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Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

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VT-VSPD – Digital valve amplifier for proportional valves without position feedback

RE 30523-B/09.13
Replaces: 08.07

Installation and operation

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1 General

1.1 About these instructions

Before installing or operating the VSPD controller card for the first time, you must read these instructions. Pay particular attention to the safety regulations described in chapter 2.1.

The controller card may only be commissioned and operated by persons who have a sufficient knowledge with regard to its installation and operation.

These instructions are intended to make you familiar with the functions of the controller card and utilize it according to the intended purpose.

The instructions contain important notes for the proper and safe installation and operation of the controller card. Observing these instructions helps to:

- avoid risks
- reduce repair costs and downtimes
- increase the service life and reliability of the controller card.

Additionally, please observe all regulations that are in effect in the country and/or community to prevent accidents and to protect the environment.

These instructions only describe the installation and operation of the controller card. For additional information on commissioning the controller card with help of the software BODAC, which is included in the scope of supply, "Starting up the VSPD Control Card and Operation of the BODAC Software ". A list of documentation for the VSPD can be found in the chapter “Associated documentation" section.

Associated documentation

Apart from the present instructions, we offer further documentation with regard to the "VSPD digital control electronics for electromechanical and electrohydraulic drives".

These include:

- RE data sheet “RE 30 523” in paper form.
- The documentation RE 30 523-B. Starting up the VSPD Controller Card and Operation of the BODAC Software”.
- Internet: www.boschrexroth.com

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1 General

Signs and symbols used

The following signs and symbols are used in these instructions:

- ➢ Action symbol: The text following this symbol describes actions. The text under this sign describes activities that must be carried out in the given order.
- ✓ Result symbol: The text following this symbol describes the results of an action.

Following this symbol you will find notes and useful tips for optimal use of the controller card.

Warning signs

Special safety notes are provided at the relevant locations. These are indicated by the following symbols.

General hazard
This sign is placed in front of activities which represent a potential hazard to persons and/or extensive damage to equipment.

If the source of the hazard can be exactly defined, the corresponding pictogram is used.

Hazard of electric power
This sign is placed in front of activities which represent a potential hazard to persons and/or extensive damage to equipment due to high voltage.

Damage to property
This sign precedes activities, which involve a risk of damage to property.

1.2 Scope of supply

The equipment is packed in anti-static packaging to protect the controller card from electrostatic discharge. Please also observe the notes at the top of the packaging.

Included in the shipment:

- Controller card VSPD
- RE data sheet RE 30 523-B

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1.3 Preconditions for operation

The controller card is operated in an open card holder

- VT3002-2x/48F or VT 3002-2x/64G

according to RE 29 928. The open card holder must be installed in a control cabinet, since there is no shock-hazard protection provided.

When no voltage supply is provided from the system side, you can also use power supply unit

- VT-NE30

according to RE 29 929.

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2 Installing the VSPD

2.1 Safety regulations

Operate the VSPD controller card only when it is in technically perfect condition and in accordance with the intended use, being aware of safety and risks and observing the present documentation!

In the event of faults that affect safety or in the case of changes in the operating behavior, shut the controller card down immediately and inform the responsible personnel.

The proper and safe operation of the product implies proper transport, correct storage, and installation as well as thorough commissioning and operation.

The VSPD controller card has been built using the latest technology, and in accordance with recognized safety standards. Nevertheless, its use can result in personal injury and damage to property, when:

- You operate the VSPD controller card not in accordance with the intended purpose (see page 9, Use in accordance with the intended purpose)
- The VSPD controller card is not installed, commissioned and operated by specialist personnel.
- You modify or convert the VSPD controller card improperly.
- You do not observe the safety regulations and safety notes.

The VSPD controller card is intended for use in industrial applications.

The card must not be operated until it has been determined that the system in which the controller card is installed, meets all applicable standards and safety regulations for the application.

In European countries: EC Directive 89/392/EEC (Machinery Directive)

Operation is permitted only when applicable EMC regulations for the application are met.

Adherence to limits defined by national regulations and standards is the responsibility of the manufacturer of the system or machine.

In European countries: EC Directive 89/336/EEC (EMC Directive)

In the USA: National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA), as well as local standards should be observed. The operator must comply at any time with the points mentioned before.

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Use in accordance with the intended purpose

The VSPD controller card is designed for the open and closed-loop control of electro-mechanical and electrohydraulic drives.

Possible fields of application are:

- Proportional directional valves without feedback
- Pressure control valves

Use in accordance with the intended purpose also includes the observance of these instructions, accompanying documentation and the compliance with regulations for the prevention of accidents valid at the place of operation.

Personnel Selection and Qualification

Operating and Startup

Operation and startup of the VSPD controller card requires specialized skills. Therefore this work should be performed only by properly trained individuals.

Only persons who are trained or properly instructed should start up and operate the VSPD controller card. Additionally the oversight of a qualified supervisor may be advised.

Personnel are considered qualified if they are familiar with the installation, startup and operation of the VSPD controller card, and with all the warning notes and safety regulations contained in the accompanying documentation.

Work on the electrical equipment must be performed only by qualified specialists or by personnel appropriately instructed and under the supervision and guidance of persons qualified and familiar with electrical safety standards.

An electrical specialist is someone who, based on his technical knowledge and training, as well as knowledge of the relevant standards, is able to evaluate the tasks assigned to him, recognize potential hazards and take the appropriate safety measures.

Repair and troubleshooting

Repair and troubleshooting requires specialized skills. Therefore, this work should be performed only by trained and designated specialists.

Design Changes and Electrical Installation

User changes to the VSPD controller card may result in safety hazards.

Note the following recommendations on electrical installation:

- Use low-capacitance cables. Make cable connections without intermediate connections whenever possible.
- Control electronics should be isolated from electromagnetic noise sources (IE: V/F drives).
- Power wiring should not be routed in the vicinity of control electronics.
- Power wiring should not be routed in the vicinity of control wiring or cables.
- Route sensor lines separately.
- Maintain a distance of at least 1 meter from antenna lines, RF devices and radio equipment.

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- When using differential inputs switch both inputs on and off at the same time.
- When switching signal inputs, use dry circuit rated relays with gold-plated contacts (low voltages, low currents)
- Always shield all analog signal lines. Connect shields at the card end only, connecting to the "Shield" terminal, and leave the other end open to prevent ground loops.
- Connect to an appropriate system ground using stranded copper wire (min 2.5mm2 / 12 AWG)
  The system ground is an essential component of the EMC protection for the controller card. The ground provides a path for noise that could otherwise enter the controller card through the signal and power supply lines. Noise is bypassed only if the system ground does not couple noise into the controller card.
  Rexroth also recommends shielding solenoid wiring.
- Do not use logical signals from the controller card (IE: “OK” signal) for switching machine safety circuits
  (see European Norm "Safety Requirements for Fluid Power Systems and Components" EN982:1996).

2.2 Repair and Troubleshooting

If the control cabinet contains additional electrical components utilizing high voltage, always observe safety standards to prevent accidents! Use appropriate protective gear, such as safety shoes and safety gloves, when prudent!

Use appropriate tools (IE: insulated tools)

Before opening control cabinet doors, open the main disconnect.

To ensure safe working conditions, observe the following safety rules:

- Remove all power
- Ensure against unintended energization: lockout devices when possible, and use lockout warning tags
- Verify that voltage is not present
- Cover or close off adjacent areas that are still energized.

If work on energized components is necessary, have a second person present as a safety backup to actuate an E-STOP switch or open the main disconnect, if necessary. Use insulated tools only

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2.3 Transport, Storage and Handling the Controller Card

Notes on handling the controller card are printed on the packaging. They must be strictly observed.

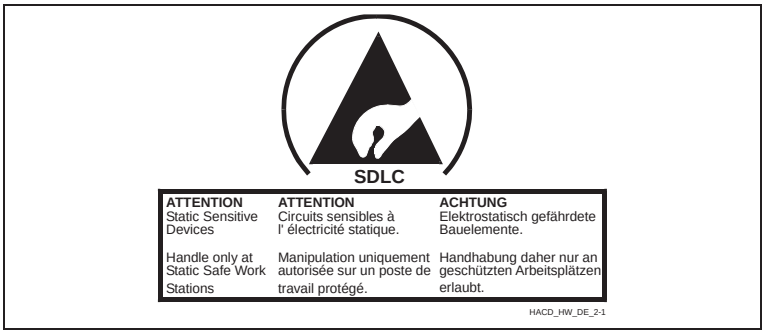

Fig. 1 Notes for handling printed on the packaging

Comply with the following requirements:

- Keep the controller card away from moisture and dust
- Adhere to the permissible temperature range of –20° C to + 70 °C.
  (allowable operating temperature: 0 – 50° C)

NOTE!

