C-DIAS Processor Module CCP 521

The CCP 521 processor module runs the control program and thereby represents an essential component of an automation system. The internal DC/DC converter powers all modules on a C-DIAS module carrier.

The CAN bus, an Ethernet interface or the USB device (Mini USB) can be used as the online interface.

A 7-segment display and 2 status LEDs provide information on the actual status of the CPU.

For program updates, the integrated USB Host interface can be used (USB stick, keyboard). With help from the exchangeable SD card, the entire control program can be easily exchanged.

The CCP 521 processor module is designed to be mounted in the control cabinet.

With the integrated VARAN manager, the processor module offers the possibility to construct a high-performance VARAN system to operate for example, decentralized I/O modules, drive systems or communication modules.

Compatibility

Completely PC-compatible. The CCP 521 works with standard PC BIOS and therefore no SIGMATEK-specific BIOS is needed; the LASAL operating system in provided.

Technical Data

Performance data

Processor	EDGE-Technology X86 compatible 16-bit data bus
Clock frequency	500 MHz
Addressable I/O/P modules	VARAN bus: 65.280 CAN bus: 32 C-DIAS bus: 8
Internal I/O	No
Internal cache	32-kbyte L1 Cache 256-kbyte L2 Cache
BIOS	AMI
Internal program and data memory (DDR2 RAM)	64 Mbytes
Internal remnant data memory	512 Kbytes (1)
Internal storage device (IDE)	512 MByte microSD card
Interface connections	1 x USB Host 2.0 (full speed 12 Mbit/s) 1 x USB Device 1.1 1 x Ethernet 1 x CAN 1 x VARAN-Out (Manager) (maximum length: 100 m) 1 x C-DIAS
Data buffer	Yes
Status display	Yes
Status LEDs	Yes
Real-time clock	Yes (buffering approximately 10 days)

(1) See chapter “Note on SRAM Behavior”

Electrical requirements

Supply voltage	+18 – 30 V DC	
Supply voltage (UL)	18 – 30 V DC (Class 2)	
Current consumption of (+24 V) power supply	Typically 150 mA	Maximum 500 mA
Current consumption of (+24 V) power supply (UL)	Maximum 500 mA	
Starting current	For a very short time (~20 ms) : 30 A	
Power supply on the C-DIAS bus	Supplied by the CCP 521	
Current load on C-DIAS bus (power supply for I/O/P modules).	Maximum 1.2 A	

Only US and Canada:
Use class 2 power supply only!

Seulement Etats-Unis et Canada:
Utilisez alimentation de la classe 2 uniquement!

Standard configuration

Ethernet 1	IP: 10.10.150.1	Subnet-Mask: 255.0.0.0
CAN bus	Station: 00	Baud rate: 01 = 500 kBaud

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

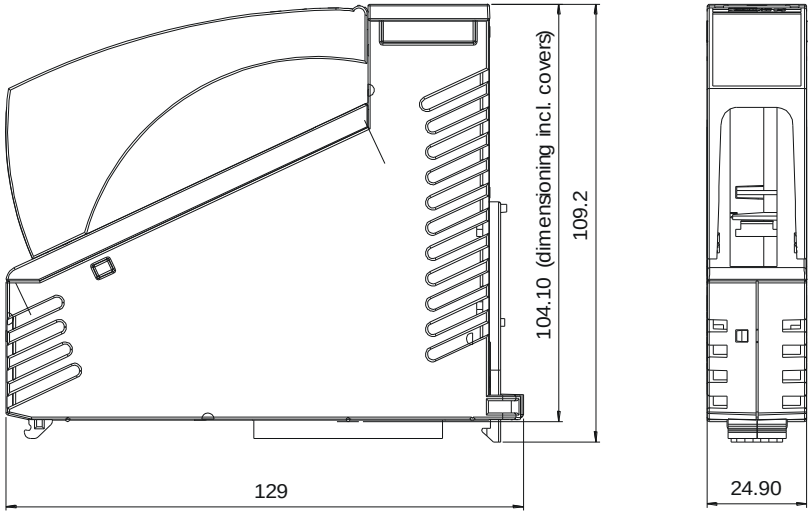
Miscellaneous

Article number	12-104-521
Hardware version	2.x
Project back-up	Internally on the microSD card
Standard	UL508 (E247993)

