INSTALLATION, OPERATION, MAINTENANCE AND SAFETY MANUAL

CONTENT

1. SAFETY INFORMATION

These instructions must be followed to ensure safe and proper installation, operation and maintenance of the WAT Electronically Communicated EC motors. They should be brought to the attention of anyone who installs, operates or maintains the motor or associated equipment especially by Fan Users OEMs and end users. The motor is intended for installation and use by qualified personnel, familiar with health and safety requirements and national legislation. Ignoring these instructions may invalidate all applicable warranties. Intervention of unqualified person may result in serious injury and material damages.

BEFORE USING THE MOTORS PLEASE CAREFULLY READ THE INSTRUCTION MANUAL. PLEASE TAKE NOTE OF AND FOLLOW SAFETY INSTRUCTIONS.

This instruction manual will help you in using your electric motor safely.
• Before installing and operating your motor please carefully read the instruction manual and other documents provided with the machine.
• Please follow safety instructions.
• Please keep instruction manual at easily accessible place for future reference.

Symbols and their descriptions
Following symbols are used in this instruction manual:

WARNING
This symbol denotes a warning against risk of injury or damage.
Please be careful and follow safety instructions.

ELECTRICAL HAZARD
This symbol denotes presence of the risk electrical shock.
This is a warning against electrical voltage.

NOTE
This symbol points out important information regarding the relevant subject.

Technical information in the catalogues and nameplates on the electric motors must be followed. Operation instructions should be carefully studied. Electric power circuit connection and cut off operations should only be performed by authorized operator. Operation and maintenance of electric motors and any intervention in case of breakdown should only be performed by authorized operator.
Any service on the internal parts of the motor must be performed by qualified personnel only, since, due to the attraction between metallic parts caused by the magnets, risk of accident is present both in the assembly and disassembly of the motor. Before beginning any maintenance work on the electric motor power connection of the electric motor should be cut off and motor should be secured with warning signs to ensure safety. After power to the motor cut off, operator should wait until moving parts becomes totally stable before starting any intervention on the motor. Electrical and mechanical connections should be controlled before reconnecting power to the motor. Proper grounding should be ensured. Electric terminal connections should be tightened with the proper torque, and it should be ensured that the connection does not cause any problems.

During operation, such equipment has energized or rotating parts that may present high temperature. So open terminal boxes, unprotected couplings, incorrect handling may cause serious injuries to people and/or material damage. The people responsible for installation safety should ascertain that: Only qualified personnel with proper qualifications must perform installation and operation services on the equipment.

These personnel must carry this Manual along with other documents supplied with the motor, and the works should be performed in accordance with specific standards and documentation for this product. Unqualified personnel should never perform any work on electric equipment.
If installation and safety instructions are not followed accordingly, the warranty may be void.

The qualified personnel should be pay attention to:
• Technical data referred to allowed applications (assembly, storage, connection, installation and operation conditions), included in this Manual, Purchase Order documentation, operation instructions, manuals, and other documents.
• Instructions and specific conditions for installation on site.
• Use of proper tools and equipment.
• During handling and transportation, all protection devices of each component were removed before installation.
• Not to remove or open ANY components without WAT permission including end shield or Flanges.

Additionally, all motors must be stored in vibration-free rooms to avoid bearings damages.
For practical reasons, it is not possible to include in this Manual detailed information that covers all construction variables, nor covering all possible assembly, operation or maintenance alternatives. In case of any doubts or questions directly reach WAT to clarify open points.

WAT EC motors contain Permanent magnets and Electronic integrated circuits. For Pacemaker users it is recommended to avoid close or prolonged contact with this product even though motors fulfill LVD and EMC requirements.

There is a risk for electric shock while operating electric motor, whose proper electrical connections and wirings are not properly done. If the proper connections are not done or if you are not sure for proper cable connections DO NOT OPERATE.

Ensure that the power is cut off and motor is not running before measuring the insulation resistance. The housing of the motor and if available thermal protectors, should be grounded.

Disconnect motor from the power supply before making any control system connections. To avoid electric discharge risks, discharge the terminals right after performing the measurement. if power cables connected, make sure that the main supply is clearly disconnected. This applies both to the main and auxiliary circuits.

In order to perform any operations on motor or motor assembled system pay attention to lifting procedure:
• Never lift the motor by the shaft
• Check the motor weight to lift

2. MOTOR INSTALLATION AND MECHANICAL CONNECTIONS

2.1 Before Installation

• Ensure that motor is not damaged during transportation and storage.
• Check the information on the motor nameplate complies with the current line voltage.
• Check the conformity of the motor for the intended usage.
• Check the accessories on the motor – if available – in complete and operative condition.
• Check the nameplate is the data matches environmental and operating site conditions

2.2 Preparations for Installation

• Rust Protective Material on the shaft should be cleaned.
• Check whether there is a friction by rotating the motor shaft by hand.

WAT Motors are balanced dynamically by installing half key. Therefore, transmission parts should be balanced with half key also.

If the motors are bound with coupling and similar parts, parallelism and axial eccentricity is so critical for the performance and lifetime of the motor. Therefore, it is required to align suitably and measure. If the alignment is not suitable, vibration may occur in motor. If the eccentricity is so much, some parts may get harmed.

In the application of belt and pulley, the pulleys should be put in parallel, and belt and pulley system should be set with suitable belts in suitable tension. Over-tension on belts may cause over-vibration and shaft breaking or bearing damages. As the motor is balanced with half key, the pulleys and couplings to be used should be balanced with half key.

Installation locations should allow easy access for inspection and maintenance services. WAT is not liable for removing motors from the site.

Cable glands are meant protect the main and accessories lead wires. Handle these leads carefully in order to avoid insulation damages on leads and cable in general.

Always disconnect the main power supply before touching any electrical device associated with the product. Several components may remain charged with high voltage and/or in movement and may cause injuries to people, even after the AC power supply has been disconnected or turned off. Wait at least 10 minutes to guarantee the fully discharge of capacitors. Always connect the equipment to the ground protection (PE).

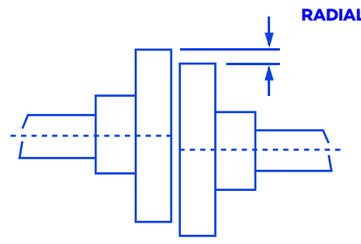


Figure 1-
Angular alignment (parallelism)

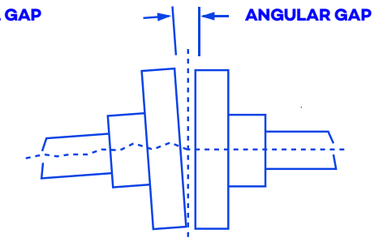


Figure 2 -
Radial alignment (concentricity).

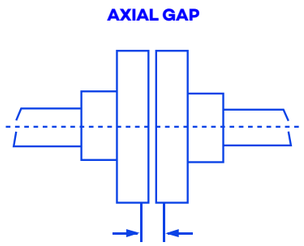


Figure 3 -
Radial alignment (concentricity).

Maximum Permissible Loads (Newton) for 20.000 Hours Bearing Life Time								
Direction	Mounting	Force Type	750 rpm	1000 rpm	1500 rpm	1800 rpm	3000 rpm	3600 rpm
			FORCE (N)	FORCE (N)	FORCE (N)	FORCE (N)	FORCE (N)	FORCE (N)
Axial*	Horizontal	Pushing	885	840	800	765	730	665
		Pulling	515	475	450	430	390	340
	Vertical Shaft Down	Pushing	935	900	860	820	765	710
		Pulling	495	465	425	405	350	310
	Vertical Shaft Up	Pushing	875	835	785	750	710	665
		Pulling	615	565	500	475	410	375
Radial*	All	L	710	640	595	550	440	425
		L/2	765	730	665	620	500	475

*Axial Max Permissible Load (Radial Load Zero)
**Radial Max Permissible Load (Axial Load Zero)

WAT EC motors are balanced as half key. To prevent vibrations, please ensure proper alignment and not to exceed above given permissible loads base on type of mounting.
Incorrect alignment, improper belt tensions, exceed vibration or exceed allowed forces may cause bearing failure

3. ELECTRICAL CONNECTIONS AND GROUNDING

3.1 Before Installation

• Connections should be done according to the electric connection diagram, supplied with the motor. The motor connection should not be done without checking the diagram.
• Voltage and frequency information on the motor nameplate should be examined carefully and the conformity with the current line should be checked.

3.2 Preparations for Installation

• The connection side of the cables to the windings must be checked whether there is corrosion.
• The cable section used appropriately to the power of the motor and distance to the panel of motor must be appropriate. (In case if loose wire extensions are not long enough)
• The tightness of the cable glands on the EC motor must be checked before any wiring connections (to prevent pull effect)
• The direction of rotation must be determined before motor-load connection is made and the connection must be made after the compliance to the load is provided.

