

# ETT 1962

## Touch Operating Panel

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### **Translation from German**

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## Touch Operating Panel

## ETT 1962

The ETT 1962 is an intelligent terminal for programming and visualization of automated processes. Process diagnostics as well as operating and monitoring automated procedures are simplified using this terminal.

A resistive glass touch screen serves as the input medium for process data and parameters. The output is shown on a 19" SXGA TFT color display.

With the LSE mask editor, graphics can be created on the PC, then stored and displayed on the terminal.

The available interfaces can be used to exchange process data or configure the terminal. In the internal Flash memory, the operating system, application and application data are stored.



## Contents

<b>1</b>	<b>Technical Data .....</b>	<b>4</b>
1.1	Performance Data .....	4
1.2	Electrical Requirements .....	5
1.3	Terminal .....	5
1.4	Environmental Conditions .....	5
1.5	Display .....	6
1.6	Control Unit .....	6
1.7	Miscellaneous .....	6
<b>2</b>	<b>Mechanical Dimensions .....</b>	<b>7</b>
<b>3</b>	<b>Chemical Resistance .....</b>	<b>8</b>
3.1	Touch Interface .....	8
<b>4</b>	<b>Connector Layout .....</b>	<b>9</b>
4.1	Front Connector .....	9
4.2	Status Displays .....	10
4.3	Rear Connectors .....	11
4.3.1	Applicable Connectors .....	13
<b>5</b>	<b>cooling .....</b>	<b>14</b>
<b>6</b>	<b>Mounting Instructions .....</b>	<b>14</b>
<b>7</b>	<b>Buffer Battery .....</b>	<b>14</b>
7.1	Exchanging the Battery .....	15

<b>8</b>	<b>Wiring Guidelines</b> .....	<b>17</b>
8.1	Ground .....	17
8.2	Shielding .....	17
8.3	ESD Protection .....	17
8.4	USB Interface Connections .....	17
<b>9</b>	<b>Process Diagram</b> .....	<b>18</b>
<b>10</b>	<b>Status and Error Messages</b> .....	<b>19</b>
<b>11</b>	<b>Cleaning the Touch Screen</b> .....	<b>27</b>
<b>12</b>	<b>Disposal</b> .....	<b>28</b>

# 1 Technical Data

## 1.1 Performance Data

Processor	EDGE2 Technology
Processor core	2 <sup>1)</sup>
Internal Cache	32-kbyte L1 Instruction Cache 32-kbyte L1 Data Cache 512-kbyte L2 Cache
Internal program and data memory (DDR3 RAM)	512-Mbyte
Internal remnant data memory	512-kbyte SRAM (battery buffered)
Internal storage device	4 GB microSD card (3D-TLC pSLC technology) <sup>2)</sup>
Internal I/O	no
Interfaces	1x USB Host 2.0, Type A (front) 1x USB Host 2.0, Type A (rear, on circuit board) 2x Ethernet 10/100 (RJ45)
Internal interface connections and devices	1x TFT LCD color display 1x USB (touch connection)
Display	19" TFT color display
Resolution	1280 x 1024 Pixels
Control panel	Glass touch screen (resistive touch)
Real-time clock	yes
Cooling	passive (fanless)

<sup>1)</sup> Attention: When programming (with LASAL) on multicore CPUs, particular focus must be placed on thread security!

<sup>2)</sup> The 4 GByte microSD card is formatted to 1 GByte in order to achieve the lifetime of a standard SLC card. A format change to the full 4 GByte is not allowed and will result in a massive reduction of the microSD card's lifetime.

## 1.2 Electrical Requirements

Supply voltage	typically +24 V DC	
	minimum +18 V DC	maximum +30 V DC
Current consumption of power supply at +24 V	0.85 A (without externally connected devices)	1 A (with externally connected devices)
Inrush current	1,2 A (3 ms)	

## 1.3 Terminal

Dimensions	360 x 462 x 57 mm (W x H x D)
Weight incl. Mounting brackets	typically 7 kg

