Control Panel ETV 1991

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 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 interface connections can be used to exchange process data or configure the terminal. An internal Compact Flash serves as the storage medium for the operating system, application and application data.

The integrated, high-performance VARAN bus enables the direct control of I/O modules.

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Contents

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Technical Data

Performance data

Processor	1.6 GHz Intel Atom N270
Cache	512 Kbytes 1st Level
BIOS	AMI BIOS
SDRAM (SO-DIMM 200-Pin)	256-Mbyte DDR2
Compact Flash (Type I)	1 Gbyte
SRAM	512 Kbytes (battery buffered)
Interface connections	1 x CAN bus 1 x DIAS bus 2 x VARAN bus (maximum length: 100 m) 2 x Ethernet 10/100 Mbit 2 x USB V2.0 Type A (Front + back side) 1 x chip card reader (optional)
Internal interface connections and devices	1 x TFT color display and inverter 1 x Touch 1 x Compact Flash socket
Control panel	Touch-Screen (analog resistive)
Display	19" TFT color display SXGA, 1280 x 1024 pixels
LEDs	Status displays
Data buffer	Lithium battery
Real-time clock	Yes
Cooling	Active (fan)

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Electrical requirements

Supply voltage	Minimum +18 V DC	Maximum +30 V DC
Current consumption of voltage supply	Typically 1.5 A (at +24 V) (without external devices connected)	
Starting current	Maximum 20 A for <5 ms	

Terminal

Dimensions	462 mm / 360 mm / 57 mm (H x W x D)
Weight incl. mounting bracket	Typically 7 kg

Control unit

Touch foil	Analog resistive glass touch panel
Active surface	376.3 mm 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

Display

Type	19" TFT color display
Resolution	SXGA, 1280 x 1024 pixels
Color depth	18-Bit (262 x 144 colors)
Pixel size	0.294 mm x 0.294 mm
Active surface	376.3 mm x 301.1 mm
Background lighting	4 cold cathode tubes (CCFT, switchable)
Contrast	Typically 1300: 1
Brightness	Typically 300 cd/m²
Angle CR > 10	Left and right 89°, above and below 89°

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Miscellaneous

Article number	12-230-1991
Hardware version	1.x
Software Macro	LSE LASAL operating system
Project back-up	Internally on Compact Flash

Environmental conditions

Storage temperature	-20 – +60 °C	
Operating temperature	0 – +50 °C	
Humidity	10 - 90 %, non-condensing	
EMV tolerance	EN 61000-6-2 (industrial area): Noise resistance EN 61000-6-4: noise emission	
Vibration tolerance	EN 60068-2-6	2 – 9 Hz: amplitude 3.5 mm 9 – 200 Hz: 1 g (10 m/s²)
Shock resistance	EN 60068-2-27	15 g (150 m/s²), duration 11 ms, 18 Shocks
Protection Type	EN 60529: Protected through the housing	Front: IP54 Top cover: IP20