Electrostatic discharge (ESD) can result in damage to components. To prevent this, take the following precautions.

Provide equipotential bonding to discharge static charge from your body.

Work in a safe environment. Do not use any devices in the working environment that generate or hold static charge. Avoid working with the controller card in areas where floors or work surfaces are composed of materials that can generate a static charge.

Handle the controller card with care. Do not touch any exposed pins and sensitive components of the electronics.

Transport and store the controller card with care in its original packaging.

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2.4 Installing the card

Only take the card from its packaging at a protected workplace.

Do not touch electrical components and install the controller card as shown in Fig. 2 Installing the controller card in the card holder provided for this purposes.

Installing the VSPD controller card correctly:

- ➢ De-energize the rack used.
- ➢ Hold the controller card by the front panel and take it out of the packing.
- ➢ Slide the controller card into the guard rails of the rack as shown in Fig. “Installing the controller card” without using excessive force.
- ➢ Snap the edge connector in place by gently pressing on the front panel.

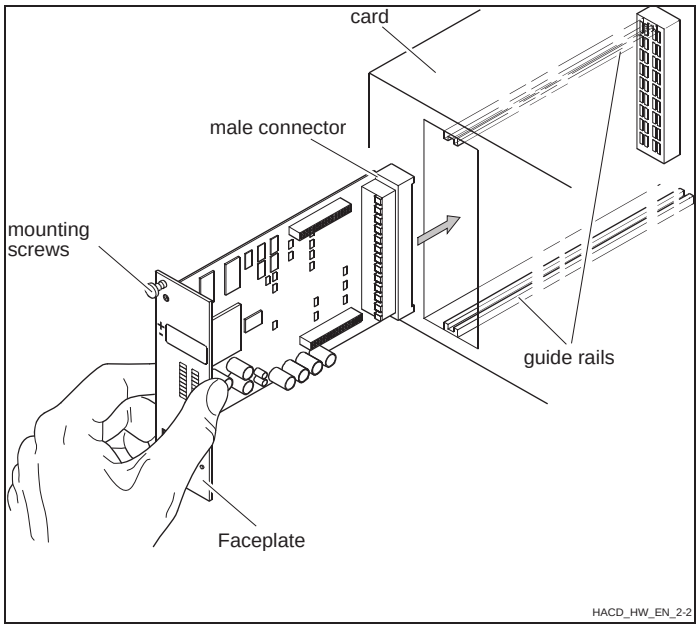

Fig. 2 Installing the controller card

- ➢ Tighten the two mounting screws on the front panel.
- ✓ The controller card is now correctly installed.

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2.5 Pin assignment of the edge connector

The edge connector is a 64-pin, type G (DIN 41612) connector.

The pin assignment of the edge connector is not fully downward compatible with existing, older valve amplifiers.

Any changes in the pin assignment were made so as to ensure that damage is avoided when an older controller card is replaced by a newer one.

The pin assignment is listed in the following tables.

Row d

Pin	Description	Type
2	DI 1	Discrete input
4	DI 2	Discrete input
6	DI 3	Discrete input
8	DI 4	Discrete input
10	DI 5	n. c.
12	DI 6	Discrete input
14	DI 7	n. c.
16	DI 8	n. c.
18	DI 9	Discrete input
20	DO 1	Discrete output
22	OK	Discrete output
24	Data +	Local CAN Bus Input/Output
26	DO 2	Discrete output
28	Data –	Local CAN Bus Input/Output
30	AO 1	Analog output
32	AO 2	n. c.

Tab. 1 Pin assignment row d

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2 Installing the VSPD

Row b

Pin	Description	Type
2	AI3+	n. c.
4	AI3-	n. c.
6	AI2+	Differential input (+)
8	AI2-	Differential input (-)
10	AI1+	n. c.
12	AI1-	n. c.
14	AI4+	Differential input (+)
16	AI4-	Differential input (-)
18	AI5+	Differential input (+)
20	AI5-	Differential input (-)
22	AI6+	Differential input (+)
24	AI6-	Differential input (-)
26	AO3	Analog Output
28	AGND	Analog GND
30	REF-	Reference voltage -10V
32	REF+	Reference voltage +10V

Tab. 2 Pin assignment row b

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Row z

Pin	Description	Type
2	MA+	Solenoid a +
4	MA-	Solenoid a -
6	MB+	Solenoid b +
8	MB -	Solenoid b -
10	Shield	Shield
12	L1O-	n. c.
14	L1I-	n. c.
16	L1I+	n. c.
18	L1O+	n. c.
20	Ground	System ground
22	DO 3	Discrete output
24	DO 4	Discrete output
26	DO 5	Discrete output
28	DO 6	Discrete output
30	U_B	Supply voltage
32	LO	Supply GND

Tab. 3 Pin assignment row z

Single-solenoid valves are to be connected to solenoid A+/A-. The solenoid B+/B- connection then remains open. For single-solenoid valves, only positive command values are recognized as being valid.

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2 Installing the VSPD

Row f

Pin	Description	Type
2	DO 7	n. c.
4	SSI Clk +	n. c.
6	SSI Clk -	n. c.
8	SSI Data+ / INC Ua1	n. c.
10	SSI Data - / INC /Ua1	n. c.
12	Ua2	n. c.
14	/Ua2	n. c.
16	Ua0	n. c.
18	/Ua0	n. c.
20	L2O-	n. c.
22	L2I-	n. c.
24	L2I+	n. c.
26	L2O+	n. c.
28	GND_CAN	n. c.
30	CANL	n. c.
32	CANH	n. c.

Tab. 4 Pin assignment row f

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2.6 Installation Local Bus

The local bus is used to connect the individual amplifier cards of the HACD family.

Up to 32 cards can be connected. Each amplifier must be assigned a clear bus address.
The connection is established using a CAN protocol with a baud rate of 250kbit. The maximum length of the most distant amplifier cards must not exceed 280m. Moreover, the maximum length of the branch lines of 1 m must be observed.

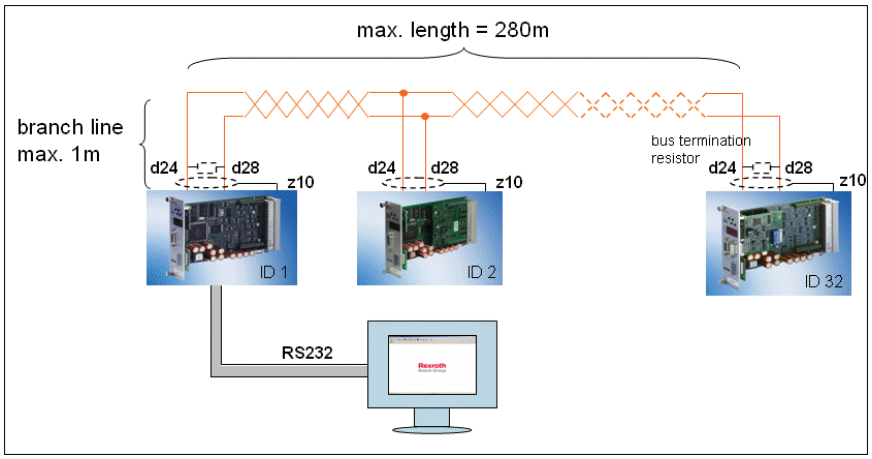

Fig. 3 Schematic structure of "Local Bus"

Data is to be transmitted via a shielded twisted-pair cable.

Two bus terminating resistors of 120 Ohm are required.

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3 Commissioning the VSPD controller cards

3.1 Providing readiness for operation

The procedure of commissioning the VSPD controller card depends on various factors on site. For this reason, only basic commissioning steps can be described in these instructions.

Making the controller card ready for operation:

- ➢ Carefully check cabling.
- ➢ Apply voltage to the VSPD controller card.

