LISTEC® GmbH
Lineare Sensor Technik

Test Report

Effects of a 25kV catenary short circuit on the LIST and δ-LIST fire detection systems

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Contents:

1 TEST PURPOSE

The aim of this test was to determine whether a short circuit of the 25kV catenary would influence the function of the LIST and δ-LIST fire detection systems and therefore demonstrate the suitability of these systems for fire detection in rail tunnels.

The secondary purpose of the test was the determine the effect of induction from the 25kV line on the sensor cables.

Sensor cable mounted between two pylons at Thessaloniki-Aghialou

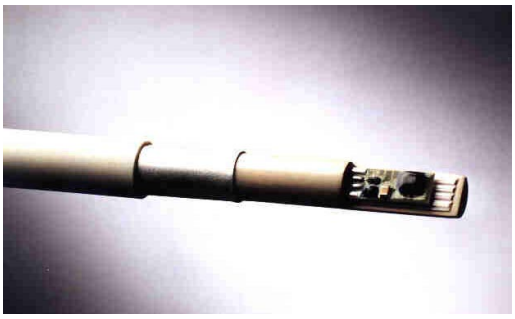
The tests were performed in co-operation with OSE S.A., the Greek railways and ERGOSE S.A., the management of the OSE Investment Program, a subsidiary of OSE.

The tests were performed by LISTEC GmbH, the manufacturer of the systems, and its Greek representative ACRONICAL Ltd.

The tests were performed on the electrified railway line in the area Thessaloniki-Aghialou.

2 MEASURING PRINCIPLE LIST (LINEAR SENSING OF TEMPERATURE)

The **LIST** fire detection system consists of a 4-core flat cable, with measuring points mounted at predetermined intervals and a sensor control unit, in this case a SCS4010. The measuring points are hybrids, which contain a so-called ASIC (application specific integrated circuit) and a semiconductor temperature sensor. These are enclosed by an hermetically sealed jacket. Measuring points have fixed addresses, therefore enabling their physical location.



The LIST Sensor cable type SEC20

The **δ-LIST** fire detection system consists of a 2-core flat cable, with measuring points mounted at predetermined intervals and a sensor control unit SCU800. The measuring points are enclosed by an hermetically sealed jacket. Measuring points have fixed addresses, therefore enabling their physical location.

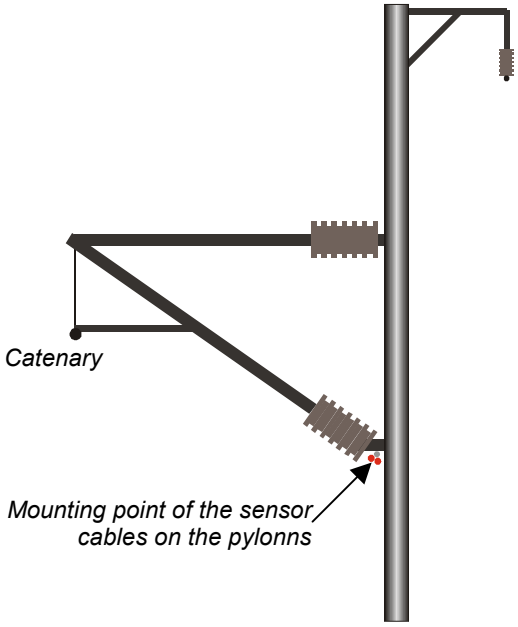
The δ-LIST sensor cable SEC15

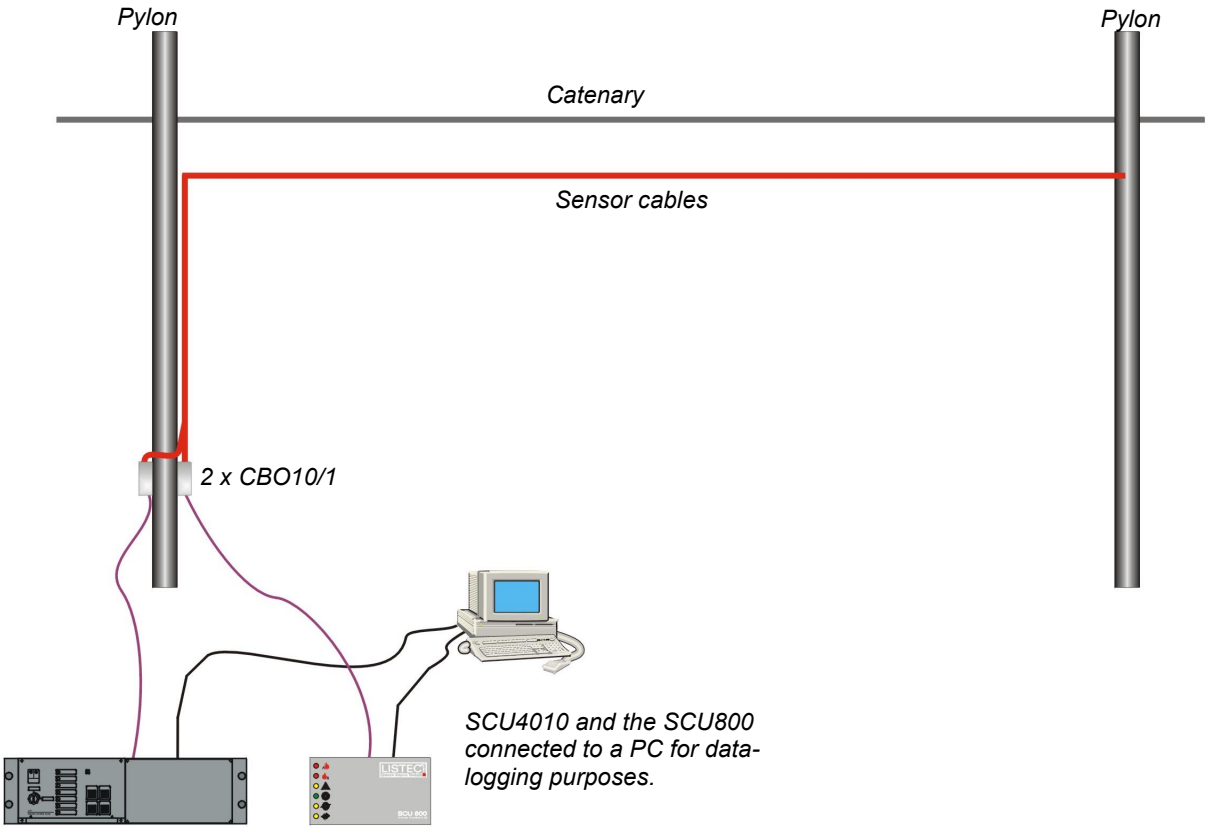
The operating principle of both the control units is similar: these provide electric power to the sensor cables, perform the cyclic addressing of the connected sensors, read the measured temperature values and evaluate the data with reference to different alarm-criteria.
The reference temperatures of all the measuring points, are gradually adjusted to the actual temperatures to compensate for natural temperature variations (e.g. day, night, seasons). Actual temperatures are continuously compared to the reference temperatures. A differential fire alarm is set when the differential temperature of a measuring point exceeds the differential temperature threshold TKRITD. A pre-alarm is given when the differential temperature is greater than 50% of the differential temperature threshold. An absolute fire alarm is set when temperature of a measuring point exceeds the maximum threshold.
An alarm can be localised by the measuring point address. In cases where many measuring points are in use, the creation of alarm sections has proven useful. This allows alarm signalling for sections of the monitored area.