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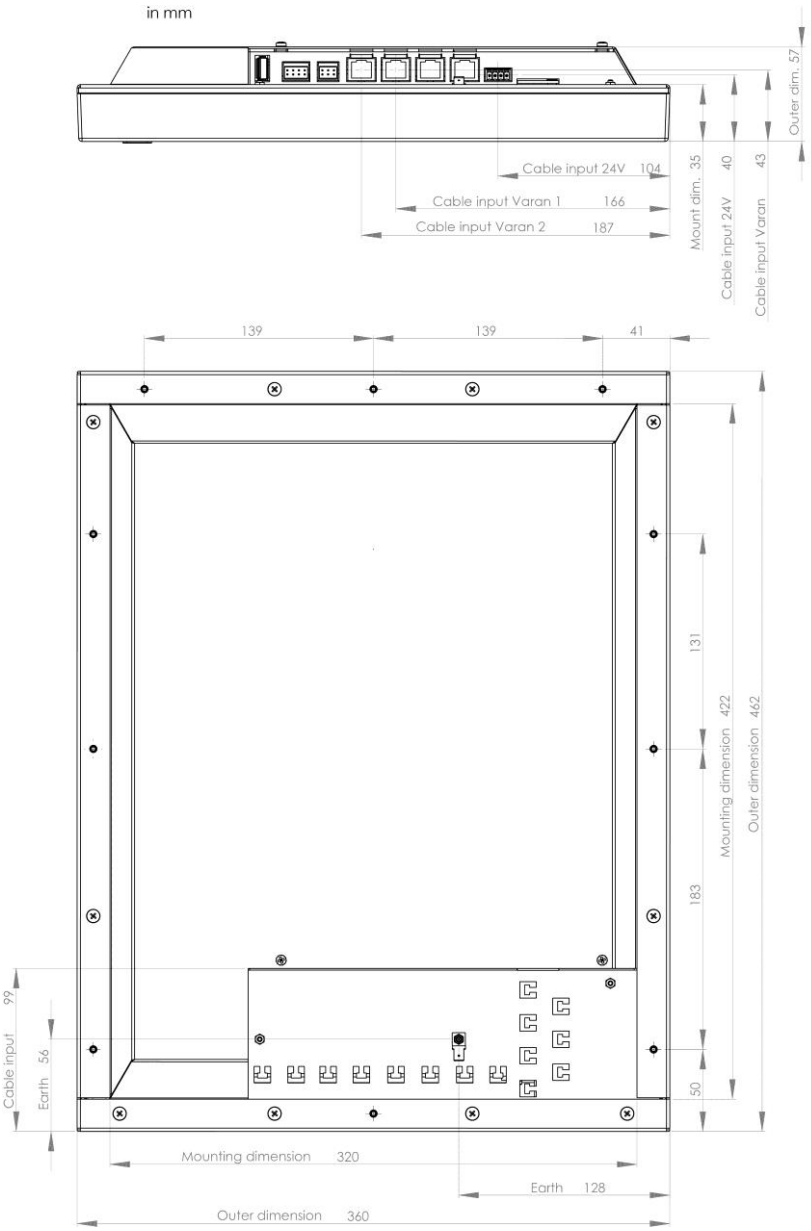
Mechanical Dimensions



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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

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Touch foil

Solution	Visual Effect
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
Lip stick	None

Touch Protective Foil

To extend the lifespan of the touch screen as must as possible, a protective foil is places of the touch field.

The foil adds the following properties.

- High chemical stability
- Hard surface
- Splitter protection
- Easy to clean
- Matt anti-reflective surface

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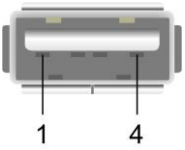
Connector Layout

Front connector

USB Type A V2.0



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

Status Displays

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

LED status	Definition
Red and green light simultaneously	The ETV 1991 is booting
Red LED blinks only	The operating system is loading
The green LED blinks only	The application is running

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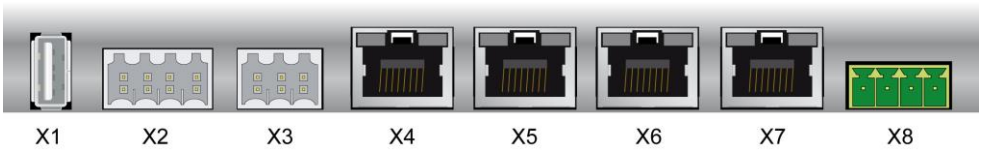
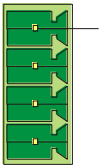
Rear connectors

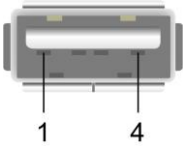


X8: power plug (FK-MCP 1,5/4-ST-3,5)



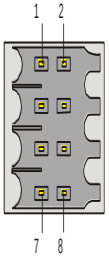
Pin	Function
1	+24 V supply
2	+24 V supply
3	GND
4	GND

X1 USB Type A V1.1



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

X2: CAN (Weidmüller B2L 3,5/8)



Pin	Function
1	CAN A (CAN LOW)
2	CAN B (High)
3	CAN A (CAN LOW)
4	CAN B (High)
5	GND
6	+5 V
7	GND
8	+24 V

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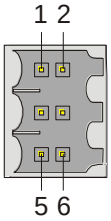
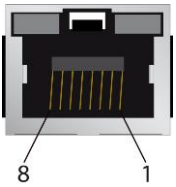
X3: DIAS-Bus (Weidmüller B2L 3,5/6)



Pin	Function
1	MBUS+
2	MBUS-
3	SBUS+
4	SBUS-
5	GND
6	n.c.

n.c. = do not use

X6, X7: ETHERNET (RJ45)



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

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.

