

C-DIAS Interface Module VARAN

CIV 521

The interface module CIV 521 expands the VARAN bus with several standard interfaces. The module has an Ethernet, CAN bus, RS232, RS422/485 as well as a DIAS, C-DIAS and TTY interface.

The VARAN Out port allows the construction of the VARAN bus in a line structure.



HW1.x-2.x



starting with HW3.x

C-DIAS

Power and connection of a decentralized C-DIAS module group consisting of up to 8 C-DIAS modules to a CPU through the VARAN bus.

The CIV 521 can operate the C-DIAS bus directly or through a data mover. The Datamover offers the possibility to manage the I/O data of the connected C-DIAS modules independently, thereby by reducing the burden on the VARAN bus.

DIAS

Power and connection of a decentralized DIAS bus to a CPU through the VARAN bus.

CAN, RS232, RS422/485 and TTY

The CIV 521 expands the VARAN bus with these interfaces. These are operated through the CPU operating system directly.

Ethernet Port

The VARAN bus offers the possibility to transmit Ethernet packets using VtE (VARAN transmits Ethernet). Incoming Ethernet packets to Ethernet ports are, similar to using a HUB, distributed to all other in the VARAN HUB system and the VARAN manager (and therewith the CPU) with VtE.

Technical Data

Performance Data

Interface connections	1 x VARAN In (RJ45) (maximum length: 100 m) 1 x VARAN Out (RJ45) (maximum length: 100 m) 1 x Ethernet(VtE) 1 x RS232 1 x RS422/RS485 1 x TTY current interface (20 mA) 1 x C-DIAS bus (back) 1 x DIAS bus 1 x CAN bus	
Settable Baud Rate	RS485/422	9600 Baud, 19200 Baud, 38400 Baud, 57600 Baud, 115000 Baud
	RS232	9600 Baud, 19200 Baud, 38400 Baud, 57600 Baud, 115000 Baud
	TTY	9600 Baud, 19200 Baud, 38400 Baud, 57600 Baud

Electrical Requirements

Supply voltage	18 – 30 V DC
Current consumption of voltage supply	The current consumption is dependent on the connected loads (max. 1.4 A)
Current capacity on C-DIAS bus (power supply for I/O modules).	Maximum 1.2 A
Power consumption	> 2.4 W

The device shall be supplied from an isolating transformer having a secondary Listed fuse rated either:

- a) max. 5 amps for voltages 0..20 Vrms (0..28.3 Vp), or
- b) 100 VA/Vp for voltages of 20..30 Vrms (28.3..42.4 Vp).

Le module doit être alimenté par un transformateur d'isolement avec un fusible sur la sortie de l'enroulement secondaire dont les spécifications sont:

- a) max. 5 A pour des tensions 0 ~ 20 V (0 ~ 28,3 Vp), ou
- b) 100 VA/Vp pour des tensions de 20 ~ 30 V (28,3 ~ 42,4 Vp).

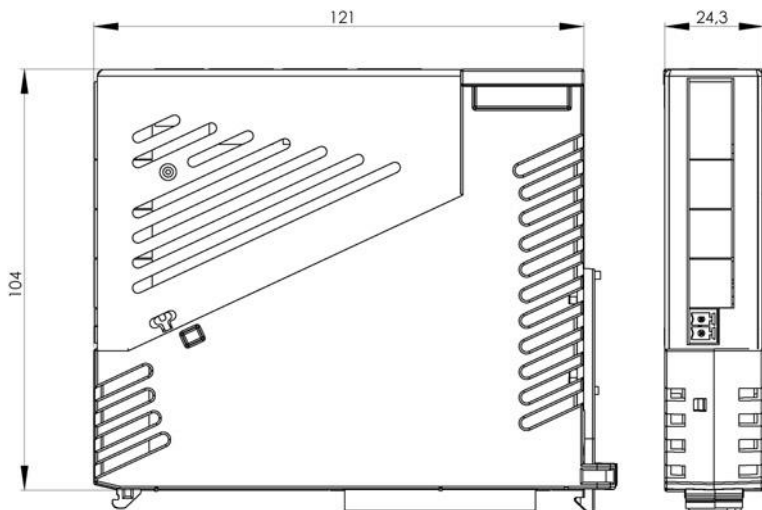
Miscellaneous

Article number	12-003-521
Hardware version	1.x-3.x
Standardization	UL (E247993)

