SV 141

S-DIAS Splitter VARAN

Instruction Manual

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Translation of the Original Instructions

S-DIAS Splitter VARAN SV 141

with 1 VARAN In

4 VARAN Out

With its four VARAN Out ports, the VARAN SV 141 S-DIAS splitter module allows a VARAN bus system to be configured in a tree structure.

The SV 141 has the same form as S-DIAS, so that it can be mounted on a DIN rail with S-DIAS modules.

The VARAN Out ports have a +24 V supply for the VARAN bus, which can be switched via the software. With this supply, special VARAN peripheral devices can be connected to the SV 141 and supplied with +24 V without an additional power cable.

The VARAN Out ports have automatic Ethernet recognition. If one of the ports is connected to an Ethernet participant, it is automatically made an Ethernet port.

As soon as a VARAN Out port has changed to Ethernet, this function is blocked for all other VARAN Out ports.

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

To connect a simulation computer in real time, the SV 141 has an optional real-time Ethernet port.

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1 Introduction

1.1 Target Group/Purpose of this Operating Manual

This operating manual contains all information required for the operation of the product.

This operating manual is intended for:

- Project planners
- Technicians
- Commissioning engineers
- Machine operators
- Maintenance/test technicians

General knowledge of automation technology is required.

Further help and training information, as well as the appropriate accessories can be found on our website www.sigmatek-automation.com.

Our support team is happily available to answer your questions.
Please see our website for our hotline number and business hours.

1.2 Important Reference Documentation

This and additional documents can be downloaded from our website or obtained through support.

1.3 Contents of Delivery

1x SV 141

2 Basic Safety Directives

2.1 Symbols Used

The following symbols are used in the operator documentation for warning and danger messages, as well as informational notes:

DANGER

Danger indicates that death or serious injury **will occur**, if the specified measures are not taken.

⇨ To avoid death or serious injuries, observe all guidelines.

Danger indique une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

WARNING

Warning indicates that death or serious injury **can** occur, if the specified measures are not taken.

⇨ To avoid death or serious injuries, observe all guidelines.

Avertissement d'une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

CAUTION

Caution indicates that moderate to slight injury **can** occur, if the specified measures are not taken.

⇨ To avoid moderate to slight injuries, observe all guidelines.

Attention indique une situation dangereuse qui, faute de prendre les mesures adéquates, **peut** entraîner des blessures assez graves ou légères.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

INFORMATION

Information

⇨ Provides important information on the product, handling or relevant sections of the documentation, which require attention.

2.2 Disclaimer

INFORMATION

The contents of this operating manual were prepared with the greatest care. However, deviations cannot be ruled out. This operating manual is regularly checked and required corrections are included in the subsequent versions. The machine manufacturer is responsible for the proper assembly, as well as device configuration. The machine operator is responsible for safe handling, as well as proper operation.

The current operating manual can be found on our website. If necessary, contact our support.

Subject to technical changes, which improve the performance of the devices. The following operating manual is purely a product description. It does not guarantee properties under the warranty.

Please thoroughly read the corresponding documents and this operating manual before handling a product.

SIGMATEK GmbH & Co KG is not liable for damages caused through, non-compliance with these instructions or applicable regulations.

2.3 General Safety Directives

The Safety Directives in the other sections of this operating manual must be observed. These instructions are visually emphasized by symbols.

INFORMATION

According to EU Directives, the operating manual is a component of a product.

This operating manual must therefore be accessible in the vicinity of the machine since it contains important instructions.

This operating manual should be included in the sale, rental or transfer of the product, or its online availability indicated.

Regarding the requirements for Safety and health connected to the use of machines, the manufacturer must perform a risk assessment in accordance with machine directives 2006/42/EG before introducing a machine to the market.

Operate the unit with devices and accessories approved by SIGMATEK only.

CAUTION

Handle the device with care and do not drop or let fall.

Prevent foreign bodies and fluids from entering the device.

The device must not be opened!

Manipulez l'appareil avec précaution et ne le laissez pas tomber.

Empêchez les corps étrangers et les liquides de pénétrer dans l'appareil.

L'appareil ne doit pas être ouvert!

If the device does not function as intended or has damage that could pose a danger, it must be replaced!

En cas de fonctionnement non conforme ou de dommages pouvant entraîner des risques, l'appareil doit être remplacé!

The module complies with EN 61131-2.

In combination with a facility, the system integrator must comply with EN 60204-1 standards.

For your own safety and that of others, compliance with the environmental conditions is essential.

Le module est conforme à la norme EN 61131-2.

En combinaison avec une équipement, l'intégrateur de système doit respecter la norme EN 60204-1.

Pour votre propre sécurité et celle des autres, le respect des conditions environnementales est essential.

2.4 Software/Training

The application is created with the software LASAL CLASS 2 and LASAL SCREEN Editor.

Training for the LASAL development environment, with which the product can be configured, is provided. Information on our training schedule can be found on our website.

3 Standards and Directives

3.1 Directives

The product was constructed in compliance with the following European Union directives and tested for conformity.

3.1.1 EU Conformity Declaration

EU Declaration of Conformity

The product SV 141 conforms to the following European directives:

- **2014/35/EU** Low-voltage Directive
- **2014/30/EU** Electromagnetic Compatibility (EMC Directive)
- **2011/65/EU** “Restricted use of certain hazardous substances in electrical and electronic equipment” (RoHS Directive)

The EU Conformity Declarations are provided on the SIGMATEK website. See Products/Downloads or use the search function and the keyword “EU Declaration of Conformity”.

4 Type Plate

Exemplary nameplate (symbol image)

HW: Hardware version
SW: Software version

5 Technical Data

5.1 Performance Data

Interfaces	1x VARAN In (RJ45) 4x VARAN Out (RJ45), +24 V switchable over VARAN, 500 mA per port (of which 1x Ethernet (Vte) or real-time Ethernet optional) (maximum cable length: 100 m)

