USER MANUAL

Z-SG3 / ZE-SG3

SENECA S.r.l.
Via Austria 26 – 35127 – Z.I. - PADOVA (PD) - ITALY
Tel. +39.049.8705355 – 8705355 Fax +39 049.8706287
www.seneca.it

ORIGINAL INSTRUCTIONS

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CONTACT US	
Technical support	supporto@seneca.it
Product information	commerciale@seneca.it

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11/12/2023	2	Added new feature from firmware rev 1025: Analog output writeable from modbus	MM
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1. INTRODUCTION

ATTENTION!

This user manual extends the information from the installation manual to the configuration of the device. Use the installation manual for more information.

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1.1. DESCRIPTION

Z-SG3 and ZE-SG3 are load cell converters (strain gauge).
The measurement, carried out with the 4 or 6-wire technique, is available via the TCP-IP Modbus server (ZE-SG3 model only) or via RTU slave Modbus protocols.
The devices are equipped with a new noise filter specifically developed to obtain a rapid response time. The device is fully configurable also via the webserver (ZE-SG3 model only).
.

MODEL	*ETHERNET PORT*	*USB PORT*
Z-SG3	NO	YES
ZE-SG3	1 PORT 10/100 Mbit	NO

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1.2. LOAD CELL CONNECTION

It is possible to connect the converter to the load cell in 4- or 6-wire mode. 6-wire measurement is preferable for measurement accuracy.
The load cell power supply is provided directly by the device.

1.3. 4- OR 6-WIRE LOAD CELL CONNECTION

A load cell can have a four-wire or six-wire cable. In addition to having the +/- excitation and +/- signal lines a six-wire cable also has the +/- sense lines. It is a common misconception to think that the only difference between 4- or 6-wire load cells is the possibility of the latter to measure the actual voltage at the load cell. A load cell is compensated to work within specifications in a certain temperature range (usually -10 - +40°C). Since the cable resistance depends on the temperature, the response of the cable to temperature changes must be eliminated. The 4-wire cable is part of the load cell temperature compensation system. The 4-wire load cell is calibrated and compensated with a certain amount of cable connected. For this reason, never cut the cable of a 4-wire load cell. The cable of a 6-wire cell, on the other hand, is not part of the load cell temperature compensation system. The sense lines are connected to the R-SG3 sense terminals, to measure and adjust the actual voltage of the load cell. The advantage of using this "active" system is the possibility of cutting (or extending) the 6-wire load cell cable to any length. It must be considered that a 6-wire load cell will not reach the performance declared in the specifications if the sense lines are not used.

1.4. CHECKING THE LOAD CELL OPERATION

Before starting the configuration of the device it is necessary to verify the correctness of the wiring and the integrity of the load cell.

1.4.1. CHECKING CABLES WITH A DIGITAL MULTIMETER

First you need to check with the load cell manual that there are about 5V DC between the +Excitation and –Excitation cables. If the cell has 6 wires check that the same voltage is also measured between +Sense and –Sense.
Now leave the cell at rest (without the tare) and check that the voltage between the +Signal and –Signal cables is around 0 V.
Now unbalance the cell by applying a compression force, checking that the voltage between the +Signal and –Signal cables increases until it reaches the full scale (if possible) where the measurement will be approximately:

5* (cell sensitivity) mV.

For example, if the declared cell sensitivity is 2 mV/V, 5 * 2 = 10 mV must be obtained.

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In the case of bipolar measurement only (compression/traction) it is necessary to completely unbalance the cell even in traction, in this case the same value must be measured between the +Signal and –Signal cables but with the negative sign:

-5* (cell sensitivity) mV.

1.4.2. CONNECTION OF MORE LOAD CELLS IN PARALLEL

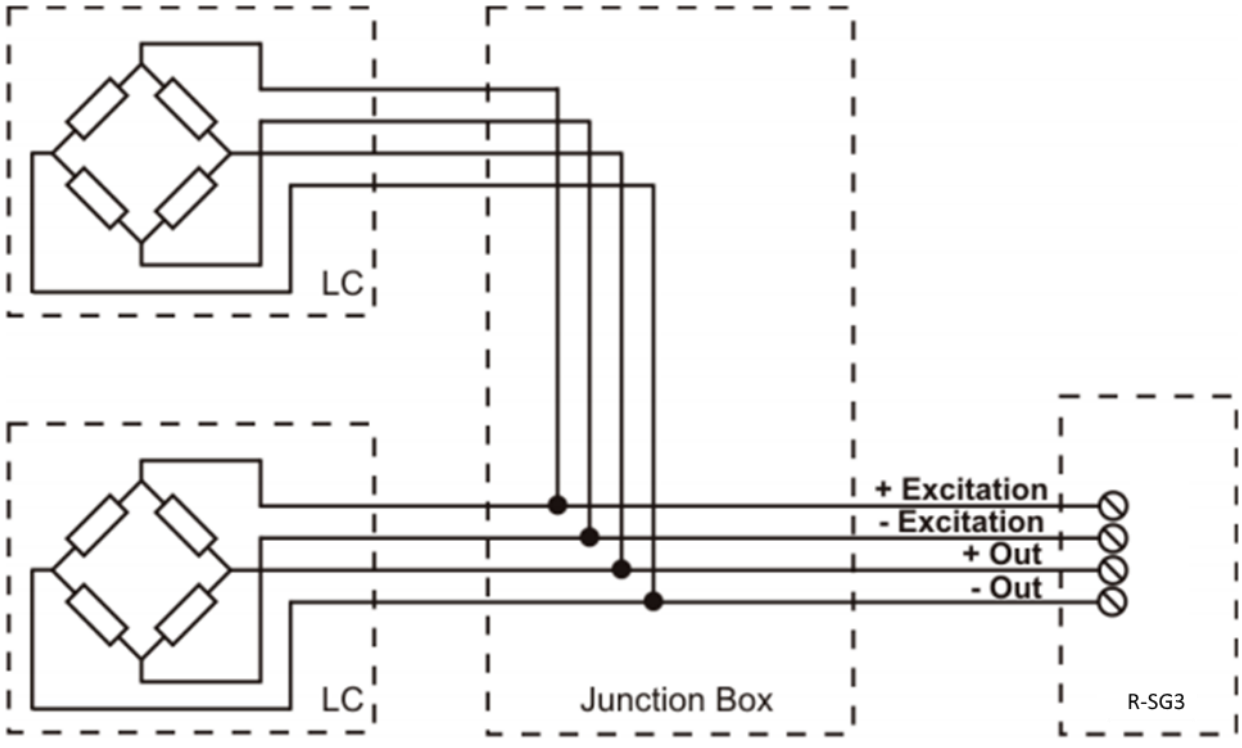
It is possible to connect up to a maximum of 8 load cells (and in any case without ever falling below the minimum 87 Ohms).

It is therefore possible to connect:

NUMBER OF LOAD CELLS IN PARALLEL	
IMPEDANCE OF THE STATED LOAD CELL [Ohm]	*MAXIMUM NUMBER OF CONNECTABLE CELLS IN PARALLEL*
350	4
1000	8

For the connection of 4 load cells Seneca recommends using the SG-EQ4 product.