## 1.4 Environmental Conditions

Storage temperature	-20 ... +60 °C	
Environmental temperature	0 ... +50 °C	
Humidity	10-95 %, non-condensing	
EMC tolerance	EN 61000-6-2 (industrial area): EMV resistance EN 61000-6-4: Noise emission	
Vibration resistance	EN 60068-2-6	2-9 Hz: Amplitude 3.5 mm 9-200 Hz: 1 g (10 m/s <sup>2</sup> )
Shock resistance	EN 60068-2-27	15 g (150 m/s <sup>2</sup> ), duration 11 ms, 18 Shocks
Protection type	EN 60529: protected through the housing	Front: IP54 Cover: IP20

## 1.5 Display

Type	19" TFT color display
Resolution	SXGA, 1280 x 1024 pixels
Color depth	24-bit (16 777 216 colors)
Pixel size	0.294 x 0.294 mm
Active surface	376.3 x 301.1 mm
Backlighting	LED
Contrast	typically 2000 : 1
Brightness	typically 300 cd/m <sup>2</sup>
Angle CR > 10 from	left and right 89°, above and below 89°

## 1.6 Control Unit

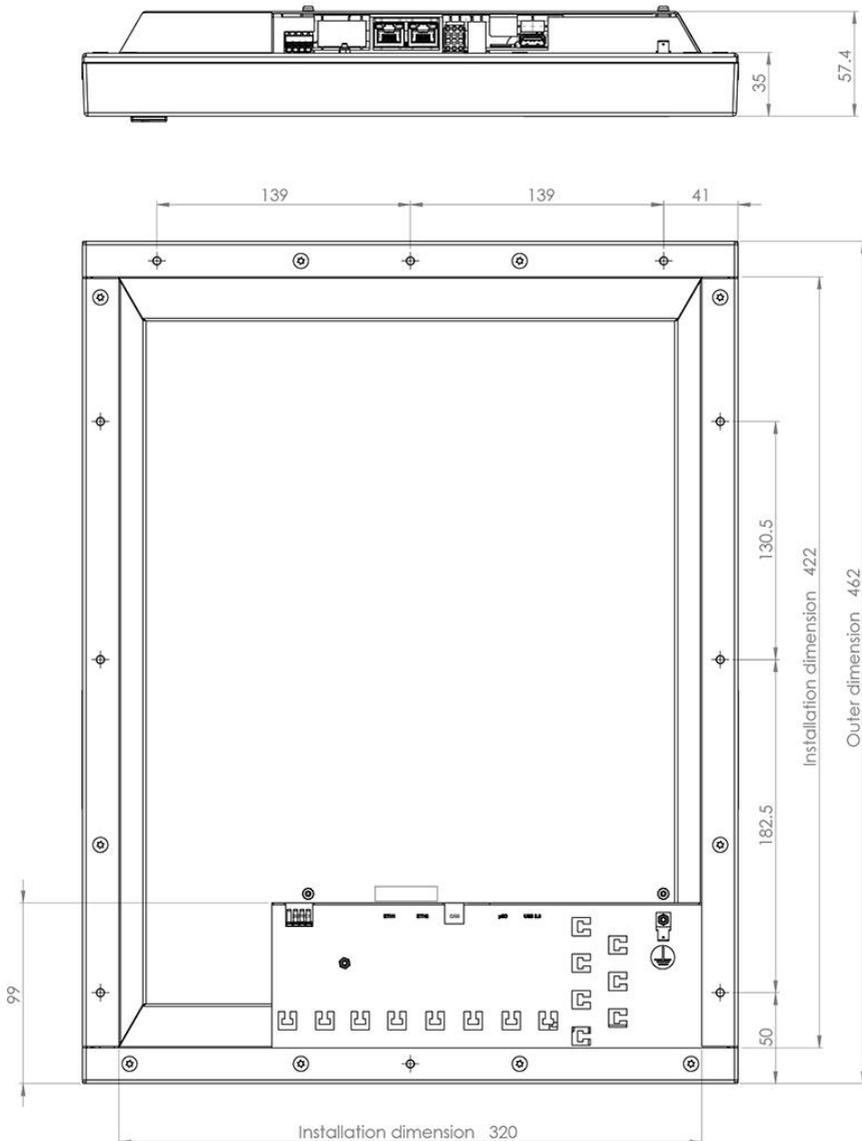
Touch pad	resistive glass foil glass touch panel
Active surface	376.3 x 301.1 mm
Resolution	12-bit (4096 x 4096)
Touch precision	< 1.5 % of maximum value (5.6 mm)
Data wheel	no
Buttons	no

