ETT 732

Touch Operating Panel

Touch Operating Panel   ETT 732

The ETT 732 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 projected capacitive touch screen serves as the input medium for process data and parameters. The output is shown on a 7" WVGA 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 terminals. In the internal Flash memory, the operating system, application and application data are stored.

Contents

1   Technical Data

1.1   Performance Data

Processor	EDGE2 Technology
Processor core	1
Internal cache	32-kbyte L1 Instruction Cache
	32-kbyte L1 Data Cache
	512-kbyte L2 Cache
Internal program and data memory (DDR3 RAM)	256-Mbyte
Internal remnant data memory	256-kbyte SRAM (battery buffered)
Internal storage device	512-Mbyte NAND Flash
Internal I/O	no
Interfaces	1x USB 2.0 (Type A)
	1x Ethernet 10/100 (RJ45)
	2x CAN bus (6-pin Weidmüller)
	1x RS232 (9-pin D-Sub)
Internal interface connections and devices	1x TFT LCD color display
	1x touch
Display	7" TFT color display
Resolution	800 x 480 Pixel
Control panel	touch screen (projective capacitive)
Data buffer	yes
Signal generator	no
Status LEDs	no
Real-time clock	yes
Cooling	Passive (fanless)

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	typically 180 mA (without externally connected devices)	maximum 290 mA (with external devices connected)
Current consumption of standby voltage at +24 V	typically 110 mA (without externally connected devices)	maximum 180 mA (with external devices connected)
Inrush current	600 mA (1 ms)	

1.3   Terminal

Dimensions	183.6 x 138.8 x 41.9 mm (W x H x D)
Material	front plate: 4 mm Aluminum
Weight	circa 600 g

1.4   Environmental Conditions

Storage temperature	-10 ... +80 °C	
Operating temperature	0 ... 60 °C	
Humidity	10-90 %, non-condensing	
EMC stability	in accordance with product standard EN 60730-1	
Vibration resistance	EN60068-2-6	2-9 Hz: amplitude 3.5 mm 9-200 Hz: 1 g (10 m/s²)
Shock resistance	EN60068-2-27	15 g (150 m/s²) duration 11 ms, 18 Shocks
Protection type	EN 60529 protection through housing	front: IP65 cover: IP20

1.5   Display 7" VGA incl. Touch

Type	7" TFT LCD color display
Resolution	WVGA 800 x 480 pixels
Color depth	16 Bit RGB (65K colors)
LCD mode	normal white [1]
LCD Polarizer	transmissive [2]
Pixel size	0.0642 x 0.1790 mm
Number of pixels	800*3 (RGB) x 480
Active surface	154.08 x 85.92 mm
Backlighting	LED
Contrast	500:1
Brightness	typically 280 cd/m²
Visible field	left and right 70°, below 70°, above 50°

[1] If there is no display data, the display is white (LED backlight visible)

[2] Display technology, with which display backlighting is used.

Touch panel	projective capacitive touch
Sensor type	glass-glass
Surface	1.0 mm hardened glass front with black frame
Surface hardness	7H pencil hardness according to JIS K5400
Transparency	≥ 85 %
Cleaning	see chapter: Cleaning the Touch Screen

For input to the touch screen, only the fingers, capacitive touch pens or suitable gloves can be used. No hard or pointed objects can be used. Visualization properties must be adapted to a projected capacitive touch screen.

