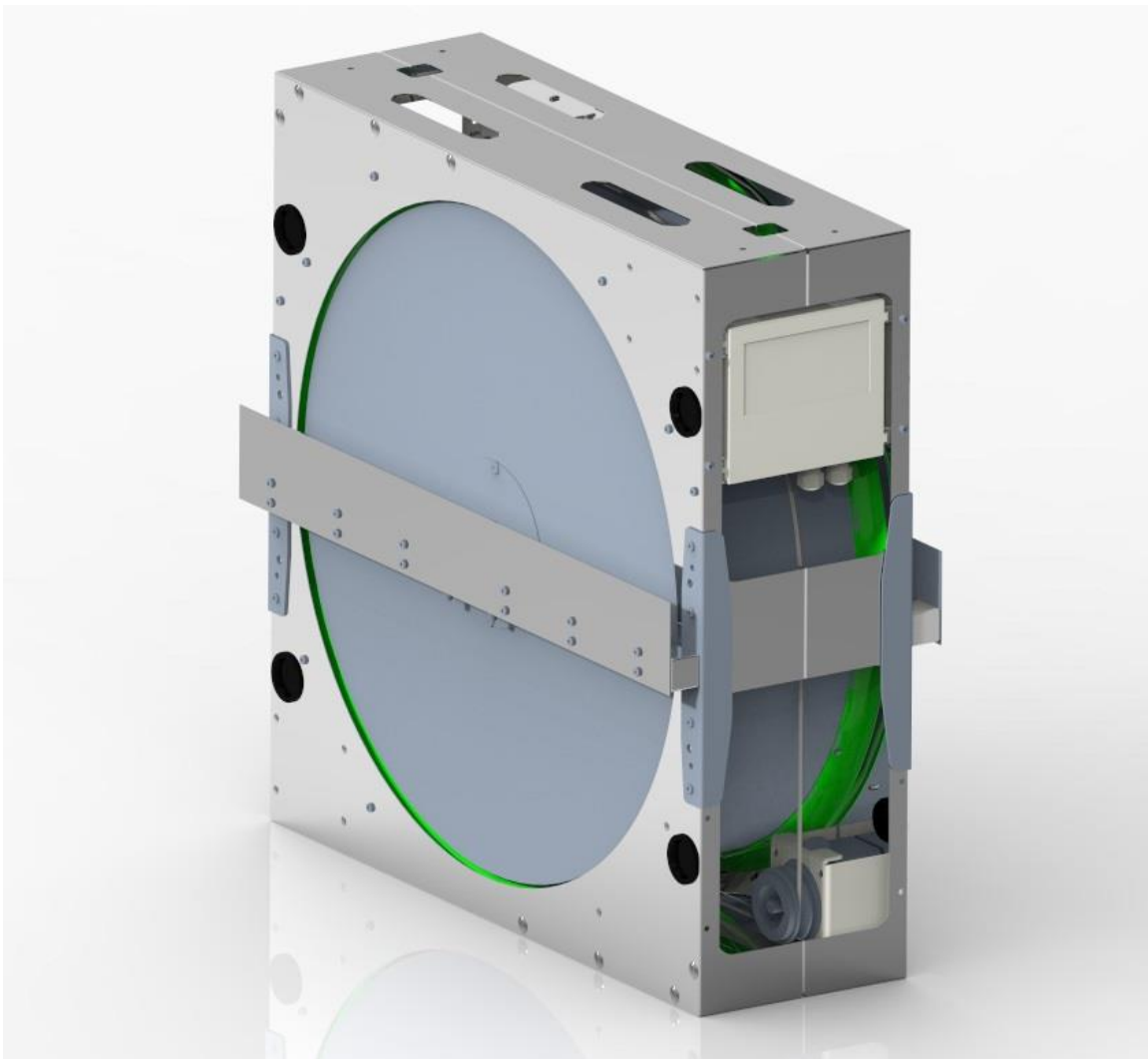# ENERGY RECOVERY WHEEL MOTOR MANUAL

OPERATION AND MAINTANANCE

Please read the following documentation carefully before performing installation, maintenance and operating of rotary heat exchangers motors. In case of doubts contact VTS official support. This manual must only be used by a qualified installer/service technician.

TABLE OF CONTENT

1. GENERAL SAFETY

CAUTION! Electric Voltage: All motors described in the following manual can be operated, connected, installed, repaired and modified by qualified personnel only. Failure in performing in any of this operations may result in risk of fatal injury, electric shock, incorrect mounting or product damage. Installation should be carried out with usage of power lines, without short circuits and with proper grounding. Follow the connection diagrams dedicated to given motors.

WARNING: Do not open or disassemble the motor while power supply is connected to the device. It may result in fatal injury caused by electric shock. If it is necessary to open the motor, wait at least 5 minutes after disconnecting from the power supply.

NOTE: It is the user and the installer responsibility to provide the system with the proper grounding and protection in accordance with national and local standards. VTS is not responsible for any damages or injuries caused by incorrect installation, bad circuits or other failures.

Before installation and operating the motor please read entire instruction carefully! Follow the connection diagrams to perform successful installation.

2. PRODUCT DESCRIPTION & TECHNICAL SPECIFICATION

Rotary Heat Exchangers may be equipped with three different stepper motors configurations tailored to the needs and electrical requirements of our customers. *Table 1* represents the general characteristics of stepper motors occurring in the series of Rotary Heat Exchangers.

Table 1 Stepper motors used in the series of Rotary Heat Exchangers

Torque - Power	2.0 Nm – 55W	4.0 Nm – 110W	8.0 Nm – 260 W
Weight	≈ 2.4 kg	≈ 3.5 kg	≈ 5.0 kg
Dimensions	85 x 85 x 67	85 x 85 x 97	85 x 85 x 156
Shaft diameter	12 mm	12 mm	12 mm

Table 2 represents configuration of motors in reference to the AHU size.

Table 2 Available motor configurations

Motor	AHU Size
2 Nm – 55 W	VVS021-VVS055
4 Nm – 110 W	VVS075-VVS300
8 Nm – 260 W	VVS150-VVS300

Note: Given setups are explanatory. VTS reserves the right to change those configurations without informing. Any modification or configuration changes other than proposed should be reported and consulted in details with VTS technical department first.

Tables below represent the technical specifications of the given motors with the correct identification numbers. The index number is a unique code identifying the suitable engine for the product.

