

## Application Note

## AN0801

### *WattsOn-DISP Wiring and Configuration*

**Associated Product:** WattsOn  
WattsOn-DISP

#### Summary

The WattsOn-DISP provides a convenient local display option for the WattsOn Universal Power Transducer. When used with a WattsOn-1100 model (-1200 Models are not compatible with the display), it can be configured to display any two parameters that the WattsOn measures.

There are three steps required to configure the DISP for operation. By default, the WattsOn meter is not configured to communicate with the display.

**NOTE:** *WattsOn firmware version 4.5 (or greater) is required for WattsOn-DISP support.*

#### **Step 1: Wiring / Hardware Configuration:**

The WattsOn-DISP requires a 12-24VDC (*not* AC) power supply. This power supply can be shared with the WattsOn transducer, provided that the WattsOn is not being powered by an AC supply. The power terminal for the display may be wired directly to the external power supply, or spliced into the terminal on the WattsOn power supply. It is important to note that if an auxiliary power supply is used, it **MUST** share a common "ground" (negative supply) connection with the WattsOn. The power and data ports are referenced to a common ground, and must be at the same potential as the WattsOn "-" terminal.

Note: when physically mounting the display within the panel use the included bracket and screws. Take care not to over tighten the screws to avoid damage to the display and bezel.

The WattsOn uses the second pulse output (normally used for VARh pulses) as the data port for the display. The WattsOn-DISP "Data" terminal must be wired to the "A" terminal on the WattsOn 8-position output connector. The WattsOn "B" terminal must be jumpered to the WattsOn "G" terminal. The DISP GND terminal must be wired to either of the WattsOn

"G" terminals, or the power supply "-" terminal. See Figure 1 for more detail.

#### **Step 2: Enabling the data output stream**

By default, the second WattsOn output is configured as a pulse output for VARh. For the DISP display to function properly, it is required to reconfigure the WattsOn output to send a data stream. This is done via Modbus. Bit 0 in Register 0x9E (40159) must be set to 1. Note that bit 15 is a R/O bit and is always set to one. The default register value is 0x8000. To enable the data output stream, set this register to 0x8001. See Table 1 for more details.

#### **Step 3: Configuring parameter display**

The DISP receives data from the WattsOn containing register data and parameter selection. Registers 0x9C (40157) and 0x9D (40158) ("ScratchPad[7]" and "ScratchPad[8]") are used to configure the data to be displayed on the top and bottom lines. The address of the floating point value to be displayed is programmed into these registers. Register 0x9C corresponds to the top line and 0x9D to the bottom line. The user must program these registers with the floating point register offset (as specified in Table 1). For example, to display *Total Real Power (kW)* on the top line and *Total Energy (kWH)* on the bottom line, the registers must be programmed as follows:

