C-DIAS IPC with LX800 and VM 052

Compact DIAS
Industrial
Personal
Computer

The C-IPC is a C-DIAS industrial PC with an AMD Geode LX800 processor. A 7-segment display and 3 status LEDs provide information on the actual status of the CPU. 2 compact flash cards can be used as program memory. The C-IPC also has an S-DVI interface for a terminal and a USB V1.1 interface. An integrated expansion card provides the C-IPC with three VARAN Out interfaces.

Compatibility

Completely PC-compatible. The C-IPC works with standard PC BIOS; no SIGMATEK-specific BIOS is therefore needed. LASAL is provided as the operating system.

Technical Data

Performance data

Processor	AMD GEODE LX800
Internal program memory (Compact Flash)	2x Compact Flash Type I or II
Internal program memory (SRAM)	256 Kbytes (battery powered)
Internal program memory (DDR-RAM)	256 – 512 MB DDR RAM

Interface connections	1x Ethernet 10/100 Mbits (RJ45) 1x RS 232 – COM1 1x RS232/ RS485/ RS422 – COM2 1x DIAS intelligent (Weidmüller plug and 14-Pin ribbon cable) 1x CAN for a PLC 1x CAN for a Terminal 1x S-DVI interface for a terminal (TFT display, USB, CAN keyboard) 1x USV 1x USB V1.1 Over an integrated VM052 expansion card: 3x VARAN-Out (RJ45)
Data buffer	Lithium battery
Status display	Yes
Status LEDs	Yes
Real-time clock	Yes

Electrical requirements

Supply voltage	24 – 30 V DC
Supply voltage current consumption	Up to 4 A (depending on the CPU and external devices)
Starting current	For a very short time (~5 ms) : 15 A
Available current for DIAS (+5 V)	Maximum 1 A
Available current for S-DVI (+24 V)	Maximum 2 A

Miscellaneous

Article number	AMD LX800, 256 MB, DDR RAM 512 MB Compact Flash, VM 052 01-450-031-V
Module identification on DIAS bus	No
Hardware Version	1.x-4.x
Standard	UL (E247993)
Project back-up	Internally on Compact Flash

A CAN terminations is provided on the CAN bus.

Environmental conditions

Storage temperature	-20 – +85 °C	
Environmental temperature	+5 – +50 °C	
Max. Process temperature	+85 °C (automatic cut-off)	
Humidity	0 - 95 %, uncondensed	
EMV stability	According to EN 50082 section 2 (industry area)	
Shock resistance	EN 60068-2-27	150 m/s²
Protection Type	EN 60529	IP 20

Standard configuration

Ethernet	IP: 10.10.150.1	Subnet-Mask: 255.0.0.0
CAN bus PLC	Station: 00	Baud rate: 01 = 500 kBaud
CAN bus Terminal	Station: 00	Baud rate: 01 = 500 kBaud
COM 1 (RS232)	57600 Baud	
COM 2 (RS232)	57600 Baud	

The CAN bus terminal is initialized by the FPGA and is limited in use!
Several CAN objects of the CAN bus terminal are not available.

Le moniteur de bus CAN est initialisé par le FPGA et son domaine d'utilisation est limité.
En conséquence plusieurs objets Can du moniteur de bus CAN ne sont pas disponibles.

Problems can arise if a control is connected to an IP network, which contains modules that do not contain 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.

Xilinx Version

Directly after the C-IPC is turned on, the Xilinx version number is shown in the display.

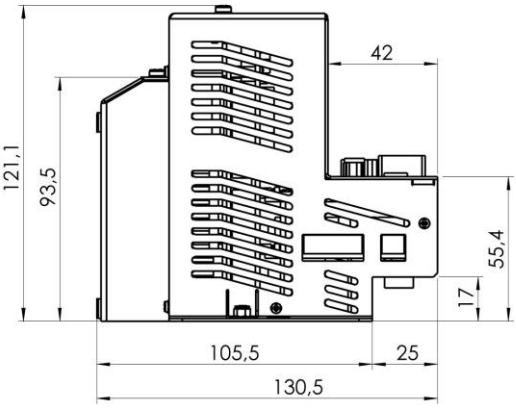
In display D1, 05 is shown and in display D2, the version number can be seen. This information can also be found on the identification label. (I.e.: X 1.8)

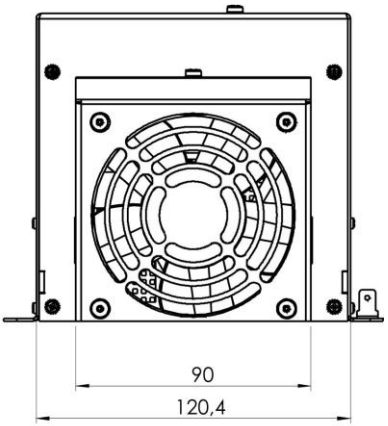
Postcodes

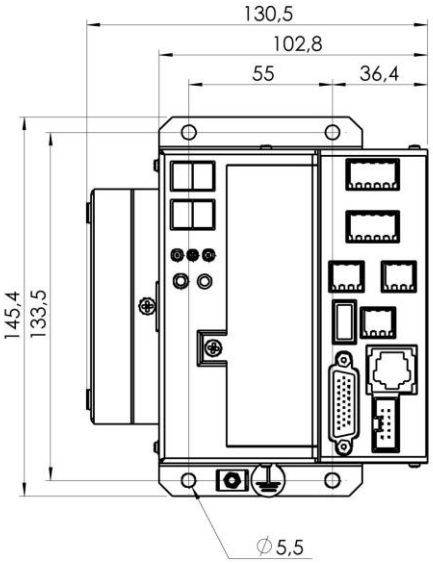
During startup, the BIOS-dependent postcodes are shown in the display. It is important to note these codes in order to simplify troubleshooting if an error occurs.

