VME - ISER12

Intelligent Board for 12 Serial Interfaces

Hardware Manual

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Changes in the chapters

The changes listed in the document affect changes in the hardware as well as a changes in the description of facts only.

Chapter	Changes versus previous version
1.6	Order information updated.
5.	Names of GND signals revised. Signal name of R/Tx- corrected.

Technical details are subject to change without further notice.

N O T E

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1. Overview

1.1 Block-Circuit Diagram

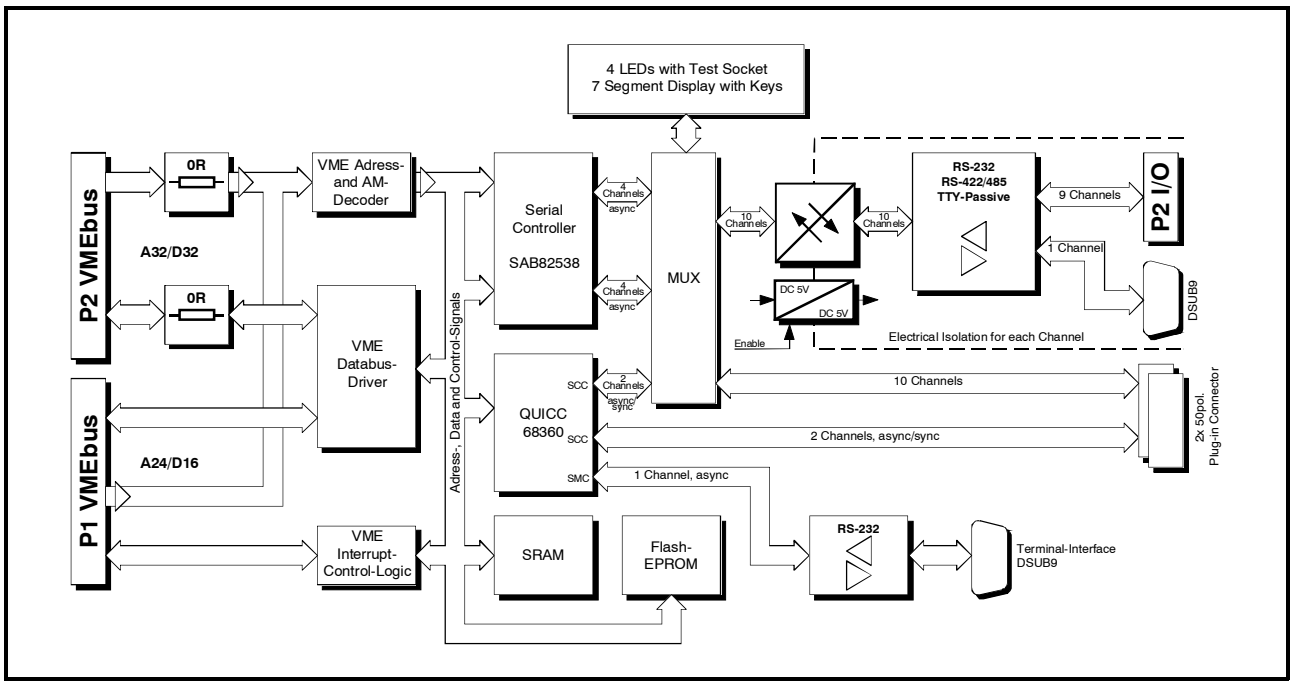


Fig. 1.1.1: Block-circuit diagram of the VME-ISER12

1.2 General

The VMEbus unit VME-ISER12 is an intelligent interface board with 12 serial interfaces for process connection and an additional RS-232 interface for the connection of a terminal for service and programming.
The CPU 68360 with a clock frequency of 33 MHz controls the local units. The firmware is stored in the Flash EPROM. A firmware update is possible via the VMEbus.

The serial controller SAB 82538 controls eight serial interfaces. The CPU 68360 supplies further four interfaces and the terminal interface via its SCCs.

The interfaces are electrically insulated from the VMEbus potential and each other by opto couplers and DC/DC converters. The channel supply can be selected. The physical interfaces RS-232, RS-422, RS-485 and TTY (passive) can be realised locally via piggybacks. In standard design the board is available with mounted RS-232 drivers.

Via VMEbus connector P2 nine serial channels are available. An additional channel can be connected by means of a female 9-pin DSUB connector in the front panel. The second DSUB connector in the front panel has been assigned with the terminal interface (RS-232).
The TTL-signals of the serial channels are led to two 50-pin post connectors.

In standard design the board offers the data transfer options A24/D16. The board can additionally be fitted with an A32/D32 interface as an assembly option. This is not useful, however, when using the local physical interfaces, because the distances in insulation decrease very much.

By means of keys and a 7-segment display in the front panel you can select a serial channel to have its signals displayed by LEDs. The selected signals can then be directly accessed at the front panel in 2 mm test sockets (TTL-level).
The status of the power supply of the electrically insulated interfaces is shown for each channel via LEDs.

A channel-oriented RAM-interface is available as firmware for the local CPU. In the local RAM the commands and parameters which are executed by the local CPU are stored. Serial data is buffered in the RAM as well.

By this shared-RAM interface the implementation into different master operating systems can easily be realised. Drivers are available for most real-time operating systems such as OS-9, VxWorks or RTOS-UH.

1.3 ESP360-Transition Modules

Two transition modules of ESP360 design can be connected via the two 50-pin post connectors. Each of these transition modules offers the conversion of four serial channels to the physical interfaces RS-232, RS-422 and RS-485. Two additional channels can be operated as RS-232 and RS-422-interfaces. They are connected by means of six 15-pin HD-DSUB connectors in the 6 HE front panel of the modules. With two ESP-360 modules all twelve channels of the VME-ISER12 become available as, e.g., RS-232 interfaces.

In the ESP-360 modules the physical layer can be selected by means of software, bridges in the connector or solder bridges, because the interface options are available in parallel here for each channel. An advantage of the ESP-360 adapter boards is the wide insulation distance of the electrical insulation, which allows operating voltages of up to 300 VDC/ 250 VAC.

A separate data sheet and manual are available for the ESP-360 module.

1.4 Compatibility to the VME-ISER8

The VME-ISER12 can substitute the VME-ISER8, because its functions are mostly compatible for the user. The following points have to be observed when exchanging the modules, however:

1. **Setting the operating mode**
   In order to achieve a compatibility to the VME-ISER8, coding switch SW130 has to be set to the value 'F'.

2. **Activity after power-on**
   In contrast to the VME-ISER8, which receives possibly arriving data on the serial interfaces immediately after power-on, the serial drivers of the VME-ISER12 are switched off until the baud rate of the according channel has been set to a value equal zero.
   Accordingly a channel can be switched off during operation by setting the baud rate to zero.

