hejm automation

Parameter, Instructions

for device series

DR312, DR322

When used as speed controller or speed governer.

Hardware version DR300_02

Software version DR300_06

HEJM Automatisierungstechnik GmbH
Wilhelm-Moriell-Straße 7
D-78315 Radolfzell

Phone: 07732 94558-0
Fax: 07732 94558-29
E-Mail: info@hejm.de
Web: www.hejm.de

1. Introdution

The device series DR312, DR322 can operate in various applications. Parameter P06 is used to adjust the device to the application.

Different parameter lists are shown then.

When the device is used as a speed controller, or speed governor this parameter has to be set in a range between 1 to 4.

2. Comissioning

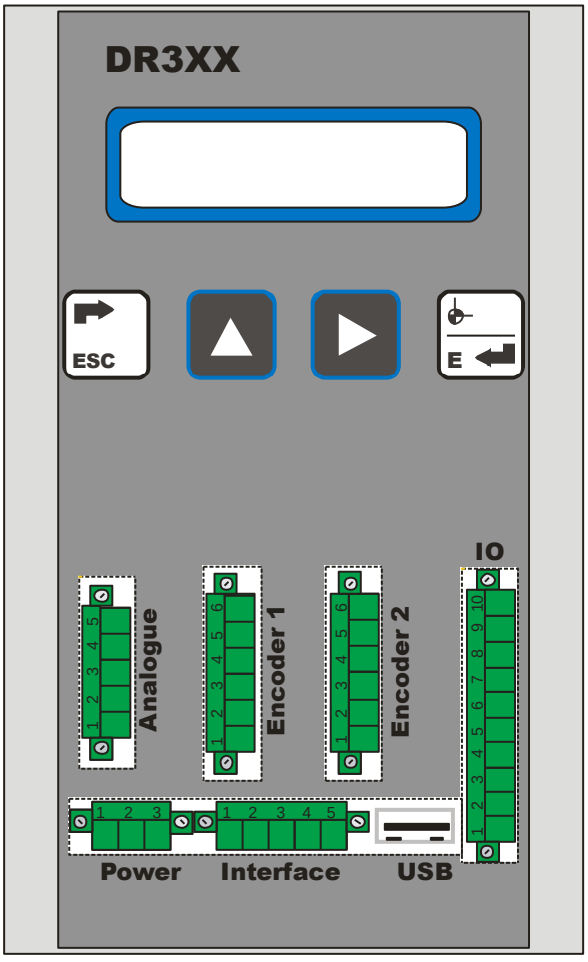


Abb. 1 Connection located on the front panel

CON1	Power supply for electronic 24V DC (Power)
	Terminal strip 3 pin
Pin 1	GND, 0V
Pin 2	+24V DC, +/- 10%
Pin 3	NC, not connected

CON2	Analogue inputs (Analogue)
	Terminal strip 5 pin
Pin 1	GND
Pin 2	0 – 10V, or +/- 10V input for target speed motor 1
Pin 3	0 – 10V, or +/- 10V input for target speed motor 2
Pin 4	0 – 20mA, or 4 – 20mA input for optional application
Pin 5	0 – 20mA, or 4 – 20mA input for optional application

CON3	Measuring system motor 1 (Encoder 1)
	Terminal strip 6 pin
Pin1	GND for measuring system supply
Pin 2	+24V for measuring system supply max. 120 mA.
Pin 3	Signal A
Pin 4	Signal B
Pin 5	Signal Z
Pin 6	GND, for shield

When brushless DC motors are connected, the rotor position signals can be used as a measuring system too.

In this case Con 3 will not be used.

CON4	Measuring system motor 2 (Encoder 2)
	Terminal strip 6 pin
Pin1	GND for measuring system supply
Pin 2	+24V for measuring system supply max. 120 mA.
Pin 3	Signal A
Pin 4	Signal B
Pin 5	Signal Z
Pin 6	GND, for shield

When brushless DC motors are connected, the rotor position signals can be used as a measuring system too.

In this case Con 4 will not be used.