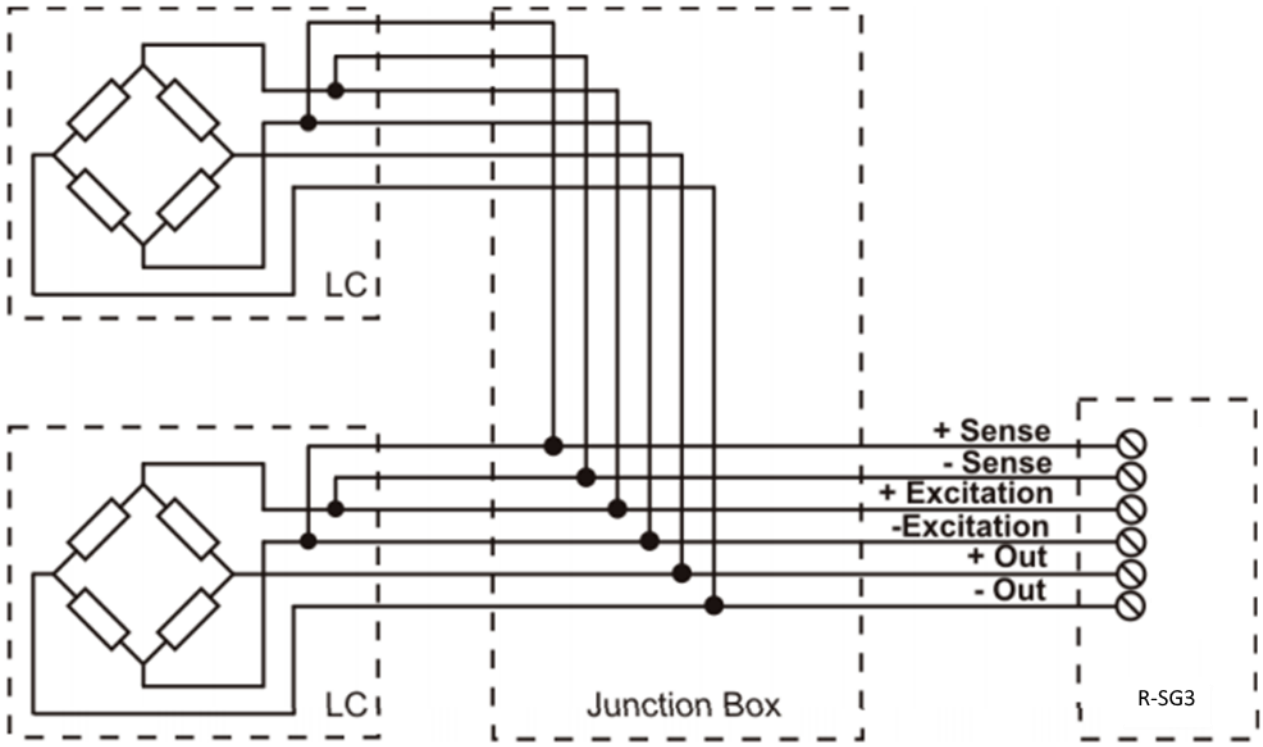
To connect 2 or more 4-wire cells in parallel with the SG-EQ4 junction box, use the following diagram:



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To connect 2 or more 6-wire cells in parallel with the SG-EQ4 junction box use the following diagram:



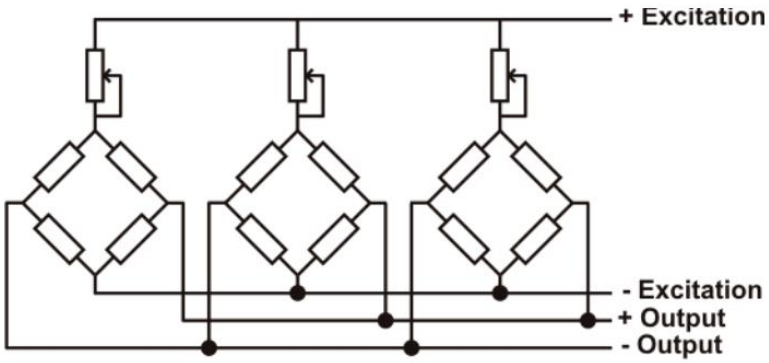
For more details, refer to the SG-EQ4 Junction Box accessory manual.

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1.4.3. TRIMMING 4-WIRE LOAD CELLS

The figure below shows a diagram of three trimmed load cells.



A variable resistor, independent of the temperature, or a typically 20 Ω potentiometer is inserted in the +Excitation cable of each load cell. There are two ways to trim the load cells. The first method is to adjust the potentiometers by trial, shifting the calibration weights from one corner to another. All the potentiometers must be adjusted so as to set the maximum sensitivity for each cell, turning them all completely clockwise. Then, once the angle with the lowest output is located, act on the trimmers of the other cells until obtaining the same minimum output value. This method can be very long, especially for large scales where the use of test weights on the corners is not very practical. In these cases the second, more suitable method is to "pre-trim" the potentiometers using a precision voltmeter (at least 4 1/2 digits). You can use the following procedure:

1) Determine the exact mV/V ratio of each load cell, shown in the calibration certificate of the cell itself.
2) Determine the exact excitation voltage provided by the indicator/meter (for example Z-SG), measuring this voltage with the voltmeter (for example 10.05 V).
3) Multiply the lowest mV/V value found (point 1) by the excitation voltage (point 2).
4) Divide the trimming factor calculated in point 3 by the mV/V value of the other load cells.
5) Measure and adjust the excitation voltage of the other three load cells using the respective potentiometer. Check the results and make a final adjustment by moving a test load from corner to corner.

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2. DIP SWITCH

ATTENTION!

THE DIP SWITCH SETTINGS ARE READ ONLY AT THE START. AT EACH CHANGE, IT IS NECESSARY TO RESTART.

2.1. SW1 DIPSWITCH

2.1.1. CONFIGURATION OF THE RS485 PORT BY DIP SWITCH

The SW1 dip switch is used to configure the parameters related to the RS485 communication port.

DIP switches 1 and 2 are used for the baud rate of the RS485 port
DIP switches 3 to 8 are used for the Modbus station address of the RS485 port

ATTENTION!

The configuration via dip switch is active only after a restart!

ATTENTION!

The configuration via dip switch has priority over the one saved in flash, if you need to use the configuration of the RS485 port sent by Easy Setup you must bring all the dip switches 1..8 to "OFF" and restart the device.

2.1.2. CONFIGURATION OF THE FLASH MEMORY RS485 PORT

If ALL the dip switches 1 ... 8 are OFF, the device uses the configuration saved in Flash (configured with the Easy Setup software) for the RS485 port.

RS485 configuration	*DIP1*	*DIP2*	*DIP3*	*DIP4*	*DIP5*	*DIP6*	*DIP7*	*DIP8*
FROM LASH	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

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2.1.3. CONFIGURATION OF BAUD RATE OF THE RS485 BY DIP SWITCH

Dip switches 1 and 2 configure the baud rate.

Baud Rate	*DIP1*	*DIP2*
9600	OFF	OFF
19200	OFF	ON
38400	ON	OFF
57600	ON	ON

ATTENTION!

The parity bit and other baud rates can only be configured via the Easy Setup software.
Setting the dip switches, parity will always be "No" and stop bits always at 1.

