

## Control Panel

## ETV 1251

The control panel is an intelligent terminal for programming and visualization of automated processes. Process diagnosis as well as operating and monitoring automated procedures is simplified using this terminal.

A touch screen serves as the input medium for process data and parameters. The output is shown on a 12.1" SVGA TFT color display.

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

The available interface connections can be used to exchange process data or configure the terminal. A micro SD card serves as the storage medium for the operating system, application and application data.

The integrated, high-performance VARAN bus can be used to control I/O modules directly.



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## Technical Data

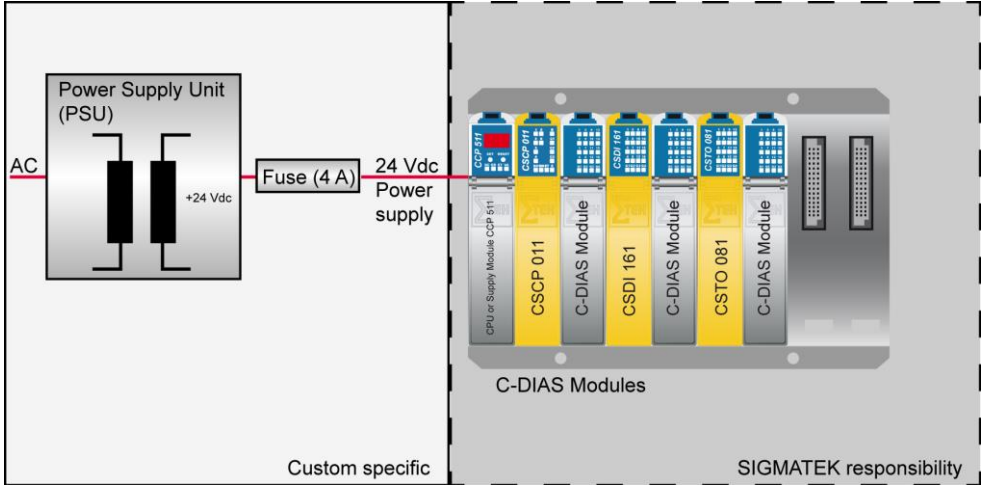
### Performance Data

|   |  |
|---|--|
| Processor                                   | EDGE-Technology X86 compatible   |
| Internal cache                              | 32-kbyte L1 Cache<br>256-kbyte L2 Cache  |
| BIOS  | AMI  |
| Internal program and data memory (DDR2 RAM) | 64 Mbytes  |
| Internal remnant data memory                | 512 Kbytes <sup>(1)</sup>  |
| Internal storage device (IDE)               | 512 MByte microSD  |
| Internal I/O                                | Yes  |
| Interface connections                       | 2 x USB 2.0, Type A (Full speed 12 Mbit/s)<br>1 x USB 1.1, Type Mini B<br>1 x Ethernet<br>1 x VARAN-Bus (maximum length: 100 m)<br>1 x CAN-Bus |
| Internal interface connections and devices  | 1 x TFT-LCD color display<br>1 x Touch   |
| Display                                     | 12.1" TFT color display  |
| Resolution                                  | 800 x 600 Pixel  |
| Control panel                               | 4-wire touch screen (analog resistive)   |
| Data buffer                                 | Yes  |
| Signal generator                            | No   |
| Status leds                                 | Yes  |
| Real-time clock                             | Yes (buffering via battery)  |
| Cooling                                     | Passive (fanless)  |

<sup>(1)</sup> See chapter "Note on SRAM Behavior"

### Electrical Requirements

|   |  |   |
|---|--|---|
| Supply voltage                          | Typically +24 V DC                                       |   |
|   | Maximum +18 V DC   | Maximum +30 V DC                                    |
| Current consumption of the +24 V supply | Typically 610 mA<br>(with no external devices connected) | Maximum 670 mA<br>(with external devices connected) |
| Starting current                        | Maximum 27 A for 9 $\mu$ s                               |   |



The control panel was tested as a limited voltage/limited current (LVLC) device according to the UL508 Norm. To fulfill the normative requirements, the control panel must be powered by a galvanically isolated supply that is protected with a UL-approved fuse in the secondary circuit. The maximum rated current is determined by UL508, table 32.1.

UL508, table 32.1: rated fuse values

| Output voltage (peak value) $U_{max}$                      | Current limit        |
|--|----------------------|
| 0 V – 20 V (0 V – 28.3 V)<br>20 V – 30 V (28.3 V – 42.2 V) | 5.0<br>$100/U_{max}$ |

Example:  
 Output voltage: 24 VDC  
 Maximum current:  $100/24 \text{ V} = 4.17 \text{ A}$   
 Selected fuse: 4 A

**Terminal**

|            |                                       |
|------------|---------------------------------------|
| Dimensions | 320 mm / 260 mm / 47.5 mm (W x H x D) |
| Material   | Front plate: 3.5 mm anodized aluminum |
| Weight     | Typically 3.4 kg                      |

**Environmental Conditions**

|                       |  |  |
|-----------------------|--|--|
| Storage temperature   | -10 – +80 °C   |  |
| Operating temperature | 0 – 50 °C  |  |
| Humidity              | 10 - 90 %, uncondensed   |  |
| EMV stability         | EN 61000-6-2: noise resistance<br>EN 61000-6-4: noise emission |  |
| Vibration tolerance   | EN 60068-2-6   | 2 – 9 Hz: amplitude 3.5 mm<br>9 – 200 Hz: 1 g (10 m/s <sup>2</sup> ) |
| Shock resistance      | EN 60068-2-27  | 150 m/s <sup>2</sup>   |
| Protection Type       | EN 60529<br>protection through housing                         | Front: IP54<br>Cover: IP20   |

**12.1" SVGA Display**

|                     |  |
|---------------------|--|
| Type                | 12,1" TFT LCD color display              |
| Resolution          | SVGA 800 x 600 Pixel                     |
| Color depth         | 18-bit RGB (262K colors)                 |
| LCD mode            | TN / normal white                        |
| LCD Polarizer       | Transmissive                             |
| Pixel size          | 0.3075 mm x 0.3075 mm                    |
| Active surface      | 246.0 mm x 184.5 mm                      |
| Background lighting | LED                                      |
| Contrast            | Typically 700:1                          |
| Brightness          | Typically 450 cd/m <sup>2</sup>          |
| Angle CR ≥ 10       | Left and right 80°, above 65°, below 75° |

