Protection tube diameter : ø3.2 (*)
- K : Thermocouple K

Products with traceability option.

(*) Available with sheath diameter of 1.0mm/2.3mm/4.8mm/6.4mm.

• This is a stick type temperature sensor for internal temperature measurement of the object.
This sensor can be dipped into liquids or stuck into a semi-solid objects.

(Stick Type)

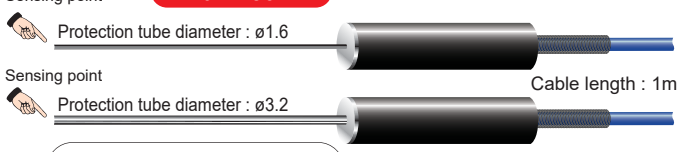


JB-16	Response of 95%	Response of 63% (Time constant)
ø1.6	1.00 sec (Boiling Water)	0.15sec (Boiling Water)
ø3.2	2.50 sec (Boiling Water)	0.50sec (Boiling Water)

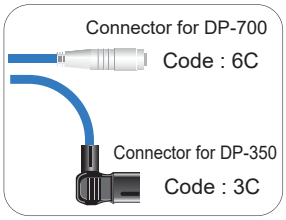
JB-16	Resistance value (With cable 1m)
ø1.6	3.9Ω
ø3.2	1.7Ω

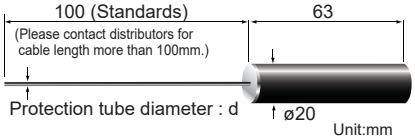
Accuracy
Less than 333°C : ±2.5°C
More than 333°C : ±0.0075•\|t\|

JB-16 Max. 650°C : ø1.6 / Max. 750°C : ø3.2



Nicrobell sheathed type is also available.
Recommended for frequent measurement of high temperature objects.
Please consult with our local distributors.





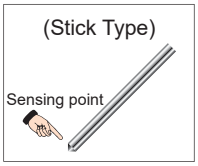
JB-160-K-□-□-1000-□□

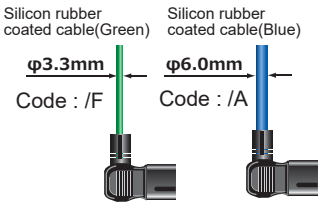
- /F : Silicon rubber coated cable (Green) Standard type
- /A : Silicon rubber coated cable (Blue)
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- 100: Protection tube 100mm
  150: Protection tube 150mm
- 1.6 : Protection tube diameter : ø1.6
  3.2 : Protection tube diameter : ø3.2
- K : Thermocouple K

Products with traceability option.

- Dimpled handle for easy grip with or without gloves.
- More durable "Silicon rubber coated cable(Blue)" is available.

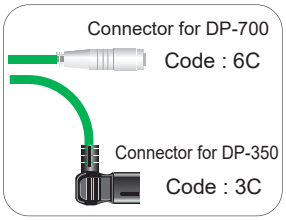
(Stick Type)

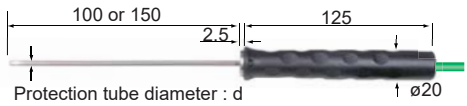




JB-160	Response of 90%	Resistance value (With cable 1m)	Accuracy
ø1.6	0.7 sec (Boiling Water)	12Ω	Less than 333°C : ±2.5°C More than 333°C : ±0.0075•|t|
ø3.2	1.4 sec (Boiling Water)	9Ω	

JB-160 Max. 650°C : ø1.6
Max. 750°C : ø3.2



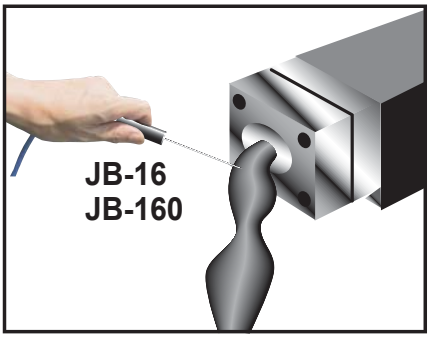


Unit:mm

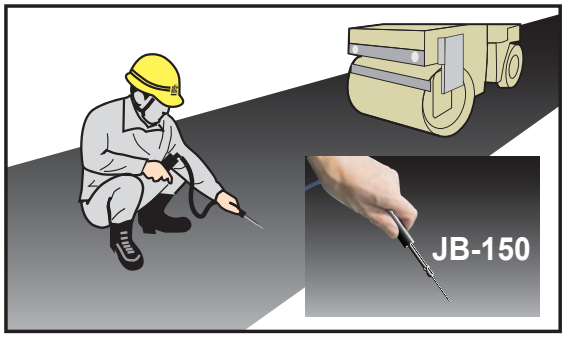
The image shows Silicon rubber coated cable(Green)

Applications

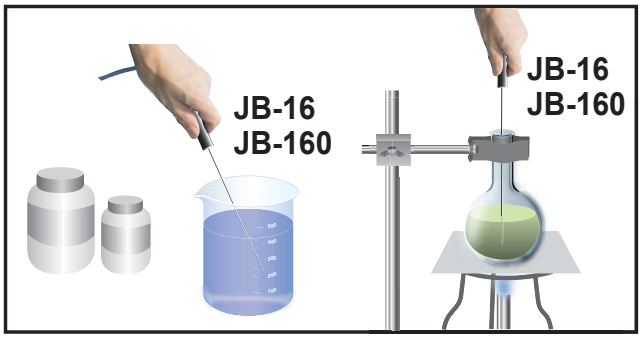
Extrusion molding machine outlet resin temperature measurement



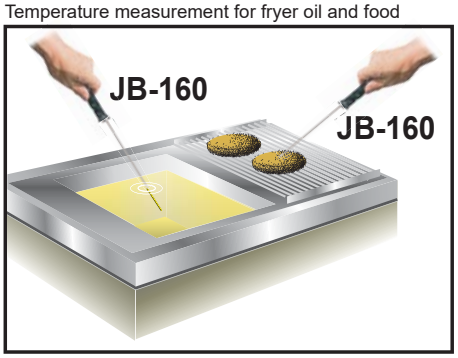
Internal temperature measurement of asphalt during road paving



Reaction temperature measurement of chemical solutions.
(Not available for corrosive liquids such as sulfuric acid.)



Temperature measurement for fryer oil and food



JB-703 / JB-704

For Semi-solid, Viscous Material and Liquids

For Producing Foods

JB-703 A-K-1000-6C/E

For DP-700

(Tip Sharpened Form)

- /E : Silicon rubber coated cable (White)
- 6C : Connector for DP-700
- 1000 : Cable length 1m
- K : Thermocouple K
- A : Protection tube : #400 polish finishing, Waterproof

Waterproof

#400 polish finishing

Products with traceability option.

JB-703

Sensing point

(Tip Sharpened Form)

JB-703 Max. 400°C

Connector for DP-700
Code : 6C

Sensing point

(Tip Sharpened Form, Polish Finishing)

The tip is shaped like a needle. Use caution when using this sensor.

