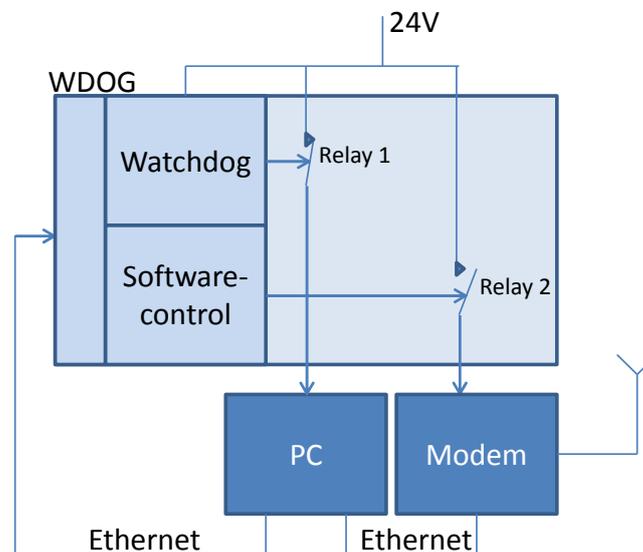# Dual Ethernet controlled relays / watchdog

Features

- 2 software programmable SPDT relays
- NO, NC and common contacts available
- Watchdog function for each relay
- 10/100 Mbit/s Ethernet interface
- Simple command set and configuration
- Configurable IP address
- Additional digital trigger input
- Measurement of temperature and power supply voltage
- Wide input range power supply, 9-36V DC
- Din rail enclosure

Description

The WDOG is a configurable watchdog module with two relay outputs. Each relay has its own watchdog function. The watchdog is triggered by TCP or UDP commands or optionally by a hardware trigger. When a watchdog time-out occurs the corresponding relay is powered for a configurable time and then un-powered again. By using the normally closed contacts of the relay you are then able to reset the connected equipment. The relays can also be controlled by software commands, in this case the watchdog function is switched off automatically. The relays have normally open and normally closed contacts available.

The figure below shows an example of how the WDOG can be connected: The PC power is controlled by the watchdog function of relay 1 and the modem power is controlled by software and relay 2.

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Technical Specifications

INPUT

- Ethernet   : 10/100 Mbits/s
- Protocol   : TCP / UDP
- Input connector   : RJ-45

RELAY SWITCHING CHARACTERISTICS

- Arrangement   : From C (SPDT)
- Number of relays   : 2
- Max. Load   : 8 A @ 250 VAC, 8 A @ 36 VDC
- Expected Mechanical Life   : 10 million operations

TRIGGER

- Trigger input low level   : < 1 V
- Trigger input high level   : > 4.5 V
- Trigger input max level   : 30 V
- Trigger input type   : Bipolar, isolated opto coupler input
- Trigger input impedance   : typ. 4k7 Ohm

STATUS

- 3 LEDs   : Communication, Relais 1 and Relais 2 status
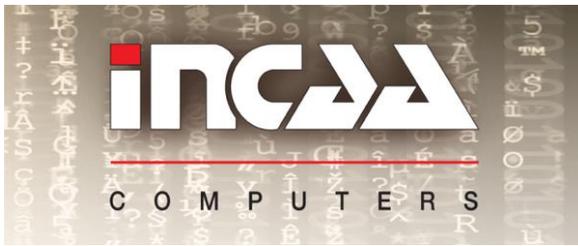
ENVIRONMENTAL CONDITIONS

- Max. operating relaltive humidity : 90 %, no condensation
- Operating temperature range   : --20 °C to 50 °C
- Power supply requirements   : + 9 - 36 Volt. Typ. < 1.5 W

WARRANTY   : 1 year

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Operation

Initial setup

The default IP address of the module is 192.168.3.25
With the tool provided the network settings can be changed to adjust it to your own preferred addressing (also DHCP is available).

The module can be accessed in two ways:
1. The module listens to incoming connections on port 41020 through TCP or UDP. This connection can be held open or can be reconnected for every action.
2. The module can connect to a server and maintain this connection. Every hour a status message is send to the server and the connection can be used for sending commands to the device. For this option an extra setting is available with the network configuration tool, named "Server IP" (port is fixed 42000). Here you can enter an IP in dot notation or it can be a hostname. For the hostname option you also need to fill in at least one DNS server IP.

Operation

The relays can be controlled by software commands:
- Kick (Trigger)
- Reset
- Switch Off
- Switch On
- Get Status

All communication is in big-endian format. An LabVIEW example can be provided.