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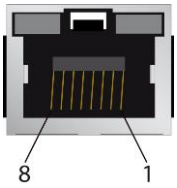
X4, X5: VARAN-Bus (RJ45)



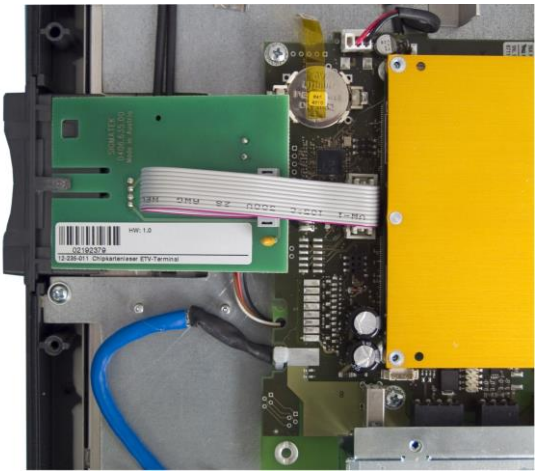
Pin	Function
1	TX/RX+
2	TX/RX-
3	RX/TX+
4	n.c.
5	n.c.
6	RX/TX-
7	n.c.
8	n.c.

n.c. = do not use

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

Chip-card reader

A chip-card reader can be added as shown below. The order number for the chip-card reader is: 12-235-011.



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Storage Media

**It is recommended that only storage media provided by SIGMATEK (CompactFlash cards, microSD cards etc.) be used.
The number of read and write actions have a significant influence on the lifespan of the storage media.**

**Il est recommandé d'utiliser uniquement les supports de stockage fournis par SIGMATEK (Cartes CompactFlash, cartes microSD, etc).
Le nombre de lectures et d'écritures ont un effet significatif sur la durée de vie du support de stockage.**

Buffer Battery

The exchangeable buffer battery ensures that programs and data in the expanded memory (SRAM) as well the clock time (RTC) are 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 2 years.

We recommend however, that the battery be replaced annually to ensure optimal performance.

Battery order number: 01-690-052

	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!

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Battery Exchange

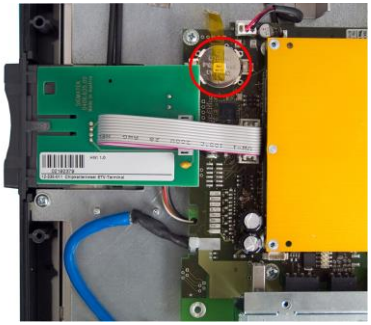
Switch off the terminal.

Loosen the marked screws and open the housing.

The corresponding screws are:

2 pieces
Combination pan-head screw M3x6

10 pieces
PT screws countersunk head KA40x10



Remove the battery and replace it with the new battery.

The negative pole of the battery must be on the board side.

The exchange must take place within 5 minutes with the terminal switched off, otherwise zero voltage safe data (SRAM, date and time) will be lost.

Close the housing and switch on the terminal.

