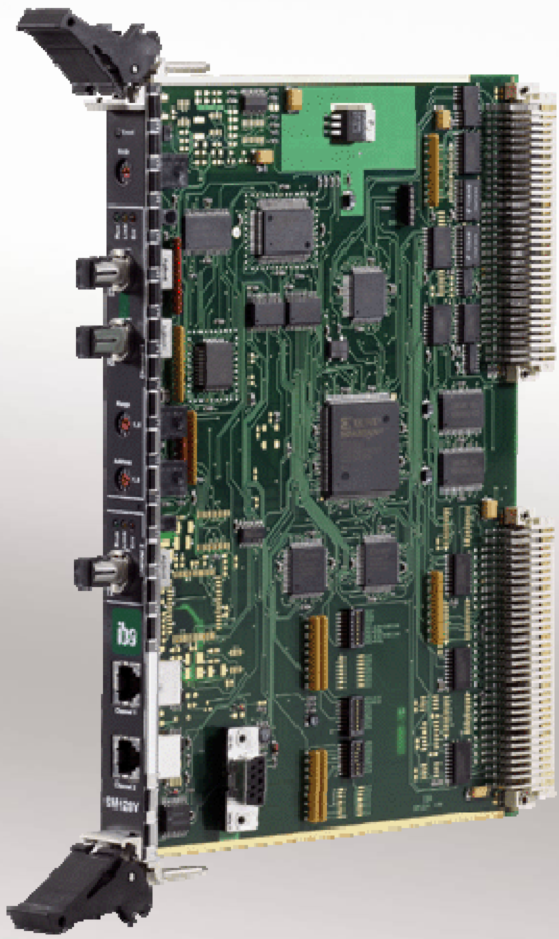
ibaLink-SM-128V-i-2o

VMEbus Interface Board



Manual

Issue 2.5

Measurement and Automation Systems

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The content of this publication has been checked for compliance with the described hardware and software. Nevertheless, deviations cannot be excluded completely so that the full compliance is not guaranteed. However, the information in this publication is updated regularly. Required corrections are contained in the following regulations or can be downloaded on the Internet.

The current version is available for download on our web site http://www.iba-ag.com.

Protection note

Windows® is a label and registered trademark of the Microsoft Corporation. Other product and company names mentioned in this manual can be labels or registered trademarks of the corresponding owners.

Certification

The device is certified according to the European standards and directives. This device corresponds to the general safety and health requirements. Further international customary standards and directives have been observed.

Issue	Date	Revision	Chapter	Author	Version HW / FW
2.5		DIP switch/address TDC	7.2.7.3	rm	1.4

Table of contents

1 About this manual

This compact manual provides the information for installation and handling of the VME interface board ibaLink-SM-128V-i-2o.

For further information concerning the system integration and software configuration please refer to the corresponding engineering manuals and / or software documentation of our software products used in conjunction with this device.

1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded to as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

1.2 Notations

The following designations are used in this manual:

Action	Notations
Menu command	Menu „Logic diagram“
Call of menu command	„Step 1 – Step 2 – Step 3 – Step x” Example: Select menu „Logic diagram – Add – New logic diagram”
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name“, „Path” Example: „Test.doc“

1.3 Used symbols

If safety instructions or other notes are used in this manual, they mean:

⚠ DANGER

The non-observance of this safety information may result in an imminent risk of death or severe injury:

- By an electric shock!
- Due to the improper handling of software products which are coupled to input and output procedures with control function!

⚠ WARNING

The non-observance of this safety information may result in a potential risk of death or severe injury!

⚠ CAUTION

The non-observance of this safety information may result in a potential risk of injury or material damage!

Note

A note specifies special requirements or actions to be observed.

Important note

Note if some special features must be observed, for example exceptions from the rule.

Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.

Other documentation

Reference to additional documentation or further reading.

2 Introduction

The ibaLink-SM-128V-i-2o VMEbus interface card is a multi-purpose, bi-directional interface card designed for use in VMEbus compatible PLCs and computer systems. It may be used for data acquisition and process monitoring purposes as well as in control system applications, such as the ibaLogic SoftPLC. In the following the board will be named SM128V for a more simplified description.

Key features of the SM128V include:

- ❑ 1 bi-directional fiber-optic link with 64A+64D inputs/outputs per link (channel 1)
- ❑ 1 unidirectional fiber-optic link with 64A+64D outputs per link (channel 2)
- ❑ Synchronous message transmission of all channels on both links at 1ms rate
- ❑ Address switches for cascading of up to eight SM128V interface cards on link Channel 1
- ❑ Compatible interface for ibaFOB-io, ibaFOB -4i (-S), ibaFOB-4o
- ❑ Compatible process i/o interface for ibaPADU-8-IO series and ibaNet750-BM series
- ❑ 5 V power from VMEbus

The SM128V can be used in both VME32 and VME64 systems. The card requires a 5 V power supply. The following non-privileged modes of VME access can be realized:

- ❑ A24 as well as A32 with the following VMEbus data formats
  - D08 (E0)
  - D16
  - D32
  - A40 MD32 (upon special request)

The modes BLT and MBLT as well as automatic configuration and geographic addressing are in preparation but not available now. The 2eVME mode is not intended to be realized. Access is permitted in non-priviledged data access mode only.

The SM128V is a passive board on the VMEbus, i. e. no active access or interaction on the VMEbus will be performed. The board uses 256 kByte address space at VMEbus.

- ❑ Related specifications (VITA Standards):
  - VMEbus
  - IEEE 1014-1987
  - VME64
  - ANSI VITA 1-1994 VME64X; VITA 1.1-19

Remark: Since one analog channel corresponds always to one digital channel within the iba bus concept, an analog value together with a digital value are referred to one channel or one signal for a more simplified description.

3 Scope of delivery

After unpacking check the completeness and intactness of the delivery.

The scope of delivery includes:

- ❑ Device ibaLink-SM-128V-i-2o
- ❑ Manual

4 Safety instructions

4.1 Designated use

The device is an electrical equipment. It may be used only in the following applications:

- ❑ Automation of industrial systems
- ❑ Measurement data logging and analysis
- ❑ Applications of ibaSoftware products (ibaPDA, ibaLogic etc.)

The device is only to be applied as shown in the Technical Data in chapter 11.

4.2 Special advices

⚠ CAUTION

The EGB standards for handling electrostatic sensitive devices must be followed.

Use a ground line or discharge any electrostatic charge from yourself before touching the card.

Avoid direct contact with the connectors.

5 System requirements

5.1 Hardware

- ❑ IBM-compatible PC, Pentium IV 1 GHz, 256 MB RAM, 20 GB HD or better
- ❑ at least one ibaFOB-io or ibaFOB-4i (-S) -card in the PC

5.2 Software

- ❑ OS Windows NT 4.0 (servicepack 6), 2000 or XP.
- ❑ ibaPDA version > 3.11 (for ibaLink-SM-64-io and SM128V)

5.3 PLC or control system with compatible hardware interface

- ❑ 32 Bit- or 64 Bit VME rack
  (16 Bit-VME rack for modified SM128V-16)
- ❑ SM128V installed in PLC

6 Installation / Deinstallation

⚠ CAUTION

The EGB standards for handling electrostatic sensitive devices must be followed.

Use a ground line or discharge any electrostatic charge from yourself before touching the card.

Avoid direct contact with the connectors.

Each SM128V occupies a single slot in the VME rack.

6.1 Installing the card

⚠ CAUTION

Before installation / deinstallation of the card switch off the power supply of the VME-bus rack.

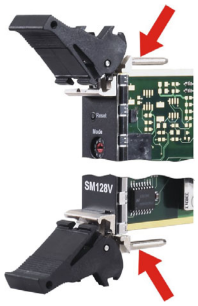
Don’t plug in or pull out the card under power.

1. Unpack the card carefully. Use a ground line or discharge any electrostatic charge from yourself before touching the card.
2. Put the card with the welded side down on an even, clean and dry surface and make the required settings of the DIP switches.
3. Switch off the VMEbus rack.
4. Take hold of the card by the two slide elements (grips) between thumb and index finger each.
5. Slide the card into the appropriate slot of the VME system carefully.
6. Before sliding in the card to the end make sure that the two guide pins on the rear side of the front panel slide into the dedicated holes in the rack.
7. Unless already done, raise the lower, respectively the upper slide element (grip) until they click.
8. Push the card firmly until the end by pressing your thumbs on the front panel.
9. Fix the card to the rack with the two screws on the upper and lower end of the front panel.

Special note for installing the SM128V card in a GE 90/70 system rack

The GE90/70 system rack has no openings for the guide pins of the SM128V card.

If this fact has not been considered when ordering the card, the guide pins have to be removed before installing the card.



6.2 Removing the card

In order to remove the card from the VME rack please follow these steps:

1. Switch off the power supply of the VME rack.
2. Release the screws in the front panel.
3. Press the two slide elements (grips) apart from each other. This will release the card from the backplane connectors.
4. Pull the card out of the slot.