3.3 Electrical Connections for Three Phase Motor Models:

• Before starting work, make sure that all necessary safety precautions have been taken and that you have the required equipment with you. Ensure that the power source is off and that you are using appropriate personal protective equipment.
• The WAT Motor cover has two cable outputs: a power cable and a signal cable, as shown in Figure 1. Before powering the system, check that the connections listed in Table 1 and Table 2 are secure and correctly made.

3.3.1 Power Cable Connections

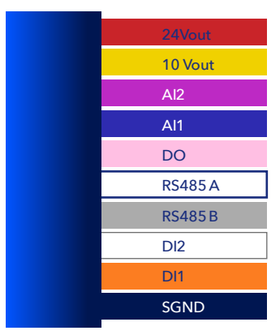
Information about the power cables can be found in below Table 1.

CABLE	FUNCTION	WIRE COLOR
1	L1	Brown
2	L2	Black
3	L3	Grey
4	Protective Earth	Yellow / Green

Table 1

3.3.2 Control Cable Connections

Information about the power cables can be found in below Table 2.

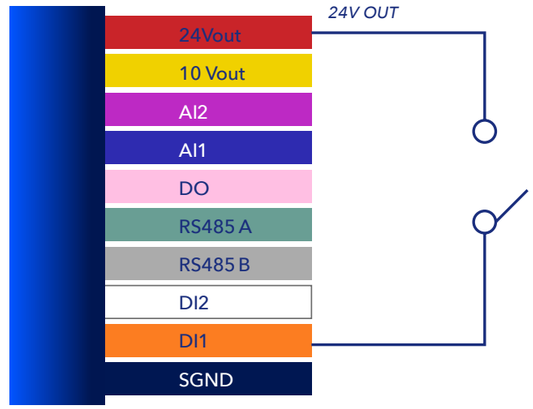


CABLE	FUNCTION	WIRE COLOR	NAME
1	DC 24V output	Red	100mA max
2	DC 10V output	Yellow	20mA max
3	AI 2	Purple	
4	AI 1	Blue	0-10V Speed control
5	DO	Pink	Alarm
6	RS485 A	Green	
7	RS485 B	Gray	
8	DI 2	White	CW/CCW
9	DI 1	Orange	Run/Stop
10	COM	Black	Logic Ground

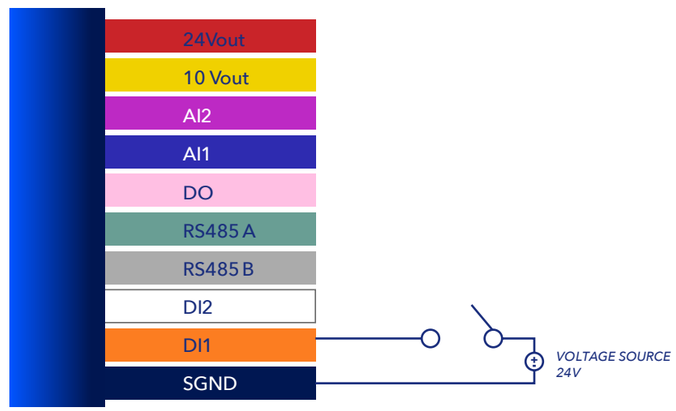
Table 2

3.3.3 Start / Stop Operations

To start the WAT EC Motor, a 24V power supply voltage must be applied to the DI1 input. As shown in Figure 2, voltage can be supplied to the DI1 pin using the 24V power supply voltage between the WAT EC Motor control cables or an external voltage source. To stop the system, the power supply to the DI1 input must be removed.



Start / Stop using Internal 24V Source

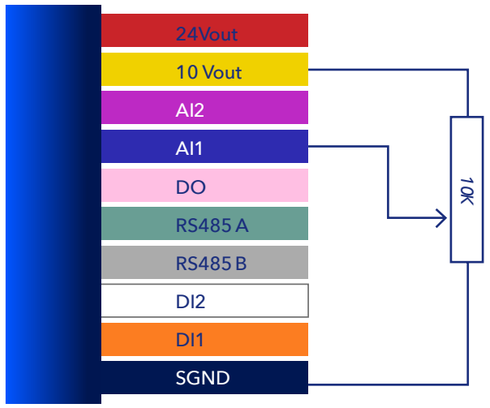


Start / Stop using External 24V Source
Figure 1 Start/Stop Wiring Diagram

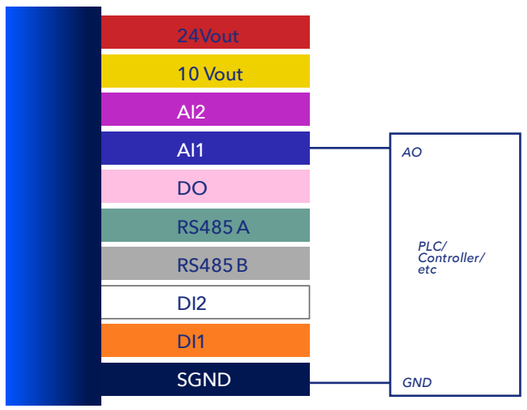
3.3.4 Speed Adjustment

First, make sure that you have all necessary tools on hand and always prioritize safety. Verify that the power source is off and the WAT EC Motor's electrical connections are secure. Operator must be wearing appropriate personal protective equipment. After confirming that all required safety measures are in place, proceed with the process.

The speed reference for the WAT EC Motor can be adjusted using the DC voltage level applied to the blue (AI1) cable and the Modbus speed reference.
Analog Signal Input
You can use a 0-10V DC analog voltage signal as an input for the WAT EC Motor.



Speed control using potentiometer



Speed control using potentiometer
Figure 2 Speed Adjustment Wiring Diagram

For speed control, connect an external potentiometer, PLC, or other analog signal source to the AI1 cable on the WAT EC Motor, as shown in Figure 3.

Analog Input - Speed Reference

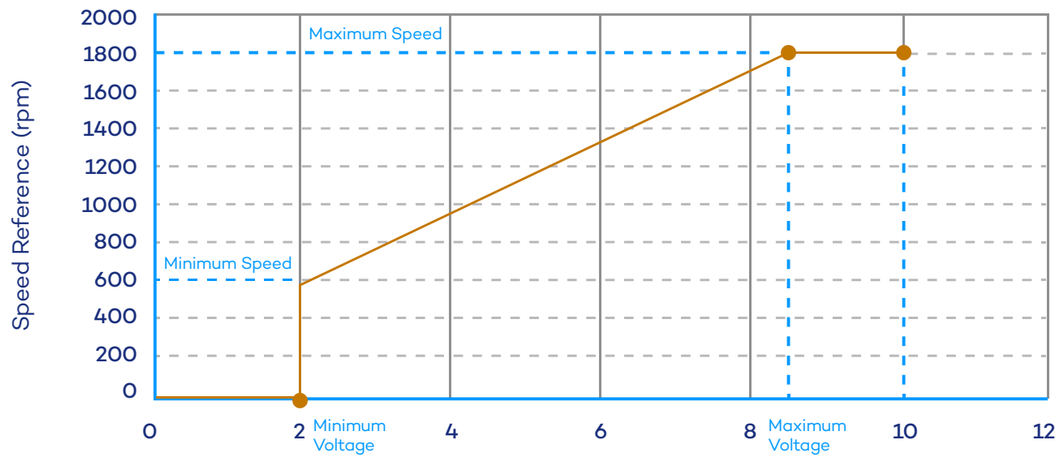


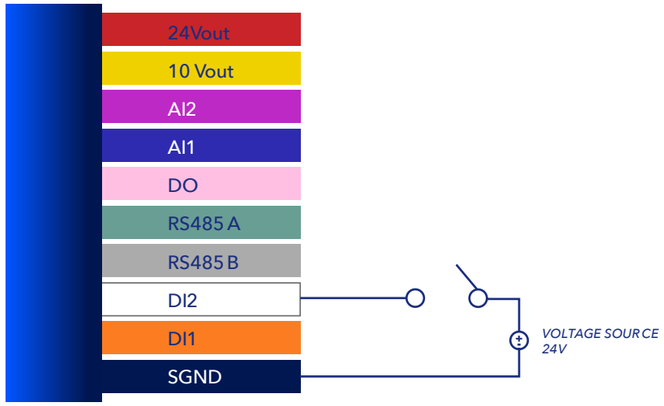
Figure 4 Analog Signal Input and Speed Reference

After making the relevant settings, the procedures described in the start/stop step should be performed to activate the motor.