Environmental Conditions

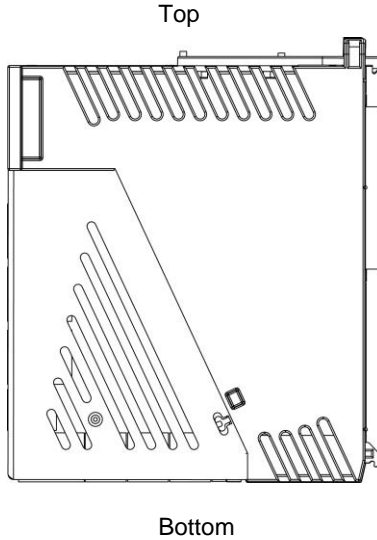
Storage temperature	-20 ... +70 °C	
Operating temperature	0 ... +50 °C	
Humidity	0 – 95 %, uncondensed	
EMV resistance	According to EN 61000-6-2 (industrial area)	
Shock resistance	EN 60068-2-27	150 m/s ²
Protection	EN 60529	IP20

Mechanical Dimensions



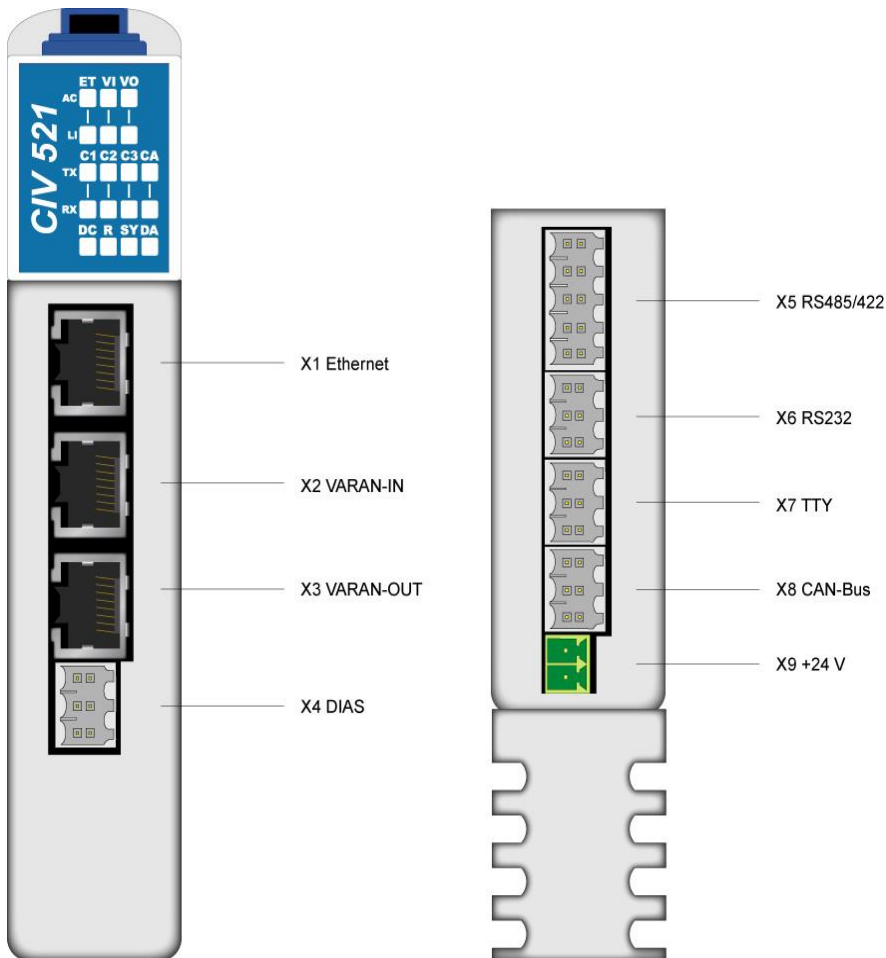
Mounting position

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

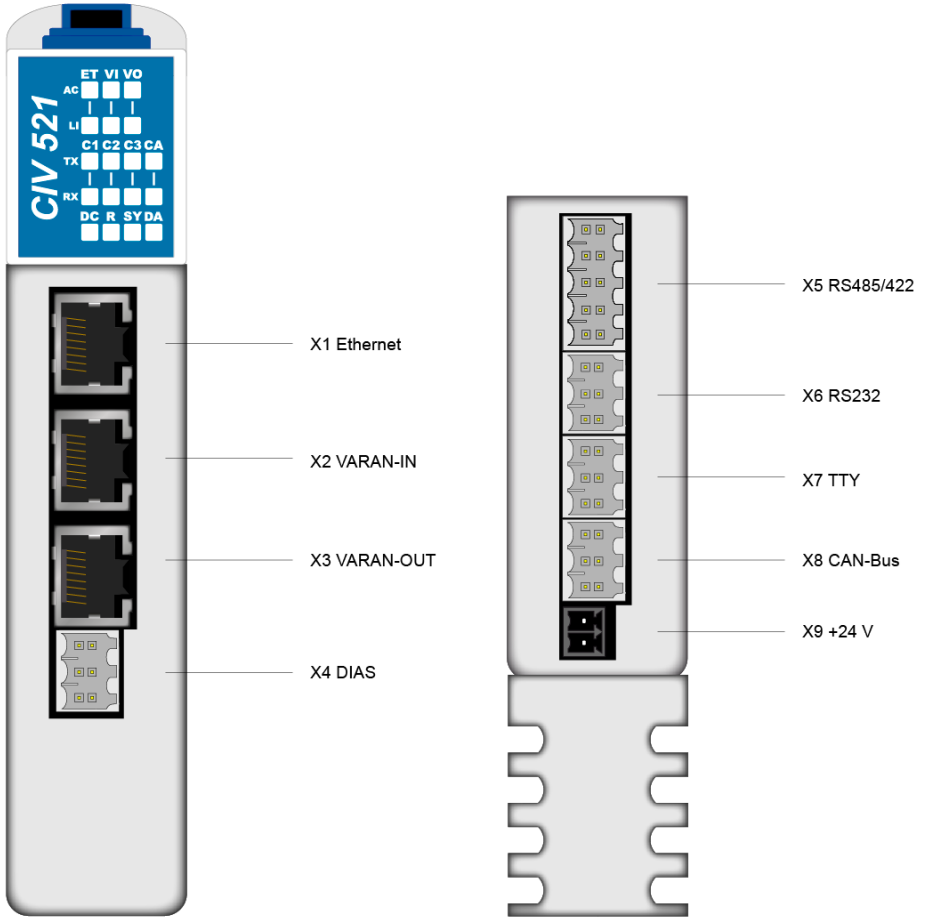


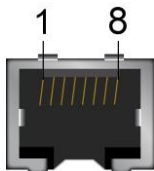
Connector Layout

HW1.x-2.x



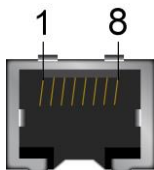
HW3.x



X1: Ethernet Port (VtE)


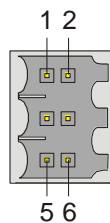
Pin	Function
1	Tx+
2	Tx-
3	Rx+
4 - 5	n.c.
6	Rx-
7 - 8	n.c.

n.c. = do not connect

**X2: VARAN In
X3: VARAN Out**


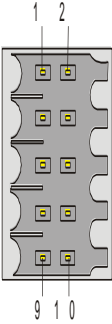
Pin	Function
1	TX/RX+
2	TX/ RX-
3	RX/TX+
4 - 5	n.c.
6	RX /TX-
7 - 8	n.c.

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

X4: DIAS


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