7 Device description

7.1 Connectors and Operational Elements on Front Panel

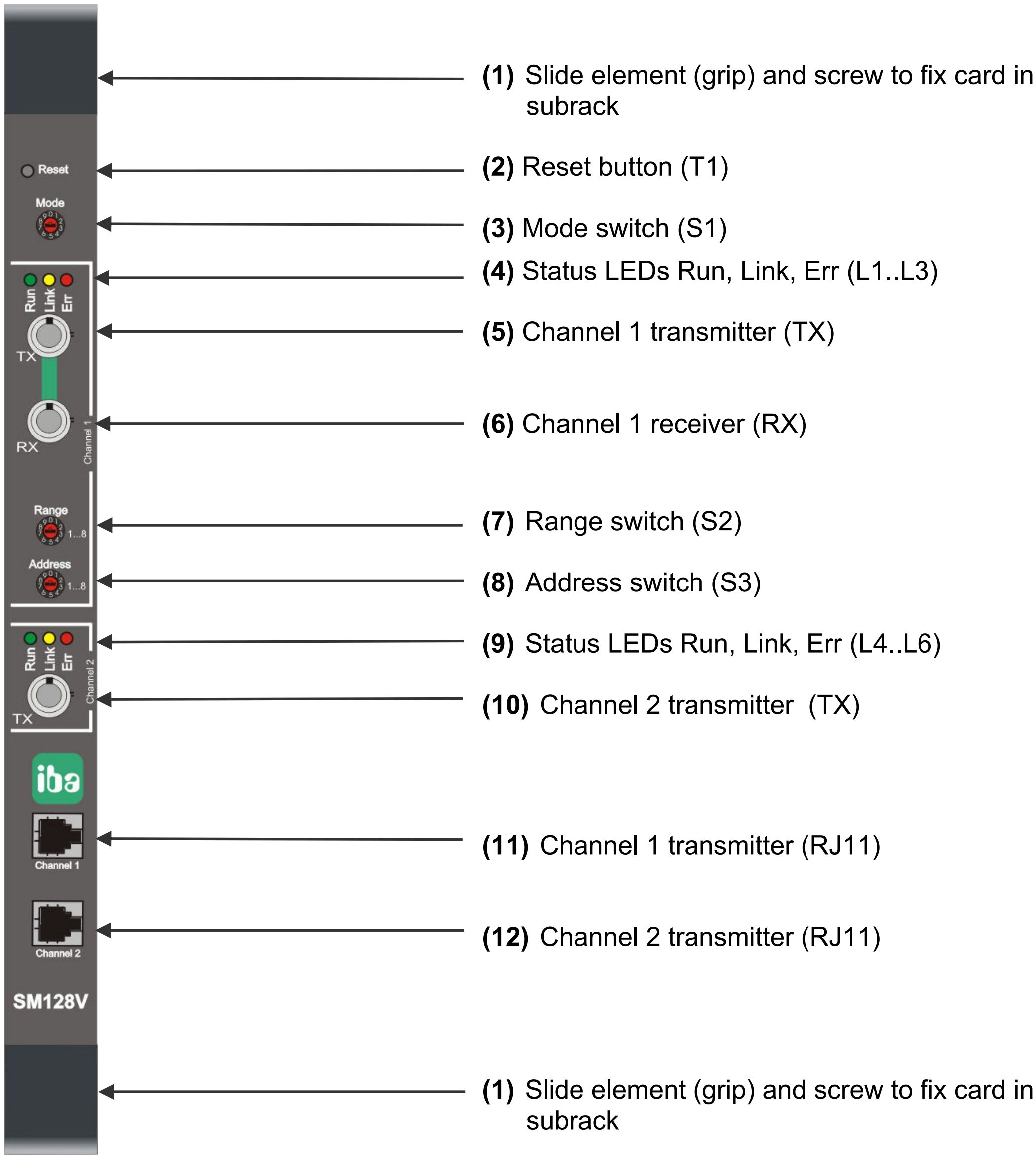


Figure 1 View on front panel of SM128V

7.1.1 Fiber-Optic Connectors TX and RX (5) (6)

Channel 1 communicates bi-directionally with compatible devices over the TX and RX interface ports. Both ports use standard ST type connectors. TX realizes the fiber-optic transmitter while RX realizes the fiber-optic receiver.

7.1.2 Fiber-Optic Connector TX (10)

Channel 2 communicates unidirectionally with compatible devices via the TX interface port. This port uses a standard ST type connector. TX realizes the fiber-optic transmitter for Channel 2.

7.1.3 RJ11 Connector Channel 1 (11)

Channel 1 may transmit data unidirectionally to a single ibaPCMCIA-F device. This port uses a special serial cable that is delivered with the PCMCIA-F. Data is transmitted synchronously with optical channel 1.

7.1.4 RJ11 Connector Channel 2 (12)

Channel 2 may transmit data unidirectionally to a single ibaPCMCIA-F device. This port uses a special serial cable that is delivered with the PCMCIA-F. Data is transmitted synchronously with optical channel 2.

7.1.5 Mode Switch (3)

This switch sets the mode of operation for the SM128V interface card.
Set switch to mode = 0 (RUN) for normal or cascading operation.
Set switch to mode = 8 (peer to peer) for direct coupling of SM128V´s. (No cascade)

7.1.6 Range Switch (7)

Using the range and address switches on the front panel of the SM128V, each interface card arranges the starting position (e.g. 1, 2, 3,..8) and the range of channels (1x8=8, 2x8=16, 3x8=24, etc.) to be transmitted over the fiber-optic link. A maximum of 8 x 8 = 64 signals may be transmitted in daisy-chain mode. If channel 1 is not operating in daisy-chain mode the switch setting should be *8*.

Example:

Range = 2: the card occupies 2 x 8 = 16 signals in a daisy-chain telegram.

Range = 4: the card occupies 4 x 8 = 32 signals, i.e. half of the daisy-chain telegram.

➚ See also section 9.4 ”Cascade Mode”

7.1.7 Address Switch (8)

This switch defines the starting position of the local data in the daisy-chain. Valid values: 1…8.
If channel 1 is not operating in daisy-chain mode the switch setting should be *1*.

Example:

Address = 5: the data to be transmitted have the starting position 5 in the telegram.

In conjunction with the range setting of switch S2 this defines how many and which addresses are used by the card. With reference to the example above:

If Range = 2: 2 x 8 = 16 signals will be transmitted on address 5 in the telegram, i.e. addresses 5 and 6 (signals 32...47).

If Range = 4: 4 x 8 = 32 signals will be transmitted on address 5 in the telegram, i.e. addresses 5, 6, 7 and 8 (signals 32…63).

➚ See also section 9.4 ”Cascade Mode”

Overlapping of Address/Range Settings

Be careful to note that the data written to each SM128V local dual port RAM via VME defines the data on the local SM128V only. If the Address/Range settings indicate a daisy-chain mode, then the incoming telegram will overwrite the outbound telegram respectively.

Consider the example of Figure 14, #2 receives 16 signals from #1 and places them in the signal 00-15 positions of the telegram. #2 transmits 16 + 16 signals to #3, #3 receives 32 signals and writes its own 32 signals (internal signal 32-63) to the resulting telegram. Now, if #3 has an Address = 4 instead of 5, the 2nd 8 signal block from #2 will be overwritten by #3 and then sent further to the FOB-interface card.

	S2 Range							
S3 Address	1	2	3	4	5	6	7	8
1	☺	☺	☺	☺	☺	☺	☺	☺
2	☺	☺	☺	☺	☺	☺	☺	☹
3	☺	☺	☺	☺	☺	☺	☹	☹
4	☺	☺	☺	☺	☺	☹	☹	☹
5	☺	☺	☺	☺	☹	☹	☹	☹
6	☺	☺	☺	☹	☹	☹	☹	☹
7	☺	☺	☹	☹	☹	☹	☹	☹
8	☺	☹	☹	☹	☹	☹	☹	☹

Table 1 Working (☺) and not working (☹) combinations of S2 and S3 switch settings

7.1.8 Reset Button (2)

Pressing this switch resets the SM128V. Please note, that in certain instances, this may cause disturbances within a host system, when the SM128V refuses bus access requests during reset.

7.1.9 Status LEDs (4) (9)

The Status LEDs indicate general conditions about the state of the SM128V interface card.

LED	Status	Description
Run (green) L1, L4	blinking off	power on and device functioning properly no power or defect
Link (yellow) L2, L5	off blinking on	Device is inactive / no data exchange Device sends data on TX Device sends and receives data on RX/TX, *not channel 2!*
Error (red) L3, L6	on off	internal error in the device normal state; after resolution of error, LED automatically resets

Table 2 Status-LEDs

7.2 DIP-Switches on Board

The DIP-switches are located in the lower part of the board. They are used for setting interrupts, data formats and memory addresses. The service interface (D-sub 9) for loading firmware is located in this area, too.