**Control Unit**

|                       |   |
|-----------------------|---|
| Touch panel           | Analog resistive film-glass touch panel |
| Resolution            | 12-Bit (4096 x 4096)                    |
| Connection technology | 4-wire                                  |

## Digital Outputs

|   |                         |
|---|-------------------------|
| Number of ...                                       | 8                       |
| Short-circuit proof                                 | Yes                     |
| Maximum continuous current load allowed per channel | 2 A                     |
| Maximum total current (all 8-channels)              | 6 A (100 % of on-time)  |
| Voltage drop over power supply (output active)      | $\leq 1$ V              |
| Residual output current (inactive)                  | $\leq 12$ $\mu$ A       |
| Turn-on delay                                       | $< 400$ $\mu$ s         |
| Turn-off delay                                      | $< 400$ $\mu$ s         |
| Max. braking energy of inductive loads              | 1 channel 0.12 [Joules] |

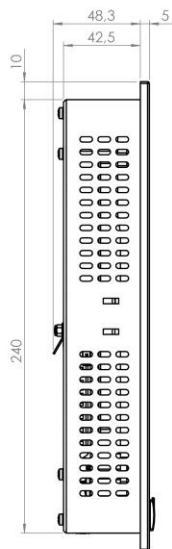
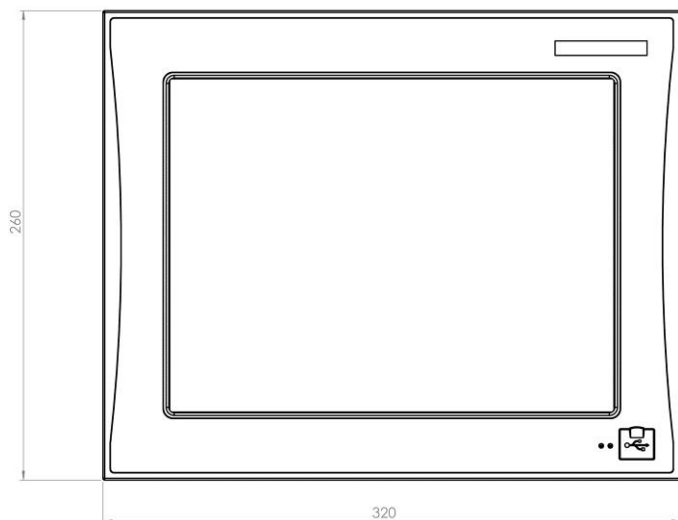
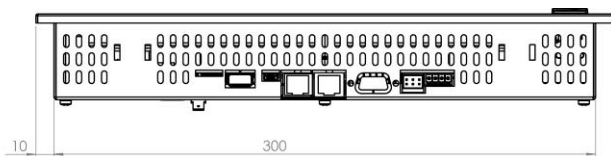
## Digital Inputs

|                     |                         |                  |
|---------------------|-------------------------|------------------|
| Number of ...       | 8                       |                  |
| Input voltage       | Typically +24 V         | Maximum +30 V    |
| Signal level        | Low: $< +4.5$ V         | High : $> +14$ V |
| Switching threshold | Typically +11 V         |                  |
| Input current       | Typically 5 mA at +24 V |                  |
| Input delay         | Typically 5 ms          |                  |

## Miscellaneous

|                  |              |
|------------------|--------------|
| Article number   | 12-230-1251  |
| Hardware version | 5.x          |
| Standard         | UL (E247993) |

# Mechanical Dimensions



## Chemical Resistance

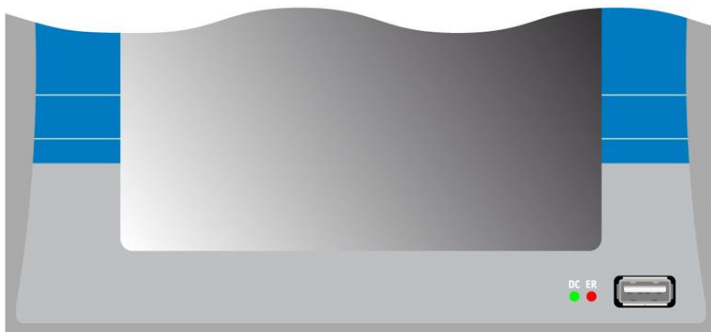
### Decorative foil

| Solution                       | Effect over time |          |
|--------------------------------|------------------|----------|
|                                | 1 hour           | 24 hours |
| Methyl, ethyl, ketone          | None             | None     |
| Cyklohexanol                   | None             | None     |
| Acetone                        | None             | None     |
| Ethanol                        | None             | None     |
| Benzyl alcohol                 | Yes              | Yes      |
| 1.1.1.Trichlorethan (Genklene) | None             | None     |
| Perchloroethylene (Perklone)   | None             | None     |
| Trichloroethylene              | None             | None     |
| Methylene chloride             | Yes              | Yes      |
| Diethyl ether                  | None             | None     |
| Toluene                        | None             | None     |
| Xylene                         | None             | None     |
| Benzine                        | None             | None     |
| Diesel oil                     | None             | None     |
| Nitric acid <10 %              | None             | None     |
| Sodium hydroxide <10 %         | None             | None     |
| Turpentine                     | None             | None     |
| Ethyl acetate                  | None             | None     |

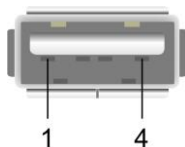


# Connector Layout

## Front



### USB 2.0 (Type A, Full Speed 12 Mbit/s)

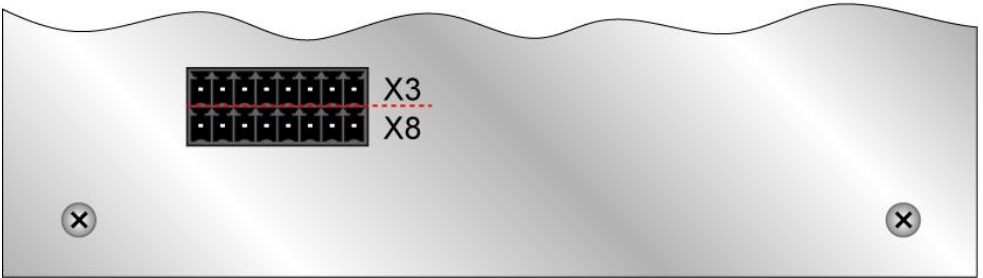
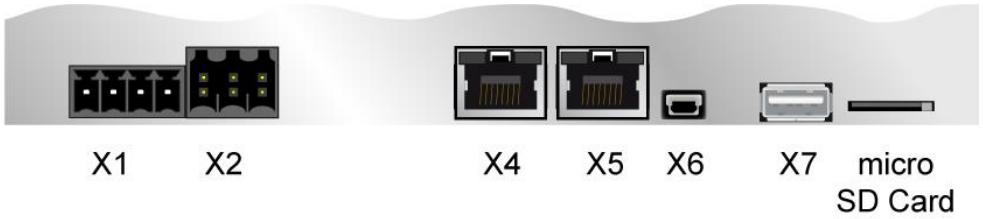


| Pin | Funktion |
|-----|----------|
| 1   | +5 V_USB |
| 2   | D0-      |
| 3   | D0+      |
| 4   | GND      |

