

Funktionsplan REFdrive 500 - RDS2 Motorgelung		Datum:	Firmware:	Blatt Nr.:				
		2000-02-02	FWC-SR1700-200-02VRS-MS	22				
4.0	kHz	2	R/W	off				
500.0	Hz	0	Read	U16				
0	h	-	Read	S32				
0	min	-	Read	U16				
0.0	%	3	R/W	on				
1)	A	0	Read	S32				
34	Lüfter Steuerung	0	1	0	1	R/W	on	U16

RD500 Drive Control Devices V/f characteristic control RD51

Troubleshooting Guide: 04VRS

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 Drive Control Devices
 V/f characteristic control RD51

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Purpose of Documentation This document is designed to assist maintenance personnel in identifying errors with the machinery.

- 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 Error Messages

After the initialization routine, the system carries out a self-test. Here, the individual parts of the microcomputer system, such as the EEPROM, are checked and data are read in from the power control board.

1.2 Warnings

If a warning occurs, the warning message is displayed alternately with the programmed operating display. The warning bit can be output on a digital input. If the converter startup is to be prevented, the warning bit must be linked in free parameter assignment.

Note: The warning bit (D1737) is set and can be linked in a digital output or in the device to prevent startup, for example.

1.3 Faults

During operation, permanently programmed limit values whose parameters can be assigned are constantly monitored. To protect the power section from damage, a shutdown always occurs when a limit value is exceeded; the corresponding fault message is then shown in the display.

For the REFUdrive 500 converters with a three-phase supply, the main contactor is shut down when a fault occurs so that the power section is switched off. The corresponding fault message is shown in the display.

The fault is displayed by the red "alarm" LED on the front of the device.

Fault messages are stored in the fault memory so that they are retained even if the power supply fails. The fault memory appears in the monitor. The last 10 faults are saved in the fault memory. The most recent fault is in memory location S0, the oldest in S9. A new fault is always saved in memory location S0. All of the older faults are always shifted one position upwards in the memory. This means the fault in memory location S9 is lost.

Fault Acknowledgement

After a shutdown due to a fault, the device cannot be switched back on until the fault is acknowledged. As long as the cause of the fault is still present, acknowledgement is impossible. When the cause of the fault has been eliminated, the fault can be acknowledged after a set timer (P0093, factory setting = 1 sec.) has elapsed.

There are several ways to acknowledge a fault message:

- pressing the **Esc** key of the control panel.
- pressing the S9 "Fault acknowledgement" key on the logic and control card.
- using a digital input: apply the H signal to the digital input and switch the non-inverted D parameter of the selected digital input in P0050.07.
- using serial interface RS485; transfer the control word with bit 7 set to "high".

1.4 List of 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	Device excess temperature	X	X
8	Braking resistor		X
9	Main contactor		X
10	Pre-charge		X
11	New EEPROM		X
12	Clock1 <=> Clock2		X
13	Power section	X	X
14	Inverter		X
15	Power supply		X
17	Excess speed	X	X
18	Ground fault		X
19	EEPROM data	X	X
21	Internal WS comm. (communication)		X
22	NTC power section		X
24	SS1 time monitor	X	X
25	SS2 function	X	X
26	SS2 time monitor	X	X
27	Analog input I < 4 mA		
28	Motor excess temperature	X	X
30	SR output level		X
31	BR overload	X	X
32	Overcurrent		X
34	Safety OFF	X	X
35	Motor Overload	X	X
39	On for starting lock-out		X
40	Switch power pack		X
41	SR <==> WS new		X
44	SS4 function	X	X
45	SS4 time monitor	X	X
47	Starting lock-out active	X	
48	Module excess temperature	X	X
49	Uic asymmetry	X	X
50, 51	Phase V, phase W		X
59	SS6 time monitor	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 / Comments

