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Ex Certified  
Heat Tracing  
and M&E Supplier

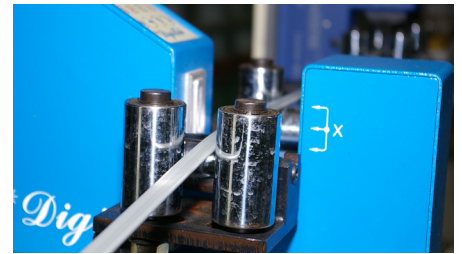
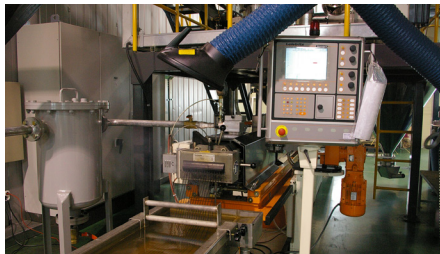
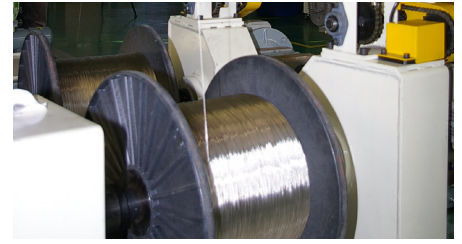
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# Heat Tracing Total Solution



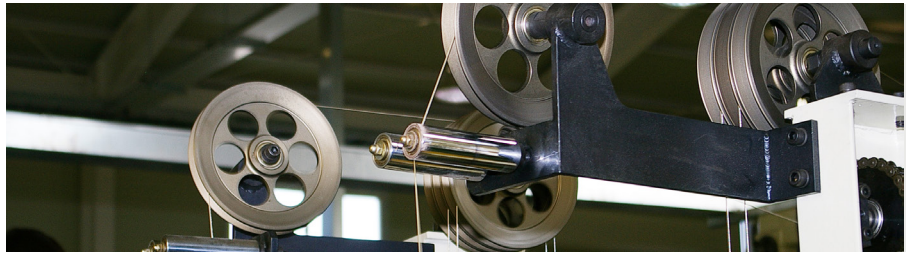
**SOLCO PYROELEC**  
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<http://www.pyroelec.com>



SOLCO PYROELEC & SOLCOTEC is the one stop total heat tracing solution provider of design, production, construction, maintenance, etc. And we provide the electrical equipment for shipbuilding and marine, industrial use. Moreover, as a specialized company that develops, certifies, produces and supplies to business partners worldwide. SOLCO PYROELEC & SOLCOTEC's management philosophy is based on quality, innovation, and continuous development. We promise to do our best to meet the customer needs.





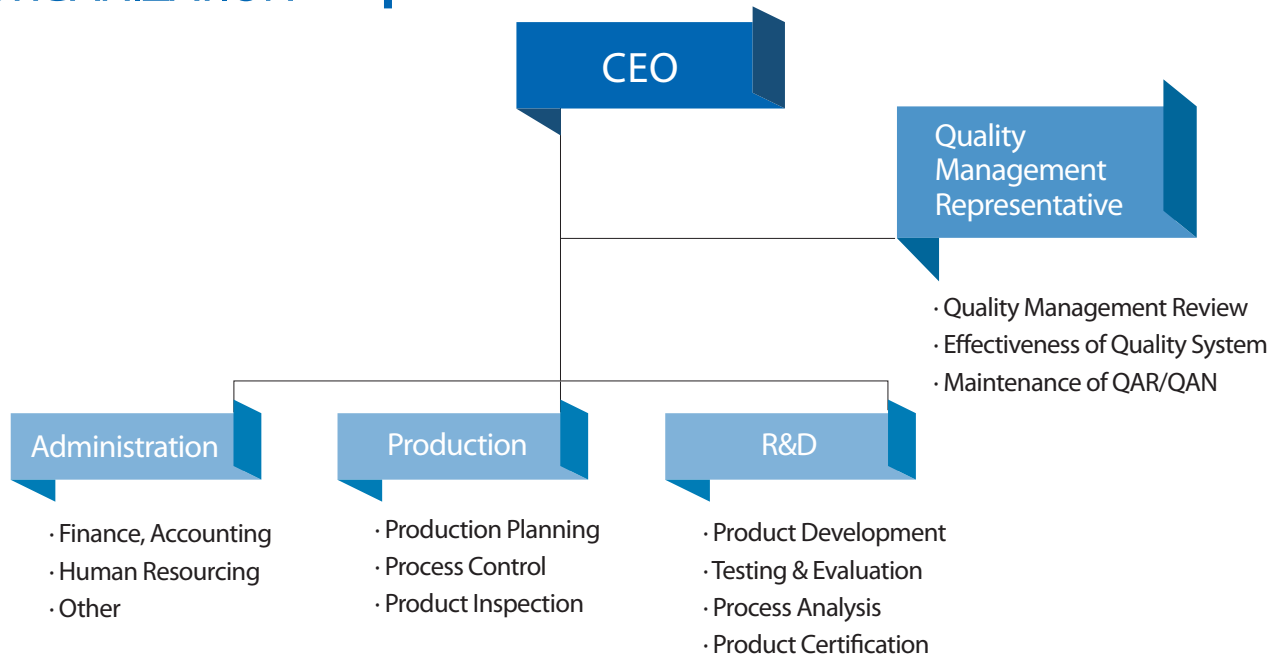
SOLCO PYROELEC  
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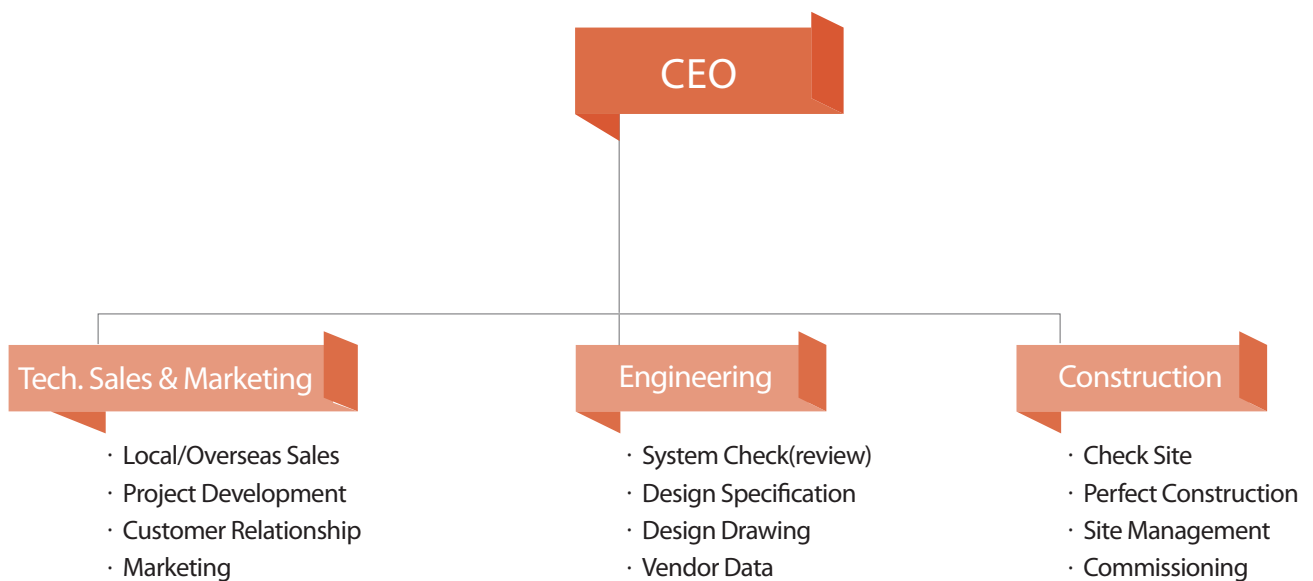
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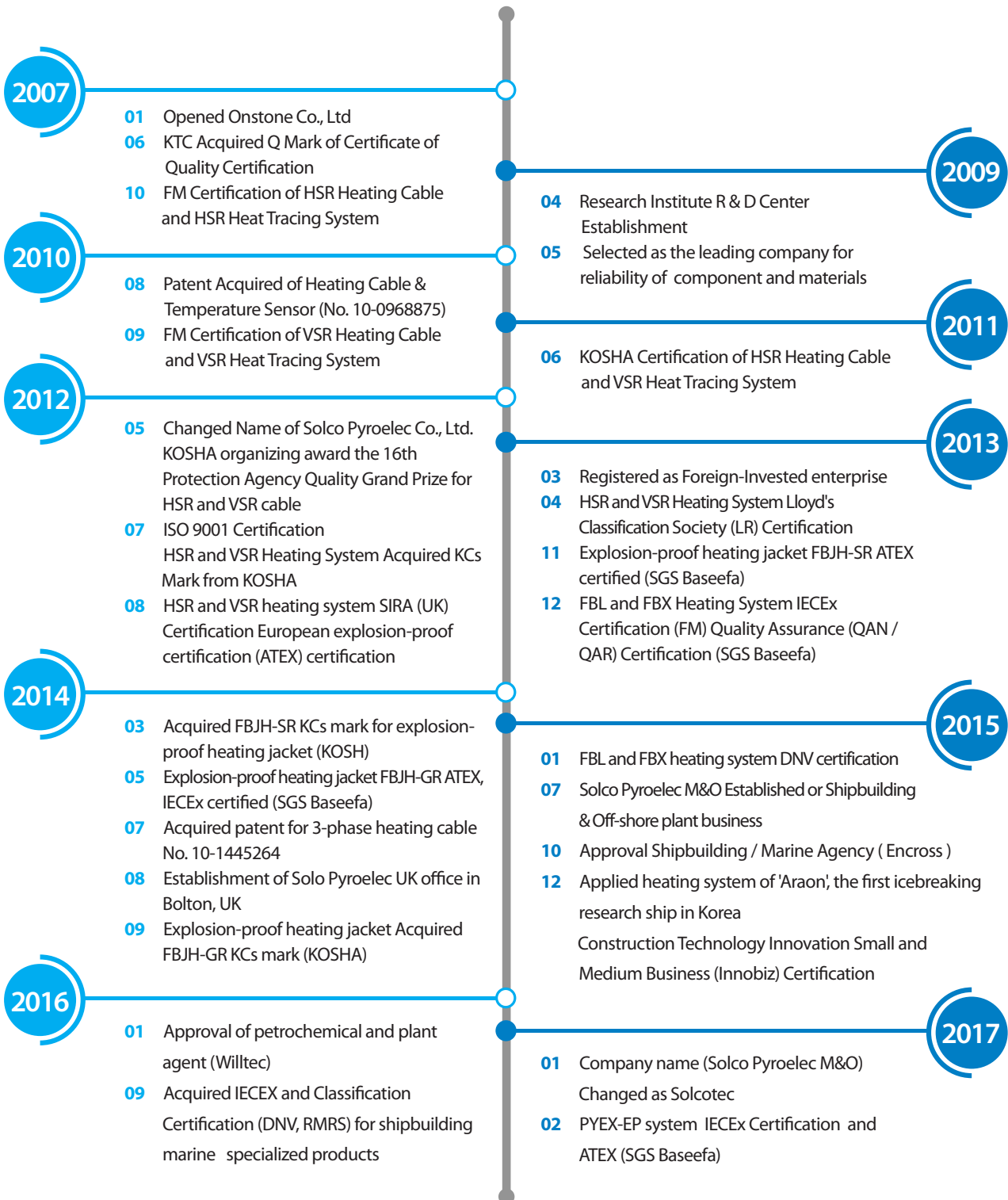
## SOLCO PYROELEC ORGANIZATION



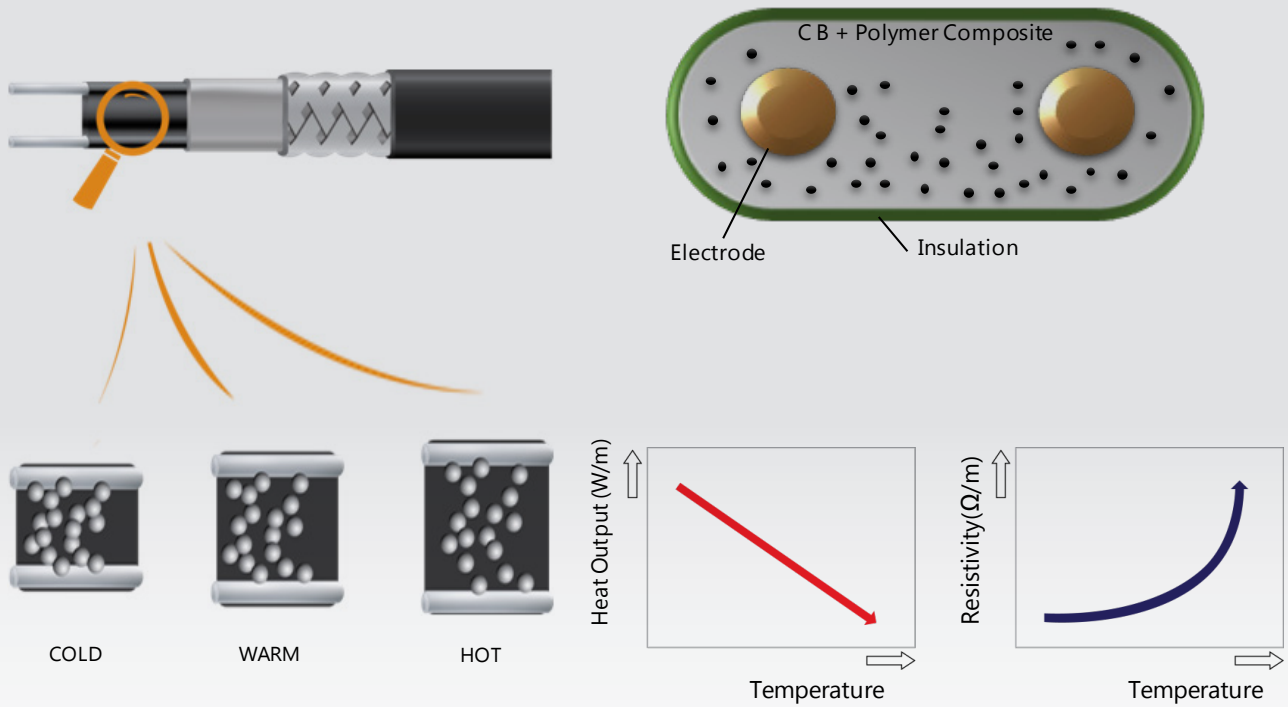
## SOLCOTEC ORGANIZATION



## HISTORY



## Core Technologies for Self-regulating Heating cable



### Principles of Self-Regulating

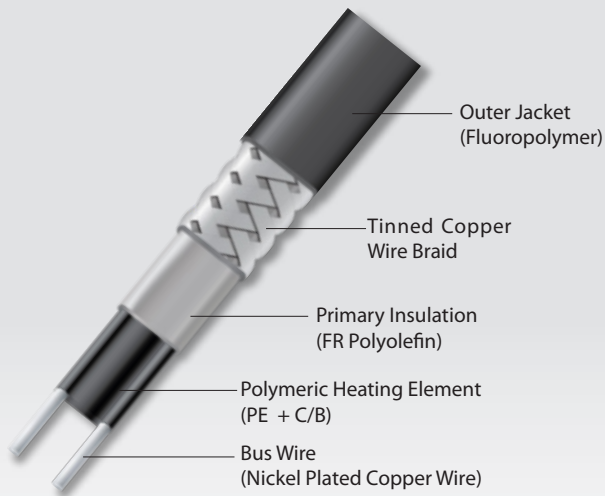
The conductive (polymeric carbon), the heating element inside the heating cable maintains the required temperature by changing the resistance and output depending on the temperature of ambient and surroundings.

### Features

- Neither burning nor overheating
- It can be cut at any length to suit site condition
- Flexible to form any shape
- It varies power output corresponding to ambient or object temperature

## FBL Self-regulating Heating cable

The FBL family of self-regulating heating cables is capable of maintaining process temperatures up to 65°C and used to prevent freezing of pipes and ships.



※ Actual colors can be different depending on the material of outer jacket.

### Features

- No over heating or burning even it overlaps each other
- It self-regulates thermal performance in response to temperature
- Soft switching for the energy-saving and longer service time
- Easy installation and low maintenance costs.
- Easy connection for powering and splicing.