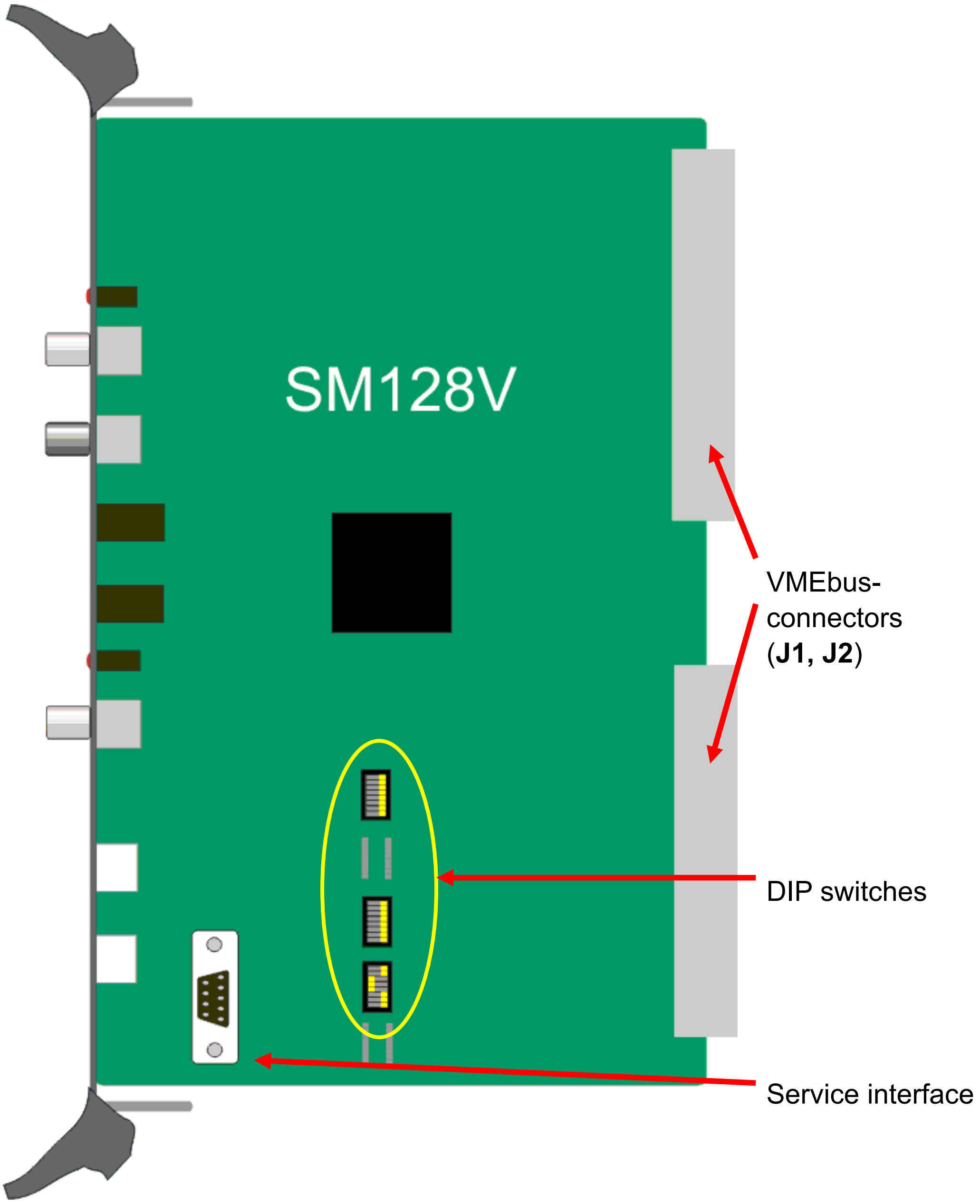


Figure 2 View on assembly side

Default settings of DIP-switches: 0xE0000000

7.2.1 Function of DIP Switches

ON		OFF
Testing operation active for service only	**TEST**	Testing operation off
No function (on request)	**IRQ6**	Interrupt 6 off
No function (on request)	**IRQ2**	Interrupt 2 off
No function	**xxx**	No function
Channel 1 Big Endian	**CH1-BIG-ENDIAN**	Channel 1 Little Endian
Channel 1 REAL data	**CH1-REAL**	Channel 1 INTEGER data
Channel 2 Big Endian	**CH2-BIG-ENDIAN**	Channel 2 Little Endian
Channel 2 REAL data	**CH2-REAL**	Channel 2 INTEGER data
24-bit-mode active	**A24/A32**	32-bit-mode active
A40 MD32 not available (on request);	**A40MD32**	24- or 32-bit-mode active
Memory addr. bit 31 = TRUE	**A31**	Memory addr. bit 31= FALSE
Memory addr. bit 30 = TRUE	**A30**	Memory addr. bit 30 = FALSE
Memory addr. bit 29 = TRUE	**A29**	Memory addr. bit 29 = FALSE
Memory addr. bit 28 = TRUE	**A28**	Memory addr. bit 28 = FALSE
Memory addr. bit 27 = TRUE	**A27**	Memory addr. bit 27 = FALSE
Memory addr. bit 26 = TRUE	**A26**	Memory addr. bit 26 = FALSE
Memory addr. bit 25 = TRUE	**A25**	Memory addr. bit 25 = FALSE
Memory addr. bit 24 = TRUE	**A24**	Memory addr. bit 24 = FALSE
Memory addr. bit 23 = TRUE	**A23**	Memory addr. bit 23 = FALSE
Memory addr. bit 22 = TRUE	**A22**	Memory addr. bit 22 = FALSE
Memory addr. bit 21 = TRUE	**A21**	Memory addr. bit 21 = FALSE
Memory addr. bit 20 = TRUE	**A20**	Memory addr. bit 20 = FALSE
Memory addr. bit 19 = TRUE	**A19**	Memory addr. bit 19 = FALSE
Memory addr. bit 18 = TRUE	**A18**	Memory addr. bit 18 = FALSE

Default settings with yellow background. Red frames show recommended settings (don't change).

Table 3 Function of DIP switches

Note concerning former card versions

The swich XXX had the function of "Swap Digs / No Dig Swap".
"Swap Digs" = ON activates the Little / Big Endian conversion for digital signals. Else the digital values are not swapped (default).

7.2.2 Setting the VMEbus Start Address

The lower two DIP-switches are used for setting the VME memory address of the card in hex-code.

The assignment of DIP-switch bits and address is shown in the picture below with start address 0x77900000 as an example.

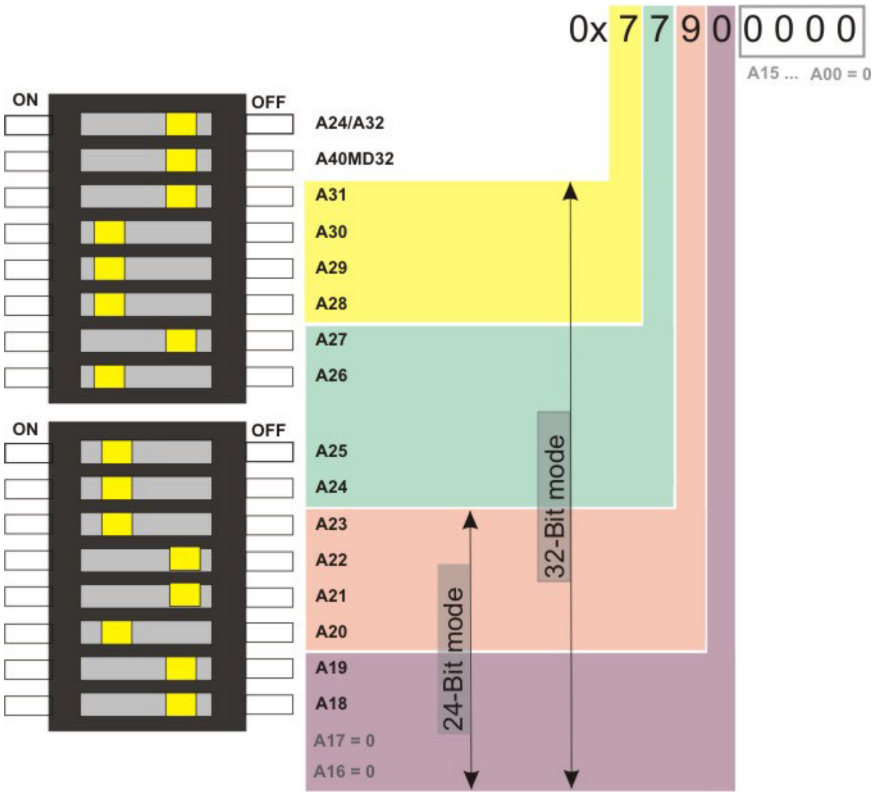


Figure 3 VME memory addressing

The lower four hex digits of the address have the value 0. There are no switches to change these values. The bit A16 and A17 have the fixed value 0 too.

The address setting can be modified from the 19th bit (A18) on. Thus, the value of the 5th hex digit can be 0, 4, 8 or C.

Default setting: 0xE0000000

7.2.3 Settings for ALSPA CP80/A800 (AEG Logidyn D)

ALSPA CP80/A800 is the ALSTOM-compatible name for the former high performance control system CP80 / A800 with Logidyn D from AEG. It is a VME based system for fast control and regulation, developed by ALSTOM Power Conversion GmbH, Berlin, Germany, formerly known as AEG, AEG Daimler-Benz and AEG-Cegelec.

In order to use the ibaLink-SM-128V-i-2o board in this system it is required to use a modified version with connectors to the 16 bit VME backplane. In the lower part of the system's backplane in the rack there is the PMB bus.

Engineering notes for SM128V with ALSPA CP80/A800 (Logidyn D)

On the next page you'll find an example with card settings for using the card in 24 bit mode and delivering integer values for analog signals.

Possible address settings might be as follows:

Addresses analog (integer) channel 0: 0xE43802

Addresses analog (integer) channel 1: 0xE43902

Addresses digital channel 0: 0xE42420

Addresses digital channel 1:..........................0xE42428

Address lifesign counter: …………….........0xE40080

The corresponding memory access may be managed in the LogiCAD-program by subroutines (UP). These subprograms are required to map the signals to be measured to the memory addresses of the board.

A request solution for selecting data to be measured over ibaPDA is not available. The signals have to be "wired" in the application program.

The usage of more than one card in a rack is permitted.

Tip

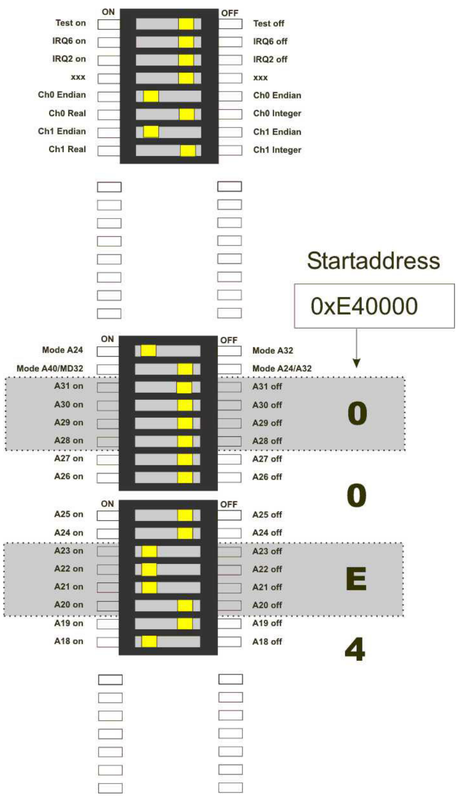
A sample program (*.O32 object file) is available on request from iba AG, Germany, which uses the addresses mentioned above in this example. Furthermore, we can provide a LogiCAD documentation of a sample application. The object must be linked to the Logiydyn application program, i. e. entered in the *.ind file, using LogiTool or a command on the DOS shell.

The subprogram can handle up to 64 integer and 64 binary signals in groups of 16 signals in the LogiCAD program. The signals are transmitted to ibaPDA over the first FO channel of the board.

If the addresses mentioned above are already used for other components in the existent application, the subroutine must be compiled with reference to other address ranges. Therefore, a DSI PC card is required.

7.2.3.1 Card Settings

The yellow marks show the switch position.



Settings:

Mode: A24 (24-bit mode)

Start address memory range: 0xE40000

Swap: Big Endian

Data format: Integer

Figure 4 DIP switch, settings for ALSPA CP80/A800 (one, or first SM128V card)

7.2.3.2 Switch Settings on Front Panel of SM128V

Switch S1 "Mode": Should be always 0 (zero).

Switch S2 "Range" = 8 and switch S3 "Address" = 1;
other settings apply only if card is working in cascade mode with other iba-devices, e.g. ibaPADU.

7.2.4 Settings for ALSPA C80 HPC (Logidyn D2)

The system ALSPA C80 HPC is a VME based system for fast control and regulation, developed by Converteam GmbH, Berlin, Germany. The standard version of the SM128V interface card can be used in a HPC rack with Logidyn D2. For the older system A800 / Logidyn D1 a modified version of the SM128V card with connectors to the 16 bit VME backplane is available.

Engineering notes for SM128V with ALSPA C80 HPC (Logidyn D2)

Four VMEbus addresses are reserved by ALSTOM for the operation of up to four SM128V cards in one HPC rack. The memory ranges are 512 kByte wide, though only 256 kByte are currently used by the SM128V card, with reference for future extensions.

In order to write data into the memory range of the SM128V card, a subroutine – the so called parameter block "IBA_SM128V" – must be used in the application program. One parameter block has to be programmed for each SM128V card in the rack. Input parameters are the number of the VME block, the VMEB1 block and the slot number where the card is installed. A sample application is available on request from ALSTOM Power Conversion Berlin, Germany. The analog values (float) are assigned to the VME block, the digital values (flags) are assigned to the VMEB1 block.

Parameterizing the card memory in HPC (LogiCAD)

A32 base address: 0x77900000
A32 size: 0x00040000 (256 kByte)

Administration in HPC (LogiCAD)

An administration block and a time management (synchronization) must be programmed for operation of one or more SM128V cards.

Link Statement (LogiCAD)

The application program must include a link statement to the library SM128\IBA.

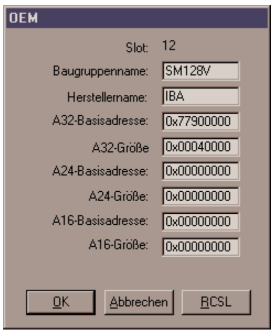
Signal Assignment to Measurement Channels (LogiCAD)

The analog and digital signals to be transmitted should be named according to the module structure of ibaPDA for better understanding.