Environmental conditions

Storage temperature	-10 ... +85 °C	
Operating temperature	0 ... +60 °C	
Humidity	10 - 90 %, uncondensed	
EMV stability	According to EN 61000-6-2 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s²
Protection Type	EN 60529	IP20
Protection Type (UL)	open type device	
Pollution degree	2	

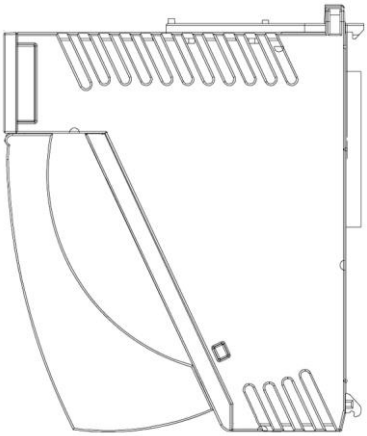
Mechanical Dimensions



Mounting position

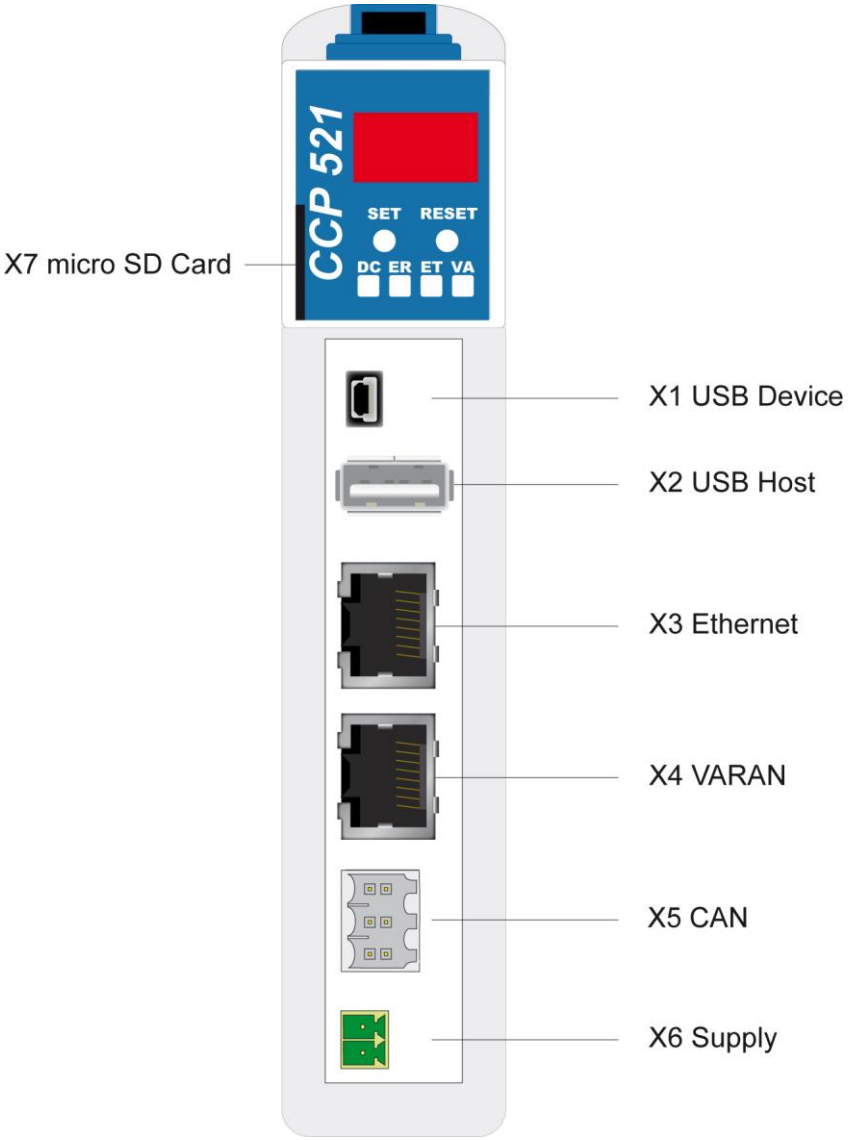
To ensure optimal cooling of the module, the CCP 521 must be mounted as shown (standing). For an angled mounting position, forced convection (cooling fan) must be used.

