SWC5090 1.00

D5000 Series
Configuration Software

Installation and user manual

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Fig. 1: SWC5090 D5000 Series Configuration Software (for example, D5293S case).

1 Introduction

The Configuration Software (Fig. 1) provides a PC user interface for the D5000 series modules that allows the user to:

- ❑ Write configuration parameters to the unit (via COM port);
- ❑ Restore data to and from local hard drive for backup;
- ❑ Monitor Input values (via COM port).

1.1 Requirements

The Configuration Software has to be installed on a machine with the following minimum requirements:

- ❑ Pentium class Processor 200MHz;
- ❑ 800x600 pixels screen resolution;
- ❑ 64-MB RAM;
- ❑ 1 USB port;
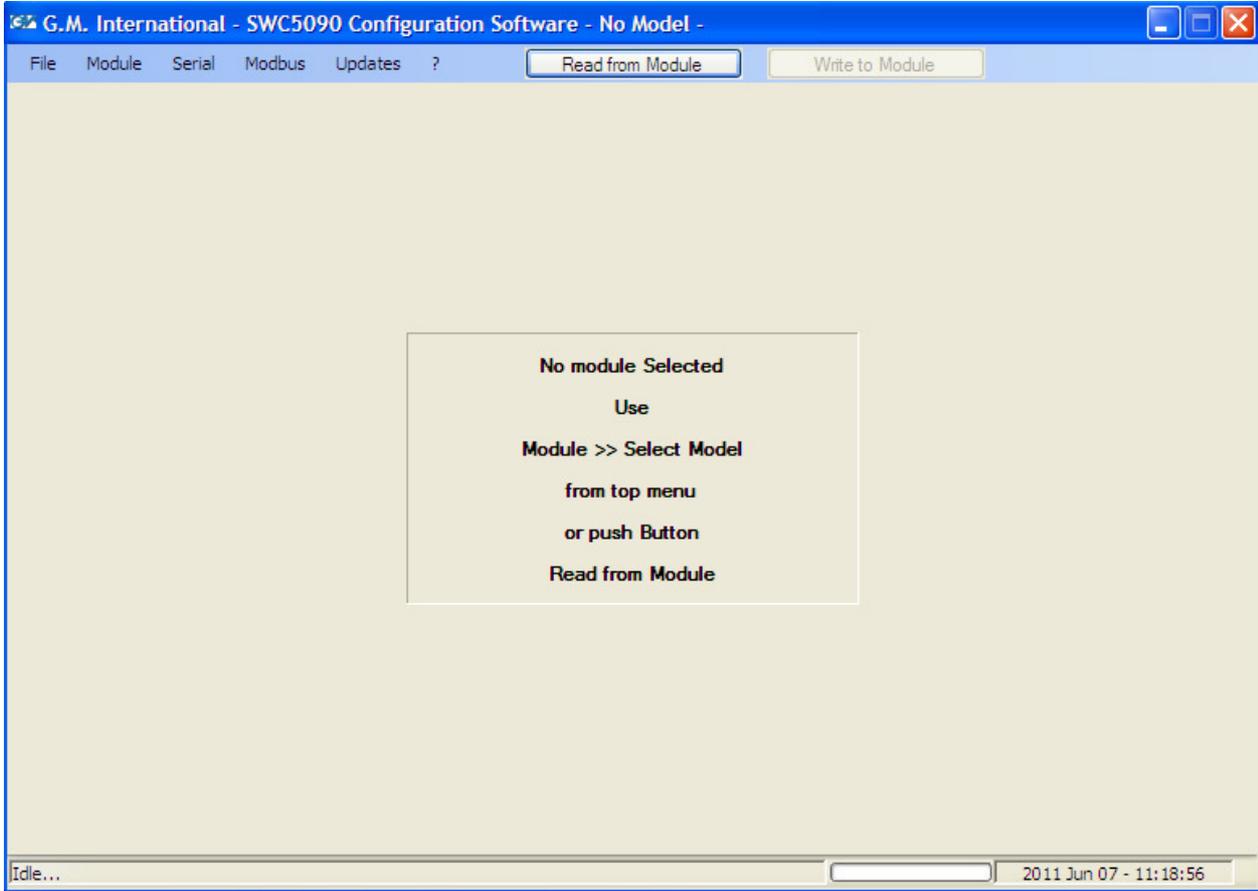- ❑ "Microsoft Windows" operating system.