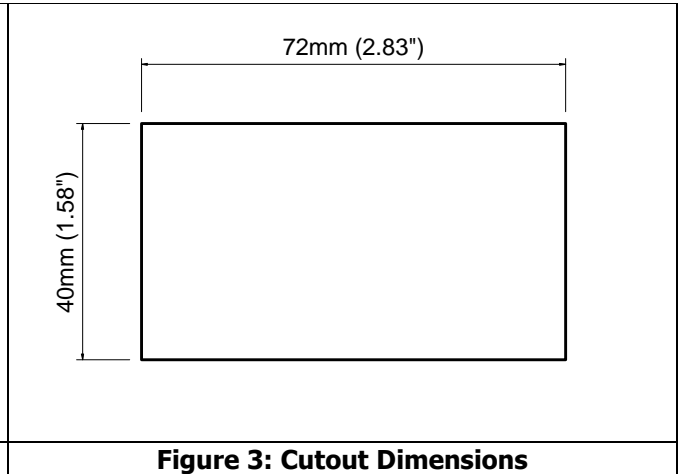
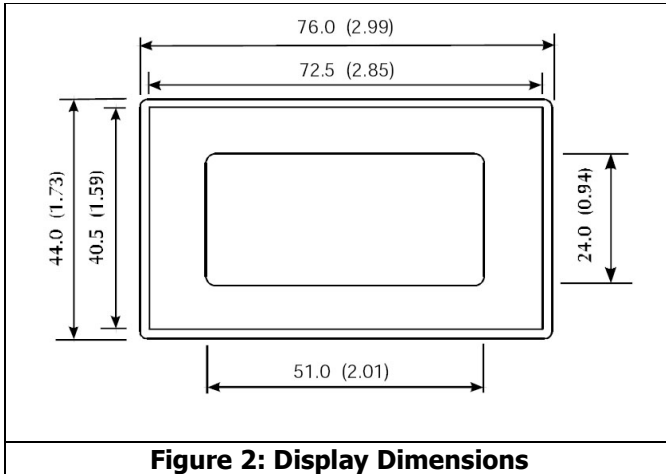
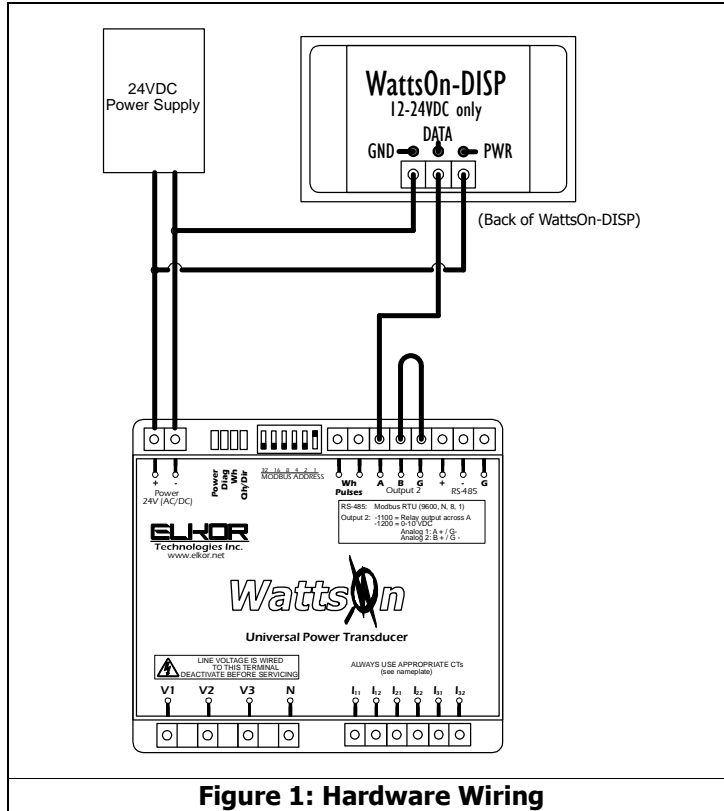
0x9C=0x0302 (770 decimal)  
0x9D=0x0300 (768 decimal)

See Table 2 for register setup example summary.

Modbus Addr	Offset (hex)	Offset (dec)	Description
40769	0x0300	768	Total Energy Consumption
40771	0x0302	770	Total Real Power
40773	0x0304	772	Total Reactive Power
40775	0x0306	774	Total Apparent Power
40777	0x0308	776	Average Voltage (L-N)
40779	0x030A	778	Average Voltage (L-L)
40781	0x030C	780	Average Current
40783	0x030E	782	Total (System) Power Factor
40785	0x0310	784	Frequency
40787	0x0312	786	Sliding Window Demand Power
40789	0x0314	788	Voltage A-N
40791	0x0316	790	Voltage B-N
40793	0x0318	792	Voltage C-N
40795	0x031A	794	Voltage A-B
40797	0x031C	796	Voltage B-C
40799	0x031E	798	Voltage A-C
40801	0x0320	800	Current A
40803	0x0322	802	Current B
40805	0x0324	804	Current C
40807	0x0326	806	Real Power A
40809	0x0328	808	Real Power B
40811	0x032A	810	Real Power C
40813	0x032C	812	Reactive Power A
40815	0x032E	814	Reactive Power B
40817	0x0330	816	Reactive Power C
40819	0x0332	818	Apparent Power A
40821	0x0334	820	Apparent Power B
40823	0x0336	822	Apparent Power C
40825	0x0338	824	Power Factor A
40827	0x033A	826	Power Factor B
40829	0x033C	828	Power Factor C
40831	0x033E	830	Software Version

