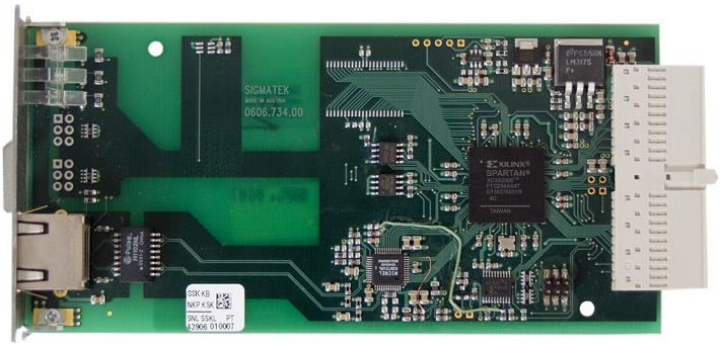
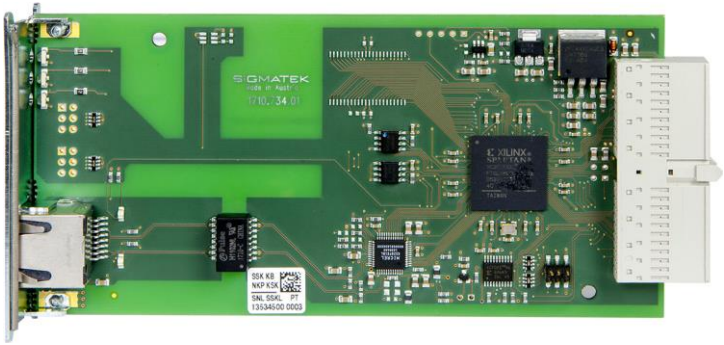
VARAN Baumüller Interface „b maXX 4000“ VBI 021

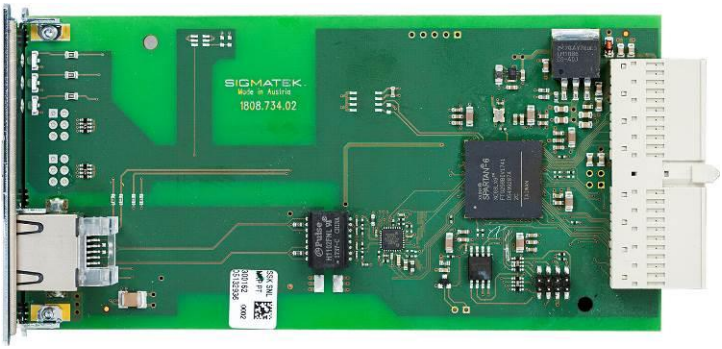
This interface serves as the communication interface between a servo amplifier (b maXX – 4000 Series) and a control over the VARAN bus.



HW1.00 to HW1.60



since HW2.00



since HW3.00

Technical Data

Performance characteristics

Internal Memory (until HW2.00)	Serial Flash (25P40)
Internal Memory (since HW3.00)	Serial Flash (W25Q80)
Interfacing	1 x VARAN-Bus (maximum length: 100 m) 1 x „BACI“-Bus
LEDs	1 x PLL sync. (green) 1 x DCOK (green) 1 x Error (red)

Electrical requirements

Supply voltage „BACI“	Typically +5 V DC (provided by converter)	
Current consumption of the voltage supply (until HW2.00)	Typically 300 mA	Maximum 400 mA
Current consumption of the voltage supply (since HW3.00)	Typically 170 mA	Maximum 400 mA