Furthermore, the following items are required:

- ❑ PPC5092 (USB-to-MiniUSB Adapter) with related installation software;
- ❑ MiniUSB-MiniUSB cable.

1.2   Configurable units

The G.M. units that can be configured via software are:

❑   Smart Solenoid Drivers: D5293S, D5294S.

Fig. 2: SWC5090 Main Window.

2 SWC5090 Main Window

At start-up, the SWC5090 Configuration Software loads a Main Window, which is the same for all D5000 Series modules. The Main Window is basically a frame with a menu at the top and a bottom bar.

At the beginning, the window of Fig. 2 pops up on the screen. Two options are now given to the user: a module can be selected from the menu entry *Module* (off-line operation), or data can be read from the module connected to the PC, by pressing the **"Read from Module"** button (on-line operation). In both cases, a secondary panel will pop up inside the Main Window, as in Fig. 1.

2.1 Main Window Menu

File	Module	Serial	Modbus	Updates	?	Read from Module	Write to Module
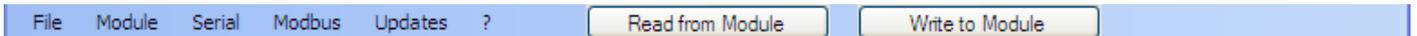
Fig. 3: Menu.

The menu at the top of the Main Window (see Fig. 3) is divided into the following entries:

❑ **File**

- ❑ **Open:** load configuration data from local hard drive backup;
- ❑ **Save:** save configuration data to the present local hard drive backup (if any);
- ❑ **Save as…**: save configuration data to a different local hard drive backup;
- ❑ **Print Preview:** screen preview of the configuration report to be printed;
- ❑ **Print:** configuration report print on paper;
- ❑ **Exit:** exit from the configuration software.

❑ **Module**

- ❑ **Select Module:** during off-line operations, select the module window among the supported ones;
- ❑ **Show Identification:** show the instrument and option code, and the software and hardware release. Identification is only available after that a read operation from module has been successfully completed.

❑ **Serial**

In the COM Port Setup window (see Fig. 4) the user can choose the COM Port of the PPC5092 in the drop-down menu at the top. The connection to the module can be tested by pressing the **"Test Port COM#"** button. Finally the COM Port can be updated by pressing the **"Update Com Port & Exit"** button or left unchanged by pressing the **"Exit without changes"** button.
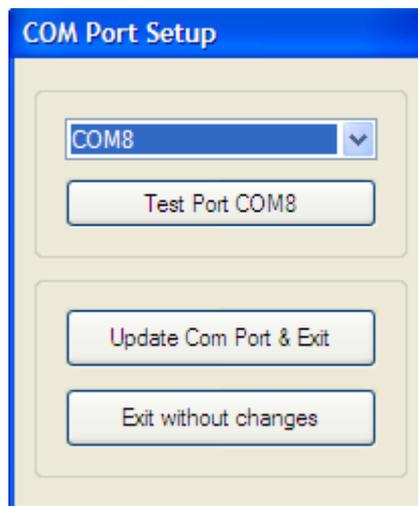
Fig. 4: COM Port Setup window

❑ **Modbus**

In the Module Modbus Setup window (see Fig. 5) the user can introduce the Modbus address of the module (from 1 to 247), the Modbus Baud Rate (selectable among 4800, 9600, 19200, 38400, 57600 and 115200 bps) and the Modbus Format (no parity 1 stop bit, even parity 1 stop bit, odd parity 1 stop bit).
The changes are saved by pressing the **"Ok"** button, while they are discharged by pressing the **"Cancel"** button. Note that the **"Write to Module"** button on the menu bar must be pressed to make the Modbus settings effective. Moreover, the module must be power cycled.
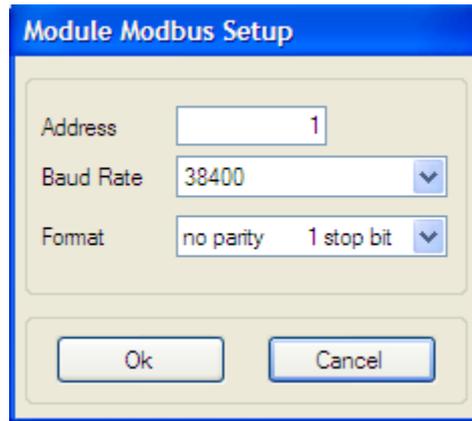
Fig. 5: Modbus Setup window.