3. **Interrupt handling**
   The interrupt handling remains unchanged for the user. Locally, however, the interrupt handling has been redesigned compared to the VME-ISER8: On the VME-ISER12 seven interrupts to the VMEbus can apply simultaneously, now. The according interrupt vectors are buffered in a FIFO structure, until they are requested by the respective IACK cycle. Furthermore, the VMEbus interrupt is now reset, when the IACK signal is received.
   These changes support applications with large data rates as well as multi master applications, for example.

4. **TTY-Piggyback**
   In contrast to the VME-ISER8 only TTY-piggybacks for 'passive' TTY-interfaces can be used on the VME-ISER12. TTY-active is not possible, because no power sources are available.

5. **Standard bit rate of the terminal interface for service and programming**
   The bit rate of the terminal interface at connector P4 in the front panel is default-set to 19200 baud on the VME-ISER12.

1.5 Summary of Technical Data

1.5.1 VMEbus Interface, General

VMEbus interface	IEEE 1014 Rev. C1
Address modifier	Standard supervisory and non-privileged data access, extended supervisory and non-privileged data access, short supervisory and non-privileged access
Access modes	A24: D8, D16, ADO, UAT, RMW optional: A24/A32: D8, D16, D32, ADO, UAT, RMW
Basis address	can be configured by means of coding switches, the board uses 1 MB
Temperature range	max. permissible ambient temperature: 0...70 ˚C
Humidity	max. 90%, non-condensing
Connectors	P1 - DIN 41612-C96 (VMEbus) P2 - DIN 41612-C96 (I/O-signals and optional VMEbus signals) P3 - DSUB9/female (serial channel 10) P4 - DSUB9/female (terminal interface, RS-232) P5, P6 - 50-pin post connector (transition connector for ESP-360 modules) further connectors, only for programming and testing: X300 - 10-pin post connector (BDM-interface) X990 - 8-pin post connector (ISP-interface) X991 - 8-pin SMD socket (JTAG-interface)
Board dimensions	160 mm x 233 mm
Slot dimensions	6 HE high / 4 TE wide
Weight	ca. 400 g
Component design	SMD
Power supply via VMEbus	+5 V ±5% typical current consumption: - in idle mode on VMEbus: 1.4 A - all RS-232 channels equipped and active: 2.3 A

1.5.2 CPU-Units

CPU	QUICC 68360, 33 MHz
Flash-EPROM	1 M x 16 bits
SRAM	512 kbytes
High-Speed SRAM (optional)	2 Mbytes

1.5.3 Terminal Interface

Controller	QUICC 68360, 33 MHz
Physical Interface	RS-232
Baud rate	19200 baud (default setting)
Connection	DSUB9, sockets, front panel

1.5.4 Serial Interfaces

Number	SAB 82538: 8 asynchronous process channels QUICC 68360: 4 async./sync. process channels
Physical interface	RS-232, RS-422, RS-485, TTY passive
Baud rate	min. 38.4 kbaud (full duplex) when using all twelve channels
Electrical insulation:	via opto couplers from VMEbus potential and channels from each other
Power supply of the physical interfaces:	DC/DC-converters
LED-displays:	- 10 LEDs for power supply of the electrically insulated channels - 4 LEDs for serial signals, channel selection via keys and 7-segment display, displayed signals at 2 mm test sockets
Connection	9 channels: via P2 (VG96), 1 channel: via DSUB9 (P3) in front panel optional: 12 channels via 2x adapter board ESP360, (each 6x HD-DSUB 15-pin sockets)

1.5.5 Optional ESP360 Transition Module

Dimensions	233.35 mm x 160 mm with front panel for VMEbus slot (module takes one slot)
Temperature range	max. permissible ambient temperature: 0...50 ˚C
Connection	6x HD-DSUB15 in front panel for serial interfaces
Physical interfaces	4x RS-232, RS-422 and RS-485 2x RS-232 and RS-422 can be selected via software, solder bridges or wired bridges
Electrical insulation of serial interfaces from VME-ISER12 and each other	Reference potential of electrical insulation: according to VDE 0110b §8, Insulation group C and installation into cubicle: 300 VDC / 250 VAC

1.6 Order Information

Type	Features	Order No.
VME-ISER12	intelligent interface board with 12 serial channels, 10x RS-232 interface on board	V.1414.01
VME-ISER12-2M	additional 2 MB high-speed RAM	V.1414.15
VME-ISER12-32	A32/D32-VMEbus interface	V.1414.11
RS422-Adapter	RS-422 piggyback	V.1920.02
RS485-Adapter	RS-485 piggyback	V.1920.04
TTY-passive-Adapter	TTY-20mA passive piggyback	V.1920.06
Adapter cable 9x DSUB9	adapter cable from VMEbus P2 to 9x DSUB9 (sockets) with assembly screws, line length 1 m, for VME-ISER12	V.1410.10
VME-ISER8-ADAPT-FP3/3	front panel 3 HE/4 TE with cut-outs for 3 DSUB9-connectors, unlabelled	V.1402.13
VME-ISER8-ADAPT-FP6/9	front panel 6 HE/8 TE with cut-outs for 9 DSUB9-connectors, arranged horizontally, labelled with Port 1 ... Port 9	V.1402.12
ESP360	adapter board with 6 interfaces RS-232, RS-422 and RS-485	V.1129.01
VME-ISER12-ME	Hardware manual in English [1*)] (this manual plus software manual)	V.1414.21
VME-ISER12-ENG	Engineering manual in English [2*)] Content: circuit diagrams, PCB top overlay drawing, data sheets of significant components	V.1414.25

1 *) If module and manual are ordered together, the manual is free of charge.
2 *) This manual is liable for costs, please contact our support.

