

The image displays various Rexroth REFdrive 500 control units. On the left are two large vertical units with multiple buttons and a screen. In the center is a smaller vertical unit. To the right is a handheld unit with a screen and buttons. Below these are technical diagrams, including a motor control circuit diagram and a parameter table.

Funktionsplan REFdrive 500 - RD52 Motorgängung				Datum:	Firmware:	Blatt Nr.:
				2000-02-02	FWC-SR1700-200-02VRS-MS	22
4.0	kHz	2	R/W	off	U16	
500.0	Hz	0	Read	U16		
0	h	-	Read	S32		
0	min	-	Read	U16		
0.0	%	3	R/W	on	S16	
1)	A	0	Read	S32		
34	Lüfter Steuerung	0	1	0	1	R/W on U16

RD500 Drive Control Devices Field-oriented vector control RD52

Troubleshooting Guide: 05VRS

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Purpose of Documentation	<p>This document is designed to assist maintenance personnel in identifying errors with the machinery.</p> <ul style="list-style-type: none"> • help in understanding error messages • help in finding the causes of errors • describe the procedure for trouble shooting • simplify the process of establishing contact with the Customer service department

Record of Revisions

Description	Release Date	Notes
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1 Troubleshooting

1.1 Self-test routine - fault messages

The system executes a self-test routine after the initialization routine. Individual sections of the microcomputer system, e.g. the EEPROM, are checked and data read-in from the power control board.

1.2 Warnings

If a warning occurs, the warning message is displayed, alternating with the programmed operating display. The warning bit can be output at a digital input. If the drive converter is not to be powered-up, this warning must be logically combined in the free parameterization.

Note: The warning bit (D1737) is set, and can be logically combined in a digital output or also in the unit, e. g. to prevent the drive unit from being powered-up.

1.3 Faults

Fixed program and parameterizable limit values are continuously monitored in operation. In order to protect the power section against damage, when a limit value is violated, the drive unit is always powered-down and the appropriate fault message displayed.

For REFUdrive 500 drive converters, with three-phase supply, when a fault appears, the main contactor is opened, and the power section goes into a no-voltage condition. The appropriate fault message is displayed.

The fault is displayed with the red LED "Alarm" on the front of the unit.

Fault messages are saved in the fault memory and are not lost when the power fails. The fault memory is called in the monitor (handling, refer to Section 5). The last 10 faults are saved in the fault memory. The last fault is memory location S0, and the oldest is in memory location S9. A new fault is always saved in memory location S0. All of the older faults are shifted one position upwards in the memory. This means that the fault at memory location S9 is lost.

Fault acknowledgement

After a fault trip, the drive unit cannot be powered-up again until the fault has been acknowledged. The fault cannot be acknowledged as long as the cause of the fault is still present. Once the cause of the fault has been removed, the fault can be acknowledged after a set timer has expired (P0093, factory setting 1 sec.).

There are various ways of acknowledging a fault message:

- Press the **Esc** key on the operator field.
- Press key S9 "Fault acknowledgement" on the control card.
- Using a digital input: Connect an H signal at the digital input, connect non-inverted D parameters to the selected digital input in P0050.07.
- Via the serial RS485 interface; transfer control word with bit 7 set to "high".

1.4 List of the warning and fault messages

No.	Messages	Warning	Fault
1	External	x	x
3	DC link voltage too high		x
4	DC link voltage too low	x	x
7	Overtemperature, drive unit	x	x
8	Brake resistor		x
9	Main contactor		x
10	Pre-charging		x
11	New EEPROM		x
13	Power section	x	x
14	Inverter		x
15	Power supply		x
16	Internal DSP comm. (communications)		x
17	Overspeed	x	x
18	Ground fault		x
19	EEPROM data	x	x
20	Internal DSP. ack. (receive acknowledg.)		x
21	Internal WS comm. (communications)		x
22	NTC power section		x
23	Motor encoder		x
24	SI1 time monitoring	x	x
25	SI2 function	x	x
26	SI2 time monitoring	x	x
28	Overtemperature, motor	x	x
30	Drive converter, version		x
31	Brake resistor, overload	x	x
39	On for start inhibit		x
40	Switched-mode power supply section		x
41	Drive converter <==> WS new		x
44	SI4 function	x	x
45	SI4 time monitoring	x	x
47	Start inhibit active	x	
48	module overtemp.	X	X
49	DC-link asymmetry	X	X
50, 51	Phase V, Phase W		X
52, 53, 54, 55, 56, 57, 58	External1, External 2, External 3, External 4, External 5, External 6, External 7	X	X