Pendant le démarrage les BIOS power-on self-test codes sont affichés à l'écran. Il est important de noter ces codes afin de rendre le dépannage plus facile si le S-IPC ne démarre pas.

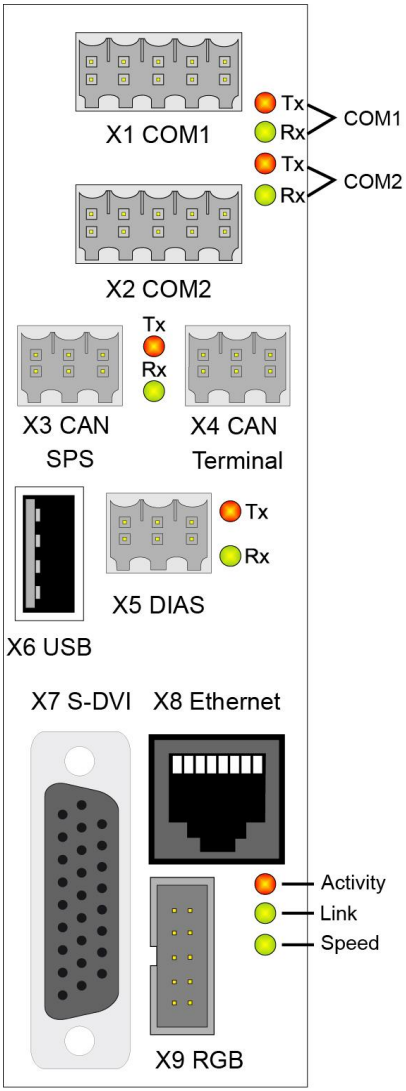
Mechanical Dimensions



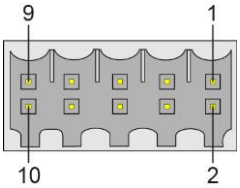




Connector Layout



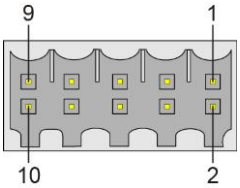
X1 COM 1 (10-pin Weidmüller plug)



Pin	Function
1	RxD
2	RTS
3	TxD
4	CTS
5	DTR
6	GND
7	DCD
8	DSR
9	RI
10	n.c.

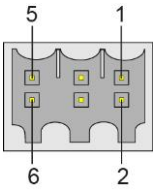
n.c. = do not use

X2 COM 2 (10-pin Weidmüller plug)



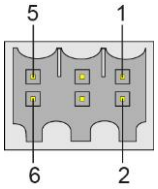
Pin	Function: RS232	Function: RS422	Function: RS485
1	RxD	RS422 TxD+	RS485 A
2	RTS	RS422 TxD-	RS485 B
3	TxD	RS422 RxD+	n.c.
4	CTS	RS422 RxD-	n.c.
5	DTR	n.c.	n.c.
6	GND	GND	GND
7	n.c.	RS422 TxD+	RS485 A
8	n.c.	RS422 TxD-	RS485 B
9	n.c.	RS422 RxD+	n.c.
10	n.c.	RS422 RxD-	n.c.

X3 CAN Bus PLC (6-pin Weidmüller plug)



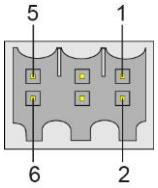
Pin	Function
1	CAN SA = LOW
2	CAN SB = HIGH
3	CAN SA = LOW
4	CAN SB = HIGH
5	GND
6	+5 V (for online adapter)

X4 CAN Bus Terminal (6-pin Weidmüller plug)



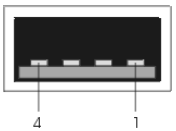
Pin	Function
1	CAN A = LOW
2	CAN B = HIGH
3	CAN A = LOW
4	CAN B = HIGH
5	GND
6	n.c.

X5 DIAS Bus (6-pin Weidmüller plug)



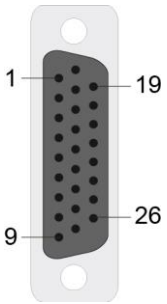
Pin	Function
1	MBUS+
2	MBUS-
3	SBUS+
4	SBUS-
5	GND
6	n.c.

X6 USB (Type A)



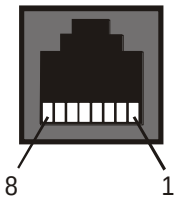
Pin	Function
1	+5 V
2	D0-
3	D0+
4	GND

X7 S-DVI (26-pin HD-DSUB)



Pin	Function	Pin	Function
1	DVI1+	14	Shielded
2	DVI1-	15	Shielded
3	DVI2+	16	Shielded
4	DVI2-	17	Shielded
5	DVI3+	18	Shielded
6	DVI3-	19	+24 V
7	DVIC+	20	+24 V
8	DVIC-	21	USB Ext. In+
9	Reserved	22	USB Ext. In-
10	GND	23	USB Ext. Out+
11	GND	24	USB Ext. Out-
12	Shielded	25	CAN A
13	Shielded	26	CAN B

X8 Ethernet 1 (8-pin RJ45)



Pin	Function
1	TD+
2	TD–
3	RD+
4	n.c.
5	n.c.
6	RD–
7	n.c.
8	n.c.