### Selection Code

· FBL XX Y - C Z

XX : Rated output 10, 16, 24, 30 W/M at 10°C

Y : Rated voltage 2 ▶ 200~277Vac

C : Braid

Z : Outer jacket P, F



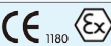


P ▶ FR Polyolefin

F ▶ Fluoropolymer

### Application

Area classification	Zone 1, Zone 2
Supply voltage	200 ~ 277 Vac
Chemical resistance (Outer jacket)	CP (FR Polyolefin) : Water soluble inorganic chemical exposure possible CF (Fluoropolymer) : For organic corrosive chemicals

### Approvals

	IECEX FMG 14.0011X
	DNVGL MRE0000001
	Baseefa16ATEX0118X
	RMRS 15.10470.296
	KCs 15-AV2BO-0192X

## Specifications

Max. maintain or continuous temp.	65°C (Power On)
Max. continuous exposure temp.	85°C (Power Off)
T-rating	T6 (85°C)
Bus conductor wire	ASTM B355 Class 2 NPC 16 AWG
Min. bend radius	30mm @ -60°C
Min. installation temperature	-60°C (excluding FBL102)

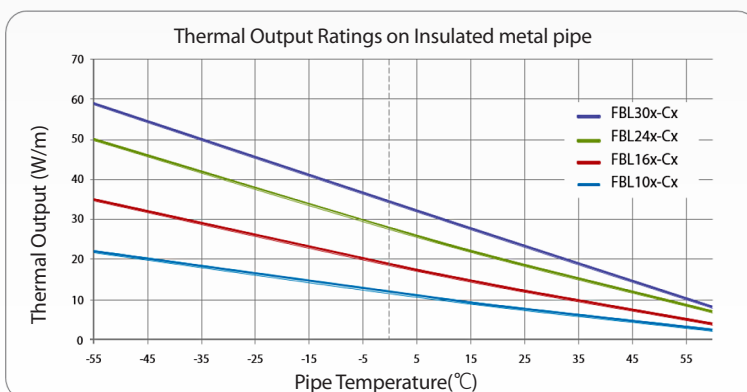
## Thermal Output Rating

Model	FBL102	FBL162	FBL242	FBL302
Nominal power output (W/m @ 10°C)	10	16	24	30

### Thermal output graph

- On insulated steel pipes
- Based on rated voltage 230 Vac

IEC 60079-0 : General requirements  
 IEC 60079-30-1 : Electrical Resistance Trace Heating  
 : General and testing requirements  
 IEC 60079-7 : Equipment protection by increased safety "e"



## Product Dimensions (Nominal)

Model	FBL102	FBL162	FBL242	FBL302
Size / Weight				
Thickness (mm)	5.6	5.6	5.6	5.6
Width (mm)	11.6	11.6	11.6	13.6
Weight (g/m)	105	105	105	120

## Max. Circuit Length(m)

※ Based on type 'C' Circuit Breakers

Electrical Protection Sizing	Start-up Temperature 10°C				Start-up Temperature -20°C			
	16A	25A	32A	40A	16A	25A	32A	40A
FBL102	193	193	193	193	134	155	155	155
FBL162	147	162	162	162	94	129	129	129
FBL242	105	137	137	137	67	104	111	111
FBL302	66	102	124	124	51	80	101	101



## FBH Self-Regulating Heating Cable

The FBH family of self-regulating heating cables is capable of maintaining process temperatures up to 110°C and used to prevent freezing of a large pipe of ship and plant, tank.



※ Actual colors can be different depending on the material of outer jacket.

### Features

- No over heating or burning even it overlaps each other
- Itself-regulated thermal performance in response to temperature
- Soft switching for the energy-saving and longer service time
- Easy installation and low maintenance costs.
- Easy connection for powering and splicing

### Selection Code

- FBH XX Y - C Z

XX : Rated output 15, 30, 45, 60 W/M @ 10°C

Y : Rated voltage 1 ▶ 100~120 Vac,  
2 ▶ 200~277 Vac

C : Braid

Z : Outer jacket

T ▶ Fluoropolymer

### Application

Area classification	Zone 1, Zone 2
Supply voltage	100 ~ 120 Vac 200 ~ 277 Vac
Chemical resistance (Outer jacket)	CT (Fluoropolymer) : For organic corrosive chemicals

### Approvals

	IECEx FMG 14.0011X
	Baseefa 16ATEX0118X
	DNVGL MRE0000003

## Specifications

Max. maintain or continuous temp.	110°C (Power On)
Max. continuous exposure temp.	135°C (Power Off)
T-rating	T4 (135°C)
Bus conductor wire	ASTM B355 Class 2 NPC 16 AWG (15W, 30W, 45W) ASTM B355 Class 2 NPC 15 AWG (60W)
Min. bend radius	23mm @ -55°C
Min. installation temperature	-55°C

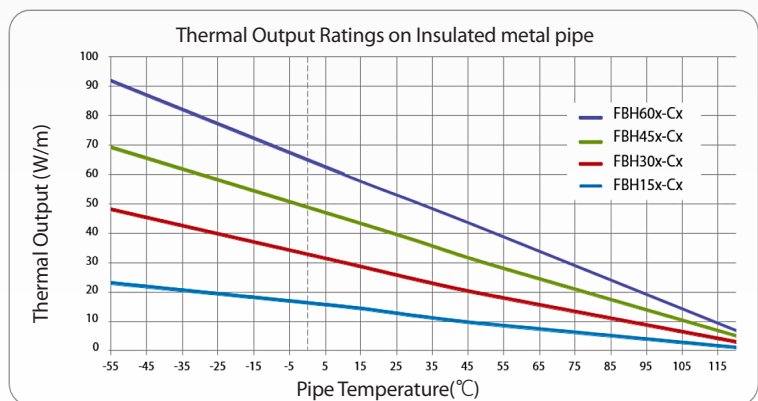
## Thermal Output Rating

Model	FBH152	FBH302	FBH452	FBH602
Nominal power output (W/m @ 10°C)	15	30	45	60

### Thermal output graph

- On insulated steel pipes
- Based on rated voltage 230 Vac

IEC 60079-0 : General requirements  
 IEC 60079-30-1 : Electrical Resistance Trace Heating  
 : General and testing requirements  
 IEC 60079-7 : Equipment protection by increased safety "e"



## Product Dimensions (Nominal)

Model	FBH152	FBH302	FBH452	FBH602
Size / Weight				
Thickness (mm)	5.2	5.2	5.2	5.6
Width (mm)	12.9	12.9	12.9	14.8
Weight (g/m)	128	128	128	172

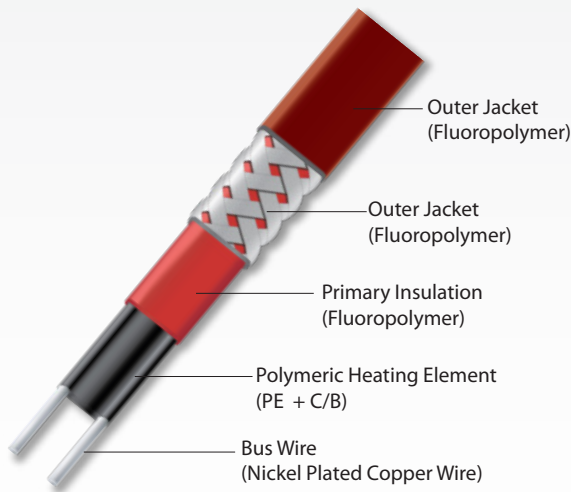
## Max. Circuit Length(m)

※ Based on type 'C' Circuit Breakers

Electrical Protection Sizing	Start-up Temperature 10°C				Start-up Temperature -20°C			
	16A	25A	32A	40A	16A	25A	32A	40A
Model								
FBH152	128	151	151	151	134	155	155	155
FBH302	77	117	117	117	94	129	129	129
FBH452	56	87	99	99	67	104	111	111
FBH602	43	68	87	92	51	80	101	101

## FBX Self-Regulating Heating Cable

The FBX family of self-regulating heating cables is capable of maintaining process temperatures up to 150°C and used to prevent freezing of a large pipe of ship and plant, tank.



※ Actual colors can be different depending on the material of outer jacket.

### Features

- No over heating or burning even it overlaps each other
- It self-regulates thermal performance in response to temperature
- Soft switching for the energy-saving and longer service time
- Easy installation and low maintenance costs.
- Easy connection for powering and splicing

### Selection Code

- FBX XX Y - C Z

XX : Rated output 15, 30, 45, 60 W/M @ 10°C

Y : Rated voltage 2 ▶ 200~277 Vac

C : Braid

Z : Outer jacket

T ▶ Fluoropolymer

### Application

Area classification	Zone 1, Zone 2
Supply voltage	200 ~ 277 Vac
Chemical resistance (Outer Jacket)	CT (Fluoropolymer) : For organic corrosive chemicals

### Approvals

	IECEx FMG 14.0011X
	DNVGL MRE0000002
	Baseefa16ATEX0118X
	RMRS 15.10470.296
	KCs 15-AV2BO-0193X

## Specifications

Max. maintain or continuous temp.	150°C (Power On)
Max. continuous exposure temp.	190°C (Power Off)
T-rating	T3 (200°C) : FBX152, FBX302, FBX452 T2 (300°C) : FBX602
Bus conductor wire	ASTM B355 Class 2 NPC 16 AWG
Min. bend radius	30mm @ -60°C
Min. installation temperature	-60°C

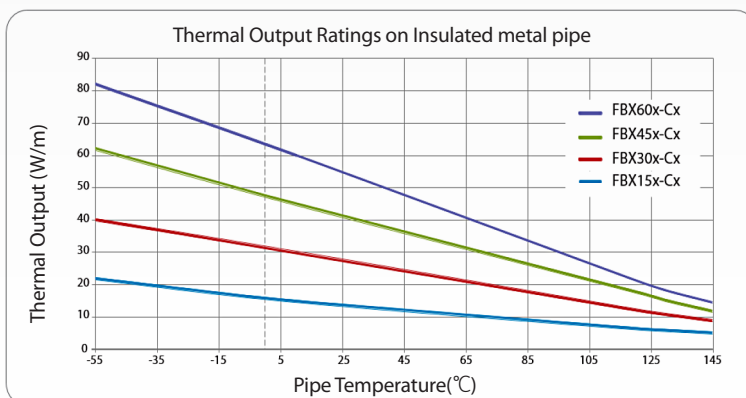
## Thermal Output Rating

Model	FBX152	FBX302	FBX452	FBX602
Nominal power output (W/m @ 10°C)	15	30	45	60

### Thermal output graph

- On insulated steel pipes
- Based on rated voltage 230 Vac

IEC 60079-0 : General requirements  
 IEC 60079-30-1 : Electrical Resistance Trace Heating  
 : General and testing requirements  
 IEC 60079-7 : Equipment protection by increased safety "e"



## Product Dimensions (Nominal)

Model	FBX152	FBX302	FBX452	FBX602
Size / Weight				
Thickness (mm)	4.8	4.8	4.8	4.8
Width (mm)	12.2	12.2	12.2	12.2
Weight (g/m)	126	126	126	126

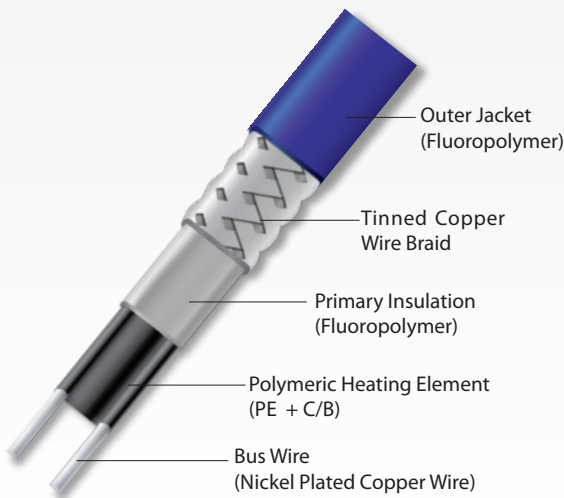
## Max. Circuit Length(m)

※ Based on type 'C' Circuit Breakers

Electrical Protection Sizing	Start-up Temperature 10°C				Start-up Temperature -20°C			
	16A	25A	32A	40A	16A	25A	32A	40A
FBX152	128	151	151	151	107	138	138	138
FBX302	77	117	117	117	70	110	112	112
FBX452	56	87	99	99	50	79	94	94
FBX602	43	68	87	88	39	61	79	84

## FBZ Self-Regulating Heating Cable

The FBZ family of self-regulating heating cables is capable of maintaining process temperatures up to 150°C and used to prevent freezing of large pipes and ships. Also, Freeze protection for various pipeline under steam purge temperature maintenance for petrochemical and gas plant.



※ Actual colors can be different depending on the material of outer jacket.

### Features

- No over heating or burning even it overlaps each other
- It self-regulates thermal performance in response to temperature
- Soft switching for the energy-saving and longer service time
- Easy installation and low maintenance costs.
- Easy connection for powering and splicing

### Selection Code

- FBZ XX Y - CZ

XX : Rated output 15, 30, 45, 60 W/M @ 10°C

Y : Rated voltage 2 ▶ 200~277 Vac

C : Braid




Z : Outer jacket

T ▶ Fluoropolymer

### Application

Area classification	Zone 1, Zone 2
Supply voltage	200 ~ 277 Vac
Chemical resistance (Outer Jacket)	CT (Fluoropolymer) : For organic corrosive chemicals

### Approvals

	IECEx BAS 16.0054U
	Baseefa16ATEX0058U
	DNVGL MRE0000004

## Specifications

Max. maintain or continuous temp.	150°C (Power On)
Max. continuous exposure temp.	240°C (Power Off)
T-rating	T3 (200°C) : FBZ152, FBZ302, FBZ452 T2 (300°C) : FBZ602
Bus conductor wire	ASTM B355 Class 2 NPC 16 AWG
Min. bend radius	30mm @ -60°C
Min. installation temperature	-60°C

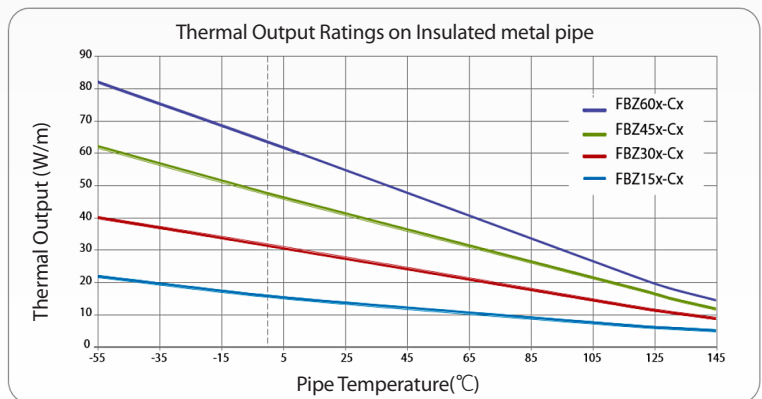
## Thermal Output Rating

Model	FBZ152	FBZ302	FBZ452	FBZ602
Nominal Power Output (W/m @ 10°C)	15	30	45	60

### Thermal output graph

- On insulated steel pipes
- Based on rated voltage 230 Vac

IEC 60079-0 : General requirements  
 IEC 60079-30-1 : Electrical Resistance Trace Heating  
 : General and testing requirements  
 IEC 60079-7 : Equipment protection by increased safety "e"



## Product Dimensions (Nominal)

Model	FBZ152	FBZ302	FBZ452	FBZ602
Size / Weight				
Thickness (mm)	4.8	4.8	4.8	4.8
Width (mm)	12.2	12.2	12.2	12.2
Weight (g/m)	126	126	126	126

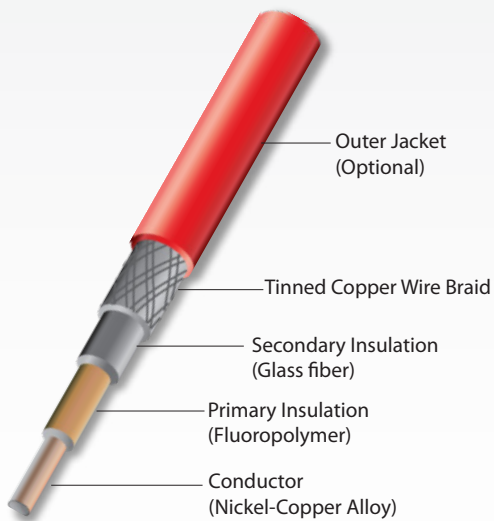
## Max. Circuit Length(m)

\*Based on type 'C' Circuit Breakers

Electrical Protection Sizing	Start-up Temperature 10°C				Start-up Temperature -20°C			
	16A	25A	32A	40A	16A	25A	32A	40A
Model								
FBZ152	98	132	132	132	82	121	121	121
FBZ302	66	102	108	108	59	93	103	103
FBZ452	49	77	93	93	44	69	89	89
FBZ602	39	61	79	83	36	56	71	80

## SFC Series Heating Cable

The SFC family of series heating cables is capable of maintaining process temperatures up to 120°C and installing up to 4Km with one power connection point. In extreme weather condition, It is suitable for heat-up and temperature maintenance of tank or vessel, long pipe line for single phase power connection.



