USER MANUAL

Z-SG / Z-SG-L

Advanced Digital

Strain gauge converter

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Date	Revision	Notes
15/04/2016	4	New revision
28/09/2016	5	Correct example at chapter 11.2

Table of Contents

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. General characteristics

- *ADC with 24bit resolution*
- *4 wires or 6 wires load cell measure mode*
- *Compression and Traction or only compression load mode*
- *NR 1 analog output configurable in Current or Voltage mode (only Z-SG model)*
- *Load cell sensitivity configurable from +-1mV/V to +-64mV/V or virtually every sensitivity*
- *Measure resolution configurable*
- *RS232 and RS485 port with Modbus RTU protocol*
- *Configurable Moving average filtering*
- *Digital input for Tare acquisition (only Z-SG model)*
- *General purpose Digital input or Digital output (only Z-SG-L model)*
- *Digital output with one configurable weight threshold or "stable measure" condition*
- *Modbus Station address and baud-rate configurable by Dip-Switches*

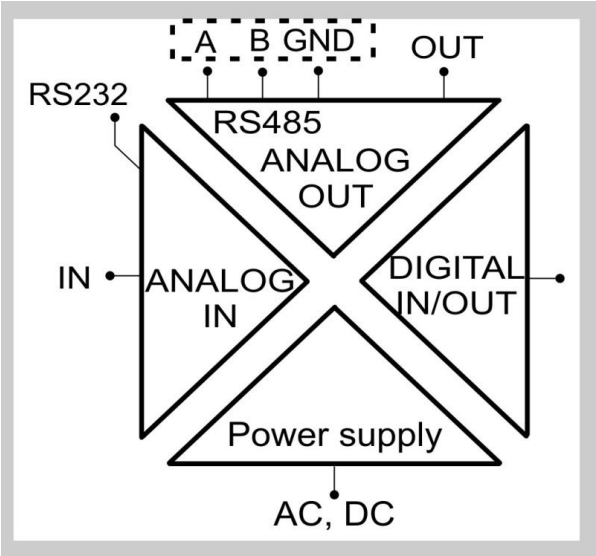
3. Features

ANALOG INPUT	
Number	1 (for one load cell: + Excitation, - Excitation, +Sense, - Sense, + Signal, - Signal)
Resolution	24bits
Sampling frequency	Configurable between: 12.53Hz; 16.65Hz; 24.82Hz; 37.59Hz; 49.95Hz; 50.57Hz; 74.46Hz; 151.71Hz
Rejection	50Hz or 60Hz
Accuracy	Initial: 0.1% of E.E.S.
	Linearity: 0.03% of E.E.S.
	Thermal stability: 25ppm/K

	EMI: < 1%
ANALOG OUTPUT (only Z-SG model)	
Number	1
Accuracy	0.1% of output scale range
Response time (10%-90%)	5ms
Voltage-type OUT	Output scale range configurable between: 0..5V or 0..10V by Dip-Switches. Minimum resistance that can be connected: 2 kΩ
Current-type OUT	Output scale range configurable between: 0..20mA or 4..20mA by Dip-Switches. Max resistance that can be connected: 500 Ω
LOAD CELLS	

A load cell or more load cells (if they are parallel-connected) can be connected to the Z-SG module.	
Load impedance	Minimum impedance that can be connected: 87 Ω. This value can be equivalent impedance of more parallel-connected load cells. For example: up to 4 load cells (if each cell has input impedance: 350Ω), up to 8 load cells (if each cell has input impedance: 1000Ω)
Cell sensitivity	Configurable between: ±1mV/V; ±2mV/V; ±4mV/V; ±8mV/V; ±16mV/V; ±32mV/V; ±64mV/V by Dip-Switches. From +-1mV to virtually infinity from Modbus Registers.
Internal load cell voltage supply	the #7 screw terminal (+Excitation) powers 5Vdc with reference to the #10 screw terminal (-Excitation). The #8 screw terminal (+Sense) reads "+Excitation", the #11 screw terminal (-Sense) reads "-Excitation"
CONNECTIONS	
RS485 interface	IDC10 connector
RS232 interface	Jack stereo 3.5mm connector: plugs into COMport
PROTECTION	
	This module provides inputs protection against the ESD (up to 4kV) for every screw terminals
1500 Vac ISOLATIONS	
	Between: power supply, ModBUS RS485 and analog output, analog

	input, digital input/output



POWER SUPPLY	
Supply voltage	10 – 40 Vdc or 19 – 28 Vac (50Hz - 60Hz)
Power consumption	Max: 2W

The power supply transformer necessary to supply the module must be comply with EN60742 (Isolated transformers and safety transformers requirements).