CON5	Inputs, Outputs
	Terminal strip 10 pin
Pin1	GND
Pin 2	+24V supply for external switches, sensors max. 100 mA.
Pin 3	Controller release motor 1
Pin 4	Controller release motor 2, when used as a 2 axis controller, Limit switch + Motor 1, when used as a 1 axis controller
Pin 5	Input direction, motor 1, for 0 – 10V analogue input
Pin 6	Input direction, motor 2 for 0 – 10V analogue input, when used as a 2 axis controller. Limit switch - Motor 1, when used as a 1 axis controller
Pin 7	Error reset input
Pin 8	Not used
Pin 9	Error output. Active high when error active. Tri state otherwise.
Pin 10	Not used .

CON6	Interface(Interface)
	Terminal strip 5 pin
Pin 1	Can L
Pin 2	RS232 RxD
Pin 3	RS232 TxD
Pin 4	Can H
Pin 5	GND

CON7	USB update connector (USB)
	USB connector

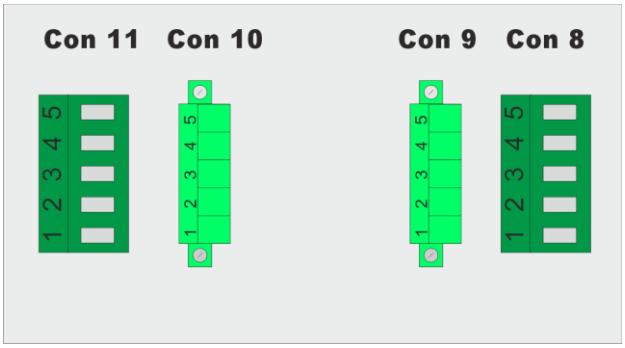


Abb. 2 Wiring diagram bottom plate

CON8	**Motor connector for DC motor 1**
	Terminal strip 5 pin (Master motor in synchron mode)
Pin1	GND, input for motor supply
Pin 2	+24V - + 48V DC input for motor supply
Pin 3	Motor phase T
Pin 4	Motor phase S
Pin 5	Motor phase R, not connected when brushed motors are used

CON9	**Rotor position encoder for DC motor 1**
	Terminal strip 5 pin
Pin1	GND, for rotor position encoder supply
Pin 2	+12V for rotor position encoder supply ,(5V supply possible via internal jumper)
Pin 3	Hall sensor C (Motor phase T) Connect this to GND when brushed motors are used.
Pin 4	Hall sensor B (Motor phase S)
Pin 5	Hall sensor A (Motor phase R)

CON10	Motor connector for DC motor 2
	Terminal strip 5 pin (Slave motor in synchron mode)
Pin1	GND, input for motor supply
Pin 2	+24V - + 48V DC input for motor supply
Pin 3	Motor phase T
Pin 4	Motor phase S
Pin 5	Motor phase R, not connected when brushed motors are used

CON11	Rotor position encoder for DC motor 2
	Terminal strip 5 pin
Pin1	GND, for rotor position encoder supply
Pin 2	+12V for rotor position encoder supply ,(5V supply possible via internal jumper)
Pin 3	Hall sensor C (Motor phase T) Connect this to GND when brushed motors are used.
Pin 4	Hall sensor B (Motor phase S)
Pin 5	Hall sensor A (Motor phase R)

3. Display

When the device is used as a single axis cntroller the following informations are displayed on the screen.

The upper row shows the demand speed in rpm, while the lower row shows the actual speed, when the controller release is active.

When the controller release is not active the following display appears.

Press the  button to switch to the next information screen.

The display shows the actual temperature of the drive in °C and the actual current sourced by the drive

When used as a 2 axis controller the following informations are displayed.

The upper row shows the demand speed in rpm, while the lower row shows the actual speed, when the controller release is active.

Press the  button to switch to the next information screen.

The second screen is equal tot he first and shows the values for axis 2.

In the third screen the temperature of the drive is shown in °C.

The fourth screen shows the actual current for both axis sourced by the drives.

4. Parameter

Relating to the field of application the device provides 5 or 6 parameter levels.