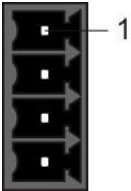
### Status Displays

| LED status            | Definition                                   |
|-----------------------|--|
| LED error lights red  | BIOS is booted                               |
| LED error blinks read | Error status / operating system boot process |
| LED DC lights green   | DC OK  |

## Connections on Rear and Bottom

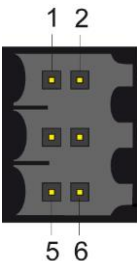


### X1: Power plug



| Pin | Function         |
|-----|------------------|
| 1   | +24 V DC DIG IOs |
| 2   | +24 V DC         |
| 3   | GND              |
| 4   | GND              |

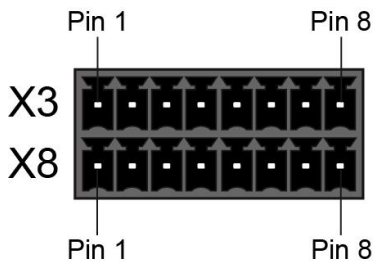
### X2: CAN



| 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 and X8: 8 digital inputs, 8 digital outputs**

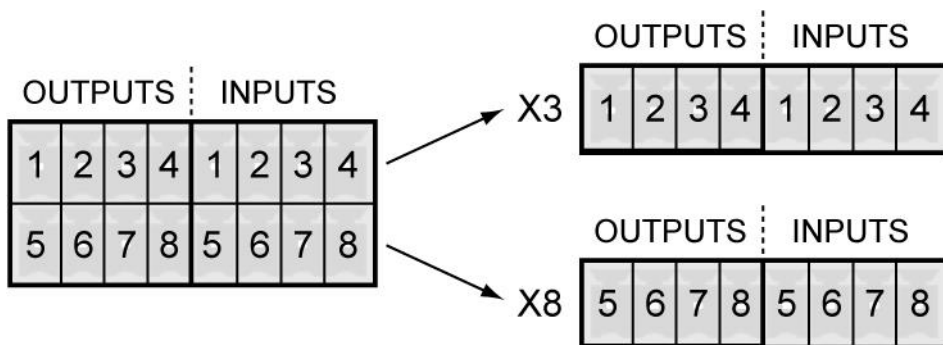


**X3: Pin assignment**

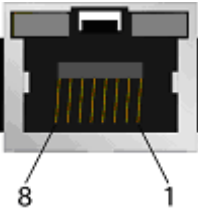
| Pin | Function |
|-----|----------|
| 1   | Output 1 |
| 2   | Output 2 |
| 3   | Output 3 |
| 4   | Output 4 |
| 5   | Input 1  |
| 6   | Input 2  |
| 7   | Input 3  |
| 8   | Input 4  |

**X8: Pin assignment**

| Pin | Function |
|-----|----------|
| 1   | Output 5 |
| 2   | Output 6 |
| 3   | Output 7 |
| 4   | Output 8 |
| 5   | Input 5  |
| 6   | Input 6  |
| 7   | Input 7  |
| 8   | Input 8  |



#### X4: Ethernet



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

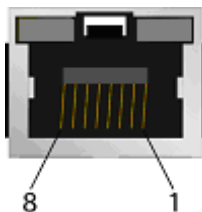
n.c. = do not use

Problems can arise if a control is connected to an IP network, which contains modules that are not running with 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.

**For use in local networks only, not telecommunication circuits.**

**Pour une utilisation dans les réseaux locaux uniquement, et non pas dans de circuits de télécommunications.**

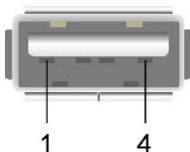
**X5: VARAN-Out**


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

**More information on the VARAN bus can be found in the VARAN bus specifications!**

**X6: USB 1.1 (Type Mini B)**


| Pin | Function |
|-----|----------|
| 1   | +5 V     |
| 2   | D-       |
| 3   | D+       |
| 4   | n.c.     |
| 5   | GND      |

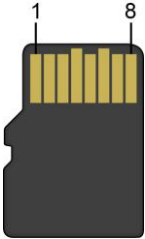
**X7: USB 2.0 (Type A, Full Speed 12 Mbit/s)**


| Pin | Function |
|-----|----------|
| 1   | +5 V_USB |
| 2   | D-       |
| 3   | D+       |
| 4   | GND      |

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. 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.

Il faut souligner que la plupart des périphériques USB sur le marché ne sont pas conformes aux spécifications USB, ce qui peut entraîner des dysfonctionnements de l'appareil. Il est également possible que ces dispositifs ne seront pas détectés par le port USB ou qu'ils ne fonctionnent pas correctement. Par conséquent, il est recommandé que chaque clé USB soit testée avant l'utilisation sur l'automate.

## 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 the 512-Mbyte EDGE microSD card: 12-630-051**

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

**Il est recommandé de n'utiliser que les supports de stockage approuvés par SIGMATEK (compact flash, microSD, etc.).  
Numéro de commande pour la carte microSD 512 Mo Edge est le: 12-630-051**

**Le nombre de cycles de lecture et d'écriture a l'influence notable sur la durée de vie des supports de stockage.**

## Applicable connectors

- CAN-Bus:** 6-pin Weidmüller plug, B2L3, 5/6
- USB:** 4-pin, type A (downstream connector)
- Ethernet:** 8-pin, RJ45
- VARAN:** 8-pin, RJ45
- Power supply:** 4-pin Phoenix plug with screw terminal technology MC1, 5/4-ST-3.5  
4-pin Phoenix plug with spring terminal FK-MCP1, 5/4-ST-3.5
- Digital I/Os:** 2 x 8-pin Phoenix plug with spring terminal FMC1, 5/8-ST-3.5

**The complete CKL 213 connector set is available from SIGMATEK under the article number 12-600-213.**

## Buffer Battery

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

The battery has enough capacity to preserve data in the absence of a supply voltage for up to 7 years.