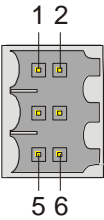
X5: RS485/422



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

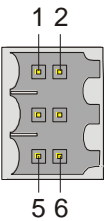
n.c. = do not connect

X6: RS232

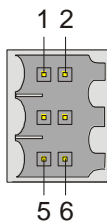


Pin	Function
1	RxD
2	RTS
3	TxD
4	CTS
5	DTR
6	GND

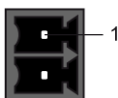
X7: TTY (20 mA)



Pin	Function
1	Tx+
2	Tx-
3	Rx+
4	Rx-
5	20 mA
6	GND

X8: CAN Bus


Pin	Function
1	CAN A (LOW)
2	CAN B (HIGH)
3	CAN A (LOW)
4	CAN B (HIGH)
5	GND
6	+5 V / 500 mA

X9: Power plug


Pin	Function
1	+24 V supply
2	GND

Applicable connectors

- X1 – X3:** 8-pin. RJ45
X5: 10-pin. Weidmüller connector B2L3, 5/10
X4, X6 – X8: 6-pin. Weidmüller connector B2L3, 5/6
X9: 2-pin. Phoenix connector with screw terminal technology MC1,5/2-ST-3,5
 2-pin. Phoenix connector with spring terminals FK-MCP1,5/2-ST-3,5

The complete C-DIAS CKL 022 connector set with spring terminals is available from SIGMATEK under the article number 12-600-022.