Table 3 Technical specification of available motor setups

| Torque	2.0 Nm	4.0 Nm	8.0 Nm
INDEX NUMBER	7-1-0005-0082	7-1-0002-0083	7-1-0005-0084
PH	1	1	1
Voltage [V]	208-240	208-240	208-240
Stepper motor voltage [V]	3 x 0-200 V	3 x 0-200 V	3 x 0-200 V
RPM	0-400	0-400	0-400
Frequency [Hz]	50	50	50
HP	0,08	0,15	0,36
Power size (250 rpm)	55 W	110 W	260 W
Weight	≈ 2.4 kg	≈ 3.5 kg	≈ 5.0 kg
Sealing grade [IP]	54	54	54
Operating temperature	-40˚C to +40˚C	-40˚C to +40˚C	-40˚C to +40˚C
Storage temperature	-40˚C to +70˚C	-40˚C to +70˚C	-40˚C to +70˚C
Dimensions	85 x 85 x 67	85 x 85 x 97	85 x 85 x 156
Shaft diameter	12 mm	12 mm	12 mm
Electrical connection	4-pole Tyco MATE-N-LOK	4-pole Tyco MATE-N-LOK	4-pole Tyco MATE-N-LOK
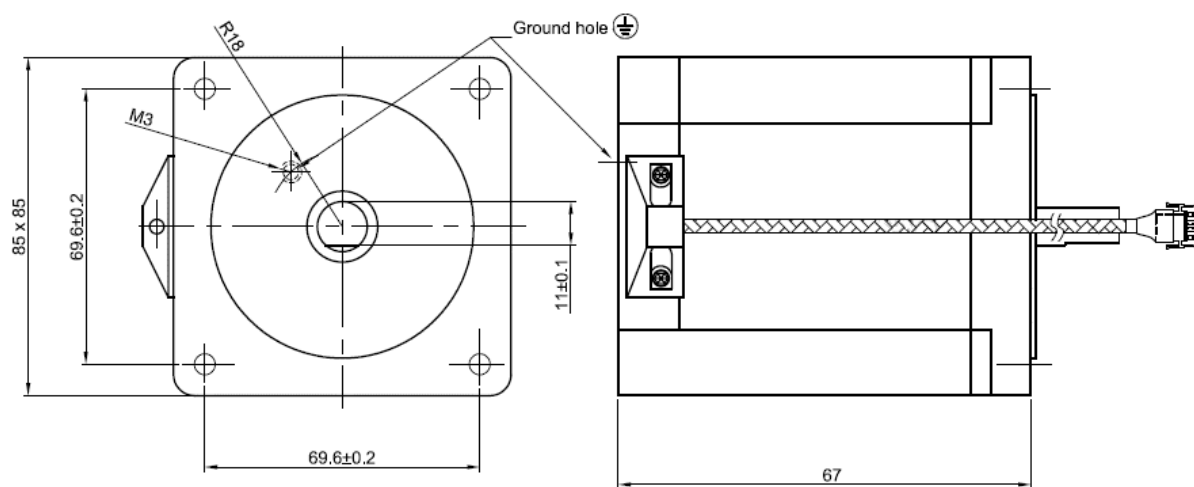
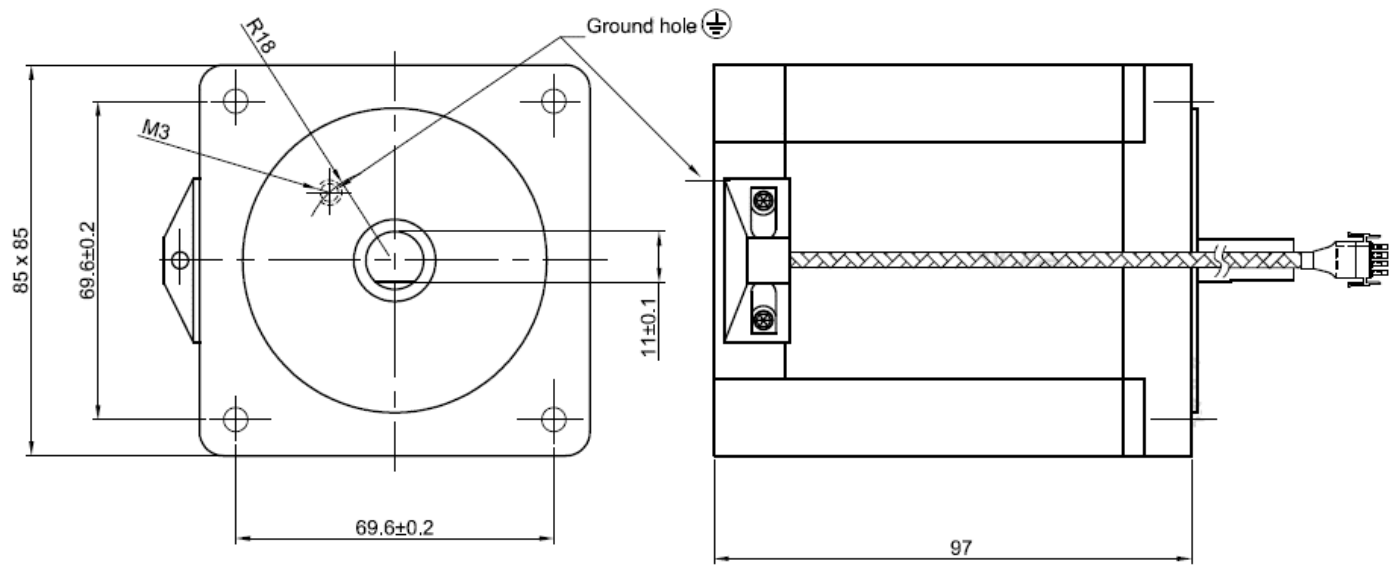*Figure 1 Stepper Motor 2.0 Nm **(all dimensions are given in mm units)***

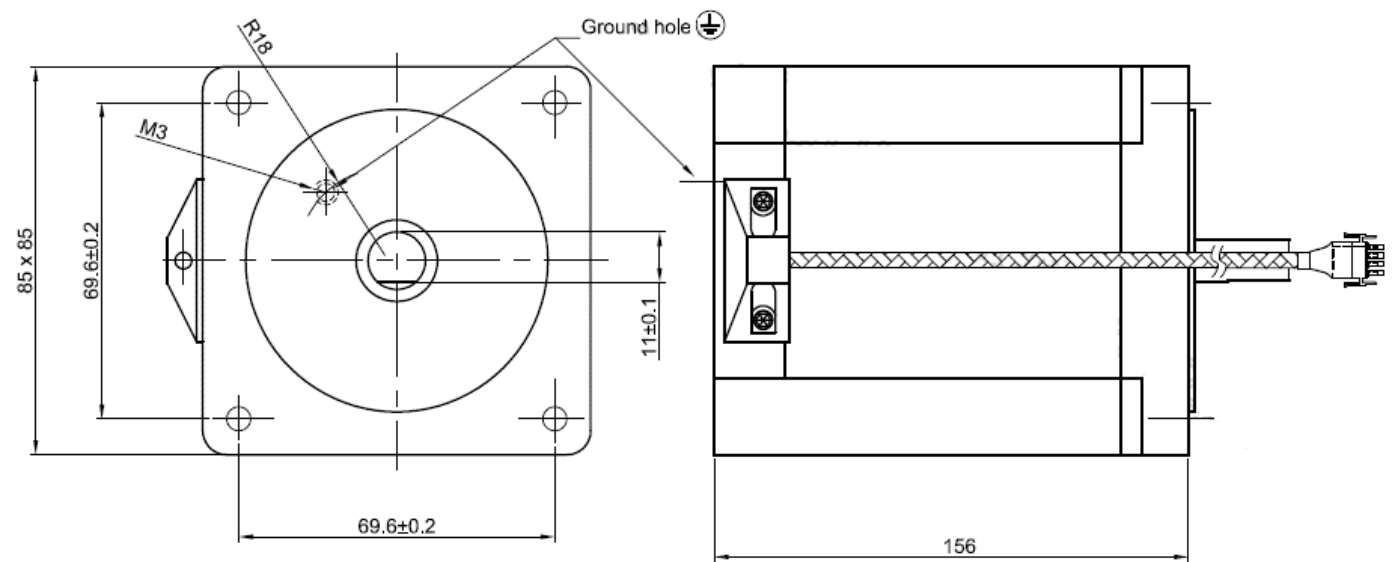*Figure 2* Stepper Motor 4.0 Nm **(all dimensions are given in mm units)**

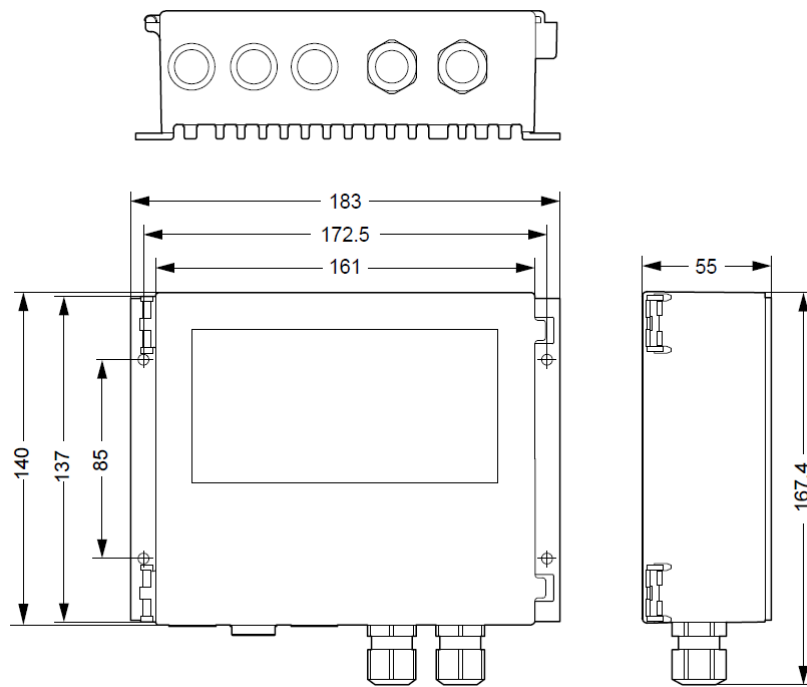*Figure 3* Stepper Motor 8.0 Nm **(all dimensions are given in mm units)**

*Figure 4 Dedicated controller **(all dimensions are given in mm units)***

3. INSTALLATION

3.1 Assembly and installation

Following illustrations and instructions presents the correct assembling of the motors and controller with the casing of the rotary heat exchanger. Motors are designated to be firmly attached to casing of the exchanger. Pulleys are selected to match the expected speed, efficiencies and performance of the motors. Please refer to the *Chapter 2 - Product Description and Technical Specification* to determine the correct set of components for the product. Pulley wheels must be firmly attached to the shaft of the motor.

