Z-PC-LINE Z-SG

Strain gauge converter / RS485 Modbus

Z-PC LINE

Analogue I/O modules

CE

- INPUT: 6-wire bridge connections, lowest value 87 Ω suitable for 1..4 loadcells (350 Ω) or 1..8 loadcells (1000 Ω)
- OUTPUT: N.1 channel current 0..20, 4..20 mA or voltage 0..10, 0..5 Vdc
- 1 DIGITAL INPUT/OUTPUT selectable for tare calibration or threshold weight
- SENSITIVITY: from 1 to 128 mV/V
- INTERFACE: RS485 serial communication with Modbus–RTU protocol
- DIP-switch or software programmable functions: full scale, exceed threshold, stable weight
- Galvanic isolation @ 1,5 KV
- Screw-fit terminals removable
- Din rail mounting
- Power supply: 10..40 Vdc, 19..28 Vac

2AR Groupe Votre contact

AIRICOM Groupe 2AR — Ile de France Paris et Nord
65 rue de la Libération - 60710 Chevrières
Tél 03.44.91.04.14 - Fax 03.44.91.04.15
www.airicom.com - info@airicom.com

AURECOM Groupe 2AR — Bretagne et Grand Ouest
La Ville Cognac - 56430 Mauron
Tél 02.97.22.79.72 - Fax 02.97.22.90.51
www.aurecom.fr - info@aurecom.fr

RG2i Groupe 2AR — Rhône Alpes Est et Sud-Est
26 rue Bergson - 42000 Saint-Etienne
Tél 04.77.92.03.56 - Fax 04.77.92.03.57
www.rg2i.com - info@rg2i.fr

TECHNICAL SPECIFICATIONS

Z-SG - Strain gauge converter / RS485 Modbus

ORDER CODES

Code		Description
Model	Z-SG	Strain gauge converter / RS485 Modbus
Software	Z-NET	Configuration sw downloading from www.seneca.it
Bus accessories		**Z-PC DINAL** (Terminal block for power & RS485 communication) **Z-PC DIN2 Z-PC DIN4 Z-PC DIN8** (2, 4, 8 slot block)
Cable	PM001600	Configuration sw downloading from www.seneca.it
K-LINE modules		**K107A** (RS485 repeater), **K107B** (RS232-RS485 converter), **K107USB** (USB-RS485 din rail mounting), **S107USB** (portable)

GENERAL FEATURES

Power supply	10÷40Vdc, 19÷28 Vac
Status indicators	Power Supply Error Data sending Data receiving
Galvanic Isolation	1.500 Vac
Hot swapping	Yes
Power consumption	2,0 W
Humidity	30..90% at +40°C (non condensing)
Mounting	35 mm DIN 46277
Accuracy	0,01% calibration 0,01% linearity 0,0025% /°C Thermal coefficient
Sampling frequency	From 12,53Hz to 151,71 Hz
ADC	24 bit
Software	Tare calibration Span calibration Threshold setting Stable weight detection

RS485 interface	2 wires, baud rate 1.200..115k
RS232 interface	Stereo jack, 2.400 baud, 8 data bit, no parity, 1 bit stop
Protocol	ModBUS RTU Slave
Data memory	EEPROM for all configuration data; storage time: 10 years
Design	Terminal housing for mounting on 35 mm DIN 46277
DIP Switch	Address setting, baud rate setting, digital input/output analog output, sensitivity
Case	"V0" self-extinguishing glass filled nylon case
Dimensions	17,5 x 100 x 112 mm (w x h x d)
Weight	140 g
Operating temperature	-10..+65 °C
Connections	Plug-in screw clamp terminal blocks, wires up to 2.5 mm²
IP Protection	IP 20
Approvals	CE
Standards	EN50081-2, EN50082-2, EN61010-1 ESD: 4KV IEC 61131 (plc fucntion)

INPUT

Type

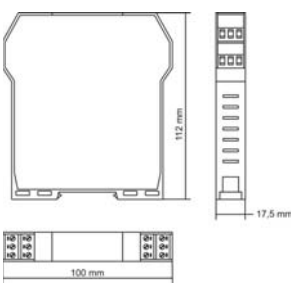
ANALOG: Load cells (strain gauges), Voltage supply of 5Vdc, lowest value 87 Ohm, 6 –wire bridge connections, from 1 to 128 mV.
DIGITAL: Tare calibration and Span

OUTPUT

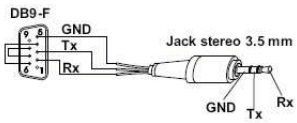
Type

ANALOG: nr 1 channel: current 0..20, 4..20 mA or voltage 0..5, 0..10 Vdc
DIGITAL: nr 1 channel for stable weight or threshold

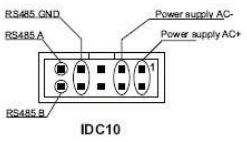
DIMENSIONS AND ELECTRICAL CONNECTIONS



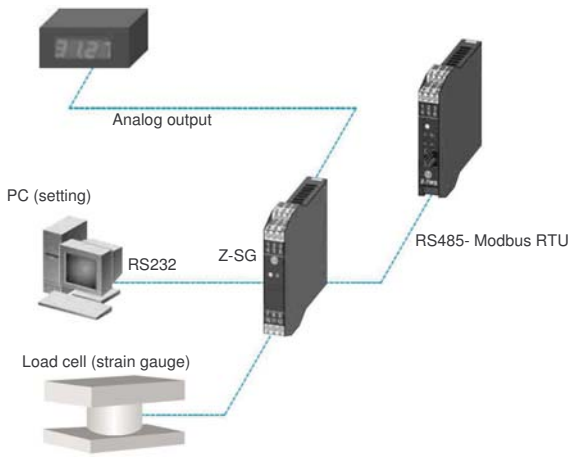
RS232 SERIAL PORT (DB9-stereo jack 3,5 mm connection cable)



