

Products CATALOG

- Thermocouple Extension/Compensating Cables
- Thermocouple Wires
- Heat Resistant Wires

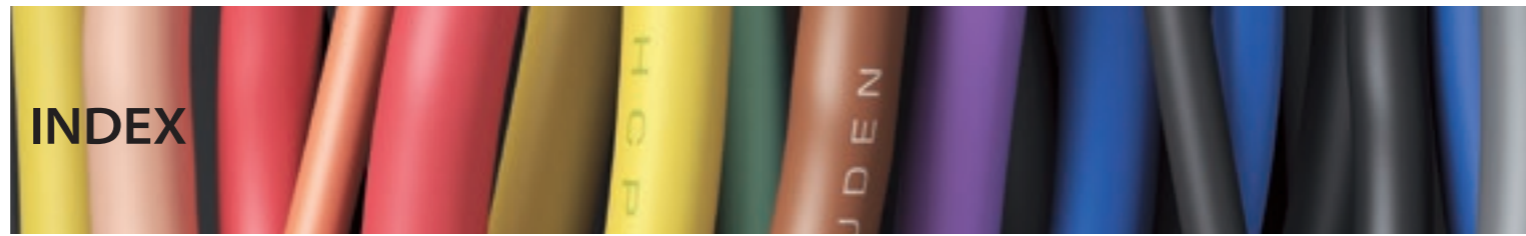


Message

The temperature measurement and control has rapidly become more and more important along with the great advances of all of the industries in recent years. Especially, the Thermocouple Extension and Compensating Cables are indispensable for heating management in terms of the automation and the labor saving such as steel, chemistry, electric power, industrial waste disposal, the semiconductor mono-crystalline refinements, and the synthetic resin molding machines, etc. Ever since its establishment in 1950, Our company, a professional manufacturer of the Thermocouple Extension and Compensating Cables has been dedicated to responding to our customers promptly and adequately, catching accurately the needs in time with our customers by cultivating the technological ability and the consistent system of the quality control through the manufacturing achievements over many years. We shall satisfy our customers not only with the Japanese standard (JIS) but also the American standard (ASTM) and the European standard (IEC), and offer our products that can manage and control the temperature safely and accurately on site including all the plants in the world in the future. Additionally, in this regard we must not be satisfied with the current achievements but continue to strive unremittingly to contribute to the society as a manufacturer.



Thermocouple Extension/Compensating Cables



Thermocouple Extension / Compensating Cables

■ What is Thermocouple Extension/Compensating Cable?

How to Choose a Model P3-6

Single Pair

PVC Types (Temp.Range: up to 60°C~105°C)

Polyvinyl Chloride PVC Insulation and Sheath, Flat/Round shape, without or with Shield (BA, SA, BT)

General PVC,(Temp.60°C) **VVF / VVF-BA / VVR / VVR-SA** P7-8

Special Heat-resistant PVC,(Temp.105°C) **SHVVF / SHVVF-BT** P9

General or Flame-retardant General PVC,(Temp.60°C) **FR-VVR / FR-VVR-SA** P10

Glass Fiber Types (Temp.200°C)

Glass Fiber Braided Insulation and Sheath, Flat or Round Shape, without or with Shield (BT)

Heat Resistance (Temp.200°C) **GGBF/GGBF-BT/GGBR/GGBR-BT** P11-12

FEP Types (Temp.200°C)

Teflon® (FEP) Insulation and Sheath, Flat or Round shape, without or with Shield (BT)

Heat Resistance (Temp.200°C) **FEPFEPF / FEPFEPF-BT/ FEPFEPR / FEPFEPR-BT** P13-14

Other Types (Temp.Range: up to 75 ~ 135°C)

Other Materials of Insulation and Sheath

Polyethylene (Temp.75°C),Round Shape,with Shield(SA) **EER-SA** P15

Halogen-free Polyolefin (Temp.75°C), Round Shape,with Shield(SA) **EMEMR-SA** P15

Flame-retardant Elastomer (Temp.135°C), Round Shape,without or with Shield(BT) **FR-SPHR / FR-SPHR-BT** P16

Flexible/Vibration-proof Heat Resistant Types (Temp.Range: up to 60 ~ 200°C)

Flexible Heat-resistant Materials of Insulation and Sheath,Round Shape.

200°C FEP Insulation, Flexible Fluorine-Contained Heat-resistant Rubber (FRW) Sheath **KX-1-Toughler** P17

90°C Special Polyethylene Insulation, Flame-retardant Special Elastomer Sheath **KCB Tough EV3** P17

60°C Special Polyethylene Insulation, Flexible PVC Sheath **KCB Sofura** P17

FEP(UL) Type (Temp.200°C)

UL Certificated FEP Insulation and Sheath

Heat Resistance (Temp.200°C) **FEPFEPF-BT(UL)** P18

Multi-Pair(twisting)

PVC Types (Temp.Range: up to 60 ~ 105°C)

Polyvinyl Chloride PVC Insulation and Sheath, Round Shape, with Shield (SA, SL)

General or Flame-retardant General PVC, with shield (SA) (Temp.60°C) **VVR-SA / FR-VVR-SA** P19-20

General or Flame-retardant General PVC, with shield (SL),(Temp.60°C) **VVR-SL / FR-VVR-SL** P21-22

FEP Types (Temp.200°C)

FEP Insulation and Sheath, Round Shape,with Shield (BT)

Heat Resistance (Temp.200°C) **FEPFEPR-BT** P23-24

Others (Temp.75°C)

Other Materials of Insulation and Sheath,Round Shape,with Shield (SA)

Polyethylene (Temp.75°C) **EER-SA** P25-26

Halogen-free Polyolefin (Temp.75°C) **EMEMR-SA** P25-26

■ Reference Technical Materials of Thermocouple Extension/Compensating Cables P27-29

Thermocouple Wires (Duplex Type)



■ What is Thermocouple Wire(Duplex Type)?

How to Choose a Model P30

Types of Thermocouple Wires(Duplex Type)

Heat-resistant PVC Insulation and Sheath,Flat Shape **HVVF** Heat Resistance(Temp.80°C) P31

Glass Fiber Braided Insulation and Sheath, Flat Shape **GGBF** Heat Resistance(Temp.200°C) P31

Silica Glass Fiber Braided Insulation and Sheath, Flat Shape **SSBF** Heat Resistance(Temp.400°C) P32

Alumina Fiber Braided Insulation and Sheath, Flat Shape **CCBF** Heat Resistance(Temp.Range.450 ~ 750°C) P32

FEP Insulation and Sheath,Flat Shape **FEPFEPF** Heat Resistance(Temp.200°C) P33

UL Certificated FEP Insulation and Sheath,Flat Shape **FEPFEPF(UL)** Heat Resistance(Temp.200°C) P33

FEP Insulation and Sheath,Flat Shape,with a Molding Cover **FEPFEPF(M)** Heat Resistance(Temp.200°C) P34

■ Reference Technical Materials of Thermocouple Wires (Duplex Type) P34-35

Heat Resistant Wires



■ What is Heat-resistant Wire? P36

Types of Heat Resistant Wires

Flexible Fluorine-Contained Heat-resistant Rubber Insulation **600V FRW** Heat Resistance(Temp.200°C) P36

Silicon Rubber Insulation and Glass Fiber Braided Sheath **600V LKGB** Heat Resistance(Temp.180°C) P37

Teflon® Insulation **FEP/PFA/ETFE/PTFE** Heat Resistance (Temp.Range.150 ~ 260°C) P38

Fluorinated Ethylene Propylene Insulation(FEP) and Flexible Fluorine-Contained Heat-resistant Rubber Sheath (FRW) **FF Toughler** Heat Resistance(Temp.200°C) P39

Glass Fiber Braided Insulation **NiGB** Max.Heat Resistance (Temp.300°C) P40

Silica Glass Fiber Braided Insulation **NSBL/28NSBL** Max.Heat Resistance (Temp.400°C) P41-42

Mica-Tape Double Wrapped and Silica Glass Fiber Braided, Special Heat-resistant Varnished Insulation **NSBL 6x4-I** Max.Heat Resistance (Temp.400°C) P43

Mica-Tape Double Wrapped and Silica Glass Fiber Braided Insulation **NSBL 6x5** Max.Heat Resistance (Temp.500°C) P44

■ Reference Technical Materials of Heat-resistant Wires P45-49

■ Instructions on Products P50

Thermocouple Extension/Compensating Cables



Thermocouple Extension/Compensating Cable is a lead cable used to connect between Thermocouple Sensor and Thermometer for measuring the temperature. We would like to introduce our products of Thermocouple Extension/Compensating Cables as follows:

How to Choose a Model

An example, based on IEC-60584-3-2007

FR-KX-IEC-1-G-VV R-SL-WAZV 1P × 1.5SQ(7/0.52)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

- ① FR(Flame-retardant), ② Cable Type, ③ Standard(Color Code), ④ Division Symbols(Class & Tolerance),
- ⑤ Materials of Insulation & Sheath ⑥ Shape, ⑦ Shield, ⑧ Armor, ⑨ Pair, ⑩ Conductor Size, ⑪ Conductor Combination

① Flame-retardant (● IEC 60332-3 Cat.A, ● IEC 60332-3 Cat.C)

② ③ Types, Standards and Colors

There are many types of Thermocouple Extension/Compensating Cables. Please choose the type corresponding with Thermocouple Sensor type which is chosen according to Temperature Range(°C) and the Accuracy(Class & Tolerance).

Sensors	Types	Conductor Composition		Colors : IEC Standard (60584-3-2007)		Colors: ASTM E230-2012	
		Positive (PX)	Negative (NX)				
K	KX	Chromel®	Alumel®		Green(+), White(-), Green(Sheath)		Yellow(+), Red(-), Yellow(Sheath)
	KCA	Iron	Constantan		Green(+), White(-), Green(Sheath)	---	---
	KCB	Copper	Constantan		Green(+), White(-), Green(Sheath)	---	---
J	JX	Iron	Constantan		Black(+), White(-), Black(Sheath)		White(+), Red(-), Black(Sheath)
T	TX	Copper	Constantan		Brown(+), White(-), Brown(Sheath)		Blue(+), Red(-), Blue(Sheath)
E	EX	Chromel®	Constantan		Violet(+), White(-), Violet(Sheath)		Purple(+), Red(-), Purple(Sheath)
R	RCA	Copper	Copper-Nickel alloy		Orange(+), White(-), Orange(Sheath)		Black(+), Red(-), Green(Sheath)
	RCB				Orange(+), White(-), Orange(Sheath)		
S	SCA	Copper	Copper-Nickel alloy		Orange(+), White(-), Orange(Sheath)		Black(+), Red(-), Green(Sheath)
	SCB				Orange(+), White(-), Orange(Sheath)		
B	BC	Copper	Copper		Gray(+), White(-), Gray(Sheath)		Gray(+), Red(-), Gray(Sheath)
N	NX	Nickel-Chromium-Silicon	Nickel-Silicon		Pink(+), White(-), Pink(Sheath)		Orange(+), Red(-), Orange(Sheath)
	NC	Copper-Nickel alloy	Copper-Nickel alloy		Pink(+), White(-), Pink(Sheath)		

④ ⑤ Division Symbols(Class & Tolerance) and Materials of Insulation and Sheath

Accuracy(Class & Tolerance) is influenced by the wiring environment(temperature in particular) and the material of insulation.

Please choose a suitable kind of material for Insulation from below item ⑤ and a Division Symbol according to the Standards in below item ④.

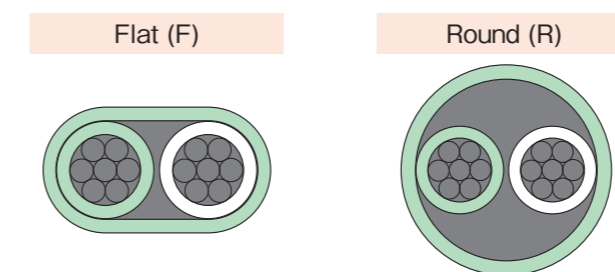
④ Division Symbols(Class & Tolerance)

Class & Tolerance	Division Symbols		Materials used mainly
	IEC St.	ASTM St.	
Precision Class	1-G	SP	PVC
Normal Class	2-G	ST	
Precision Class	1-H	SP	Glass Fiber
Normal Class	2-H	ST	
Precision Class	1-S	SP	Teflon®
Normal Class	2-S	ST	

Remarks:
 1) IEC standard: G(General), H(Heat-resistance), S(Special heat-resistance)
 2) ASTM Standard: SP(Special Tolerance), ST(Standard Tolerance)

⑥ Types of Shapes

Please confirm the wiring area and environment and then choose the shape below.



⑤ Materials of Insulation and Sheath

Symbols	Materials of Insulation & Sheath	Temperature Range (°C)
V	General PVC(Polyvinyl chloride)	up to 60
HV	Heat-resistant PVC	up to 80
SHV	Special heat-resistant PVC	up to 105
TV	Cold-proof PVC	bottom to - 20
FR-V	Flame-retardant general PVC	up to 60
FR-HV	Flame-retardant heat-resistant PVC	up to 90
FR-SHV	Flame-retardant Special heat-resistant PVC	up to 105
E	Polyethylene	up to 75
FR-E	Flame-retardant Polyethylene *1	up to 75
C	Cross-linked Polyethylene	up to 105
EM	Non-Halogen (Halogen-free) Polyolefin, (Eco material)	up to 75
GB	Glass Fiber	up to 200
FEP	Fluorinated Ethylene Propylene	up to 200
ETFE	Ethylene-TetraFluoroEthylene	up to 150
PFA	PerFluoroAlkoxy	up to 260



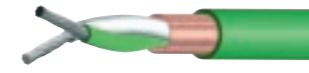
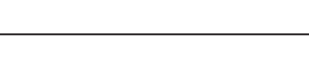



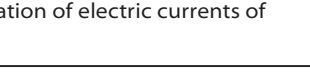
*1: Flame-retardant Polyethylene applies to IEC 60332-1 only

7 Types of Shields

Usually wired together with other kinds of cables of high voltage and multi-electric current, when approaching to the electrical machinery and apparatus, temperature indicating error and variation from inductive interference can occur in Thermocouple Extension/Compensating Cable which transmits a tiny voltage and a feeble signal during measurement. In order to remove the electrical noise, metal Shields are used to eliminate those inductive interference.

1) Electro-static Shields



These types of shields are used to eliminate Electro-static inductive disorder from the voltage of power cables.

Shields	BA	Plain Copper Wire Braided Shield	Excellence in flexibility and shielding effect. They are used mainly in a thin and Flat shape cable.	
	BT	Tinned Copper Wire Braided Shield		
	SA	Copper Tape Shield (individual, used both in Single and Multi-Pair)	SA (a piece of 0.05-0.1mm Copper Tape) is one of the most common shields. Excellence in shielding effect. Used both in Single and Multi-Pair of Round shape cable.	
	EDSA	Copper Tape Shield(individual) + Copper Tape Shield(Overall, used in Multi-Pair)		
	ESA	Copper Tape Shield (individual, used in Multi-Pair only)		
	SL	Alumi-Mylar Tape with a Drain Wire Shield (individual, used mostly in single pair)		
	EDSL	Alumi-Mylar Tape with a Drain Wire Shield (individual) + Alumi-Mylar Tape with a Drain Wire Shield (Overall, used in Multi-Pair)	It is lighter and more flexible than Copper Tape. It is a kind of economical shield, used mainly in a Round shape cable.	
	ESL	Alumi-Mylar Tape with a Drain Wire Shield(individual, used in Multi-Pair only)		

Applicable for Steel Tape Shield(SF), Tinned Copper Wire Braided + Steel Wire Braided Shield(BTF)

2) Electro-magnetic Shields

These types of shields are used to eliminate Electro-magnetic inductive disorder because of the variation of electric currents of power cables

Shields	SAF	Copper Tape + Steel Tape	SAF is composed of a piece of 0.05-0.1mm voltage-inductive Copper Tape and a piece of magnetic Steel Tape. It can eliminate Electro-magnetic inductive disorder due to an electric current from outside.	
	BAF	Plain Copper Wire + Steel Wire Braided	BAF is composed of a piece of 0.05-0.1mm of voltage-inductive Copper Wires and magnetic Steel Wires. It can eliminate Electro-magnetic inductive disorder because of an electric current from outside. BAF is more flexible than SAF.	








10-11 Conductor Size and Combination

The characteristics of Thermal-Electro-Motive-Force(EMF) converted into temperature in a Thermocouple Thermometer is not influenced by the thickness of the conductor. Please choose a suitable conductor size and its combination after considering the mechanical characteristics such as a wiring environment, distance, flexibility, etc.

Nominal Sectional Area	Conductor Combination	Main wiring places and Features
2.3SQ	7/0.65	Wiring to a long distance, used mainly in a big plant
2.0SQ	7/0.6	Similar to 7/0.65, but the price is a little cheaper
1.5SQ	7/0.52	Mostly used in a big plant of overseas
1.3SQ	4/0.65	Wiring to a long distance, wired mainly inside a big equipment
1.25SQ	7/0.45	Similar to 4/0.65, a little flexibility, the diameter is compact, too
1.25SQ	40/0.2	Flexibility, used mostly in Cabtire specification
1.0SQ	7/0.44	Mostly used in a big plant of overseas
0.75SQ	24/0.2	Flexibility, used mostly inside an equipment
0.75SQ	30/0.18	More flexible than 24/0.2, used mostly inside an equipment
0.5SQ	7/0.32	Wiring to a short distance and a narrow place, used inside equipment, too
0.5SQ	7/0.3	Wiring to a short distance and a narrow place, used inside equipment, too
0.5SQ	20/0.18	Flexibility, used mostly inside an equipment

8 Types of Armors

Armor is applied for the purpose of protecting the surface of cable from mechanical damage and supporting the mechanical strength to cables.

Armors	Stainless-Steel Wire(OBS)	As a protective layer, the most commonly used to prevent damage to cables. Nominal 0.12 ~ 0.20 mm diameter Stainless- Steel Wire (OBS), Tinned Copper Wire (OBT) and Steel Wire (OBF) are applied as a braided Armor in a density of above 90% around the surface of cables.	
	Tinned Copper Wire (OBT)		
	Steel Wire (OBF)		
	Galvanized Steel Wire, PVC (WAZV)	For the purpose of preventing the damage to cables buried directly to the ground, Armor of Galvanized Steel Wire (WAZV) or (WAZE) is used widely as a protective layer, playing a role as a tension plate for sharing the burden which adds tension to the cable during or after the installation of the Submarine Cable and the cable for standing stakes. The surface of Inner sheath of the cable is spiraled by some of the suitable size of Galvanized Steel Wires according to the outer diameter and the tension of the cable. For the sake of anti-rust and anti-rodent, on the surface of Armor, PVC (WAZV) or PE (WAZE) Outer Sheath is covered.	
	Galvanized Steel Wire, PE (WAZE)		
	Galvanized Steel-Tape, PVC (TAZV)	For the purpose of preventing the damage to the cable buried directly to the ground, Armor of Galvanized Steel Tape (TAZV) or (TAZE) is used widely as a protective layer. The surface of Inner Sheath of the cable is wrapped by two pieces of the suitable thickness Galvanized Steel Tape corresponding to the outer diameter of the cable: one of the Galvanized Steel Tapes is helically applied over the Inner Sheath, and then the other is wrapped, overlapping the first one. In general, for the purpose of anti-rust and anti-rodent, the surface of the Armor, PVC (TAZV) or PE (TAZE) Outer Sheath is covered.	
	Galvanized Steel-Tape, PE (TAZE)		
	Galvanized Steel Corrugated Tube, PVC (MAZV)	Armor of Galvanized Steel Corrugated Tube is manufactured as follows: First, a piece of Galvanized Steel tape is affixed to the surroundings of the cable, and then its joints are welded continuously. At last, produce a linear corrugated pattern on the surface of the tape. Armor of Galvanized Steel Corrugated Tube is applied for the cable buried directly to the ground for the purpose of making a cable excellent in compressive strength and easy to be used for the construction because of its features: lightness and flexibility. For the purpose of anti-corrosion and preventing attacks by termites, rats and other vermin, on the surface of Armor, PVC (MAZV) or PE (MAZE) Outer Sheath is covered. In addition to that, there is an effect as an electro-magnetic shielding layer.	
Galvanized Steel Corrugated Tube, PE (MAZE)			

9 Pair

Each pair consists of 2cores called 1P which is composed of a Positive (PX) and a Negative (NX).

