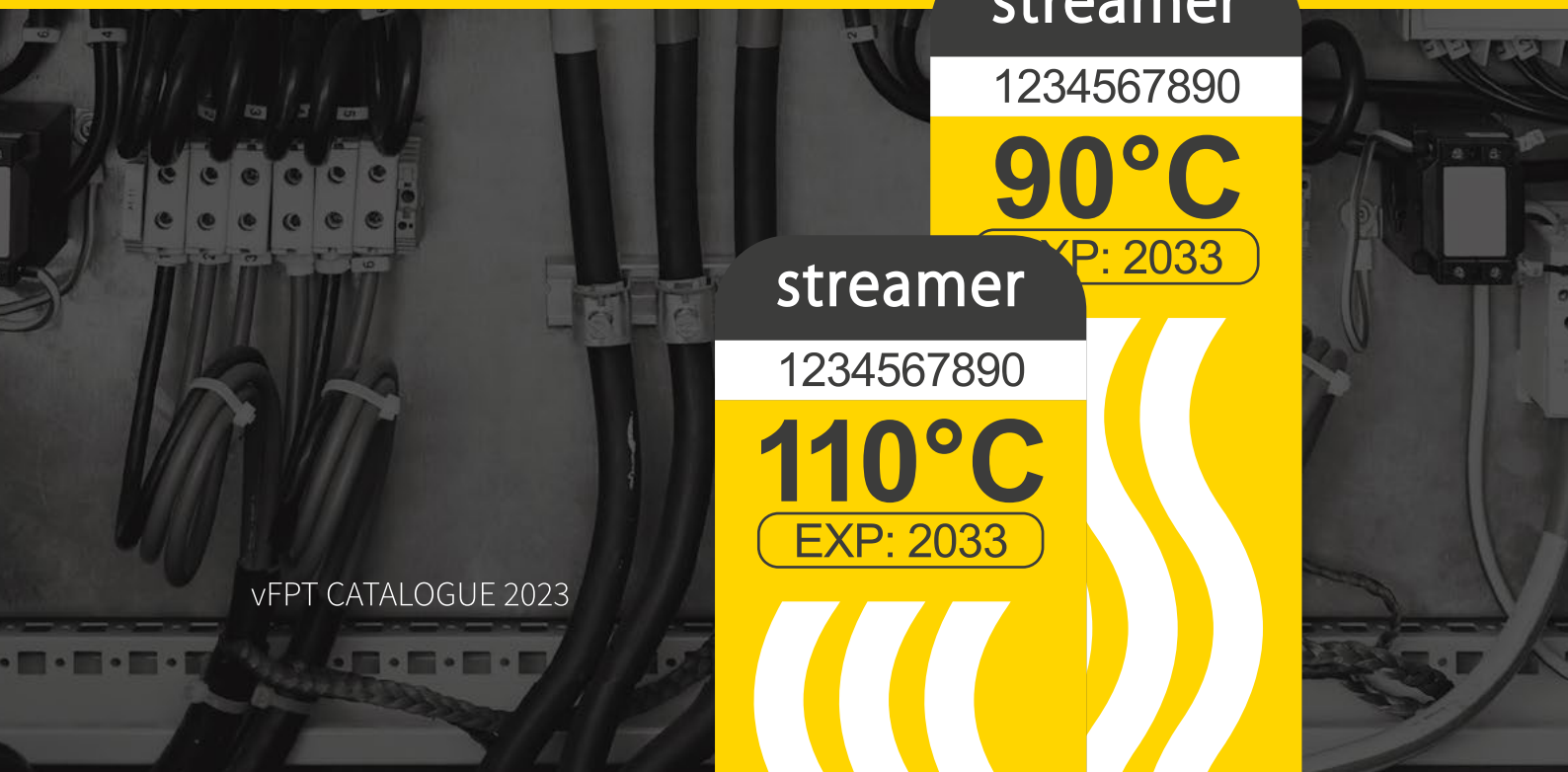
streamer

VISUAL OVERHEATING INDICATOR

FIPRES

ELECTRICAL FIRE PREVENTION AND OVERHEATING CONTROL SYSTEM

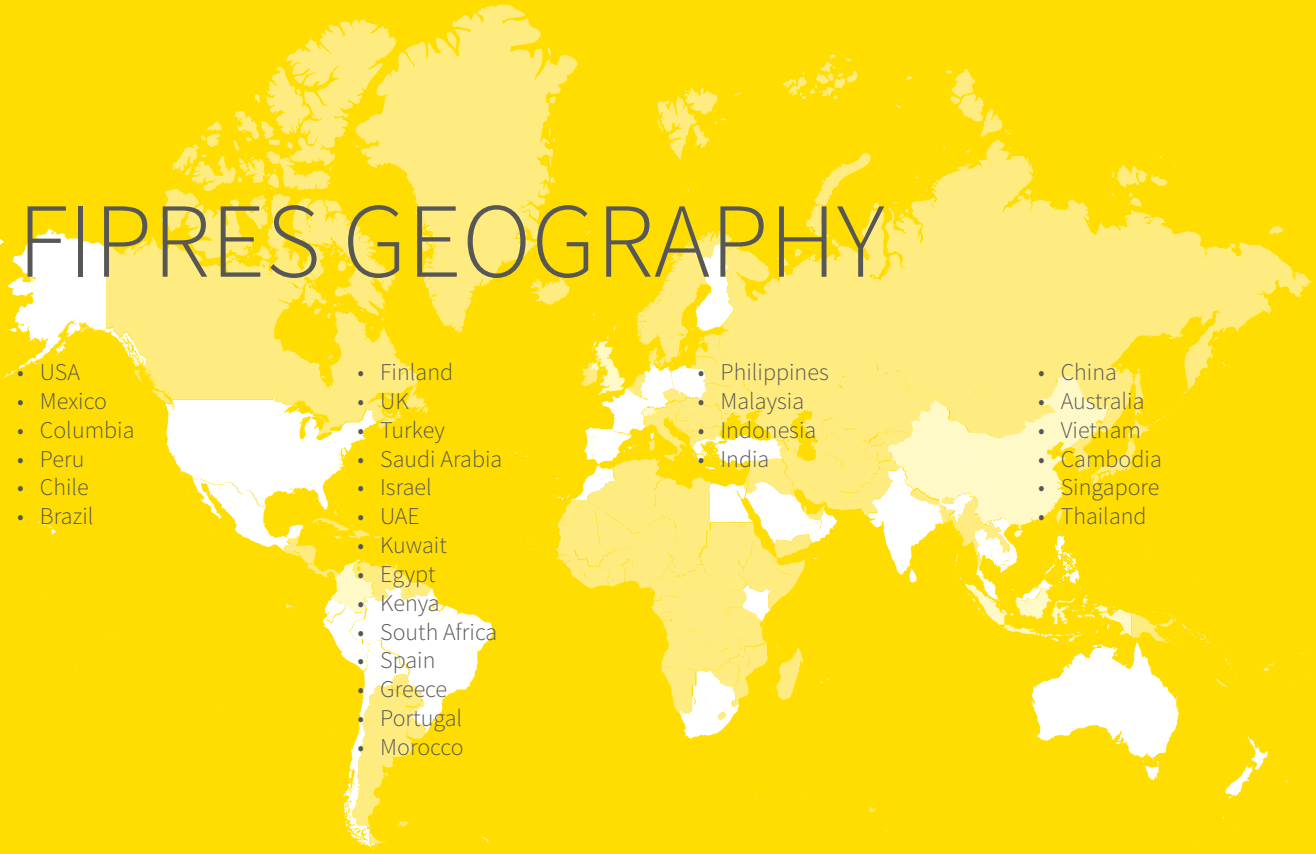


vFPT CATALOGUE 2023

FIPRES APPLICATION SEGMENTS

- POWER TRANSMISSION UTILITIES
- COMMERCIAL AND RESIDENTIAL BUILDINGS
- MINING, OIL & GAS COMPANIES
- INDUSTRIAL FACTORIES
- PANEL BUILDERS
- POWER PLANTS
- HOSPITALS
- MALLS

FIPRES GEOGRAPHY



STREAMER ELECTRIC PRODUCT RANGES

FIPRES

ELECTRICAL FIRE PREVENTION & OVERHEATING CONTROL SYSTEM

FIPRES detects abnormal overheating of electrical equipment, thus avoiding material damage from fire, loss of profit and life threatening situations. In a nutshell, the system consists of thermolabels (rFPT), a special gas sensor (FPA), and a concentrator unit (FPC). rFPT is a sticker made of composite material with encapsulated gas inside.

These stickers are glued at the contact connections (CB inputs/outputs, bus-bars, cable terminations, etc.).

Should the contact become heated up to the activation temperature of the sticker, rFPT releases a safe and non-toxic signal gas. This gas is detected by FPA, which in turn sends an ALARM signal to maintenance personnel through Modbus, dry contact relay, or via SMS in case of use with FPC.

FIPRES offers a new and unique solution at an affordable price that takes utility and industrial companies to a new level of safety and maintenance efficiency.

LLPD

LIGHTNING PROTECTION UP TO 69 KV

A unique lightning protection solution for overhead lines: Line Lightning Protection Devices (LLPDs) with EasyQuench (EQ) technology have been invented and patented by Streamer.