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2.1.4. SETTING THE MODBUS STATION ADDRESS OF THE RS485 PORT BY SW1 DIP SWITCH

Dip switches 3 to 8 are used to configure the ModBUS station address of the RS485 port using the binary convention:

Modbus Station Address	*DIP3*	*DIP4*	*DIP5*	*DIP6*	*DIP7*	*DIP8*
1	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	ON	ON
4	OFF	OFF	OFF	ON	OFF	OFF
5	OFF	OFF	OFF	ON	OFF	ON
6	OFF	OFF	OFF	ON	ON	OFF
7	OFF	OFF	OFF	ON	ON	ON
8	OFF	OFF	ON	OFF	OFF	OFF
9	OFF	OFF	ON	OFF	OFF	ON
10	OFF	OFF	ON	OFF	ON	OFF
11	OFF	OFF	ON	OFF	ON	ON
12	OFF	OFF	ON	ON	OFF	OFF
13	OFF	OFF	ON	ON	OFF	ON
14	OFF	OFF	ON	ON	ON	OFF
15	OFF	OFF	ON	ON	ON	ON
…	…	…	…	…	…	…
63	ON	ON	ON	ON	ON	ON

ATTENTION!

To set station addresses > 63 it is necessary to use the Easy Setup software.

2.2. SW2 DIP SWITCH

Below is the meaning of the SW2 dip switches:

DIP1	*DIP2*	*MEANING*
OFF	OFF	Normal operation: The device loads the configuration from the flash.
ON	ON	Resets the device to its factory configuration
OFF	ON	Disables access to the Web server (ZE-SG3 model only)
ON	OFF	Reserved

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3. USB PORT

The front USB port allows a simple connection using the Modbus RTU slave protocol, the communication parameters for the USB port cannot be modified and are:

Baud rate: 38400
Address of the Modbus RTU station: 1
Data Bit: 8
Stop bit: 1

ATTENTION!

IT IS NOT POSSIBLE TO COMMUNICATE SIMULTANEOUSLY FROM BOTH THE RS485 PORT AND THE USB PORT, THE USB PORT HAS PRIORITY (WHEN THE USB CABLE IS INSERTED, COMMUNICATION IS ONLY FROM THE USB).
TO GET THE COMMUNICATION ON THE RS485 IT IS NECESSARY TO DISCONNECT THE USB CABLE.

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4. CONNECTION OF THE DEVICE TO AN ETHERNET NETWORK (ZE- SG3 MODEL ONLY)

The factory configuration of the IP address is:

Static address: 192.168.90.101

Therefore, multiple devices must not be inserted on the same network with the same static IP.
If you want to connect multiple devices on the same network, you need to change the IP address configuration using Seneca Discovery Device software.

⚠ ATTENTION!

DO NOT CONNECT 2 OR MORE FACTORY-CONFIGURED DEVICES ON THE SAME NETWORK, OR THE ETHERNET INTERFACE WILL NOT WORK
(CONFLICT OF IP ADDRESSES 192.168.90.101)

If the addressing mode with DHCP is activated and an IP address is not received within 1 minute, the device will set an IP address with a fixed error:

169.254.x.y

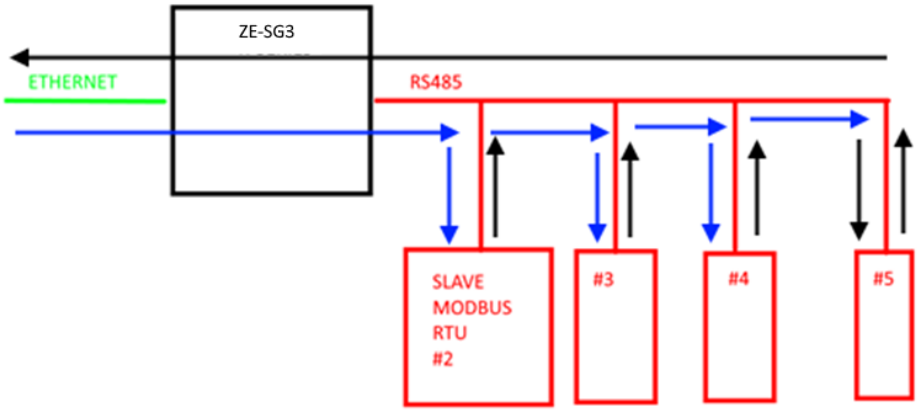
Where x.y are the last two values of the MAC ADDRESS.
This way it is possible to install more I/O of the R series and then configure the IP with the Seneca Discovery Device software even on networks without a DHCP server.

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5. MODBUS PASSTHROUGH (ZE- SG3 MODEL ONLY)

Thanks to the Modbus Passthrough function it is possible to extend the amount of I/O available in the device via the RS485 port and the Modbus RTU slave protocol, for example by using the Seneca Z-PC series products.
In this mode the RS485 port stops working as Modbus RTU slave and the device becomes a gateway from Modbus TCP-IP (ethernet) to Modbus RTU (serial):



Each Modbus TCP-IP request with station address other than that of the R series device is converted into a serial packet on the RS485 and, in the case of a reply, it is turned over to TCP-IP.
Therefore, it is no longer necessary to purchase gateways to extend the I/O number or to connect already available Modbus RTU I/O.

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6. WEBSERVER (ZE- SG3 MODEL ONLY)

6.1. ACCESS TO THE WEB SERVER

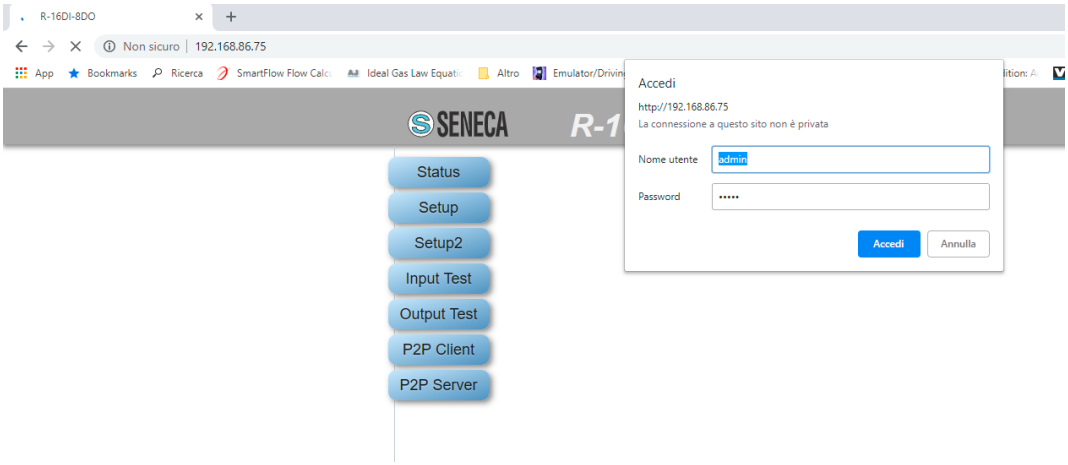
Access to the web server takes place using a web browser and entering the IP address of the device.
To know the IP address of the device you can use the Seneca Discovery Device software.

On first access the user name and password will be requested.
The default values are:

User Name: admin
Password: admin

ATTENTION!

AFTER THE FIRST ACCESS CHANGE USER NAME AND PASSWORD IN ORDER TO PREVENT ACCESS TO THE DEVICE TO UNAUTHORIZED PEOPLE.



ATTENTION!

IF THE PARAMETERS TO ACCESS THE WEB SERVER HAVE BEEN LOST, IT IS NECESSARY TO RESET THE FACTORY-SET CONFIGURATION

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7. CONFIGURATION OF THE ZE-SG3 DEVICE VIA WEB SERVER

7.1. SETUP SECTION

DHCP (ETH) (default: Disabled)
Sets the DHCP client to get an IP address automatically.