59	SI6 timeout	X	X
60	SynchroLink timeout	X	X
63	Output current EN81 – for future use		
64	DC link discharge – for future use		

Fig. 1-1: Fault messages

1.5 Warning and fault messages – cause and remedy / comment

No	Designation	Message
	Cause	Remedy / comment
1	External	Warning / fault
	If a digital input was assigned the “No external fault” function, and there is no 24V signal at the digital input, then the drive unit is shutdown with “External” fault (wire breakage-proof).	Determine the cause of the signal loss in the system and rectify.
3	DC link voltage too high	Fault
	The motor regenerates into the DC link for regenerative operation. Limit value: $V_{DClinkmax}$ (P0095) was exceeded. The ramp-down ramp time was set too short.	If the fault occurs when braking, set the down ramp of the ramp-function generator slower (P0280). Check the brake resistor with the ohmmeter (if the W option is available), use a higher-rating external brake resistor. Check that the brake resistor is selected (P0036)
4	DC link voltage too low	Warning / fault
	During operation, the DC link voltage drops below the limit value $V_{DClinkmin}$ (P0094) Line supply dip or power failure Main contactor contacts interrupted. Defective line supply rectifier	Check the line supply voltage using an oscilloscope.
7	Overtemperature, drive unit	Warning / fault
	The measured heatsink (cooling system) temperature of the power section or the rectifier is too high. An alarm is displayed if the heatsink (cooling system) temperature exceeds 65 °C. The drive unit is fault tripped (shutdown) if the temperature exceeds 70 °C. The temperature difference between the warning and the fault trip (shutdown) can be changed in parameter P0086. The actual heatsink (cooling system) temperatures can be displayed with the monitor (power section = D1870 and rectifier = D2029). Ambient temperature > 40 °C Defective fan Air filter blocked Defective NTC (temperature sensor) Incorrectly set fan control	Example for an incorrectly set fan control in P0034: The function is set to “Automatic” and the threshold value in P0035 is set too high. Reduce the threshold value.
8	Brake resistor	Fault
	When the brake resistor is controlled, there is no checkback signal. The switching transistor or possibly the brake resistor is defective.	Check the brake resistor switching transistor between terminals F and D using a multimeter. If the brake resistor switching transistor is OK, then the following: must be measured: From F to D: Reverse voltage, from D to F: Diode conducting-state voltage
9	Main contactor	Fault
	The main contactor does not pull-in, drops-out in operation or does not provide a checkback signal.	Check the main contactor control voltage. Check the auxiliary contact for the checkback signal.