3 TEST ARRANGEMENT

With courtesy of OSE S.A., Thessaloniki, two sensor cables were installed parallel to the 25kV catenary. The two sensor cables were attached to a steel cable, which was mounted between two pylons approximately 80m apart.

The diagrams below show the position of the sensor cables and the test arrangement.





The sensor cables were connected to the SCU's via a CBO10/1 (one per system) and a connection cable of the type J-Y(St)Y 2x2x0,8.

Both SCU's were connected to a personal computer (PC) for data-logging purposes. The SCU800 (δ-LIST) was connected to COM1 and the SCU4010 (LIST) was connected to COM2 of the PC. The temperature of each sensor was logged to file every 10 seconds. Each log-file contains the data of one SCU for 24 hours. The files have the format *dd_m_yy_c.LOG* where *dd* = day, *m* = month, *yy*=year logging took place and *c* = com-port of the PC to which the SCU was attached.

The differential thresholds for both SCU's was set to 3.4°, which is the standard setting for fire detection purposes. The installation of the sensor cables in the direct influence of the sun, required the absolute alarm threshold to be set to 70°C in both SCU's during the test period. All other parameters were set to standard values which are used for detecting fires with the LIST systems.

Data-logging did not take place over the whole test period, because the PC could not cope with the high temperatures in the room in which it was placed. At two consecutive visits to the PC was found to be out of order, at which point an air-conditioner was installed to prevent a further PC malfunction.

All logged data was handed over to an OSE technician for verification.

4 SYNOPSIS

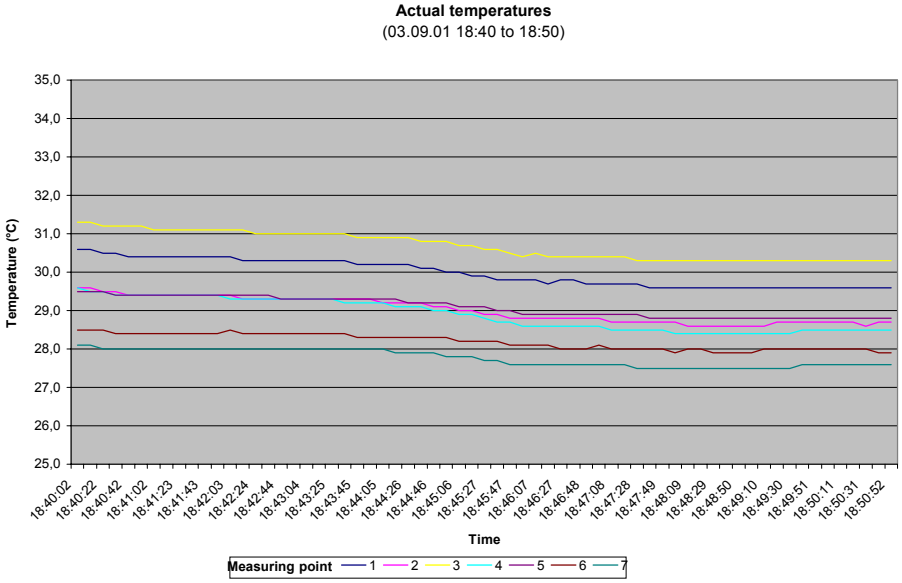
The table below shows the most important events and the resulting effects on the equipment:

Date	Time	Event	Result
26.07.01		System Installation / configuration Start data-logging	
27.07.01		PC graphics card defect / replaced	No data-logging
06.08.01		Visit by ACRONICAL technician: LIST: no alarms or faults present / set absolute threshold to 70°C δ-LIST: no alarms or faults present; set absolute threshold to 70°C PC: out of order (high temperature)	No data-logging Installation of air conditioner
12.08.01	17:35	Short circuit	LIST: No alarms / No faults δ-LIST: No alarms / No faults
18.08.01	18:35	Short circuit	LIST: No alarms / No faults δ-LIST: No alarms / No faults
21.08.01		Visit by ACRONICAL technician: LIST: no alarms or faults present δ-LIST: no alarms or faults present; PC: out of order (air cond. off)	No data-logging Air conditioner switched on
03.09.01	18:46	Short circuit	LIST: No alarms / No faults δ-LIST: No alarms / No faults
12.09.01		Visit by ACRONICAL technician: LIST: no alarms or faults present δ-LIST: no alarms or faults present; PC: in order	Data-logging complete End of test

5 RESULTS

LIST / SCS4010:

The data logged in the time around the third short circuit on the 03.09.01 at 18:46 is attached in appendix A. This is an extract from the file "3_9_01_2.LOG".



The data shows no change in temperature whatsoever. Attached in appendix B is a commented version of the maintenance log created on the 12.09.01, which shows all data recorded on completion of the tests. Important indicators for the correct functioning of the LIST system are the following entries:

FLIST the message list of the SCS4010. The following points must be noted:

- The two messages on the 26.07.01 resulted from the installation of the system
- The messages "`WARNG. - AT`" , which indicate a pre-alarm for the absolute threshold, result from the high ambient temperatures. This resulted in the increasing of the absolute alarm threshold to 70°C for both SCU's.
- The messages "UPS active" and "UPS n.activ" indicate the loss of and return of AC power at the SCU.

ILIST the internal fault list which detects anomalies in the system, is empty.

DLIST a logging function for maximum differential temperatures, has a value of 0.7° as a maximum value. This value is reached by normal day / night fluctuations in temperature.

δ-LIST / SCU800:

The data logged in the time around the third short circuit on the 03.09.01 at 18:46 is attached in appendix C. This is an extract from the file "3_9_01_1.LOG". Note: because the SCU800 has no internal clock, the times were logged by the logging software after the alarm status entry on completion of a temperature list.

The data shows no change in temperature whatsoever. An important indicator for the correct functioning of the δ-LIST system is the alarm status entry after each temperature list.