Top



Bottom

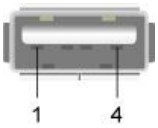
Connector Layout



X1: USB Device 1.1

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

X2: USB Host 2.0

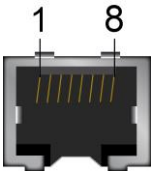


Pin	Function
1	+5 V
2	D-
3	D+
4	GND

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.

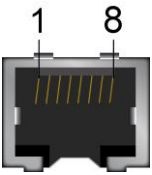
Il faut souligner que la plupart des périphériques USB sur le marché ne sont pas conformes aux spécifications USB, ce qui peut entraîner des dysfonctionnements de l'appareil. Il est également possible que ces dispositifs ne seront pas détectés par le port USB ou qu'ils ne fonctionnent pas correctement.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

X3: Ethernet



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

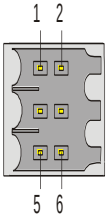
X4: VARAN-Out



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

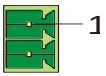
More information on the VARAN bus can be found in the VARAN bus specifications!

X5: CAN-Bus



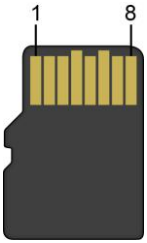
Pin	Function
1	CAN A (CAN LOW)
2	CAN B (High)
3	CAN A (CAN LOW)
4	CAN B (High)
5	GND
6	-

X6: Power plug



Pin	Function
1	+24 V supply
2	GND

X7: 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.

Exchanging the microSD card

	The microSD card is located under the LED cover.
	To exchange the microSD card, carefully lift the LED cover.
	The microSD card is located on the left side and can be disengaged by lightly pressing on the card itself.
	Remove the microSD card.

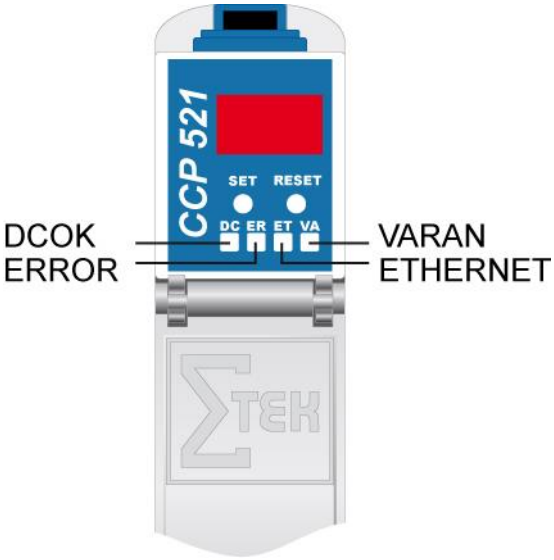
Connector	Type	Wire Size	Max. drive torque
X1	USB Typ Mini-B	-	-
X2	USB Typ A	-	-
X3, X4	RJ45	-	-
X5	B2L 3.5/6	0.13 - 1.0 mm^2 28 - 18 AWG (UL/CSA)	Cage Clamp
X6	FK-MCP 1.5/ 2-ST-3.5	0.14 - 1.5 mm^2 28 - 16 AWG (UL/cUL)	Cage Clamp
	MC 1.5/ 2-ST-3.5	0.13 - 1.0 mm^2, 30 - 16 AWG (UL), 28 - 16 AWG (CSA)	0.22 - 0.25 Nm