IP ADDRESS STATIC (ETH) (default: 192.168.90.101)
Sets the device static address. Careful not to enter devices with the same IP address into the same network.

IP MASK STATIC (ETH) (default: 255.255.255.0)
Sets the mask for the IP network.

GATEWAY ADDRESS STATIC (ETH) (default: 192.168.90.1)
Sets the gateway address.

MODBUS SERVER PORT (ETH) (default: 502)
Sets the communication port for the Modbus TCP-IP server.

MODBUS SERVER STATION ADDRESS (ETH) (default: 1)
Active only if Modbus Passthrough is also active, it sets the station address of the modbus TCP-IP server.

ATTENTION!

THE MODBUS SERVER WILL ANSWER ANY STATION ADDRESS ONLY IF THE MODBUS PASSTHROUGH MODE IS DISABLED.

MODBUS PASSTHROUGH (ETH) (default: disabled)
Sets the conversion mode from Modbus TCP-IP to Modbus RTU serial (see chapter 5).

MODBUS TCP-IP CONNECTION TIMEOUT [sec] (ETH) (default: 60)
Sets the TCP-IP connection timeout for the Modbus TCP-IP server and Passthrough modes.

P2P SERVER PORT (default: 50026)
Sets the communication port for the P2P server.

WEB SERVER USERNAME (default: admin)
Sets the username to access the webserver.

CONFIGURATION/WEB SERVER PASSWORD (default: admin)
Sets the password to access the webserver and to read/write the configuration (if enabled).

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WEB SERVER PORT (default: 80)
Sets the communication port for the web server.

BAUDRATE MODBUS RTU (SER) (default: 38400 baud)
Sets the baud rate for the RS485 communication port.

DATA MODBUS RTU (SER) (default: 8 bit)
Sets the number of bits for the RS485 communication port.

PARITY MODBUS RTU (SER) (default: None)
Sets the parity for the RS485 communication port.

STOP BIT MODBUS RTU (SER) (default: 1 bit)
Sets the number of stop bits for the RS485 communication port.

MODBUS PASSTHROUGH SERIAL TIMEOUT (default: 100ms)
Active only if passthrough mode is activated, sets the maximum waiting time before sending a new packet from TCP-IP to the serial port. It must be set according to the longest response time of all the devices present on the RS485 serial port.

7.2. LOAD CELL SETUP SECTION

FUNCTION MODE
It allows to configure the basic operation of the device, can be set to factory calibration or to Calibration with standard weight.

FACTORY CALIBRATION
It is used when a load cell with declared sensitivity is available.
In this mode, calibration only consists in acquiring the tare directly in the field with a direct measurement. If it is not possible to acquire the tare with a direct measurement (for example in the case of an already filled silo) it is possible to manually enter the tare value in the desired unit of measurement (kg, t, etc.).

CALIBRATION WITH STANDARD WEIGHT
It is used when a sample weight is available (as far as possible towards the load cell full scale).
In this mode the calibration consists in acquiring both the tare and the sample weight directly on the field.

MEASURE TYPE
It allows to configure the operation of the device between.

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BALANCE (UNIPOLAR)

It is used when a scale is being created in which the load cell is only compressed, in this case the maximum resolution of the compression measurement is obtained.

COMPRESSION AND TRACTION (BIPOLAR)

It is used when a measurement system (typically of force) is being created that can both compress and extend the load cell. In this case the direction of the force can also be decided, if compression the measurement will have the + sign, if traction it will have the - sign. A typical case of use is to link the direction of the force to the analogue output so that, for example, 4mA correspond to the maximum traction force and 20mA correspond to the maximum compression force (in this case the cell at rest will provide 12Ma).

MEASURE UNIT

Sets the unit of measurement for the weighing in g, Kg, etc.

CELL SENSITIVITY

It is the declared cell sensitivity value expressed in mV/V (in most cells it is 2mV/V).

CELL FULL SCALE

It is the full scale value of the cell expressed in the selected unit of measurement.

STANDARD WEIGHT VALUE

It represents the value of the sample weight that will be used in the calibration if the operating mode with standard weight has been chosen.

NOISE FILTER

Enables or disables measurement filtering.

FILTER LEVEL

Allows you to set the measurement filter level according to the following table:

FILTER LEVEL	RESPONSE TIME [ms]
0	2
1	6.7
2	13
3	30
4	50
5	250
6	850
ADVANCED	Configurable

The higher the filter level the more stable (but slow) the weight measurement will be.

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If you select the advanced filtering level (Advanced), the configuration will allow you to select the following parameters:

ADC SPEED Selects the ADC acquisition speed from 4.7 Hz to 960 Hz

NOISE VARIATION It is the variation in ADC points due to noise alone (represents the measurement uncertainty due to noise) or how much we expect the measurement to vary (the unit of measurement is in raw ADC points).

FILTER RESPONSE SPEED
Represents a parameter related to the filter response speed, it can vary from 0.001 (slowest response) to 1 (fastest response). Represents the variance of the process.

NET WEIGHT RESOLUTION
It is the resolution with which the value of the net weighing is represented, it can be worth:

MAXIMUM RESOLUTION
It will represent the net weight with the highest possible resolution

MANUAL
It will represent the net weight with the manual resolution set (in engineering units).
For example, by setting 0.1 Kg you will get that the net weight can only vary by multiples of 100g.

AUTOMATIC RESOLUTION
It will represent the net weight with a calculated resolution of about 20000 points. Unlike Maximum or Manual resolution, this setting limits also the ADC value and therefore affects all measurements.

⚠ CAUTION

Keep in mind that in the "Calibration with sample weight" mode, using the "Manual Resolution", the correct sample weight value may not be perfectly represented:

For example, you have:

Cell full scale 15000 g
Sample weight 14000 g
Manual Resolution 1.5 g

The value of the sample weight (14000 g) cannot be represented with the resolution in 1.5g steps (14000/1.5g = 9333.333 is not an integer value) so it will be represented as: 9333*1.5g = 13999.5g
To avoid this effect, use a resolution that allows the value to be represented (for example 1g or 2g).

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SAMPLE PIECE WEIGHT

Sets the weight of a single piece in technical units for the mode. By setting the net weight of a single element in this register, the converter will be able to indicate the number of pieces present in the scales special register according to the relation:

$$Nr\ Pezzi = \frac{Peso\ Netto}{Peso\ Pezzo\ Campione}$$

AUTOMATIC TARE TRACKER

It allows you to enable or disable the automatic tare reset.

ADC VALUE

It allows to set the number of ADC points within which to reset the tare automatically.
If after 5 seconds of stable weighing condition the ADC value of the net weight deviates by less than this value then a new tare is acquired.

7.3. I/O SETUP SECTION

DIGITAL I/O MODE

Configures the digital I/O of the device

DIGITAL INPUT

If the nth IO is configured as an input, it is possible to choose its function from:

FUNCTION DIGITAL INPUT

The input is configured as a digital input whose value can be read from the appropriate register.

FUNCTION ACQUIRE TARE

In this mode, if the digital input is activated for a time longer than 3 seconds, a new tare value is acquired (in RAM, then it is lost upon restart). It is equivalent to sending the command 49594 (decimal) in the command register.

DIGITAL OUTPUT

If the nth IO is configured as an output, it is possible to choose its function from:

DIGITAL OUTPUT MODE

The output can be configured as normally open (***Normally Open***) or as normally closed (***Normally Close***).