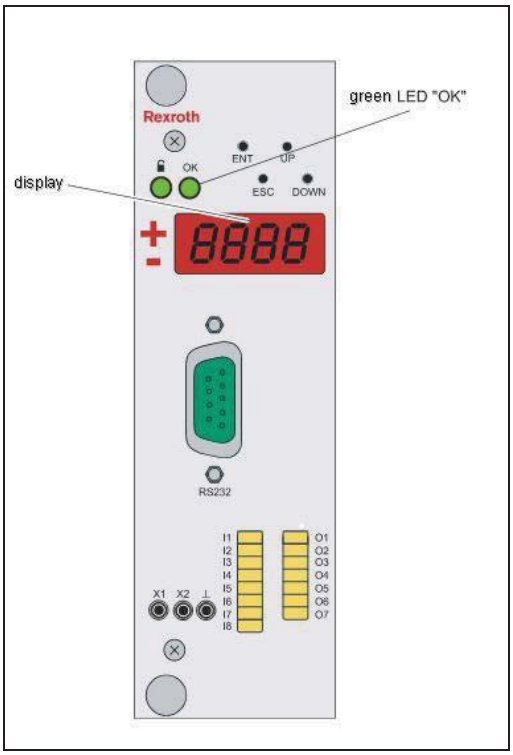

*Fig. 4 Front panel of the VSPD controller card**

- ✓ The controller card executes a short internal function test.
- ✓ The display on the controller card shows the manufacturer name and version number in scrolling text (when powered up) *

* only for VT-VSPD-1-2x/V0/1-0-1

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3.2 Installing the software BODAC

The software BODAC, order designation SYS-HACD-BODAC-01/ (material number R900777335) can also be downloaded on the Internet. This software is used for initial commissioning and convenient operation of the controller card. You can use it to make all the required settings for the optimum operation of your VSPD controller card. The functions, menus and program windows of the software are matched to your controller card. This makes the operation of the software very easy.

Installation requirements

Hardware 100% IBM compatible PC with the following minimum requirements:

- 200 MHz Pentium processor (or comparable)
- 32 MB working memory (RAM)
- VGA graphic card, minimum resolution: 800x600 pixels
- Hard drive with minimum 2 MB available space
- CD-ROM drive
- Mouse
- Free serial interface

Software Operating system: Windows 2000/ XP ™.

When these requirements are met you can install the software BODAC as described in the next chapter.

BODAC setup routine

Start the setup routine for the installation of the software BODAC with the file "Set-up.exe".

Installing the BODAC software:

➢ Insert CD-ROM and navigate to "Setup.exe" file.
➢ Double-click on “Setup.exe“.
✓ The setup program will load and show a the start screen.
➢ Follow the instruction on screen to run through the setup routine.
✓ The software BODAC is now installed.

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3.3 Initial startup with BODAC

- After having installed the VSPD controller card in the rack and provided the readiness for operation as described in chapter 2.4 Installing the card, you can start with commissioning.
- Before starting the next steps make sure that the following requirements are met:
- Serial interface cable (1:1 cable) available
- Free serial interface available on the PC
- Software BODAC is installed.

Proceeding for (initial) startup:

➢ Connect serial interface cable (mat. no. R900776897) to the port of the VSPD controller card.

➢ Plug serial interface cable to the serial port (COM) on the PC.

✓ The VSPD controller card and the PC are now connected.

➢ Start software BODAC

➢ Carry out software commissioning as described in the documentation "Commissioning of the VSPD controller card and operation of the software BODAC".

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4 Operating the VSPD

4.1 Display/input keys and connections of the controller card

You can use the control keys and connectors on the front panel of the VSPD to check parameters and settings, attach diagnostic instruments and connect the card to a PC.

The graphic below shows an overview of display/control elements and connections of the controller card.

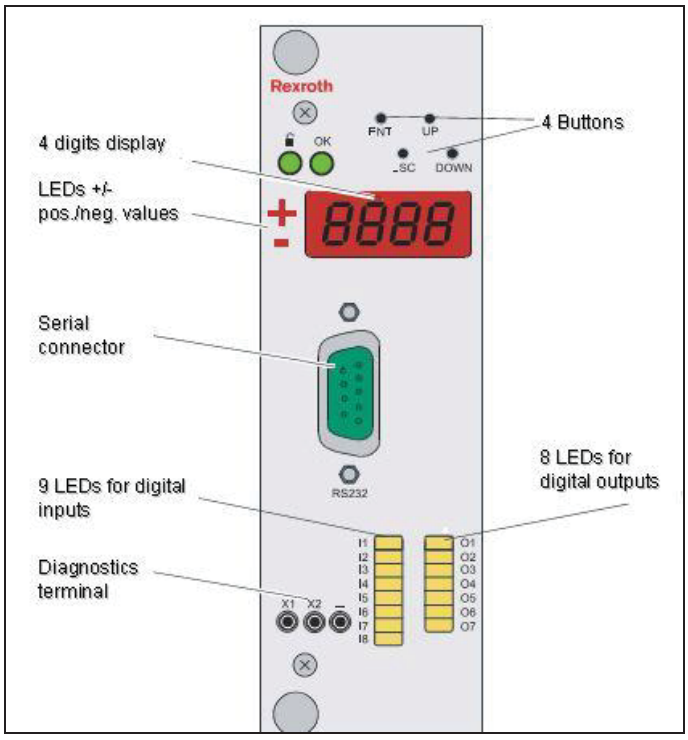

*Fig. 5 Display/input keys and connections of the controller card**

Display* The display is four characters in length. Messages that exceed four characters are displayed as a scrolling display.

When parameters are displayed, the negative or positive sign is indicated by the “+” and “-“ LEDs.

LEDs of digital in- / outputs. The LEDs (input) only signal the input signal. The LEDs (output) signal the state of the controller card. When a signal is present on an input/output, the associated LED will illuminate.

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4 Operating the VSPD

Serial interface The serial interface on the front panel is designed as nine-pin D-sub socket according to the RS-232 standard. Establish the connection to the serial interface of the PC with a serial data cable.

Buttons* Four buttons are located on the front panel of the card. The functions of these buttons are described in detail in section 4.4 Display/Input Key Operations.

* only with VT-VSPD-1-2x/V0/1-0-1

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4.2 Diagnostics test jacks

The diagnostics port on the front panel of the controller card can be used for connecting external diagnosis instruments. You can take measurements via two analog signals.

4.3 Menu Tree for Setup and Parameters (Option Display)

The following contains an overview of the menus that can be selected using the buttons on the HACD controller card. Shown are the parameters and settings that are available

An overview of the items listed below are shown on the following pages:

- Menu tree „Parameter"
- Menu tree „Setup“
- Menu tree „Valve menu Part 1“
- Menu tree „Valve menu Part 2“
- Menu tree „Structure"
- Menu tree „Command Adjust. Part 1“
- Menu tree „Command Adjust. Part 2“
- Menu tree „Analog I/O Part 1“
- Menu tree „Analog I/O Part 2“
- Menu tree „Digital I/O Part 1“
- Menu tree „Digital I/O Part 2“
- Menu tree „Faults“

For a detailed description of the settings and parameters, please refer to document: “Starting up the HACD Control Card and Operation of BODAC Software”.