1.6   Miscellaneous

Article number	01-230-732
Hardware version	1.x

2   Mechanical Dimensions
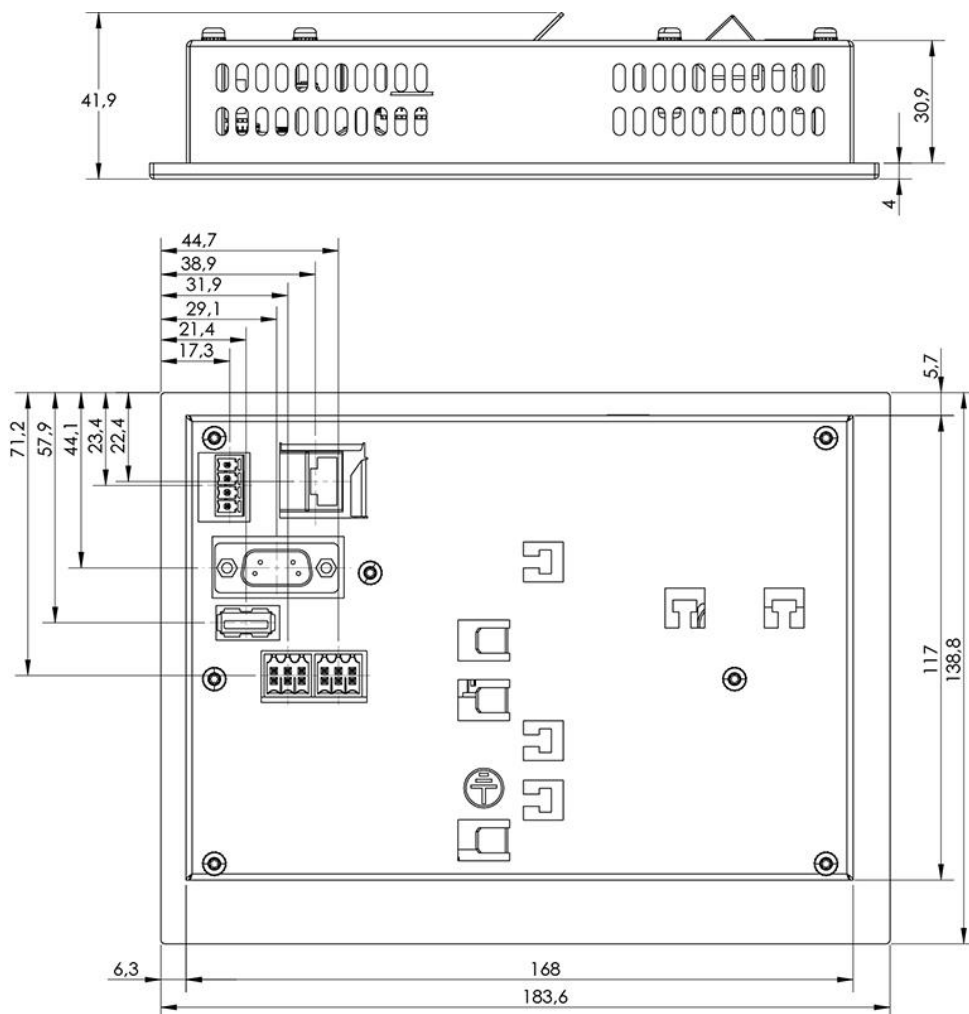
3   Connector Layout

3.1   Backside:
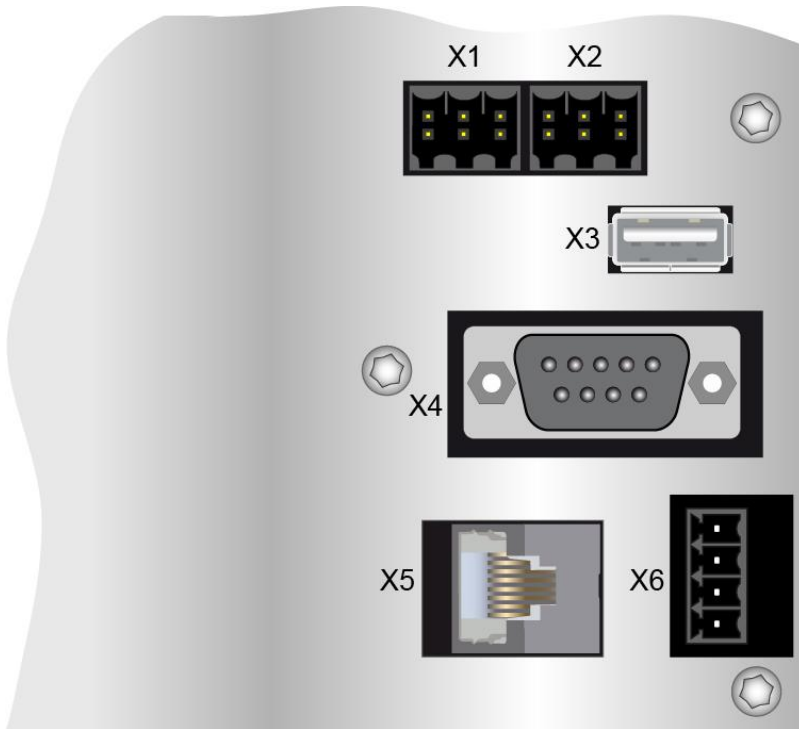
X1: CAN 1 (6-pin Weidmüller))
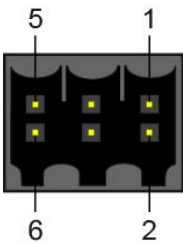
Pin	Function
1	CAN A (LOW)
2	CAN B (High)
3	CAN A (LOW)
4	CAN B (High)
5	GND
6	n.c.
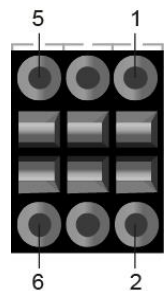
n.c. = do not use

X2: CAN 2 (6-pin Weidmüller)
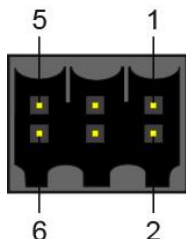
Pin	Function
1	CAN A (LOW)
2	CAN B (High)
3	CAN A (LOW)
4	CAN B (High)
5	GND
6	n.c.

n.c. = do not use
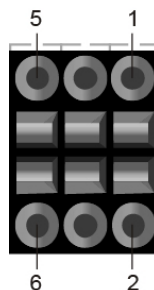
X3: USB 2.0 (Type A)
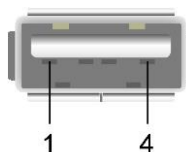
Pin	Function
1	+5 V
2	D-
3	D+
4	GND

X4: RS232 (D-Sub)
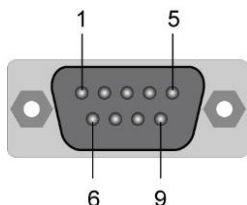
Pin	Function
1	DCD
2	Rx
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

X5: Ethernet 10/100 (RJ45)
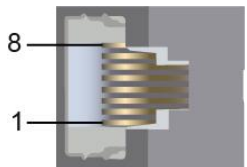
Pin	Function
1	TX +
2	Tx-
3	RX +
4	n.c.
5	n.c.
6	RX -
7	n.c.
8	n.c.

> **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.**

> **Des problèmes peuvent survenir si un automate est connecté à un réseau IP contenant des modules qui ne fonctionnent pas sous un système d'exploitation SIGMATEK. Avec de tels dispositifs, les paquets Ethernet peuvent être envoyés à l'automate avec une fréquence tellement élevée (càd. diffusion), que les interruptions ainsi générées peuvent provoquer une erreur d'exécution. En configurant d'une façon appropriée le filtre de paquets (pare-feu ou un routeur) il est toutefois possible de connecter un réseau avec le matériel SIGMATEK à un réseau tiers sans déclencher l'erreur mentionnée ci-dessus.**
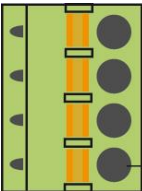
X6: Power supply (4-pin Phoenix Contact)