2. Description of Coding Switches and Bridges

2.1 Board View

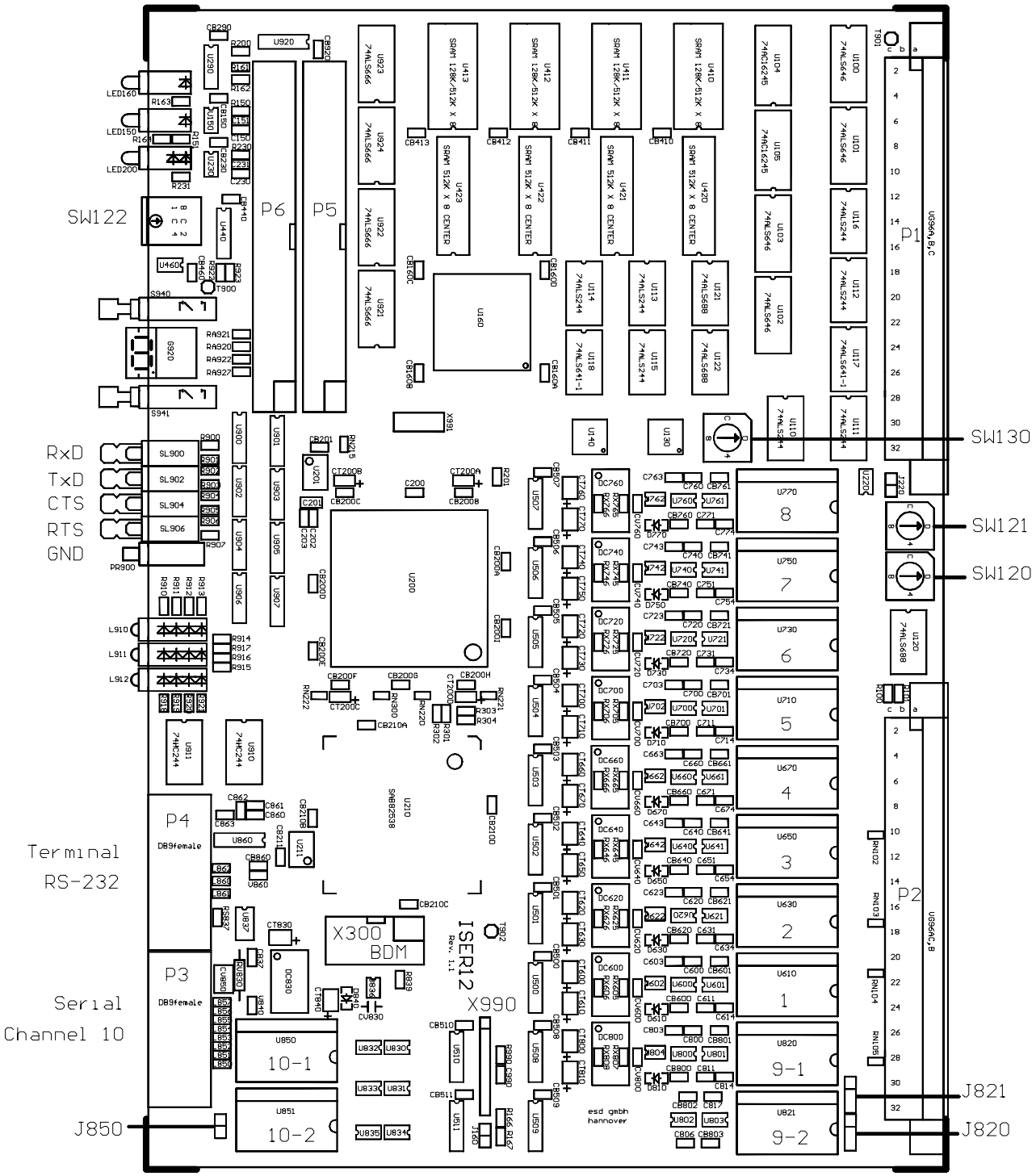


Fig. 2.1.1: Board view top layer

2.2 Default Setting of Coding Switches and Bridges

The respective default setting at the time the board is delivered is shown in the following table.

The position of coding switches and bridges is represented in Fig. 2.1.1. The jumpers will be represented in the following descriptions as seen by the user when looked at the board with the VMEbus connectors pointing to the right.

Coding switch	Function	Setting
SW120, SW121	VMEbus addresses A24...A31	VME-A32-basis address: $FF00.0000
SW122	addresses A20...A23	VME-basis address: $xx80.0000, all A24-standard accesses are permissible
SW130	A24/A32-addressing and operating mode of the VME-ISER12	A24-addressing selected and operating mode compatible to VME-ISER8

Jumper	Function	Setting
J160 *)	FPGA-slave mode or JTAG-mode	not assembled, i.e. slave mode
J220 *)	RESET	not assembled, i.e. no RESET
J820, J821	input/output setting of the sync. cycle for channel 9	open, i.e. no sync. cycle
J850	switching signal of channel 10 in synchronous mode	closed, i.e signal on pin 8 of channel 10 is connected to GND according to RS-422 and RS-485 standard.

*) J160 and J220 are not assembled in standard version

Table 2.2.1: Setting of coding switches and bridges at delivery of board

2.3 VMEbus-A24 Basis Address (SW122)

The VMEbus basis address for A24-accesses is set by means of coding switch SW122 which is accessible via the front panel. The coding switch sets the address compare bits A20 to A23.

SW122 is only evaluated, if the way of addressing has been set to A24 by means of the coding switch.

The default setting at delivery is $xx**8**0.0000.

2.4 VMEbus-A32 Basis Address (SW120, SW121)

The VMEbus basis address for A23 accesses is set by means of coding switches SW120 and SW121 which are positioned between the VMEbus connectors. They are only evaluated, if coding switch SW130 is set to access mode A23.

A32-address bits	Coding switches	Default setting [hex]
A31...A28	SW121	F
A27...A24	SW120	F

Table 2.4.1: Assignment of coding switches to A32-address bits

The default setting at delivery is $**FF**00.0000.

2.5 A24/A32-Selection and Operating Mode of the VME-ISER12 (SW130)

By means of SW130 you can select whether the VME-basis address of the VME-ISER12 is to be in A24 or A32 address range. Depending on SW130 then either SW122 for setting the A24-basis address or SW120 and SW121 for setting the A32-basis address are selected.

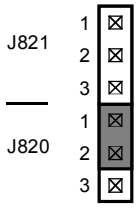
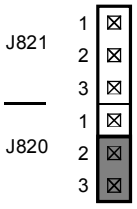
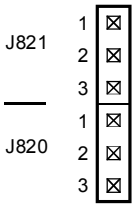
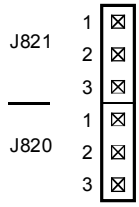
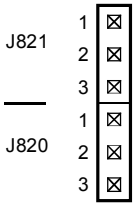
Furthermore, the operating mode of the VME-ISER12 is set by means of SW130. The following configurations are supported:

Coding switch position SW130	Addressing and operating mode
F	A24-accesses, VME-ISER12 compatible in functions to VME-ISER8
E : 8	A24-accesses, no further operating mode defined yet
7 : 1	A32-accesses, no further operating mode defined yet
0	A24-accesses, only to Flash-EPROM for program updates

Table 2.5.1: Operating modes of the VME-ISER12

2.6 Setting the Sync. Cycle Direction for Channel 9 (J820, J821)

The sync. cycle direction is configured via jumpers J820 and J821.