More than 2 million LLPDs have been installed worldwide (China, Indonesia, Malaysia, Brazil, UAE, Iran, Vietnam, Switzerland, Germany and elsewhere).

TRANSEC

MOISTURE MONITORING AND EXTRACTION FOR POWER TRANSFORMERS

Moisture is one of the primary causes of failures for power transformers and one of the main degradation factors for insulation paper. Therefore, it increases the risks of operation failures and shortens the life expectancy of the asset. After several years of service operation, moisture can appear in a transformer from several sources which are external or internal and it has a complex dynamic between the oil and paper within the transformer. Also it is difficult to evaluate the moisture situation of a transformer without thorough monitoring.

TRANSEC offers an efficient solution for both moisture monitoring and extraction which is online and does not require any operator.

PROBLEM: ELECTRICAL FIRE

Every year fire causes an enormous amount of damage to all kinds of facilities, social and private possessions. It can lead to life threatening incidents and huge losses because of material damage of assets, power supply interruption and production loss and business opportunity cost. Global statistics shows that around 30% of the fires are caused by electrical faults:

25%

of building fires are due to electrical malfunctions

- according to European Fire Academy (EFA)

32%

of fires in Germany are related with electricity

- according to German Insurance Association

3.2B$

USD annual cost of damage in the U.S. and Europe due to electrical fires

- according to the National Fire Protection Association (NFPA) and the European Fire Safety Alliance (EFSA)

ELECTRICAL FIRE MAY START BECAUSE OF SEVERAL REASONS:

- overheating of defective equipment;
- overloads;
- open circuits;
- harmonics;
- outdated electrical wiring and loose connections, which may happen due to improper torque, corrosion, vibration, withdrawals of moving contacts.

When considering the causes of electrical fires, it must be highlighted that there are many causes that cannot be prevented by standard solutions such as overcurrent protection, AFDD or GFP devices.

Contact connection problems are the most widespread reason for the fire, and loose connections are the most common reason for electrical overheating and further fire.

more often

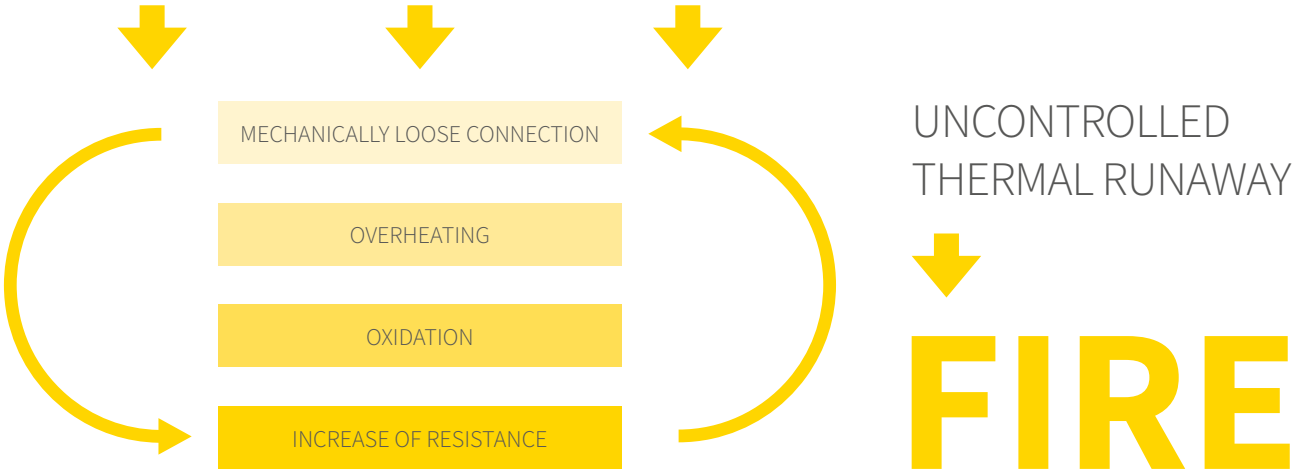
Problem	Solution
Loose connection	FIPRES
Aging	FIPRES
Arc faults	Arc fault detection device (AFDD)
Insulation failure	Residual current device (RCD) and Ground fault protection (GFP)
Overloads	Circuit breaker (CB) with overcurrent threshold
Improper selection of equipment	FIPRES

less often

PROBLEM: CONTACT CONDITIONS

The quality (condition) of contact connections is determined by the value of the contact resistance. Over time, an increase in transient contact resistance is possible due to:

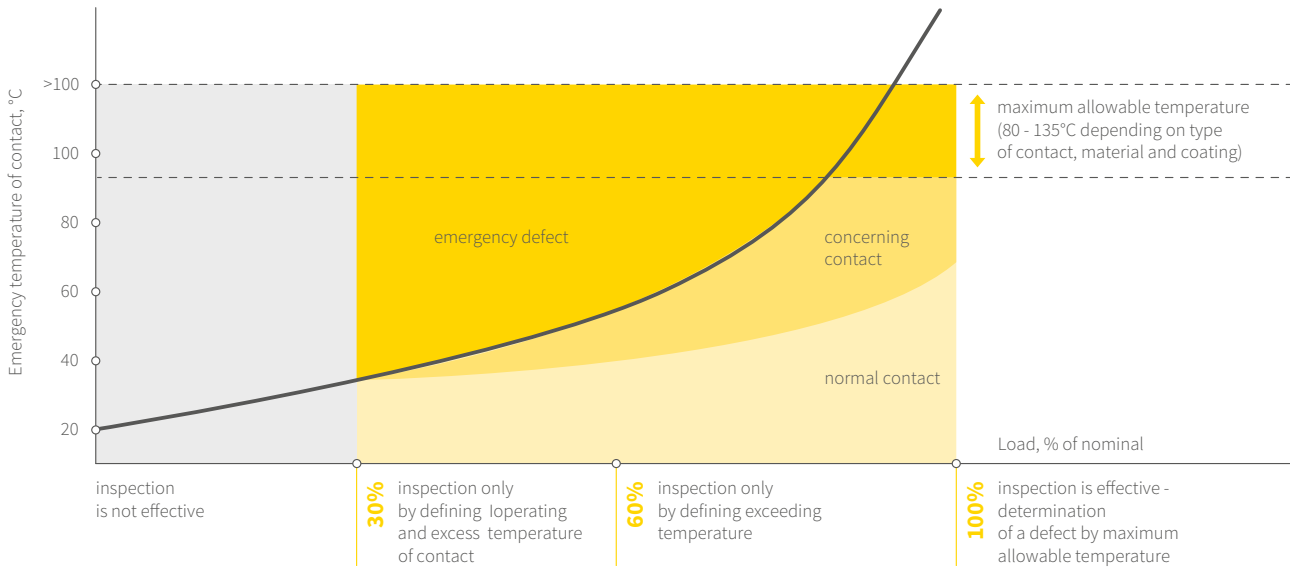
Improper torque, the weakening of the pressure, corrosion, vibration, current/temperature fluctuations, withdrawals of moving contacts, oxidation of the metal



The classic method of equipment inspection and identifying faults is scheduled infrared thermography inspection.
The purpose of thermal monitoring is to detect contacts that can burn out at the moment of maximum load.
To do this with a thermal imaging camera, you not only need to determine the temperature of the contact, but also adjust it to the nominal load.

Dependence of the temperature of the emergency contact defect on the load current:

Thermal monitoring without measuring the load current is effective only when the load is higher than 60%.
Under 60% the inspection is effective only when measuring the load current and excess temperature of the contact in comparison to other similar contacts. For the load under 30% inspection is not effective at all.

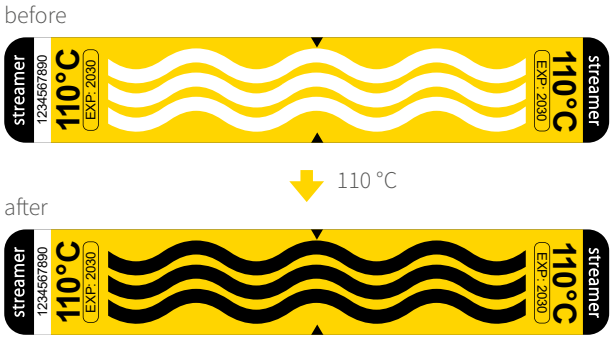


visual FIRE PREVENTION THERMOLABELS (vFPT)

vFPTs are self-adhesive thermal indicator stickers made of composite material that irreversibly change color when the threshold temperature is reached.
The thermolabels continuously monitor the temperature, allowing register the fact of exceeding one or more temperatures by a contact or contact connection during the operation of the electrical installation.

vFPT helps maintenance personnel understand the condition of the equipment, not only at the time of inspection, but can also see if the equipment has reached a certain temperature in the past. Unlike using a thermal imager, vFPT provides a clear picture of what has happened since the last check. These labels are extremely easy to install for any configuration of electrical equipment.