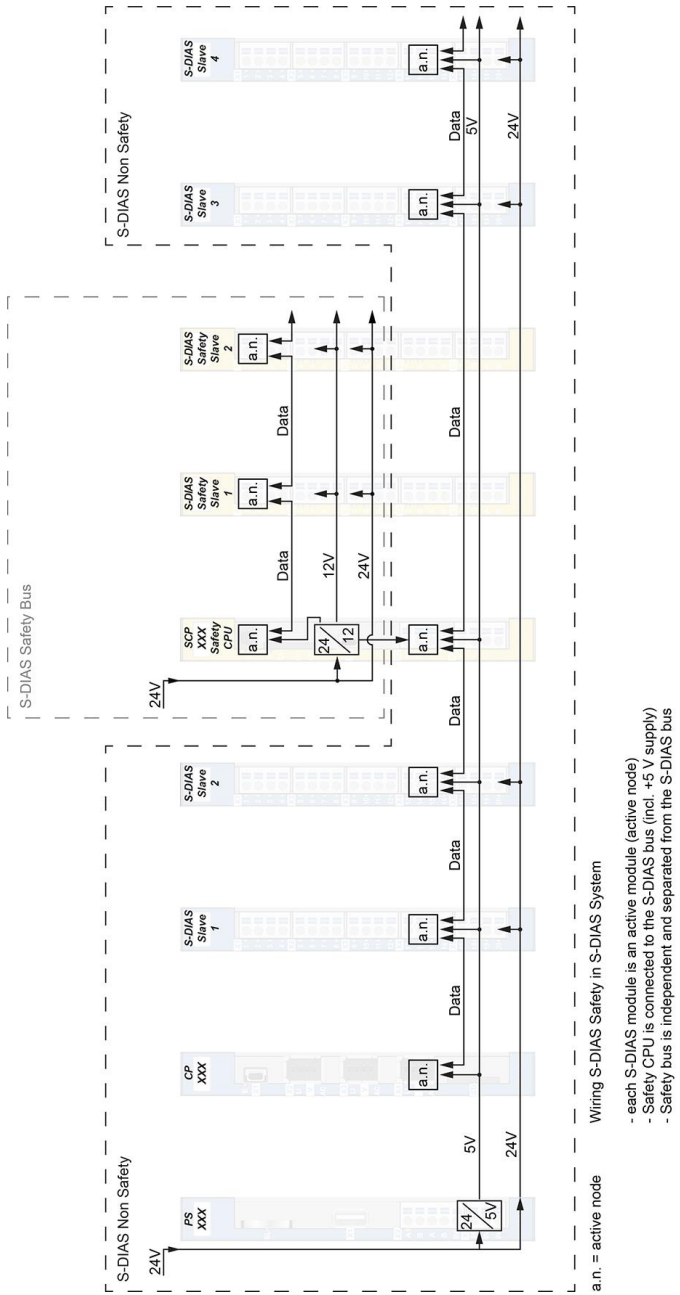
5.2 Electrical Requirements

Supply voltage	+18-30 V DC UL: Class 2 or LVLC(1)
Current consumption of +24 V power supply	typically 0.25 A internal electronics supply VARAN Out port load (maximum 2 A)

(1) Limited Voltage/Limited Current

INFORMATION

(1) Device shall be supplied by a secondary isolated source rated 24 V DC. Fuse in accordance with UL 249, rated max. 4 A shall be provided between the supply and device terminal.


S-DIAS Non Safety
S-DIAS Safety Bus
S-DIAS Non Safety
24V
PS XXX
CP XXX
S-DIAS Slave 1
S-DIAS Slave 2
SCP XXX Safety CPU
S-DIAS Safety Slave 1
S-DIAS Safety Slave 2
S-DIAS Slave 3
S-DIAS Slave 4
a.n.
Data
5V
12V
24V
24/5V
24/12
a.n. = active node
Wiring S-DIAS Safety in S-DIAS System
- each S-DIAS module is an active module (active node)
- Safety CPU is connected to the S-DIAS bus (incl. +5 V supply)
- Safety bus is independent and separated from the S-DIAS bus

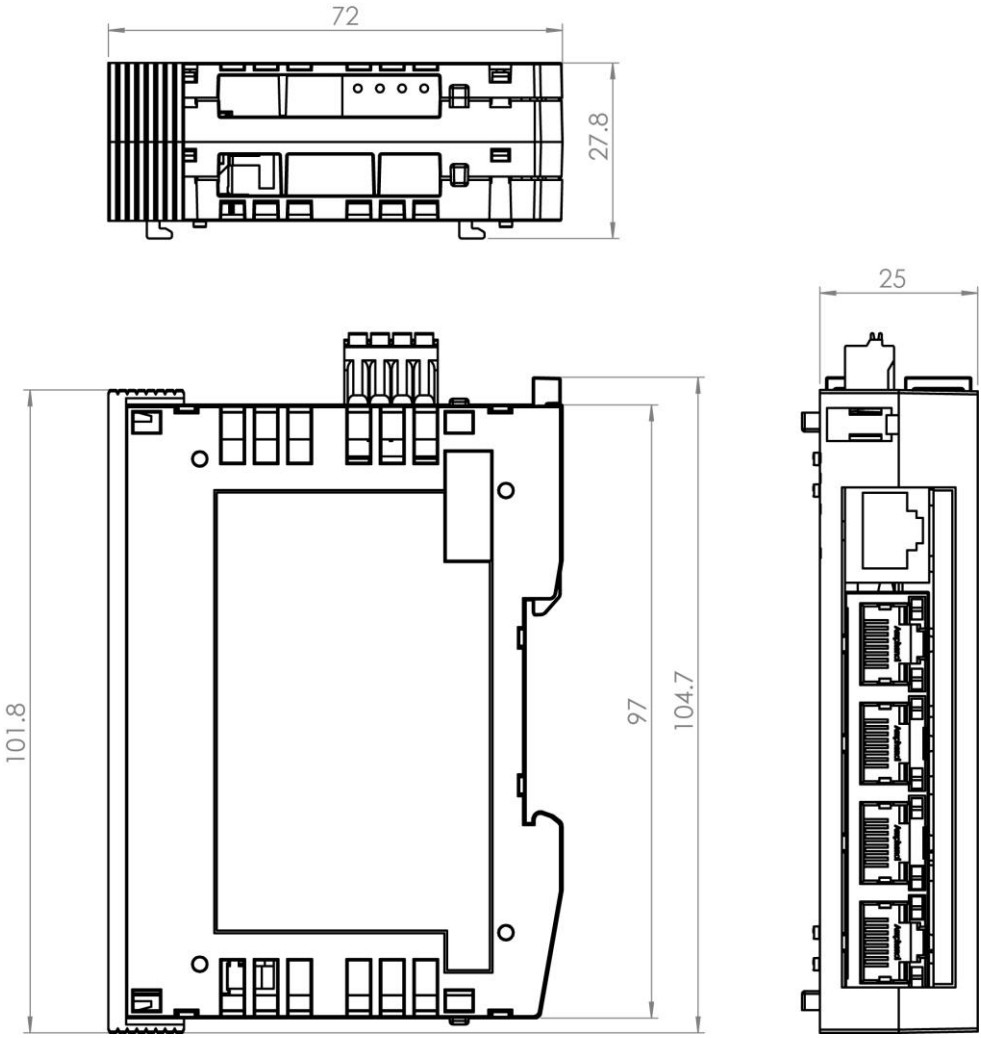
5.3 Miscellaneous

Article number	20-023-141
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE, UKCA

5.4 Environmental Conditions

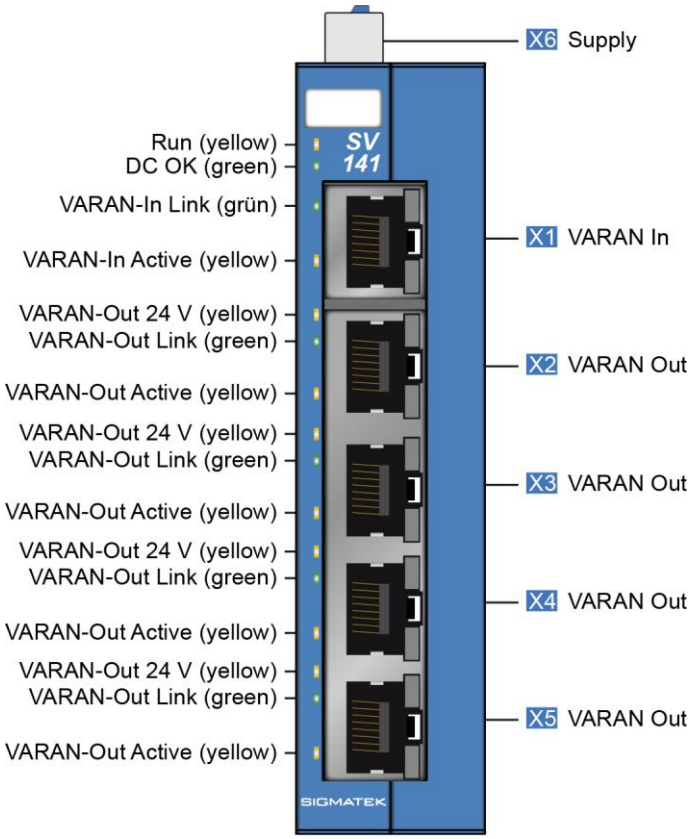
Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +50 °C	
Humidity	0-95 %, non-condensing	
Installation altitude above sea level	0-2000 m without derating > 2000 m up to a maximum of 5000 m with derating of the maximum environmental temperature by 0.5 °C per 100 m	
Operating conditions	pollution degree 2	
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 1g from 8.4-150 Hz
Shock resistance	EN 60068-2-27	15 g
Protection type	EN 60529	IP20