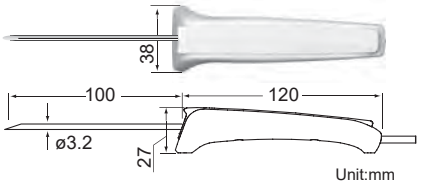
CAUTION

- A stick type temperature sensor for food and general use. Exclusively designed for use with our DP-700. Its protecting tube is buff finished.
- IP67 waterproof structure. The sensor and DP-700 when connected together can be washed with water.
- JB-703, having a needle shaped protection tube tip, allows for insertion into a relatively solid object.

	Response of 90%	Resistance value (With cable 1m)
JB-703	1.1 sec (Boiling Water)	7.6Ω

Accuracy

Less than 333°C : ±2.5°C
More than 333°C : ±0.0075•|t|
(t=Measured temperature)



Unit:mm

JB-704 A-K-3.2-100-1000-6C/E

For DP-700

- /E : Silicon rubber coated cable (White)
- 6C : Connector for DP-700
- 1000 : Cable length 1m
- 100: Protection tube 100mm
- 3.2 : Protection tube diameter : ø3.2
- K : Thermocouple K
- A : Protection tube : #400 polish finishing, Waterproof

Waterproof

#400 polish finishing

Products with traceability option.

JB-704

Sensing point

JB-704 Max. 400°C

Connector for DP-700
Code : 6C

Sensing point

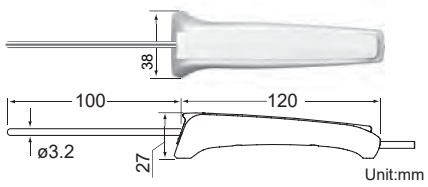
(Polish Finishing)

- A stick type temperature sensor for food and general use. Exclusively designed for use with our DP-700. Its protecting tube is buff finished.
- IP67 waterproof structure. The sensor and DP-700 when connected together can be washed with water.

	Response of 90%	Resistance value (With cable 1m)
JB-704	1.9 sec (Boiling Water)	18.5Ω

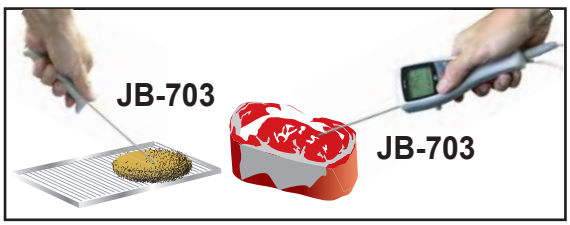
Accuracy

Less than 333°C : ±2.5°C
More than 333°C : ±0.0075•|t|
(t=Measured temperature)

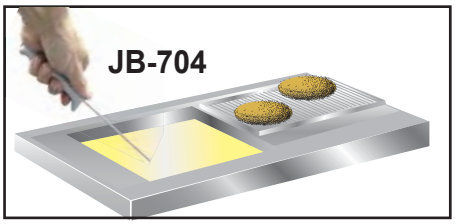


Unit:mm

Applications

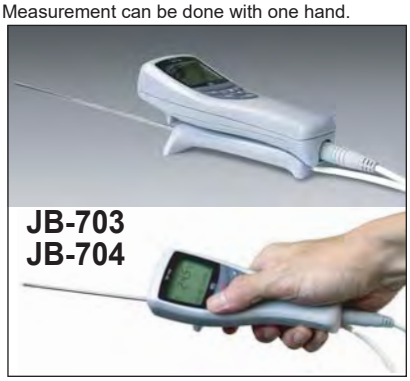


Internal temperature measurement of food. (Core temperature).



Internal temperature measurement for fryer oil and food.

Attachable at the back of DP-700.
Measurement can be done with one hand.

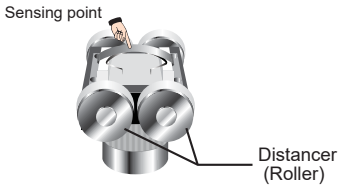


ST-41-K-1000-□□

/A : Silicon rubber coated cable (Blue) Standard type
/C : Spiral cable
3C : Connector for DP-350
6C : Connector for DP-700
1000 : Cable length 1m
• Please contact distributors for cable length more than 1m.
K : Thermocouple K

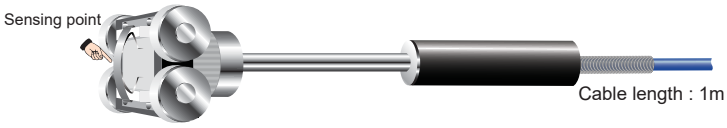
Products with traceability option.

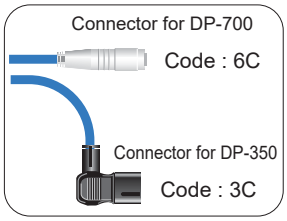
• Optimum contact pressure is obtained with the distancers for stable and accurate temperature measurement.
• The measuring part adjusts to fit the surface of the item to be measured.



	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)
ST-41	0.7 sec (Metal Surface)	0.3 sec (Metal Surface)	1.6Ω

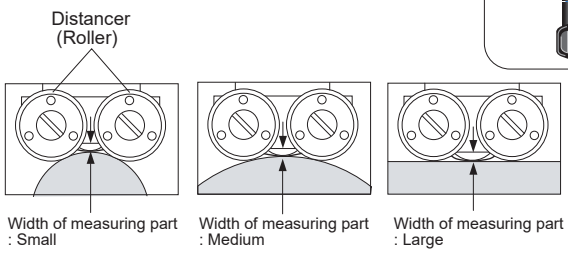
ST-41 Max. 300°C



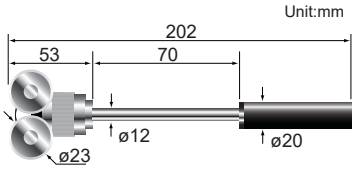


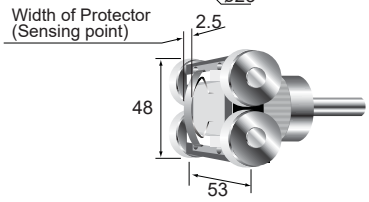
Accuracy (*)	Error due to frictional heat
±0.3%±1°C	Less than 1°C (Metal Roller Speed : 700mm/sec)

(*) : Accuracy when temperature on copper metal surface is 100°C.



The measuring part is adjusts to fit the surface of the item to be measured.





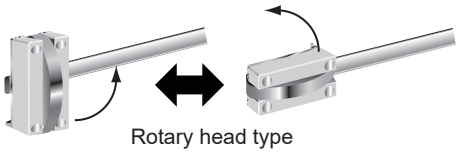
ST-44-K-1000-□□

(Rotary head type)

/A : Silicon rubber coated cable (Blue) Standard type
/C : Spiral cable
3C : Connector for DP-350
6C : Connector for DP-700
1000 : Cable length 1m
• Please contact distributors for cable length more than 1m.
K : Thermocouple K

Products with traceability option.

• Swivel head sensor to cope with roller movement at different directions.
• Teflon resin head is applied. This temperature sensor is for rolling and moving objects and gives minimal damage to the other parts of measured objects.