POWER SUPPLY AND RS485 SERIAL PORT



APPLICATION EXAMPLE



EN Z-SG Strain Gauge Converter

General Description

Module Z-SG is a strain gauge signal converter. Measurements taken using the 6-wires or 4-wires technique are available through Modbus-RTU serial protocol or the analog output. The module is also characterised by:

- Facilitated power supply and serial bus wiring by means of the bus housed in the DIN rail.
- Communication configurability by DIP-switch or software.
- RS485 serial communication with MODBUS RTU protocol, maximum 32 nodes.
- Protection against ESD discharge up to 4 kV.
- Input insulation: 1500 Vac compared to all the other circuits.
- Insulation between communication and power supply: 1500 Vac.
- Insulation between analog output and power supply: 1500 Vac.
- Analog output in voltage or current, with settable limits.
- Strain gauge calibration with standard weight.
- Strain gauge calibration not required if the sensitivity of the strain gauge is known.
- Configurable digital I/O.
- Rejection at 50 and 60Hz.
- Configurable Resolution.
- Sampling frequency settable from 12,53 Hz to 151,71 Hz.
- Stable weight indication via Modbus register/digital output.
- Remote writing of the tare in volatile and/or non-volatile memory by digital input/Modbus register/Modbus commands.
- Strain gauge directly powered by instrument.
- Ratiometric measurement.
- Sensitivity from ±1 to ±64 mV/V, settable by DIP-switch for integer values, via software for real/integer values.
- Alarm generated when programmable threshold is exceeded.
- Measurement stabilisation through the calculation of the moving average value of a programmable number of samplings.
- Complete configurability by Z-NET3 software.

Technical Specifications

Power supply :	10..40 Vdc or 19..28 Vac (50..60 Hz)
Consumption :	max 2.0 W
Communication Ports :	-RS485, 2400..115200 Baud. -RS232, 2400 Baud, Address: 01, Parity: NO, Data: 8 bits, Stop bits: 1.
Protocol :	MODBUS-RTU
Analog Input	
Input Type :	6-wires or 4-wires differential measurement input.
Full scale :	± 5 mV .. ± 320 mV
Error :	Calibration : 0,01 % of the full scale value. Linearity : 0,01 % of the full scale value. Thermal Stability : 0,0025 % / °C of the full scale value.
Insulation :	1500 Vac respect to the remaining circuits.

Strain gauge characteristics	
Power supply voltage :	5 Vdc
Minimum impedance :	87 Ω equivalent (derived from several strain gauges connected in parallel).
Sensitivity :	From ±1 mV/ V to ±64 mV/V.
Terminals :	4 or 6.
Analog Output	
Output Voltage :	0..10 Vdc, 0..5 Vdc, minimum load resistance : 2 kΩ.
Output Current :	0..20 mA, 4..20 mA, maximum load resistance : 500 Ω.
Transmission error :	0,1 % (max. range).
Response time (10%..90%) :	5 ms.
Digital Input or Output (as alternative)	
Optoisolated digital Input :	Max Voltage : 30 V.
Optoisolated digital Output :	Max Current : 50 mA, Max Voltage : 30 V.
Other Features	
ADC :	24 bit.
Thermal drift :	25 ppm/K.
Sampling frequency :	settable from 12,53 Hz to 151,71 Hz.
Interference rejection :	settable at either 50 Hz or 60 Hz.
Insulation voltage :	1500 Vac between the measurement input and all the other circuits. 1500 Vac between power supply and communication. 1500 Vac between power supply and analog output.
Protection :	IP20
Environmental conditions :	Temperature -10..+65 °C. Humidity 30..90 % non-condensing. Altitude: up to 2000 m a.s.l.
Storage temperature :	-20..+85 °C
Signalling by LED :	Power supply, calibration, RS485 communication.
Connections :	-Removable 3-way screw terminals, 5,08 mm pitch. -Rear IDC10 connector for DIN rail. -3.5 mm stereophonic front jack for RS232 (COM) connection. -Lateral button for strain gauge calibration.
Box :	PBT, black
Dimensions and weight :	100 x 112 x 17,5 mm, 140 g.
Reference standards :	EN61000-6-4/2002 (electromagnetic emission, industrial environment) EN61000-6-2/2005 (electromagnetic immunity, industrial environment) EN61010-1/2001 (safety). All circuits must be insulated from the other circuits under dangerous voltage with double insulation. The power supply transformer must comply with EN60742: "Insulated transformers and safety transformers".

CE

MODULE Z-SG CALIBRATION

The calibration procedures are illustrated in detail on the appropriate attached addendum. Anyway they are briefly listed below.

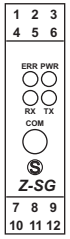
Calibration Mode 1
The user has at his disposal a PC with Z-NET3 software (release 1.02883 or later, to download from www.seneca.it web site) and a weight of known value. It is not necessary that the known weight is equal to the full scale of the strain gauge or to the full scale of the measurement.

Calibration Mode 2
The user has at his disposal a PC with Z-NET3 software and a strain gauge with declared sensitivity.

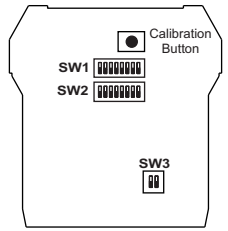
Calibration Mode 3
The user does not have at his disposal a PC but has a weight of known value equal to the full scale of measurement.

Calibration Mode 4
The user does not have at his disposal a PC and a weight of known value but has only a strain gauge with declared sensitivity.