Pin	Function
1	+24 V DC
2	+24 V DC
3	GND
4	GND

3.1.1   Applicable Connectors

X1 and X2: 6-pin Weidmüller plug B2L3.5/6 (included in delivery)
X3:   USB 2.0 (Type A) (not included in delivery)
X4:   9-pin D-Sub (not included in delivery)
X5:   8-pin RJ45 (not included in delivery)
X6:   4-pin Phoenix Contact plug with spring terminal FK-MCP 1.5/ 4-ST-3.5
                 (Included with delivery)

4   Cooling

The terminal's power loss can reach up to 7.5 Watts. To ensure the necessary air circulation for cooling, the following mounting instructions must be followed!

5   Mounting Instructions

The following distance from the housing should be maintained:

- Left, right, below, above 2 cm
- In the rear, 10 cm
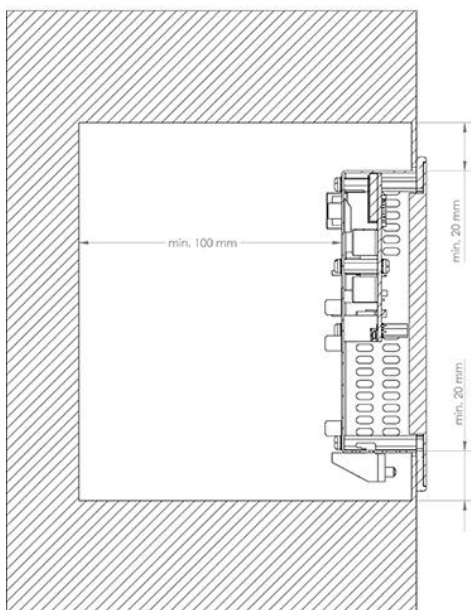
Top view:

Side view:
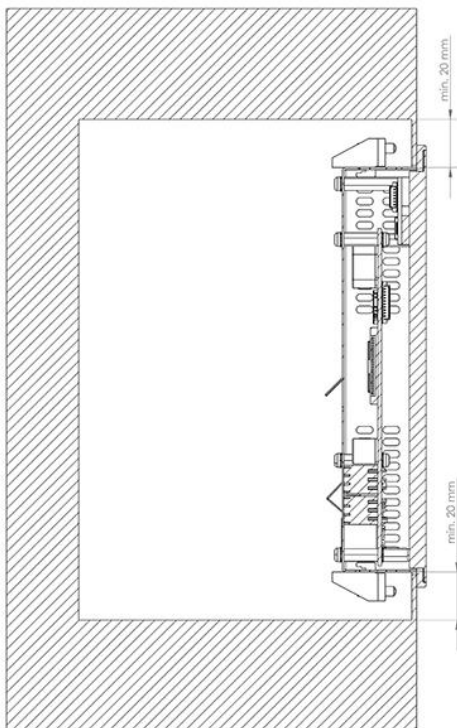
A mounting position of 60°- 120° is also required.
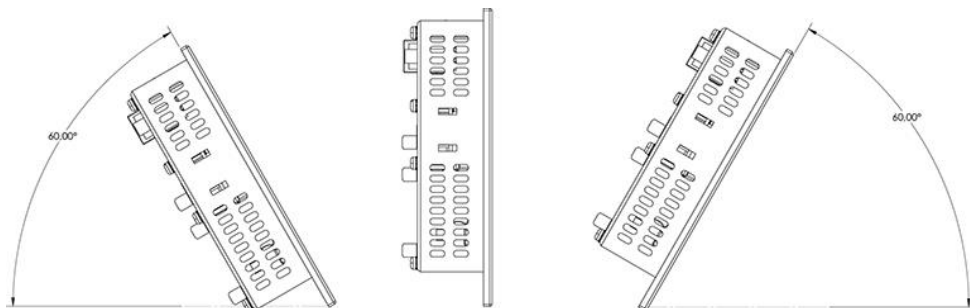
6   Buffer Battery

The exchangeable buffer battery ensures that the clock time (RTC) and SRAM data of the ETT 732 is preserved in the absence of a supply voltage. A lithium battery is installed at the manufacturer.