Applicable connectors

USB Device: 5-pin, type Mini-B
USB Host: 4-pin, type A
Ethernet: 8-pin, RJ45
VARAN: 8-pin, RJ45
CAN-Bus: 6-pin Weidmüller plug, B2L/B2CF 3,5/6
Supply: 2-pin Phoenix plug with screw terminal technology MC 1.5/ 2-ST-3.5
2-pin Phoenix plug with spring terminal FK-MCP 1.5/ 2-ST-3.5

The complete C-DIAS CKL 017 connector set with spring terminals is available from Sigmatek under the article number 12-600-017.

Status Displays



Ethernet		
LED	**Color**	**Description**
Active	Yellow	Lights when data is exchanged over Ethernet
Link	Green	Lights when the connection between the two PHYs is established
VARAN		
LED	**Color**	**Description**
Active	Yellow	Lights when data is exchanged over the VARAN bus
Link	Green	Lights when the connection between the two PHYs is established
Control		
LED	**Color**	**Description**
ERROR	Red	Lights when an error occurs (defective USV)
DCOK	Green	Lights when the power supply is OK

Display

The CCP 521 processor module has a 2-digit decimal display (7 segment display) for the following functions:

- When configuring the processor module, the parameters are shown in the display.
- If an error occurs while running the program or no valid user program is found, the display shows an error message. Thereby, "Er" (error) and the error code are displayed alternatingly. The same error code is also shown in the LASAL status line.
- While running the program, the display can be used to show digits using the system variable _cpuDisplay. Valid values are 0 to 255; values over 99, however, are not shown and the display remains dark.

CAN Bus Setup

This section explains how to configure a CAN bus correctly. 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

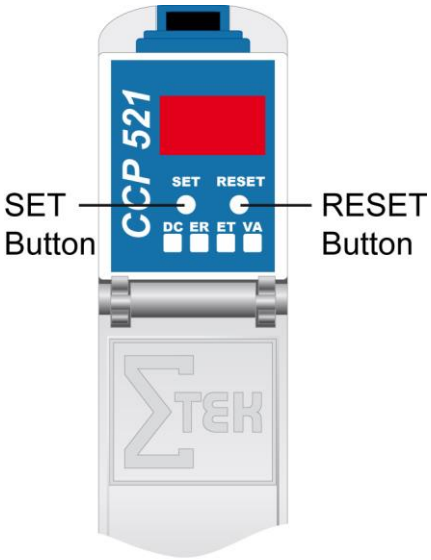
The data transfer rate (baud rate) for the CAN bus can be set. However, the longer the length of the bus, the smaller the transfer rate that must be selected.

Value	Baud rate	Maximum length
00	615 kBit/s	60 m
01	500 kbit/s	80 m
02	250 kBit/s	160 m
03	125 kBit/s	320 m
04	100 kBit/s	400 m
05	50 kBit/s	800 m
06	20 kBit/s	1200 m
07	1 Mbit / s	30 m

These values are valid for the following cable: 120 Ω, Twisted Pair.

NOTE: the following is valid for the CAN bus protocol: 1 kBit/s = 1 kBaud.

Configuration of the Process Module

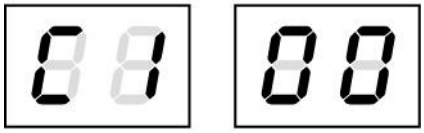


To enter the mode for setting changes, press and hold the SET button while the C-IPC is booting.

When the following appears in the display:

the SET button can be released.

After releasing the SET button, the first menu appears in the display.



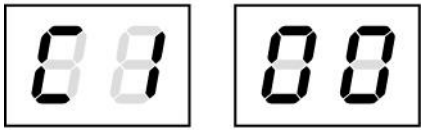
With several short presses of the SET button, it is possible to switch through the various menu points. By pressing the SET button for approximately 1.5 s, the menu is accessed and the setting can be changed with short presses.