※ Actual colors can be different depending on the material of outer jacket.

### Features

- Easy Operation and fast response
- Heat tracing up to 4km with single power source
- Flexible and excellent mechanical strength
- Resistance to heat, oil and chemicals Long service life
- Cost saving of cabling and installing
- No inrush current

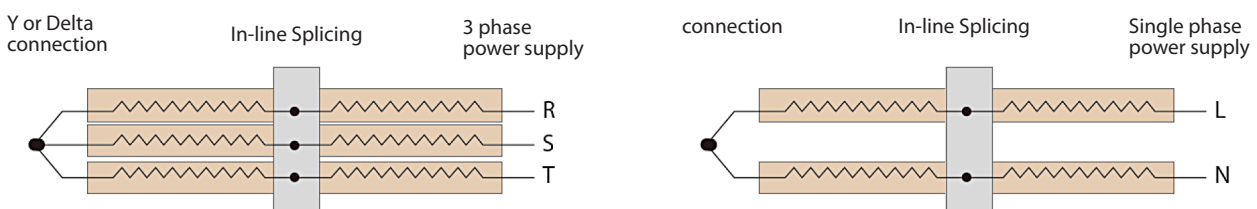
### Selection Code

- SFC L XX - GNT
- NONE : Heating cable  
 L : Cold lead cable  
 XX : DC Resistance  $\Omega$ /km @ 20°C
- GNT : Outer jacket  
 G ▶ Glassfibre tape  
 N ▶ Nickel plated copper wire braid  
 T ▶ Fluoropolymer

### Application

Supply voltage	Max. 600 Vac
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### Circuit configuration



## Specifications

Max. maintain or continuous temp.	150 °C (Power On)
Max. continuous exposure temp.	250 °C (Power Off)
Min. bend radius	6 x O.D

## Thermal Output Rating

Model	Heating Element	Conductor Dia. (mm)	Nominal Resistance (Ω/m@20°C)	Out Dia. (mm)	Model	Heating Element	Conductor Dia. (mm)	Nominal Resistance (Ω/m@20°C)	Out Dia. (mm)
SFC0.8-GNT	Copper	6.314	0.749	9.8	SFC320-GNT	NiCr Alloy	0.852	319.743	4.3
SFC1.1-GNT	Copper	5.166	1.114	8.6	SFC380-GNT	NiCr Alloy	0.78	381.496	4.3
SFC1.8-GNT	Copper	4.018	1.831	7.5	SFC480-GNT	NiCr Alloy	0.696	479.139	4.2
SFC2.9-GNT	Copper	3.185	2.922	6.7	SFC600-GNT	NiCr Alloy	0.621	601.861	4.1
SFC4.4-GNT	Copper	2.555	4.491	6.0	SFC700-GNT	NiCr Alloy	0.567	701.185	4.0
SFC7-GNT	Copper	2.020	7.164	5.5	SFC810-GNT	NiCr Alloy	0.534	813.949	4.0
SFC10-GNT	Copper	1.722	9.628	5.2	SFC1000-GNT	NiCr Alloy	0.48	1007.389	4.0
SFC11.7-GNT	Copper	1.6	11.409	5.1	SFC1440-GNT	NiCr Alloy	0.396	1437.502	3.9
SFC15-GNT	Copper	1.365	15.368	4.8	SFC1750-GNT	NiCr Alloy	0.363	1761.434	3.8
SFC17.8-GNT	Copper	1.12	19.445	4.7	SFC2000-GNT	NiCr Alloy	0.339	2019.67	3.8
SFC25-GNT	Copper	1.083	24.404	4.6	SFC3000-GNT	NiCr Alloy	0.273	3204.638	3.8
SFC31.5GNT	Copper	0.96	30.967	4.4	SFC8000-GNT	NiCr Alloy	0.171	7937.569	3.7
SFC50-GNT	NiCu Alloy	0.72	48.316	4.2	SFCL3.5-GNT	Copper	2.275	5662	5.8
SFC65-GNT	NiCu Alloy	0.87	66.183	4.4	SFCL4.0-GNT	Copper	2.828	3.697	6.3
SFC80-GNT	NiCu Alloy	0.78	82.337	4.3	SFCL6.0-GNT	Copper	3.185	2.922	6.7
SFC100-GNT	NiCu Alloy	0.72	96.332	4.2	SFCL10-GNT	Copper	4.095	1.777	7.6
SFC150-GNT	NiCu Alloy	0.738	150.227	4.2	SFCL16-GNT	Copper	5.166	1.114	8.6
SFC200-GNT	NiCr Alloy	1.077	200.101	4.6	SFCL25-GNT	Copper	6.516	0.702	10

## Application

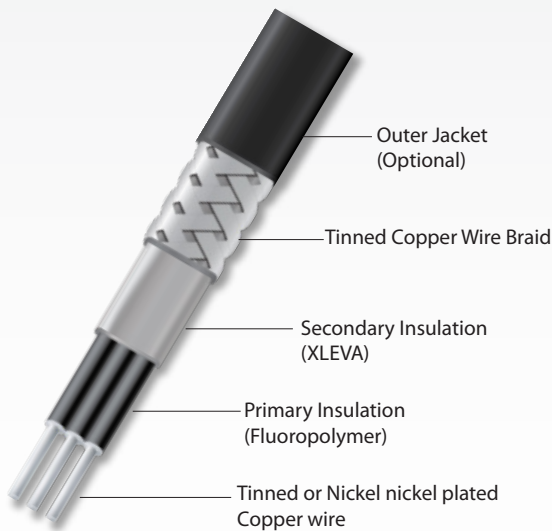


- In extreme weather condition, heat-up or temperature maintenance of tank or vessel requires an outstanding performance together with ultimate energy efficiency. SFC heating cable and relevant components show outstanding thermal endurance and mechanical strength up to 250 °C.



## LLC 3-Phase Heating Cable

The LLC family of insulated heating cables is capable of maintaining process temperatures up to 120°C and installing up to 4Km with one power connection point. It is suitable for heat-up and temperature maintenance of tank or vessel, long pipe line for 3- Phase power connection.



※ Actual colors can be different depending on the material of outer jacket.

### Features

- Easy Operation and fast response
- Heat tracing up to 4km with single power source
- Flexible and excellent mechanical strength
- Resistance to heat, oil and chemicals Long service life
- Cost saving of cabling and installing
- No inrush current

### Selection Code

· LLC 3C XXX - CZ

3C : Conductors 3core

XXX : Conductors size 1.5, 2.5, 4.0, 6.0, 8.0, 10.0

Y : Rated voltage 2 ▶ 200~277Vac

C : Braid

Z : Outer jacket

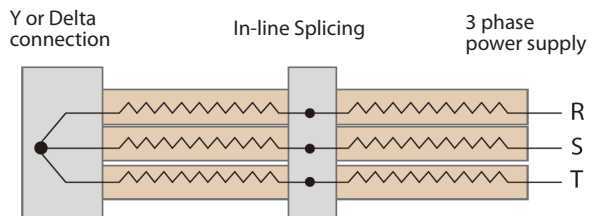
X ▶ XLEVA

F ▶ Fluoropolymer

### Application

Supply voltage	Max. 600 Vac
Outer jacket	CX (XLEVA): Exposure to aqueous inorganic chemicals CT (Fluoropolymer) : For organic corrosive chemicals

### Circuit configuration

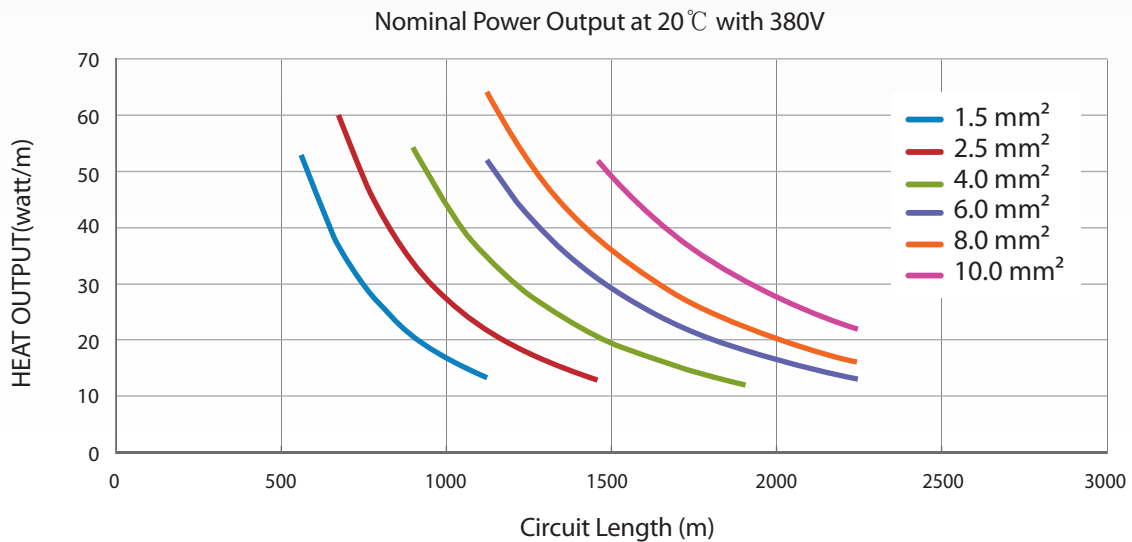


## Specifications

Max. maintain or continuous temp.	150°C (Power On)
Max. continuous exposure temp.	240°C (Power Off)

## Thermal Output Rating

Model	Conductor size	Nominal resistance (Ω/Km@20°C)	Cabel W x T (mm)	Min. Bend Radius(mm)	Weight (g/m)
LLC3C015	3C x 1.5 mm <sup>2</sup>	12.1 ± 10%	12.7 x 7.0	42	146
LLC3C025	3C x 2.5mm <sup>2</sup>	7.4 ± 10%	13.4 x 7.4	45	181
LLC3C040	3C x 4.0mm <sup>2</sup>	4.6 ± 10%	15.1 x 7.9	48	230
LLC3C060	3C x 6.0mm <sup>2</sup>	3.1 ± 10%	16.8 x 8.5	51	290
LLC3C080	3C x 8.0mm <sup>2</sup>	2.5 ± 10%	18.2 x 9.30	54	346
LLC3C100	3C x 10.0mm <sup>2</sup>	1.8 ± 10%	19.5 x 9.5	57	402



※ Refer to data sheet for other voltage applications.

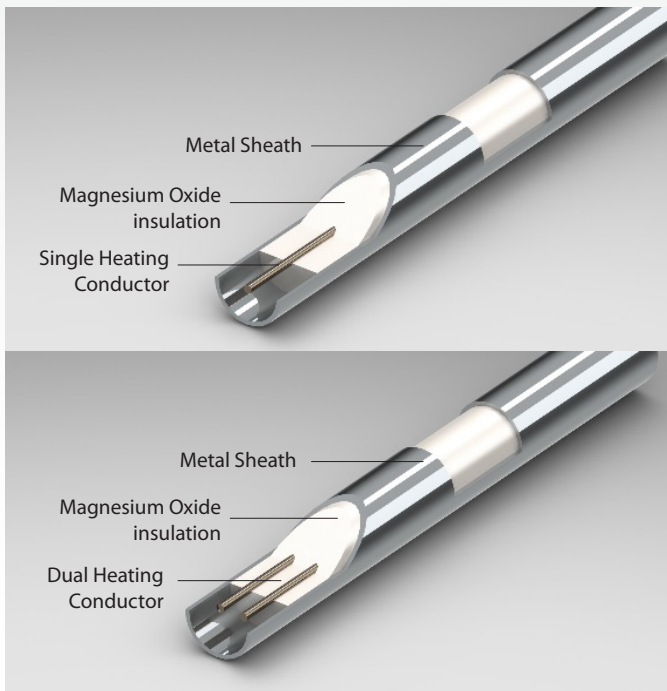
## Application



· In cold weather, an electrical heat tracing system is highly required for freeze protection of pipelines ex. chemical transport or water supply. But the heat tracing for tunnel or long distance pipeline should bear numbers of power supplies with conventional heating cables. The cabling cost often exceeds that of heat tracing itself. Solco's LLC longline heating cable system requires only one power supply in order to trace up to 4 km and saves money and time for extra cablings and connections.

## MI Mineral Insulated Heating Cable

The MI family Of mineral insulated heating cables is capable of maintaining process temperatures above 600°C, high temperature process and areas where good corrosion resistance are required for long periods of time in extremely harsh enviroments. For example, petro-chemical, reactor vessels and other applications where the integrity of the cable is most important.



### ■ Features



- Easy Operation and fast response
- Heat tracing up to 4km with single power source
- Flexible and excellent mechanical strength
- Resistance to heat, oil and chemicals Long service life
- Cost saving of cabling and installing
- No inrush current

※ Actual colors can be different depending on the material of outer jacket.

### ■ Application

Supply voltage	Zone 1, Zone 2
Supply voltage	Max. 500Vac (assembled unit) Max. 750Vac (cable)
Outer jacket	Copper sheath Cupronickel sheath Stainless steel and nickel alloy sheath

### ■ Approvals

	IECEX SIR16.0046
	Sira 16ATEX3154

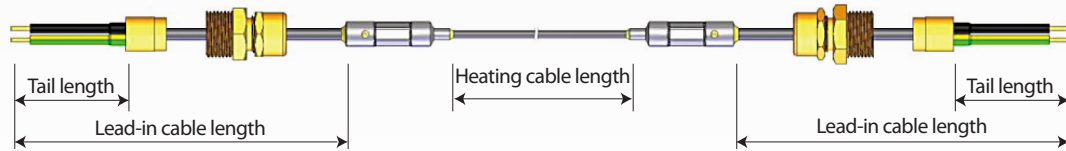
## Specifications

Seath material	Copper Stainless steels of AISI 300x range	Cupronickel 70/30 Alloys 825, Inconel 600
Conductor material	Nichrome Copper	Constantan Copper-Nickel alloys
Insulation material	Manesum Oxide(MgO)	
Max. maintain or continous temp.	Copper sheath : 200°C Stainless steel and nickel alloy sheath : 600°C	Cupronickel sheath : 400°C
Supply voltage	Max. 500Vac (assembled unit)	Max. 750Vac (cable)

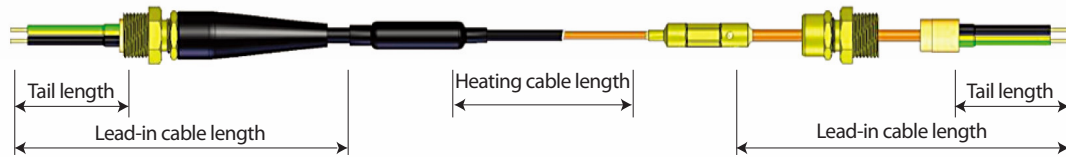
## Units Design Types

### Design B

Single core heating cable with Stainless Steel, Cupronickel or Nickel alloy sheath

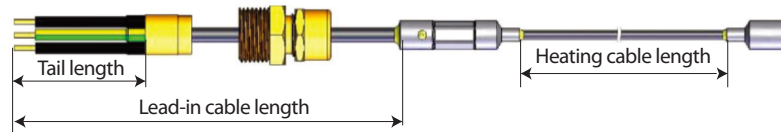


Single core heating cable with Copper sheath bare (right) or HDPE served (left)



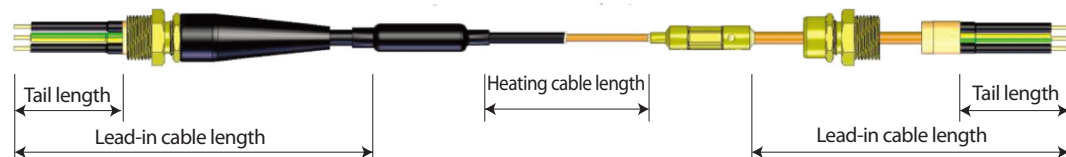
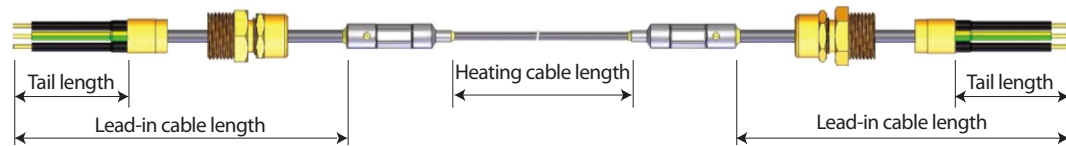
### Design D