To protect the power supply, is recommended to install a fuse.

4. LEDs for signalling

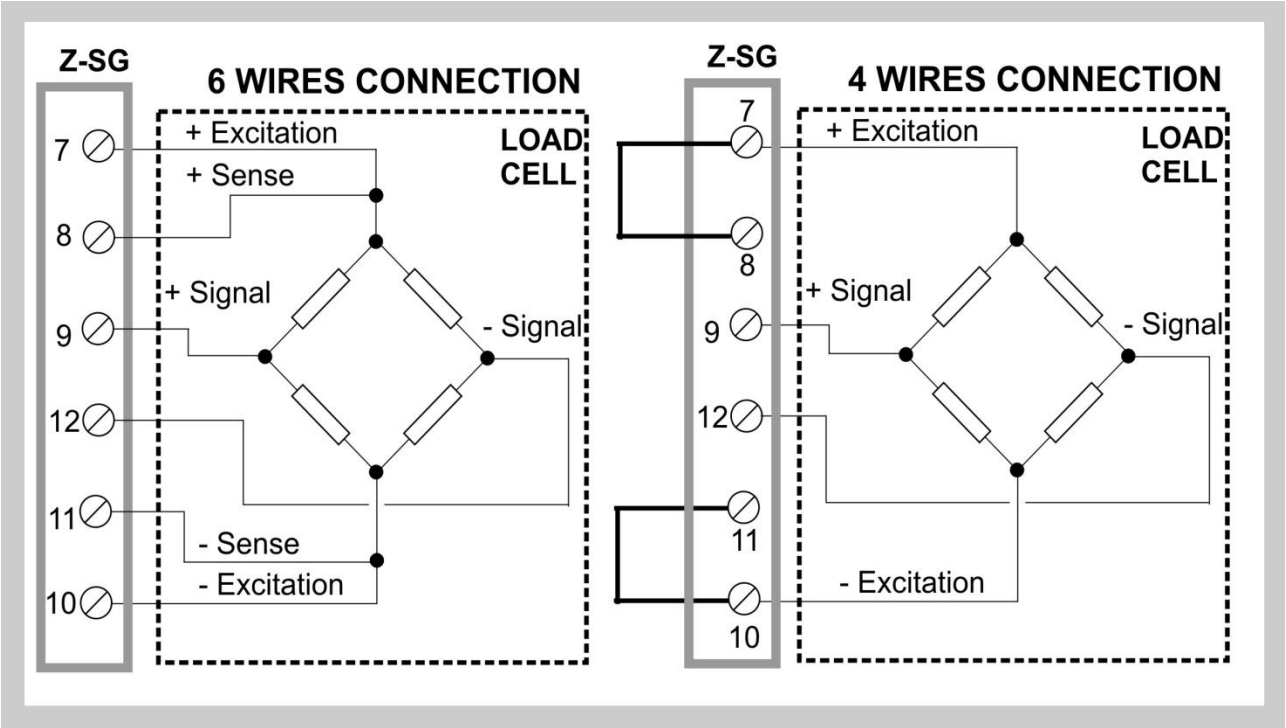
In the front-side panel there are 4 LEDs and their state refers to important operating conditions of the module.

LED	LED status	Meaning
PWR	Constant light	The power is on
ERR	Blinking light	See “Setting by calibration button”
	Turn off after 3 seconds	See “Setting by calibration button”

RX	Constant light	Verify if the bus connection is corrected
	Blinking light	The module received a RS485 data packet
TX	Blinking light	The module sent a RS485 data packet

5. Load Cell: 4 or 6 Wires Connection

The Load Cell can be connected in 6 or 4 wires:



Input	Screw terminal	Meaning
+ Excitation	7	Load cell power (+)
+ Sense	8	Reading of load cell power (+)
+ Signal	9	Load cell output signal (+)
- Signal	12	Load cell output signal (-)
- Sense	11	Reading of load cell power (-)
- Excitation	10	Load cell power (-)