DIGITAL OUTPUT CONFIGURATION

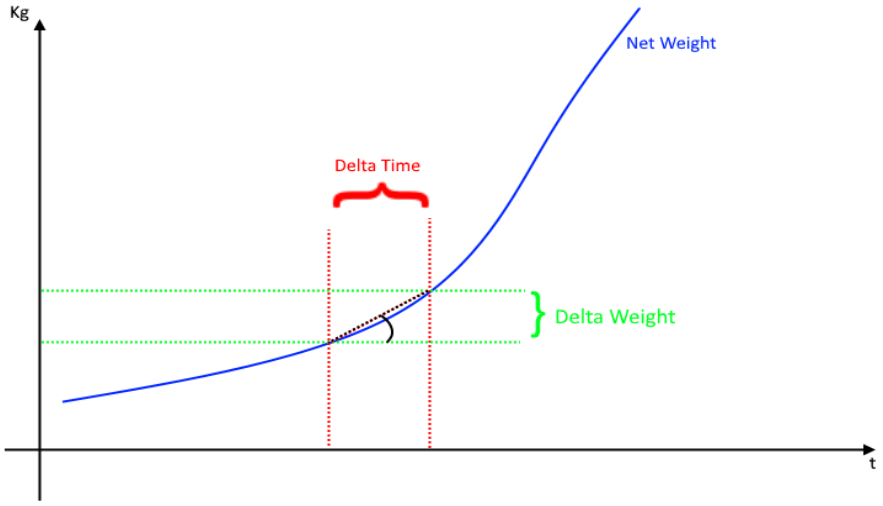
Here you can choose the behaviour of the digital output:

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STABLE WEIGHT

The stable weighing condition is used to indicate that the net weight measurement is stable if:
The net weight remains within the weight $\Delta peso_netto$ over time $\Delta tempo$ or if the slope of the curve drawn by the net weight is less than $\frac{\Delta peso_netto}{\Delta tempo}$:



You will be prompted to enter Delta Net Weight (***Delta Weight***) (in engineering units) and Delta Time (***Delta Time***) (in 0.1 seconds).

THRESHOLD AND STABLE WEIGHT

In this mode, the output activates when the net weight reaches the threshold and the weigh is in a stable weighing condition.

STABLE WEIGHT

In this mode the output is activated if the weighing is in the stable weighing condition.

COMMANDABLE FROM MODBUS

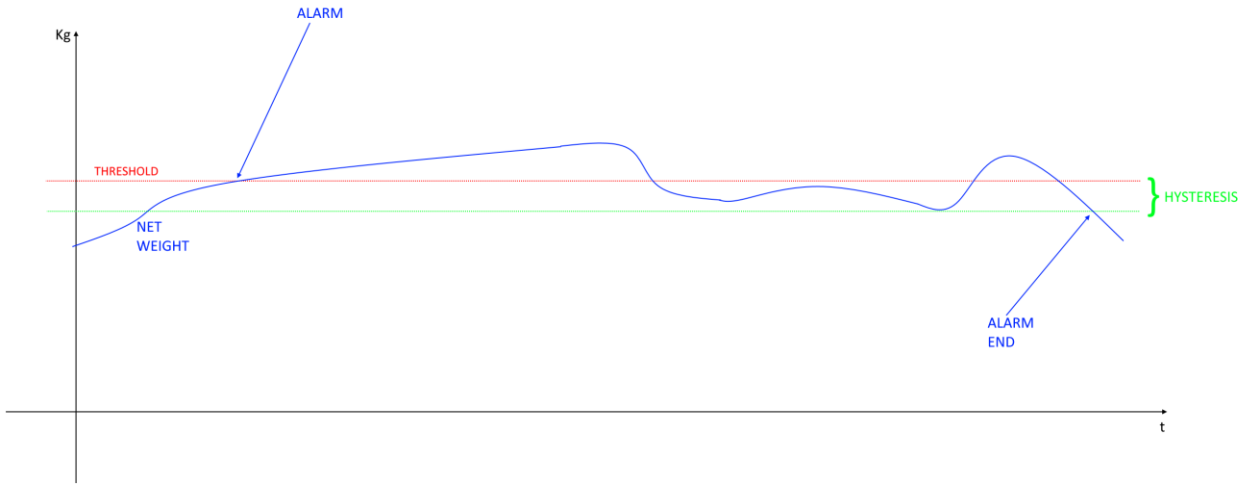
In this mode the output can be controlled by the modbus register.

THRESHOLD WITH HYSTERESIS

In this mode the output is activated when the net weight reaches the threshold, the alarm is cancelled when the net weight falls below the Threshold-Hysteresis value:

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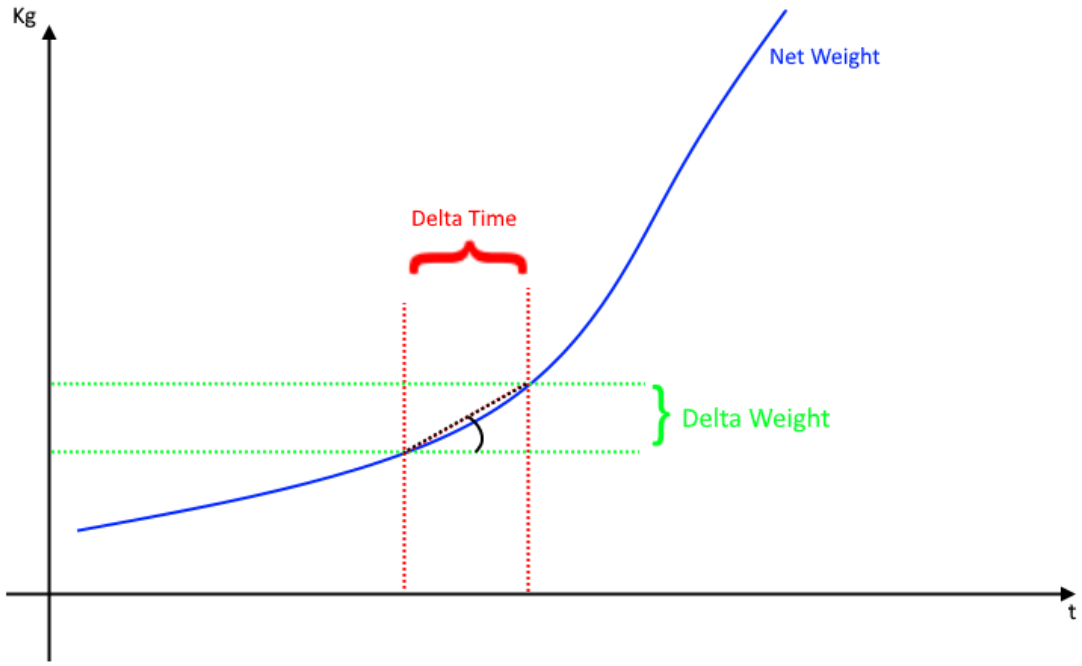
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STABLE WEIGHT CONDITION

The stable weighing condition is used to indicate that the net weight measurement is stable if:

The net weight remains within the weight $\Delta peso_netto$ (DELAT WEIGHT) over time $\Delta tempo$ (DELTA TIME) or if the slope of the curve drawn by the net weight is less than $\frac{\Delta peso_netto}{\Delta tempo}$:



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ANALOG OUTPUT WORKING MODE
Selects whether the analogue output is linked to net measurement or controllable via modbus register

ANALOG OUTPUT FUNCTION
Selects whether the analogue output is Voltage or Current

START/STOP NET WEIGHT [g/Kg/…]
Selects the start and end of the weighing scale for the analogue output. They have no effect in the case of analogue output controlled by Modbus.

