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Beijer Electronics MODBUS TCP Ethernet IP Network

USER GUIDE

1. Introduction

This manual describes how to connect controllers to the driver, and how they communicate via WAGO addressing. The driver works as master. Addressing an item is made in the WAGO way. For information about the controller, we refer to the manual for the current system.

2. Release Notes

Ver- sion	Release	Description
5.11	July 2025	Added support for new HMI platform.
5.10	June 2017	Added support for new HMI platform.
5.09	June 2016	Added support for new HMI platform. Corrected issue when using index.
5.08	November 2015	The range of MX is increased from 0..1274 to 0..3327 . Corrected reconnect problem.
5.07	May 2012	Corrected performance issue when reading many IX or QX devices at the same time.
5.06	April 2011	Added unicode string support for certain HMI models.
5.05	September 2010	Support for new HMI models.
5.04	April 2010	Corrected startup problem when using certain HMI m odels.
5.03	October 2009	Fixed reading of MX-devices. Changed analog input/output modules setting to anal og input/out- put words.
5.02	August 2009	Fixed string swap for analog devices. Added column for analog input/output modules in the stations property to get the same addressing in the H MI as in the controller configuration program.

5.01	October 2008	Added controller clock support. Changed default port number. Added support for new HMI models. Added support for single coil actions through the new devices SQX, SMX and SIX. Added devices W and B for standard Modbus commu nication.
5.00	January 2007	Initial version.

3. Disclaimer

Please note that changes in the controller protocol or hardware, which may interfere with the functionality of this driver, may have occurred since this documentation was created. Therefore, always test and verify the functionality of the application. To accommodate developments in the controller protocol and hardware, drivers are continuously updated. Accordingly, always ensure that the latest driver is used in the application.

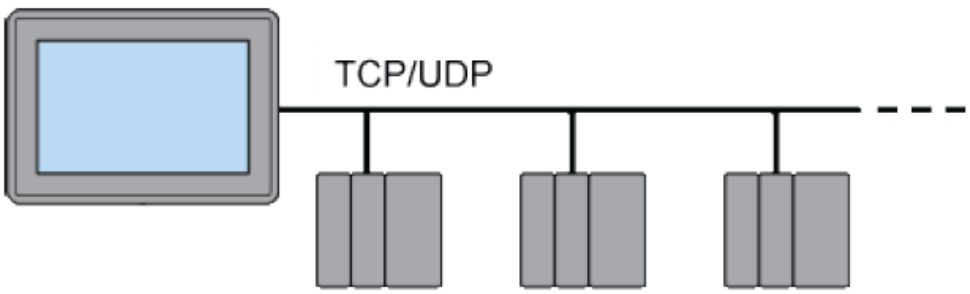
4. Limitations

WAGO addressing is used in this driver. This means that if you have an old project that uses another kind of addressing, the addresses must be converted.

5. Connecting to the Controller

5.1. Ethernet

5.1.1. Ethernet Connection



Connection in a network is made according to Ethernet standards.
To extend the network a switch may be used.

NOTE
When connecting to the controller, all included symbols are uploaded. Depending on the number of symbols, there could be a delay before the values are shown in the

HMI.

For further information about settings in the controller, cable specifications and information about connecting the controller to the HMI we refer to the manual for the current controller.

Connecting to the Controller

6. Settings

6.1. General

Parameter	Default value	Description
Default station	0	The station address of the default controlle r.
Clock register (MW)	0	Register address in the controller where cl ock data is stored.

6.2. Advanced

Parameter	De- fault value	Description

Enable uni- cod e	False	Enables read/write of unicode characters to the contro ller. Note that each character in a unicoded string will use two bytes of the memory in the controller.
Byte order	Intel	Sets the byte order of the unicode character.
Timeout	400	The number of milliseconds of silence on the port befo re the next retry is sent.
		NOTE Certain functions use the HMI as a gateway for pass- i ng on communication. These functions, including Tran sparent mode, Routing, Passthrough mode, Modem, a nd Tunneling, might need a higher time- out value.
Retries	3	Number of retries before a communication error is det ected.
Offline sta- tion retry time	10	How long to wait after a communication error before tr ying to re- store communication.
Hide comm erro r	False	Hides the error message that is displayed on communi cation prob- lem.
Command line options		Special commands that can be passed to the driver. A vailable com- mands are described in the chapter Co mmands below.

6.2.1. Commands

No commands are available for this driver.

6.3. Station

Parameter	Default value	Description
Station	0	The reference number used in the devices. Maximum number of stations that can be co nfigured: 20 Value range: [0-255]
IP address	192.168.1.1	The IP address of the connected station.
Port	502	The port number of the connected station. Value range: [0-65535]
Analog input	0	The number of analog input words used in t he connected station. Value range: [0-65535]
Analog output	0	The number of analog output words used in the connected station. Value range: [0-65535]

Set the number of analog words in each station to match the addressing in the controller. The controller sort the addresses starting with the analog modules followed by the digital modules.
To get the same addressing in the HMI as in the controller software the number of analog words must be configured for each station.

For example: Set the analog output to 2 will make the digital devices to start at QX2.0 and the analog devices will be QW0-QW1.

NOTE
Trying to read/write an address below the limit of the digital device area may cause unwanted behavior.

7. Addressing

The driver can handle the following data types in the controller.