Twin core heating cable with Stainless Steel, Cupronickel or Nickel alloy sheath



### Design E

Twin core heating cable with Stainless Steel, Cupronickel or Nickel alloy sheath



## ■ Heating Units Reterence

1)Unit design	2) Heating cable reference	3)Type of termination	4) Heated length (m)	5) Cold lead-in Length (m)	6)Tails length(mm)
B	/ H321-A10K	/ T1	25	/ 1.15	/ 150

1) Unit design  
 B : Single core Heating Unit design  
 D : Twin core Heating Unit design  
 E : Twin core Heating Unit design

2) Heating cable reference  
 Fore cable references see tables below

3) Type of termination  
 T1 : Type 1  
 T2 : Type 2  
 T4 : Type 4

4) Heated Length (m)  
 ex) 9m, 25m, 40m

5) Cold Lead-in Length (m)

6) Tails length (mm)

## ■ Heating Cable Reterence

1) Unit design	2) Sheath material	3) Number of conductors	4) Conductor material	5) Conductor cross section area	6) Suffix
H	122	/ 1	D	100	/ HDPE

1) Unit design  
 H : Heating cable

2) Sheath material  
 122 : Copper  
 321 : AISI321 Stainless steel  
 316L: AISI316L Stainless steel  
 310 : AISI 310 Stainless steel  
 400 : Cupronickel 70/30  
 600 : Inconel 600  
 825 : Alloy 825

3) Number of conductors  
 1 : One conductor (omitted by default)  
 2 : Two conductors

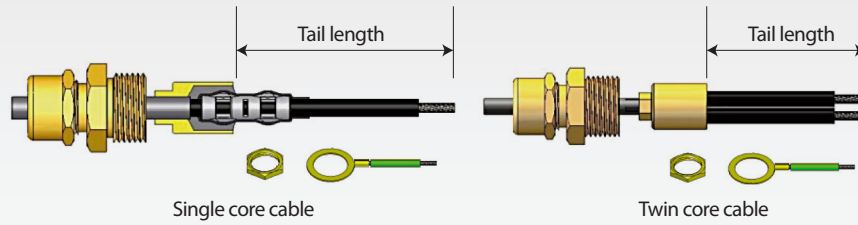
4) Conductor material  
 A : Nichrome  
 B : Constantan  
 C : Copper  
 D : Copper-Nickel alloys

5) Conductor(s)resistance  
 Resistance in Ohm/1000m (km)  
 for single conductor or for loop of two conductors

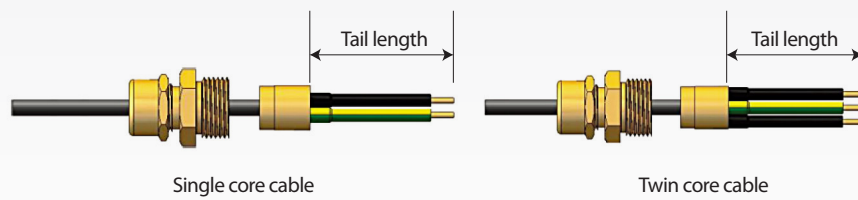
6) Suffix  
 Additional information, such as  
 300V : Voltage rating if not 500V  
 HDPE : for HDPE served cables

## Cold Lead-in/Wiring Code Reference

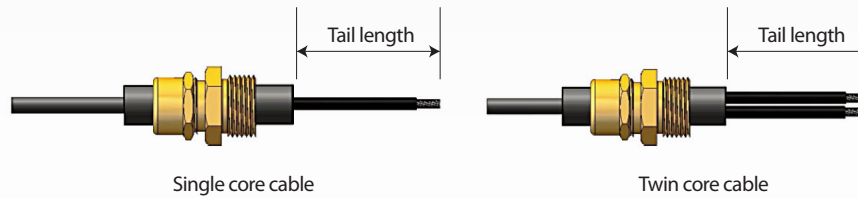
### TYPE 1



### TYPE 2



### TYPE 4



1) Unit desing	2) Sheath material	3) Number of conductors	4) Conductor material	5) Conductor cross section area	6) Voltage rating	7) Suffix
W	122	/	C	10	750V	/ HDPE

1) Unit design

W : Wiring/Cold lead-in cable

2) Sheath material

122 : Copper  
 321 : AISI321 Stainless steel  
 316L: AISI316L Stainless steel  
 310 : AISI 310 Stainless steel  
 400 : cupronickel 70/30  
 600 : Inconel 600  
 825 : Alloy 825

3) Number of conductors

1 : One conductor (omitted by default)  
 2 : Two conductors

4) Conductor material

C : Copper

5) Conductor cross section area

Cross section area of a single conductor

6) Voltage Rating

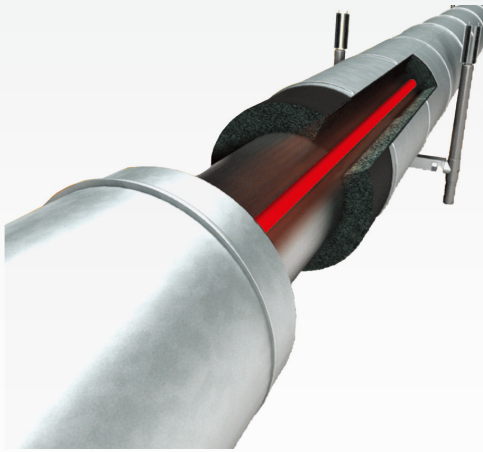
Voltage rating 750V

7) Suffix

HDPE : for HDPE served cables with copper sheath

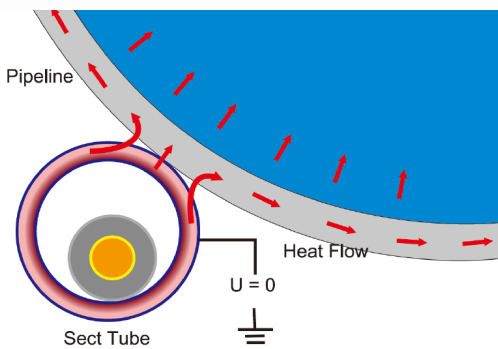
## STS Skin Trace Heating System

STS, skin trace heating system is capable of maintain the process temperature up to 150°C and long-distance pipeline of 30Km or more.



### Features

- The only one method of heating pipelines up to 30km with single power supply
- The ultimate heat efficiency save cabling cost for power supply
- Zero electrical potential on outer surface of heat tube
- Long service Life



### System Principles

- STS's Skin Trace system generates heat by using the induced current with conductor in heating pipe.

※ For further technical information, please contact us.

### Installation



- The Skin Trace (Induction-resistive heating system) is designed to maintain the product temperature and/or to protect long distance pipelines against the frost.
- The STS is the only one capable of heating pipeline up to 30km with single power supply.
- It is the most thermally-efficient and cost-saving-solution for the pipeline having distance longer than 3km.

## PYEX-EP-JB Engineering Plastic Enclosure

PYEX-EP-JB, Engineering (Glass Fiber Reinforced) Plastic box family which is installed directly on the pipe and used for power wiring, distribution, end termination (LED lamp type selection), temperature sensor.



### Features

- Designed for use in Ex-proof area with heat-tracing cables
- Consist of corrosion-resistant connection parts for enclosure assembly
- The glass fiber polyester used for minimizing the electrical resistance of the surface to  $10^9 \Omega/\text{cm}$  and durability and enhanced mechanical strength



PPS mounting



SUS mounting

### Selection Code

- PYEX - EP - JBX - YY - Z

X : blank ▶ enclosure only

P ▶ PPS mounting

S ▶ SUS mounting

YY : 12 ▶ 120 X 122 X 90

16 ▶ 160 X 160 X 90

Z : P ▶ Power Connection

T ▶ Distribution

TC ▶ Temp. Sensor

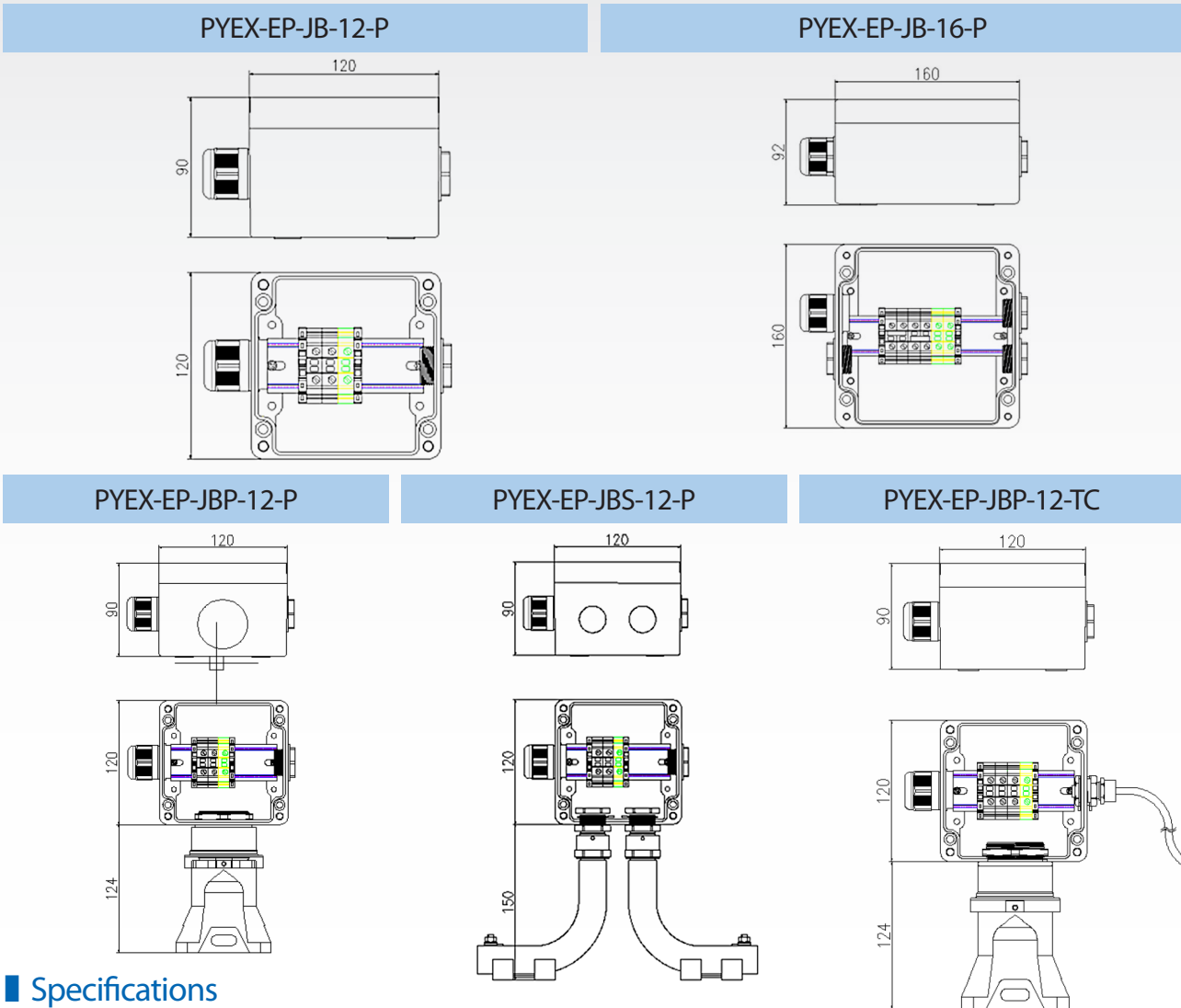
E(LE) ▶ End Termination(Lamp type)

### Approvals

	IECEx BAS 17.0009X
	Baseefa17ATEX0016X



## Product Drawing



Enclosure

## Specifications

Heating cable capability	FBL, FBH, FBX, FBZ
IP Grade	IP66
Ambient temperature range	-50°C ~ 110°C
Entries	JB-12(M25 x 2ea) / JB-16(M25 x 4ea)
Supply voltage	Max. 277Vac
Impact resistance	7Joule
Ex-proof type	Ex eb II C Gb

## Weight (Based on PYEX-EP-JB-12)

PYEX-EP-JB-12-P	PYEX-EP-JB-12-P-E	PYEX-EP-JB-12-P-T	PYEX-EP-JB-12-P-TC	PYEX-EP-JB-12-P-LE
0.82kg	0.72kg	0.84kg	0.83kg	0.85kg

## PYEX-SS-JB Stainless Steel Enclosure

PYEX-SS-JB, Stainless Steel Enclosure family which is installed directly on the pipe with SUS-mounting. Excellent durability and weatherproof make it possible to install in extreme environments.



### Features

- Stainless steel enclosure
- Manufactured of acid resistant and corrosion resistant stainless steel 316L
- Designed with high strength and weatherproof for trace-heating in harsh environment
- High ingress protection, IP66 or or higher
- Drain plug used for preventing condensation

### Selection Code

- PYEX - SS - JBX - YY - Z



SUS mounting

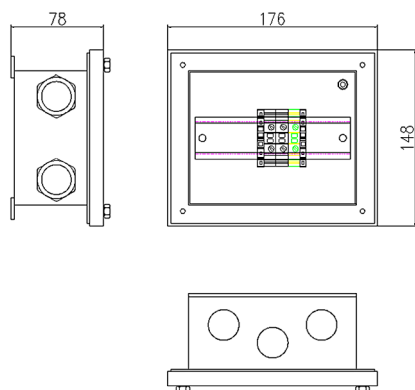
X : Blank ▶ Enclosure only  
S ▶ SUS mounting

YY : 18 ▶ 176 X 148  
25 ▶ 253 X 175

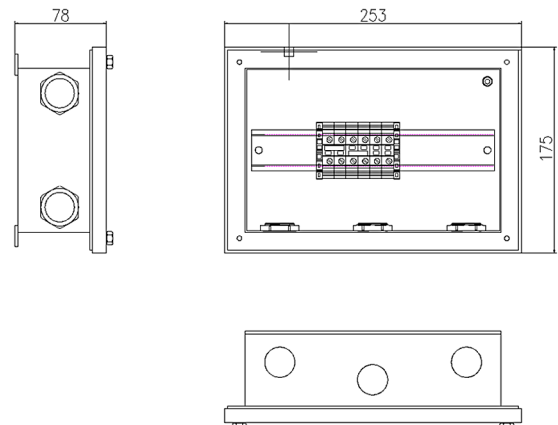
Z : P ▶ Power connection  
T ▶ Distribution  
E ▶ End termination

### Product Drawing

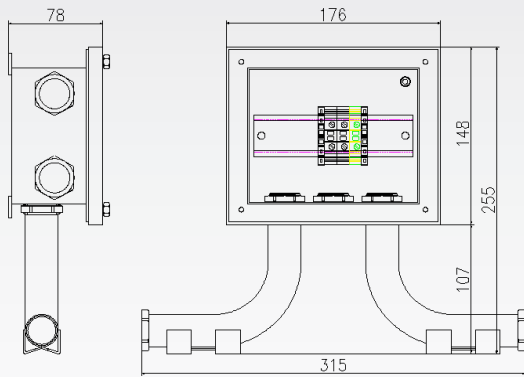
PYEX-SS-JB-18-P



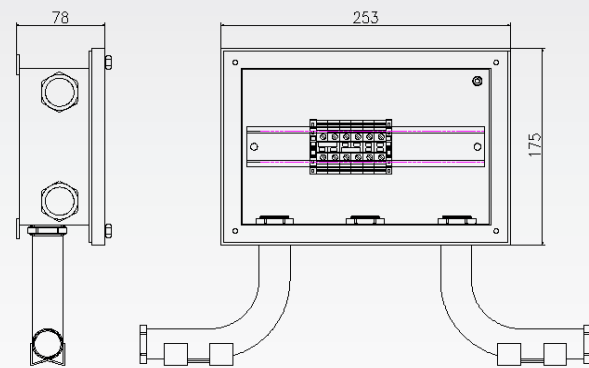
PYEX-SS-JB-25-P



PYEX-SS-JBS-18-P



PYEX-SS-JBS-25-P



Enclosure

## Specifications

Heating cable capability	FBL, FBH, FBX, FBZ
IP Grade	IP66, IP67
Ambient temperature range	-50°C ~ 50°C
Entries	M25 X 7(Max.)
Supply Voltage	Max. 750V
Max. operating voltage	277Vac
Ex-proof type	Ex eb II C Gb, Db

## Weight

PYEX-SS-JBS-18	PYEX-SS-JBS-25	PYEX-SS-MT
1.68Kg	2.1Kg	0.95kg

## PYEX-AE Aluminum Connection Enclosure

PYEX-AE, the reinforced aluminum connection enclosure is installed directly on the pipe and used for power connection, distribution, end termination, temperature sensor.