Problems can arise if a control is connected to an IP network, which contains modules that do not contain 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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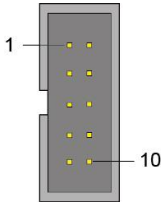
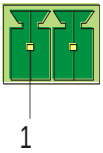
X9 Video (RGB)



Pin	Function
1	Red
2	GND
3	Green
4	GND
5	Blue
6	GND
7	Vsync
8	GND
9	Hsync
10	GND

X10 Power Supply 18 - 30 Volts DC

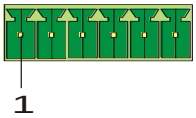
2-pin Phoenix 3,5 mm (power supply)



Pin	Function
1	+24 V
2	GND

X11 External UPS Connection

6-pin Phoenix 3,5 mm (UPS)



Pin	Function
1	RxD
2	TxD
3	RTS (USV Off)
4	CTS (+24 V OK)
5	DCD (Battery weak)
6	GND

Applicable connectors

COM1/COM2:	10-pin Weidmüller plug B2L3, 5/10
CAN/ DIAS bus:	6-pin Weidmüller connector plug B2L3, 5/6
USB:	Type A
Ethernet/VARAN:	8-pin RJ 45
Video:	10-pin RM 2.54
Power:	2-pin Phoenix FK-MCP 1.5/2-ST-3.5
USV:	6-pin Phoenix FK-MCP 1.5/6-ST-3.5

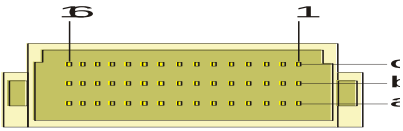
The complete C-DIAS CKL 012 connector set with spring terminals is available from SIGMATEK under the article number 12-600-012.

S-DVI Cable	0.3 m	Art.Nr.: 05-950-003
	2 m	Art.Nr.: 05-950-020
	3 m	Art.Nr.: 05-950-030
	3.5	Art.Nr.: 05-950-035
	5 m	Art.Nr.: 05-950-050
	7 m	Art.Nr.: 05-950-070
	10 m	Art.Nr.: 05-950-100
	15 m	Art.Nr.: 05-950-150

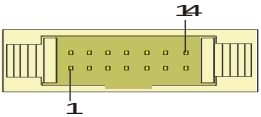
NOTE:
Connecting the S-DVI cable under voltage can damage the S-DVI interface; it is not hot-plug capable.

Bottom Connectors

X12 C-DIAS Bus Connector



X13 DIAS Bus Connector

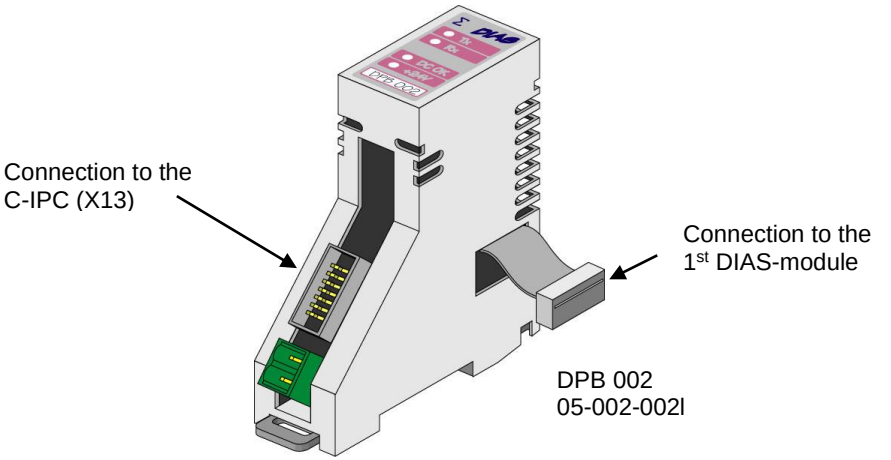


Pin	Function
1	GND
2	MBUS+
3	MBUS-
4	GND
5	SBUS+
6	SBUS-
7	GND
8	DCOK
9 - 13	+5 V
14	GND

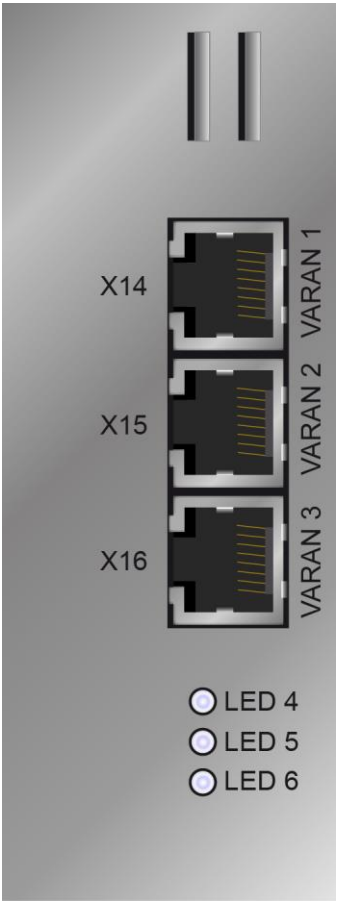
b

Caution!
To connect the DIAS module to X13 of the C-IPC, a DIAS power module (power booster) between the C-IPC and DIAS module is required. The measure is necessary to protect the C-IPC from EMV-noise and to unburden the DCDC converter in the C-IPC (reducing power loss in the C-IPC).