After delivery of the ETT 732 and storage of one year, the lifespan of the battery reaches 10 years.

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

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

	MANUFACTURER	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 into fire!

Utilisez seulement des piles de RENATA CR2032 ! ATTENTION! La pile peut exploser si elle n'est pas manipulée corredtement! Ne pas recharger, démonter ou jeter au feu!

6.1   Exchanging the Battery: Option 1

1. The SRAM data are saved in the Flash using the CLI command SRAM Save.

2. Disconnect the ETT 732 supply

3. Loosen the seven locking screws (Torx) on the back of the terminal with a TX9 screw driver.
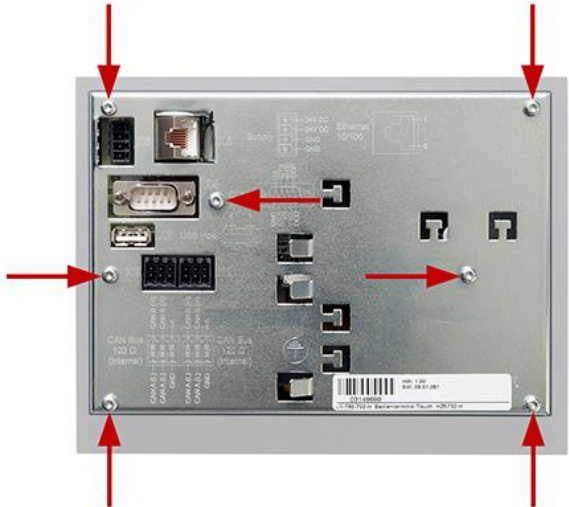
4. Lift the rear panel of the terminal.

5. Using the strap, remove the battery from the holder.

6. Insert the new battery with the correct polarity (plus side facing the back of the terminal) and replace the back panel of the terminal and tighten the screws.

7. Load the SRAM data from the Flash using the CLI command SRAM Load and set the time. The time and date can be set through Time and Date.

6.2   Exchanging the Battery: 2. Option

 1. Disconnect the ETT 732 supply

2. Loosen the seven locking screws (Torx) on the back of the terminal with a TX9 screw driver.
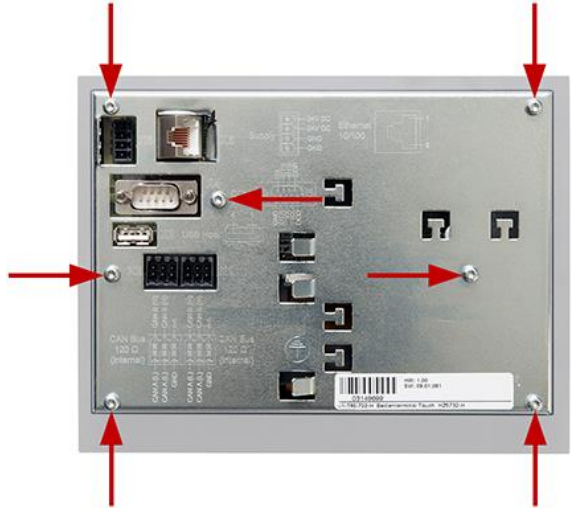
3. Lift the rear panel of the terminal.

4. Reconnect supply.

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

5. Using the strap, remove the battery from the holder.

6. Insert the new battery with the correct polarity (plus side facing the back of the terminal). Disconnect the supply, replace the back panel of the terminal and tighten the locking screws.

7. Connect the ETT 732 supply

7   Wiring Guidelines

7.1   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.

7.2   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.

7.3   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). This will allow the dissipation of electrostatic loads (caused by clothing/shoes).

7.4   USB Interface Connections

The terminal has a USB interface. 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.