### ■ Features

- Explosion-proof aluminium enclosure
- Designed and manufactured for Ex e and IP66
- Excellent Weather-proof and mechanical strength
- Fixing screws and flame-proof gaskets against water and dust ingress
- Compatibility with various power cables and heating cables up to 15mm in diameter.

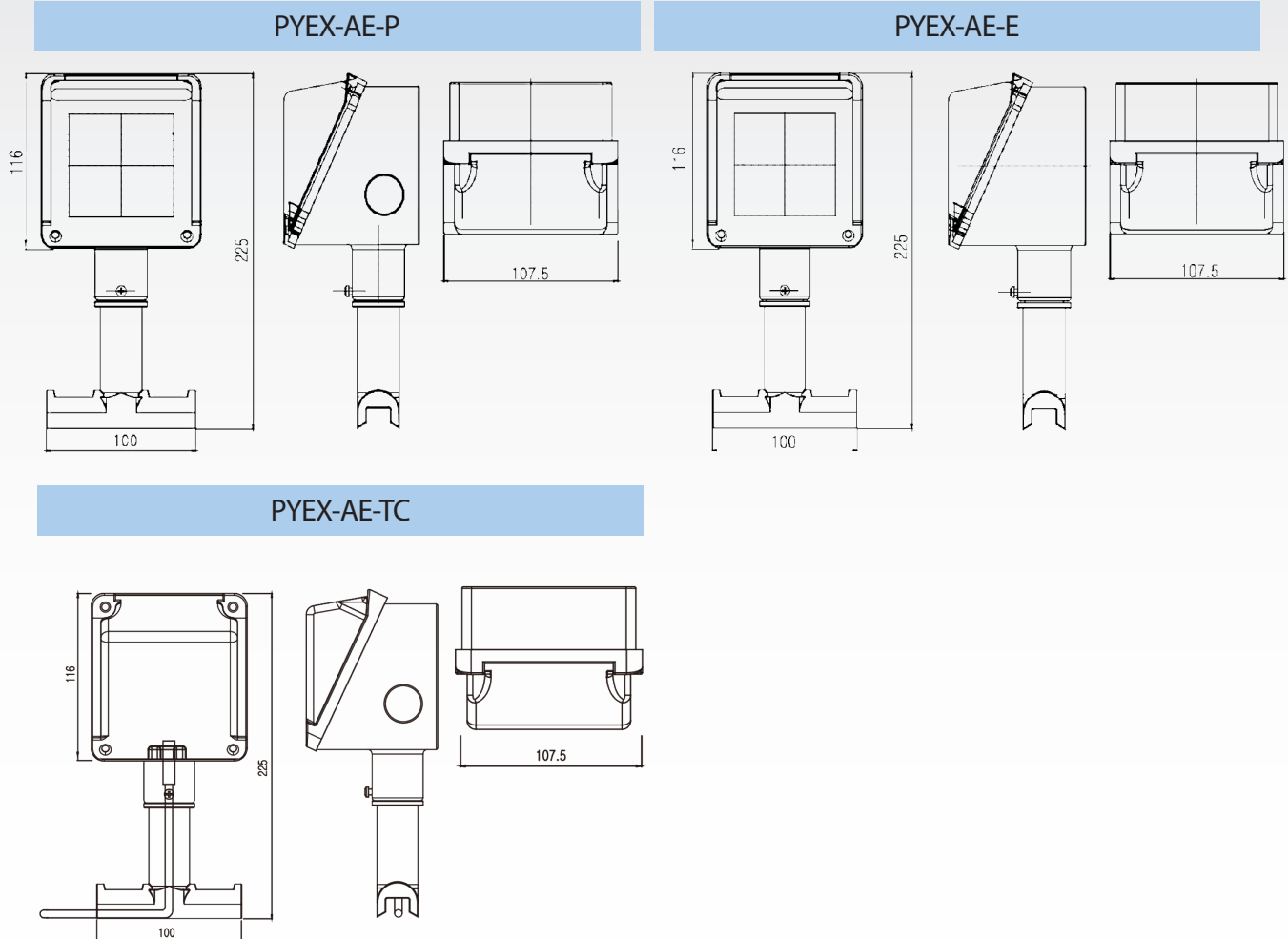
### ■ Selection Code

- PYEX - AE - X
  - X : P ▶ Power connection
  - T ▶ Distribution
  - TC ▶ Temp. sensor
  - E ▶ End termination

### ■ Approvals

PYEX-AE-P	CE 1180 Ex	Sira 12ATEX4255X
	CS	KCs 11-AV2BO-0146
PYEX-AE-E	CS	KCs 11-AV2BO-0146

## Product Drawing



Enclosure

## Specifications

Heating cable capability	FBL, FBH, FBX, FBZ
IP Grade	IP66
Ambient temperature range	-55°C ~ 40°C
Entries	1 x M25
Supply voltage	Max. 277Vac
Ex-proof type	Ex e II C Gb

## Weight

PYEX-AE-P	PYEX-AE-T	PYEX-AE-E	PYEX-AE-TC
0.89kg	0.9kg	0.98kg	0.92kg

## HACC Aluminum Connection Enclosure

HACC, the reinforced aluminum connection circular enclosure is installed directly on the pipe and used for power connection, distribution, end termination, temperature sensor.



### ■ Features

- Designed and manufactured for Ex e and IP66
- Excellent Weather-proof and mechanical strength than others
- Fixing screws and flame-proof gaskets against water and dust ingress
- Compatibility with various power cables and heating cables up to 15mm in diameter.

### ■ Selection Code

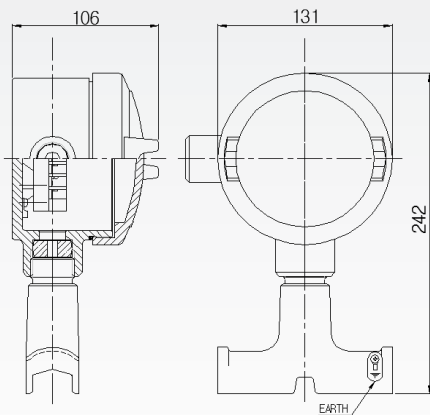
- HACC - XXK - P
  - PK ▶ Power connection
  - TK ▶ Distribution
  - TSK ▶ Temp. sensor

### ■ Approvals

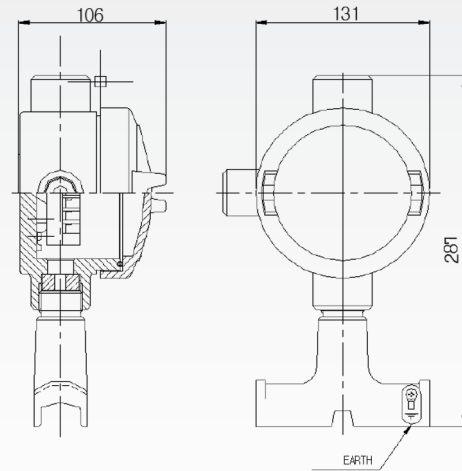
HACC-PK-P		KCs 12-AV2BO-0448
HACC-TK-P		KCs 13-AV2BO-0053
HACC-TSK-P		KCs 12-AV2BO-0449X

## Product Drawing

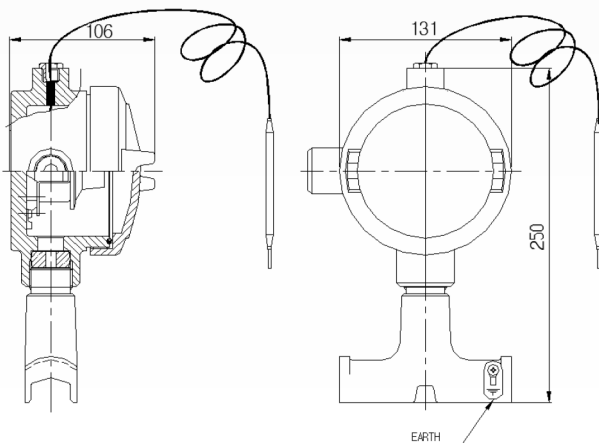
HACC-PK-P



HACC-TK-P



HACC-TSK-P



Enclosure

## Specifications

Heating cable capability	FBL, FBH
IP Grade	IP65
Ambient temperature range	-20°C ~ 50°C
Entries	Max. 2 x PF 1"
Supply voltage	Max. 277Vac
Ex-proof type	Ex d II C T6

## Weight

HACC-PK-P	HACC-TK-P	HACC-TSK-P
1.95kg	2.05kg	2.15kg

## PYEX-EP-SPK Engineering Plastic Mini Enclosure

PYEX-EP-SPK is the engineering plastic enclosure for power connection and/or splice connection of heating cable. It is small and water-tight (IP65), so to be installed under insulation.



### ■ Features

- Engineering plastic enclosure for power connection and/or splice connection of heating cable
- IECEx certified IP65
- Excellent mechanical strength and weather-proof
- Compatibility with power cable and heating cable up to 15mm in diameter
- Suitability for narrow installation space and low profile connection
- The clamping nut used as cable gland having 1"PF thread

### ■ Selection Code

- PYEX - EP - SPK - X



X : Use

P ▶ Heating cable +Power connection

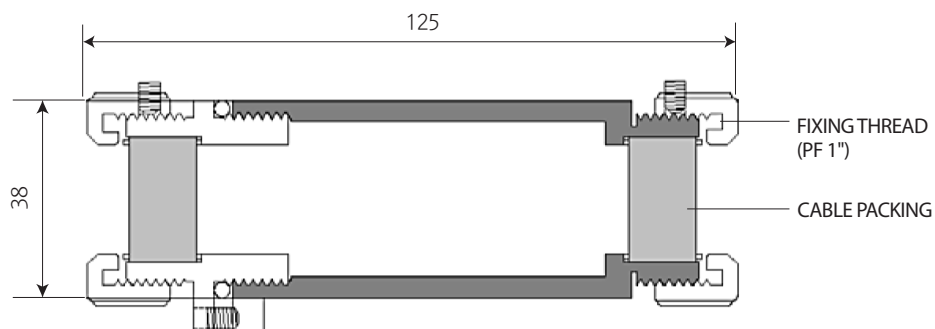
S ▶ Heating cable splicing

E ▶ End termination

### ■ Approvals

	IECEx BAS 15.0110X
	Baseefa15ATEX0161X

### ■ Product Drawing



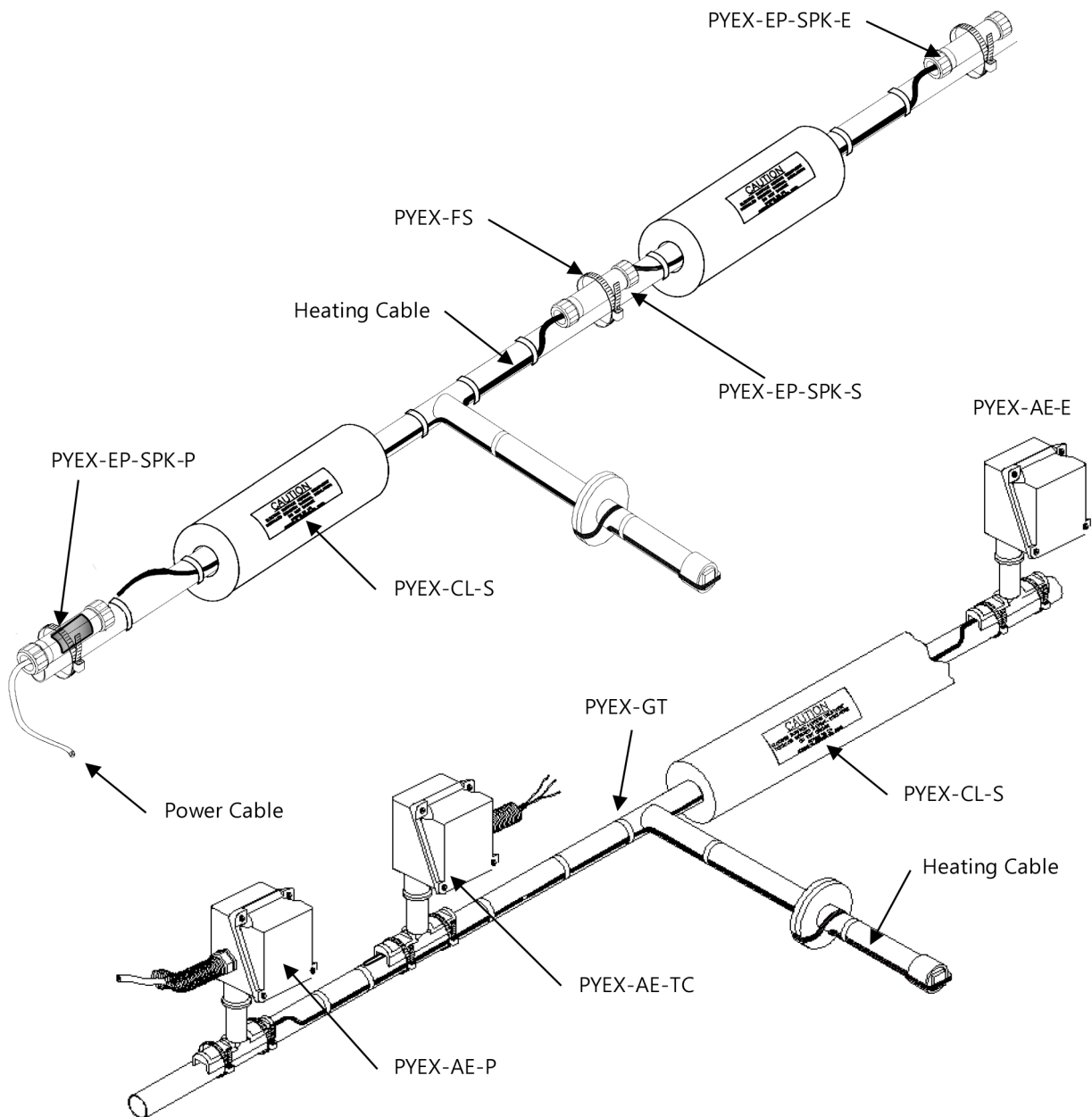


## ■ Specifications

Heating cable capability	FBL
IP Grade	IP65
Ambient temperature range	-40°C ~ 85°C
Entries	2 x PF 1"
Supply voltage	Max. 277Vac
Weight	0.13kg
Ex-proof type	Ex eb II CT6 Gb

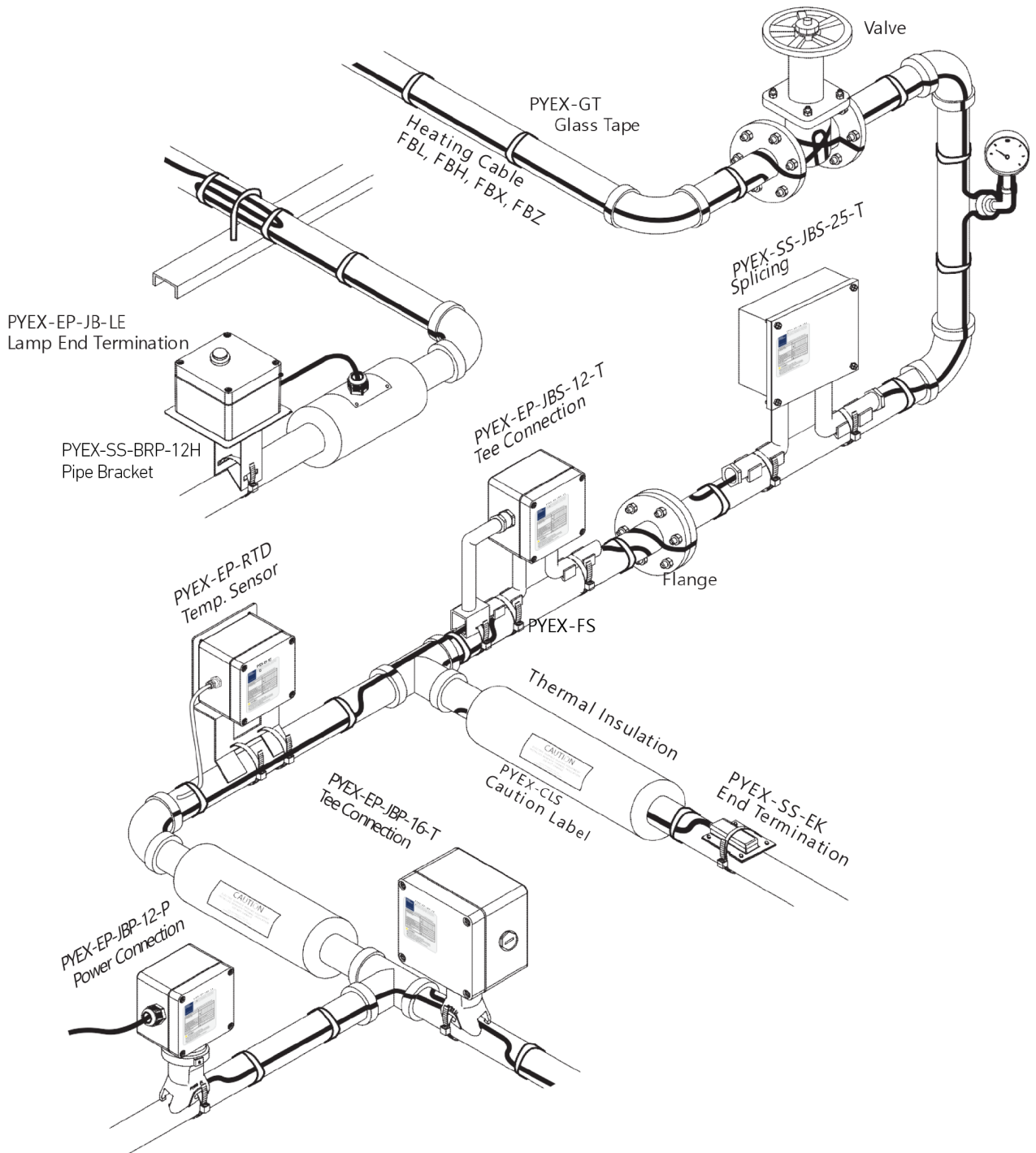
Enclosure

## TYPICAL INSTALLATION



SOLCO PYRO ELEC's self-regulating cables are to be installed with genuine components being supplied by SOLCO PYROELEC's representatives to guarantee optimum performance as well as to validate extended warranty scheme. To benefit from SOLCO PYRO ELEC's product warranty, the customer must complete and retain the installation, inspection or commissioning record(s) provided with installation manual. Also the customer complete warranty registration form and send it to SOLCO PYRO ELEC within thirty(30) days from the installation. Otherwise only standard terms and conditions apply.