Frontal Panel and Leds



DIP-switch Position
Lateral button for calibration



To use the lateral button for calibration, move to OFF position the DIP-switch 1 of SW2.

DESCRIPTION OF OPERATION

The strain gauge's measured value is translated into an analog output signal (current or voltage). The measurement of the input is available through Modbus RTU protocol upon query by RS485 bus and/or RS232 jack.
Serial communication parameter settings can be made either by Modbus RTU or DIP-switch, whereas the settings selectable via SW2 cannot be configured via Modbus (except the sensitivity).
The instrument's various functions are described below.

Stable Weight Function

The ***Stable Weight*** function informs the user of the precise moment in which weight has stabilised.
This information is available via Modbus register (see the **Modbus Registers** section, Register 40066: STATUS) and can also be signalled by digital output (after previous selection and programming by Modbus). This function is characterised by the two parameters: ΔWeight and ΔTime. The weight is considered stable whenever the net weight in the ΔTime has changed by a quantity lower than ΔWeight.

Digital input/output

The instrument offers the possibility to select either a digital input or a digital output. This selection (input or output) is made only by DIP-switch.
Digital Input: allows to memorize the tare during all the calibration phases and may be used as an alternative to the lateral button.
On the normal functioning it may be used to acquire the temporary tare, which will be lost at the turn off of the module; at the next start up the tare value, acquired on calibration, will be loaded.
Digital Output: the output can be configured via Modbus for three different operating modes and switches to ON or OFF status (always according to Modbus setting) whenever:
1)The Gross Weight exceeds the Full Scale of the strain gauge (Default Setting).
2)The Weight is stable and the Net Weight exceeds the threshold set.
3)The Weight is stable.

Analog Output

The analog output permits the retransmission of the net weight as follows:
-If the Net Weight in units of weight ≤ **MINOUT**, the output relays 0%.
- If the Net Weight in units of weight ≥ **MAXOUT**, the output relays 100%.
-At intermediate values, the progression is linear.
Where **MINOUT** and **MAXOUT** in Mode 1 and 2 may be set via MODBUS (The default values are respectively: 0,00 and 10000,00).

Rejection at 50 and 60 Hz

Rejection to interference at both 60 and 50 Hz can be enabled at the same time.
See **Appendix A** for details on setting and optimisation.

Calculation of Measurement Moving Average

The moving average of a settable number of samples (NR_SAMPLINGS: 1 ..100) can be calculated. In this way, the Net Weight displayed is the calculated moving average value. For Mode 1 and 2, NR_SAMPLINGS may be set via MODBUS (default: 100).

Installation rules

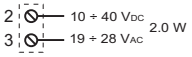
The module is designed to be installed in vertical position on a DIN 46277 rail. In order to ensure optimum performance and the longest working life, the module(s) must be supplied adequate ventilation and no raceways or other objects that obstruct the ventilation slots. Never install modules above sources of heat; we recommend installation in the lower part of the control panel.

Electric connections

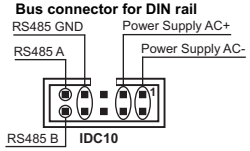
RS485 SERIAL PORT AND POWER SUPPLY

The electric connections for power supply can be made by using either the terminals or the bus for the Seneca DIN rail. The RS485 bus connections are available only by using the bus for the DIN rail.

Power Supply from terminals



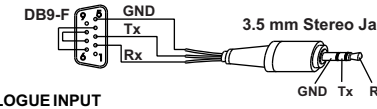
Bus connector for DIN rail



There is no insulation between RS485 and the analog output.

RS232 SERIAL PORT

Connection cable DB9 with a 3.5 mm stereo Jack, can be assembled as indicated in the following figure, or can be bought as an accessory.

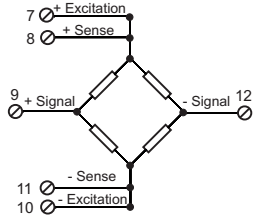


ANALOGUE INPUT

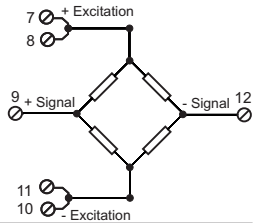
The figure below shows the connections to be made for connection to a strain gauge.
The terminals have the following meaning:

7: Strain gauge positive power supply
8: Strain gauge positive power supply reading
9: Strain gauge positive reading
10: Strain gauge negative power supply
11: Strain gauge negative power supply reading
12: Strain gauge negative reading
The use of shield cables is necessary for the electronic connections.

6 wires measurement



4 wires measurement



ANALOG OUTPUT

The module provides an analog output in voltage (0..10 VDC, 0..5 VDC) or current (0..20 mA, 4..20 mA). We recommend using shielded cables for the electric connections above.

There is no insulation between RS485 and the analog output.

DIGITAL INPUT/OUTPUT

The module can be set to provide either a digital input or digital output.
The connections in the two cases are as follows:

INDICATIONS BY LED ON THE FRONTAL PANEL

PWR LED (GREEN)	Meaning
Steady	Power supply is present.

ERR LED (YELLOW)	Meaning
Steady/Flashing	Signallings relative to the calibration phases. For further informations see the **Calibration Addendum,** containing the calibration procedures.

RX LED (RED)	Meaning
Steady	Data are being received through the RS485 communication port.

TX LED (RED)	Meaning
Steady	Data are being transmitted through the RS485 communication port.

SERIAL INTERFACE

For detailed information on RS485 serial interface, consult the documentation provided by the website www.seneca.it, in the section **Prodotti/Serie Z-PC/MODBUS TUTORIAL**.