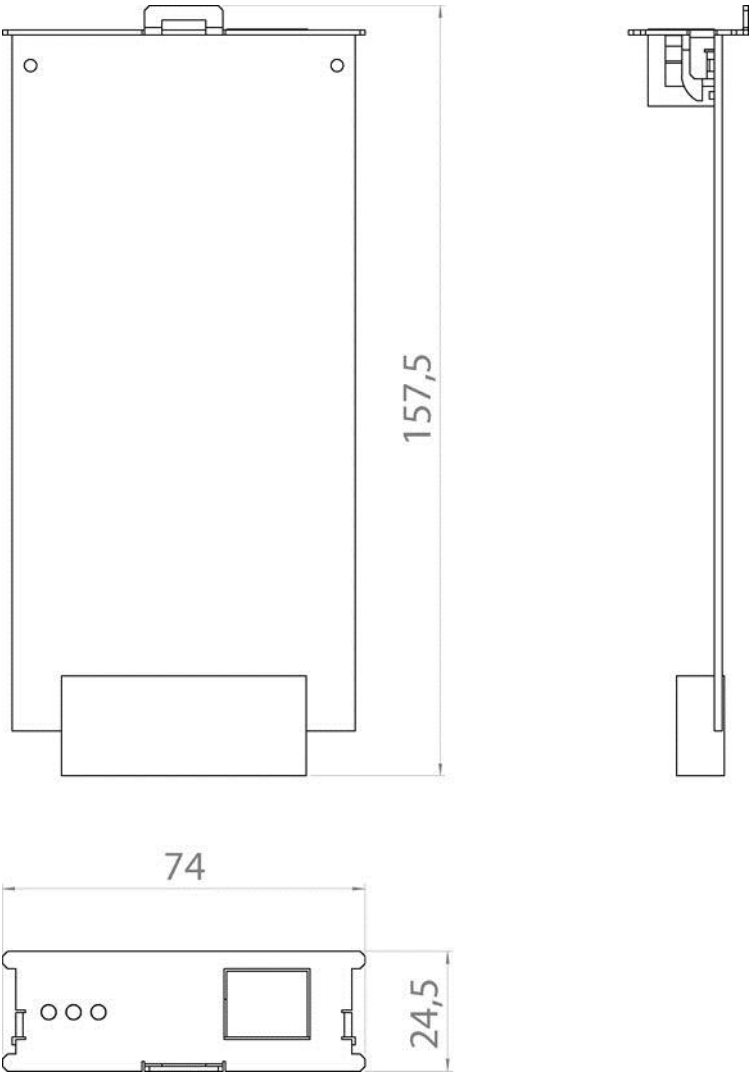
Miscellaneous

Article number	16-071-021
Hardware version	1.x-3.x

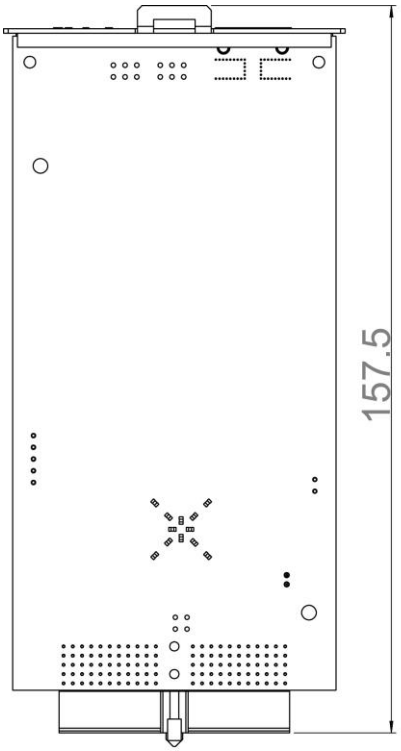
Environmental conditions

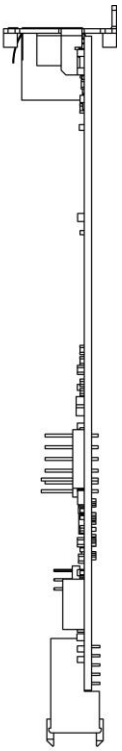
Storage temperature	-20 – +85 °C	
Environmental temperature	0 – +60 °C	
Humidity	0 – 95 %, uncondensed	
EMC resistance	in accordance with EN 61000-6-2 (industrial area)	
EMC noise generation	in accordance with EN 61000-6-4 (industrial area)	
Vibration resistance	EN 60068-2-6	3.5 mm from 5-8.4 Hz 1 g from 8.4-150 Hz
Shock resistance	EN 60068-2-27	150 m/s²
Protection type	EN 60529	IP00

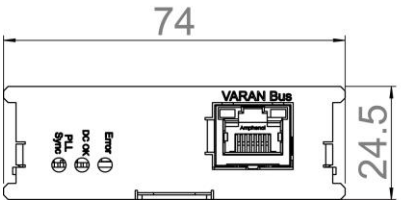
Mechanical Dimensions up to HW1.60



Mechanical Dimensions starting with HW2.00



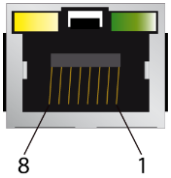




Connector Layout

1 x RJ45 connector for the electrical VARAN-Bus.