⚠️ Do not change the motor configurations. Follow the correctly selected setup given in the first chapter of this manual (see Table 2). Changing the settings is associated with poor performance of the rotary wheel and risk of incorrect attachment to the housing of the exchanger, and most importantly, the risk of motor damage, as well as electric shock due to incorrect connection.

Warning: Incorrect mechanical installation of the motor can be a cause of error alerts.

Following illustrations represents stepper motor assembly and installation methods. Each of the stepper motor model has its own way of assembly and may differ in according to *Table 2 Available motor configurations.*

Important notes:

- Stepper motor must be fixed firmly to a casing via dedicated motor holder.
- Stepper motor must be grounded.
- Do not use cables or connectors other than that included in the set with motor and controller.
- Do not change the size of the pulley wheel. Optimal pulley sizes were calculated and chosen to match the desired performance of the Rotary Heat Exchanger.
- Position the controller correctly to avoid overheating. Avoid exposure to direct sunlight.
- Check the specification plate on the motor and controller to confirm electrical configuration.
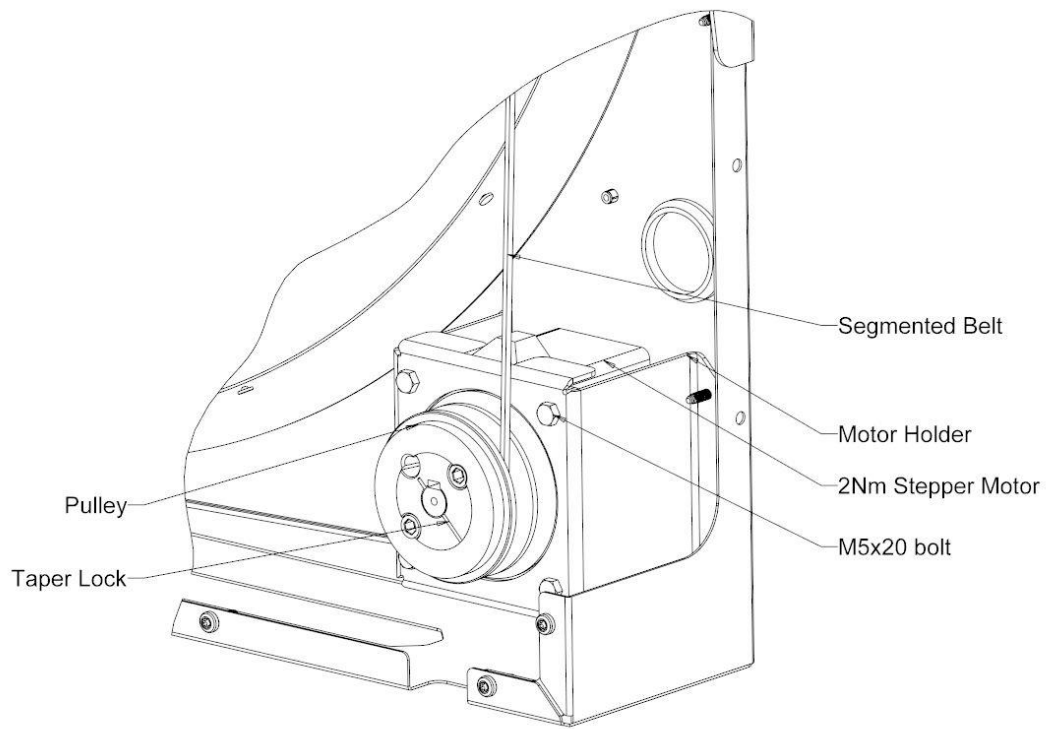
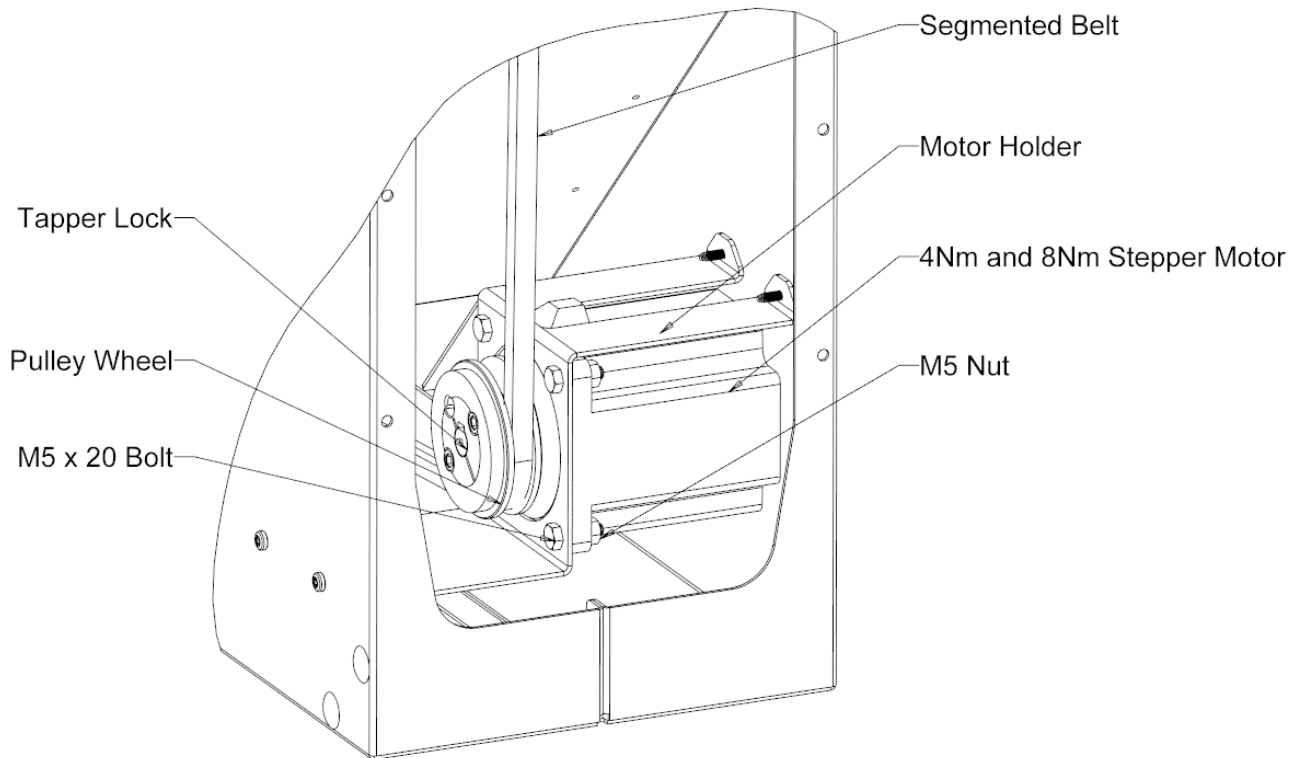*Figure 5 Stepper Motor 2Nm assembly schematic.*

Figure 6 Stepper Motor 4Nm and 8Nm assembly schematic.

.

3.2 Connection and wiring

⚠️ To perform the correct setup, please refer to the following diagrams representing possible ways of motor connection. Installation and connection can be done by qualified personnel only. Failure in performing in any of this operations may result in risk of fatal injury, electric shock, incorrect mounting or product damage.

WARNING: Do not open or disassemble the motor nor controller while power supply is connected to the device. It may result in fatal injury caused by electric shock. If it is necessary to open the motor, wait at least 5 minutes after disconnecting from the power supply.

Notes on proper installation:

- Use fuses at power line.
- Check the wires condition before operating. Make sure that there are no short circuits.
- Use cables fulfilling the voltage, current, load and insulation installation requirements.
- Use only high quality hard wire or fiber copper wire with ferrule.
- Use shield cable.
- Make sure that motor label plate specification matches the operating supply voltage. Use cables that are adapted to work with the desired current.