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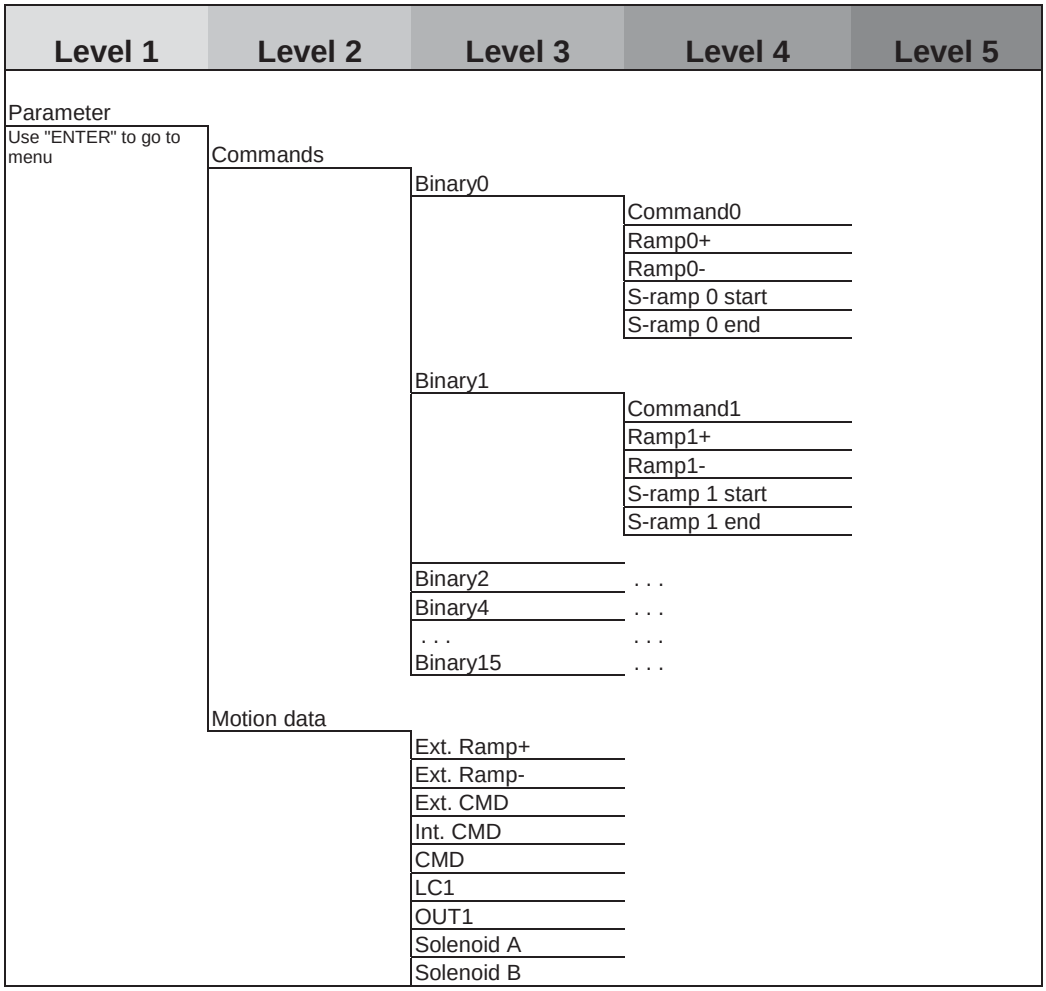

Fig. 6 Menu tree „Parameter"

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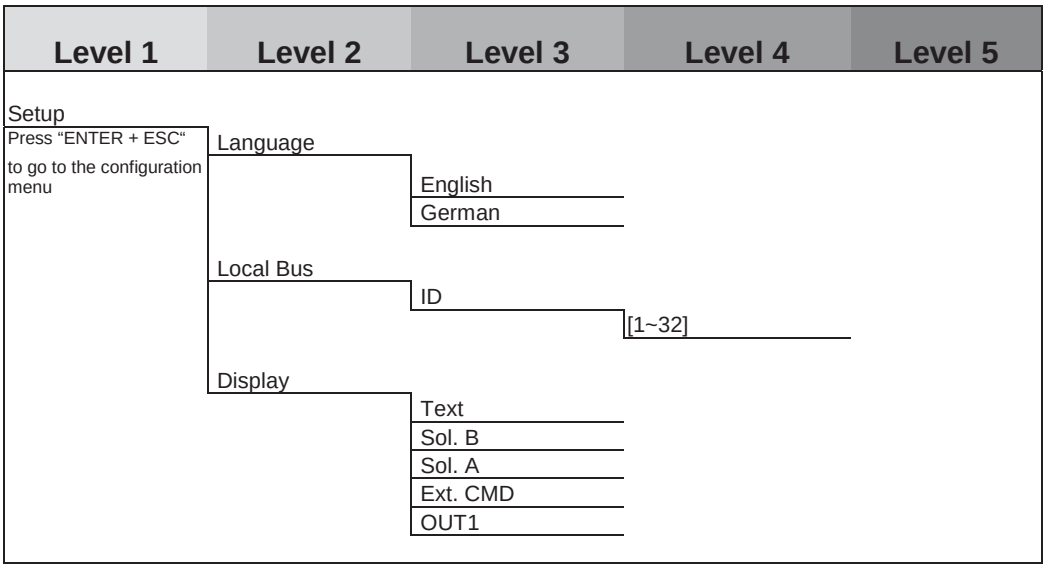

Fig. 7 Menu tree „Setup“

There has to be an obligatory reinitialization of the controller card after changing a bus ID. Please toggle the card when the changes are written successfully to the memory.

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Level 1	Level 2	Level 3	Level 4	Level 5
Valve Menu				
Press “ENTER + ESC“ to go to the configuration menu	Off			
	Valve o.l.			
		4WRA		
			NG6 – 2x	
			NG10 – 2x	
		4WRZ		
			NG10 – 5x	
			NG16 – 6x	
			NG25 – 5x	
			NG32 – 5x	
			NG52 – 5x	
			NG10 – 7x	
			NG16 – 7x	
			NG25 – 7x	
			NG32 – 7x	
			NG52 – 7x	
		3DREP		
			NG6 – 1x	
			NG6 – 2x	
		DBEP		
			NG6 – 1x	
		DBE(M)T		
			NG6 – 5x	
		DBET		
			NG6 – 6x	
		(Z)DBE		
			NG6 – 1x	
		DBE(M)		
			NG10 – 5x	
			NG25 – 5x	
			NG32 – 3x	
		DRE 4K		
			NG4 – 3x	
		(Z)DRE		
			NG6 – 1x	
			NG10 – 1x	
			NG10 – 2x	

Fig. 8 Menu tree „Valve menu Part 1“

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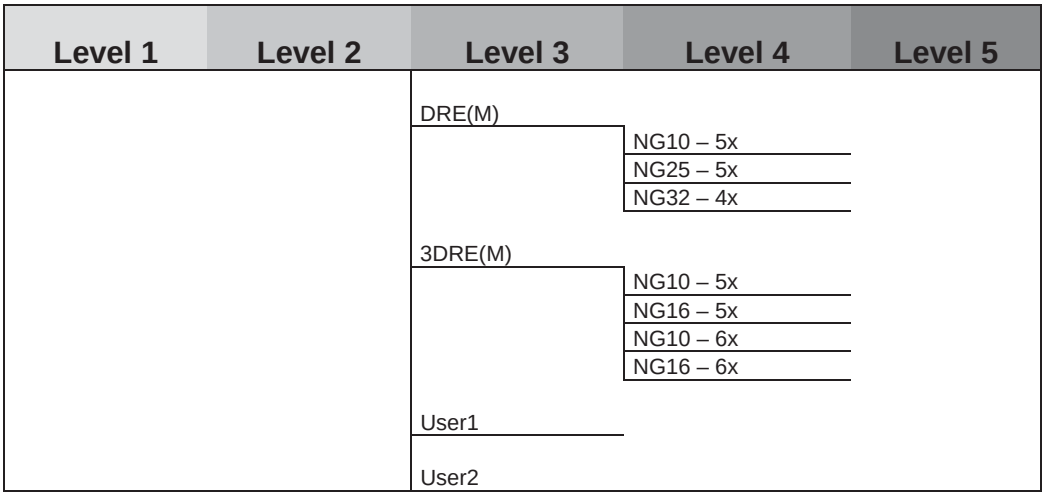

Fig. 9 Menu tree „Valve menu Part 2“

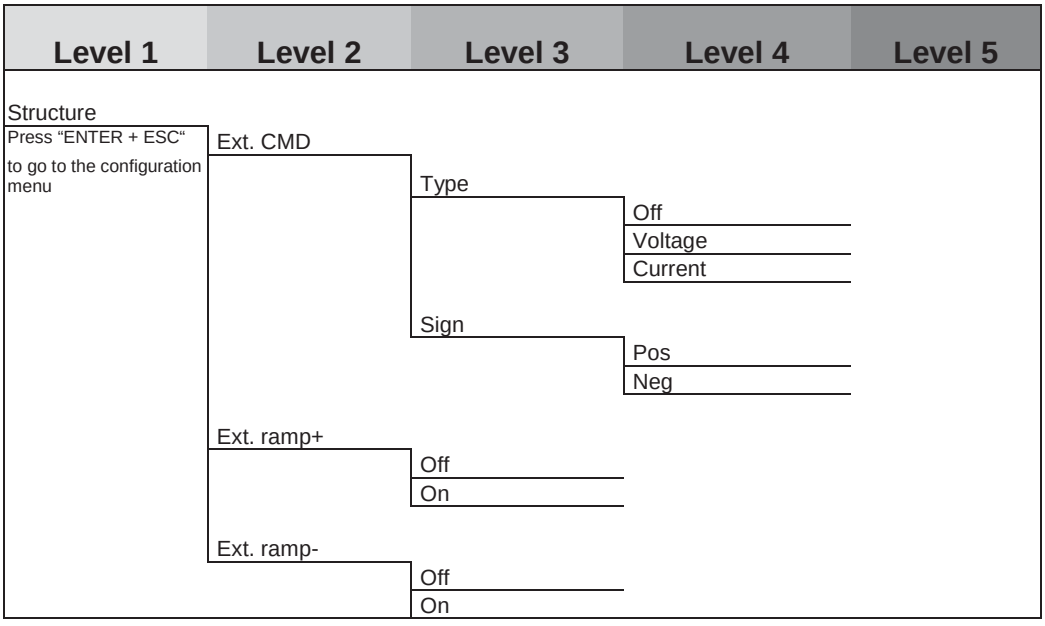

Fig. 10 Menu tree „Structure"