Note: during installation the sensors 106 and 107 were damaged and therefore indicate a temperature of –99°C.

6 APPENDICES

Appendix A - data logged in the time around the third short circuit on the 03.09.01 at 18:46 from the SCS4010. (extract from the file "3_9_01_2.LOG").

Appendix B - commented version of the SCS4010 maintenance log created on completion of the test on the 12.09.01 (file " SCU4010.WRT").

Appendix C - data logged in the time around the third short circuit on the 03.09.01 at 18:46 from the SCU800. (extract from the file "3_9_01_1.LOG").

Description of the command LISTC, which was used to generate the temperature logging of each of the control units:

Single, abbreviated temperature list output:
On entering LISTC1 a single output of temperature data over the whole monitored distance, including date, time, cyclical no. and sensor state (as in LISTP), is displayed in abbreviated form.
At the end of the listing, the system state is indicated:

FIRE! - DT	TKRITD exceeded
FIRE! - AT	TKRITA exceeded
ALARM! - UT	below TKRITC
FAULT	fault in SCU 3000 or in the sensor cable
NO ALARM	no fire or fault alarm

Appendix A

Data from the SCS4010 extracted from 3_9_01_2.LOG

```
LISTC1
D.: 03.09.01   T.: 18:39:41  C.No.:   1
   1/ 30.8/ 30.7
   2/ 29.8/ 29.7
   3/ 31.5/ 31.4
   4/ 29.7/ 29.6
   5/ 29.6/ 29.5
   6/ 28.5/ 28.5
   7/ 28.1/ 28.1
NO ALARM
DATE : 3_9_01
TIME : 18:40:08
LISTC1
D.: 03.09.01   T.: 18:39:51  C.No.:   1
   1/ 30.8/ 30.7
   2/ 29.8/ 29.6
   3/ 31.5/ 31.4
   4/ 29.7/ 29.6
   5/ 29.6/ 29.5
   6/ 28.5/ 28.5
   7/ 28.1/ 28.1
NO ALARM
DATE : 3_9_01
TIME : 18:40:18
LISTC1
D.: 03.09.01   T.: 18:40:02  C.No.:   1
   1/ 30.8/ 30.6
   2/ 29.8/ 29.6
   3/ 31.5/ 31.3
   4/ 29.7/ 29.6
   5/ 29.6/ 29.5
   6/ 28.5/ 28.5
   7/ 28.1/ 28.1
NO ALARM
DATE : 3_9_01
TIME : 18:40:28
LISTC1
D.: 03.09.01   T.: 18:40:12  C.No.:   1
   1/ 30.8/ 30.6
   2/ 29.7/ 29.6
   3/ 31.5/ 31.3
   4/ 29.7/ 29.5
   5/ 29.5/ 29.5
   6/ 28.5/ 28.5
   7/ 28.1/ 28.1
NO ALARM
DATE : 3_9_01
TIME : 18:40:38
LISTC1
D.: 03.09.01   T.: 18:40:22  C.No.:   1
   1/ 30.8/ 30.5
   2/ 29.7/ 29.5
   3/ 31.4/ 31.2
   4/ 29.7/ 29.5
   5/ 29.5/ 29.5
   6/ 28.5/ 28.5
   7/ 28.1/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:40:48
LISTC1
D.: 03.09.01   T.: 18:40:32  C.No.:   1
   1/ 30.7/ 30.5
   2/ 29.7/ 29.5
   3/ 31.4/ 31.2
   4/ 29.6/ 29.4
   5/ 29.5/ 29.4
   6/ 28.5/ 28.4
   7/ 28.1/ 28.0
NDATE : 3_9_01
TIME : 18:40:59
O ALARM
LISTC1
D.: 03.09.01   T.: 18:40:42  C.No.:   1
   1/ 30.7/ 30.4
   2/ 29.7/ 29.4
   3/ 31.4/ 31.2
   4/ 29DATE : 3_9_01
TIME : 18:41:09
.6/ 29.4
   5/ 29.5/ 29.4
   6/ 28.5/ 28.4
   7/ 28.1/ 28.0
NO ALARM
LISTC1
D.: 03.09.01   T.: 18:40:52  C.No.:   1
   1/ 30.7/ 30.4
   2/ 29DATE : 3_9_01
TIME : 18:41:19
.7/ 29.4
   3/ 31.4/ 31.2
   4/ 29.6/ 29.4
   5/ 29.5/ 29.4
   6/ 28.5/ 28.4
   7/ 28.0/ 28.0
NO ALARM
LISTC1
DATE : 3_9_01
TIME : 18:41:29
D.: 03.09.01   T.: 18:41:02  C.No.:   1
   1/ 30.7/ 30.4
   2/ 29.6/ 29.4
   3/ 31.4/ 31.1
   4/ 29.6/ 29.4
   5/ 29.5/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
LISTC1
DATE : 3_9_01
TIME : 18:41:39
LISTC1
D.: 03.09.01   T.: 18:41:13  C.No.:   1
   1/ 30.6/ 30.4
   2/ 29.6/ 29.4
   3/ 31.3/ 31.1
   4/ 29.6/ 29.4
   5/ 29.5/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:41:49
LISTC1
D.: 03.09.01   T.: 18:41:23  C.No.:   1
   1/ 30.6/ 30.4
   2/ 29.6/ 29.4
   3/ 31.3/ 31.1
   4/ 29.5/ 29.4
   5/ 29.5/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:41:59
LISTC1
D.: 03.09.01   T.: 18:41:33  C.No.:   1
   1/ 30.6/ 30.4
   2/ 29.6/ 29.4
   3/ 31.3/ 31.1
   4/ 29.5/ 29.4
   5/ 29.5/ 29.4
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   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:42:09
LISTC1
D.: 03.09.01   T.: 18:41:43  C.No.:   1
   1/ 30.6/ 30.4
   2/ 29.6/ 29.4