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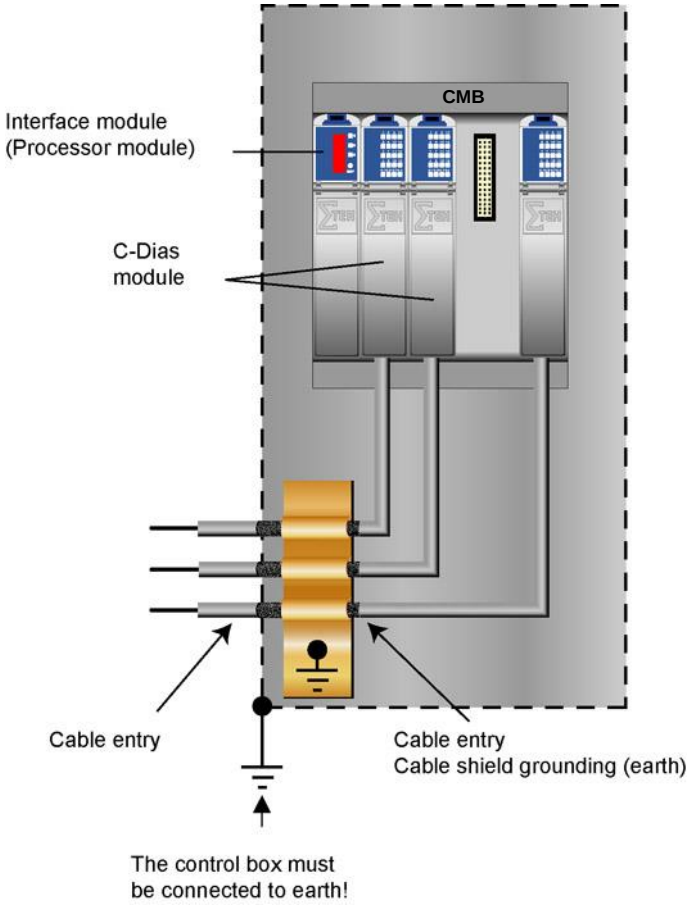
Wiring Guidelines

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.

Any noise signals that reach the terminal over external cables must be filtered over the earth connection. With a large electrical surface, high frequency noise can also be dissipated (skin effect).



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Shielding

For the CAN and DIAS bus wiring, twisted pair shielded wires should be used. The cable shielding must be connected to earth either directly before the terminal over a large surface and with low Ohms using grounding clamps or with a blade terminal. With Ethernet and the VARAN bus, CAT5 cables with shielded RJ45 connectors are required. The shielding in the CAT5 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.

DIAS Bus Termination

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

The DIAS bus termination is integrated in the terminal and must no longer be built into the DIAS bus connector.

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DIAS bus with C-DIAS modules

To ensure a good bus connection, several wiring guidelines must be followed:

- The cable used must be designed for the data transfer speed:
  Data cable (10 MBit, 2 x 2 wire TWISTED PAIR, shielded)
  E.g.: LAPPKABEL / UNITRONIC-BUSLEITUNG FD P LD

- Because of the internal resistance of the module, the cable impedance should be 100 Ohms.

- With twisted-pair cables, ensure that the correct pairs are connected to one another:
  2x2 pair cables: Pair 1 MBUS+, MBUS-
  Pair 2 SBUS+, SBUS-

- The shielding must be connected over a large area and the shortest possible route.

- To connect the individual wires to the connector, the insulation must be removed and the exposed shielding shifted to the side. Only remove as much of the insulation and shielding as needed.

- The send and receive modules must have the same GND potential.

The maximum length allowed for twisted-pair cables 20 m (when using the UNITRONIC bus cable FD P LD / Fa.LAPPKABEL)

DIAS bus with DIAS modules

It is also possible to connect the terminal to a DIAS module. However, the DIAS modules require a power supply (a DPS 001, for example) as well as an adapter module for connect the twisted-pair cable to the ribbon cable connector (i.e.: DKO 012 /013).

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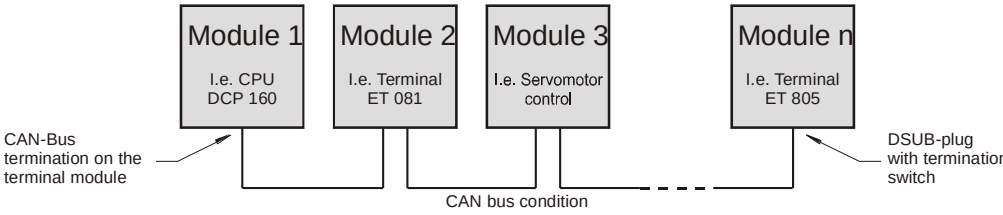
CAN Bus Termination

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).

USB Interface Connections

The terminal has two USB interface connections that can 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.

The following restriction applies to the BIOS setup:

The BIOS setup can only be operated when the USB keyboard is connected directly to the USB socket. Using a USB hub can cause errors in the BIOS setup!