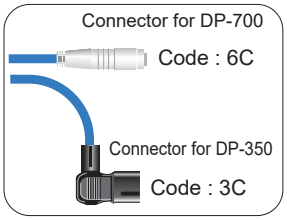


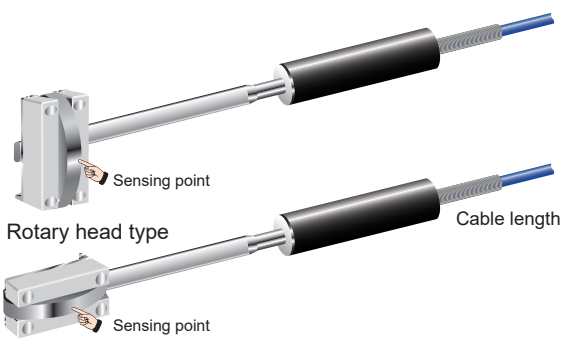
	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)
ST-44	0.7 sec (Metal Surface)	0.2 sec (Metal Surface)	23Ω

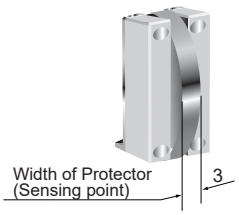
Accuracy (*)	Error due to frictional heat
±0.3%±1°C	Less than 2°C (Metal Roller Speed : 700mm/sec)

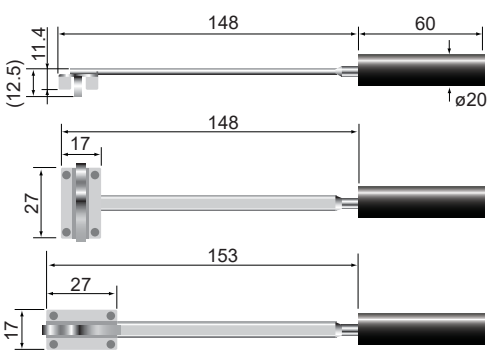
(*) : Accuracy when temperature on copper metal surface is 100°C.

ST-44 Max. 300°C





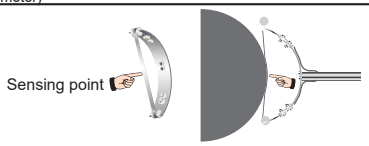




ST-36-K-1000-□□

- /A : Silicon rubber coated cable (Blue) Standard type
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- K : Thermocouple K

- An arc-shaped sensor is placed in contact with the roller surface of the object to measure surface temperature of the roller.
- Can be used for roller surface of various size (more than ø60mm diameter)

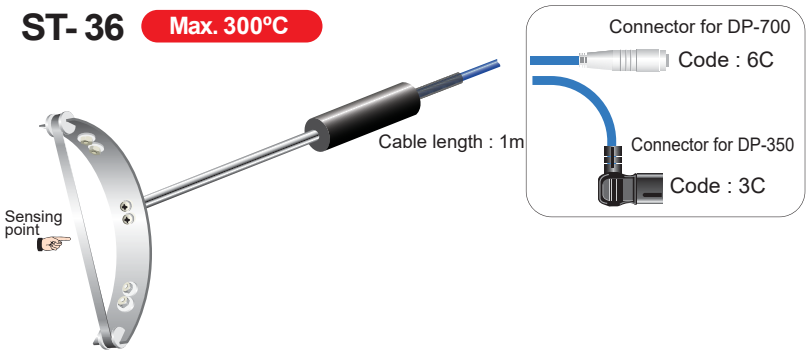


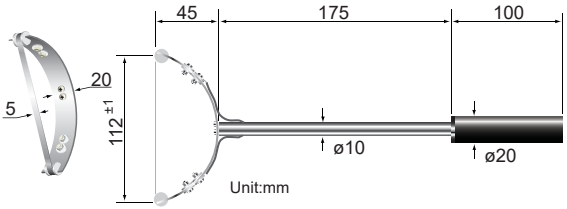
	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)
ST-36	1.7 sec (Metal Surface)	0.4 sec (Metal Surface)	1.9Ω

Accuracy (*)	Error due to frictional heat
±0.5%±1°C	Less than 2°C (Metal Roller Speed : 700mm/sec)

(*) : Accuracy when temperature on copper metal surface is 100°C.

ST-36 Max. 300°C



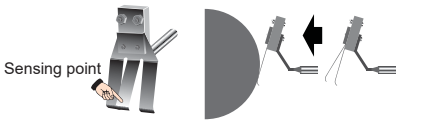


ST-37-K-1000-□□

- /A : Silicon rubber coated cable (Blue) Standard type
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- K : Thermocouple K

Products with traceability option.

- Spring type temperature sensor of roller surface.
- Temperature measurement of moving and rolling objects.

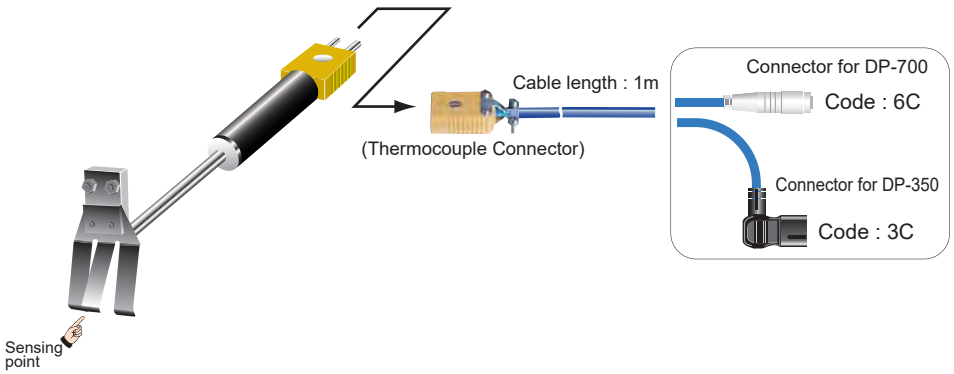


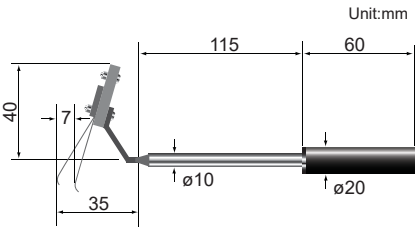
	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)
ST-37	2.2 sec (Metal Surface)	0.4 sec (Metal Surface)	4.0Ω

Accuracy (*)	Error due to frictional heat
±2%±1°C	Less than 1°C (Metal Roller Speed : 700mm/sec)

(*) : Accuracy when temperature on copper metal surface is 100°C.

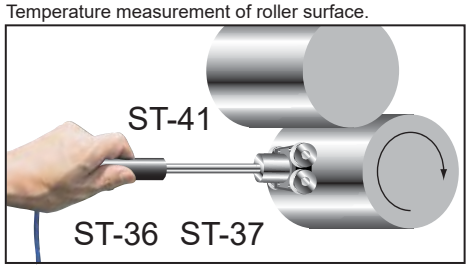
ST-37 Max. 300°C



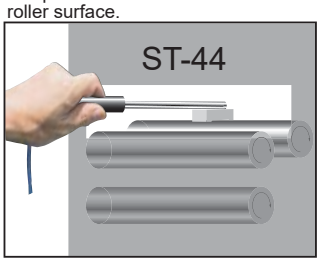


Applications

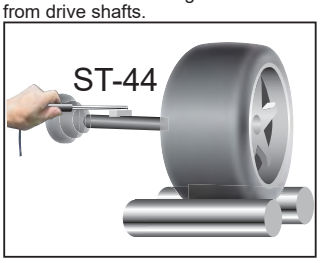
Temperature measurement of roller surface.