Hardware Configuration in HPC

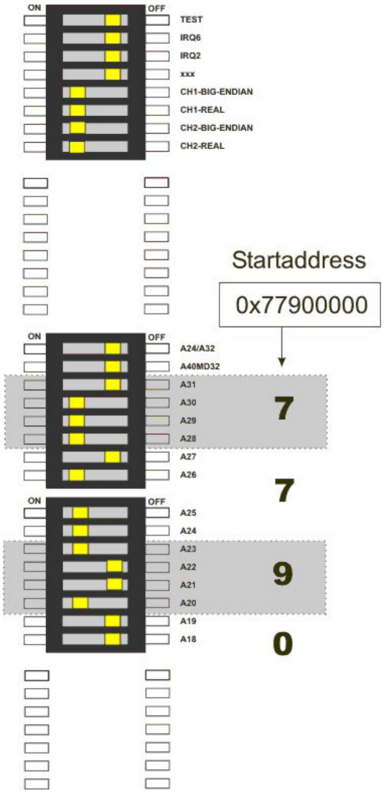
The SM128V card has to be entered as OEM device in the hardware configuration.

Special settings for Hardware (WINRDTM)



7.2.4.1 Card Settings

The yellow marks show the switch position.



Settings:

Mode: A32 (32-bit mode)

Start address memory range: 0x77900000

Swap: Big Endian

Data format: REAL

Figure 5 DIP switch, settings for ALSPA C80 HPC (one, respectively first SM128V card)

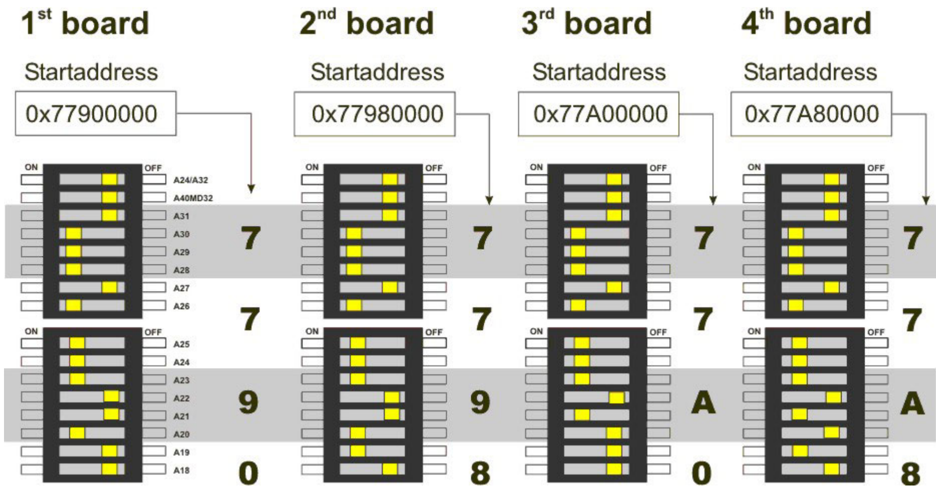


Figure 6 DIP switch, settings for up to four SM128V cards in ALSPA C80 HPC

7.2.4.2 Switch Settings on Front Panel of SM128V

Switch S1 "Mode": Should be always 0 (zero).

Switch S2 "Range" = 8 and switch S3 "Address" = 1;
other settings apply only if card is working in cascade mode with other iba-devices, e.g. ibaPADU.

7.2.5 Settings for ALSPA C80 HPCi

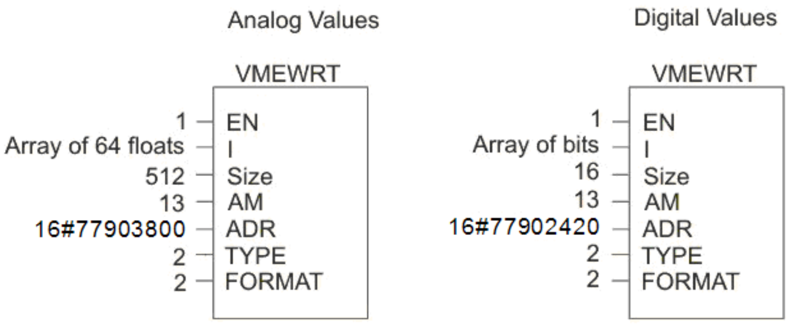
The system ALSPA C80 HPCi is a VME based system for fast control and regulation, developed by ALSTOM Power Conversion. It is the successor of the ALSPA C80 HPC (Logidyn D2) system. The standard version of the SM128V interface card can be used in a HPCi rack with operating system VxWorks and programming system ALSPA P80i.

7.2.5.1 Engineering notes for SM128V with HPCi

Four VMEbus addresses are reserved by ALSTOM for the operation of up to four SM128V cards in one HPC rack. The memory ranges are 512 kByte wide, though only 256 kByte are currently used by the SM128V card, with reference for future extensions.

7.2.5.2 Writing the data into the VME memory range

In order to write data into the VME memory range the corresponding VMEWRT function blocks must be included in the application program. Example:

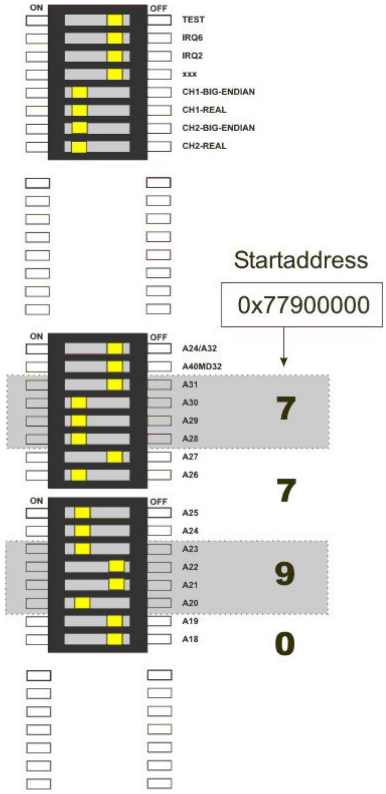


7.2.5.3 Parameterizing the card memory in HPCi (P80i)

A32 base address: 0x7790 0000
A32 size: 0x00040000 (256 kByte)

7.2.5.4 Card Settings

The yellow marks show the switch position.



Settings:

Mode: A32 (32-bit mode)

Start address memory range: 0x77900000

Swap: Big Endian

Data format: REAL

Figure 7 DIP-switch, settings for ALSPA C80 HPCi (one, respectively first SM128V card)

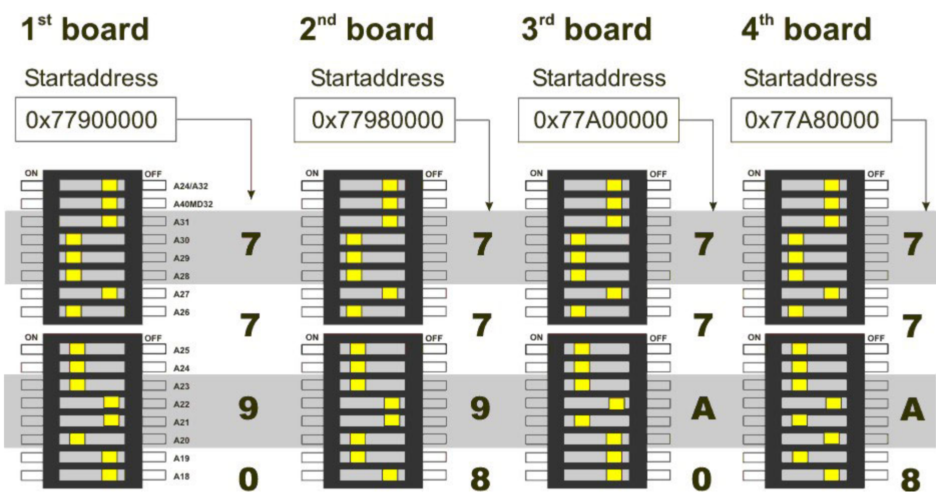


Figure 8 DIP-switch, settings for up to four SM128V cards in ALSPA C80 HPCi

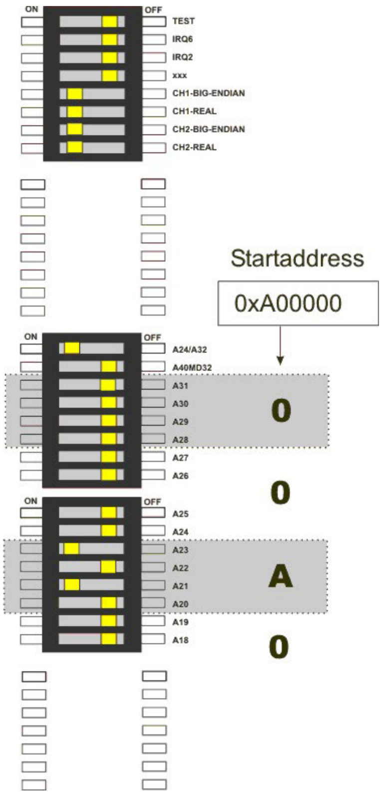
7.2.5.5 Switch Settings on Front Panel of SM128V

Switch S1 "Mode": Should be always 0 (zero).

Switch S2 "Range" = 8 and switch S3 "Address" = 1;
other settings apply only if card is working in cascade mode with other iba-devices, e.g. ibaPADU.

7.2.6 Settings for GE 90/70

The yellow marks show the switch position.



Settings:

Mode: A24 (24-bit mode)

Start address memory range: 0xA00000

Swap: Big Endian

Datenformat: REAL

Figure 9 DIP switch, settings for GE 90/70 (one, respectively first SM128V card)

7.2.7 Settings for Simatic TDC

7.2.7.1 Introduction

Up to the version 5.x of the D7-SYS configuration package, only the Siemens modules developed for this package could be used in this system. Beginning with version 6.0 standard VMEbus modules, which meet certain requirements, can also be used.

The SM128V board of the iba AG meets these requirements and can be used as interface to the ibaPDA system. Using this board up to 128 analog and 128 binary signals can be transferred from the VME system to the ibaPDA system.

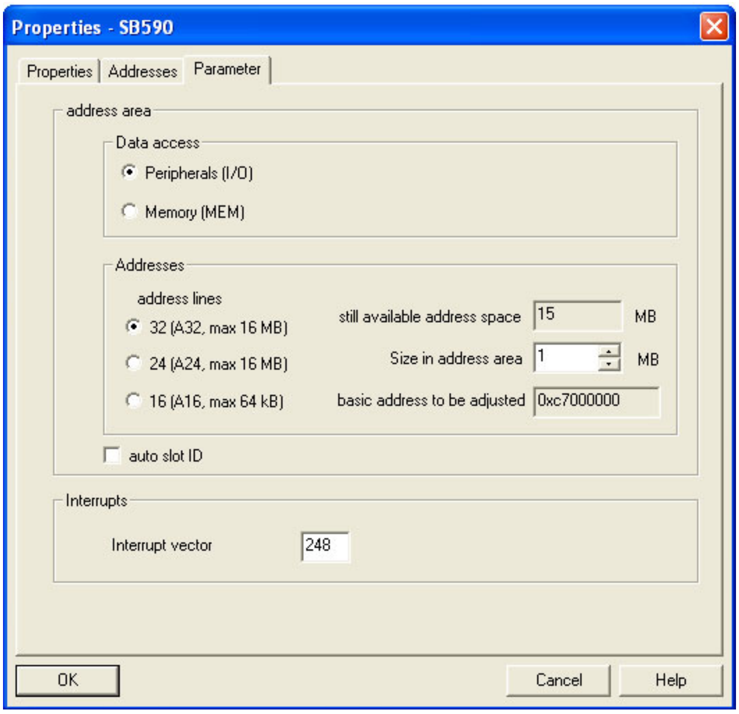
Note

For this purpose functional modules are required, that can address the interface board via the graphic project configuration interface. These modules are not provided by iba, but can only be developed by a “system integrator”. Please contact the Siemens AG.