Transmission mode	synchronous		asynchronous: **(default setting)**
	sync. cycle generated on ISER12	sync. cycle generated externally	
RS-232			
RS-422 RS-485			
TTY (20 mA) no synchronous operation possible			

 jumper closed  jumper open

Fig. 2.6.1: Setting the sync. cycle direction

2.7 Signal Switching in sychronous Mode for Channel 10 (J850)

The signal of pin 8 of channel 10 is configured via jumper J850 in synchronous mode.
In asynchronous mode or for standard connector pin assignment of the RS-422 and RS-485 interface on a DSUB9 connector in synchronous mode, pin 8 has to be set to GND. This is the default setting of J850. For special synchronous applications pin 8 can be used for different signals:

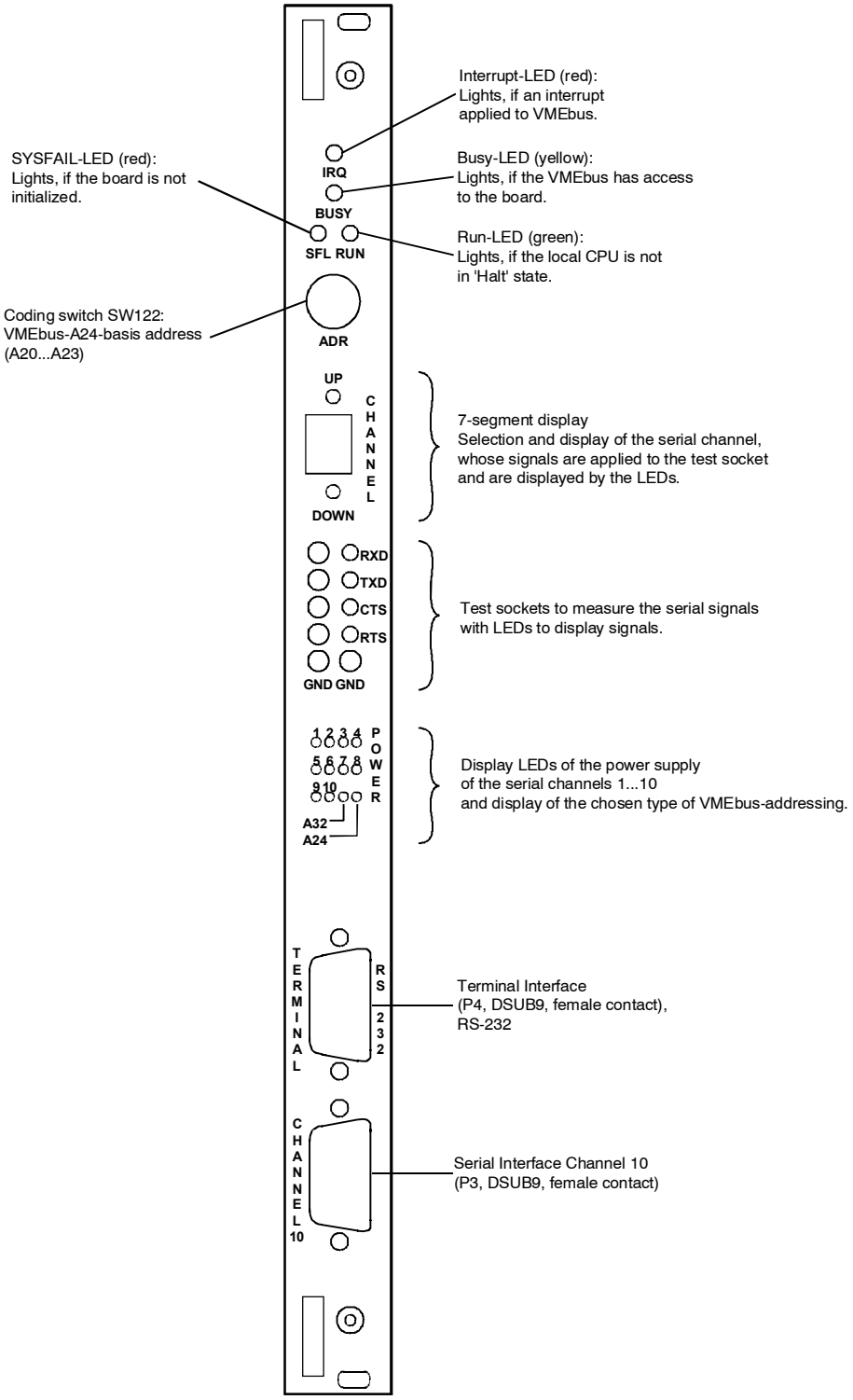
For transmission mode RS-422 the signal CLKIN- can be configured, if a separate CLKIN / CLKOUT signal is required.
For transmission mode RS-485 the signal AΩ2- can be configured, if a termination for the CLK wiring is required.

Transmission mode	signal assignment of pin 8	
	J850 closed (default)	J850 open
RS-422	GND	CLKIN-
RS-485	GND	AΩ2-

Fig. 2.6.1: Signal assignment of pin 8 of channel 10

3. Operating Elements of the Front Panel

3.1 Front Panel View and LED Functions



3.2 Description of the 7-Segment Display

3.2.1 Displays during Operation

Displayed character	Meaning	Explanations
- (hyphen)	no serial diagnosis channel has been selected	This message appears after the initialisation phase has been completed. In this status the decimal point of the 7-segment display flashes every second as well.
1...9 A	selected diagnosis channel (1...10) to LED and test sockets	In this status the decimal point of the 7-segment display flashes every second as well.

Table 3.2.1: Meaning of characters displayed during operation

3.2.2 Displays during Boot-Up

Displayed character	Meaning	Explanations
P	Board is in Flash-program mode	
E .	Board error	The 'E' and the decimal point are shown alternatively. The decimal point does not flash in this status!
1...F	Initialisation message during boot-up phase	This message appears after power-on and remains visible for a few seconds.

Table 3.2.2: Meaning of characters displayed during boot-up

3.3 Coding Switch SW122

The function of coding switch SW122 has already been described on page 13.

4. The Serial Interfaces

4.1 Overview

The ISER12 has got 10 serial process interfaces. The maximum baud rate when using all ten serial channels simultaneously is 38.4 kbaud. You can select a software (XON/XOFF) or hardware handshake for each channel.

Each of the ten channels can either be operated as RS-232, RS-422, RS-485 or TTY-power loop (passive). The different transmission modes are realised by means of RS-232 driver components or small adapter boards, so-called piggybacks.

The interfaces are electrically insulated from microcontroller potentials and each other by opto couplers and DC/DC-converters.

4.2 Connection Diagram of Serial Interfaces

Below the wiring of the serial interfaces regarding the data direction is represented. The figures are used to help to explain the short terms of the signals used in the appendix (connector assignments). You can also find the circuit diagrams of the various piggybacks available in the appendix (circuit diagrams).

4.2.1 The RS-232 Interface

In standard option the VME-ISER12 is delivered with ten RS-232 interfaces.