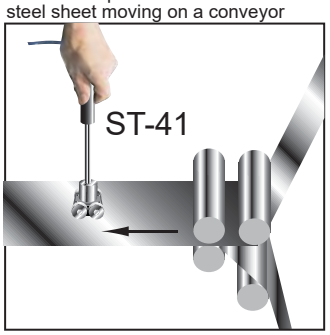
Temperature measurement of roller surface.



Measurement of heat generation from drive shafts.



Surface temperature measurement of steel sheet moving on a conveyor



Contact / Non-Contact Type (Installation Type)

If the moving/rolling objects are too fast to measure with a handheld sensor, a fixed type surface temperature measurement sensor (JBS-3898) is recommended.
To reduce friction heat influence, ST-100 (for metallic surface) or ST-100K (for insulated surface) is recommended

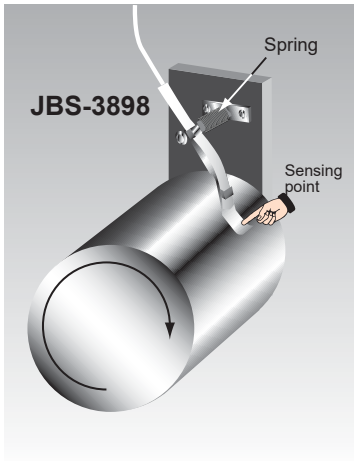
Only spade lug (Y-shaped lug) is available for lead wire terminal. Please use it with panel mount type indicators.

Contact type

Temperature Sensors
For Rotating / Moving Surface

JBS-3898 Max. 300ºC

• Right and left rolling types are available.



Panel Mounting Type Indicator

High Performance Indicator with Alarm
AG500
96×48×60mm (W×H×D)

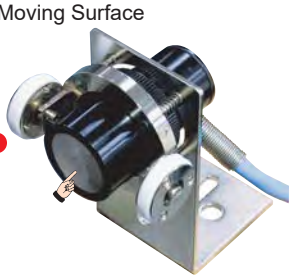
Indicator with Alarm
AE500
96×48×100mm (W×H×D)

A table-top box is also available.
This can be easily set up for use.

For Metal Surface, Non-Contact Type

Temperature Sensors
For Rotating / Moving Surface

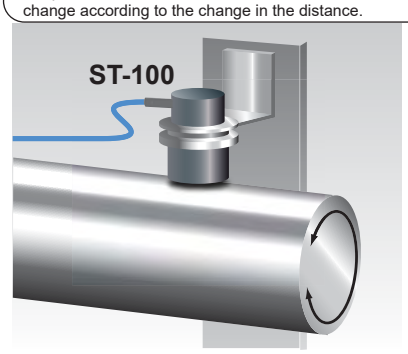
ST-100 Max. 300ºC

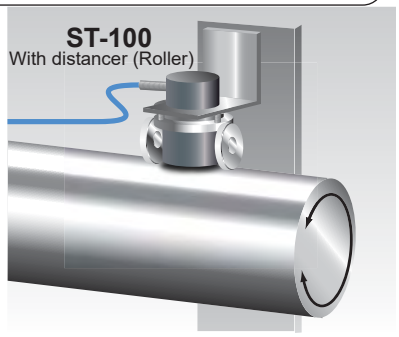


Non-contact temperature measurement of a shiny object surface is also possible. (with ST100 only)

Interconnected triple temperature sensing elements enable surface temperature measurement of shiny metallic object, which was not possible with an infrared pyrometer.
Moreover, it can be connected to an indicator and a controller for K type thermocouple since output characteristics are similar to traditional contact-type thermocouple

Keep a constant distance between the sensor and the measured object. Otherwise, measured values will change according to the change in the distance.

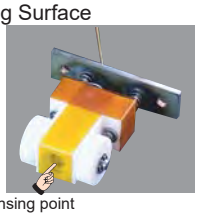




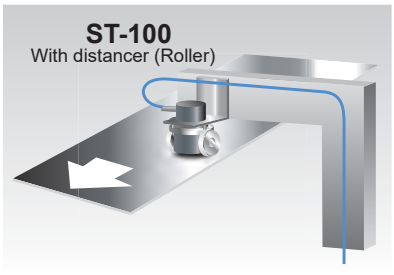
For Insulator surface, Non-Contact Type

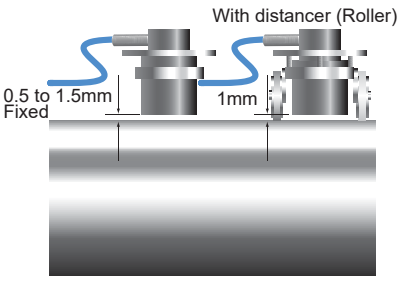
Temperature Sensors
For Rotating / Moving Surface

ST-100K Max. 260ºC



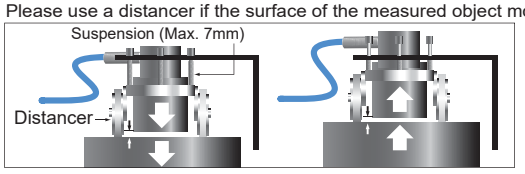
ST-100K is not designed for metal surface temperature measurement.





Measuring method : Non-contact
Measuring element : Thermocouple K
Element wire diameter : 0.08mm (ST-100)
0.076mm (ST-100K)
Measuring range : Ambient temperature to 300°C (ST-100)
Ambient temperature to 260°C (ST-100K)
Response time : Approx.30 sec (Response of 98%)
Measuring accuracy : a) ST-100
Within ±3°C (at 200°C)
* When output is adjusted in the middle of the measuring range.
b) ST-100K
Within ±2°C
(Ambient temperature to 150°C)
Within ±5°C (150 to 260°C)
Measuring distance : a) ST-100 0.5 to 1.5mm
Keep a certain distance when measuring.
(1mm when it is with distancer)
b) ST-100K 0.5mm (Fixed)
Output signal : Thermocouple K output
Lead wire : ST-100 : ϕ6 Silicone rubber protection lead (KX type, 3m)
ST-100K : Fiberglass
Output impedance : 50Ω (ST-100), 15.4Ω (ST-100K)

Please use a distancer if the surface of the measured object moves up and down.



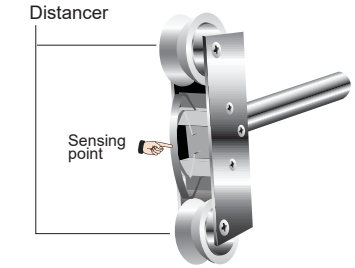
Please refer to a separate catalog for more details.

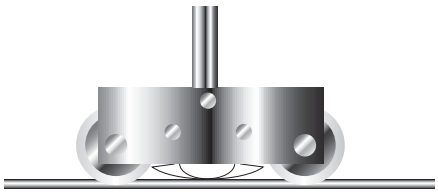
ST-43-K-1000-□□*□

- P3 : Protector width 3mm
- P4 : Protector width 4mm
- /A : Silicon rubber coated cable (Blue) Standard type
- /C : Spiral cable
- 3C : Connector for DP-350
- 6C : Connector for DP-700
- 1000 : Cable length 1m
  - Please contact distributors for cable length more than 1m.
- K : Thermocouple K

Products with traceability option.