6 Mechanical Dimensions



7 Connector Layout

7.1 Front View

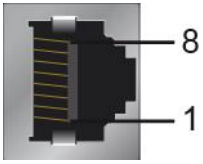


7.1.1 Status LEDs

RUN	yellow	LIGHTS	VARAN PLL locked
DC OK	green	LIGHTS	Module is supplied with a voltage > 18 V
VARAN In Link	green	LIGHTS	Connection between both PHYs made
		BLINKS	VARAN In of the primary client has no link
VARAN In Active	yellow	LIGHTS	Data is exchanged over the VARAN bus
VARAN Out Link	green	LIGHTS	Connection between both PHYs made
		BLINKS	There is no connection between VARAN In and the primary client.
VARAN Out Active	yellow	LIGHTS	Data is exchanged over the VARAN bus
VARAN Out 24 V	yellow	LIGHTS	24 V supply to VARAN Out port is on

7.1.2 Connectors

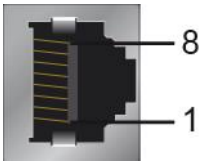
X1: VARAN In
8-pin RJ45



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

n.c. = do not use

X2-X5: VARAN Out
8-pin RJ45



Pin	Function
1	TX+/RX+
2	TX-/RX-
3	RX+/TX+
4	+24 V out
5	+24 V out
6	RX-/TX-
7	GND
8	GND

INFORMATION

24 V / 500 mA per VARAN-Out port (switchable)

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

7.1.3 VARAN Wiring Guidelines

Since the components are supplied with power through VARAN, the maximum cable length (without new 24 V supply is highly dependent on the cross section of the VARAN cable and the number of connected modules.

INFORMATION

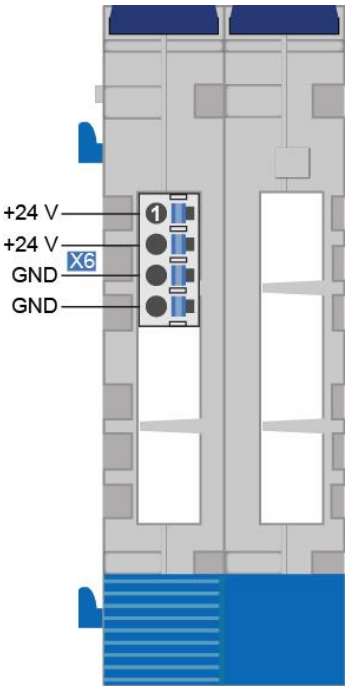
The voltage can be supplied (switchable via the software) to the following modules over the RJ45 connector of the VARAN Out port.

This does NOT comply with the VARAN specification.

The supply voltage of the VARAN Out port to the SV 141 can only then be turned on when the respective port is connected to a VARAN module that is suited of a 24 V supply (e.g.: PVDM 08x, PVAI 011, VEB 02x,...).

VARAN modules, which are not suitable for the supply over VARAN, can be damaged when connected to modules with an active power supply.

7.2 Top View



INFORMATION

The connections of the +24 V supply (X6: Pin 1 and Pin 2) or the GND supply (X6: Pin 3 and Pin 4) are internally bridged. To supply the module, only one +24 V pin (pin 1 or pin 2) and one GND pin (pin 3 or pin 4) must be connected. The bridged connections may be used to loop the +24 V supply and the GND supply. However, it must be ensured that the total current of 4 A per connection is not exceeded by the looping on!

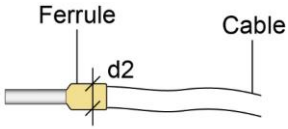
7.3 Applicable Connectors

Connectors:
X6: Connectors with spring terminals (included in delivery)
The spring terminals are suitable connecting ultrasonically compacted (ultrasonically welded) strands.

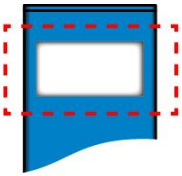
Connections:

Stripping length/Sleeve length:	10 mm
Mating direction:	parallel to the lead axis or circuit board
conductor cross section rigid:	0.2-1.5 mm^2
Conductor cross section flexible:	0.2-1.5 mm^2
Conductor cross section ultrasonically compacted:	0.2-1.5 mm^2
Conductor cross section AWG/kcmil:	24-16
Conductor cross section flexible with ferrule without plastic sleeve:	0.25-1.5 mm^2
Conductor cross section flexible with ferrule with plastic sleeve:	0.25-0.75 mm^2 (reason for reduction d2 of the ferrule)

d2 = max. 2.8 mm



7.4 Label Field



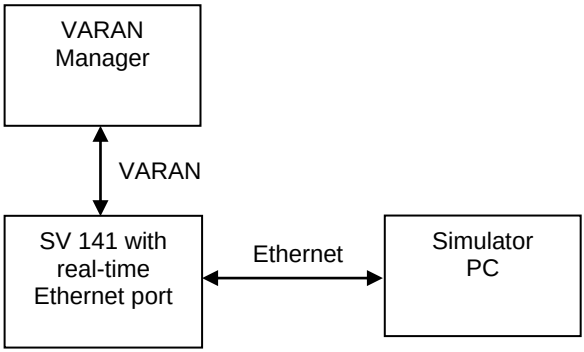
Manufacturer	Weidmüller
Type	MF 10/5 CABUR MC NE WS
Weidmüller article number	1854510000
Compatible printer	Weidmüller
Type	Printjet Advanced 230V
Weidmüller article number	1324380000

7.5 Real-time Ethernet

To connect a simulation computer in real time, the SV 141 has an optional real-time Ethernet port.

The applicable real-time Ethernet port is defined through the HW class (VARAN Out Port 1-4).

The simulation computer is connected directly to the port defined in the HW class. With an active application, the real-time simulation data can now be exchanged between the simulation computer and the CPU via the VARAN bus. To avoid disruptions by the network participants, the simulation computer and VSV 141 must be connected directly.



INFORMATION

As soon as the real-time Ethernet port is activated by the HW class, the normal Ethernet port (VtE) is no longer available in the SV 141.

8 Assembly/Installation

8.1 Check Contents of Delivery

Ensure that the contents of the delivery are complete and intact. See chapter 1.3 Contents of Delivery.