❑ **Update**

In the Update Manager window (see Fig. 6) the user can automatically check the **"Running Version"** against the **"Last released Version"** from the G.M. International website. The Configuration Software can be updated by pressing the **"Update"** button or left unchanged by pressing the **"Exit"** button.
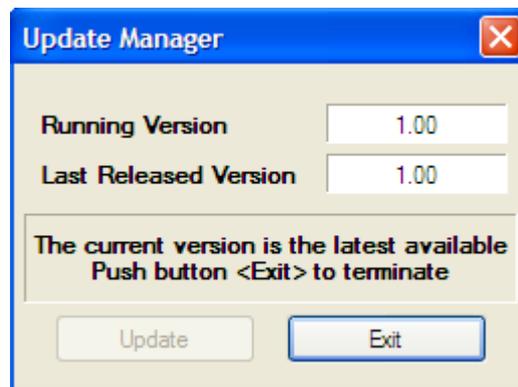
Fig. 6: Update Manager window.

❑ **?**

    ❑ **Show EULA:** The End User License Agreement is displayed and a copy can be saved;

    ❑ **Show Help:** Opens this documentation in pdf format;

    ❑ **About SWC5090:** Shows the release of the current SWC5090 Configuration Software.

On the right of the menu entries two buttons are available: **"Read from Module"**, **"Write to Module"**. By pressing the first one, the configuration settings, the Modbus settings and the Tag currently stored in the Module are read from the module and displayed. Since this operation overwrites the settings on the screen, the user is asked for confirmation.
The **"Write to Module"** button allows the storage to the Module of the configuration settings, the Modbus settings and the Tag, which are currently displayed on the Configuration window. By doing so, the previous settings saved on the Module are overwritten.

Note that all the Menu functions are available only when the continuous scan is inactive.
In particular, the **"Write to Module"** button is activated only when configuration data have successfully been read from the Module or loaded from a backup file.

2.2 Bottom Bar

| Data Scanning | ▮▮▮▮▮ | 2011 Jun 06 - 17:31:58 |

Fig. 7: Bottom Bar.

The Bottom Bar (see Fig. 7) includes a status bar, an odometer that indicates that the operation is in progress, and the current date & time.

3 Application Windows

The center of the SWC5090 Configuration Software window is filled with the Application Window, which is different for each module. In the Application Window the user can read the field data, configure the data ranges and so on.

3.1 D5293S and D5294S Application Window

The D5293S-D5294S Application Window user interface is organized into six Boxes:

- ❑ **Measured Values**
- ❑ **Continuous Scan**
- ❑ **User Manual Settings**
- ❑ **Fault Conditions Monitoring**
- ❑ **Tag**
- ❑ **Acquire Functions**

3.1.1 Measured Values

Measured Values	
Load Supply Voltage RMS (V)	23.8
Load Current RMS (A)	0.083
Load OFF Resistance (Ohm)	5000
Isolation Resistance (kOhm)	3000
Coil Integrity	OK
Driver Status	ON
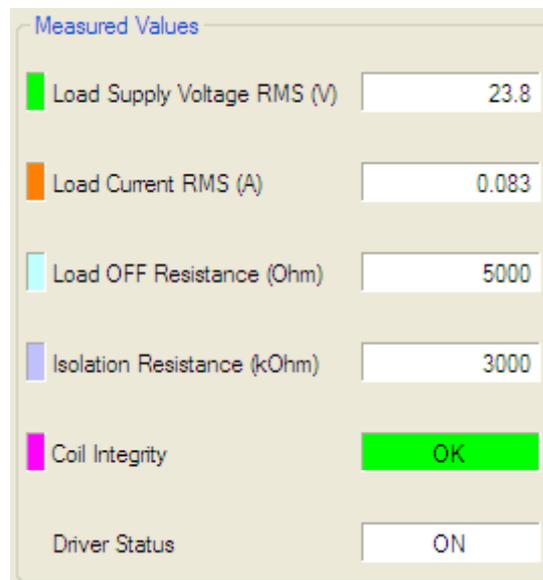
Fig. 8: Measured Values box.

