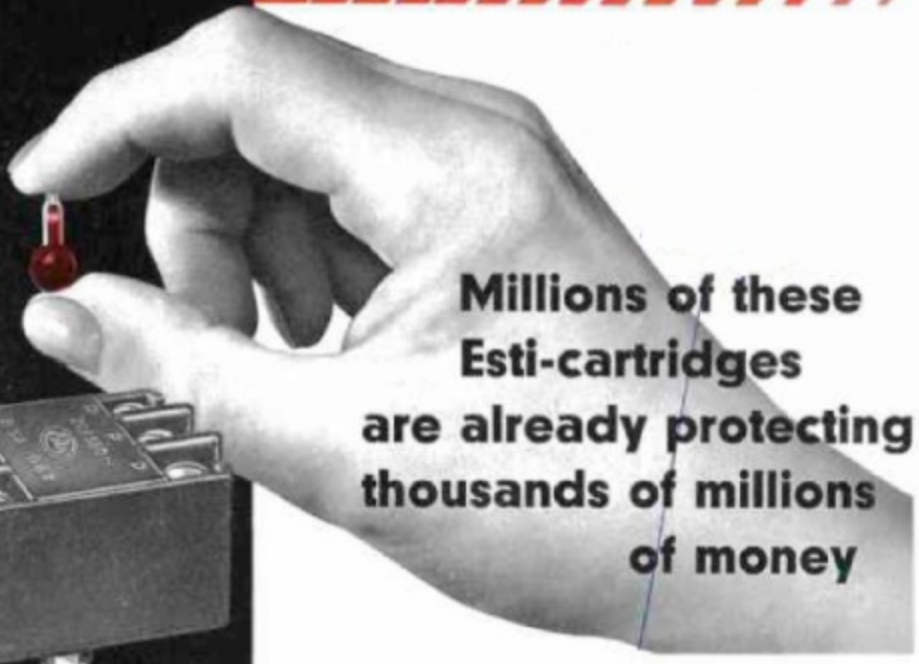
Esti

Protection from excess temperature



Millions of these Esti-cartridges are already protecting thousands of millions of money

CATALOGUE ESTI 567

PERFECT PROTECTION FROM THE DANGERS OF

EXCESS TEMPERATURE

The ESTI EXCESS TEMPERATURE PROTECTOR is a revolutionary development in the field of thermal safety engineering. It represents the very best solution, from the technical and economical point of view, of all the difficult problems involved in the limitation of temperature between + 86 and 572 degrees F. (30 and 300 degrees C.). Due to the innumerable possibilities of using this perfectly reliable device for the protection of rooms, halls, plants, machines, and apparatus imperilled by overheating, to the simple manner of installing this ingenious gadget and to its perfectly dependable reaction the ESTI Excess Temperature Protector is one of the most important technical helps for the prevention of dangers and losses in both industry and trade.

ESTI PROTECTION for

Turbines
Generators
Motors
Transformers
Rectifiers
Vulcanizers
Drying kilns
Air heaters
Hardening furnaces
Baker's ovens
Laboratory equipment
Sterilizers
Instrument cookers
Pumping plants
Tanks
Liquid fuel stores
Gear transmissions
Bearings of every description
Electric heaters
Immersion heaters
Coffee machines
Geysers
Flow type heaters
Washing machines
Silos
Storage bins
Air conditioning plants
Autoclaves
Distilling apparatus
Fire alarms
Gas piping

as well as for the mining industry and in all industrial plants where explosions may occour.

Patented in Germany and abroad. Appreciative expert opinions, in writing, received from: Chemisch-Technische Reichsanstalt (amalgamated with Material Testing Department, at Berlin-Dahlem), Berliner Kraft- und Licht- (Bewag) Akt.-Ges. (Power and Light), Telefunken, B.B.C., and others.

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** = with probe
* = with insulated probe

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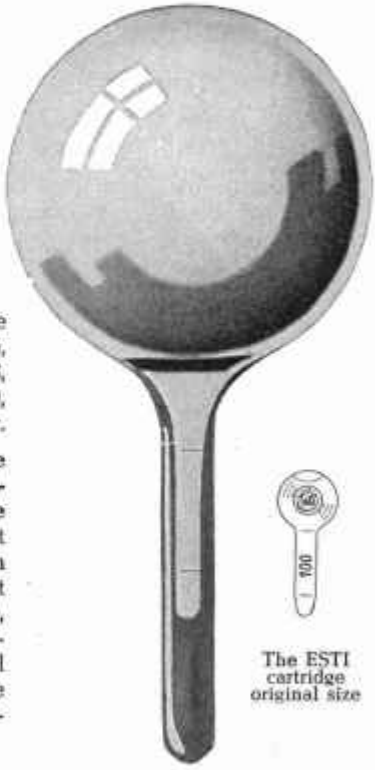
The never failing ESTI-principle:

The releasing element of all ESTI excess temperature protectors is the ESTI cartridge. This is a small spherical glass bulb, as shown on this page, filled with a chemically inactive and insulating fluid. Whenever the cartridge is heated the fluid contained in it expands. As soon as a predetermined critical temperature is reached the ESTI cartridge bursts with absolute certainty, due to the excess internal pressure.

This bursting of the ESTI cartridge offers the possibility of releasing electrical and mechanical switches.

THE ESTI CARTRIDGE



The ESTI cartridge original size

The ESTI cartridge is manufacted for response temperatures of + 86, 104, 122, 140, 158, 176, 194, 212, 230, 248, 266, 284, 302, 320, 338, 356, 374, 392, 410, 428, 446, 464, 482, 500, 518, 536, 554, 572° F., and marked accordingly.

The ESTI cartridge does not need to be adjusted. It does not age and it is cold-resistant, corrosion-proof and insensitive to shock. Its shock-proofness is above 500 g at 1,2 milliseconds. Its operating efficiency can be tested, without destroying the cartridge, at any time, as many times as may be desirable, and in a very simple manner. The ESTI cartridge has nothing in common with bi-metal or fusible solder and is far superior to the latter in respect of the reliability of the temperature limitation.

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The ESTI Excess Temperature Protection

is a method approved for many years giving for the first time absolute certainty that dangerous overheating can be rendered harmless promptly and anywhere. It acts before fire or explosion can cause catastrophe resulting in the loss of great economic assets, irreplaceable private or public property. Numerous dramatic examples over the past few years can be quoted where ESTI protection would have prevented loss of assets and human lives. ESTI Excess Temperature Protection, which is distinguished for the utmost simplicity of principle, has therefore a high economic importance by virtue of its absolutely certain and permanent function.