Pair	1Pair	2Pairs	3Pairs	4Pairs	5Pairs	10Pairs
Symbols	1P	2P	3P	4P	5P	10P

Thermocouple Extension/Compensating Cables

Thermocouple Extension/Compensating Cables

Insulation and Sheath: General PVC, Shape: Flat (F)

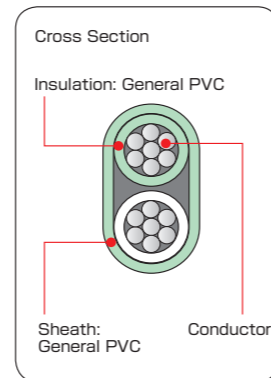
Type (P3) - Division Symbol (P4) - **VVF**

Rated Temp.Range **60~105°C**

- Features:** Excellence in Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC(HV)
 - Special heat-resistant PVC(SHV)
 - Cold-proof PVC(TV)
 - Flame-retardant PVC Sheath(FR-VVF,FR-HVVF,FR-SHVVF)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
Conductor (No./mm)		7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
Nom.O.D (mm)		0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.40	0.50	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		1.76	2.13	2.52	2.55	2.77	2.76	3.15
Sheath	Nom.thick (mm)	0.50	0.80	1.00	1.00	1.00	1.00	1.00
Approx.O.D (mm)		2.8 × 4.6	3.8 × 5.9	4.6 × 7.1	4.6 × 7.1	4.8 × 7.6	4.8 × 7.6	5.2 × 8.4
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
Insulation resistance (M Ω km)		Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		23	37	54	56	61	65	84



Insulation and Sheath: General PVC, Shape: Round (R)

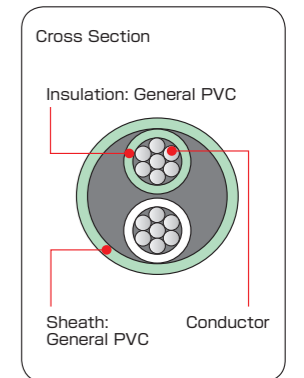
Type (P3) - Division Symbol (P4) - **VVR**

Rated Temp.Range **60~105°C**

- Features:** Excellence in Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC(HV)
 - Special heat-resistant PVC(SHV)
 - Cold-proof PVC(TV)
 - Flame-retardant PVC Sheath(FR-VVR,FR-HVVR,FR-SHVVR)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
Conductor (No./mm)		7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
Nom.O.D (mm)		0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		2.16	2.33	2.52	2.55	2.77	2.76	3.15
Sheath	Nom.thick (mm)	1.00	1.00	1.00	1.00	1.00	1.00	1.10
Approx.O.D (mm)		6.8	7.1	7.5	7.5	8.0	8.0	8.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
Insulation resistance (M Ω km)		Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		50	53	66	68	76	81	106



Insulation and Sheath: General PVC, Shape: Flat (F), Shield: Plain Copper Wire Braided (BA)

Type (P3) - Division Symbol (P4) - **VVF-BA**

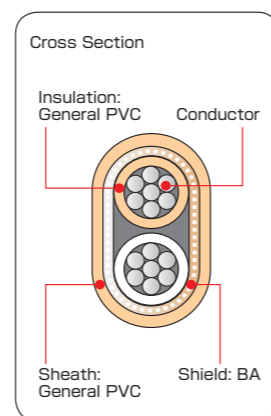
Rated Temp.Range **60~105°C**

- Features:** Excellence in Electro-static effect, Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC(HV)
 - Special heat-resistant PVC(SHV)
 - Cold-proof PVC(TV)
 - Flame-retardant PVC Sheath(FR-VVF,FR-HVVF,FR-SHVVF)



Applicable for Tinned Copper Wire Braided Shield(BT)

Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
Conductor (No./mm)		7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
Nom.O.D (mm)		0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.40	0.50	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		1.76	2.13	2.52	2.55	2.77	2.76	3.15
Shield	Nom.thick (mm)	0.30	0.30	0.3	0.30	0.30	0.30	0.30
Sheath	Nom.thick (mm)	0.50	0.80	1.00	1.00	1.00	1.00	1.00
Approx.O.D (mm)		3.4 × 5.2	4.4 × 6.5	5.2 × 7.7	5.2 × 7.7	5.4 × 8.2	5.4 × 8.2	5.8 × 8.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
Insulation resistance (M Ω km)		Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		35	51	68	70	78	85	103



Insulation and Sheath: General PVC, Shape: Round (R), Shield: Copper Tape (SA)

Type (P3) - Division Symbol (P4) - **VVR-SA**

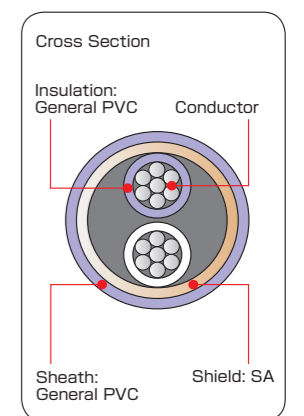
Rated Temp.Range **60~105°C**

- Features:** Excellence in Electro-static effect, Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC(HV)
 - Special heat-resistant PVC(SHV)
 - Cold-proof PVC(TV)
 - Flame-retardant PVC Sheath(FR-VVR,FR-HVVR,FR-SHVVR)
- Applicable for other types of shields:**
- Plain Copper Wire Braided Shield (BA)
 - Tinned Copper Wire Braided Shield (BT)



Remarks: Many sizes are on stock sale.

Conductor	Nominal sectional area (SQ)	0.75	1.0	1.25	1.3	1.5	2.3	AWG16
Conductor (No./mm)		24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65	1/1.29
Nom.O.D (mm)		1.13	1.32	1.35	1.57	1.56	1.95	1.29
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		2.33	2.52	2.55	2.77	2.76	3.15	2.49
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.00	1.00	1.00	1.10	1.10	1.10	1.00
Approx.O.D (mm)		7.4	7.8	7.9	8.5	8.5	9.3	7.7
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
Insulation resistance (M Ω km)		Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		75	83	85	98	104	127	88



Thermocouple Extension/Compensating Cables

Thermocouple Extension/Compensating Cables

Insulation and Sheath: Special Heat-resistant PVC (SHV), Shape: Flat(F)

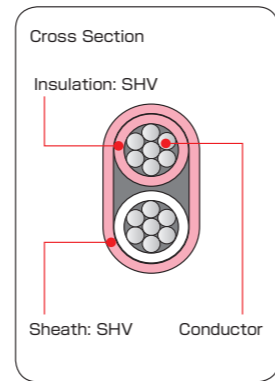
Type (P3) - Division Symbol (P4) -SHVVF

Rated Temp.Range 60~105°C

- Features:** Excellence in Heat-resistance, Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC(HV)
 - Cold-proof PVC(TV)
 - Flame-retardant PVC Sheath(FR-VVF,FR-HVVF,FR-SHVVF)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
Conductor (No./mm)		7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
Nom.O.D (mm)		0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.40	0.50	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		1.76	2.13	2.52	2.55	2.77	2.76	3.15
Sheath	Nom.thick (mm)	0.50	0.80	1.00	1.00	1.00	1.00	1.00
Approx.O.D (mm)		2.8 × 4.6	3.8 × 5.9	4.6 × 7.1	4.6 × 7.1	4.8 × 7.6	4.8 × 7.6	5.2 × 8.4
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		23	37	54	56	61	65	84



Insulation: General PVC, Sheath: Flame-retardant General PVC, Shape: Round (R)

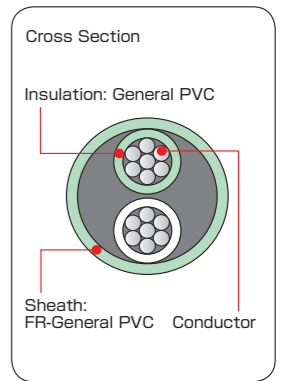
FR- Type (P3) - Division Symbol (P4) -VVR

Rated Temp.Range 60~105°C

- Features:** Excellence in Flame-retardant, Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC Insulation and Flame-retardant Heat-resistant PVC Sheath(FR-HVVR)
 - Special heat-resistant PVC Insulation and Flame-retardant Special heat-resistant PVC(FR-SHVVR)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
Conductor (No./mm)		7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
Nom.O.D (mm)		0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		2.16	2.33	2.52	2.55	2.77	2.76	3.15
Sheath	Nom.thick (mm)	1.00	1.00	1.00	1.00	1.00	1	1.10
Approx.O.D (mm)		6.8	7.1	7.5	7.5	8.0	8	8.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		50	53	66	68	76	81	106



Insulation and Sheath: Special Heat-resistant PVC (SHV), Shape: Flat(F), Shield: Tinned Copper Wire Braided (BT)

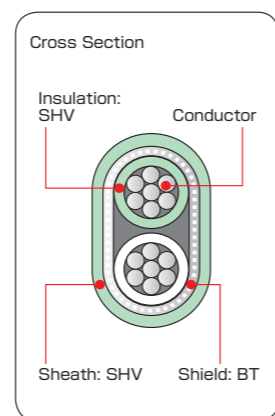
Type (P3) - Division Symbol (P4) -SHVVF-BT

Rated Temp.Range 60~105°C

- Features:** Excellence in Electro-static effect, Heat-resistance, Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC(HV)
 - Cold-proof PVC(TV)
 - Flame-retardant PVC Sheath(FR-VVF,FR-HVVF,FR-SHVVF)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
Conductor (No./mm)		7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
Nom.O.D (mm)		0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.40	0.50	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		1.76	2.13	2.52	2.55	2.77	2.76	3.15
Shield	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sheath	Nom.thick (mm)	0.50	0.80	1.00	1.00	1.00	1.00	1.00
Approx.O.D (mm)		3.4 × 5.2	4.4 × 6.5	5.2 × 7.7	5.2 × 7.7	5.4 × 8.2	5.4 × 8.2	5.8 × 8.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		35	51	68	70	78	85	103



Insulation: General PVC, Sheath: Flame-retardant General PVC, Shape: Round (R), Shield: Copper Tape (SA)

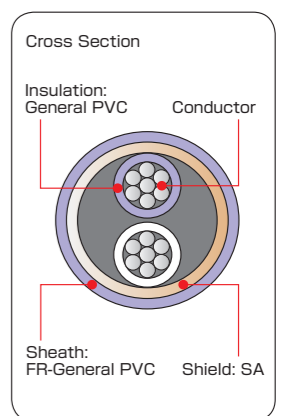
FR- Type (P3) - Division Symbol (P4) -VVR-SA

Rated Temp.Range 60~105°C

- Features:** Excellence in Flame-retardant, Electro-static effect, Damp-proof, Water-proof
Applicable for some other kinds of PVC materials as follows:
- Heat-resistant PVC Insulation and Flame-retardant Heat-resistant PVC Sheath(FR-HVVR)
 - Special heat-resistant PVC Insulation and Flame-retardant Special heat-resistant PVC(FR-SHVVR)
- Applicable for**
- Alumi-Mylar Tape with a Drain Wire Shield(SL)
 - Plain Copper Wire Braided Shield(BA)
 - Tinned Copper Wire Braided Shield(BT)



Conductor	Nominal sectional area (SQ)	0.75	1.0	1.25	1.3	1.5	2.3	AWG16
Conductor (No./mm)		24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65	1/1.29
Nom.O.D (mm)		1.13	1.32	1.35	1.57	1.56	1.95	1.29
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Approx.O.D (mm)		2.33	2.52	2.55	2.77	2.76	3.15	2.49
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.00	1.00	1.00	1.10	1.10	1.10	1.00
Approx.O.D (mm)		7.4	7.8	7.9	8.5	8.5	9.3	7.7
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		2000	2000	2000	2000	2000	2000	2000
Weight (kg/km)		75	83	85	98	104	127	88

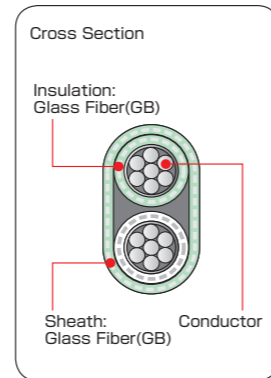


Insulation and Sheath: Glass Fiber Braided (GB), Shape: Flat (F)
 Type (P3) - Division Symbol (P4) - **GGBF** Rated Temp. 200°C

Features: Excellence in Heat-resistance
Attention: It can not be used in an environment of damp and water.



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.32	0.37	0.37	0.37	0.37	0.37	0.37
	Approx.O.D (mm)	1.60	1.87	2.06	2.09	2.31	2.30	2.69
Sheath	Nom.thick (mm)	0.25	0.45	0.45	0.45	0.45	0.45	0.45
	Approx.O.D (mm)	2.1 × 3.7	2.8 × 4.7	3.0x5.1	3.0 × 5.1	3.3 × 5.6	3.2x5.5	3.6 × 6.3
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000
Weight (kg/km)		20	33	38	40	45	50	64

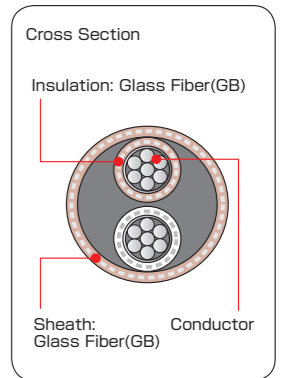


Insulation and Sheath: Glass Fiber Braided (GB), Shape: Round (R)
 Type (P3) - Division Symbol (P4) - **GGBR** Rated Temp. 200°C

Features: Excellence in Heat-resistance
Applicable for Multi-Pair
Attention: It can not be used in an environment of damp and water.



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.32	0.37	0.37	0.37	0.37	0.37	0.37
	Approx.O.D (mm)	1.60	1.87	2.06	2.09	2.31	2.30	2.69
Sheath	Nom.thick (mm)	0.25	0.45	0.45	0.45	0.45	0.45	0.45
	Approx.O.D (mm)	3.7	4.7	5.1	5.1	5.6	5.5	6.3
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000
Weight (kg/km)		32	55	62	65	73	75	98

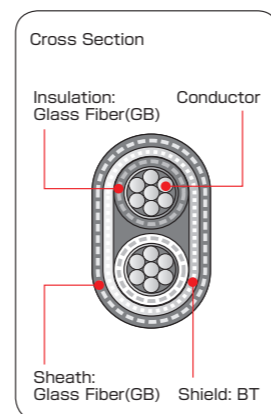


Insulation and Sheath: Glass Fiber Braided (GB), Shape: Flat (F), Shield: Tinned Copper Wire Braided (BT)
 Type (P3) - Division Symbol (P4) - **GGBF-BT** Rated Temp. 200°C

Features: Excellence in Heat-resistance, Electro-static effect
Attention: It can not be used in an environment of damp and water.



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.32	0.37	0.37	0.37	0.37	0.37	0.37
	Approx.O.D (mm)	1.60	1.87	2.06	2.09	2.31	2.30	2.69
Shield	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sheath	Nom.thick (mm)	0.25	0.45	0.45	0.45	0.45	0.45	0.45
	Approx.O.D (mm)	2.7 × 4.3	3.4 × 5.3	3.6x5.7	3.6 × 5.7	3.9 × 6.2	3.8x6.1	4.2 × 6.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000
Weight (kg/km)		28	46	50	52	57	60	78

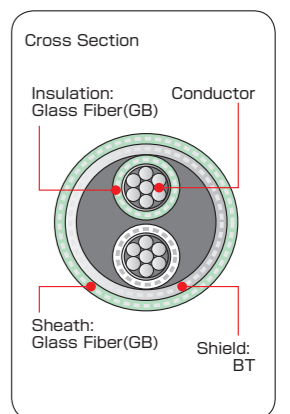


Insulation and Sheath: Glass Fiber Braided (GB), Shape: Round (R), Shield: Tinned Copper Wire Braided (BT)
 Type (P3) - Division Symbol (P4) - **GGBR-BT** Rated Temp. 200°C

Features: Excellence in Heat-resistance, Electro-static effect
Applicable for Multi-Pair
Attention: It can not be used in an environment of damp and water.



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.32	0.37	0.37	0.37	0.37	0.37	0.37
	Approx.O.D (mm)	1.60	1.87	2.06	2.09	2.31	2.30	2.69
Shield	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	4.3	5.3	5.7	5.7	6.2	6.1	6.9
Sheath	Nom.thick (mm)	0.25	0.45	0.45	0.45	0.45	0.45	0.45
	Approx.O.D (mm)	4.3	5.3	5.7	5.7	6.2	6.1	6.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0	Min. 5.0
Max. Length (m)		500	500	500	500	500	500	500
Weight (kg/km)		43	70	78	81	90	93	118



Insulation and Sheath: Fluorinated Ethylene Propylene (FEP), Shape: Flat (F)
 Type (P3) - Division Symbol (P4) - **FEPFEPF** **Rated Temp.Range 150~260°C**

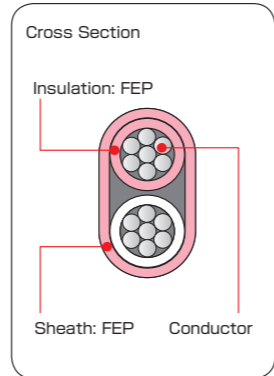
Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof

Applicable for other kinds of Teflon® materials as follows:

- PerFluoroAlkoxy(PFA 260°C)
- Ethylene-TetraFluoroEthylene(ETFE 150°C)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.56	1.73	1.92	1.95	2.17	2.16	2.55
Sheath	Nom.thick (mm)	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	Approx.O.D (mm)	2.4 × 4.0	2.6 × 4.3	2.8X4.7	2.8 × 4.7	3.0 × 5.2	3.0X5.2	3.4 × 5.9
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		500	500	500	500	500	500	500
Weight (kg/km)		25	29	36	37	44	46	64



Insulation and Sheath: Fluorinated Ethylene Propylene (FEP), Shape: Round (R)
 Type (P3) - Division Symbol (P4) - **FEPFEPR** **Rated Temp.Range 150~260°C**

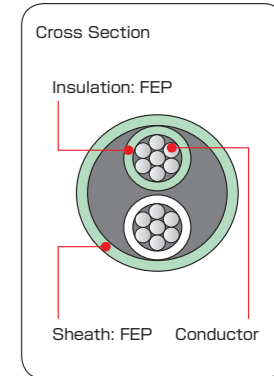
Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof

Applicable for other kinds of Teflon® materials as follows:

- PerFluoroAlkoxy(PFA 260°C)
- Ethylene-TetraFluoroEthylene(ETFE 150°C)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.56	1.73	1.92	1.95	2.17	2.16	2.55
Sheath	Nom.thick (mm)	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Approx.O.D (mm)	4.5	5.0	5.3	5.5	5.8	5.8	6.5
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		500	500	500	500	500	500	500
Weight (kg/km)		40	46	51	58	68	64	95



Insulation and Sheath: Fluorinated Ethylene Propylene (FEP), Shape: Flat (F), Shield: Tinned Copper Wire Braided (BT)
 Type (P3) - Division Symbol (P4) - **FEPFEPF-BT** **Rated Temp.Range 150~260°C**

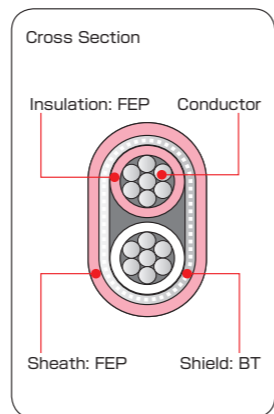
Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof, Electro-static effect

Applicable for other kinds of Teflon® materials as follows:

- PerFluoroAlkoxy(PFA 260°C)
- Ethylene-TetraFluoroEthylene(ETFE 150°C)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.56	1.73	1.92	1.95	2.17	2.16	2.55
Shield	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sheath	Nom.thick (mm)	0.40	0.40	0.40	0.40	0.40	0.40	0.40
	Approx.O.D (mm)	3.0 × 4.4	3.2 × 4.7	3.4X5.3	3.4 × 5.3	3.6 × 5.8	3.6X5.8	4.0 × 6.5
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		500	500	500	500	500	500	500
Weight (kg/km)		35	41	50	51	56	61	80



Insulation and Sheath: Fluorinated Ethylene Propylene (FEP), Shape: Round (R), Shield: Tinned Copper Wire Braided (BT)
 Type (P3) - Division Symbol (P4) - **FEPFEPR-BT** **Rated Temp.Range 150~260°C**