No.	Designation	Message
	Cause	Remedy / comments
1	External	Warning / fault
	If the function “no external fault” is assigned to a digital input and if there is no 24V signal at the digital input, the device shuts down with fault “External” (wire break-proof design).	Determine and eliminate the cause of signal loss in the system.
3	DC link voltage too high	Fault
	Regeneration of the motors in the DC link in the case of dynamic operation. Limit value: U_{ICmax} (P0095) has been exceeded. The set time of the descending ramp is too short.	If the fault occurs during braking, set the descending ramp of the ramp-function generator (P0280) so that it is slower. Check the braking resistor (if option W exists) with the ohmmeter; use a more efficient external braking resistor. Check if the braking resistor is selected (P0036)
4	DC link voltage too low	Warning / fault
	The DC link voltage has dropped below limit value U_{ICmin} (P0094) during operation Slowdown or failure of power supply Contacts of main contactor interrupted. Mains rectifier defective	Check power supply voltage using oscilloscope measurement.
7	Device excess temperature	Warning / fault
	The measured cooler temperature of the power section or of the mains rectifier is too high. The fault causes a shutdown if the temperature has exceeded the value specified in parameter D1036.73 (mains rectifier) or D1036.74 (inverter). The difference in temperature between the warning and the shutdown due to the fault can be changed in parameter P0086. The current cooler temperatures can be displayed using the monitor (power section = D1870 and inverter = D2029). Ambient temperature > 40 °C Fan defective Air filter clogged NTC (temperature sensor) defective Incorrectly set air control	Example of incorrectly set air control in P0034: Function is on “Automatic” and the threshold value in P0035 is set too high. Lower the threshold value.
8	Braking resistor	Fault
	No acknowledgment occurs when the braking resistor is activated. The switching transistor or perhaps the braking resistor is defective.	Check the BR switching transistor between terminals F and D using a multimeter. If the BR switching transistor is OK, the measuring result must be as follows: from F to D: reverse voltage from D to F: diode conduit voltage
9	Master contactor	Fault
	The master contactor does not pick up, drops off during operation or does not acknowledge.	Check the control voltage for the master contactor. Check the auxiliary contact for acknowledgement.

No.	Designation	Message
	Cause	Remedy / comments
10	Precharge	Fault
	<p>After startup, the temporal sequence of charging the DC link voltage is checked. If inadmissible variances occur here, precharging is terminated. Short-circuit between terminals C and D (DC link voltage) or C-PE / D-PE.</p> <p>Only for option W Braking resistor: Short-circuit between F and C.</p> <p>Only if option V 24V standby power supply is active, but no power supply is available.</p>	<p>Check: if the power supply is available if there is a short-circuit between terminals C and D or C-PE / D-PE.</p> <p>Note: After the "Precharge" fault is acknowledged, the system can be switched back on again only after 30 seconds; this protects the precharge resistors from overheating.</p>
11	New EEPROM	Fault
	The bit pattern loaded into the EEPROM at the factory is not recognized by the processor control.	Please call Customer Service.
12	Clock1 \iff Clock2	Fault
	The frequencies of the two clock generators provided on the control card are checked with one another for plausibility (overspeed protection). This fault trip is output for deviations exceeding ± 1 %.	One of the two clock generators is defective, replace the module.
13	Power section	Fault
	Unspecified error in the power section.	Please call Customer Service.
14	Inverter	Fault
	This fault is initiated when the overcurrent threshold is exceeded.	
	<p>Causes outside the drive converter:</p> <ul style="list-style-type: none"> - Defective motor, invalid load, defective motor cable - Setpoint step which is too fast 	<p>Disconnect the motor cable, enable the inverter. If the fault no longer occurs, then it is highly likely that the cause is outside of the drive converter.</p> <p>Measure using the RDwin "Oscilloscope function": Parameter D1981 "f act from normalization".</p>
	<p>Cause in the parameterization:</p> <p>The incorrect motor data were parameterized. Only for option S sinusoidal filter: The pulse frequency (P0026) is set to less than 8 kHz; thus, the sinusoidal filter can oscillate and conduct high currents.</p>	Check the motor data in the Quick-Setup. Set the pulse frequency in Quick-Setup (P0026) to 8 kHz or greater.
	<p>Cause inside the drive converter:</p> <p>Defective power section transistor.</p>	Please contact your customer service.
15	Power supply	Fault
	The voltages of the switch power pack lie beyond the limit values: Limit value for + 15V = + 13.5V - 15V = - 13.5V	The switch power pack is defective or the load is too high due to a defective module (also see the note regarding fault 40 Switch power pack).
17	Overspeed	Warning / fault
	The actual speed exceeds the speed limit of the parameter "f limit machine".	<p>Check P0178 (f limit machine) for the correct setting. An excessive slip compensation (P0540) may have been selected.</p> <p>Check P0390 (frequency normalization) for a correct value and, if required, change.</p> <p>Either alarm or fault can be selected using P0449 (response to overspeed).</p>