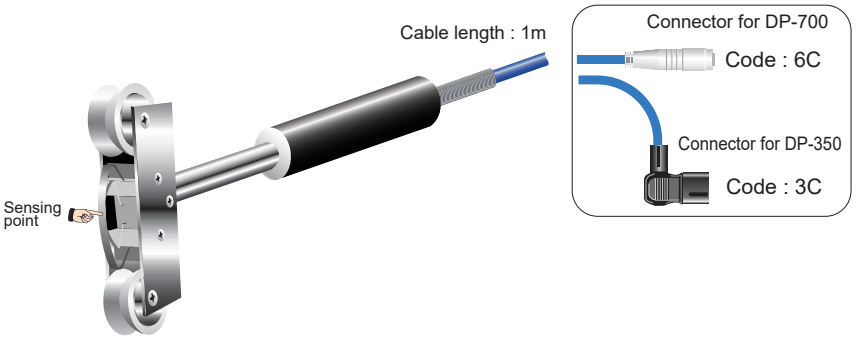
- Distancers are installed. They maintain appropriate distance between the sensors and the measured objects, and realize accurate and steady temperature measurement.





Measurable Wire Diameter : ø10 to ø30

ST-43 Max. 300°C

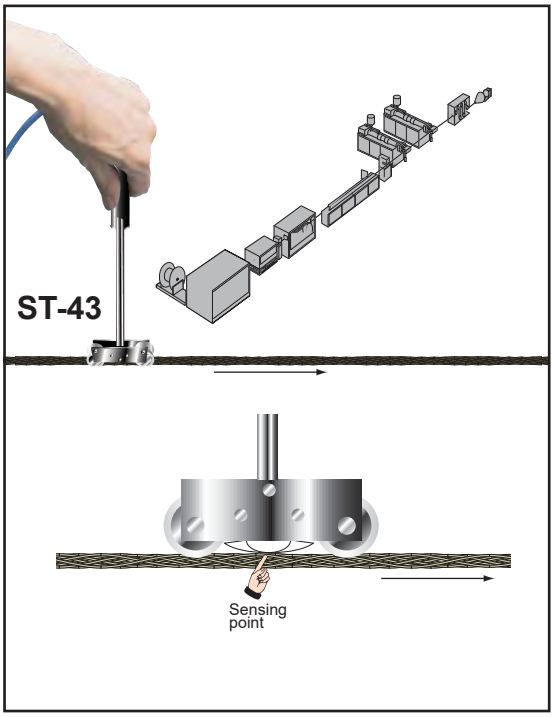


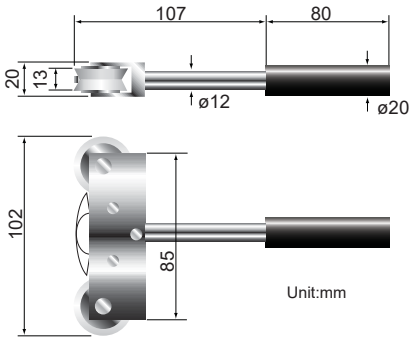
	Response of 95%	Response of 63% (Time constant)	Resistance value (With cable 1m)
ST-43	1.0 sec (Metal Surface)	0.3 sec (Metal Surface)	1.6Ω

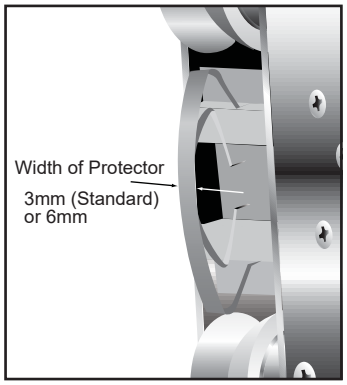
Accuracy (*)	Error due to frictional heat
±0.5%±1°C	Less than 1°C (Metal Roller Speed : 700mm/sec)

(*) : Accuracy when temperature on copper metal surface is 100°C.

Preliminary heat measurement in the wire extrusion process





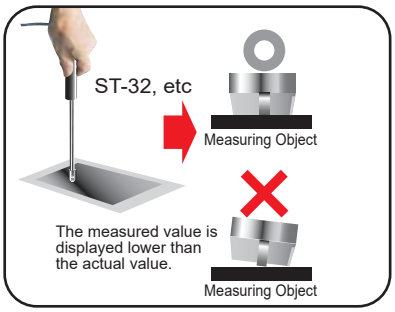


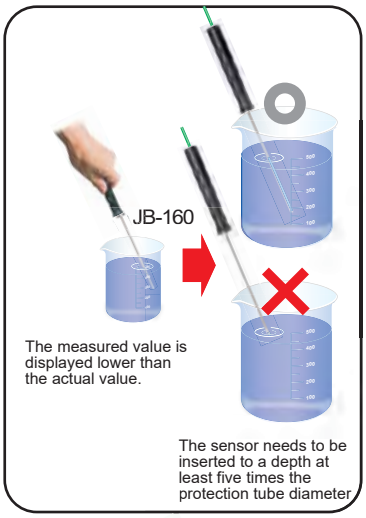
Supplemental information

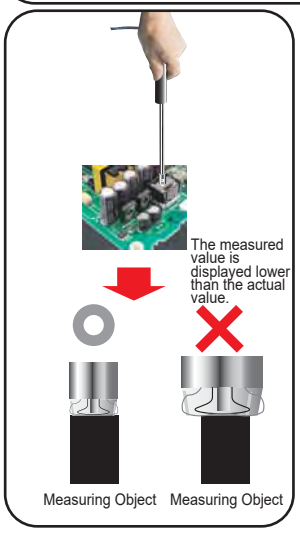
Measurement error and response

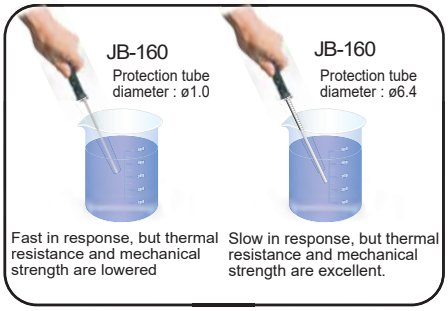
In the contact temperature measurement method, it is very important to keep the sensor in full contact with the object being measured. Read the values only after both temperatures equal each other. Occasionally you will find that the measured value is lower than the actual value or that the sensor response time is slow. In the case of the former, a lower measured value against the actual often occurs when the sensor and the measured object are loosely connected. Tightening the connection generally solves the problem.

With regard to response time, the sensor is usually the issue. The sensor can be replaced with another type that offers faster responses. This will often solve the problem. On the other hand, using sensors with faster response times can sometimes sacrifice mechanical strength and heat resistance capability which can cause a problem as well.
In order to measure temperature quickly and accurately, it is most important to select the proper sensor to fit the application.