Stepper motors used in series of VTS Heat Exchangers (*Figure 9*) are connected and powered via controller responsible for basic operational parameters. Motor itself is equipped with male type terminal (*Figure 10)* which characteristic are described below in the *Figure 6.*

Figure 9 Stepper motor with male type terminal.

Cable YGZF
4 x Led 200 °C 20AWG
Style: 1332
UL: E482835

Tyco: 350779-4 UL: E28476
Terminal 350536

Shrink flex: Style SBRS UL:E203950

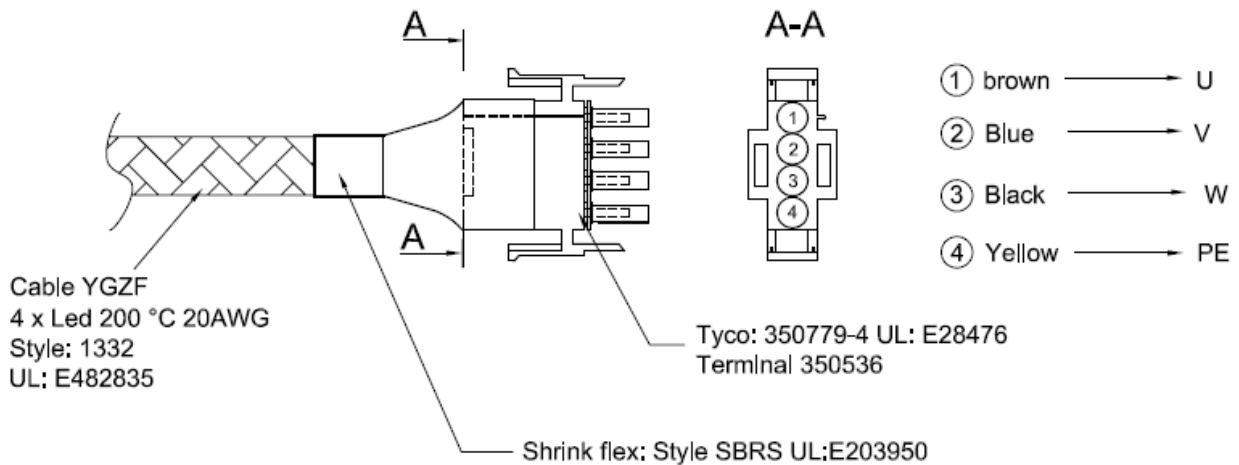① brown ⟶ U
② Blue ⟶ V
③ Black ⟶ W
④ Yellow ⟶ PE

Figure 10 Connection cable with dedicated terminal

Due to length of the motor cables, extension cables connecting motor with the controller are supplied additionally. Extension cable is equipped with 4 pole connectors sleeves fitting terminal of the motors (*Figure 11*).

Lengths of the cables differs depending on the size of the Rotary Heat Exchanger. Figure below represents the cable connection with proper wiring description.
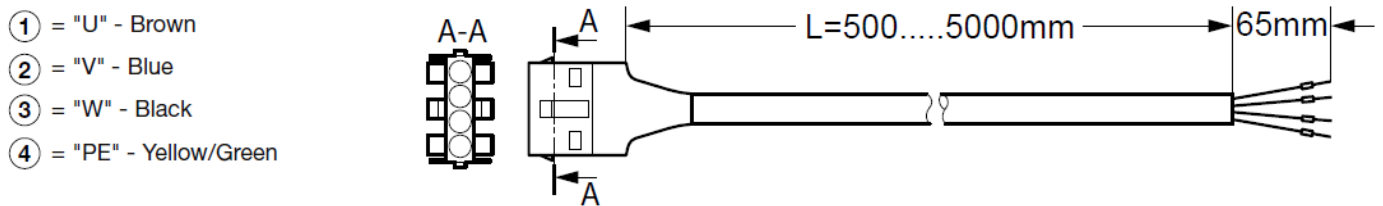
① = "U" - Brown
② = "V" - Blue
③ = "W" - Black
④ = "PE" - Yellow/Green

L=500.....5000mm   65mm

Figure 11 Extension cable

Stepper motors are operated via designated controller connected with the motor by the up mentioned cables. *Figure 13* represents the slot description of the controller. Wires of the motor must be connected according to the following figures which are describe in *Table 4* in details. Start with opening the cover of the controller by unscrewing it.

⚡ WARNING! Wait at least 3 minutes after disconnecting the main voltage before opening the cover of controller. Be sure that supply voltage is disconnected before opening.
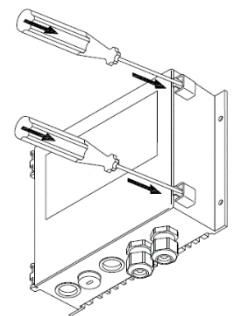
Figure 12 Opening controller by removing screws

To make the wiring process easier it is possible to remove the cover completely by detaching it from the controller. It will provide an easy access to the wiring slots. Hinged brackets allow to detach the doors by light pull (*Figure 13*). Despite that, cover doors can be opened at approximately 135°.
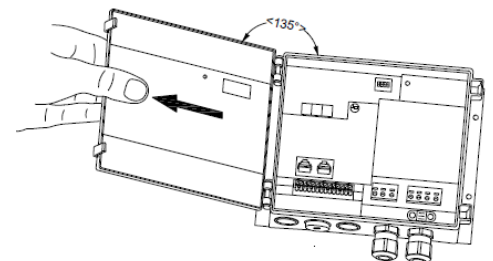
Figure 13 Controller cover

Electronic circuits of the controller (PCB) is protected by additional plastic cover (*Figure 14*) - it is forbidden to remove by unqualified personnel. This cover can be opened only to perform specialized service repairs. Do not attempt to perform any repairs by your own. Manufacturer warranty will not be void until the cover has traces of opening.
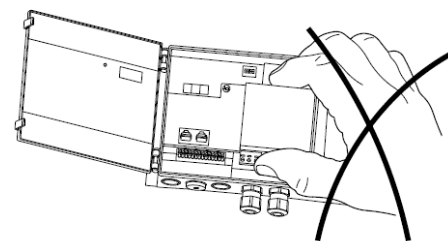
Figure 14 PCB cover

Controller is equipped with spring terminals to make the installation faster. Spring-loaded terminal allows to easily insert the wire into the desired slot by pushing it inside – no tools required. It is compatible with an multi-core cables/leads with additional core sleeves/end sleeves. Maximum and minimum dimensions of the wires are given in the manual at the end of this section (*Chapter 3.2.2.*). Wire ends or end sleeves must be between 8 – 10 mm. To detach the wire – press the terminal carefully with the screwdriver.

Figure 15 Spring terminals

Figure 16 Stepper motor controller - wiring slots

Table 4 Controller slots description

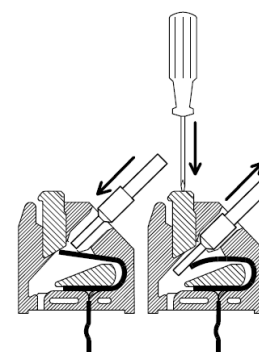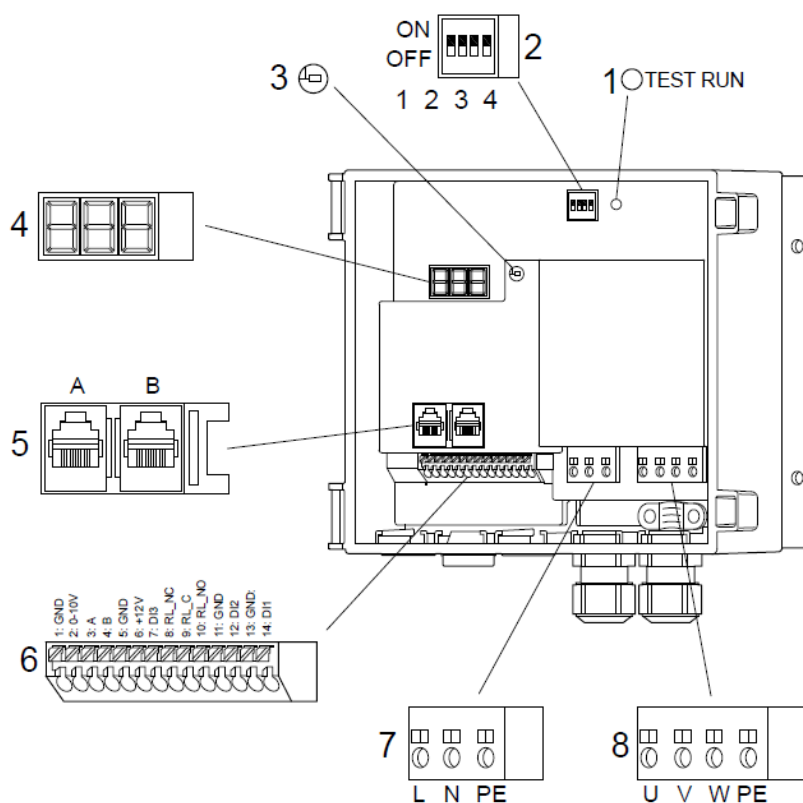| No.	Description
1	Test button
2	4-pole DIP switch
3	LED
4	3 x 7 -segment display – depending on version
5	RJ12 Modbus connector (2 x RJ12)
6	A/D control and signal terminals, depending on version
7	Supply terminals (L, N, PE)
8	Connection terminals for stepper motor (U, V, W, PE)