Battery order number: 01-690-055

|                 | MANUFACTURER | DATA            |
|-----------------|--------------|-----------------|
| Lithium battery | RENATA       | 3.0 V / 235 mAh |

Use batteries from RENATA with the number CR2032 only!  
With any other battery, the danger of fire or explosion exists!

Remplacer la pile avec RENATA, modèle n° CR2032 uniquement! Utilisation d'une autre pile peut présenter un risque d'incendie ou d'explosion!

## Exchanging the Battery

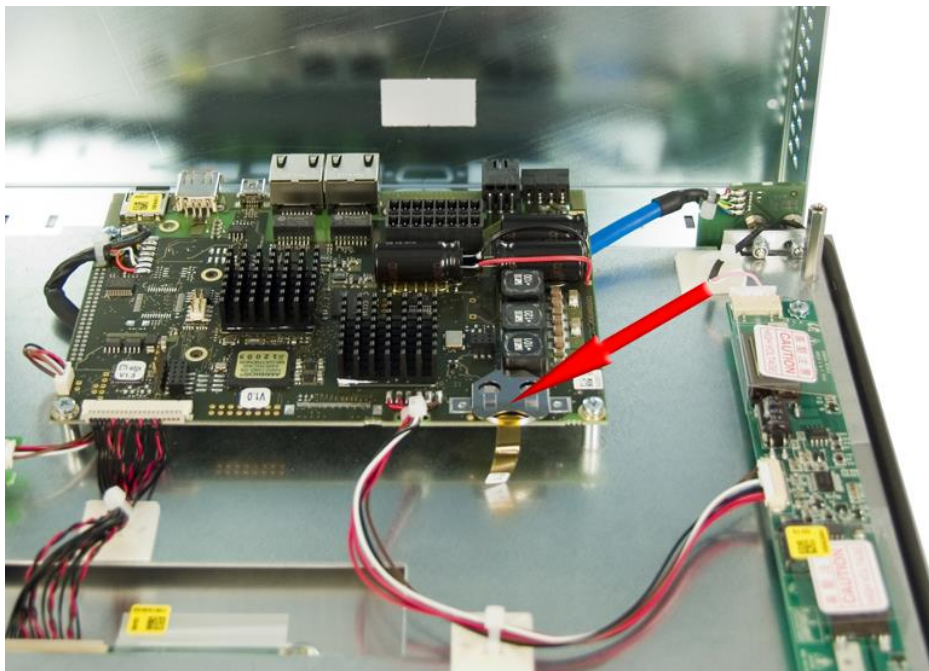
1. Disconnect the power to the ETV.
2. Open the locking screws on the back of the terminal with a PH-1 screwdriver:





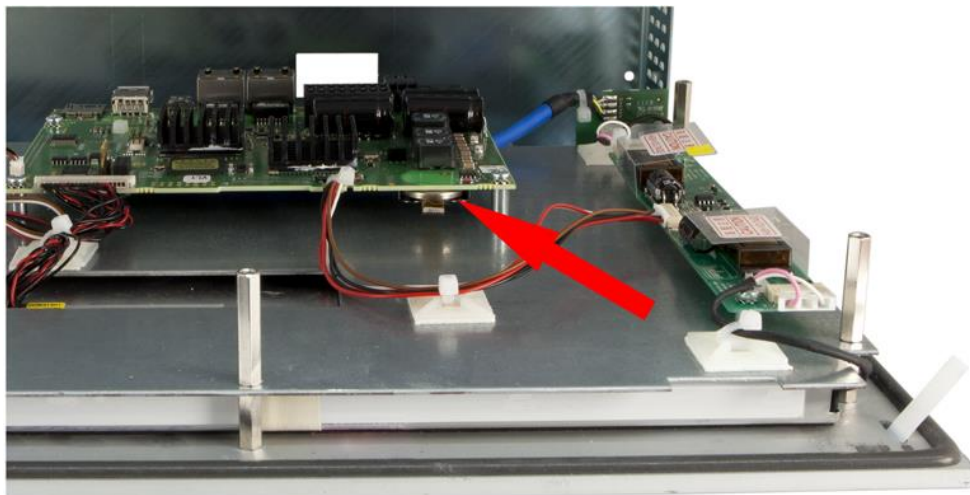
3. Lift rear panel of the terminal:

**For HW version 1.x:**



4. Using the strap, remove the battery the holder (see arrow).

5. Insert the new battery with the correct polarity and close the terminal.  
(+ Pole toward the backside)

**From HW version 2.x:**

4. Using the strap, remove the battery from the holder (see arrow).
5. Place the new battery in the holder with the correct polarity (+ Pole toward the frontside) and replace the cover.

## BIOS

The BIOS is configured so that the LASAL operating system is booted from the SD card.

## Cooling

The terminal's power loss can reach up to 16 Watts. To ensure the necessary air circulation for cooling, the following mounting instructions must be followed!

## Mounting Instructions

The following clearance is required for the cover:

- Rear side, left and right 5 cm
- Above and below 10 cm

A mounting position of 60° to 120° is also required.

## Wiring Guidelines

### Earth Connection

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

### Shielding

With Ethernet, a CAT-5 cable with shielded RJ45 connectors is required. The shielding in the CAT-5 cable is connected to earth through the RJ45 connector. Noise therefore cannot reach the electronics and affect the function.

### 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 control cabinet or earth terminal). Electrostatic loads (through clothing and shoes) can thereby be dissipated.

### USB Interface Connections

The terminal has a USB interface connection that can be used to connect various USB devices (keyboard, mouse, storage media, hubs, etc.) in LASAL. Several USB devices, which are fully functional in LASAL, can be connected using a hub.

## 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.

### 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. Up to 31 stations can be installed in a CAN bus system. However, each station number can only be assigned once.

### CAN bus data transfer rate

The data transfer rate (baud rate) for the CAN bus can be set. However, the longer the length of the bus, the smaller the transfer rate that must be selected.

