

Manual OJ Electronics Stepper motor system MRHX-2/-4/-8Nm & DRHX-1055, -1220

HO*-DRHX-1055/1220-MAD5

Hoval



Hoval factory setting is for analogue use (0-10V)

DI1: Rotor rotation

DI2: Enable external rotor guard

DI3: Signal from external rotor guard

MHRX = motor DRHX = control unit

*The DRHX control unit is programmed with a Hoval custom made UDF file

This manual is specific for the setup of the Hoval drive system in RHE

For complete instructions, information, warnings (caution/ protection) see OJ's original manual.

Also valid for Modbus or OJ's DRHX PC – Tool (link and QR-code:

<https://ojelectronics.com/hvac/products/oj-drhx-drives/>



Introduction



MRHX/DRHX cannot be repaired on site. Never attempt to repair defective DRHX control unit or MHRX motor. Contact Hoval for support.

Ensuring safety before installation

Product MRHX/ DRHX **must only be installed by qualified personnel or people who have received appropriate training and have thus become qualified to install the product.**

Controller DRHX contains dangerous high voltage when connected to the mains. Mains voltage must always be disconnected before any installation, service or maintenance tasks are performed on the product.

The test button can be operated while mains voltage is connected. The stepper motor/ rotor can be started up using the test button, the 0–10 V input signal or via the RS-485 interface (Modbus).

Before connecting mains voltage to the DRHX controller

- all components, i.e. stepper motor, belt, pulley and rotor, must be installed correctly.
- all openings, covers and cable glands must be properly fitted and closed.

To maintain the specified enclosure rating, unused cable glands should be replaced with blank glands/ plug.

Controller DRHX contains capacitors which become charged during operation. These capacitors can remain charged even after the power supply has been cut off. There is a risk of severe personal injury if the connection terminals or wire ends are touched before these capacitors have been completely discharged. The discharge time is about 3 minutes under normal conditions.

Product use

DRHX controller is used to regulate the speed of a rotary heat exchanger in air handling units. Controller DRHX can only be used to control MRHX stepper motor, supplied by OJ Electronics A/S. Never try to connect or control other types of stepper motor.

Technical specifications

The controller and stepper motor is controlled by signals or commands from an external control unit in the AHU. DRHX controller has built-in stepper motor protection and has a built-in EMC filter.

The product carries a manufacturer's warranty if installed in accordance with these instructions and applicable installation regulations. If the product has been damaged (e.g. during transportation), it must be checked and (if necessary) repaired by OJ Electronics A/S before the product is installed, connected to mains voltage and energized.

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Technical data

Motor	MRHX-3P0xN-03C5	MRHX-02N	MRHX-04N	MRHX-08N*
Control unit		DRHX-1055 MAD5	DRHX-1220 MAD5	DRHX-1220 MAD5
Max Torque	Nm	2	4	8*
Input Signal	V	0-10	0-10	0-10
Output Rpm 50Hz		150 / 170 / 200 / 400* rpm		
Voltage Input 50/60Hz	V	1x230	1x230	1x230
Motor voltage	V	3x0-200 V AC	3x0-200 V AC	3x0-200 V AC
Motor power	kW	0,055	0,110	0,220
Rated current	A	0,6	2,4	2,4
Class of protection		IP54	IP54	IP54
Weight motor	kg	2,4	3,5	5
Weight controller	kg	0,9	0,9	0,9
Shaft Ø (motor)	mm	12	12	12

***8 Nm torque at max. 250 motor rpm – but only max. 5 Nm torque at max. 400 motor rpm**

11. Exploded and dimensioned drawings

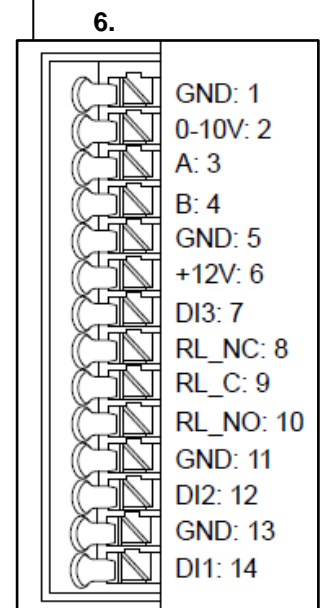
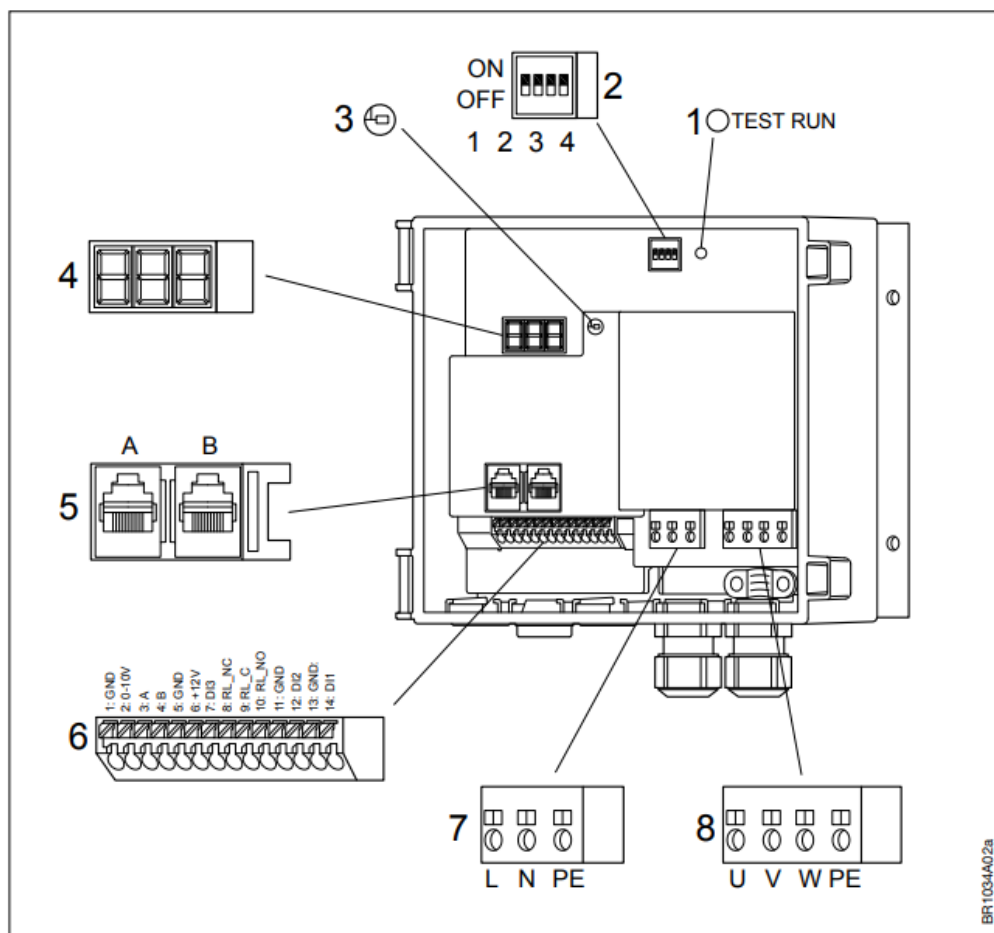