   3/ 31.3/ 31.1
   4/ 29.5/ 29.4
   5/ 29.4/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:42:19
LISTC1
D.: 03.09.01   T.: 18:41:53  C.No.:   1
   1/ 30.6/ 30.4
   2/ 29.5/ 29.4
   3/ 31.3/ 31.1
   4/ 29.5/ 29.4
   5/ 29.4/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:42:29
LISTC1
D.: 03.09.01   T.: 18:42:03  C.No.:   1
   1/ 30.6/ 30.4
   2/ 29.5/ 29.4
   3/ 31.2/ 31.1
   4/ 29.5/ 29.3
   5/ 29.4/ 29.4
   6/ 28.4/ 28.5
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:42:39
LISTC1
D.: 03.09.01   T.: 18:42:14  C.No.:   1
   1/ 30.5/ 30.3
   2/ 29.5/ 29.3
   3/ 31.2/ 31.1
   4/ 29.5/ 29.3
   5/ 29.4/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:42:49
LISTC1
D.: 03.09.01   T.: 18:42:24  C.No.:   1
   1/ 30.5/ 30.3
   2/ 29.5/ 29.3
   3/ 31.2/ 31.0
   4/ 29.5/ 29.3
   5/ 29.4/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:42:59
LISTC1
D.: 03.09.01   T.: 18:42:34  C.No.:   1
   1/ 30.5/ 30.3
   2/ 29.5/ 29.3
   3/ 31.2/ 31.0
   4/ 29.4/ 29.3
   5/ 29.4/ 29.4
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:43:09
LISTC1
D.: 03.09.01   T.: 18:42:44  C.No.:   1
   1/ 30.5/ 30.3
   2/ 29.5/ 29.3
   3/ 31.2/ 31.0
   4/ 29.4/ 29.3
   5/ 29.4/ 29.3
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:43:19
LISTC1
D.: 03.09.01   T.: 18:42:54  C.No.:   1
   1/ 30.5/ 30.3
   2/ 29.4/ 29.3
   3/ 31.2/ 31.0
   4/ 29.4/ 29.3
   5/ 29.4/ 29.3
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:43:29
LISTC1
D.: 03.09.01   T.: 18:43:04  C.No.:   1
   1/ 30.4/ 30.3
   2/ 29.4/ 29.3
   3/ 31.1/ 31.0
   4/ 29.4/ 29.3
   5/ 29.4/ 29.3
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:43:39
LISTC1
D.: 03.09.01   T.: 18:43:14  C.No.:   1
   1/ 30.4/ 30.3
   2/ 29.4/ 29.3
   3/ 31.1/ 31.0
   4/ 29.4/ 29.3
   5/ 29.4/ 29.3
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:43:49
LISTC1
D.: 03.09.01   T.: 18:43:25  C.No.:   1
   1/ 30.4/ 30.3
   2/ 29.4/ 29.3
   3/ 31.1/ 31.0
   4/ 29.4/ 29.3
   5/ 29.4/ 29.3
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:43:59
LISTC1
D.: 03.09.01   T.: 18:43:35  C.No.:   1
   1/ 30.4/ 30.3
   2/ 29.4/ 29.3
   3/ 31.1/ 31.0
   4/ 29.4/ 29.2
   5/ 29.3/ 29.3
   6/ 28.4/ 28.4
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:44:09
LISTC1
D.: 03.09.01   T.: 18:43:45  C.No.:   1
   1/ 30.4/ 30.2
   2/ 29.4/ 29.3
   3/ 31.1/ 30.9
   4/ 29.3/ 29.2
   5/ 29.3/ 29.3
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   6/ 28.3/ 28.3
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:44:19
LISTC1
D.: 03.09.01   T.: 18:43:55  C.No.:   1
   1/ 30.4/ 30.2
   2/ 29.4/ 29.3
   3/ 31.1/ 30.9
   4/ 29.3/ 29.2
   5/ 29.3/ 29.3
   6/ 28.3/ 28.3
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:44:29
LISTC1
D.: 03.09.01   T.: 18:44:05  C.No.:   1
   1/ 30.3/ 30.2
   2/ 29.3/ 29.2
   3/ 31.0/ 30.9
   4/ 29.3/ 29.2
   5/ 29.3/ 29.3
   6/ 28.3/ 28.3
   7/ 28.0/ 28.0
NO ALARM
DATE : 3_9_01
TIME : 18:44:39
LISTC1
D.: 03.09.01   T.: 18:44:16  C.No.:   1
   1/ 30.3/ 30.2
   2/ 29.3/ 29.2
   3/ 31.0/ 30.9
   4/ 29.3/ 29.1
   5/ 29.3/ 29.3
   6/ 28.3/ 28.3
   7/ 27.9/ 27.9
NO ALARM
DATE : 3_9_01
TIME : 18:44:49
LISTC1
D.: 03.09.01   T.: 18:44:26  C.No.:   1
   1/ 30.3/ 30.2
   2/ 29.3/ 29.2
   3/ 31.0/ 30.9
   4/ 29.3/ 29.1
   5/ 29.3/ 29.2
   6/ 28.3/ 28.3
   7/ 27.9/ 27.9
NO ALARM
DATE : 3_9_01
TIME : 18:44:59
LISTC1
D.: 03.09.01   T.: 18:44:36  C.No.:   1
   1/ 30.3/ 30.1
   2/ 29.3/ 29.2
   3/ 31.0/ 30.8
   4/ 29.3/ 29.1
   5/ 29.3/ 29.2
   6/ 28.3/ 28.3
   7/ 27.9/ 27.9
NO ALARM
DATE : 3_9_01
TIME : 18:45:09
LISTC1
D.: 03.09.01   T.: 18:44:46  C.No.:   1
   1/ 30.3/ 30.1
   2/ 29.3/ 29.1
   3/ 31.0/ 30.8
   4/ 29.2/ 29.0
   5/ 29.3/ 29.2
   6/ 28.3/ 28.3
   7/ 27.9/ 27.9
NO ALARM
DATE : 3_9_01
TIME : 18:45:19
LISTC1
D.: 03.09.01   T.: 18:44:56  C.No.:   1
   1/ 30.3/ 30.0
   2/ 29.3/ 29.1