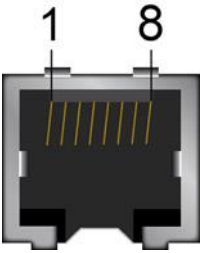
ATTENTION!
Pour pouvoir brancher le module DIAS sur X13 du C-IPC, un module d'alimentation DIAS (puissance d'appoint) est nécessaire entre les modules C-IPC et DIAS. Il est également nécessaire de protéger le C-IPC contre les perturbations électromagnétique et de soulager le convertisseur DCDC dans le C-IPC (réduisant les pertes de puissance dans le C-IPC).


Connection to the
C-IPC (X13)
Connection to the
1st DIAS-module
DPB 002
05-002-002I

Expansion Card Connections



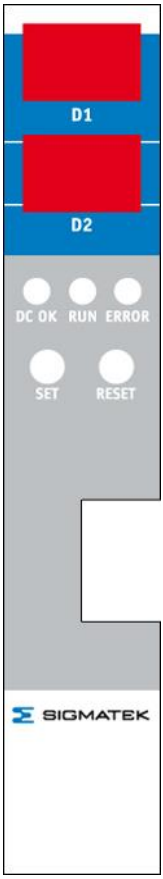
X14/X15: VARAN-Out 1/2/3 (8-pin RJ45)



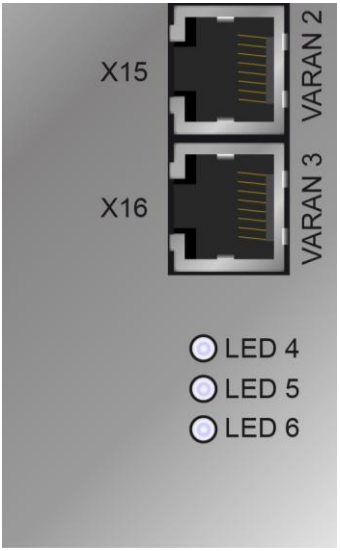
Pin	Function
1	TX/RX+
2	TX/RX-
3	RX/TX+
4	Not used
5	Not used
6	RX/TX-
7	Not used
8	Not used

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

Status Displays



LED 1	Green	DC OK	Lights when the supply voltage is correct.
LED 2	Green	RUN	Lights when the program is running
LED 3	Red	ERROR	Lights when an error occurs
Button 1		Set	Set/display Ethernet, CAN address
Button 2		Reset	Reset CPU hardware



LED 4	Yellow	Active VARAN 1	Lights when data is exchanged over VARAN-Out 1
	Green	Link VARAN 1	Lights with a connection to VARAN-Out 1
LED 5	Yellow	Active VARAN 2	Lights when data is exchanged over VARAN-Out 2
	Green	Link VARAN 2	Lights with a connection to VARAN-Out 2
LED 6	Yellow	Active Ethernet 2	Lights when data is exchanged over Ethernet 2
	Green	Link Ethernet 2	Lights with a connection to Ethernet 2

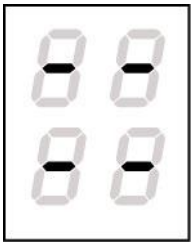
SIGMATEK Components

- 7-segment display for CPU status
- Reset button
- Set button
- DC OK LED
- Error LED
- Run LED
- Timer - 1 µs precision with Interrupt capability
- EEPROM for configuration and version management
- S-DVI interface including:
  - Keyboard
  - USB
  - Touch
  - Chip card
  - PC speakers
  - 18-Bit TFT, TMDS coded signal (3x data, 1x clk), max. resolution 1024x768

Setting C-IPC Parameters with the SET Button
(with the LASAL operating system only)

To enter the mode to change settings, press and hold the SET button while the C-IPC is booting

When the following display appears



the SET button can be released.

The upper section of the display shows which setting can be changed; the lower section of the display shows the set value.

The blinking part of the display can be set with a short press of the SET button:

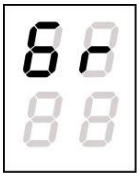
If the upper section is blinking, the various settings can be viewed by quickly pressing the set button multiple times. To change between the setting and the value, the Set button must be pressed for about 1.5 s.
Once the desired changes are made, press the SET button for about 5 seconds to end the process. If the changes are to be discarded, press the RESET button to restart the C-IPC

The settings for the IP address, subnet mask and gateway are hexadecimal, whereas in the left and right digits, 0 - F must be entered separately. The changeover is triggered by pressing the SET button for about 1.5 s

When changing the graphic resolution, a special feature is available: Because the BIOS must first read the new value, the computer must be restarted (Reset value, current supply)

The values from AUTOEXEC.LSL are used as the standard settings; changes are written back to this file. Before this, the original content of the file is written to AUTOEXEC.BAK.

Gr ... Graphic resolution
01 ... QVGA 320x240
02 ... VGA 640x480
03 ... SVGA 800x600
04 … XGA 1024x768



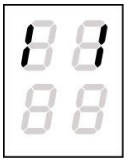
L1 … Lasal Online COMx interface number
01 ... COM1
02 ... COM2

L2 .. Lasal Online Baud rate for COMx
00 ... 300
01 ... 600
02 ... 1200
03 ... 2400
04 ... 4800
05 ... 9600
06 ... 14400
07 ... 19200
08 ... 38400
09 ... 57600
10 ... 115200

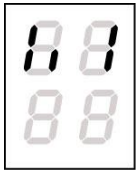
C1 ... CAN PLC station
00 – 30 ... Station number

C2 ... CAN PLC baud rate
00 ... 615.000
01 … 500.000
02 … 250.000
03 … 125.000
04 … 100.000
05 … 50.000
06 … 20.000
07 … 1.000.000

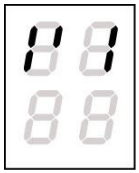
I1, I2, I3, I4 IP Address I1.I2.I3.I4, hexadecimal 00-FF each