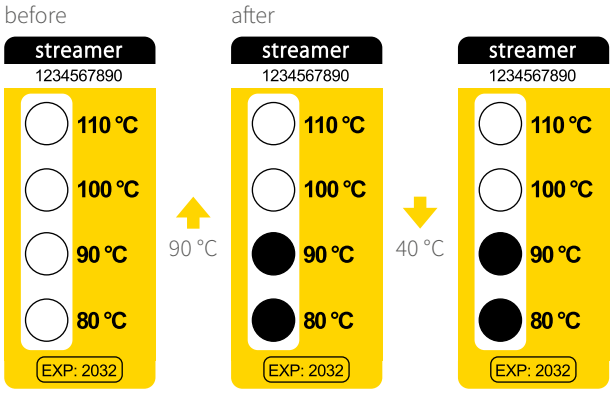
SINGLE-TEMPERATURE THERMOLABELS



The principle of operation is simple: at the activation temperature (70, 90 or 110 °C) the white strips irreversibly change color to black.

Single-temperature vFPT thermal indicators detect overheating above the set maximum allowable temperature.

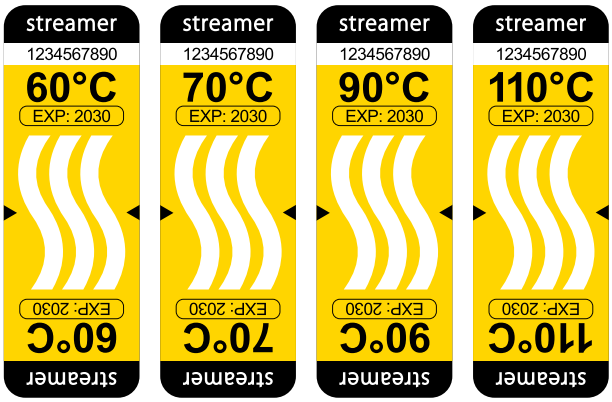
FOUR-TEMPERATURES THERMOLABELS



Four vFPT temperature indicators allow to determine the maximum temperature to which overheating occurred and detect differences in heating of identical units (phases, motors, mechanical devices), allowing to understand the exact reason of the overheating.

1-TEMPERATURE vFPT

- vFPT provides information on overheating occurred between 2 checks.
- More effective way of tracking contact connections temperature than traditional visual inspection and infrared thermography (IRT).
- Long strips allow to get 360° angle of observation.
- Specially designed for installation on electrical equipment
- 10 years of validity period.
- Single-temperature vFPT allows to determine the maximum exceeded temperature during operation of electrical equipment.
- Control hard-to-reach or inaccessible elements for the thermal imager (MV switchgear, explosion-proof electrical equipment).



	S	M	L
Length, mm	40	50	75
Width, mm	15	15	15

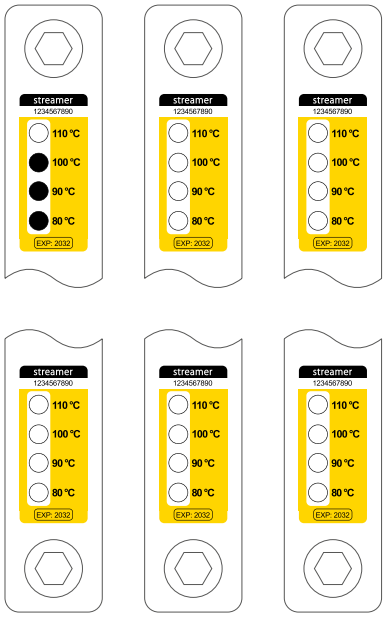
Activation temperature	Item name	Conductor cross-section, mm^2	Reference
70 °C	vFPT 70S	up to 10	FP.VT.070A.Y1.WW
	vFPT 70M	10-35	FP.VT.070B.Y1.WW
	vFPT 70L	35-120	FP.VT.070C.Y1.WW
90 °C	vFPT 90S	up to 10	FP.VT.090A.Y1.WW
	vFPT 90M	10-35	FP.VT.090B.Y2.WW
	vFPT 90L	35-120	FP.VT.090C.Y2.WW
110 °C	vFPT 110S	up to 10	FP.VT.110A.Y1.WW
	vFPT 110M	10-35	FP.VT.110B.Y1.WW
	vFPT 110L	35-120	FP.VT.110C.Y2.WW
Other temperature vFPT can be created on request with a minimum order quantity			

4-TEMPERATURES vFPT

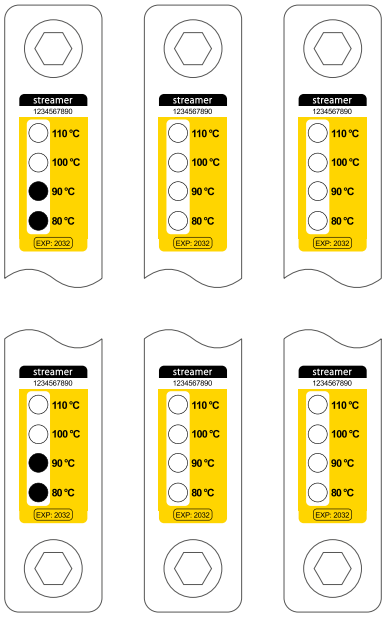
- Shows if the contacts is ok, concerning or emergency.
- Detect defects at early stages.
- 4-temperatures vFPT allows you to understand not only if the contact has reached highest permissible temperature but also to see how defect evolves and understand the reasons of overheating.
- Reduce the risk of fires in electrical installations.
- 10 years of validity period.
- Control hard-to-reach or inaccessible elements for the thermal imager (MV switchgear, explosion-proof electrical equipment).

EXAMPLES OF CONTACT CONNECTION CONDITION EVALUATION USING THERMOLABELS

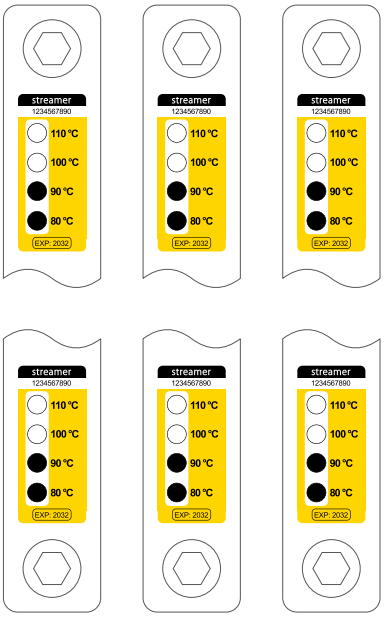
Loose connection of one contact



Overload on one phase



Overload on all phases/high ambient temperature

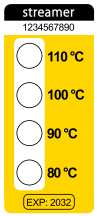


Length, mm	50							
Width, mm	20							
Conductor cross-section, mm^2	10-120							
Standard range vFPT	FP.VT.058C.Y1.WW — 50-60-70-80 °C FP.VT.811C.Y1.WW — 80-90-100-110 °C Other set of temperatures can be created on request with a minimum order quantity							
Possible temperature range, °C	50	60	70	80	90	100	110	120

vFPT INSTALLATION

- Choose the correct temperatures to monitor based on contact material, voltage and load current.
- Install the thermal indicators during the manufacturing phase of the electrical equipment or during repair work.
- Install thermal indicators as close as possible to the contacts or contact connections so that the temperature-sensitive surface layer is clearly visible and the sticker itself does not interfere with the operation of the electrical installation, inspections, or repair work.

THERMOLABELS OPERATION

<table>
<tr>
<td> 
</td>
<td>NO OPERATION.
NO DEFECT.</td>
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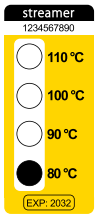
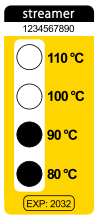
<td> 
</td>
<td rowspan="3">PARTIAL OPERATION.
THE DEGREE OF THE DEFECT SHOULD BE ASSESSED.

The maximum allowable temperature has not been exceeded, but the contact may become faulty as the load increases or in the event of a short circuit.