   3/ 31.0/ 30.8
   4/ 29.2/ 29.0
   5/ 29.3/ 29.2
   6/ 28.3/ 28.3
   7/ 27.9/ 27.8
NO ALARM
DATE : 3_9_01
TIME : 18:45:29
LISTC1
D.: 03.09.01   T.: 18:45:06  C.No.:   1
   1/ 30.2/ 30.0
   2/ 29.2/ 29.0
   3/ 30.9/ 30.7
   4/ 29.2/ 28.9
   5/ 29.3/ 29.1
   6/ 28.3/ 28.2
   7/ 27.9/ 27.8
NO ALARM
DATE : 3_9_01
TIME : 18:45:39
LISTC1
D.: 03.09.01   T.: 18:45:16  C.No.:   1
   1/ 30.2/ 29.9
   2/ 29.2/ 29.0
   3/ 30.9/ 30.7
   4/ 29.2/ 28.9
   5/ 29.2/ 29.1
   6/ 28.3/ 28.2
   7/ 27.9/ 27.8
NO ALARM
DATE : 3_9_01
TIME : 18:45:49
LISTC1
D.: 03.09.01   T.: 18:45:27  C.No.:   1
   1/ 30.2/ 29.9
   2/ 29.2/ 28.9
   3/ 30.9/ 30.6
   4/ 29.1/ 28.8
   5/ 29.2/ 29.1
   6/ 28.3/ 28.2
   7/ 27.9/ 27.7
NO ALARM
DATE : 3_9_01
TIME : 18:45:59
LISTC1
D.: 03.09.01   T.: 18:45:37  C.No.:   1
   1/ 30.2/ 29.8
   2/ 29.2/ 28.9
   3/ 30.9/ 30.6
   4/ 29.1/ 28.7
   5/ 29.2/ 29.0
   6/ 28.3/ 28.2
   7/ 27.9/ 27.7
NO ALARM
DATE : 3_9_01
TIME : 18:46:09
LISTC1
D.: 03.09.01   T.: 18:45:47  C.No.:   1
   1/ 30.1/ 29.8
   2/ 29.1/ 28.8
   3/ 30.8/ 30.5
   4/ 29.1/ 28.7
   5/ 29.2/ 29.0
   6/ 28.2/ 28.1
   7/ 27.8/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:46:19
LISTC1
D.: 03.09.01   T.: 18:45:57  C.No.:   1
   1/ 30.1/ 29.8
   2/ 29.1/ 28.8
   3/ 30.8/ 30.4
   4/ 29.0/ 28.6
   5/ 29.2/ 28.9
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   6/ 28.2/ 28.1
   7/ 27.8/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:46:29
LISTC1
D.: 03.09.01   T.: 18:46:07  C.No.:   1
   1/ 30.1/ 29.8
   2/ 29.1/ 28.8
   3/ 30.8/ 30.5
   4/ 29.0/ 28.6
   5/ 29.1/ 28.9
   6/ 28.2/ 28.1
   7/ 27.8/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:46:39
LISTC1
D.: 03.09.01   T.: 18:46:17  C.No.:   1
   1/ 30.0/ 29.7
   2/ 29.1/ 28.8
   3/ 30.8/ 30.4
   4/ 29.0/ 28.6
   5/ 29.1/ 28.9
   6/ 28.2/ 28.1
   7/ 27.8/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:46:49
LISTC1
D.: 03.09.01   T.: 18:46:27  C.No.:   1
   1/ 30.0/ 29.8
   2/ 29.0/ 28.8
   3/ 30.7/ 30.4
   4/ 28.9/ 28.6
   5/ 29.1/ 28.9
   6/ 28.2/ 28.0
   7/ 27.8/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:46:59
LISTC1
D.: 03.09.01   T.: 18:46:38  C.No.:   1
   1/ 30.0/ 29.8
   2/ 29.0/ 28.8
   3/ 30.7/ 30.4
   4/ 28.9/ 28.6
   5/ 29.1/ 28.9
   6/ 28.2/ 28.0
   7/ 27.7/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:47:09
LISTC1
D.: 03.09.01   T.: 18:46:48  C.No.:   1
   1/ 30.0/ 29.7
   2/ 29.0/ 28.8
   3/ 30.7/ 30.4
   4/ 28.9/ 28.6
   5/ 29.1/ 28.9
   6/ 28.1/ 28.0
   7/ 27.7/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:47:19
LISTC1
D.: 03.09.01   T.: 18:46:58  C.No.:   1
   1/ 30.0/ 29.7
   2/ 29.0/ 28.8
   3/ 30.7/ 30.4
   4/ 28.9/ 28.6
   5/ 29.0/ 28.9
   6/ 28.1/ 28.1
   7/ 27.7/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:47:29
LISTC1
D.: 03.09.01   T.: 18:47:08  C.No.:   1
   1/ 29.9/ 29.7
   2/ 29.0/ 28.7
   3/ 30.6/ 30.4
   4/ 28.8/ 28.5
   5/ 29.0/ 28.9
   6/ 28.1/ 28.0
   7/ 27.7/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:47:39
LISTC1
D.: 03.09.01   T.: 18:47:18  C.No.:   1
   1/ 29.9/ 29.7
   2/ 28.9/ 28.7
   3/ 30.6/ 30.4
   4/ 28.8/ 28.5
   5/ 29.0/ 28.9
   6/ 28.1/ 28.0
   7/ 27.7/ 27.6
NO ALARM
DATE : 3_9_01
TIME : 18:47:49
LISTC1
D.: 03.09.01   T.: 18:47:28  C.No.:   1
   1/ 29.9/ 29.7
   2/ 28.9/ 28.7
   3/ 30.6/ 30.3
   4/ 28.8/ 28.5
   5/ 29.0/ 28.9
   6/ 28.1/ 28.0
   7/ 27.7/ 27.5
NO ALARM
DATE : 3_9_01
TIME : 18:47:59
LISTC1
D.: 03.09.01   T.: 18:47:39  C.No.:   1
   1/ 29.9/ 29.6
   2/ 28.9/ 28.7
   3/ 30.6/ 30.3
   4/ 28.8/ 28.5
   5/ 29.0/ 28.8
   6/ 28.1/ 28.0
   7/ 27.7/ 27.5
NO ALARM
DATE : 3_9_01
TIME : 18:48:09
LISTC1
D.: 03.09.01   T.: 18:47:49  C.No.:   1
   1/ 29.8/ 29.6
   2/ 28.9/ 28.7
   3/ 30.5/ 30.3
   4/ 28.7/ 28.5
   5/ 29.0/ 28.8
   6/ 28.1/ 28.0
   7/ 27.6/ 27.5
NO ALARM
DATE : 3_9_01
TIME : 18:48:19
```