When used as a single axis device these levels are

1. **Parameter All**
2. **Parameter Axis 1**
3. **Factory level**
4. **Adjust level**
5. **Test level**

When used as a 2 axis device these levels are

1. **Parameter All**
2. **Parameter Axis 1**
3. **Parameter Axis 2**
4. **Factory level**
5. **Adjust level**
6. **Test level**

How to change a parameter setting .

When 

is pressed the device switches to the parameter selection screen.

Press  to switch between the parameter levels.

Open the parameter level by pressing 

.

In the upper row, the parameter level will appear while the parameter number and value will be shown in the lower row.

To show the next parameter ▲ must be pressed.

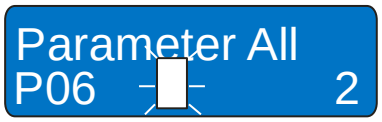
Press ▶ to switch to the last parameter.

Repeated pressing of ▲ will change the display for example to

To change the parameter value press E↵. A blinking cursor will appear at the last decade.

Pressing ▶ will increment the value on the cursor position.

Pressing  will change the position oft he blinking cursor.



To change the value on the cursor position use the  button..

The new value is stored by pressing  and the next parameter will be shown on the screen.

When the value is outside the possible parameter range the minimal or maximal value is shown on the screen.

5. Parameterlist

The parameters shown in the following are all performed according to the sample

- Parameter number Name [unit, minimum/maximum value) Parameter description.

Parameters with index ro can only be read.

Parameter level All

P02 *Softwareversion [ro/------,-------]*

Actual software version oft he device.

P03 *Language [Language/0,1]*

Setting	Language
0	German
1	English

Parameter level All

P06 *Device functionality [Function/1,15]*

Einstellung	Funktion
1	The device is used as a one axis speed controller. Analogue input 1 will set the variable speed.
2	The device is used as a two axis speed controller. Analogue input 1 and 2 will set the variable speed.
3	The device is used as a one axis speed governer. Analogue input 1 will set the variable speed.
4	The device is used as a two axis speed governer. Analogue input 1 and 2 will set the variable speed.
5 - 8	Reserved for further expansions.
9	The device is used as a one axis positioning module. The demand value and commands are sent by one of the available interfaces.
10	The device is used as a two axis positioning module. The demand values and commands are sent by one of the available interfaces.
11	Reserved for further expansions.
12	The device is used as a synchronization module. The motors are started by activating the forward or backward input. The motor will run to the positive or negative software limit, while the input is active. Axis 2 will follow axis 1 synchron or in the adjusted ratio.
13	The device is used as a synchronization module. The demand value, start and stop commands are sent via the available interfaces. Axis 2 will follow axis 1 synchron or in the adjusted ratio.

14	The device is used as a synchronization module. The variable speed is selected by the analogue input one and the axis is started by the controller release input one. Axis 2 will follow axis 1 synchron or in the adjusted ratio. Axis 2 can also be synchronized to an external motor. For this the analogue input must be disconnected and the measuring input of the master must be connected to the encoder input axis one. Axis two will follow the digital signal of encoder 1.

P08 *Customer number for special devices [ro/------,-------]*

P21 *Security code for parameter level [7 decade number/ 0, 999999]*

The parameters may be protected against unintended changes by using a security code.

Data can only be entered in the parameter level All, Axis 1 and Axis2 after entering this code.

Parameter level All

P70 Switching input logic 1 [binary code/ 0,255]

In engineering both normally open and normally closed devices are used as electrical switches.

In order to adapt the device quickly to suit any hardware, the

switching behavior of the inputs can be determined using this parameter.

The input is connected with a NO contact by pressing 0, and it is

connected with a NC contact by pressing 1.

5 inputs are available using the device as speed controller, or speed governer.

Up to 32 various combinations are possible with these 5 inputs.

The following table gives a more detailed description of the procedure.