DIP-SWITCH SETTING

The settings of the DIP-switches define the module's communication parameters (address and speed) and other parameters we are going to explain. In order for the setting modifications made to be confirmed valid, the module must be switched off and on again.
In all the following tables, the indication ● corresponds to a DIP-switch set in ON; no indication is provided when the DIP-switch is set in OFF.

COMMUNICATION SPEED (BAUDRATE)			
SW1	1	2	
			9600 Baud
		●	19200 Baud
	●		38400 Baud
	●	●	57600 Baud

ADDRESS								
SW1	3	4	5	6	7	8	
								Communication Parameters from EEPROM (*)
							●	Fixed Address: 01
						●		Fixed Address: 02
						●	●	Fixed Address: 03
					●			Fixed Address: 04
	X	X	X	X	X	X		Fixed Address, as from binary representation.
	●	●	●	●	●	●		Fixed Address: 63

DIGITAL I/O SELECTION - ENABLING LATERAL BUTTON OF CALIBRATION		
SW2	1	
		Digital Input. Besides it enables the lateral button of calibration (**).
	●	Digital Output

OUTPUT			
SW2	2	3	
			0..10 V
		●	0..5 V
	●		0..20 mA
	●	●	4..20 mA

UTILIZE / CALIBRATION MODE (**)			
SW2	4	5	
			Modes 2 and 4 are selected.
		●	Modes 1 and 3 are selected.
	●		The tare value acquired by the lateral button or digital input is saved on non-volatile memory (for Modes 2 and 4).
	●	●	Manual calibration of the strain gauge (for Modes 1 and 3).

(*) The default configuration is the following: Address 1, 38400, no parity, 1 stop bit.

(**) For further informations consult the **Calibration Addendum**, containing the calibration procedures.

STRAIN GAUGE SENSITIVITY				
SW2	6	7	8	
				± 1 mV/V
			●	± 2 mV/V
		●		± 4 mV/V
		●	●	± 8 mV/V
	●			± 16 mV/V
	●		●	± 32 mV/V
	●	●		± 64 mV/V
	●	●	●	Sensitivity from MODBUS register **SENSE_RATIO** (40044). Real values (not only integer) may be set too.

RS485 TERMINATOR		
SW3	1	2
	x		Terminator OFF, the SW3-2 is not used.
	●	x	Terminator ON, the SW3-2 is not used.

PROGRAMMING

The release of Z-NET3 software to be used for product's programming/configuration, must be the 1.0.2883 or later. This software may be downloaded from the web site www.seneca.it.
During initial programming, the EEPROM (SW3 ..8 in OFF position) default setting values originally programmed as follows can be used:
Address = 1, **SPEED = 38400 baud**, **PARITY = none**, **BIT NUMBER = 8**, **STOP BIT = 1**.
The module can also be programmed through the front connector (COM) while paying attention to set the following connection parameters:
Address = 1, Speed = 2400 Baud, **PARITY = none**, **STOP BIT = 1**.
The Com communication port behaves in the same way as the RS485 bus port except for the communication parameters described above. It also has priority over the RS485 serial port and closes after 10 seconds of inactivity.

CSQ IQNet ISO9001-2000
SENECA s.r.l.
Via Germania, 34 - 35127 - Z.I. CAMIN - PADOVA - ITALY
Tel. +39.049.8705355 - 8705359 - Fax +39.049.8706287
e-mail: info@seneca.it - www.seneca.it

MODBUS REGISTERS

Z-SG has MODBUS 16 bits (words) registers, accessible by RS485 or RS232 serial communication. In the next paragraphs, we shall describe the supported MODBUS commands, and the functions of the registers.

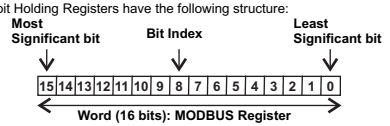
Supported MODBUS Commands

Code	Function	Description
03 (*)	Read Holding Registers	Reading of word registers up to 16 at a time.
04 (*)	Read Input Registers	Reading of word registers up to 16 at a time.
06	Write Single Register	Writing of a word register.
16	Write Multiple Registers	Writing of word registers up to 16 at a time.

(*) The two functions have the same effect.

HOLDING REGISTER

The 16-bit Holding Registers have the following structure:



The Bit notation [x:y] shown in the table indicates all the bits from x to y. For example, Bit [2:1] indicates bit 2 and bit 1, and illustrates the meaning of the various linked combinations of the values of the two bits. Remember that the MODBUS 3, 4, 6 and 16 single and multiple reading and writing functions can be executed on the following registers.

The following indication (only readable or also writable) is provided for every register:

R: Readable W: Writeable

REGISTER	Description	ADD.	R/W
MACHINE ID	**Bit [15:8]: contain the module's ID: 23 (hexadecimal: 0x17). Bit [7:0]: contain the firmware's revision.**	40001	R
FW_CODE	**Register that contains the firmware's internal code.**	40002	R
HW_REL	**Register that contains the instrument's hardware version.**	40003	R
ADDR	**Register for the setting of the module's address and parity control.**	40004	R/W
Bit [15:8]	Set the module's address. Permissible values from **0x00** to **OxFF** (decimal values in the range of 0-255). Default address: 1.		