3.2.1 Main voltage and stepper motor wiring

The power supply of the controller is 230V AC; +/- 10%. Cable of the power supply should be connected on the terminals marked with letters "L", "N" and "PE" (see *Figure 17).* Cables should be inserted via dedicated cable entries/glands. After the wiring is performed, remember to re-tighten the cable glands and avoid pulling out or twisting.

Stepper motor is assembled with the integrated cable and connected to the controller via dedicated extension cable. Both of them are ended with the 4-pole connectors allowing for quick connection. Locking pawl of terminals will ensure the firm installation of both cables. Do not shorten the cables.
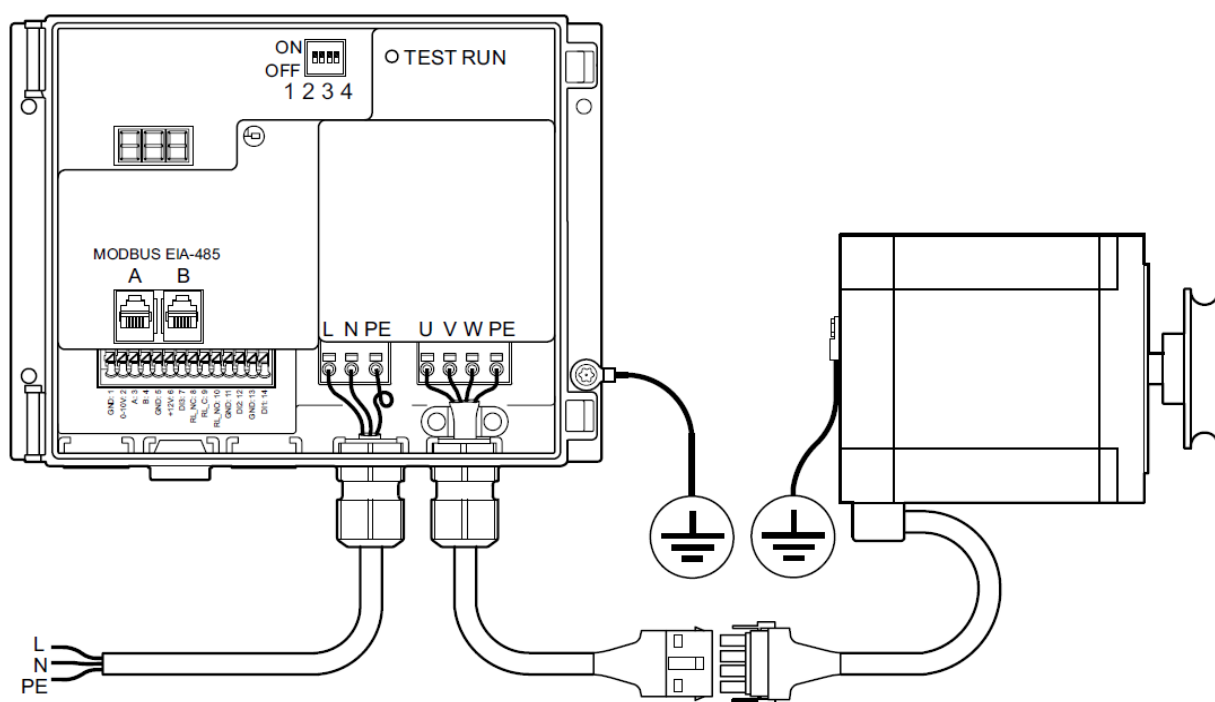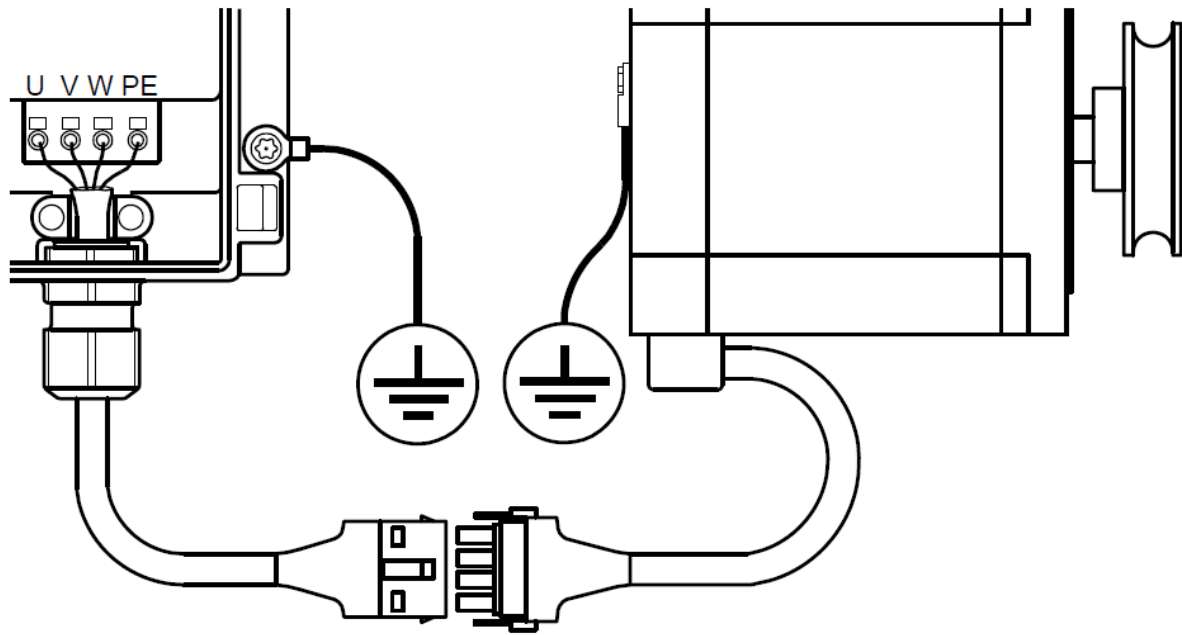