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.

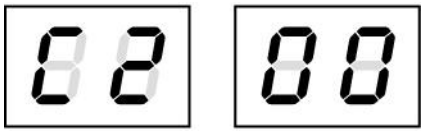
The settings for the IP address, subnet mask and gateway are hexadecimal, whereas in the left and right digits, 0 - F must be entered separately. The switch occurs when the SET button is pressed for about 1.5 s.

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.

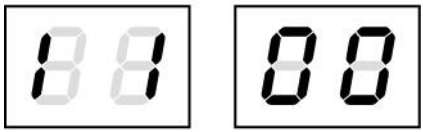
C1 ... CAN PLC station
00 – 30 ... Station number



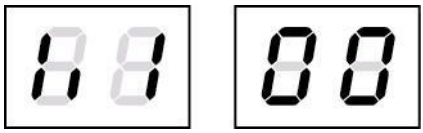
C2 ... CAN PLC baud rate
00 ... 615.000
01 … 500.000
02 … 250.000
03 … 125.000
04 … 100.000
05 … 50.000
06 … 20.000
07 … 1.000.000



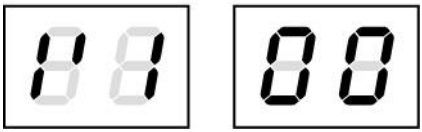
I1, I2, I3, I4 IP address I1.I2.I3.I4, Hexadecimal
00 – FF respectively



S1,S2,S3,S4 Subnet Mask S1.S2.S3.S4, hexadecimal
00 – FF respectively

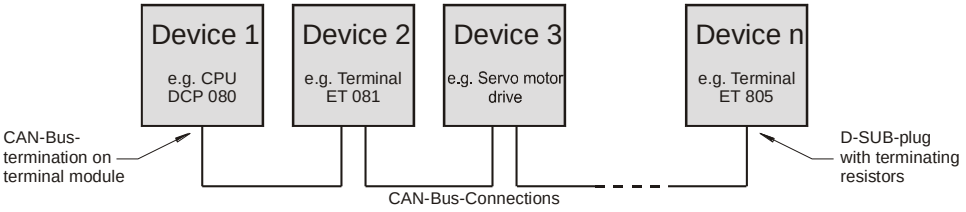


G1,G2,G3,G4 Gateway G1,G2.G3.G4, hexadecimal
00 – FF respectively



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 CCP 521 processor module is an end module, it can be terminated by placing a 150-Ohm resistor between CAN-A (Low) and CAN-B (High).