No	Designation	Message
	Cause	Remedy / comment
10	Pre-charging	Fault
	<p>After powering-up, the DC link voltage charge-up characteristic is monitored. The pre-charging operation is interrupted if inadmissible deviations occur. Short-circuit between terminals C and D (DC link voltage) or C-PE or D-PE.</p> <p>Only for option W, brake resistor: Short-circuit between F and C.</p> <p>Only for option V, electronics standby supply active but there is no line supply voltage.</p>	<p>Check the following, whether the line supply voltage is present whether there is a short-circuit between terminals C and D or C-PE and D-PE.</p> <p>Comment: After acknowledging the "Pre-charging" fault, the drive unit can only be powered-up after 30 seconds, in order to protect the pre-charging resistors against overheating.</p>
11	New EEPROM	Fault
	The bit pattern, loaded in the factory in the EEPROM was not recognized by the processor control.	Please contact Customer Service.
13	Power section	Fault
	Power section fault, which was not specified in more detail.	Please contact Customer Service.
14	Inverter	Fault
	<p>This fault is initiated when an overcurrent threshold responds and protects the power section transistors.</p> <p>Causes outside the drive unit:</p> <p>Defective motor</p> <p>Defective motor cable.</p> <p>Defective speed encoder or encoder cable.</p> <p>Incorrectly connected encoder cable.</p>	<p>Disconnect the motor cable, enable the inverter. If a fault no longer occurs, then, it is highly probable that the problem lies on the motor side. Replace the motor. Check the encoder signal using the display or REFUwin under no-load operating conditions, or by manually rotating the motor shaft.</p> <p>Measure with REFUwin "Oscilloscope function": Parameter D1850, speed controller setpoint.</p>
	<p>Cause in the parameterization:</p> <p>Incorrect motor data have been parameterized.</p> <p>Incorrect current controller setting</p> <p>Incorrect encoder setting (P0130)</p> <p>Only for option S, sinusoidal filter: The pulse frequency (P0026) is less than 8 kHz; this means that the sinusoidal filter can go into resonance, resulting in high currents.</p>	<p>Check the motor data in Quick Setup. Carry-out the motor identification routine (P0189). The current controller automatically tunes itself (refer to the explanation in the function chart)</p> <p>Set the pulse frequency in the Quick Setup (P0026) to either 8 kHz or higher.</p>
	<p>Cause within the unit:</p> <p>Defective power section transistor.</p>	
15	Power supply	Fault
	<p>The switched-mode power supply voltage lies outside the limit values:</p> <p>Limit values for +15V = +13.5V - 15V = - 13.5V</p>	The switched-mode power supply is defective, or the load, caused by a defective module/board, is too high (also refer to the comment, regarding Fault 40, switched-mode power supply).
16	Internal DSP comm. (communications)	Fault
	Faulty communications with the digital signal processor on the control card	Please contact Customer Service.

No	Designation	Message
	Cause	Remedy / comment
17	Overspeed	Warning / fault
	<p>This fault is initiated if the speed encoder signal exceeds the selected threshold (P0395 n_{\max}: Fault).</p> <p>Cause outside the drive unit: Encoder system fault. The driven machine drives the motor above the speed threshold. Only for synchronous motors: incorrect motor phase assignment incorrect resolver angle setting.</p>	Measure the encoder signal using an oscilloscope or using the REFUwin "Oscilloscope" function (D1873)
	<p>Cause in the parameterization: Incorrect speed normalization.</p> <p>Incorrect speed threshold setting Incorrect speed controller setting (this can result in the speed overshooting).</p>	Check that P0390 (speed normalization) is set to the correct value, and if required change. Check the speed threshold in P0395. Check the speed controller settings in the Quick Setup or using the REFUwin "Oscilloscope" function.
18	Ground fault	Fault
	Ground fault at the inverter output terminals (U2, V2, W2) or excessively high capacitance with respect to ground due to long motor feeder cables.	
19	EEPROM data	Warning / fault
	<p>Cause in the parameterization: The control card was replaced and after initialization recognizes a new power section, which e.g. cannot supply the parameterized currents. This means that one or several parameters lie outside the tolerance range. The associated parameters are reset when acknowledging the standard drive unit values.</p>	<p>The appropriate parameter numbers can be viewed using P0061.XX, and the erroneous parameter values using P0062.XX.</p> <p>The fault can be removed by applying a special acknowledgement with P0060 (password level 3  , ,  and acknowledge with ).</p> <p>A check must then be made as to whether the modified parameters match the application.</p> <p>When the parameterization is exited, save the values in the Eeprom.</p>
	<p>Cause in the drive converter: The fault can also occur, if the power fails during operation. In this case, the power section could send incorrect data to the control card.</p>	The fault may be able to be removed by powering-down and powering-up again or switching the standby power supply on and off. If this measure is not successful, please call Customer Service.
20	Internal DSP ackn. (receive acknowledgement)	Fault
	The internal processor coupling is faulted.	Fault acknowledgement; if this fault repeatedly occurs, then there is component fault, and it may be necessary to replace the control card.
21	Internal WS comm.	Fault
	Faulty communications between the processor board and power section. If the fault occurs immediately after powering-up during the self test, then it cannot be acknowledged.	Check the plug connection between the boards or replace the board/module.
22	NTC power section	Fault
	Wire breakage to the NTC on the heatsink in the power section or rectifier section; defective NTC; excessively high ohmic connection or connector has no contact	Check the connection; replace the connector, cable or NTC.

No	Designation	Message
	Cause	Remedy / comment
23	Motor encoder	Fault
	Incorrect encoder data parameterized Jumper S5 incorrectly inserted on SR17002 (refer to Fig. 4-11: Control terminals on the control board SR17002) The encoder feeder cable is interrupted. Defective encoder	Check that the encoder data in P0130 and P0131 are correct. Check that the encoder cable is not interrupted. Replace the encoder.
24	SS1 time monitoring	Warning / fault
	The control computer does not send any data within the parameterized response time (P0506)	Check the plug connector SI1 (RS485); extend the response time (P0506), select another response type (P0505).
25	SI2 function	Warning / fault
	Only for the optional interface card at option 1. The drive converter recognizes a physical fault on the interface cable from the higher-level control computer. Data transfer on the fieldbus is erroneous.	Check that the PPO type is correct (protocol type), along with the baud rate, parity, stop bit and slave address. If the bus fault/error occurs in the form of a warning or fault, then parameter P0509 can be used to suppress the warning or fault or both, i.e. the system can still be operated!
		Only for the CAN bus option: The protocols which are sent are monitored on the CAN-bus interface. If a bus error occurs more than 127 times, a warning is output. If a bus error occurs more than 255 times, a fault is output. The warning or fault which occurs or both messages can be masked using P0509, i.e. the system can still be operated.
		Only for the Profibus option: A selection can be made between "No action" and "Fault" using parameter P0524 when Clear Data is received. Caution: P0509 should be set to the "All active" function! This means that the control computer sends Clear Data if there is an invalid protocol or bus error.
		Only for the Interbus S option: The response time can be set in parameter P0518 and the monitoring time for a bus error in P0519. Index 0 = process data, Index 1 = PKW area.
26	SI2 time monitoring	Warning / fault
	Only for optional interface cards in option slot 1. The higher-level control computer does not send any data within the parameterized response time (P0527).	Check the plug connector SI2 Extend the response time (P0527), select another response type (P0526).
27	Analog input 1: <4mA	Warning / fault
	Cause outside the drive unit: Short-circuit or interrupted cable on the setpoint cable to the analog input or to the optional analog inputs (only for 4-20 mA or 2-10 V operation).	Check the setpoint cable
	Cause in the parameterization: Incorrect response type Incorrect operating mode	Check the response type in P0564 and P0752. Check the operating mode in P0201 and P0735.

