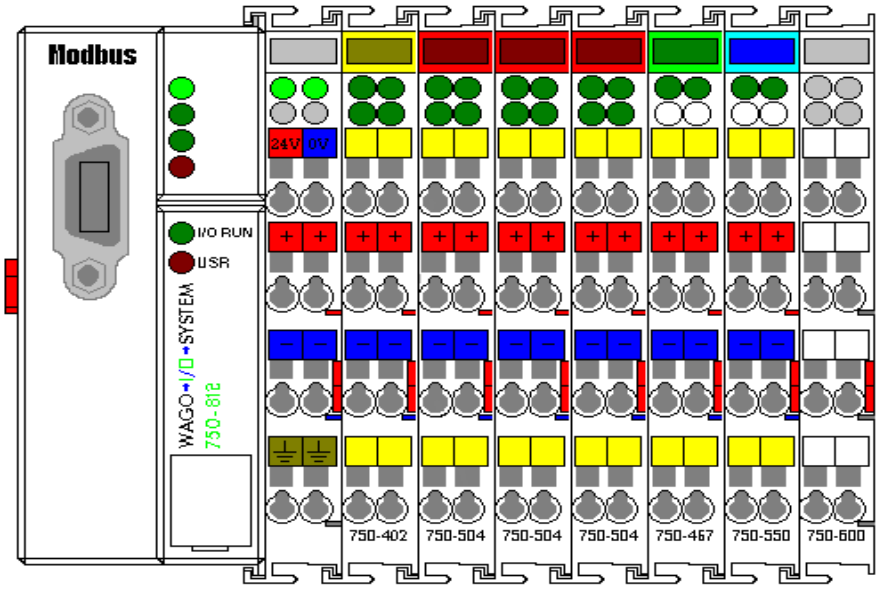
WAGO I/O SYSTEM 750

750-8xx Modbus PFC

Configuring & Networking

The 750-812, -814, -815, -816 & -842 Modbus TCP



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Every conceivable measure has been taken to ensure the correctness and completeness of this documentation. However, as errors can never be fully excluded we would appreciate any information or ideas at any time.

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally trademark or patent protected.

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1 Important comments

To ensure fast installation and start-up of the units described in this manual, we strongly recommend that the following information and explanation is carefully read and adhered to.

1.1 Legal principles

1.1.1 Copyright

1.1.2 Personnel qualification

The use of the product detailed in this manual is exclusively geared to specialists having qualifications in PLC programming, electrical specialists or persons instructed by electrical specialists who are also familiar with the valid standards. WAGO Kontakttechnik GmbH declines all liability resulting from improper action and damage to WAGO products and third party products due to non-observance of the information contained in this manual.

1.1.3 Intended use

For each individual application, the components supplied are to work with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in the manuals. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH.

1.2 Range of validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the correspondent documentation. This application note is therefore only valid for the described installation.

New hardware and software versions may need to be handled differently. Please note the detailed description in the specific manuals.

2 Description

The purpose of this document is to provide a step-by-step procedure for Configuring & Networking the WAGO 750-812, -814, -815, -816 & -842 Modbus TCP 750-837 PFC. This document is to be used with the example node from the document Get Started Quick. The following equipment and software were used to Configuring and Network the Modbus network.

Modscan 32 from WinTech.

Download from www.win-tech.com

Serial Com port for RS-232 or RS-485 Card

Ethernet port for Ethernet

For other details about WAGO Modbus & 750-8xx please refer to the WAGO Modbus Users Manual 750-138