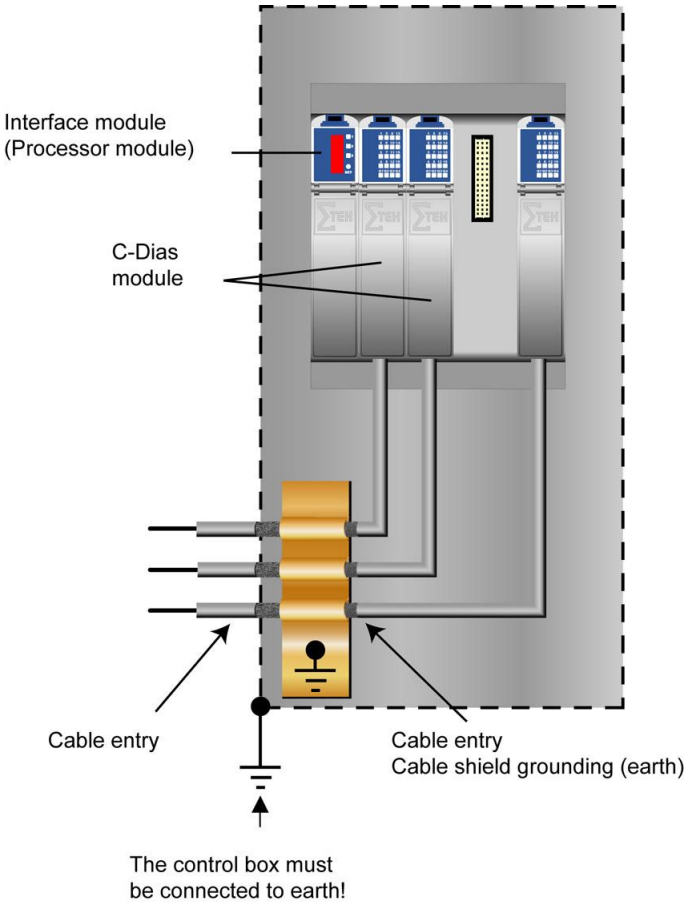
1 x 150-Ohm resistor

Wiring and Mounting Instructions

Earth Connection

The CCP 521 must be connected to earth over the mounting on the back wall of the control cabinet or over the earth terminal provided (C-DIAS module carrier). 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 CCP 521 over external cables must be filtered out over the earth connection. With a large (electrical) surface, high frequency noise can also be well dissipated.



Shielding

The wiring for the CAN bus, Ethernet and VARAN bus must be shielded. The low-ohm shielding is either connected at the entry to the control cabinet or directly before the CCP 521 processor module over a large surface (cable grommets, grounding clamps)!

Noise signals can therefore be prohibited from reaching the electronics and affecting the function.

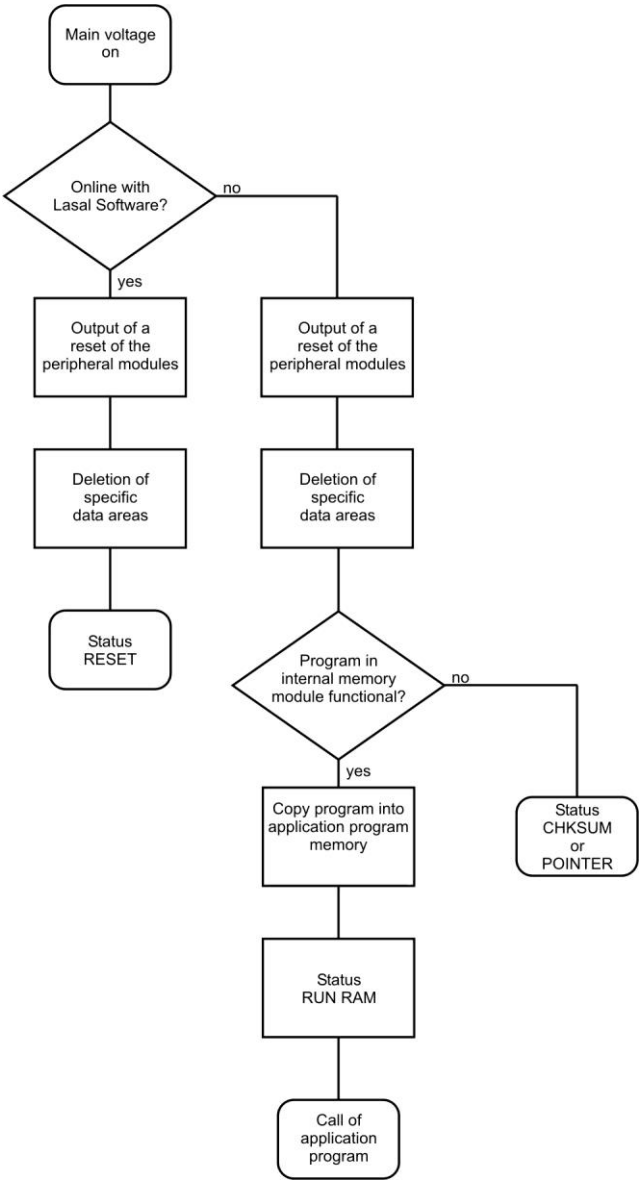
ESD Protection

Before any device is connected to or disconnected from the CCP 521, the potential with ground should be equalized (by touching the control cabinet or earth terminal). Static electricity (from clothing, footwear) can therefore be reduced.