Table 11

No.	Description	No.	Description
1	Test button	5	RJ12 RS-485 interface connector (2 x RJ12)
2	4-pole DIP switch	6	A/D control and signal terminals, depending on variant
3	LED	7	Supply terminals (L, N, PE)
4	3 x 7-segment display - depending on variant	8	Connection terminals for stepper motor (U, V, W, PE)

MECHANICAL INSTALLATION

Control unit

- To achieve correct cooling of the DRHX, it must always be positioned so that there is free airflow around the cooling fins of the DRHX (see fig. 12.1.1).
- To achieve the specified enclosure rating, the cable glands must not point upwards (see fig. 12.1.2).
- To prevent water from entering the DRHX via cables and cable glands, ensure that connection is performed in such a way that water is prevented from accumulating around the cable in the gland.
- For optimal cooling of the DRHX, it must be installed vertical and on a slope, with a max. gradient of 45° (see fig. 12.1.1). The cooling fins on the reverse of the product should thus always be able to be cooled by the natural thermic up flow past the cooling fins.
- DRHX must be installed on a flat solid surface.
- The product should be attached using at least 3 of the screw holes in the aluminum cooler profile.
- The control unit should not be installed in direct sunlight.

Figure 12.1.1

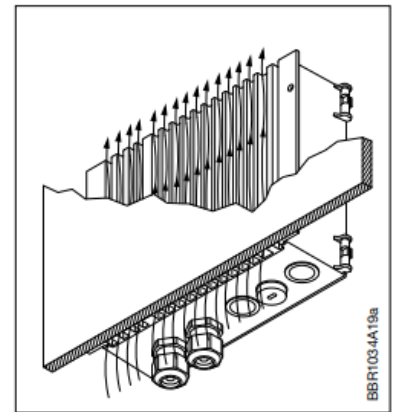
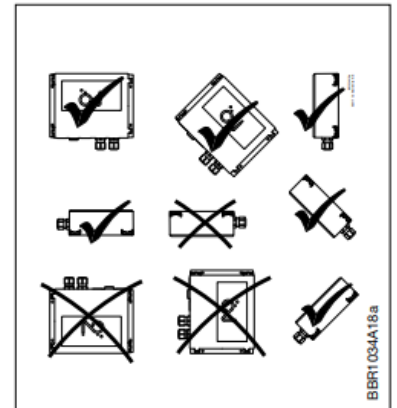


Figure 12.1.2



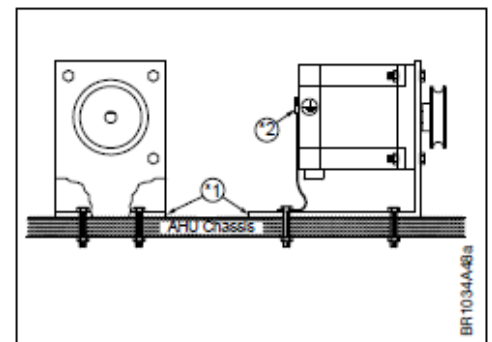
Motor

- To ensure integrated rotor guard in the DRHX, and to avoid false alarms and errors, it is important to install it proper. The stepper motor comes with four holes for attachment to a solid mounting plate.
- The mounting plate must be firmly attached to the chassis of the rotary heat exchanger or AHU (see figure 12.2.1, marked 1)

Do not use vibration dampers or springs!

Must be mounted on a fixed motor bracket.

Figure 12.2.1



ELECTRICAL INSTALLATION

Potential equalization

There is a risk of electrical interference if the ground potential between the DRHX and the air handling unit differ from each other.

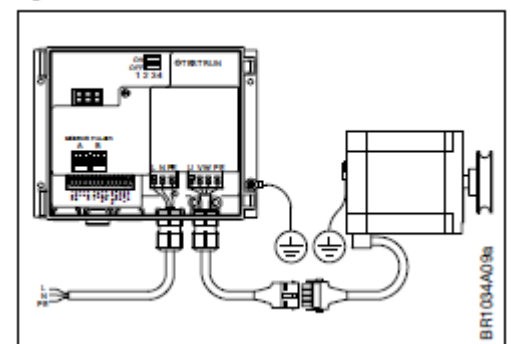
It's important to fix the control unit and the motor with metallic screws into the casing

If delivered mounted and fixed inside casing by Hoval above is fulfilled.