No.	Designation	Message
	Cause	Remedy / comments
18	Ground fault	Fault
	Ground fault at the inverter output terminals (U2, V2, W2) or excessive capacitance with respect to ground as a result of long motor cables.	
19	EEPROM data	Warning / fault
	Cause in the parameterization: The control card was replaced and, after initialization, detects a new power section, which for example, cannot supply the parameterized currents. This means, that one or several parameters lie outside the tolerance range. When the fault is acknowledged, the associated parameters are reset to the standard drive converter values.	The appropriate parameter numbers can be viewed using P0061.XX, and the erroneous parameter values using P0062.XX. The fault can be removed using a special acknowledgement with P0060 (password level 3 [Esc], [Mon], [Prog] and [+]). It must then be checked, whether the modified parameters match the particular application. When parameterization is exited, the values are transferred into the Eeprom.
	Cause in the drive converter: This fault can also occur if the power fails during operation. In this case, the power section could send incorrect data to the control card.	The fault may be able to be removed by powering-up and powering-down the line supply voltage or the standby supply. If this is not successful, then please call customer service.
21	Internal WS comm.	Fault
	Communications between the processor board and the power section are faulted. If the fault occurs after power-up during the self-test, it cannot be acknowledged.	Check the plug connection between the PC boards or replace the modules.
22	NTC power section	Fault
	Wire break to the NTC on the heat sink in the power section or the inverter section; NTC is defective – the impedance is too high or the plug has no contact.	Check the connector; replace the plug, cable or NTC.
24	SS1 time monitor	Warning / fault
	The control computer does not send any data within the set reaction time (P0506)	Check connector SS1 (RS485); increase the reaction time (P0506) or select another reaction type (P0505).

No.	Designation	Message
	Cause	Remedy / comments
25	SS2 function	Warning / fault
	Only for option interface cards at option slot 1. The drive converter detects a physical fault on the interface cable from the higher-level control computer. Erroneous data transfer along the fieldbus.	Check that the PPO type (protocol type), baud rate, parity, stop bit and slave address are correct. If a bus error occurs in the form of an alarm or fault, then the alarm or the fault or both messages can be suppressed using parameter P0509; this means that the system can continue to operate!
		Only for CAN bus option: The protocols sent on the CAN bus interface are monitored. If a bus error occurs more than 127x, an alarm is output. If a bus error occurs more than 255x, a fault is signaled. The alarm or fault, or both messages can be masked in parameter P0509; this means that the system can continue to operate.
		Only for Profibus option: Either "No action" or "Fault" can be selected in parameter P0524 when receiving Clear Data. Caution: In this case, 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 a bus error.
		Only for Interbus S option: The response type can be set in parameter P0518 and the monitoring time when a bus error occurs, in P0519. Index 0 = process data, index 1 = PKW range.
26	SS2 time monitor	Warning / fault
	Only for option interface cards at option slot 1. Within the parameterized response time (P0527), the higher-level control computer does not send any data.	Check connector SS2 Extend the response time (P0527), select another response type (P0526).
27	Analog input 1:I<4mA	Warning / fault
	Causes outside of the device: Short-circuit or interrupted cable on the setpoint line to the analog input or to the optional analog inputs (only for operating mode 4-20 mA or 2-10 V).	Check the setpoint cable
	Causes in the parameterization: Incorrect response type Incorrect operating mode	Check the response type in P0564.0X / P0752.0X Check the operating mode in P0201.0X / P0735.0X
28	Motor overtemperature	Warning / fault
	The drive converter detects an excessive resistance at terminals X15.1 and 2. The motor temperature is too high, temperature sensor defective, sensor cable defective. Erroneous parameterization.	Replace the sensor or sensor cable. Check the temperature evaluation parameters (P0385 – P0389) to ensure that they are correctly set. If a KTY84 has been selected, the actual motor can be displayed in °C in the monitor using D1872; if a PTC has been selected, the actual ohmic value can be displayed using D1871.