Note: You can set the speed range and speed adjustment precision you want to use in the WAT EC Motor via the MODBUS interface according to your application requirements. With these settings, you can define the maximum and minimum speed values of your motor, as well as the analog input sensitivity. If you do not make these settings, the system will continue to operate with the default values shown in Figure 4.
3.3.5 Changing Direction of Rotation

Ensure that you have all the necessary tools at hand and always prioritize safety. Make sure the power supply is turned off, that the electrical connections of the WAT EC Motor are made correctly, and that appropriate personal protective equipment is worn. After confirming that all necessary safety precautions have been taken, proceed with the operation.

Rotation Change with Internal 24V Source

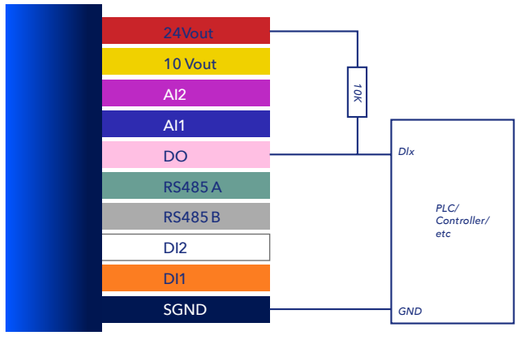


Rotation Change with External 24V Source

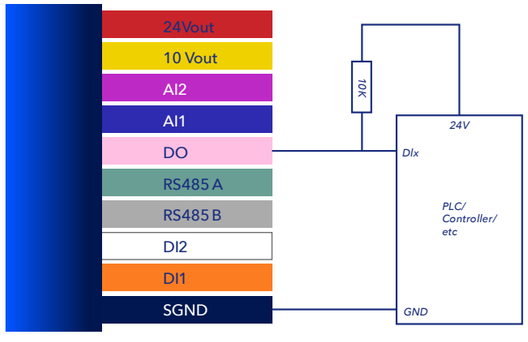
The direction of rotation of the WAT EC Motor can be adjusted by applying a voltage level to the DI2 pin. When making cable connections, it is recommended to ensure that the power is turned off for safety reasons. A 24V voltage can be implemented through the WAT EC Motor wiring or using an external power supply, as shown in Figure 5. The direction of rotation can be set by connecting a switch between the DI2 and 24Vout cables. The switch should be OPEN for counterclockwise (CCW) rotation and CLOSED for clockwise (CW) rotation.
The direction of rotation is defined when viewed from the drive end of the motor (shaft). If the direction of rotation is changed while the motor is running, the motor will slow down, reverse its direction, and then return to its previous speed.

3.4 Error Condition

When an error is detected on the WAT EC Motor, the DO (error notification) signal will drop to a low voltage level (SGND).



Open Collector Fault Output with Internal 24V Source



Open Collector Fault Output with Internal 24V Source
Figure 6: Error Notification Signal Wiring Diagram

The recommended connection diagram for obtaining information through the relevant pin is shown in Figure 6.
Note: The DO pin can provide a maximum output current of 40 mA. The pull-up resistor to be connected should be selected according to this current level.

The motor must be ground to a good grounding system.

5. Verify Grounding Connections: Ensure the motor and all related equipment are properly grounded to prevent electric shock and system errors. Lack of proper grounding can lead to serious injury or equipment damage.

6. Short Circuit and Overcurrent Protection: Use fuses and circuit breakers to protect against overcurrent or short-circuit risks in the electric motor system. This protection prevents motor overload and potential malfunctions.

7. Observe After Powering On: Once powered, observe the motor and surrounding equipment for proper operation. Stop the system immediately and recheck connections if you notice abnormal sounds, overheating, or vibrations.

8. Emergency Stop: Ensure the emergency stop button is accessible to quickly stop the motor and system in an emergency. This minimizes potential hazards.

9. Periodic Maintenance and Control: Regularly maintain the motor and electrical system. Check cable connections, grounding, and signs of wear and tear on equipment.

- All WAT EC motors are supplied with ZZ closed bearings for lifetime greased.
- Please check below parts as.
- Is the air ventilation passing on the motor?
- Visual inspection: cleanliness, leads cables, terminals, eye bolts, fan and fan cover, couplings, fittings and drain plug on area of operation.
- Type of alignment: what type was used (clock – radial/radial; clock – radial/axial; optical; ule to pulleys.
- Alignment values: radial (....mm) and axial (....mm).
- the speed (rpm).
- Ambient Temperature: measure the ambient temperature at a distance of 1 m from the motor.
- Altitude: determine site altitude.
- Air flow speed: check if the TEAO motor is receiving the necessary air speed as recommended.
- Bearings housing temperature: DE and NDE temperature.
- Vibration values: check the vibration on all of 6 points (if possible), as recommended by standard, at the DE and NDE bearing. Also check acceleration.
- Final condition: approved or not approved, and who is approving.
- General observation: all the details that were verified during the start-up.

4. SERIAL COMMUNICATION

4.1. Overview

EC Motor: The master (PC) can communicate with EC motor via RS485 and Modbus protocol. The electrical interface and connection comply with EIA/TIA-485 standards. The connection between motor (Slave) and PC (master) can be configured with point to point or multi-point system.

A master (PC) communicates with one or multi-EC motors on a passive serial link. EC motor provides RS485 ports at control cable. Green cable represents RS485 A (Data+) signal. Gray cable represents RS485 B (Data-) signal.

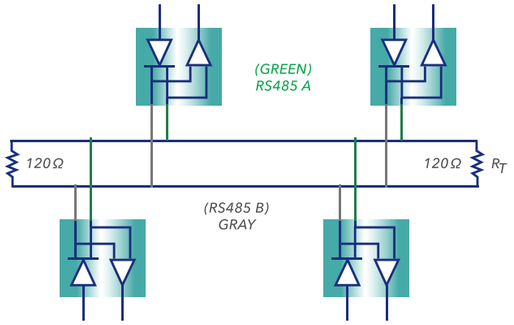


Figure 1: Serial bus connection

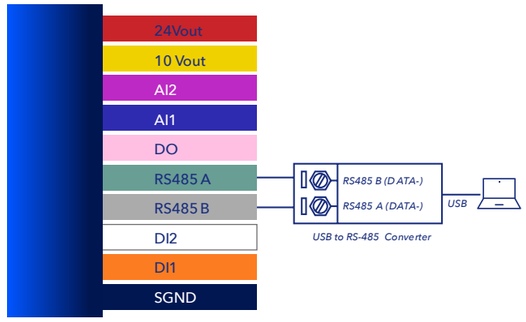


Figure 2: Motor control cable connections example for RS485.

4.2. Physical Layer

4.2.1. Data Transmission Rate

The baud rate can be configurated as 4800/9600/115200bps.
The default baud rate is 9600bps.

4.2.2. Multi-Point Serial Bus Structure

EC motors support Modbus multi-point serial link architecture and can also be connected to trunk cables or master devices via Daisy chain. Line terminal resistors need to be used at both ends of the trunk cable to match the impedance. Standard resistance of 120 ohms is recommended.

4.2.3. Electrical Connection

It is recommended that the pull-up resistance of the host be at least 1K ohm.
It is recommended that the host pull-down resistance be greater than or equal to 1K ohm.
Method for connecting dual-core communications cables: The dual-core communications cables must be the shielded twisted-pair cables (cables A, B, and the shielded layer). Cables A and B must be the shielded twisted-pair cables. It is recommended that the shielded layer be connected to the ground or suspended on the host. The shielding layer does not allow access to the functional ground (GND) at the motor end and must be suspended.

Method of connecting three-core communications cables: Three-core communications cables include twisted-pair cables A and B, the third cable, and the shielding layer. Mask layer It is recommended that the host be connected to the earth. The shielding layer line is not allowed to access the functional ground (GND) at the motor end and must be suspended. The third wire can be connected to the functional ground (GND) of the motor end and the functional ground (GND) of the host end, so that the motor end (GND) and the functional ground (GND) of the host end are connected to form a common end.

Shielded twisted pair cables must be used for communications. Within 10 meters of laying length, wire diameter is not less than 22# AWG line (single wire by 0.3 square mm). 10 to 50 meters long, the diameter of a single cable should not be smaller than 20# AWG cable (0.5 square mm).
When the length exceeds 50 meters, the diameter of a single cable should not be smaller than 18# AWG cable (0.8 square mm).

Do not cut the communications cable and make connection in the middle. Otherwise, the line impedance loss may cause communication failure.
The communication cable must be far away from the frequency conversion power supply and a large inductive load. It is recommended that the communication cable and the power cable be

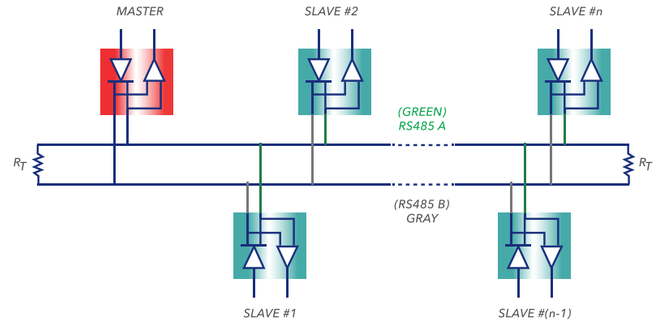


Figure 3: Connection topology (General 2-Wire Topology)

4.2.4. Maximum Number of Connected Motor

The maximum number of connected motors must be less than 60.