Wiring Guidelines for the RS232

General data /specifications

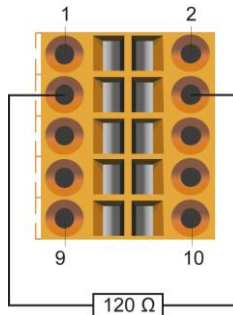
- For RS232 connections, shielded data cables must be used!
- Maximum bus participants: 2 stations
- Maximum length: 15 m

Wiring Guidelines for the RS422

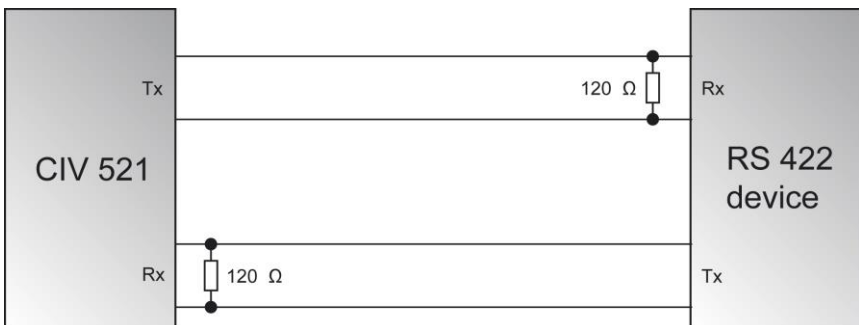
General data /specifications

- For wiring data cables, twisted pair cables with shielding must be used!
- Maximum bus participants: 1 master, 10 Slaves
- Maximum length: 500 m (ISO Norm 8482)
- Sender/Receiver IC: MAX1486

Terminating the CIV



Wiring

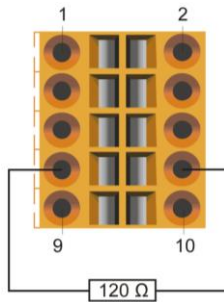


Wiring Guidelines for the RS485

General data /specifications

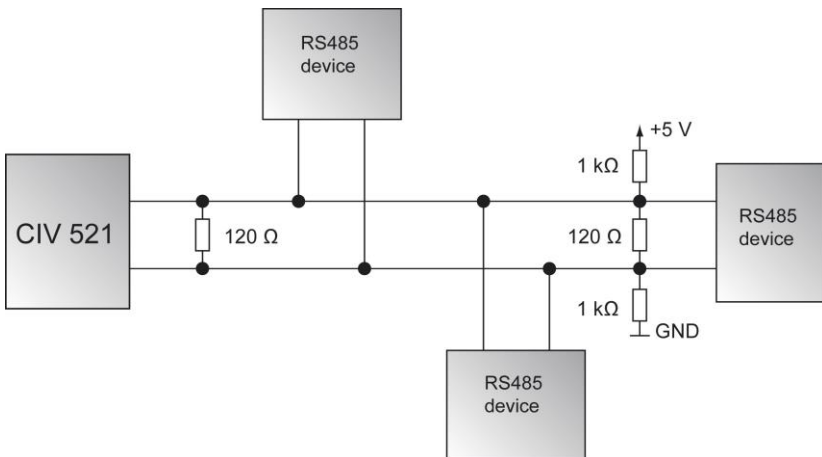
- For wiring data cables, twisted pair cables with shielding must be used!
- Maximum bus participants: 32 stations
- Maximum length: 500 m (ISO Norm 8482)
- Sender/Receiver IC: MAX1486

Terminating the CIV



Wiring

Because the RS485 requires a defined quiescent point, a pull-up and pull-down resistor is required in addition to the termination resistor.



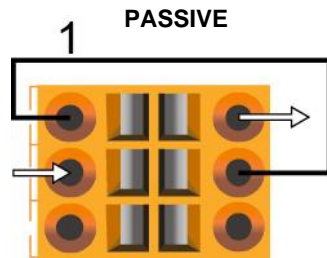
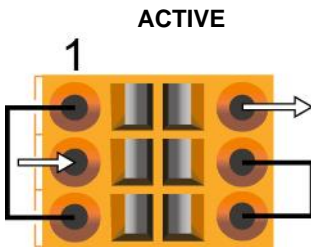
The 5 V supply shown in the diagram above is generated externally.