Appendix B

Commented SCS4010 maintenance file SCS4010.WRT

```
****************************************
* Projekt    : OSE TEST SCU4010
* Datei      : SCU4010.wrt
* Datum      : 12.09.01
* Software   : V6.31 26.01.00 S4SE
* Bearbeiter: TS
****************************************
```

File-header / information

```
KLIST
*00******       10:10:45 12.09.01
MREL            10:09:58 12.09.01
*00******       10:09:58 12.09.01
VERSION         10:09:58 12.09.01
MREL            10:09:51 12.09.01
*00******       10:09:51 12.09.01
VERSION         10:09:51 12.09.01
VERSION         10:09:50 12.09.01
LISTC1          10:20:44 09.09.01
LISTC1          10:20:34 09.09.01
LISTC1          10:20:24 09.09.01
LISTC1          10:20:14 09.09.01
LISTC1          10:20:04 09.09.01
LISTC1          10:19:54 09.09.01
LISTC1          10:19:44 09.09.01
LISTC1          10:19:34 09.09.01
LISTC1          10:19:24 09.09.01
LISTC1          10:19:14 09.09.01
LISTC1          10:19:04 09.09.01
LISTC1          10:18:54 09.09.01
LISTC1          10:18:44 09.09.01
LISTC1          10:18:34 09.09.01
LISTC1          10:18:24 09.09.01
LISTC1          10:18:14 09.09.01
LISTC1          10:18:04 09.09.01
LISTC1          10:17:54 09.09.01
LISTC1          10:17:44 09.09.01
LISTC1          10:17:34 09.09.01
LISTC1          10:17:24 09.09.01
LISTC1          10:17:14 09.09.01
LISTC1          10:17:04 09.09.01
LISTC1          10:16:54 09.09.01
LISTC1          10:16:44 09.09.01
LISTC1          10:16:34 09.09.01
LISTC1          10:16:24 09.09.01
LISTC1          10:16:14 09.09.01
LISTC1          10:16:04 09.09.01
LISTC1          10:15:54 09.09.01
LISTC1          10:15:44 09.09.01
LISTC1          10:15:34 09.09.01
LISTC1          10:15:24 09.09.01
LISTC1          10:15:14 09.09.01
LISTC1          10:15:04 09.09.01
LISTC1          10:14:54 09.09.01
LISTC1          10:14:44 09.09.01
LISTC1          10:14:34 09.09.01
LISTC1          10:14:24 09.09.01
LISTC1          10:14:14 09.09.01
LISTC1          10:14:04 09.09.01
```

List of the last commands sent to the SCS4010

```
KVECTOR1=361-367
KABSCHN1=1-7
TKRITA1=70
TKRITD1=3.4
TKRITC1=-40
ZYKLMAX*1=257
MREL0
SREL0
UREL0
VREL0
SSPV0
SD0=0
SD1=0
```

<u>System Configuration:</u>
Address range
Alarm section configuration (only one section)
Absolute alarm threshold at 70°C
Differential alarm threshold at 3.4°
Frost alarm threshold at –40°C (switched off)

Relay configuration (none – all 0)

System switches – all standard settings

```
SD2=0
SD3=0
SD4=0
SD5=0
SD6=0
SD7=0
ZYKLUS=0:0:10
ZYKLMAX1
DRUCK1
DRUCK2
SB1=2
```

Time between measuring cycles (10s)
Reference profile update after every cycle

Message Listec

```
FLIST1
No. Message     S Se SNr. Remark
----------------------------------------
  1 ACKNOWLEDGE 1          05:41:10 26.07.01
  2 ! Stop !    1          05:43:32 26.07.01
  3 WARNG. - AT 1  1    3 01:55:48 27.07.01
  4 WARNG. - AT 1  1    3 01:59:41 27.07.01
  5 WARNG. - AT 1  1    3 02:14:35 27.07.01
  6 WARNG. - AT 1  1    3 02:31:41 27.07.01
  7 WARNG. - AT 1  1    3 03:04:52 27.07.01
  8 WARNG. - AT 1  1    1 03:11:28 27.07.01
  9 WARNG. - AT 1  1    2 03:11:59 27.07.01
 10 WARNG. - AT 1  1    3 03:16:12 27.07.01
 11 WARNG. - AT 1  1    1 03:18:34 27.07.01
 12 WARNG. - AT 1  1    2 03:22:18 27.07.01
 13 WARNG. - AT 1  1    1 03:31:56 27.07.01
 14 WARNG. - AT 1  1    1 03:33:18 27.07.01
 15 WARNG. - AT 1  1    2 03:41:26 27.07.01
 16 WARNG. - AT 1  1    2 04:03:06 27.07.01
 17 WARNG. - AT 1  1    3 05:15:32 27.07.01
 18 WARNG. - AT 1  1    3 01:57:39 28.07.01
 19 WARNG. - AT 1  1    3 02:05:56 28.07.01
 20 WARNG. - AT 1  1    3 02:08:29 28.07.01
 21 WARNG. - AT 1  1    3 02:10:20 28.07.01
 22 WARNG. - AT 1  1    3 02:15:25 28.07.01
 23 WARNG. - AT 1  1    3 02:16:06 28.07.01
 24 WARNG. - AT 1  1    3 02:33:01 28.07.01
 25 WARNG. - AT 1  1    3 02:45:43 28.07.01
 26 WARNG. - AT 1  1    1 03:18:13 28.07.01
 27 WARNG. - AT 1  1    1 03:28:43 28.07.01
 28 WARNG. - AT 1  1    1 03:29:13 28.07.01
 29 WARNG. - AT 1  1    1 03:35:59 28.07.01
 30 WARNG. - AT 1  1    2 03:53:46 28.07.01
 31 WARNG. - AT 1  1    3 03:59:51 28.07.01
 32 WARNG. - AT 1  1    1 04:49:37 28.07.01
 33 WARNG. - AT 1  1    3 05:16:52 28.07.01
 34 WARNG. - AT 1  1    3 05:20:56 28.07.01
 35 WARNG. - AT 1  1    3 02:06:56 29.07.01
 36 WARNG. - AT 1  1    3 02:31:19 29.07.01
 37 WARNG. - AT 1  1    3 02:42:49 29.07.01
 38 WARNG. - AT 1  1    3 02:46:12 29.07.01
 39 WARNG. - AT 1  1    3 02:47:44 29.07.01
 40 WARNG. - AT 1  1    3 03:45:17 29.07.01
 41 WARNG. - AT 1  1    3 03:45:58 29.07.01
 42 WARNG. - AT 1  1    3 04:49:36 29.07.01
 43 WARNG. - AT 1  1    3 02:13:31 30.07.01
 44 WARNG. - AT 1  1    3 02:14:32 30.07.01
 45 WARNG. - AT 1  1    3 02:23:21 30.07.01
 46 WARNG. - AT 1  1    3 02:43:49 30.07.01
 47 WARNG. - AT 1  1    3 03:09:23 30.07.01
 48 WARNG. - AT 1  1    3 03:33:15 30.07.01
 49 WARNG. - AT 1  1    1 03:37:29 30.07.01
 50 WARNG. - AT 1  1    1 03:43:14 30.07.01
 51 WARNG. - AT 1  1    1 03:52:02 30.07.01
 52 WARNG. - AT 1  1    1 03:53:34 30.07.01
 53 UPS active  1          16:29:54 05.08.01
 54 UPS n.activ 1          17:17:17 05.08.01
 55 UPS active  1          18:25:00 05.08.01
 56 UPS n.activ 1          18:25:10 05.08.01
 57 ACKNOWLEDGE 1          22:25:44 05.08.01
 58 ACKNOWLEDGE 1          00:17:50 06.08.01
----------------------------------------
```

```
LISTP1
  Date    Time    Cycle-Nr.
  12.09.01     10:11:01  1
```