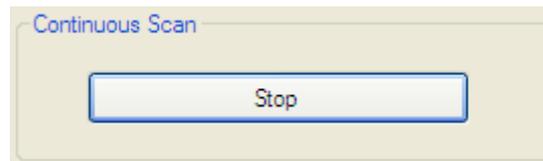The **Measured Values** (see Fig. 8) are periodically acquired from the field, when the Start/Stop button in the **Continuous Scan** box is activated (odometer running in the Bottom Bar). When the Start/Stop button is deactivated, the **Measured Values** are frozen to the last field acquisition. The **Measured Values** include:

- ❏ *Load Supply Voltage RMS (V)*
- ❏ *Load Current RMS (A)*
- ❏ *Load OFF Resistance (Ohm)*
- ❏ *Isolation Resistance (kOhm)*
- ❏ *Coil Integrity*
- ❏ *Driver Status*

The *Load Supply Voltage* indicates the RMS voltage that is actually applied (in ON State, load energized) or that will be applied (in OFF State, load de-energized) to the load. The *Load Current* represents the RMS current that is flowing through the load (hence it will be zero in OFF state). The *Load OFF Resistance* is the load resistance measured in OFF State. In ON State, this value will be stuck at the saturation value (5 kOhm). The *Isolation Resistance* shows the leakage resistance to earth. Also the Isolation Resistance is measured only in OFF State; during ON State, it goes to the saturation value of 3 MOhm. The *Coil Integrity* monitors the status of the relay coil in ON State: the "FAIL" indicates that a relay coil is in short-circuit. The *Driver Status* indicates whether the load has been energized ("ON") or not ("OFF").

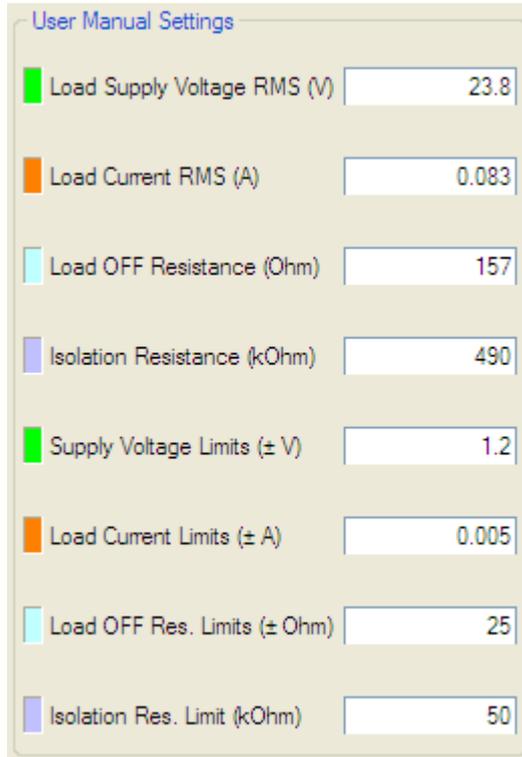See Sec. 3.1.4 for the explanation of the color indicators on the left.

3.1.2 Continuous Scan

Fig. 9: Continuous Scan box.

By pressing the **"Start"** button in the **Continuous Scan** box (see Fig. 9), the module starts acquiring the data field (in the **Measured Values**) periodically. To interrupt the data acquisition the same button – this time the label will be **"Stop"** – shall be pressed.

3.1.3 User Manual Settings

Fig. 10: User Manual Settings box.

The **User Manual Settings** (see Fig. 10) can partially be acquired through the **Acquire Functions** and/or changed manually before being written to the D5293S/D5294S module through the **"Write to Module"** button on the Menu Bar. The **User Manual Settings** include:

- ❑ *Load Supply Voltage RMS (V)*
- ❑ *Load Current RMS (A)*
- ❑ *Load OFF Resistance (Ohm)*
- ❑ *Supply Voltage Limits (± V)*
- ❑ *Load Current Limits (± A)*
- ❑ *Load OFF Resistance Limits (± Ohm)*
- ❑ *Isolation Resistance Limit (kOhm)*

The **User Manual Settings** specify the nominal values and the limits that shall activate the fault indication (red LED and two fault relay contacts). See the Sec. 3.1.4 for more details.

Remember that only after pressing the **"Write to Module"** button on the Menu Bar the **User Manual Settings** and the **Fault Conditions Monitoring** become effective.

See the Sec. 3.1.4 for the explanation of the color indicators on the left.
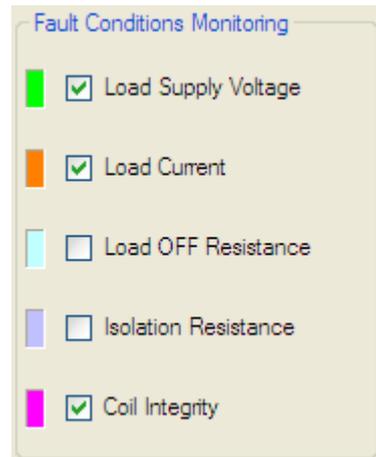
3.1.4 Fault Conditions Monitoring

Fig. 11: Fault Conditions Monitoring box.