## TYPICAL INSTALLATION



## PYEX-EP-TSK Ex-proof Thermostat

PYEX-EP-TSK, Engineering (Glass Fiber Reinforced) Plastic box temperature sensing and control device is able to control temperatures from 0 to 500 °C for explosion-proof areas.



### ■ Features

- Auto controlled temperature limit switches
- Temperature sensing depending on thermal expansion of a liquid or gas
- Electric switching unit of the device made into form of a micro switch inside a plastic enclosure
- Meet RoHS requirements and no cadmium
- Work at extremely low temperatures

### ■ Selection Code


- PYEX - EP - TSK - X

X : Type  
 S ▶ Single  
 D ▶ Double

### ■ Application

Area Classification	Zone 1, Zone 2 (Gas) Zone 21, Zone 22 (Dust)
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### ■ Approvals

	IECEX EPS 13.0046
	EPS 11 ATEX 1354

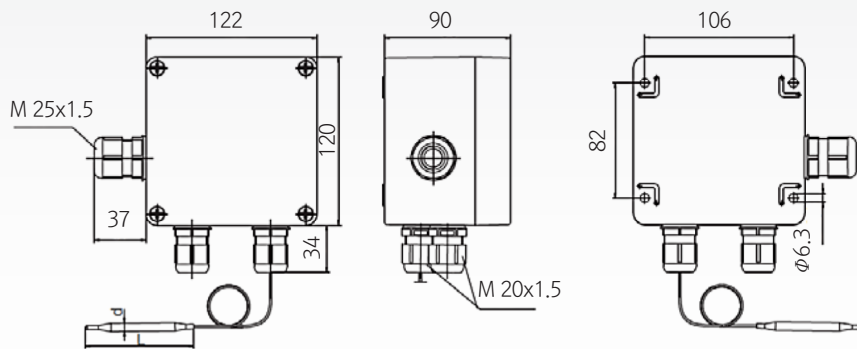
## Specifications

Control range	0°C ~ 500°C
IP Grade	IP66
Ambient temperature	-55°C ~ 70°C
Conductors cross-section	2.5 mm <sup>2</sup>
Supply voltage	230Vac / Max. 25A
Entries	2 x metal M20 x PF1.5 " 1 x metal M25 x PF1.5 "
Weight	1.7Kg
Differential gap	2.5%
Ex-proof type	Ex d e II C Gb

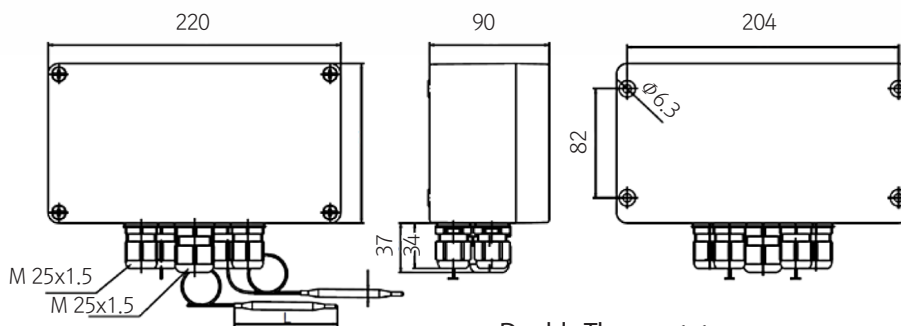
## Temp. Sensor

Capillary length	1M (Max. 5M)
Sensing element diameter	4mm ~ 6mm
Capillary material	Stainless Steel

## Product Drawing

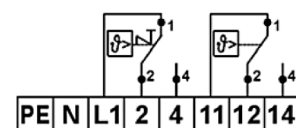
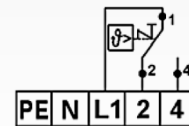


Single Thermostat



Double Thermostat

## Product wiring



## PYEX-BT Ex-proof Bimetal Thermostat

PYEX-BT, a stainless steel temperature control device for explosion proof area is capable of operating temperature of 60 °C ~ 100 °C Based on initial settings .



### ■ Features

- Used with power relay to cut off main supply
- Made into form of a microswitch and installed inside enclosure or mounted on the surface heating devices
- Work at extremely low temperature up to -40°C

### ■ Selection Code

- PYEX - BT - X - Y

X : Housing type

B1418 ▶ Rectangular

1/2 ▶ PF 1/2" thread

3/8 ▶ PF 3/8" thread




Y : Operating temperature

60°C to 100°C with interval of 5°C

### ■ Application

Area Classification	Zone 1, Zone 2
Supply Voltage	24Vdc/50mA, 250Vac/30mA

### ■ Approvals

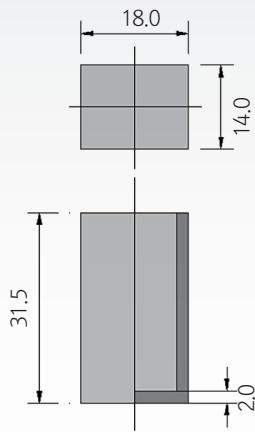
	IECEx BAS14.0140X
	Baseefa 14ATEX0298X
	KCs 15-AV2BO-0191X

## Specifications

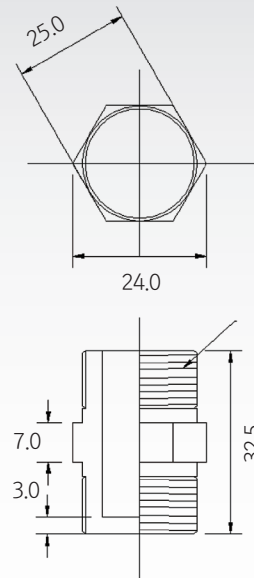
Control range	60°C~100°C, 5°C Interval
IP Grade	IP67
Ambient temperature	-40°C ~ 100°C
Supply voltage	250Vac / Max. 30mA 24Vdc / Max. 50mA
Conductors cross-section	32 AWG
Differential gap	±5°C

## Product Drawing

PYEX - BT - B1418



PYEX - BT - 1/2



## Ex-RTD Ex-proof RTD Thermostat

Ex RTD is three-wire or four wire, ambient sensing platinum RTD(Resistance Temperature Diode) typically used with electronic control systems that require accurate ambient temperature sensing that comes with M16 or M20 threaded fitting to be installed with Ex certified enclosures and appropriate conduit.



### ■ Features

- 3 wire or 4 wire construction
- RTD(Resistance Temperature Diode) typically used with electronic control systems for accurate ambient temperature sensing.
- M16 or M20 threaded fitting supplied to be installed with Ex certified enclosures

### ■ Application

Area Classification	Zone 1, Zone 2
---------------------	----------------

### ■ Approvals

	Sira 16ATEX3155X
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## Specifications

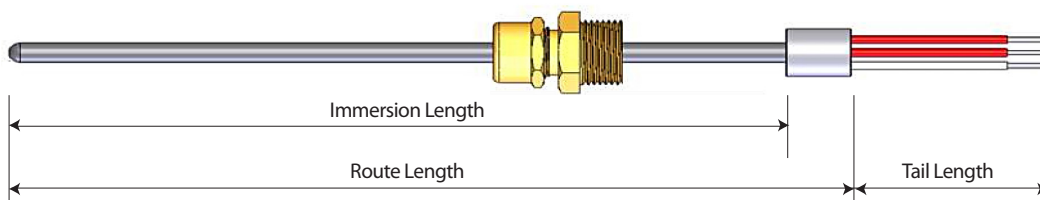
Tip operating temp.	-200°C ~ 800°C
IP Grade	IP66
Ambient temperature	-30°C ~ 100°C
Probe diameter	Max. 6.4mm
Min. bend radius	Cable O.D x 10
Seath material	321, 316L, 316Ti

## Selection Code

1) Category	2) Number of conductors	3) Conductors material	4) Sheath material	5) Cable Diameter	6) RTD Class Tolerances (probes only)	7) Additional features
P	2	D	- 316	- 60	A	
R	4	C	- 316L	- 64		- C5

1) Category	P : Premium grade probe T : Commercial grade probe R : Transducer cable	4) Sheath material	321 : AISI 321 Stainless Steel 316L : AISI 316L Stainless Steel 316Ti : AISI 316Ti Stainless Steel
2) Number of conductors	2 : Two conductors (Simplex) 4 : Four conductors (Duplex) 6 : Six conductors (Triplex)	5) Cable Diameter	2 or 3digits metric range in 1/10mm
3) Conductors material	C : Copper D : Nickel A : Nichrome W : AISI 310	6) RTD Class Tolerances (probes only)	A : Class A to EN 60751 B : Class B to EN 60751
		7) Additional features	C1 : 3 conductors wide spaced C5 : 4 conductors wide spaced

## Probe Design Type



## FBJH-SR Ex-Silicon Heating Jacket

FBJH-SR, a heating jacket made of glass fiber and reinforced silicone pads is used for explosion proof and cylindrical type heating and keeping temperature in the general area, and for preventing freezing of chemical tank.



### ■ Features

- Explosion proof heating jacket for various containers
- Wire type or etched foil type heating element for long service life
- Flat heating element for highly efficient thermal performance
- Glassfiber reinforced silicone rubber substrate for high thermal endurance
- Flexible and excellent mechanical strength Easy installation and fast response
- Resistance to heat, oil and chemicals

### ■ Selection Code

- FBJH - SR / X -YYYYZ

X : Type Y ▶ Y Cylinder  
T ▶ Ton Cylinder




YYYY : Output 4000 ▶ 4kW  
6000 ▶ 6kW  
8000 ▶ 8kW

Z : Heating element  
Blank ▶ Alloy resistance wire  
F ▶ Foil heater

### ■ Application

Area classification	Zone 1, Zone 2
Supply voltage	220 Vac, 50/60Hz

### ■ Approvals

	Baseefa 13ATEX0179X-5
	KCs 14-AV2BO-0365, 0165X, 0167X
	NEPSI GYJ13.1455X

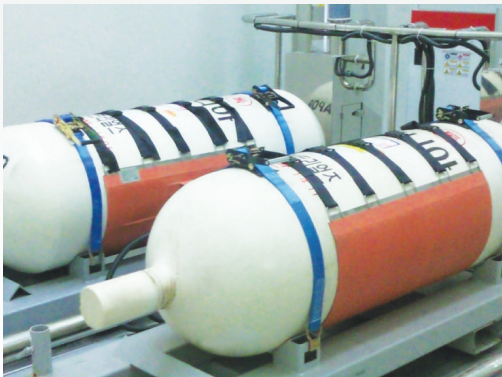
## Specifications

Max. maintain or continous temp.	40°C (Power On)
Max. continous exposure temp.	150°C (Power Off)
T-Rating	T4 (135°C )
Bus conductor wire	ASTM B355 Class 2 NPC 16 AWG
Min. bend radius	310mm
Min. installation temperature	-20°C

## Product Dimensions (Nominal) and weight

Model	FBJH-SR/Y-4000	FBJH-SR/Y-6000	FBJH-SR/T-8000
Size / Weight			
Thickness (mm)	7	7	7
Size(mm)	800 x 1270	800 x 1270	1400 x 1900
Weight (g/m)	10.5	10.5	20.7

## Application



- In semi-conductor industry, the variety of aggressive gases are required for many different purposes. The heat-up temperature maintenance of the gas supply system including gas cylinder and feeding tube requires an outstanding and durable thermal performance and accuracy. Solco Pyroelec FBJH Heating jacket and relevant componets show outstanding thermal performance and mechanical strength up to 150°C together with energy edfficiency while not compromising the safety.

## FBJH-GR Ex-Glass fiber Heating Jacket

FBJH, heat jacket made of glass-reinforced fiber with aluminum coating is used for heating and maintaining temperature in explosion-proof and general area, and for preventing freezing of chemical tank and ship & marine structure, etc.



### ■ Features

- Explosion proof heating jacket designed for various containers
- Easy installation and fast response
- Flexible and excellent mechanical strength
- Resistance to heat, oil and chemicals
- Long service life

### ■ Selection Code

- FBJH - GR / X -YYY




X : Container type 10, 47, 54

YYYY : Output 70 ▶ 70W  
200 ▶ 200W  
300 ▶ 300W

### ■ Application

Area classification	Zone 1, Zone 2
Supply voltage	220 Vac, 50/60Hz

### ■ Approvals

	Baseefa 14.0032X
	Baseefa 14ATEX0066X , Baseefa 14ATEX0066X/1
	KCs 14-AV2BO-0573X, 14-AV2BO-0574X, 14-AV2BO-0575X

## Specifications

Max. maintain or continuous temp.	40°C (Power On)
Max. continuous exposure temp.	150°C (Power Off)
T-Rating	T4 (135°C )
Bus conductor wire	ASTM B355 Class 2 NPC 16 AWG
Min. bend radius	310mm
Min. installation temperature	-20°C

## Product Dimensions (Nominal) and weight

Size / Weight \ Model	FBJH-GR/10-70	FBJH-GR/47-200	FBJH-GR/54-300
Thickness (mm)	8.8	8.8	8.8
Size(mm)	550 x 300	880 x 500	952 x 450
Weight (g/m)	1.7	2.96	2.9


## Application





- In semi-conductor industry, the variety of aggressive gases are required for many different purposes. The heat-up temperature maintenance of the gas supply system including gas cylinder and feeding tube requires an outstanding and durable thermal performance and accuracy. Solco Pyroelec FBJH Heating jacket and relevant components show
- outstanding thermal performance and mechanical strength up to 150°C together with energy efficiency while not compromising the safety


## ACCESSORIES Accessories for Heat tracing System


Accessory part for heat tracing system installation, Individual purchases and supply as needed.

<p><b>PYEX-EP-PG25</b></p>	<p><b>(Gland)</b></p>
	<p>The M25 plastic cable gland is made of fiberglass reinforced nylon for thermal endurance and mechanical strength. The silicone rubber seal should be selected with care to maintain optimum sealing with the heating cable to use with. An additional locknut is provided for unthreaded enclosure entry.</p>

<p><b>PYEX-SG</b></p>	<p><b>(Silicon Protection)</b></p>
	<p>The protective cover made of silicone rubber protects against physical damage from sharp edges, pipe flanges, and insulation cladding. Minimum outside temperature: -50 °C Maximum Exposure temperature: 215 °C</p>

<p><b>PYEX-GT</b></p>	<p><b>(Glass Tape)</b></p>
	<p>The attachment tape is used to fix the heating cable or temperature sensor. The glass tape is made of fiberglass for thermal endurance and mechanical strength. - Max. exposure temp. 130°C, Size 12mm x 30M</p>

<p><b>PYEX-AT</b></p>	<p><b>(Aluminum Tape)</b></p>
	<p>The attachment tape is used to fix the heating cable or temperature sensor. The high performance tape is made of aluminum for thermal conductivity and mechanical strength. - Max. Exposure Temp. 125°C, Size 50mm x 50m Roll</p>

<p><b>PYEX-CL-S/P</b></p>	<p><b>(Warning Label)</b></p>
	<p>S : PET sheet type warning label P : SUS316L Plate type warning label used for outdoor use.</p>

**PYEX-FS**

**(Pipe Strap)**



The fixing straps are used to fix the heat trace equipment like enclosure. The fixing strap installed on pipe does not require Hot-work for installing equipment.