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.

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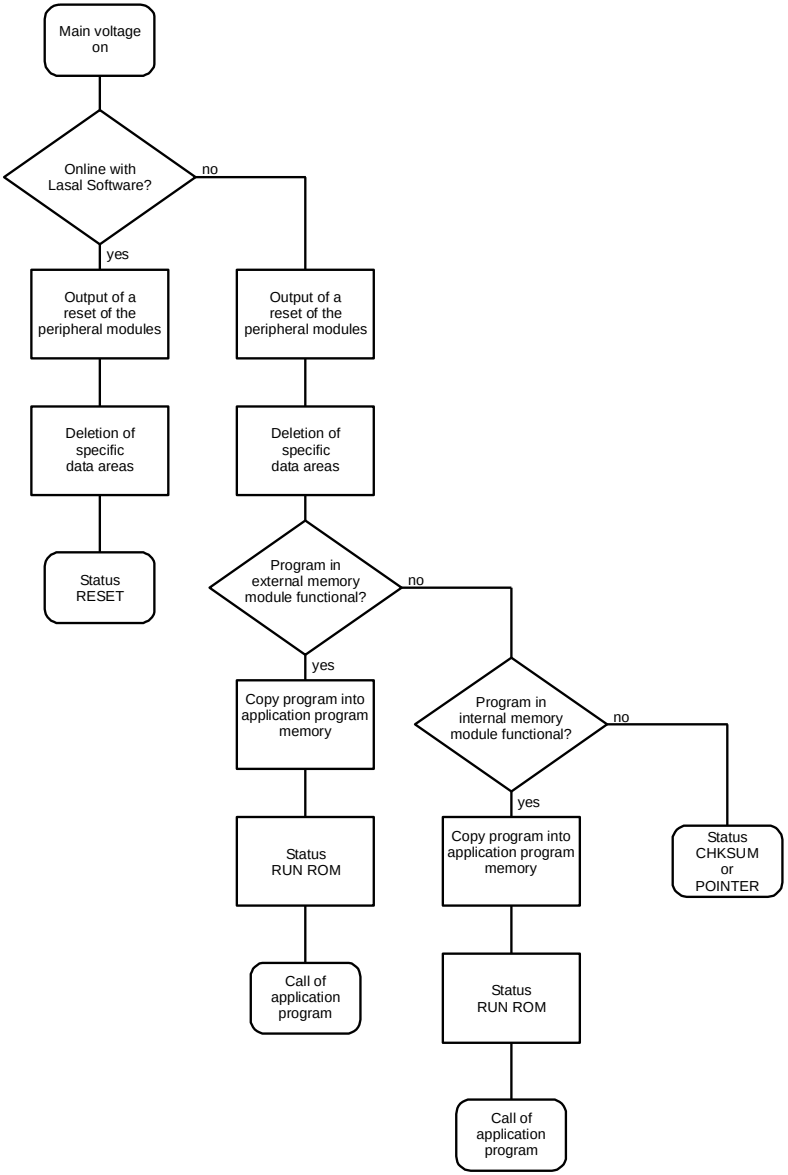
Process Diagram



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Status and Error Messages

Status and error messages are displayed in the LASAL Class software status test. If the CPU has a status display, the status or error number is also show here as well. POINTER or CHKSUM messages are 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.	
01	**RUN ROM**	The user program in the program memory module was loaded into the RAM and is currently being run. The display is not affected.	
02	**RUNTIME**	The total duration of all cyclic objects exceeds the maximum time; the time can be configured using 2 system variables: -Runtime: time remaining -SWRuntime: pre-selected value for the runtime counter	
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**	Before running the user program, a false checksum was detected.	Cause/solution: s. POINTER

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05	**Watchdog**	The program was interrupted through the watchdog logic.	Possible Causes: - Interrupts the user program blocked of a long time period (STI instruction 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	
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.	
09	**WD DEFEKT**	The hardware monitoring circuit (watchdog logic) is defect. 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**		
11	**PROG BUSYS**		
12	**PROGRAM LENGTH**		
13	**PROG END**	The memory module was successfully completed.	
14	**PROG MEMO**	The CPU is currently programming the memory module.	