The **Fault Conditions Monitoring** (see Fig. 11) indicate which subset of the **User Manual Settings** shall activate the fault. Therefore, if the

- ❑ *Load Supply Voltage* is enabled, a measured *Load Supply Voltage RMS* outside the specified limits will activate the fault.
- ❑ *Load Current* is enabled, a measured *Load Current RMS* outside the specified limits will activate the fault.
- ❑ *Load OFF Resistance* is enabled, a measured *Load OFF Resistance* outside the specified limits shall activate the fault.
- ❑ *Isolation Resistance* is enabled, only a measured *Isolation Resistance* <u>below</u> the specified limit shall activate the fault.
- ❑ *Coil Integrity* is enabled, a coil short circuit in ON state shall activate the fault.

Note that, by activating the monitoring of a fault condition, the related color indicator on the left side becomes brighter together with the corresponding measured value and user manual settings. This color policy allows a fast identification of the quantities that contribute to the fault activation.

The **Fault Conditions Monitoring** are combined with the **Driver Status**. While the *Load Supply Voltage RMS* can always be effective, the *Load Current RMS* and *Coil Integrity* can be active only during the ON State, whereas the *Load OFF Resistance* and the *Isolation Resistance* only during the OFF State.

Note also that only after pressing the **"Write to Module"** button on the Menu Bar the **User Manual Settings** and the **Fault Conditions Monitoring** will be saved onto the module, hence becoming effective.

3.1.5 Acquire Functions
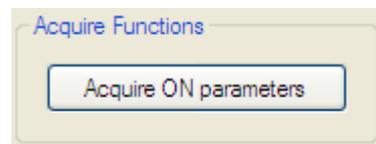
Fig. 12: Acquire Functions box.

The **Acquire Functions** (see Fig. 12) allow the user to acquire the **Measured Values** to the **User Manual Settings**. These functions ease the user's task, while avoiding that the technical details (supply voltage, load current, load resistance, etc.) of the application are necessary for the module configuration. If the load is de-energized (OFF State), the **"Acquire OFF parameters"** button will copy the *Load Supply Voltage RMS* and the *Load OFF Resistance* to the corresponding **User Manual Settings**. If the load is energized (ON State), the **"Acquire ON parameters"** button will copy the *Load Supply Voltage RMS* and the *Load Current RMS* to the corresponding **User Manual Settings**.

Note that the data acquisition button can be pressed only when the continuous scan is active, hence avoiding to acquire outdated field values.

3.1.6 Tag

Fig. 13: Tag box.

The **Tag** (see Fig. 13) provides a label that can be associated to the specific loop.

3.1.7 Fault Activation

The fault is activated if <u>at least one</u> of the following conditions hold:

- ❑ *Load Supply Voltage* Monitoring is enabled AND
  ((*Load Supply Voltage RMS < Load Supply Voltage RMS* Nominal – *Supply Voltage Limits*) OR
  (*Load Supply Voltage RMS > Load Supply Voltage RMS* Nominal + *Supply Voltage Limits*))

- ❑ *Load Current* Monitoring is enabled AND the load is Activated AND
  ((*Load Current RMS < Load Current RMS* Nominal - *Load Current Limits*) OR
  (*Load Current RMS > Load Current RMS* Nominal + *Load Current Limits*))

- ❑ *Load OFF Resistance* Monitoring is enabled AND the load is De-activated AND
  ((*Load OFF Resistance < Load OFF Resistance* Nominal – *Load OFF Resistance Limits*) OR
  (*Load OFF Resistance > Load OFF Resistance* Nominal + *Load OFF Resistance Limits*))

- ❑ *Isolation Resistance* Monitoring is enabled AND the load is De-activated AND
  (*Isolation Resistance < Isolation Resistance* Nominal - *Isolation Resistance Limit*)

- ❑ *Coil Integrity* Monitoring is enabled AND the load is Activated AND
  Coil Integrity is *FAIL*.