Wiring Guidelines for the TTY

General data /specifications

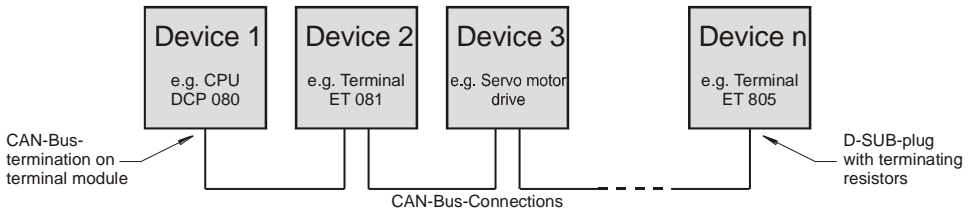
- For wiring data cables, twisted pair cables with shielding must be used!
- Maximum bus participants: 2 stations
- Maximum length: 300 m
- Sender / receiver IC Optic coupler

Wiring and configuration (X3/X4)



CAN Bus Termination

In a CAN bus system, both end modules must be terminated. This is required to avoid data transfer errors that are caused by reflections in the data lines.



If the CIV 521 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 resistor

DIAS Bus Termination

In a DIAS bus system, both end modules must be terminated. This is required to avoid data transfer errors that are caused by reflections in the data lines.

The DIAS bus termination is integrated in the CIV 521 and must no longer be built into the connector.

La terminaison de bus DIAS est intégré dans le CIV 521 et ne doit plus être intégré dans le connecteur.

The DIAS Bus Connection

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

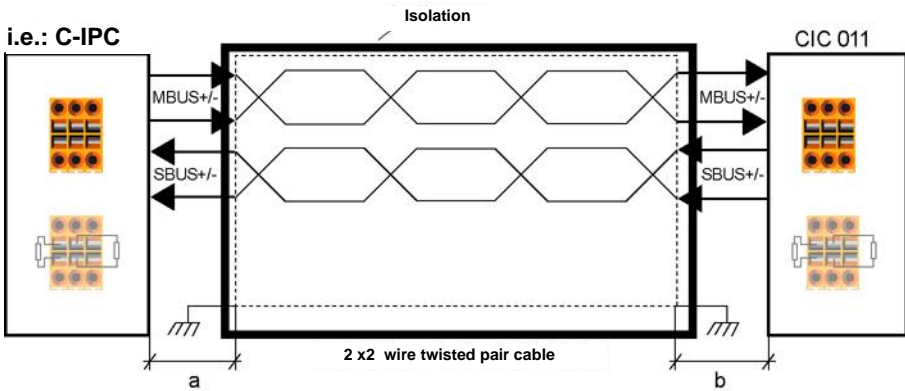
- It is important to ensure the cables used are designed for the data transfer speed.
Data cables (10Mbit, 2 x 2 wire TWISTED PAIR, shielded)
i.e.: LAPPKABEL / UNITRONIC-BUSLEITUNG FD P LD
- Due to the internal resistance of the module, the cable impedance should be 100 Ohms.
- For twisted-pair cables, caution must be taken to ensure that the correct pair are connected with one another:
2x2 pair cables:

Pair 1	MBUS+
	MBUS-
Pair 2	SBUS+
	SBUS-
- The shielding must be connected to GND over the widest surface and shortest route possible at both ends
- To connect the individual wires to the connector, the insulation must be removed and the exposed shielding shifted to the side. Only as much insulation as required should be removed.
- It is important to ensure that the send and receive modules are connected to the same GND potential.

The maximum length allowed for twisted-pair cables per DIAS bus connector is 20 m (when using the UNITRONIC BUS-Leitung 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)

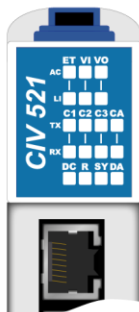
Example



The distance between a and b should be as small as possible! Shift the shielding and connect it to GND over the shortest route and largest area

The CIV 521 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).