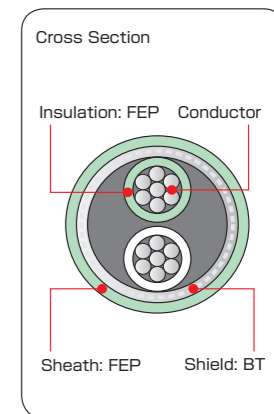
Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof, Electro-static effect

Applicable for other kinds of Teflon® materials as follows:

- PerFluoroAlkoxy(PFA 260°C)
- Ethylene-TetraFluoroEthylene(ETFE 150°C)



Conductor	Nominal sectional area (SQ)	0.5	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	7/0.32	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	0.96	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.56	1.73	1.92	1.95	2.17	2.16	2.55
Shield	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Sheath	Nom.thick (mm)	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	Approx.O.D (mm)	4.8	5.2	5.6	5.6	6.0	6.0	6.8
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		500	500	500	500	500	500	500
Weight (kg/km)		50	58	64	70	82	78	110



Insulation and Sheath: Polyethylene (E), Shape: Round (R), Shield: Copper Tape (SA)
 Type (P3) - Division Symbol (P4) - **EER-SA** Rated Temp. 75°C

Features: Excellence in Oil-proof, Water-proof, Chemical proof
 Eco-friendliness, Electro-static effect

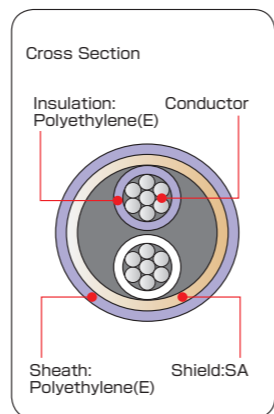
Applicable for other kinds of Teflon® materials as follows:

- Insulated Cross-Linked Polyethylene and Sheathed Flame-retardant Polyethylene*1(FR-CER)

Remarks: *1: Flame-retardant Polyethylene applies to IEC 60332-1 only



Conductor	Nominal sectional area (SQ)	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.33	2.52	2.55	2.77	2.76	3.15
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.00	1.00	1.00	1.10	1.10	1.10
	Approx.O.D (mm)	7.4	7.8	7.9	8.5	8.5	9.3
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		1000	1000	1000	1000	1000	1000
Weight (kg/km)		62	72	73	84	87	110



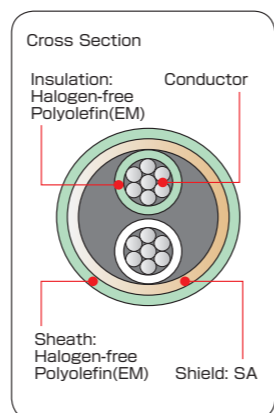
Insulation and Sheath: Eco material of Halogen-free Polyolefin (EM), Shape: Round(R), Shield: Copper Tape (SA)
 Type (P3) - Division Symbol (P4) - **EMEMR-SA** Rated Temp. 75°C

Features: Excellence in Low-smoke, Flame-retardant, Recycle,
 Eco-friendliness, None-emission of corrosion gas,
 Chemical proof, Electro-static effect

Applicable for without-Shield type



Conductor	Nominal sectional area (SQ)	0.75	1.0	1.25	1.3	1.5	2.3
	Conductor (No./mm)	24/0.2	7/0.44	7/0.45	4/0.65	7/0.52	7/0.65
	Nom.O.D (mm)	1.13	1.32	1.35	1.57	1.56	1.95
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.33	2.52	2.55	2.77	2.76	3.15
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.00	1.00	1.00	1.10	1.10	1.10
	Approx.O.D (mm)	7.4	7.8	7.9	8.5	8.5	9.3
Electric Characteristics	Voltage resistance (V/min)	AC500	AC500	AC500	AC500	AC500	AC500
	Insulation resistance (M Ω km)	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500	Min. 500
Max. Length (m)		1000	1000	1000	1000	1000	1000
Weight (kg/km)		71	82	83	96	99	123



Insulation: Elastomer (SPH), Sheath: Flame Retardant Elastomer (FR-SPH) Cabtire, Shape: Round (R)
 Type (P3) - Division Symbol (P4) - **FR-SPHR** Rated Temp. 135°C

Features: Excellence in Flexibility(as flexible as rubber material)

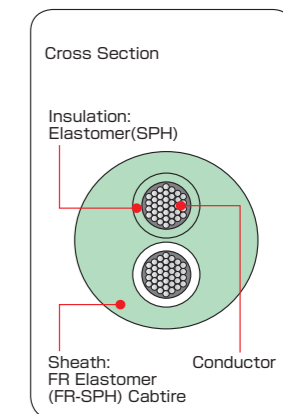
Applicable for other type of None-Flame-retardant Elastomer(SPH) of Insulation and Sheath

Remarks: None-Flame-retardant Elastomer(SPH) material is more flexible than Flame-retardant Elastomer(FR-SPH)



Applicable for Multi-Pair

Conductor	Nominal sectional area (SQ)	1.25
	Conductor (No./mm)	40/0.2
	Nom.O.D (mm)	1.46
Insulation	Nom.thick (mm)	0.80
	Approx.O.D (mm)	3.06
Sheath	Nom.thick (mm)	1.50
	Approx.O.D (mm)	9.2
Electric Characteristics	Voltage resistance (V/min)	AC500
	Insulation resistance (M Ω km)	Min. 500
Max. Length (m)		1000
Weight (kg/km)		105



Insulation: Elastomer (SPH), Sheath: Flame-retardant Elastomer (FR-SPH) Cabtire, Shape: Round (R), Shield: Tinned Copper Wire Braided (BT)
 Type (P3) - Division Symbol (P4) - **FR-SPHR-BT** Rated Temp. 135°C

Features: Excellence in Flexibility(as flexible as rubber material),
 Electro-static effect

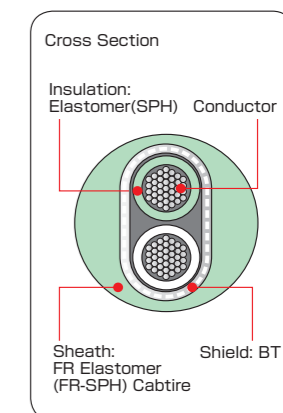
Applicable for other type of None-Flame-retardant Elastomer(SPH) of Insulation and Sheath

Remarks: None-Flame-retardant Elastomer(SPH) material is more flexible than Flame retardant Elastomer(FR-SPH)



Applicable for Multi-Pair

Conductor	Nominal sectional area (SQ)	1.25
	Conductor (No./mm)	40/0.2
	Nom.O.D (mm)	1.46
Insulation	Nom.thick (mm)	0.80
	Approx.O.D (mm)	3.06
Shield	Nom.thick (mm)	0.30
Sheath	Nom.thick (mm)	1.50
	Approx.O.D (mm)	9.8
Electric Characteristics	Voltage resistance (V/min)	AC500
	Insulation resistance (M Ω km)	Min. 500
Max. Length (m)		1000
Weight (kg/km)		155



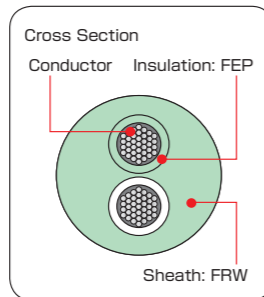
Fluorinated Ethylene Propylene(FEP) Insulation, Flexible Fluorine-Contained Heat-resistant Rubber(FRW) Sheath, Round Shape(R)

KX-1-Toughler

Rated Temp. 200°C

This kind of cable is widely used to the moving and bending parts of Robot, Injection Molding Machine, etc.

Features: Excellence in Flexibility, bending, Vibration-resistance, Heat-resistance, Cold-proof, Flame-retardant, and Chemical proof



Conductor	Nominal sectional area (SQ)	0.2
	Conductor (No./mm)	30/0.1
	Nom.O.D (mm)	0.63
Insulation	Nom.thick (mm)	0.30
	Approx.O.D (mm)	1.23
Sheath	Nom.thick (mm)	0.80
	Approx.O.D (mm)	4.1
Electric Characteristics	Voltage resistance (V/min)	AC500
	Insulation resistance (M Ω km)	Min. 500
Weight (kg/km)		31
Bending test Characteristics	Bending test (O type) /time	more than 5 million times
	Twisting Test/time	
	Bending Test (U type)/time	

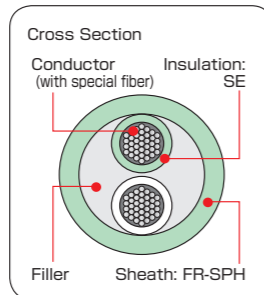
Special Polyethylene Insulation(SE), Flame-retardant special Elastomer Sheath(FR-SPH), Round Shape(R)

KCB Tough EV3

Rated Temp. 90°C

This kind of cable is widely used to the moving and bending parts of Robot, Injection Molding Machine, etc.

Features: Excellence in Flexibility, bending, Vibration-resistance, Flame-retardant



Conductor	Nominal sectional area (SQ)	0.75
	Conductor (No./mm)	96/0.1
	Nom.O.D (mm)	1.13
Insulation	Nom.thick (mm)	0.60
	Approx.O.D (mm)	2.33
Sheath	Nom.thick (mm)	1.00
	Approx.O.D (mm)	6.7
Electric Characteristics	Voltage resistance (V/min)	AC500
	Insulation resistance (M Ω km)	Min. 500
Weight (kg/km)		51
Bending test Characteristics	Bending test (O type) /time	more than 5 million times
	Twisting Test/time	
	Bending Test (U type)/time	

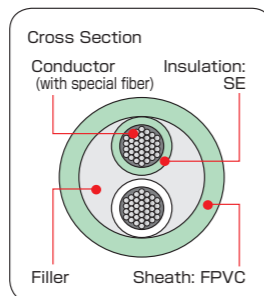
Special Polyethylene Insulation (SE), Flexible Polyvinyl Chloride Sheath(FPVC), Round Shape(R)

KCB Sofura

Rated Temp. 60°C

This kind of cable is widely used to the moving and bending parts of Robot, Injection Molding Machine, etc.

Features: Excellence in Flexibility, bending, Vibration-resistance



Conductor	Nominal sectional area (SQ)	0.5
	Conductor (No./mm)	64/0.1
	Nom.O.D (mm)	1.00
Insulation	Nom.thick (mm)	0.50
	Approx.O.D (mm)	2.00
Sheath	Nom.thick (mm)	0.80
	Approx.O.D (mm)	5.6
Electric Characteristics	Voltage resistance (V/min)	AC500
	Insulation resistance (M Ω km)	Min. 500
Weight (kg/km)		35
Bending test Characteristics	Bending test (O type) /time	more than 5 million times
	Twisting Test/time	
	Bending Test (U type)/time	

Insulation and Sheath: Fluorinated Ethylene Propylene (FEP), Shape: Flat (F), Shield: Tinned Copper Wire Braided (BT)

FEPFEP(UL)F-BT

Rated Temp. 200°C

Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof, Electro-static effect

This kind of cable can be used in a severe environment.



*UL Certificate Thermocouple Extension Cable (Style No.: UL13, File No.: E254583, Category: CL3R)

How to Choose a Model

An example, based on IEC-60584-3-2007

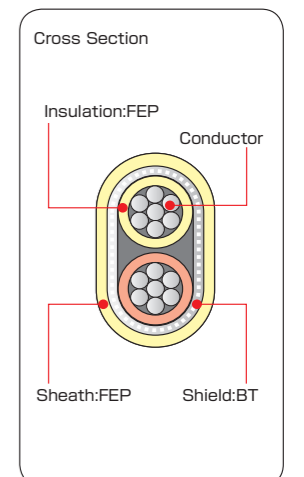
KX-ASTM-SP-FEPFEP(UL) F-BT 1P × 16AWG(4/0.65)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Cable Type, ② Standard(Color Code), ③ Division Symbol (Class & Tolerance), ④ Insulation & Sheath
⑤ Shape, ⑥ Shield, ⑦ Pair, ⑧ Conductor Size, ⑨ Conductor Combination

- **Cable Type:** Select from KX, JX, TX, EX, RX, BX, and NX(KCA and KCB can not be applied)
- **Standard:** IEC, JIS, and other international Standards
- **Division Symbols:** ① ASTM Standard(SP:Special Tolerance, ST: Standard Tolerance), ② IEC Standard (Precision Class:1-S/ Normal Class:2-S)
- **Insulation & Sheath:** FEPFEP (200°C) only
- **Applicable for some other kinds of shields as follows :**
 - Tinned Copper Wire Braided(BT)
 - Alumi-Mylar Tape with a Drain Wire(SL)
 - Copper Tape(SA)
 - Plain Copper Wire Braided(BA)
- **Conductor Size:** AWG23~AWG14
- **Remarks:** Applicable for 105°C PVC(UL) Category: CL3R and CL3X

Conductor	AWG	23	20	19	17	16	14
	Nominal sectional area (SQ)	0.3	0.5	0.75	1.25	1.3	2
	Conductor (No./mm)	12/0.18	7/0.32	24/0.2	7/0.45	4/0.65	7/0.6
	Nom.O.D (mm)	0.72	0.96	1.13	1.35	1.57	1.8
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.32	1.56	1.73	1.95	2.17	2.4
Shield	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	2.0 × 3.3	2.2 × 3.8	2.4 × 4.1	2.6 × 4.5	2.8 × 5.0	3.1 × 5.6
Sheath	Nom.thick (mm)	0.40	0.40	0.40	0.40	0.40	0.40
	Approx.O.D (mm)	2.8 × 4.1	3.0 × 4.6	3.2 × 4.9	3.4 × 5.3	3.6 × 5.8	3.9 × 6.4
Electric Characteristics	Voltage resistance (V/min)	AC1500	AC1500	AC1500	AC1500	AC1500	AC1500
	Insulation resistance (M Ω /km)	1500	1500	1500	1500	1500	1500
Approx Length (153m/Ft)		500	500	500	500	500	500
Weight (kg/km)		27	35	41	51	56	75



Thermocouple Extension/Compensating Cables

Thermocouple Extension/Compensating Cables

Multi-Pair(Twisting), Round Shape(R), with Shield

Model 1 Insulation and Sheath: General PVC, Shield: Copper Tape(SA)
 Type (P3) - Division Symbol (P4) - **VVR-SA** **Rated Temp.Range** 60~105°C

Model 2 Insulation: General PVC, Sheath: Flame-retardant General PVC, Shield: Copper Tape (SA)
FR- Type (P3) - Division Symbol (P4) - **VVR-SA** **Rated Temp.Range** 60~105°C

Applicable for some other kinds of PVC materials as follows:

- Model 1: Heat-resistant PVC(HV), Special heat-resistant PVC(SHV), Cold-proof PVC(TV)
- Model 2: Heat-resistant PVC Insulation and Flame-retardant Heat-resistant PVC Sheath (FR-HVVR) or Special heat-resistant PVC Insulation and Flame Retardant Special heat-resistant PVC(FR-SHVVR)
- Model 1 & Model 2: Features: Excellence in Damp-proof, Water-proof
 Applicable for ● Plain Copper Wire Braided Shield(BA)
 ● Tinned Copper Wire Braided Shield(BT)
 Applicable for without-Shield type, too



0.5SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Conductor (No./mm)	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32
	Nom.O.D (mm)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.8
	Approx.O.D (mm)	10.3	12.0	14.0	14.4	18.3	18.9	21.1	24.1	28.8
Max. Length (m)		1000	1000	1000	1000	1000	500	500	500	500
Weight (kg/km)		126	186	237	261	406	451	554	716	1024

0.75SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Conductor (No./mm)	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2
	Nom.O.D (mm)	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.1	1.2	1.3	1.3	1.5	1.5	1.6	1.7	1.9
	Approx.O.D (mm)	10.9	12.7	14.8	15.3	19.6	20.3	22.6	25.9	30.9
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		143	214	274	302	481	537	659	855	1230

1.0SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Conductor (No./mm)	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44
	Nom.O.D (mm)	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.6	1.6	1.8	2.0
	Approx.O.D (mm)	11.8	13.6	15.9	16.4	21.1	22.1	24.3	28.1	33.3
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		170	250	320	355	569	663	788	1033	1488

□-□-VVR-SA / FR-□-□-VVR-SA Multi-Pair(Twisting), Round Shape(R), with Shield

1.25SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Conductor (No./mm)	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45
	Nom.O.D (mm)	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.6	1.6	1.8	2.0
	Approx.O.D (mm)	11.8	13.6	15.9	16.4	21.1	22.1	24.4	28.1	33.6
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		173	256	327	364	583	666	807	1070	1535

1.3SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Conductor (No./mm)	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65
	Nom.O.D (mm)	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.3	1.4	1.4	1.6	1.6	1.7	1.9	2.1
	Approx.O.D (mm)	12.6	14.7	17.1	17.7	22.8	23.7	26.4	30.4	36.3
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		195	289	380	423	678	764	939	1240	1785

1.5SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Conductor (No./mm)	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52
	Nom.O.D (mm)	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.3	1.4	1.4	1.6	1.6	1.7	1.9	2.1
	Approx.O.D (mm)	12.6	14.7	17.1	17.7	22.8	23.7	26.3	30.3	36.2
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		199	307	392	437	703	767	974	1282	1847

AWG16		2	4	5	6	10	12	15	20	30
Conductor	AWG	16	16	16	16	16	16	16	16	16
	Conductor (No./mm)	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29
	Nom.O.D (mm)	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.5	1.6	1.8	2.0
	Approx.O.D (mm)	11.6	13.3	15.5	16.0	20.6	21.4	23.8	27.6	32.8
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		175	261	335	374	599	677	831	1097	1579

Multi-Pair(Twisting), Round Shape(R), with Shield

Model 1 Insulation and Sheath: General PVC, Shield: Alumi-Mylar Tape with a Drain Wire(SL)
 Type (P3) - Division Symbol (P4) - **VVR-SL** **Rated Temp.Range 60~105°C**

Model 2 Insulation: General PVC, Sheath: Flame-retardant General PVC, Shield: Alumi-Mylar Tape with a Drain Wire(SL)
FR- Type (P3) - Division Symbol (P4) - **VVR-SL** **Rated Temp.Range 60~105°C**

Applicable for some other kinds of PVC materials as follows:

- Model 1: Heat-resistant PVC(HV), Special heat-resistant PVC(SHV), Cold-proof PVC(TV)
- Model 2: Heat-resistant PVC Insulation and Flame-retardant Heat-resistant PVC Sheath (FR-HVVR) or Special heat-resistant PVC Insulation and Flame Retardant Special heat-resistant PVC(FR-SHVVR)
- Model 1 & Model 2: Features: Excellence in Damp-proof, Water-proof
 Applicable for ●Plain Copper Wire Braided Shield (BA)
 ●Tinned Copper Wire Braided Shield(BT)
 Applicable for without-Shield type, too



0.5SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Conductor (No./mm)	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32
	Nom.O.D (mm)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.8
	Approx.O.D (mm)	10.3	12.0	13.9	14.4	18.3	18.9	21.1	24.1	28.8
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000	1000	500
Weight (kg/km)		111	166	213	235	370	414	510	665	962

0.75SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Conductor (No./mm)	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2
	Nom.O.D (mm)	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.1	1.2	1.3	1.3	1.5	1.5	1.6	1.7	1.9
	Approx.O.D (mm)	10.9	12.7	14.8	15.2	19.6	20.3	22.6	25.9	30.9
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000	500	500
Weight (kg/km)		126	193	247	274	443	497	614	800	1157

1.0SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Conductor (No./mm)	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44
	Nom.O.D (mm)	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.6	1.6	1.8	2.0
	Approx.O.D (mm)	11.7	13.5	15.7	16.2	20.8	21.9	24.2	27.7	33.2
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000	500	500
Weight (kg/km)		151	228	292	326	529	619	739	976	1417

Multi-Pair(Twisting), Round Shape(R), with Shield

1.25SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Conductor (No./mm)	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45
	Nom.O.D (mm)	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.4	1.5	1.6	1.6	1.8	2.0
	Approx.O.D (mm)	11.8	13.6	15.9	16.6	21.1	22.1	24.4	28.1	33.6
Max. Length (m)		1000	1000	1000	1000	1000	1000	1000	500	500
Weight (kg/km)		154	232	298	341	541	622	756	1001	1453

1.3SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Conductor (No./mm)	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65
	Nom.O.D (mm)	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.2	1.3	1.4	1.4	1.6	1.6	1.7	1.9	2.1
	Approx.O.D (mm)	12.6	14.7	17.1	17.7	22.8	23.7	26.4	30.4	36.3
Max. Length (m)		1000	1000	1000	1000	1000	1000	500	500	500
Weight (kg/km)		173	271	347	389	631	714	883	1169	1694

1.5SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Conductor (No./mm)	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52
	Nom.O.D (mm)	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.2	1.3	1.4	1.4	1.6	1.6	1.7	1.9	2.1
	Approx.O.D (mm)	12.5	14.7	17.1	17.6	22.7	23.5	26.2	30.2	36.1
Max. Length (m)		1000	1000	1000	1000	1000	1000	500	500	500
Weight (kg/km)		179	282	361	405	658	717	921	1219	1769

AWG16		2	4	5	6	10	12	15	20	30
Conductor	AWG	16	16	16	16	16	16	16	16	16
	Conductor (No./mm)	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29
	Nom.O.D (mm)	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
Shield	Nom.thick (mm)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.5	1.6	1.8	2.0
	Approx.O.D (mm)	11.6	13.3	15.5	16.0	20.6	21.4	23.8	27.5	32.8
Max. Length (m)		1000	1000	1000	1000	1000	1000	500	500	500
Weight (kg/km)		157	240	307	345	559	635	785	1041	1510

Multi-Pair(Twisting), Round Shape(R), with Shield

□-□-FEPFEP-R-BT

Insulation and Sheath: Fluorinated Ethylene Propylene(FEP), Shield: Tinned Copper Wire Braided(BT)

Type (P3) - Division Symbol (P4) - **FEPFEP-R-BT** Rated Temp.Range 150~260°C

Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof, Electro-static effect.

