Linear Heat Detection System

Technical Specification

Introduction:

The Linear heat sensor cable system with electronic sensors is a temperature measurement system and a resettable line type heat detector, according to “FprEN54-22:2012-03”. It continuously measures and monitors the temperature in the area deployed to provide a reliable and early alarm if any abnormal rise of temperature occurs or if the temperature reaches at any point the maximum temperature threshold.

System Features:

The Linear heat sensor cable system should measure the temperature along the cable installed, with distance between sensors freely selectable with a resolution of 0.1° and a permanent accuracy of 0.1 °, within a maximum 10 seconds measuring cycle for all the connected sensors.

The Linear heat sensor cable system should automatically give the signal to the SCADA and to the fire panel, which transmits the alarm to the Emergency Services, with the highest adaptability in fire detection for specificity and very precise fire location.

Each sensor should have its own address. The position of each sensor within the cable on the cable sheath should be indicated by specific marking.

The alarms and pre-alarms thresholds should be freely selectable. The alarm temperature thresholds can also be different and freely programmed for the different alarm zones in the area deployed.

The Linear heat sensor cable system should react to both convection and heat radiation (detection of variations and temperature gradients).

The control units and the sensor cable should be immune against typical appearing vibrations in the area deployed.

The Linear heat sensor cable outer sheath should be halogen free and flame-retardant according to the following norms relative to fire behaviour and smoke emission in case of fire EN 50267-2-1:1999-04 + EN 50267-2-2:1999-04, EN 60332-1-2:2005-06 + EN 60332-2-2:2005-06, EN 61034-2:2006-03, IEC 60754-1 + IEC 60754-2. Additionally, the aramid fibres inside the sensor cable should serve as reinforcement in case of fire.

The Linear heat sensor cable system’s maintenance-free operation should allow the sensor cable to be used in areas which are not accessible during normal operation and should be able to be branched.

No calibration should be required to maintain the high accuracy and precision for the fire detection for this system.

The Linear heat sensor cable system should be freely adaptable to the area which it is deployed and specially to the security requirements: flexible sensor spacing, free alarm zones programming for easy matching with the other security equipment, easy integration by open protocol or/ and relays contacts, full automatism and self-checking of the system functions, different possible configurations in accordance with the required security level, simple, with loop back or with total redundancy for the complete system, inclusive the controllers.

Sensor cable:

It should be a completely sealed cable to protect sensors from the environmental influences.
It should be a Four-core flat cable with hybrid circuits located each xx meter (integrated circuits with a defined address and a semiconductor temperature sensor, electrically connected by the four-core flat cable; xx= free selectable distance in meter between sensors inside the cable.
It should have Filler material: Complete aluminium shield against EMI
The Outer sheath (cable jacket): grey halogen free and flame retardant according to the following norms relative to fire behaviour and smoke emission in case of fire EN 50267-2-1:1999-04,EN 50267-2-2:1999-04, EN 60332-1-2:2005-06, EN 60332-2-2:2005-06, EN 61034-2:2006-03, IEC 60754-1, IEC 60754-2
It should have Fixed individual addresses determine each sensor's exact location within the cable.
The Sensor positions should be marked on the cable sheath by an ascending “4 digit” imprint followed by the cable identifier, rendering every cable and each sensor re-traceable.
Early and precise fire detection thanks to the high sensitivity, precise temperature measurement and fire location.
Reparability: In case of accidental cut or after a fire, the sensor cable should be quickly repaired, by cutting out the damaged part (not the whole sensor cable to be replaced) and fitted in the new part , or either with connection boxes or either with completely sealed sleeves.
The Sensor cable should have the following features:

a) Measure temperature from -40°C to +85°C range, and up to +200°C for short periods.
b) Temperature measurement resolution: 0.1°C (which enables to use such system for an accurate temperature monitoring in the area deployed)
c) Repeatability: +/- 0.1K.
d) Calibration free temperature sensor cable
e) Freely selectable sensor spacing (for instance: each 4m, 8m, 10m, etc)
f) Bi-directional bus, for easy branching via connection boxes
g) Automatic control of all sensors every 10 seconds
h) Cable jacket Ø =18mm
i) Aluminium shield
j) Filler material
k) Hybrid chip
l) 4-core flat conductor
m) Strain relief
n) Constant sensor monitoring via control and evaluation unit
o) Supply voltage: 15V DC via the system controller
p) Cable diameter: approx. 18 mm
q) Cable weight: approx. 0,45 kg/m
r) Bending radius: ≥ 30 cm
s) Sensor address range: 0...999

System controller:

Supply “15 V DC” to the sensor cable* trough the connection cable and the connection box,