Working with and on the CCP 521

- Valid operating and safety guidelines for personal safety must always be observed.
- With installation /initial start-up / product maintenance, the relevant measures for ESD protection must be taken.
  (For example: the employees must ground themselves before they start working with and on the product.

Process Diagram



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
88	Display during system start. If the status does not change, the operating system or application cannot be started. This may be for different reasons.	- The operating system is not fully booted - Check operating system/boot medium - Boot medium not inserted - Boot medium defective - No operating system on the boot medium - BIOS self-test error - RAM, CPU, BIOS, etc.

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 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 user program is overwriting a software error Solution: - Reprogram the memory module, if the error reoccurs exchange the module. - 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 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 programming 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.
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**	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 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 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
75	**SRAM ERROR**	Only EDGE CPUs An error occurred while initializing, reading or writing SRAM data.	Possible causes: - - SRAM configured incorrectly - - SD card formatted incorrectly - - SD card removed Solution: - - evaluate log file (Event00.log) - - check configuration - - format SD card as EDGE medium with Lasal Class 2 - - check SD card
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 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.	
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**		

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 microSD 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 microSD 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.

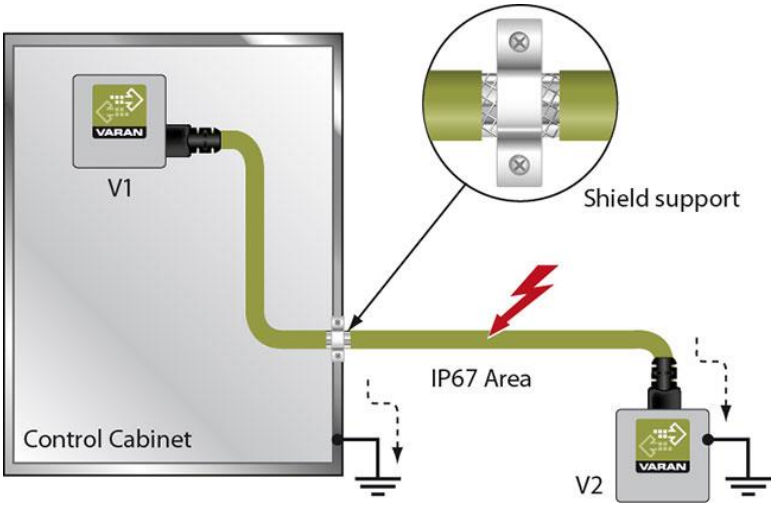
For the shielding, an S-FTP cable should be used.
An S-FTP bus is a symmetric, multi-wire cable with unshielded pairs. For the total shielding, a combination of foil and braiding is used. A non-laminated variant is recommended.

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)!

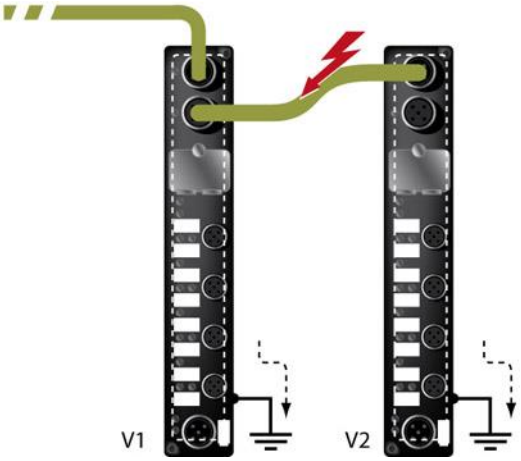
1. Wiring from the Control Cabinet to an External VARAN Component

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.