## 1.7 Miscellaneous

Article number	01-230-1962
Hardware version	1.x
Software macro	LSE LASAL operating system
Project backup	internally on the microSD card

## 2 Mechanical Dimensions

in mm



## 3 Chemical Resistance

### 3.1 Touch Interface

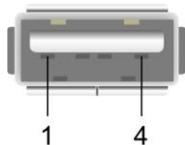
<b>Solution</b>	<b>Visual Effect</b>
Coal tar oil / toluene	None
Trichloroethylene	None
Acetone	None
Alcohol	None
Benzine	None
Machine oil	None
Ammonia	None
Glass cleaner	None
Mayonnaise	None
Ketchup	None
Wine	None
Salad oil	None
Vinegar	None

## 4 Connector Layout

### 4.1 Front Connector



**X6: USB 2.0 Type A**



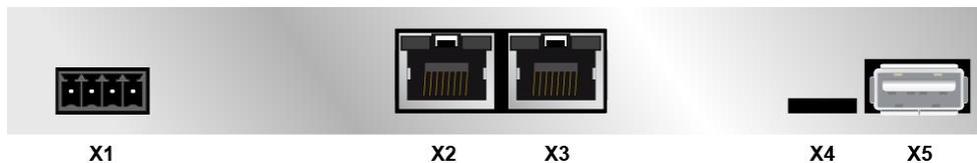
Pin	Function
1	+5 V
2	D0-
3	D0+
4	GND

## 4.2 Status Displays

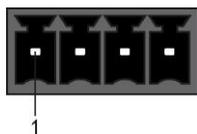
Two status LEDs are located on the front (one red and one green LED).

Run	green	ON	From activation of the voltage supply until processing of the auto-exec.IsI  When the application is running (except when controlled through application differently)
		BLINKS	In the CLI, while processing the autoexec.IsI until the application is running
		OFF	When error occurs or reset
	Can be set from the application (ON, BLINKING, OFF)		
Error	red	BLINKS	When error occurs or reset
		OFF	During start process  During RUN status (application running)
	Can be set from the application (ON, BLINKING, OFF)		

### 4.3 Rear Connectors

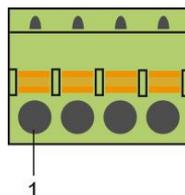


#### X1: Power supply (4-pin Phoenix Contact)

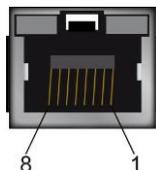


Pin	Function
1	n.c.
2	+24 V DC
3	GND
4	GND

n.c. = do not use

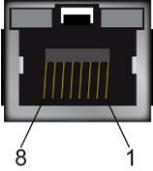


#### X2: Ethernet 10/100 (RJ45)



Pin	Function BaseT/ Gbit
1	Tx+
2	TX-
3	RX+
4	n.c.
5	n.c.
6	RX-
7	n.c.
8	n.c.

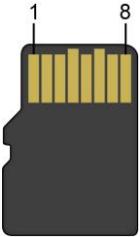
### X3: Ethernet 10/100 (RJ45)



Pin	Function
1	Tx+
2	TX-
3	Rx+
4	n.c.
5	n.c.
6	Rx-
7	n.c.
8	n.c.

Problems can arise if a control is connected to an IP network, which contains modules that do not have a SIGMATEK operating system. With such devices, Ethernet packets could be sent to the control with such a high frequency (i.e. broadcasts), that the high interrupt load could cause a real-time runtime error or runtime error. By configuring the packet filter (Firewall or Router) accordingly however, it is possible to connect a network with SIGMATEK hardware to a third party network without triggering the error mentioned above.

### X4: microSD Card

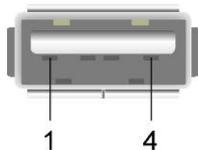


Pin	Function
1	DAT2
2	CD/DAT3
3	CMD
4	+3V3
5	CLK
6	GND
7	DAT0
8	DAT1

It is recommended that only storage media provided by SIGMATEK (CompactFlash cards, microSD cards etc.) be used.  
Order number for 4 GByte EDGE2 microSD card 12-630-105

The number of read and write actions have a significant influence on the lifespan of the storage media.