*One or two sensor cable lengths or groups of sensor cable branches may be connected, up to 3200m per sensor cable connection with sensors each 10m, max. 500 sensor per cable connection (320 approved by VdS Schadenverhutung according to “FprEN54-22:2012-03)
Perform measuring cycles in 10 second intervals, addressing each of all the connected sensors, acquiring all temperature values and analysing them.
Read the measured temperature values with high temperature resolution (0.1°)
Recurring measurement accuracy of 0.1°
Up to 254 programmable individual alarm zones with alarm, and fault status signalling to superordinate systems via up to 16 relay modules with 16 relay contacts each.
Evaluate the data according to different criteria.
Alarm triggering via differential and maximum temperature evaluation. Free from false alarms, caused by natural ambient temperature fluctuations, due to intelligent evaluation algorithms
Alarm and fault indications via LEDs an LC-Display plain text messages in the chosen language (available and configurable at the present time in alphabetic order: Dutch, English, French, German, Italian, Polish Spanish, and Swedish)
Signalling of alarms and fault status should take place visually by a lit alarm LED, and via text message on front panel display, electrically via three common alarm relays
Navigation and function keys. 5 button membrane keyboard for many navigation, data and function input.
Web-interface (for commissioning)
USB host interface (optionally saved alarm temperature data, transfer unit configurations, perform software update)
Configuration down load from memory stick
Individual password-protected access levels for operators, maintenance and service personnel, as well as for commissioning
Maintenance file: Easy access through USB and specific codes to the lecture of all the programming parameters and functions status from the system controller. Displaying maintenance file and possibility to save the file to the PC. This file contains the configuration, set parameters, message list, temperature list, fault status, differential temperature lists and internal events.
Easy replacement of board cards inside the controller. Once connected, the temperature monitoring will be indicated automatically with the predetermined parameters functions.
No calibration or adjustment is necessary.
The Controller should have the following Features:

a) Operating temperature : -5°C to +70°C range (-25° feasible with the exception of an illegible LC-display)
b) Power supply: 9,5V...36V DC
c) Current draw : typ. 175 mA (normal) / 212 mA (Alarm), at 24 V DC
d) Power consumption: Max. 5 W
e) Relay output : 1 Relay each for alarm, pre-alarm, frost alarm
f) 1 relay for fault (= active without power)
g) Switching voltage : 48 V DC / 32 V AC max
h) Switching current: 250mA max (resistive load)
i) Input: 1x external reset (5V....36 V DC)
j) Highly durable via utilisation of maintenance-free components in a modular configuration,
k) RoHS compliant.

l) Support connection box for connection between the sensor cable and the connection cable (CC) or for the connection between 2 sensor cables for covering larger distances.
m) Support relay modules with 16 relays for Alarm per zone, Pre-alarm per zone and Fault per zone
n) Support Communication via RS 485

Temperature Alarm thresholds

Maximum and differential alarm thresholds should be freely programmable for each alarm zone by 0.1° steps.
A maximum temperature alarm shall be issued, if a sensor's actual temperature exceeds the maximum temperature threshold.
Freely adjustable absolute alarm threshold, e.g. 50°C (55°C as a default for classes A1N and A2N / or 70°C for class BN)
A differential temperature alarm shall be issued, if a sensor's differential temperature exceeds the differential temperature threshold.
Freely adjustable differential alarm threshold, e.g. 2,8K (2,5K as a default for classes A1N, A2N and BN)
Reference profile:
The reference temperatures of all sensors are derived from their actual temperature measurements, in order to compensate for natural ambient temperature fluctuations (i.e. Day, night, and seasons). This reference profile should get updated with every measuring cycle.
A differential temperature alarm “fire alarm” should be issued if the differential temperature of a sensor “n” exceeds the differential temperature threshold. This guarantees no false alarms due to natural ambient temperature fluctuations (i.e. Day, night, and seasons)

Integration / Alarm signalling and interfaces:

Alarm signalling should take place as:
Visually: by a lit alarm LED
Visually: via text message on front panel display with changing coloured back-ground
Electrically: via three common alarm relays (alarm, pre-alarm, frost alarm)
Optional: acoustically by the controller buzzer
Optional: electrically via up to 254 zone alarm relays
Optional: informally via data interface and software-Protocol
Interfaces:
RS 232 interface (programming and data communication with optional MODBUS protocol)
RS 485 (LIST network master/slave)
Ethernet for LIST network and data communication with optional MODBUS TCP or IEC 60870-5-104
USB Host: to save optionally saved temperature data files after alarms
Supported Software Protocols by the Controller: (Optional)
MODBUS (RTU) via serial interface
MODBUS TCP via LAN interface
Communication protocol to Esser/Honeywell FCP
Communication protocol to Bosch FCP
Communication protocol IEC 60870-5-104 via LAN interface
Simatic protocol 3964 R (Siemens) via serial interface.

Visualisation software: (Optional) - The software installed should be able to provide different temperature graphics inclusive in 3D.

Certifications

The system should be designed to meet “FprEN54-22:2012-03”.
It should verified and approved to “FprEN54-22:2012-03” by VdS Schadenverhutung, VdS Nr G213072.
It should meet requirements of environmental classification III
ISO 9001/2008 – quality management system.
All the above mentioned certificates should be submitted along with the bid along with the OEM authorisation certificate.