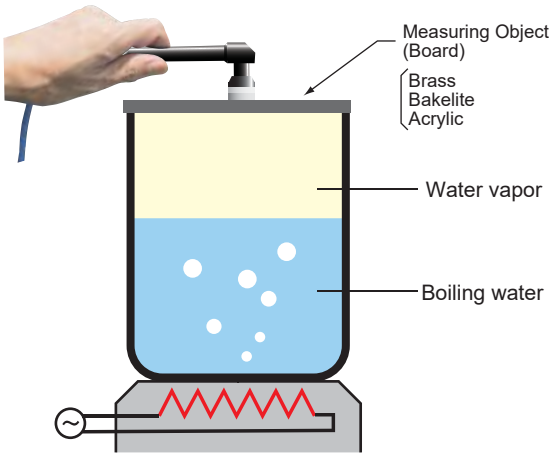




● Indication speed is largely affected by the material of the measured object

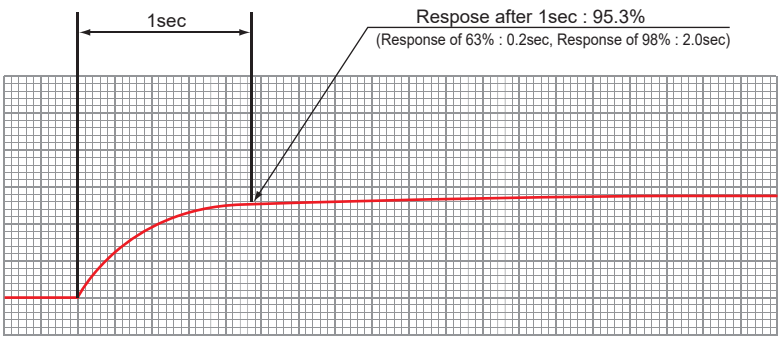
The response is determined by the material of the measured object. The higher the thermal conductivity, the faster the response.
The table shows test data on “the relation between the indication speed and the material of the measured object.

The test data was obtained as illustrated in the picture. In this test setup, water is boiled and the temperature of the object is measured as illustrated below.



Material	Measuring time	Response (%)	Measuring time	Response (%)	Measuring time	Response (%)	Measuring time	Response (%)
Brass t=1	1sec	95.3	2sec	98.0	3sec	98.5	10sec	99.2
Bakelite Primary color t=5	6sec	92.7	10sec	95.0	14sec	95.7	16sec	96.2
Bakelite Black t=5	15sec	91.9	30sec	92.5	60sec	93.6	180sec	96.4
Acrylic Transparency t=5	15sec	90.3	30sec	92.4	60sec	93.8	180sec	96.7

● Response

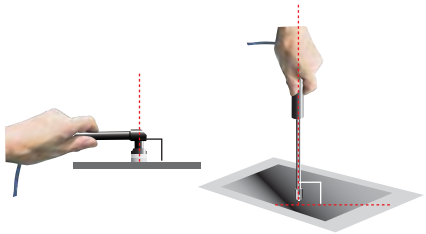


Precautions for Temperature Sensor

High Temperature Caution	Immediately after the temperature measurement, the measuring part of the sensor (head or tip) may be hot. Do not touch the measuring part soon after the measurement. Likewise, do not touch the measuring part soon after measuring low temperatures. If the surface is too cold and you may be injured.. Please wait until temperature returns to ambient temperature.

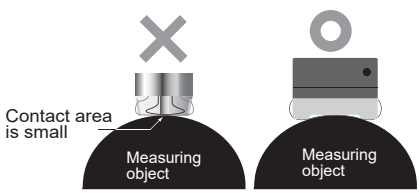
● Temperature Sensors for Stationary Surface

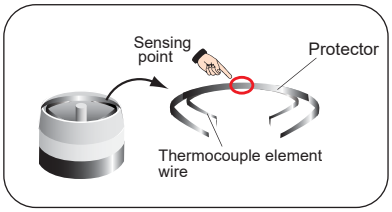
1. Measurement errors caused by position
Place the sensor head vertically in contact with the measured object or
Error may be observed.



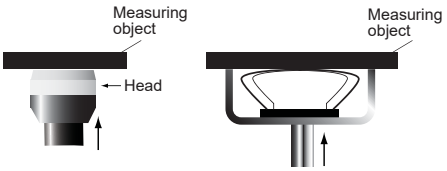
2. Stains on the surface of the measuring part
Stains or rusts on the measuring object may cause measurement errors.

3.Shape and size of the object
Basically, the measuring part should be bigger than the sensors' head. Objects smaller than the head may lose temperature to the protector and the head and measurement errors may occur.
If there is unevenness on the object surface, measurement errors may occur because of the gap between the object and the measuring point (protector) or the insufficient contact between them. To avoid such errors, please select a sensor for measuring tiny objects or a sensor for rotating/moving items.





4.Contact pressure
Each sensor has a stopper to prevent damage to the guide and measuring part.
Place the sensor on the measured surface so that the guide is firmly in contact with the measured objects.



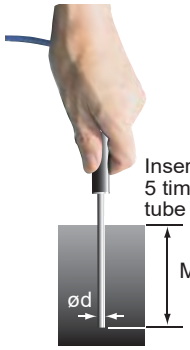
5.Other precautions
The sensor may be damage if shifted horizontally or rotated during measurement.
Sensors may be damaged if used above the maximum operating temperature.
If the sensor is kept in contact with an object over a long period of time, used on a curved surface such as a roller, or pressed with a load exceeding the normal load range, a mark may be left on the measurement surface.

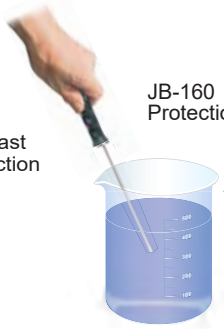
● Temperature Sensors for Rotating / Moving Surface

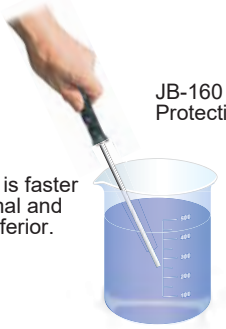
1. For curved and moving surface
Please choose a suitable sensor for measuring curved and moving surface. Use of unsuitable sensor may cause not only measurement errors but also damage to the sensor itself
2. For fast moving and rotating measured objects
Fixed type sensor for a moving and rotating object is available. (Model code:JBS-3898) If the surface of the measured object is rough, friction heat may affect the accuracy. Please try to use this sensor for an object with a smooth surface.
If frictional heat is critical, a non-contact type thermocouple (Model ST-100) is available.

● Temperature Sensors for Semi-solid and Liquid

Sensors designed for measuring the internal temperature of liquid and semi-solid objects cannot be used for solid surface measurement.
Temperature is measured at the tip of the protection tube, which needs to be inserted at least five times deeper than the protection tube diameter.
A thinner protection tube is faster in response, but its thermal and mechanical strength is inferior. On the contrary, a thicker protection tube is slower in response, but its thermal and mechanical strength is superior.







Traceability

Traceability certifies that the calibration/measuring equipment used in manufacturing is also calibrated and meet national standards.

● Structure of traceability documents

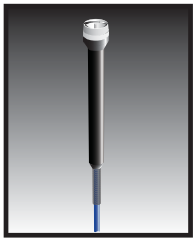
Traceability documents consist of 1. Traceability system chart, 2. Test report of Reference standards equipment, 3.Test report of Intermediate standards equipment, 4.Test report of Working standards equipment, and 5.Test report of the product.
A set of traceability documents consists of all of the above documents (1-4) except for the test report of the product (5).