Input	0	1	2	3	4
NC/NO	NO	NO	NC	NC/NO	NC/NO
Binary	0	0	1	1/0	1/0
Decimal	128	64	32	16	8

NO = Normally Open (binary value = 0)

NC = Normally closed (binary value = 1)

The following inputs are used in this software:

Input 0 = Con 5 pin 3 – BCD Code 1

Input 1 = Con 5 pin 4 – BCD Code 2

Input 2 = Con 5 pin 5 – BCD Code 4

Input 3 = Con 5 pin 6 – BCD Code 8

Input 4 = Con 5 pin 7 – BCD Code 16

To calculate parameter value to be entered, determine if input 0 to 4 is needed as NO or NC. Then multiply the binary value with the decimal value for each input and add up the results of each input.

Example: Input 0, 1, 4 = NO.

Input	NC / NO	Binary	Decimal	Binary x Decimal	
0	NO	0	1	0	+
1	NO	0	2	0	+
2	NC	1	4	4	+
3	NO	1	8	8	+
4	NO	0	16	0	+
			Total	12	

Enter “12” in parameter All/P70 to get required input configuration

Parameter level All

P74 *Switching output logic 1 [*binary code/ 0, 3]

The switching characteristic of the outputs 1 and 2 can be inverted with this parameter.

Setting	Function
0	**Both outputs will switch on when active.**
1	**Output one will be switched off, and output two will be switched on when active.**
2	**Output one will be switched on, and output two will be switched off when active.**
3	**Both outputs will switch off when active.**

P81 *Baud rate for serial communication [Baud/ 4800/256000]*

Setting	Baud rate
0	**4800**
1	**9600**
2	**19200**
3	**38400**
4	**56000**
5	**115200**
6	**256000**

Parameter level All:

P82 *Serial address [address/ 11,99]*

When using the serial RS232 interface option, enter the unit number here.

Do not use addresses like 20, 30, 40,.., 90. as these addresses are reserved for unit groups.

(A unit will not respond when communicating with such an address.)

P84 *Baud rate for can communication [Baud/ 125kB/1MB]*

Setting	Baud rate
1	125 kBit
2	250 kBit
3	500 kBit
4	800 kBit
5	1 Mbit

P89 *Can adress [adress/ 1/127]*

The device adress for can communication must be set here.

P90-P93 *Analog adjustment of the 4 – 20 mA inputs [DAC value/ 0/2047]*

These parameters are reserved for special applications.

P94 *Analogue offset 0-10V input motor 1 [DAC value/ 0/2047]*

The setting f this parameter is done in the factory and should not exceed the range of +/- 10 DAC increments.

If the motor is drifting when the analogue value is 0 volts however, this value can be changed, to compensate the drift.

Parameter level All:

P95 *Analogue offset 0-10V input motor 2 [DAC value/ 0/2047]*

The setting f this parameter is done in the factory and should not exceed the range of +/- 10 DAC increments.

If the motor is drifting when the analogue value is 0 volts however, this value can be changed, to compensate the drift.

P96 *Temperature Offset [°C/ -20/+20]*

This value compensates the temperature difference of the temperature sensor inside the device.

P97 *Maximum temperature of the drive [°C/ 0/95]*

To avoid an overheating and possible damage of the drive, the maximum temperature can be set here..

Parameter levels axis 1, axis 2:

P07 *Maximum permanent current [x.xx Ampere/ 0.01, 20.00]*

Contains the current which the motor may receive for an undefined period without causing the drive to abort and send an error message.

An error message is sent and the positioning in process aborted if the maximum current is exceeded for a period of 2-4 seconds.

The measured current can differ from the real value by ± 10%.

P27 *Connected measuring system[measuring system/ 0/1]*

Setting	Measuring system
0	For speed measurement, the encoder input signal Z is used.
1	For speed measurement, signal C of the rotor position encoder is used.

P53 *Analogue input [Range/ 0/1]*

Setting	Input range
0	A +/-10V signal is used to control and direction of the motor.
1	A 0 to 10V signal is used to control the speed of the motor. The direction is selected by the direction inputs of Con 5.

Parameter levels axis 1, axis 2:

P54 *Time for smooth start [Seconds/ 0.0000/10.0000]*

When a smooth start is needed for the acceleration ramp of the motor, the time can be set in this parameter.

This ramp time is only active once after, the controller release input is activated. After this time the motor will follow the analogue signal without any delay.