8   CAN Bus Setup

This section explains how to correctly configure the CAN bus. The following parameters must first be set: Station number and data transfer rate.

8.1   CAN Bus Station Number

Each CAN bus station is assigned its own station number. With this station number, data can be exchanged with other stations connected to the bus. In a CAN bus system however, each station number can only be assigned once!

8.2   Number of CAN Bus Participants

The maximum number of participants on the CAN bus depends on the cable length, termination resistance, data transfer rate and the drivers used in the participants.

With a termination resistance of 120 Ω, at least 100 participants are possible.

8.3   CAN Bus Data Transfer Rate

Various data transfer rates (baud rates) can be set on the CAN bus. The longer the bus line is, the lower the data transfer rate that must be selected.

Value	Baud Rate	Maximum Length
0	615 Kbits/s	60 m
1	500 kbit/s	80 m
2	250 Kbits/s	160 m
3	125 Kbits/s	320 m
4	100 Kbits/s	400 m
5	50 Kbits/s	800 m
6	20 kbits/s	1200 m
7	1 Mbit/s	30 m

These values apply to the following cable: 120 Ω Twisted Pair.

Note: For the CAN bus protocol: 1 kbit/s = 1 kBaud.

9   CAN Bus Termination

In a CAN bus system, both end modules must be terminated. This is necessary to avoid transmission errors caused by reflections in the line.
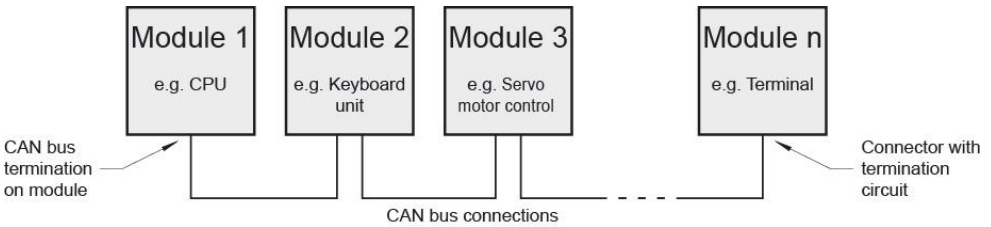
The termination is made by an internal 120 Ω resistor between CAN A (LOW) and CAN B (HIGH).

10 Process Diagram
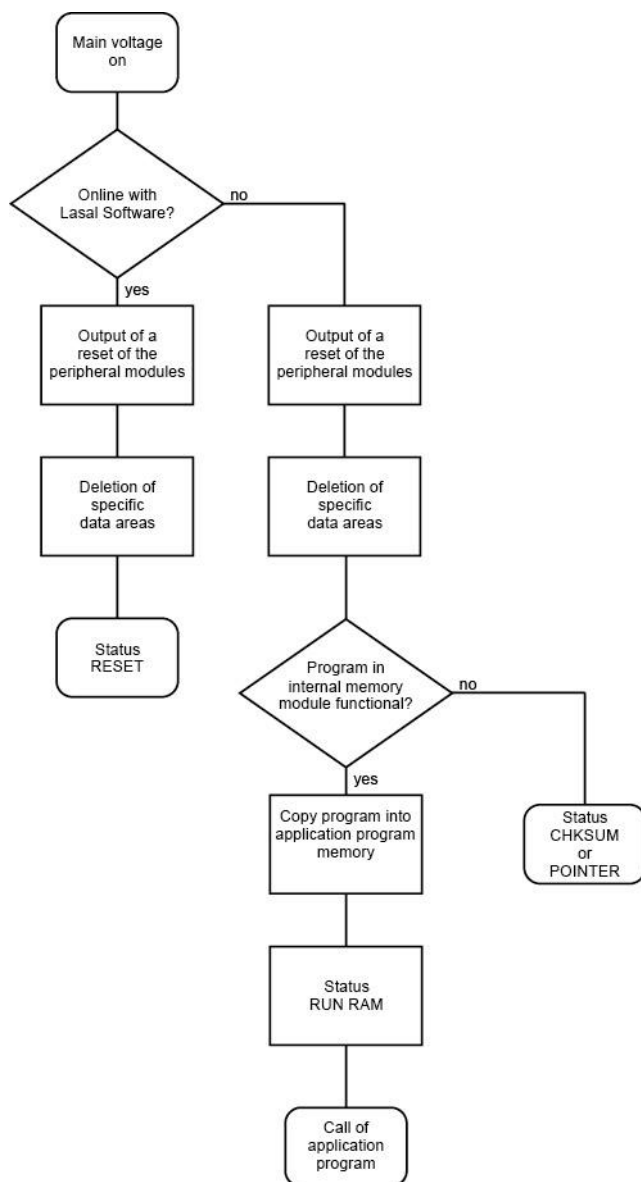
11 Status and Error Messages

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	`RUN RAM`	The user program is currently running in RAM. The display is not affected.	Info
01	`RUN ROM`	The user program stored in the program memory module loaded into the RAM is currently running. The display is not affected.	Info
02	`RUNTIME`	The total time for all cyclic objects exceeds the maximum time; the time can be configured using two system variables: - Runtime: time remaining - SWRuntime: pre-selected value for the runtime counter	Optimize the application's cyclic task. Use higher capacity CPU Configure preset value
03	`POINTER`	Incorrect program pointers were detected before running the user program	Possible Causes: - The program memory module is missing, not programmed or defect. - The program in the user program memory (RAM) is not executable. - The buffering battery has failed. - The user program has overwritten a software error. Solution: - Reprogram the memory module, if the error reoccurs exchange the module. - Exchange the buffering battery - Correct programming error
04	`CHKSUM`	An invalid checksum was detected before running the user program.	Cause/solution: s. POINTER

05	`WATCHDOG`	The program was interrupted via the watchdog logic.	Possible Causes: - User program interrupts blocked over a longer period of time (STI command forgotten) - Programming error in a hardware interrupt. - INB, OUTB, INW, OUTW instructions used incorrectly. - The processor is defect. Solution: - Correct programming error. - Exchange CPU.
06	`GENERAL ERROR`	General error An error has occurred while stopping the application over the online interface.	The error occurs only during the development of the operating system.
07	`PROM DEFECT`	An error has occurred while programming the memory module.	Cause: - The program memory module is defect. - The user program is too large. - The program memory module is missing. Solution: - Exchange the program memory module
08	`RESET`	The CPU has received the reset signal and is waiting for further instructions. The user program is not processed.	Info
09	`WD DEFEKT`	The hardware monitoring circuit (watchdog logic) is defective. 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.	Solution: Exchange CPU.
10	`STOP`	The program was stopped by the programming system.	
11	`PROG BUSY`	Reserved	
12	`PROGRAM LENGTH`	Reserved	