5. MODBUS PROTOCOL SPECIFICATIONS

5.1. Default Modbus Communication Settings
The default Modbus communication settings are given Table 1.

Tranmission mode	RTU
User interface	RS485
Bauf rate	9600
Data size	8
Parity	None (or disable)
Stop bit	1
Error detection	CRC

Table 1: Default Modbus communication settings

5.2. Structure of a Byte

When devices communicate on a MODBUS serial line using the RTU, a byte has the following structure.

Start	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Parity	Stop

Parity bit can be configurated by changing the parameter “6.1.12. Modbus parity configuration” as Even/Odd/None. If “None” configuration is selected for parity, an additional stop bit is transmitted to fill out the character frame to a full 11-bit asynchronous character.

5.3. Communication Process

Frame descriptions of MODBUS messages using RTU framing are given below for both command from PC and answer from motor situations. The messages start with a silent interval of at least 3.5-character times (shown as T1–T2–T3–T4 in below). Following the last transmitted character has also a similar interval of at least 3.5-character times marks the end of the message. A new message can begin after this interval.

Command from PC:

START	ADRESS	FUNCTION	DATA	CrcLow	CrcHigh	STOP
T1-T2-T3-T4	8BITS	8BITS	NX8BITS	8BITS	8BITS	T1-T2-T3-T4

Answer from motor:

START	ADRESS	FUNCTION	DATA	CrcLow	CrcHigh	STOP
T1-T2-T3-T4	8BITS	8BITS	NX8BITS	8BITS	8BITS	T1-T2-T3-T4

In contrast to the general specifications, the maximum telegram length is 41 bytes!

5.3.1. Command from PC

Initial synchronization:
- A transmission pause of at least 3.5 bytes is used for initial synchronization.
- The following byte is then interpreted as the first byte of a frame (i.e. address).
- The pause between the individual bytes of a frame may be a maximum of 1.5 bytes.

Address:
The address field has a size of 8 bits. The MODBUS addressing space comprises 256 different addresses. The Modbus addressing structure is given below. The master has no address, only the slave has an address. On the Modbus serial bus, this address must be unique.

The Address 0 is reserved for the broadcast address. The master has no specific address, nly the slaves must have an address and this address must be unique. The addresses of the hold registers that support broadcast commands are D000, D001, D003, and D007.

01	-127
Broadcast address	Slave individual address

Command:
The following commands from the MODBUS application protocol specifications are supported.

Function Code	Command
0x03	Read Holding Register
0x04	Read Input Register
0x06	Write Single Register

Other commands are not supported.

Data:
The length of the device’s response and the meaning of the data bits may differ depending on the command concerned.
CRC L / CRC H:
For the complete telegram, a CRC checksum is generated.
- The polynomial for defining the checksum is 1 + x2 + x15 + x16 (i.e., XOR link to 0xA001).
- The initial value is 0xFFFF.
- The low byte of checksum is transmitted first, then the high byte.

More detailed information about calculating the checksum can be found in the “MODBUS over Serial Line Specification & Implementation guide V1.02”.

5.3.2. Answer from motor

The motor will respond only in the following cases:
- Received a message from its own address. No response is sent for the broadcast address.
- The correct number of data bytes should be sent so that the telegram can be interpreted.
- The telegram length is at most 41bytes.
- The checksum should be correctly recognized.
- A reply can be sent to the broadcast read hold register D000 (the current motor ID value).

Note: Replies will not be sent to the broadcast address of any write command.

Initial synchronization:
The motor will wait for 15-30ms (or 3.5 bytes) transmission pause after the command from the master has been received.

Address:
The address is repeated by the command from the master (i.e., its own motor address)

Command:
The command code is repeated if the command is processed. In this situation, the MSB is set to command. In this case the command byte is, for example, 0x83 for the command “Read holding register (0x03)”.

Data:
The length of the device's response and the meaning of the data bits may differ depending on the command concerned.

CRC L / CRC H:
A CRC checksum is generated via the complete telegram. The defined way the CRC checksum is not different from the procedure described above for the command from PC.
The way the checksum is defined is no different from the procedure described above for the command from PC.

5.4. Function Code Definitions

5.4.1. Read Holding Register (Command code: 0x03):

This command is used to read the contents of a multiple holding registers in a remote device which is a motor in this system.
Request from master:
The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero. Therefore, registers numbered 1-16 are addressed as 0-15. The command structure is given below.

Function Code	**1 Byte**	**0x03**
Starting Address	**2 Bytes**	**0x0000 to 0xFFFF**
Quantity of registers	**2 Bytes**	**1 to 125 (0x7D)**

Answer from motor:
The register data in the response message is packed in two byte values per register. For each register, the first byte contains the high order bits and the second contains the low order bits. The response structure is given below.

Function Code	**1 Byte**	**0x03**
Byte Count	**1 Byte**	**2 x n**
Register Value	**n Bytes**	

Here, "n" value defines quantity of registers.

Exception codes:
In case of error, only one data byte (the exception code) will be transmitted.
The error structure given below.

Error Code	**1 Byte**	**0x83**
Exception Code	**1 Byte**	**01/02/03/04**

The state diagram of read holding register is given below.

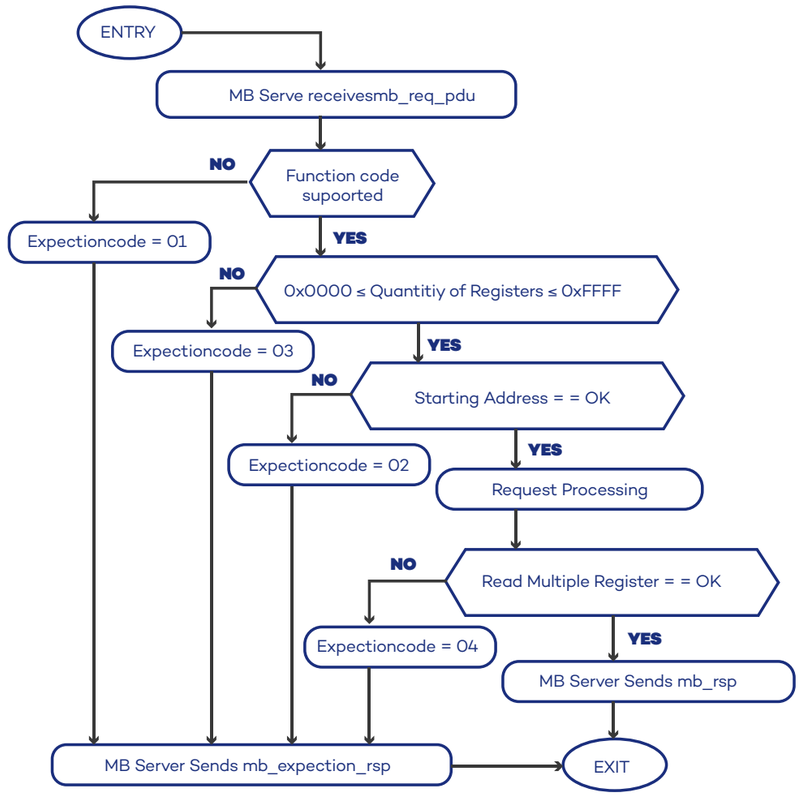


Figure 4: State diagram of read holding register

Here is an example given for read holding register. The example command is requesting the content of analog output holding registers #40112 to 40114 from the slave device with address 11.
Each register contains 16 bits.

Request: 0B 03 006F 0003 357C
- 0B: The Slave Address (0B hex = address 11)
- 03: The Function Code 3 (Read Multiple Holding Registers)
- 006F: The Data Address of the first register requested (006F hex = 111, +40001 offset = input #40112).
- 0003: The total number of registers requested (read 3 registers 40112 to 40114).
- 357C: The CRC (Cyclic Redundancy Check) for error checking.

Response: 0B 03 06 AE41 5652 4340 FACD
- 0B: The Slave Address (0B hex = address 11)
- 03: The Function Code 3 (Read Multiple Holding Registers)
- 06: The number of data bytes to follow (3 registers x 2 bytes each = 6 bytes)
- AE41: The contents of register 40112
- 5652: The contents of register 40113
- 4340: The contents of register 40114
- FACD: The CRC (Cyclic Redundancy Check)

5.4.2. Read Input Register (Command code: 0x04):

It is used for reading from 1 to 125 contiguous input registers in a remote device.
Request from master:
The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero. Therefore, input registers numbered 1-16 are addressed as 0-15. The command structure is given below.