If not, following need to be insured of:

- Lugs should be used, and the equalization conductor should be attached to the DRHX alu-profile via one of the screws used to mechanically install the DRHX (see fig.13.5).
- Recommended cable cross section: 10 mm².
- To prevent potential differences between system components, an equalization conductor must always be fitted.
- A potential equalization connection must always be installed between the stepper motor and the chassis of the air handling unit (see section 12.2).

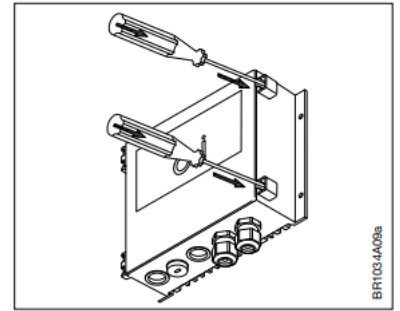
Figure 13.5



Opening the control unit

- Check that the voltage supply to the DRHX has been disconnected before opening the cover.
- **Wait approx. 3 minutes after disconnecting mains voltage before removing the cover, warning see page 1.**
- The controller can be opened using a screwdriver or similar (see fig.13.8.1)

Figure 13.8.1



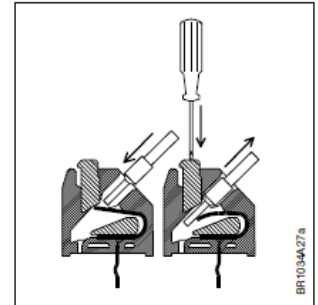
Spring terminals

- The connection terminals are spring-loaded and the stripped wire can be easily inserted into the terminal by carefully pushing the wire into the terminal without using tools.

Alternatively, the terminal spring can be loosened by pressing it lightly with a screwdriver or similar implement. See fig. 13.9.

- Stripped wire ends or end sleeves must be between 8 and 10 mm.
- Wires can be removed by carefully loosening the terminal spring by pressing lightly with a screwdriver or similar implement. See fig. 13.9.

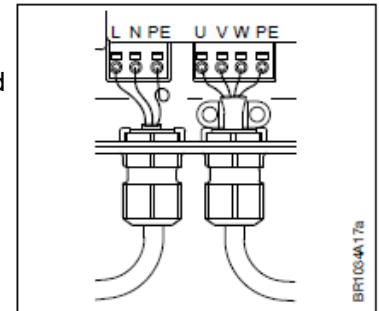
Figure 13.9



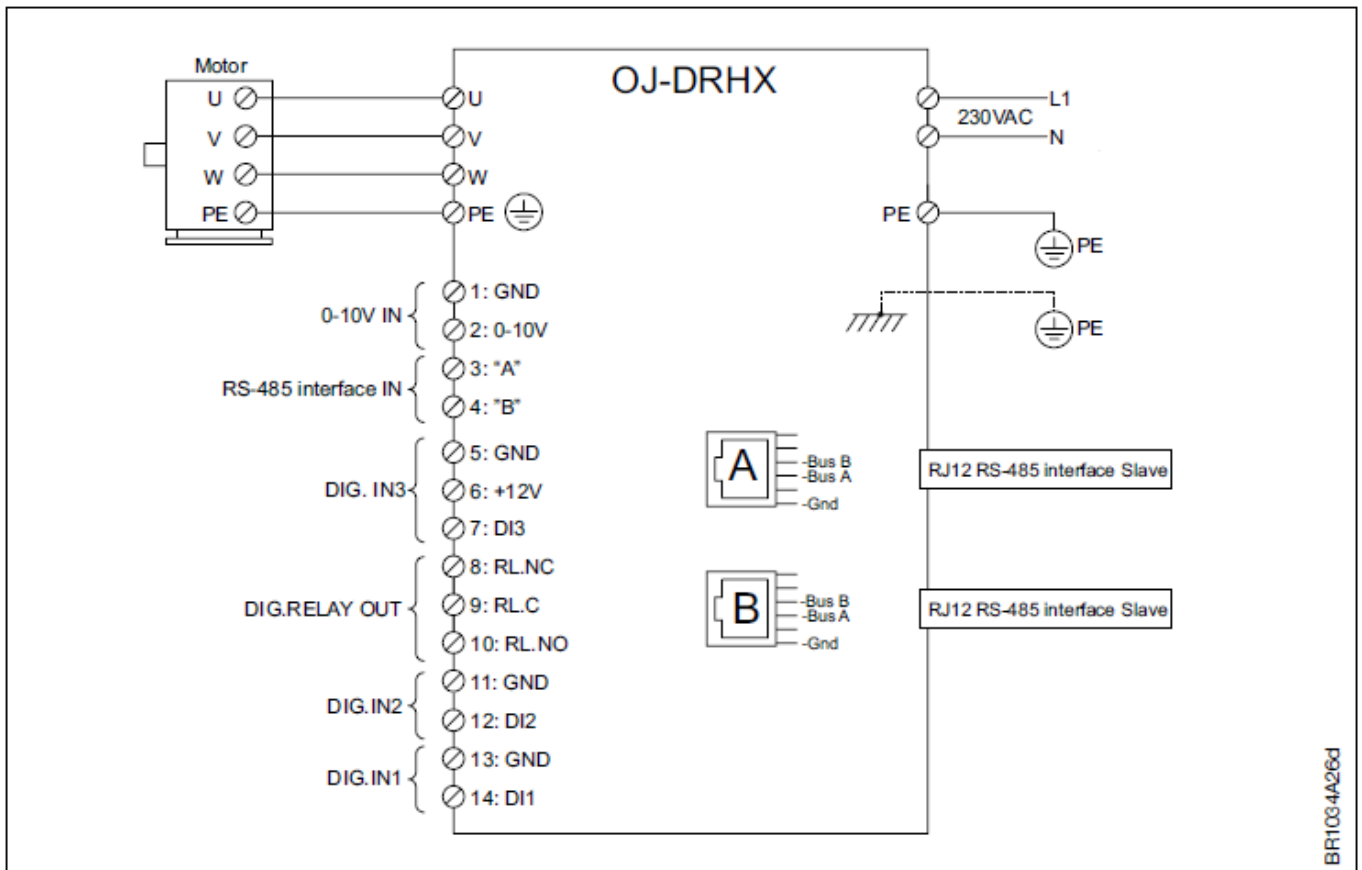
Cable entries – cable glands

- The factory-fitted PG9 cable glands should be used when inserting power and stepper motor cables into DRHX (see fig. 13.10.1).
- Remember to re-tighten the cable glands to ensure ingress protection.