INFORMATION

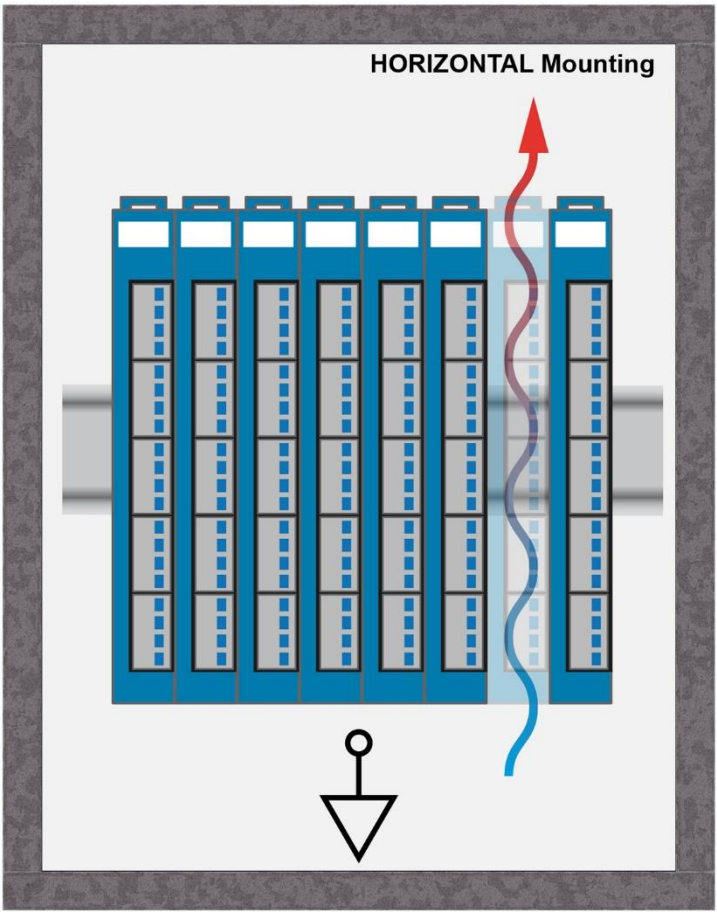
On receipt and before initial use, check the device for damage. If the device is damaged, contact our customer service and do not install the device in your system.

Damaged components can disrupt or damage the system.

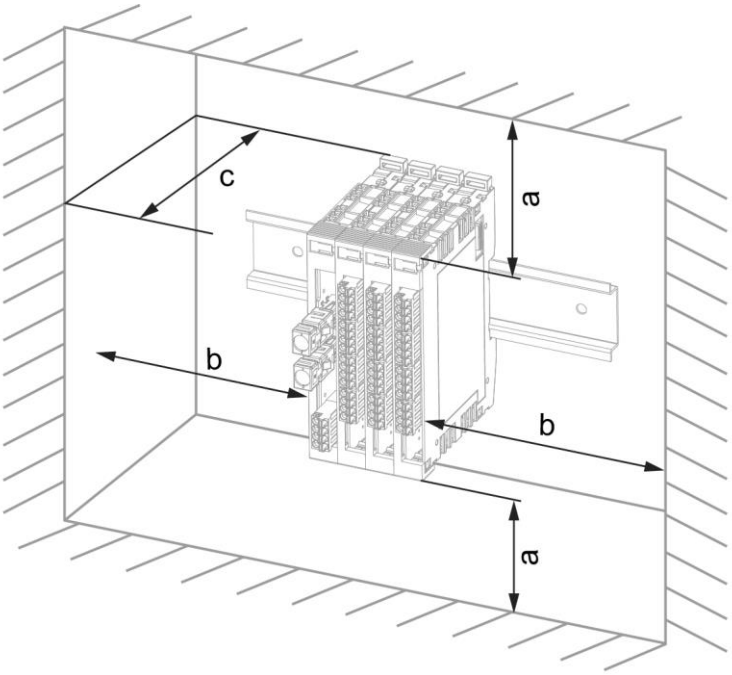
8.2 Mounting

8.2.1 Thermal Requirements

The S-DIAS modules are designed for installation into the control cabinet. To mount the modules a DIN-rail is required. The DIN rail must establish a conductive connection with the back wall of the control cabinet. The individual S-DIAS modules are mounted on the DIN rail as a block and secured with latches. The functional ground connection from the module to the DIN rail is made via the grounding clamp on the back of the S-DIAS modules. The modules must be mounted horizontally (module label up) with sufficient clearance between the ventilation slots of the S-DIAS module blocks and nearby components and/or the control cabinet wall. This is necessary for optimal cooling and air circulation, so that proper function up to the maximum operating temperature is ensured.



Recommended minimum distances of the S-DIAS modules to the surrounding components or control cabinet wall:



a	b	c
30 mm (1.18″)	**30 mm** (1.18″)	**100 mm** (3.94″)

a, b, c … distances in mm (inches)

8.3 S-DIAS Assembly

The SV 141 has no S-DIAS functions and does not extend the S-DIAS bus.

INFORMATION

The SV 141 must be mounted at the beginning or end of an SDIAS module block, so the

S-DIAS bus of the module block is not interrupted.

9 Transport/Storage

INFORMATION

This device contains sensitive electronics. During transport and storage, high mechanical stress must therefore be avoided.

For storage and transport, the same values for humidity and vibration as for operation must be maintained!

Temperature and humidity fluctuations may occur during transport. Ensure that no moisture condenses in or on the device, by allowing the device to acclimate to the room temperature while turned off.

When sent, the device should be transported in the original packaging if possible. Otherwise, packaging should be selected that sufficiently protects the product from external mechanical influences. Such as cardboard filled with air cushioning.

10 Storage

INFORMATION

When not in use, store the operating panel according to the storage conditions. See chapter 9.

During storage, ensure that all protective covers (if available) are placed correctly, so that no contamination, foreign bodies or fluids enter the device.

11 Maintenance

INFORMATION

During maintenance as well as servicing, observe the safety instructions from chapter 2 Basic Safety Directives.

11.1 Service

This product was constructed for low-maintenance operation.

11.2 Repair

INFORMATION

In the event of a defect/repair, send the device with a detailed error description to the address listed at the beginning of this document.

For transport conditions, see chapter 9 Transport/Storage.

12 Disposal

INFORMATION

Should you need to dispose of the device, the national regulations for disposal must be followed.

The device appliance must not be disposed of as household waste.

13 Recommended Shielding for VARAN

The VARAN real-time Ethernet bus system exhibits a very robust quality in harsh industrial environments. Through the use of IEEE 802.3 standard Ethernet physics, the potentials between an Ethernet line and sending/receiving components are separated. In the event of an error, the VARAN Manager resends messages to a bus participant immediately. The shielding described below is mainly recommended.

For applications in which the bus is operated outside the control cabinet, the correct shielding is required. This is especially important, if due to physical requirements, the bus cables must be placed next to sources of strong electromagnetic noise. 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.

An S-FTP cable should be used for the shielding.

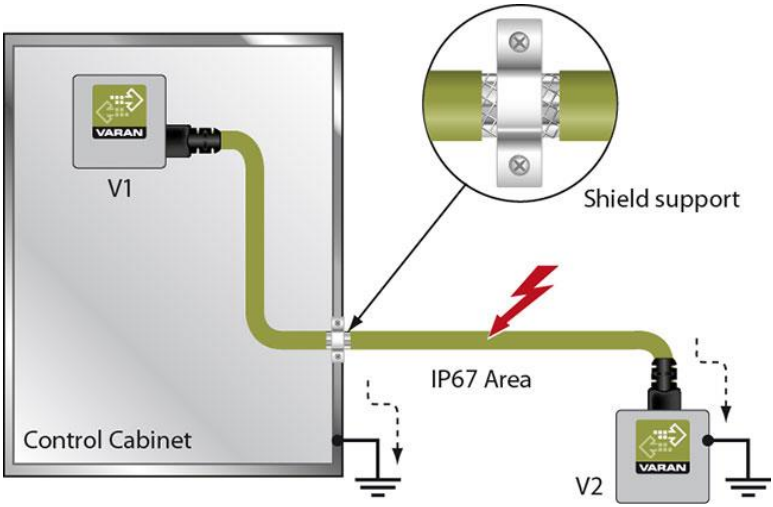
An S-FTP bus is a symmetric, multi-wire cable with unshielded pairs. For the entire shielding, a combination of foil and braiding is used. A non-laminated variant is recommended.