OUTPUT START/STOP [mV/mA]
Selects the start and end of scale of the analogue output linked to the start/stop net weight. Has no effect in the case of analogue output controlled by Modbus.

7.4. TEST AND LOAD CELL CALIBRATION SECTION

In this section it is possible to calibrate the cell and carry out the tests. For more information on cell calibration refer to the Cell Calibration chapter of this manual.

8. CONFIGURATION OF THE Z-SG3 / ZE-SG3 DEVICE VIA EASY SETUP 2

To configure the device it is necessary to install the free "Easy Setup 2" software suite which can be downloaded in the Z- SG3 / ZE- SG3 section of the www.seneca.it website.

MODE
It allows to configure the basic operation of the device, can be set to factory calibration or to Calibration with standard weight.

FACTORY CALIBRATION
It is used when a load cell with declared sensitivity is available.
In this mode, calibration only consists in acquiring the tare directly in the field with a direct measurement. If it is not possible to acquire the tare with a direct measurement (for example in the case of an already filled silo) it is possible to manually enter the tare value in the desired unit of measurement (kg, t, etc.).

CALIBRATION WITH SAMPLE WEIGHT
It is used when a sample weight is available (as far as possible towards the load cell full scale).
In this mode the calibration consists in acquiring both the tare and the sample weight directly on the field.

ADC POLARITY
It allows to configure the operation of the device between:

UNIPOLAR (COMPRESSION ONLY)
It is used when a scale is being created in which the load cell is only compressed, in this case the maximum resolution of the compression measurement is obtained.

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BIPOLAR (COMPRESSION AND TRACTION)

It is used when a measurement system (typically of force) is being created that can both compress and extend the load cell. In this case the direction of the force can also be decided, if compression the measurement will have the + sign, if traction it will have the - sign. A typical case of use is to link the direction of the force to the analogue output so that, for example, 4mA correspond to the maximum traction force and 20mA correspond to the maximum compression force (in this case the cell at rest will provide 12Ma).

UNIT OF MEASUREMENT

Sets the unit of measurement for the weighing in g, Kg, t etc.

CELL SENSITIVITY

It is the declared cell sensitivity value expressed in mV/V (in most cells it is 2mV/V).

CELL FULL SCALE

It is the full scale value of the cell expressed in the selected unit of measurement.

SAMPLE WEIGHT

It represents the value of the sample weight that will be used in the calibration if the operating mode with standard weight has been chosen.

NOISE FILTER

Enables or disables measurement filtering.

FILTER LEVEL

Allows you to set the measurement filter level according to the following table:

FILTER LEVEL	RESPONSE TIME [ms]
0	2
1	6.7
2	13
3	30
4	50
5	250
6	850
ADVANCED	Configurable

The higher the filter level the more stable (but slow) the weight measurement will be.

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If you select the advanced filtering level, the configuration will allow you to select the following parameters:

ADC SPEED Selects the ADC acquisition speed from 4.7 Hz to 960 Hz

ADC POINT VARIATION

It is the variation in ADC points due to noise alone (represents the measurement uncertainty due to noise) or how much we expect the measurement to vary (the unit of measurement is in raw ADC points).

FILTER RESPONSE SPEED

Represents a parameter related to the filter response speed, it can vary from 0.001 (slowest response) to 1 (fastest response). Represents the variance of the process.

TYPE OF RESOLUTION

It is the resolution with which the value of the net weighing is represented, it can be worth:

MAXIMUM RESOLUTION

It will represent the net weight with the highest possible resolution

MANUAL

It will represent the net weight with the manual resolution set (in engineering units).
For example, by setting 0.1 Kg you will get that the net weight can only vary by multiples of 100g.

AUTOMATIC RESOLUTION

It will represent the net weight with a calculated resolution of about 20000 points. Unlike Maximum or Manual resolution, this setting limits also the ADC value and therefore affects all measurements.

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CAUTION

Keep in mind that in the "Calibration with sample weight" mode, using the "Manual Resolution", the correct sample weight value may not be perfectly represented:

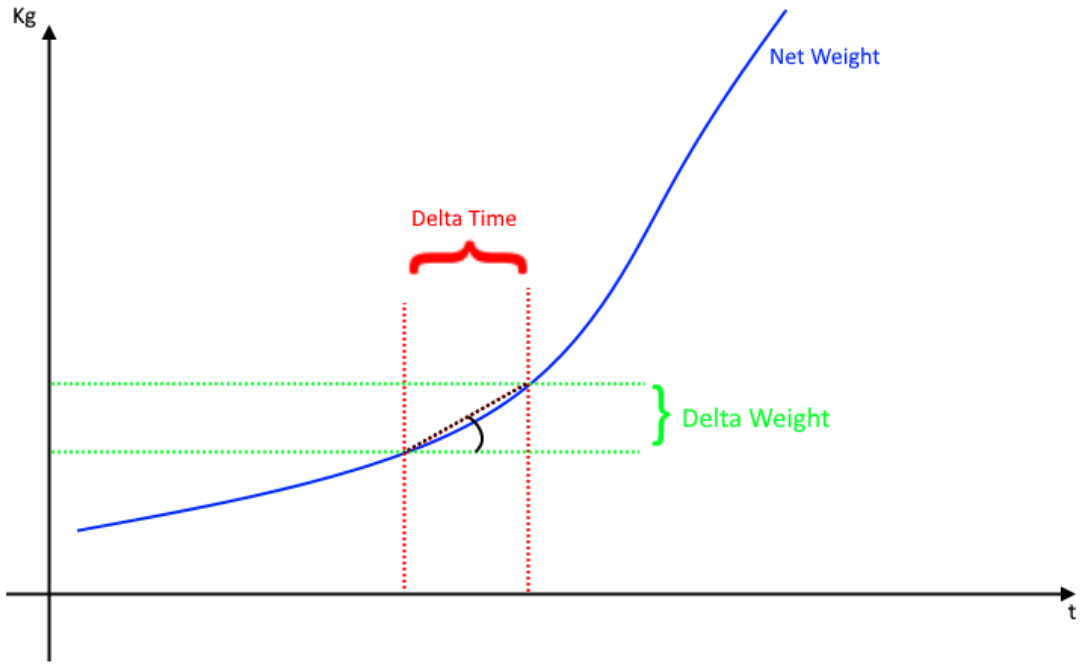
For example, you have:

Cell full scale 15000 g
Sample weight 14000 g
Manual Resolution 1.5 g

The value of the sample weight (14000 g) cannot be represented with the resolution in 1.5g steps (14000/1.5g = 9333.333 is not an integer value) so it will be represented as: 9333*1.5g = 13999.5g
To avoid this effect, use a resolution that allows the value to be represented (for example 1g or 2g).