Figure 13.10.1



Terminal and connector overview



BR10G4A26d

Mains voltage connection

- The power supply is 230 V AC; +/-10%.
- The power cable is connected to the DRHX on the terminals marked "L", "N" and "PE". See fig. 13.12, or table 11 on page 2.
- It is recommended that the PE wire is 20 mm longer than the other wires in the cable.

If the cable is accidentally pulled out of the DRHX while there is voltage on the cable and terminals, the PE wire will then be the last to be disconnected.

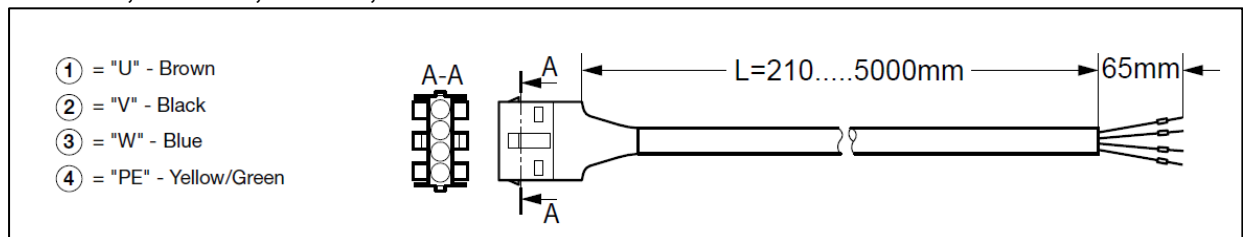
DRHX is thus prevented from causing electric shock.

- When the stripped wire is properly inserted into the terminal the terminal automatically tensions.
- Remember to **re-tighten the cable glands** to ensure the ingress protection level of the DRHX and to provide cable strain relief.

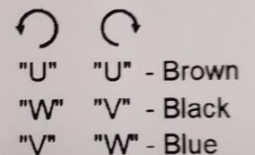
Cable

- Because the stepper motor cable from factory is directly connected into the motor windings, **it is not allowed to be replaced nor shortened.**
- The motor cable is correctly assembled when the locking pawl on both sides of the connector is locked in place with the connector from the cable from the DRHX (extension cable).
- The connector can be separated again by releasing the locking pawl on both sides of the connector on the motor cable and pulling the 2 connectors apart.
- The extension cable should be connected to the terminals marked:

U – Brown, V – Black, W – Blue, PE – Yellow/Green



- **If rotation of rotor is wrong: switch the "V" (black) and "W" (blue) cable to change motor direction.**



Analogue/digital signal connections

- Connect A/D control signals to the terminal strip, see fig. 13.15. 0-10V = terminal 1 + 2
- Max. wire dimension is 0.75 mm² for control terminals.
- For further information on using the spring terminals, see fig. 13.10.1

0-10 V control Which terminals!

- DRHX is factory-configured for 0-10 V control (this can be changed Modbus operation*)
- The motor starts when there is a control signal over 1.1 V (threshold value)
- The motor stops when control signal is less than 0.6 V
- The motor runs at maximum speed when there is a control signal over 9.5 V

*RS-485 interface control: DRHX can be controlled via Modbus or BACnet MSTP commands according to the Modbus / BACnet MSTP protocols (see separate documentation on OJ Electronic homepage)

Figure 13.12

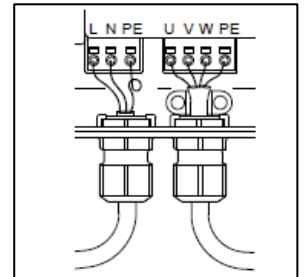
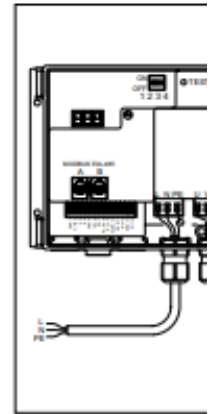
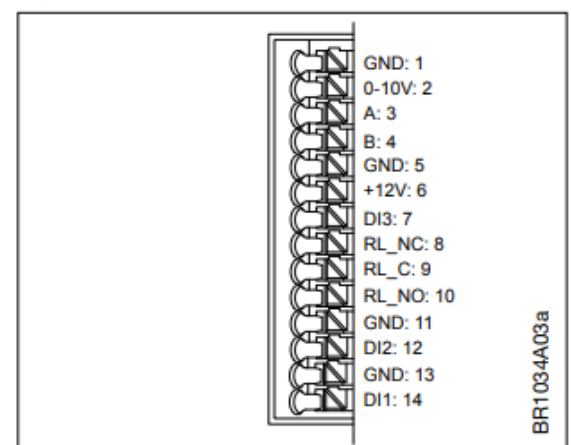


Figure 13.15



FUNCTIONS (power off when changing DIP switch setting)

DIP switch – settings and functions **(are pre-set if delivered with a rotary heat exchanger from Hoval)**

The DRHX series is equipped with 4 DIP switches for setting e.g. the stepper motor size and maximum motor speed
DIP 1-2: motor size / DIP 3-4: motor rpm (see table 15.1.1 and 15.1.2).