INFORMATION

The VARAN cable must be secured at a maximum distance of 20 cm from the connector to protect against vibration!

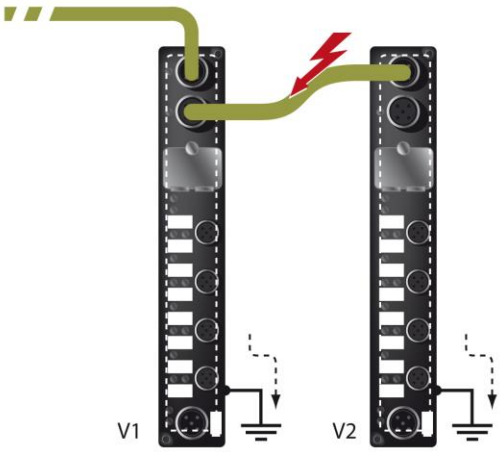
13.1 Wiring from the Control Cabinet to an External VARAN component

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 deflected from the electronic components before reaching the module.



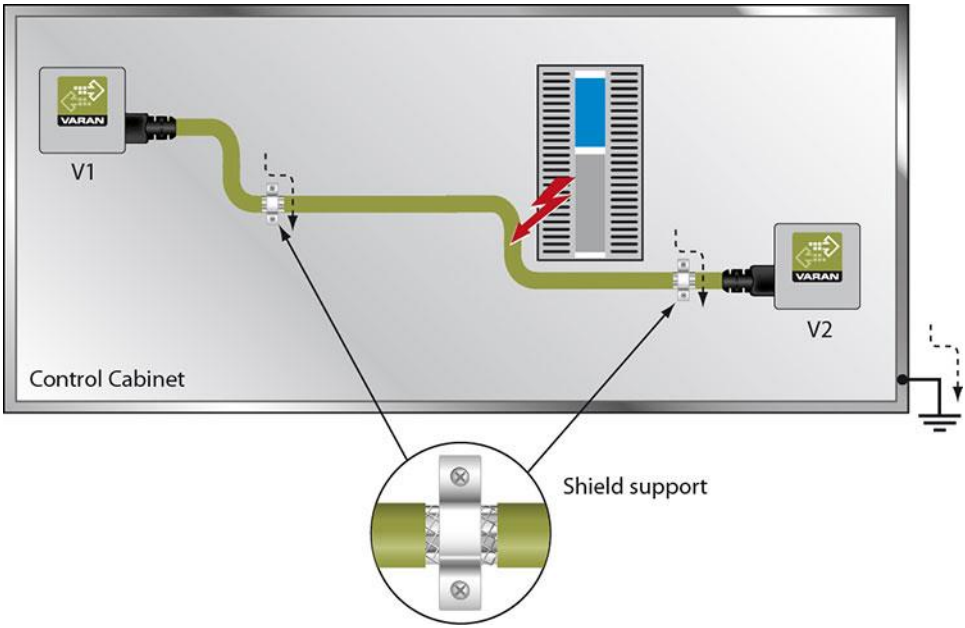
13.2 Wiring Outside of the Control Cabinet

If a VARAN bus line must be connected outside of the control cabinet only, no additional shield support is required. A requirement therefore, is that only IP67 modules and connectors can be used outside the control cabinet. 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.



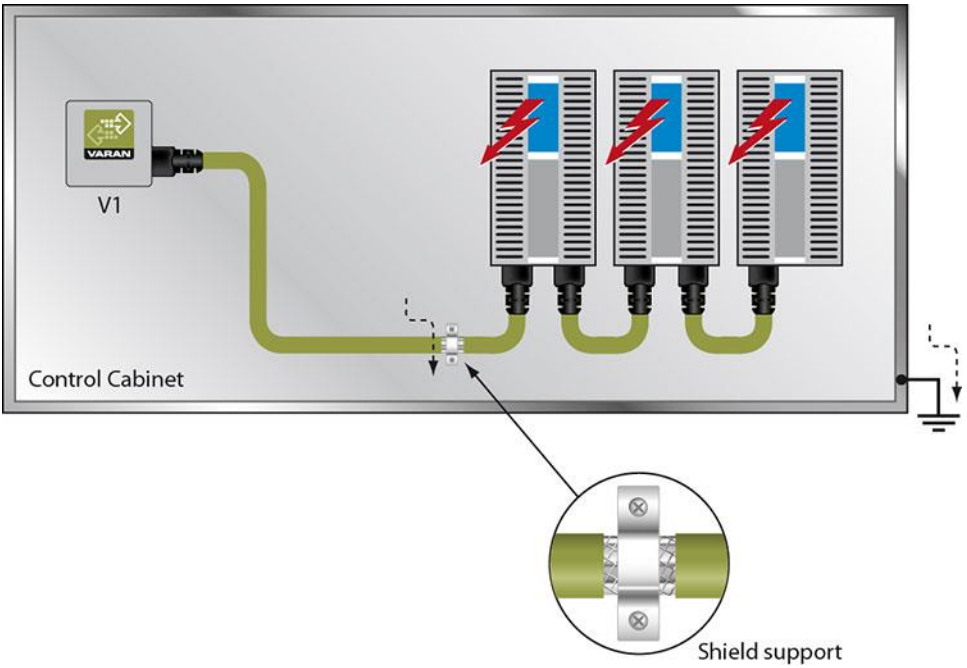
13.3 Shielding for Wiring Within the Control Cabinet

Sources of strong electromagnetic noise located within the control cabinet (drives, Transformers, etc.) can induce interference in a VARAN bus line. Spike voltages are dissipated 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 for all electronic components be connected within the control cabinet.



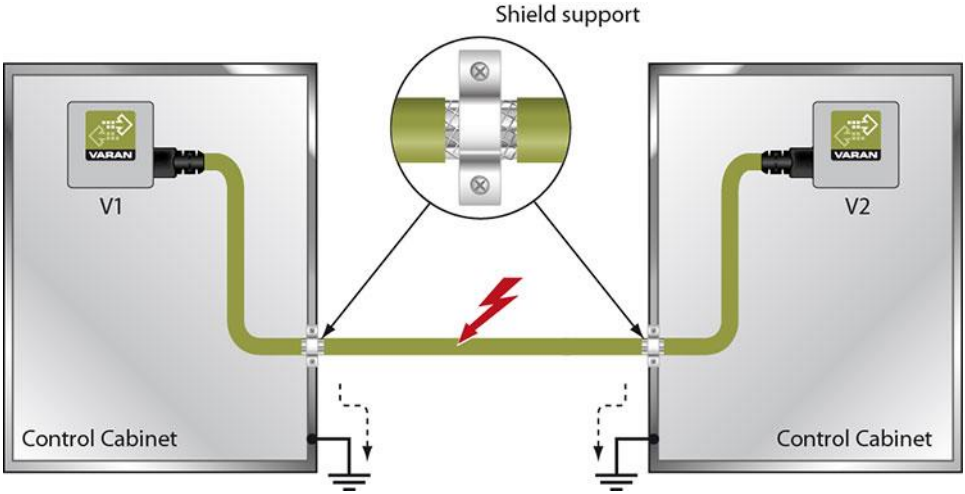
13.4 Connecting Noise Generating Components