Actions for elimination of the defect:
• performing an unscheduled IR control of the elements of the electric power unit in order to clarify the degree of heating;
• setting the element to a more frequent control (reducing the frequency of visual inspections);
• taking measurements of load currents and unloading of electric installation or distribution of loads more evenly by phases;
• repair or replacement of the element (unit) of electric power unit.</td>
</tr>
<tr>
<td> 
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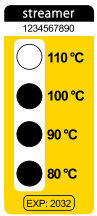
<td> 
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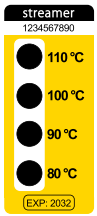
<td> 
</td>
<td>FULL OPERATION.
EMERGENCY DEFECT.</td>
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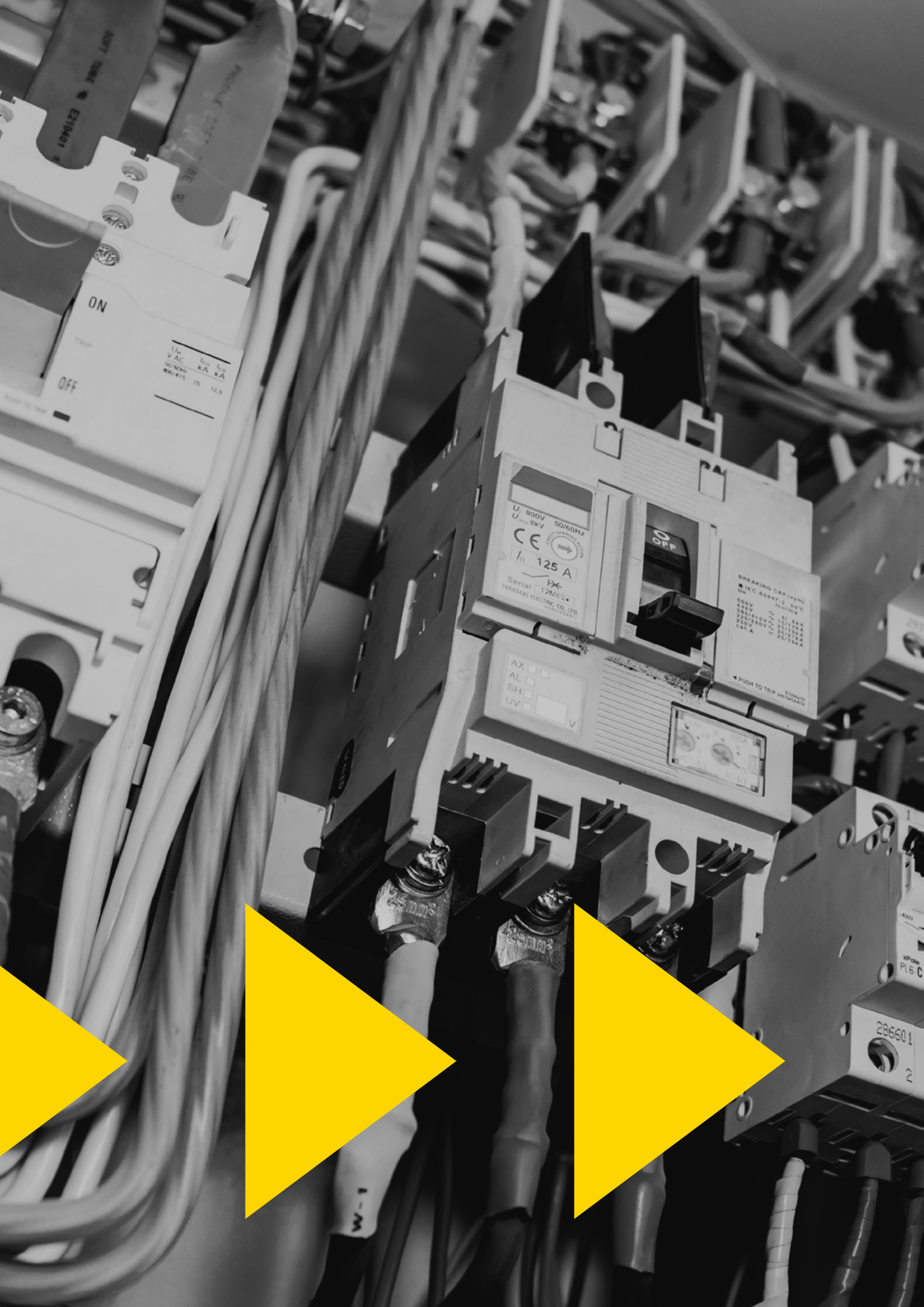

ON
OFF
TRIP
Ue V AC
Icu kA
Ics kA
50/60Hz 415
25
12.5
Ui 800V
Uimp 8kV
50/60Hz
In 125 A
Serial
TERASAKI ELECTRIC CO. LTD
OFF
BREAKING CAP.(sym)
IEC 60947-2
AX
AL
SH
UV
V
PUSH TO TRIP
125A
286501
2

TECHNICAL CHARACTERISTICS OF vFPT

Characteristics	Value							
vFPT material	PVC							
Color transition at threshold temperature	White to Black							
Indication type	Irreversible							
Thickness of the thermal indicator, mm	Not more than 0.5							
Protective film	PVC coating (resistant to water, UV, solvents and lubricants; resistant to mechanical stress)							
Temperature range, °C	50	60	70	80	90	100	110	120
Temperature measurement accuracy, °C	± 2							
Speed of color transition at the threshold temperature, s	2							
Electrical strength, kV/mm	18							
Fire resistance	Does not support combustion, self-extinguishing material							
Classification by degree of exposure to the human body	Low-hazard (do not emit any harmful substances when triggered)							
Lifespan	10 years from manufacture date							
Adhesion (FINAT TM 1, after 24 hours, stainless steel)	28 N/25 mm							
Glue	Polyacrylic, permanent adhesive with a strong initial setting and a high final adhesion							
Storage conditions	-60…+40 °C with humidity up to 90%							
Notes	Only for indoor use. Keep away from direct sunlight and liquids							

BASIC RECOMENDATIONS

Type of equipment/live part	Highest permissible temperature, °C	Recommended type of 1-temperature vFPT	Recommended type of 4-temperatures vFPT
Conductive (with the exception of contacts and contact connections) and non-conductive metal parts			
• not insulated and not in contact with insulating materials	120	110	80-90-100-110
Insulated or in contact with insulating materials of heat-resistance:			
• Y	90	90	80-90-100-110
• A	105	110	
• E	120		
Copper and copper alloy contacts			
• without coatings, in air	75	70	50-60-70-80
• with silver plating, in air	120	110	80-90-100-110
• silver or nickel plated, in air	105		
• coated with silver with thickness not less than 24 microns	120		
• tin-plated, in the air	90	90	
Terminals of apparatus made of copper, aluminium or their alloys, intended for connection to external conductors of electrical circuits			
• without coating	90	90	80-90-100-110
• with tin, silver or nickel coating	105	110	
Bolted contact connections made of copper, aluminium and their alloys:			
• without coating, in air	90	90	80-90-100-110
• with tin coating, in air	105	110	
• with silver or nickel coating, in air	115		

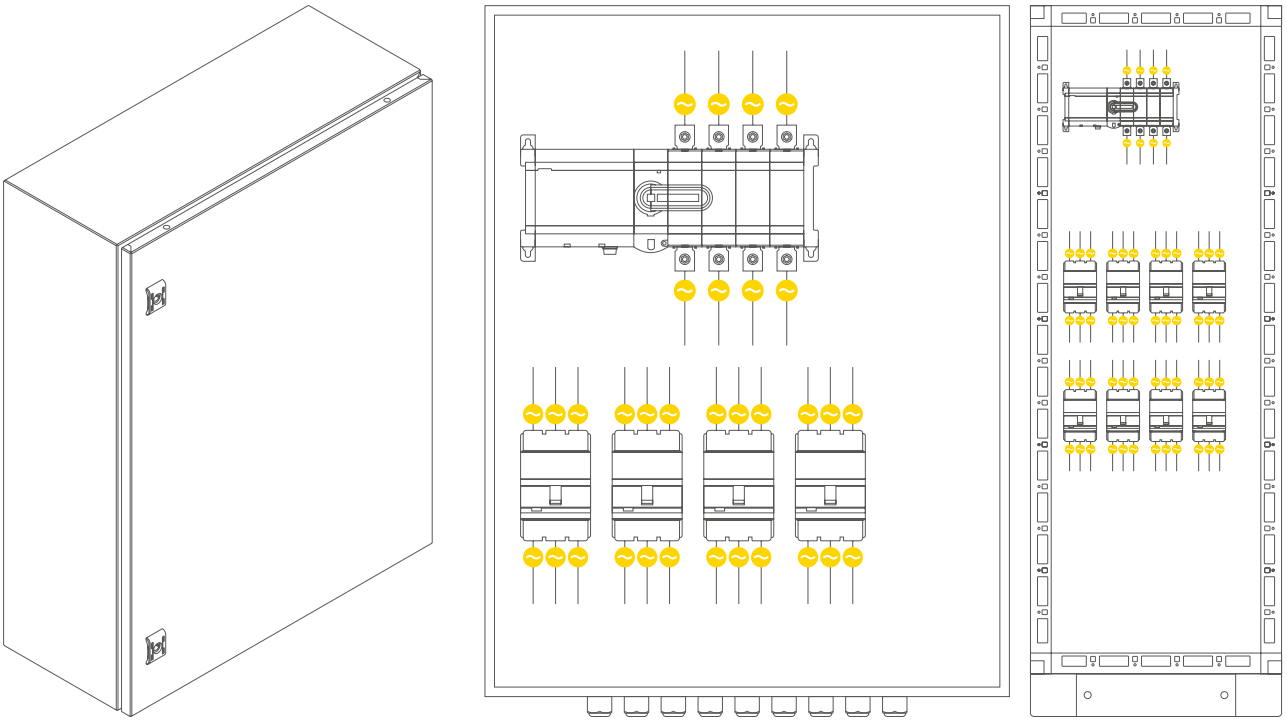
BASIC RECOMENDATIONS

Type of equipment/live part	Highest permissible temperature, °C	Recommended type of 1-temperature vFPT	Recommended type of 4-temperatures vFPT
AC fuses for voltages of 3 kV and above: copper, aluminium and their alloys in air			
Without coatings/with coating			
• with separable contact connection by springs	75/95	70/110	50-60-70-80/80-90-100-110
• with separable connection (pressed by bolts or screws), including fuse terminals	90/105	90/110	80-90-100-110
Metal parts used as springs			
• made of copper	75	70	50-60-70-80
• of phosphor bronze and similar alloys	105	110	80-90-100-110
Current carrying conductors of power cables in continuous/emergency mode with insulation			
• polyvinyl chloride plastic and polyethylene	70/80	70	50-60-70-80
• vulcanizing polyethylene	90/130	90/110	80-90-100-110
• rubber	65/-	70	50-60-70-80
• heat-resistant rubber	90/-	90	80-90-100-110
With impregnated paper insulation at viscous/lean impregnation and rated voltage			
• 1 and 3	80	70/90	50-60-70-80/80-90-100-110
• 6	75	70	50-60-70-80
• 10	60		
• 20	55		
• 35	50		