Active Monitoring	Driver Status					
	OFF State			**ON State**		
Load Supply Voltage	$V_{meas} < V_{nom} - V_{lim}$	$V_{nom} - V_{lim} \leq V_{meas}$ **or** $V_{meas} \leq V_{nom} + V_{lim}$	$V_{nom} + V_{lim} < V_{meas}$	$V_{meas} < V_{nom} - V_{lim}$	$V_{nom} - V_{lim} \leq V_{meas}$ **or** $V_{meas} \leq V_{nom} + V_{lim}$	$V_{nom} + V_{lim} < V_{meas}$
Load Current	*Not applicable*			$I_{meas} < I_{nom} - I_{lim}$	$I_{nom} - I_{lim} \leq I_{meas}$ **or** $I_{meas} \leq I_{nom} + I_{lim}$	$I_{nom} + I_{lim} < I_{meas}$
Load OFF Resistance	$R_{meas} < R_{nom} - R_{lim}$	$R_{nom} - R_{lim} \leq R_{meas}$ **or** $R_{meas} \leq R_{nom} + R_{lim}$	$R_{nom} + R_{lim} < R_{meas}$	*Not applicable*		
Isolation Resistance	$R_{meas} < R_{nom} - R_{lim}$	$R_{nom} - R_{lim} \leq R_{meas}$		*Not applicable*		
Coil Integrity	*Not applicable*			FAIL		OK

Tab. 1: Combination of Monitoring functions activation with Driver Status.

Tab. 1 shows how the activation of the various Monitoring functions combines with the Driver Status: a red cell indicates that the fault can be activated, while a green cell indicates that the fault cannot be activated.

Note again that only after pressing the **"Write to Module"** button on the Menu Bar, the **User Manual Settings** and **Fault Conditions Monitoring** will be exported to the module, hence becoming effective.

When the fault is activated, the red LED is lighted and the two fault relays open. On the Application Window the **Measured Values** that caused the fault turn red.