Modbus Addr	Offset (hex)	Offset (dec)	Description
40833	0x0340	832	Import Energy (+) A
40835	0x0342	834	Import Energy (+) B
40837	0x0344	836	Import Energy (+) C
40839	0x0346	838	Total Import Energy (+) A+B+C
40841	0x0348	840	Export Energy (-) A
40843	0x034A	842	Export Energy (-) B
40845	0x034C	844	Export Energy (-) C
40847	0x034E	846	Total Export Energy (-) A+B+C
40849	0x0350	848	Total Energy (+/-) A
40851	0x0352	850	Total Energy (+/-) B
40853	0x0354	852	Total Energy (+/-) C
40855	0x0356	854	Total Energy (+/-) A+B+C
40857	0x0358	856	(Same As 0x300)
40859	0x035A	858	Inductive Energy (+) A
40861	0x035C	860	Inductive Energy (+) B
40863	0x035E	862	Inductive Energy (+) C
40865	0x0360	864	Total Inductive Energy (+) A+B+C
40867	0x0362	866	Capacitive Energy (-) A
40869	0x0364	868	Capacitive Energy (-) B
40871	0x0366	870	Capacitive Energy (-) C
40873	0x0368	872	Total Capacitive Energy (-) A+B+C
40875	0x036A	874	Total VARh (+/-) A
40877	0x036C	876	Total VARh (+/-) B
40879	0x036E	878	Total VARh (+/-) C
40881	0x0370	880	Total VARh (+/-) A+B+C
40883	0x0372	882	Total Vah A
40885	0x0374	884	Total Vah B
40887	0x0376	886	Total Vah C
40889	0x0378	888	Total Vah (A+B+C)

**Table 1**



Register	Description	Default (hex)	Sample Configuration (hex/dec)
0x9E (40159)	Extended Config Register	0x8000	0x8001 / 32769 (enable data output)
0x9C (40157)	Scratchpad Register [7]	0x0000	0x0302 / 770 (Output total kW – top line)
0x9D (40158)	Scratchpad Register [8]	0x0000	0x0300 / 768 (Output total kWh – bottom line)

**Table 2: Sample Register Configuration**

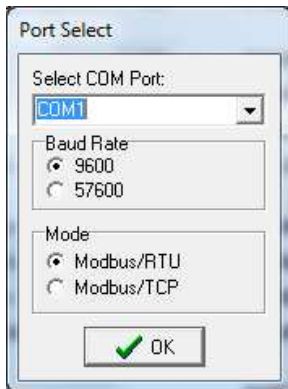
### Using the Elkor WattsOn Console Software:

Configuring the WattsOn for use with the WattsOn-DISP can be easily handled by using the WattsOn Console Software, available for free download at

[http://www.elkor.net/EWC\\_setup.exe](http://www.elkor.net/EWC_setup.exe)

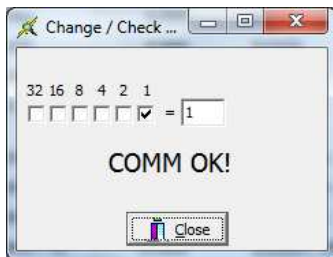
Prior to downloading the software, ensure that you have a RS-485 interface, such as a USB-to-RS485 or RS232-to-RS485 converter. The interface must have the proper drivers installed, and present itself to Windows as a serial COM port.

After downloading and installing the software, run the application. By default, the software uses COM1. If your RS485 adapter is on a different port, click "Port" from the application menu, and select the proper COM port. Ensure that the Baud Rate is properly set (by default, WattsOn units communicate at 9600 bps).



Once the COM port is configured, click "OK".

Click "Options > Address", and ensure that the address in the software matches the address set on the WattsOn DIP switch. By default, WattsOn units are typically shipped with the address set to "1", but this can be changed by using the DIP switch.



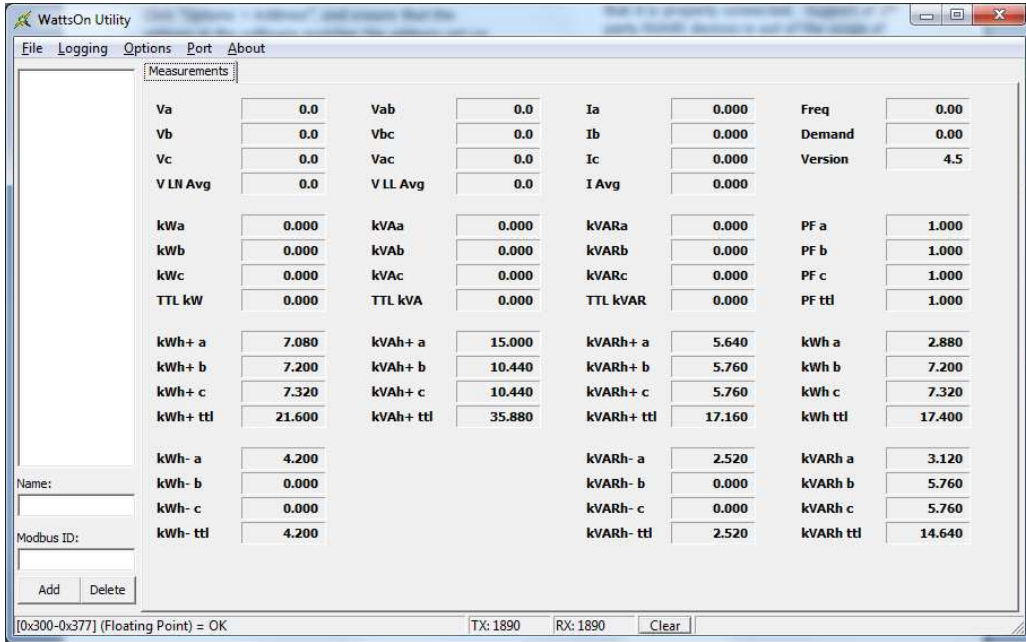
Assuming the wiring is correct, and the Port and Address selections have been properly defined, a message "COMM OK" should appear on the Address screen, and data should populate fields on the main screen as shown on the next page.