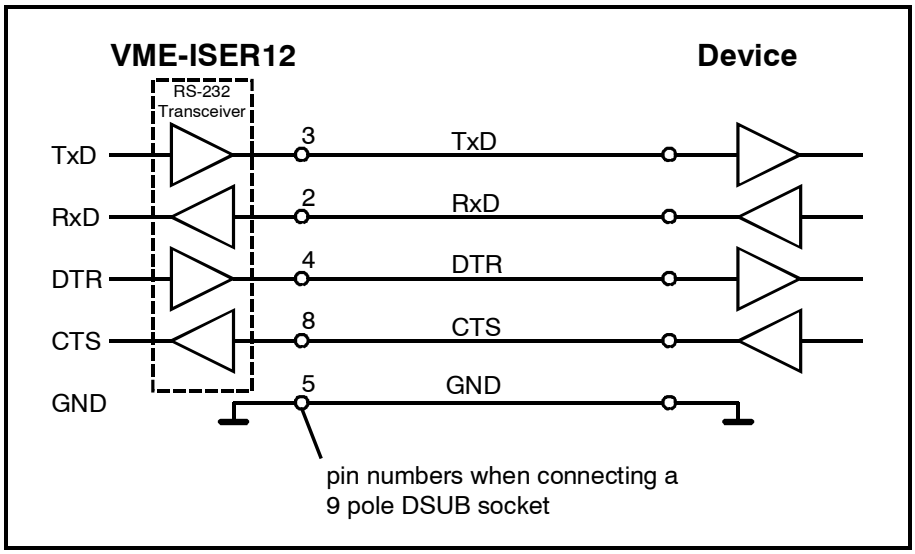


Fig. 4.2.1: Connection diagram for RS-232 operation

4.2.2 The RS-422 Interface

Assembled with according piggybacks, channels 1 to 10 can be operated as RS-422 interfaces.

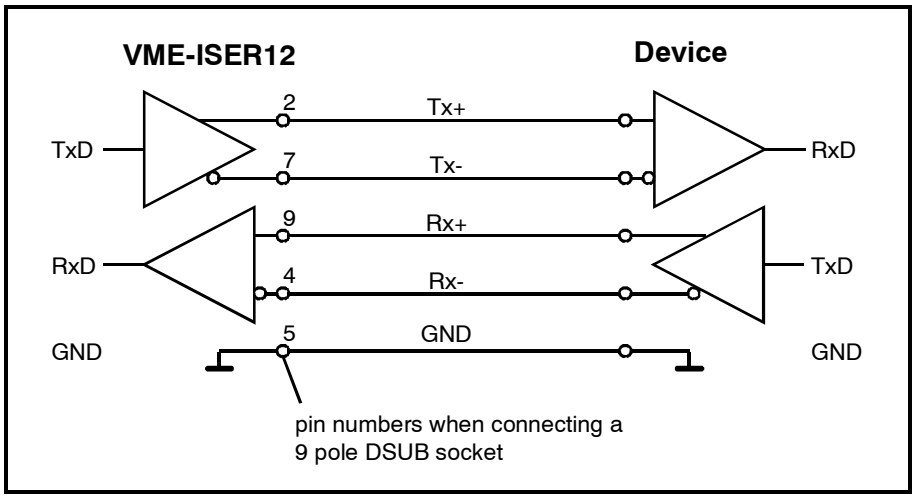


Fig. 4.2.2: Connection diagram for RS-422 operation

4.2.3 The RS-485 Interface

Assembled with according piggybacks, channels 1 to 10 can be operated as RS-485 interfaces. The piggyback contains a terminal resistor network which can be activated by setting bridges (such as in the DSUB connector).

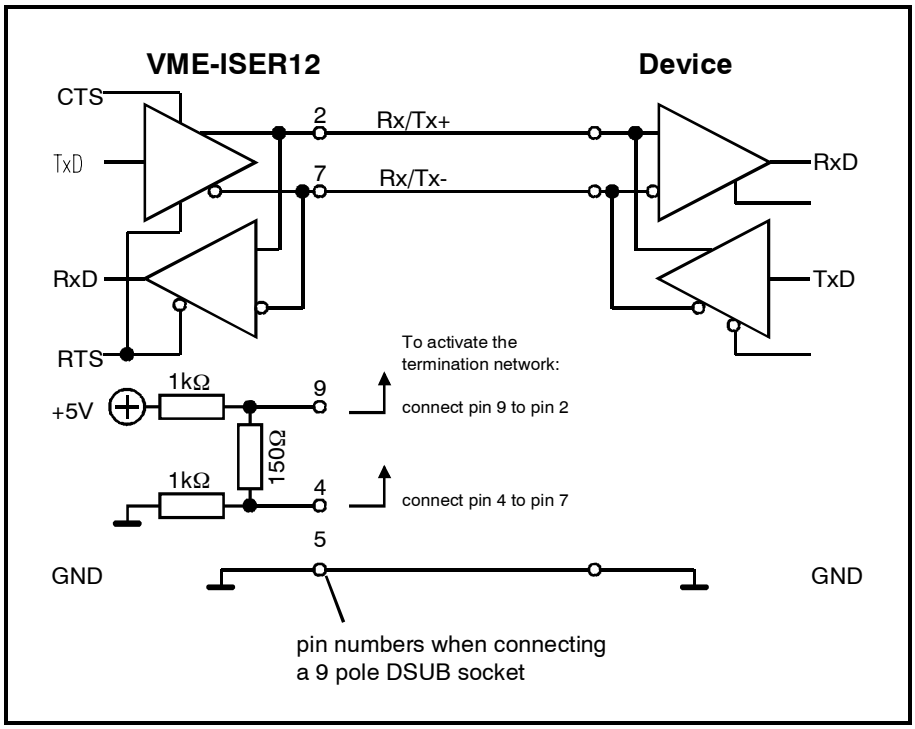


Fig. 4.2.3: Connection diagram for RS-485 operation

4.2.4 The TTY(20mA) Interface

Assembled with according piggybacks, channels 1 to 10 can be operated as passive TTY interfaces.

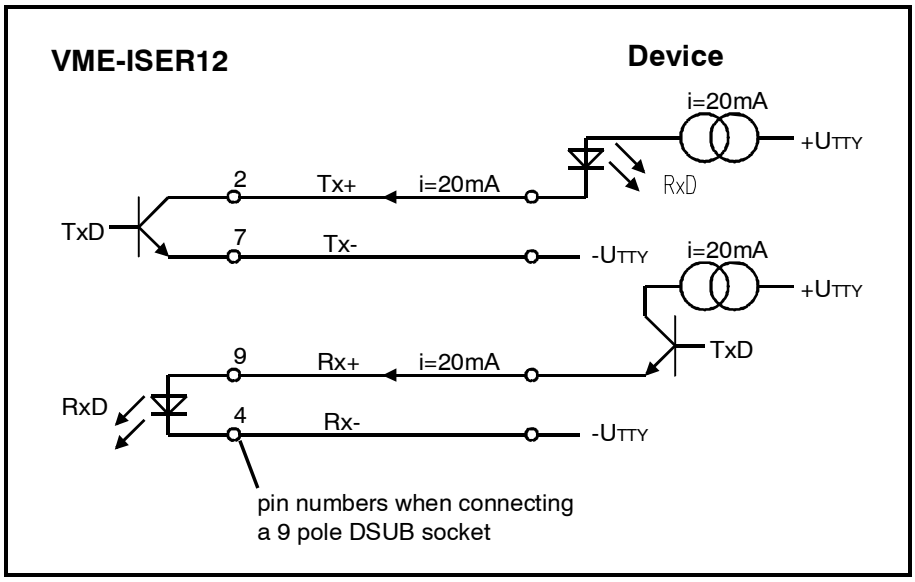


Fig. 4.2.4: Connection diagram for TTY-operation (passive)