Industry at home and abroad has enthusiastically adopted the ESTI principle and utilises more and more its wide and varied scope of application. For a great number of purposes ESTI APPARATEBAU in Berlin have developed outstandingly practical ESTI safety appliances which have proved their worth to an extraordinary degree in practice.

The importance of ESTI Excess Temperature Protection is so great not only because extremely valuable machinery and equipment in heavy industry and vital public utilities are protected against damage, but all the electrical appliances used in the household can be fitted with ESTI protection. Immense damage occurs yearly through irons, electric cushions, heaters, etc. being left on. ESTI protection can give security here too, beyond any achieved so far. — Apart from this, ESTI protects not only the value of the machinery and equipment and prevents loss of working time and prevents often extensive fire damage to buildings and installations, but also the ever recurrent danger to human life. The universal worth of ESTI excess temperature protection is recognised everywhere. It has passed with distinction the tests of the strictest public authorities. Its absolute reliability therefore makes the ESTI principle very important to industry and the economy.

ESTI Excess Temperature Protection provides thermic monitoring of machinery, plant, rooms and equipment in industry, the mines, shipping, trade and in the home. ESTI reliably and automatically switches off or reverses electrical supply as soon as undesirably high temperatures occur. ESTI protective switches exist (or

can easily be designed) for all kinds of machinery, electric motors, transformers, electric heating appliances, electric stoves, small electric appliances, large scale units' etc. In the same way the ESTI principle can be applied for mechanical fire alarms and the release and control of fire protective and fire fighting installations.

The ESTI principle

The ESTI principle, an absolutely reliable protection against the dangerous development of heat, is based on the "ESTI Cartridge", a small glass bulb filled with an inactive fluid. The heating of this ESTI cartridge causes the fluid in it to expand so that when a predetermined critical temperature is reached the glass bulb is absolutely certain to burst due to internal pressure. In simple switches and appliances disigned for the purpose this sudden collapse of the glass bulb can release electric or mechanical switches instantaneously at the critical moment.

The ESTI Cartridge

Aging

The ESTI cartridge *does not age*, whereas in bimetallic temperature regulators the oxygen content of the air is known to deposit a layer of oxide on the contact points. The enlargement of the conductive resistances thus causes sparking, which leads to sintering or even welding of the contacts, preventing operation. This can never occur in ESTI cartridges.

Resistance to cold

The ESTI cartridge is resistant to cold down to −80° C. Its functionability remains unchanged, while in bimetals low temperatures can cause a diversion of the contact to the negative side and interrupt the necessary bias. This means that such a regulator no longer works reliably, unlike the ESTI cartridge, which is not influenced by cold.

Adjustment

The ESTI cartridge requires *no adjustment whatever*, and can be installed in machinery or equipment by unskilled operatives. Against this the subsequent adjustment of bimetallic regulators is precision work which only an expert can perform.

Performance

The ESTI cartridge always reacts *instantaneously*, thus guaranteeing the prevention of arc-ing, which occurs easily in

the much more sluggish reactions and complicated mechanisms of bimetallic regulators.

ESTI Excess Temperature Protection equipment is supplied for circuits up to 60 amps., with one and three poles. In many cases they save the inclusion of a relay. The ESTI thermo-intermediate link ETZ 13 even allows main switches of practically unlimited Amperage to be switched. Such perfomances cannot be achieved with bimetallic regulators.

Shock

ESTI cartridges and switch appliancas are *shock-proof* and have an impact safety of over 500 g at 1.2 milli-seconds. It is known that this is never attained with bimetallic regulators. The glass bodies of normal ESTI-Cartridges are exposed, before filling, to an inertive pressure test of about 6-7 kg, glass bodies of reinforced ESTI cartridges to a pressure test of approximately 20 kg.

Temperature Limitation

ESTI cartridges can be supplied for temperatures from + 30° C to 300° C, graduated in 10° C steps. The operating temperature is marked on every cartridge. ESTI cartridges are supplied for operating temperatures as low as + 30° C, while with bimetallic and solder a more or less reliable switch-off only begins at 60° to 70° C.

Tolerance

ESTI cartridges have for each operating temperature a tolerance of about ± 5° C. referring to the exposed ESTI-Cartridge in an agitated liquid medium (see Report Chem. Techn. Reichsanstalt Berlin page 33 „as to 2"). Solder, which is stil lfrequently used as a temperature controller, is known to undergo molecular change through chemical influences from the air, and corrodes. Consequently the operating tolerances fluctuate considerably.

Testing

The ESTI cartridge is virtually the first safety device which can be tested quite simply for working efficiency without being destroyed. When the ESTI cartridge is heated slowly and carefully (with a cigar, cigarette, match or the like) the fluid inside expands

and the air bubble becomes visibly smaller. (It must never be heated so far that the air bubble disappears.) As the liquid is heated so the internal pressure increases, and if there were an crack in the glass, even hair-thin and invisible to the naked eye, the liquid would leak at this point and the air bubble would expand. If no fluid leaks, the ESTI cartridge is in order. On reaching its operating temperature it would rupture with absolute certainty due to internal pressure.

The approximate response temperature can also be tested in the same way. The ESTI cartridge is heated under water or oil to 15° C below operating temperature. The expansion of the fluid causes the gas bubble to shrink to a minimum, smaller than a pin point. From this state to bursting point further heating by approximately 15° C is required.

Failure of regulators

Temperature regulators are indispensable wherever heating processes are to be controlled. That regulators are unreliable is universally know and is frequently proved in practice. Neither bimetal nor solder can give the absolute certainty of proper functioning and actual safe protection against dangerous heat development. For this reason it is essential to install an ESTI Excess Temperature protection as an absolute safety device. ESTI also protects, when regulating devices fail, with complete certainty valuable machinery, expensive apparatus and equipment against all damage and against the direct and indirect consequences which are often so infinitely expensive. ESTI excess temperature Protection is therefore the absolutely reliable safety device for the extreme emergency (which is always possible) when all regulating installations fail.

Choosing the operating temperature

The operating temperature should be chosen for the ESTI cartridge so that it only operates in case of real necessity. This makes it very rarely necessary to change an ESTI cartridge. If it does operate then damage has been prevented which experience shows would cost many times the price of ESTI protection.

Motors windings

The enemy of all live windings is well known to be excessive heat. In most cases it occurs under overloading, and its consequence is brittleness in the insulation. Finally this leads to shorting in the winding and to destruction of the motor or transformer etc. Nearly all motors have for this reason a protection switch, which is, however, only an overload protection, and not at all a special safety device against undesirable heating. It often happens that when the motor is overloaded the protective device switches off, but the motor cannot cool down because the device is at once cut in again so that the work is not interrupted. Often enough this process is repeated several times in succession. The motor becomes hotter and hotter, and the final consequence is shorting in the winding, failure of the machine, loss of work, repair costs etc.