S1,S2,SI3,S4 Subnet Mask SI1SI2.S3.S4, hexadecimal 00-FF respectively



G1,G2,G3,G4 Gateway G1,G2.G3.G4, hexadecimal 00-FF respectively



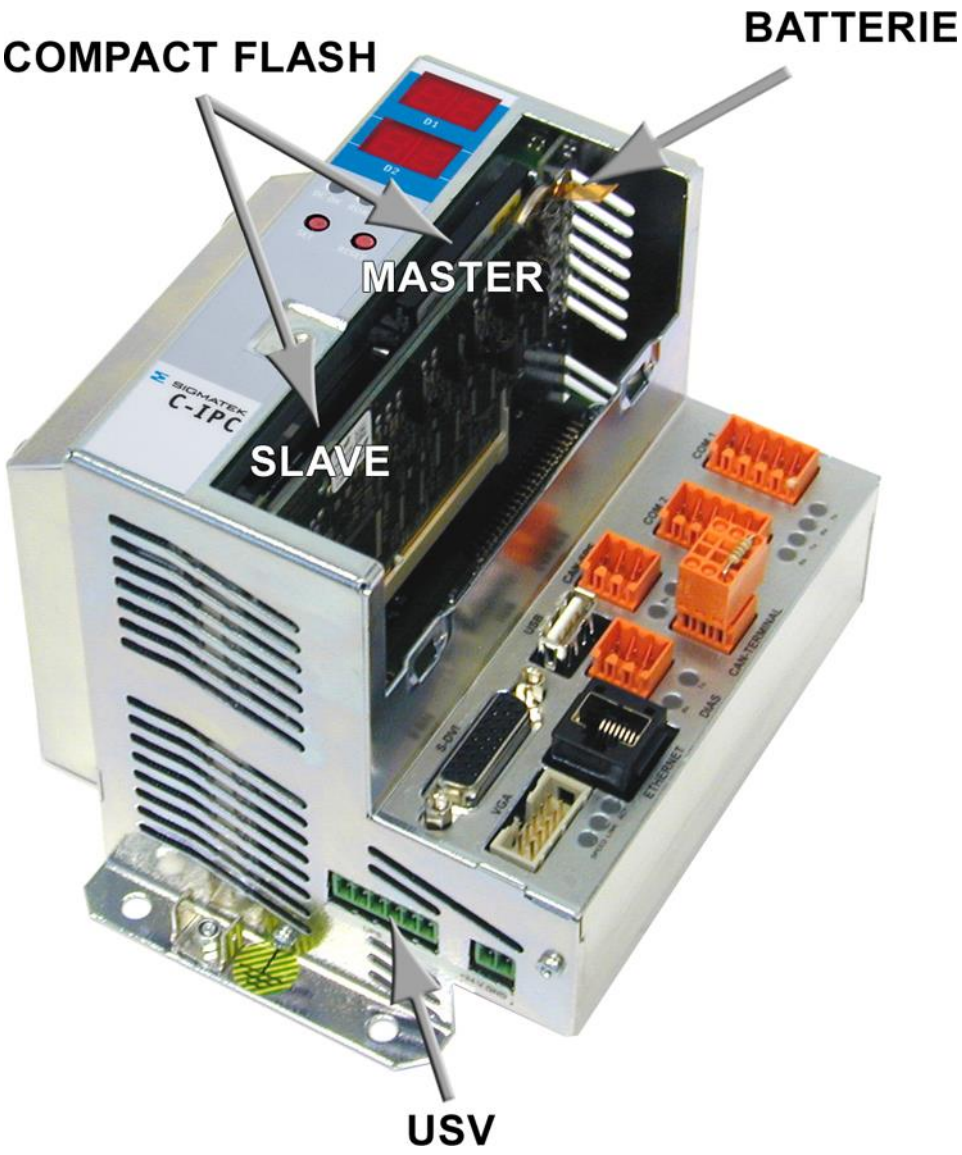
Design Layout

The CPU module is placed on the left side of the C-DIAS module carrier.

Front view with cover

Rear view with cover

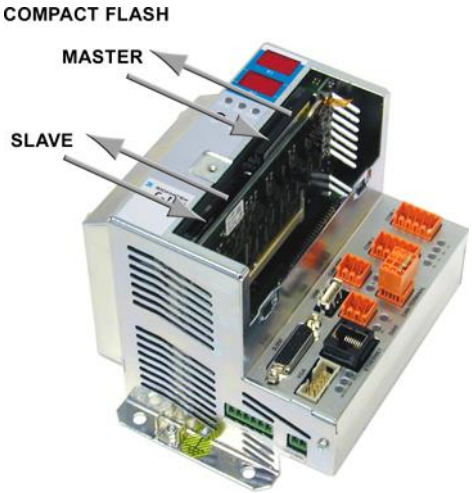
Front view without cover



Exchanging the Compact Flash Card

To exchange the Compact Flash card, remove the screws and carefully tilt the cover to the front as shown below.

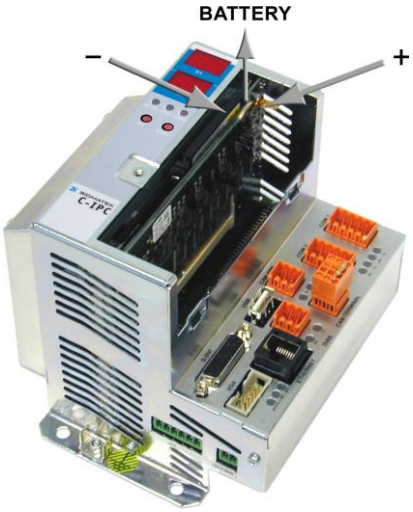
Next, remove the old flash card and insert the new card as shown. Finally, replace the cover and tighten the screws.