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5. Appendix

5.1 Connector Assignment

5.1.1 VMEbus Connector P1

Pin	Signal row a	Signal row b	Signal row c
1	D00	-	D08
2	D01	-	D09
3	D02	-	D10
4	D02	BG0IN* ⌉	D11
5	D04	BG0OUT* ⌋	D12
6	D05	BG1IN* ⌉	D13
7	D06	BG1OUT* ⌋	D14
8	D07	BG2IN* ⌉	D15
9	GND	BG2OUT* ⌋	GND
10	-	BG3IN* ⌉	SYSFAIL*
11	GND	BG3OUT* ⌋	BERR*
12	DS1*	-	SYSRESET*
13	DS0*	-	LWORD*
14	WRITE*	-	AM5
15	GND	-	A23
16	DTACK*	AM0	A22
17	GND	AM1	A21
18	AS*	AM2	A20
19	GND	AM3	A19
20	IACK*	GND	A18
21	IACKIN*	-	A17
22	IACKOUT*	-	A16
23	AM4	GND	A15
24	A07	IRQ7*	A14
25	A06	IRQ6*	A13
26	A05	IRQ5*	A12
27	A04	IRQ4*	A11
28	A03	IRQ3*	A10
29	A02	IRQ2*	A09
30	A01	IRQ1*	A08
31	-	-	-
32	+5 V	+5 V	+5 V

Blade-connector strip in accordance with DIN41612 design C96/a+b+c
I_{max} per pin : 1.0 A

⌉⌋ ... signals bridged on board
- ... signal not connected on board

5.1.2 VMEbus Connector P2, Row b (Assembly Option)

Pin row b	Signal
1	-
2	GND
3	-
4	A24
5	A25
6	A26
7	A27
8	A28
9	A29
10	A30
11	A31
12	-
13	-
14	D16
15	D17
16	D18
17	D19
18	D20
19	D21
20	D22
21	D23
22	-
23	D24
24	D25
25	D26
26	D27
27	D28
28	D29
29	D30
30	D31
31	-
32	-

Blade-connector strip in accordance with DIN41612
I_{max} per pin : 1.0 A

5.1.3 VMEbus Connector P2, Row a and c

Pin row a	Signal at row a						Signal at row c					Pin row c
	RS-232	RS-485	RS-422	20mA passive	20mA active		RS-232	RS-485	RS-422	20mA passive	20mA active	
1	-	R/Tx-8	Tx-8	Tx-8	(-12V)		RxD8	R/Tx+8	Tx+8	Tx+8	Tx-8	1
2	CTS8	GND	GND	(I2+8)	Rx+8	**Channel 8**	TxD8	-	-	(I1+8)	Tx+8	2
3	-	AΩ8+	Rx+8	Rx+8	Rx-8		DTR8	AΩ8-	Rx-8	Rx-8	(-12V)	3
4	RxD7	R/Tx+7	Tx+7	Tx+7	Tx-7		GND8	GND8	GND8	GND8	GND8	4
5	TxD7	-	-	(I1+7)	Tx+7		-	R/Tx-7	Tx-7	Tx-7	(-12V)	5
6	DTR7	AΩ7-	Rx-7	Rx-7	(-12V)	**Channel 7**	CTS7	GND7	GND7	(I2+7)	Rx+7	6
7	GND7	GND7	GND7	GND7	GND7		-	AΩ7+	Rx+7	Rx+7	Rx-7	7
8	-	R/Tx-6	Tx-6	Tx-6	(-12V)		RxD6	R/Tx+6	Tx+6	Tx+6	Tx-6	8
9	CTS6	GND6	GND6	(I2+6)	Rx+6	**Channel 6**	TxD6	-	-	(I1+6)	Tx+6	9
10	-	AΩ6+	Rx+6	Rx+6	Rx-6		DTR6	AΩ6-	Rx-6	Rx-6	(-12V)	10
11	RxD5	R/Tx+5	Tx+5	Tx+5	Tx-5		GND6	GND6	GND6	GND6	GND6	11
12	TxD5	-	-	(I1+5)	Tx+5		-	R/Tx-5	Tx-5	Tx-5	(-12V)	12
13	DTR5	AΩ5-	Rx-5	Rx-5	(-12V)	**Channel 5**	CTS5	GND5	GND5	(I2+5)	Rx+5	13
14	GND5	GND5	GND5	GND5	GND5		-	AΩ5+	Rx+5	Rx+5	Rx-5	14
15	-	R/Tx-4	Tx-4	Tx-4	(-12V)		RxD4	R/Tx+4	Tx+4	Tx+4	Tx-4	15
16	CTS4	GND4	GND4	(I2+4)	Rx4+	**Channel 4**	TxD4	-	-	(I1+4)	Tx+4	16
17	-	AΩ4+	Rx+4	Rx+4	Rx4-		DTR4	AΩ4-	Rx-4	Rx-4	(-12V)	17
18	RxD3	R/Tx+	Tx+3	Tx+3	Tx-3		GND4	GND4	GND4	GND4	GND4	18
19	TxD3	-	-	(I1+3)	Tx+3		-	R/Tx-3	Tx-3	Tx-3	(-12V)	19
20	DTR3	AΩ3-	Rx-3	Rx-3	(-12V)	**Channel 3**	CTS3	GND3	GND3	(I2+3)	Rx+3	20
21	GND3	GND3	GND3	GND3	GND3		-	AΩ3+	Rx+3	Rx+3	Rx-3	21
22	-	R/Tx-2	Tx-2	Tx-2	(-12V)		RxD2	R/Tx+2	Tx+2	Tx+2	Tx-2	22
23	CTS2	GND2	GND2	(I2+2)	Rx2-	**Channel 2**	TxD2	-	-	(I1+2)	Tx+2	23
24	-	AΩ2+	Rx+2	Rx+2	Rx2+		DTR2	AΩ2-	Rx-2	Rx-2	(-12V)	24
25	RxD1	R/Tx+1	Tx+1	Tx+1	Tx-1		GND2	GND2	GND2	GND2	GND2	25
26	TxD1	-	-	(I1+1)	Tx+1		-	R/Tx-1	Tx-1	Tx-1	(-12V)	26
27	DTR1	AΩ1-	Rx-1	Rx-1	(-12V)	**Channel 1**	CTS1	GND1	GND1	(I2+1)	Rx+1	27
28	GND1	GND1	GND1	GND1	GND1		-	AΩ1+	Rx+1	Rx+1	Rx-1	28
29	RxD9	R/Tx+9	Tx+9	Tx+9	Tx-9		CLKI/O	CLK9	CLK9	-	-	29
30	TxD9	-	-	(I1+9)	Tx+9	**Channel 9**	-	R/Tx-9	Tx-9	Tx-9	(-12V)	30
31	DTR9	AΩ9-	Rx-9	Rx-9	(-12V)		CTS9	GND9	GND9	(I2+9)	Rx+9	31
32	GND9	GND9	GND9	GND9	GND9		-	AΩ9+	Rx+9	Rx+9	Rx-9	32

Blade-connector strip in accordance with DIN 41612 design C96 a+c

( )... The signals in brackets are connected to the female DSUB connector but are not required fo the corresponding operating mode.

