EWON practical limits

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For all eWON types

1 Overview

The software and hardware features of the eWON are defined into the related User Manuals. Nevertheless, for some applications it is useful to get clear and clean limits that cannot be overruled in any case in order to ensure the quality of the installation.

This document is the starting point of the software and hardware limits for the eWON® 4000, 500-2001-4001 version 4.xx on one side, and for the eWON® 4000 version 3.5 on the other side. This document will be updated each time a new limit that is not clearly defined into the User Manuals is discovered.

2 Available memory

The total memory of the eWON includes both Flash and SDRAM memories.

2.1 eWONs versions 3.5 (4000) and 3.8 (500-2001-4001)

The flash memory is divided into two 2MBytes devices. One device holds the program memory, while the second one holds the configuration of the eWON, the logged data and the user defined web pages.

2.2 eWONs version 4.xx (500-2001-4001 only)

The SDRAM memory size is 4Mbytes, of which use can be customized from the ***System Setup/Storage/Configure*** eWON webpage. Please refer to eWON 500-2001-4001 version 4 User Guide (http://www.ewon.biz website).

The following table can be kept in mind while using the eWON:

FILE	SIZE		DESCRIPTION	
	eWON (ver < 4)	**eWON (ver 4.xx)**	**eWON® 4000, 500-2001-4001 (4000 ver 3.5, others -> ver 3.8)**	**eWON 500-2001-4001 (ver 4.xx)**
Configuration (except COM)	64k	128K	Config. Files: **• System setup** **• Pages setup** **• Modbus, UNITE and NETMPI IO servers** **• Tag setup** **• Users setup** (COM setup is not saved here).	Config. Files: **• System setup** **• Pages setup** **• Modbus, UNITE, NETMPI and DF1 IO servers** **• Tag setup** **• Users setup** (COM setup is not saved here).
Basic Program	64k	128K	Basic scripts.	Basic scripts.
/usr directory	190K	1 to 3 Mbyte	Content of the whole **/usr** directory and sub-directories.	Content of the whole **/usr** directory and sub-directories.
Event file	64-128k	128K	EWON Event files.	EWON Event files.
Alarm history	64-128k	128K	Alarm history file.	Alarm history file.
Historical log	320-384k	16384, 73728 or 139264 points	Historical logging file (size per record is 16 bytes, so 20480 records can be logged).	Historical logging file. Depends on the memory config you have setup in the ***Storage***/ ***Configure*** page.

3 Basic scripts speed

The eWON has a powerful Basic script functionality. But it has NOT to be considered as a PLC, which provides deterministic loop cycle time. Although it is as robust and more powerful than the classical ladder IEC61131 language, the Basic script interpreter has NO guaranteed loop cycle time.

The scripts are pre-compiled (tokenized) before execution. The cycle time depends on the script length and is application dependant. That is why we recommend NOT to use the Basic feature if the response time to an event has to be smaller than the order of one second. With the eWON500, 2001, 4001 series, the CPU runs faster, and then the scripts processing too. That means that transferring a BASIC application from an eWON4000 to an eWON4001 will speed up this application.

4 SMS alarms

The eWON features a powerful alarm service, including direct SMS posting without Email forwarding service needed, as http://www.2sms.com.
The SMS are sent by two different means, depending on the modem type. For PSTN and ISDN (4000 only) modems, the SMS server of the destination provider is dialed and the SMS sent by means of the TAP, UCP or InfoZ (France) protocol. A complete listing of the different countries providers is available on the eWON web site.

For GSM 900 and 1800 modems, the SMS can be sent without the use of a provider, directly through the internal GSM's functionalities or exactly the same way as for PSTN and ISDN modems.
When an SMS action is required, all ongoing connections are immediately shut down and the SMS is sent. You can encounter this by requesting the SENDSMS command from the Basic command line window of the eWON when you are connected to the eWON by a PPP link.

The typical post time for an SMS is around 30 seconds.

5 RS485 Modbus network

The main extension bus of the eWON is the well-known Modbus485 RTU protocol. The eWON can only act as a master on the network, this means the eWON sends the requests to the slaves and waits for their answer.

Nevertheless is it useful to give here some rules in order to ease the use of the extension bus.