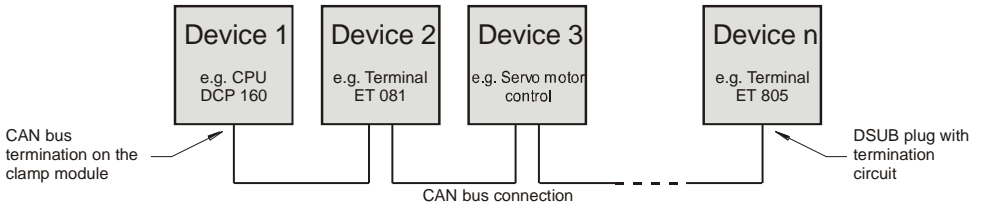
| Value | Baud rate  | Maximum length |
|-------|------------|----------------|
| 0     | 615 kBit/s | 60 m           |
| 1     | 500 kBit/s | 80 m           |
| 2     | 250 kBit/s | 160 m          |
| 3     | 125 kBit/s | 320 m          |
| 4     | 100 kBit/s | 400 m          |
| 5     | 50 kBit/s  | 800 m          |
| 6     | 20 kBit/s  | 1200 m         |
| 7     | 1 Mbit / s | 30 m           |

These values are valid for the following cable: 120  $\Omega$ , Twisted Pair.

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

## CAN Bus Termination

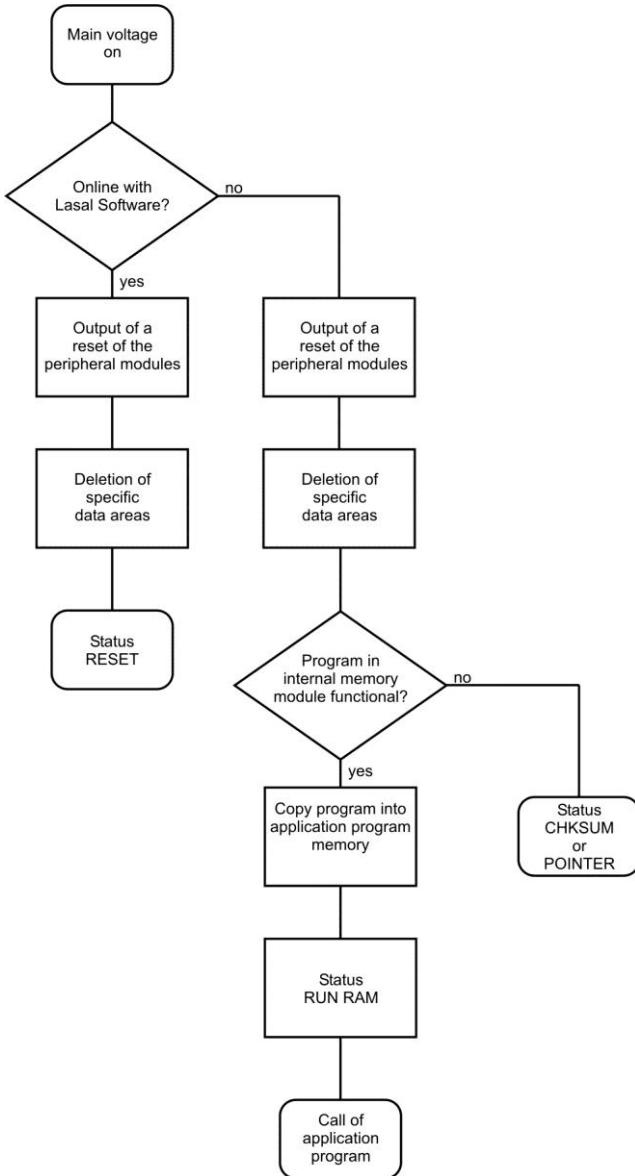
In a CAN bus system, both end modules must be terminated. This is necessary to avoid transmission errors caused by reflections in the line.



If the terminal is an end module, it can be terminated by placing a 150-Ohm resistor between CAN-A (Low) and CAN-B (High).



# Process Diagram



## 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.<br>The display is not affected.   | Info   |
| 01     | <b>RUN ROM</b> | The user program in the program memory module was loaded into the RAM and is currently being run.<br>The display is not affected.   | Info   |
| 02     | <b>RUNTIME</b> | The total duration of all cyclic objects exceeds the maximum time; the time can be configured using 2 system variables:<br>- Runtime: time remaining<br>- SWRuntime: pre-selected value for the runtime counter | Optimize the application's cyclic task.<br><br>Use higher capacity CPU<br>Configure preset value   |
| 03     | <b>POINTER</b> | Incorrect program pointers were detected before running the user program  | Possible Causes:<br>- The program memory module is missing, not programmed or defect.<br>- The program in the user program memory (RAM) is not executable.<br>- The buffering battery has failed.<br>- The user program has overwritten a software error.<br><br>Solution:<br>- Reprogram the memory module, if the error reoccurs exchange the module.<br>- Exchange the buffering battery<br>- Correct programming error |
| 04     | <b>CHKSUM</b>  | Before running the user program, a false checksum was detected.   | Cause/solution: s. POINTER   |



|    |                       |   |   |
|----|-----------------------|---|---|
| 05 | <b>Watchdog</b>       | The program was interrupted through the watchdog logic.   | Possible Causes: <ul style="list-style-type: none"> <li>- Interrupts the user program blocked of a long time period (STI instruction 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> Solution: <ul style="list-style-type: none"> <li>- Correct programming error.</li> <li>- Exchange CPU.</li> </ul> |
| 06 | <b>GENERAL ERROR</b>  | General error<br>Stopping the application from the online interface has failed.   | This error occurs during the development stage of operating system only.  |
| 07 | <b>PROM DEFECT</b>    | An error has occurred while programming the memory module.  | Cause: <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> Solution: <ul style="list-style-type: none"> <li>- Exchange the program memory module</li> </ul>   |
| 08 | <b>Reset</b>          | The CPU has received the reset signal and is waiting for further instructions.<br>The user program is not processed.  | Info  |
| 09 | <b>WD DEFEKT</b>      | The hardware monitoring circuit (watchdog logic) is defect.<br>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 | <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>     | The memory module was successfully completed.  | 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:<br>- A nonexistent operating system was used.<br>- Stack error (uneven number of PUSH and POP instructions).<br>- The user program was interrupted by a software error.<br><br>Solution:<br>- Correct programming 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 has been sent to the CPU and it is ready to run the program.   | Info  |
| 20 | <b>LOAD</b>         | The program has stopped and is receiving a module or project.  | Info  |
| 21 | <b>UNZUL. Modul</b> | The CPU has received a module, which does not belong to the project.   | Solution:<br>- Recompile and download the entire project  |
| 22 | <b>MEMORY FULL</b>  | The operating system memory /Heap) is too small. No more memory could be reserved, when an internal or interface function was called from the application. | Cause:<br>- Memory is only allocated but not released.<br><br>Solution<br>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:<br>- Recompile and download the entire project  |