RS-485: In order to activate the terminal resistor network of an interface signal AΩy+ has to be connected to R/Tx+y, and AΩy- to R/Tx-y (y = 1, 2,...9).

5.1.4 Transition Module I/O-Connector P2 to Phönix FLKM64 or FLKMS64

Pin	Signal						Signal					Pin
	RS-232	RS-485	RS-422	20mA passive	20mA active		RS-232	RS-485	RS-422	20mA passive	20mA active	
2	-	R/Tx-8	Tx-8	Tx-8	(-12V)		RxD8	R/Tx+8	Tx+8	Tx+8	Tx-8	1
4	CTS8	GND8	GND8	(I2+8)	Rx+8	Channel 8	TxD8	-	-	(I1+8)	Tx+8	3
6	-	AΩ8+	Rx+8	Rx+8	Rx-8		DTR8	AΩ8-	Rx-8	Rx-8	(-12V)	5
8	RxD7	R/Tx+7	Tx+7	Tx+7	Tx-7		GND8	GND8	GND8	GND8	GND8	7
10	TxD7	-	-	(I1+7)	Tx+7		-	R/Tx-7	Tx-7	Tx-7	(-12V)	9
12	DTR7	AΩ7-	Rx-7	Rx-7	(-12V)	Channel 7	CTS7	GND7	GND7	(I2+7)	Rx+7	11
14	GND7	GND7	GND7	GND7	GND7		-	AΩ7+	Rx+7	Rx+7	Rx-7	13
16	-	R/Tx-6	Tx-6	Tx-6	(-12V)		RxD6	R/Tx+6	Tx+6	Tx+6	Tx-6	15
18	CTS6	GND6	GND6	(I2+6)	Rx+6	Channel 6	TxD6	-	-	(I1+6)	Tx+6	17
20	-	AΩ6+	Rx+6	Rx+6	Rx-6		DTR6	AΩ6-	Rx-6	Rx-6	(-12V)	19
22	RxD5	R/Tx+5	Tx+5	Tx+5	Tx-5		GND6	GND6	GND6	GND6	GND6	21
24	TxD5	-	-	(I1+5)	Tx+5		-	R/Tx-5	Tx-5	Tx-5	(-12V)	23
26	DTR5	AΩ5-	Rx-5	Rx-5	(-12V)	Channel 5	CTS5	GND5	GND5	(I2+5)	Rx+5	25
28	GND5	GND5	GND5	GND5	GND5		-	AΩ5+	Rx+5	Rx+5	Rx-5	27
30	-	R/Tx-4	Tx-4	Tx-4	(-12V)		RxD4	R/Tx+4	Tx+4	Tx+4	Tx-4	29
32	CTS4	GND4	GND4	(I2+4)	Rx4+	Channel 4	TxD4	-	-	(I1+4)	Tx+4	31
34	-	AΩ4+	Rx+4	Rx+4	Rx4-		DTR4	AΩ4-	Rx-4	Rx-4	(-12V)	33
36	RxD3	R/Tx+	Tx+3	Tx+3	Tx-3		GND4	GND4	GND4	GND4	GND4	35
38	TxD3	-	-	(I1+3)	Tx+3		-	R/Tx-3	Tx-3	Tx-3	(-12V)	37
40	DTR3	AΩ3-	Rx-3	Rx-3	(-12V)	Channel 3	CTS3	GND3	GND3	(I2+3)	Rx+3	39
42	GND3	GND3	GND3	GND3	GND3		-	AΩ3+	Rx+3	Rx+3	Rx-3	41
44	-	R/Tx-2	Tx-2	Tx-2	(-12V)		RxD2	R/Tx+2	Tx+2	Tx+2	Tx-2	43
46	CTS2	GND2	GND2	(I2+2)	Rx2-	Channel 2	TxD2	-	-	(I1+2)	Tx+2	45
48	-	AΩ2+	Rx+2	Rx+2	Rx2+		DTR2	AΩ2-	Rx-2	Rx-2	(-12V)	47
50	RxD1	R/Tx+1	Tx+1	Tx+1	Tx-1		GND2	GND2	GND2	GND2	GND2	49
52	TxD1	-	-	(I1+1)	Tx+1		-	R/Tx-1	Tx-1	Tx-1	(-12V)	51
54	DTR1	AΩ1-	Rx-1	Rx-1	(-12V)	Channel 1	CTS1	GND1	GND1	(I2+1)	Rx+1	53
56	GND1	GND1	GND1	GND1	GND1		-	AΩ1+	Rx+1	Rx+1	Rx-1	55
58	RxD9	R/Tx+9	Tx+9	Tx+9	Tx-9		CLKI/O	CLK+9	CLK+9	-	-	57
60	TxD9	CLK-9	CLK-9	(I1+9)	Tx+9	Channel 9	-	R/Tx-9	Tx-9	Tx-9	(-12V)	59
62	DTR9	AΩ9-	Rx-9	Rx-9	(-12V)		CTS9	GND9	GND9	(I2+9)	Rx+9	61
64	GND9	GND9	GND9	GND9	GND9		-	AΩ9+	Rx+9	Rx+9	Rx-9	63

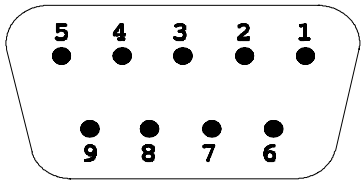
( )... The signals in brackets are connected to the female DSUB connector, but are not required for the corresponding operating mode.

RS-485: In order to activate the terminal resistor network of an interface signal AΩy+ has to be connected to R/Tx+y, and AΩy- to R/Tx-y (y = 1, 2,...9).

5.1.5 Assignment of a 9-pin Female DSUB with the Signals of Serial Channels 1...8

The following assignment applies when the adapter cable 'VMEbus P2 to 9x 9-pin DSUB female' with order number V.1402.10 is used (see order information).

Pin Position DSUB9 Female :



Pin Assignment:

Signal				DSUB9-Pin		Signal			
RS-232	**RS-485**	**RS-422**	**20mA passive**			**20mA passive**	**RS-422**	**RS-485**	**RS-232**
-	-	-	-	1	6	-	-	-	-
RxD	R/Tx+	Tx+	Tx+	2	7	Tx-	Tx-	R/Tx-	-
TxD	-	-	(I1+)	3	8	(I2+)	GND	GND	CTS
DTR	AΩ1-	Rx-	Rx-	4	9	Rx+	Rx+	AΩ1+	-
GND	GND	GND	GND	5					

9-pin DSUB female

( )... The signals given in brackets are connected to the DSUB, but are nor required for the corresponding operating mode.