Exchanging the Battery

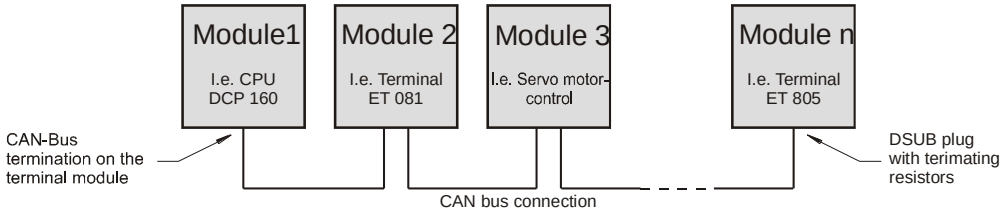
The battery can only be exchanged when the C-IPC is OFF! To exchange the battery, remove the screws and carefully tilt the cover to the front as shown below.

Next, remove the old battery from the fixture and insert the new one. When inserting the new battery, ensure the polarity is correct. Finally, replace the cover and tighten the screws.



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

1 x 150R Widerstand

USB Interface Connections

The C-IPC has a USB interface connection that can used in LASAL to connect various USB devices (keyboard, mouse, storage media, hubs …). 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!

La configuration du BIOS est accessible uniquement si le clavier est connecté directement à la prise USB. L'utilisation d'un concentrateur USB peut provoquer des erreurs dans la configuration du BIOS!

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.

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 C-IPC and must no longer be built into the DIAS bus connector.

The DIAS Bus Connection

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

- The cable used must be designed for the data transfer speed:
  Data cables (10Mbit, 2 x 2 wire TWISTED PAIR, shielded)
  i.e.: 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.

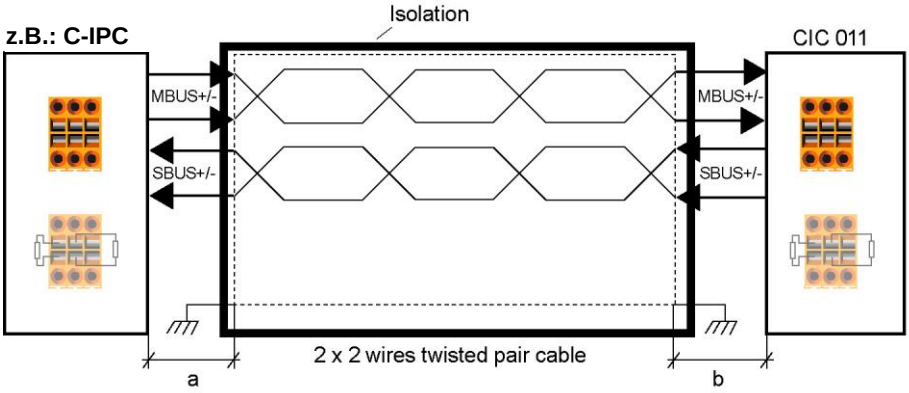
- To connect the individual wires to the connector, the insulation must be removed and the exposed shielding shifted to the side. Only remove as much of the insulation and shielding as needed.

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

The maximum length allowed for twisted-pair cables per DIAS bus connector is 20 M (when using the UNITRONIC BUS cable FD P LD / Fa. LAPPKABEL)

La longueur maximale totale d'un câble à paire torsadée est de 20m (lors de l'utilisation UNITRONIC BUS FD P LD / Fa. LAPPKABEL).

Example



a, b ..... These distances are to be kept as small as possible!
Put screening on both sides and extensive on shortest way to GND!

The C-IPC can also be connected 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).

Connecting DIAS Modules

The C-IPC can also be connected to DIAS modules. Here, 2 options are available:

1. Connection over a DIC 121

The DIAS bus connection between the C-IPC and DIC 121 is a point-to-point connection and must therefore be terminated on both sides. The DIC 121 has an integrated bus termination

Wiring the C-IPC:
- X1: Install bus termination (2x 100 Ω)
- X2: Connect to DIC 121

2. Connection over a DKO 011 or DKO 013:

If both DIAS bus connectors on the C-IPC are needed, a DKO 011 or DKO 013 can be used in combination with a DPS 001 power supply module.

Wiring the DIAS modules with a DPS 001:
- Left: DPS 001 power supply module
- Right: DKO 011 or DKO 013 adapter module

Wiring the C-IPC:
- X1: DIAS bus to CIC interface modules or bus termination (2 x 100 Ω)
- X2: Connection to DKO 011 or DKO 013 adapter module

Buffer Battery

The exchangeable buffer battery ensures that programs and data in the user memory (RAM) 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 3 years.

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

Battery order number: 01-690-028

	MANUFACTURER	TYPE	DATA
Lithium battery	RENATA	CR2032	3 V

Replace battery with RENATA Part No. CR2032 only. Use of other battery may present a risk of fire or explosion. See owner's manual for safety instructions.

N'utilisez que des piles RENATA CR2032! Avec d'autres piles, un risque d'incendie ou d'explosion existe!

Caution:
The battery can only be changed when the C-IPC is off! After the +24 V supply is removed, the battery is buffered for approximately 15 minutes (via ELKO). The battery must be changed within this period or data loss occurs.

Attention:
La pile ne doit être changée que si le C-IPC est éteint! Après avoir débranché l'alimentation +24 V, la pile est tamponnée pendant 15 minutes (via ELKO). La pile doit être remplacée pendant ce laps de temps sinon les données seront perdues.