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



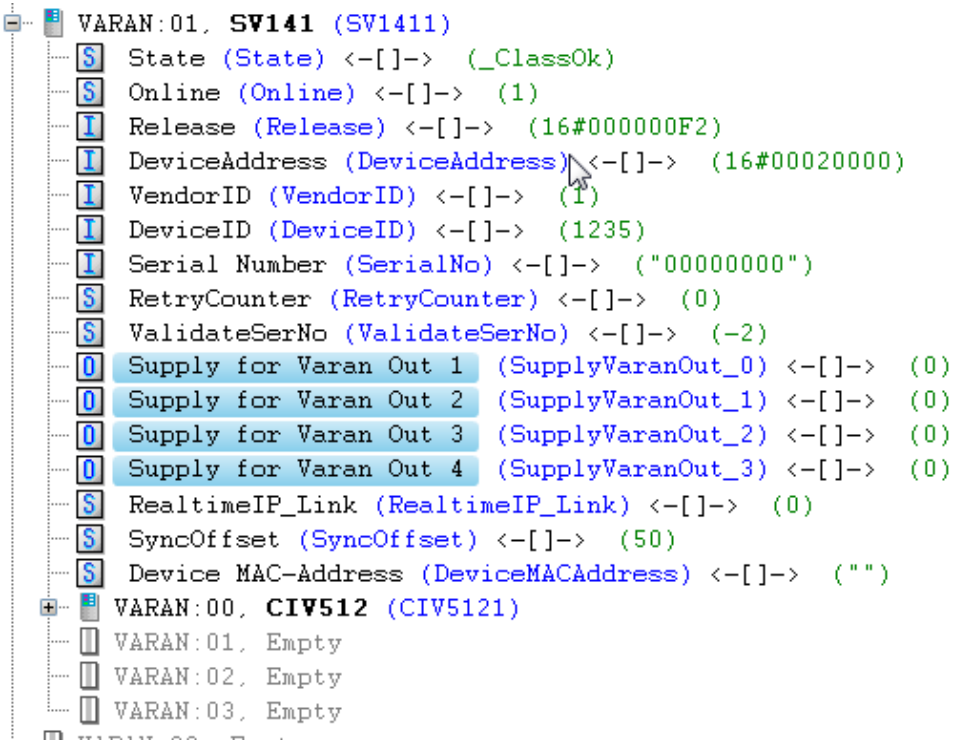
13.5 Shielding Between Two Control Cabinets

If two control cabinets must be connected over a VARAN bus, it is recommended that the shielding be located at the entry points of both cabinets. Noise can be thereby prevented from reaching the electronics within the control cabinet.



14 Hardware Class SV141

Hardware Class SV141 for the 4-Port VARAN splitter module



This hardware class is used for controlling the SV141 VARAN splitter hardware module. More information regarding the hardware can be found in the hardware documentation.

With this hardware class also the splitter module SV 142 can be controlled.

14.1 Interfaces

14.1.1 Clients

VaranIn	This client must be connected to a VARAN port; a "„VaranOut_[x]" server.
Required	This client is active by default, which means that the VARAN hardware modules at this position is mandatory for the system and can under no circumstances be missing, disconnected or return an error. Otherwise, the entire hardware deactivated. If the hardware module is missing, and error is returned. This triggers a "VaranError", which the application can suppress with help from the "UserAction" client. In any case, the hardware is deactivated. If his client is initialized with 0, the hardware module located in this position is not mandatory. This means that it can be inserted or removed at any time. However, which components identified as "not required" should be selected with regard to the safety of the system.
UserAction	This client is optional and must not be connected. For more information refer to General Documentation to the VARAN Library.
SerNoValidation	This client activates the validation of the serial number of a module 0 serial number of the module is not checked 1 serial number of the module must be confirmed (validated) The serial number is confirmed for a connected module by writing to the "ValidateSerNo" server.
Transparent	With this client, the module can be switched transparently. The transparent mode is described in the chapter "Transparent Mode". 0 The transparent mode is inactive 1 The transparent mode is active The module is not used in the "VARAN tree".
RealtimeIP_Mode	0 No RealtimeIP function 1 Data transfer over Sync + Offset (Server SyncOffset) 2 Transfer with last byte written As initial value!
RealtimeIP_PortNr	Defines which VaranOut is used as the RealtimeIP port; -1 Function deactivated 0-4 Port selection As initial value!
DontCheckRxDestMAC	0 Only packets with the MAC address of the VSV are accepted 1 All incoming packets are accepted As initial value!

14.1.2 Servers

State	This server shows the actual status of the hardware class. For a detailed description, see Status of VARAN Hardware Classes
Online	This server is set as soon as the hardware class is processed properly (when the data are valid, drives synchronized,..) The server is reset when an error occurs or when disconnected.
Release	The actual FPGA version of the connected hardware module is shown in this server.
DeviceAddress	The actual device address of the connected hardware module is shown in this server.
VendorID	The vendor ID of the hardware module is shown in this server.
DeviceID	The device ID of the hardware module is shown in this server.
SerialNo	The serial number of the hardware module is shown in this server.
RetryCounter	On this server, all retries of active VARAN data objects that affect this module are displayed. If, for example, packets are repeated on the VARAN bus due to malfunctions, this counter increases. If the system runs without transmission errors on the VARAN bus, this value remains unchanged. When modules are disconnected from the VARAN bus, retries do not necessarily have to occur. This depends on whether communication was active for the respective module (active data objects).
ValidateSerNo	If serial number validation is enabled (SerNoValidation = 1), the serial number of the connected module is confirmed by writing 1 to this server. The server also shows the status of the serial number validation: -2: serial number test disabled -1: no serial number defined for this position 0: serial number of the connected module does not match the stored number 1: serial number matches the stored number
ProtocolVersion	The VARAN protocol version of the hardware module is displayed on this server. Format xx.y.z e.g. 16#0130 means v01.3.0 If this server is 16#0, then reading the VARAN protocol version is not supported by the operating system interface.
SupplyVaranOut_[0..4]	With this server, the power supply for the individual ports can be activated/deactivated by initializing a server with 0 or 1, or entering 0 or 1 in the server during the runtime.
RealtimeIP_Link	Shows whether a device is connected to the RealtimeIP interface 1: Real-time Ethernet is connected 0: Real-time Ethernet is not connected
SyncOffset	Indicates at which time point in the VARAN cycle that real-time data is sent.
DeviceMACAddress	The String server shows VSV MAC address specified in the SPI Flash.
VaranOut_[0..4]	The VARAN hardware classes are connected to the "VaranIn" client with this server. Each port can only have one client connected.

14.2 Global Methods

The global methods are used to operate the real-time Ethernet interface

SetSendData Method for cyclically changing the send data.

▶ p_Data	^VOID Pointer to the data	READY:	Function successfully executed
▶ ui_length	UINT Data length	ERROR:	No data pointer, no length or length too large
◀ ret_code	iprStates		

ConfigReceiveData Configuration methods for receive data
Only 6 Init-cycles can be called!