X1: VARAN Bus



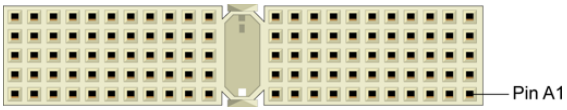
Pin	Assignment
1	TX/RX +
2	TX/RX -
3	RX/TX +
4	Not used
5	Not used
6	RX/TX -
7	Not used
8	Not used

LEDs	Assignment
Green	LINK
Yellow	ACTIVE

LED	Color	Description
ACTIVE	Yellow	Lighting when data is received through the VARAN bus.
LINK	Green	Lighting when the link between the two PHYs is established.

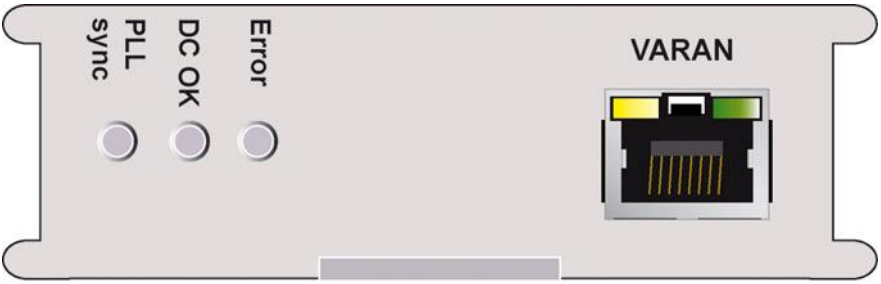
X2: „BACI“ Bus

The connection to the frequency converter is made over a 110-pin angled VG strip:



Pin	Function: Row A	Function: Row B	Function: Row C	Function: Row D	Function: Row E
1	+5 V	Not used	GND	Not used	+5 V
2	Not used	Not used	Not used	Not used	Not used
3	Not used	Not used	Not used	Not used	Not used
4	Not used	GND	Not used	GND	Not used
5	Not used	SYNC 1	RST	Not used	\PRST
6	GND	GND	Not used	GND	Not used
7	Not used	Not used	SYNC 0	Not used	GND
8	Not used	GND	Not used	GND	Not used
9	STPL_B	STPL_C	GND	Not used	Not used
10	CS_B	GND	CS_C	GND	STPL_A
11	+5 V	CFG_SPACE	GND	CS_A	+5 V
12	Not used	Not used	Not used	Not used	Not used
13	Not used	Not used	Not used	Not used	Not used
14	Not used	Not used	Not used	Not used	Not used
15	Not used	\TS	GND	\RDY	Not used
16	\TE	GND	CLK_A	GND	Not used
17	Not used	\PERR	GND	MASTER_A/B	Not used
18	PAR	GND	CLK_B	GND	C1_BE1
19	Not used	AD15	GND	C0_BE0	Not used
20	AD12	GND	AD13	GND	AD14
21	Not used	AD10	GND	AD11	Not used
22	AD07	GND	AD08	GND	AD09
23	Not used	AD05	GND	AD06	Not used
24	AD02	GND	AD03	GND	AD04
25	Not used	AD00	GND	AD01	Not used

Front view of module up to HW 1.60



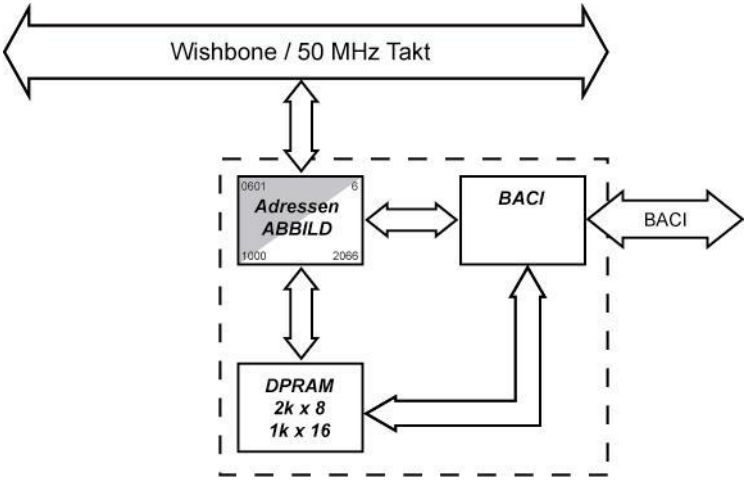
Front view of module starting with HW 2.00

LED	Color	Description
PLL sync	Green	Lights when the module is synchronized with the VARAN manager.
DC OK	Green	Lights when the module is powered by the drive.
Error	Red	Lights when the module is not synchronized with the VARAN manager.