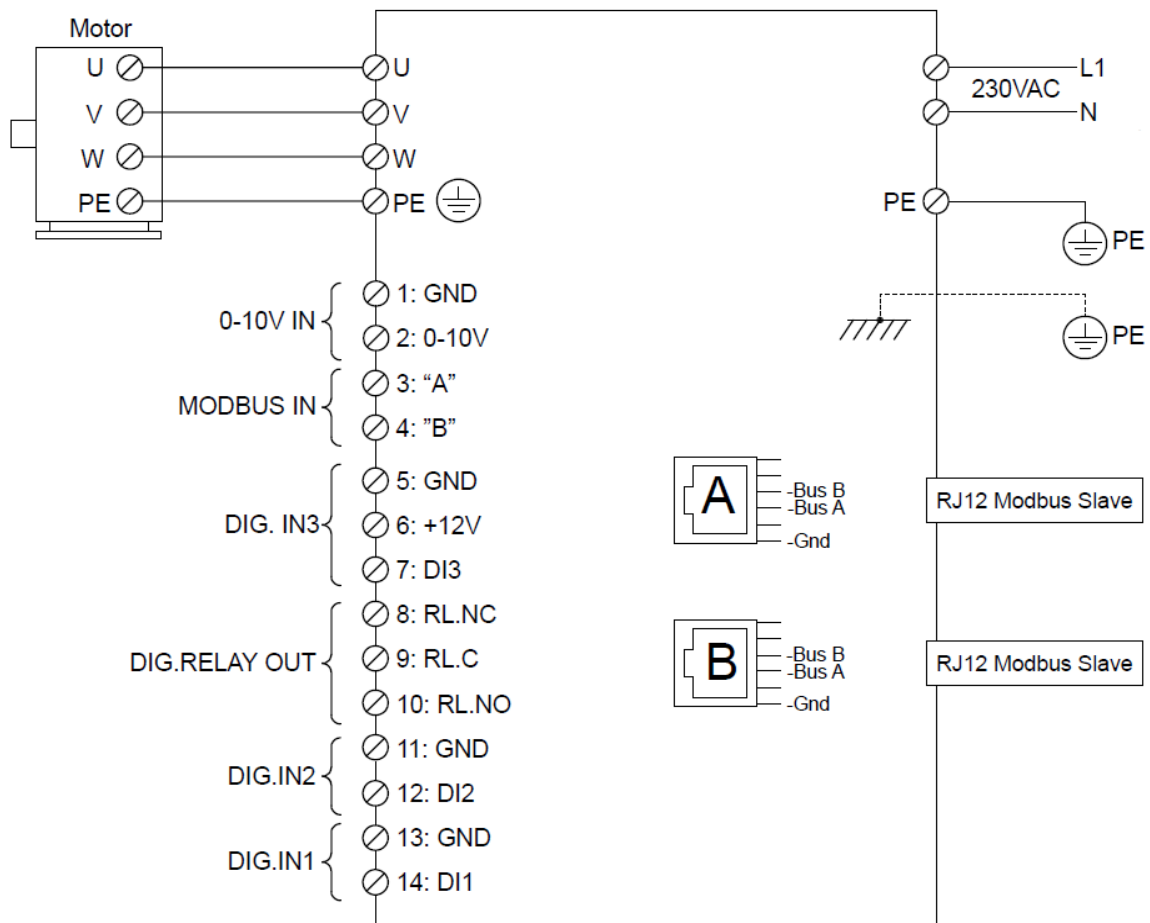*Figure 17 Power supply connection*

Figure 18 Stepper motor connection

Figure 19 Controller schematic

3.2.2 Cable requirements

Before performing the installation, make sure that your setup fulfills the following list of requirements:

- All cables and leads must comply with the local and national regulations.
- Cable dimensions for PG9 connectors should be within the range of 3-8mm
- Cables meet the dimension requirements given in the *Table 5.*
- Copper wires are recommended.
- Modbus cable can be 6-wire unshielded, 30 AWG/0,066 m^2 or similar.

Table 5 Cable and wires dimension requirements

Control wires and cables	Minimal Conductor Dimension	Maximum Conductor Dimension	Cable dimension
Solid wires	0.08 mm^2	1.5 mm^2	3-8 mm
Multi-core wires	0.14 mm^2	1.0 mm^2	3-8 mm
Power leads and cables			
Solid wires	0.2 mm^2	4.0 mm^2	3-8 mm
Multi-core wires	0.2 mm^2	2.5 mm^2	3-8 mm

3.3 Elements of the controller panel

3.3.1 Test button

The driver is provided with a test function in the form of a built-in test push-button. The test button is located inside the drive in the upper right corner and must be operated with the drive open. The test button has different functions, depending on how long the button is pressed in:

1. Short press < 1sec.: The drive will enter test mode and stay in test mode until the button is pressed again. The rotor will start rotating in a sequence from 0–100 rpm according to the selected ramp-up time and remain at 100 rpm. Pressing the button a second time will cause the drive to leave test mode and stop the rotor according to the selected ramp-down time.

2. Pressing and holding the button will cause the drive to enter test mode where it will remain until the button is released. The signal to the rotor will override to 100 rpm according to the selected ramp-up time.

Please note, that when pressing the test button for more than 20 sec. the calibration function off the internal rotorguard may be triggered.

The test button also works when Modbus control is activated.

3.3.2 Dip switch

The driver is equipped with 4 DIP switches for setting the stepper motor size (see table 6) and maximum motor speed (see table 7).
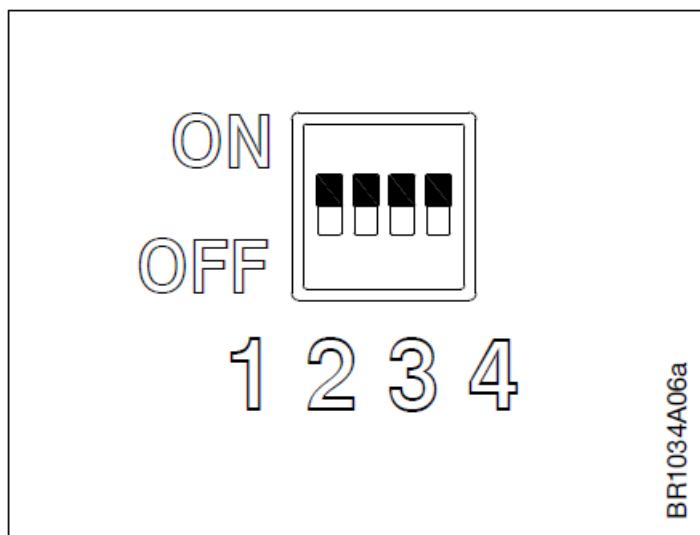
Figure 20 Dip switch

Note – motor size and speed settings of the device delivered with the VTS AHU are prepared by the manufacturer for optimal operation and should not be changed.

Table 6 stepper motor size setting

	DIP1	DIP2
Stepper motor = 2Nm	OFF	OFF
Stepper motor = 4Nm	ON	OFF
Stepper motor = 8Nm	OFF	ON

Table 7 max RPM settings

	DIP3	DIP4
Max RPM = 250	OFF	OFF
Max RPM = 200	ON	OFF
Max RPM = 170	OFF	ON
Max RPM = 150	ON	ON

3.3.3 LED Indicator

The driver is fitted with a LED indicator - see fig. 21. The LED diode can be seen with both open and closed cover.

Figure 21 LED indicator

The statuses of the indicator are shown in Table 8 below. **Note**: Flashing means that the LED is off for 100 ms and on for min. 100 ms (ms=milliseconds).

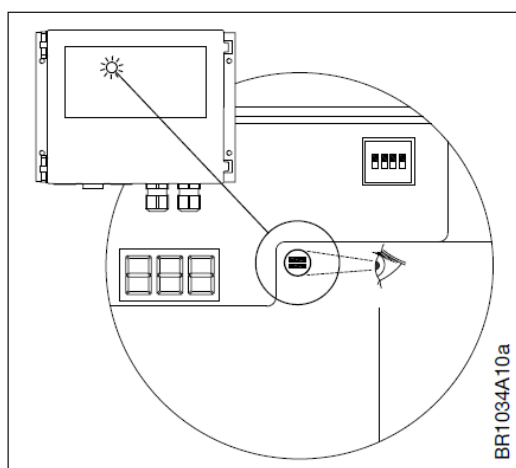| LED	State
OFF	No voltage
Green ON	Voltage is present
Flashing green	Valid Modbus communication
Red ON	Rotor stopped due to critical alarm
Flashing red	Operating with reduced power
Orange ON	Test function activated
Flashing orange	Purging function activated

3.3.4 Display

Display is visible with open and closed cover. The display shows current status for drive, stepper motor and rotor.

Table 9 Display statuses

Code	Description
139	Current stepper motor speed is displayed when the stepper motor is running and no rotor or pulley diameter has been entered via respective corresponding Modbus registers.
r73	Current rotor speed is displayed when the stepper motor is running and rotor and pulley diameter have been entered via respective corresponding Modbus registers. Display toggles between torque and speed with 2 sec toggle intervals.
t12	Current torque (Nm) Display toggles between torque and speed with 2 sec toggle intervals.
E12	Fault codes - see the importance of the individual fault codes in the table 10.
dE	Reduced performance operation due to current overload, overheating or other failure or overload. Read out the current fault/alarm via Modbus – table 14.
PU	Purging function activated.
tSt	Test function is activated and stepper motor is receiving control signal for max. RPM rotations.
hld	Hold function is activated (Holding).

	Stepper motor is in "STOP" mode.