The Modbus Users Manual can be downloaded from the web site www.wago.com

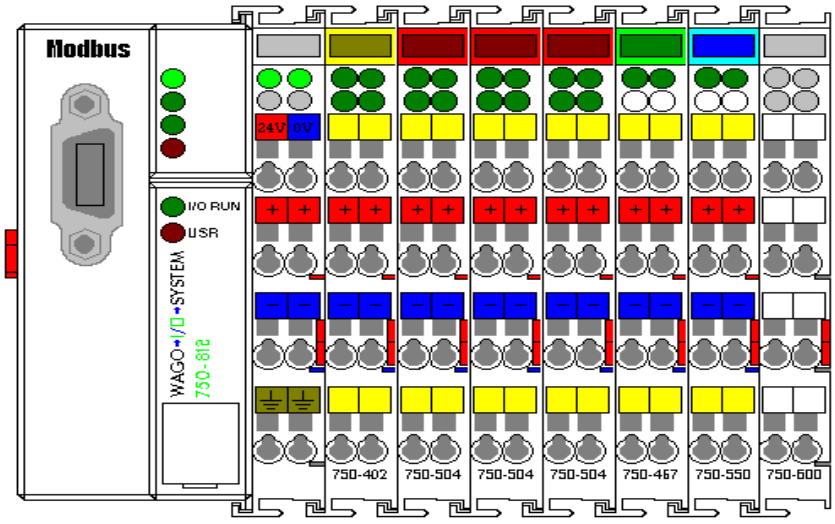
3 Reference Material

3.1.1 Configuration Mapping:

Taking the example node from the Get Started Quick, the configuration is described as follows.
WAGO modules used in the example:

750-814	1	Profibus PFC Buscoupler
750-402	1	4 Point 24Vdc Input module
750-504	3	4 point output modules
750-550	1	2 Channel Analog 0-10Vdc Output module
750-467	1	2 Channel Analog 0-10Vdc Input module
750-600	1	End module

The modules are placed in the node as follows:



Modbus is an address type of protocol that communicates through the serial port of a PC/PLC. Data is placed into registers and then sent or read to the PFC. The software used in the example to pass data is MODSCAN32 by WinTech.

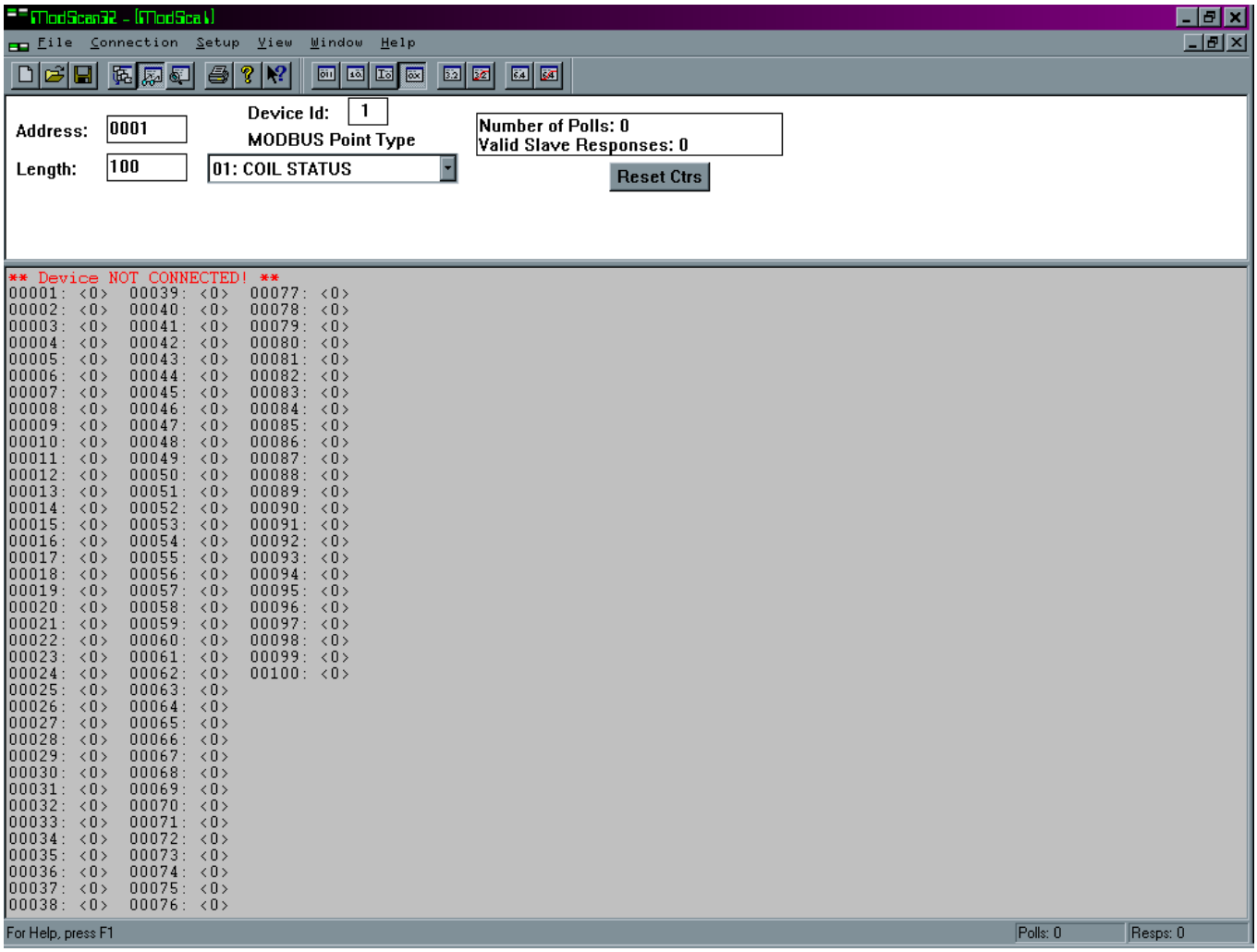
This software can be downloaded from the internet at www.win-tech.com. The unlicensed version will run for 3 min. and then disconnect. Contact Wintech to get a licensed copy of the software to be able to run the software.