Such damage can in every case be avoided with certainty by installing ESTI Excess Temperature Protection. The ESTI is a device responding to heat, not to over-current. It reliably switches off the machine at the critical temperature which arises through continued overload. Only when a new ESTI cartridge is inserted can the machine be switched on again.

Scope for using ESTI

ESTI Excess Temperature Protection can be used for ensuring safety in all thermal processes, wether regulated or not; it is a complete revolution in the field of thermo-safety devices, i. e. of technical arrangements for protection against danger through overheating the scope for using ESTI is practically unlimited.

Installing ESTI protection

ESTI excess temperature protective switches in single and multipole design can be fitted directly outside the danger points in machines, equipment etc., and absorb the contact heat there, as well as monitor the inside of machines. For this latter case the critical interior point is reached by a probe of appropriate length with the ESTI cartridge at the detecting end. If the critical temperature is exceeded a sprung tongue reliably releases the easily accessible protective switch on the outside. With an insulated probe it is

even possible to use ESTI protection in a high tension field or high frequency alternating magnetic field. The probes can be as long as 800 mm.

ESTI excess temperature protection can be used in controls for electrical installations and for

mechanical release, including signalling devices for temperature monitoring installations and fire alarms in large rooms (theatres, cinemas, warehouses, storage places, silos. etc.), in mines, shipping, industry and railways of all kinds.

Also for

- motors of all sizes
- generators
- transformers
- compressors
- turbines
- machinery bearings
- gears
- rectifiers
- choke coils
- immersion heaters
- electric heaters
- coffee mills
- hot water boilers
- washing machines
- continous-flow heaters
- instrument boilers
- sterilisers
- laboratory equipment
- autoclaves
- air-conditioning plant
- garbage disposal plant
- air heaters
- drying ovens
- case-hardening furnaces
- baking ovens
- vulcanising equipment
- pump installations
- petrol stores
- fuel stations
- fire hatches and doors
- etc.

Fire extinguishers

The ESTI principle is applied in automatic extinguishing devices, in particular sprinkler installations in industrial plant subject to fire hazard, and in mining. Its suitability here has been emphasised by its inspection and approval by the extremely strict *Hauptstelle für Grubenrettungswesen*, the West German supervisory authority for mine rescue work. In these sprinkler installations overheating causes the ESTI cartridge to burst and release the control valve of the fire water supply, and directing a jet of water at the point of danger — and at the very moment of danger. Well known firms in the fire-fighting equipment industry have introduced the ESTI principle into their designs; its absolute reliability and insensitivity to outside influences makes it a more perfect, safe and accurate protection than any other means.

With the ESTI thermo-intermediate link type ETZ 13, the controlled shutting and opening of doors, hatches, valves, bulkheads and the like can be effected, and electric switches can be operated without the necessity of wiring in the room monitored. In hazardous areas, where explosive gasses are present for instance, the danger of sparking is precluded.

It is impossible to give a complete survey of all the ways of using the ESTI principle, for almost daily new ones are discovered. There seem to be hardly any limits for its use. In many branches of industry ESTI Excess Temperature Protection is part of the standard equipment of maschinery etc. in production. Wide circles of people are becoming increasingly interested in the ESTI principle. Its effects in the economic and industrial respects are immeasurable.

> *The ESTI principle seems qualified to cause a complete revolution in the field of safety precautions. The ESTI principle protects human beings and property against damage by overheating and fire, which have in the past have cost thousands of millions of pounds.*

It is the duty of technical staff in all fields of industry to study the ESTI principle and to apply its extraordinary advantages in their own production processes.

EHT 44

ESTI PROTECTION

1-pole
1 amp.
220 volts
height 12 mm
width 14 mm
length 35 mm
weight 5 g

(actual size)

EHT 44
Esti Excess Temperature Protector Switch
for very small loads

The ESTI protector EHT 44 is suitable and intended for heating pads, inductive ballasts and chokes selinium rectifiers, leakage field transformers, pilot motors and many other applications. In heating pads or cushions it will respond only if the built-in regulating sets fail; for this particular application we supply the ESTI cartridge having an operating temperature of +221°F. (105°C.). The EHT 44 is exceptionally small and very easily installed.

Upper limit of ambient temperature: + 266° F. (130° C.)

The above illustration shows the function of the ESTI principle very distinctly. The ESTI cartridge which bursts infallibly as soon as the critical temperature is reached breaks the supply before any dangerous over heating can occur.

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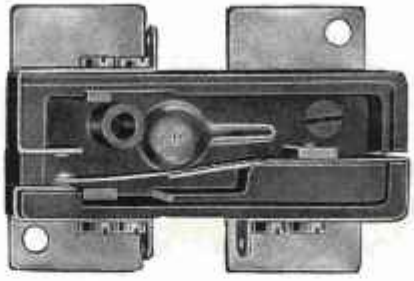
ESTI PROTECTION

EFT 45

1-pole
2 amp.
220 volts
height 17 mm
width 41 mm
length 62 mm
weight 45 g



(actual size)

EFT 45
ESTI Excess Temperature Protector Switch
for small loads

The mode of operation of the EFT 45 can be seen from the illustration. Also here it is the ESTI cartridge which holds a circuit closed until the operating temperature is reached, when the cartridge will operate the change over contacts. The smallness of the instrument, its simple installation and the dependable mode of operation of the ESTI cartridge ensure a great many applications for the EFT 45. It can be used as a fire-alarm, as a signalling device for temperature control systems, and as a temperature limiter in many fields, sometimes also in connection with a contactor or an automatic circuit-breaker. The EFT 45 is covered by a cap made of plastic material and provided, over the ESTI cartridge, with an observation hole.

Maximum ambient temperature +266°F. (130°C.)

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KS 24
EKT 25

ESTI PROTECTION

KS 24 1-pole
10 amp.
250 volts

weight 27 mm
height 40 mm
depth 16 mm

weight 20 g

KS 24
ESTI Excess Temperature Protector Switch for incorporation purposes, enclosed in a ceramic housing, single-pole circuit-breaker, 10 A. 250V.

The ESTI excess temperature protector, type KS 24, for small appliances in which the use of more complicated equipment of this type cannot be considered for reasons of either space of economy, in which, however, a reliable excess temperature protector is required.

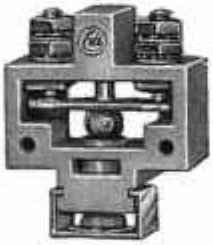
It is particulary suitable for leakage-field transformers, small electric fires, water heaters, irons, and similar electric heaters, to be effectively protected from unintended overheating.

Maximum limit of usability: +572° F. (300° C.)