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|----|----------------------------|--|--|
| 24 | <b>DIV BY 0</b>            | A division error has occurred.   | Possible Causes:<br>- Division by 0.<br>- The result of a division does not fit in the result register.<br><br>Solution:<br>- Correct programming error. |
| 25 | <b>DIAS ERROR</b>          | An error has occurred while accessing a DIAS module.                   | Hardware problem   |
| 26 | <b>WAIT</b>                | The CPU is busy.   | Info   |
| 27 | <b>OP PROG</b>             | The operating system is currently being reprogrammed.                  | Info   |
| 28 | <b>OP INSTALLED</b>        | The operating system has been reinstalled.                             | Info   |
| 29 | <b>OS TOO LONG</b>         | The operating system cannot be loaded; too little memory.              | Restart; report error to Sigmatek.   |
| 30 | <b>NO OPERATING SYSTEM</b> | Boot loader message.<br>No operating system found in RAM.              | Restart; report error to Sigmatek.   |
| 31 | <b>SEARCH FOR OS</b>       | The boot loader is searching for the operating system in RAM.          | Restart; report error to Sigmatek.   |
| 32 | <b>NO DEVICE</b>           | Reserved   |  |
| 33 | <b>UNUSED CODE</b>         | Reserved   |  |
| 34 | <b>MEM ERROR</b>           | The operating system loaded does not match the hardware configuration. | - Use the correct operating system version   |
| 35 | <b>MAX IO</b>              | Reserved   |  |
| 36 | <b>MODULE LOAD ERROR</b>   | The LASAL Module or project cannot be loaded.                          | Solution:<br>- Recompile and download the entire project   |
| 37 | <b>BOOTIMAGE FAILURE</b>   | A general error has occurred while loading the operating system.       | Contact SIGMATEK   |
| 38 | <b>APPLMEM ERROR</b>       | An error has occurred in the application memory (user heap).           | Solution:<br>- Correct allocated memory access error   |
| 39 | <b>Offline</b>             | 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 | <b>APPL LOAD</b>           | Reserved   |  |

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| 41 | APPL SAVE              | Reserved   |  |
| 44 | VARAN MANAGER ERROR    | An error number was entered In the VARAN manager and stopped the program.  | Solution:<br>- Read logfile  |
| 45 | VARAN ERROR            | A required VARAN client was disconnected or there was a communications error with a VARAN client.                            | Solution:<br>- Read logfile<br>- Error Tree  |
| 46 | APPL-LOAD-ERROR        | An error has occurred while loading the application.   | Cause:<br>- Application was deleted.<br>Solution:<br>- 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:<br>- 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:<br>- Correct application errors  |
| 52 | PRIVILEGED INSTRUCTION | An invalid instruction for the CPU level, i.e. setting the segment register.   | Cause:<br>- The application has overwritten the application program code.<br>Solution:<br>- 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 applications 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.   |

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| 67 | <b>REALTIME RUNTIME</b>   | <p>The total duration of all real-time objects exceeds the maximum time; the time cannot be configured.</p> <p>2 ms for 386 CPUs<br/>1 ms for all other CPUs</p>  | <p>Solution:</p> <ul style="list-style-type: none"> <li>- Optimize the application's realtime task (RtWork).</li> <li>- Reduce the clock time for the realtime task of all objects.</li> <li>- Correct application errors</li> <li>- CPU is overloaded in realtime =&gt; use a higher capacity CPU.</li> </ul>   |
| 68 | <b>BACKGROUND RUNTIME</b> | <p>The total duration of all background objects exceeds the maximum time; the time can be configured using 2 system variables:</p> <p>-BTRuntime: time remaining<br/>-SWBTRuntime: pre-selected value for the runtime counter</p> | <p>Solution:</p> <ul style="list-style-type: none"> <li>- Optimize the application's background task (background)</li> <li>- Use higher capacity CPU</li> <li>- Set SWBTRuntime correctly.</li> </ul>  |
| 70 | <b>C-DIAS ERROR</b>       | <p>An error occurred in connection with a C-DIAS module.</p>  | <p>Cause:</p> <ul style="list-style-type: none"> <li>- The reason for this error is documented in the log file</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- Depends on the cause</li> </ul>  |
| 72 | <b>S-DIAS ERROR</b>       | <p>A connection error with a S-DIAS module has occurred.</p>  | <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>         | <p>Only EDGE CPUs</p> <p>An error occurred while initializing, reading or writing SRAM data.</p>  | <p>Possible causes:</p> <ul style="list-style-type: none"> <li>- - SRAM configured incorrectly</li> <li>- - SD card formatted incorrectly</li> <li>- - SD card removed</li> </ul> <p>Solution:</p> <ul style="list-style-type: none"> <li>- - evaluate log file (Event00.log)</li> <li>- - check configuration</li> <li>- - format SD card as EDGE medium with Lasal Class 2</li> <li>- - check SD card</li> </ul> |
| 95 | <b>USER DEFINED 0</b>     | <p>User-definable code.</p>   |  |
| 96 | <b>USER DEFINED 1</b>     | <p>User-definable code.</p>   |  |
| 97 | <b>USER DEFINED 2</b>     | <p>User-definable code.</p>   |  |
| 98 | <b>USER DEFINED 3</b>     | <p>User-definable code.</p>   |  |

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|-----|-------------------------|--|--|
| 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 class from a stand-alone or embedded object: unknown base class.                        |  |
| 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> | Reference to an unknown object in an interpreter program, creation of more than 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 attribute.  |  |
| 112 | <b>C_SYNTAX_ERROR</b>   | No specific error, recompile all and reload project components.                                    |  |
| 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_INCOMPATIBLE</b>   | An object with the same name exists but has another class.   |  |
| 117 | <b>C_COMPATIBLE</b>     | An object with the same name and class 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.   |  |

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|-----|-------------------------|--|--|
| 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.<br>The system is shutdown. |  |
| 241 | <b>Reboot</b>           | The operating system is restarted.   |  |
| 242 | <b>LSL SAVE</b>         |  |  |
| 243 | <b>LSL LOAD</b>         |  |  |
| 252 | <b>CONTINUE</b>         |  |  |
| 253 | <b>PRERUN</b>           | The application is started.  |  |
| 254 | <b>PRERESET</b>         | The application is ended.  |  |
| 255 | <b>CONNECTION BREAK</b> |  |  |

## Application exceptions

### SRAM and IRQ routines

Writing remnant data during interrupt routines is not allowed and leads to a system crash.