The Modbus Serial PFC default communications are set to:

9600, N,8,1

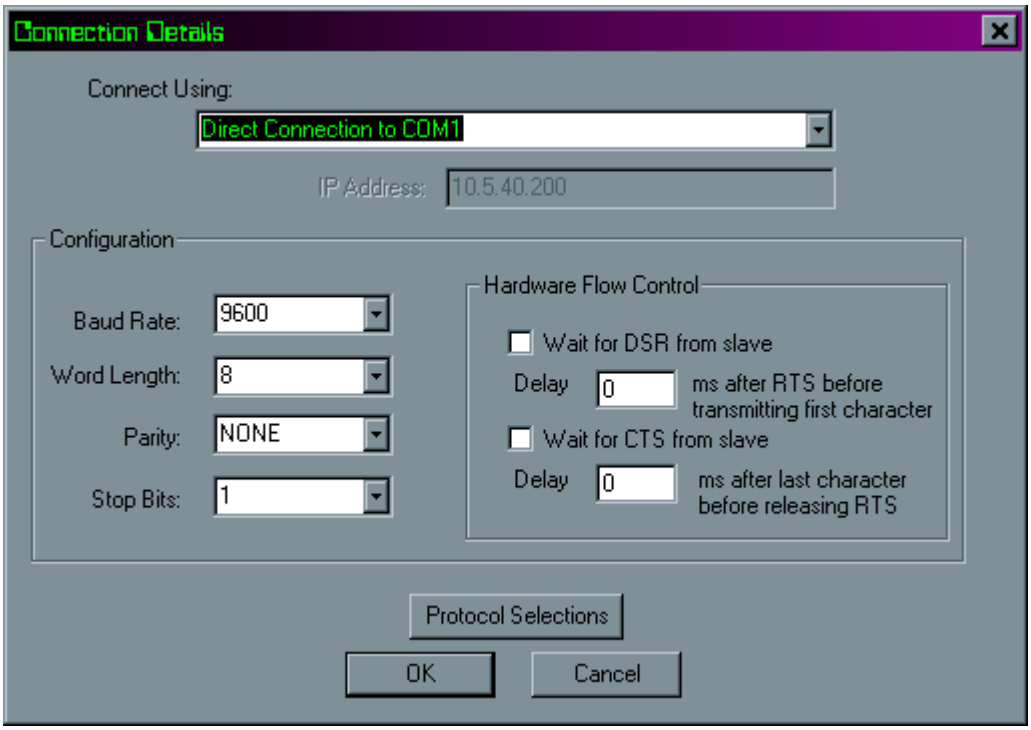
(This Document was written using Modscan32 by Wintech)

Start the Modscan32 software.