Temperature list at the time indicated

```
 No.| S |T-Ref.|T-Act.|T-Dif.| Adr| Stat
----+---+------+------+------+----+-----
   1|  1|  20.5|  20.7|   0.0| 361|
   2|  1|  20.7|  20.9|   0.0| 362|
   3|  1|  21.6|  21.8|   0.0| 363|
   4|  1|  18.3|  18.4|  -0.1| 364|
   5|  1|  20.7|  20.9|   0.0| 365|
   6|  1|  19.9|  20.2|   0.1| 366|
   7|  1|  17.2|  17.4|   0.0| 367|
--------+------+------+-----------------
Average |  19.8|  20.0|Drift =    0.2
----------------------------------------
```

```
ILIST
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
MueTec GmbH    0  00:00:00 00.00.00
```

Internal fault Listec

```
DLIST1=1
Time    Date     No. SNr. T-Dif.
 1  03:31:50 26.08.01    6  366   0.6
 2  00:01:00 06.08.01    2  362   0.6
 3  01:27:36 02.08.01    7  367   0.6
 4  01:38:19 30.07.01    7  367   0.6
 5  02:51:48 29.07.01    3  363   0.6
 6  15:50:55 24.08.01    6  366   0.7
 7  15:43:28 24.08.01    4  364   0.7
 8  13:03:01 22.08.01    7  367   0.7
```

Maximum differential value evaluation

highest differential value is 0.7°

```
    TEMPERATURE 1  1    1  20.7C
    TEMPERATURE 1  1    1  20.7C
    TEMPERATURE 1  1    1  20.7C
    TEMPERATURE 1  1    1  20.7C
    TEMPERATURE 1  1    1  20.8C
```

Temperature stability test for measuring point no. 1;
max. allowable variation between measurements = 0.2°;
measurements are recorded after every measuring cycle, i.e. every 10s

```
    TEMPERATURE 1  1    3  21.8C
    TEMPERATURE 1  1    3  21.8C
    TEMPERATURE 1  1    3  21.9C
    TEMPERATURE 1  1    3  21.9C
    TEMPERATURE 1  1    3  21.9C
```

Temperature stability test for measuring point no. 3

```
    TEMPERATURE 1  1    5  20.9C
    TEMPERATURE 1  1    5  20.9C
    TEMPERATURE 1  1    5  20.9C
    TEMPERATURE 1  1    5  20.9C
    TEMPERATURE 1  1    5  20.9C
```