Applicable for other kinds of Teflon® materials as follows:

- PerFluoroAlkoxy(PFA 260°C)
- Ethylene-TetraFluoroEthylene(ETFE 150°C)

Applicable for Alumi-Mylar Tape with a Drain Wire Shield(SL)

Applicable for without-Shield type, too



0.5SQ		2	4	5	6	10	12	15	20
Conductor	Nominal sectional area (SQ)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Conductor (No./mm)	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32
	Nom.O.D (mm)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Shield	Nom.thick (mm)	0.30	0.30	0.35	0.35	0.40	0.40	0.40	0.40
Sheath	Nom.thick (mm)	0.5	0.6	0.6	0.6	0.7	0.7	0.7	0.7
	Approx.O.D (mm)	7	8.3	9.6	10	13	13.5	14.8	16.8
Weight (kg/km)		100	149	196	215	355	393	480	617

0.75SQ		2	4	5	6	10	12	15	20
Conductor	Nominal sectional area (SQ)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Conductor (No./mm)	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2
	Nom.O.D (mm)	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.73	1.73	1.73	1.73	1.73	1.73	1.73	1.73
Shield	Nom.thick (mm)	0.30	0.35	0.35	0.35	0.40	0.40	0.40	0.40
Sheath	Nom.thick (mm)	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8
	Approx.O.D (mm)	7.8	9.1	10.5	10.8	14.1	14.6	16.1	18.6
Weight (kg/km)		123	182	235	258	431	476	580	770

1.0SQ		2	4	5	6	10	12	15	20
Conductor	Nominal sectional area (SQ)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Conductor (No./mm)	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44
	Nom.O.D (mm)	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.92	1.92	1.92	1.92	1.92	1.92	1.92	1.92
Shield	Nom.thick (mm)	0.35	0.35	0.40	0.40	0.40	0.40	0.45	0.45
Sheath	Nom.thick (mm)	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8
	Approx.O.D (mm)	8.5	9.9	11.5	11.9	15.4	15.9	17.9	20.5
Weight (kg/km)		138	211	274	309	511	603	710	936

Multi-Pair(Twisting), Round Shape(R), with Shield

1.25SQ		2	4	5	6	10	12	15	20
Conductor	Nominal sectional area (SQ)	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Conductor (No./mm)	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45
	Nom.O.D (mm)	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.95	1.95	1.95	1.95	1.95	1.95	1.95	1.95
Shield	Nom.thick (mm)	0.30	0.35	0.35	0.40	0.40	0.40	0.40	0.45
Sheath	Nom.thick (mm)	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.8
	Approx.O.D (mm)	8.6	10	11.6	12	15.6	16.1	18.1	20.7
Weight (kg/km)		152	230	296	333	548	606	759	997

1.3SQ		2	4	5	6	10	12	15	20
Conductor	Nominal sectional area (SQ)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Conductor (No./mm)	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65
	Nom.O.D (mm)	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	2.17	2.17	2.17	2.17	2.17	2.17	2.17	2.17
Shield	Nom.thick (mm)	0.35	0.35	0.4	0.4	0.4	0.4	0.45	0.45
Sheath	Nom.thick (mm)	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
	Approx.O.D (mm)	9.4	10.9	12.9	13.4	17	17.9	20	22.8
Weight (kg/km)		181	267	363	399	640	729	908	1179

1.5SQ		2	4	5	6	10	12	15	20
Conductor	Nominal sectional area (SQ)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Conductor (No./mm)	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52
	Nom.O.D (mm)	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
Shield	Nom.thick (mm)	0.35	0.35	0.40	0.40	0.40	0.40	0.45	0.45
Sheath	Nom.thick (mm)	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
	Approx.O.D (mm)	9.4	10.9	12.9	13.4	17.0	17.8	19.9	22.7
Weight (kg/km)		175	265	356	396	644	732	911	1190

AWG16		2	4	5	6	10	12	15	20
Conductor	AWG	16	16	16	16	16	16	16	16
	Conductor (No./mm)	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29
	Nom.O.D (mm)	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Insulation	Nom.thick (mm)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	Approx.O.D (mm)	1.89	1.89	1.89	1.89	1.89	1.89	1.89	1.89
Shield	Nom.thick (mm)	0.30	0.35	0.35	0.35	0.40	0.40	0.40	0.45
Sheath	Nom.thick (mm)	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.8
	Approx.O.D (mm)	8.4	9.8	11.3	11.9	15.2	15.7	17.6	20.3
Weight (kg/km)		153	235	303	344	563	627	781	1032

Thermocouple Extension/Compensating Cables

Thermocouple Extension/Compensating Cables

Multi-Pair(Twisting), Round Shape(R), with Shield

□-□-EER-SA / □-□-EMEMR-SA

Multi-Pair(Twisting), Round Shape(R), with Shield

Model 1 Insulation and Sheath: Polyethylene(E), Shield: Copper Tape(SA) **Rated Temp. 75°C**

Type (P3) - Division Symbol (P4) -EER-SA

Applicable for some other kinds of PVC materials as follows:

●Insulated Cross-Linked Polyethylene and Sheathed Flame-retardant Polyethylene*1(FR-CER)

Remarks: *1: Flame-retardant Polyethylene applies to IEC 60332-1 only

Model 2 Insulation and Sheath: Eco-material of Halogen-free Polyolefin(EM), Shield: Copper Tape(SA) **Rated Temp. 75°C**

Type (P3) - Division Symbol (P4) -EMEMR-SA

Features of Model 2: Excellence in Low-smoke, Flame retardant, Recycle, Eco-friendliness, None-emission of corrosion gas, Electro-static effect.

Model 1 & Model 2: Features: Excellence in Damp-proof, Water-proof
 Applicable for ●Plain Copper Wire Braided Shield(BA) ●Tinned Copper Wire Braided Shield(BT)
 ●Alumi-Mylar Tape with a Drain Wire(SL)
 Applicable for without-Shield type, too



0.5SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Conductor (No./mm)	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32	7/0.32
	Nom.O.D (mm)	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16	2.16
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.1	1.2	1.3	1.3	1.4	1.4	1.5	1.6	1.8
	Approx.O.D (mm)	10.3	12.0	14.0	14.4	18.3	18.9	21.1	24.1	28.8
Max. Length (m)		1000	1000	1000	1000	1000	500	500	500	500
Weight (kg/km)		126	186	237	261	406	451	554	716	1024

0.75SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
	Conductor (No./mm)	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2	24/0.2
	Nom.O.D (mm)	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33	2.33
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.1	1.2	1.3	1.3	1.5	1.5	1.6	1.7	1.9
	Approx.O.D (mm)	10.9	12.7	14.8	15.3	19.6	20.3	22.6	25.9	30.9
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		143	214	274	302	481	537	659	855	1230

1.0SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Conductor (No./mm)	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44	7/0.44
	Nom.O.D (mm)	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32	1.32
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52	2.52
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.6	1.6	1.8	2.0
	Approx.O.D (mm)	11.8	13.6	15.9	16.4	21.1	22.1	24.3	28.1	33.3
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		170	250	320	355	569	663	788	1033	1488

1.25SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
	Conductor (No./mm)	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45	7/0.45
	Nom.O.D (mm)	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.6	1.6	1.8	2.0
	Approx.O.D (mm)	11.8	13.6	15.9	16.4	21.1	22.1	24.4	28.1	33.6
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		173	256	327	364	583	666	807	1070	1535

1.3SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
	Conductor (No./mm)	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65	4/0.65
	Nom.O.D (mm)	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77	2.77
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.3	1.4	1.4	1.6	1.6	1.7	1.9	2.1
	Approx.O.D (mm)	12.6	14.7	17.1	17.7	22.8	23.7	26.4	30.4	36.3
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		195	289	380	423	678	764	939	1240	1785

1.5SQ		2	4	5	6	10	12	15	20	30
Conductor	Nominal sectional area (SQ)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Conductor (No./mm)	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52	7/0.52
	Nom.O.D (mm)	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56	1.56
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76	2.76
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.3	1.4	1.4	1.6	1.6	1.7	1.9	2.1
	Approx.O.D (mm)	12.6	14.7	17.1	17.7	22.8	23.7	26.3	30.3	36.2
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		199	307	392	437	703	767	974	1282	1847

AWG16		2	4	5	6	10	12	15	20	30
Conductor	AWG	16	16	16	16	16	16	16	16	16
	Conductor (No./mm)	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29	1/1.29
	Nom.O.D (mm)	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29
Insulation	Nom.thick (mm)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
	Approx.O.D (mm)	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49	2.49
Shield	Nom.thick (mm)	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Sheath	Nom.thick (mm)	1.2	1.2	1.3	1.3	1.5	1.5	1.6	1.8	2.0
	Approx.O.D (mm)	11.6	13.3	15.5	16.0	20.6	21.4	23.8	27.6	32.8
Max. Length (m)		1000	1000	1000	1000	500	500	500	500	500
Weight (kg/km)		175	261	335	374	599	677	831	1097	1579

Types & Limits of Error of Thermocouple Extension/Compensating Cables

IEC 60584-3-2007						
Thermocouple Sensors	Types	Conductor Composition		Temp. of connected point with thermocouple °C	Limits of error(°C)	
		Positive(PX)	Negative (NX)		Class1	Class2
B	BC	Copper	Copper	0 ~ + 100	-	-
R	RCA	Copper	Copper-Nickel alloy	0 ~ + 100	-	± 2.5
	RCB			0 ~ +200	-	± 5.0
S	SCA	Copper	Copper-Nickel alloy	0 ~ +100	-	± 2.5
	SCB			0 ~ +200	-	± 5.0
K	KX	Chromel®	Alumel®	- 25 ~ + 200	± 1.5	± 2.5
	KCA	Iron	Constantan	0 ~ + 150	-	± 2.5
	KCB	Copper	Constantan	0 ~ + 100	-	± 2.5
E	EX	Chromel®	Constantan	- 25 ~ + 200	± 1.5	± 2.5
J	JX	Iron	Constantan	- 25 ~ + 200	± 1.5	± 2.5
T	TX	Copper	Constantan	- 25 ~ + 100	± 0.5	± 1.0
N	NX	Nickel-Chromium-Silicon	Nickel-Silicon	- 25 ~ + 200	± 1.5	± 2.5
	NC	Copper-Nickel alloy	Copper-Nickel alloy	0 ~ + 150	-	± 2.5

*Because the metal materials of Positive & Negative of BC type are the same, Limits of error is not stipulated.

ASTM E230-2012				
Thermocouple Sensors	Types	Temp. of connected point with thermocouple °C	Limits of error (°C)	
			Special	Standard
B	B	0 ~ + 100	-	± 3.7
	BX	0 ~ + 200	-	± 4.2
R	RX	0 ~ + 200	-	± 5.0
S	SX	0 ~ + 200	-	± 5.0
K	KX	0 ~ + 200	± 1.1	± 2.2
E	EX	0 ~ + 200	± 1.0	± 1.7
J	JX	0 ~ + 200	± 1.1	± 2.2
T	TX	- 60 ~ + 100	± 0.5	± 1.0
N	NX	0 ~ + 200	± 1.1	± 2.2

Classification				
Use Division	Symbols	Materials for Insulation and Sheath	Temp.Range(°C)	Remarks
for Nomal	G	PVC	- 20 ~ + 90	Not apply for RCB and SCB
			0 ~ + 90	Apply for BC, RCA, SCA, NC, KCA, and KCB if temperature is at the range of 0°C ~ +90°C
for Heat-resistant	H	Glass Fiber	0 ~ + 150	Not apply for BC, RCA, SCA, KCB, and TX
for High Heat-resistant	S	Fluoropolymers (Teflon®)	- 25 ~ + 200	Not apply for Compensating type
				Apply for TX if temperature is at the range of -25°C ~ +100°C

Materials' Characteristics of Insulation and Sheath

Please consider wiring environment and choose the suitable materials of Insulation and Sheath from the following table:

Materials of Insulation & Sheath	Symbols	Water-proof	Oil-proof	Chemical proof	environment	Insulation resistance (MΩ /km)	Cold-proof Temperature Range (°C)	Heat-proof Temperature Range (°C)																																																																																																																																																																																																																												
									<table border="1"> <tr> <td rowspan="7">PVC</td> <td>General PVC(Polyvinyl chloride)</td> <td>V</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 10</td> <td>up to 60</td> </tr> <tr> <td>Heat-resistant PVC</td> <td>HV</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 10</td> <td>up to 80</td> </tr> <tr> <td>Special heat-resistant PVC</td> <td>SHV</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 10</td> <td>up to 105</td> </tr> <tr> <td>Cold-proof PVC</td> <td>TV</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 20</td> <td>up to 60</td> </tr> <tr> <td>Flame-retardant general PVC</td> <td>FR-V</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 10</td> <td>up to 60</td> </tr> <tr> <td>Flame-retardant heat-resistant PVC</td> <td>FR-HV</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 10</td> <td>up to 80</td> </tr> <tr> <td>Flame-retardant Special heat-resistant PVC</td> <td>FR-SHV</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 10</td> <td>up to 105</td> </tr> <tr> <td rowspan="10">Others</td> <td>Polyethylene</td> <td>E</td> <td>Good</td> <td>Excellent</td> <td>Good</td> <td>Excellent</td> <td>Excellent</td> <td>- 60</td> <td>up to 75</td> </tr> <tr> <td>Flame-retardant Polyethylene *1</td> <td>FR-E</td> <td>Good</td> <td>Excellent</td> <td>Good</td> <td>Excellent</td> <td>Excellent</td> <td>- 60</td> <td>up to 75</td> </tr> <tr> <td>Non-Halogen (Halogen-free) Polyolefin (Eco material)</td> <td>EM</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>Excellent</td> <td>Good</td> <td>- 40</td> <td>up to 75</td> </tr> <tr> <td>Cross-linked Polyethylene</td> <td>C</td> <td>Good</td> <td>Excellent</td> <td>Good</td> <td>Excellent</td> <td>Excellent</td> <td>- 60</td> <td>up to 105</td> </tr> <tr> <td>Nylon</td> <td>N</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Excellent</td> <td>Good</td> <td>- 40</td> <td>up to 90</td> </tr> <tr> <td>Polyurethane mixed with PVC</td> <td>UV</td> <td>Good</td> <td>Normal</td> <td>Good</td> <td>Invalid</td> <td>Good</td> <td>- 40</td> <td>up to 60</td> </tr> <tr> <td>Silicon Rubber</td> <td>K</td> <td>Normal</td> <td>Invalid</td> <td>Normal</td> <td>Good</td> <td>Good</td> <td>- 60</td> <td>up to 180</td> </tr> <tr> <td>Elastomer</td> <td>SPH</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Excellent</td> <td>- 60</td> <td>up to 135</td> </tr> <tr> <td>Flame-retardant Elastomer</td> <td>FR-SPH</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Good</td> <td>Excellent</td> <td>- 60</td> <td>up to 135</td> </tr> <tr> <td rowspan="4">Fluoropolymers (Teflon®)</td> <td>Flexible Fluorinated Heat-resistant Rubber</td> <td>FRW</td> <td>Good</td> <td>Good</td> <td>Excellent</td> <td>Invalid</td> <td>Excellent</td> <td>- 60</td> <td>up to 200</td> </tr> <tr> <td>Fluorinated Ethylene Propylene</td> <td>FEP</td> <td>Excellent</td> <td>Excellent</td> <td>Excellent</td> <td>Invalid</td> <td>Excellent</td> <td>- 253</td> <td>up to 200</td> </tr> <tr> <td>Perfluoroalkoxy</td> <td>PFA</td> <td>Excellent</td> <td>Excellent</td> <td>Excellent</td> <td>Invalid</td> <td>Excellent</td> <td>- 195</td> <td>up to 260</td> </tr> <tr> <td>Ethylene-TetraFluoroEthylene</td> <td>ETFE</td> <td>Good</td> <td>Excellent</td> <td>Excellent</td> <td>Invalid</td> <td>Excellent</td> <td>- 100</td> <td>up to 150</td> </tr> <tr> <td rowspan="3">Braided</td> <td>Polytetrafluoroethylene</td> <td>PTFE</td> <td>Excellent</td> <td>Excellent</td> <td>Excellent</td> <td>Invalid</td> <td>Excellent</td> <td>- 253</td> <td>up to 260</td> </tr> <tr> <td>Glass Fiber</td> <td>GB</td> <td>-</td> <td>-</td> <td>-</td> <td>Excellent</td> <td>Invalid</td> <td>Frost-Free</td> <td>up to 200</td> </tr> <tr> <td>Silica Glass Fiber</td> <td>SB</td> <td>-</td> <td>-</td> <td>-</td> <td>Excellent</td> <td>Invalid</td> <td>Frost-Free</td> <td>up to 400</td> </tr> <tr> <td>Alumina Fiber</td> <td>CB</td> <td>-</td> <td>-</td> <td>-</td> <td>Excellent</td> <td>Invalid</td> <td>Frost-Free</td> <td>up to 1100</td> </tr> </table>									PVC	General PVC(Polyvinyl chloride)	V	Good	Normal	Good	Invalid	Good	- 10	up to 60	Heat-resistant PVC	HV	Good	Normal	Good	Invalid	Good	- 10	up to 80	Special heat-resistant PVC	SHV	Good	Normal	Good	Invalid	Good	- 10	up to 105	Cold-proof PVC	TV	Good	Normal	Good	Invalid	Good	- 20	up to 60	Flame-retardant general PVC	FR-V	Good	Normal	Good	Invalid	Good	- 10	up to 60	Flame-retardant heat-resistant PVC	FR-HV	Good	Normal	Good	Invalid	Good	- 10	up to 80	Flame-retardant Special heat-resistant PVC	FR-SHV	Good	Normal	Good	Invalid	Good	- 10	up to 105	Others	Polyethylene	E	Good	Excellent	Good	Excellent	Excellent	- 60	up to 75	Flame-retardant Polyethylene *1	FR-E	Good	Excellent	Good	Excellent	Excellent	- 60	up to 75	Non-Halogen (Halogen-free) Polyolefin (Eco material)	EM	Good	Invalid	Good	Excellent	Good	- 40	up to 75	Cross-linked Polyethylene	C	Good	Excellent	Good	Excellent	Excellent	- 60	up to 105	Nylon	N	Good	Good	Good	Excellent	Good	- 40	up to 90	Polyurethane mixed with PVC	UV	Good	Normal	Good	Invalid	Good	- 40	up to 60	Silicon Rubber	K	Normal	Invalid	Normal	Good	Good	- 60	up to 180	Elastomer	SPH	Good	Good	Good	Good	Excellent	- 60	up to 135	Flame-retardant Elastomer	FR-SPH	Good	Good	Good	Good	Excellent	- 60	up to 135	Fluoropolymers (Teflon®)	Flexible Fluorinated Heat-resistant Rubber	FRW	Good	Good	Excellent	Invalid	Excellent	- 60	up to 200	Fluorinated Ethylene Propylene	FEP	Excellent	Excellent	Excellent	Invalid	Excellent	- 253	up to 200	Perfluoroalkoxy	PFA	Excellent	Excellent	Excellent	Invalid	Excellent	- 195	up to 260	Ethylene-TetraFluoroEthylene	ETFE	Good	Excellent	Excellent	Invalid	Excellent	- 100	up to 150	Braided	Polytetrafluoroethylene	PTFE	Excellent	Excellent	Excellent	Invalid	Excellent	- 253	up to 260	Glass Fiber	GB	-	-	-	Excellent	Invalid	Frost-Free	up to 200	Silica Glass Fiber	SB	-	-	-	Excellent	Invalid	Frost-Free	up to 400
PVC	General PVC(Polyvinyl chloride)	V	Good	Normal	Good	Invalid	Good	- 10	up to 60																																																																																																																																																																																																																											
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Fluorinated Ethylene Propylene		FEP	Excellent	Excellent	Excellent	Invalid	Excellent	- 253	up to 200																																																																																																																																																																																																																											
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Remarks: *1: Flame-retardant Polyethylene applies to IEC 60332-1 only