To connect the Z-SG / Z-SG-L to load cell in 4-wires mode:

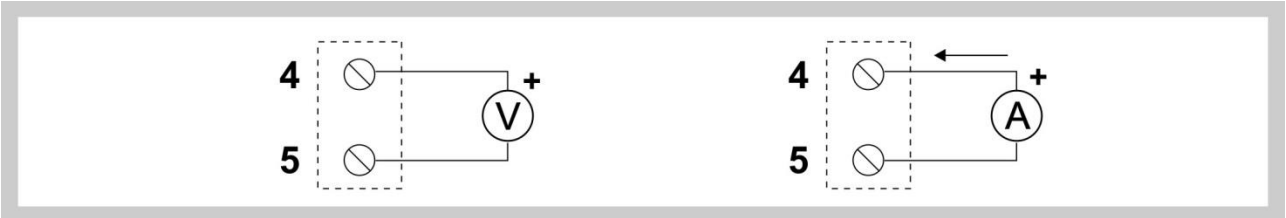
- short-circuit screw terminal 7 to screw terminal 8;

- short-circuit screw terminal 10 to screw terminal 11.

Use shielded cables for connections.

6. ANALOG OUTPUT (ONLY Z-SG MODEL)

The Analog output can be configured in Voltage or Current mode:



”V” means voltmeter, “A” means amperemeter.

The Analog output is proportional to the net weight measure.

The Analog Output 0% and 100% can be fully configurable.

7. “STABLE WEIGHT” CONDITION

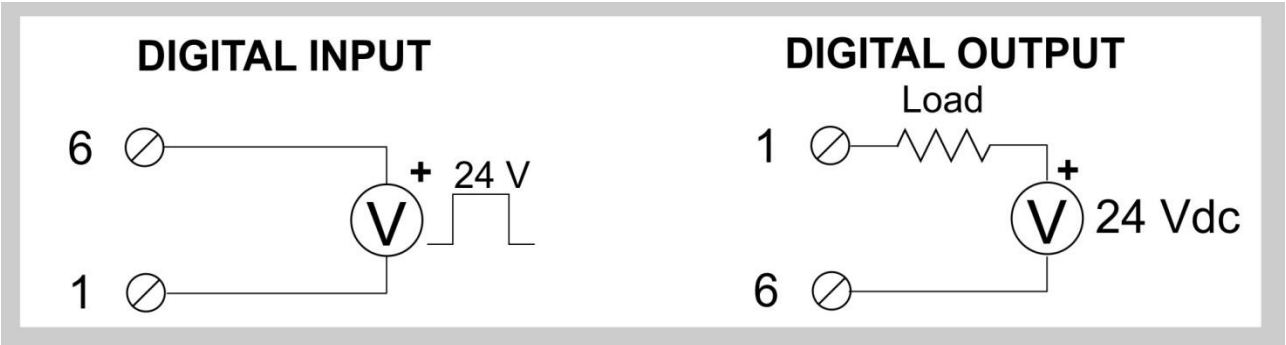
Z-SG / Z-SG-L module allows to detect when a weight measure is stable:

weight stability information is available through 40066 Modbus register (bit Nr 4) or through digital output.

In particular, a weight measure is stable:

If the net weight measure variation (reg.40064-40065), in a given time interval (“delta time”, reg.40058), is less than weight interval (“delta weight”, reg.40056-40057).

8. DIGITAL INPUT / DIGITAL OUTPUT



”V” means equivalent voltage generator.

Z-SG / Z-SG-L module can be configured in digital input mode or (in alternative) in digital output mode only by Dip-Switch.

In the Z-SG model the digital input can be used for:

-Acquire a tare value

-Alternative for the calibration button

in the Z-SG-L model the digital input can be used for acquire a general purpose input.

Digital output allows to open/close a opto-isolated contact

In Z-SG/Z-SG-L model the digital output can be controlled by the firmware with this configurations:

-gross weight is greater than load cell end scale

-weight is stable and net weight is greater than Threshold

-weight is stable

In the Z-SG-L model the digital output can also be controlled from modbus register.

9. Dip-switches table

In the following tables:

box without circle means Dip-Switch=0 (OFF state);

box with circle means Dip-Switch=1 (ON state).

BAUD-RATE (Dip-Switches: SW1)		
1	2	Meaning
		Baud-rate=9600 Baud
	●	Baud-rate=19200 Baud
●		Baud-rate=38400 Baud
●	●	Baud-rate=57600 Baud

ADDRESS (Dip-Switches: SW1)						
3	4	5	6	7	8	Meaning
						Address and Baud-Rate are acquired from memory(EEPROM)
					●	Address=1
				●		Address=2
				●	●	Address=3
			●			Address=4
X	X	X	X	X	X	……
●	●	●	●	●	●	Address=63

DIGITAL INPUT/OUTPUT (Dip-Switches: SW2)	
1	Meaning
	Digital input. Calibration button (used during calibration procedure) is enabled
●	Digital output

ANALOG OUTPUT (Dip-Switches: SW2)		
2	3	Meaning
		Output scale range=0..10V
	●	Output scale range=0..5V
●		Output scale range=0..20mA
●	●	Output scale range=4..20mA

OPERATING MODE (Dip-Switches: SW2)		
4	5	Meaning

		Factory calibration
	●	Calibration with Standard weight
●		Factory calibration using calibration button (or digital input in Z-SG model)
●	●	Calibration with known weight using calibration button (or digital input in Z-SG model)

LOAD CELL SENSITIVITY (Dip-Switches: SW2)			
6	7	8	Meaning
			±1 mV/V
		●	±2 mV/V
	●		±4 mV/V
	●	●	± 8mV/V
●			±16 mV/V
●		●	±32 mV/V
●	●		±64 mV/V
●	●	●	The module acquires load cell sensitivity from register 40044, 40045 (FP): in this case, real numbers for sensitivity are allowed

RS485 TERMINATOR (Dip-Switches: SW3)		
1	2	Meaning
		RS485 terminator disabled
		RS485 terminator enabled

10. Measure Calibration with Modbus Registers

10.1. CALIBRATION WITH EASY SETUP

Use the software “Easy Setup” (download from www.seneca.it) for Configure and Calibrate the Z-SG/Z-SG-L.

10.2. CALIBRATION WITH A STANDARD WEIGHT

WARNING

Gross weight (tare + Standard weight) must not to exceed 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 to “OFF” and SW2-5 to “ON”

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

6) Power ON the module

7) Write 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)

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

10) Put the tare on the balance

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)

10.3. 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 to “OFF” and SW2-5 to “OFF”

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

6) Power on the module

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

8) Write 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 balance

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

11. MEASURE CALIBRATION WITHOUT MODBUS REGISTERS

11.1. CALIBRATION WITH A STANDARD WEIGHT USING THE CALIBRATION BUTTON

WARNING

Gross weight (tare + known weight) must not to exceed 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 to “ON” and SW2-5 to “ON”. In this way, setting by calibration button is possible.

3) Switch the Dip-Switch SW2-1 to “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 Dip-Switches table, to select one of the possible modalities 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 pushed the calibration button (or in alternative, only for Z-SG model, use 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 pushed the calibration button (or in alternative use digital input signal for Z-SG model) until LED ERR switches from flashing to “OFF”

 The module has acquired the tare value.

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

13) Release the calibration button

14) Control that the LED ERR is flashing

15) Put the known weight on the tare

16) Keep pushed the calibration button (or in alternative use 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 to “OFF” and SW2-5 to “ON”. In this way, the module is calibrated.

19) Power ON the module

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

11.2. CALIBRATION WITHOUT A STANDARD WEIGHT USING THE CALIBRATION BUTTON

 **WARNING**

Gross weight (tare + known weight) must not to exceed 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 to “ON” and SW2-5 to “OFF”. In this way, factory calibration using calibration button (or digital input). It is possible to acquire tare value by digital input or calibration button.

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

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

8) Keep pushed the calibration button (or in alternative, only for 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 module is power off).

9) Power off the module

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

11) Power on the module

 When calibration procedure is ended, it is possible to calibrate the module by the digital input (only Z-SG model) or by calibration button (after switching SW2-1 to “OFF”: digital input is enabled). If a digital signal commutation (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 power off or when a new digital signal commutation (from “0” to “1”) occurs (through screw terminals 1-6).

 If the module is power off during this procedure, 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).

12. 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.