P55 *Time for stop ramp [Seconds/ 0.0000/10.0000]*

This is the time the motor will need to reduce its speed from maximum to zero.

This time is active, when the maximum limit switches ate reached.

When the device is used for positioning behaviour, this value should be set to zero.

P56 *Tolerance range for stand still voltage[Volt/ 0.00/2.00]*

In case of potential difference between the analogue source and the device it is possible to adjust an analogue range, within an analogue value is interpreted as 0 volt.

This will prevent the motor to drift out of its position.

Parameter levels axis 1, axis 2:

P61 *P -Gain [Factor/ 0.000/30.000]*

This parameter only is used, when the unit works as a speed governor. It is the multiplying factor of the system deviation.

After multiplying the system deviation with this factor, the value is used to control the drive.

A large value will cause a strong coupling, but can cause motor vibrations too.

P62 *I -Gain [Factor/ 0.0000/6.0000]*

This parameter is used to compensate system deviations, that could not be balanced out by the P-Gain.

A large value will cause a fast compensation, but can cause motor vibrations too.

P63 *Maximum value for I -Gain [PWM increments/ 0/2000]*

The integral factor cause by a system deviation needs a certain time to stay stable. To reduce the risk of motor vibrations the maximum value controlled by the drive can be set here.

When this parameter is set to 2000, the maximum value control is switched of.

Parameter levels axis 1, axis 2:

P64 *Calculation factor for speed visualizing [Factor/ 0/100000]*

When the actual motor speed in rpm should be shown on the display,

the resolution of the connected measuring system must be known.

The frequency of the incoming pulses when the motor runs 3000 rpm should be set here.

$$P64 = \frac{3000\ \text{rpm}}{60\text{s/min}} \times \text{resolution of the measuring system}$$

Example 1:

The motor speed should be calculated, using the rotor position encoder of a motor with 8 poles per rotation.

P64 = 50 rotation per second * 8 = 400.

Example 2:

The motor speed should be calculated, using an external encoder with 200 pulses per rotation.

P64 = 50 rotation per second * 200 = 10000.

P65 *Maximum motor speed [rpm/ 0/10000]*

To enable the device calculating the correct motor speed for the analogue input value, the device must know the maximum motor speed, of the connected motor.

5.1.1 Parameter list

For service purpose it could be helpful to document the parameter setting of the device before the machine is shipped.

Therefor the following table can be used.

Parameter	Parameter setting	Default
Parameter All		
P02 Software version	---	Actual version
P03 Language		0
P06 Device functionality		1 - 4
P08 Customer number for special devices		0
P21 Security code parameter level		0
P70 Switching input logic 1		0
P74 Switching output logic		0
P81 Baud rate for serial communication		1
P82 Serial address		11
P84 Baud rate for Can communication		0
P89 Can address		3
P90, P91 For special purpose		0
P92, P93 For special purpose		1.000
P94 Analogue offset Motor 1		0
P95 Analogue offset Motor 2		0
P96 Temperature offset		7

P97 Maximum Temperature of the drive			85
Parameter	Axis 1	Axis 2	Default
P07 Maximum permanent current			6.00
P27 Connected measuring system			0
P53 Analogue input			0
P54 Time for smooth start			1.0000
P55 Time for stop ramp			1.0000
P56 Tolerance range for stand still voltage			0.00
P61 P-Gain			0.100
P62 I-Gain			0.0040
P63 Maximum value for I-Gain			2000
P64 Calculation factor for speed visualizing			202
P65 Maximum motor speed			3000

6. Analogue adjustment

The analogue adjustment of the 0 – 10V or +/- 10V inputs can be done in the parameter level “Adjust”.

Caution: When the drive free input is active the connected motors may move. All security functions are switched off during the adjustment. Take care that no danger to humans and material, equipment may result.

Press 

.

Press  as often until

appears.

Afterwards press 

as often until

appears.

The offset for axis 1 is adjusted by using the  and  keys.

Press 

to store the offset to RAM.

Then the display will switch to

The analogue offset for axis 2 can be set here.

When finished store the vale to RAM by pressing 

.

After 

is pressed, the values are stored to EEProm..

7. List of illustration