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15	**STOP BRKPT**	The CPU was stopped by a breakpoint in the program.	
16	**CPU STOP**	The CPU was stopped by the PG software (F6 HALT in status test).	
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 interrupted by a software error. Solution: - Correct programming error.
18	**SINGLE STEP**	The CPU is in single step mode and is waiting for further instructions.	
19	**Ready**	A module or project has been sent to the CPU and it is ready to run the program.	
20	**LOAD**	The program has stopped and is receiving a module or project.	
21	**UNZUL. Modul**	The CPU has received a module, which does not belong to the project.	
22	**MEMORY FULL**	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.	
23	**NOT LINKED**	When starting the CPU, a missing module or a module that does not belong to the project was detected.	
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**	An error has occurred while accessing a DIAS module.	Possible Causes: - An attempt is made to access a nonexistent DIAS module. - DIAS bus error. Solution: - Check the DIAS bus - Check the termination resistors.

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26	**WAIT**	The CPU is busy.	
27	**OP PROG**	The operating system is currently being reprogrammed.	
28	**OP IN-STALLED**	The operating system has been reinstalled.	
29	**OS TOO LONG**	The operating system cannot be loaded; too little memory.	
30	**NO OPERAT-ING SYSTEM**	Boot loader message. No operating system found in RAM.	
31	**SEARCH FOR OS**	The boot loader is searching for the operating system in RAM.	
32	**NO DEVICE**		
33	**UNUSED CODE**		
34	**MEM ERROR**	The operating system loaded does not match the hardware configuration.	
35	**MAX IO**		
36	**MODULE LOAD ERROR**	The LASAL Module or project cannot be loaded.	
37	**GENERELLER BS-FEHLER**	A general error has occurred while loading the operating system.	
38	**APPLMEM ERROR**	An error has occurred in the application memory (user heap).	
39	**Offline**		
40	**APPL LOAD**		
41	**APPL SAVE**		
45	**VARAN ERROR**	A required VARAN client was disconnected or there was a communications error with a VARAN client.	
46	**APPL-LOAD-ERROR**	An error has occurred while loading the application.	
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).	
51	**BOUND EXCEEDED**	An exception error caused by exceeding the memory limits	

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52	**PRIVILEDGED INSTRUCTION**	An invalid instruction for the CPU level, i.e. setting the segment register.	
53	**FLOATING POINT ERROR**	An error has occurred during a floating-point operation.	
60	**DIAS-RISC-ERROR**	Error from the Intelligent DIASMaster.	
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.
67	**REALTIME RUNTIME**	The total duration of all real-time objects exceeds the maximum time; the time cannot be configured. 2 ms for 386 CPUs 1 ms for all other CPUs	Starting from Version 1.1.7
68	**BACKGROUND RUNTIME**	The total duration of all background objects exceeds the maximum time; the time can be configured using 2 system variables: -BTRuntime: time remaining -SWBTRuntime: pre-selected value for the runtime counter	
70	**C-DIAS ERROR**	An error occurred in connection with a C-DIAS module.	Cause: - The reason for this error is documented in the log file Solution: - Depends on the cause
72	**S-DIAS ERROR**	A connection error with a S-DIAS module has occurred.	Possible causes: - real network does not match the project - S-DIAS client is defective Solution: - analyze logfile
95	**USER DEFINED 0**	User-definable code.	
96	**USER DEFINED 1**	User-definable code.	
97	**USER DEFINED 2**	User-definable code.	

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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 class from a stand-along or embedded object: unknown base class.	
107	**C_UNKNOWN_CONSTR**	The operating system class cannot be created; the operating system is probably wrong.	
108	**C_UNKNOWN_OBJECT**	Reference to an unknown object in an interpreter program, creation of more than 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 attribute.	
112	**C_SYNTAX_ERROR**	No specific error, recompile all and reload project components.	
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 exists but has another class.	
117	**C_COMPATIBLE**	An object with the same name and class exists but must be updated.	
224	**LINKING**	The application is currently linking.	

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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**	The operating system is currently being 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.	
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**		

Further addressing information can be found in the VARAN bus specifications.

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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!