The Table of Conductor Sizes & Loop Conductor Resistance of Thermocouple Extension/Compensating Cables

JIS C 1610-2012		BC	RCA/RCB SCA/SCB	KX	KCA	KCB	EX	JX	TX	NX
Nominal sectional area(SQ)	Conductor Combination	Unit (Below Ω /m)								
		0.3SQ	12/0.18	0.120	0.280	3.600	2.500	2.100	4.500	2.500
0.5SQ	7/0.32	0.080	0.170	2.200	1.400	1.200	2.700	1.400	1.200	3.000
0.75SQ	24/0.2	0.050	0.110	1.500	0.950	0.750	1.800	0.950	0.750	2.000
1.25SQ	7/0.45	0.040	0.080	1.000	0.650	0.550	1.300	0.650	0.550	1.300
1.3SQ	4/0.65	0.030	0.070	0.900	0.550	0.450	1.100	0.550	0.450	1.100
1.5SQ	7/0.52	0.030	0.060	0.780	0.500	0.420	0.960	0.500	0.420	1.000
2.3SQ	7/0.65	0.020	0.040	0.500	0.300	0.250	0.600	0.300	0.250	0.650
JIS C1610-2012										
1.0SQ	7/0.44	0.050	0.100	1.250	0.800	0.700	1.600	0.800	0.700	1.700

Company Standard

International Standards and Colors

Types Standards	BC		RCA/RCB SCA/SCB		KX KCA		KCB		KCC		EX		JX		TX	
	BX		RX/SX		KX		WX		VX		EX		JX		TX	
JIS C 1610-1995 (Japan/Color2)																
+ / -	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White	Red	White
Sheath	Gray		Black		Blue		Blue		Blue		Purple		Yellow		Brown	
BS 1843 (Britain)																
+ / -	-	-	White	Blue	Brown	Blue	-	-	White	Blue	Brown	Blue	Yellow	Blue	White	Blue
Sheath	-		Green		Red		-		Red		Brown		Black		Blue	
DIN 43710-4 (Germany)																
+ / -	Red	Gray	Red	White	Red	Green	Red	Green	-	-	Red	Black	Red	Blue	Red	Brown
Sheath	Gray		White		Green		Green		-		Black		Blue		Brown	
NFC - 42 - 324 (France)																
+ / -	-	-	Yellow	Green	Yellow	Brown	Yellow	White	Yellow	Brown	Yellow	Purple	Yellow	Black	Yellow	Blue
Sheath	-		Green		Yellow		White		Red		Purple		Black		Blue	

Thermocouple Wires (Duplex Type)

What is Thermocouple Wire (Duplex Type)?

Thermocouple Wire (Duplex type) is one kind of Thermocouple Sensors. Let's introduce some models of our products as follows:

Thermocouple Wire (Duplex Type) is insulated and sheathed by the materials such as PVC, Glass Fiber, Teflon®, Silica Glass Fiber and Alumina Fiber, etc.

It is also called Thermocouple wire because the appearance and shape are similar to Thermocouple Extension/Compensating Cable, the difference between them are in the conductor combination. The feature of Thermocouple Wire (Duplex type) is composed of a solid wire because of the characteristics of the Thermal Electro-Motive-Force(EMF). Most of the conductors of Thermocouple Extension/Compensating Cables are mostly composed of stranded wire(*1)

(*1) As regards the conductor combination of 16AWG and 20AWG in Thermocouple Extension/Compensating Cable, there are two kinds as follows:
 16AWG (solid conductor : 1/1.29), (stranded conductor: 4/0.65)
 20AWG(solid conductor : 1/0.81), (stranded conductor: 7/0.32)



The Table of Thermal Electro-Motive-Force (EMF) of Thermocouple Extension /Compensating Cables

(unit : μV)

Standards	Types	Tolerances (°C)	- 25°C	0°C	50°C	100°C	150°C	200°C
IEC-60584-2007 (JIS C1610-2012)	RCA	± 2.5		0 ± 30	296 ± 30	647 ± 30		
	RCB	± 5.0		0 ± 60	296 ± 60	647 ± 60	1041 ± 60	
	SCA	± 2.5		0 ± 30	299 ± 30	646 ± 30		
	SCB	± 5.0		0 ± 60	299 ± 60	646 ± 60	1029 ± 60	
	KX-1	± 1.5	- 968 ± 60	0 ± 60	2023 ± 60	4096 ± 60	6138 ± 60	8138 ± 60
	KX-2	± 2.5	- 968 ± 100	0 ± 100	2023 ± 100	4096 ± 100	6138 ± 100	8138 ± 100
	KCA	± 2.5		0 ± 100	2023 ± 100	4096 ± 100	6138 ± 100	
	KCB	± 2.5		0 ± 100	2023 ± 100	4096 ± 100	6138 ± 100	
	EX-1	± 1.5	- 1432 ± 120	0 ± 120	3048 ± 120	6319 ± 120	9789 ± 120	13421 ± 120
	EX-2	± 2.5	- 1432 ± 200	0 ± 200	3048 ± 200	6319 ± 200	9789 ± 200	13421 ± 200
	JX-1	± 1.5	- 1239 ± 85	0 ± 85	2585 ± 85	5269 ± 85	8010 ± 85	10779 ± 85
	JX-2	± 2.5	- 1239 ± 140	0 ± 140	2585 ± 140	5269 ± 140	8010 ± 140	10779 ± 140
	TX-1	± 0.5	- 940 ± 30	0 ± 30	2036 ± 30	4279 ± 30		
	TX-2	± 1.0	- 940 ± 60	0 ± 60	2036 ± 60	4279 ± 60		
ASTM E230-2012	NX-1	± 1.5	- 646 ± 60	0 ± 60	1340 ± 60	2774 ± 60	4302 ± 60	5913 ± 60
	NX-2	± 2.5	- 646 ± 100	0 ± 100	1340 ± 100	2774 ± 100	4302 ± 100	5913 ± 100
	NC	± 2.5		0 ± 100	1340 ± 100	2774 ± 100	4302 ± 100	
	RX	± 5.0		0 ± 26	296 ± 32	647 ± 37	1041 ± 41	
	SX	± 5.0		0 ± 27	299 ± 32	646 ± 37	1029 ± 39	
	KX-SP	± 1.1		0 ± 46	2023 ± 45	4096 ± 45	6138 ± 44	8138 ± 43
	KX-ST	± 2.2		0 ± 102	2023 ± 90	4096 ± 91	6138 ± 88	8138 ± 88
	EX-SP	± 1.0		0 ± 59	3048 ± 63	6319 ± 67	9789 ± 71	13421 ± 74
	EX-ST	± 1.7		0 ± 99	3048 ± 107	6319 ± 114	9789 ± 120	13421 ± 125
	JX-SP	± 1.1		0 ± 55	2585 ± 58	5269 ± 59	8010 ± 60	10779 ± 60
	JX-ST	± 2.2		0 ± 111	2585 ± 115	5269 ± 118	8010 ± 121	10779 ± 122
	TX-SP	± 0.5	- 940 ± 18	0 ± 19	2036 ± 21	4279 ± 23		
	TX-ST	± 1.0	- 940 ± 37	0 ± 39	2036 ± 43	4279 ± 46		
	NX-SP	± 1.1		0 ± 28	1340 ± 30	2774 ± 32	4302 ± 34	5913 ± 36
NX-ST	± 2.2		0 ± 57	1340 ± 60	2774 ± 65	4302 ± 69	5913 ± 72	

How to Choose a Model

An example, based on JIS C 1602

K-JIS- (Class 1) -GGB F-OBS 1P × 1/0.65

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Wire Type, ② Standard (Color Code), ③ Division Symbols(Class & Tolerance), ④ Materials of Insulation & Sheath, ⑤ Shape, ⑥ Armor(if necessary), ⑦ Pair, ⑧ Conductor Combination

- **Wire Type:** Select from K, E, J, T, and N
- **Standard:** ASTM, IEC, JIS, and other international Standards
- **Division Symbols:** ① ASTM Standard (SP: Special Tolerance, ST: Standard Tolerance)
② IEC Standard (Class 1: Precision Class, Class 2: Normal Class)
- **Insulation & Sheath:** Heat-resistant PVC, Glass Fiber, Silica Glass Fiber, Alumina Fiber, Teflon® (FEP)
- **Armor:** Stainless-Steel Wire Braided(OBS), Tinned Copper Wire Braided (OBT), etc.

Usage: To cut the Thermocouple wire according to a necessary length and then peel the insulation and sheath from the ends of Positive and Negative, and expose the core of both ends to be welded together.

Features: The cost is cheaper than the type of Metallic Protection Tube, etc.

Please confirm the wired environment (eg: temperature range, damp, water, etc.), and then choose the type below.

Insulated and Sheathed Heat-resistant PVC(HV) Thermocouple Wire(Duplex Type)

Type (P30) - Division Symbol (P30) - **HVVF**

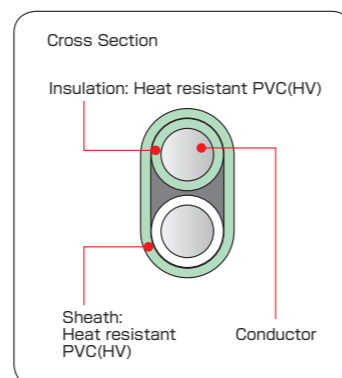
Rated Temp. **80°C**

This kind of Thermocouple Wire(Duplex Type) is insulated and sheathed Heat-resistant PVC(HV), Flat shape(F).
Features: Excellence in Damp-proof, Water-proof



PVC Type

Conductor	Conductor (No./mm)	1/0.2	1/0.32	1/0.65	1/1.0
	Nom.O.D (mm)	0.2	0.32	0.65	1.0
Nominal sectional area (SQ)	0.03	0.08	0.33	0.75	
Insulation	Nom.thick (mm)	0.20	0.30	0.40	0.40
	Approx.O.D(mm)	0.60	0.92	1.45	1.80
Sheath	Nom.thick (mm)	0.30	0.50	0.50	0.50
	Approx.O.D (mm)	1.2 × 1.8	1.9 × 2.9	2.5 × 3.9	2.8 × 3.6
Electric Characteristics	Voltage resistance (V/min)	DC500	AC500	AC500	AC500
	Insulation resistance (MΩ /km)	40	50	50	50
Max Length (m)		1000			
Weight (kg/km)		3.4	7.9	16.1	27.2



Silica Glass Fiber Braided Insulation and Sheath(SB) Thermocouple Wire(Duplex Type)

Type (P30) - Division Symbol (P30) - **SSBF**

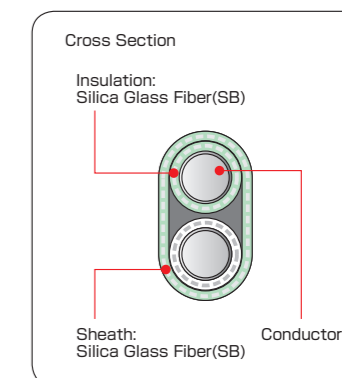
Rated Temp. **400°C**

This kind of Thermocouple Wire(Duplex type) is Silica Glass Fiber (SB) Braided Insulation and Sheath, Flat Shape (F).
Features: Excellence in High Heat-resistance
Attention: It can not be used in an environment of damp and water.



Silica Glass Fiber Braided Type

Conductor	Conductor (No./mm)	1/0.65	1/1.0
	Nom.O.D (mm)	0.65	1.0
Nominal sectional area (SQ)	0.33	0.75	
Insulation	Nom.thick (mm)	0.45	0.45
	Approx.O.D(mm)	1.55	1.90
Sheath	Nom.thick (mm)	0.45	0.45
	Approx.O.D (mm)	2.5 × 4.0	2.8 × 4.7
Electric Characteristics	Voltage resistance (V/min)	DC500	
	Insulation resistance (MΩ /km)	0.1	
Max Length (m)		500	
Weight (kg/km)		23.8	30.0



Glass Fiber Braided Insulation and Sheath(GB) Thermocouple Wire(Duplex Type)

Type (P30) - Division Symbol (P30) - **GGBF**

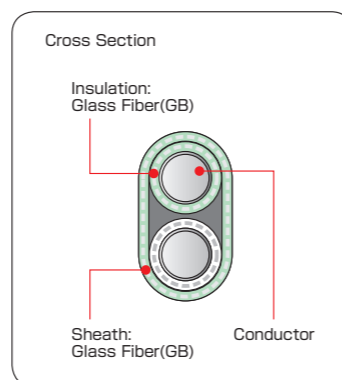
Rated Temp. **200°C**

This kind of Thermocouple Wire(Duplex Type) is Glass Fiber braided(GB) Insulation and Sheath, Flat shape(F).
Features: Excellence in Heat-resistance
Attention: It can not be used in an environment of damp and water.



Glass Fiber Braided Type

Conductor	Conductor (No./mm)	1/0.1	1/0.2	1/0.32	1/0.65	1/1.0
	Nom.O.D (mm)	0.1	0.2	0.32	0.65	1.0
Nominal sectional area (SQ)	0.008	0.03	0.08	0.33	0.75	
Insulation	Nom.thick (mm)	0.10	0.10	0.30	0.32	0.32
	Approx.O.D(mm)	0.30	0.40	0.92	1.29	1.64
Sheath	Nom.thick (mm)	0.20	0.20	0.25	0.25	0.45
	Approx.O.D (mm)	0.7 × 1.0	0.8 × 1.2	1.4 × 2.3	1.8 × 3.1	2.5 × 4.2
Electric Characteristics	Voltage resistance (V/min)	DC500				
	Insulation resistance (MΩ /km)	0.1				
Max Length (m)		100	100	1000	1000	1000
Weight (kg/km)		2.0	2.7	7.7	14.1	30.9



Alumina Fiber Braided Insulation and Sheath(CB) Thermocouple Wire(Duplex Type)

Type (P30) - Division Symbol (P30) - **CCBF**

Rated Temp. Range **450 ~ 750°C**

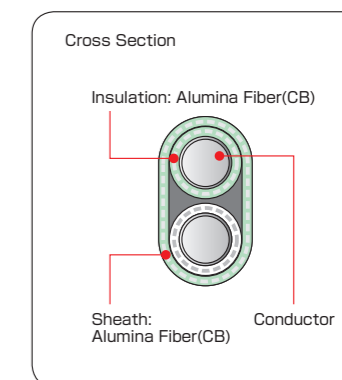
This kind of Thermocouple Wire (Duplex type) is Alumina Fiber (CB) Braided Insulation and Sheath, Flat Shape (F).
Features: More super Heat-resistance than Silica Glass Fiber (SB) type
Attention: It can not be used in an environment of damp and water.



Alumina Fiber Braided Type

(1/0.32mm: Heat-resistant Temp.450°C)
 (1/0.65mm: Heat-resistant Temp.650°C)
 (1/1.0mm: Heat-resistant Temp.750°C)

Conductor	Conductor (No./mm)	1/0.32	1/0.65	1/1.0
	Nom.O.D (mm)	0.32	0.65	1.0
Nominal sectional area (SQ)	0.08	0.33	0.75	
Insulation	Nom.thick (mm)	0.20	0.20	0.35
	Approx.O.D(mm)	0.72	1.05	1.70
Sheath	Nom.thick (mm)	0.20	0.35	0.35
	Approx.O.D (mm)	1.1 × 1.8	1.8 × 2.8	2.4 × 4.1
Electric Characteristics	Voltage resistance (V/min)	Conductor ends of Positive & Negative can be connected only		
	Insulation resistance (MΩ /km)			
Max Length (m)		500	500	500
Weight (kg/km)		7.2	12.6	26.3



Insulated and Sheathed FEP Thermocouple Wire (Duplex type)

Type (P30) - Division Symbol (P30) - **FEPFEPF**

Rated Temp. **200°C**

This kind of Thermocouple Wire (Duplex type) is Insulated and Sheathed FEP, Flat Shape (F).

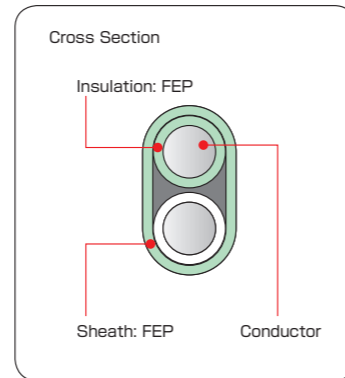
Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof

Applicable for PFA type (Heat Resistance Temp.260°C)



Teflon® FEP/PFA Type

Conductor	Conductor (No./mm)	1/0.1	1/0.2	1/0.32	1/0.65	1/1.0
	Nom.O.D (mm)	0.1	0.2	0.32	0.65	1.0
Nominal sectional area (SQ)	0.008	0.03	0.08	0.33	0.75	
Insulation	Nom.thick (mm)	0.15	0.15	0.15	0.25	0.30
	Approx.O.D(mm)	0.40	0.50	0.62	1.15	1.60
Sheath	Nom.thick (mm)	0.20	0.20	0.20	0.30	0.30
	Approx.O.D (mm)	0.8 × 1.2	0.9 × 1.4	1.0 × 1.6	1.8 × 2.9	2.2 × 3.8
Electric Characteristics	Voltage resistance (V/min)	AC500				
	Insulation resistance (MΩ /km)	500				
Max Length (m)		500	500	1000	1000	1000
Weight (kg/km)		2.0	2.8	4.1	13.1	25.4



Insulated and Sheathed FEP Thermocouple Wire (Duplex type)

Type (P30) - ASTM - SP - **FEPFEPF(UL)**

Rated Temp. **200°C**

This kind of Thermocouple Wire (Duplex type) is Insulated and Sheathed UL Certificated FEP, Flat Shape (F).

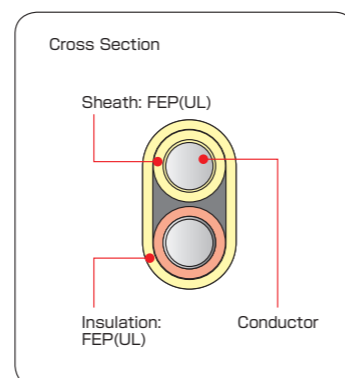
Features: Excellence in Heat-resistance, Cold-proof, Chemical proof, Damp-proof, Water-proof



*UL Certificate (Style No.: UL13, File No.: E254583, Category: CL3R)

Teflon® FEP (UL) Type

Conductor	Conductor (No./mm)	1/0.65
	Nom.O.D (mm)	0.65
	Nominal sectional area (SQ)	0.33
Insulation	Nom.thick (mm)	0.25
	Approx.O.D(mm)	1.15
Sheath	Nom.thick (mm)	0.30
	Approx.O.D (mm)	1.75 × 2.9
Electric Characteristics	Voltage resistance (V/min)	AC1500
	Insulation resistance (MΩ /km)	1500
Max Length (m)		153
Weight (kg/km)		23.8



Insulated and Sheathed FEP Thermocouple Wire (Duplex type), with a Molding Cover

Type (P30) - Division Symbol (P30) - **FEPFEPF (M)**

Temp. **200°C**

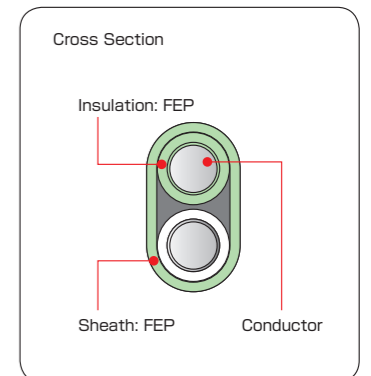
This kind of Thermocouple Wire (Duplex type) is Insulated and Sheathed FEP, with a molding cover*1, Flat shape (F).