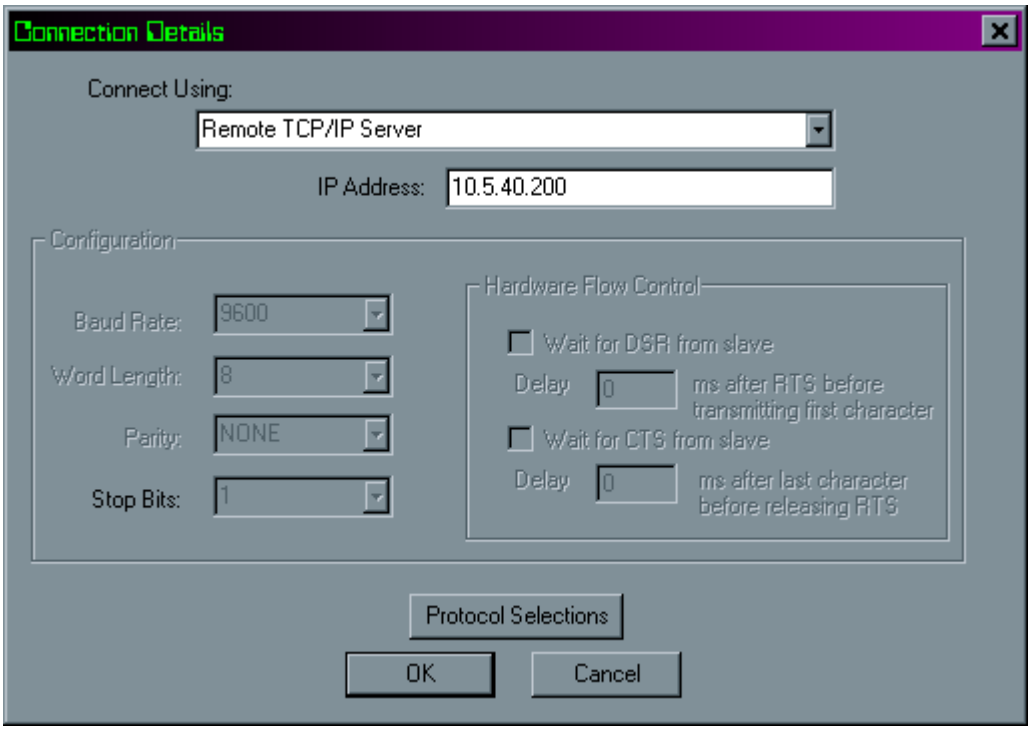


Modscan 32 Main Window

Click on Connection to open up the communication parameter window



Serial Setup Window Set Comm Parameters



Ethernet Setup Window IP Address

Set up the communication parameters and then click **OK.**

If Modscan 32 is communicating with the PFC:

1: * Device Not connected ***** in the editor window will not be displayed.

2: Number of polls and Valid Slave response counters will be counting up

The Memory Map of the PFC is as follows:

Location to Read/Write to I/O Modules.

Location for Network Data Holding Registers

Output Status Image Table

Note: The PFC starts at Register 0 and Modscan32 starts at Register 1. When passing data add 1 to the address of Modscan32.

Since Modbus is register based, it is straight forward to write data and read data.

3.1.2 PFC Module Addressing

1: Analogs and Specialty modules are addressed first

2: Digital modules follow after the Analog & Specialty modules

3: PFC Addressing is sequential

4: PFC Addressing starts at word 0

750-8xx Modbus PFC I/O Addressing is as follows

Inputs	Adrs	Variables	Output	Adrs	Variables
750-467	%IW0	AICHAN1	750-550	%QW0	AOCHAN1
	%IW1	AICHAN2		%QW1	AOCHAN2
750-402	%IX2.0	INPUT0	750-504	%QX2.0	OUTPUT0
	%IX2.1	INPUT1		%QX2.1	OUTPUT1
	%IX2.2	INPUT2		%QX2.2	OUTPUT2
	%IX2.3	INPUT3		%QX2.3	OUTPUT3
			750-504	%QX2.4	OUTPUT4
				%QX2.5	OUTPUT5
				%QX2.6	OUTPUT6
				%QX2.7	OUTPUT7
			750-504	%QX2.8	OUTPUT8
				%QX2.9	OUTPUT9
				%QX2.10	OUTPUT10
				%QX2.11	OUTPUT11