STABLE WEIGHING CONDITION

The stable weighing condition is used to indicate that the net weight measurement is stable if:
The net weight remains within the weight $\Delta peso_netto$ (DELAT WEIGHT) over time $\Delta tempo$ (DELTA TIME) or if the slope of the curve drawn by the net weight is less than $\frac{\Delta peso_netto}{\Delta tempo}$:



ALARM 1/2 THRESHOLD WEIGHT

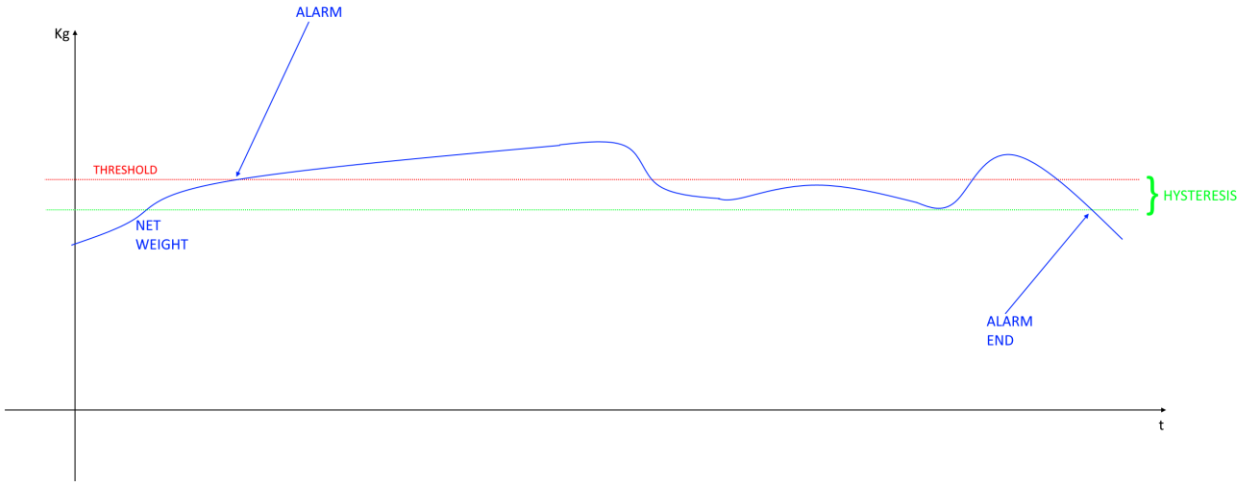
Sets the value of the net weight alarm threshold, the alarm stops when the net weight falls below the Threshold-Hysteresis value

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ALARM 1/2 HYSTERESIS

Value of the alarm threshold hysteresis



1/2 DIGITAL INPUT/OUTPUT

Configures the digital I/O of the device as input or output

1/2 DIGITAL OUTPUT MODE

Here you can choose the behaviour of the digital output:

FULL SCALE EXCEEDED

In this mode the output is activated when the gross weight exceeds the full scale of the cell.

EXCEEDING THE THRESHOLD AND STABLE WEIGHING

In this mode, the output activates when the net weight reaches the threshold and the weigh is in a stable weighing condition.

STABLE WEIGHING

In this mode the output is activated if the weighing is in the stable weighing condition.

MODBUS CONTROLLABLE

In this mode the output can be controlled by the modbus register.

THRESHOLD EXCEEDED WITH HYSTERESIS

In this mode the output is activated when the net weight reaches the threshold, the alarm is cancelled when the net weight falls below the Threshold-Hysteresis value:

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OUTPUT 1/2 NC/NO
The output can be configured as normally open (***Normally Open***) or as normally closed (***Normally Close***).

1/2 DIGITAL INPUT MODE

EXTERNAL DIGITAL INPUT
The input is configured as a digital input whose value can be read from the appropriate register.

TARE RESET
In this mode, if the digital input is activated for a time longer than 3 seconds, a new tare value is acquired (in RAM, then it is lost upon restart). It is equivalent to sending the command 49594 (decimal) in the command register.

ANALOGUE OUTPUT TYPE
Sets the type of output in Voltage (range 0-10 V) or Current (range 0 – 20mA)

NET WEIGHING SCALE START
Sets the starting value of the net weighing which represents 0% of the analogue output

NET SCALE-END WEIGHING
Sets the end value of the net weighing which represents 100% of the analogue output

ANALOGUE OUTPUT SCALE START
Sets the value that represents 0% of the analogue output in V/mA

ANALOGUE OUTPUT SCALE END
Sets the value that represents 100% of the analogue output in V/mA

MODBUS RTU BAUDRATE (default: 38400 baud)
Sets the baud rate for the RS485 communication port.

MODBUS RTU DATA (default: 8 bit)
Sets the number of bits for the RS485 communication port.

PARITY MODBUS RTU (SER) (default: None)
Sets the parity for the RS485 communication port.

MODBUS RTU STOP BIT (default: 1 bit)
Sets the number of stop bits for the RS485 communication port.

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WEIGHT FOR PIECE COUNTER

Sets the weight of a single piece in technical units for the mode. By setting the net weight of a single element in this register, the converter will be able to indicate the number of pieces present in the scales special register according to the relation:

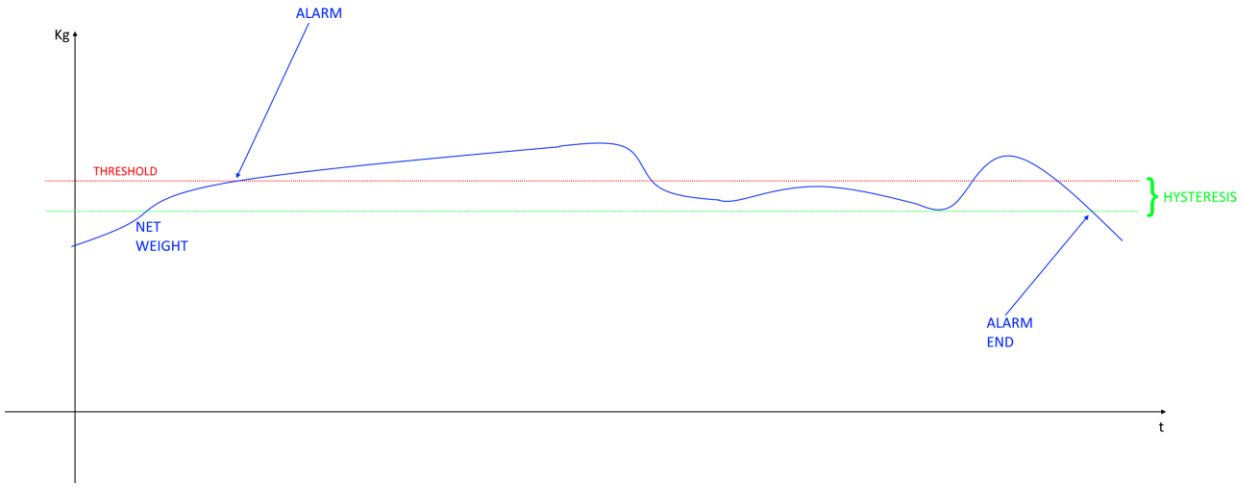
$$Nr\ Pezzi = \frac{Peso\ Netto}{Peso\ Pezzo\ Campione}$$

AUTOMATIC TARE TRACKER

It allows you to enable or disable the automatic tare reset.

ADC VALUE

It allows to set the number of ADC points within which to reset the tare automatically.
If after 5 seconds of stable weighing condition the ADC value of the net weight deviates by less than this value then a new tare is acquired.



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9. LOAD CELL CALIBRATION

9.1. LOAD CELL CALIBRATION THROUGH THE WEB SERVER (ZE-SG3 MODEL ONLY)

To calibrate the load cell, access the "TEST AND LOAD CELL CALIBRATION" section of the web server. Depending on the two modes chosen between factory calibration or with standard weight, it will be possible to proceed with the calibration.