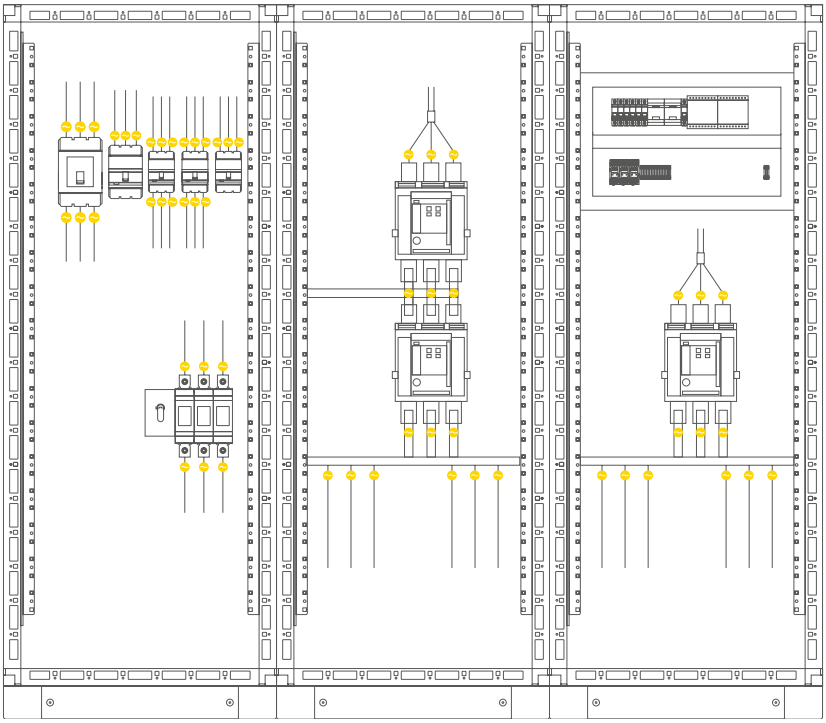
At a maximum operating temperature of 40 °C.
Other set of temperatures can be created on request with a minimum order quantity.

STANDARD SOLUTIONS

ELECTRICAL PANEL (0.4 KV) WITH 1 M^3 VOLUME



LOW VOLTAGE DISTRIBUTION SWITCHBOARD 0.4 KV



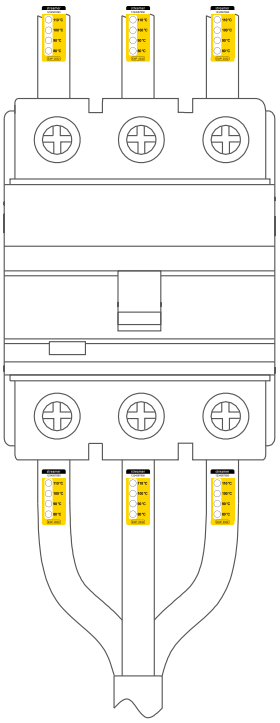
STANDARD SOLUTIONS

Conductor type	Highest permissible temperature, °C	Conductor cross-section range, mm²	Recommended temperature vFPT
Copper and aluminum current-carrying conductors of power cables with polyvinylchloride plastic and polyethylene insulation: • NAYY-J • AYBY-O • NYY-J • NYCY • NYIFY-J • YBY-O • NYM-J • NYM-O • H07V-U • H07V-R • H07V-K • H07V3-K • H05VV-F • etc.	70	2-10	70
		more than 10	50-60-70-80
Contact connections of apparatus outputs, contact terminals with internal bare busbars, uninsulated busbars	95	2-10	90/110
		more than 10	80-90-100-110
At a maximum operating temperature of 40 °C. Other set of temperatures can be created on request with a minimum order quantity.			

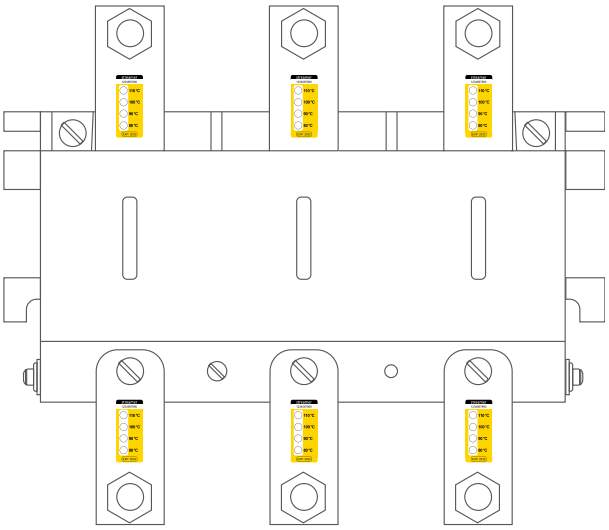
STANDARD SOLUTIONS

ELECTRICAL EQUIPMENT UP TO 1000 VAC AND 1500 VDC FOR DIFFERENT TYPES OF ELECTRICAL PANELS

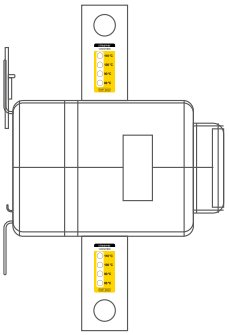
Circuit breaker with busbar and cable connection