▶ p_ReceiveFunction	^VOID Pointer to a receive method corresponding to the prototype of the DataReceivedDummy method	READY:	Function successfully executed
▶ p_this	^VOID This-pointer for the receive method call	ERROR:	Invalid method pointer of invalid This-pointer
▶ p_FilterMacAddress	^t_MacAddr Pointer to the MAC address for the receive filter		
▶ ret_code	iprStates	ERROR_BUSY:	Function was called after the 6th Init cycle

ConfigSendData Configuration methods for send data
Only 6 Init-cycles can be called!

▶ ui_MaxLength	UINT Maximum send length	READY:	Function successfully executed
▶ ui_ProtocolType	UINT Ether type for the Ethernet frame	ERROR:	Invalid maximum length
▶ p_DestinationMacAddress	^t_MacAddr Pointer to a MAC address for the destination address		
▶ ret_code	iprStates	ERROR_BUSY:	Function was called after the 6th Init cycle

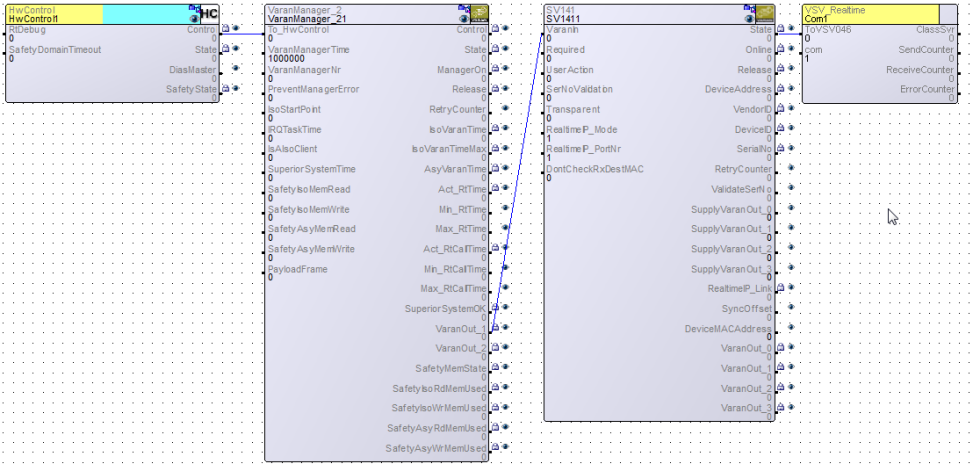
14.3 Required VARAN Data Objects

The following data objects are required with an active RealtimeIP interface:

Data element	s_DO_VSV_FrameSend
Type	Memory Write / LongDO
Length	Maximum send length + 18 byte; rounded to a multiple of 128 bytes
Description	This data object is used to transfer send data

Data element	s_DO_VSV_FrameReceive
Type	Memory Read / LongDO
Length	Maximum send length + 18 byte; rounded to a multiple of 128 bytes
Description	This data object is used to retrieve the receive data

14.4 Example



The following source code provides an example of the "VSV_Realtime" class:

```
TYPE
#pragma pack(push, 1)
  t_Protocol : STRUCT
    us_PayloadLength : USINT;
    a_Payload : ARRAY [0..253] OF USINT;
  END_STRUCT;
#pragma pack(pop)
END_TYPE

FUNCTION VIRTUAL GLOBAL VSV_Realtime::Init
VAR
  DestinationMacAddress : VSV046::t_MacAddr;
  pMacAddress : ^VSV046::t_MacAddr;
END_VAR
  IF us_firstscan = 1 THEN
    //*****************************************************************************
    //** set destination mac address (according to module!)                      **
    //*****************************************************************************
    CASE com OF
    1:
      DestinationMacAddress[0] := 16#00;
      DestinationMacAddress[1] := 16#50;
      DestinationMacAddress[2] := 16#F4;
      DestinationMacAddress[3] := 16#1F;
      DestinationMacAddress[4] := 16#01;
      DestinationMacAddress[5] := 16#13;
      pMacAddress := #DestinationMacAddress;
    2:
      DestinationMacAddress[0] := 16#00;
      DestinationMacAddress[1] := 16#50;
      DestinationMacAddress[2] := 16#F4;
```

```
      DestinationMacAddress[3] := 16#1F;
      DestinationMacAddress[4] := 16#01;
      DestinationMacAddress[5] := 16#14;
      pMacAddress := #DestinationMacAddress;
    ELSE
      pMacAddress := NIL;
    END_CASE;
    //*************************************************************************
    //** the ethernet-frame will contain the "protocol"                      **
    //*************************************************************************
    ToVSV046.ConfigSendData( ui_MaxLength           := SIZEOF( t_Protocol )
                           , ui_ProtocolType        := 16#0000
                           , p_DestinationMacAddress := pMacAddress );
    //*************************************************************************
    //** for now we do not use the mac-address filter                        **
    //*************************************************************************
    ToVSV046.ConfigReceiveData( p_ReceiveFunktion  := #DataReceived()
                              , p_this             := THIS
                              , p_FilterMacAddress := NIL );

    //*************************************************************************
    //** we use a 4-byte payload (counter)                                   **
    //*************************************************************************
    SendDataBuf.Data $ t_Protocol.us_PayloadLength := 4;
  END_IF;
  us_firstscan += 1;
END_FUNCTION


FUNCTION GLOBAL VSV_Realtime::DataReceived
VAR_INPUT
  p_Data         : ^VSV046::t_ETHFrame;
  length         : UINT;
END_VAR
  IF p_Data THEN
    IF length <= sizeof(VSV046::t_ETHFrame) THEN
      //*************************************************************************
      //** copy header                                                         **
      //*************************************************************************
      ReceiveDataBuf.Header := p_Data^.Header;
      //*************************************************************************
      //** copy data                                                           **
      //*************************************************************************
      _memcpy( ptr1 := #ReceiveDataBuf.Data, ptr2 := #p_Data^.Data, cntr := length);
      //*************************************************************************
      //** put counter from payload to server                                  **
      //*************************************************************************
      ReceiveCounter := ( ReceiveDataBuf.Data $ t_Protocol.a_Payload[0] ) $ DINT;
    ELSE
      ErrorCounter += 1; // package too long
    END_IF;
  ELSE
    ErrorCounter += 1; // no valid data-pointer
  END_IF;
END_FUNCTION

FUNCTION VIRTUAL GLOBAL VSV_Realtime::RtWork
VAR_INPUT
  EAX    : UDINT;
END_VAR
VAR_OUTPUT
```

```
  state (EAX)    : UDINT;
END_VAR

  IF ToVSV046.RealtimeIP_Link THEN
    //*************************************************************************
    //** copy data to send-buffer                                            **
    //*************************************************************************
    IF ToVSV046.SetSendData( p_Data    := #SendDataBuf.Data[0]
                           , ui_length := SIZEOF(t_Protocol) ) = READY THEN
      //*************************************************************************
      //** increment server and counter in payload                             **
      //*************************************************************************
      SendCounter += 1;
      (SendDataBuf.Data $ t_Protocol.a_Payload[0] ) $ DINT := SendCounter;
    END_IF;
  END_IF;
  state := READY;
END_FUNCTION
```

14.5 Setting Examples

1. Only packets with the SPI Flash MAC address are received; the destination MAC address from sent packets should be taken from the packets first received