The microSD card is not meant to be used as a removable media and thus only should be removed from the card holder for maintenance purposes.

**X5: USB Type A 2.0**

Pin	Function
1	VCC
2	D0-
3	D0+
4	GND

**4.3.1 Applicable Connectors**

- X1:** 4-pin Phoenix Contact plug with spring terminal  
FK-MCP 1.5/ 4-ST-3.5 (Included with delivery)
- X2, X3:** 8-pin RJ45 (not included in delivery)
- X5, X6:** USB 2.0 (Type A) (not included in delivery)

## 5 Cooling

The unit is designed for convection cooling.

## 6 Mounting Instructions

- Mounting position: standing, with connectors on bottom frame
- Mounting is customer specific

## 7 Buffer Battery

The exchangeable buffer battery ensures that the clock time (RTC) of the ETT 1962 is preserved in the absence of a supply voltage. A lithium battery is installed at the manufacturer.

After delivery of the ETT 1962 and storage of one year, the lifespan of the battery reaches 3 years.

We recommend however, that the battery be replaced every 2 years to ensure optimal performance.

**Battery order number: 01-690-055**

	Company	Data
Lithium battery	RENATA	3.0 V/235 mAh

**Use batteries from RENATA with the label CR2032 only!**  
**WARNING! Incorrect use of the batteries could result in fire or explosion! Do not recharge, disassemble or throw batteries in fire!**

When the battery voltage is in between the supervisor circuit thresholds, it may happen that the battery is detected "good" during operation, but "low" after a power cycle. If this happens, it is recommended to replace the battery.

## 7.1 Exchanging the Battery

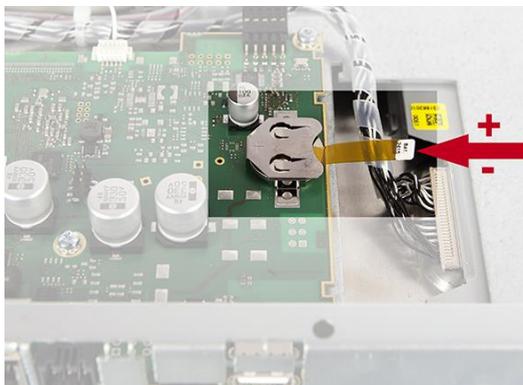
1. It is not necessary to save data on the microSD card. These are stored internally in a battery-buffered memory module (SRAM).
2. Disconnect the ETT 1962 supply. After the supply is disconnected, the real-time clock is buffered for at least 5 minutes after the battery has been removed.
3. Open the housing cover screws with a screwdriver.



4. Open the 2 housing cover screws on the top with a screwdriver and lift the cover.



5. Insert the new battery with the correct polarity (plus side facing the back of the terminal).



5. Hang up housing again and screw it.

6. Reconnect supply.

**When exchanging the battery, caution must be taken to avoid a short circuit. Otherwise, a defect can be caused in the terminal!**

## 8 Wiring Guidelines

### 8.1 Ground

The terminal must be connected to ground through the assembly on the control cabinet or over the connection provided. It is important to create a low-ohm ground connection, only then can error-free operation be guaranteed. The ground connection should have a maximum cross section and the largest (electrical) surface possible.

### 8.2 Shielding

For the Ethernet, CAT5 cables with shielded RJ45 connectors must be used. The shielding on the CAT5 cable is connected to ground over the RJ45 plug connector. Noise signals can therefore be prevented from reaching the electronics and affecting the function.

For CAN shielding is recommended.

### 8.3 ESD Protection

Typically, USB devices (keyboard, mouse) are not equipped with shielded cables. These devices are disrupted by ESD and in some instances, no longer function.

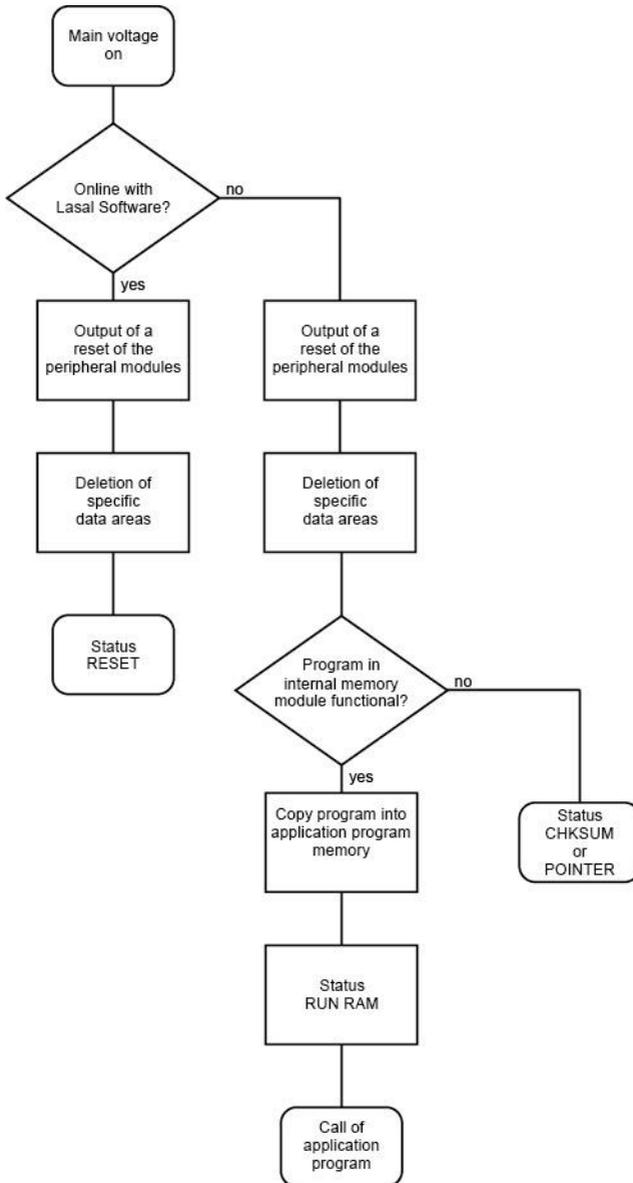
Before any device is connected to, or disconnected from the terminal, the potential should be equalized (by touching the control cabinet or ground terminal). Electrostatic loads (through clothing and shoes) can thereby be dissipated.

### 8.4 USB Interface Connections

The terminal has USB host interfaces. In LASAL, this interface can be used for various USB devices (keyboard, mouse, storage media, hubs, etc.). Using a hub, several USB devices can be connected that are then fully functional in LASAL.

**It should be noted that many of the USB devices on the market do not comply with USB specifications; this can lead to device malfunctions. This can lead to malfunction of the device. It is also possible that these devices will not be detected at the USB port or function correctly. Therefore, it is recommended that every USB stick be tested before actual use.**

## 9 Process Diagram



## 10 Status and Error Messages

Status and error messages are displayed in the LASAL CLASS software status test. POINTER or CHKSUM messages can also be shown on the terminal screen.

Number	Message	Definition	Cause/Solution
00	<b>RUN RAM</b>	The user program is currently running in RAM. The display is not affected.	Info
01	<b>RUN ROM</b>	The user program stored in the program memory module loaded into the RAM is currently running. The display is not affected.	Info
02	<b>RUNTIME</b>	The total time for all cyclic objects exceed the maximum time; the time can be configured using two system variables: <ul style="list-style-type: none"> <li>- Runtime: time remaining</li> <li>- SWRuntime: pre-selected value for the runtime counter</li> </ul>	Solution: <ul style="list-style-type: none"> <li>- Optimize the application's cyclic task.</li> <li>- Use higher capacity CPU</li> <li>- Configure preset value</li> </ul>
03	<b>POINTER</b>	Incorrect program pointers were detected before running the user program	Possible Causes: <ul style="list-style-type: none"> <li>- The program memory module is missing, not programmed or defect.</li> <li>- The program in the user program memory (RAM) is not executable.</li> <li>- The buffering battery has failed.</li> <li>- The user program has overwritten a software error.</li> </ul> Solution: <ul style="list-style-type: none"> <li>- Reprogram the memory module, if the error reoccurs exchange the module.</li> <li>- Exchange the buffering battery</li> <li>- Correct programming error</li> </ul>
04	<b>CHKSUM</b>	An invalid checksum was detected before running the user program.	Cause/solution: s. POINTER