Bit [7:0]	Set the type of parity control: 00000000 : No parity (NONE) (Default) 00000001 : Even parity (EVEN) 00000010 : Odd parity (ODD)		
BAUDR	**Register for the setting of the Baudrate and the response delay time in characters.**	40005	R/W
Bit [15:8]	Set the serial communication speed value (Baudrate) : 00000000 (0x00) : 4800 Baud. 00000001 (0x01) : 9600 Baud. 00000010 (0x02) : 19200 Baud. 00000011 (0x03) : 38400 Baud (Default). 00000100 (0x04) : 57600 Baud. 00000101 (0x05) : 115200 Baud . 00000110 (0x06) : Not permitted. 00000111 (0x07) : 2400 Baud.		
Bit [7:0]	Set the response delay time in characters that represents the number of pauses of 6 characters each to be entered between the end of the Rx message and the start of the Tx message. Default value: 0.		
SENSE RATIO _FL_H	**Sensitivity of the strain gauge in mV/V (floating point format, most significant word).**	40044	R/W
Bit [15:8]	If the DIP-switches: SW2-7/8/9 are all in ON position, the sensitivity of the strain gauge in mV/V is set by this register (floating point format, most significant word).		
SENSE RATIO _FL_L	**Sensitivity of the strain gauge in mV/V (floating point format, least significant word).**	40045	R/W
FULL SCALE _FL_H	**Full scale of the strain gauge in technical units (floating point format, most significant word).**	40046	R/W
Bit [15:8]	If the full scale of the strain gauge is declared (Mode 2: with both SW2-4/5 in OFF position), sets the full scale of the strain gauge in technical units of weight (kg, pounds, etc). Floating point Format, most significant word. Default: 10000,00.		
FULL SCALE _FL_L	**Full scale of the strain gauge in technical units (floating point format, least significant word).**	40047	R/W
KNOWN WEIGHT_FL_H	**Known weight of the strain gauge in technical units (floating point format, most significant word).**	40048	R/W
Bit [15:8]	If the full scale of the strain gauge is not declared		

	(Mode 1: SW2-4=OFF and SW2-5=ON), it sets the known weight of the strain gauge in technical units of weight (kg, pounds, etc). Floating point format, most significant word. Default: 10000,00		
KNOWN WEIGHT_FL_L	**Known weight of the strain gauge in technical units of weight (floating point format, least significant word).**	40049	R/W
MAXOUT_FL_H	**Value of the net weight in technical units of weight which corresponds to the maximum value of the analog output (floating point format, most significant word).**	40050	R/W
Bit [15:8]	Value of the net weight in technical units of weight which corresponds to the maximum value of the analog output (100%). The value is in floating point format (most significant word) and so it has to be referred to the net weight in floating point format. Default: 10000,00.		
MAXOUT_FL_L	**Value of the net weight in technical units of weight which corresponds to the maximum value of the analog output (floating point format, least significant word).**	40051	R/W
MINOUT_FL_H	**Value of the net weight in technical units of weight which corresponds to the minimum value of the analog output (floating point format, most significant word).**	40052	R/W
Bit [15:8]	Value of the net weight in technical units which corresponds to the minimum value of the analog output (0%). The value is in floating point format (most significant word) and so referred to the net weight in floating point format. Default: 0,00.		
MINOUT_FL_L	**Value of the net weight in technical units of weight which corresponds to the minimum value of the analog output (floating point format, least significant word).**	40053	R/W
THRES_FLOAT_H	**Threshold in unit of weight (floating point format, most significant word).**	40054	R/W
Bit [15:0]	If the net weight (WEIGHT_FLOAT: 40064-65) exceeds the threshold value set and the weight is stable, the digital output (whenever set in the second operating mode) is closed or opened. Default: 0,00.		
THRES_FLOAT_L	**Threshold in unit of weight (floating point format, least significant word).**	40055	R/W

ΔWEIGHT_FLOAT_H	**Weight variation in technical units accepted for stable weight (floating point format, most significant word).**	40056	R/W
Bit [15:0]	With the Register 40058 (ΔTime), it permits to establish when the weight is stable. This represents the variation in units of weight accepted for stable weight. Weight is considered stable whenever the net weight (WEIGHT_FLOAT: 40064-65) in the ΔTime has changed by a quantity < than ΔWeight. Default: 1.		
ΔWEIGHT_FLOAT_L	**Weight variation in technical units accepted for stable weight (floating point format, least significant word).**	40057	R/W
ΔTIME	**Time in units of 100 ms used to establish whether or not the weight is stable.**	40058	R/W
Bit [15:0]	With the registers 40056-57 (ΔWeight) establishes whether or not the weight is stable, and is expressed in units of 100 ms. Weight is considered stable whenever the net weight (WEIGHT_FLOAT: 40064-65) in the ΔTime has changed by a quantity < than ΔWeight. Default Value: 1 (100 ms).		
RESOLUTION/ DIGITAL_OUT_TYPE	**Sets the resolution and the shifting of the digital output (if selected by DIP-switch).**	40059	R/W
Bit 15	0: Resolution set by bit [14:8] 1: 24 bit Resolution		
Bit [14:8]	If Bit 15 = 0 it sets the resolution value multiplied by 1000. Default: 30000 monopolar points.		
Bit 7	Defines the shifting of the output upon the appearance of the condition set by the Bit[6:0]: 0 : The output is normally opened and closes whenever the condition selected arises (default). 1 : The output is normally closed and opens whenever the condition selected arises.		
Bit [6:0]	Defines the operation of the digital output and switches to ON or OFF (according to the status of Bit 7) when any of the following conditions arise: 0: The Gross Weight exceeds the Full Scale (Default setting). 1: The Weight is stable and the Net Weight exceeds the threshold set. 2: The Weight is stable. Net Weight=WEIGHT_FLOAT (40064-65).		