In order for the eWON to retrieve a value out of a slave device is the configuration of a Tag needed. Three different polling rates can be programmed in the eWON; only one polling rate can be assigned to a given Tag.

The maximum number of Tags that can be retrieved by the eWON is limited as a rough estimation to 128 (ver 3.5 and 3.8) and to about 300 for version 4 (please contact us for a particular application needing more registers). It is obvious that if the 128 Tags have to be retrieved each second this will create an RS485 bus congestion and the actual poll-time will be higher than expected.

In a real world application, the values to be retrieved can be classified in different classes: high polling rate, medium polling rate and slow polling rate. The RS485 bus is then used optimally, by retrieving the critical data at a fast rate (for example 1 second), and the slow moving data at a slow rate (for example 10 minutes). It is of the user responsibility to understand the limits of a serial link and of the Modbus RTU protocol.

If a device where 20 registers have to be retrieved at a fast rate is having problems (cabling, …), the eWON detects it and enters in a mode called "slow poll mode", where this slave is polled at a predefined rate of 20 seconds. Again this is defined in the Modbus RTU protocol. Please also have a look at the Technical note Setup and Debug ‘Send Mail' and 'Put FTP' (TN04_1.1_UK.pdf) available on our web site.

The RS485 serial link most standard parameters are:

- **9600bps**
- **1 Stop bit**
- **No parity**
- **Reply timeout 3000ms**

At this rate, the maximum practical cable length that can be used with the Modbus link, without repeaters is around 1000m or 4000ft if no stubs are present. Nevertheless, this bus length also depends on the environment's noise. A rule of thumb is to place a repeater when a length of 400m is exceeded.

6 Power supply (eWON® 4000)

The eWON4000 is available with two different power supplies: AC or DC. The AC power supply is capable of withstanding AC *and* DC voltage inputs.

6.3 EWON4000 AC

When used in AC mode, the RMS voltage has to be between 100 and 240VAC. These classical values for AC power supplies with wide range is 85 to 265VAC, thus the 100 and 240VAC values referenced in the eWON documentation include tolerances around these values, yielding the 85 and 265VAC classical values also.

When used in DC mode, the DC value has to be between 100 and 300VDC +10/-15%. A full bridge is present at the power input, so no polarity check has to be made.

6.4 EWON4000 DC

The DC module of the eWON DC can only be used with DC inputs, as no full bridge is present at the supply input. The input is protected against polarity inversions, and will lead to a fuse blow when encountered. The input range spreads between 18 and 55VDC, as specified in the eWON4000 manual. This is a conservative range, the tested range spreads from 12 to 60VDC as maximum absolute values.

7 Analog inputs AI1 & AI2 (eWON® 4000)

Four (4) analog inputs are present on the eWON box. AI1 and AI2 can be used as voltage [0..10VDC] or current [0..20mA] inputs. The selection between input type is selected through the settings of the piano switch.
The calibration of these inputs is done using two precision signals of 2.5 and 5.0VDC. In voltage mode, a simple linear transformation is applied to the analog to digital converter output in order to yield eWON read-out values of 255.5 and 511.5 when these values are applied (over the maximum range which is 1023 for a 10bits converter). The internal electronics is subject to dispersion and creates in the acquisition path an offset and a gain error (which remain fixed for the whole life of the device). This means that first order errors are compensated, but that errors related to computation and second order errors are still present after calibration. As a result, small deviations from the perfect linear curve can be seen in the digital result, but the error should be less than 1 LSB of the ADC converter.
As a result of small power supply and low cost of the device, a small "dead band" commonly found in most devices is also present at very low measurement levels, leading in small precision around 0VDC measurements. A measure below 10LSB should be carefully interpreted.

These warnings should NOT scare you, these effects are present in ANY device, but constructors usually don't mention it… Choosing eWON is choosing for transparency information.

Power precision resistors shunting the inputs to ground create the current inputs. As current is applied, the ADC converter measures a voltage. The input impedance is 270Ω and the current is thus converted to an equivalent voltage equal to 270 * Imeas. This voltage is then the measured value of the AI Tags. In order to get a current value, you should use an offset of 0 and a gain of 20/(270*20E-3/10*1023)=0.0362. A same computation can be performed for 4-20mA inputs.