RS-485: In order to activate the terminal resistor network of an interface, signal AΩy+ has to be connected to R/Tx+y and AΩy- to R/Tx-y (y = 1, 2,...9).

5.1.6 Serial Channel 9 (optional Synchronous Mode)

The following assignment applies when the adapter cable 'VMEbus P2 to 9x 9-pin DSUB female' with order number V.1402.10 is used (see order information).

Signal				DSUB9-Pin		Signal			
RS-232	RS-485	RS-422	20mA passive			20mA passive	RS-422	RS-485	RS-232
-	-	-	-	1	6	-	CLK+	CLK+	CLKI/O
RxD	R/Tx+	Tx+	Tx+	2	7	Tx-	Tx-	R/Tx-	-
TxD	CLK-	CLK-	(I1+)	3	8	(I2+)	GND	GND	CTS
DTR	AΩ1-	Rx-	Rx-	4	9	Rx+	Rx+	AΩ1+	-
GND	GND	GND	GND	5					

9-pin DSUB female

( )... The signals given in brackets are connected to the DSUB, but are nor required for the corresponding operating mode.

RS-485: In order to activate the terminal resistor network of an interface, signal AΩy+ has to be connected to R/Tx+y and AΩy- to R/Tx-y (y = 1, 2,...9).

Note: Interface 9 is connected via VMEbus-I/O connector P2 (adapter cable). Interface 10 can be accessed via the lower DSUB connector in the front panel (P3).

5.1.7 Serial Channel 10 (optional Synchronous Mode)

Interface 10 can be accessed via the lower DSUB connector in the front panel (P3).

Signal				DSUB9-Pin		Signal			
RS-232	**RS-485**	**RS-422**	**20mA passive**			**20mA passive**	**RS-422**	**RS-485**	**RS-232**
CLKO	AΩ2+	CLKIN+	-	1	6	-	CLKO+	CLKIO+	CLKI
RxD	R/Tx+	Tx+	Tx+	2	7	Tx-	Tx-	R/Tx-	-
TxD	CLKIO-	CLKO-	(I1+)	3	8	(I2+)	CLKIN-** / GND*	AΩ2-** / GND*	CTS
DTR	AΩ1-	Rx-	Rx-	4	9	Rx+	Rx+	AΩ1+	-
GND	GND	GND	GND	5					

9-pin DSUB female

( )... The signals given in brackets are connected to the DSUB, but are not required for the corresponding operating mode.

RS-485: In order to activate the terminal resistor network of an interface, signal AΩ1+ has to be connected to R/Tx+ and AΩ1- to R/Tx-. In synchronous mode signal AΩ2+ has to be connected to CLKIO+ and AΩ2- to CLKIO-.

*... Default signal according to RS-422 and RS-485 standard. Valid, if Jumper J850 is closed.

**... Signal valid if J850 is open. Used in transmission mode RS-422, if a seperate CLKIN/CLKOUT signal is required. Used in transmission mode RS-485, if a termination for the CLK wiring is required.

5.1.8 Serial Interface for Terminal Connection (P4, DSUB9)

The terminal interface has been designed as an RS-232 interface. The standard baud rate is 19200 baud.

The DSUB connector is installed in the front panel (upper DSUB connector).

Pin Position:

Signal RS-232	DSUB9 Pin		Signal RS-232
-	1	6	-
RxD (input)	2	7	-
TxD (output)	3	8	-
RTS (output)	4	9	-
GND	5		

9-pin DSUB female
-.... signal is not connected

5.1.9 Transition Connector P5 to ESP-Module ESP-360

Signal	Pin		Signal
RXD9	1	2	MOD0WR9*
TXD9	3	4	MOD0WR10*
RXCLK9	5	6	GND
RXCLK10	7	8	RTS09*
SEL01	9	10	RTS10*
SEL00	11	12	RTS01*
RXCLK01	13	14	RTS02*
RXCLK02	15	16	CTS9*
RXD10	17	18	DIR09*
TXD10	19	20	CTS10*
MOD01RD*	21	22	GND
MOD00RD*	23	24	DIR10*
MOD1WR09*	25	26	-
SMRXD4	27	28	CTS1*
SMTXD3	29	30	RXD1
SMRXD3	31	32	TXD01
DIR01*	33	34	TXCLK09
CTS2*	35	36	TXCLK10
DIR02*	37	38	SMLEV03*
TXCLK01	39	40	GND
SMLEV04*	41	42	MOD1WR02*
RXD2	43	44	MOD0WR02*
TXD02	45	46	MOD1WR01*
SMTXD04	47	48	MOD0WR01*
MOD1WR10*	49	50	TXCLK02

-... signal is not connected

5.1.10 Transition Connector P6 to ESP-Module ESP-360

Signal	Pin		Signal
RXD11	1	2	MOD0WR11*
TXD11	3	4	MOD0WR12*
RXCLK11	5	6	GND
RXCLK12	7	8	RTS11*
SEL11	9	10	RTS12*
SEL10	11	12	RTS05*
RXCLK05	13	14	RTS06*
RXCLK06	15	16	CTS11*
RXD12	17	18	DIR11*
TXD12	19	20	CTS12*
MOD11RD*	21	22	GND
MOD10RD*	23	24	DIR12*
MOD1WR11*	25	26	-
SMRXD8	27	28	CTS5*
SMTXD7	29	30	RXD5
SMRXD7	31	32	TXD05
DIR05*	33	34	TXCLK11
CTS6*	35	36	TXCLK12
DIR06*	37	38	SMLEV07*
TXCLK05	39	40	GND
SMLEV08*	41	42	MOD1WR06*
RXD6	43	44	MOD0WR06*
TXD06	45	46	MOD1WR05*
SMTXD08	47	48	MOD0WR05*
MOD1WR12*	49	50	TXCLK06

-... signal is not connected

5.1.11 Position of Serial Channels at Front Panel of the ESP-Modules

In order to connect all twelve channels of the VME-ISER12 two ESP-modules are required. The following table represents the assignment of the twelve channels to the 15-pin HD-DSUB female connectors in the front panel of the ESP-modules. The order of the channels does **not** correspond to the labelling of the ESP360-modules, because the labelling regards the connection of ESP360-modules to the IP-module IP-Comm360!

The following table shows the position of the serial channels in the front panel of the ESP360-modules:

Front panel labelling of the ESP360-module	Serial channel of the VME-ISER12 when connecting the ESP360-module to connector...	
	... P5	... P6
SMC 1	3	7
SMC 2	4	8
SCC 1	9	11
SCC 2	10	12
SCC 3	1	5
SCC 4	2	6

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