Required motor rpm is calculated by Hoval. Depends on rotor \emptyset , pulley \emptyset , rotor and motor torque, and given rotor rpm. See table 15.1.3.

Table 15.1.1

Motor type MRHX-	DIP1	DIP2
1Nm motor	ON	ON
2Nm motor	OFF	OFF
4Nm motor	ON	OFF
8Nm motor	OFF	ON

Table 15.1.2

Motor rpm	DIP3	DIP4
Speed 1 400 rpm	OFF	OFF
Speed 2 200 rpm	ON	OFF
Speed 3 170 rpm	OFF	ON
Speed 4 150 rpm	ON	ON

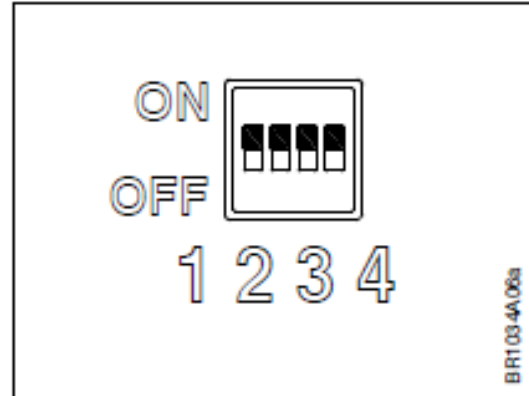


Table 15.1.3

Rotor 12 RPM Rotor type ST1, SE3, SC1, ST2			
Rotor \emptyset_{exact}	Drive type	Pulley	Motor rpm
500-609	MRHX 2N	FN-50A-12	150
610-689	DRHX 1055	FN-50A-12	170
690-769	"	1008-63A	150
770-809	"	1108-67A	150
810-849	"	1108-71A	150
850-919	"	1108-75A	150
920-979	"	1210-80A	150
980-1039	"	1210-85A	150
1040-1109	"	1210-80A	170
1110-1199	"	1108-75A	200
1200-1249	MRHX 4N	1210-90A	170
1250-1309	DRHX 1220	1210-80A	200
1310-1399	"	1210-85A	200
1400-1479	"	1610-106A	170
1480-1569	"	1610-112A	170
1570-1649	"	1610-100A	200
1650-1749	"	1610-106A	200
1750-1849	"	1610-112A	200
1850-1949	"	1610-118A	200
1950-2059	"	1610-125A	200
2060-2179	"	1610-132A	200
2180-2299	"	1610-140A	200
2300-2479	MRHX 8N	1108-75A	400
2480-2649	DRHX 1220	1210-80A	400
2650-2799	"	1210-85A	400
2800-2969	"	1210-90A	400
2970-3149	"	1210-95A	400
3150-3299	"	1610-100A	400
3300-3399	"	1610-106A	400

Rotor 20 RPM Rotor type HM1, SH1			
Rotor \emptyset_{exact}	Drive type	Pulley	Motor rpm
500-539	MRHX 2N	1108-75A	150
540-569	DRHX 1055	1108-71A	170
570-619	"	1108-75A	170
620-659	"	1210-80A	170
660-729	"	1108-75A	200
730-789	"	1210-95A	170
790-829	"	1210-85A	200
830-879	"	1210-90A	200
880-929	"	1210-95A	200
930-979	"	1610-100A	200
980-999	"	1610-106A	200
1000-1039	MRHX 4N	1610-106A	200
1040-1099	DRHX 1220	1610-112A	200
1100-1159	"	1610-118A	200
1160-1229	"	1610-125A	200
1230-1299	"	1610-132A	200
1300-1369	"	1610-140A	200
1370-1469	"	1610-150A	200
1470-1569	"	1210-80A	400
1570-1669	"	1210-85A	400
1670-1759	"	1210-90A	400
1760-1799	"	1210-95A	400
1800-1879	MRHX 8N	1210-95A	400
1880-1979	DRHX 1220	1610-100A	400
1980-2099	"	1610-106A	400
2100-2219	"	1610-112A	400
2220-2339	"	1610-118A	400
2340-2479	"	1610-125A	400
2480-2539	"	1610-132A	400
2540-2649	"	1610-140A	400



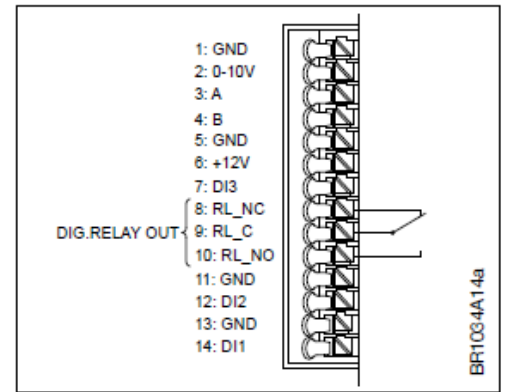
Warning

Incorrect DIP switch setting to select stepper motor and max. motor speed can result in reduced performance or overload of the stepper motor, with a risk of overheating and lasting damage to the stepper motor and drive.

Digital relay output

- DRHX is equipped with a digital relay output, which can for example be used for alarm signals (see fig. 13.17).
- The relay output is a potential-free relay with changeover switch.
- The factory-configured function is an alarm relay.
- Max. load is 2A/30 V DC/24 V AC.
- Terminals to use:
 - Alarm signal: RL_C (9) and RL_NC (8)
 - Start or Running signal: RL_C (9) and RL_NO (10) (need to be changed via PC-Tool)

Figure 13.17

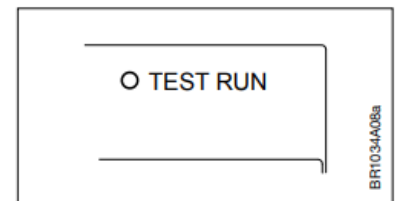


Test functions

DRHX series is provided with a test function in the form of a built-in test push-button. The test button is located inside the controller in the upper right corner and must be operated with the controller open (see figure 15.2).