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Level 1	Level 2	Level 3	Level 4	Level 5
Command Adjust.				
Press “ENTER + ESC“ to go to the configuration menu	Overlap			
		Deadband		
			[0.0~+100.0] %	
		Step +		
			[0.0~+100.0] %	
		Step -		
			[0.0~+100.0] %	
	Offset			
		[-100.00~+100.00] %		
	Limit			
		Limit +		
			[0.0~+100.0] %	
		Limit -		
			[0.0~+100.0] %	
	Current Curve User 1			
		Precurrent		
			[0~+3000] mA	
		Jump Current		
			[0~+3000] mA	
		Max. Current		
			[0~+3000] mA	
	Current Curve User 2			
		X0		
			[-100.0~+100.0] %	
		Y0		
			[0~+3000] mA	
		X1	…	
		Y1	…	
		X2	…	
		Y2	…	
		X3	…	
		Y3	…	
		X4	…	
		Y4	…	
		X5	…	
		Y5	…	
		X6	…	
		Y6	…	
		X7	…	
		Y7	…	

Fig. 11 Menu tree „Command Adjust. Part 1“

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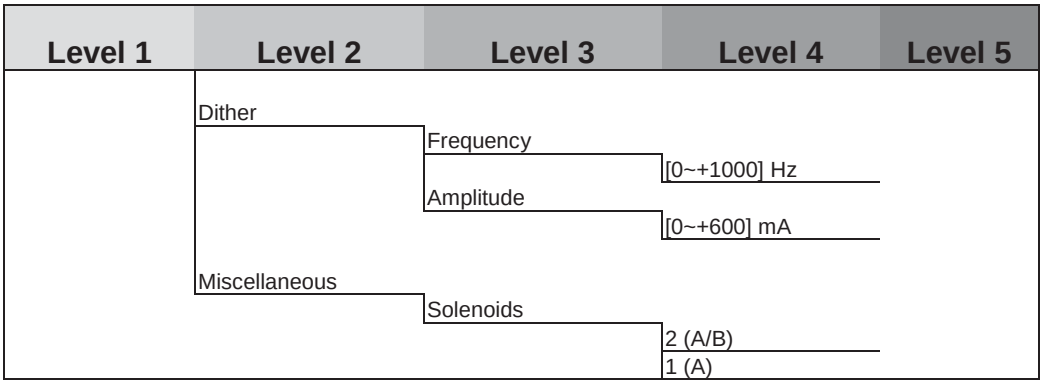

Fig. 12 Menu tree „Command Adjust. Part 2“

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Level 1	Level 2	Level 3	Level 4	Level 5
Analog I/O				
Press "ENTER + ESC" to go to the configuration menu	Inputs			
		Voltage (b14/b16)		
			Type	
				+/-10 Volts
				[0~+10] Volts
			Range	
				+/-100 %
				[0~+100] %
			Min. Value V	
				[-11.00~+11.00] V
			Max. Value V	
				[-11.00~+11.00] V
			Min. Fault V	
				[-11.0~+11.0] V
			Max. Fault V	
				[-11.0~+11.0] V
			Max. Unit	
				100.0 s
		Current (b22/b24)		
			Type	
				[+4~+20] mA
			Range	
				+/-100 %
				[0~+100] %
			Min. Value mA	
				[-2.00~+22.00] mA
			Max. Value mA	
				[-2.00~+22.00] mA
			Min. Fault mA	
				[-2.0~+22.0] mA
			Max. Fault mA	
				[-2.0~+22.0] mA
			Max. Unit	
				100.0 s
		Ramp+ (b6/b8)		
			Type	
				[0~+10] Volts
				[+4~+20] mA
			Range	
				[0~+100] %
			Min. Value V	
				[-11.00~+11.00] V
			Min. Value mA	
				[-2.00~+22.00] mA

Fig. 13 Menu tree „Analog I/O Part 1"

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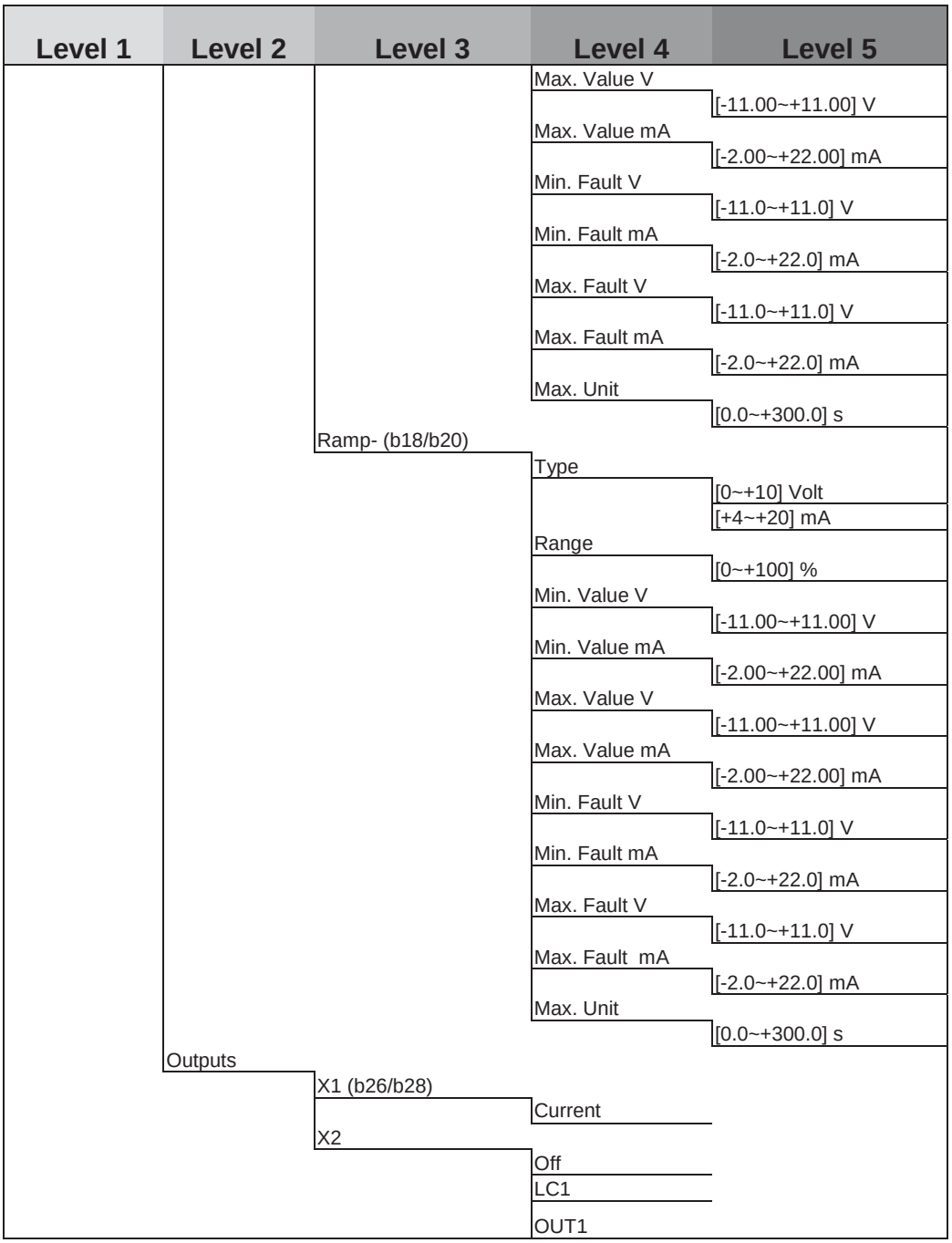