Status Display



LED number	LED color	Definition	Description
AC line			
ET	Yellow	Ethernet Active	Lights when data is sent or received.
VI	Yellow	VARAN IN Active	Lights up when data is received or sent via the VARAN-In.
VO	Yellow	VARAN OUT Active	Lights up when data is received or sent via the VARAN-Out.
LI Row			
ET	Green	Ethernet Link	Lights when the connection between both PHYs is established
VI	Green	VARAN IN Link	Lights when the connection between both PHYs is established
VO	Green	VARAN OUT Link	Lights when the connection between both PHYs is established
TX Row			
C1	Yellow	RS485/422 Transmit	Lights when data over RS485/422 is sent.
C2	Yellow	RS232 Transmit	Lights when data over RS232 is sent.
C3	Yellow	TTY Transmit	Lights when data over TTY s sent.
CA	Yellow	CAN Transmit	Lights when data over CAN is sent.
RX Line			
C1	Green	RS485/422 Receive	Lights when data over RS485/422 is received.
C2	Green	RS232 Receive	Lights when data over RS232 is received.
C3	Green	TTY Receive	Lights when data over TTY is received.
CA	Green	CAN Receive	Lights when data over CAN is received.
Status Roy			
DC	Green	DCOK	Lights when the 24 V and 5 V supply is present
R	RED	RESET	Lights when the CIV 521 is in Reset.
SY	Green	PLL-Sync	Lights when the CIV 521 is synchronized with the VARAN-Manager.
DA	Yellow	DIAS Active	Lights when data is sent or received over the DIAS bus.

Applicable Modules

C-DIAS up to 2.x

Almost all C-DIAS modules are supported.

The modules CCA 021 – CCA 121 and CPB 021 can only be operated over the CIV 521 without the Datamover.

The following C-DIAS modules must be operated with a CPU directly:

- CSI 021 – CSI 025
- CGPS 011
- CBC 021

C-DIAS starting with HW3.x

Almost all C-DIAS modules are supported.

The modules CCA 121 and CPB 021 can only be operated via the CIV 521 without Datamover.

The following C-DIAS modules are not supported directly behind the CIV 521 and must instead be operated directly by a C-DIAS CPU:

- CSI 021 – CSI 025
- CGPS 011
- CBC 021
- CME 021
- CME 221
- CNC 115
- CNC 305
- (T)CCA 021
- CDI 162

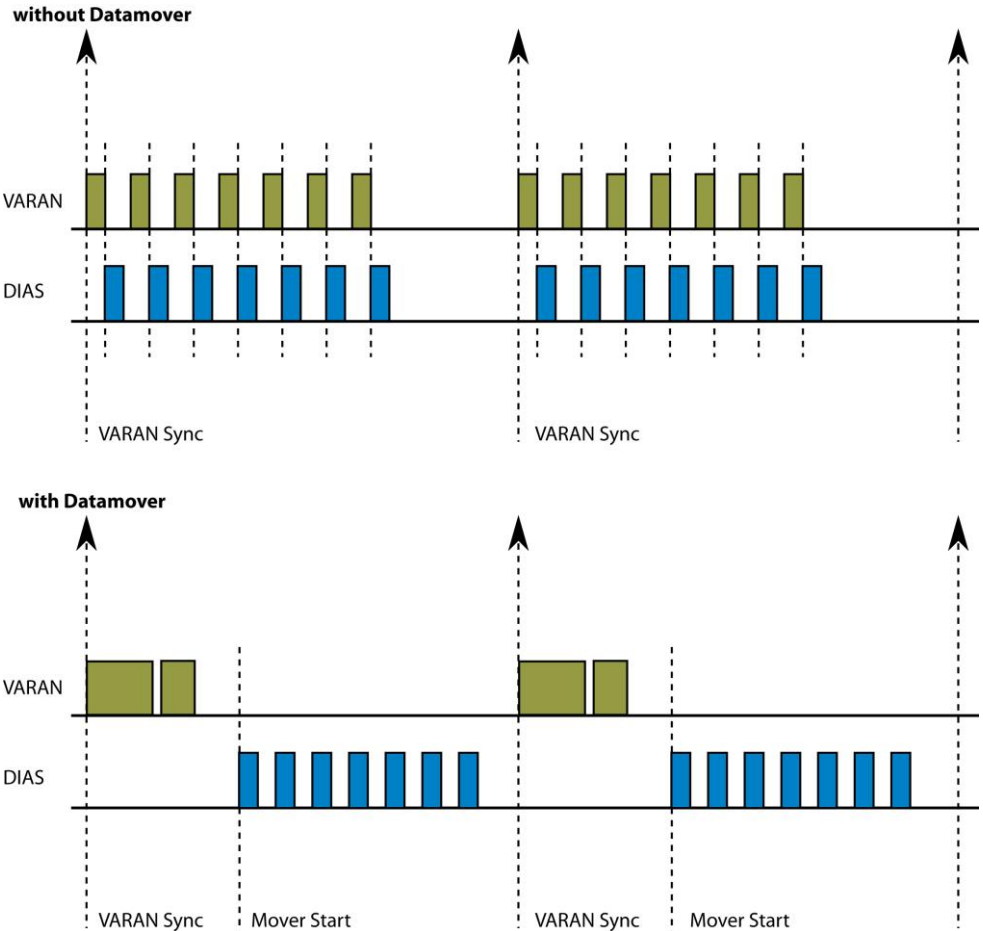
DIAS

The CIV 521 allows the connection of nearly all DIAS modules. Only DIAS modules that require the DIAS interrupt (e.g. communication modules), must be directly connected to the CPU.

C-DIAS

If the C-DIAS bus is operated with the CIV 521 without the Datamover, the I/O data of the module group is assumed immediately.

With the Datamover activated, the I/O data of the entire C-DIAS module group is collected by accessing VARAN. The Datamover starts the C-DIAS communication offset from VARAN bus. The burden on the VARAN bus is thereby reduced significantly.



VARAN Recommended Shielding

The VARAN real-time Ethernet bus system offers robust performance in harsh industrial environments. Through the use of IEEE 802.3 standard Ethernet physics, the potential between an Ethernet line and sending/receiving components is kept separate. The VARAN Manager resends messages to a bus participant immediately when an error occurs. It is principally recommended that the shielding guidelines below be followed.

For applications in which the bus line is run outside the control cabinet, correct shielding is required. This is especially important, if due to physical requirements, the bus lines must be placed next to sources of strong electromagnetic noise. It is recommended that whenever possible, to avoid wiring VARAN-Bus lines parallel to power cables.

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

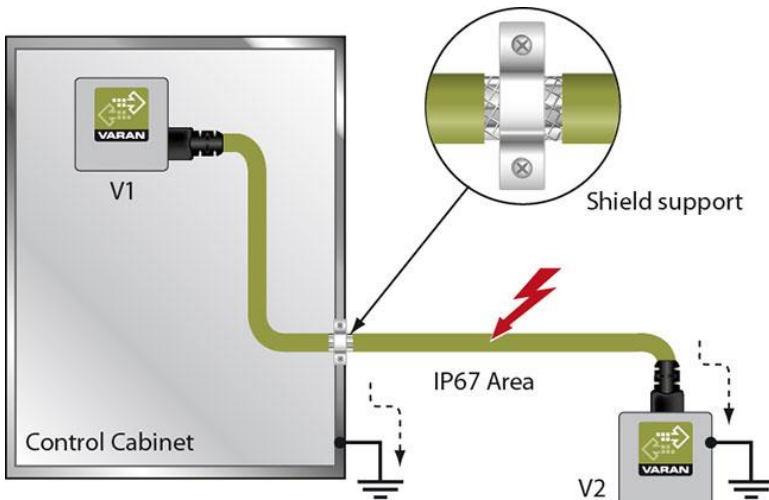
For the shielding variants, an S-FTP bus line is recommended, which is a symmetric, multi-wire cable with unshielded pairs. For the total shielding, a combination of foil and braiding is used; it is recommended that an unvarnished variant be used.

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)!

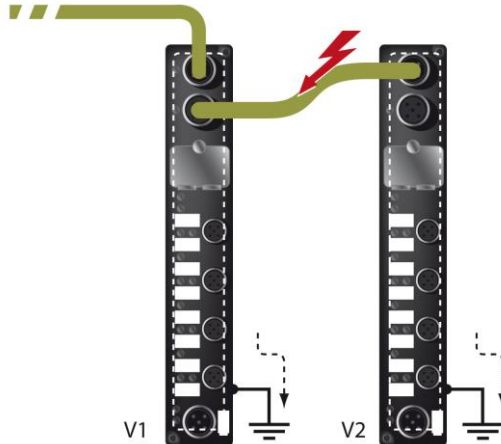
1. Wiring from the Control Cabinet to an External VARAN Component