The test button has different functions, depending on how long the button is pressed in:

Figure 15.2



- **Running Test for RHE**

Belt should be mounted on rotor and pulley.

Start the test by pressing and continuously holding the test button. The controller will enter test mode. Visible in display and LED will be orange. The test will remain active until the test button is released.

During this test run the motor will rotate with a maximum speed of 100 rpm.

Stop the test by releasing the test button. The DRHX will return to normal operation procedure and the LED will turn green.



- **Pulley calibration test** see page 10

If drive equipment is wired by us from factory **and** mounted in a RHE this test have been done before delivery.

Instructions on page 10. The pulley calibration test is made without the belt, rotor should not run.

LED indicator

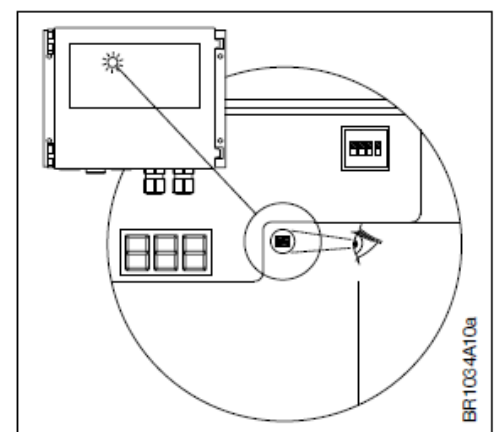
DRHX series is fitted with an LED indicator, see fig. 15.3.

LED can be viewed both with open and closed cover.

For LED indicator codes see table 15.3:

LED	State
OFF	No voltage
Green ON	Voltage is present
Flashing green	Valid RS-485 interface communication
Red ON	Rotor stopped due to critical alarm
Flashing red	Operating with Reduced power
Orange ON	Test function activated
Flashing orange	Purging function activated

Figure 15.3









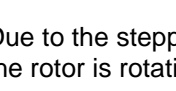


NOTE: Flashing means that the LED is off for 100 ms and on for min. 100 ms (ms=milliseconds)

Display

Display is visible with open and closed cover. The display shows current status for controller, stepper motor and if rotor runs. See table 15.4. For alarm codes see table 19, page 11.

Views:

Table 15.4	
	Current stepper motor speed is displayed when the stepper motor is running and no rotor or pulley diameter has been entered via OJ-DRHX-PC-Tool or the respective corresponding RS-485 interface registers.
	Current rotor speed is displayed when the stepper motor is running and rotor and pulley diameter have been entered via OJ-DRHX-PC-Tool or the respective corresponding RS-485 interface registers. <i>Display toggles between torque and speed with 2 sec toggle intervals.</i>
	Current torque (Nm) <i>Display toggles between torque and speed with 2 sec toggle intervals.</i>
	Fault codes*; see the importance of the individual fault codes under the section "Alarms and fault codes" – See table 19.
	Reduced performance operation due to current overload, overheating or other failure or overload. Read out the current fault/alarm via RS-485 interface.
	Purging function activated
	Test function is activated and stepper motor is receiving control signal for max. rpm rotations.
	Hold function is activated (Holding).
	Stepper motor is in "STOP" mode

Rotation monitoring

Due to the stepper motor and rotor are mechanically connected through a belt, it is necessary to monitor whether the rotor is rotating.

- If the motor is no longer turning the rotor due to a lack of tension or a broken/ damage belt, the DRHX controller will trigger a "rotor guard" alarm (E01).
- The DRHX has two possibilities of rotor monitoring systems: internal and external.
- The factory setting is "Internal rotor guard", external is an option (Hoval option RG3).

Internal rotor guard

The internal rotor guard monitors the rotation of the rotor by measuring the electrical signal returning from the motor, will take place every 10 seconds.

- After five consecutive failed detections within 1 hour the alarm E01 is given (see page 11).
- The internal rotor monitor works automatically with a motor speed above 25 rpm.

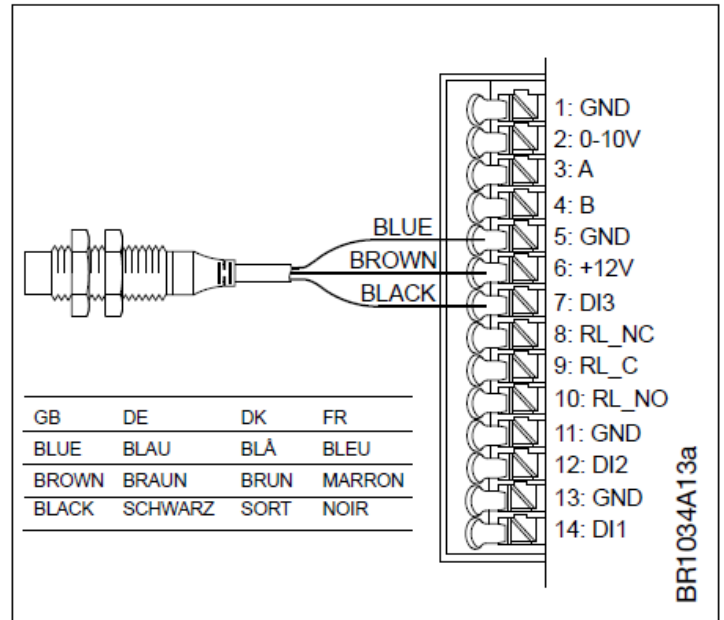
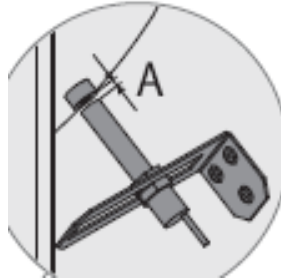
External rotor guard

If external rotor guard is wired, "Internal rotor guard" will be automatically deactivated.