No	Designation	Message
	Cause	Remedy / comment
28	Motor overtemperature	Warning / fault
	The drive converter recognizes an excessive resistance at terminals X15.1 and X15.2. The motor has overheated, temperature sensor defective, sensor cable is defective. Parameterization is erroneous.	Replace the sensor or sensor cable. Check the temperature evaluation parameter (P0385 – P0389) to ensure that it is correct. When KTY84 is selected, the actual motor temperature can be displayed in °C in the Monitor using D1872; when a PTC is selected, the actual ohmic value can be displayed using D1871.
30	Drive converter version?	Fault
	The control card and the firmware (flash Eprom) do not match	Please call Customer Service.
31	Pulsed resistor overload	Warning / fault
	The drive converter calculates a temperature image for the parameterized brake resistor. If the brake resistor is energized, then the drive converter calculates the assigned temperature. If the threshold value is exceeded, the drive converter signals pulsed resistor overload.	
	Cause outside the drive unit: Only for option W, brake resistor: The connected brake resistor has an excessively high ohmic resistance. A brake resistor is not connected. The connected brake resistor is too small for the energy which is regenerated into the DC link when braking.	Check the brake resistor.
	Cause in the parameterization: An excessively fast down ramp was set. The incorrect brake resistor was selected. Only for an external programmable brake resistor: The values for resistance, continuous power and/or thermal time constant were incorrectly parameterized.	Check the down ramp in P0280.0X Check whether the correct brake resistor was selected in P0036. Reference to REFU standard: A specific brake resistor is assigned to each drive converter output class. Check the values in P0623 to P0625. Maintain the max. braking time and the required no-load times (i.e. no braking) up to the next braking operation. The load diagram in the brake resistor option instructions can be used to calculate the braking and no-braking times.
39	On for start inhibit	Fault
	Sizes A to E: Contact X80.1 and X80.2 were opened during operation, or, with the terminal open-circuit, an On command was issued. Sizes G and H: Contact X80.170 and X80.171 were opened during operation, or, with the terminal open-circuit, an On command was issued.	

No	Designation	Message
	Cause	Remedy / comment
40	Switched-mode power section	Fault
	The switched-mode power section for the electronics supply does not provide a checkback signal.	Replace the defective switched-mode power supply. Depending on the drive unit type, the switched-mode power supply is located on the board: LT (power section), WS (inverter control), or SV (power supply).
41	Drive converter <==> WS new	
	If the control card is replaced in another unit with a higher or lower output or drive unit index, this is entered into the fault memory (the unit does not go into a fault condition!). A fault is output if the parameters lie outside the limit values (refer to Fault 19).	
44	SI4 function	Warning / fault
	Only for optional interface cards at option slot 2. The drive converter recognizes a physical fault on the interface cable from the higher-level control computer. Data transfer on the fieldbus is erroneous.	Check that the PPO type is correct (protocol type), along with the baud rate, parity, stop bit and slave address. If the bus fault/error occurs in the form of a warning or fault, then parameter P0745 can be used to suppress the warning or fault or both, i.e. the system can still be operated!
		Only for the CAN bus option: The protocols which are sent are monitored on the CAN-bus interface. If a bus error occurs more than 127 times, a warning is output. If a bus error occurs more than 255 times, a fault is output. The warning or fault which occurs or both messages can be masked using P0745, i.e. the system can still be operated.
		Only for the Profibus option: A selection can be made between "No action" and "Fault" using parameter P0524 when Clear Data is received. Caution: P0745 should be set to the "All active" function! This means that the control computer sends Clear Data if there is an invalid protocol or bus error.
		Only for the Interbus S option: The response time can be set in parameter P0518 and the monitoring time for a bus error in P0519. Index 0 = process data, Index 1 = PKW area.
45	SI4 time monitoring	Warning / fault
	Only for optional interface cards in option slot 2. The higher-level control computer does not send any data within the parameterized response time.	Check the plug connector SI4 Extend the response time (P0747), select another response type (P0746).
47	Start inhibit active	Warning
	Start inhibit was activated.	The drive unit cannot be powered-up when this warning is present. If the inverter is enabled, the fault "On for start inhibit" is output.