The driver has a built-in alarm monitor, which monitors optimal fault-free operation and triggers an alarm if operating or performance problems are observed. Alarms are either "Critical" or "Non-critical". "Critical" alarms stop the stepper motor. "Non-critical" alarms reduce stepper motor performance. The built-in alarm monitor stops the device. If the alarm situation passes, the alarm is automatically reset and the driver is restarted.

If the maximum number of restarts (5 times/60 min) is exceeded, the alarm must be reset. The alarm can be reset by means of a Modbus command. The alarm is automatically reset if the power is disconnected for longer than 60 seconds. Alarm/fault code is shown on the display. Alarms can also be read via Modbus – see Table 14.

Table 10 Fault codes

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

3.4 Modbus and 0-10V control

Rotary Wheel driver can be controlled via Modbus RTU, according to the Modbus protocol or via analogue 0-10 V input signal. The device is factory-set for 0-10 V control – after detection of a start signal or speed setpoint via Modbus, it will automatically shift temporarily to control via Modbus RTU (the "0-10 V" signal is then ignored). The function is automatically reset when the device is restarted.

3.4.1 Modbus control

Modbus can be connected to the controller via the two RJ12 connectors (connectors "A" and "B" are internally parallel connected and it is therefore optional which connector is used) or via spring terminals in the terminal strip. For RJ12 connectors, we recommend the use of telecom cable, 6-wire, unshielded, 30 AWG/0.066mm² (flat/telecom cable) and round communications cable (like twisted pair cables) for the spring terminal connectors.
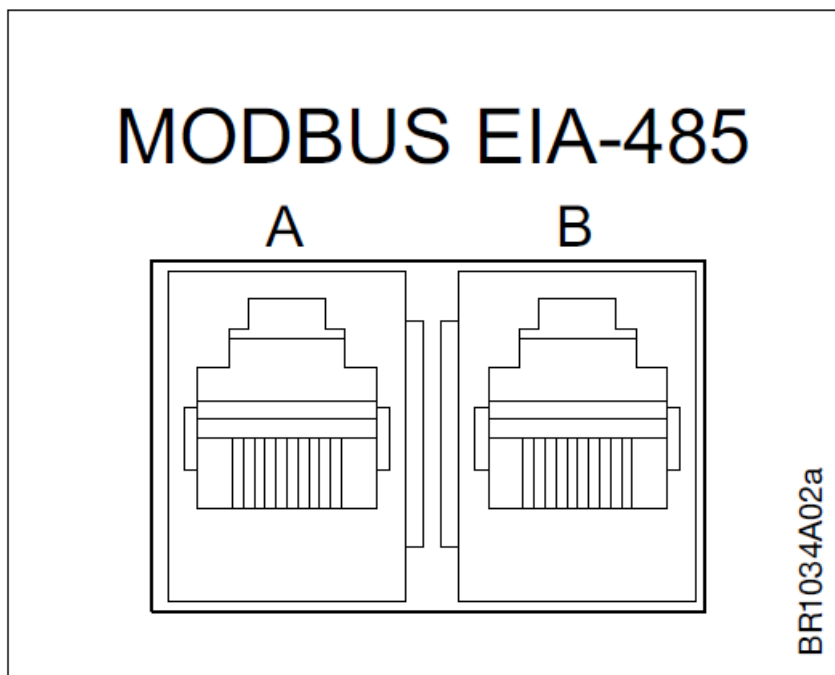
Figure 22 RJ12 Modbus connectors
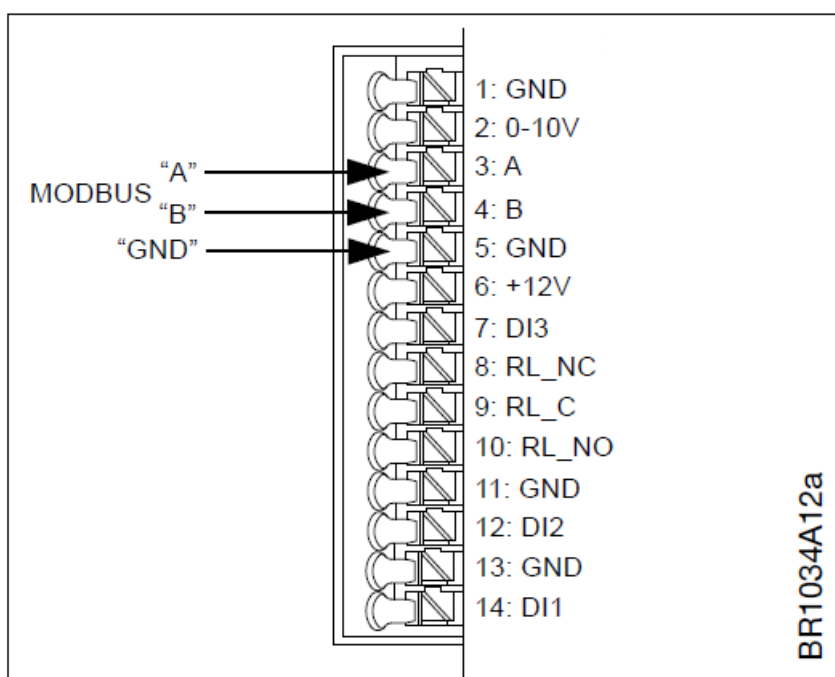
Figure 23 spring terminal Modbus connectors

After 10 seconds without receiving a valid Modbus request with the default parameters, the controller will try to detect a Modbus request with the alternative parameters (see Table 16 to see which registers are responsible for alternative communication parameters).

The default values of the parameters responsible for the communication between the controller and AHU are unchangeable - only the alternative parameters are to be changed.

Adaptation of the brand new RRG controller to work with VTS AHU automation requires changing the Coil Status 8 value (use of the alternative communication mode) to 1 and appropriate setting of the Holding Registers 13-16 - in accordance with the communication parameters of the uPC3 controller (address 4, baudrate 9600, no parity check, 1 stop bit) - see Tables 13 and 16. RRG motor type on the uPC3 I03 configuration screen must be set to OI.

Access to the registers of the rotary exchanger controller settings is done without the use of a password. It is also not required to save the settings after changing them.

Table 11 Communication parameters

	Setting range	Unit	Factory setting	Delivered as a spare part
Adress	1-247	n/a	4 dec.	79 dec.
Baud rate	9.6, 19.2, 38.4, 57.6, 115.2 kBaud	n/a	9.6	38.4
Parity	None, even, odd	n/a	None	None
Stop bit(s)	0, 1, 2	n/a	1	2
Communication timeout	0-240	Sec.	10	10

Note - the settings of the device delivered with the VTS AHU are prepared by the manufacturer for optimal operation and should be changed only in justified cases.

Table 12 Available functions

Function code	Description
1	Read Coil Status
2	Read Input Status
3	Read Holding Registers
4	Read Input Registers
5	Force Single Coil
6	Preset Single Registers
8	Diagnostics. Sub-function 00 Only – Return Query Data (loop back)
15	Force Multiple Coils
16	Preset Multiple Registers

Table 13 Available coil statuses

Register	Address	Function	Range	Active state	Factory
0x0001	0	Motor ON/OFF	0 - 1	1 = ON	0
0x0002	1	Reset Alarms	0 - 1	1 = Reset	0
0x0004	3	Rotation direction	0 - 1	1 = CounterClockWise	0
0x0008	7	Control mode	0 - 1	0 = Modbus, 1 = 0-10V	1
0x0009	8	Use altern. comm. settings	0 - 1	1 = Alternative	0
0x0010	9	Autodetect communication	0 - 1	1 = Enable	1
0x0011	10	Analog start signal	0 - 1	1 = Enable	1
0x0012	11	Autodetect control mode	0 - 1	1 = Enable	1
0x0013	12	Disable internal rotor guard	0 - 1	1 = Disabled	0
0x0014	13	Enable external rotor guard	0 - 1	1 = Enabled	0
0x0015	14	High speed resolution	0 - 1	0 = Resolution = 0.1 RPM 1 = Resolution = 0.01 RPM	1
0x0016	15	K-factor for Modbus	0 - 1	1 = K-factor not used for Modbus	1
0xx17	17	Enable auto saving of UDF	0 - 1	1 = UDF stored automatically	1