Fig. 14 Menu tree „Analog I/O Part 2“

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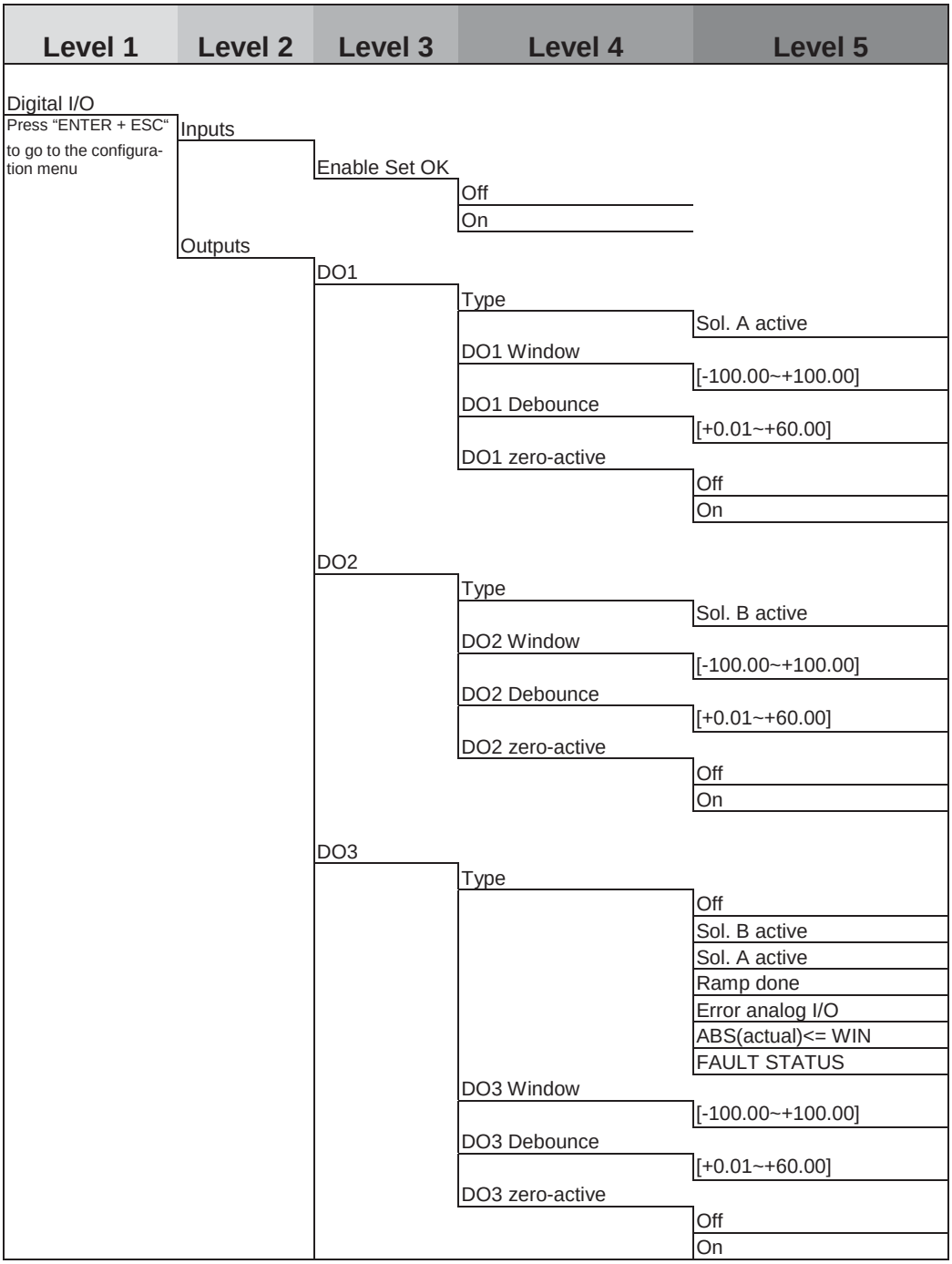

Fig. 15 Menu tree „Digital I/O Part 1"

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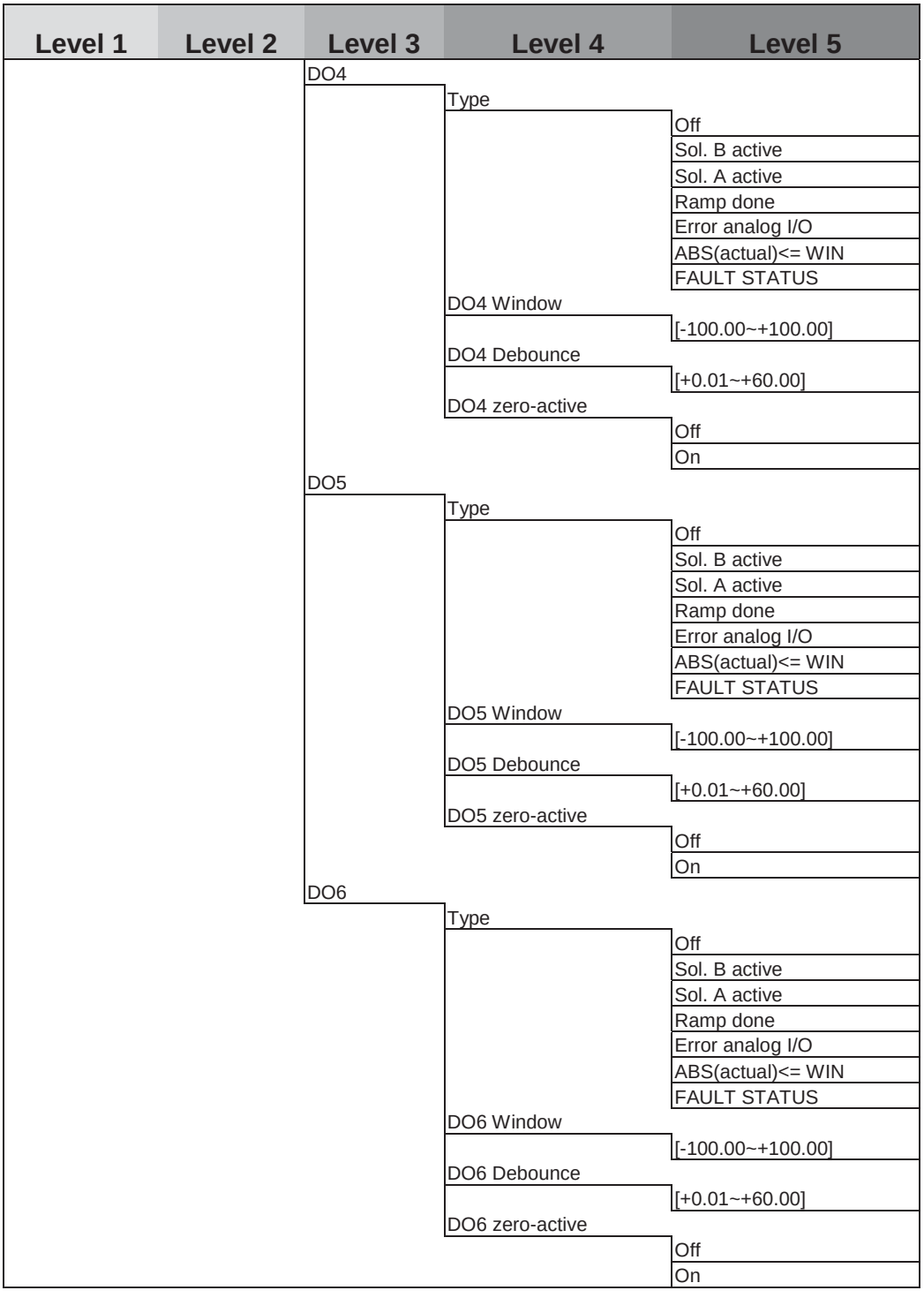