7.2.7.2 Engineering notes for Simatic TDC

❑ Address range definition beginning with D7-Sys Version 6.1

The “universal module SB950” must be configured with the master program. Here you can read out the address which must be set on the SM128V board. The only modification of the default values is to unselect the option "auto Slot-ID".



❑ Slot

With the recent version of the SM128V board a special problem occurs: the Simatic TDC system does not boot up, if a CP51M1 module (Ethernet) or a CP52A0 module (GDM connection) is inserted to the right of the SM128V board.

Note

When using a SM128V board in a Siemens Simatic TDC automation system a Simatic TDC module must not be inserted to the right of the SM128V board in a TDC rack! Due to the dynamic address allocation, a required initializing signal to the TDC module is not transmitted via the slot where an SM128V board is inserted. The TDC module cannot answer and prevents correct initialization. As a result the TDC system cannot boot up.

⚠ CAUTION

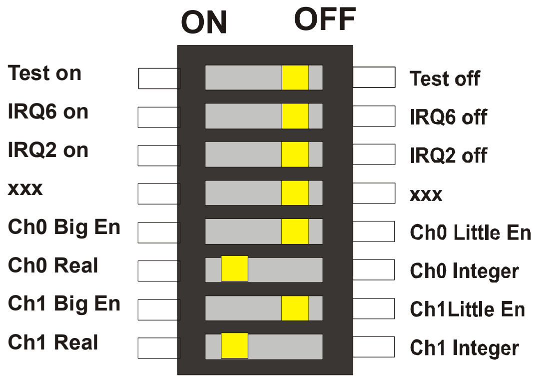
After having modified the hardware configuration, check the address. The access to an address which is not allowed causes the fatal error “H”.

7.2.7.3 Card settings

❑ Transmission mode setting on the card

Set the appropriate data format, which is supported by the functional module. Switch off byte swapping (LITTLE ENDIAN).

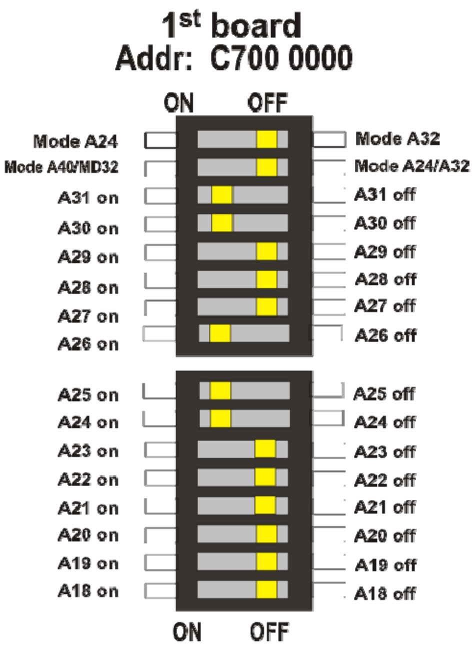
Example for REAL:

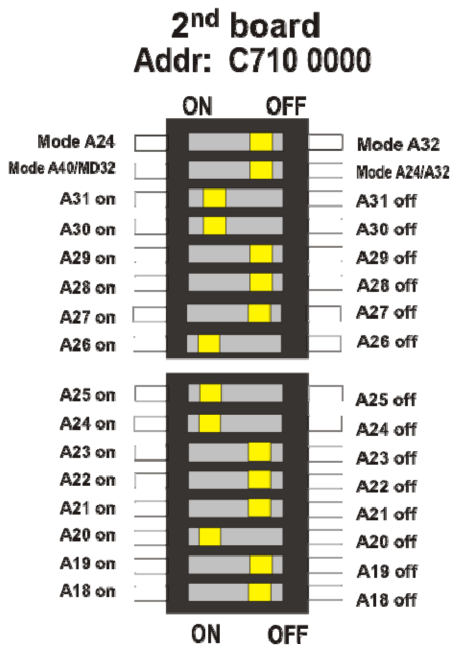


❑ Setting the memory address on the card

The card ibaLink-SM-128V allocates a memory range of 256 KByte. But D7-Sys reserves at least 1 MByte by default. The addresses of all cards can be found in the hardware engineering.

Example:





❑ Switch Settings on Front Panel of SM128V

Switch S1 "Mode": set to 0 (zero) or 8 (peer-to-peer connection)

Switch S2 "Range" and switch S3 "Address": Range = 8, Adr = 1 (no cascade)

A cascade is only possible, when the functional modules provide this option!

8 Application Notes

The optical fiber input/output links operate at 3.3 Mbps.

The following components are compatible with fiber-optic channel 1 of the SM128V:

- ibaLink-SM-64-io (but mixed cascade of ibaLink-SM-64-io and SM128V is not supported),
- ibaLink-SM-64-SD16,
- ibaBM-DPM-S-64,
- ibaPADU-8, ibaPADU-8-I, ibaPADU-8-O,
- ibaFOB-4io-S and ibaFOB-io-S,
- ibaFOB-4io-D, ibaFOB-2io-D and ibaFOB-io-D,
- ibaBM-FOX-i-3o and ibaBM-FOX-i-3o-D,
- ibaBM-COL-8i-o, ibaBM-DIS-i-8o

The following operation modes are supported on channel 1:

- I/O operation; up to eight devices connected to the fiber-optic input (Rx) and up to eight devices connected to the fiber-optic output (Tx)
- Cascade operation with daisy-chain of up to eight SM128V cards
- Addressing of input and output data in steps of eight signals.

Channel 2 provides 64 channels for transmission only.

The following devices are compatible with fiber-optic channel 2 of the SM128V:

- ibaPADU-8-O,
- ibaLink-SM-64-SD16,
- ibaBM-DPM-S-64,
- ibaFOB-4i-S and ibaFOB-io-S (Input),
- ibaFOB-4i-D, ibaFOB-2i-D and ibaFOB-io-D (Input),
- ibaBM-FOX-i-3o and ibaBM-FOX-i-3o-D,
- ibaBM-COL-8i-o

Both fiber-optic output channels (Channel 1 and Channel 2) can be interfaced to individual ibaCom-PCMCIA-F cards via the X4 and X5 RJ11 sockets. Note that only one ibaCom-PCMCIA-F card may be used at a time in a Notebook measurement PC.

9 System Topologies

Multiple system topologies are possible with the SM128V. PC based measurement with ibaPDA, SoftPLC PC-based control with ibaLogic, and process i/o interface for VME based controllers are application possibilities with the SM128V. The operating mode of the SM128V is a consequence of the desired topology.

9.1 Peer-to-Peer Operation

If the device shall run in loopback mode (output coupled to own input) or two SM128V cards shall run directly coupled the mode switch of at least one SM128V card must be set to mode = 8. In this setting cascading of multiple devices is NOT supported (device acts as if address switch is set to 1 and range = 8).

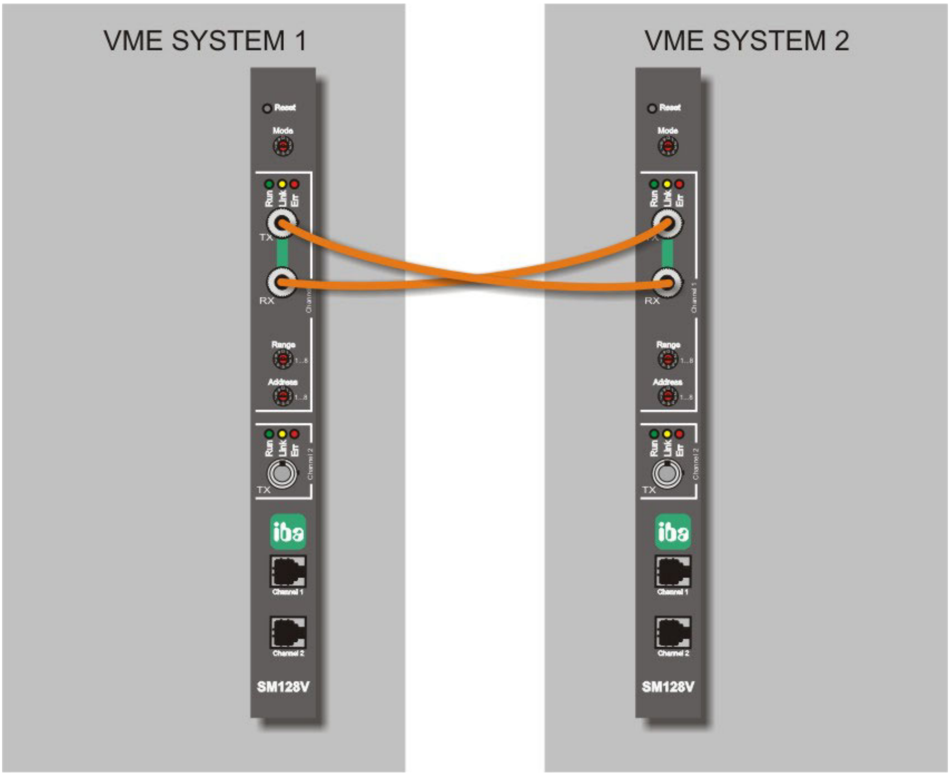


Figure 10 Peer-to-peer operation

This operation mode is used to connect two VME-systems in order to exchange data (64 analog and 64 digital signals) periodically in 1 ms.

No further accessories, such as additional power supply or software, are needed. In this mode of operation the two VMEbus memory ranges are transmitted from one card to the other. The outputs of one card are the inputs for the other card and vice versa.

9.2 ibaPDA Application

In classic combination of SM128V and ibaPDA the two fiber-optic output links are connected to input links on ibaFOB-io or ibaFOB-4i (-S) cards. Each link transmits 64 analog and 64 digital signals, i.e. a total of 128 signals.

Only the outputs (Tx) of the SM128V card can be used.