### SRAM and consistency of changed data

If more than 32 different sectors are changed (512 bytes each) shortly before shutting down the voltage supply while the user program is writing to the Micro SD card, this can sometimes lead to partial loss of remnant data.

### The file system does not support safe writing through SRAM

If files are stored, modified or written on the Micro SD card from the user program, these files must always be stored with a fixed maximum size. Since changes in size and the simultaneous shutdown of the voltage supply can corrupt the file system, a later change in the file size is not allowed.

### Data Breakpoint

This CPU does not support the data breakpoint is a feature.



## Note on SRAM Behavior

Because the SRAM (remnant memory) is emulated via the microSD card, there are two different mechanisms for saving SRAM data to the microSD card:

1. Cyclic writing when data is changed (default)
2. Writing only in the event of PowerFail with a backup time buffered through the hardware (starting with version 01.02.195)

The advantage of cyclic writing is that in the event of a severe system crash, it's possible to reference an image of the SRAM data that with the standard settings, is a maximum of 1 minute older than the last change. With extensive use, the amount and frequency of SRAM data changes from the user program can have a massive effect on the microSD card lifespan.

Detailed information regarding the SRAM behavior and the corresponding settings can be found in the LASAL OS documentation, in the chapter "SRAM".

In the LASAL CLASS project, seldom changed value settings in retentive servers as well as RamEx and StringRam objects, can be converted to file storage. Should existing objects be converted from SRAM to File, the loader version 02.02.140 or higher and the RamEx and StringRam classes of the Tools library version 01.02.033 or higher must be used.

If the user program runs cyclic writing processes in files, the tool "Flash Media Lifetime Calculation" included in LASAL CLASS can be used to determine the effects of the operations mentioned above on the flash media. This allows the lifespan of the media to be calculated for different, configurable writing scenarios.

## Recommended Shielding for VARAN

The real-time VARAN Ethernet bus system exhibits very robust characteristics in industrial environments. Through the use of IEEE 802.3 standard Ethernet physics, the potentials between an Ethernet line and sending/receiving components are separated. Messages to a bus participant are immediately repeated by the VARAN Manager in the event of an error. The shielding described below is principally recommended.

For applications in which the bus is run outside the control cabinet, the correct shielding is required. Especially when for structural reasons, the bus line must be placed next to strong electromagnetic interference. It is recommended to avoid placing VARAN bus lines parallel to power cables whenever possible.

SIGMATEK recommends the use of **CAT5e** industrial Ethernet bus cables.

For the shielding, an **S-FTP cable** should be used.

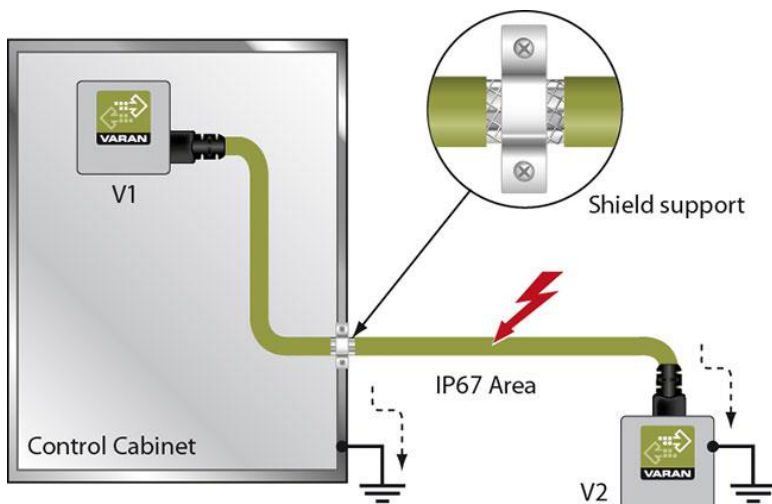
An S-FTP bus is a symmetric, multi-wire cable with unshielded pairs. For the total shielding, a combination of foil and braiding is used. A non-laminated variant is recommended.

**The VARAN cable must be secured at a distance of 20 cm from the connector for protection against vibration!**

**Le câble VARAN doit être protégé contre les vibrations à moins de 20 cm du connecteur (par exemple à l'aide d'une pince)!**

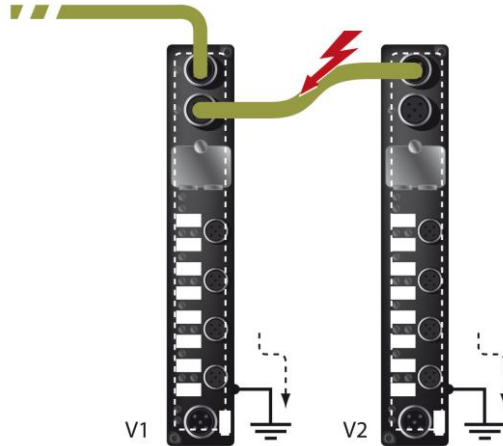
## 1. Wiring from the Control Cabinet to an External VARAN Component

If the Ethernet lines are connected from a VARAN component to a VARAN node located outside the control cabinet, the shielding should be placed at the entry point to the control cabinet housing. All noise can then be dissipated before reaching the electronic components.



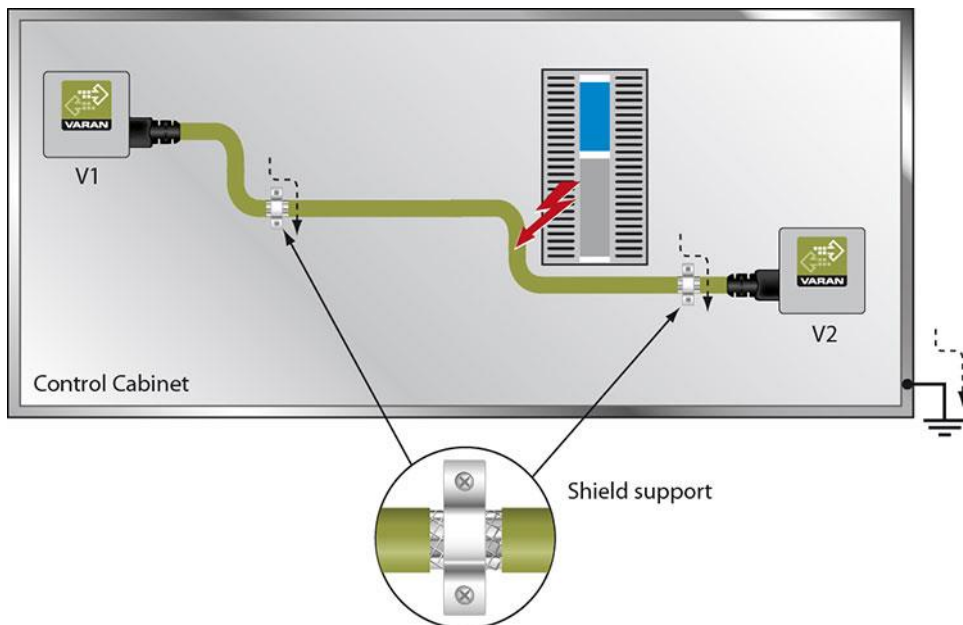
## 2. Wiring Outside of the Control Cabinet