3.1.8 Examples

Fig. 14 shows a typical application in ON State, in presence of a Normally Energized 24 Vdc, 250 Ohm solenoid (with series diodes).
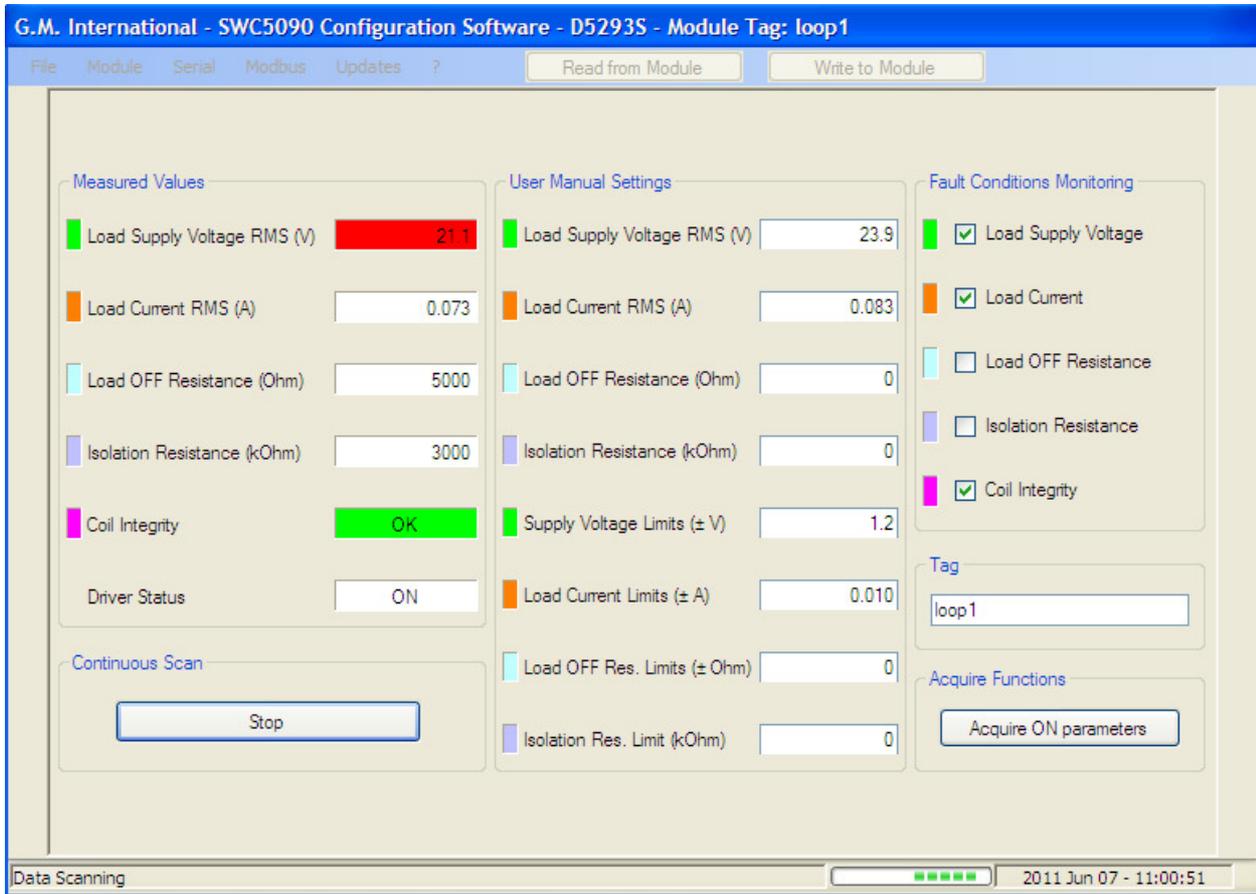
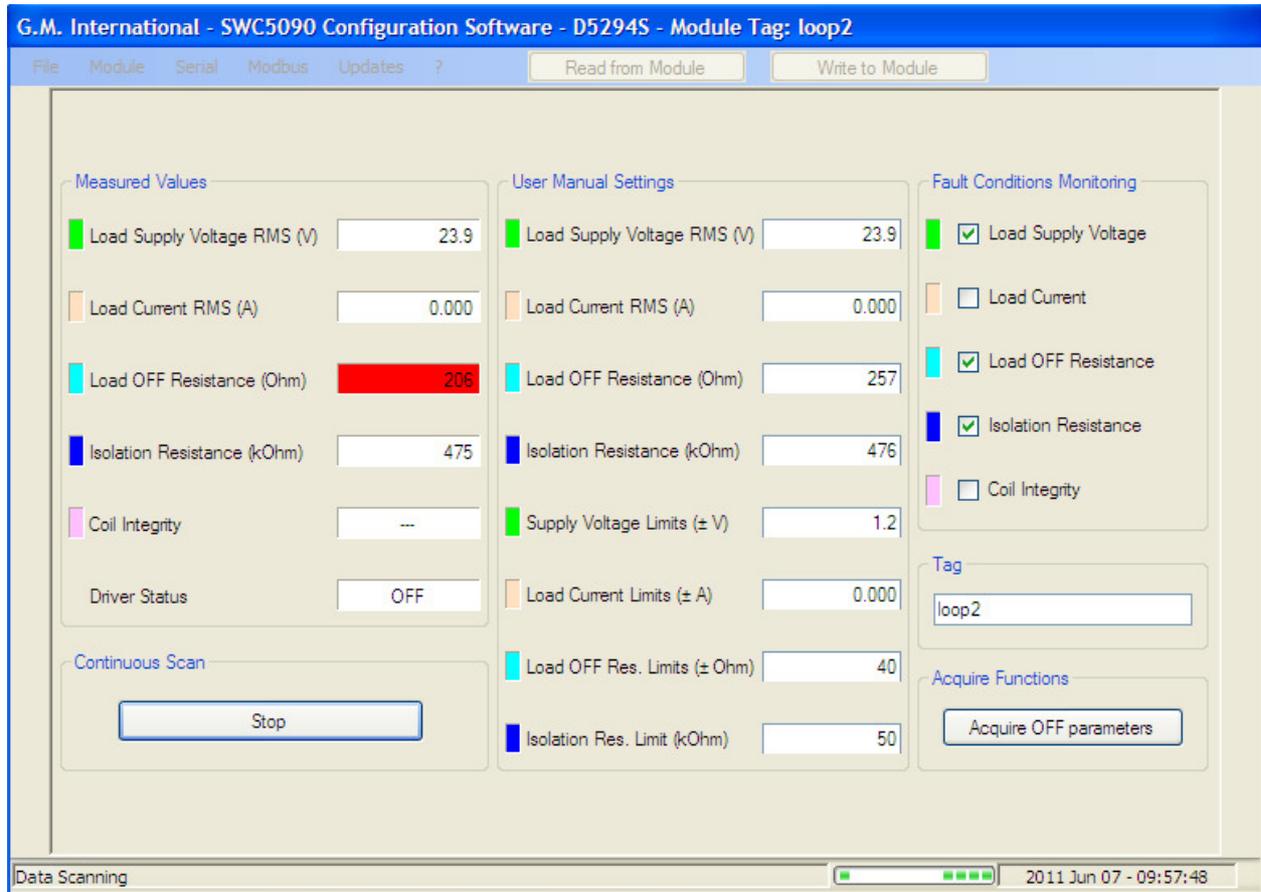**Fig. 14: User Interface example in ON State.**