750-600 End Module (No Memory Allocation needed)

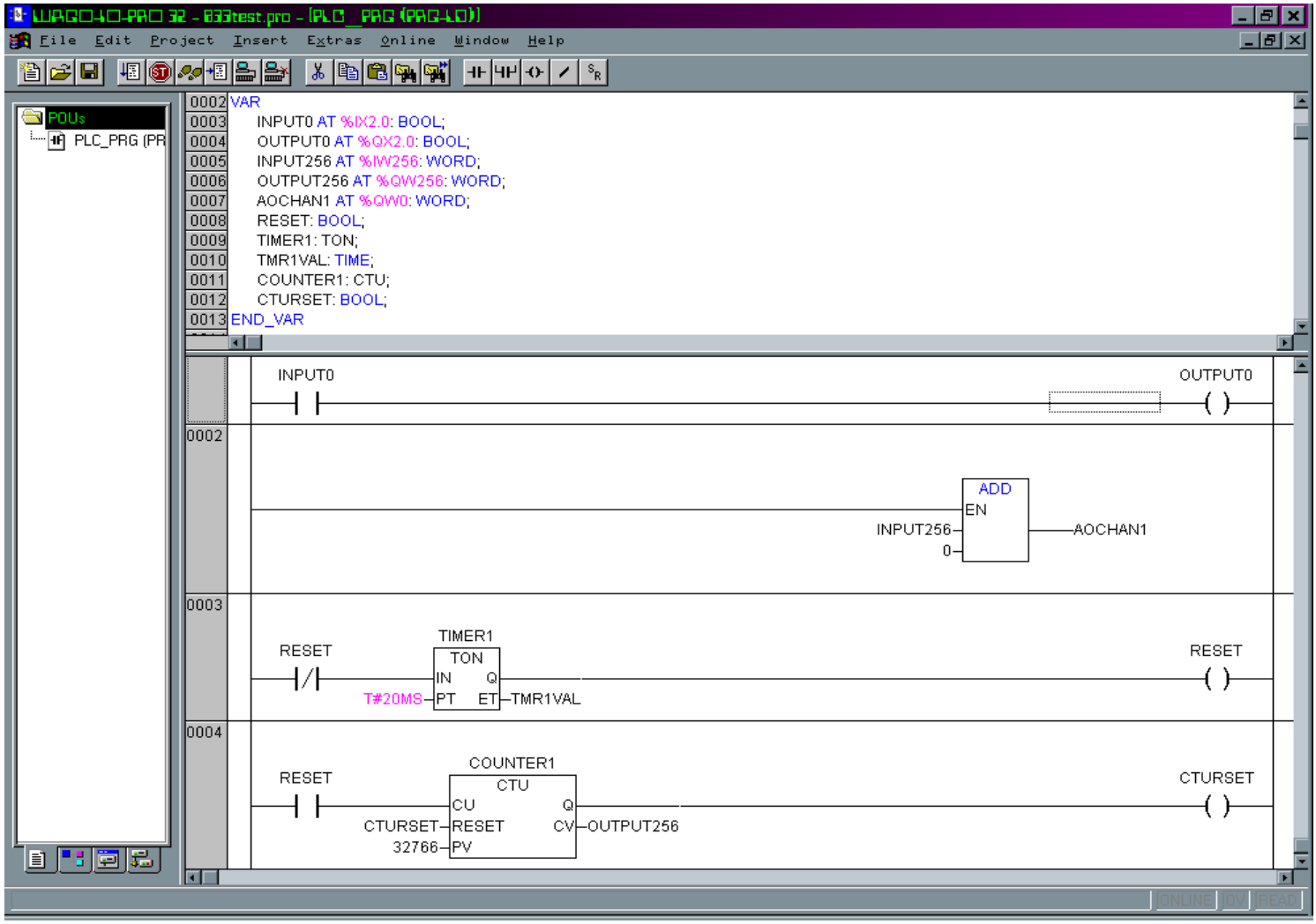
3.1.3 Example Internal Variables:

Input256 First Memory location in the PFC to write and read register data is %IW256.