If data is not showing, and the status bar at the bottom of the screen is not displaying "OK" messages, then do not proceed with further steps, as the communication must work before the subsequent steps are to be followed.

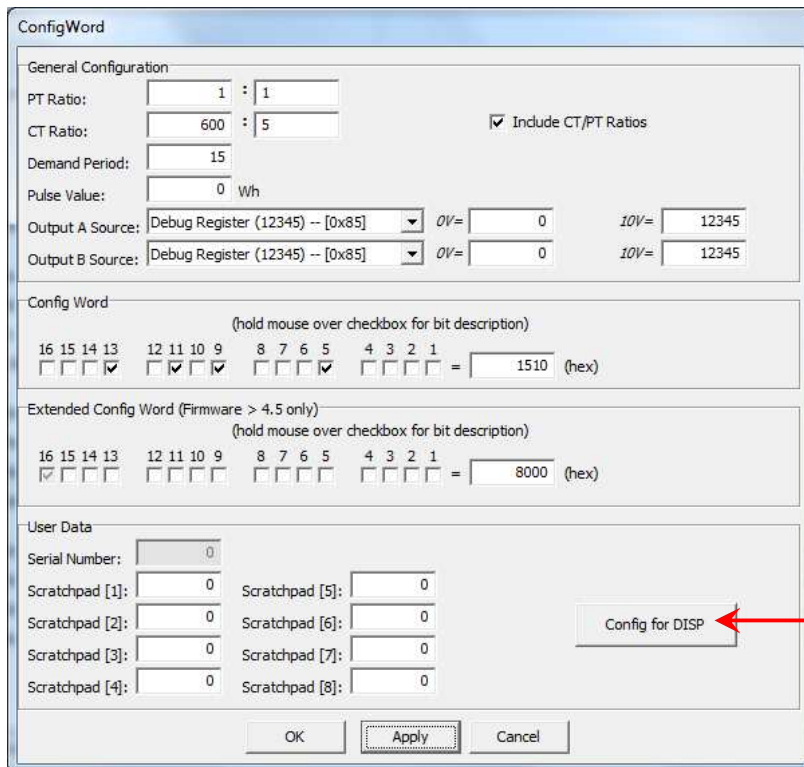
In such a case, several troubleshooting steps are recommended:

- 1) Ensure that the WattsOn has the appropriate power supply -- 24VDC, 100mA recommended).
- 2) Ensure proper continuity between WattsOn and RS485 converter.
- 3) Try reversing the polarity of the +/- RS485 connection on the WattsOn.
- 4) Confirm that the RS485 driver is properly installed, and if it requires a power supply, that it is properly connected. Support of 3<sup>rd</sup> party RS485 devices is out of the scope of this manual and support capabilities of Elkor Technologies Inc.
- 5) In some cases, a 120 ohm termination resistor is required in the line.
- 6) Ensure that no other devices are connected to the +/- RS485 port on the WattsOn.

When the communications is working properly, the main display of the WattsOn Console software will be populated with data, and the status bar at the bottom will be updated with the results of the last attempted communications poll ("OK" in the case of properly working communications).



Press CTRL-G, to enter the Config Word settings screen



The DISP module must be enabled as follows:

- 1) Click "Config For DISP" to automatically configure the values
- OR**
- 1) Checking the "Extended Config Word" bit "1" (sets the hex value to 8001)
  - 2) Set the "Scratchpad [7] / DISP Line 1" value to "770" (for kW) \*\*
  - 3) Set the "Scratchpad [8] / DISP line 2" value to "768" (for kWh) \*\*
  - 4) Click "Apply"

\*\* You may substitute these values for the ones in Table 1 if you wish to change the display data parameters.

The resulting screen should appear as follows:

