USER MANUAL

Z-SG / Z-SG-L

Advanced Digital

Strain Gauge Converter

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MI002637

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Date	Revision	Notes
15/04/2016	4	New revision
28/09/2016	5	Correct example at chapter 11.2
21/10/2019	6	Edited chapter: Calibration with a standard weight Fix Analog Input Features
23/06/2020	7	Added Warning for max 10000 write times in flash

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Seneca Z-SG / Z-SG-L

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1. Glossary

- *Modbus RTU*

An open protocol for the serial communications developed by Modicon Inc. (AEG Schneider Automation International S.A.S.). Simple and robust, it has since become a de facto standard communication protocol.

For more info http://www.modbus.org/specs.php

2. Measure Calibration with Modbus Registers

2.1. CALIBRATION WITH EASY SETUP

Use the software “Easy Setup” (download from www.seneca.it) to configure and calibrate the Z-SG/Z-SG-L.

2.2. CALIBRATION WITH A STANDARD WEIGHT

WARNING

Gross weight (tare + standard weight) must not exceed the load cell end scale, to avoid serious damage to the cell.

1) Power off the module.

2) Switch Dip-Switch SW2-1 as desired: “OFF”=digital input enabled, digital output disabled; “ON”=digital input disabled, digital output enabled

3) Switch Dip-Switches SW2-2 and SW2-3 as desired: see Dip-Switches table

4) Switch Dip-Switches SW2-4 “OFF” and SW2-5 “ON”

5) Switch Dip-Switches SW2-6 “ON”, SW2-7 “ON”, SW2-8 “ON”

6) Power the module ON

7) Write the sensitivity value in reg. 40044-40045

8) Write the Standard Weight value in reg. 40048-40049

9) Reset the module (write 0xABAC=43948 in reg.40068)

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New sensitivity and Standard weight are saved in the Z-SG/Z-SG-L module.

10) Put the tare on the scales

11) Save the tare value in EEPROM memory (write 0xC2FA=49914 in reg.40068)

12) Put the known weight on the tare

13) Save the known weight in EEPROM memory (write 0xC60C=50700 in reg.40068)

14) Switch Dip-switch SW2-1 OFF SW2-2 ON SW2-3 ON SW2-4 OFF SW2-5 ON SW2-6 ON SW2-7 ON SW2-8 ON

2.3. CALIBRATION WITHOUT A STANDARD WEIGHT

1) Power off the module before configuring it by Dip-Switches to avoid serious damage due to electrostatic discharges.

2) Switch Dip-Switch SW2-1 as desired: “OFF”=digital input enabled, digital output disabled; “ON”=digital input disabled, digital output enabled

3) Switch Dip-Switches SW2-2 and SW2-3 as desired: see Dip-Switches table

4) Switch Dip-Switches SW2-4 “OFF” and SW2-5 “OFF”

5) Switch Dip-Switches SW2-6 “ON”, SW2-7 “ON”, SW2-8 “ON”

6) Power on the module

7) Write the sensitivity value in reg. 40044, 40045 (FP)

8) Write the load cell end scale in reg. 40046, 40047 (FP)

New sensitivity and load cell end scale are saved in Z-SG / Z-SG-L module.

10) Put the tare on the scales

11) Save the tare value in the EEPROM memory (write 0xC2FA=49914 in reg.40068)

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3. MEASURE CALIBRATION WITHOUT MODBUS REGISTERS

3.1. CALIBRATION WITH A STANDARD WEIGHT USING THE CALIBRATION BUTTON

WARNING

Gross weight (tare + known weight) must not exceed the load cell end scale, to avoid serious damage to the cell.

1) Power off the module before configuring it by Dip-Switches to avoid serious damage due to electrostatic discharges.

2) Switch the Dip-Switches SW2-4 “ON” and SW2-5 “ON”. In this way, setting by calibration button is possible.

3) Switch the Dip-Switch SW2-1 “OFF”. In this way, calibration with known weight using calibration button (or digital input) is possible.

4) Switch the Dip-Switches SW2-2 and SW2-3 as shown in the Dip-Switches table, to select one of the possible modes of analog output.

5) Switch the Dip-Switches SW2-6, SW2-7, SW2-8 to choose the load cell sensitivity (see Dip-Switch table)

6) Power on the module

7) Keep the calibration button pressed (or in alternative, only for Z-SG model, use a digital input) until LED ERR is “ON”

8) Release the calibration button

9) Control that the LED ERR is flashing

10) Put the tare on the load cell

11) Keep the calibration button pressed (or in alternative use a digital input signal for the Z-SG model) until LED ERR switches from flashing to “OFF”

The module has acquired the tare value.

12) Keep the calibration button pressed (or in alternative use a digital input signal) until LED ERR is “ON”

13) Release the calibration button

14) Control that the LED ERR is flashing

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15) Put the known weight on the tare

16) Keep the calibration button pressed (or in alternative use a digital input signal) until LED ERR switches from flashing to “OFF”

☞ The module has acquired the known weight value.

17) Power off the module

18) Switch the Dip-Switches SW2-4 “OFF” and SW2-5 “ON”. In this way, the module is calibrated.

19) Power ON the module

☞ If the power is off during this procedure, the calibration setting is lost. Restart the calibration procedure from the first point.

3.2. CALIBRATION WITHOUT A STANDARD WEIGHT USING THE CALIBRATION BUTTON

⚠ WARNING

Gross weight (tare + known weight) must not exceed the load cell end scale, to avoid serious damage to the cell.

1) Power off the module before configuring it by Dip-Switches to avoid serious damage due to electrostatic discharges.

2) Move the Dip-Switches SW2-4 to “ON” and SW2-5 to “OFF”. In this way, the factory calibration mode is selected. Now It is possible to acquire tare value by digital input or calibration button..

3) Switch the Dip-Switch SW2-1 “OFF”. In this way, the calibration button is enabled for digital input (used during the calibration procedure) and it is possible to acquire the tare value.

4) Switch the Dip-Switches SW2-2 and SW2-3 as shown in Dip-Switches table, to select one of the possible modes of analog output.

5) Switch the Dip-Switches SW2-6, SW2-7, SW2-8 to choose the load cell sensitivity (see Dip-Switch table)

6) Power on the module

7) Put the tare on the load cell

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8) Keep the calibration button pressed (or in alternative, only for the Z-SG model, use digital input) until LED ERR is “ON”

 The Z-SG / Z-SG-L module has acquired tare value: this value is saved in EEPROM (keep saved when the power is off).

9) Power off the module

10) Switch the Dip-Switches SW2-4 “OFF” and SW2-5 “OFF”. In this way, the Z-SG / Z-SG-L module is calibrated.

11) Power on the module

 When the calibration procedure is finished, it is possible to calibrate the module by digital input (only Z-SG model) or by calibration button (after switching SW2-1 “OFF”: digital input is enabled). If a digital signal switching (from “0” to “1”) occurs (through screw terminals 1-6), a tare value is saved in RAM memory. This value is erased if the module is powered off or when a new digital signal switching (from “0” to “1”) occurs (through screw terminals 1-6).

 If the module is powered off during this procedure, the calibration setting is lost. Restart the calibration procedure from the first point.

 Analog output end scale is related to load cell end scale, with the following equation:

Real end scale = Load cell end scale – tare

Example:

If load cell end scale is equal to 50kg, tare is equal to 10kg and analog output scale range is 0..10V, the maximum net weight is

Max net weight = 50 – 10 = 40kg

When a weight of 40Kg is measured the Analog Output will reach 100% (10 Volts).

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4. Easy-SETUP

Free-downloadable from the www.seneca.it; the Z-SG/Z-SG-L configuration and the calibration can be performed by RS232 or RS485 bus communication.

5. Modbus RTU protocol

The Modbus protocol supported by the Z-SG I is the Modbus RTU protocol.

The RS485 port Modbus parameters can be configured from Modbus or from Dip switches.

The RS232 COM port parameters are fixed: Baudrate 2400 baud, Parity None, Delay None, Modbus Station address 1.

All registers are “Holding registers” (Read Modbus function 3) with the convention that the first register is the 40001 address (offset 0).

The following Modbus functions are supported:

Read Single Modbus Register (function 3)
Write Single Modbus Register (function 6)
Write Multiple Modbus Registers (function 16)
All values in 32bits are stored into 2 consecutive registers, for example:

Net Weight in floating point 32 bits is stored into registers 40064 and 40065, the most significant word is the register 40064, the less significant word is the 40065 (default).

So the 32bits value is obtained by the following relation:
NetWeight=Reg40064+(Reg40065×2^16)=Reg40064+(Reg40065 ×65536)

For the floating point values the Z-SG-L model can swap the most significant word with the less significant word.

For more information about this protocol please refer to the Modbus specification website:
http://www.modbus.org/specs.php

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5.1. Modbus function code supported

The following Modbus functions are supported:

Read Holding Register (function 3)

Read Input Registers (function 4)

Write Single Register (function 6)

Write Multiple registers (function 16)

5.2. Modbus RTU Register table

In the following table these abbreviations are used:

“MS” = Most significant
“LS” = Less significant
“MSB” = Most significant Byte
“LSB” = Less significant Byte
“MSW” = Most significant Word (16 bits)
“LSW” = Less significant Word (16 bits)
“R” = Read only register
“RW” = Read and write register

“Unsigned 16 bit” = Unsigned 16 bits register
“Signed 16 bit” = 16 bit register with sign
“Float 32 bits” = Floating point single precision 32 bits (IEEE 754) register
“0x” = Hexadecimal Value

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WARNING!

EACH REGISTER IN FLASH CAN ONLY BE WRITTEN ABOUT 10000 TIMES!

Generic parameters of the Z-SG/Z-SG-L module are shown in the following table.

 To choose the number of samples, see the following table.

Number of samples	Weight measure stability	Weight measure speed
High values (MAX = 100)	Better	Worst
Low values (MIN = 1)	Worst	Better

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