13	**PROG END**	A memory module was successfully programmed.	Info
14	**PROG MEMO**	The CPU is currently programming the memory module.	Info
15	**STOP BRKPT**	The CPU was stopped by a breakpoint in the program.	Info
16	**CPU STOP**	The CPU was stopped by the program-ming software.	Info
17	**INT ERROR**	The CPU has triggered a false interrupt and stopped the user program or has encountered an unknown instruction while running the program.	Cause: - A nonexistent operating system was used. - Stack error (uneven number of PUSH and POP instructions). - The user program was interrupt-ed through a software error. Solution: Correct program error
18	**SINGLE STEP**	The CPU is in single step mode and is waiting for further instructions.	Info
19	**READY**	A module or project was sent to CPU and it is now ready to run the program.	Info
20	**LOAD**	The program is stopped and the CPU is currently receiving a new module or project.	Info
21	**UNZUL. MODULE**	The CPU has received a module that does not belong to the project.	Solution: - Recompile and download the entire project
22	**MEMORY FULL**	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 bun not released. Solution Free memory
23	**NOT LINKED**	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	`DIV BY 0`	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	`DIAS ERROR`	While accessing a DIAS module, an error has occurred.	Hardware problem
26	`WAIT`	The CPU is busy.	Info
27	`OP PROG`	The operating system is currently being reprogrammed.	Info
28	`OP INSTALLED`	The operating system has been rein-stalled.	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.	- 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 FAIL-URE`	A general error has occurred while loading the operating system.	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 log file
45	`VARAN ERROR`	A required VARAN client was discon-nected or communication error has occurred.	Solution: - Read LogFile - Error Tree
46	`APPL-LOAD-ERROR`	An error has occurred while loading the application.	Cause: - Application was deleted. Solution: - Reload the application into the control.
47	`APPL-SAVE-ERROR`	An error has occurred while attempting to save the application.	
50	`ACCESS-EXCEPTION-ERROR`	Read or write access of a restricted memory area. (I.e. writing to the NULL pointer).	Solution: - Correct application errors
51	`BOUND EXCEEDED`	An exception error has occurred when accessing arrays. The memory area was overwritten through accessing an invalid element.	Solution: - Correct application errors
52	`PRIVILEDGED INSTRUCTION`	An unauthorized instruction for the current CPU level was given. For exam-ple, setting the segment register.	Cause: - The application has overwritten the application program code. Solution: - Correct application errors
53	`FLOATING POINT ERROR`	An error has occurred during a floating-point operation.	
60	`DIAS-RISC-ERROR`	Error from the Intelligent DIASMaster.	Restart; report error to SIGMATEK.
64	`INTERNAL ERROR`	An internal error has occurred, all appli-cations are stopped.	Restart; report error to SIGMATEK.
65	`FILE ERROR`	An error has occurred during a file operation.	
66	`DEBUG   ASSERTION FAILED`	Internal error.	Restart; report error to SIGMATEK.

67	`REALTIME RUNTIME`	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	`BACKGROUND RUNTIME`	The total time for all background objects exceeds the maximum time; the time can be configured using two system variables: -BTRuntime: time remaining SWBTRuntime: preset value for the runtime counter	Solution: - Optimize the application's background task (background) - Use higher capacity CPU - Set SWBTRuntime correctly
70	`C-DIAS ERROR`	A connection error with a C-DIAS module has occurred.	Cause: - The cause of the error is documented in the log file Solution: - This depends on the cause
72	`S-DIAS ERROR`	A connection error with an S-DIAS module has occurred.	Possible causes: - real network does not match the project - S-DIAS client is defective Solution: - analyze log file
95	`USER DEFINED 0`	User-definable code.	
96	`USER DEFINED 1`	User-definable code.	
97	`USER DEFINED 2`	User-definable code.	
98	`USER DEFINED 3`	User-definable code.	
99	`USER DEFINED 4`	User-definable code.	
100	`C_INIT`	Initialization start; the configuration is run.	
101	`C_RUNRAM`	The LASAL project was successfully started from RAM.	
102	`C_RUNROM`	The LASAL project was successfully started from ROM.	
103	`C_RUNTIME`		
104	`C_READY`	The CPU is ready for operation.	

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

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

12 Cleaning the Touch Screen

CAUTION!
Since it may be possible to activate the touch screen by water droplets, grease spots etc., these substances should be removed with a cloth as quickly as possible. Before cleaning the touch screen, the terminal must first be turned off to avoid unintentionally triggering functions or commands!

ATTENTION!
Avant de nettoyer l'écran tactile, le terminal doit d'abord être éteint afin d'éviter un déclanchement involontaire des commandes!

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!

Documentation Changes

Change date	Affected page(s)	Chapter	Note
26.11.2014	5	1.4 Environmental Conditions	Protection type changed