Function Code	**1 Byte**	**0x04**
Starting Address	**2 Bytes**	**0x0000 to 0xFFFF**
Quantity of registers	**2 Bytes**	**0x0001 to 0x007D**

Answer from motor:
The register data in the response message are packed as two bytes per input register.
For each register, the first byte contains the high order bits and the second contains the low order bits. The response structure is given below.

Function Code	**1 Byte**	**0x04**
Byte Count	**1 Byte**	**2 x n**
Register Value	**n Bytes**	

Here, “n” value defines quantity of registers.

Exception codes
In case of error, only one data byte (the exception code) will be transmitted.
The error structure given below.

Error Code	**1 Byte**	**0x84**
Exception Code	**1 Byte**	**01/02/03/04**

The state diagram of read input registers is same as read holding register is given above.

Here is an example given for read input register. The example command is requesting the content of analog input register #30011 from the slave device with address 11.
Each register contains 16 bits.

Request: 0B 04 000A 0001 1162
• 0B: The Slave Address (0B hex = address 11)
• 04: The Function Code 4 (Read Input Registers)
• 000A: The Data Address of the first register requested (000A hex = 10, + 30001 offset = input register #30011)
• 0001: The total number of registers requested (read 1 register).
• 1162: The CRC (Cyclic Redundancy Check) for error checking.

Response: 0B 04 02 102F 6D2D
• 0B: The Slave Address (0B hex = address 11)
• 04: The Function Code 4 (Read Input Registers)
• 02: The number of data bytes to follow (1 registers x 2 bytes each = 2 bytes)
• 102F: The contents of register 30011
• 6D2D: The CRC (Cyclic Redundancy Check).

5.4.3. Write Single Register (Command code: 0x06):

This function code is used to write a single holding register in a remote device.
Request from master:
The Request PDU specifies the address of the register to be written. Registers are addressed starting at zero. Therefore, register numbered 1 is addressed as 0. The command structure is given below.

Function Code	**1 Byte**	**0x06**
Starting Address	**2 Bytes**	**0x0000 to 0xFFFF**
Quantity of registers	**2 Bytes**	**0x0001 to 0x007D**

Answer from motor:
The register data in the response message are packed as two bytes per input register.
For each register, the first byte contains the high order bits and the second contains the low order bits. The response structure is given below.

Function Code	**1 Byte**	**0x06**
Byte Count	**1 Byte**	**2 x n**
Register Value	**n Bytes**	

Here, “n” value defines quantity of registers.

Exception codes
In case of error, only one data byte (the exception code) will be transmitted.
The error structure given below.

Error Code	**1 Byte**	**0x86**
Exception Code	**1 Byte**	**01/02/03/04**

The state diagram of read input registers is same as read holding register is given above.

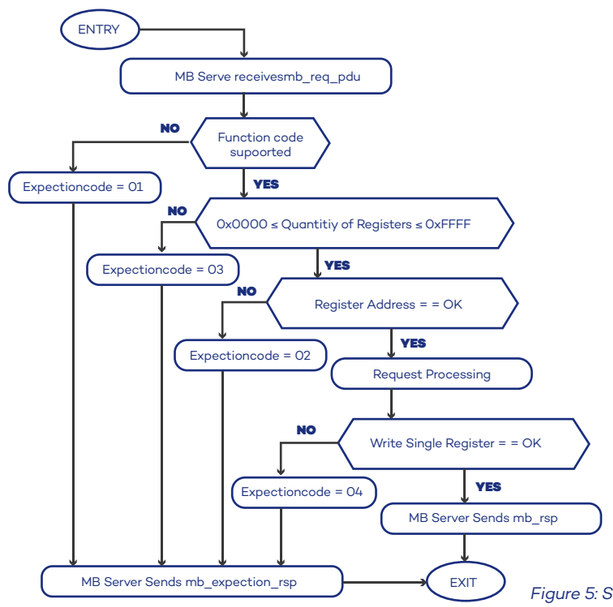


Figure 5: State diagram of write single register

Here is an example given for write single register. The example command is writing the contents of analog output holding register # 40005 to the slave device with address 11.
Each holding register can store 16 bits.

Request: 0B 06 0004 ABCD 7604
• 0B: The Slave Address (0B hex = address 11)
• 06: The Function Code 6 (Write Single Holding Register)
• 0004: The Data Address of the register (0004 hex = 4, + 40001 offset = register #40005).
• ABCD: The value to write.
• 7604: The CRC (Cyclic Redundancy Check) for error checking.

Response: 0B 06 0004 ABCD 7604
• 0B: The Slave Address (0B hex = address 11)
• 06: The Function Code 6 (Write Single Holding Register)
• 0004: The Data Address of the register (0004 hex = 4, + 40001 offset = register #40005).
• ABCD: The value written.
• 7604: The CRC (Cyclic Redundancy Check) for error checking.

5.5. Error Checking Method

The security standard of MODBUS serial line is based on two types of error checking:
• Parity checking: The parity checks are applied to each character either even or odd.
• Frame checking: A frame check is applied to the entire message either LRC or CRC.
The device (master or slave) that sends the message generates and applies character and message frame checking before transmission. Upon receipt, the receiving device (slave or master) verifies each character and the entire message frame.

Users have the option to configure devices for Even or Odd parity checking, or No parity checking. This selection dictates how the parity bit is assigned to each character. In cases where Even or Odd parity is chosen, the number of 1 bit in the data portion of each character is counted (eight data bits for RTU). Subsequently, the parity bit is set to 0 or 1 to ensure an Even or Odd total of 1 bit.
Conversely, if No parity checking is selected, no parity bit is included in the transmission, and therefore, no parity checking is conducted. An additional stop bit is transmitted to complete the character frame.
The messages include an error–checking field that is based on a Cyclical Redundancy Checking (CRC) method in RTU mode. The CRC field validates the entirety of the message content, independent of any parity checking method applied to individual characters within the message.

6. MODBUS REGISTER LIST

The registers are stored in the EEPROM. The number of the register address is 16 bits.
A comprehensive list below provides an overview of all parameters, with detailed descriptions of their functions presented in subsequent chapters.

Modbus Address (Hex)	Function Code	Definition
0000	03, 06	Motor address
0002	03, 06	Reset
0003	03, 06	Set speed
0004	03, 06	Speed command type
0005	03, 06	Run/stop
0006	03, 06	Unidirectional mode
0007	03, 06	Rotation
0008	03, 06	Vsp - on voltage
0009	03, 06	Vsp – off voltage
000A	03, 06	Min. speed
000B	03, 06	Max. speed
000C	03, 06	Ramp up time
000D	03, 06	Ramp down time
000E	03, 06	Modbus baud rate configuration
000F	03, 06	Modbus parity configuration
0010	03, 06	Modbus stop bit configuration
0011	03, 06	Reset to factory
0100	04	Motor type
0101	04	MCU temperature
0102	04	Actual speed
0103	04	Phase current
0104	04	IPM temperature
0105	04	DC bus voltage
0106	04	Software version
0107	04	Total running hours
0108	04	Total running minutes
0109	04	Active fault state
010A	04	Failure 1
010B	04	Failure 2
010C	04	Failure 3
0111	04	Failure 4
0112	04	Failure 5
0113	04	Failure 6

Modbus Address (Hex)	Function Code	Definition
0114	04	Failure 11
0115	04	Failure 12
0116	04	Failure 13
0117	04	Failure 14
0118	04	Failure 15
0119	04	Failure 16
011A	04	Over current failure number
011B	04	Over voltage failure number
011C	04	Under voltage failure number
011D	04	Overload failure number
011E	04	Temperature failure number
011F	04	Input phase loss failure number
0120	04	Output phase loss failure number
0121	04	Short circuit failure number
0122	04	Communication failure number
0123	04	EEPROM failure number
0124	04	Speed tracking failure number
0125	04	ADC offset failure number
0126	04	PSU offset failure number
0127	04	Startup fault failure number
0128	04	BIT fault failure number

6.1. Holding Register

6.1.1. Motor Address

Represent Modbus slave address between 1-127 values.

Modbus Address	0000
Default Value	(Hex)
Minimum Value	1
Maximum Value	1

6.1.2. Reset

When the reset is set to 1, the motor reset automatically. After reset operation is performed, the bit is automatically reset by the motor.

Modbus Address	0002
Default Value	(Hex)
Motor works normally	0
Reset	1

6.1.3. Set Speed

Set desired motor speed. Value exceeds the minimum speed and maximum speed only allowed by the motor. The speed unit is in rpm. When the speed is set to 0, the motor stops automatically.

Modbus Address	0003
Default Value	(Hex)
Minimum Value	0
Maximum Value	0

6.1.4. Speed Command Type

Determine from which input it will receive speed.