An external sensor (3 wired) can be connected to the digital input ports (Hoval product code/ option RG3). See instructions on next page.

Mounting instruction for rotation guard, 3 wire (mtrl no 2045980):

- Connect the sensor to 5 (GND), 6 (+12V) and 7 (DI3)
- Connect a jumper between 11 and 12 to activate external sensor, is there to stay.
- Distance between magnet and sensor:
A= 3-5 mm



Boost function

- The DRHX series has a built-in “Start function” which automatically allows higher current for the motor during start-up (set to 10 seconds at 150% of rated current).

Purging function, cleaning

- When DRHX is controlled via 0-10 V signal (analogue), the purging/ cleaning function starts automatically when the stepper motor has been stopped for 10 minutes.
- The stepper motor shaft will rotate 10 times at a low speed, after which the stepper motor will stop again.

Holding torque

- To prevent the rotor from rotating due to air flow going throw or start rotating by itself (can happen larger rotor diameters, but it is very rare) the DRHX has a brake function which retains the rotor in a fixed position.
- This brake function is automatically activated when the motor has no operating signal.

Built-in protection

- If the temperature inside DRHX overstep 95°C, DRHX will attempt to reduce its internal heat generation by reducing the amount of current that is sent to the stepper motor.
- DRHX has built-in current limitation for the protection of stepper motor and cables and can therefore not supply more current than it is rated to (see technical data page 2).
- DRHX is short-circuit protected against phase-phase short-circuits on the DRHX connector terminals for the stepper motor (U, V, W).
- DRHX control inputs are protected against short-circuits.

Display of actual speed

- During normal operation, the controller display will show the speed of the stepper motor.

Rotor blocked, do not run/ turn

If the load of the rotor is higher than the rated maximum torque of the DRHX system, the controller will trigger a motor blocked alarm (E06)

- This detection depends on the tension of the belt and friction between belt and pulley (E01)
- Depending on the motor speed and the friction between belt and pulley, the DRHX controller will detect this malfunction by observing the speed ripple of the motor and the vibrations of the system (E06).
 - Higher ripple and vibrations will typically be detected at higher motor speeds, rpm.



Calibration test for pulley/ internal rotation guard **STP in the display no 5??**

- For example needed if received an E01 error/ alarm

If drive equipment is wired by us from factory and mounted in a RHE this test have been done before delivery

Before opening DRHX, the mains voltage must be **disconnected for at least 3 minutes** to ensure that there is no risk of dangerous residual currents in electronic circuits or capacitors.

The test button you find to the right of the DIP switches, see figure 15.2 on page 7.

1. Turn off the DRHX controller and **remove the belt from the pulley.**
2. Power up the DRHX controller and **briefly press** the test button, < 1 second, to start test mode
The LED will shine orange. Display will show "tSt" for test mode. 
3. Wait for the stepper motor to reach maximum speed. It's limited to 100 rpm in this test.
4. After the stepper motor has reached the maximum speed, the system will start performing the internal rotor guard function. The stepper motor will accelerate at short intervals every 10 seconds (that should be possible to hear) for a minute.
5. If the stepper motor stops and restarts after one minute the internal rotor guard is correctly calibrated.
6. **Press the test button for 2 seconds to end test mode.** LED turn green. See point 8. 
7. If the stepper motor continues to run for more than one minute, a recalibration needs to be done:

Recalibration:

Press and keep pressing the test button **until LED flashes orange** (can take 10–50 sec).

Remove your finger from the button and the LED will turn green, the pulley/ internal rotor guard has been calibrated.

8. After, turn off the DRHX controller and mount the belt. Start normal operation procedure.

Alarms and fault codes see table 19, page 10 and 19.1 page 11

DRHX has a built-in alarm monitor, which monitors optimal fault-free operation and triggers an alarm if operating or performance problems are observed. Alarm codes can be read on the display. Alarms are either "Critical" or "Non-critical" alarms: "Critical" alarms stop the stepper motor. "Non-critical" alarms reduce stepper motor performance.

- The built-in alarm monitor stops the DRHX.
- If the alarm situation passes, the alarm is automatically reset and DRHX will be restarted.
- If the maximum number of restarts (5 times/ 1 h) is overstepped, the **alarm must be reset**
- Alarm reset: **The alarm is automatically reset if the power is disconnected for longer than 60 seconds.**

Fault code	Alarm overview	Alarm priority	Activity
E01	Alarm from rotor guard	"C"	"SA5"
E02	Excessive supply voltage	"C"	"SA5"
E03	Insufficient supply voltage	"C"	"S"
E04	Power to the motor increased at a critical level, e.g. short-circuiting cable, connector or motor	"C"	"SA5"
E05	Excessive temperature inside OJ-DRHX (> 95°C)	"NC"	"RP"
E06	Blocked motor	"C"	"SA5"
E07	No valid RS-485 interface communication >10 sec.	"C"	"S"
E08	Phase fault on stepper motor power supply (U, V, W)	"C"	"SA5"
E09	Internal hardware error	"C"	"S"

Remarks:

"C" = Critical alarm, stop the motor. / "NC" = Non-critical , reduce the motor performance.

"RP" = Reducing performance.

"SA5" = Stepper motor stops after 5 restarts caused by same fault within 60 min.