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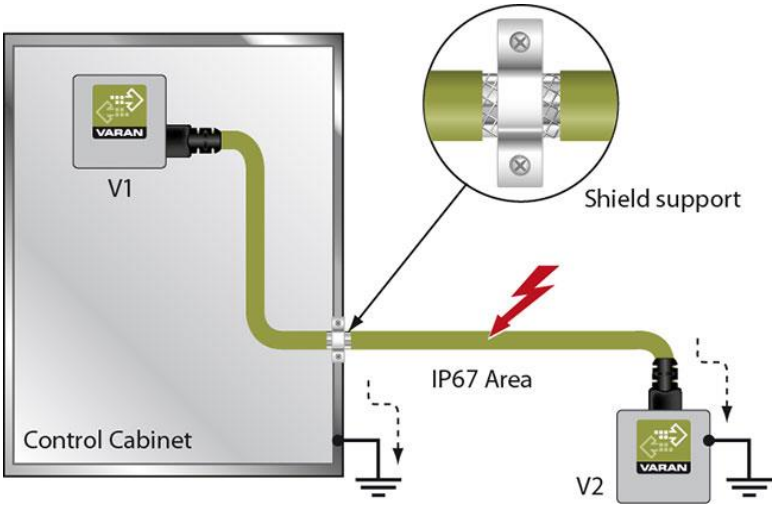
1. Wiring from the Control Cabinet to an External VARAN Component

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.



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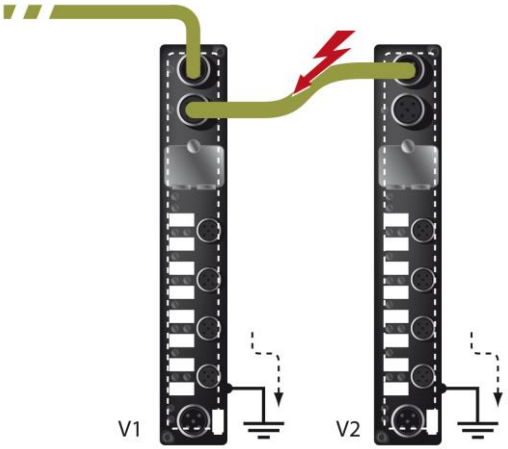
2. Wiring Outside of the Control Cabinet

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.



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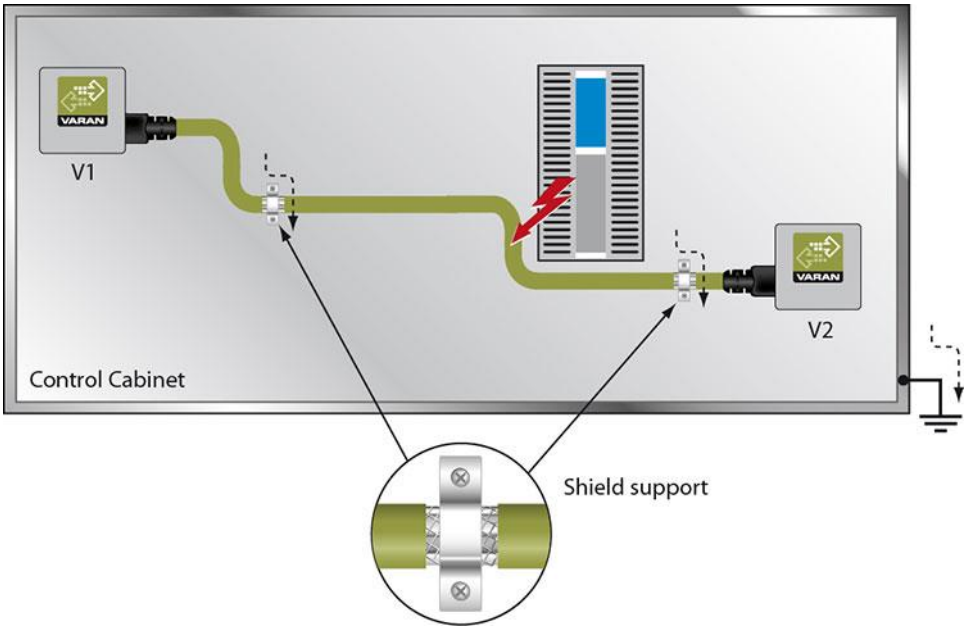
3. Shielding for Wiring Within the Control Cabinet

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.