7.1. Digital Signals

Name	Address	Read / write	Type
Physical Outputs	QX0.0 – QX31.15 *	Read / write	Digital
Physical Inputs	IX0.0 – IX31.15 *	Read only	Digital
Volatile PLC output variables	QX256.0 – QX511.15	Read only	Digital
Volatile PLC input variables	IX256.0 – IX511.15	Read / write	Digital
Remanent memory	MX0.0 – MX3327.15	Read / write	Digital

* Start and end address depend on the number of analog words configured for the controller.

NOTE

The Remanent memory digital devices work with the read before write method. This means that when a bit is modified, the whole word is read, the interesting bit is modified in the word, and the whole word is written back to the controller. This leaves a potential risk that any changes done to the 16 bits by the controller itself during this procedure may be lost.

Using the prefix S to the digital devices will use the function single coil write instead. This ensures that no other bits are affected when the write takes place. The drawback is that only one bit can be written at the time and may thus cause a performance hit when modifying several bits within the same word.

Example: writing to the MX12.3 bit will write all the bits MX12.0 to MX12.15, but writing

to SMX12.3 will only write to the MX12.3 bit.

7.2. Analog Signals

Name	Address	Read / write	Type
Physical Outputs	QW0 – QW255	Read / write	Analog 16-bit
Physical Inputs	IW0 – IW255	Read only	Analog 16-bit
Volatile PLC output variables	QW256 – QW511	Read only	Analog 16-bit
Volatile PLC input variables	IW256 – IW511	Read / write	Analog 16-bit
Remanent memory	MW0 – MW4095	Read / write	Analog 16-bit

7.3. Special Addressing

Name	Address	Read / write	Type
Coils	B	Read / write	Digital
Holding registers	W	Read / write	Analog

The special addresses B and W can be used if the Wago-controller is programmed to use standard Modbus communication (Intel data format).
The B-register is mapped to Modbus coil addresses (00000-) where B0 = 00000, B1 = 00001 etc. and the W-register is mapped to the holding registers (40000-) where W0 = 40000, W1 = 40001 etc.

Note that only Modbus slave station 0 can be used.

7.4. Station Addressing

For communication with stations other than the default station, the station number is given as a prefix to the device.

Example
05:QX3.6 addresses Physical Output QX3.6 in station 5.
03:IX23.8 addresses Physical Input IX23.8 in station 3.
QW262 addresses PFC OUT variable QW262 in default station.

7.4.1. Broadcast Station

Station number 0 is reserved for broadcast, which means that writing to address 0 will affect all slaves at the same time. Since it is only possible to write to station 0, objects referring to station 0 will be empty until a value is entered.

7.5. Performance

The following table shows the maximum number of signals per message for each address and type of operation. For information how to optimize the project for best performance please see chapter Efficient communication.

Addresses	Read	Write	Waste
MW/IW/QW/W	125	100	20
B/MX/SMX/IX/QX	125	1	20

8. Routing

The driver does not support any routing mode.

9. Import Module

The driver does not support any import module.

10. Efficient Communication

10.1. Packing of Signals

When tags are transferred between the driver and the controller, all tags are not transferred simultaneously. Instead they are divided into messages with several tags in each message. By decreasing the number of messages that have to be transferred, the communication speed can improve. The number of tags in each message depends on the used driver.

NOTE

ASCII Strings and arrays are packed into one message for each object.

NOTE

Having different pollgroups will affect how requests are generated.

10.2. Waste

To make the message as efficient as possible, the waste between two tag addresses must be considered. The waste is the maximum distance between two tag addresses that you can have and keep them in the same message. The waste limit depend on the used driver.

NOTE

Waste is only valid for number-based addressing, not for Name-based addressing.

NOTE

Waste can only be calculated between two similar datatype tags, not between different datatypes tags.

Scenario 1

When integer tags with address 4, 17, 45, 52 are used with waste limit of 20, this will end up creating two messages.

First message with address 4 and 17 (tag address difference is 13 <= 20).

Second message with address 45 and 52 (tag address difference is 7 <= 20).

Reason: Difference between 17 and 45 is more than the waste limit of 20, hence creating 2nd message.

Scenario 2

When integer tags with address 4, 17, 37, 52 are used with waste limit of 20, this will end up creating one message.
Reason: Difference between the consecutive tags is less than or equal to the waste limit of 20, hence creating one message.

Conclusion

Scenario 2 is more efficient than scenario 1.

Efficient Communication

11. Troubleshooting

11.1. Error Messages

The meaning of error messages from the controller shown by the driver.

Error message	Description
Bad Reply	The driver received an unexpected response. Verify that the devic es exist and that their addresses are within a valid range for the c onnected controller.
Comm Err	Communication fails. Check communication settings, cable and st ation num- ber.
Illegal station	The driver is trying to access a device in an Ethernet station that i s not defined in the Stations configuration.

Specifications

- Driver Version: 5.11
- Date: August 15, 2025

Troubleshooting

11.1. Error Messages

If you encounter error messages during communication, refer to the troubleshooting section of the manual for solutions.

FAQ

Q: What should I do if I cannot establish a connection to the controller?

A: Check the Ethernet connection, ensure the controller is powered on, and verify the IP settings.

Documents / Resources

	Beijer Electronics MODBUS TCP Ethernet IP Network [pdf] User Guide v.5.11, MODBUS TCP Ethernet IP Network, MODBUS TCP, Ethernet IP Network, IP Network, Network

References

- User Manual

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