CONFIG FREQ_REJ	**Configuration register for setting of rejection and sampling frequency.**	40060	R/W
Bit [15:0]	The value of this register sets the sampling frequency and the characteristics interference rejection. ***Appendix A*** provides the values of these parameters according to the value set in this register. Default value: 82 (0x0052), corresponding to the Sampling Frequency: 49,95 Hz, Rejection at 50 Hz and 60 Hz: Enabled.		
NRSAMPLINGS_TARE	**Sets the number of samplings of the ADC upon which the moving average will be calculated and indicates the tare value used.**	40061	R/W
Bit [15:9]	Not used		
Bit 8	*Used Tare value (only for Modes 2 and 4):* 0: the value of the tare had not never been written on the memory: at the start up the factory value will be loaded. 1: the value of the tare had been written at least once on the memory: at the start the last set value will be loaded.		
Bit [7:0]	The number of samplings upon which the moving average must be calculated. The WEIGHT_FLOAT Register provides the mean value calculated. Permissible values: 1..100. Default: 100.		
ADC_VAL	**Filtered ADC value.**	40062	R
WEIGHT_SHORT	**Net weight value in ±30000 scale.**	40063	R
	Net weight value in ± 30000 scale. Equal to 0: if the WEIGHT_FLOAT (40064-65) is equal to MINOUT_FL (40052-53, value of the weight corresponding to the minimum value of the analog output). Equal to 30000: if the WEIGHT_FLOAT is equal to MAXOUT_FL (40050-51, value of the weight corrisponding to the maximum value of the analog output). Values<0 if WEIGHT_FLOAT<MINOUT_FL. Limited: -31000..+31000.		
WEIGHT_FLOAT_H	**Register containing the net weight value in technical units of weight (floating point format, most significant word).**	40064	R
WEIGHT_FLOAT_L	**Register containing the net weight value in technical units of weight (floating point format, least significant word).**	40065	R

STATUS	**Status Register**	40066	R/W
Bit [15:5]	Not used.		
Bit 4	*Stable weight* 1: signals that the weight is stable.		
Bit 3	*Memorizing of the tare on volatile memory:* 1 : a memorizing of the tare is required (the value is valid up to the next start up of the module).		
Bit 2	*Gross Weight ≤ Memorized Tare:* 1: signals that the gross weight is ≤ *Tare value saved in memory.*		
Bit 1	*Gross Weight* ≥ Max Full Scale of the strain gauge: 1 : signals that the gross weight is ≥ Maximum allowed Full Scale.		
Bit 0	*Alarm Status:* 1: It signals that the net weight value has exceeded the threshold and that the weight is stable.		
STATUS_DIP-SWITCH	**Status of the Dip-switches.**	40067	R
Bit 15	Indicates the status of DIP1-SW1.		
Bit 14	Indicates the status of DIP2-SW1.		
Bit 13	Indicates the status of DIP3-SW1.		
Bit 12	Indicates the status of DIP4-SW1.		
Bit 11	Indicates the status of DIP5-SW1.		
Bit 10	Indicates the status of DIP6-SW1.		
Bit 9	Indicates the status of DIP7-SW1.		
Bit 8	Indicates the status of DIP8-SW1.		
Bit 7	Indicates the status of DIP1-SW2.		
Bit 6	Indicates the status of DIP2-SW2.		
Bit 5	Indicates the status of DIP3-SW2.		
Bit 4	Indicates the status of DIP4-SW2.		
Bit 3	Indicates the status of DIP5-SW2.		
Bit 2	Indicates the status of DIP6-SW2.		
Bit 1	Indicates the status of DIP7-SW2.		
Bit 0	Indicates the status of DIP8-SW2.		
COMMAND	**Commands Register.**	40068	R/W
Bit [15:0]	By inserting the next codes the following actions are performed: **43948 (0xABAC):** Module reset. **49594 (0xC1BA):** Save the tare in volatile memory. **49914 (0xC2FA):** Save the tare in volatile and non- volatile memory. **50700 (0xC60C):** Save the known weight in non-volatile memory.		

Remote Memorizing of the Tare

The memorizing of the tare may be perfomed in the following ways:

Action	Memorizing in Volatile Memory	Memorizing in Non-Volatile Memory	Notes
Digital Input with ON 4 5	●		-
Digital Input with ON 4 5		●	Only for Modes 2 or 4. Once the tare has been saved, restart the module in these modes.
Digital Input with ON 4 5	●		-
Bit in reg. STATUS or Command 49594 with ON 4 5	●		-
Bit in reg. STATUS or Command 49594 with ON 4 5	●		-
Command: 49914 with ON 4 5	●	●	-
Command: 49914 with ON 4 5	●	●	-

APPENDIX A

Configuration of Sampling Frequency, Rejection.

The table below provides the values that can be set in the Modbus register **CONFIG FREQ_REJ** (40060) together with the corresponding sampling frequency values. It is also indicating whether rejections are enabled at 50 or 60 Hz.

Value of Register: CONFIG FREQ_REJ (40060)	Sampling Freq. (Hz)	Rejection: 50 Hz	Rejection: 60 Hz
27	151,71	NO	NO
55	74,46	NO	NO
82	49,95	YES	YES
109	37,59	NO	YES
155	50,57	NO	NO
183	24,82	YES	NO
210	16,65	YES	YES
237	12,53	NO	YES

CSQ IQNet ISO9001-2000

SENECA s.r.l.
Via Germania, 34 - 35127 - Z.I. CAMIN - PADOVA - ITALY
Tel. +39.049.8705355 - 8705359 - Fax +39.049.8706287
e-mail: info@seneca.it - www.seneca.it

Addendum for Calibration and Functioning of the strain gauge converter Z-SG

MODE 1 - TO UTILIZE IF THE USER HAS AT HIS DISPOSAL:

- A COMPUTER WITH INSTALLED Z-NET3 SOFTWARE (Version 1.0 build 2883 or later)

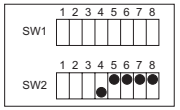
- A WEIGHT OF KNOWN VALUE.