No	Designation	Message
	Cause	Remedy / comment
48	module overtemp.	
	<p>The measured IGBT temperature of the power section or the rectifier is too high. Possible reasons: Ambient temperature > 40 °C Defective fan Air filter blocked Defective NTC (temperature sensor) Incorrectly set fan control</p>	<p>Example for an incorrectly set fan control in P0034: The function is set to "Automatic" and the threshold value in P0035 is set too high. Reduce the threshold value.</p>
49	DC-link asymmetry	
	The asymmetry checking has detected an error.	Please contact Customer Service.
50, 51	Phase V, Phase W	
	<p>This fault is initiated when an overcurrent threshold responds and protects the power section transistors. Causes outside the drive unit: Defective motor Defective motor cable. Defective speed encoder or encoder cable. Incorrectly connected encoder cable.</p>	<p>Disconnect the motor cable, enable the inverter. If a fault no longer occurs, then, it is highly probable that the problem lies on the motor side. Replace the motor. Check the encoder signal using the display or REFUwin under no-load operating conditions, or by manually rotating the motor shaft. Measure with REFUwin "Oscilloscope function": Parameter D1850, speed controller setpoint.</p>
	<p>Cause in the parameterization: Incorrect motor data have been parameterized. Incorrect current controller setting Incorrect encoder setting (P0130) Only for option S, sinusoidal filter: The pulse frequency (P0026) is less than 8 kHz; this means that the sinusoidal filter can go into resonance, resulting in high currents.</p>	<p>Check the motor data in Quick Setup. Carry-out the motor identification routine (P0189). The current controller automatically tunes itself (refer to the explanation in the function chart) Set the pulse frequency in the Quick Setup (P0026) to either 8 kHz or higher.</p>
	<p>Cause within the unit: Defective power section transistor.</p>	
52, 53, 54, 55, 56, 57, 58	External1, External 2, External 3, External 4, External 5, External 6, External 7	
	If a digital input was assigned the "No external fault" function, and there is no 24V signal at the digital input, then the drive unit is shutdown with "External" fault (wire breakage-proof).	Determine the cause of the signal loss in the system and rectify.

No	Designation	Message
	Cause	Remedy / comment
59	SI6 timeout	
	Only for interface SS6 (X13) No telegram received within the parameterized response time (P1275)	Check the plug connector X13 Extend the response time (P1275), select another response type (P1276).
60	SynchroLink timeout	
	Only for interface SynchroLink SS7 No telegram received within the parameterized response time (P0497).	Check the plug connector Extend the response time (P0497), select another response type (P0496).
63	Output current EN81 – for future use	
64	DC link discharge – for future use	

2 Service & Support

2.1 Indramat Refu GmbH

Adresse: Indramat Refu GmbH
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Kundendienst - Service

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Service Telefax: +49 (0)7123/969-220

E-Mail: service.brc-mg@boschrexroth.de

2.2 Internet

Unter www.boschrexroth.de finden Sie ergänzende Hinweise zu Service, Reparatur und Training sowie die **aktuellen** Adressen *) unserer auf den folgenden Seiten aufgeführten Vertriebs- und Servicebüros.



Verkaufsniederlassungen



Niederlassungen mit Kundendienst

Außerhalb Deutschlands nehmen Sie bitte zuerst Kontakt mit unserem für Sie nächstgelegenen Ansprechpartner auf.

*) Die Angaben in der vorliegenden Dokumentation können seit Drucklegung überholt sein.

At www.boschrexroth.de you may find additional notes about service, repairs and training in the Internet, as well as the **actual** addresses *) of our sales- and service facilities figuring on the following pages.



sales agencies



offices providing service

Please contact our sales / service office in your area first.

*) Data in the present documentation may have become obsolete since printing.

2.3 Vor der Kontaktaufnahme... - Before contacting us...

Wir können Ihnen schnell und effizient helfen wenn Sie folgende Informationen bereithalten:

1. detaillierte Beschreibung der Störung und der Umstände.
2. Angaben auf dem Typenschild der betreffenden Produkte, insbesondere Typenschlüssel und Seriennummern.
3. Tel./Faxnummern und e-Mail-Adresse, unter denen Sie für Rückfragen zu erreichen sind.

For quick and efficient help, please have the following information ready:

1. Detailed description of the failure and circumstances.
2. Information on the type plate of the affected products, especially type codes and serial numbers.
3. Your phone/fax numbers and e-mail address, so we can contact you in case of questions.

2.4 Kundenbetreuungsstellen - Sales & Service Facilities

Deutschland – Germany

vom Ausland:

(0) nach Landeskennziffer weglassen!

from abroad:

don't dial (0) after country code!

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