05	<b>WATCHDOG</b>	The program was interrupted via the watchdog logic.	<p>Possible Causes:</p> <ul style="list-style-type: none"> <li>- User program interrupts blocked over a longer period of time (STI command forgotten)</li> <li>- Programming error in a hardware interrupt.</li> <li>- INB, OUTB, INW, OUTW instructions used incorrectly.</li> <li>- The processor is defect.</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- Correct programming error.</li> <li>- Exchange CPU.</li> </ul>
06	<b>GENERAL ERROR</b>	<p>General error</p> <p>An error has occurred while stopping the application over the online interface.</p>	The error occurs only during the development of the operating system.
07	<b>PROM DEFECT</b>	An error has occurred while programming the memory module.	<p>Cause:</p> <ul style="list-style-type: none"> <li>- The program memory module is defect.</li> <li>- The user program is too large.</li> <li>- The program memory module is missing.</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- Exchange the program memory module</li> </ul>
08	<b>RESET</b>	<p>The CPU has received the reset signal and is waiting for further instructions.</p> <p>The user program is not processed.</p>	Info
09	<b>WD DEFEKT</b>	<p>The hardware monitoring circuit (watchdog logic) is defective.</p> <p>After power-up, the CPU checks the watchdog logic function. If an error occurs during this test, the CPU deliberately enters an infinite loop from which no further instructions are accepted.</p>	<p>Solution:</p> <ul style="list-style-type: none"> <li>- Exchange CPU.</li> </ul>
10	<b>STOP</b>	The program was stopped by the programming system.	
11	<b>PROG BUSY</b>	Reserved	
12	<b>PROGRAM LENGTH</b>	Reserved	
13	<b>PROG END</b>	A memory module was successfully programmed.	Info
14	<b>PROG MEMO</b>	The CPU is currently programming the memory module.	Info

15	<b>STOP BRKPT</b>	The CPU was stopped by a breakpoint in the program.	Info
16	<b>CPU STOP</b>	The CPU was stopped by the programming software.	Info
17	<b>INT ERROR</b>	The CPU has triggered a false interrupt and stopped the user program or has encountered an unknown instruction while running the program.	Cause: - A non-existent operating system was used. - Stack error (uneven number of PUSH and POP instructions). - The user program was interrupted through a software error.  Solution: - Correct program error
18	<b>SINGLE STEP</b>	The CPU is in single step mode and is waiting for further instructions.	Info
19	<b>READY</b>	A module or project was sent to CPU and it is now ready to run the program.	Info
20	<b>LOAD</b>	The program is stopped and the CPU is currently receiving a new module or project.	Info
21	<b>UNZUL. MODULE</b>	The CPU has received a module that does not belong to the project.	Solution: - Recompile and download the entire project
22	<b>MEMORY FULL</b>	The operating system memory /heap is too small. No memory could be reserved while calling an internal or interface function from the application.	Cause: - Memory is only allocated but not released.  Solution - Clear memory
23	<b>NOT LINKED</b>	When starting the CPU, a missing module or a module that does not belong to the project was detected.	Solution: - Recompile and download the entire project
24	<b>DIV BY 0</b>	A division error has occurred.	Possible Causes: - Division by 0. - The result of a division does not fit in the result register.  Solution: - Correct program error
25	<b>DIAS ERROR</b>	While accessing a DIAS module, an error has occurred.	Hardware problem
26	<b>WAIT</b>	The CPU is busy.	Info