*1: The Measuring Junction is fitted with a molding cover by using the same material of Insulation and Sheath.

Features: Excellence in Anti-corrosion, Air tight can be used in variety of environments within the temperature range of 200°C. Especially excellence in water, soil and place where electric insulation is required, and proper for the temperature measurement in a limited space.



Types	K/T/J (Class 1 or Class 2)				
	Conductor (No./mm)	1/0.1	1/0.2	1/0.32	1/0.65
Conductor	Nom.O.D (mm)	0.1	0.2	0.32	0.65
	Nominal sectional area (SQ)	0.008	0.03	0.08	0.33
Insulation	Nom.thick (mm)	0.15	0.15	0.15	0.25
	Nom.thick (mm)	0.2	0.2	0.2	0.3
Sheath	Approx.O.D (mm)	0.8x1.2	0.9x1.4	1.0x1.6	1.8x2.9



The Table of Types and Tolerance of Thermocouple Wires (Duplex type)

Types	Conductor Composition		JIS1995 Class	JIS1981 Grade	Temp.Range(°C)	Tolerance °C	Measuring Temp. °C	JIS-1981		JIS-2012 / 1995 (1)		
	(+)Positive	(-)Negative						(+)(-)	Sheath	(+)(-)	Sheath	
K	Chromel®	Alumel®	Class1	0.4	-40 ~ +375	± 1.5	-40 ~ +1000	Red/White	Blue	Green/White	Green	
			Class2	0.75	-40 ~ +333	± 2.5						-40 ~ +1200
			Class3	1.5	333 ~ 1200	± 0.0075 · t						
E	Chromel®	Constantan	Class1	0.4	-40 ~ +375	± 1.5	-40 ~ +800	Red/White	Purple	Violet/White	Violet	
			Class2	0.75	-40 ~ +333	± 2.5						-40 ~ +900
			Class3	1.5	333 ~ 900	± 0.0075 · t						
J	Iron	Constantan	Class1	0.4	-40 ~ +375	± 1.5	-40 ~ +750	Red/White	Yellow	Black/White	Black	
			Class2	0.75	-40 ~ +333	± 2.5						-40 ~ +750
			Class3	1.5	333 ~ 750	± 0.0075 · t						
T	Copper	Constantan	Class1	0.4	-40 ~ +125	± 0.5	-40 ~ +350	Red/White	Brown	Brown/White	Brown	
			Class2	0.75	-40 ~ +133	± 1						-40 ~ +350
			Class3	1.5	133 ~ 350	± 0.0075 · t						
N	Nickel-Chromium-Silicon	Nickel-Silicon	Class1	0.4	-40 ~ +375	± 1.5	-40 ~ +1000	-	-	Pink/White	Pink	
			Class2	0.75	-40 ~ +333	± 2.5						-40 ~ +1200
			Class3	1.5	333 ~ 1200	± 0.0075 · t						
			Class1	0.4	-167 ~ +40	± 2.5	-200 ~ +40					
			Class2	0.75	-200 ~ -167	± 0.015 · t						
			Class3	1.5	-200 ~ -167	± 0.015 · t						

(JIS C 1605 - 1995)

The Limit of Temperature Range of Each Type

Types	Conductor Size(mm)	Common use limit (°C)	Overheat use limit (°C)
K	0.65	650	850
	1.00	750	950
	1.60	850	1050
	2.30	900	1100
	3.20	1000	1200
E	0.65	450	500
	1.00	500	550
	1.60	550	600
	2.30	600	750
	3.20	700	800
J	0.65	400	500
	1.00	450	550
	1.60	500	650
	2.30	550	750
	3.20	600	750
T	0.32	200	250
	0.65	200	250
	1.00	250	300
	1.60	300	350
N	0.65	850	900
	1.00	950	1000
	1.60	1050	1100
	2.30	1100	1150
	3.20	1200	1250

(JIS C 1602-1995)

The Table of Standards and Thermal Electro-Motive-Force(EMF) of Thermocouple Wires (Duplex Type)

Types	Temp(°C)	- 40	- 20	50	100	150	200	250	300	350	400	600
K	Standard value (μ V)	- 1527	- 778	2023	4096	6138	8138	10153	12209	14293	16397	24905
	Class 1(0.4grade)	± 055	± 057	± 061	± 062	± 060	± 059	± 060	± 061	± 063	± 067	± 101
	Class2(0.75grade)	± 091	± 095	± 103	± 103	± 100	± 099	± 101	± 103	± 110	± 126	± 191
E	Standard value (μ V)	- 2255	- 1152	3048	6319	9789	13421	17181	21036	24964	28946	45093
	Class 1(0.4grade)	± 080	± 084	± 094	± 101	± 106	± 111	± 114	± 117	± 118	± 128	± 193
	Class2(0.75grade)	± 134	± 140	± 158	± 168	± 177	± 185	± 190	± 194	± 206	± 240	± 362
J	Standard value (μ V)	- 1961	- 995	2585	5269	8010	10779	13555	16327	19090	21848	33102
	Class 1(0.4grade)	± 070	± 073	± 079	± 081	± 082	± 083	± 083	± 083	± 082	± 088	± 140
	Class2(0.75grade)	± 118	± 122	± 131	± 136	± 137	± 138	± 138	± 138	± 144	± 165	± 262
T	Standard value (μ V)	- 1475	- 757	2036	4279	6704	9288	12013	14862	-	-	-
	Class 1(0.4grade)	± 017	± 018	± 021	± 023	± 030	± 042	± 055	± 069	-	-	-
	Class2(0.75grade)	± 035	± 037	± 043	± 046	± 056	± 079	± 103	± 130	-	-	-
N	Standard value (μ V)	- 1023	- 518	1340	2774	4320	5913	7597	9341	11136	12974	20613
	Class 1(0.4grade)	± 037	± 038	± 041	± 044	± 047	± 049	± 051	± 053	± 054	± 059	± 093
	Class2(0.75grade)	± 061	± 063	± 069	± 073	± 078	± 082	± 086	± 088	± 095	± 111	± 175

(JIS C 1602-1995)

Heat Resistant Wires

What is Heat Resistant Wire?

Heat-resistant Wire is used as a lead wire which is connected to some Electric generator, apparatus or device (such as Electric Motors, an Electric Furnace, etc.) in high temperature.



Flexible Fluorine-Contained Heat-resistant Rubber(FRW) Wire

600V FRW

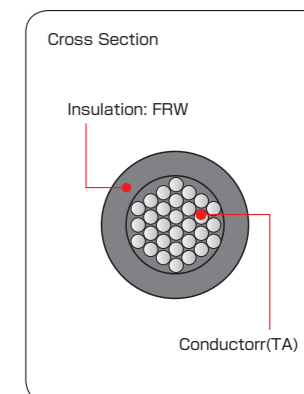
Rated Temp. 200°C **Rated voltage** 600V

This kind of Heat-resistant Wire is insulated Flexible Fluorine-Contained Heat-resistant Rubber (FRW). It is excellent in Heat-resistance for the continuous use in the temperature of 200°C.

Features: Excellence in Heat-resistance, Flexibility, Cold-proof, Water-proof, Chemical proof, Flame-retardant.



- **Conductor:** TA (Tin-coated Copper Wire)
- **Insulation:** Flexible Fluorine-Contained Heat-resistant Rubber (FRW)
- **Standard Color:** Black
- **Main Usage:**
 - ① As a lead wire for an Electric generator, Heating apparatus, Refrigerator and others etc.
 - ② As a lead wire for Heat-resistant Motor, Car, Work apparatus wiring, Wiring in the board which needs a space-saving, Resistor, Anti-oil device, Measuring apparatus etc.
 - ③ As a lead wire for wiring inside an equipment with a severe environmental condition



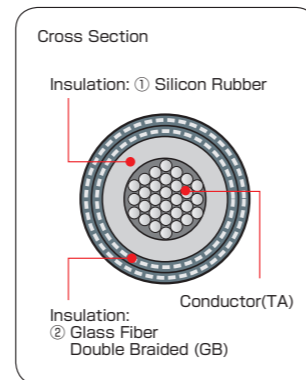
Nominal sectional area	Conductor		Nom. thick FRW Insulation	Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.			Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance	Standard Voltage Value		
SQ (mm²)	Core/mm	mm	mm	mm	Max. Ω /km	V/min	Min. M Ω·km	N	M	kg/km
0.75SQ	30/0.18	1.2	0.5	2.2	25.8	AC1500	2500	14	1000	10
1.25SQ	50/0.18	1.5	0.55	2.6	15.5	AC1500	2000	19	1000	17
2SQ	37/0.26	1.8	0.6	3.0	9.91	AC1500	1500	27	1000	24
3.5SQ	45/0.32	2.5	0.6	3.7	5.38	AC1500	1500	37	1000	42
5.5SQ	35/0.45	3.1	0.7	4.5	3.50	AC1500	1500	49	1000	62
8.0SQ	50/0.45	3.7	0.7	5.1	2.45	AC1500	1500	61	1000	90
14SQ	88/0.45	4.9	0.7	6.7	1.39	AC1500	1500	88	500	157
22SQ	7/20/0.45	7.0	0.8	9.2	0.857	AC1500	1000	115	500	252
38SQ	7/34/0.45	9.1	0.9	12.0	0.505	AC1500	900	162	500	426
60SQ	19/20/0.458	11.6	0.9	14.1	0.316	AC1500	700	217	200	634
100SQ	27/34/0.45	18.5	1.0	17.8	0.186	AC1500	600	298	100	1036

Silicon Rubber and Glass Fiber Double Braided (GB) Wire

600V LKGB

Rated Temp. 180°C Rated voltage 600V

This Heat-resistant Wire is insulated Silicon Rubber and Glass Fiber Double Braided. It is excellent in Heat-resistance for the continuous use in the temperature of 180°C, because Glass Fiber is double braided on the surface of Silicon Rubber Insulation.



- **Conductor:** TA (Tin-coated Copper Wire)
- **Insulation:** ① Silicon Rubber
② Glass Fiber Double Braided (GB)
- **Standard color:** White (Applicable for Red, Green, Yellow, Blue, Brown, Orange, Purple, Gray, etc.)
- **Main Usage:** As a lead wire for an Electric generator, an Electric Motor, an Electric Furnace, and others. etc.

Nominal sectional area	Conductor		Nom.thick of Insulation		Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.	Silicon Rubber Insulation	Double Braided Glass Fiber		Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance	Standard Voltage Value		
SQ (mm ²)	Core/mm	mm	mm	mm	mm	Max. Ω /km	V/mm	Min. M.Ω /km	N	M	kg/km
0.75SQ	30/0.18	1.2	1.1	0.5	4.4	25.8	AC1500	200	14	1000	30
1.25SQ	50/0.18	1.5	1.1	0.5	4.7	15.5	AC1500	150	19	1000	40
2SQ	37/0.26	1.8	1.1	0.5	5.0	9.91	AC1500	150	27	1000	50
3.5SQ	45/0.32	2.5	1.1	0.5	5.7	5.38	AC1500	100	37	1000	70
5.5SQ	35/0.45	3.1	1.1	0.5	6.3	3.50	AC1500	80	49	1000	90
8SQ	50/0.45	3.7	1.1	0.5	6.9	2.45	AC2000	70	61	1000	120
14SQ	88/0.45	4.9	1.1	0.6	8.3	1.39	AC2000	70	88	500	200
22SQ	7/20/0.45	7.0	1.4	0.6	11.0	0.892	AC2000	60	115	500	310
38SQ	7/34/0.45	9.1	1.4	0.6	13.1	0.525	AC2500	50	162	500	520
60SQ	19/20/0.45	11.6	1.8	0.6	16.2	0.329	AC2500	40	217	200	750
80SQ	19/27/0.45	13.6	1.8	0.7	18.5	0.243	AC2500	40	257	100	1040
100SQ	19/34/0.45	15.2	2.3	0.7	21.2	0.193	AC2500	40	298	100	1270
150SQ	27/34/0.45	18.7	2.3	0.7	24.7	0.136	AC3000	40	395	100	1810
200SQ	37/34/0.45	21.2	2.9	0.7	28.4	0.0993	AC3000	40	469	100	2370
250SQ	37/42/0.45	23.6	2.9	0.7	30.8	0.0803	AC3000	40	556	100	2860

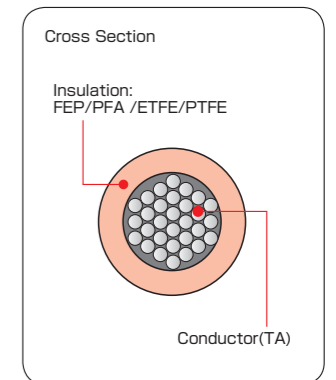
Teflon®(FEP/PFA/ETFE/PTFE) Wire

FEP/PFA /ETFE/PTFE

Rated Temp. 260°C Rated voltage 600V

This kind of Heat-resistant Wire is insulated Teflon® (FEP/PFA /ETFE/PTFE). It is excellent in Heat-resistance for continuous use in the temperature of 150°C~260°C.

* ⚠ Some limited wiring can be used below -80 °C.



- **Conductor:** TA (Tin-coated Copper Wire), SA (Silver-coated Copper Wire), NA (Nickel-coated Copper Wire)
- **Insulation:** ETFE(150 °C),FEP(200°C), PFA(260 °C),PTFE(260 °C)
- **Standard Color:** Black, White, Red, Green, Yellow, Blue, Brown, Orange, Gray, and Transparent
- **Main Usage:** As a lead wire for an Electric generator, Heating apparatus, Refrigerator and others etc.

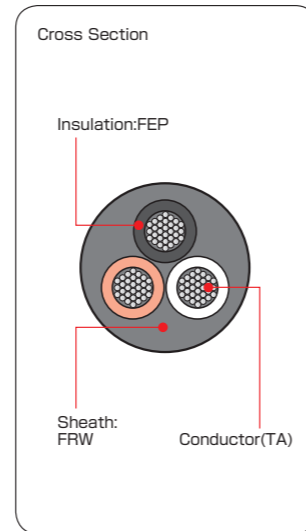
Nominal sectional area	Conductor		Nom. thick FEP/PFA / ETFE/PTFE Insulation	Standard overall diam.	Electrical Properties					Approx Length	Weight	
	Combination	Outer diam.			Conductor Resistance 20°C (Max. Ω /km)			Dielectric Strength Test	Insulation Resistance			Standard Voltage Value
SQ (mm ²)	Core/mm	mm	mm	mm	SA	TA	NA	V/min	Min. M.Ω /km	N	M	kg/km
0.3SQ	12/0.18	0.72	0.4	1.5	60.8	65.6	64.9	AC 1500	2500	7	100	6
0.5SQ	19/0.18	0.9	0.4	1.7	38.4	41.4	41	AC 1500	2500	10	100	8
0.75SQ	30/0.18	1.2	0.4	2.0	24.3	26.3	26	AC 1500	2500	14	100	12
1.25SQ	50/0.18	1.5	0.4	2.3	14.6	15.8	15.6	AC 1500	2000	19	100	17
2SQ	37/0.26	1.8	0.4	2.6	9.5	10.3	10.2	AC 1500	1500	27	100	24
3.5SQ	45/0.32	2.5	0.4	3.3	5.09	5.49	5.53	AC 1500	1500	37	100	34
5.5SQ	35/0.45	3.1	0.5	4.1	3.29	3.5	3.51	AC 1500	1500	49	100	63
8.0SQ	50/0.45	3.7	0.6	4.9	2.3	2.24	2.46	AC 1500	1500	61	100	89
14SQ	88/0.45	4.9	0.7	6.3	1.31	1.41	1.39	AC2000	1500	88	100	153
22SQ	7/20/0.45	7.0	0.8	8.6	0.838	0.904	0.894	AC2000	1000	115	100	243
38SQ	7/34/0.45	9.1	0.9	10.9	0.493	0.532	0.526	AC2000	900	162	100	402
60SQ	19/20/0.45	11.6	0.9	13.4	0.309	0.316	0.329	AC2500	900	217	100	602
80SQ	19/27/0.45	13.6	1.0	15.6	0.225	0.243	0.24	AC2500	900	257	100	782
100SQ	19/34/0.45	15.2	1.0	17.2	0.172	0.186	0.184	AC2500	900	298	100	1040

FEP Insulation and Flexible Fluorine-Contained Heat-resistant Rubber(FRW) Sheath Wire

FF Toughler

Max Rated Temp. 200°C Rated voltage 600V

This kind of Heat-resistant Wire is insulated FEP and Sheathed Flexible Fluorine-Contained Heat-resistant Rubber (FRW). It is excellent in Heat-resistance for the continuous use in the temperature of 200°C.



- **Conductor:** TA (Tin-coated Copper Wire)
- **Insulation:** Fluorinated Ethylene Propylene (FEP)
- **Sheath:** Flexible Fluorine-Contained Heat-resistant Rubber (FRW)
- **Standard Color:** Black
- **Identification of colors:** 2Core (Black/White), 3Core (Black/White/Red), 4Core (Black/White/Red/Green)
- **Features:**
 - ① Flexibility: Since a conductor is composed of thin stranded Tin-coated copper wire, insulated Fluorinated Ethylene Propylene (FEP) and Sheathed Flexible Fluorine-Contained Heat-resistant Rubber (FRW), it is very excellent in Flexibility and Vibration-resistance.
 - ② Heat-resistance: Fluorinated Ethylene Propylene insulation (FEP) and Flexible Fluorine-Contained Heat-resistant Rubber sheath (FRW) has both heat and cold-resistance, it is excellent in Heat-resistance for the continuous use in the temperature of 200°C.
 - ③ Eco-Environment : Because of very excellent in Oil-proof, Water-proof, Cold-proof, Flame-retardant, and Chemical proof, it is suitable for the use in a clean room under the indoor severe environmental condition.
- **Usage:** It also can comply with RoHS
It is suitable to be used for the place where the wire bear, the Robot's power supply under a high temperature and some other conveyor chain equipments which always need flexing, bending, twisting. It is suitable for the use in the field of the electrical machinery and apparatus for the movement of both indoor and outdoor, and parts of sputtering.

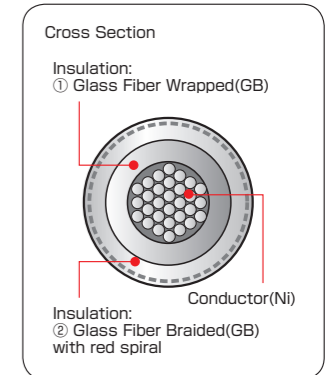
Nominal sectional area	Conductor		Insulation		Core (No./mm)	Sheath		Electrical Properties			Approx Length	Weight
	Combination	Outer diam.	Nom.thick.	Overall diam.		Nom.thick.	Overall diam.	Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance		
SQ (mm ²)	Core/mm	mm	mm	mm	mm	mm	mm	Max. Ω /km	V/mm	Min. M Ω /km	M	kg/km
0.75SQ	3/50/0.08	1.3	0.4	2.1	2	1.5	7.2	25.80	AC1500	1500	500	85
					3		7.5					100
					4		8.0					125
1.25SQ	7/36/0.08	1.55	0.4	2.35	2	1.5	7.7	15.50	AC1500	1500	500	105
					3		8.0					130
					4		8.7					160
2SQ	7/57/0.08	2.1	0.4	2.9	2	1.5	8.8	9.91	AC1500	1500	500	135
					3		9.2					170
					4		10.0					215
3.5SQ	7/100/0.08	2.6	0.4	3.4	2	1.5	9.9	5.38	AC1500	1500	500	185
					3		10.4					240
					4		11.3					305

Glass Fiber Wrapped and Braided Insulation(GB) Wire

NiGB

Max. Rated Temp. 300°C Rated voltage 200V

This kind of Heat-resistant Wire is Glass Fiber Wrapped and Glass Fiber Braided Insulation. It is excellent in Heat-resistance for medium and high temperature range, its continuous use temperature is 300°C. It is a kind of low-cost Heat-resistant wire.