Required settings:
- No specified receive filter (methods ConfigReceiveData, Parameter p_FilterMacAddress = NIL)
- Receive filter active (client DontCheckRxDestMAC = 0)
- No specified destination MAC address (method ConfigSendData, Parameter p_DestinationMacAddress = NIL)

2. Packets with any MAC address are received; the destination MAC address from sent packets should be taken from the packets first received

Required settings:
- A receive filter is given (methods ConfigReceiveData, Parameter p_FilterMacAddress <> NIL)
- Receive filter active (client DontCheckRxDestMAC = 0)
- No specified destination MAC address (method ConfigSendData, Parameter p_DestinationMacAddress = NIL)

3. All packets are received; the destination MAC address from sent packets should be taken from the packets first received

Required settings:
- Receive filter inactive (client DontCheckRxDestMAC = 1)
- No specified destination MAC address (method ConfigSendData, Parameter p_DestinationMacAddress = NIL)

4. Only packets with the SPI Flash MAC address are received; the destination MAC address from sent packets should be set to any value

Required settings:
- No specified receive filter (methods ConfigReceiveData, Parameter p_FilterMacAddress = NIL)
- Receive filter active (client DontCheckRxDestMAC = 0)
- Destination MAC address given (method ConfigSendData, Parameter p_DestinationMacAddress <> NIL)

5. Only packets a Flash MAC address are received; the destination MAC address from sent packets should be set to any value

Required settings:
- A receive filter is given (methods ConfigReceiveData, Parameter p_FilterMacAddress <> NIL)
- Receive filter active (client DontCheckRxDestMAC = 0)
- Destination MAC address given (method ConfigSendData, Parameter p_DestinationMacAddress <> NIL)

6. All packets are received; the destination MAC address from sent packets should be set to any value

Required settings:

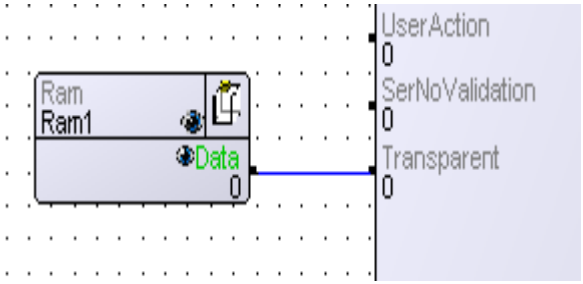
- No specified receive filter (methods ConfigReceiveData, Parameter p_FilterMacAddress = NIL)
- Receive filter inactive (client DontCheckRxDestMAC = 1)
- Destination MAC address given (method ConfigSendData, Parameter p_DestinationMacAddress <> NIL)

14.6 Transparent Mode

The transparent mode is set so that a project with different stages of the hardware can be maintained with just one software version.

Example: With the full range of functions, a system consists of 10 modules that are connected by the VARAN bus. There is a project, which contains all system functions. If not all modules are required and therefore not integrated into the system, the hardware class objects or the respective modules are switched to transparent in the project. This means the project does not have to be changed with the reduced hardware stage. It is sufficient to switch the respective objects to transparent.

All VARAN hardware classes have a "Transparent" client. Through this client, the read method of the server connected to the client is called. In the read method for example, a configuration file can be read in which whether the transparent mode should be active or inactive is defined. The status is sent as a return value.



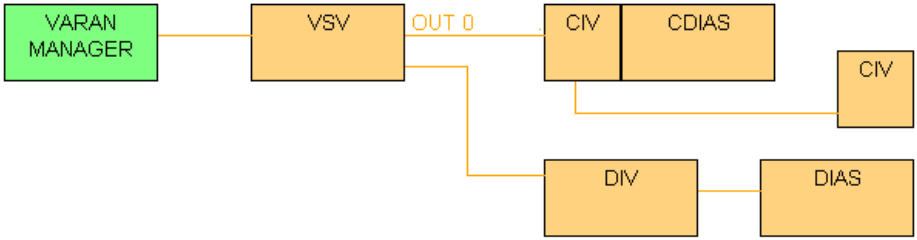
If a hardware class object is set to transparent, The VARAN bus structure moves up and the module is removed from the configuration. A distinction is now made between modules with 1 output and modules with several outputs.

If a module is removed (the corresponding object set to transparent) that has only one output, the following module (if available) must be directly connected to the preceding module (See item CIV Transparent).

If a module (e.g. VSV) with several outputs is removed, only the module at the first output (if available) has to be connected to the preceding module. The other modules at the remaining outputs are removed and the corresponding hardware class objects are set to transparent (See item VSV Transparent).

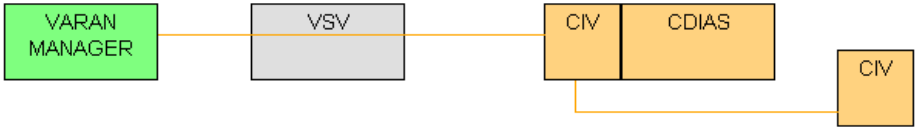
14.6.1 No transparent module

The following image shows the output assignment in which no class is set to transparent. The modules are connected to one another by the VARAN bus.



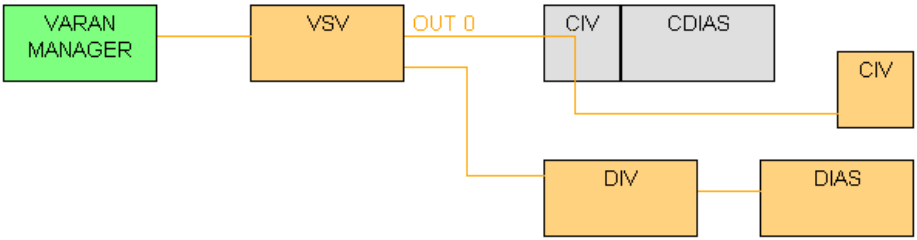
14.6.2 VSV Transparent

The "Transparent" client of the VSV hardware class object was initialized with 1. This means that the object is set to transparent. The VSV hardware must therefore be removed from the configuration and the VARAN Manager is connected directly to the CIV module through the software. All modules that are not connected to the first output of the VSV are set to transparent and not initialized, since with the VSV, only one thread can be moved.



14.6.3 CIV Transparent

The "Transparent" client of the CIV hardware object was initialized with 1. This means that the object is set to transparent. The CIV hardware must therefore be removed from the configuration and the VSV module is connected directly to the following CIV module.



Documentation Changes

Change date	Affected page(s)	Chapter	Note
26.03.2015	9	3.3 Applicable Connectors	Connections expanded
21.01.2016	4	1.2 Electrical Requirements 1.3 Miscellaneous	Standard changed
26.01.2016	4	1.2 Electrical Requirements	Graphics added
28.04.2016	14	4 Mounting	Graphics distances
17.08.2017	6 12	1.4 Environmental Conditions 3.3 Applicable Connectors	Pollution Degree Sleeve length added Added info regarding ultrasonically welded strands
18.10.2017	13 16	3.4 Label Field 4 Thermal Requirements	Added chapter Graphic replaced
15.04.2019	10	3.1.3 VARAN Wiring Guidelines	VDM removed
01.09.2020	11	3.2 Top View	Text block inserted
08.09.2020	23	6 Hardware Class SV141	Chapter added
04.11.2020	15	4 Mounting	Expansion functional ground connection
24.05.2022	6	1.3 Miscellaneous	HW Versions added
06.12.2022	6	1.3 Miscellaneous	UKCA conformity
26.07.2023		Document	General chapters added, design