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.

Cooling

The terminal's power loss can reach up to 50 Watts. The built-in fan removes most of the generated heat. Also when mounted, heat dissipation must be ensured.

At processor temperatures above the allowed limit, the C-IPC will shut down automatically!
The C-IPC will only resume normal operation after a sufficient cooling period (1 minute). After an emergency shutdown, the fan function and environmental conditions should be checked.

Le S-IPC s'arrête automatiquement en présence d'une température trop élevée du processeur!
Le C-IPC revient au fonctionnement normal après une phase de refroidissement suffisante (1 minute). Après un arrêt d'urgence, le fonctionnement correct du ventilateur ainsi que les conditions d'environnement doivent être vérifiés.

System Boot Checkpoints

The checkpoints are shown on the 7-segment display before the LASAL CLASS software status and error messages. Since this involves checkpoints, it should be interpreted as errors when the system stops at a checkpoint.

Number	Meaning	Cause/solution
1F	The operating system or application cannot be started	- Check operating system/boot medium - Boot medium not inserted - Boot medium defective - No operating system on the boot medium
A5, BF	Error in RAM	- The module detected an error in the RAM during the self-test.

Status and Error Messages

Status and error messages are shown in the status test of the LASAL CLASS software. If the CPU has a status display, the status or error number is also show here as well. 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.	
01	**RUN ROM**	The user program stored in the program memory module has been loaded into the RAM is currently running. The display is not affected.	
02	**RUNTIME**	The total time for all cyclic objects exceed the maximum time; the time can be configured using two 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 is overwriting 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 through the watchdog logic.	Possible Causes: - Interrupts blocked by the user program for an extensive period of time (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.	

15	**STOP BRKPT**	The CPU was stopped by a breakpoint in the program.	
16	**CPU STOP**	The CPU 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 was sent to CPU and is ready to run the program	
20	**LOAD**	The program is stopped and the CPU is currently receiving a new module or project.	
21	**UNZUL. MODUL**	The CPU has received a module that does not belong to the project.	
22	**MEMORY FULL**	The operating system memory /Heap) is too small. No memory could be reserved while calling an internal or interface function is called from the application.	
23	**NOT LINKED**	When starting the CPU, a missing module or a module that does not belong 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**	While accessing a DIAS module, an error has occurred.	Possible Causes: - An attempt is made to access a nonexistent DIAS module. - DIAS bus error. Solution: - Check the DIAS bus - Check the termination resistors.
26	**WAIT**	The CPU is busy.	
27	**OP PROG**	The operating system is currently being reprogrammed.	
28	**OP INSTALLED**	The operating system has been reinstalled.	
29	**OS TOO LONG**	The operating system cannot be loaded; too little memory.	
30	**NO OPERATING 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**		

44	**VARAN MANAGER ERROR**	In the VARAN Manager, an error number was stored and the program execution was stopped.	Possible causes: - Real network does not match the project Solution: - Read log file
45	**VARAN ERROR**	A required VARAN Client was removed or a communication error has occurred. The program execution has stopped.	Possible causes: - Damaged wiring - Missing energy supply for decentralized modules Solution: - Read Log file - Analyze error tree
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**	A 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	
52	**PRIVILEDGED INSTRUCTION**	An unauthorized instruction for the current CPU level was given. For example, 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 DIAS-Master.	
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 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	Starting from Version 1.1.7

68	**BACKGROUND RUNTIME**	The total time for all background objects exceed the maximum time; the time can be configured using two system variables: -BTRuntime: time remaining -SWBTRuntime: pre-selected value for the runtime counter	
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
73	**EEPROM ERROR**	An error has occurred while reading the CPU EEPROM.	Cause: - Accessing I²C has failed multiple times due to a hardware defect. Solution: - Restart the CPU - After repeated failure, exchange CPU
75	**SRAM ERROR**	An error occurred while initializing, reading or writing SRam data.	Possible Causes: - SRam configured incorrectly - Battery fort he internal program memory supply is empty Solution: - Analyze log file (Event00.log, Event19.log) - Check configuration - Change internal program memory supply battery
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 attribute.	
112	**C_SYNTAX_ERROR**	Non-specific error. Recompile and download all project sections.	
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**	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**		

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.

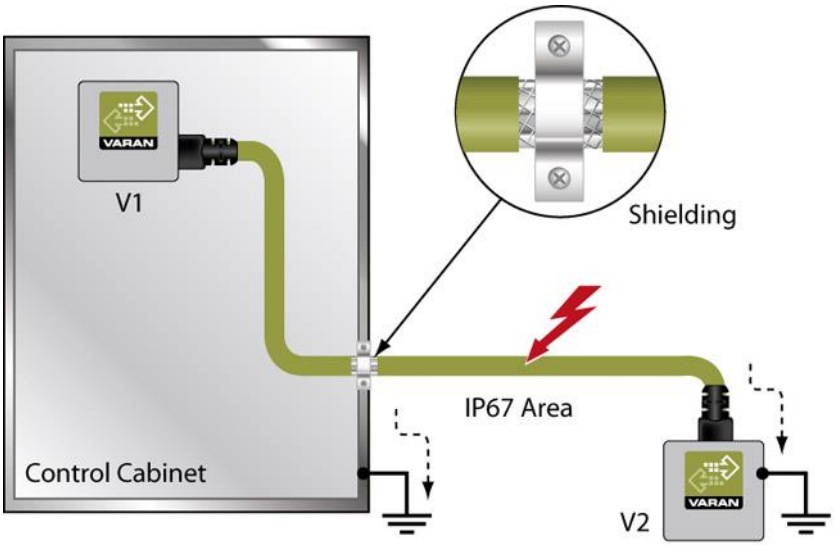
SIGMATEK recommends the use of CAT5e industrial Ethernet bus cables.