EKT 25
1-pole
25 amp.
380 volts

width 39 mm
height 47 mm
depth 19 mm

weight 55 g



EKT 25
ESTI Excess Temperature Protector Switch for incorporation purposes, enclosed in a ceramic housing, single-pole circuit-breaker, 25 A. 380 V.

This simple switching appliance was developed in order to make the best use of the technical advantages of the ESTI cartridge and to them to the widest possible range of use.
The EKT 25 represents the very best solution from both the technical and the economic point of view.
It is suitable and intended for being built into:
electric cookers, irons, coffee-machines, electric fires, laboratory appliances, starters and oil contactors, in short wherever this small, inexpensive and absolutely reliable switching appliance can be installed and used as an automatic heat controller.

Maximum limit of usability: 572° F. (300° C.)

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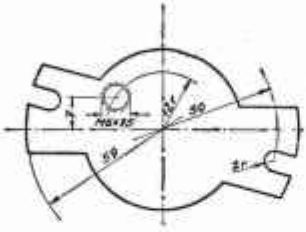
ESTI PROTECTION

ES 15

1 and 3-pole
15 amp.
380 volts
height 1-pole 58 mm
3-pole 70 mm
Ø 64 mm
weight 15/1 U 120 g
15/3 160 g



ES, EST, ETT base plate

(with cover as EST 15-see following page)

ES 15
ESTI Excess Temperature Protector Switch with ESTI Cartridge built-in to base plate, single and triple-pole switch, 15 A., 380 V.

An ESTI cartridge inserted in the recess of the base plate holds the switch in the on position. The aluminium base plate of the switch being in close contact with the apparatus to be protected attains the temperature of the latter. When the temperature at the base plate exceeds the limit set by the ESTI cartridge the latter bursts, releasing the switch, which then breaks the circuit of the current. After a new ESTI cartridge has been inserted, the ES 15 is then immediately ready for use again at once. It is available either as a **single-pole switch (ES 15/1 U)** to be used as a change-over switch, or a **triple-pole switch (ES 15/3)** to be used as a circuit-breaker.

Maximum ambient temperature + 266° F. (130° C.)

Application: for the protection of motors, live rails, bearings etc.

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EST 15

ESTI PROTECTION

1 and 3-pole
15 amp.
380 volts
control head
Ø 64 mm
height 60 mm
3-pole 70 mm
length of probe
approx 180 mm
Ø 12 mm
weight 15/1 U 200 g
15/3 240 g

EST 15 ESTI Excess Temperature Protector Switch with ESTI Cartridge in the probe, single and triple-pole switch, 15 A. 380 V.

For the purpose of controlling the **interior** of appliances, apparatus etc. or of being as near the source of heat as possible the safety switch EST 15 is equipped with a **probe.** The ESTI cartridge is inserted into the bottom part of the probe and holds the switch through a spring-loaded locking-pin. When the cartridge comes into action the locking-pin releases the switch, thus producing the desired reaction. The EST 15 is supplied with a $^1/_2$" cap nut with gas pipe thread to permit installing the cartridge in a protecting tube. Standard length of probe 7 in. (180 mm), diameter of probe 0.47 in. (12 mm). Special probes having a length of from 21/2 to 40 in. (ca. 80 to 1000 mm) on application. The EST 15 is supplied in the shape of either a single-pole switch to be used as a **change-over switch (EST 15/1U),** or a **three-pole switch (EST 15/3)** to be used as a circuit-breaker.

Maximum probe temperature 572° F. (300° C.)
Maximum ambient control head temperature
+ 266° F. (130° C.)

Range of application: oil cooled transformers, air heaters, drying ovens, hardening furnaces, baker's ovens, sterilizers, distilling apparatus, instrument cookers, generators, autoclaves, etc.

ETT 15/1 U ESTI Excess Temperature Protector Switch with insulated probe, single-pole change-over switch, 15 A. 380 V.

The structure of the Safety Switch ETT 15 is, in principle, the same as that of the EST 15, but its probe is made of insulating material throughout. This safety switch permits, for the first time, the thermal control directly in high voltage fields and in high frequency magnetic alternating fields, e. g. in high voltage air-cooled transformers, induction furnaces, rectifiers, transmitting valves etc. In the former case, the insulated probe can be positioned directly in the voltage field between the primary and the secondary windings and directly over the air cooling channel, or on the windings. Standard length of probe 7.87 in. (200 mm), ∅ 0.47 in. (12 mm).

Maximum temperature: + 266° F. (130° C.)

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ESTI PROTECTION

EG 6

1 or 2 poles
6 amp.
380 volts

control head
77 x 36 x 36 mm

length of probe
standard ca. 200 mm
Ø 12 mm

weight 200 g

EG 6 1/U ESTI Excess Temperature Protection Switch with Probe containing the ESTI Cartridge, single pole change-over-switch 6 A. 380V. splash-proof.

This switch is used in a similar manner to the EST 15 (Page 15). The EG 6 however is splashproof. The normal arrangement is for single pool change-over contacts, but can be varied to two normally open or normally closed contacts. It can also be supplied with a $^1/_2$" cap nut with a gas pipe thread.

Normal length of probe ca. 7.87 in. (200 mm) ∅ 0.46 in. (12 mm).

Maximum temperature for probe 300° C.

Maximum temperature for control head 70° C.

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BS 3

ESTI PROTECTION

3-pole
20 and 30 amp.
380 volts
control head
56×39×31 mm
length of probe
standard approx. 85 mm
Ø 12 mm
weight 20 amp. 125 g
30 amp. 160 g

BS 3
ESTI Excess Temperature Protector Switch with ESTI Cartridge in the probe, triple-pole, 20, 30 A. 380 V.

The safety switch BS 3 is a three-pole circuit-breaker. It can be supplied with or without $^1/_2$" cap nut with gas pipe thread. It is suitable and specially intended for being built into flow type heaters, electric washing maschines, electric fires, oil-prewarmers, steam-generators, pressure-reservoirs, and the like.

Standard length of probe approx. 3.2 in. (85 mm), 0.46 in. (12 mm).

Maximum temperature for probe: + 572° F. (300° C.)

Maximum ambient temperature
for control head max. + 266° F. (130° C.)

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BS 6

3-pole
25 amp.
380 volts
control head
58×40×32 mm
length of probe
app. 85 mm
Ø 12 mm
weight 160 g
STP 6
plug-in socket for BS 6
71×40×14 mm
weight 50 g

BS 6
ESTI Excess Temperature Protection Switch with Probe, with plug-in socket plate STP 6, triple-pole, 25 A. 380 V.