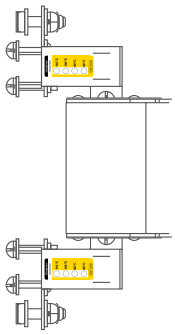
Contactor



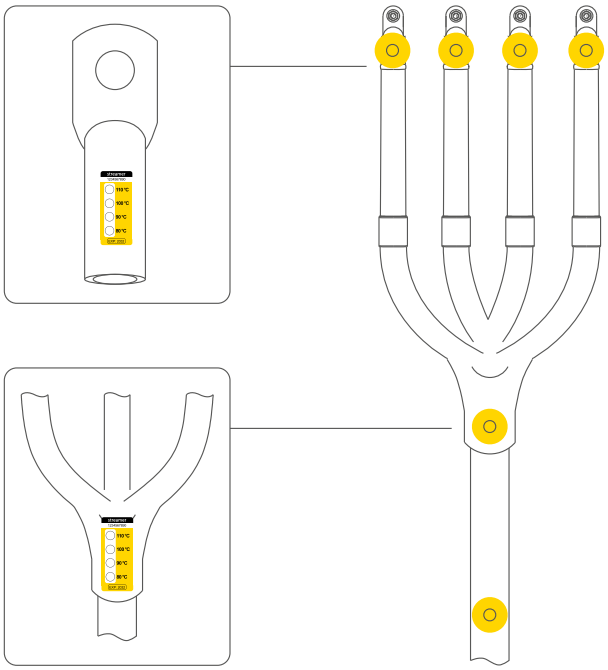
Current transformer 0.4 kV



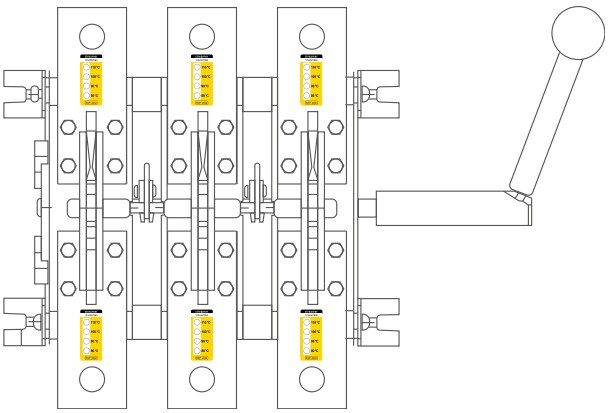
Fuse



Cable line termination



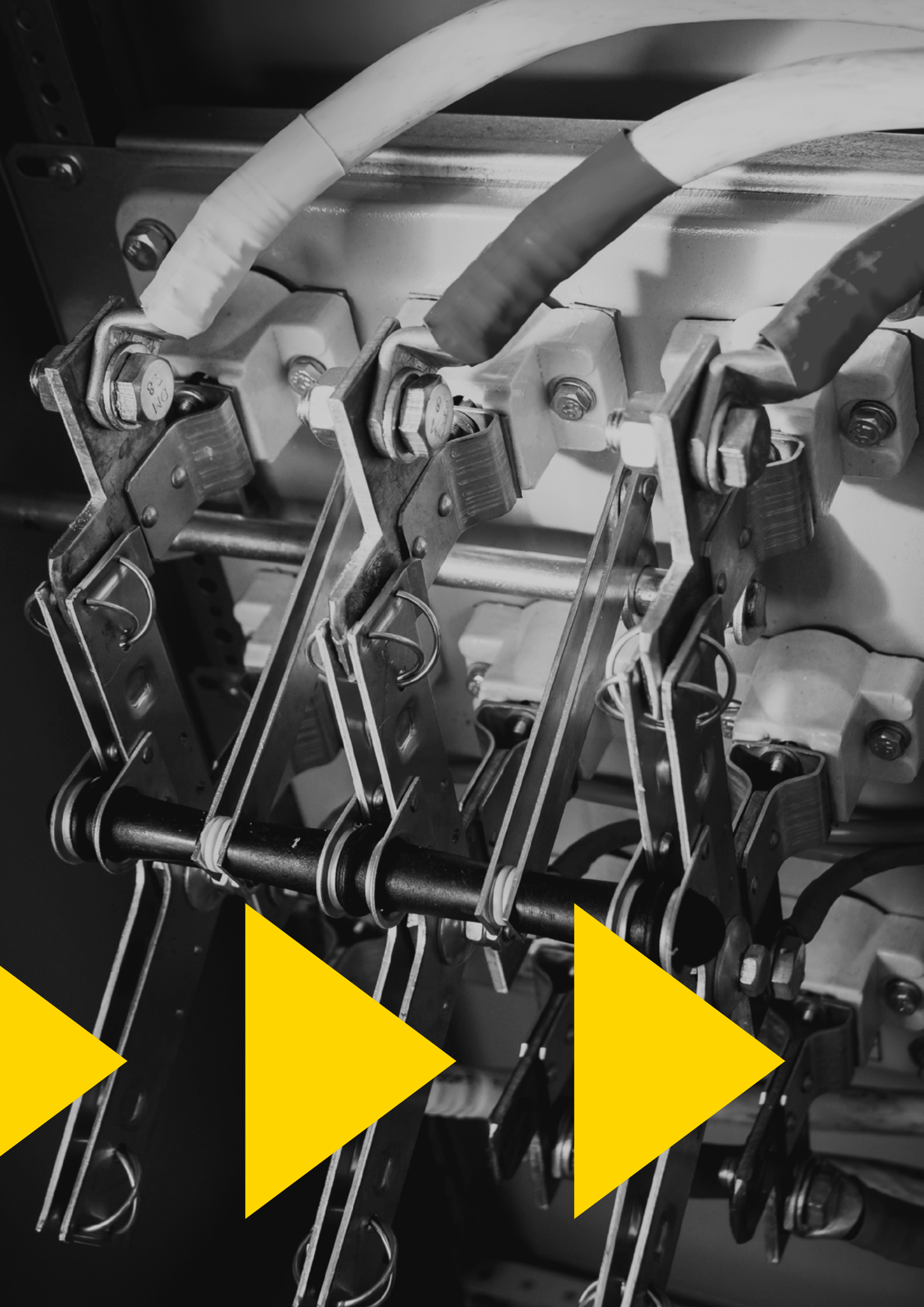
Switcher



STANDARD SOLUTIONS

Controlled item	Type of contact or contact connection	Highest permissible temperature, °C	Recommended type of 1-temp vFPT	Recommended type of 4-temp vFPT
Separable and inseparable copper, aluminum and their alloys busbars, wires and cables on the outputs of electrical devices, as well as on the connection of conductors to each other for currents from 2.5 A	• conductors made of copper, alumina, aluminum and its alloys without protective coatings of working surfaces	95	110	80-90-100-110
	• conductors made of copper, alumina, aluminum and its alloys with protective coatings of working surfaces of base metals	110		
	• conductors (wires) with PVC insulation	70	70	50-60-70-80
Contacts of fuses equipped with current-limiting closed fuse-links with a rated breaking capacity of at least 6 kA. Spring contacts without shell:	• copper without coating	80	70/90	50-60-70-80
	• brass without tin coating	85	90	80-90-100-110
	• tinned	95	110	
	• nickel plated	110		
Contacts of switching devices (circuit breakers, switches, disconnectors, magnetic starters, contactors, etc.)	• copper without coating	75	70	50-60-70-80
	• with silver overlay plates	120	110	80-90-100-110
	• with silver or nickel coating	105		
	• silver plated with a minimum thickness of 24 microns	120		
	• tin-plated	90	90	
Insulated manual controls (toggle switches) and switchgear housings	-	50	70	50-60-70-80
Cable termination. Current carrying conductors of power cables in continuous operation with insulation:	• polyvinyl chloride plastic and polyethylene	70	70	50-60-70-80
	• rubber	65		
	• made of heat resistant rubber	90	90	80-90-100-110

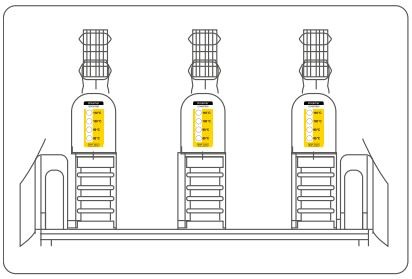
At a maximum operating temperature of 40 °C.
Other set of temperatures can be created on request with a minimum order quantity.

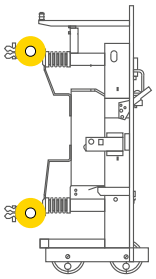


STANDARD SOLUTIONS

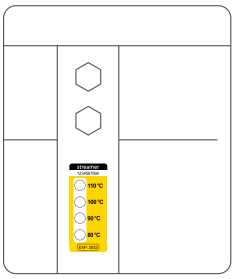
SWITCHGEARS 6-35 KV

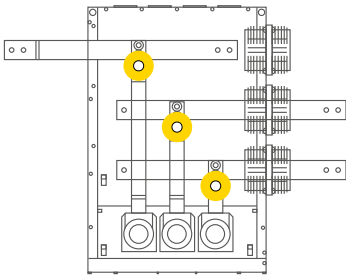
Withdrawable element with circuit breaker