27	OP PROG	The operating system is currently being reprogrammed.	Info
28	OP INSTALLED	The operating system has been reinstalled.	Info
29	OS TOO LONG	The operating system cannot be loaded; too little memory.	Restart; report error to SIGMATEK.
30	NO OPERATING SYSTEM	Boot loader message. No operating system found in RAM.	Restart; report error to SIGMATEK.
31	SEARCH FOR OS	The boot loader is searching for the operating system in RAM.	Restart; report error to SIGMATEK.
32	NO DEVICE	Reserved	
33	UNUSED CODE	Reserved	
34	MEM ERROR	The operating system loaded does not match the hardware configuration.	Solution: - Use the correct operating system version
35	MAX IO	Reserved	
36	MODULE LOAD ERROR	The LASAL Module or project cannot be loaded.	Solution: - Recompile and download the entire project
37	BOOTIMAGE FAILURE	A general error has occurred while loading the operating system.	Solution: - Contact SIGMATEK
38	APPLMEM ERROR	An error has occurred in the application memory (user heap).	Solution: - Correct allocated memory access error
39	OFFLINE	This error does not occur in the control.	This error code is used in the programming system to show that there is no connection to the control.
40	APPL LOAD	Reserved	
41	APPL SAVE	Reserved	
44	VARAN MANAGER ERROR	An error number was entered in the VARAN manager and stopped the program.	Solution: - Read logfile
45	VARAN ERROR	A required VARAN client was disconnected or communication error has occurred.	Solution: - Read logfile - Error Tree

46	<b>APPL-LOAD-ERROR</b>	An error has occurred while loading the application.	Cause: - Application was deleted.  Solution: - Reload the application into the control.
47	<b>APPL-SAVE-ERROR</b>	An error has occurred while attempting to save the application.	
50	<b>ACCESS-EXCEPTION-ERROR</b>	Read or write access of a restricted memory area. (I.e. writing to the NULL pointer).	Solution: - Correct application errors
51	<b>BOUND EXCEEDED</b>	An exception error has occurred when accessing arrays. The memory area was overwritten through accessing an invalid element.	Solution: - Correct application errors
52	<b>PRIVILEGED INSTRUCTION</b>	An unauthorized instruction for the current CPU level was given. For example, setting the segment register.	Cause: - The application has overwritten the application program code.  Solution: - Correct application errors
53	<b>FLOATING POINT ERROR</b>	An error has occurred during a floating-point operation.	
60	<b>DIAS-RISC-ERROR</b>	Error from the Intelligent DIASMaster.	Restart; report error to SIGMATEK.
64	<b>INTERNAL ERROR</b>	An internal error has occurred, all applications are stopped.	Restart; report error to SIGMATEK.
65	<b>FILE ERROR</b>	An error has occurred during a file operation.	
66	<b>DEBUG ASSERTION FAILED</b>	Internal error.	Restart; report error to SIGMATEK.
67	<b>REALTIME RUNTIME</b>	The total time for all real time objects exceeds the maximum time allowed. The time cannot be configured.  2 ms for 386 CPUs 1 ms for all other CPUs	Solution: - Optimize the application's real-time task (RtWork). - Reduce the clock time for the real-time task of all objects. - Correct application errors - CPU is overloaded in real-time => use a higher capacity CPU.
68	<b>BACKGROUND RUNTIME</b>	The total time for all background objects exceed the maximum time; the time can be configured using two system variables:  -BTRuntime: time remaining SWBTRuntime: pre-selected value for the runtime counter	Solution: - Optimize the application's background task (background) - Use higher capacity CPU - Set SWBTRuntime correctly

70	<b>C-DIAS ERROR</b>	A connection error with a C-DIAS module has occurred.	<p>Cause:</p> <ul style="list-style-type: none"> <li>- The cause of the error is documented in the log file</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- This depends on the cause</li> </ul>
72	<b>S-DIAS ERROR</b>	A connection error with a S-DIAS module has occurred.	<p>Possible causes:</p> <ul style="list-style-type: none"> <li>- real network does not match the project</li> <li>- S-DIAS client is defective</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- analyze logfile</li> </ul>
75	<b>SRAM ERROR</b>	An error occurred while initializing, reading or writing SRam data.	<p>Possible Causes:</p> <ul style="list-style-type: none"> <li>- SRam configured incorrectly</li> <li>- Battery for the internal program memory supply is empty</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- Analyze log file (Event00.log, Event19.log)</li> <li>- Check configuration</li> <li>- Change internal program memory supply battery</li> </ul>
96	<b>USER DEFINED 1</b>	User-definable code.	
97	<b>USER DEFINED 2</b>	User-definable code.	
98	<b>USER DEFINED 3</b>	User-definable code.	
99	<b>USER DEFINED 4</b>	User-definable code.	
100	<b>C_INIT</b>	Initialization start; the configuration is run.	
101	<b>C_RUNRAM</b>	The LASAL project was successfully started from RAM.	
102	<b>C_RUNROM</b>	The LASAL project was successfully started from ROM.	
103	<b>C_RUNTIME</b>		
104	<b>C_READY</b>	The CPU is ready for operation.	
105	<b>C_OK</b>	The CPU is ready for operation.	

