



- 8 inputs 24V,  $R_i = 5k\Omega$
- 8 output relays (Tyco PCN124D3MHZ)
- Status display for each input and output
- 10/100BaseT connection via RJ45 socket
- Supply voltage (Logic) 8 .. 30 VDC
- Supply voltage (Relays) 18 .. 30 VDC
- Dimensions: 90mm(L) x 77mm(W) x 40mm(H)
- Pluggable cage clamp terminal max. 0.5mm<sup>2</sup>
- DIN rail mounting



#### **Safety notes**

This product is not fail-safe and should not be used in life-supporting systems and other applications which are critical for safety, without a new risk assessment and evaluation of the conformity!

If the module is intended to be installed into a machine or a system, for which the EC machinery directive 98/37 or its amendment is valid, it is necessary to make sure that the product, after its application, complies with all relevant regulations!

#### **Application**

The interface component offers a simple method to control up to eight digital inputs and outputs through an Ethernet port. Since inputs and outputs are separated from the remaining circuitry by optical couplers, signals of industrial controls can be easily connected to a PC or a terminal or other devices with Ethernet ports. The digital inputs are designed for 24VDC. The outputs are potential free normally open contacts, by Tyco PCN124D3MHZ, with a switching capacity of 3A@30VDC respectively 3A@250VAC. Logic and decoupled outputs may be separately powered. The component is easy-to-mount on a 35 mm-DIN rail. The electrical connection is made by pluggable cage clamp terminals.

#### **Function**

Serial to parallel conversion and vice versa will be performed by a PIC16F877 (MicroChip). To comply with the network communication requirements, a Tibbo EM203 module is placed in front of the PIC. On a simple command, the standard firmware reads the inputs and outputs, and transfers the data to the PC or to a corresponding device. If parameters are transferred with the command, the outputs will be set accordingly. Additionally, an automated scan takes place at an interval of 100ms. If there is a difference compared to the last status, a notification will be sent automatically. Thus it is possible to easily detect changes on the inputs. If special relations between inputs to outputs are required, it is possible to deliver a customized firmware.

#### **Operation**

Start-up is quite simple. After connecting the supply voltage (logic) the module is ready for use. For applications where no outputs are required, the supply voltage (relays) can be omitted. The communication with the module is realized by means of simple ASCII code commands and can be easily executed out of any application by accessing the Ethernet interface. For reaching the module, it is necessary to assign a valid IP address to the module. On delivery, obtaining a dynamic IP address by an DHCP server is activated (factory default setting). The assignment of a static IP address can only be performed via the MFR configuration program which have to be installed first. For checking the communication, any terminal program can be used which is able to handle an Ethernet interface. Ready status is indicated by two LEDs. Whereas the first LED indicates the applied operating voltage, the second LED indicates the heart beat signal which is regularly controlled by the processor. The receipt of a command is indicated by one more LED.

#### **Operation as MFR module**

For operation as a multifunction relay and programming the different modes, you need to install the necessary configuration software. The latest version may be download from <http://zeb-automation.de/de2/>. It is free of charge. Using this tool, it is possible to assign special functions to each of the eight channels. As soon as it is configured, the software is no longer needed to operate the module. This tool also allows updating the firmware of the MFR module.

Data communication

Command	Parameter	Function	Return Value
'X'	none	Reset	'XEP01R' CR
'I'	none	Reads input status	'I' 1.7-4 I.3-0 CR
'O'	none	Reads output status	'O' 0.7-4 O.3-0 CR
'O'	'@' + bit7..4 ' '@' + bit3..0	Sets the output bit7..0	none
others **	with or without	No function	'?' CR
Command line: <b>Command [Parameter] CR</b> -----			
** There are further commands assigned for the MFR functions. They return other informations! Refer to <i>mfr_api.pdf</i> .			

Examples:

The command 'OAC' followed by return is setting the output bits 4, 1, and 0 to active.

The return information 'I@A' followed by return indicates a signal at the input bit 0.

Character	Bit 7/3	Bit 6/2	Bit 5/1	Bit 4/0	Character	Bit 7/3	Bit 6/2	Bit 5/1	Bit 4/0
@	0	0	0	0	H	1	0	0	0
A	0	0	0	1	I	1	0	0	1
B	0	0	1	0	J	1	0	1	0
C	0	0	1	1	K	1	0	1	1
D	0	1	0	0	L	1	1	0	0
E	0	1	0	1	M	1	1	0	1
F	0	1	1	0	N	1	1	1	0
G	0	1	1	1	O	1	1	1	1