Fig. 16 Menu tree „Digital I/O Part 2“

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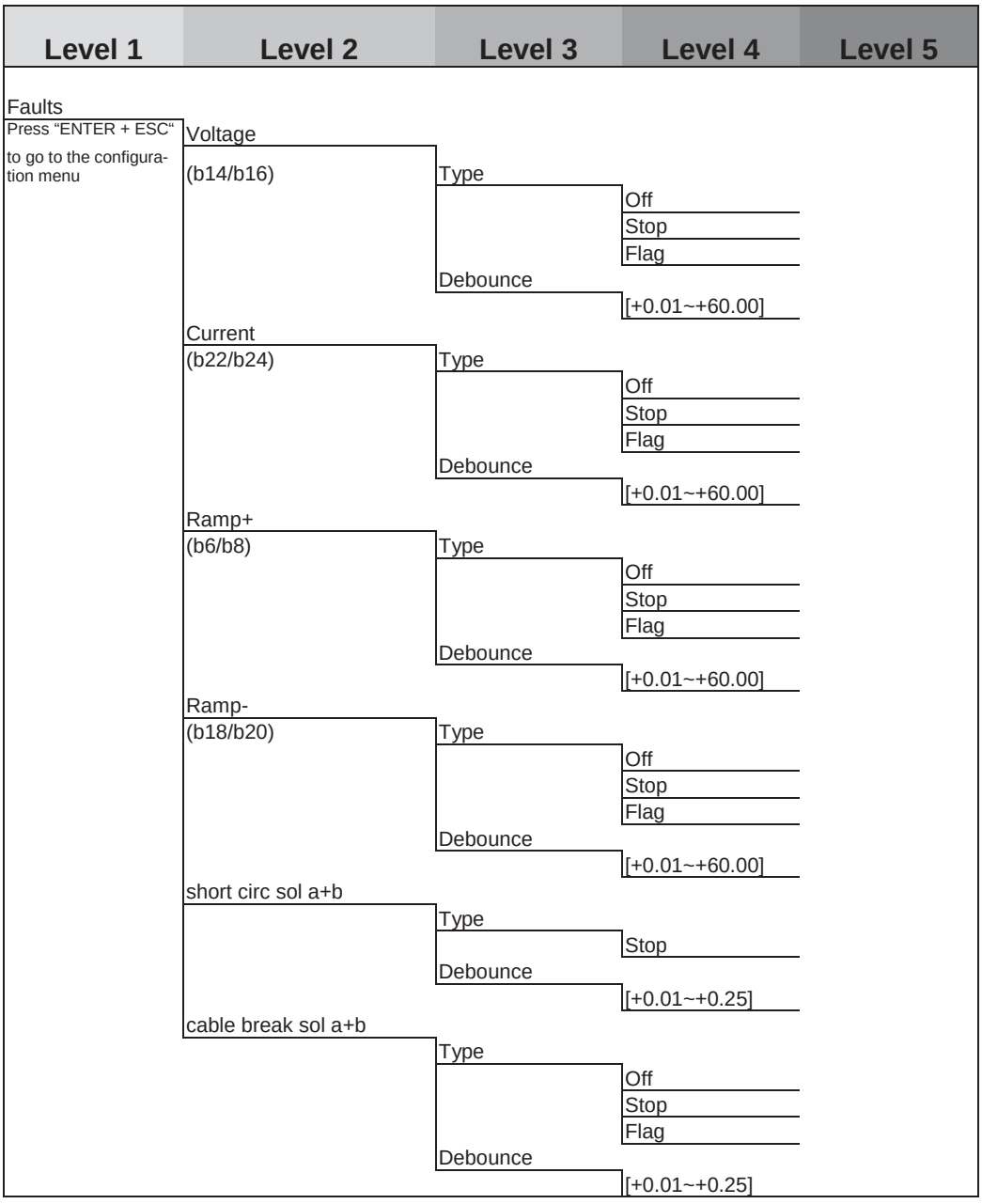

Fig. 17 Menu tree „Faults"

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4.4 Display/Input Key Operations (Option Display)

All operations can be performed directly on the card using the "UP", "DOWN", "ENTER" and "ESCAPE" keys.

The keys are especially useful for quickly and easily checking, changing or correcting parameters and settings.

Always use BODAC software for the initial startup before placing the card in service.

Before making any changes to parameters or settings, familiarize yourself with the menu structure of the card. This can be found in section 4.3: "Menu tree for settings and parameters".

Key functions:

● **UP**

Pressing the "UP" key moves in the upward direction, within the selected level, to available menu items. (for an overview, see section 4.3 Menu Tree for Setup and Parameters)

● **DOWN**

Pressing the "DOWN" key moves in the downward direction, within the selected level, to available menu items (for an overview, see section 4.3 Menu Tree for Setup and Parameters).

Change menu mode:

● **ENTER**

Parameterization Menu

Press the "ENTER" key for 2 seconds or longer, to switch to configuration mode – "EDIT Parameters".

Change menu level:

Press the “ENTER“ key to take you one level lower in the menu structure, or confirms an entered value.

Note: The entered value will be stored in memory by returning to level 0 (displaying the manufacturer’s name).

The process of storing the data will take about a minute. During this time do not cut off the current supply of the card, otherwise your changes won’t be saved in the memory.

● **ESCAPE**

Pressing the "ESCAPE" key takes you one level higher in the menu structure.

Configuration Menu:

● **ENTER** + ● **ESCAPE**

Pressing the “ENTER“ and “ESCAPE“ keys simultaneously opens the configuration menu.

The configuration menu is structured in levels. The first level contains main categories, below which are additional sub-categories and settings. Depending on the entry selected, a main category may have up to 4 sub-levels.

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The following figure illustrates the menu level structure.

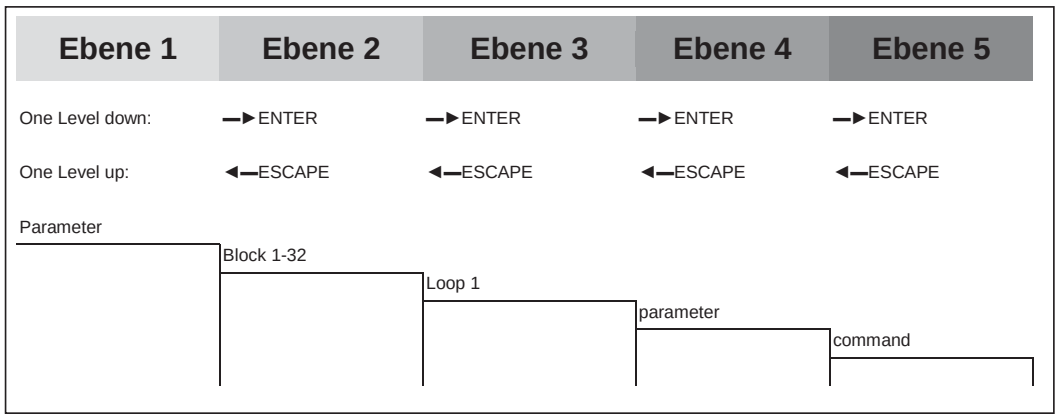

Fig. 18 Example of the menu levels in configuration mode

Changing from Run Mode to Configuration Mode – "EDIT Parameters":

The card must be in run mode.

The display will show scrolling text to display the manufacturer's name, the software version for the controller, or a custom configured text string.

➢ Press and hold "Enter" and "ESCAPE" simultaneously for at least 2 seconds (except when in "EDIT Parameter" mode, see above) until the display reads "Set-up".

✓ The controller card is now in "EDIT Parameter" mode.

Changing from Run Mode to Configuration Mode:

The card must be in run mode.

The display will show scrolling text to display the manufacturer's name, the software version for the controller, or a custom configured text string.

✓ Press and hold "Enter" and "ESCAPE" simultaneously for at least 2 seconds (except when in "EDIT Parameter" mode, see above) until the display reads "Setup".

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To exit Configuration Mode

As an example, the second level of the “Setup” menu is shown.

The display on the controller card shows the option “Sprache/Language“.

- ➢ Press “ESCAPE”.
- ✓ The display is scrolling “Setup“.
- ➢ Press “ESCAPE”.
- ✓ The display will show scrolling text to display the manufacturer’s name, the software version for the controller, or a custom configured text string

If while in Configuration Mode no entry is made within one minute, the controller card will automatically return to successively higher menu levels until Run Mode is reached.

The VSPD Control Card is fully operational in Configuration Mode.

To change a parameter using the input keys

As an example, the parameter "Max. Value" (see Fig. 13 Menu tree „Analog I/O Part 1“–Inputs – AI1) is shown. In this case, set the parameter to: “+10 Volts“.

The card is now in Run Mode.

The display will show scrolling text to display the manufacturer’s name, the software version for the controller, or a custom configured text string.