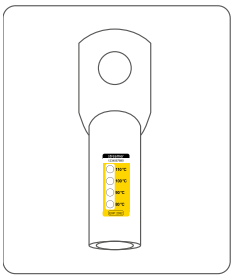


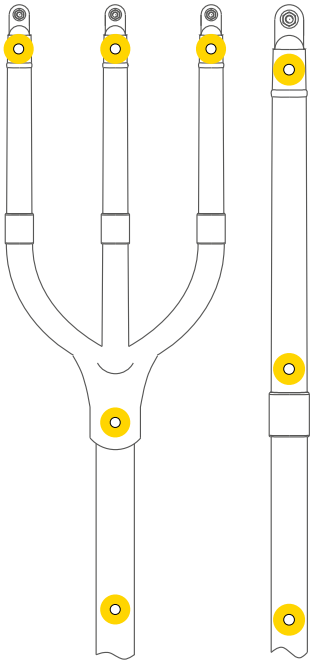
Busbars

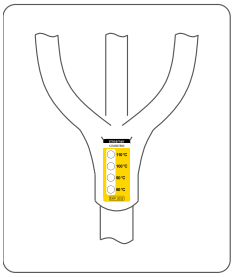




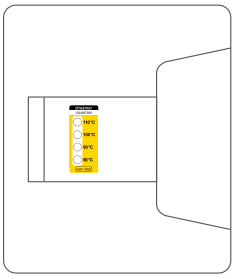
Cable line termination

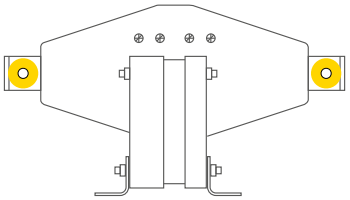




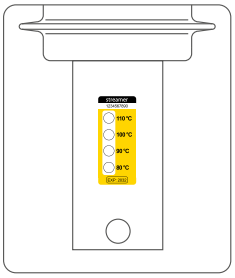


Current transformer

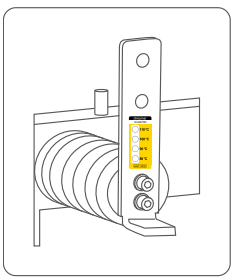


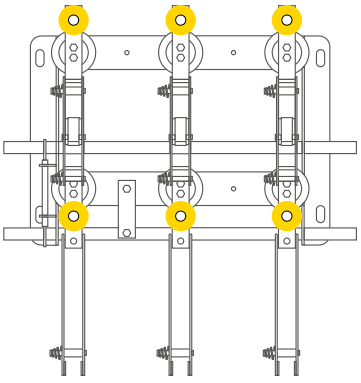


Insulator bushing

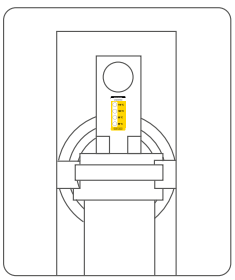


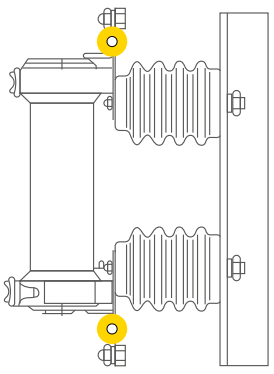
Disconnector





High-voltage fuse





STANDARD SOLUTIONS

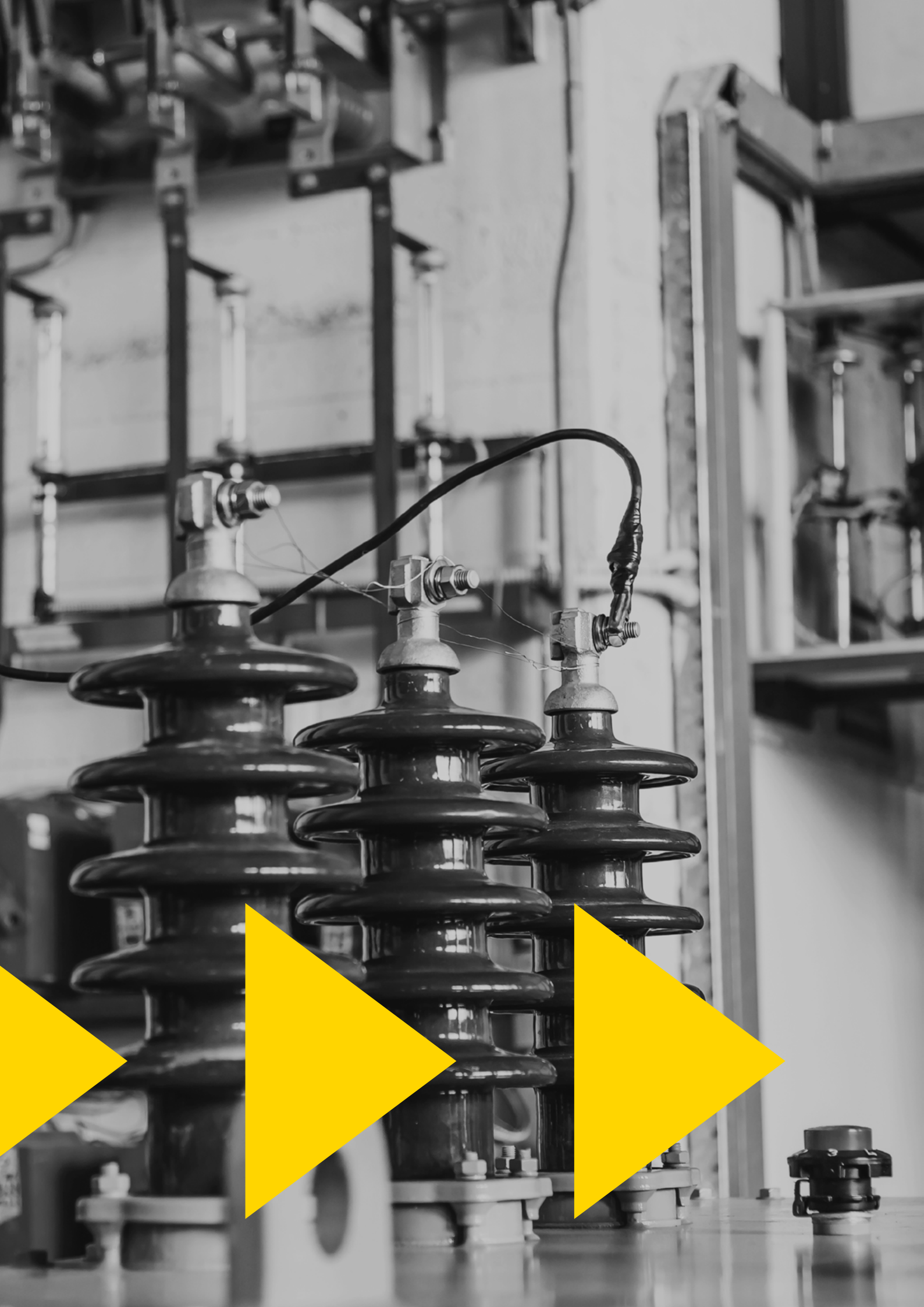
SWITCHGEARS 6-35 KV

Controlled item	Type of contact or contact connection	Highest permissible temperature, °C	Recommended type of 1-temp vFPT	Recommended type of 4-temp vFPT
Plug-in contacts of the removable elements of switchgear cubicles (with circuit breakers, fuses, VTs, disconnectors) made of copper and its alloys:	• without coating, in air	75	70	50-60-70-80
	• with silver overlay plates, in air	120	110	80-90-100-110
	• with silver or nickel coating, in air	105		
	• with tin coating, in air	90	90	
Cable termination. Current carrying conductors of power cables in continuous operation with insulation:	• polyvinyl chloride plastic and polyethylene	70	70	50-60-70-80
	• vulcanizable (cross-linked) polyethylene	90	90	80-90-100-110
	With impregnated paper insulation at rated voltage:			
	• 6 kV	65	70	50-60-70-80
	• 10 kV	60		
	• 20 kV	55		
	• 35 kV	50		
Contact connections (except welded and soldered) of busbars and connecting bars, busbars with terminals of apparatus, apparatus terminals of electrical equipment with external conductors of electrical circuits (switches, current transformers, fuses, etc.)	Of copper, aluminium and their alloys:			
	• without coating	90	90	80-90-100-110
	• tin-coated	105	110	
	• silver or nickel plated	115		
	• aluminium and its alloys with silver or nickel coating	115		

STANDARD SOLUTIONS

Controlled item	Type of contact or contact connection	Highest permissible temperature, °C	Recommended type of 1-temp vFPT	Recommended type of 4-temp vFPT
Current-carrying busbars (with the exception of contacts and terminals)	• uninsulated	120	110	80-90-100-110
	Insulated with insulating materials of heat-resistance classes according to IEC 85-84:			
	• Y	90	90	80-90-100-110
	• A	100	110	
	• E	120		
Spring contacts of copper and copper alloy fuses 6 kV and above:	• without coating	75	70	50-60-70-80
	• with silver or nickel coating	105	110	80-90-100-110
	• with tin coating	95		
Contact connections of power capacitors, separately standing or connected in a battery	-	90	90	80-90-100-110

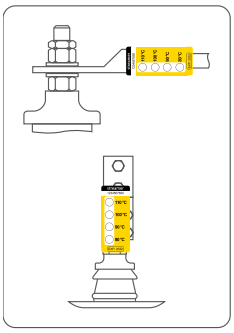
At a maximum operating temperature of 40 °C
Other set of temperatures can be created on request with a minimum order quantity

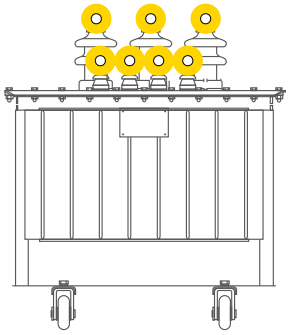


STANDARD SOLUTIONS

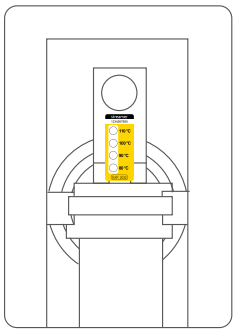
6(10)/0.4 KV COMPLETE TRANSFORMER SUBSTATIONS

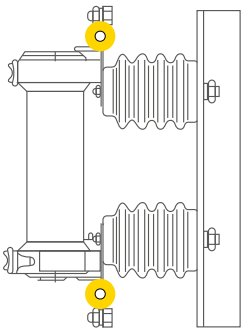
10/0.4 kV transformer



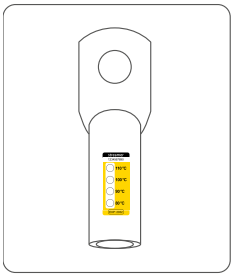


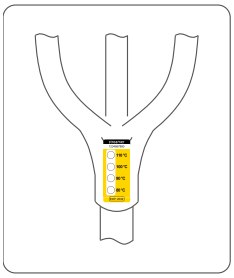
High-voltage fuse

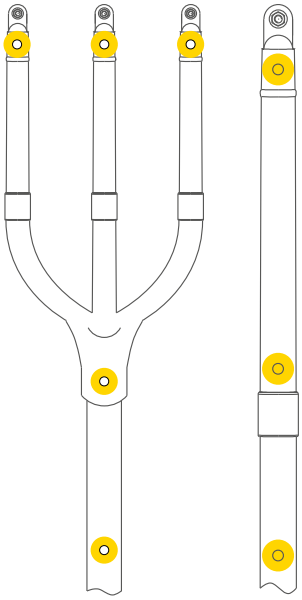




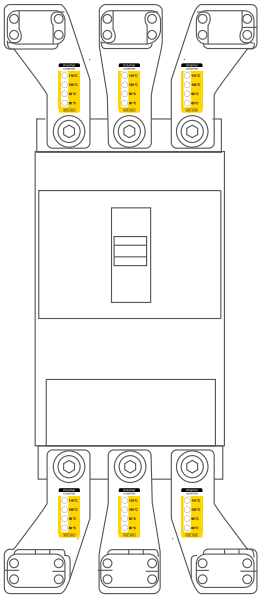
Cable line termination



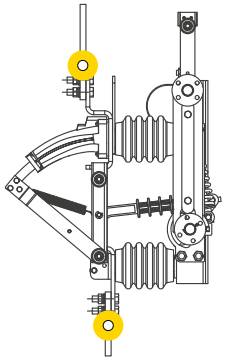


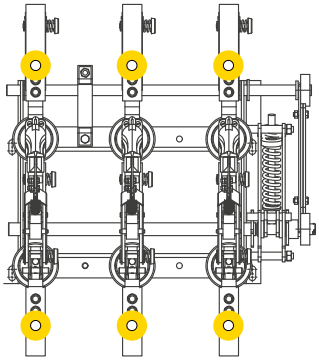


Circuit breaker

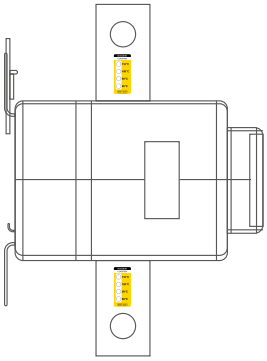


Load disconnector





Current transformer



STANDARD SOLUTIONS

6(10)/0.4 KV COMPLETE TRANSFORMER SUBSTATIONS

Controlled item	Type of contact or contact connection	Highest permissible temperature, °C	Recommended type of 1-temp vFPT	Recommended type of 4-temp vFPT
Contact connections on removable (detachable) terminals of HV, MV, LV bushings of power transformers (autotransformers)	-	105	110	80-90-100-110
Terminal cable coupling. Current carrying conductors of power cables in continuous operation with insulation:	• polyvinyl chloride plastic and polyethylene	70	70	50-60-70-80
	• vulcanizable (cross-linked) polyethylene	90	90	80-90-100-110
	With impregnated paper insulation at rated voltage:			
	• 6 kV	65	70	50-60-70-80
	• 10 kV	60		
	• 20 kV	55		
	• 35 kV	50		
Spring contacts of copper and copper alloy fuses 6 kV and above:	• without coating	75	70	50-60-70-80
	• with silver or nickel coating	105	110	80-90-100-110
	• with tin coating	95		
Separable and inseparable copper, aluminium and their alloys busbars, wires and cables on the outputs of electrical devices, as well as on the connection of conductors to each other for currents from 2.5 A	• conductors made of copper, alumina, aluminium and its alloys without protective coatings of working surfaces	95	110	80-90-100-110
	• conductors made of copper, alumina, aluminium and its alloys with protective coatings of working surfaces of base metals	110		
	• conductors (wires) with polyvinyl chloride insulation	70	70	50-60-70-80

STANDARD SOLUTIONS

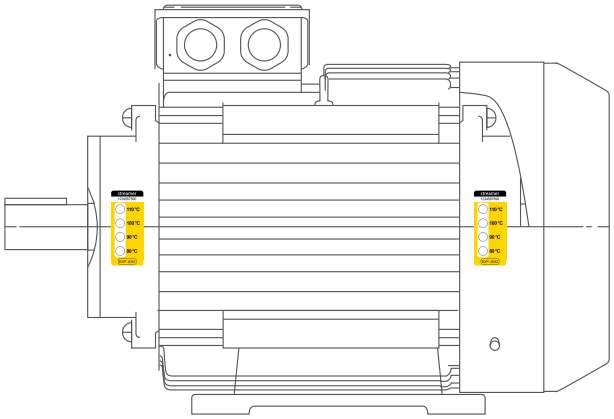
Controlled item	Type of contact or contact connection	Highest permissible temperature, °C	Recommended type of 1-temp vFPT	Recommended type of 4-temp vFPT
Contacts of switching devices (circuit breakers, switches, disconnectors, magnetic starters, contactors, etc.)	• copper without coating	75	70	50-60-70-80
	• with silver overlay plates	120	110	80-90-100-110
	• with silver or nickel coating	105		
	• silver plated with a minimum thickness of 24 microns	120		
	• tin-plated	90	90	

At a maximum operating temperature of 40 °C.
Other set of temperatures can be created on request with a minimum order quantity.

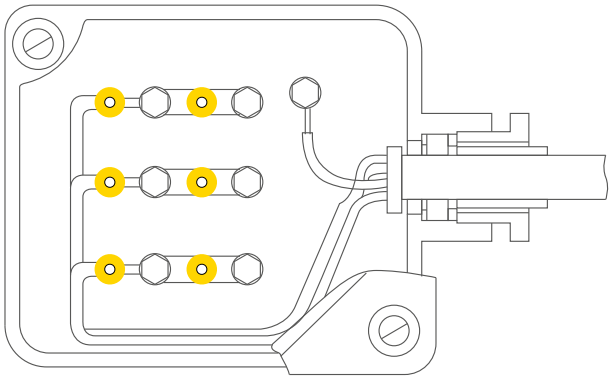
STANDARD SOLUTIONS

0.4-20 KV ELECTRIC MOTORS AND GENERATORS

Electric motor bearings 0.4 kV

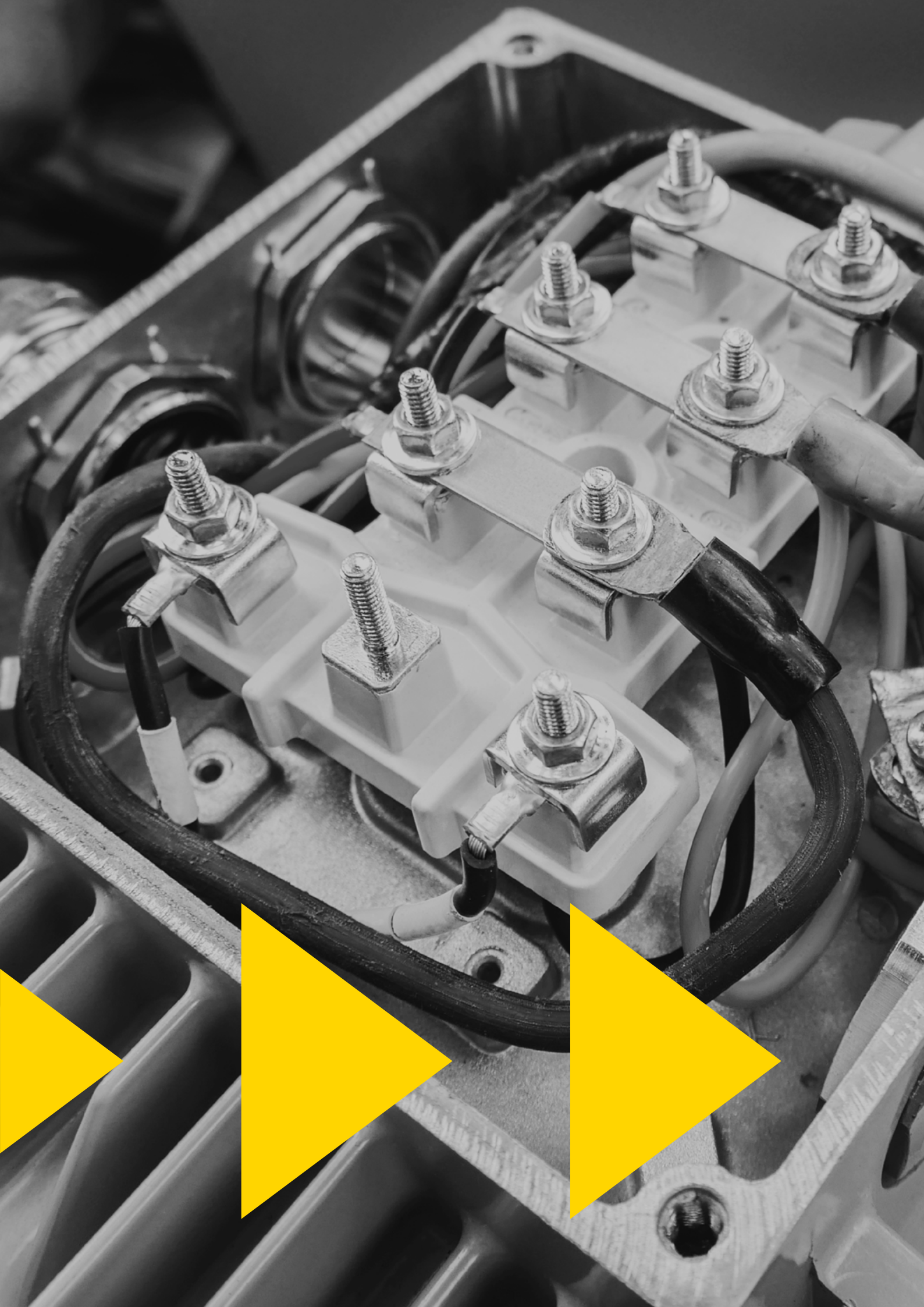


Electric motor terminal box



Controlled item	Type of contact or contact connection	Highest permissible temperature, °C	Recommended type of 1-temp vFPT	Recommended type of 4-temp vFPT
Electric motor housings with multi-layer coil windings with heat-resistant insulation materials according to IEC85-84	• Y	90	90	80-90-100-110
	• A	105	110	
	• E	120		
Bearings	• sliding bearings	80	70/90	50-60-70-80/ 80-90-100-110
	• rolling bearings	100	110	80-90-100-110
Separable and inseparable copper, aluminum and their alloys contact connections in terminal boxes of electric motors and generators	• without protective coatings of working surfaces	95	110	80-90-100-110
	• with protective coatings of working surfaces with base metals	110		
	• conductors (wires) with PVC insulation	70	70	50-60-70-80

At a maximum operating temperature of 40 °C
Other set of temperatures can be created on request with a minimum order quantity



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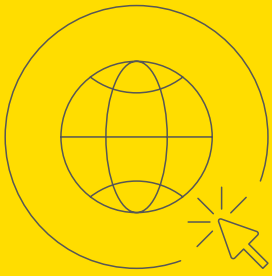

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