Wishbone to BACI

The wishbone to BACI or VARAN to BACI interface is shown below. The component for the BACI interface is set though the DPRAM. An additional component for the address image is used to address the DPRAM and the configuration point of the BACI interface. The DPRAM for the wishbone interface consists of 2 kbit x 8 and each BACI interface consists of 1kbit x 16. The BACI configuration point is located in the BACI core. Due to the different clock ranges, access must be synchronized.

Block diagram



Address Image

Address (hex)	Size (Byte)	Access Type	Description	Reset Value
Memory				
0000	2048	r/w	DPRAM Memory access	-
0800	2	r16/w16	SlaveBoardState2	0000
0802	2	r16/w16	MasterBoardState2	0000
0804	2	r16/w16	SlaveBoardState1	0000
0806	2	r16/w16	MasterBoardState1	0000
0808	2	r16/w16	MasterCs_Actual2	0000
080A	2	r16/w16	MasterCs_Set2	0000
080C	2	r16/w16	MasterCs_Actual1	0000
080E	2	r16/w16	MasterCs_Set1	0000
0810	2	r16/w16	SyncTrigCfg	0000
0812	14	-	Reserved	
0820	1	w	Wishbone JTAG master interface JTAG master outputs Bit 0: JTAG TDI Bit 1: JTAG TMS Bit 7 .. 2: JTAG write enable pattern	g_jtag_en_pattern & 00
0820	1	r	Wishbone JTAG master interface JTAG master inputs Bit 0: JTAG TDO Bit 1: JTAG TMS Bit 7 .. 2: Expected JTAG write enable pattern	g_jtag_en_pattern & 00
0821	15	-	Reserved	

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.

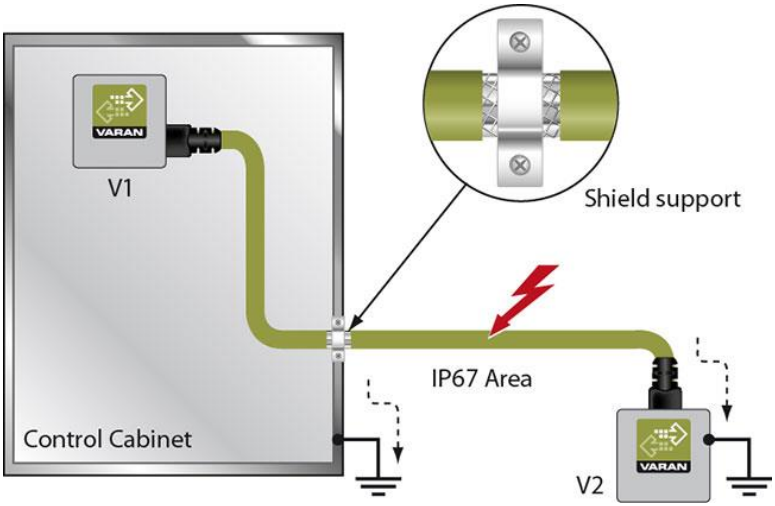
SIGMATEK recommends the use of **CAT5e** industrial Ethernet bus lines.

For the shielding variants, an S-FTP bus line is recommended, which is a symmetric, multiwire 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!

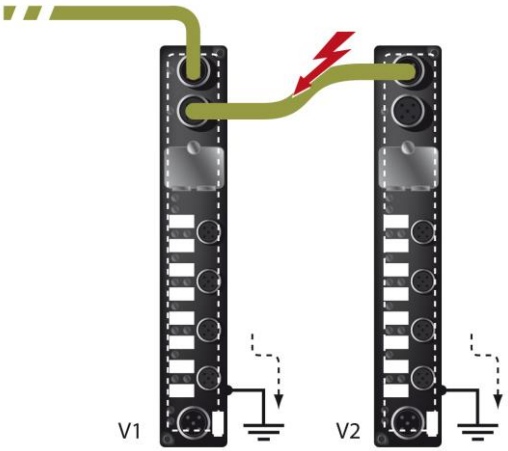
1. Wiring from the Control Cabinet to an External VARAN Component

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.