Modbus Address	0004
Default Value	(Hex)
From Modbus	0
From 0-10V (Channel 1)	0

6.1.5. Run/Stop

Stop or run the motor with choosing this value.

Modbus Address	0005
Default Value	(Hex)
Stop	1
Run	0

6.1.6. Unidirectional Mode

Select bidirectional or unidirectional mode for motor drive operation. Changing the rotation direction of the motor operating is prevented at unidirectional mode during drive operation.

Modbus Address	0006
Default Value	(Hex)
Bidirectional Mode	0
Unidirectional Mode	0

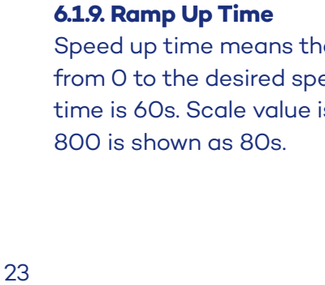
6.1.7. Rotation

Select rotation direction of the motor as clockwise or counterclockwise.

Modbus Address	0007 (Hex)
Default Value	0
CW (Clockwise)	0
CCW (Counterclockwise)	1

6.1.8. Vsp On and Off Voltage

Configurate analog input voltage range as 0-10V. The relation between input voltage and speed command is given below as a graph. P1x and P2x represent voltage, P1y and P2y represent command speed as RPM. The scale value is 10x. For example, 3V is shown as 30.



If P1 value greater than P2, P1 takes the value of P2. P1x, minimum value is 20 (2V) and P2x, maximum value is 80 (8V).

Vsp - On Voltage (P1x)

Modbus Address	0008 (Hex)
Default Value	20
Minimum Value	20
Maximum Value	40

Vsp - Off voltage (P2x)

Modbus Address	0009 (Hex)
Default Value	80
Minimum Value	50
Maximum Value	80

Min Speed (P1y)

Modbus Address	000A (Hex)
Default Value	600
Minimum Value	600
Maximum Value	(P2y) 1800

Vsp - Off voltage (P2y)

Modbus Address	000B (Hex)
Default Value	1800
Minimum Value	(P1y) 600
Maximum Value	1800

6.1.9. Ramp Up Time

Speed up time means the time of RPM from 0 to the desired speed, the default time is 60s. Scale value is 10x. For example, 800 is shown as 80s.

Modbus Address	000C
Default Value	(Hex)
Minimum Value	600
Maximum Value	600

6.1.10. Ramp Down Time

Speed down time means the time of RPM from max to the desired speed, the default time is 60s. Scale value is 10x. For example, 800 is shown as 80s.

Modbus Address	000D (Hex)
Default Value	600
Minimum Value	600
Maximum Value	2000

6.1.11. Modbus baud rate configuration

Configurate Modbus communication baud rate as 4800 or 9600 or 115200 bps.

Modbus Address	000E (Hex)
Default Value	1
4800 bps	0
9600 bps	1
115200 bps	2

6.1.12. Modbus parity configuration

Configurate Modbus communication parity as none or even or odd.

Modbus Address	000F (Hex)
Default Value	0
None	0
Even	1
Odd	2

6.1.13. Modbus stop bit configuration

Configurate Modbus communication stop

Modbus Address	0010 (Hex)
Default Value	0
1 bit	0
2 bit	1

6.1.14. Reset to factory

Restore the motor configurations to factory settings.

Modbus Address	00011 (Hex)
Default Value	0
Reset	1

Note: It can be set when motor stop, effective immediately.

6.2. Input Register

6.2.1. Motor Type

This parameter indicates the motor type.

Modbus Address	0100 (Hex)
Default Value	0

6.2.2. MCU Temperature

This parameter indicates the MCU temperature (unit: °C)

Modbus Address	0101 (Hex)

6.2.3. Actual speed

This parameter indicates the actual motor output speed (unit: RPM)

Modbus Address	0102 (Hex)

6.2.4. Phase current

This parameter indicates the phase current (unit: RMS)

Modbus Address	0103 (Hex)

6.2.5. IPM temperature

This parameter indicates the temperature of IPM module (unit: °C).

Modbus Address	0104 (Hex)

6.2.6. DC bus voltage

This parameter indicates the DC bus voltage (unit: V)

Modbus Address	0105 (Hex)

6.2.7. Software version

This parameter indicates the software version. Scale value is 10x. For example, v1.0 is shown as 10.

Modbus Address	0106 (Hex)

6.2.8. Total Running Hours

Keeps the total hour time of the system. The parameter is updated every 60 min. and saved to EEPROM every 60 min.

Modbus Address	0107 (Hex)

6.2.9. Total Running Minutes

Keeps the total minute time of the system. The parameter is updated every 1 min. and saved to EEPROM every 29 min.

Modbus Address	0108 (Hex)

6.2.10. Active Fault State

Indicator for active fault state.

Modbus Address	0109 (Hex)
No Fault	0
In fault state	1

6.2.11. Failures

Modbus Address	010A (Hex) – 0119 (Hex)

Record maximum 16 failures sequentially. Failure 1 is the latest fault and faults are read only.

Bit 15 (MSB)	Bit 14	Bit 13	Bit 12
BIT fault	Startup fault	PSU Check	ADC Offset

Bit 11	Bit 10	Bit 9	Bit 8	Bit 7
Speed Tracking Fault	EEPROM Failure	Communication Failure	Short Circuit	Output Phase Loss

Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1 (LSB)
Input Phase Loss	Temperature Failure	Overload	Under Voltage	Over Voltage	Over Current

Bit X: 1 (Fault present)
Bit X: 0 (No fault)

6.2.12. Fault Causes and Actions

Information about causes for the faults and action modes taken against the errors.

Fault Mode	Fault Cause	Protection Mode	Action	Action Modes
Over Current	|iu|, |iv|, |iw| > 16.5 Apk	Mode C	Values N = 6 T = 130s	Mode A: The fault can only be corrected after the power is turned off. Mode B: The fault is once triggered, an information message will be transmitted via the communication channel and the system will continue to operate.
Over Voltage	DC Bus Voltage > 730 Vdc	Mode C	N = 6 T = 130s	
Over Temperature MCU	MCU_Temp >= 98	Mode A		
Over Temperature Drive	I : Temperature > 80 II : Temperature > 90 III : Temperature < 72	Mode D	N = 6 T = 130s	
Lower Temperature	Temperature < -10	Mode C	N = 6 T = 130s	
Input Phase Loss	Disconnection of any of the grid input phases	Mode C	N = 6 T = 130s	

Fault Mode	Fault Cause	Protection Mode	Action	Action Modes
Short Circuit	Short circuit in motor phases	Mode A		Mode C : After the error is triggered, the motor will stop and wait for T seconds. The error will automatically recover and attempt to restart the motor. If it is tried N times and the motor still cannot start, then the motor stops and is not tried. After this, the error can only be corrected after the power is turned off. (Note: Total trigger times will be reset to zero after receiving the motor reset command by powering off) Mode D : If condition "I" is met, the speed of the motor will decrease. If condition "II" is met, the motor will be commanded to stop. If condition "III" is met, it will automatically clear the error and attempt to restart after waiting T seconds. If it is tried N times and the motor still cannot start, then the motor stops and is not tried. After this, the error can only be corrected after the power is turned off. Mode E : If condition "I" is met, the timer of overloading is started. If the timer runs out, the motor will be commanded to stop. The permitted time of overloading is decreased with increasing overloading. If condition 'II' is met, the motor will be commanded to stop without waiting timer. After the fault, the error can only be corrected after the power is turned off.
Output Phase Loss	Disconnection of any of the motor phases	Mode C	N = 6 T = 130s	
Speed Tracking Error	Speed error > 200 rpm	Mode C	N = 6 T = 130s	
Communication Fault	MODBUS_EXCEP_ILLEGAL_FUNCTION (Illegal function code) MODBUS_EXCEP_ILLEGAL_ADDRESS (Illegal data address) MODBUS_EXCEP_ILLEGAL_VALUE (Illegal data value) MODBUS_EXCEP_SLAVE_FAILURE (Slave could not process the request) MODBUS_EXCEP_ACK (Acknowledge) MODBUS_EXCEP_NACK (Negative acknowledge)	Mode B		
EEPROM Fault	The data written to the EEPROM is not the same as the data read	Mode A		
ADC Offset	Fault caused by PGA, shunt resistor etc. I : ADC OFFSET < 1900 II : ADC OFFSET > 2100	Mode A		
PSU Check	MCU supply fault LVD1MON (VCC < Vdet1 = 4.57 V)	Mode A		
BIT Fault	Fault during startup algorithm	Mode A		
Startup Fault	Failure in transition to close loop during motor drive	Mode C	N = 6 T = 130s	

Explanations of the faults are given below.