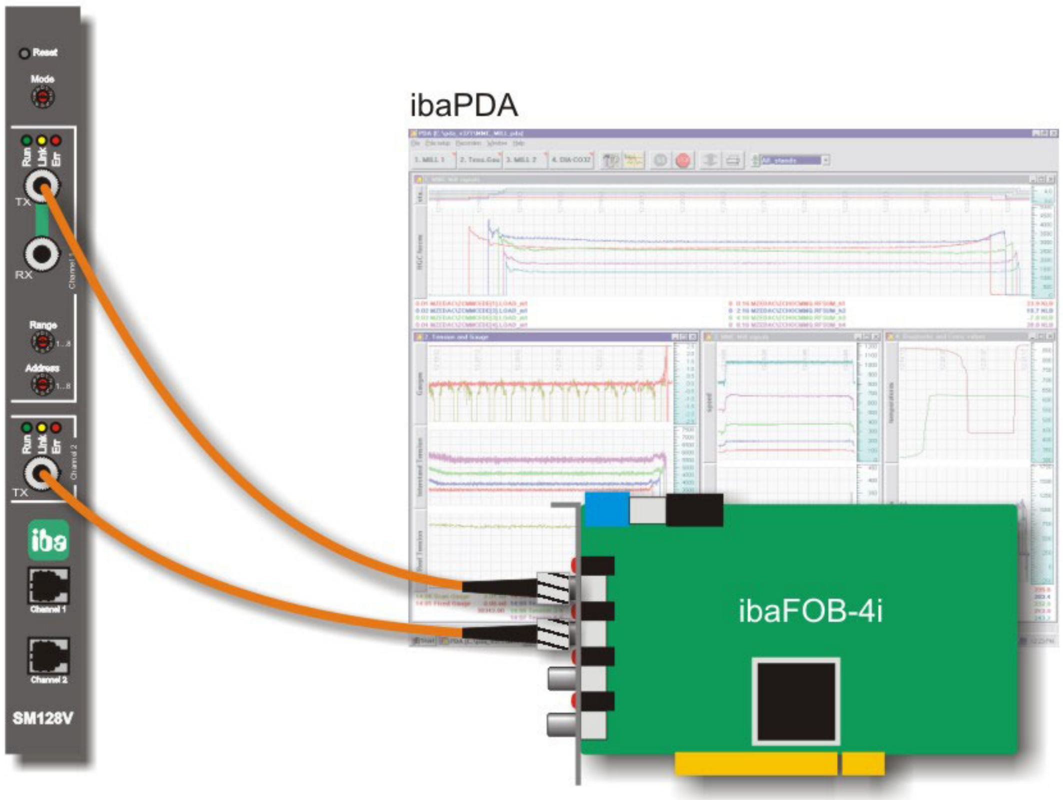


Figure 11 SM128V with ibaPDA

9.2.1.1 Engineering Note

If ibaPDA version is 5.20 or higher each connected fiber-optic link must be assigned to two modules of module type “SM128”. This module type offers the possibility to scale the incoming signals with gain and offset even in real format. This allows the processing of standardized values (-1.0 …0 .. 1.0) coming from the VME control system.

With older versions of ibaPDA assign the module type “ibaLink-SM-64-io” to the appropiate modules. Scaling of the signals is not possible. The values are expected by ibaPDA in physical units.

9.3 ibaLogic Application

A typical combination of SM128V and ibaLogic requires connections of the fiber-optic output links to ibaFOB-io- or ibaFOB-4i (-S) input links. Each link transmits 64 analog and 64 digital signals, i.e. a total of 128 signals.

In order to use the outputs of the ibaLogic application the fiber-optic input link at channel 1 of the SM128V-card must be connected to the output link of a ibaFOB-io- or ibaFOB-4o card in the ibaLogic-PC. This link receives 64 analog and 64 digital signals.

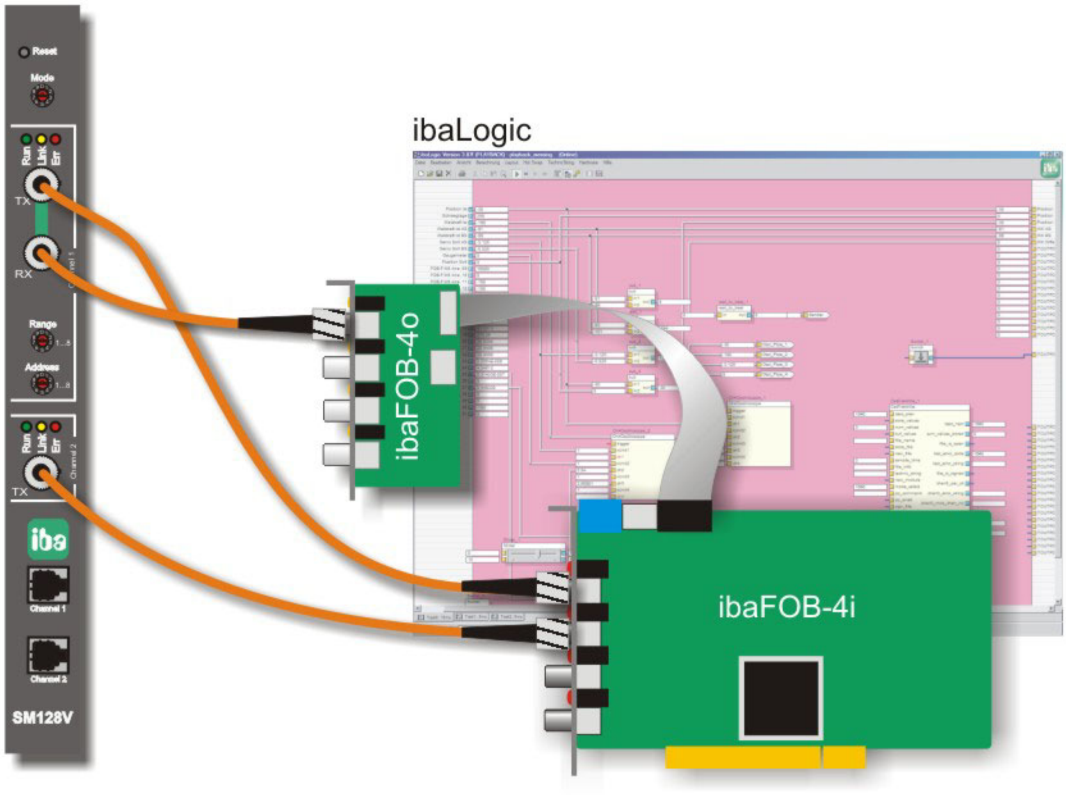


Figure 12 SM128V with ibaLogic

9.3.1.1 Engineering Note

In ibaLogic use the input resources FOB-F/FOB-IO for data coming from a SM128V.

The ibaLogic output resources FOB-F OUT / FOB-IO OUT should be used for outputs from ibaLogic to the SM128V-card.

9.4 Cascade Mode

Up to eight SM128V cards (Channel 1 only) may be cascaded in a single daisy-chain of fiber-optic devices.

Similar to the data package concept of ibaPADU-8, the total of 64 a/d signals to be transmitted over one fiber-optic link is subdivided into eight containers of eight a/d signals each.

In this mode, each SM128V participating in the chain can be partitioned into units with integer multiples of 8 channels.

The settings of the switches S2 and S3 (Channel 1) determine the start position (group of eight signals) of the *local* data in the telegram on the ibaNet bus (address 1…8) and the number of signals, in groups of eight (range 1…8), that will be occupied.

The setting of S1 switch is 0 (zero) in cascade mode.

Example 1: System Topology for Daisy-Chain of 8 SM128V with Equal Ranges

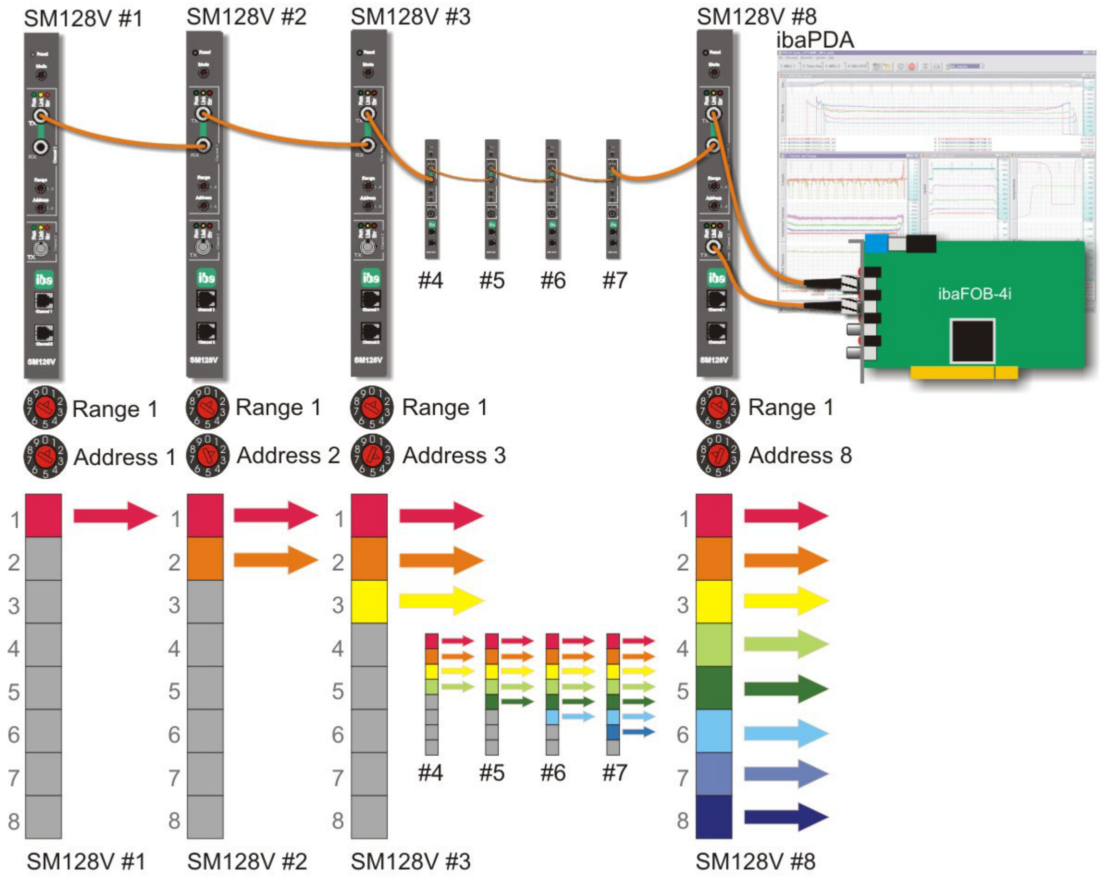


Figure 13 Cascade mode with 8 x SM128V

Eight SM128V interface cards are daisy-chained with each card transmitting 8 signals for the resulting daisy-chain telegram. The connection must be performed according to the Address switch setting on the front panel. Card #1 output is connected to card #2 input, and so on. The Range setting for each card is identical and equal to 1 in this example.

The second link of the card (Channel 2) may be used for independent transmission of up to 64 a/d signals.