PYEX-FS-045	0.5"-1.5"	10-45mm
PYEX-FS-100	2"-4"	42-100mm
PYEX-FS-225	4"-9"	92-225mm
PYEX-FS-380	9"-15"	220-380mm
PYEX-FS-540	15"-20"	375-540mm

**PYEX-PTK-M**

**(Connection Kit-Adhesive )**



This kit is certified for ATEX and IECEx for use in hazardous areas. The silicone molded power tube within PYEX-PTK-M kit does not require a heat gun or torch for insulating heating core.

- Min. ambient temperature : -50°C
- Max. exposure temp. : 150°C
- Ingress protection : IP67

**PYEX-PTK-S**

**(Connection Kit- Heat Shrink )**



The PTK-S is for terminating all Solco Pyroelec FBL, FBH, FBX and FBZ parallel heating cables to an Ex certified junction box, whilst maintaining electrical insulation of the heating cable conductors and core.

- Min. ambient temperature : -50°C
- Max. exposure temp. : 120°C
- Ingress protection : IP66

**PYEX-ETK-M**

**(Terminal Kit-Adhesive )**



This connection kit is designed for end terminating all Solco Pyroelec heat tracing cables HSR, VSR, FBL, FBH, FBX and FBCW parallel constant heating cable. while maintaining electrical insulation of the heating cable conductors and core.

- Min. ambient temperature : -50°C
- Max. exposure temp. : 150°C
- Ingress protection : IP67

**PYEX-ETK-S**

**(Terminal Kit- Heat Shrink)**



The ETK-S is for end terminating all Solco Pyroelec FBL, FBH, FBX and FBZ parallel heating cables to an Ex certified junction box, whilst maintaining electrical insulation of the heating cable conductors and core.

- Min. ambient temperature : -50°C
- Max. exposure temp. : 120°C
- Ingress protection : IP66

**PYEX-SS-EK**

**(Terminal Kit- Fixing)**



It is certified for ATEX and IECEx for use in hazardous areas. It provides both excellent electrical insulation and ultimate mechanical protection as it is the ideal combination between molded silicone rubber end seal and stainless steel cover.

- Min. ambient temperature : -50°C
- Max. exposure temp. : 240°C
- Length : 57mm
- Model material : SUS304

## I-TRACE Control and Monitoring System

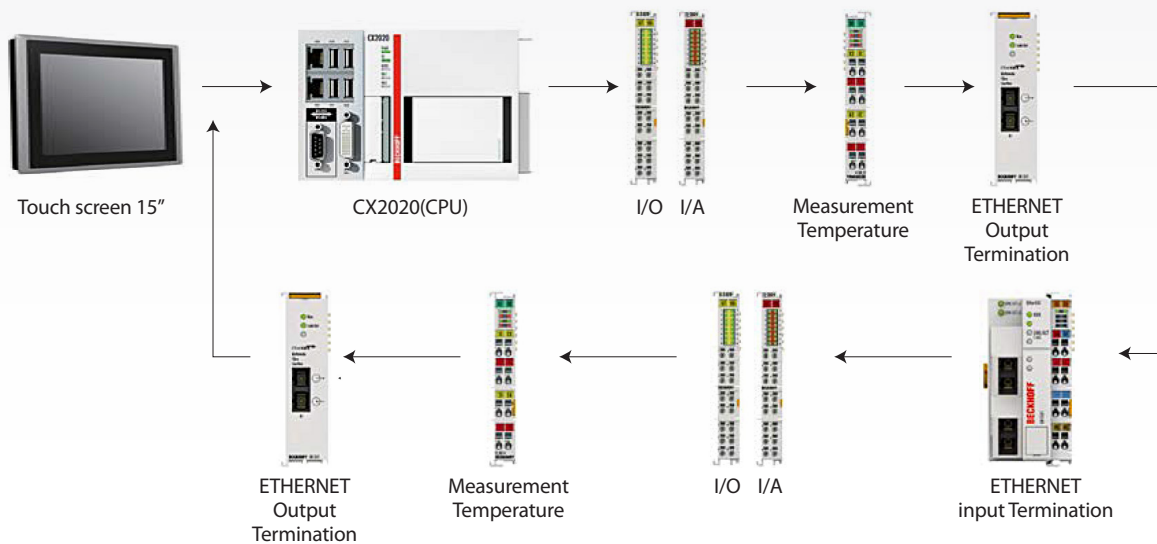
i-Trace is an automated control and monitoring system for electrical trace heating system. It has many components being connected each other by optic fiber communication network. i-Trace offers a graphical and interactive interface on 15" LCD touch screen, which provides all relevant information such as temperature, alarm, operating status of individual circuit line. i-Trace complies with all relevant IEC and IEEE standards.



### Features

- Multi-electronic circuit configuration monitoring system.
- Management in real time data based on initial setting temperature and current of each line.
- Simple line configuration, simple setup
- Consists of several cabinets independently, without complex cable connections between units Configuration and modules.
- Remote monitoring through internet connection.

### Schematic Diagram



### Application

Supply voltage	3-Phase 380V 1-Phase 230V
----------------	------------------------------



### Touch screen



LCD Size 15" (4:3)  
 Max. Resolution 1024 x 768  
 Brightness (cd/m<sup>2</sup>) 350  
 Contrast Ratio 800:01:00  
 LCD Color 16.2M

### POWER SUPPLY



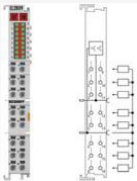
Power supply 24 V DC ( - 15 % / +20 %)  
 Max. output 45 W  
 Current supply I/O terminals 2 A  
 Diagnostics LED 1 x PWR, 1 x I/O Run, 1 x I/O Err  
 Max. power consumption 3,5 W

### CPU



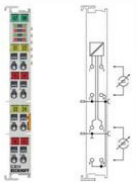
Processor Intel Celeron 827E 1.4 GHz, 1 core Flash memory 4 or 8 GB CFast  
 flash card Internal main memory 2 GB DDR3 RAM Persistent memory 128  
 KB NOVRAM integrated

### Output Card



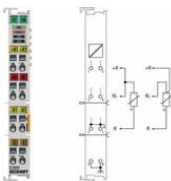
Connection technology 1 – wire  
 Load type ohmic, inductive, lamp load  
 Max. output current 0,5 A (short – circuit – proof)  
 Number of outputs 16  
 Nominal voltage 24 V DC ( - 15 % / +20 %)

### Input Card



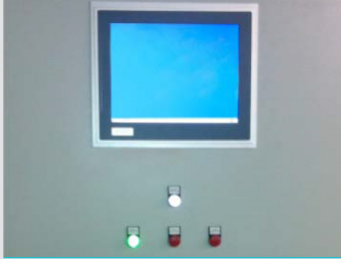
Connection technology 1 – wire  
 Load type ohmic, inductive, lamp load  
 Max. output current 0,5 A (short – circuit – proof)  
 Number of outputs 16  
 Nominal voltage 24 V DC ( - 15 % / +20 %)

### Temp. Input Card



Power supply via the E – bus  
 method 2 – or 3 – wire (default: 3 – wire) Number of inputs 2  
 Nominal voltage 24 V DC ( - 15 % / +20%)

15" Main Touch Screen



The main screen, 15 "(4:3) LCD in the upper center of the front display the normal operation of the heating line temperature and power consumption setting reference value for each zone through the touch screen.

**i-Trace Interface**



Initial Main Screen

Touch Screen for Start-up

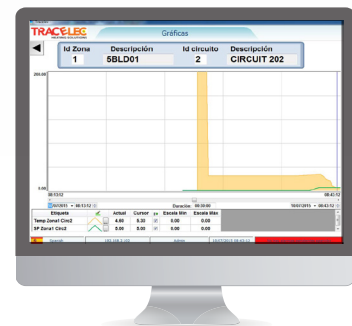
- TEMPERATURE : Display of the main parameters for every circuit.  
-zone, circuit, Min & Max Temp., etc.
- TIERS DISPLAY : Display of the main parameters up to 5-lines  
-zone, circuit, hysteresis, Min & Max Temp., etc.
- TEMP GRAPHICS : Display of the temperatures chart of the configured signals in real-time  
-zone, circuit, etc.
- CONFIGURATION : Set up the parameters for each line  
-zones, circuits, parameters, etc.
- ALARMS : Unsuitability for the setting parameters of each line



Temperatures graphics



Configuration



Graphics

# CERTIFICATES Certificate for Heat tracing system



**1 TYPE EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/EC

3 Certificate Number: **Sira 12ATEK4255X** Issue: **0**

4 Equipment: **HSR and VSR Self-Regulating Heating Cable Systems**

5 Applicant: **Solco Pyroelec Co. Ltd**

6 Address: **20-7 Yanggi-ro  
Gyeonggi-do  
Anseong-si  
Gyeonggi-do  
Korea**

7 This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service certifies that this equipment has been found to comply with the Essential Health and Safety Requirements that relate to the design of Category 2 equipment, which is intended for use in potentially explosive atmospheres. These Essential Health and Safety Requirements are given in Annex B to European Union Directive 94/EC of 23 March 1994.

9 The examination and test results are recorded in the confidential reports listed in Section 14.2.

10 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule of this certificate, has been assessed by reference to:

EN 60079-0:2009    EN 60079-15:2005    EN 60079-20-1:2007

11 If the sign "T" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

12 The TYPE EXAMINATION CERTIFICATE relates only to the design of the specified equipment, and not to specific items of equipment subsequently manufactured.

The marking of the equipment shall include the following:

**II 2G**  
Ex II 2G T4 GC 1966 (" refer to the Description for T class)  
For ambient range refer to operating temperatures in the Description and Special Conditions for Safe Use.

Project Number: **27690**

The certificate and its schedule may only be reproduced in its entirety and without charge.

D S Subbinga BA HET  
Certification Manager

**Sira Certification Service**  
Mike Law, Editor-in-Chief, Director, UK & Europe  
Tel: +44 (0) 1246 810000  
Fax: +44 (0) 1246 811200  
Email: [info@sira-certification.com](mailto:info@sira-certification.com)  
Web: [www.sira-certification.com](http://www.sira-certification.com)

Page 1 of 3

Form 6402 Issue 3

**EU RO MUTUAL RECOGNITION TYPE APPROVAL CERTIFICATE**

Certificate No: **19E22000004**  
File No: **19E-0511**  
Job No: **2024-0-00021-3**

This Certificate is issued to:  
**SOLCO PYROELEC CO., LTD.**  
Anseong-si Gyeonggi-do, Republic of Korea

for  
**Electric Cables - Heating Cables**  
with type designation(s)  
**F2E self-regulating heating cable**

The product is found to comply with  
**EU RO Mutual Recognition Technical Requirements for Electric Cables - Heating Cables**

Intended service  
**IECEx type self-regulating heating cable systems, Anti-icing system and De-icing system on-board ships and offshore vessels.**

Voltage (V)    200-277 VAC  
Temp. class    T3 (200°C 15, 30, 45W/m) T3 (300°C 60W)  
Power (W/m) @ref. Temp.    15, 30, 45, 60 @30°C  
Ex area    Yes

This Certificate is valid until **2021-09-20**.

Issued at **Hanku** on **2016-09-21**

DNV GL local station: **Seoul**

Approval Engineer: **Evar Bull**

Trend Sjøvåg  
Head of Section

This Certificate is subject to terms and conditions attached. Any approved change in design or construction may render this Certificate invalid. The validity date remains in the Type Approval Certificate and not in the approval of equipment/systems installed.

Form code: 19EEX 360a    Revision: 2024-11    www.dnv.com    Page 1 of 3  
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Issued at **Hanku** on **2016-09-21**

DNV GL local station: **Seoul**

Approval Engineer: **Evar Bull**

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Form code: 19EEX 360a    Revision: 2024-11    www.dnv.com    Page 1 of 3  
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FM Approvals  
1101 Union Providence Temple  
P.O. Box 9102, Norwood, MA 02062 USA  
Tel: 781 754-4888 | F: 781 754-3770 | [www.fmaprovals.com](http://www.fmaprovals.com)

**CERTIFICATE OF COMPLIANCE**

**HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT**

This certificate is issued for the following equipment:

**HSRab-Co, Self-Regulating Electrical Heating Cable System.**  
SIRABCO15C (P50)

a = Power output 15, 24 or 30.  
b = Service voltage 1 or 2.  
c = Outer jacket F or P.

Special Conditions of Use:  
1. HSR Series cables have a maximum operating temperature (power on) of +55°C with a maximum exposure temperature (power off) of +85°C.  
2. HSR Series cables have a maximum installation temperature of -20°C.  
3. HSR Series cables are designed for use with the manufacturer's PTK-S, ETK-S and AL-PUB-P connection kits.  
4. The optional AL-PUB-TC kit provides the ability to monitor pipe temperatures from a remote location/control panel.

**VSRab-Co, Self-Regulating Electrical Heating Cable System.**  
SIRABCO15C (P50)

a = Power output 24, 30, 40 or 50.  
b = Service voltage 1 or 2.  
c = Outer jacket F, T or X.

Special Conditions of Use:  
1. VSR Series cables have a maximum operating temperature (power on) of +110°C with a maximum exposure temperature (power off) of +135°C.  
2. VSR Series cables have a minimum installation temperature of -20°C.  
3. VSR Series cables are designed for use with the manufacturer's PTK-S, ETK-S and AL-PUB-P connection kits.  
4. The optional AL-PUB-TC kit provides the ability to monitor pipe temperatures from a remote location/control panel.

FM Approvals IEC 607    3023888  
Page 1 of 3

**IECEx Certificate of Conformity**

**INTERNATIONAL ELECTROTECHNICAL COMMISSION**  
IEC Certification Scheme for Explosive Atmospheres

Certificate No.: **IECEx FMD 14.001X** Issue No. 1: **Certificate history**  
Status: **Current** Page 1 of 4    Issue No. 1: 2016(04-04)  
Date of Issue: **2016-07-20** Issue No. 2: 2014-04-20

Applicant: **Solco Pyroelec Company**  
1918 Seokgong-dong  
Yangju-si, Gyeonggi-do  
Anseong-si  
Gyeonggi-do  
Korea, Republic of

Equipment: **F2E, P2E and F2E Cores Heating Cable Systems**  
Critical accessory: **PTK-S Series Connection Kits**

Type of Protection: **Increased safety, e**

Marking: **Ex e IIC 1, Ga T4 + 20°C 60°C to +85°C IP7**  
Please see cable and connection kit marking for specific T-code and ingress rating information.

Approved for issue on behalf of the IECEx Certification Body: **J.E. Mansour**

Position: **Manager, Electrical Systems**

Signature: \_\_\_\_\_  
(or printed name)

Date: \_\_\_\_\_

1. This certificate and schedule may only be reproduced in full.  
2. This certificate is not transferable and remains the property of the issuing body.  
3. The status and authority of this certificate may be verified by visiting the IECEx website.

Certification issued by:  
**FM Approvals LLC**  
1101 Union Providence Temple  
Norwood, MA 02062  
United States of America

**Type Approval Certificate**

This is to certify that the submitted products have been tested with satisfactory results in accordance with the relevant requirements of the LR Type Approval System.