Kick: To start a Watch Dog function it is necessary to send a "kick" command to the WDOG.
This command has the following format:

Variable	Description
Length	32-bit integer, number of bytes in this message, 6
Command	8-bit unsigned integer, command to execute, 0 = kick
Relay number	8-bit unsigned integer, relay number(1 or 2) where command should be executed for
Reset time	16-bit unsigned integer, time in seconds to apply a reset if necessary
Watchdog timeout	16-bit unsigned integer, time in seconds before a watchdog reset must be applied

The response is:

Variable	Description
Result	16-bit string, OK = Command accepted, NO = Command not accepted

After the first "kick" command the WDOG expects an new "kick" command within the specified time otherwise it will reset (= power) the relay as long as specified by the reset time. After that it will wait for another command. "Kick" commands that are received during the reset time are ignored.

A "kick" command un-powers the relay, even when it was switched on with the switch on command.

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Reset: This command can be used to manually perform a reset.
This command has the following format:

Variable	Description
Length	32-bit integer, number of bytes in this message, 6
Command	8-bit unsigned integer, command to execute, 1 = reset
Relay number	8-bit unsigned integer, relay number(1 or 2) where command should be executed for
Reset time	16-bit unsigned integer, time in seconds to apply the reset
Delay time	16-bit unsigned integer, time in seconds before the reset must be applied

The response is:

Variable	Description
Result	16-bit string, OK = Command accepted, NO = Command not accepted

This command executes a delayed action: it powers the relay as long as specified by the reset time after the delay time has expired.

A reset command stops the Watchdog function.

Switch Off: With this command you are able to un- power a relay manually.
This command has the following format:

Variable	Description
Length	32-bit integer, number of bytes in this message, 2
Command	8-bit unsigned integer, command to execute, 2 = switch off
Relay number	8-bit unsigned integer, relay number(1 or 2) where command should be executed for

The response is:

Variable	Description
Result	16-bit string, OK = Command accepted, NO = Command not accepted

A Switch Off command stops the Watchdog function.

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Switch On: With this command you are able to power a relay manually.
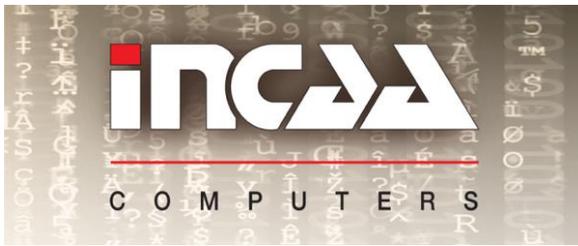This command has the following format:

Variable	Description
Length	32-bit integer, number of bytes in this message, 2
Command	8-bit unsigned integer, command to execute, 3 = switch on
Relay number	8-bit unsigned integer, relay number(1 or 2) where command should be executed for

The response is:

Variable	Description
Result	16-bit string, OK = Command accepted, NO = Command not accepted

A Switch On command stops the Watchdog function.

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Get Status: With this command you can request the ADC values for Temperature and Power supply input voltage.
This command has the following format:

Variable	Description
Length	32-bit integer, number of bytes in this message, 2
Command	8-bit unsigned integer, command to execute, 4 = get status
Checksum	8-bit unsigned integer, should be always 1

The response is:

Variable	Description
ADC value Temperature	32-bit unsigned integer, ADC value of current temperature reading
ADC value Voltage	32-bit unsigned integer, ADC value of current supply voltage reading
Relay Status	32-bit unsigned integer, status of relays, 1bit per relay, 0=unpowered, 1=powered
Watchdog Status	32-bit unsigned integer, status of watchdogs, 1bit per relay, 0=inactive, 1=active
Current tick	32-bit unsigned integer, free running ms tick timer value, to check correct functioning

Please refer to the examples below how to convert the ADC code to temperature or voltage readings.

Example 1:

Formula to calculate Temperature in degrees Celsius:

Temp =
$1/(0,003354016 + 0,0002744032 * \ln(A) + 3,666944E - 6 * \ln(A)^2 + 1,375492E - 7 * ln(A)^3) - 273,15$ (^{0}C)

$$A = \frac{\left(\frac{33000}{\frac{3,3}{4095}*x} - 10000\right)}{22000}$$

x = ADC value

Example 2:

Formula to calculate the power supply input voltage in Volts:

Voltage =

$\frac{\frac{3,3}{4095}*x}{0,09}$ (Volt) (where x is the ADC code)

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