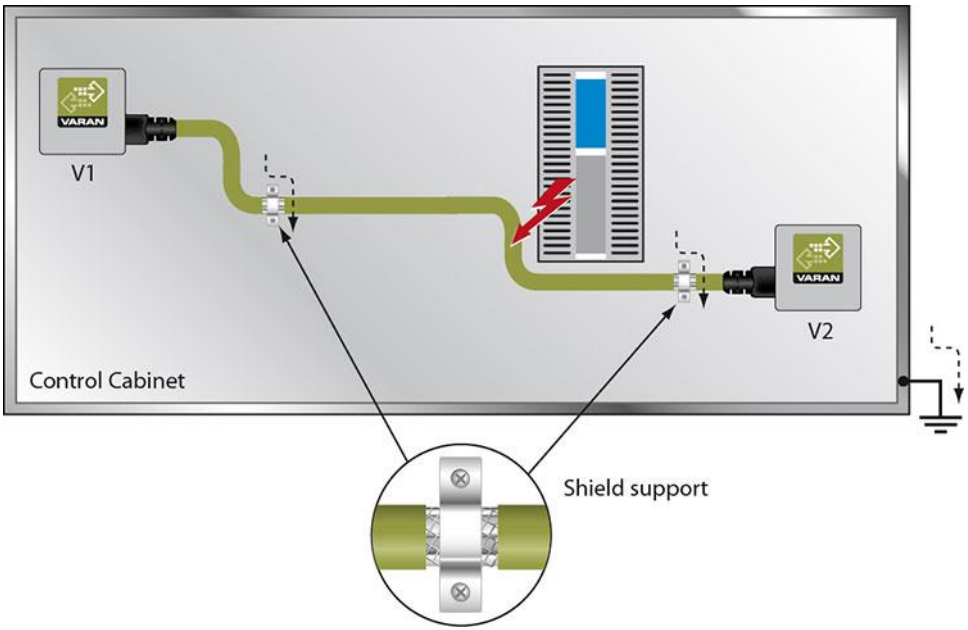
2. Wiring Outside of the Control Cabinet

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.



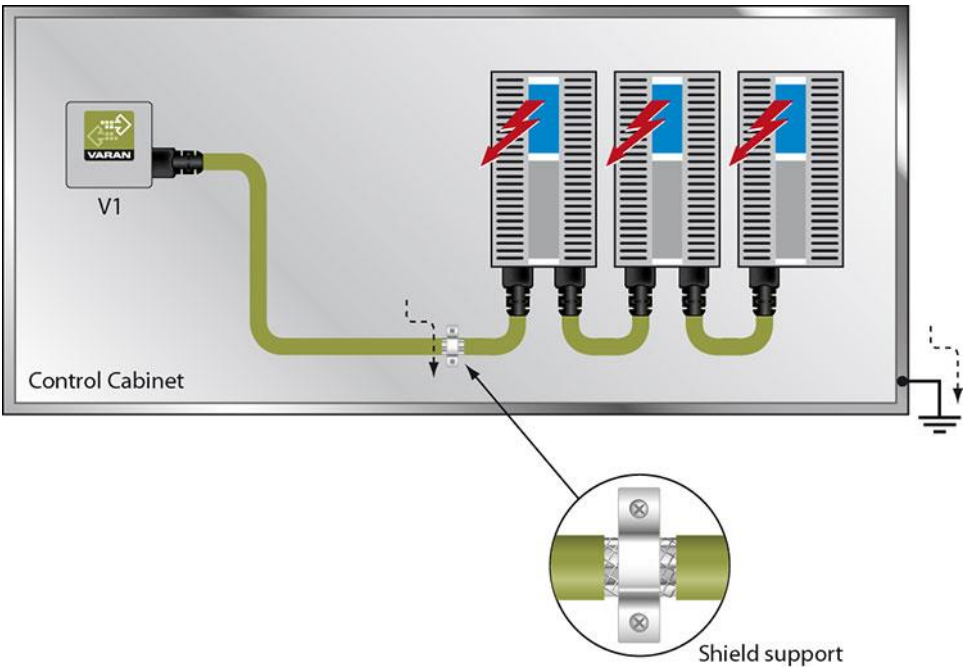
3. Shielding for Wiring Within the Control Cabinet

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.