The voltage input range is 10VDC, but input protection is guaranteed from –10VDC to 40VDC for 1 minute. When working with current inputs, the current range is 20mA, but up to 35mA can be input for up to 1 minute. A silicon fuse is also implemented for short circuits in current mode. This means that an automatic fuse will disconnect the inputs if the power dissipation through the measurement resistor is too high. The input impedance will then be very high for a few seconds and then will return to 270Ω when the hardware cooled down. This means that no breakdown of the hardware is possible if the voltage is kept below 60VDC.

8 PT100 inputs (eWON® 4000)

The PT100 inputs can be equipped of low-cost two wire PT100 resistors. This is useful for reading room or process temperature, provided the wire length is kept below 10m.
The calibration process of each input is realized by applying two different precision resistors to these inputs, respectively 100 and 112,5Ω. The analog value read out by the eWON AI3 & AI4 Tags are calibrated in such a way that the resistor value is returned.
In order to get the temperature returned as °C, the offset and gain have to be set to values of (-100/38.5*100) and (100/38.5), result of the linear transformation required for a standard PT100 sensor (0°C → 100Ω, 100°C → 138,5Ω).

The ADC resolution is 10bits, but as the electronics is subject to components tolerances, the actual resolution is slightly different and depending on the specific device calibration. But the nominal resolution should be around 0.09°C. The measurement range of each input is specified between –10°C and +60°C.

9 Relay outputs

Two relay outputs can be controlled in any way by the eWON, at a maximum rate specified by the eWON Basic cycle speed.

The contact resistance of the relay (thus not including the connectors) is less than 50mΩ and contacts are specified for at least 100.000 toggling at a current/voltage of 30VDC/2A or 2.000.000 toggling at 30VDC/1A. These relay outputs are then intended to be used as coil drivers for high power relays if devices powered by the mains have to be controlled.

10 Phone Line (PSTN-POTS)

When the eWON contains an analog modem, the RJ45 connector labeled “COM” can be used to connect the eWON directly to a phone line. This means a classical RJ11 connector can be inserted and fastened.
The internal modem is a 33600bps type modem. We did not implement a Flex or 56K modem, because these modems have an asymmetrical data throughput: the World-to-eWON link is at 56kbps, while the eWON-to-world link is specified at 33600bps. The actual gain is then really weak when using the eWON as a server.
The modem accreditations include the CTR21 international agreement, which means it can be used in a lot of countries without any modification nor specific testing required.
The phone line protection includes lightning, ESD, fast transients, over voltages,… realized by gas discharge tube and surge arrestor protections.

11 ISDN modem (eWON® 4000)

The eWON® 4000 can be connected to the ISDN network when it is delivered with its embedded internal ISDN modem. This modem can implement a lot of different protocols (PPP Async., V12à,…) required to connect to an ISP, to SMS servers,…

It is a complete 1B+D configuration, which means that a 64kbits data channel (B) is available, along with the control channel (D). The multilink PPP is not available yet for the eWON (2B+D configuration).

12 Digital & counter inputs

The eWON is provided with 8 isolated digital inputs. The ground return path of these signals is common to all the inputs but is isolated from the main ground signal of the eWON.
Each input is a sink type, which means that 24VDC must be applied between an input and ground in order to get a logic level "1". Typical ranges for a "0" logic level is 0-5VDC, for a "1" logic level 10 to 24VDC. The range between 5-10VDC is *unknown*. That means that the signal state from the eWON's point of view can be 0 or 1.
The input level can extended from –30 up to 30VDC for one minute without damage.

Each input can also be configured in the eWON software to be a counter input. There is no need to modify hardware settings. The counters follow the S0 DIN43 864 recommendation. Note that in this case, the active level of the counter signal is logical "0". Why? Indeed the output of S0 pulses is usually isolated through optic-couplers, which invert the signal. In this case, the provided interface is the open-collector of a transistor; and the user has to provide a pull-up resistor to a 24VDC power supply.

13 See also

- **“eWON User Guide for Revision 3.5” (EWON4000UGUK35.pdf) - [Support/Documentation/Technical Notes] on http://www.ewon.biz**
- **”eWON User Guide for Revision 4.0” (eWON_V4_04_UG_UK.pdf) - [Support/Documentation/Technical Notes] on http://www.ewon.biz**
- **http://www.modbus.org**