Example 2: System Topology for Daisy-Chain of 3 SM128V with Different Ranges

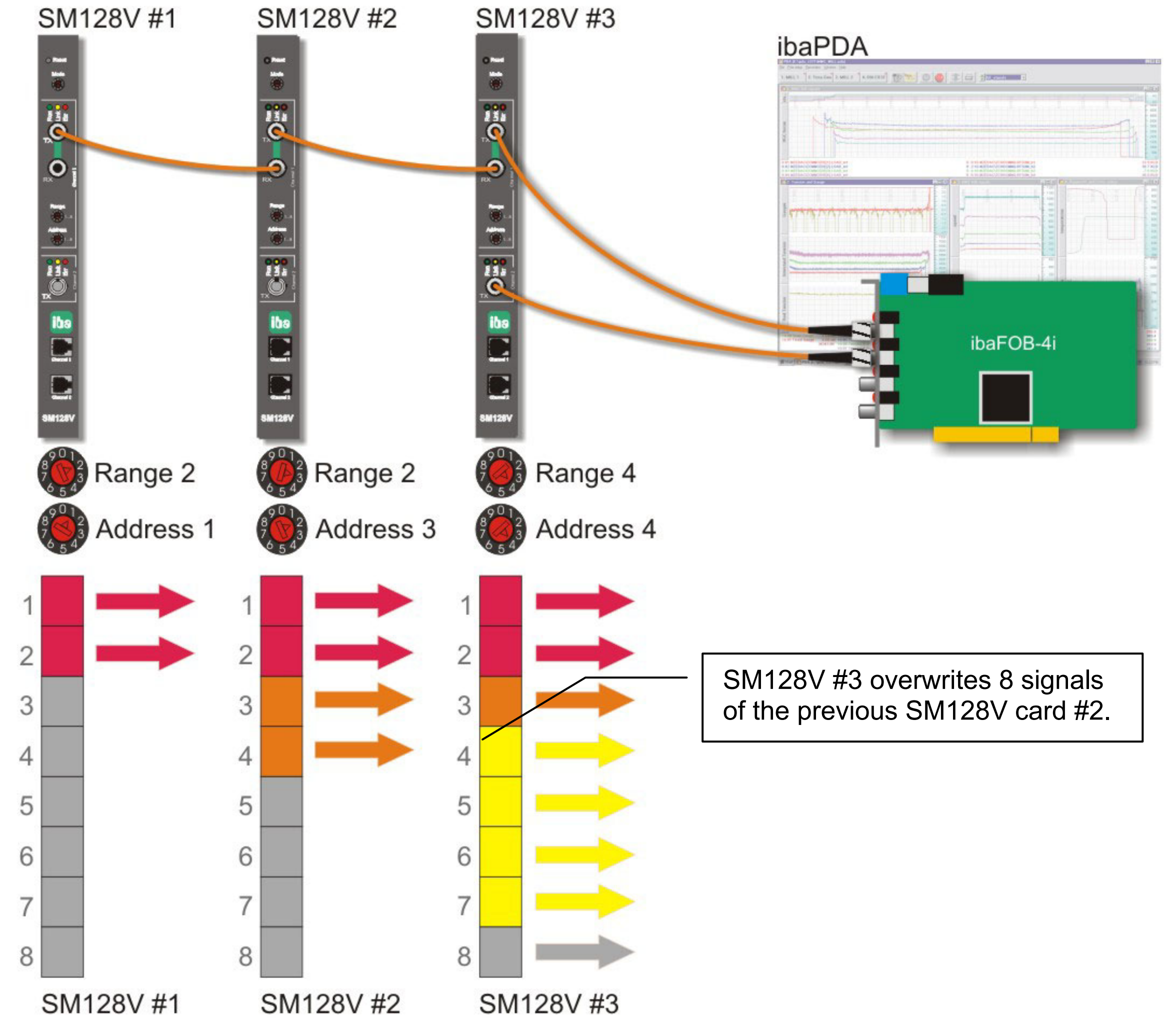


Figure 14 Cascade mode with 3 x SM128V

Three SM128V interface cards are daisy-chained with card #1 transmitting 16 signals, card #2 transmitting 16 signals and card #3 transmitting 32 signals to reach the total of 64 signals for the fiber-optic link. Again, card #1 output is connected to card #2 input, and so on. The Range switch is set according to the number of signals required to be transmitted from each respective SM128V. But in this example the card #3 overwrites eight signals of the previous card #2 in the chain because its address switch has been set to address 4. In order to transmit all 64 signals in the final telegram, the address switch of card #3 should point on 5.

Flow of Data Considerations

Be careful to note that the data written to each SM128V local dual port RAM via VME writes defines the data on the local SM128V only. If the Address/Range settings indicate a daisy-chain mode, then the incoming telegram will overwrite the outbound telegram respectively.

Consider the example of Figure 14 above, #2 receives 16 signals from #1 and places them in the signal 00-15 positions of the telegram. #2 transmits 16+16 signals to #3, #3 receives 32 signals and writes its own 32 signals (internal signal 32-63) to the resulting telegram. Now, if #3 has an Address=4, the last 8-signals block from #2 will be overwritten by #3 and then sent further to the final receiver.

9.5 Process I/O Mode

The SM128V can serve as a process i/o bus extender for PLC systems using ibaPADU-8 or ibaNet750-BM series process input and output devices. Up to 8 iba-PADU-8-O output devices can be connected to each fiber-optic output of Channel 1 and 2 for a total of 16 x 8 analog (+/-10 V or +/-20 mA, or other) and 16 x 8 binary outputs. Only daisy-chain structures are supported.

ibaPDA and ibaLogic can also be connected.

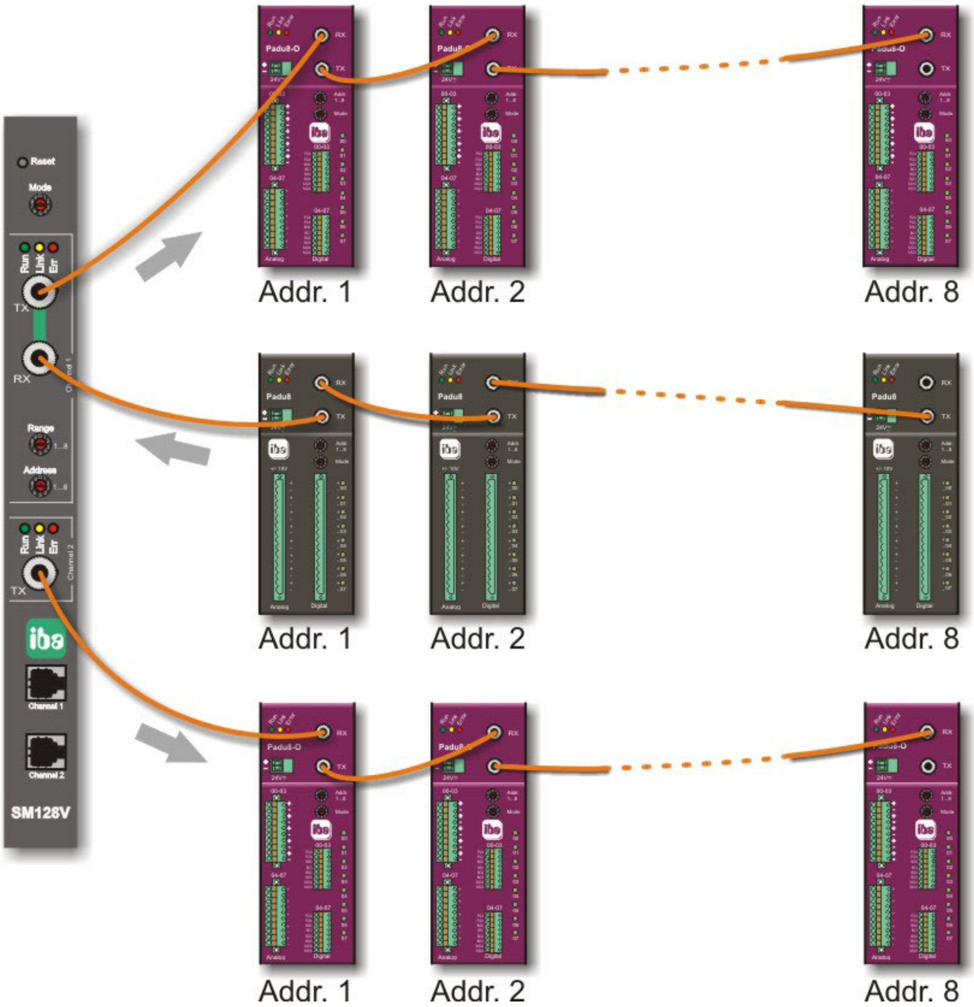


Figure 15 System topology for process i/o application with ibaPADU-8 and ibaPADU-8-O

A mix of i/o mode and cascade mode is also possible. E.g. channel 1 could be used in cascade mode and channel 2 as output.

Any ibaLink-SM-64-io telegram compatible series device can be used in combination with the SM128V.

10 The VMEbus interface

The SM128V supports a maximum of 64 input channels (a + d) and 128 output channels. The card occupies 256 kByte memory space on the VMEbus. The base VME address is adjustable using the DIP switch settings as described above.

From the VMEbus viewpoint, WORDs and DWORDs can be read and written in BIG ENDIAN or LITTLE ENDIAN format. The SM128V-card can accept both formats. The used format has to be configured with a DIP switch.

Whether the link sends in integer or float format must be defined prior to installing the SM128V. Use the DIP switch to change this setting for each fiber optic link. Each fiber-optic link must be set independently. Data must then be written to the appropriate registers.

The digital channel values may be written in channel-wise in either a DWORD for each digital channel (bit 0 of each DWORD) or an 8 byte bit mask. Prior to sending the telegram the respective registers are OR'd to determine whether a 0 or 1 is sent in the telegram. For this reason, it is important to reset the registers of the unused method.

It's an asynchronous take-over of data from the VME range into the buffer of the FOB-transmitter. Data coming out of the VME range will be synchronized with the 1 ms clock of the FOB interface. Thus the take-over time for the data varies between 0 and 1 ms.

Note

The SM128V is initialized on power reset and ready for use. It may, but must not, be reset using the hardware reset control register.