106	<b>C_UNKNOWN_CID</b>	An unknown object from a stand-alone or embedded object, or an unknown base class was detected.	
107	<b>C_UNKNOWN_CONSTR</b>	The operating system class cannot be created; the operating system is probably wrong.	
108	<b>C_UNKNOWN_OBJECT</b>	Indicates an unknown object in an interpreter program; more the one DCC080 object.	
109	<b>C_UNKNOWN_CHNL</b>	The hardware module number is greater than 60.	
110	<b>C_WRONG_CONNECT</b>	No connection to the required channels.	
111	<b>C_WRONG_ATTR</b>	Wrong server attributes.	
112	<b>C_SYNTAX_ERROR</b>	No specific error, recompile all project components and reload the project.	
113	<b>C_NO_FILE_OPEN</b>	An attempt was made to open an unknown table.	
114	<b>C_OUTOF_NEAR</b>	Memory allocation error	
115	<b>C_OUT_OF_FAR</b>	Memory allocation error	
116	<b>C_INCOMAPTIBLE</b>	An object with the same name already exists but has a different class.	
117	<b>C_COMPATIBLE</b>	An object with the same name and class already exists but must be updated.	
224	<b>LINKING</b>	The application is currently linking.	
225	<b>LINKING ERROR</b>	An error has occurred while linking. An error message is generated in the LASAL status window.	
226	<b>LINKING DONE</b>	Linking is complete.	
230	<b>OP BURN</b>	The operating system is currently being burned into the Flash memory.	
231	<b>OP BURN FAIL</b>	An error has occurred while burning the operating system.	
232	<b>OP INSTALL</b>	The operating system is currently being installed.	
240	<b>USV-WAIT</b>	The power supply was disconnected; the UPS is active. The system is shutdown.	
241	<b>REBOOT</b>	The operating system is restarted.	
242	<b>LSL SAVE</b>		

243	LSL LOAD		
252	CONTINUE		
253	PRERUN	The application is started.	
254	PRERESET	The application is ended.	
255	CONNECTION BREAK		

## 11 Cleaning the Touch Screen

### **CAUTION!**

**Before cleaning the touch screen, the terminal must first be turned off to avoid unintentionally triggering functions or commands!**

The terminal's touch screen can only be cleaned with a soft, damp cloth. A screen cleaning solution such as an anti-static foam, water with a mild detergent or alcohol should be used to dampen the cloth. The cleaning solution should be sprayed onto the cloth and not directly on the terminal. The cleaning solution should not be allowed to reach the terminal electronics, for example, through the ventilation slots.

No erosive cleaning solutions, chemicals, abrasive cleansers or hard objects that can scratch or damage the touch screen may be used.

If the terminal comes in contact with toxic or erosive chemicals, carefully clean the terminal immediately to prevent corrosion!

**To ensure the optimal function of the terminal, the touch screen should be cleaned at regular intervals!**

**To extend the lifespan of the touch screen as much as possible, using the fingers to operate the terminal is recommended.**

## 12 Disposal

To dispose of the product, the respective, possibly country-dependent, guidelines must be met and followed.

## Documentation Changes

Change date	Affected page(s)	Chapter	Note
19.04.2016	4	1.1 Performance Data	Table updated Remanent memory 256 => 512 KB
23.09.2016	12 28	4.3 Rear Connectors 12 Disposal	Note microSD Chapter added
23.11.2016	24	10 Status and Error Messages	Error code 75 added
05.12.2016	14	7 Buffer Battery	Battery monitoring added
18.05.2017	4	1.1 Performance Data	DDR3 RAM changed to 512 Mbyte
24.11.2020	4	1.1 Performance Data	Footnote cores (programming) added
13.03.2024	4 9	1.1 Performance Data 4 Connector Layout	microSD card updated