- **Conductor:** Nickel (Ni)
- **Insulation:** ① Glass Fiber Wrapped (GB) ② Glass Fiber Braided (GB)
- **Standard Color:** White with red spiral
- **Main Usage:** As a lead wire for an Electric Furnace, High temperature Furnace, and Electric generator apparatus in high temperature etc.

Nominal sectional area	Conductor		Nom. Thick	Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.			Glass Fiber Wrapped and Braided	Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance		
SQ (mm ²)	Core/mm	mm	mm	mm	Max. Ω /km	V/mm	Min. M Ω /km	N	M	kg/km
0.75SQ	14/0.26	1.2	0.37	2.0	148	AC500	0.1	8	1000	12
1.25SQ	24/0.26	1.5	0.57	2.7	86.3	AC500	0.1	10	1000	18
2SQ	37/0.26	1.8	0.57	3.0	56.0	AC500	0.1	15	1000	26
3.5SQ	22/0.45	2.5	0.57	3.7	31.4	AC500	0.1	25	600	43
5.5SQ	35/0.45	3.1	0.57	4.3	19.7	AC500	0.1	30	400	63
8SQ	50/0.45	3.7	0.57	5.1	13.8	AC500	0.1	40	200	88
14SQ	7/12/0.45	5.4	0.90	7.2	8.23	AC500	0.1	55	100	159
22SQ	7/20/0.45	7.0	0.90	8.8	4.95	AC500	0.1	70	100	224
38SQ	7/34/0.45	9.1	0.90	10.9	2.85	AC500	0.1	100	100	397

Warning notice :



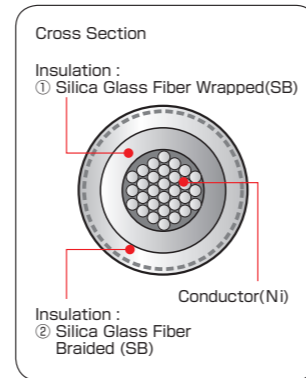
- When power turns on, it becomes very high temperature by self-generation of heat. For the buildings with which an electric wire is in contact or approach please use the materials which shall not yield to the high temperature, and please arrange the wiring at the place away from people's reach.
- The glass fiber currently used for the electric wire is very weak in the material to too much crookedness. Please avoid use in a place (equipment) with the crookedness after electric wire construction, or an intense vibration. (fixed wiring).
- Since this electric wire is hygroscopic and has a threat of sparking (short circuit) if applied in the place of humidity and moisture, therefore please do not carry out wiring.

Silica Glass Fiber Wrapped and Braided Insulation(SB) Wire

NSBL

Max. Rated Temp. 400°C Rated voltage 200V

This kind of Heat-resistant Wire is Silica Glass Fiber Wrapped and Silica Glass Fiber Braided Insulation. It is a Super Heat-resistant Wire for the continuous use in the temperature of 400°C.



- **Conductor:** Nickel (Ni)
- **Insulation:** ①Silica Glass Fiber Wrapped (SB)
②Silica Glass Fiber Braided (SB)
- **Standard Color:** White
- **Main Usage:** As a lead wire for a high temperature furnace and other high temperature apparatus, etc.

Nominal sectional area	Conductor		Nom.thick of Insulation	Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.			Silica Glass Fiber Wrapped and Braided	Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance		
SQ (mm ²)	Core/mm	mm	mm	mm	Max. Ω /km	V/min	Min. M Ω · km	N	M	kg/km
0.75SQ	14/0.26	1.2	0.65	2.5	148	AC500	0.1	10	1000	17
1.25SQ	24/0.26	1.5	0.65	2.8	86.3	AC500	0.1	15	1000	23
2SQ	37/0.26	1.8	0.65	3.1	56.0	AC500	0.1	20	1000	30
3.5SQ	22/0.45	2.5	0.65	3.7	31.4	AC500	0.1	30	600	47
5.5SQ	35/0.45	3.1	0.65	4.4	19.7	AC500	0.1	40	400	69
8SQ	50/0.45	3.7	0.65	5.0	13.80	AC500	0.1	50	200	99
14SQ	7/12/0.45	5.4	0.75	6.9	8.23	AC500	0.1	70	100	156
22SQ	7/20/0.45	7.0	0.75	8.5	4.94	AC500	0.1	90	100	249
38SQ	7/34/0.45	9.1	1.15	11.4	2.85	AC500	0.1	130	100	453

Warning notice :



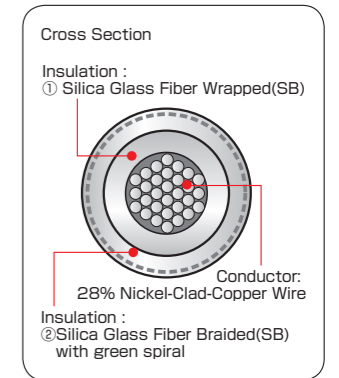
- When power turns on, it becomes very high temperature by self-generation of heat. For the buildings with which an electric wire is in contact or approach please use the materials which shall not yield to the high temperature, and please arrange the wiring at the place away from people's reach.
- The glass fiber currently used for the electric wire is very weak in the material to too much crookedness. Please avoid use in a place (equipment) with the crookedness after electric wire construction, or an intense vibration.(fixed wiring).
- Since this electric wire is hygroscopic and has a threat of sparking (short circuit) if applied in the place of humidity and moisture, therefore please do not carry out wiring.

Silica Glass Fiber Wrapped and Braided Insulation(SB) Wire

28NSBL

Max. Rated Temp. 400°C Rated voltage 200V

This kind of Heat-resistant Wire is Silica Glass Fiber Wrapped and Silica Glass Fiber Braided Insulation. It is a Super Heat-resistant Wire for the continuous use in the temperature of 400°C.



- **Conductor:** 28% Nickel-Clad-Copper Wire
- **Insulation:** ①Silica Glass Fiber Wrapped(SB)
②Silica Glass Fiber Braided (SB)
- **Standard Color:** White with green spiral
- **Main Usage:** As a lead wire for a high temperature furnace and other high temperature apparatus, etc.

Nominal sectional area	Conductor		Nom.thick	Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.			Silica Glass Fiber Wrapped and Braided	Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance		
SQ (mm ²)	Core/mm	mm	mm	mm	Max. Ω /km	V/mm	Min. M Ω /km	N	M	kg/km
0.75SQ	14/0.26	1.2	0.65	2.5	37.7	AC 500	0.1	—	1000	17
1.25SQ	24/0.26	1.5	0.65	2.8	22	AC 500	0.1	—	1000	23
2SQ	37/0.26	1.8	0.65	3.1	14.2	AC 500	0.1	—	1000	30
3.5SQ	22/0.45	2.5	0.65	3.7	8.01	AC 500	0.1	—	600	47
5.5SQ	35/0.45	3.1	0.65	4.4	5.03	AC 500	0.1	—	400	69
8.0SQ	7/7/0.45	3.7	0.65	5.0	3.52	AC 500	0.1	—	200	99
14SQ	7/12/0.45	5.4	0.75	6.9	2.09	AC 500	0.1	—	100	156
22SQ	7/20/0.45	7.0	0.75	8.5	1.25	AC 500	0.1	—	100	249
38SQ	7/34/0.45	9.1	1.15	11.3	0.741	AC 500	0.1	—	100	453

Warning notice :



- When power turns on, it becomes very high temperature by self-generation of heat. For the buildings with which an electric wire is in contact or approach please use the materials which shall not yield to the high temperature, and please arrange the wiring at the place away from people's reach.
- The glass fiber currently used for the electric wire is very weak in the material to too much crookedness. Please avoid use in a place (equipment) with the crookedness after electric wire construction, or an intense vibration.(fixed wiring).
- Since this electric wire is hygroscopic and has a threat of sparking (short circuit) if applied in the place of humidity and moisture, therefore please do not carry out wiring.

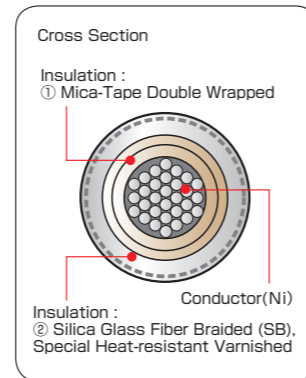
Mica-Tape Double Wrapped and Silica Glass Fiber Braided Insulation(SB) Wire

NSBL 6×4-I

Max. Rated Temp. 400°C Rated voltage 600V

This kind of Heat-resistant Wire is Nickel Conductor, Mica-Tape Double Wrapped and Silica Glass Fiber Braided, Special Heat-resistant Varnished Insulation.

It is a Super Heat-resistant Wire for the continuous use in the temperature of 400°C. It can be used for the continuous use in the temperature of 500°C, in case of a varnish un-disposed article.



- **Conductor** Nickel (Ni)
- **Insulation** ① Mica-Tape Double Wrapped
② Silica Glass Fiber Braided (SB), Special Heat-resistant Varnished
- **Standard Color:** White
- **Main Usage:** As a lead wire for a high temperature furnace and high temperature apparatus, etc.

Nominal sectional area	Conductor		Nom. thick of Insulation		Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.	Mica-Tape Wrapped	Silica Glass Fiber Braided		Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance	Standard Voltage Value		
SQ (mm ²)	Core/mm	mm	mm	mm	mm	Max. Ω /km	V/mm	Min. MΩ /km	N	M	kg/km
0.75SQ	14/0.26	1.2	0.52	0.45	3.2	148	AC1500	5.0	10	1000	26
1.25SQ	24/0.26	1.5	0.52	0.45	3.5	86.3	AC1500	5.0	15	1000	27
2SQ	37/0.26	1.8	0.52	0.45	3.8	56.0	AC1500	5.0	20	1000	36
3.5SQ	22/0.45	2.5	0.52	0.45	4.5	31.4	AC1500	5.0	30	600	50
5.5SQ	35/0.45	3.1	0.52	0.45	5.4	19.7	AC1500	5.0	40	400	76
8SQ	50/0.45	3.7	0.52	0.45	5.7	13.8	AC1500	5.0	50	200	100
14SQ	7/12/0.45	5.4	0.52	0.90	8.3	8.23	AC2000	3.0	70	100	200
22SQ	7/20/0.45	7.0	0.52	0.90	9.9	4.94	AC2000	3.0	90	100	276
38SQ	7/34/0.45	9.1	0.52	0.90	12.0	2.85	AC2000	3.0	130	100	470
60SQ	19/20/0.45	11.6	0.52	0.90	14.5	1.58	AC2000	3.0	170	100	700
80SQ	19/27/0.45	13.6	0.52	1.35	17.4	1.21	AC3000	1.0	220	100	910
100SQ	19/34/0.45	15.2	0.52	1.35	19.0	1.10	AC3000	1.0	240	100	1120

Warning notice :



- When power turns on, it becomes very high temperature by self-generation of heat. For the buildings with which an electric wire is in contact or approach please use the materials which shall not yield to the high temperature, and please arrange the wiring at the place away from people's reach.
- The glass fiber currently used for the electric wire is very weak in the material to too much crookedness. Please avoid use in a place (equipment) with the crookedness after electric wire construction, or an intense vibration.(fixed wiring).
- Since this electric wire is hygroscopic and has a threat of sparking (short circuit) if applied in the place of humidity and moisture, therefore please do not carry out wiring.

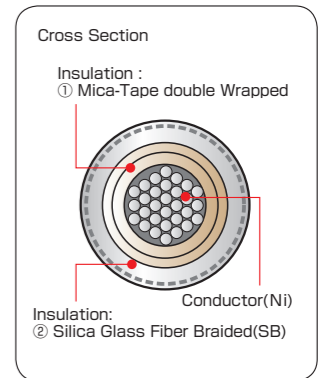
Mica-Tape double Wrapped and Silica Glass Fiber Braided Insulation(SB) Wire

NSBL 6×5

Max. Rated Temp. 500°C Rated voltage 600V

This kind of Heat-resistant Wire is Nickel Conductor, Mica-Tape Double Wrapped and Silica Glass Fiber Braided Insulation.

It is a Super Heat-resistant Wire for the continuous use in the temperature of 500°C. Silica Glass Fiber Braided Insulation is proceeded in a varnish un-disposed article, for the purpose of removing impurities gas generated in a high temperature.



- **Conductor:** Nickel (Ni)
- **Insulation:** ① Mica-Tape Double Wrapped
② Silica Glass Fiber Braided (SB)
- **Standard Color:** White
- **Main Usage:** As a lead wire for a high temperature furnace and high temperature apparatus, etc.

Nominal sectional area	Conductor		Nom.thick of Insulation		Standard overall diam.	Electrical Properties				Approx Length	Weight
	Combination	Outer diam.	Mica-Tape Wrapped	Silica Glass Fiber Braided		Conductor Resistance 20°C	Dielectric Strength Test	Insulation Resistance	Standard Voltage Value		
SQ (mm ²)	Core/mm	mm	mm	mm	mm	Max. Ω /km	V/mm	Min. MΩ /km	N	M	kg/km
3.5SQ	22/0.45	2.5	0.52	0.45	4.5	31.4	AC1500	5.0	30	100	50
5.5SQ	35/0.45	3.1	0.52	0.45	5.1	19.7	AC1500	5.0	40	100	76
8SQ	50/0.45	3.7	0.52	0.45	5.7	13.8	AC1500	5.0	50	100	100
14SQ	7/12/0.45	5.4	0.52	0.9	8.3	8.23	AC2000	3.0	70	50	200
22SQ	7/20/0.45	7.0	0.52	0.9	9.9	4.94	AC2000	3.0	90	30	276
38SQ	7/34/0.45	9.1	0.52	0.9	12.0	2.85	AC2000	3.0	130	20	470

Warning notice :



- When power turns on, it becomes very high temperature by self-generation of heat. For the buildings with which an electric wire is in contact or approach please use the materials which shall not yield to the high temperature, and please arrange the wiring at the place away from people's reach.
- The glass fiber currently used for the electric wire is very weak in the material to too much crookedness. Please avoid use in a place (equipment) with the crookedness after electric wire construction, or an intense vibration.(fixed wiring).
- Since this electric wire is hygroscopic and has a threat of sparking (short circuit) if applied in the place of humidity and moisture, therefore please do not carry out wiring.

Types of Conductor Materials

Material Types	Symbols	Heat Resistance (Temp.)	Density	Temp. Coefficient (20°C)	Resistance peculiar to volume $\mu\Omega \cdot \text{cm}$	Properties
Tin Coated Copper	TA	150°C	8.89	0.0039	1.80	It is used widely because Copper wire is uniformly electricity-coated by Tin. The soldering characteristics are good.
Silver-Coated Copper	SA	200°C	8.95	0.0039	1.72	Heat Resistance is improved because Copper wire is uniformly electricity-coated by Silver.
Nickel-Coated Copper	NA	260°C	8.89	0.004	1.83	Excellence in Heat Resistance because Copper wire is uniformly electricity-coated by Nickel.
Nickel	Ni	500°C	8.79	0.006	9.60	To be use in high temperature, Excellence in Anti-corrosion
28 % Nickel Coated copper	28N	400°C	8.80	0.0039	2.46	This conductor is coated by 28%Nickle of peculiar to volume, it is of Super-Heat-resistant to the temperature of 400°C, High conductivity as well.

The Table of Properties and Material Types of Insulation and Sheath

Material Types	Symbols	Water-proof	Oil-proof	Chemical-proof	Environment	Insulation Resistance	Cold-proof(°C)	Temp. proof(°C)	
Braided	Glass Fiber	GB	-	-	-	Excellent	Invalid	Frost-Free	350
	Silica Glass Fiber	SB	-	-	-	Excellent	Invalid	Frost-Free	700
	Alumina Fiber	CB	-	-	-	Excellent	Invalid	Frost-Free	1100
Teflon®	Flexible Teflon®	FRW	Good	Good	Good	Invalid	Excellent	- 60	200
	FEP	FEP	Excellent	Excellent	Excellent	Invalid	Excellent	- 253	200
	PFA	PFA	Good	Excellent	Excellent	Invalid	Excellent	- 195	260
	PTFE	PTFE	Excellent	Excellent	Excellent	Invalid	Excellent	- 253	260
	ETFE	ETFE	Good	Excellent	Excellent	Invalid	Excellent	- 100	150
Others	Elastomer	SPH	Good	Good	Good	Good	Excellent	- 60	135
	Silicone Rubber	K	Normal	Invalid	Normal	Good	Good	- 60	180

Current Tolerance Table

■ 600V LKGB

Products	size	Standard Electric Current Value	50°C	60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C	150°C	160°C	170°C
600V LKGB	0.5SQ	10	20.8	20.0	19.1	18.3	17.3	16.3	15.3	14.1	12.9	11.5	10.0	8.2	5.8
	0.75SQ	14	29.1	28.0	26.8	25.6	24.2	22.9	21.4	19.8	18.1	16.2	14.0	11.4	8.1
	1.25SQ	19	39.6	38.0	36.4	34.7	32.9	31.0	29.0	26.9	24.5	21.9	19.0	15.5	11.0
	2SQ	27	56.2	54.0	51.7	49.3	46.8	44.1	41.2	38.2	34.9	31.2	27.0	22.0	15.6
	3.5SQ	37	77.0	74.0	70.8	67.6	64.1	60.4	56.5	52.3	47.8	42.7	37.0	30.2	21.4
	5.5SQ	49	102.0	98.0	93.8	89.5	84.9	80.0	74.8	69.3	63.3	56.6	49.0	40.0	28.3
	8SQ	61	127.0	122.0	116.8	111.4	105.7	99.6	93.2	86.3	78.8	70.4	61.0	49.8	35.2
	14SQ	88	183.2	176.0	168.5	160.7	152.4	143.7	134.4	124.5	113.6	101.6	88.0	71.9	50.8
	22SQ	115	239.4	230.0	220.2	210.0	199.2	187.8	175.7	162.6	148.5	132.8	115.0	93.9	66.4
	38SQ	162	337.2	324.0	310.2	295.8	280.6	264.5	247.5	229.1	209.1	187.1	162.0	132.3	93.5
	60SQ	217	451.7	434.0	415.5	396.2	375.9	354.4	331.5	306.9	280.1	250.6	217.0	177.2	125.3
	80SQ	257	535.0	514.0	492.1	469.2	445.1	419.7	392.6	363.5	331.8	296.8	257.0	209.8	148.4
	100SQ	298	620.3	596.0	570.6	544.1	516.2	486.6	455.2	421.4	384.7	344.1	298.0	243.3	172.1
	150SQ	395	822.3	790.0	756.4	721.2	684.2	645.0	603.4	558.6	509.9	456.1	395.0	322.5	228.1
	200SQ	469	976.3	938.0	898.1	856.3	812.3	765.9	716.4	663.3	605.5	541.6	469.0	382.9	270.8
	250SQ	556	1157	1112	1065	1015	963.0	907.9	849.3	786.3	717.8	642.0	556.0	454.0	321.0