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!

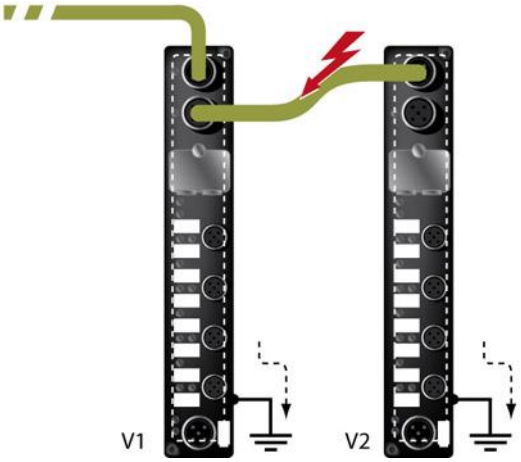
1. Wiring from the Control Cabinet to an External VARAN Component

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.



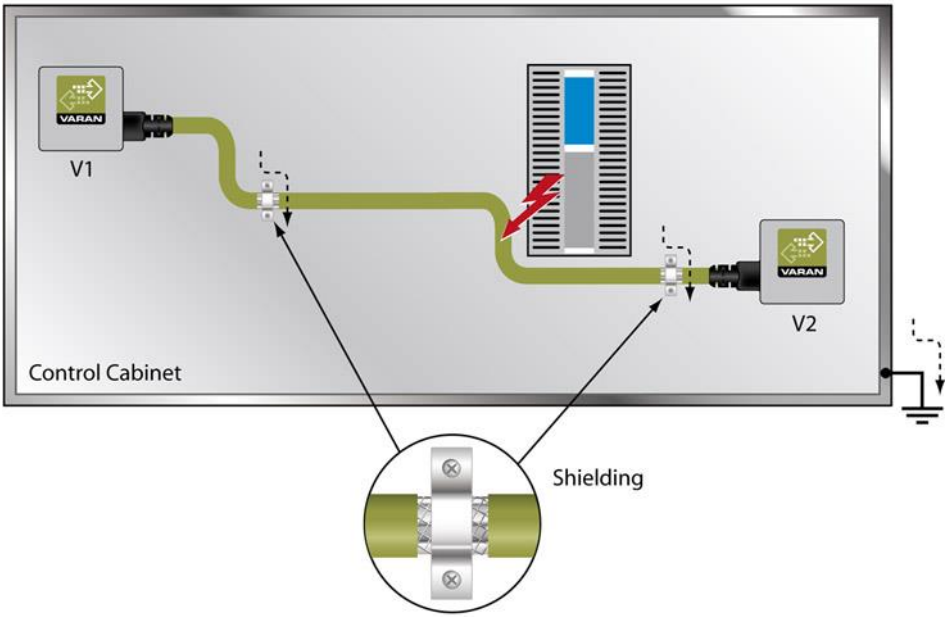
2. Wiring Outside of the Control Cabinet

If a VARAN bus cable must be placed outside of the control cabinet, additional shielding is not required. Outside of the control cabinet, IP67 modules and connectors are used exclusively. These components are very robust and noise resistant. The shielding for all sockets in IP67 modules is electrically connected internally or over the housing, whereby voltage spikes are not deflected through the electronics.



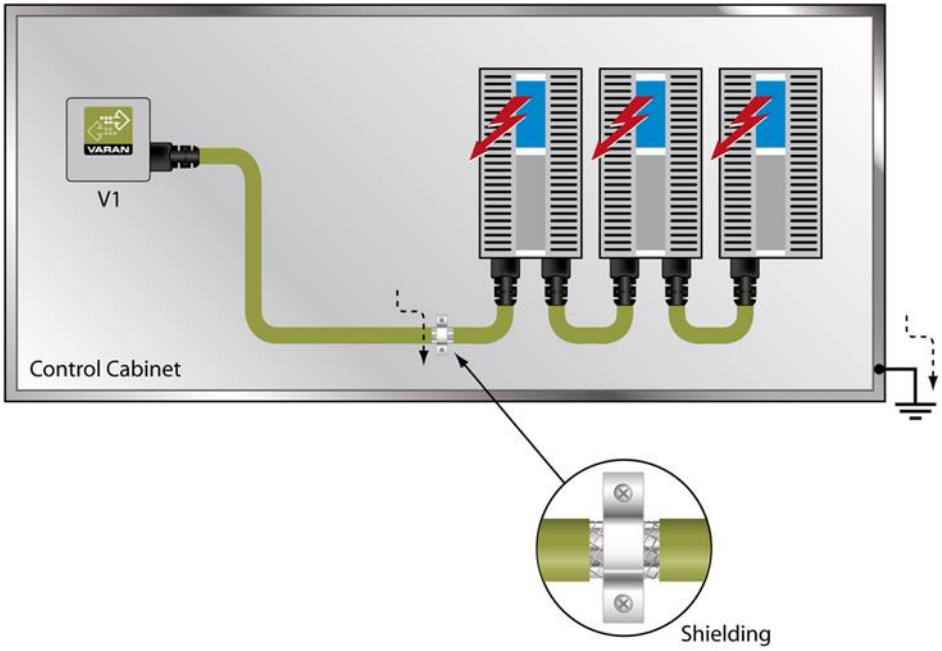
3. Shielding for Wiring within the Control Cabinet

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.