Testing and Calibration

● Testing and calibration of temperature sensor or indicator

We will test and calibrate either a specified temperature sensor or a specified indicator.
Temperature sensors are tested and calibrated using our calibration system, water baths, hot plate, etc., in comparison to the actual temperature.
For a temperature indicator, the output from the reference standard is given to the indicator for test and measurement in comparison with the actual temperature value.

or



● Testing and Calibration for a set of sensor and indicator

We will test and calibrate a specified temperature sensor and a specified indicator together as a set.
Test and calibration methods are the same as the case for the sensor.
If you just need a certificate for the indicator only, we will prepare it as an option.

● A set of sensor and indicator received from a customer.

At our lab we can test and calibrate the temperature sensor and the indicator now in use at a customer's site.
Methods of testing and calibration for the above are similar to that of a set of a sensor and a indicator

- Repair and/or calibration fee(s) may be charged.
- We may be able to conduct testing and calibration for products other than ours. Please consult with us for availability.

● Documents

Traceability documents

1. Traceability system chart
2. Test report of Reference standards equipment
3. Test report of Intermediate standards equipment
4. Test report of Working standards equipment (Attached if necessary)

■ Individual Documents
- Traceability system chart
- Test report of Reference standards equipment
- Calibration Certificate

Indicator Test Report

DP-350 Calibration temperature points (ºC)
-190.0, 0.0, 600,1190ºC (4 points)

Calibration temperature points not on the below chart are available. (please specify when ordering.)

DP-700 Calibration temperature points (ºC)
-190.0, -100.0, 0.0, 400.0, 800.0, 1000, 1300 (7 points)

Calibration temperature points not on the below chart are available. (please specify when ordering.)

Temperature Sensor Test Report

Calibration temperature points (ºC) : See page 23

Test Report for a set of sensor and indicator

Calibration temperature points (ºC) : See page 23

Traceability

Calibration Temperature Range

Model Code	Max. Operating Temperature	Calibration Temperature Range (°C)	Standard Calibration Temperature (3 points) *3
JB-150 *1	400	- 40 to 400	100, 200, 300°C
JB-16 *1, *2	750(ø3.2)	- 40 to 400	100, 200, 300°C
JB-160 *1, *2	750(ø3.2)	- 40 to 400	100, 200, 300°C
JB-703 *1	400	- 40 to 400	100, 200, 300°C
JB-704 *1	400	- 40 to 400	100, 200, 300°C
ST-230	300	30 to 300	100, 200, 300°C
ST-230L	300	30 to 300	100, 200, 300°C
ST-29	800	30 to 500	100, 200, 300°C
ST-29L	800	30 to 500	100, 200, 300°C
ST-29H	1100	30 to 500	100, 200, 300°C
ST-29HL	1100	30 to 500	100, 200, 300°C
ST-30	300	30 to 300	100, 200, 300°C
ST-30L	300	30 to 300	100, 200, 300°C
ST-32	600	30 to 500	100, 200, 300°C
ST-32L	600	30 to 500	100, 200, 300°C
ST-37	300	30 to 300	100, 200, 300°C
ST-41	300	30 to 300	100, 200, 300°C
ST-43	300	30 to 300	100, 200, 300°C
ST-44	300	30 to 300	100, 200, 300°C

*3 : Calibration temperature points not on the below chart are available.
(please specify when ordering.)
(Without any specification, calibration temperature points are as on the chart.)

*1 : -70°C calibration temperature point is available.
*2 : Please note that burns may be caused on the protection pipe for 800°C calibration temperature point for a sensor with ø6mm protection pipe.

Cable

● Shape and material

<Straight Cable>

ST-230/230L, JB-150, JB-160:

Standard specification is φ3.3mm straight cable with green silicone coating.
φ6.0mm straight cable with blue silicone coating option is also available.

Other than ST-230/230L, JB-150, JB-160:

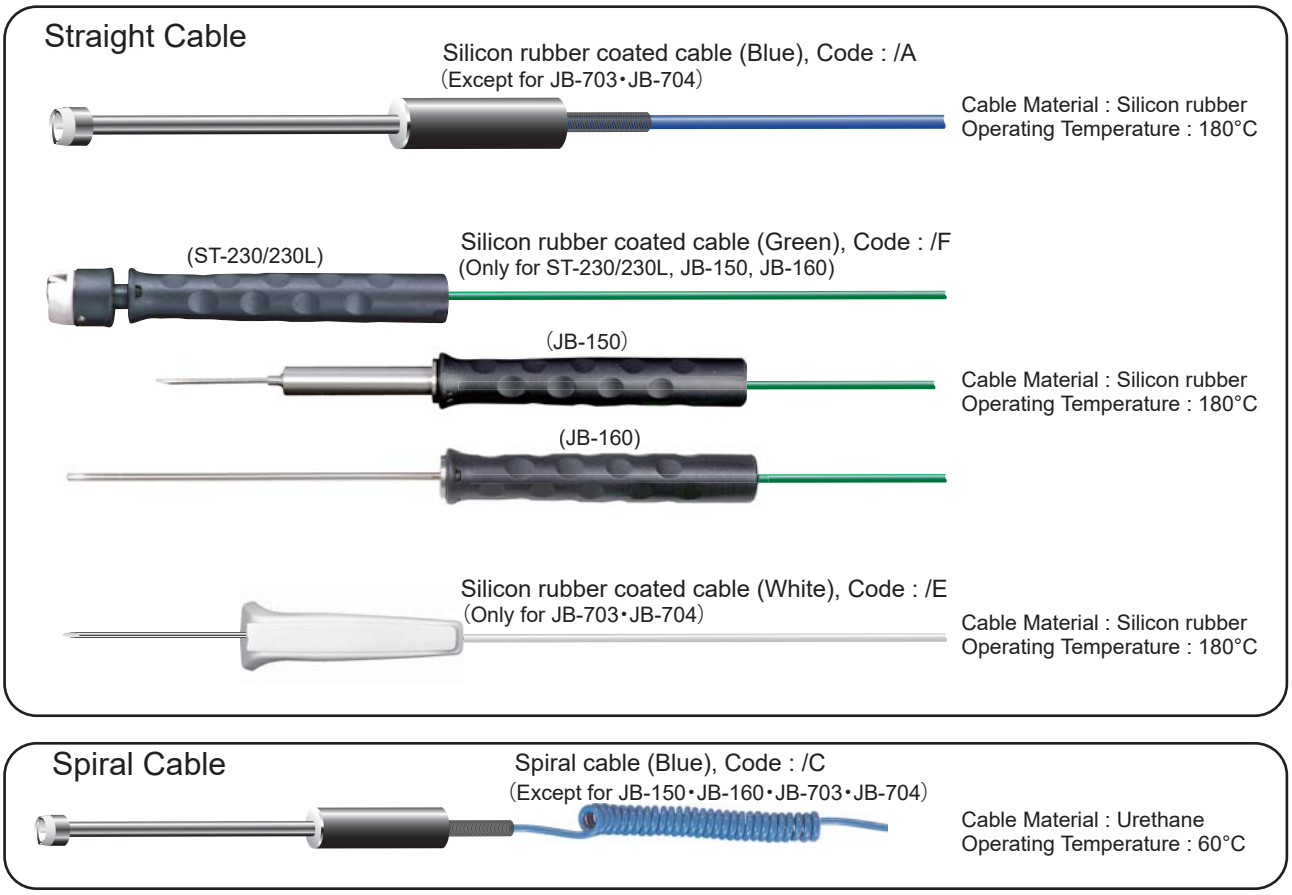
Standard specification is φ6.0mm straight cable with blue silicone coating.