This certificate is issued to:

**PRODUCER:** Solco Pyroelec Co. Ltd

**PLACE OF PRODUCTION:** 20-7 Yanggi-ro, Gyeonggi-do, Anseong-si, Gyeonggi-do, 428-821 Korea

**DESCRIPTION:** Self-Regulating Heating Cables

**TYPE:** VSR : For Medium and High-Temperature Maintenance

**VSR as y-Cg**  
Where:  
S0 = Rated output  
24, 30, 40, 50 watt/m @90°C  
Y = Rated Voltage  
1 100-150 Vdc  
2 200-277 Vdc  
g = Outer jacket  
X XLEVA  
F PTFE  
T FEP

**Comprising:**  
Braze Wire : Nickel Coated Copper Wire (ASTM B205 Class 2 NiPC 16AWG)  
Polymeric : PTFE-C-F  
Heating Element : XLEVA  
Primary Insulation : XLEVA  
Earthing : Tinned Copper Wire Braid  
Outer Jacket : XLEVA w/ Thermoplastic

Certificate No. **13/10027**

Issue Date **09 April 2013**

Expiry Date **08 April 2018**

Sheet **1 of 3**

Yokohama Design Support Office  
Lloyd's Register Group Limited

Lloyd's Register Group Limited, registered office:  
71 Fenchurch Street, London EC3M 8BS

Lloyd's Register Group Limited, a wholly owned subsidiary of the parent company, is a limited liability company, registered in the United Kingdom. Lloyd's Register Group Limited is a company limited by guarantee and all shareholders are liable for the debts and liabilities of the company in the event of its liquidation. Lloyd's Register Group Limited is a company limited by guarantee and all shareholders are liable for the debts and liabilities of the company in the event of its liquidation. Lloyd's Register Group Limited is a company limited by guarantee and all shareholders are liable for the debts and liabilities of the company in the event of its liquidation.

Certificates & Patents



# PERFORMANCE / APPLICATION

**NEWSLETTER SEPTEMBER 2014**

**(주)솔코파이로일렉 유럽 시장 진출**  
- 영국 Bolton(Bolton)에 솔코파이로일렉 UK지사 설립을 완료하고 본격적인 유럽 시장 진출을 선언하였습니다.

(주)솔코파이로일렉은 2014년 8월 영국 Bolton에 솔코 파이로일렉 UK지사 설립을 완료하고 본격적인 유럽 시장 진출을 선언하였습니다.

솔코파이로일렉 UK지사는 영국 및 유럽지역을 무대로, 한국 본사의 핵심기술을 시공, 설계, 유지보수, 그리고 산업용 자켓(타이퍼 등)을 전문적으로, 영업 활동을 할 계획이며, 자회사 운영을 본사에서 첫 수주를 계획하고 있습니다.

솔코파이로일렉 UK지사는 영국 및 유럽지역을 무대로, 한국 본사의 핵심기술을 시공, 설계, 유지보수, 그리고 산업용 자켓(타이퍼 등)을 전문적으로, 영업 활동을 할 계획이며, 자회사 운영을 본사에서 첫 수주를 계획하고 있습니다.

**SOLCO PYROELEC UK, LTD**  
Unit 1, Queensdock, Bolton Technology Exchange, Spa Road, Bolton BL1 4AY, United Kingdom  
Mr. Asif Mohamed Siddiq / CEO +44 (0)7702 580035

**FBJH-GR 모델 2종 ATEX/IECEx 방폭인증획득**  
(주)솔코파이로일렉은 2014년 8월, 소형 가스실린더용 자켓(타이퍼) FBJH-GR(중형 대용 ATEX/IECEx 용 국제인증획득)을 획득하였습니다. FBJH-GR은 유리분위기 보강된 알루미늄을 사용하여 150°C까지 견딜 수 있으며, 내내화용이 우수하고, 폭발 안전 설계, 용접이 내장된 구조를 특징입니다.

- 모델명 FBJH-GR 10-70 (10리터 가스실린더용) 유류가압연직 550 x 300mm, 소비전력 70W
- 모델명 FBJH-GR 47-200 (47리터 가스실린더용) 유류가압연직 710 x 500mm, 소비전력 200W
- 모델명 FBJH-GR 54-300 (54리터 가스실린더용) 유류가압연직 785 x 450mm, 소비전력 300W

본 인증 획득을 통한 본사는 영국, 프랑스, 이탈리아, 스페인, 포르투갈, 그리스 등 유럽지역에 진출할 수 있게 되었습니다.

**주) 솔코파이로일렉**  
SOLCO PYROELEC CO., LTD

**NEWSLETTER DECEMBER 2015**

**영국 지사 ISO9001 인증 획득**  
- 영국 BSI(BSI)에서 ISO9001:2008 품질경영시스템 인증서 획득

영국 본사부 Bolton(Bolton)에 위치한 솔코파이로일렉 영국 지사(대표 Asif Mohamed Siddiq) 영업 부문의 ISO9001:2008 품질경영시스템 인증을 획득하였습니다.

영국 및 유럽 시장을 무대로, 영국 본사 및 수출장기시스템 운영을 활발히 전개하고 있는 영국지사는 지난 2014년 9월에 품질경영시스템 인증을 획득한 이후, 이번 인증 획득을 통해, 고객들에게 믿음을 주고 있습니다.

**방폭형 SUS 정선박스 개발**  
- 안전을 강화구조, 고온(내화) 및 핵안전용 시장 진출

(주)솔코파이로일렉은 2015년 11월, 스테인레스스틸 재질의 방폭형 정선박스를 개발 완료하고 출시하였습니다. 개발된 PYREX-SS-Box는 극저온의 유전 및 원유, 화학물질과 같은 고압 및 고온에서, 핵발전소 및 석유화학 시설에서 사용하도록 설계, 개발되었습니다. 제품의 주요특징은 아래와 같습니다.

- IP68 또는 이상의 방폭급
- 내산성 스테인레스스틸 AISI 316L
- 확실히 안전 및 내화성능을 유지 보수 비용 절감
- 적은 내부 공간 활용을 위한 특수 구조인 설계
- 최대 사용 온도 750°C
- 솔코파이로일렉의 핵발전소용 방폭형 ACS(가압수발전기) 및 ACS(가압수발전기)를 갖춘 4개용 핵발전소입니다.

**미연방정부 업체등록 (SAM) 완료**

솔코파이로일렉은 지난 6월, 중소기업수용지원센터를 통해, 미연방정부 통합 조달 계약 관리 시스템(SAM)에 업체 등록을 완료 하였고, 조달 지침에 의해 해당 미연방정부 용역이 이루어져 더 영연 방출된다 등 최대 최종 완료되었습니다.

- SAMSystem for Award Management
- DUNS Number : 699517229
- NCAGE Code : 802CF

**bsi. Certificate of Registration**  
QUALITY MANAGEMENT SYSTEMS - ISO 9001:2008

**주) 솔코파이로일렉**  
SOLCO PYROELEC CO., LTD

**NEWSLETTER NOVEMBER 2015**

**누출감지케이블 산업현장에 시공 활발**  
- 방화(Leakban), CO2(카탄), CO(코이퍼)가 적용된 현장

(주)솔코파이로일렉의 누출감지케이블 시스템에 대한 관심이 높아지고 있는 가운데, 이를 도입한 산업현장의 증가가 계속되고 있습니다. 장성전지(주), LG화학(주)이후, 롯데제과(주) (주) 롯데제과(주)의 누출감지케이블(LEAKBAN)은 삼성중공업(주) 제1차 계약, 두개 7487톤, 경제협력개발기구 12.5%의 연구진 조달 한국 해양연구용 극지연구소에서 운영되고 있습니다.

솔코파이로일렉은 조선 및 해양환경 시장 진출을 위해, 2015년 4월 솔코파이로일렉(영문명)을 설립하였습니다. 이번 시공은 첫 사례에 해당하고 있습니다.

**국내최초 섀핑연구소인 아라온호**  
- 선박 섀핑(형상)에 솔코파이로일렉의 히팅케이블을 설치

(주)솔코파이로일렉은 지난 10월 중, 국내 1호 섀핑연구소인 아라온호 선조 공장에서 아라온호에 솔코파이로일렉의 히팅케이블을 설치하고 성공리에 시공을 마쳤습니다.

아라온호는 국내 최초 섀핑연구소인 R&D(연구개발)을 중심으로 설립된 것으로, 두개 7487톤, 경제협력개발기구 12.5%의 연구진 조달 한국 해양연구용 극지연구소에서 운영되고 있습니다.

솔코파이로일렉은 조선 및 해양환경 시장 진출을 위해, 2015년 4월 솔코파이로일렉(영문명)을 설립하였습니다. 이번 시공은 첫 사례에 해당하고 있습니다.

**히팅케이블 2종 러시아선급인증 획득**  
- FBX(190C) 및 18 - 52C 규격용 상용화 판매

(주)솔코파이로일렉은 2015년 11월, 러시아선급인증기관 RRS(Bulmar Maritime Register of Shipping)로부터 2종의 히팅케이블 제품 RC 인증을 획득하였습니다.

특히, 북극권과 러시아 등 극지방 운항은 해상운반시설의 경우, -50°C 이하의 극저온에 노출될 수 있어, 솔코파이로일렉의 히팅케이블을 -50°C에서 극저온용인 -100°C까지 견딜 수 있는 성능을 모두 만족하고 있음을 입증함에 의해 확인되었습니다.

**주) 솔코파이로일렉**  
SOLCO PYROELEC CO., LTD

**NEWSLETTER AUGUST 2016**

**135°C급 FBH 히팅케이블 IECEx 인증**  
- 유럽 방폭형 정선박스, 고온(내화)방폭형 정선박스 시장 진출

(주)솔코파이로일렉은 2016년 8월, 유럽 FM Approvals로부터 135°C 방폭형 정선박스를 위한 히팅케이블(IECEx)을 인증 획득하였습니다. 특히, 조선(해양환경) 시장 요구조건에 맞춰, -55°C 극저온(Winterization)에도 사용할 수 있도록 인증을 받기 위해를 확대하였습니다. 제품의 주요특징은 아래와 같습니다.

- 인증용량 IECEx FM ATEX 100/135/1
- 방폭용량 Ex e II, C, T4
- 내화온도 135°C ~ 40°C
- 방열량 15, 30, 45, 60W/m, 1H
- 시속폭 100~200mm, 200~275 mm

상기 인증 획득으로 솔코파이로일렉은 유럽 해양환경시장과 조선(해양환경) 시장 진출을 위한 제품 도입을 완료하게 되었습니다.

**MI(무기물절연) 히팅케이블 방폭인증**  
- RTD (RTD) 절연체와 고온(내화)방폭형 정선박스

(주)솔코파이로일렉은 2016년 8월, 무기물 절연 히팅케이블 (절연 MI Heating Cable)을 위한 방폭형(IECEx)을 국제 방폭 인증(IECEx)을 완료하였습니다. 아울러 가장 널리 사용되는 온도 센서인 RTD (절연 MI) 온도 센서 또한 방폭 인증을 함께 획득하였습니다. 제품의 주요특징은 아래와 같습니다.

- 무기물 절연 MI Heating Units
- 방폭인증용량 Sin1ATD315LX, IECEx 5016-0046
- 방폭용량 Ex e II, T4 to T6 Gb
- 외재사용 온도 600°C (Stainless steel and alloy sheath)
- 외재직경 500 V
- 외재폭폭 1.25mm to 6.5mm
- 외재 두께 1 to 4

**군부대 GOP 급수량 히트트레이싱 공사**  
- 수화(Leakban)를 통해 최대 230mm 급수량 히팅케이블을 설치

(주)솔코파이로일렉은 수화(Leakban)와 함께 GOP(군부대)의 급수량을 추적하는 히팅케이블을 설치하여, 최대 230mm 급수량을 추적하고, 방화(Leakban)를 설치하여 방화(Leakban)를 완료하였습니다. 또한, T4는, 프랑스, 스페인, 영국, 포르투갈 등 유럽 및 북아프리카 방화(Leakban) 시장에서 히트트레이싱 및 누출감지시스템을 위한 시장이 계속되고 있습니다.

또한 솔코파이로일렉과 T4는 솔코파이로일렉 히트트레이싱 제품과 누출감지시스템 제품을 유럽시장에 공급하기 위한 안전 계약과 신제품을 개발하여 모두 제공하였습니다.

**250mm 규도 유입투자자치 완료**  
- 프랑스 방화(Leakban) 방화(Leakban) 및 방화(Leakban)

(주)솔코파이로일렉은 지난 6월, 프랑스 T4로부터 250mm 규도 히팅케이블을 위한 히팅케이블을 제조하고, 방화(Leakban)를 설치하여 방화(Leakban)를 완료하였습니다. 또한, T4는, 프랑스, 스페인, 영국, 포르투갈 등 유럽 및 북아프리카 방화(Leakban) 시장에서 히트트레이싱 및 누출감지시스템을 위한 시장이 계속되고 있습니다.

또한 솔코파이로일렉과 T4는 솔코파이로일렉 히트트레이싱 제품과 누출감지시스템 제품을 유럽시장에 공급하기 위한 안전 계약과 신제품을 개발하여 모두 제공하였습니다.

**주) 솔코파이로일렉**  
SOLCO PYROELEC CO., LTD

## PERFORMANCE / APPLICATION

### Freeze Protection



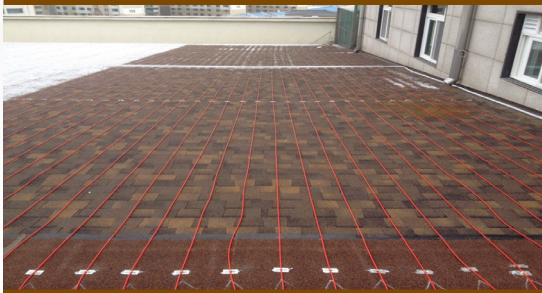
Pipes transferring water or chemicals require heat-tracing in order to prevent them from freezing in cold weather and commonly used insulation is not enough to accomplish the freeze protection. For instance, in  $-10^{\circ}\text{C}$  of the weather, the temperature of 25mm pipe drops down from  $5^{\circ}\text{C}$  to  $0^{\circ}\text{C}$  in one hour. In the past, hot steam heat-tracing are often used but due to many inconveniences of steam heat-tracing, using Self-Regulating Heating Cable is much more efficient and convenient.

### Temperature Maintenance



In case of pipes transporting crude oil or chemicals like in petrochemical plants, heat-tracing is needed to keep the temperature of the liquid inside pipes. For instance, bunker c oil, which is used as fuel in most factories, is required to be kept at above  $60^{\circ}\text{C}$  in order to freely flow along the pipe lines.

### Snow-melting & Freeze Protection



Snow built up on roofs of buildings start to melt by sunlight or by heat from inside the building. The water melted from the snow then moves onto drainpipe and freezes again which blocks flow of water overall and causes damage in draining system. Moreover, overflowed water can flow into the roof or inside the building and cause damage. Solco Pyroelec's self-regulating heating cable can provide the most convenient, efficient and safe solution..

### Concrete Curing



In construction, in order for concrete structures satisfy strength standard, it requires appropriate temperature and length of time for proper curing. Particularly when it is constructed in cold weather, curing may be insufficient resulting in poor construction. Recently, heating cable has been used to reduce curing period but other existing heating methods often cause fire due to overheating. By utilizing the unique system operation technique and self-regulating heating cable, it can save maintenance cost up to 80% when compared with the other methods.

## PERFORMANCE / APPLICATION

### Transfer Port Snow-Melting



Solco Pyroelec's Self-regulating heating cable is broadly being used for snow-melting and de-icing on passages, slope area or any exposed surfaces. Snow-melting generally requires  $300\text{w}/\text{m}^2$  and operates for 50hours per year. De-icing generally requires less than  $150\text{w}/\text{m}^2$  and operates for about 2000 hours per year. Based on use of the unique system operation technique and self-regulating heating cable, it can save maintenance cost up to 80% when compared with the other methods

### Floor Heating

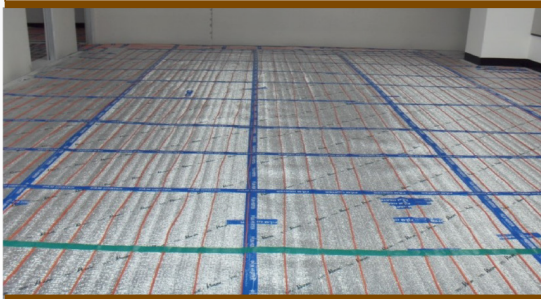


Solco Pyroelec's Tubing Bundle is designed for so that its heating performance is even over the whole area and its final size is optimized for better insulation efficiency and easy installation.

The product is composed as below.

- Process Tube
- Heating Cable
- Mineral Insulation
- Sheath material

### Indoor Heating



Indoor heating system allows comparatively easy installation and maintenance compared to hot-water heating and it is also applicable on complicated structures such as vessels and plants. Such heating system using Solco Pyroelec's self-regulating heating cable provides the most efficient and safe solution



**SOLCO.**

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**SOLCOTEC CO., LTD | GEOJE OFFICE**

10-2, Hyochon-gil, Yeonsa-ri, Yeoncho-myeon, Geoje-si,  
Gyeongsangnam-do, Republic of Korea  
T. 055. 634. 1351 F. 055. 634. 1354

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**SOLCO PYROELEC CO., LTD | FACTORY (HEAD OFFICE)**

107B Deokbongseowon-ro, Gongdo-eup, Anseong-si,  
Gyeonggi-do, South Korea  
T. 031. 655. 1188 F. 031. 692. 3536