"S" = Stepper motor stops immediately



Before opening DRHX, the mains voltage must be **disconnected for at least 3 minutes** to ensure that there is no risk of dangerous residual currents in electronic circuits or capacitors. If DRHX has no operating signal, but natural drafts through the air handling unit cause the rotor and thus the stepper motor to rotate, there is a risk that the stepper motor will induce voltage on the DRHX stepper motor terminals, making them dangerous to touch. When servicing or troubleshooting the stepper motor: The stepper motor can become very hot >60°C.

Trouble shooting alarm codes

- also see page 10 and 12

Table 19.1

Alarm	Reason to alarm	Solution
E01	Belt is slipping (around the pulley) or broken	Tension/ replace the belt.
	External rotation guard has been activated even though it is not use (is a jumper placed between Digital input 2 + GND, ground?). No rotation guard is wired to the DRHX.	Deactivate external rotor guard by removing the jumper.
	If external rotation guard is used: check if magnet/ sensor/ holder is loose or missing. Check so that sensor is in front of the magnet and with correct distance (see page 9).	Fix magnet/ sensor/ holder to its position Distance between sensor and magnet should be 3-5 mm (see page 9)
	Accidental calibration of the rotor and pulley by "double" clicked when running the test function (page 7) or forgetting to take the belt off before calibration test (page 10).	Make the test/ calibration again, see page 10.
	If the motor is too powerful for the rotors load (large motor to a very small load). The rotor torque is lower than the internal rotor guards minimal torque limit for chosen type of DRHX/ MRHX system (i.e spare part for old RHE).	Exchange type of MRHX motor and if needed DRHX controller so its fits the rotor type. Contact Hoval for support.
E06	Wobbling belt. Could be caused by incorrect mounting, damaged or out of shape rotor.	Correct and tension the belt. Check installation for damage. If needed, contact Hoval for support.
	If springs or dampers are used with the motor bracket, the vibrations can stop the MRHX motor, internal sensor will be giving error (e.g. if use new spare part to old RHE).	Change to a fixed motor bracket (without spring, dampers).
	If the motor is under dimensioned (small motor to a large rotor load), the motor will not be able to turn the rotor (i.e new spare part for an old RHE)	Check if the correct size/ type of drive equipment is mounted. If correct , maintenance is needed, i.e adjust the brush sealing (see manual for RHE). If wrong drive equipment: exchange to correct type/ size.
	Check the pressure drop, air volumes (also difference between the channels) and velocity.	See maximum values in Hoval handbook.
E09	Internal error between MOC (motor) and AOC (application): Can be an update issue when installing new software	Try to re-install firmware again. Contact Hoval for support.
	If the error occurs by after the system has been running for a period of time	Exchange the controller DRHX. Contact Hoval for support.

**Warning**

Before opening DRHX, the mains voltage must be **disconnected for at least 3 minutes** to ensure that there is no risk of dangerous residual currents in electronic circuits or capacitors. If DRHX has no operating signal, but natural drafts through the air handling unit cause the rotor and thus the stepper motor to rotate, there is a risk that the stepper motor will induce voltage on the DRHX stepper motor terminals, making them dangerous to touch.
When servicing or troubleshooting the stepper motor: The stepper motor can become very hot >60°C.

Troubleshooting - also see page 10/11, table 19 and 19.1 Fault and alarm codes

Troubleshooting when DRHX is controlled via A/D signals (0-10 V):

Symptom	Cause	Action
Stepper motor is not running	Lacking supply voltage	Check the voltage supply (230 V AC) to DRHX terminals "L" and "N" (Nominal supply voltage is stated on the rating plate). LED displays constant green light; see table 15.3 page 7 Check whether short-circuit protection has been activated, external controller in the AHU.
	Poor electrical connections	Check electrical connections. Make sure there are no loose threads when connecting to the terminals, use cable shoes (multi core).
	Wrong stepper motor for DRHX setup	Check that the DIP switch is correctly set for the selected stepper motor size and speed.
		Check that motor and controller fit: MRHX-2 = DRHX-1055, MRHX-4, -8 = DRHX-1220
	Lacking operating signal	<i>A/D control: DRHX can be configured via the RS-485 interface register to receive a start signal via an optional digital input. If this function is selected, check that the DRHX has a signal connected to the "Start/Stop" input - digital input Din 1, 2 or 3, depending on the configuration.</i>
	Lacking 0-10 V DC control signal	Check that DRHX receives an operating signal >1.1 V on "0-10 V In".
	Active alarm	Read active alarms via the display and remove what is causing the alarm see page 11. (can also be read by using DRHX-PC-Tool or via Modbus).
	The stepper motor has been stopped 5 times by the built-in stepper motor protector because of overloading or other alarm	Reset the alarm by disconnecting the power supply to DRHX and reconnecting it after approx. 60 seconds.
	Defective/ broken DRHX controller	Replace DRHX. Never attempt to repair a defective DRHX controller. Contact Hoval for support/ replacement/ repair.
	Stepper motor is defective/ broken	Replace stepper motor. Never repair a defective MRHX motor. Contact Hoval for support/ replacement/ repair.
Stepper motor/ rotor is running in wrong direction	Wrong phase sequence in stepper motor cable Swap two phase wires in the controller DRHX. Switch the "V" (black) and "W" (blue) cable to change motor direction (see page 4)	
DRHX cuts out due to an alarm	Active alarm	Read active alarms via the display and remove what is causing the alarm see page 11 (can also be read by using DRHX-PC-Tool or via Modbus).
	The alarm is re-activated after reset	Repair the cause of repeated alarm activation, see page 11
The rotor stops unintentionally (Also see Fault code E01 on page 11)	Internal rotor guard detects a loose or defective belt	Tighten or replace belt
	The internal rotor guard is incorrectly calibrated	Make a re-calibration; see " Calibration test for pulley/ internal rotor guard" on page 10
	External rotation guard. / External rotation guard is activated even if it's not in use	See Fault code E01, page 11