



- 8 inputs 24V, $R_i = 5k\Omega$
- 8 outputs 24V/600mA, solid state, high side switching
- Status display for each input and output
- USB connector via USB-B
- Supply voltage (Logic) 8 .. 30 VDC
- Supply voltage (Load) 12 .. 30 VDC
- Dimensions: 90mm(L) x 77mm(W) x 40mm(H)
- Pluggable cage clamp terminal max. 0.5mm²
- 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 a serial USB 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 USB ports. The digital inputs and outputs are designed for 24VDC. 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 USB communication requirements, a FT232C controller (FTDI) 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 (load) 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 through any serial communication port. But it is mandatory to install an USB driver, corresponding to the operating system in order to set up the virtual serial communication port. The drivers (Windows, Linux and Mac) are located on the CD or they can be downloaded from <http://zeb-automation.de/de2/>. The knowledge for driver installations is assumed. For checking the communication, any terminal program can be used. Ready status is indicated by two LEDs. Whereas the first LED indicates the applied operating voltage, the second LED indicates the heartbeat 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	'XUP01L' CR
'I'	none	Reads input status	'I' I.7-4 I.3-0 CR
'O'	none	Reads output status	'O' O.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: Command [Parameter] CR -----			
** 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+	Supply voltage (Logic) 8 .. 30 VDC
			Ub-	
			Us+	Supply voltage (Load) 12 .. 30 VDC
			Us-	
Isolated Input Bit 0	I0+		O0+	Output Bit 0
	I0-		O0-	Connected to Us-
Isolated Input Bit 1	I1+		O1+	Output Bit 1
	I1-		O1-	Connected to Us-
Isolated Input Bit 2	I2+		O2+	Output Bit 2
	I2-		O2-	Connected to Us-
Isolated Input Bit 3	I3+		O3+	Output Bit 3
	I3-		O3-	Connected to Us-
Isolated Input Bit 4	I4+		O4+	Output Bit 4
	I4-		O4-	Connected to Us-
Isolated Input Bit 5	I5+		O5+	Output Bit 5
	I5-		O5-	Connected to Us-
Isolated Input Bit 6	I6+		O6+	Output Bit 6
	I6-		O6-	Connected to Us-
Isolated Input Bit 7	I7+		O7+	Output Bit 7
	I7-		O7-	Connected to Us-

USB-B port	
Pin	Signal
1	VCC (Load ~ 1mA)
2	USBDM
3	USBDP
4	GND
5	GND

MFR functions

Beside the application as an I/O interface connected to an USB 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**.

Simple Interface (Factory setting on delivery)	The MFR functions are disabled. Inputs are read and outputs are controlled by an external unit via the USB port.
Direct	Time function is disabled. The output directly follows the input.
Switching-on delay	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.
Switching-off delay	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.
Clock Pulse/Pause	The output acts as a flasher. Either free-running or controlled via the corresponding input. The duration of pulse and pause is configurable.
Clock Pulse/Cycle	The output acts as a pulse generator. Either free-running or controlled via the corresponding input. The duration of pulse and cycle is configurable.
Switching on wipe pulse, Switching off wipe pulse	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.

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

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