Over Current: Instantaneous value of the current of any of the phases exceeds a limit value
Over Voltage: DC bus voltage exceeding the maximum safety value
Under Voltage: DC bus voltage remains below the insufficient voltage level
Over Load: Motor exceeds maximum loading torque value
Temperature Failure: Temperature of MCU or driver exceeds critical value or falls below the lowest value
Input Phase Loss: Disconnection or breakage of any of the motor input phases between motor and grid side
Output Phase Loss: Disconnection or breakage of any of the motor output phases between driver and motor side
Short Circuit: Short circuit occurring anywhere in the motor circuit
Communication Fault: Communication loss between GUI and motor
EEPROM Fault: Error in the writing or reading data to EEPROM
Speed Tracking Error: When the motor speed differs from the reference speed by more than 200 rpm for a certain period of time
ADC Offset: ADC offset value not being within normal values due to any error
PSU Check: Insufficient MCU supply voltage situation
Startup Fault: In case the motor starts unsuccessfully because of an error at transition to close loop speed control
BIT Fault: Encountering any errors during the startup algorithm

6.2.13. Over Load Scenario

In the overloading scenario, the motor is operating for a permitted time according to overloading rate. When the permitted time expires, the motor will stop. The permitted time is decreasing with overloading rate. The changing of timer of overloading graph is given below.

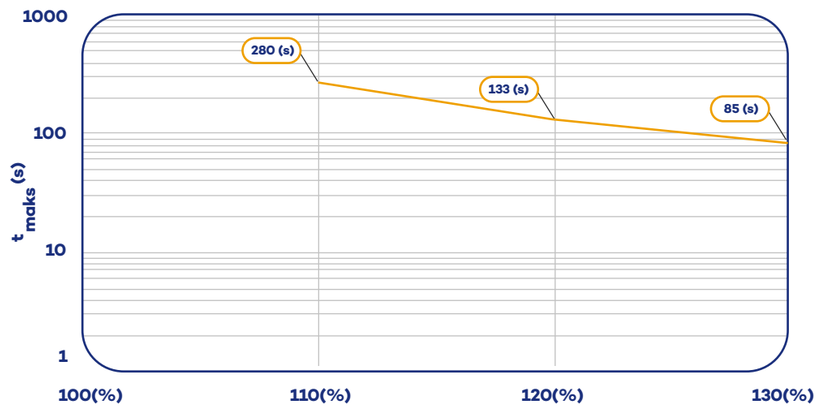


Figure 7: Graph of working time at overloading

The overloading scenario is started from %110 loading. The maximum overloading rate is %130. After the %130 loading, the motor will stop immediately without waiting a time. In cases where the motor goes out of overloading without stopping, the timer will count down, considering the cooling factor.

7. STORAGE

Motors must be kept in a dry and vibration free, clean, well-ventilated room if they have to be stored for a long period. The water drain holes, closed off with plugs when provided, must be at the lowest point of the enclosure depending on the type of construction and mounting arrangement of motor and kept clean. When these plugs are removed, the degree of the protection will be reduced nominally to IP44.
It is recommended to rotate the shaft manually once a month (10 turns at least) to prevent grease migration and to avoid corrosion. It is also recommended to place the shaft in another position after the 10 turns.
If the motors are stored for more than two years, it is recommended to change the bearings, or to inspect them before the motor is started.
If the motor and integrated control unit (drive) is out of operation or in stock, every year, supply the drive with single-phase or three-phase voltage between 220 and 277 Vac, 50 or 60 Hz, for at least one hour then de-energize and wait for at least 24 hours before using the drive in order to prevent electronic components malfunctions. If the drive has been in operation for at least 10 years, it is recommended to replace it.

8. NOMOLECTURE AND MOTOR CODING

Motors must be kept in a dry and vibration free, clean, well-ventilated room if they have to be stored for a long period. The water drain holes, closed off with plugs when provided, must be at the lowest point of the enclosure depending on the type of construction and mounting arrangement of motor and kept clean. When these plugs are removed, the degree of the protection will be reduced nominally to IP44.
It is recommended to rotate the shaft manually once a month (10 turns at least) to prevent grease migration and to avoid corrosion. It is also recommended to place the shaft in another position after the 10 turns.
If the motors are stored for more than two years, it is recommended to change the bearings, or to inspect them before the motor is started.
If the motor and integrated control unit (drive) is out of operation or in stock, every year, supply the drive with single-phase or three-phase voltage between 220 and 277 Vac, 50 or 60 Hz, for at least one hour then de-energize and wait for at least 24 hours before using the drive in order to prevent electronic components malfunctions. If the drive has been in operation for at least 10 years, it is recommended to replace it.

1			2	3	4			5	6	7	8	9	10	11	12	
E	C	I	5	-	1	0	0	B	3	A	4	N	X	-	I	X

1 .PLATFORM
ECE: WITHOUT CONTROL CARD (excluded)

ECI: WITH CONTROL CARD (Integrated)

2. EFFICIENCY LEVEL
IE5: 5
IE6: 6

3. MOUNTING TYPE
B3 :"-"
B5: FA
B14 :FC
B34: PC
B35: PA

4. FRAME
080: 080 Frame

5. POWER
A : 2,2 kW
B : 3 kW
C : 4 kW
D: 1,5 kW
E : 1,1 kW
F : 0,75 kW

6. PHASE
1 PHASE: 1
3 PHASE: 3

7. VOLTAGE
340-480V: A
..V : B
..V : C

8. NOMINAL SPEED
4: 1800 RPM
2: 3600 RPM
1: 750 RPM
3: 1000 RPM
5: 1500 RPM
6: 3000 RPM

9.COOLING TYPE
COOLING FAN: F
WITHOUT FAN (AIR OVER): N

10.FRAME TYPE
X: EXTRUSION
E: ALUMINUM INJECTION

11. TERMINAL BOX OPTION
YES:"-"
NO: T

12.ADDITIONAL SUFFIX- OVMT
IX : EC MOTOR

9. LIFTING AND HANDLING

WAT EC motors are delivered on frame size 80 – 100 and 132 IEC Frame sizes. All frame motor bodies are extruded Aluminum whereas motors have attachable feet option.

B3 Mounting

B5 Mounting

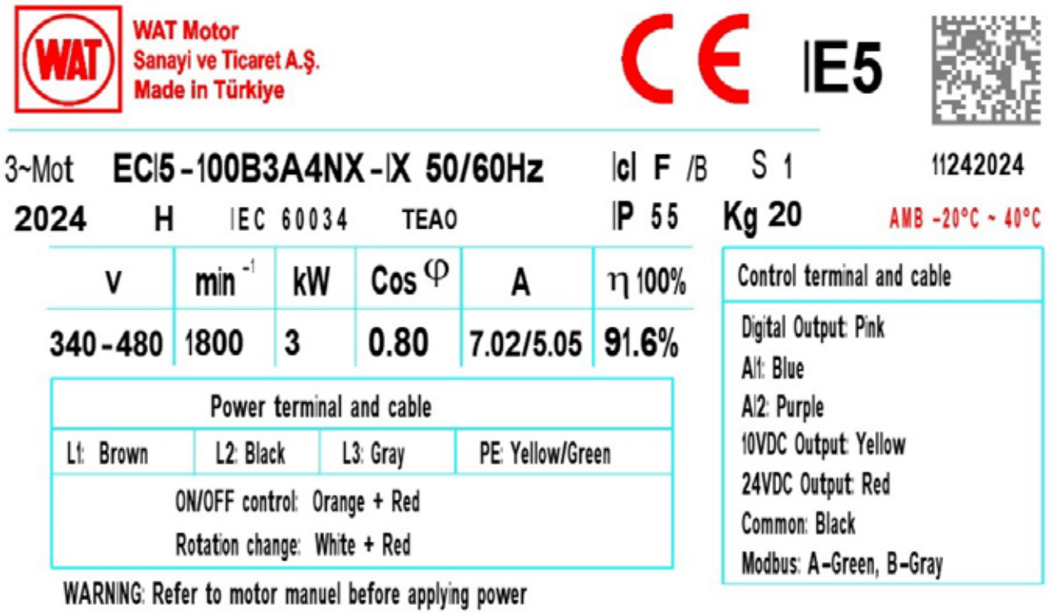
B35 Mounting

B34 Mounting

B14 Mounting

10. NAME PLATES

WAT EC motor nameplates carries required information for operations and performance. Please refer this manuel for any required technical information.



11. MAINTENANCE AND TROUBLESHOOTING

Bearing Replacement

Remove ball-bearings by means of an extraction device after slightly heating the inner ring. Never use a hammer. The inner ring of cylindrical roller bearings should be heated quickly by means of a torch and be levered-off by a screw driver. If after taking this action it still does not come off, grind a V-shaped groove into the inner ring and break it. Before installing the bearing, make sure that the shaft inside the bearings are in place before installation. Use extreme care and ensure clean conditions during installation and assembly. Heat the ball-bearings or the inner ring of the roller bearings in oil or air to a temperature of approx. 80 C and slip them onto the shaft. Heavy blows will damage the bearings and must definitely be avoided. Fill the bearings with the grease previously specified. When installing single angular contact ball bearing, make sure that the broad shoulder of the inner ring and the narrow shoulder of the outer ring in operating position points at the direction opposite to that of the axial thrust.
Care must be taken during assembly to see that the sealing rings are fitted properly.