10.1 SM128V address space region definitions

Address Range	Size	Remark
0000H-003FH	64 Bytes	Hardware control
0040H-007FH	64 Bytes	Version information
0080H-00FFH	128 Bytes	General indications and information
0100H-01FFH	256 Bytes	Clear text information
0200H-03FFH	512 Bytes	Reserved for control commands
....	....	Reserved
2000H-5FFFH	16 KBytes	Analog / digital data and information
6000H-6FFFH	4 KBytes	Reserved
7000H-7FFFH	4 KBytes	Reserved
8000H-FFFFH	32 KBytes	Reserved
10000H-3FFFFH	192 KBytes	Reserved

Table 4 Address space regions

10.2 Hardware control and version region (0000H-01FFH)

The memory space from 0-0FFH serves for hardware control registers, identification information, system information, etc. No application specific functions are realized in this region. Format of data is fixed and independent of the byte order DIP-switch

00H-3FH	Hardware Control		
00H	Byte	Reserved	
01H	Byte	Reserved	
02H	Byte	Reserved	
03H	Byte	Reserved	
08H	Byte	Hardware reset	write 5AH for microprocessor HW reset
10H	Word	Reserved	
40H-4FH	Hardware information		
40H	12 Bytes	Hardware description	“SM128-VME___”
4CH-4FH	4 Bytes	Hardware revision level	“H1.0”
50H-5FH	VME standard information		
50H	12 Bytes	Standard description	“iba-VME-FOB+”
5CH	4 Bytes	Standard level	“S1.0”
60H-6FH	Firmware information		
60H	12 Bytes	Firmware description	“SM128-VME___”
6CH	4 Bytes	Firmware revision level	“F1.4”
70H-7FH	Reserved		
80H-8FH	Indicators		
80H	Word	Life counter (BIG ENDIAN)	increments each 0.8 second
82H	13 Bytes	Reserved	
8FH	Byte	Reserved	
90H-9FH	Indicators		
90H	4 Bytes	Reserved	
96H	Word	Microprocessor clock (LITTLE ENDIAN)	x10 kHz
98H-9FH	8 Bytes	Microprocessor description	Text
A0H-A7H	SM128V interface card temperature indicators (reserved)		
A0H	Word	Current temperature on the interface card	x 0.1 deg. C
A2H	Word	Average temperature on the interface card	x 0.1 deg. C
A4H	Word	Minimum temperature on the interface card	x 0.1 deg. C
A6H	Word	Maximum temperature on the interface card	x 0.1 deg. C

Table 5 Memory space for hardware control, part 1

A8H-AFH	SM128V interface card voltage indicators (reserved)		
A8H	Word	Current supply voltage on the interface card	x1 mV
AAH	Word	Average supply voltage on the interface card	x1 mV
ACH	Word	Minimum supply voltage on the interface card	x1 mV
AEH	Word	Maximum supply voltage on the interface card	x1 mV
B0H-BFH	Reserved		
C0H-DFH	Memory management information		
C0H	Long	Address space size of the card in bytes	0x00010000
C4H-DFH		Reserved	
E0H-FFH	Extended system information		
E0H	Byte	Reserved (interrupt control)	
E1H	Byte	Reserved	
E2H	Byte	Reserved	
E3H	Byte	Reserved	
E4H	Byte	LED indicators (packed) bit 0 = reserve bit 1 = Channel 1 Err LED (red) bit 2 = Channel 1 Link LED (yellow) bit 3 = Channel 1 Run LED (green) bit 4 = reserve bit 5 = Channel 2 Err LED (red) bit 6 = Channel 2 Link LED (yellow) bit 7 = Channel 2 Run LED (green)	1 = LED on 0 = LED off Message to PC for diagnostic purposes
100H	Clear text version information		
100H	256 bytes	Clear text version information	

Table 6 Memory space for hardware control, part 2

10.3 INPUTS – received telegrams

Input status – for input channel (valid for all 64 data channels)			
1800H	Word	Input status bit 0: 0 = no telegram 1 = telegram received (no error) bit 1: 0 = baudrate 3.3 Mbps 1 = baudrate 2 Mbps bit 7: 0 = analog data channels format is Integer 1 = analog data channels format is IEEE float	BIG ENDIAN
Binary INPUT (bit field oriented) 64 values			
2400H	8 Bytes	64 binary values, bitwise packed into 8 bytes	
2408H	8 Bytes	Reserved	
Extended diagnostics for INPUT channels			
2800H	128 Bytes	Extended information	Undefined
2880H	128 Bytes	Reserved	
Analog INPUT channels – 64 possible channels			
3000H	64 DWORDs	64 analog input values of fiber optic channel 1, each 4 bytes in length (IEEE float or integer) The 2 most significant bytes are not taken into account when in integer mode	Byte-order according to DIP-swich
3100H	256 Bytes	Reserved	
3600H	256 Bytes	Reserved	
3700H	256 Bytes	Reserved	

Table 7 Memory space for received telegrams

10.4 OUTPUTS – transmitted telegrams

Output format – for output dataover channel 1 and channel			
1802H	Word	Output format for fiber-optic Channel 1 bit 7: 0 = analog data channels format is Integer (default) 1 = analog data channels format is IEEE float	Valid for all 64 values in the channel BIG ENDIAN
1A02H	Word	Output format for fiber-optic Channel 2 bit 7: 0 = analog data channels format is Integer (default) 1 = analog data channels format is IEEE float	Valid for all 64 values in the channel BIG ENDIAN
Analog OUTPUT channels – 64 possible channels			
3800H	256 bytes	Fiber-optic Channel 1: 64 analog output values each 4 bytes in length (IEEE float or integer). The 2 most significant bytes are not taken into account	Byte-order according to DIP-swich
3900H	256 bytes	Fiber-optic Channel 2: 64 analog output values each 4 bytes in length (IEEE float or integer). The 2 most significant bytes are not taken into account	Byte-order according to DIP-swich
Binary OUTPUTs (DWORD oriented) 128 values			
3E00H	256 bytes	Fiber-optic Channel 1: 64 binary output values Only the least significant bit of each DWORD is used. It is OR-ed with the corresponding bit in the output bitmask (+2420H).	Byte-order according to DIP-swich
3F00H	256 bytes	Fiber-optic Channel 2 64 binary output values Only the least significant bit of each DWORD is used. It is OR-ed with the corresponding bit in the output bitmask (+2420H).	Byte-order according to DIP-swich
Binary OUTPUTs (DWORD oriented) 128 values			
2420H	8 bytes	Fiber-optic Channel 0 64 binary output values bitwise packed into 8 bytes	In increasing bit order
2428H	8 bytes	Fiber-optic Channel 1 64 binary output values bitwise packed into 8 bytes	In increasing bit order

Table 8 Memory space for transmitted telegrams

10.4.1 Pin Assignment J1, J2

In accordance with the VME+ definition, the SM128V uses a 160 pin connector as follows:

J1/P1 (upper connector)						J2/P2 (lower connector)					
Pin No.	Row z	Row a	Row b	Row c	Row d	Pin No.	Row z	Row a	Row b	Row c	Row d
1	Reserved	D00	n.s.	D08	res.	1	Reserved	user def.	+5V	user def.	res.
2	GND	D01	n.s.	D09	res.	2	GND	user def.	GND	user def.	res.
3	Reserved	D02	n.s.	D10	res.	3	Reserved	user def.	n.s.	user def.	res.
4	GND	D03	n.s.	D11	res.	4	GND	user def.	A24	user def.	res.
5	Reserved	D04	n.s.	D12	res.	5	Reserved	user def.	A25	user def.	res.
6	GND	D05	n.s.	D13	res.	6	GND	user def.	A26	user def.	res.
7	Reserved	D06	n.s.	D14	res.	7	Reserved	user def.	A27	user def.	res.
8	GND	D07	n.s.	D15	res.	8	GND	user def.	A28	user def.	res.
9	Reserved	GND	n.s.	GND	res.	9	Reserved	user def.	A29	user def.	res.
10	GND	SYSCLK	n.s.	/SYSFAIL	res.	10	GND	user def.	A30	user def.	res.
11	Reserved	GND	n.s.	/BERR	res.	11	Reserved	user def.	A31	user def.	res.
12	GND	/DS1	n.s.	/SYSRESET	res.	12	GND	user def.	GND	user def.	res.
13	Reserved	/DS0	n.s.	/LWORD	res.	13	Reserved	user def.	+5V	user def.	res.
14	GND	/WRITE	n.s.	AM5	res.	14	GND	user def.	D16	user def.	res.
15	Reserved	GND	n.s.	A23	res.	15	Reserved	user def.	D17	user def.	res.
16	GND	/DTACK	AM0	A22	res.	16	GND	user def.	D18	user def.	res.
17	Reserved	GND	AM1	A21	res.	17	Reserved	user def.	D19	user def.	res.
18	GND	/AS	AM2	A20	res.	18	GND	user def.	D20	user def.	res.
19	Reserved	GND	AM3	A19	res.	19	Reserved	user def.	D21	user def.	res.
20	GND	n.s.	GND	A18	res.	20	GND	user def.	D22	user def.	res.
21	Reserved	n.s.	n.s	A17	res.	21	Reserved	user def.	D23	user def.	res.
22	GND	n.s.	n.s	A16	res.	22	GND	user def.	GND	user def.	res.
23	Reserved	AM4	GND	A15	res.	23	Reserved	user def.	D24	user def.	res.
24	GND	n.s.	n.s.	A14	res.	24	GND	user def.	D25	user def.	res.
25	Reserved	n.s.	n.s.	A13	res.	25	Reserved	user def.	D26	user def.	res.
26	GND	n.s.	n.s.	A12	res.	26	GND	user def.	D27	user def.	res.
27	Reserved	n.s.	n.s.	A11	res.	27	Reserved	user def.	D28	user def.	res.
28	GND	n.s.	n.s.	A10	res.	28	GND	user def.	D29	user def.	res.
29	Reserved	n.s.	n.s.	A09	res.	29	Reserved	user def.	D30	user def.	res.
30	GND	n.s.	n.s.	A08	res.	30	GND	user def.	D31	user def.	res.
31	Reserved	n.s.	n.s.	n.s.	res.	31	Reserved	user def.	GND	user def.	res.
32	GND	+5V	+5V	+5V	res.	32	GND	user def.	+5V	user def.	res.

n.s. = not supported

user def. = available user pins, not used

Table 9 Pin assignment VMEbus connectors

10.4.2 Service Interface X6 On Board

Pin assignment X6	
Pin	**Function**
1	-
2	TxD
3	RxD
4	-
5	GND
6	-
7	-
8	-
9	-

Table 10 Pin assignament service interface

11 Technical Data

Manufacturer	iba AG, Deutschland
Order no.	14.131000
Operating temperature:	0 °C to 50 °C (32 °F…122 °F)
Storage temperature:	-25 °C to 70 °C (-13 °F…158 °F)
Transport temperature:	-25 °C to 70 °C (-13 °F…158 °F)
Cooling:	Natural convection
Installation:	1 slot in standard VME chassis
Humidity:	Class F condensation not allowed
IP Class:	None
Power:	5 V from VMEbus
Current consumption:	Maximum 1 ampere at 5 V
Watchdog:	. /.
Max. distance of fiber optical cable (without repeater)	2000 m (6560 ft) with appropriate cable
Communication channels Galvanic isolation	Channel 1: In-/Output 3,3 Mbit / s Channel 2: Output 3,3 MBit / s not applicable with fiber-optic
Dimensions in mm (WxHxD) in inches Front panel	1 VME Slot x 233.6 mm x 160 mm 1 VME Slot x 9.2 " x 6.3 " 6 U / 4 HP
Weight (incl. package/documents)	approx. 1 kg

Version information

Version	Date	Remarks
V1.0	11/15/00	Data transmission on both Ch0/Ch1, cascade not implemented on Ch0, only integer data transmission when in 16-bit VME mode
V1.1	11/22/02	Added functionality for SM128V Swapping of digital inputs and outputs (new DIP switch function) Peer to peer mode added (new mode 8 for mode switch supported for firmware version of A3 of higher
V1.2	10/10/03	Error correction
V 1.3	02/20/07	New order numbers

Table 1 Version information

12 Support and contact

Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

E-Mail: support@iba-ag.com

Note

If you require support, specify the serial number (iba-S/N) of the product.

Contact

Headquarters

iba AG
Koenigswarterstr. 44
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