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



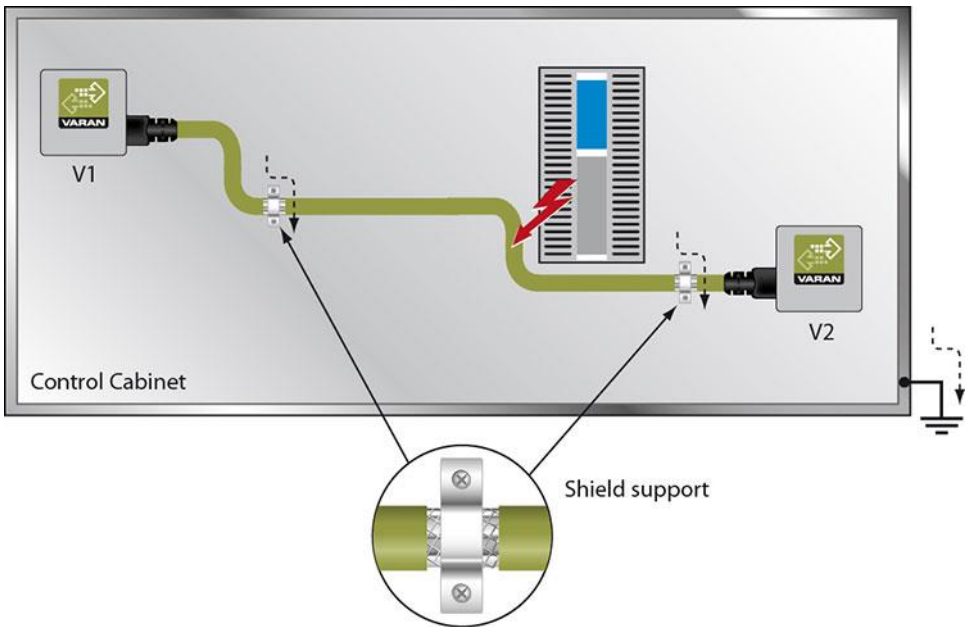
2. Wiring Outside of the Control Cabinet

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.



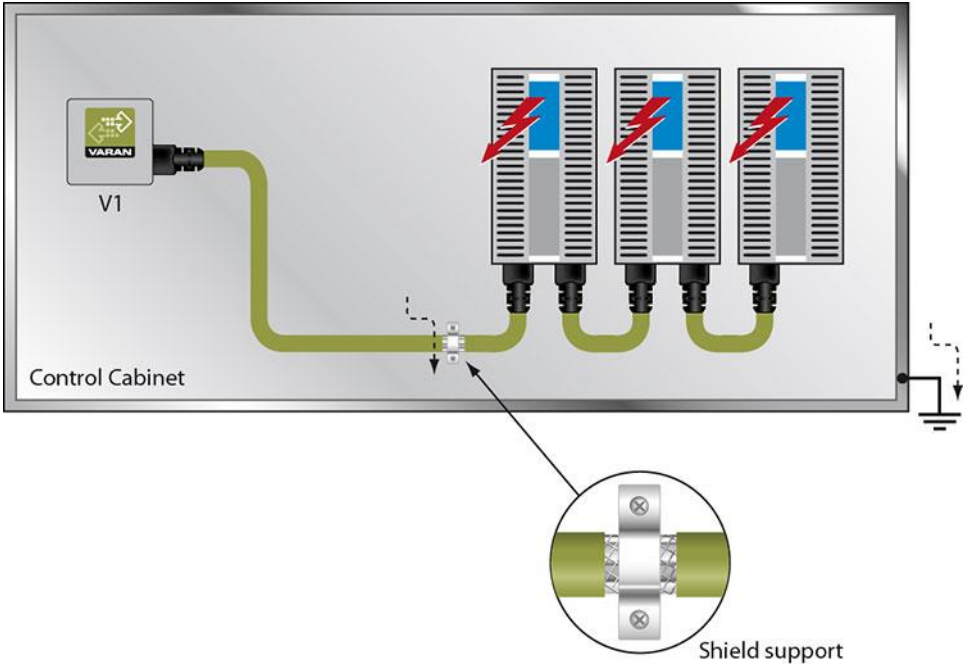
3. Shielding for Wiring Within the Control Cabinet

Sources of strong electromagnetic noise located within the control cabinet (drives, Transformers, etc.) can induce interference in a VARAN bus line. Spike voltages are deflected over the metallic housing of a RJ45 connector. Noise is conducted through the control cabinet housing without further action from the electronic components. To eliminate sources of noise during data transfer, it is recommended that the shielding from all electronic components be connected within the control cabinet.



4. Connecting Noise-Generating Components

With the connection of power components that generate strong electromagnetic noise, it is also critical to ensure correct shielding. The shielding should be placed before a power component (or a group thereof).



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 to both cabinets. Noise can thereby be kept from reaching the electronics within the control cabinet.