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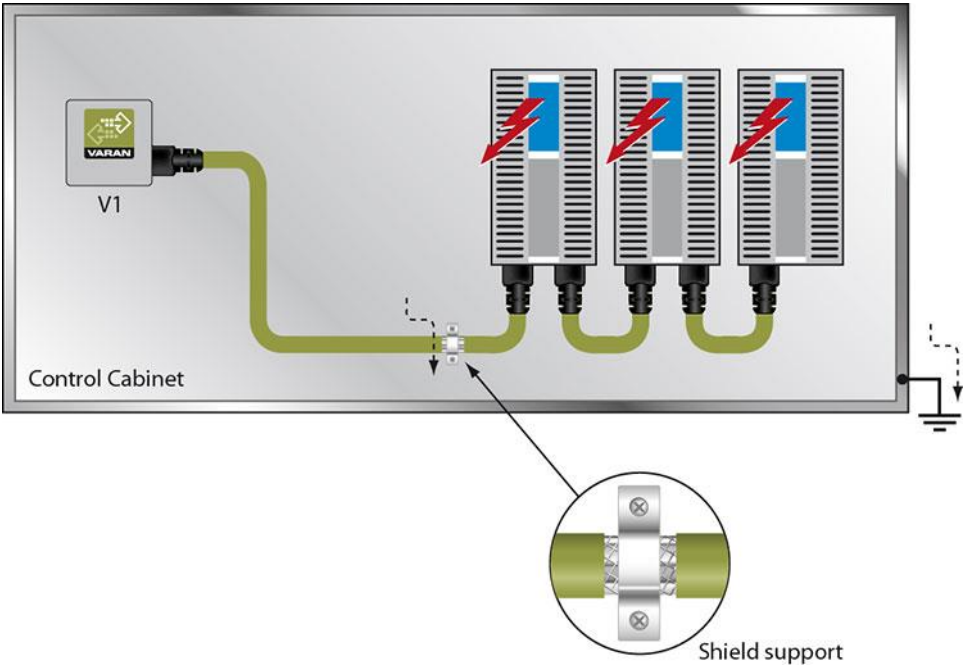
4. Connecting Noise-Generating Components

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).



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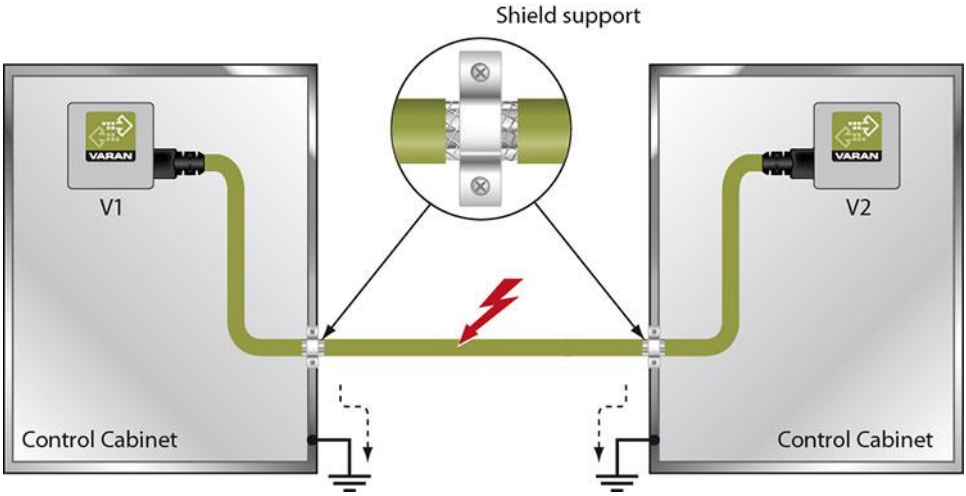
5. Shielding Between Two Control Cabinets

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.



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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. 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 is soiled with toxic or acidic chemicals, quickly and carefully clean the terminal 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.

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