The safety switch BS 6 is in its range of application similar to the type BS 3 on page 18. An advantage of this switch is the control and if necessary the replacement of the ESTI cartridge through simple removal of the switch from the plug-in socket. It is suitable and specially intended for being built into steam-generator plants, thermoblocks, heating appliances, pressure reservoirs, flow type heaters, electric washing maschines etc.

Standard length of probe approx. 3.3 in. (85 mm).

Maximum temperature for probe: 572° F. (+ 300° C.)

Maximum abient temperature for controlhead +266° F. (130° C.)

ESTI APPARATEBAU
BERLIN-WILMERSDORF · BERLINER STRASSE 18
TEL. 87 18 51 · TELEGR.-ADR. ESTIPATRONE · FERNSCHR. 01 83351

EKT 26

ESTI PROTECTION

1-pole
25 amp.
380 volts

control head
39×19×41 mm

length of probe
standard app. 180 mm
Ø 12 mm

weight 100 g
with screw cap 140 g

EKT 26
ESTI Excess Temperature Protector Switch, for incorporation purposes, complete with ceramic housing and probe single-pole circuit-breaker, 25 A, 380 V.

The safety switch EKT 26 is similar to the type EKT 25, but it has a probe which can be brought into direct contact with the source of heat.

Here, too, the ESTI cartridge is inserted into the bottom part of the feeler. Standard length of probe approx. 7 in. (180 mm), Ø 0.47 in. (12 mm). If required, the switch can be supplied with a $^1/_2$" screw nut with gas pipe thread.

Maximum temperature + 572° F. (300° C.)

Application see page 31

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ESTI PROTECTION

EST 60/3

3-pole
60 amp.
380 volts

control head

height 140 mm
width 87 mm
depth 87 mm

weight 1000 g

EST 60/3
ESTI Excess Temperature Protector Switch with probe, triple-pole circuit-breaker, 60 A. 380 V.

Developed at the suggestion of Industry this ESTI Excess Temperature protector switch EST60/3 enables for the first time **60 amp. 380 volts to be broken direct.** In unregulated heated processes this high contact rating in many cases saves the necessity of a relay. In regulated heating processes it is an additional safety factor if the regulating system or the relay fail. In type EST 60/3 the temperature-sensitive element is the ESTI cartridge, which is placed in the probe and at a pre-set temperature limit breaks out the current with absolute certainty before further overloading and consequent high temperature can become dangerous.

Standard length of probe approx. 180 mm.

Maximum temperature limit : + 572° F. (300° C.).

Maximum ambient temperature for control head:
+ 266° F. (130° C.)

ESTI APPARATEBAU
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EST 6/800

ESTI PROTECTION

1-pole
6 amp.
800 volts DC
control head
Ø 70 mm
height 88 mm
probe length
approx. 100 mm
Ø 12 mm
weight 260 g

EST 6/800
2-pole
6 amp.
800 volts DC
control head
Ø 70 mm
height 113 mm
probe lenght
approx. 100 mm
Ø 12 mm
weight 360 g

EST 6/800 (Railway Switch)
ESTI Excess Temperature Protector
Switch with Probe, 1-pole, 6 A.
800 V. DC.

The EST 6/800 protector switch is a single or double pole cut-out switch. It can be supplied with or without screw cap $^1/_8$" gas pipe thread. The purpose of this switch is to prevent with absolute certainty damage which can occur in railways of all kinds, e. g.

a) through heating failure,
b) failure of de-frosting system,
c) failure of cooling system etc.

Standard length of probe approx. 100 mm, ∅ 12 mm.
Max. temperature limit for the probe 300°C.
Maximum ambient temperature for control head +266° F. (130° C.)

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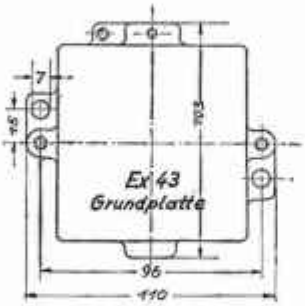
ESTI PROTECTION

EX 43

For AC supplies
rated amperage 2 A
rated voltage 220 V
rated capacity
up to 100 VA
length (including probe) approx. 180 mm
width approx. 120 mm
height approx. 60 mm
length of probe ca. 60 mm
weight approx. 1,2 kg



EX 43 base plate

EX 43 ESTI Explosion-proof Temperature Switch
(PTB no. III B/E-2305
Bb. no. 16466/53
dated 27th October, 1953)

Protective systems:
(EX) eG 5 as per VDE 0171
Housing:
P 43 nach DIN as per 40050

The mercury contacts are in a dust and waterproof cast iron housing. The switch on type EX 43 is for use in enclosed hazardous areas where gasses of groups G1-5 are liable to be present. Application: liquid fuel depots, refuelling stations, chemical industries, spinning mills, and other places where explosions may occur.

Maximum ambient temperature. 194°F. (90°C.)

ESTI APPARATEBAU
BERLIN-WILMERSDORF · BERLINER STRASSE 18
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EX 61

ESTI PROTECTION

ESTI explosion-proof, Excess Temperature Protection Switch single-pole change-over switch, protective system EX d3n G5 as per VDE 0171.

Licensed under Test Certificate PTB-Nr. III B/E-8711.

The dust and splash proof switch is in an insulated housing.

Special advantages:

a) installable in any position
b) shock-proof

The type Ex 61 can be used in factories which are endangered by inflammable substances of all classes of combustion and means of ignition.

Fields of application: drying-stoves, ships, petrol-stocks, airports, stations, chemical industries, spinning mills and other areas where any danger of explosion exists.

The switch can be supplied with or without probe.

(see also next page.)

Maximum ambient temperature:
+ 194° F. (90° C.)

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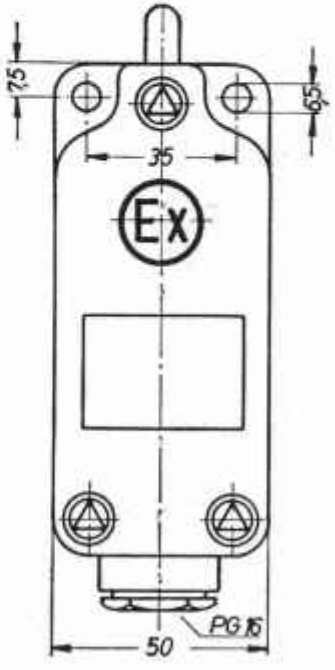
ESTI PROTECTION

EX 61

For AC supply
Breaking capacity
6 amp., 380 V.
Protective system
Ex d3n G5
as per VDE 0171
length with probe
320 mm
length without probe
150 mm
width 50 mm
height 50 mm
weight with probe
470 g
weight without probe
400 g



Maximum abient temperature + 194° F. (90° C.)