Output256 First Memory location for the Master to place Output data in the PFC is %QW256.

The test program was developed to verify that the configuration is correct and data can pass between the master and the750-8xx Modbus PFC.

Enter the following program into the PFC. When the PFC has been programmed and downloaded , run the program. Use Modscan32 to Monitor communications of the program.



Test program

Rung 1:

INPUT0 is the first Input from the first digital input module.

OUTPUT0 is the first Output from the first digital output module.

When INPUT0 is On, OUTPUT0 turns On. The PFC has control of the output.

When monitoring the PFC, the output will turn on when the input turns On.

If the output does not turn on, check the PFC Program for correct addressing of the input and output modules. If the output is used in the PFC program, do not try to write to this output directly from the Master. Write the data to the Network variable holding area of memory and then use that memory location in the PFC program. Always let the PFC do the logic solving.

The Modbus Serial PFC I/O can not be monitored by WAGO-Pro32 online unless the PFC address is placed to 00 and power is cycled, Flash the program to memory before cycling power.

Rung 2:

INPUT256 (%IW256) is the first memory location that Register 40257 places one word of data. Using the ADD operator to add 0 to INPUT256,this transfers the data from INPUT256 to AOCHAN1 (%QW0) which is addressed to channel 1 of the analog output module. If channel 1 of the analog output is wired to channel 1 of the analog input module the Analog Output data can be viewed at the Analog output status register 40513.

Changing the value in Register 40257 will change the value in INPUT256.

Note: The above information may be confusing but it does work and is true. To see the value of the analog output, go to Register 40513. If you look at Register 40001 you will only see the analog input register values. Register 40513 is the status register for analog output register 40001 and Output 00513 is the status of 00001 digital ouput.

Rung3:

This rung is used to clock the up counter in rung 4.

Rung4:

Every time the timer RESET is true, it adds one count to the up counter.

OUTPUT256 (%QW256) is the first memory location of the PFC to place data to send to the Modbus network. Compare the data of OUTPUT256 and Register 30256. The data should count up with the PFC.

The PFC program and Modscan32 configuration is a small example to demonstrate how to read/write data to the Modbus PFC.

If one of these steps is not working correctly, check the register addressing of Modscan32 and the addressing in the PFC.

3.2 Wago Modbus Memory Map

Note: when using Modscan32 Add 1 to the address. Wago starts at address 0 and Modscan 32 starts at address 1.

Inputs	**Outputs**	
0 – 255	0 – 255	Real World I/O Address for Digital and Analog Address Location for I/O.
256-511	256-511	Network Variable Addressing Memory location to read/write data from the Network.
xxxxxxx	512-767	Real World Output Status Memory Read status data of Analog & Digital outputs
xxxxxxx	768-1023	Network Variable Output Status Memory Read status data of network variable outputs.
4095-4111		Buscoupler Watchdog Status Locations to read/write watchdog functions of the Modbus buscoupler. See WAGO Modbus Manual for further detail.
	8192-8207	WAGO Modbus status Registers Memory locations to read the status of the WAGO buscoupler and modules. See WAGO Modbus Manual for further detail

Once connected and running the PFC program data can be viewed in the following Modbus address registers:

Modscan32 address	PFC program address
0513	%QX2.0
10001	%IX2.0
40513	%QW0
40257	%IW256 (when viewed mirrors %QW256)
40769	%IW256 (Status)
30257	%QW256 (write data to %QW256)

Connecting a 750-842 Ethernet PFC to WAGO-Pro32 the program can be downloaded through the Ethernet port using the Ethernet cable.