If a VARAN bus cable must be placed outside of the control cabinet only, no additional shield connection is required. This requires that only IP67 modules and connectors be used. These components are very robust and noise resistant. The shielding for all sockets in IP67 modules are internally connected to common bus or electrically connected to the housing, whereby the deflection of voltage spikes does not flow through the electronics.



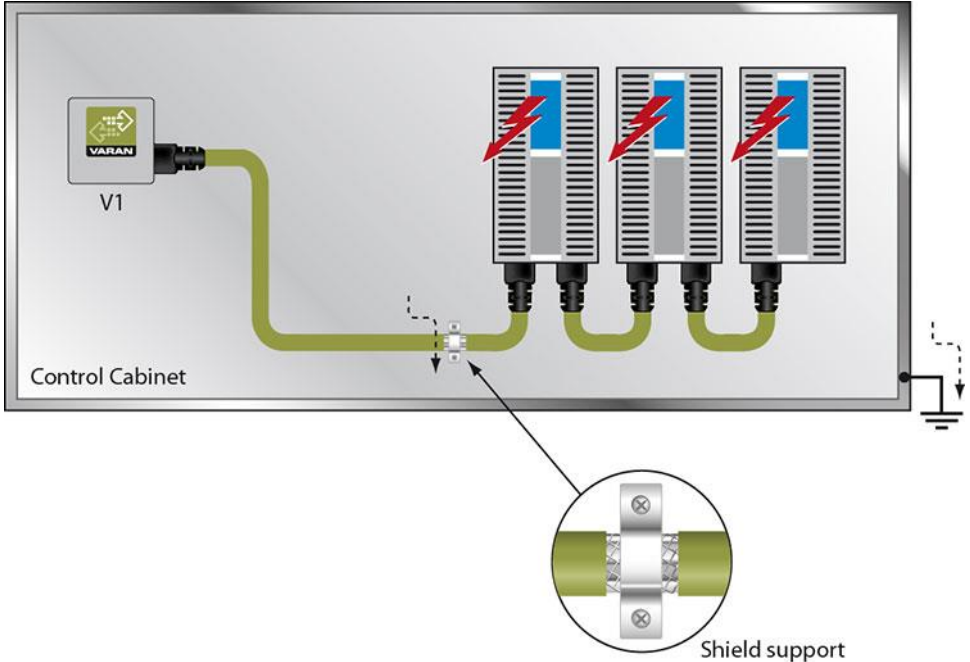
### 3. Shielding for Wiring Within the Control Cabinet

Sources of strong electromagnetic noise located within the control cabinet (drives, Transformers, etc.) can induce interference in a VARAN bus line. Voltage spikes are dissipated over the metallic housing of a RJ45 connector. Noise is conducted over the control cabinet without additional measures needed on the circuit board of electronic components. To avoid error sources with data exchange, it is recommended that shielding be placed before any electronic components in the control cabinet.



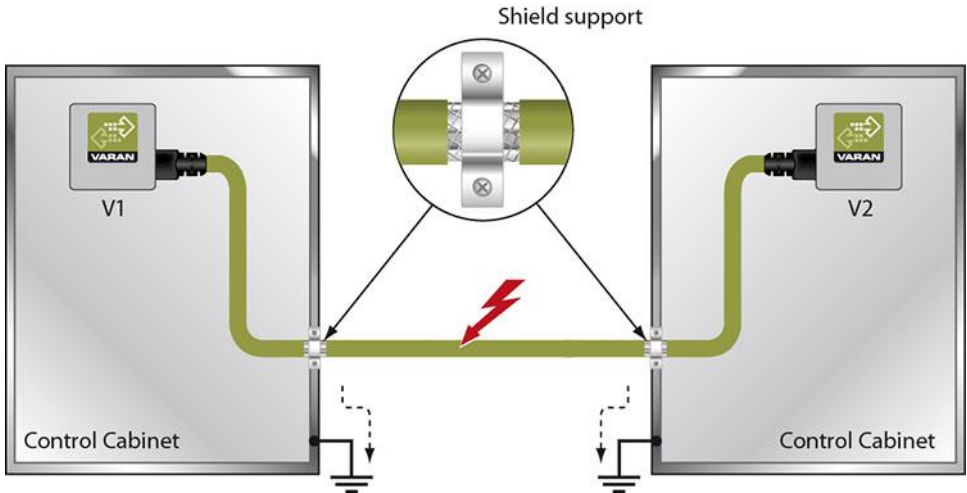
## 4. Connecting Noise-Generating Components

When connecting power lines to the bus that generate strong electromagnetic noise, the correct shielding is also important. The shielding should be placed before a power element (or group of power elements).



## 5. Shielding Between Two Control Cabinets

If two control cabinets must be connected over a VARAN bus, it is recommended that the shielding be located at the entry points of each cabinet. Noise is therefore prevented from reaching the electronic components in both cabinets.



## Cleaning the Touch Screen

### CAUTION!

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

### ATTENTION!

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

The terminal's touch screen can only be cleaned with a soft, damp cloth. To dampen the cloth, a screen-cleaning solution such as an antistatic foam, water with detergent or alcohol should be used. First spray the cleaning fluid on 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, clean the terminal immediately and with caution to prevent acid damage.

**To ensure the optimal function of the terminal, the terminal should be cleaned regularly!**

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

**Pour garantir le fonctionnement optimal du terminal, le terminal doit être nettoyé régulièrement!**

**Pour prolonger la durée de vie de l'écran tactile on recommande d'utiliser les doigts pour l'opérer.**