No.	Designation	Message
	Cause	Remedy / comments
30	SR output level?	Fault
	The control card and the firmware (Flash Eprom) do not match.	Please call customer service.
31	BR overload	Warning / fault
	For the parameterized brake resistor, the drive converter computes a temperature image. If the brake resistor is controlled, the drive converter calculates the assigned temperature. If a threshold is exceeded, the drive converter signals a brake resistor overload condition.	
	Causes outside of the device: Only for the option W brake resistor: The brake resistor which is being used has an excessive ohmic value. A brake resistor has not been connected. The connected brake resistor is too low for the energy which is fed-back into the DC link when braking.	Check the brake resistor.
	Causes in the parameterization: The down-ramp was set too fast. An incorrect brake resistor was selected. Only for an external programmable brake resistor: The values for the resistance, continuous output and/or thermal time constant were incorrectly parameterized.	Check the down ramp in P0280.0X In P0038 check whether the correct brake resistor was selected. Information regarding REFU Standard: Every drive converter output class is assigned a specific brake resistor. Check the values in P0623 to P06256. Maintain the max. braking duration and the required no-load times to the next braking operation. The load diagram in the instructions for the brake resistor option can be used to calculate the braking and no-load times.

No.	Designation	Message
	Cause	Remedy / comments
32	Overcurrent	Fault
	Current limiting is active for a time which is longer than that parameterized.	Check the setting of P0574! The time duration of the uninterrupted current limiting (D1678 = 1) can be set between 1 second and 100 seconds in 11 steps using P0574. If current limiting is interrupted before the parameterized time has expired (D1678 = 0), the time counter is reset to 0 and then restarts at the next current limiting. If P0574 has been set to 0 (= continuous), then the "Overcurrent" fault is output.
	The peak current of the drive converter was exceeded	
	Causes outside the drive converter: - Defective motor, invalid load, defective motor cable - Setpoint step which is too fast	Disconnect the motor cable, enable the inverter. If the fault no longer occurs, then it is highly likely that the cause is outside of the drive converter. Measure using the RDwin "Oscilloscope function": Parameter D1981 "f act from normalization".
	Cause in the parameterization: The incorrect motor data were parameterized. Only for option S sinusoidal filter: The pulse frequency (P0026) is set to less than 8 kHz; thus, the sinusoidal filter can oscillate and conduct high currents.	Check the motor data in the Quick-Setup. Set the pulse frequency in Quick-Setup (P0026) to 8 kHz or greater.
	Cause inside the drive converter: Defective power section transistor.	Please contact your customer service.
34	Safety Off (NAMUR)	Alarm / fault
	The "Safety Off" fault message has been introduced so that the drive converter fulfills the Namur Standard (Namur is a Standards Committee for instrumentation and control in the chemical industry). It is only activated when P0057 is set to 1. The fault or alarm is selected using P0571. The fault is initiated using an external control signal, which is connected to the digital input of the drive converter. The D parameter of the digital input is connected to P0050.1. The external control signal is used to positively disconnect the drive from the line supply (1 = operation; 0 = disconnected from the line supply).	
35	Motor overload	Alarm / fault
	The electronic overload relay has responded (refer to the function diagram "Modulation, measured value sensing" or in the Operating Instructions Section 5 of the basic programming "Thermal motor protection").	Check P0566 "Overload protection threshold" to ensure that it has been correctly set. The type of response of the electronic overload relay can be set using P0565: Disabled / Alarm / Fault.