Safe Current Tolerance Calculating Formula

$$600V \text{ LKGB (A)} = \sqrt{\frac{180 - \theta}{30}} \times (N)$$

θ =Use Temperature(°C)
 N=Standard Electric Current Value

■ 600V FEP / 600V FRW

Products	size	Standard Electric Current Value	50°C	60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C	150°C	160°C	170°C	180°C	190°C
600V FEP 600V FRW	0.3SQ	7	14.1	13.6	13.1	12.6	12.1	11.5	10.9	10.3	9.6	8.9	8.1	7.3	6.3	5.1	3.6
	0.5SQ	10	20.1	19.4	18.7	18.0	17.2	16.4	15.6	14.7	13.7	12.7	11.6	10.4	9.0	7.3	5.2
	0.75SQ	14	28.2	27.2	26.2	25.2	24.1	23.0	21.8	20.6	19.2	17.8	16.3	14.5	12.6	10.3	7.3
	1.25SQ	19	38.2	36.9	35.6	34.2	32.7	31.2	29.6	27.9	26.1	24.2	22.1	19.7	17.1	14.0	9.9
	2SQ	27	54.3	52.5	50.6	48.6	46.5	44.4	42.1	39.7	37.1	34.4	31.4	28.1	24.3	19.8	14.0
	3.5SQ	37	74.5	71.9	69.3	66.6	63.8	60.8	57.7	54.4	50.9	47.1	43.0	38.5	33.3	27.2	19.2
	5.5SQ	49	98.6	95.3	91.8	88.2	84.4	80.5	76.4	72.0	67.4	62.4	56.9	50.9	44.1	36.0	25.5
	8SQ	61	122.8	118.6	114.3	109.8	105.1	100.2	95.1	89.7	83.9	77.6	70.9	63.4	54.9	44.8	31.7
	14SQ	88	177.1	171.1	164.9	158.4	151.7	144.6	137.2	129.3	121.0	112.0	102.2	91.5	79.2	64.7	45.7
	22SQ	115	231.4	223.6	215.5	207.0	198.2	189.0	179.3	169.0	158.1	146.4	133.6	119.5	103.5	84.5	59.8
	38SQ	162	326.0	315.0	303.5	291.6	279.2	266.2	252.5	238.1	222.7	206.2	188.2	168.4	145.8	119.0	84.2
	60SQ	217	436.7	421.9	406.5	390.6	374.0	356.6	338.3	318.9	298.3	276.2	252.1	225.5	195.3	159.5	112.8
	80SQ	257	517.2	499.6	481.4	462.6	442.9	422.2	400.6	377.7	353.3	327.1	298.6	267.0	231.3	188.8	133.5
	100SQ	298	599.7	579.3	558.3	536.4	513.5	489.6	464.5	437.9	409.6	379.2	346.2	309.6	268.2	218.9	154.8

Safe Current Tolerance Calculating Formula

$$600V \text{ FEP (A)} = 0.9 \times \sqrt{\frac{200 - \theta}{30}} \times (N)$$

θ =Use Temperature(°C)
 N=Standard Electric Current Value

In the case of Multi-Core, pls refer to Electric Current Decrease Coefficient mentioned below and multiply the Safe Current Tolerance in above Table

The Electric Current Decrease Coefficient Table due to Multi-core.	Number of Core (C)	2 ~ 3	4	5 ~ 6	7 ~ 15
	Current Decrease Coefficient		0.70	0.63	0.56

Current Tolerance Table

■ 600V PFA / 600V PTFE (A)

Products	Size	Standard Electric Current Value	50°C	60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C	150°C	
600V PFA 600V PTFE	0.3SQ	7	16.7	16.3	15.9	15.4	15.0	14.5	14.1	13.6	13.1	12.6	12.1	
	0.5SQ	10	23.8	23.2	22.6	22.0	21.4	20.8	20.1	19.4	18.7	18.0	17.2	
	0.75SQ	14	33.3	32.5	31.7	30.9	30.0	29.1	28.2	27.2	26.2	25.2	24.1	
	1.25SQ	19	45.2	44.2	43.0	41.9	40.7	39.5	38.2	36.9	35.6	34.2	32.7	
	2SQ	27	64.3	62.7	61.2	59.5	57.8	56.1	54.3	52.5	50.6	48.6	46.5	
	3.5SQ	37	88.1	86.0	83.8	81.6	79.3	76.9	74.5	71.9	69.3	66.6	63.8	
	5.5SQ	49	116.7	113.9	111.0	108.0	105.0	101.8	98.6	95.3	91.8	88.2	84.4	
	8SQ	61	145.3	141.8	138.2	134.5	130.7	126.8	122.8	118.6	114.3	109.8	105.1	
	14SQ	88	209.5	204.5	199.3	194.0	188.5	182.9	177.1	171.1	164.9	158.4	151.7	
	22SQ	115	273.8	267.2	260.5	253.5	246.4	239.0	231.4	223.6	215.5	207.0	198.2	
	38SQ	162	385.8	376.5	366.9	357.1	347.1	336.7	326.0	315.0	303.5	291.6	279.2	
	60SQ	217	516.7	504.3	491.5	478.4	464.9	451.0	436.7	421.9	406.5	390.6	374.0	
	80SQ	257	611.9	597.2	582.0	566.5	550.6	534.1	517.2	499.6	481.4	462.6	442.9	
	100SQ	298	709.5	692.4	674.9	656.9	638.4	619.3	599.7	579.3	558.3	536.4	513.5	
		Size	Standard Electric Current Value	160°C	170°C	180°C	190°C	200°C	210°C	220°C	230°C	240°C	250°C	
		0.3SQ	7	11.5	10.9	10.3	9.6	8.9	8.1	7.3	6.3	5.1	3.6	
		0.5SQ	10	16.4	15.6	14.7	13.7	12.7	11.6	10.4	9.0	7.3	5.2	
		0.75SQ	14	23.0	21.8	20.6	19.2	17.8	16.3	14.5	12.6	10.3	7.3	
		1.25SQ	19	31.2	29.6	27.9	26.1	24.2	22.1	19.7	17.1	14.0	9.9	
		2SQ	27	44.4	42.1	39.7	37.1	34.4	31.4	28.1	24.3	19.8	14.0	
	3.5SQ	37	60.8	57.7	54.4	50.9	47.1	43.0	38.5	33.3	27.2	19.2		
	5.5SQ	49	80.5	76.4	72.0	67.4	62.4	56.9	50.9	44.1	36.0	25.5		
	8SQ	61	100.2	95.1	89.7	83.9	77.6	70.9	63.4	54.9	44.8	31.7		
	14SQ	88	144.6	137.2	129.3	121.0	112.0	102.2	91.5	79.2	64.7	45.7		
	22SQ	115	189.0	179.3	169.0	158.1	146.4	133.6	119.5	103.5	84.5	59.8		
	38SQ	162	266.2	252.5	238.1	222.7	206.2	188.2	168.4	145.8	119.0	84.2		
	60SQ	217	356.6	338.3	318.9	298.3	276.2	252.1	225.5	195.3	159.5	112.8		
	80SQ	257	422.2	400.6	377.7	353.5	327.1	298.6	267.0	231.3	188.8	133.5		
	100SQ	298	489.6	464.5	437.9	409.6	379.2	346.2	309.6	268.2	218.9	154.8		

Safe Current Tolerance Calculating Formula

$$600V PFA (A) = 0.9 \times \sqrt{\frac{260 - \theta}{30}} \times (N)$$

θ=Use Temperature(°C)
N=Standard Electric Current Value

■ 600V ETFE (A)

Products	size	Standard Electric Current Value	50°C	60°C	70°C	80°C	90°C	100°C	110°C	120°C	130°C	140°C
600V ETFE	0.3SQ	7	11.5	10.9	10.3	9.6	8.9	8.1	7.3	6.3	5.1	3.6
	0.5SQ	10	16.4	15.6	14.7	13.7	12.7	11.6	10.4	9.0	7.3	5.2
	0.75SQ	14	23.0	21.8	20.6	19.2	17.8	16.3	14.5	12.6	10.3	7.3
	1.25SQ	19	31.2	29.6	27.9	26.1	24.2	22.1	19.7	17.1	14.0	9.9
	2SQ	27	44.4	42.1	39.7	37.1	34.4	31.4	28.1	24.3	19.8	14.0
	3.5SQ	37	60.8	57.7	54.4	50.9	47.1	43.0	38.5	33.3	27.2	19.2
	5.5SQ	49	80.5	76.4	72.0	67.4	62.4	56.9	50.9	44.1	36.0	25.5
	8SQ	61	100.2	95.1	89.7	83.9	77.6	70.9	63.4	54.9	44.8	31.7
	14SQ	88	144.6	137.2	129.3	121.0	112.0	102.2	91.5	79.2	64.7	45.7
	22SQ	115	189.0	179.3	169.0	158.1	146.4	133.6	119.5	103.5	84.5	59.8
	38SQ	162	266.2	252.5	238.1	222.7	206.2	188.2	168.4	145.8	119.0	84.2
	60SQ	217	356.6	338.3	318.9	298.3	276.2	252.1	225.5	195.3	159.5	112.8
	80SQ	257	422.2	400.6	377.7	353.5	327.1	298.6	267.0	231.3	188.8	133.5
	100SQ	298	489.6	464.5	437.9	409.6	379.2	346.2	309.6	268.2	218.9	154.8

Safe Current Tolerance Calculating Formula

$$600V ETFE (A) = 0.9 \times \sqrt{\frac{150 - \theta}{30}} \times (N)$$

θ=Use Temperature(°C)
N=Standard Electric Current Value

■ NiGB (A)

品名	size	Standard Electric Current Value	100°C	110°C	120°C	130°C	140°C	150°C	160°C	170°C	180°C	190°C	
NiGB	0.75SQ	8	7.5	7.3	7.1	6.9	6.7	6.5	6.2	6.0	5.8	5.5	
	1.25SQ	10	9.3	9.1	8.8	8.6	8.3	8.1	7.8	7.5	7.2	6.9	
	2SQ	15	14.0	13.6	13.3	12.9	12.5	12.1	11.7	11.3	10.8	10.4	
	3.5SQ	25	23.3	22.7	22.1	21.5	20.9	20.2	19.5	18.8	18.1	17.3	
	5.5SQ	30	28.0	27.3	26.5	25.8	25.0	24.2	23.4	22.6	21.7	20.7	
	8SQ	40	37.3	36.4	35.4	34.4	33.4	32.3	31.2	30.1	28.9	27.7	
	14SQ	55	51.3	50.0	48.7	47.3	45.9	44.4	42.9	41.3	39.7	38.0	
	22SQ	70	65.3	63.6	61.9	60.2	58.4	56.5	54.6	52.6	50.6	48.4	
	38SQ	100	93.3	90.9	88.5	86.0	83.4	80.8	78.0	75.2	72.2	69.2	
		size	Standard Electric Current Value	200°C	210°C	220°C	230°C	240°C	250°C	260°C	270°C	280°C	290°C
		0.75SQ	8	5.3	5.0	4.7	4.4	4.1	3.7	3.3	2.9	2.4	1.7
		1.25SQ	10	6.6	6.3	5.9	5.5	5.1	4.7	4.2	3.6	2.9	2.1
		2SQ	15	9.9	9.4	8.8	8.3	7.7	7.0	6.3	5.4	4.4	3.1
		3.5SQ	25	16.5	15.6	14.7	13.8	12.8	11.7	10.4	9.0	7.4	5.2
		5.5SQ	30	19.8	18.8	17.7	16.6	15.3	14.0	12.5	10.8	8.8	6.3
		8SQ	40	26.4	25.0	23.6	22.1	20.4	18.7	16.7	14.4	11.8	8.3
		14SQ	55	36.3	34.4	32.4	30.3	28.1	25.6	22.9	19.9	16.2	11.5
		22SQ	70	46.2	43.8	41.3	38.6	35.8	32.6	29.2	25.3	20.6	14.6
		38SQ	100	65.9	62.6	59.0	55.2	51.1	46.6	41.7	36.1	29.5	20.9

Safe Current Tolerance Calculating Formula

$$NiGB (A) = \sqrt{\frac{300 - \theta}{230}} \times (N)$$

θ=Use Temperature(°C)
N=Standard Electric Current Value

■ NSBL / NSBL 6×4-I / 28NSBL (A)

Products	size	Standard Electric Current Value	150°C	200°C	210°C	220°C	230°C	240°C	250°C	260°C	270°C	280°C		
NSBL NSBL 6×4-I 28NSBL*	0.75SQ	10	10.4	9.3	9.1	8.8	8.6	8.3	8.1	7.8	7.5	7.2		
	1.25SQ	15	15.6	14.0	13.6	13.3	12.9	12.5	12.1	11.7	11.3	10.8		
	2SQ	20	20.9	18.7	18.2	17.7	17.2	16.7	16.2	15.6	15.0	14.4		
	3.5SQ	30	31.3	28.0	27.3	26.5	25.8	25.0	24.2	23.4	22.6	21.7		
	5.5SQ	40	41.7	37.3	36.4	35.4	34.4	33.4	32.3	31.2	30.1	28.9		
	8SQ	50	52.1	46.6	45.4	44.2	43.0	41.7	40.4	39.0	37.6	36.1		
	14SQ	70	73.0	65.3	63.6	61.9	60.2	58.4	56.5	54.6	52.6	50.6		
	22SQ	90	93.8	83.9	81.8	79.6	77.4	75.1	72.7	70.2	67.7	65.0		
	38SQ	130	135.5	121.2	118.2	115.0	111.8	108.4	105.0	101.4	97.7	93.9		
	60SQ	170	177.2	158.5	154.5	150.4	146.2	141.8	137.3	132.6	127.8	122.8		
	80SQ	220	229.4	205.2	200.0	194.6	189.1	183.5	177.7	171.6	165.4	158.9		
	100SQ	240	250.2	223.8	218.1	212.3	206.3	200.2	193.8	187.2	180.4	173.4		
		size	Standard Electric Current Value	290°C	300°C	310°C	320°C	330°C	340°C	350°C	360°C	370°C	380°C	390°C
		0.75SQ	10	6.9	6.6	6.3	5.9	5.5	5.1	4.7	4.2	3.6	2.9	2.1
		1.25SQ	15	10.4	9.9	9.4	8.8	8.3	7.7	7.0	6.3	5.4	4.4	3.1
		2SQ	20	13.8	13.2	12.5	11.8	11.0	10.2	9.3	8.3	7.2	5.9	4.2
		3.5SQ	30	20.7	19.8	18.8	17.7	16.6	15.3	14.0	12.5	10.8	8.8	6.3
		5.5SQ	40	27.7	26.4	25.0	23.6	22.1	20.4	18.7	16.7	14.4	11.8	8.3
		8SQ	50	34.6	33.0	31.3	29.5	27.6	25.5	23.3	20.9	18.1	14.7	10.4
		14SQ	70	48.4	46.2	43.8	41.3	38.6	35.8	32.6	29.2	25.3	20.6	14.6
	22SQ	90	62.2	59.3	56.3	53.1	49.7	46.0	42.0	37.5	32.5	26.5	18.8	
	38SQ	130	89.9	85.7	81.3	76.7	71.7	66.4	60.6	54.2	47.0	38.3	27.1	
	60SQ	170	117.6	112.1	106.3	100.3	93.8	86.8	79.3	70.9	61.4	50.1	35.4	
	80SQ	220	152.1	145.1	137.6	129.7	121.4	112.4	102.6	91.7	79.5	64.9	45.9	
	100SQ	240	166.0	158.3	150.1	141.5	132.4	122.6	111.9	100.1	86.7	70.8	50.0	

Safe Current Tolerance Calculating Formula

$$NSBL (A) = \sqrt{\frac{400 - \theta}{230}} \times (N)$$

NSBL 6×4-I (A)
28NSBL (A)

θ=Use Temperature(°C)
N=Standard Electric Current Value

*Please use 2 times of the Safe Current Tolerance in above mentioned Table to 28NSBL wire.
In the case of Multi-Core, pls refer to Electric Current Decrease Coefficient mentioned below and multiply the Safe Current Tolerance in above Table

The Electric Current Decrease Coefficient Table due to Multi-core.	Number of Core (C)		2~3	4	5~6	7~15
	Current Decrease Coefficient		0.70	0.63	0.56	0.49

Current Tolerance Table

■ NSBL 6 × 5

(A)

Products	Size	Standard Electric Current Value	300°C	310°C	320°C	330°C	340°C	350°C	360°C	370°C	380°C	390°C
NSBL 6 × 5	3.5SQ	30	27.9	27.3	26.4	25.8	25.0	24.1	23.4	22.6	21.6	20.7
	5.5SQ	40	37.3	36.4	35.3	34.4	33.4	32.2	31.2	30.1	28.8	27.7
	8.0SQ	50	46.6	45.5	44.1	43.0	41.8	40.3	39.0	37.7	36.0	34.6
	14.0SQ	70	65.2	63.7	61.8	60.2	58.5	56.4	54.6	52.8	50.4	48.4
	22.0SQ	90	83.9	81.9	79.4	77.4	75.2	72.5	70.2	67.9	64.8	62.3
	38.0SQ	130	121.2	118.4	114.8	111.8	108.7	104.8	101.5	98.1	93.7	90.0
	Size	Standard Electric Current Value	400°C	410°C	420°C	430°C	440°C	450°C	460°C	470°C	480°C	490°C
	3.5SQ	30	19.6	18.7	17.7	16.4	15.2	14.0	12.3	10.8	9.0	6.0
	5.5SQ	40	26.2	24.9	23.6	21.9	20.3	18.7	16.4	14.4	12.0	8.0
	8.0SQ	50	32.7	31.2	29.5	27.3	25.4	23.4	20.6	18.0	15.0	10.0
14.0SQ	70	45.9	43.7	41.4	38.3	35.6	32.8	28.8	25.2	21.0	14.0	
22.0SQ	90	59.0	56.2	53.2	49.2	45.8	42.2	37.1	32.4	27.0	18.0	
38.0SQ	130	85.2	81.1	76.9	71.2	66.2	60.9	53.6	46.8	39.0	26.0	

Safe Current Tolerance Calculating Formula

$$NSBL\ 6 \times 5\ (A) = \sqrt{\frac{500 - \theta}{230}} \times (N)$$

θ = Use Temperature(°C)
 N = Standard Electric Current Value

In the case of Multi-Core, pls refer to Electric Current Decrease Coefficient mentioned below and multiply the Safe Current Tolerance in above Table

The Electric Current Decrease Coefficient Table due to Multi-core.	Number of Core (C)	2 ~ 3	4	5 ~ 6	7 ~ 15
	Current Decrease Coefficient		0.70	0.63	0.56



Instructions on Products

Products	Instructions
Thermocouple Extension/Compensating Cables	<p>● About The Choice of Cable Type The cable will be connected to Thermocouple Sensor. Please make sure the type of Thermocouple Sensor first and then choose the type of Thermocouple Extension /Compensating Cable to match the same type of Thermocouple Sensor, otherwise correct temperature can not be measured.</p> <p>● About The Cable Wiring Environment ① Glass Fiber Braided type Cable can not be wired in an environment of damp and water. ② Please avoid using in an alkali atmosphere. ③ The cable can not be used as an electric cable for power supplies. ④ Please be noticed that the cable used outdoors and of a long-time storage, the color might fade.</p> <p>● About The Colors The color of cable in this Catalog is only an example. The color may be different for different type or different standard.</p>
Thermocouple Wires (Duplex type)	<p>● About Standards Our wire is based on the Standards of JIS-C1602 and JIS C-1605.</p> <p>● About the Colors The color code of our wire is based on the Standards of JIS C1610-2012 revised on June of 2012.</p> <p>● About Wiring of Positive(+) and Negative(-) Please be careful not to reverse Positive(+) and Negative(-) while wiring.</p> <p>● About Sheath Bending Radius The wire can be bent more than 2 times of bend radius of sheath outer diameter.</p>
Heat-resistant Wires	<p>● About the use methods The wire in this Catalog are used as a lead wire which is connected to some electric generator apparatus or device in high temperature etc.</p> <p>● About Standard Voltage Value. Please be careful not to use the Voltage above the Standard Value listed in this catalog.</p> <p>● About the wiring environment ① When power turns on, it becomes very high temperature by self-generation of heat. For the buildings with which an electric wire is in contact or approach please use the materials which shall not yield to the high temperature, and please arrange the wiring at the place away from the people's reach. ② The glass fiber currently used for the electric wire is a very weak material to too much crookedness. Please avoid using in a place (equipment) with the crookedness or an intense vibration (It must be used for fixed wiring). ③ Since this electric wire is hygroscopic and may threaten a sparking (short circuit) if applied in the place of humidity and moisture, therefore please avoid wiring in such places.</p>
Thermocouple Extension/Compensating Cables, Thermocouple Wires (Duplex type), Heat-resistant Wires	<p>● About the weight of the cable(wire) The weight of each kind of cable(wire) in this catalog is only a design value for your reference, sometimes there may be a little difference in the completed cable(wire), due to different type and materials of insulation and sheath.</p> <p>● About the overall diameter of Thermocouple Extension/Compensating Cable The Overall diameter (O.D) of each kind of cable in this catalog is only a design value for your reference. There might be ±10% error in a completed cable diameter.</p>

FUKUDEN Products CATALOG

Thermocouple Extension /Compensating Cables

Thermocouple Wires

Heat Resistant Wires



FUKUDEN INCORPORATED



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