13. Modbus RTU protocol

The Modbus protocol supported by Z-SG I sthe 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 register” (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 Modbus specification website:

http://www.modbus.org/specs.php

13.1. 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)

13.2. Modbus RTU Register table

In the following table this 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

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

REGISTER NAME	COMMENT	REGISTER TYPE	R/W	DEFAULT VALUE	MODBUS ADDRESS	OFFSET
Machine id	Id_Code (Module ID)	unsigned 16 bit	R Flash	-	40001	0
Firmware Revision	Firmware Code	unsigned 16 bit	R Flash	-	40002	1

Code						
FpSwap / ADC Polarity	Bit [0] ADC Polarity: 0 = ADC is configured for traction/compression ADC from -31000 to +31000 1 = ADC is configured only for compression ADC from 0 to 62000 Bit[8] FpSwap: Z-SG model Not Used Z-SG-L model: 0 = Floating Point Values are in H/L format (standard) 1 = Floating Point Values are in L/H format Need a reboot	unsigned 16 bit	R/W Flash	0	40003	2
Station Address / Parity	Bit [15..8] RS485 Modbus Station Address: from 1 to 255 Bit [1..0] RS485 Parity: 0 = No Parity 1 = Even Parity 2 = Odd Parity	unsigned 16 bit	R/W Flash	0x0100	40004	3
BaudRate / Delay	Bit [15..8] RS485 Baudrate: 0=4800; 1=9600; 2=19200; 3=38400; 4=57600; 5=115200; 6=1200; 7=2400 Bit [7..0] RS485 Delay: number of the pauses between the end of Rx message and the start of Tx message) (from 0x00=0 to 0xFF=255 1 pause=6 characters)	unsigned 16 bit	R/W Flash	38400 baud no delay	40005	4
Cell_Sensitivity	If Dip-Switches 7-8-9 of SW2 are set to “ON” the module acquires sensitivity [mV/V] from here	Floating Point 32 bit	R/W Flash	2.000 mV/V	40044 - 40045	43-44
Cell Full Scale	Full Scale Cell Value	Floating Point 32 bit	R/W Flash	"10000.000"	40046-40047	45-46
Standard Weight	Standard Weight to use with “calibration mode with standard weight”	Floating Point 32 bit	R/W Flash	"10000.000"	40048-40049	47-48
100% Analog Out Weight	Net Weight that will generate 100% of the analog out	Floating Point 32 bit	R/W Flash	"10000.000"	40050-40051	49-50

<table>
<tr><td>0% Analog Out Weight</td><td>Net Weight that will generate 0% of the analog out</td><td>Floating Point 32 bit</td><td>R/W Flash</td><td>"0.000"</td><td>40052-40053</td><td>51-52</td></tr>
<tr><td>Weight Threshold</td><td>Threshold for Digital Output Threshold mode</td><td>Floating Point 32 bit</td><td>R/W Flash</td><td>"5000.000"</td><td>40054-40055</td><td>53-54</td></tr>
<tr><td>Delta Weight</td><td>Delta Weight for the "Stable" Weight condition</td><td>Floating Point 32 bit</td><td>R/W Flash</td><td>"1.000"</td><td>40056</td><td>55-56</td></tr>
<tr><td>Delta time</td><td>Delta Time for the "Stable" Weight condition.
The value must be multipled x 100ms (for example value of 10 = 1 second)</td><td>unsigned 16 bit</td><td>R/W Flash</td><td>100 ms</td><td>40058</td><td>57</td></tr>
<tr><td>Resolution / Out NO NC / Switch Condition</td><td>Bit[15] Full Resolution:
1 = Full resolution
0 = Resolution from Bit [14...8]

Bit[14..8] Resolution:
Must be stored the Resolution Value/1000 (example: for 30000 points write 30)

Bit[7] NO/NC:
0 = Output is normally Open
1 = Output is normally Close

Bit[6..0] Digital Output Switch condition:
0=gross weight is greater than load cell end scale
1=weight is stable and net weight is greater than Threshold
2=weight is stable
3 = Output is controlled from Modbus Register "Status" (only Z-SG-L)</td><td>unsigned 16 bit</td><td>R/W Flash</td><td>0</td><td>40059</td><td>58</td></tr>
<tr><td>Sampling Frequency / Rejection</td><td>See Sampling Frequency / Rejection
<table><tr><th>Register value</th><th>Sampling Frequency [Hz]</th><th>50 Hz Rejection</th><th>60 Hz Rejection</th></tr><tr><td>0x001B</td><td>151.71</td><td>NO</td><td>NO</td></tr></table></td><td>unsigned 16 bit</td><td>R/W Flash</td><td>0x0052</td><td>40060</td><td>59</td></tr>
</table>