No.	Designation	Message
	Cause	Remedy / comments
39	On for starting lock-out	Fault
	The message only occurs when the start inhibit option is installed. Sizes A to E: Contacts X80.1 and 2 were opened during operation, or an on command was output with the terminal open. Sizes G and H: Contacts X80.170 and 171 were opened during operation, or an on command was issued with the terminals open.	
40	Switched-mode power supply	Fault
	The switched-mode power supply for the electronics supply does not output a checkback signal.	Replace the defective switched-mode power supply. Depending on the drive converter version, the switched-mode power section is on the PC board: LT (power section), WS (inverter control) or SV (power supply).
41	SR <==> WS new	
	If the control card is replaced in another drive converter with a higher or lower output or drive converter index, this entry is made in the fault memory (the drive converter does not go into a fault condition!). A fault is issued if the parameters lie outside the limit values (refer to fault 19).	
44	SS4 function	Warning / fault
	Only for option interface cards at option slot 2. The drive converter detects a physical fault on the interface cable from the higher-level control computer. Erroneous data transfer along the fieldbus.	Check that the PPO type (protocol type), baud rate, parity, stop bit and slave address are correct. If a bus error occurs in the form of an alarm or fault, then the alarm or the fault or both messages can be suppressed using parameter P0745, this means that the system can continue to operate!
		Only for CAN bus option: The protocols sent on the CAN bus interface are monitored. If a bus error occurs more than 127x, an alarm is output. If a bus error occurs more than 255x, a fault is signaled. The alarm or fault or both messages can be masked in parameter P0745; this means that the system can continue to operate.
	Inside the handicap there Watchdog-time no protocol communication. It's a fault as reaction on the instruction "Clear Data" in Parameter P0524 and no valide protocol inside the timeout-time receive.	Only for Profibus option: Either "No action" or "Fault" when receiving Clear Data can be selected in parameter P0524. Caution: In this case, 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 a bus error.
		Only for Interbus S option: The response type can be set in parameter P0518 and the monitoring time, when a bus error occurs, in P0519. Index 0 = process data, index 1 = PKW range.
45	SS4 time monitor	Warning / fault
	Only if an option interface card is in option slot 2. The superordinate control computer does not send any data within the set reaction time.	Check connector SS4 Increase the reaction time (P0747) or select another reaction type (P0746).

No.	Designation	Message
	Cause	Remedy / comments
47	Starting lock-out active	Warning
	Only for the start inhibit option: The start inhibit was activated, while the drive converter was not operational.	
48	Module overtemperature	Warning / fault
	The measured module temperature of the power transistor or of the mains rectifier is too high. Possible causes: ambient temperature too high fan defective air filter clogged incorrectly set fan control	Example of incorrectly set air control in P0034: Function is on "Automatic" and the threshold value in P0035 is set too high. Lower the threshold value.
49	Uic asymmetry	Warning / fault
	The symmetry monitor of the DC link capacitors has been activated.	Call Customer Service
50, 51	Phase V , phase W	Fault
	This fault is triggered by activating an overload current threshold; it protects the transistors of the power section. Causes outside of the device: defective motor defective motor cable defective speed encoder or encoder cable incorrectly connected encoder cable	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 RDwin under no-load operating conditions, or by manually rotating the motor shaft. Measure with RDwin "Oscilloscope function": Parameter D1850, speed controller setpoint.
	Causes in the parameterization: Incorrect motor data parameters. Incorrect current regulator setting Incorrect encoder setting (P0130) Only for option S Sine filter: the pulse frequency (P0026) is less than 8 kHz; as a result, the sine filter may experience resonance and provide high currents.	Check the motor data in the Quick Setup. Execute a motor identification (P0189); as a result, the current regulator sets itself automatically (see the explanations for the function plan) Set the pulse frequency equal to or greater than 8 kHz in the Quick Setup (P0026).
	Causes within the device: Defective transistor of the power section.	
59	SS6 time monitor	Warning / fault
	Within the parameterized response time (P1275) the higher-level control computer does not send any data.	Check connector X13 Increase the reaction time (P1275) or select another reaction type (P1276).
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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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!

Vertriebsgebiet Mitte Germany Centre Rexroth Indramat GmbH Bgm.-Dr.-Nebel-Str. 2 / Postf. 1357 97816 Lohr am Main / 97803 Lohr Kompetenz-Zentrum Europa Tel.: +49 (0)9352 40-0 Fax: +49 (0)9352 40-4885	SERVICE CALL ENTRY CENTER MO – FR von 07:00 - 18:00 Uhr from 7 am – 6 pm Tel. +49 (0) 9352 40 50 60 service@boschrexroth.de	SERVICE HOTLINE MO – FR von 17:00 - 07:00 Uhr from 5 pm - 7 am + SA / SO Tel.: +49 (0)172 660 04 06 oder / or Tel.: +49 (0)171 333 88 26	SERVICE ERSATZTEILE / SPARES verlängerte Ansprechzeit - extended office time - ♦ nur an Werktagen - only on working days - ♦ von 07:00 - 18:00 Uhr - from 7 am - 6 pm - Tel. +49 (0) 9352 40 42 22
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Europa (West) - Europe (West)

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