PREPARATION TO THE CALIBRATION

ATTENTION:
a - the gross weight (tare + known_weight) must not exceed the maximum capacity of the strain gauge to avoid damaging it;
b - do not consider the values provided by the analog output during the calibration phase.

1 - Disconnect the module's power supply.

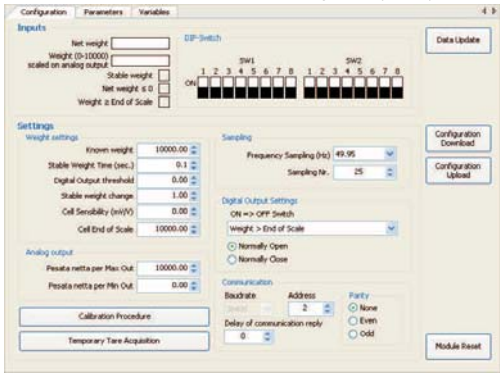
2 - Set the **dip-switch SW2**:
4 OFF, 5 ON, 6 ON, 7 ON and 8 ON as the below figure:



3 - Start the Z-NET3 software on the PC.

4 - Power the Z-SG module.

5 - In Z-NET3 set:
- the sensitivity of the strain gauge;
- the full scale of the strain gauge;
- the value of the known weight, expressed on the same technical unit used for the full scale of the strain gauge;
- the start scale and the full scale of the analog output (if used).



6 - Download (write) the configuration to the module.

INITIAL CALIBRATION OF THE TARE AND THE FULL SCALE

7 - Start the calibration procedure in Z-NET3 and execute step by step all the operations required by the program:

- acquisition of the tare;
- acquisition of the known weight after having positioned it on the measurement system.

8 - At the end of the calibration procedure the system is ready for use.

MODE 2 - TO UTILIZE IF THE USER HAS AT HIS DISPOSAL:

- A COMPUTER WITH INSTALLED Z-NET3 SOFTWARE (Version 1.0 build 2883 or later)
- A STRAIN GAUGE WITH DECLARED SENSITIVITY.

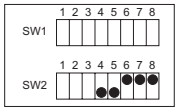
This mode does not require a weight of known value for the initial calibration.

PREPARATION TO THE CALIBRATION

ATTENTION:
Do not consider the values provided by the analog output during the calibration phase.

1 - Disconnect the module's power supply.

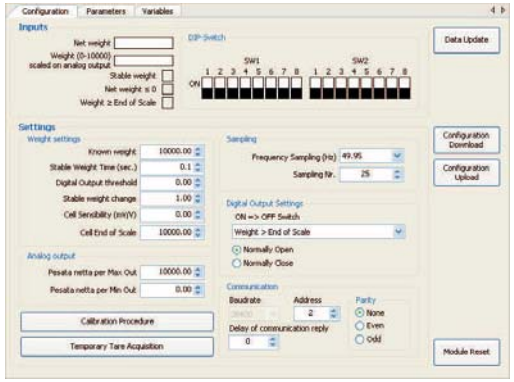
2 - Set the **dip-switch SW2**:
4 OFF, 5 OFF, 6 ON, 7 ON and 8 ON as in the below figure:



3 - Start the Z-NET3 software on the PC.

4 - Power the Z-SG module.

5 - In Z-NET3 set:
- the sensitivity of the strain gauge;
- the full scale of the strain gauge;
- the start scale and the full scale of the analog output (if used).



6 - Download (write) the configuration to the module.

INITIAL CALIBRATION OF THE TARE AND OF THE FULL SCALE

7 - Launch the calibration procedure in Z-NET3 and execute step by step all the operations required by the program:

- acquisition of the tare;

8 - At the end of the calibration procedure the system is ready for use.

MODE 3 - TO UTILIZE IF:

- THE USER DOES NOT HAVE A COMPUTER

- THE USER HAS A WEIGHT OF KNOWN VALUE TO ASSOCIATE TO THE MAXIMUM VALUE OF THE ANALOG OUTPUT.

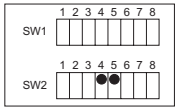
= FS analog output

PREPARATION TO THE CALIBRATION

ATTENTION:
a - the gross weight (tare + known_weight) must not exceed the maximum capacity of the strain gauge to avoid damaging it;
b - do not consider the values provided by the analog output during the calibration phase.

1 - Disconnect the module's power supply.

2 - Set the **dip-switch SW2**:
4 ON and 5 ON as in the figure:

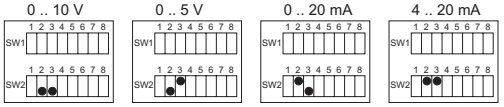


3 -Set SW2 dip-switches 6, 7 and 8 according to the following table:

STRAIN GAUGE SENSITIVITY	DIP 6 of SW2	DIP 7 of SW2	DIP 8 of SW2
> 0 mV/V & ≤ 1 mV/V	OFF	OFF	OFF
> 1 mV/V & ≤ 2 mV/V	OFF	OFF	ON
> 2 mV/V & ≤ 4 mV/V	OFF	ON	OFF
> 4 mV/V & ≤ 8 mV/V	OFF	ON	ON
> 8 mV/V & ≤ 16 mV/V	ON	OFF	OFF
> 16 mV/V & ≤ 32 mV/V	ON	OFF	ON
> 32 mV/V & ≤ 64 mV/V	ON	ON	OFF

4 - Set the SW2-1 OFF; this operation is necessary to use the button present on the lateral side of the module, or the digital input, for the acquisition of the values during the calibration phase.

5 - Set the dip 2 and 3 of SW2 to select the type of the analog output as in the following figure:



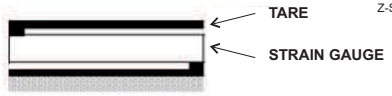
6 - Power the Z-SG module.