In order to connect to the Ethernet PFC Using Modscan32:

Click **Online**

Click **Communications Parameters**

Click on **New,** Select **Ethernet_TCP/IP**

The connection parameters have to be set as follows:

IP address: IP address of Node program is to be downloaded

Port Number: must be 2455

Transport protocol: TCP

Debug Lever: 16#0000

The WAGO Modbus PFC does not have DIP switches to change the baud rate. The Fbusconf function block must be used to change the baud and stop bits. A Library must be added to the select the Fbusconf function block so the baud rate parameters can be changed.

Once WAGO-Pro32 is has been launched:

Click on **Window**.

Click on **Library Manager**.

Click on **Insert**, Then Click on **Additional Library**.

A pull down window will display all the libraries that are available.

Click on **Fbusconf.lib**.

Inside the selection window there will be a list of function blocks.

Select the **Fieldbus configuration (FB).**

The following information will help set the parameters for the function block.

WAGO-I/O-PRO 32 Library elements

Category: Controller configuration

Name: FieldbusConfiguration

Type: Function Function block X Program

Library name: Fbusconf.lib

Applicable to: 750-812, 750-814, 750-815 and 750-816

(All MODBUS controllers)

Input parameter: Data type: Comments:

STARTWORKING BOOL: A TRUE at this input activates the function block. It is only performed once. If parameters are to be changed several times, the FB can be set several times from FALSE to TRUE.

BAUD RATE WORD: Table index for the Baud rate. [0..7]

Baud		Baud	
750-815		750-815	
750-814	Value	750-816	Value
150 Bd	0	38400 Bd	0
300 Bd	1	57600 Bd	1
600 Bd	2	115200 Bd	2
1200 Bd	3	1200 Bd	3
2400 Bd	4	2400 Bd	4
4800 Bd	5	4800 Bd	5
9600 Bd	6	9600 Bd	6
19200 Bd	7	19200 Bd	7

BYTEFRAME WORD: Table index for parity and number of stop bits. [0..3]

Stop bits	DATA LENGTH	value		
no Parity	8 bit	1	FALSE	0
even Parity	8 bit	1	FALSE	1
odd Parity	8 bit	1	FALSE	2
no Parity	8 bit	2	FALSE	3
no Parity	7 bit	2	TRUE	0
even Parity	7 bit	1	TRUE	1
odd Parity	7 bit	1	TRUE	2
no Parity	7 bit	3	TRUE	3

DATALENGTH BOOL TRUE = 7 Bit, FALSE = 8 Bit

ENDOFFRAMETIME WORD: Table index for recognizing the end of a telegram (END of Frame). [0..7]

ENDOFFRAMETIME Value

3 x Byteframe Time	0
100 ms	1
200 ms	2
500 ms	3
1 s	4
1 ms	5
10 ms	6
50 ms	7

ASCIIRTUMODE BOOL: TRUE = RTU Mode,

FALSE = ASCII Mode

ERRORCHECKING BOOL: TRUE = Protocol check activated,

FALSE = protocol check is not required

(Error Check)

Note: the check sum must be transmitted, even with false values.

EXTENDEDFUNCTIONS BOOL: TRUE = Access to the extended parameter is possible,

FALSE = access is protected.

NOWATCHDOG BOOL: TRUE = Watchdog cannot be activated,

FALSE = Watchdog can be activated.

Output parameter:	Data type:	Comments:

RESULT BOOL:TRUE as soon as the function block is started. Becomes FALSE if the parameters were already set.

Function description:

This function block allows the programmer to configure the Modbus PFC interface communications parameters by software, as opposed to the 750-3xx Modbus coupler the parameters are set means of Dip switches. If the function block is also recorded in the user program, the automatic configuration is performed even following a controller change over. The settings are taken over in the controller parameter block. If the required parameters are not already set, a software reset is automatically made in Bus operation and the controller restarts with the selected parameters. The function can be appended to the PLC cycle and is performed only once with a constantly applied TRUE at the INPUT STARTWORKING.

If the controller is only to be configured once independent of the machine configuration, a program comprising of only one POU can be downloaded from the programming system and started. A software reset is not performed when operating on the programming system.

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