Fig. 14 shows a typical situation in presence of a Normally Energized load: the monitored quantities are the *Load Supply Voltage RMS*, the *Load Current RMS* and the *Coil Integrity*. As a consequence, the green, the orange and the magenta indicators are lightened up. The **User Manual Settings** have been acquired from the field, by pressing the **"Acquire ON parameters"** button. The measured *Load OFF Resistance* and *Isolation Resistance* are at the saturation values (5 kOhm and 3 MOhm respectively), because they are not measured during ON State. Therefore, the *Load OFF Resistance* and the *Isolation Resistance* are not relevant and cannot activate the fault when the load is ON.

Since the measured *Load Supply Voltage RMS* of 21.1 V is smaller than the configured *Load Supply Voltage RMS* of 23.9 V – *Supply Voltage Limits* of 1.2 V (= 22.6 V) and the *Load Supply Voltage* monitoring is enabled, the fault was activated and the background of the measured *Load Supply Voltage RMS* turned red.
The *Load Current RMS* is still within the range imposed in the **User Manual Settings** box, hence the corresponding background color remained white. Moreover, the *Coil Integrity* is verified, hence the background color is green.

Remember that the configured limits should be far enough from the nominal values to avoid that spurious changes of the measured quantities cause false trips. This precaution holds particularly for the *Load OFF Resistance* and *Isolation Resistance*: in these cases, the configured limits should be larger than the 10% of the corresponding nominal values.

Fig. 15 shows a typical application in OFF State, in presence of a Normally De-energized 24 Vdc, 250 Ohm solenoid (with series diodes).

Fig. 15: User Interface example in OFF State.

Fig. 15 shows a typical situation in presence of a Normally De-energized load: the monitored quantities are the *Load Supply Voltage RMS*, the *Load OFF Resistance* and the *Isolation Resistance*. As a consequence, the green, the light blue and the blue indicators are lightened up. The **User Manual Settings** have been acquired from the field, by pressing the **"Acquire OFF parameters"** button. The measured *Load Current RMS* is zero because the load is de-activated, while the *Coil Integrity* is not evaluated in OFF State. Therefore, the *Load Current RMS* and the *Coil Integrity* are not relevant and cannot activate the fault when the load is OFF.

Since the measured *Load OFF Resistance* of 206 Ohm is smaller than the configured *Load OFF Resistance* of 257 Ohm – *Load OFF Res. Limits* of 40 Ohm (= 217 Ohm) and the *Load OFF Resistance* monitoring is enabled, the fault was activated and the background of the measured *Load OFF Resistance* turned red.
The *Load Supply Voltage RMS* and the *Isolation Resistance* are still within the ranges imposed in the **User Manual Settings** box, hence the corresponding background colors remained white.

Remember that the configured limits should be far enough from the nominal values to avoid that spurious changes of the measured quantities cause false trips. This precaution holds particularly for the *Load OFF Resistance* and *Isolation Resistance*: in these cases, the configured limits should be larger than the 10% of the corresponding nominal values.

4 Configuration File

Each time the main User Interface window is closed, a configuration file (SWC5090.ini) is saved in the installation directory. The configuration file contains the last COM port used for the configuration.

The first time the User Interface is started, a warning is issued, because the configuration file does not exist: it will simply be created the first time the Interface window will be closed. Another warning is issued if the COM port has changed since the last configuration.

5 Installation and quick start

After having checked the requirements at Sec. 1.1, it is possible to proceed with the installation.

5.1 Installing the USB-to-MiniUSB Driver Adapter

To install the adapter, run the CP210x_VCP_Win_XP_S2K3_Vista_7.exe file located in the SILABS_NEW directory, before inserting the adapter into an USB port of the PC. After the installation has completed, insert the adapter in any USB port.

5.2 Installing the SWC5090 Configuration Software

In case a previous version of the SWC5090 Configuration Software was installed on the system, it is preferable to uninstall it before continuing.

Launch the installer Setup.exe in the SWC5090 directory and follow the instructions.

An icon (SWC5090) will be added to the program startup menu at the end of the process.

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