ESTI APPARATEBAU
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ETA 12

ESTI PROTECTION

Ø 12 mm
length 180 mm
weight 60 g

ETA 12 Thermal probe

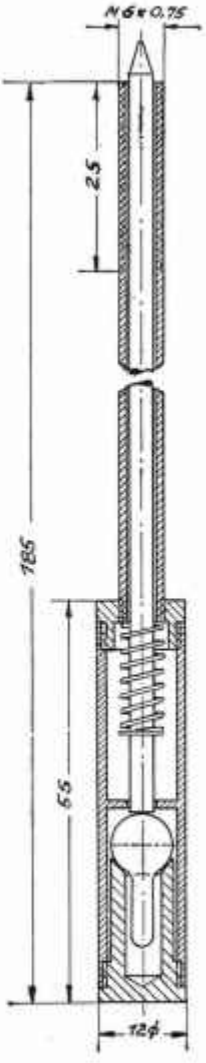
As well as actuating the contacts of an electrical circuit the ESTI cartridge can be used as a mechanical actuator.
The ETA 12 is an ESTI probe in which the ESTI cartridge carries a spring-loaded pin. When the ESTI cartridge comes into action the pin is forced down producing the desired effect e. g. releasing sprinklers spillvalves, pilot valves etc.

The probe is not sealed against fluids and gasses.

Supplied with or without visor cutting as ETZ 13 (next page).

The ETA 12 model is employed with a probe for all purposes. Material used is nickeled brass. Spring: heat resistent up to 350° C. In all ESTI models and in ETZ 13 and TR 16 the locking-pin is made from special corrosion- and acid-proof steel. The use of a protecting tube is recommended where the surrounding liquid or gas might impair correct operation.

Maximum temperature 300° C.



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ESTI PROTECTION

ETZ 13

head 12 × 12 × 16 mm
total length 67 mm
Ø 12 mm
weight 30 g

ETZ 13 ESTI-Thermo-Intermediate Link
with or without visor cutting

Whenever doors, bulkheads, throttle and other valves, cocks etc are to be opened or closed at certain temperatures the ETZ 13 is recommended for use whenever. The locking pin held in position by the ESTI cartridge connects two links which can be loaded to a maximum of 66 lbs. (30 kg). When the ESTI cartridge comes into action the locking pin snaps back, the strain is released and the desired protecting process commences.

The ETZ 13 is ideally suited as a fire-alarm in halls and large rooms, such as exhibition halls and warehouses, stores, theatres, and cinemas. Any number, according to local conditions, of the ETZ 13 can be installed as an endless chain, one end being attached to a spring while the other end is connected to a limit switch which is operated when the ESTI cartridge comes into action. This arrangement offers the advantage that there is no need for installing electric wires in the room or hall to be protected and that the only wires necessary are those leading, on one side of the room,to the limit switches. This means a considerable saving. Rooms where explosions may occur are exeptionally well protected by the ETZ 13 due to the absence of sparking.

Maximum temperature 300° C.

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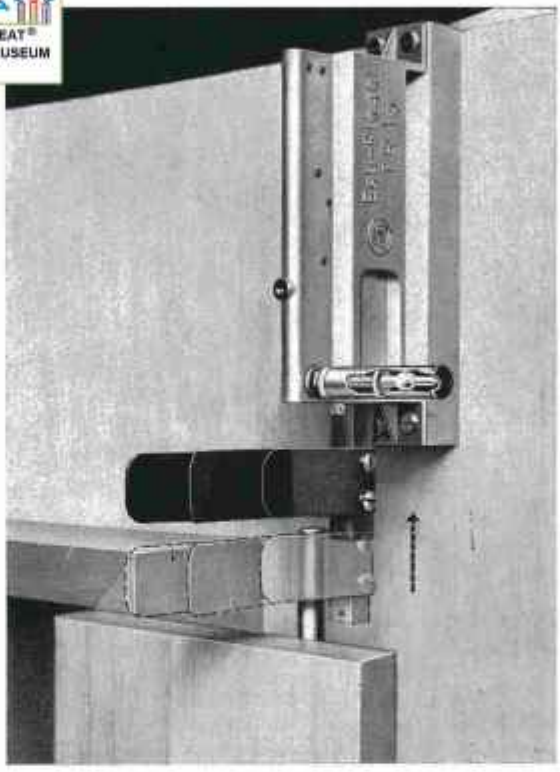
TR 16

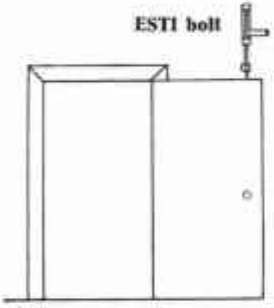
ESTI PROTECTION

ESTI-Door mechanism

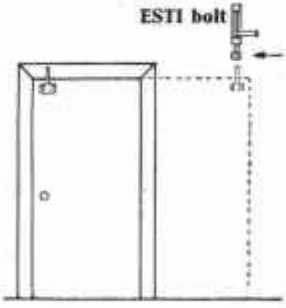
height 235 mm
width 30 mm
depth 70 mm
width with retaining springs 135 mm
weight 920 g



door open
locking bolt engaged in retainer



door closed
After operation of the cartridge the retaining lug springs upwards, releasing the door



This temperature actuated door mechanism is for use with doors not larger than 2.3 m². The shutting force of the door springs should not be more than 8 kg. Normal operating temperature 122°F (50°C).

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ESTI PROTECTION

CE 50

ULTIMHEAT®
VIRTUAL MUSEUM

height 75 mm
width 41 mm
thread ½"
weight 120 g

CE 50
Sprinkler with ESTI Cartridge with or without impact plate

This sprinkler is an important use for the ESTI cartridge. The **Centre for Mine Rescue work** has subjected the two sprinklers PL 55 and CE 50 to the notoriously strict tests and passed them to be installed for use in mines below ground. What is recognised as appropriate under the especially demanding conditions in mining is naturally also eminently suitable for use in other spheres of industry.

Fire protective installations with sprinklers controlled by ESTI cartridges are extremely valuable for works and plant subject to fire hazard, and especially for warehouses, silos, garbage disposal plants etc., stores, theatres, cinemas, ships etc. — in brief, everywhere where it is essential to **extinguish at once any focus of fire** arising, automatically and with the appropriate use of water feeding devices. The absolutely reliable ESTI cartridge makes the sprinkler an indispensable element in effective fire-extinguishing installations.

The sprinkler is mounted for an operating temperature of +158° F. (70° C.)

Made in cadmium-plated brass.

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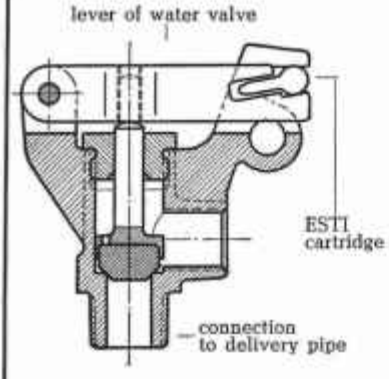
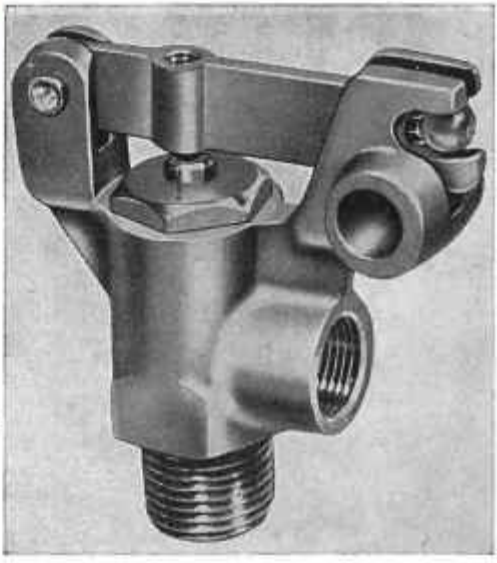
PL 55

ESTI PROTECTION

height 80 mm
width 80 mm
thread ½"
weight 340 g





The PL55 unit can be used either as a high pressure directional jet or to feed a multi-sprinkler installation. It operates accurately and speedily when the cartridge bursts, and has been tested by the German Office for Life saving in Mines.

The ESTI cartridge blocks the water valve and very accurately responds to temperatures from 86° F. (30° C.). Immediately on bursting it releases the water jet to extinguish the fire. Due to the absolute reliability of the ESTI cartridge and its insensitiveness to exterior effects, this sprinkler is an indispensable life and material protecting element of the technical equiment in plants and installations where fires may occur. A practicular advantage is the speed and simplicity of restoring the unit for use by installing a new cartridge.

The sprinkler is mounted with a reinforced ESTI cartridge for an operating temperature of 140° F. (55° C).

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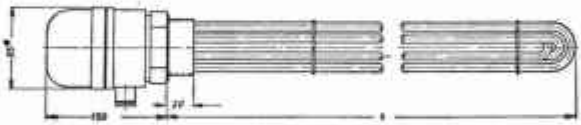


An immersion heater fitted
with a switch type EKT 26 and BS 3

The wish expressed by many users to have immersion heaters and temperature controllers combined wih the perfectly dependable protection afforded by ESTI Protectors can now satisfied by building our EKT types into these elements.

The illustrations show an immersion heater fitted with an ESTI protector EKT 26*).

Translation from the German of a report issued by the

Chemisch-Technische Reichsanstalt
vereinigt mit dem
Materialprüfungsamt
zu Tgb. Nr. T 939/51
IV 291/51

Berlin-Dahlem, April 17th, 1951

Report
On the responsive accuracy of „ESTI" Cartridges as components of excess-temperature safety devices.

The firm of Ing. Sebastian T h i e l m a n n, ESTI Apparatebau, of Berlin-Wilmersdorf, produces „excess-temperature safety devices" in various designs for releasing switch and alarm installations in the event of fire and other undesirable enhanced temperature conditions. These safety devices contain as the releasing component what are known as ESTI Cartridges. The ESTI Cartridges are glass bulbs filled with fluid and then sealed by melting, containing a small, dosed residue of air. On heating, fluid and air expand until the inside pressure reaches the breaking limit of the glass bulb and on further slight temperature rise causes it to burst. According to the quantity of air remaining in the bursting bulb (the ESTI Cartridge), the bursting or response temperature of the cartridges varies. The bursting of the ESTI Cartridge can release stressed springs and the like and effect switching actions of a mechanical or electrical nature. The response temperatures of the ESTI Cartridges can within wide limits be adapted to the particular requirement. ESTI Cartridges in 10° C steps for the range between 30° C and 300° C have been mentioned as in commercial circulation. The makers, at the suggestion of the working committee for prevention of damage, have requested the Reich Institute for Industrial Chemistry, which is incorporated in the Material Testing Authority, to perform tests to establish the variances.

After experiments to establish orientation, samples of 25 ESTI cartridges each for the temperature grades 40°, 70°, 110°, 130°, 150°, 240°, 300° C were taken from a stock presented here for selection. The fluid contents of the glass bulbs differed in colouring, thus giving a clue for characterising with the response temperatures at which the ESTI cartridges were supposed to burst.

In accordance with agreement, the test extended to ascertaining
1. the response period (period until bursting of the bulbs after introduction into the medium heated to response temperature),
2. discrepancy from rated bursting (response) temperature.

The tests were performed in a thermostat specially made for the purpose, for which the heating bath was a colourless liquid in a beaker. In fitting indentations in the lid of this beaker were empty test tubes, immersed as to half their total length in the bath liquid. In one of the tubes stood

a Vertex thermometer, which regulated the heating device of the beaker over a relay switch. In another tube was a calibrated control thermometer, and the remaining test tubes held the samples. This arrangements guaranteed that all the cartridges in the thermostat were exposed to the temperature shown by the control thermometer.

As to 1. In ascertaining the response period, five cartridges were put simultaneously in the test tubes (one cartridge to each tube) after the temperature had been set to 5° C above the rated response temperature, using the Vertex thermometer.

The transparency of the apparatus allowed the behaviour of the bulbs to be observed. The period until the ESTI cartridges burst was recorded with a stop watch.

As to 2. To ascertain discrepancy from the rated bursting (response) temperature (responsive accuracy) the bulbs were placed in the test tubes after the bath had been cooled to 20° below the given response temperature. The temperature was raised at the rate of about 0.5° C/min. On the cartridges bursting the temperature obtaining in each case was read off the control thermometer.

The values ascertained are attached in tabular and graph form *).

Neither test revealed any noticeable irregularities. The response period was 1.73 to 3.75 minutes.