WARNING!

When changing parameters using the input keys, hardware inputs are configured even when the discrete input “Enable” is active.

Caution:

Do not change any analog input from voltage to current or current to voltage when active.

Changing the analog inputs configuration may result in incorrectly interpreted values.

This can result in uncontrolled system operation and damage to the machine!!

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- ➢ Press and hold the “Enter“ and “ESCAPE“ keys simultaneously for at least 2 seconds until the display reads “Setup“.
- ✓ The card is now in Configuration Mode.
- ➢ Press the “UP” or “DOWN” keys to select “Analog I/O”.
- ➢ Press “ENTER”.
- ✓ The card is now at the second level of the Configuration Menu, “Analog I/O“ mode.
- ➢ Press the “UP” or “DOWN” keys to select “Inputs”.
- ➢ Press “ENTER”.
- ✓ The menu entry Analog Input "Voltage" is shown.
- ➢ Press “ENTER”.
- ➢ Press the “UP” or “DOWN” keys to select “Max. Value”.
- ➢ Press “ENTER”.
- ✓ The current value is shown.
- ➢ Press “UP”.

This creates a positive sign. Pressing „DOWN“ gives the value a negative sign.

- ➢ Press “UP” until "1" is displayed.
- ➢ Press “ENTER”.
- ➢ Press “UP” until "0" is displayed.
- ➢ Press “ENTER”.
- ➢ Press “UP” until "." is displayed.
- ➢ Press “ENTER”.
- ➢ Press “UP” until "0" is displayed.
- ➢ Press “ENTER”.
- ➢ Press “UP” until "0" is displayed.
- ➢ Press “ENTER”.
- ✓ The parameter “Max. Value“ 10 Volts is now entered and displayed.
- ➢ Exit the Configuration Menu by pressing “ESCAPE" five times.

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To show setpoints/feedback values on the display run mode.

In this example, the signal "OUT1"(see Fig. 7 Menu tree „Setup“) will be used.

The card should be in Run Mode.

The display will show scrolling text to display the manufacturer’s name, the software version for the controller, or a custom configured text string.

- ➢ Press and hold the “ENTER“ and “ESCAPE” keys for at least 2 seconds until the display reads “Setup“.
- ✓ The card is now in Configuration Mode.
- ➢ Press “ENTER”.
- ✓ The card is at the second level of the Configuration Menu.
- ➢ Press the “UP” or “DOWN” keys to select “Display”.
- ➢ Press “ENTER”.
- ✓ Menu entry "Text" is displayed.
- ✓ Press the “UP” or “DOWN” keys to select "OUT1".
- ➢ Press “ENTER”.
- ✓ The signal "OUT1" is displayed when the card returns to Run Mode.

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5 Carrying out diagnoses

5.1 Diagnostic options on the VSPD controller card

Diagnostic terminal

Two output signals with the following properties are applied to the diagnostics terminal on the front panel of the VSPD controller card (see chapter 4.1 Display/input keys and connections of the controller card,Fig. 5 Display/input keys and connections of the controller card*):

- X1, 10 Volts for test equipment having R_i > 1 MΩ
- X2, 10 Volts for test equipment having Ri > 1 MΩ
- COM, ground

Diagnostic terminal “X1”

At diagnostics terminal "X1" you can measure the signal of analog output "AO3". The solenoid current of the valve can be measured at this output.

Diagnostic terminal “X2”

In contrast to "AO3", you can select the signal to be measured. The signal is selected in the program “BODAC“. With the factory setting, the signal “ramped command value“ is selected.

Display* indication when an error occurs

During initial startup, BODAC software can be used to select the action of the controller when an error occurs (available in the “Error“ screen). If the controller card detects an error, which has been configured with BODAC software, the error will be displayed on the HACD controller card.

If the control card detects an error configured with BODAC software, respond as follows:

The display will flash "ERR" (Error) on the controller card!

Press “ENTER” to display the error message and clear the error.

The procedure for selecting the action desired when an error occurs can be found in the document “Starting up the HACD Control Card and Operation of the BODAC Software".

* nur bei VT-VSPD-1-2x/V0/1-0-1

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5.2 Diagnostics options by means of BODAC

The software BODAC offers additional, detailed diagnostics options.

The “process data window” and the “status window” give an overview of the current state of the controller card.

Process data window

The process data window shows the current signal processing of the controller card. This provides a quick overview of the current state of process data.

.

Status window

The status window allows an evaluation of the signals currently present. They are classified by the status words "OK", "ERROR " and "STOP".

For additional information on the process data window and the status window, see the documentation “Installation of the VSPD controller card and operation of the software BODAC”.

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6 Faults

6.1 Error messages

Error message	Description
Reference voltage	Reference voltage +10V (b32) or reference voltage –10V (b30) outside the permissible range.
Supply voltage	Power supply (z30) less than Ub min.
DO1~DO7 “OK” short circuit	Short circuit on one or more of the 8 digital outputs.
Checksum	Checksum error in program or data memory (Flash or EEprom)
Memory/version error.	Error in working memory (RAM)
Analog input AI2 (ramp+)	The level at analog input AI2 is outside the valid signal range. (adjustable, see Fig. 17 Menu tree „Faults“).
Analog input AI4 (command value U)	The level at analog input AI4 is outside the valid signal range. (adjustable, see Fig. 17 Menu tree „Faults“).
Analog input AI5 (ramp-)	The level at analog input AI5 is outside the valid signal range. (adjustable, see Fig. 17 Menu tree „Faults“).
Analog input AI6 (command value I)	The level at analog input AI6 is outside the valid signal range. (adjustable, see Fig. 17 Menu tree „Faults“).
Collective fault on daughter board	The daughter board signals a fault
Short-circuit at solenoid A/B	A short-circuit occurred on the amplifier output of the solenoid cables.
Cable break of solenoid A/B	A cable break is present at the amplifier output of solenoid cables.
Memory error of daughter board	Checksum error in program or data memory (Flash or EEprom)
Communication of daughter board	A communication error occurred between the mother and daughter board

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6.2 Changing the fuse

The controller card is protected against overload by means of a fuse. The fuse is of a disposable type and has the following data:

- F / 4A / 250V

NOTE!

The fuse is defective and must be replaced!

The fuse has opened due to mechanical damage or a product defect.

In this case, replace the fuse with a new one of the type indicated above.

The fuse has opened due to external influences, i.e. due to components connected to the controller card.

In such cases, diagnose and correct the problem that caused the fuse to open.

Only then replace the fuse with a new one.

Replacing the fuse on the VSPD controller card:

- ➢ Remove the VSPD controller card from the card holder. (reverse order as described in chapter 2.4 Installing the card)
- ➢ Remove the fuse from the fuse holder without excessive force (see Fig. 19 Fuse on the VSPD controller card).

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6 Faults

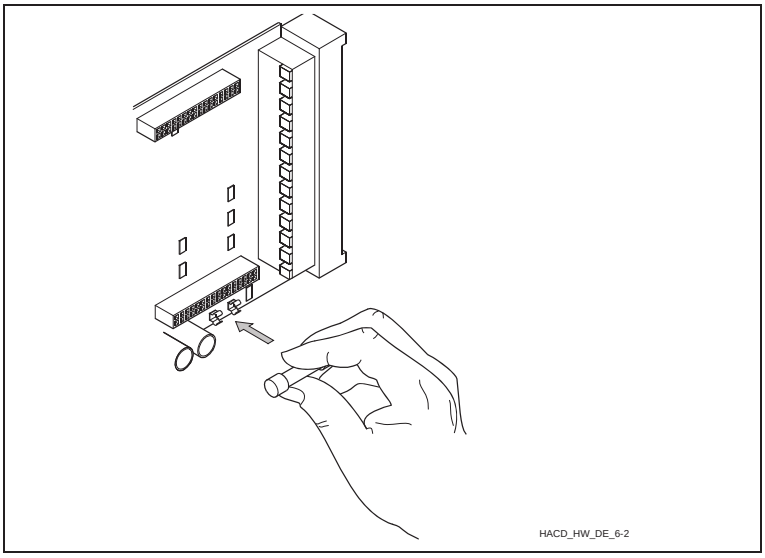

Fig. 19 Fuse on the VSPD controller card

- Use a suitable test device to check the fuse. (continuity test)
- If the fuse is defective, replace it with the same type.
- Re-fit the VSPD and carry out a function test.

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