The module is now in manual calibration mode.

CALIBRATION OF THE START SCALE

7 - Press the calibration button (or give the command to the digital input) until the yellow LED lights on; so release the button. After some seconds the LED begins flashing.

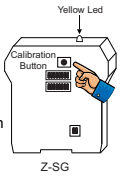
8 - Place the tare in the weighing system (see figure):



9 - Press again the calibration button (or give the command by the digital input) until the yellow LED switches off.

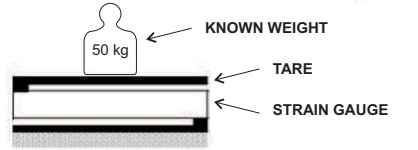
At this point the module has acquired the tare of the system.

CALIBRATION OF THE FULL SCALE



10 - Press the calibration button (or give the command to the digital input) until the yellow LED lights; so release the button. After some seconds the LED begins flashing.

11 - Place the known weight + the tare in the weighing system (see figure):

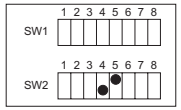


12 - Press the lateral button again (or give the command by the digital input) until the yellow LED switches off.

At this point the module has acquired the known weight.

13 - Disconnect the module's power supply.

14 - Set SW2 **DIP-switch 4 OFF and 5 ON** (see figure):



The system is ready for use.

NOTES:

1 - Once the calibration procedure has been completed, it will be still possible to perform the system TARE by using the external command (after having configured the digital I/O, terminals 1 and 6, as digital input).
However this value of the tare will be lost at the next command of TARE given by the digital input or at the module power-off.
At module restart, the tare value acquired during the initial calibration will be loaded.

2 - If, during the calibration procedure, the module is powered-down, the calibration is lost. At the power-on, it will be necessary to start the operation from the beginning.

MODE 4 - TO UTILIZE IF:

- THE USER DOES NOT HAVE A COMPUTER

- THE USER HAS AT HIS DISPOSAL A STRAIN GAUGE WITH DECLARED SENSITIVITY.

PREPARATION TO THE CALIBRATION

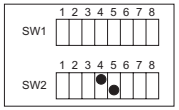
ATTENTION:

a - the gross weight (tare + known_weight) must not exceed the maximum capacity of the strain gauge to avoid damaging it;

b - do not consider the values provided by the analog output during the calibration phase.

1 - Disconnect the module's power supply.

2 - Set the **dip-switch SW2**:
4 ON and 5 OFF as in the below figure:

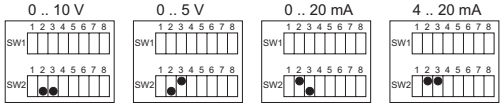


3 -Set SW2 dip-switches 6, 7 and 8 according to the following table:

STRAIN GAUGE SENSITIVITY	DIP 6 of SW2	DIP 7 of SW2	DIP 8 of SW2
> 0 mV/V & ≤ 1 mV/V	OFF	OFF	OFF
> 1 mV/V & ≤ 2 mV/V	OFF	OFF	ON
> 2 mV/V & ≤ 4 mV/V	OFF	ON	OFF
> 4 mV/V & ≤ 8 mV/V	OFF	ON	ON
> 8 mV/V & ≤ 16 mV/V	ON	OFF	OFF
> 16 mV/V & ≤ 32 mV/V	ON	OFF	ON
> 32 mV/V & ≤ 64 mV/V	ON	ON	OFF

4 - Set SW2-1 OFF; this operation is necessary to use the button present on the lateral side of the module, or the digital input, for the acquisition of the values during the calibration phase.

5 - Set 2 and 3 of SW2 to select the type of analog output as in the following figure:

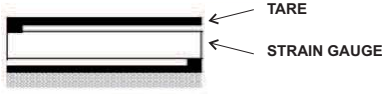


6 - Power the Z-SG module.

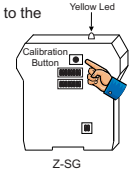
With the configuration of 4 and 5 of SW2 set as in point 2, it is possible to save the value of the system tare in eeprom by performing the following steps.

CALIBRATION OF THE START SCALE (= TARE OF THE SYSTEM)

7 - Place the tare in the weighing system (see figure):



8 - Press the calibration button (or give the command to the digital input) until the yellow LED lights.

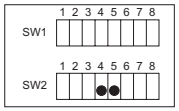


At this point the module has acquired the tare which will be used till the next calibration procedure.

The module stops waiting for a power-off.

9 - Disconnect the module's power supply.

10 - Set SW2 **switch 4 and 5 OFF** as in figure:



The system is ready for use.

NOTES:

1 - Once the calibration procedure has been completed, it will be still possible to perform the system TARE by using the external command (after having configured the digital I/O, terminals 1 and 6, as digital input).
However this value of the tare will be lost at the next command of TARE given by the digital input or at the module power-off.
At module restart, the tare value acquired during the initial calibration will be loaded.

2 - If, during the calibration procedure, the module is powered-down, the calibration is lost. At the power-on, it will be necessary to start the operation from the beginning.

3 - With this mode, the FS of the analog output is associated to the FS of the strain gauge; however this will be possible only if the tare of the system is null, otherwise the allowed FS will be:

$$FS_{SYSTEM} = FSSTRAIN\_GAUGE - TARE$$

Example: If the strain gauge has a FS equal to 50 Kg, the tare is 10 Kg and the analog output is set as 0..10 V, the maximum FS of the system will be:

$$FS_{SYSTEM} = 50 - 10 = 40\ Kg$$

And in correspondence to this weight, the analog output is in percentage:

$$\frac{50\ Kg - 10\ Kg}{50\ Kg} \times 100 = 80\ \%$$

Corresponding to a voltage value equal to 8 V.