Pin assignment

Signal	Pin	<div>Terminal strips</div> <div>The left columns designate the connections of the lower terminal strip from left to right, whereas the right columns designate the connections of the upper terminal strip from left to right, if device is mounted as shown in the picture.</div>	Pin	Signal
				Ub+
			Ub-	
			Us+	Supply Voltage (Relays) 18 .. 30 VDC
			Us-	
Isolated Input Bit 0	I0+		O0	Output Bit 0
	I0-		O0	
Isolated Input Bit 1	I1+		O1	Output Bit 1
	I1-		O1	
Isolated Input Bit 2	I2+		O2	Output Bit 2
	I2-		O2	
Isolated Input Bit 3	I3+		O3	Output Bit 3
	I3-		O3	
Isolated Input Bit 4	I4+		O4	Output Bit 4
	I4-		O4	
Isolated Input Bit 5	I5+		O5	Output Bit 5
	I5-		O5	
Isolated Input Bit 6	I6+		O6	Output Bit 6
	I6-		O6	
Isolated Input Bit 7	I7+		O7	Output Bit 7
	I7-		O7	

Ethernet-RJ45 socket	
Pin	Signal
1	TX+
2	TX-
3	RX+
4	free
5	free
6	RX-
7	free
8	free

## MFR functions

Beside the application as an I/O interface connected to an Ethernet port, it is possible to use the module as a multifunction relay. Using a corresponding configuration it is possible to assign to each of the 8 channels a different function. The required programming will be performed by means of the configuration software **MFRSETUP** (currently available for Windows applications). The latest version may be download from <http://zeb-automation.de/de2/>. As soon as the module is configured, the software is no longer needed to operate the device. Programming the appropriate parameters is self-explanatory to the greatest possible extent. Additionally there is a comprehensive Windows help, also available as a separate file **MFRHELP**.

<b>Simple Interface</b> (Factory setting on delivery)	The MFR functions are disabled. Inputs are read and outputs are controlled by an external unit via the Ethernet port.
<b>Direct</b>	Time function is switched off. The output follows the input.
<b>Switching-on delay</b>	Applying a voltage to the input, the output will be active after the configured delay. With removing the input voltage the output will be immediately inactive.
<b>Switching-off delay</b>	Applying a voltage to the input, the output will be active immediately. With removing the input voltage, the output will be inactive after the configured delay.
<b>Clock Pulse/Pause</b>	The output acts as a flasher. Either free-running or controlled via the corresponding input. The duration of pulse and pause is configurable.
<b>Clock Pulse/Cycle</b>	The output acts as a pulse generator. Either free-running or controlled via the corresponding input. The duration of pulse and cycle is configurable.
<b>Switching on wipe pulse, Switching off wipe pulse</b>	The output generates a single pulse of configurable width, independent from the duration of the input signal. Either on applying or removing an input voltage.
<b>Remote Terminal Unit (RTU)</b>	The time function is switched off. The output follows the appropriate input of the remote device. The input of this channel is transferred to the appropriate output of the remote device. For this mode the modules must have programmed corresponding IP numbers. The modules recognize one another in the network via this IP addresses.

Time range ' <b>ms</b> '	100 .. 2000 milliseconds	In steps of 100 ms
Time range ' <b>s</b> '	1 .. 120 seconds	In steps of 1s
Time range ' <b>m</b> '	1 .. 120 minutes	In steps of 1 min
Time range ' <b>h</b> '	1 .. 100 hours	In steps of 1 h

## Ethernet

General information: For the communication with the module via an Ethernet connection it is necessary to assign an IP address to the module, which allows to reach it. The IP address can be assigned dynamically from an existing DHCP server (factory default setting) or statically by the user. The programming of the IP address can only be performed via the configuration program **MFRSETUP**. The program can be installed either from the CD included in the delivery or after downloading from <http://zeb-automation.de/de2/>. The corresponding input fields can be reached via the menu item '**Network**' and must be transferred to the module after having performed the modification (refer to MFRHELP). It has to be observed that the assigning of IP addresses or the changing from dynamic to static IPs can only be performed via the MAC address of the module. Therefore, it is necessary that the module is in the same network segment as the configuration PC. Depending on the sequence of connecting the module, the MAC address is already displayed when opening the configuration mask or after clicking on '**Search for unknown module**' in the selection list. After selecting and clicking on '**Read module data**' the input fields are enabled. The further MFR parameters can be assigned via the MAC address as well as via the assigned IP address. The parameterization can also be performed via the integrated web server via the network by means of a browser if the assigned IP address can be reached from the corresponding network node (a local IP address cannot be reached from the Internet without particular provisions). It is possible to use the protocols UDP (Port 65100) or TCP (Port 65200) for the own applications. The web server uses HTTP (Port 80) by default.

Remote control mode: If 2 modules are operated in the remote control mode they can be directly connected via a "crossover" cable as soon as they were parameterized. However it is to be observed the maximum line length (CAT5 about 100m). If they are connected to an existing network, the distance between the module is only limited by the signal run time. Synchronous signals are transmitted at a rate of 5 seconds. If receiving the signals is missing, the modules fall back to the standard mode and switch the

outputs to inactive. If the synchronous signals are received in regular intervals the remote control mode is started or restarted, however active inputs do not generate any output signal (restart interlock).

Web server: If the web server is used to modify the functions and parameters it must be ensured that the module can also be reached by the browser via the assigned IP address. A login with user name and password is necessary to access the module. Both strings can be freely entered during configuration and can only be overwritten each. The factory default setting is 'admin/admin'.

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