Temperature stability test for measuring point no. 5

Appendix C

Data from the SCU800 extracted from 3_9_01_1.LOG

```
LISTC1
 C.No.:   1
 101/ 28.3/ 28.2
 102/ 28.1/ 28.1
 103/ 29.4/ 29.3
 104/ 29.1/ 29.1
 105/ 28.5/ 28.5
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.3/ 29.3
 109/ 28.3/ 28.2
 110/ 28.1/ 28.0
 111/ 29.3/ 29.3
 112/ 28.7/ 28.7
NO ALARM
DATE : 3_9_01
TIME : 18:40:06
LISTC1
 C.No.:   1
 101/ 28.2/ 28.2
 102/ 28.1/ 28.1
 103/ 29.4/ 29.3
 104/ 29.1/ 29.1
 105/ 28.5/ 28.5
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.3/ 29.2
 109/ 28.2/ 28.2
 110/ 28.1/ 28.0
 111/ 29.3/ 29.2
 112/ 28.7/ 28.6
NO ALARM
DATE : 3_9_01
TIME : 18:40:16
LISTC1
 C.No.:   1
 101/ 28.2/ 28.2
 102/ 28.1/ 28.1
 103/ 29.4/ 29.2
 104/ 29.1/ 29.1
 105/ 28.5/ 28.5
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.3/ 29.2
 109/ 28.3/ 28.1
 110/ 28.1/ 28.0
 111/ 29.3/ 29.1
 112/ 28.7/ 28.6
NO ALARM
DATE : 3_9_01
TIME : 18:40:26
LISTC1
 C.No.:   1
 101/ 28.2/ 28.2
 102/ 28.1/ 28.0
 103/ 29.4/ 29.2
 104/ 29.1/ 29.1
 105/ 28.5/ 28.4
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.3/ 29.1
 109/ 28.3/ 28.1
 110/ 28.1/ 28.0
 111/ 29.3/ 29.1
DATE : 3_9_01
TIME : 18:40:36
 112/ 28.7/ 28.6
NO ALARM
LISTC1
 C.No.:   1
 101/ 28.2/ 28.1
 102/ 28.1/ 28.0
 103/ 29.3/ 29.1
 104/ 29.1/ 29.1
 105/ 28.5/ 28.4
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.3/
29.1DATE : 3_9_01
TIME : 18:40:47

 109/ 28.2/ 28.1
 110/ 28.1/ 28.0
 111/ 29.3/ 29.1
 112/ 28.7/ 28.6
NO ALARM
LISTC1
 C.No.:   1
 101/ 28.2/ 28.1
 102/ 28.1/ 28.0
 103/ 29.3/ 29.1
DATE : 3_9_01
TIME : 18:40:57
 104/ 29.1/ 29.0
 105/ 28.5/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.3/ 29.1
 109/ 28.2/ 28.1
 110/ 28.0/ 28.0
 111/ 29.3/ 29.0
 112/ 28.7/ 28.6
NO ALARM
LISTC1
DATE : 3_9_01
TIME : 18:41:07
 C.No.:   1
 101/ 28.2/ 28.1
 102/ 28.1/ 28.0
 103/ 29.3/ 29.0
 104/ 29.1/ 29.0
 105/ 28.5/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.2/ 29.0
 109/ 28.2/ 28.1
 110/ 28.0/ 28.0
 111/ 29.2/ 29.0
 112/ 28.7/ 28.6
NO ALARM
LISTC1
DATE : 3_9_01
TIME : 18:41:17
LISTC1
 C.No.:   1
 101/ 28.2/ 28.1
 102/ 28.1/ 28.0
 103/ 29.3/ 29.0
 104/ 29.1/ 29.0
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.2/ 29.0
 109/ 28.2/ 28.1
 110/ 28.0/ 27.9
 111/ 29.2/ 29.0
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:41:27
LISTC1
 C.No.:   1
 101/ 28.2/ 28.1
 102/ 28.1/ 28.0
 103/ 29.2/ 29.0
 104/ 29.0/ 29.0
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.2/ 29.0
 109/ 28.2/ 28.1
 110/ 28.0/ 27.9
 111/ 29.2/ 28.9
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:41:37
LISTC1
 C.No.:   1
 101/ 28.2/ 28.1
 102/ 28.0/ 28.0
 103/ 29.2/ 29.0
 104/ 29.0/ 29.0
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.2/ 29.0
 109/ 28.2/ 28.1
 110/ 28.0/ 27.9
 111/ 29.2/ 28.9
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:41:47
LISTC1
 C.No.:   1
 101/ 28.1/ 28.1
 102/ 28.0/ 28.0
 103/ 29.2/ 29.0
 104/ 29.0/ 29.0
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.2/ 29.0
 109/ 28.2/ 28.1
 110/ 28.0/ 27.9
 111/ 29.1/ 28.9
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:41:57
LISTC1
 C.No.:   1
 101/ 28.1/ 28.1
 102/ 28.0/ 28.0
 103/ 29.2/ 29.0
 104/ 29.0/ 29.0
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.1/ 29.0
 109/ 28.2/ 28.1
 110/ 28.0/ 27.9
 111/ 29.1/ 28.9
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:42:07
LISTC1
 C.No.:   1
 101/ 28.1/ 28.1
 102/ 28.0/ 28.0
 103/ 29.2/ 29.0
 104/ 29.0/ 29.1
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.1/ 29.0
 109/ 28.1/ 28.1
 110/ 28.0/ 27.9
 111/ 29.1/ 28.9
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:42:17
LISTC1
 C.No.:   1
 101/ 28.1/ 28.1
 102/ 28.0/ 28.0
 103/ 29.1/ 29.0
 104/ 29.0/ 29.1
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.1/ 29.0
 109/ 28.1/ 28.1
 110/ 28.0/ 27.9
 111/ 29.1/ 28.8
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:42:27
LISTC1
 C.No.:   1
 101/ 28.1/ 28.1
 102/ 28.0/ 28.0
 103/ 29.1/ 29.0
 104/ 29.0/ 29.1
 105/ 28.4/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.1/ 29.0
 109/ 28.1/ 28.1
 110/ 27.9/ 27.9
 111/ 29.1/ 28.8
 112/ 28.6/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:42:37
LISTC1
 C.No.:   1
 101/ 28.1/ 28.1
 102/ 28.0/ 28.0
 103/ 29.1/ 29.0
 104/ 29.0/ 29.1
 105/ 28.3/ 28.3
 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.1/ 29.0
 109/ 28.1/ 28.0
 110/ 27.9/ 27.8
 111/ 29.0/ 28.8
 112/ 28.5/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:42:47
LISTC1
 C.No.:   1
 101/ 28.1/ 28.0
 102/ 28.0/ 27.9
 103/ 29.1/ 29.0
 104/ 29.0/ 29.1
 105/ 28.3/ 28.3
 106/-99.9/-99.9
```

```
 107/-99.9/-99.9
 108/ 29.1/ 28.9
 109/ 28.1/ 28.0
 110/ 27.9/ 27.8
 111/ 29.0/ 28.8
 112/ 28.5/ 28.5
NO ALARM
DATE : 3_9_01
TIME : 18:42:57
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 107/-99.9/-99.9
 108/ 29.1/ 28.9
 109/ 28.1/ 28.0
 110/ 27.9/ 27.8
 111/ 29.0/ 28.8
 112/ 28.5/ 28.4
NO ALARM
DATE : 3_9_01
TIME : 18:43:07
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 103/ 29.1/ 29.0
 104/ 29.0/ 29.0
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 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.0/ 28.9
 109/ 28.1/ 28.0
 110/ 27.9/ 27.8
 111/ 29.0/ 28.8
 112/ 28.5/ 28.4
NO ALARM
DATE : 3_9_01
TIME : 18:43:17
LISTC1
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 104/ 29.0/ 29.0
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 106/-99.9/-99.9
 107/-99.9/-99.9
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 109/ 28.1/ 28.0
 110/ 27.9/ 27.8
 111/ 29.0/ 28.8
 112/ 28.5/ 28.3
NO ALARM
DATE : 3_9_01
TIME : 18:43:27
LISTC1
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 104/ 29.0/ 29.0
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 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.0/ 28.8
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 111/ 28.9/ 28.8
 112/ 28.5/ 28.3
NO ALARM
DATE : 3_9_01
TIME : 18:43:37
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 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 29.0/ 28.8
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 110/ 27.8/ 27.8
 111/ 28.9/ 28.8
 112/ 28.5/ 28.4
NO ALARM
DATE : 3_9_01
TIME : 18:43:47
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 107/-99.9/-99.9
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 110/ 27.8/ 27.8
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 112/ 28.4/ 28.3
NO ALARM
DATE : 3_9_01
TIME : 18:43:57
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 107/-99.9/-99.9
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NO ALARM
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TIME : 18:44:07
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 107/-99.9/-99.9
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 111/ 28.9/ 28.7
 112/ 28.4/ 28.3
NO ALARM
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TIME : 18:44:17
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 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 28.9/ 28.8
 109/ 28.0/ 27.9
 110/ 27.8/ 27.8
 111/ 28.9/ 28.7
 112/ 28.4/ 28.4
NO ALARM
DATE : 3_9_01
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LISTC1
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 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 28.9/ 28.8
 109/ 28.0/ 28.0
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 111/ 28.8/ 28.7
 112/ 28.4/ 28.3
NO ALARM
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LISTC1
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 107/-99.9/-99.9
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 111/ 28.8/ 28.7
 112/ 28.4/ 28.3
NO ALARM
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LISTC1
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 106/-99.9/-99.9
 107/-99.9/-99.9
 108/ 28.9/ 28.7
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 110/ 27.8/ 27.7
 111/ 28.8/ 28.7
 112/ 28.4/ 28.2
NO ALARM
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LISTC1
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 107/-99.9/-99.9
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 111/ 28.8/ 28.6
 112/ 28.4/ 28.2
NO ALARM
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TIME : 18:45:07
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 106/-99.9/-99.9
 107/-99.9/-99.9
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 110/ 27.8/ 27.7
 111/ 28.8/ 28.6
 112/ 28.3/ 28.2
NO ALARM
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TIME : 18:45:17
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 106/-99.9/-99.9
 107/-99.9/-99.9
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 110/ 27.8/ 27.7
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NO ALARM
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TIME : 18:45:27
LISTC1
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 107/-99.9/-99.9
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 111/ 28.7/ 28.5
 112/ 28.3/ 28.1
NO ALARM
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LISTC1
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 112/ 28.3/ 28.1
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TIME : 18:45:57
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NO ALARM
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NO ALARM
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NO ALARM
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 107/-99.9/-99.9
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 111/ 28.3/ 28.2
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TIME : 18:48:47
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