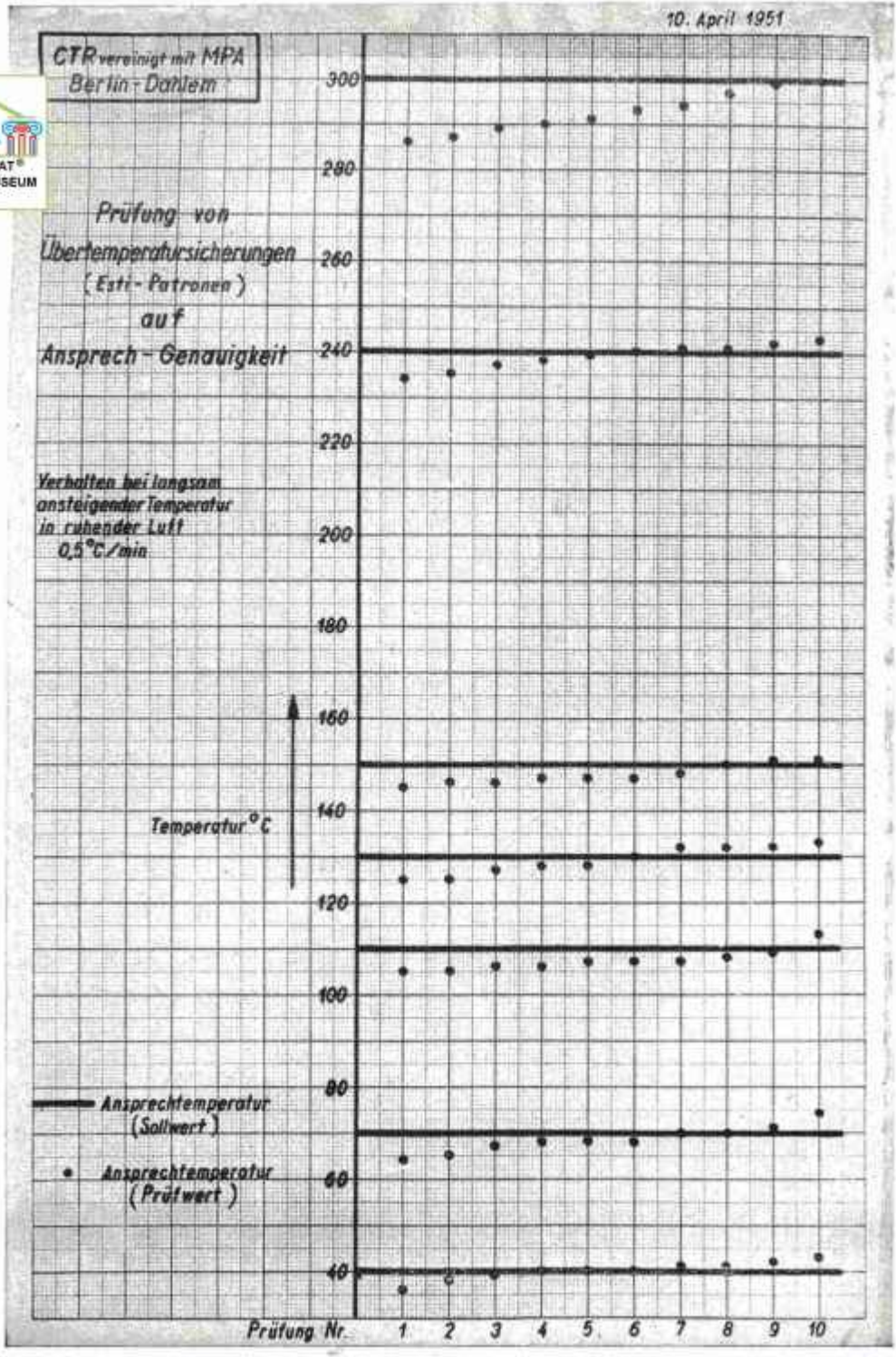
The statement of the makers that the bursting temperatures of the EST- cartridges lie with the tolerances of ± 5 percent is unmistakably true for those with response temperatures above 100° C. At lower bursting temperatures, particularly 0° C, it is not appropriate to express the tolerances in C percentages, as these would converge on the zero value. If the requirement for this range is for a tolerance of ± 5° C, the condition was fulfilled in the test in all cases.

Materialprüfungsamt Berlin

Hauptabteilungsleiter

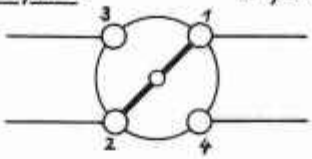
Sachbearbeiter

*) For table see following page.



ES und EST 15/1U

einpoliger Umschalter



ES und EST 15/3

dreipoliger Ausschalter

ein

aus

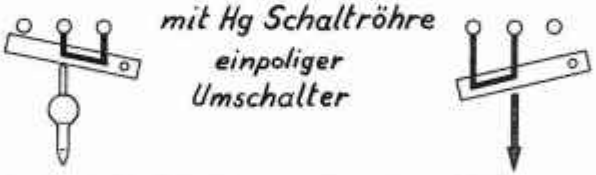
Ex 61

einpoliger Umschalter

Ex 43

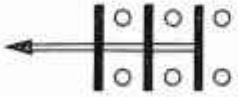
mit Hg Schaltröhre

einpoliger Umschalter



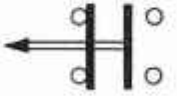
BS3 und BS6

dreipoliger Ausschalter



EG 6

einpoliger Umschalter



EST 60/3

dreipoliger Ausschalter

aus

ein

Esti Apparatebau
Berlin

General indications

The standard length for ESTI Excess Temperature Protection Appliances with probe will be found in the catalogue. Moreover these appliances with probes can be supplied for maximum length of 800 mm. The prices for these units are stated in the price-list.

ESTI Cartridges are manufactured in a standard design with operating temperatures of 30° C to 300° C.

Reinforced ESTI Cartridges for mining etc. require special manufacture and can be produced from 50° C upwards. Minimum orders 100 pieces, prices on application.

ESTI Cartridges with an operating temperature of 30° C burst at luke-warm temperatures and they therefore need expert treatment in fabrication, dispatch and storage. Store during the warm season only in a refrigerator. Despatch during summer time at consignee's own risk.

The quoted measurements, weights and illustrations may vary. We reserve the right to make alterations.

Prices of our appliances are to be understood (unless specially noted) as not including ESTI Cartridges.

ESTI Cartridges with an operating temperature of 30° C and those over 300° C are supplied at an extra charge (see price list).

All prices are to be understood ex factory Berlin, packing not included.

Terms of payment: 14 days after date of invoice with 2 % discount.
30 days after date of invoice net cash.

The general sales and delivery conditions for products and service of the German electrical industry apply.

ESTI-Appliances and ESTI-Cartridges being Safety-Protection-Elements it is essential that they be handled with care and inspected regularly to keep them in working order.

All contracts shall be construed under German Law and the Court of Berlin-Charlottenburg.

ESTI-Cartridges and switch gear are protected by world-wide patents.

ESTI-APPARATEBAU
ING. SEBASTIAN THIELMANN GMBH
1 BERLIN 31, BERLINER STRASSE 18
TEL. 87 18 51 · TELEGR. ESTIPATRONE · FERNSCHREIBER 01 83 351