	<table><tr><td>0x0037</td><td>74.46</td><td>NO</td><td>NO</td></tr><tr><td>0x0052</td><td>49.95</td><td>YES</td><td>YES</td></tr><tr><td>0x006D</td><td>37.59</td><td>NO</td><td>YES</td></tr><tr><td>0x009B</td><td>50.57</td><td>NO</td><td>NO</td></tr><tr><td>0x00B7</td><td>24.82</td><td>YES</td><td>NO</td></tr><tr><td>0x00D2</td><td>16.65</td><td>YES</td><td>YES</td></tr><tr><td>0x00ED</td><td>12.53</td><td>NO</td><td>YES</td></tr></table>					
Moving Average Filter	Number of samples in the moving average for weight Measure. Registers 40064 - 40065 contain the result of moving average. Range from 1 to 100.	unsigned 16 bit	R/W Flash	100	40061	60
ADC RAW Gross Value	Analogic to digital converter raw value (Gross weight)	unsigned 16 bit	R RAM	0	40062	61
Integer RAW Net Weight	If bipolar, the value is from –31000 (full traction) to +31000 (full compression) If unipolar, the value is from 0 (no compression) to +62000 (full compression)	Signed 16 bit / Unsigned 16 bit	R RAM	0	40063	62
Net Weight Measure Value	Net Weight Value	Floating Point 32 bit	R RAM	0	40064-40065	63-64
Status	Bit [6] Z-SG-L MODEL: 0= digital input is low 1= digital input is high Z-SG MODEL: not used Bit[5] Z-SG-L MODEL: 1 =digital output controlled by Modbus (if this output mode is selected) Z-SG MODEL: not used	unsigned 16 bit	R RAM	0	40066	65

	Bit [4] Weight stability. 0=weight is not stable 1=weight is stable Bit[3] 1=save the tare value in RAM memory Bit [2] 0=gross weight is greater than tare-value saved in memory; 1=gross weight is less than tare-value saved in memory Bit [1] 0=gross weight is less than load cell end scale; 1=gross weight is greater than load cell end scale Bit [0] 0=net weight is less than Threshold (reg.40054-40055) or weight measure is not stable 1=net weight is greater than Threshold (reg.40054-40055) and weight measure is stable					
Dip Switch	Dip Switches status refreshed at startup Bit [15] Switch1 of “SW1” state. 0= OFF 1 = ON Bit [14] Switch2 of “SW1” state. 0= OFF 1 = ON Bit [13] Switch3 of “SW1” state. 0= OFF 1 = ON Bit [12] Switch4 of “SW1” state. 0= OFF 1 = ON Bit [11] Switch5 of “SW1” state. 0= OFF 1 = ON	unsigned 16 bit	R RAM	0	40067	66

	Bit [10] Switch6 of “SW1” state. 0= OFF 1 = ON Bit [9] Switch7 of “SW1” state. 0= OFF 1 = ON Bit [8] Switch8 of “SW1” state. 0= OFF 1 = ON Bit [7] Switch1 of “SW2” state. 0= OFF 1 = ON Bit [6] Switch2 of “SW2” state. 0= OFF 1 = ON Bit [5] Switch3 of “SW2” state. 0= OFF 1 = ON Bit [4] Switch4 of “SW2” state. 0= OFF 1 = ON Bit [3] Switch5 of “SW2” state. 0= OFF 1 = ON Bit [2] Switch6 of “SW2” state. 0= OFF 1 = ON Bit [1] Switch7 of “SW2” state. 0= OFF 1 = ON Bit [0] Switch8 of “SW2” state. 0= OFF 1 = ON					
Command	Write 43948 for RESET Write 49594 for Store TARE in RAM (equivalent to bit [1] of Register 40066) Write 50700 for Store Standard weight in FLASH Memory Write 49914 for Store Tare value in FLASH and RAM Memory	unsigned 16 bit	R RAM	0	40068	67

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