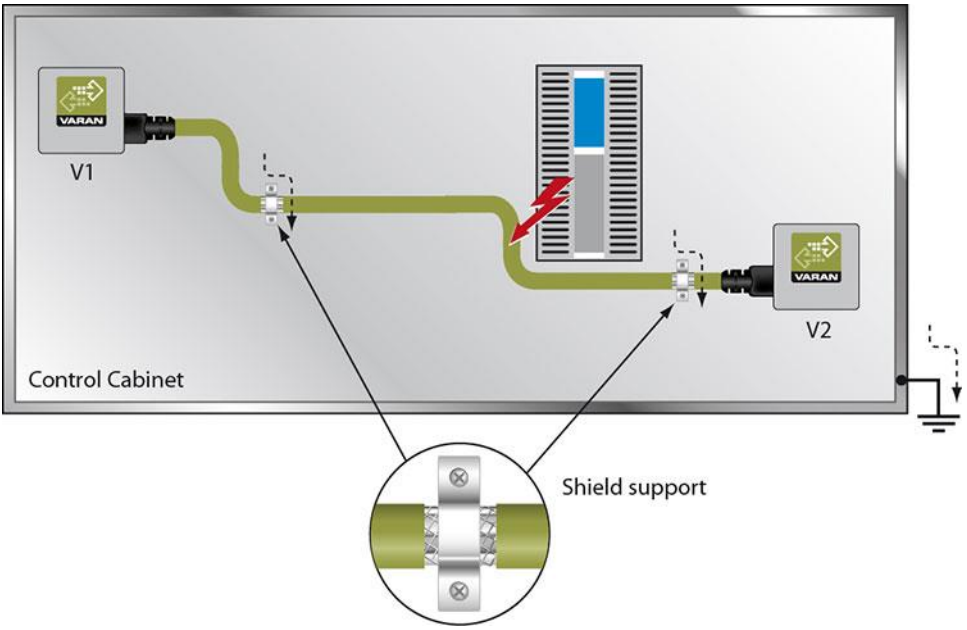
2. Wiring Outside of the Control Cabinet

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.



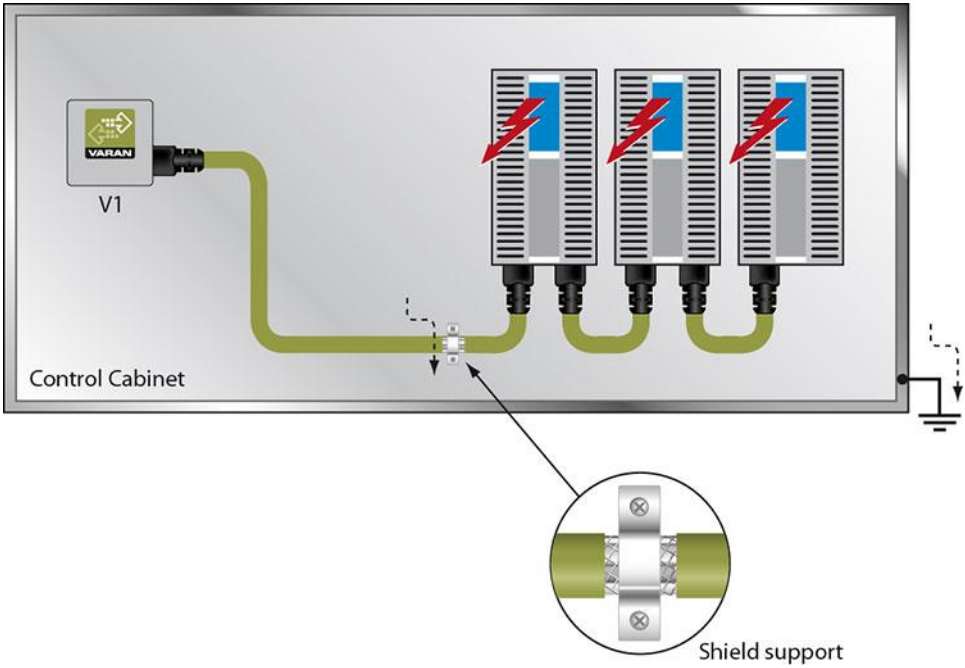
3. Shielding for Wiring Within the Control Cabinet

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.