JB-703, JB-704:

Standard specification is φ4.0mm straight cable with white silicone coating.

<Spiral Cable>

Available for all models except for JB-150, JB-160, JB-703, and JB-704.

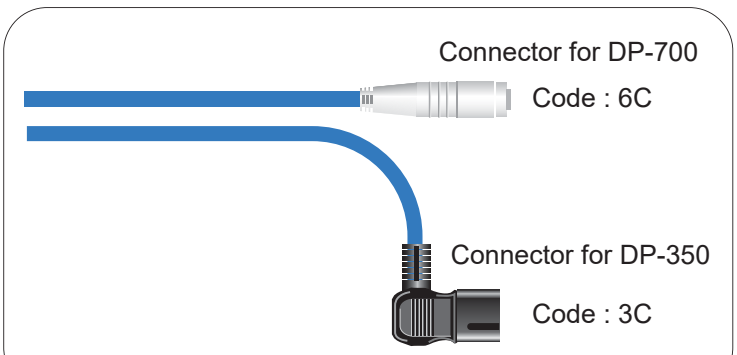


● Cable length

The standard cable length is 1 meter. If a cable longer than 1 meter is necessary, please contact with our local distributors.

Connector

Connecting plug for the handheld thermometer, 6C plug for DP-700 and 3C plug for DP-350, can be selected from the suffix code.



Note: Image depicts a silicon rubber coated cable (Blue).

Discontinued Models and Models

Discontinued Models

JB-15

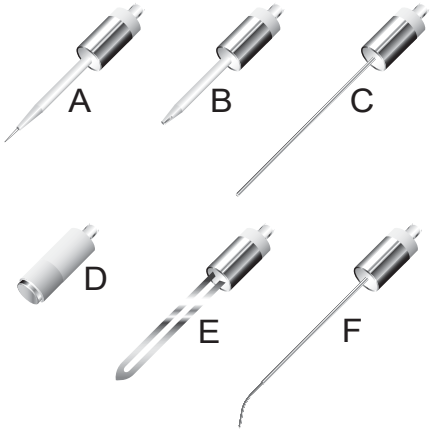
Final production date : MAR. 2019

ST-23

ST-23L

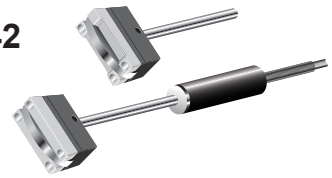
Final production date : NOV. 2016

ST-31



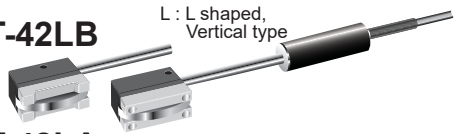
Final production date : MAY. 2011

ST-42

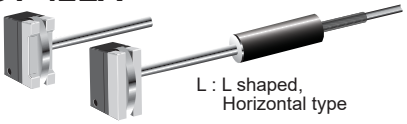


ST-42LB

L : L shaped,
Vertical type



ST-42LA



L : L shaped,
Horizontal type

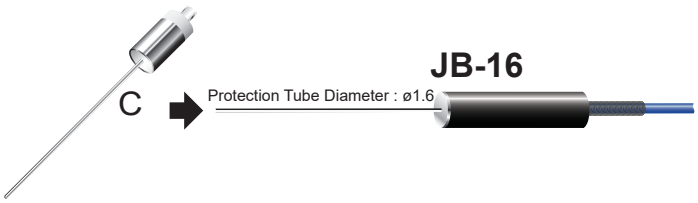
Final production date : MAY. 2011

Models

JB-150

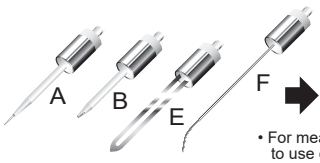
ST-230
ST-230L

JB-16



ST-230

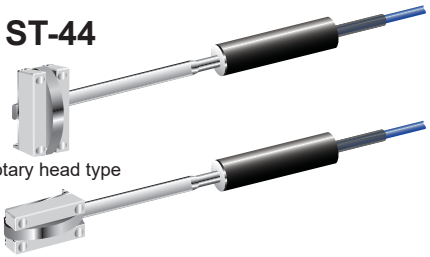
• Outer width of this head is 22mm.
Unavailable for the measurement of the objects with less than ø22mm.



No models

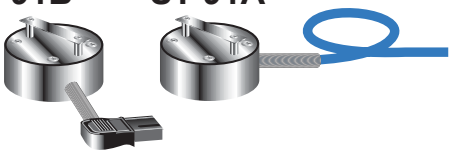
• For measurement of a tiny space, we recommend you to use our ST-50 and ST-55/56.

ST-44



Rotary head type

Discontinued Models and Models

Discontinued Models	Models
ST-47  Final production date : MAY. 2011	**ST-30L**  • Height of this head is 18mm. Measurement is impossible when the gap is less than 20mm. **ST-44** Rotary head type  • Height of this head is 12.5mm. Measurement is impossible when the gap is less than 14mm.
ST-91B **ST-91A**  Final production date : MAY. 2011	No models

Handheld Thermometer

Handheld Thermometer
DP-350

The DP-350 is an economical thermometer with a wide temperature range and useful functions, such as measured value and peak hold, sensor burnout, battery alarm, and automatic power off.

• Temperature sensor is separate.

Model Code :

DP-350C＊A

Accessories : LR6 (IEC and JIS) Alkaline battery, Strap

Specifications

Measuring Accuracy	: ±(0.2% of indicated value + 1digit) or ±2°C (4°F) (Whichever is larger)
Sampling Time	: 0.3 sec.
Display	: Reflective TN LCD
External Dimensions	: 52 x 145 x 25mm (W x H x D)
Power Supply	: Type LR6 (based on IEC and JIS) alkaline battery, 2 pcs.
Weight	: Approx 140g
Major Functions	: Peak high and low temperature Automatic Power OFF, Battery alarm

Panel Mounting Type Indicator

High Performance Indicator with Alarm

AG500

96×48×60mm (W×H×D)

Indicator with Alarm

AE500

96×48×100mm (W×H×D)

■ DP-350 Optional

Anti-shock cover (Silicon jacket)

Hard carrying case

Soft case

■ DP-350 Model Code

Model Code	Accessory (Optional)
DP-350C*A	No option
DP-350C*A-1	With anti-shock cover (Silicon jacket) *
DP-350C*A-2	With hard carrying case *
DP-350C*A-3	With soft case *

* Purchase of each cover only is available.
Refer to the following part numbers:
350P-K01: Anti-shock cover (Silicon jacket)
350P-K02: Hard carrying case
350P-K03: Soft case

Safety Warning

- Before operating this product, read the instruction manual carefully to avoid incorrect operation.
- This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
- If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.

Caution for the export trade

All transactions must comply with laws, regulations, and treaties.

Caution for imitated products

As products imitating our product now appear on the market, be careful that you don't purchase these imitated products. We will not warrant such products nor bear the responsibility for any damage and/or accident caused by their use.

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