Table 14 Available input statuses

Register	Address	Function	Range	Active state
1x0001	0	Rotorguard Alarm	0 - 1	1 = Alarm
1x0002	1	V LO Alarm	0 - 1	1 = Alarm
1x0003	2	V HI Alarm	0 - 1	1 = Alarm
1x0004	3	I HI Alarm (Motor out short)	0 - 1	1 = Alarm
1x0005	4	Temperature High	0 - 1	1 = Warning
1x0009	8	Rotorguard Signal	0 - 1	1 = Pulse
1x0010	9	Overload / I_Limit	0 - 1	1 = Warning
1x0011	10	Internal Stop	0 - 1	1 = Alarm (Stop)
1x0012	11	Rotor Blocked	0 - 1	1 = Alarm
1x0013	12	EEPROM error	0 - 1	1 = Warning
1x0014	13	Communication error MOC	0 - 1	1 = Alarm
1x0015	14	Motor Phase Error	0 - 1	1 = Alarm
1x0016	15	Ripple	0 - 1	1 = Warning
1x0017	16	Digital Input 1	0 - 1	1 = HI
1x0018	17	Digital Input 2	0 - 1	1 = HI
1x0019	18	Ext. 24V supply overload	0 - 1	1 = Overload
1x0020	19	MOC in bootloader	0 - 1	1 = Alarm
1x0021	20	Digital Input 3	0 - 1	1 = HI
1x0022	21	Digital Input 4	0 - 1	1 = HI
1x0023	22	Communication error IOM	0 - 1	1 = Warning
1x0024	23	Rotation OK	0 - 1	1 = OK
1x0025	24	Test function active	0 - 1	1 = Active
1x0026	25	Purging active	0 - 1	1 = Active
1x0027	26	IO Config mismatch	0 - 1	1 = Warning

Table 15 Available input registers

Register	Address	Function	Range	Resolution	Unit
3x0001	0x0000	DHX Type	0 - 14	1	-
3x0002	0x0001	AOC SW version	0 - ?	0.01	-
3x0003	0x0002	PrcOut	0 - 10000	0.01	%
3x0004	0x0003	Intern Temp	-5000 - 15000	0.01	ºC
3x0005	0x0004	Motor Speed Out	0 - 40000	0.01	RPM
3x0006	0x0005	V In	0 - 300	1	V
3x0007	0x0006	I Out (RMS)	0 - 10000	1	mA
3x0008	0x0007	Power In	0 - 1000	1	W
3x0009	0x0008	ExternSet	0 - 10000	1	mV
3x0010	0x0009	Operation Day	0 - 9999	1	Day
3x0011	0x000A	Operation Minutes	0 - 1439	1	Min.
3x0012	0x000B	I Ripple	0 - 10000	1	mA
3x0013	0x000C	V Ripple	0 - 100	1	V
3x0014	0x000D	Config file variant	AA - ZZ	2 ASCII characters	

3x0015	0x000E	Config file version	100 - 32000	0.01		-
3x0016	0x000F	MOC SW version	0 - ?	0.01		-
3x0017	0x0010	Rotor Speed Out	0 - 40000	0.01		RPM
3x0018	0x0011	Torque	0 - 1500	0.01		Nm
3x0018	0x0012	SW variant	-	-		-
3x0019	0x0013	AOC Boot SW	0 - ?	0.01		-
3x0020	0x0014	MOC Boot SW	0 - ?	0.01		-
3x0021	0x0015	Motor Cfg. Var.	0 - 65535	1		-
3x0022	0x0016	Motor Cfg. Ver.	0 - 65535	0.01		-
3x0023	0x0017	Rotor Cfg. Var.	0 - 65535	1		-
3x0024	0x0018	Rotor Cfg. Ver.	0 - 65535	0.01		-
3x0025	0x0019	User Data Var.	0 - 65535	1		-
3x0026	0x001A	User Data Ver.	0 - 65535	0.01		-
3x0027	0x001B	IOM SW version	0 - ?	0.01		-
3x0028	0x001C	V DC Bus (Peak)	0 – 400	1		V
3x0029	0x001D	V Motor (Peak)	0 – 400	1		V
3x0030	0x001E	ExternSet2 (IOM)	0 - 10000	1		mV

Table 16 Available holding registers

Register	Address	Function	Range	Resolution	Unit	Factory
4x0001	0x0000	Setpoint / PrcSet	0 - 10000	0.01	%	-
4x0002	0x0001	Min. Motor Speed	100 - Max.	0.01	RPM	100
4x0003	0x0002	Max. Motor Speed	Min. - 40000	0.01	RPM	25000
4x0004	0x0003	Start I Out (Boost)	0 - ?	1	mA (RMS)	I_{max} + 50%
4x0005	0x0004	Start Time (Boost)	0 - ?	1	Sec.	10
4x0009	0x0008	Prc Holding Torque	0 - 1000	0.1	% of max	0
4x0010	0x0009	UpRampTime	15 - 300	1	Sec.	60
4x0011	0x000A	DownRampTime	15 - 300	1	Sec.	60
4x0012	0x000B	SwitchMode	0	(Auto)		
			1	8	kHz	
			2	10	kHz	X
4x0013	0x000C	DHX Type	0 - ?	1	-	0 [3]
4x0014	0x000D	Alternative Modbus ID	1 - 247	1	-	3
4x0015	0x000E	Alternative BaudRate	0	9600	bps	
			1	19200	bps	
			2	38400	bps	
			3	57600	bps	
			4	115200	bps	X
4x0016	0x000F	Alternative Parity	0	None	-	
			1	Odd	-	
			2	Even	-	X
4x0017	0x0010	Alternative Stop Bits	0	INVALID	-	
			1	1	-	
			2	2	-	X

4x0018	0x0011	Number of retries	-1 - 100	1	-	5
4x0019	0x0012	Modbus Timeout	0 - 240	1	Sec.	0
4x0020	0x0013	Pulley size (diameter)	0 - 1000	1	mm.	0
4x0021	0x0014	Rotor size (diameter)	0 - 10000	1	mm.	0
4x0022	0x0015	Pulses per rotation	0 - 10	1	-	1
4x0023	0x0016	K factor	0-10000	-	-	100
4x0024	0x0017	DigIn1 config [2]	0	Disabled	-	
			1	Start/stop	-	
			2	AlarmReset	-	X
			3	Rotation direction	-	
			4	Test function	-	
			5	Ext. rotor guard signal	-	
			6	Enable ext. rotor guard	-	
4x0025	0x0018	DigIn2 config [2]	0	Disabled	-	
			1	Start/stop	-	
			2	AlarmReset	-	
			3	Rotation direction	-	
			4	Test function	-	
			5	Ext. rotor guard signal	-	
			6	Enable ext. rotor guard	-	X
4x0025	0x0019	DigOut config [1]	0	Disabled	-	

3.4.2 0-10V control

The Rotary Wheel driver is factory-configured for 0-10 V control, which is automatically deactivated when the signal is received via the Modbus protocol, so there is no need for additional configuration when choosing analog control.

The motor starts when there is a control signal over 1.1 V and stops when control signal is less than 0.6 V. The motor runs at maximum speed (predefined by the manufacturer for optimal work) when there is a control signal over 9.5 V.
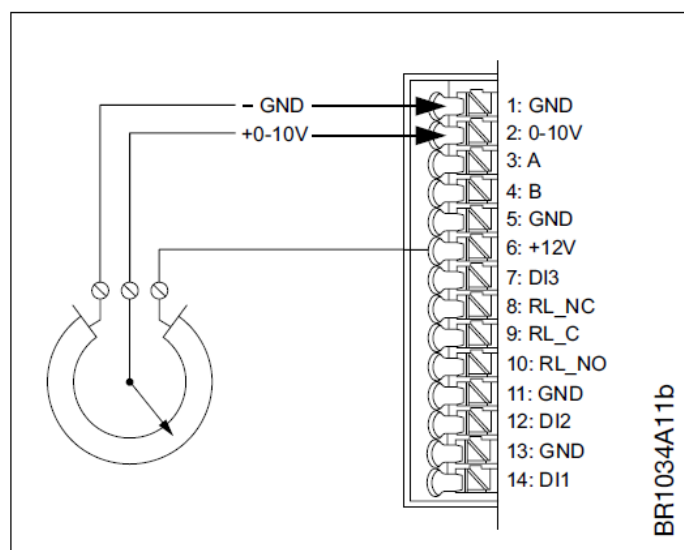

Figure 24 Spring terminal 0-10 V control connectors using internal 12V output