Preliminary Checklist for Potential Failures in WAT F300 Smoke Motors

PROBLEM	ANTICIPATED	SOLUTION
Motor is operating noisy	1. Loose parts that haven't been tightened enough. (Foot, pulley etc.) 2. Breaking or bending in fan blades. 3. Touching of the fans. 4. Loosen connections. 5. Deterioration on the motor beddings. 6. Faulty motor coupling. 7. Failed bearing tension spring. 8. Motor is running in two phases.	1. Tighten the connections. 2. Change the fan. 3. Eliminate the touching 4. Tighten the connections 5. Check the motor beddings. 6. Check and correct coupling. 7. Change the bearing tension spring 8. Find out the cause and correct.
Motor is overheating.	1. Low network voltage. 2. Fan is broken. 3. Ambient temperature too high. 4. Beddings are damaged/broken. 5. Motor is running in two phases. 6. Rotor is faulty. 7. Motor is overloaded. 8. Air suction of the motor is blocked. 9. Short circuit exists on a bobbin.	1. Find out the cause and correct. 2. Change the fan. 3. Use a special motor for the environment. 4. Check the motor beddings. 5. Find out the cause and correct. 6. Change the rotor. 7. Check the compatibility of the motor for the load. 8. Find out the cause and correct. 9. Consult the service.
Motor is not working, there is no magnetic humming noise.	1. The fuse is blown or disconnected 2. Cable connections are loose or aren't correct. 3. The circuit breaker is tripped	1. Check the fuse. 2. Check the cable connections. 3. Check the circuit breaker.
Motor is not running, there is magnetic humming noise, thermic is tripping.	1. Mechanical jamming inside the motor. 2. Incorrect cable connections. 3. Low network voltage. 4. Short circuit or disconnection in motor windings 5. Motor is running in two phases.	1. Check the motor beddings. 2. Check cable connections. 3. Determine the cause and correct. 4. Consult service.
Motor is starting but thermic is tripping after some time.	1. Low network voltage. 2. Failed thermic. 3. Motor is overloaded 4. Motor is running in two phases.	1. Determine the cause and correct. 2. Check the thermic 3. Check the compatibility of the motor for the load.. 4. Determine the cause and correct.
Unable to crank the motor	When the motor is idle; 1. Low network voltage. 2. Motor is running in two phases. 3. Connections are loose 4. Incorrect connections 5. Mechanical jamming inside the motor Additionally, when the motor is loaded; 6. Motor is overloaded	1. Determine the cause and correct. 2. Determine the cause and correct. 3. Tighten the connections. 4. Check the connections. 5. Check the motor beddings. 6. Check the compatibility of the motor for the load.

CERTIFICATE / SERTİFİKA

Esim

CERTIFICATE / *SERTİFİKA*

LOW VOLTAGE DIRECTIVE / *ALÇAK GERİLİM YÖNETMELİĞİ*

Applicant / *Başvuran*	:	WAT Motor Sanayi ve Ticaret A.Ş.
Address / *Adres*	:	Karaağaç Mah. 8. Sok. No: 4 A/2 Kapaklı
Postal code / *Posta kodu*	:	59510
Place / *Yer*	:	Tekirdağ
Country / *Ülke*	:	Türkiye
Manufacturer / *Üretici*	:	WAT Motor Sanayi ve Ticaret A.Ş.
Address / *Adres*	:	Karaağaç Mah. 8. Sok. No: 4 A/2 Kapaklı
Postal code / *Posta kodu*	:	59510
Place / *Yer*	:	Tekirdağ
Country / *Ülke*	:	Türkiye
Electrical apparatus / *Elektrikli ürün*	:	Inverter Integrated Motor / *Entegre Sürücülü Motor*
Trademark / *Ticari marka*	:	WAT
Type designations / *Tip tanımları*	:	100 Frame 3 kW 1800 Rpm, 100 Frame 3 kW 3600 Rpm, 100 Frame 2,2 kW 1800 Rpm, 100 Frame 2,2 kW 3600 Rpm, 100 Frame 1,5 kW 1800 Rpm, 100 Frame 1,5 kW 3600 Rpm

Tested according to / *Aşağıdaki standartlara göre test edildi.*

EN 61800-5-1:2008 + A1:2017 + A11:2021

This certificate cancels and replaces the certificate dated with certificate nr. LVD- / *Bu sertifika, tarih ve LVD- numaralı sertifikayı iptal eder ve yerine geçer.*

The undersigned declares that the described product(s) meet(s) the essential requirements of the standards given above, based on a non-recurrent examination. The results are recorded in our test report with LVD-2023272 / *Aşağıda imzası bulanan kişi yukarıda tarif edilen ve üretici tarafından test için sağlanan ürünün / ürünlerin yukarıda verilen standartların gerekli koşullarını yerine getirdiğini beyan etmektedir. Ürün / ürünler ile ilgili test sonuçları LVD-2023272 numaralı rapora kaydedilmiştir.*

ESIM Test Hizmetleri San. ve Tic. A.Ş.
Kocaeli, 15 May / *Mayıs* 2024

Certificate nr. / *Sertifika no*: LVD-2023272C

Engin YILDIZBAYRAK
Certification Manager / *Belgelendirme müdürü*

Esim Test Hizmetleri San. ve Tic. A.Ş.
TOSB - Otomotiv Yan Sanayi İhtisas OSB 2. Cadde 17. Sokak No:2/5 Çayırova - Kocaeli Türkiye
Tel : +90 (262) 658 3063 Faks : +90 (262) 658 3023 E-mail: esim@esim.com.tr Web : www.esim.com.tr

CERTIFICATE / SERTİFİKA

Esim

CERTIFICATE / *SERTİFİKA*

ELECTROMAGNETIC COMPATIBILITY / *ELEKTROMANYETIK UYUMLULUK*

Aplicant / *Başvuran*	:	WAT Motor Sanayi ve Ticaret A.Ş.
Address / *Adres*	:	Karaağaç Mah. 8. Sok. No:4 A/2 Kapaklı
Postal code / *Posta kodu*	:	59510
Place / *Yer*	:	Tekirdağ
Country / *Ülke*	:	Turkiye / *Türkiye*
Manufacturer / *Üretici*	:	WAT Motor Sanayi ve Ticaret A.Ş.
Address / *Adres*	:	Karaağaç Mah. 8. Sok. No:4 A/2 Kapaklı
Postal code / *Posta kodu*	:	59510
Place / *Yer*	:	Tekirdağ
Country / *Ülke*	:	Turkiye / *Türkiye*
Electrical apparatus / *Elektrikli ürün*	:	Inverter Integrated Motor / *Entegre Sürücülü Motor*
Trademark / *Ticari markası*	:	Wat
Type designation / *Tip tanımı*	:	100 Frame 3 kW 1800 Rpm

Tested according to / *Aşağıdaki standartlara göre test edildi*

EN IEC 61800-3:2023 Category C1&C3 / *Kategori C1&C3*
EN IEC 61000-3-12:2019+A1:2011
EN 61000-3-3:2013+A1:2019+A2:2021
EN 61000-4-2:2009
EN IEC 61000-4-3:2020
EN 61000-4-4:2012
EN 61000-4-5:2014+A1:2017
EN 61000-4-6:2023
EN 61000-4-11:2020
EN 61000-4-13:2002+A1:2009+A2:2016
EN 61000-4-28:2000+A2:2009

The undersigned declares that the described product meets the essential requirements of the standards given above, based on a non-recurrent examination. The results are recorded in our test report with reference EMC-2024054. / *Aşağıda imzası bulanan kişi yukarıda tarif edilen ve üretici tarafından test için sağlanan ürünün yukarıda verilen standartların gerekli koşullarını yerine getirdiğini beyan etmektedir. Ürün ile ilgili test sonuçları EMC-2024054 referans numaralı rapora kaydedilmiştir.*

ESIM Test Hizmetleri San. ve Tic. A.Ş.
Kocaeli, 05 July / *Temmuz* 2024

Certificate nr. / *Sertifika no*: EMC-2024054C

Engin YILDIZBAYRAK
Certification Manager / *Belgelendirme müdürü*

Esim Test Hizmetleri Sanayi ve Ticaret A.Ş.
TOSB TAYSAD Org. San. Bölg. 2.Cad. 17.Sok. No:2/5
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WAT Teknopark Office
Sanayi Teknopark Blv 10C BLOK Kat:2
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