9.1.1. CELL CALIBRATION WITH FACTORY PARAMETERS

In cell calibration with factory parameters it is not necessary to use a standard weight as reference is made to the parameters acquired in the factory.
The necessary data are:

-The cell sensitivity
-The cell full scale

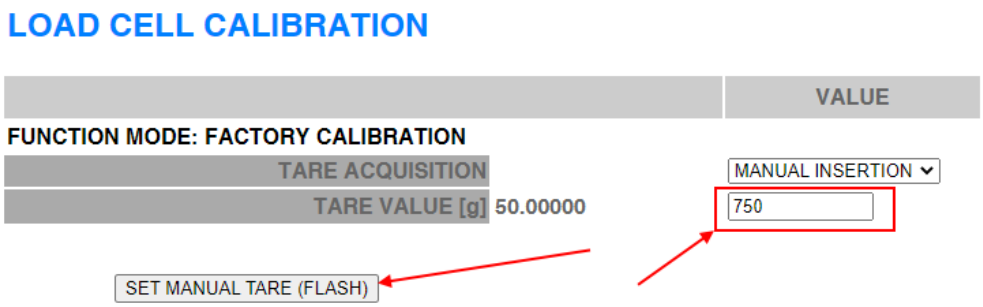
For the cell calibration procedure it is necessary to acquire the tare.
The tare can be entered manually in technical units (if known) or it can be acquired from the field.

ATTENTION!

TO OBTAIN A BETTER MEASUREMENT ACCURACY ACQUIRE THE TARE FROM THE FIELD

9.1.1.1. MANUAL ENTRY OF THE TARE

It is not always possible to acquire the tare value from the field (for example in the case of already filled silos), in these cases it is possible to introduce the tare weight in technical units.



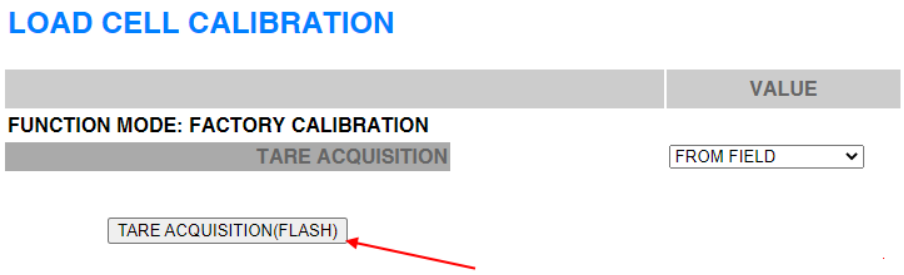
To acquire the tare value, press the "SET MANUAL TARE (FLASH)" button.

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9.1.1.2. ACQUISITION OF THE TARE FROM THE FIELD

1) Enter the "Test and load cell calibration" web server page
2) Replace the tare on the cell
3) Wait for the measurement to stabilize
4) Press the "TARE ACQUISITION (FLASH)" button

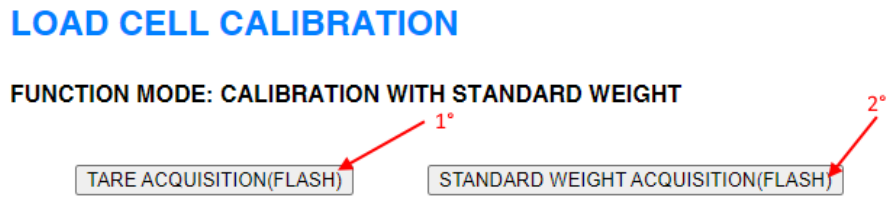


9.1.2. CELL CALIBRATION WITH A SAMPLE WEIGHT

In cell calibration with a standard weight it is necessary to know:

-The cell sensitivity
-The cell full scale
-A standard weight (so that Standard weight + Tare are as close as possible to the cell full scale)

1) Enter the "Test and load cell calibration" web server page
2) Replace the tare on the cell
3) Wait for the measurement to stabilize
4) Press the "TARE ACQUISITION (FLASH)" button
5)



6) Replace the Tare + Sample Weight
7) Wait for the measurement to stabilize
8) Press the "STANDARD WEIGHT ACQUISITION (FLASH)" button

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9.2. LOAD CELL CALIBRATION THROUGH THE EASY SETUP 2 SOFTWARE (Z-SG3 MODEL ONLY)

To calibrate the load cell, access the Test section:

9.2.1. CELL CALIBRATION WITH FACTORY PARAMETERS

1) Place the tare on the load cell
2) Wait for the measurement to stabilize
3) Press the "TARE ACQUISITION" button
4) The load cell is calibrated

9.2.2. CELL CALIBRATION WITH FACTORY PARAMETERS AND MANUALLY ENTERED TARE

1) Enter the known tare value in technical units
2) Press the “TARE MANUAL ACQUISITION” button
3) The load cell is calibrated

9.2.3. CELL CALIBRATION WITH A SAMPLE WEIGHT

1) Place the tare on the load cell
2) Wait for the measurement to stabilize
3) Press the "TARE ACQUISITION" button
4) Place the sample weight (previously configured value) on the load cell
5) Wait for the measurement to stabilize
6) Press the “SAMPLE WEIGHT ACQUISITION” button
7) The load cell is calibrated

9.3. LOAD CELL CALIBRATION THROUGH MODBUS REGISTERS

It is not always possible to use the Web server to calibrate the load cell, for example if a PLC or an HMI is to be used.
It is also possible to implement the calibration of a load cell in a simple way by sending Modbus RTU / TCP-IP commands according to the type of operation chosen.

9.3.1. CELL CALIBRATION WITH FACTORY PARAMETERS

1) Place the tare on the load cell
2) Wait for the measurement to stabilize
3) Write the decimal value 49914 in the COMMAND REGISTER
4) The device saves the new tare value in flash and resets the COMMAND REGISTER value
5) The load cell is calibrated

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9.3.2. CELL CALIBRATION WITH FACTORY PARAMETERS AND MANUALLY ENTERED TARE

1) Write the tare value in technical units in the FACTORY MANUAL TARE registers
2) Write the decimal value 50773 in the COMMAND REGISTER
3) The device acquires the new flash tare value and resets the COMMAND REGISTER value
4) The load cell is calibrated

9.3.3. CELL CALIBRATION WITH A SAMPLE WEIGHT

1) Place the tare on the load cell
2) Wait for the measurement to stabilize
3) Write the decimal value 49914 in the COMMAND REGISTER
4) The device saves the new tare value in flash and resets the COMMAND REGISTER value
5) Enter the weight value of the sample weight in technical units in the STANDARD WEIGHT VALUE registers
6) Place the sample weight on the load cell
7) Wait for the measurement to stabilize
8) Write the decimal value 50700 in the COMMAND REGISTER
9) The device saves the new sample weight value in flash and resets the COMMAND REGISTER value
10) The load cell is calibrated

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10. MODBUS RTU/ MODBUS TCP-IP REGISTERS

The following abbreviations are used in the register tables:

MS	Most Significant
LS	Least Significant
MSBIT	Most Significant Bit
LSBIT	Least Significant Bit
MMSW	“Most” Most Significant Word (16bit)
MSW	Most Significant Word (16bit)
LSW	Least Significant Word (16bit)
LLSW	“Least” Least Significant Word (16bit)
RO	Read Only
RW	Register in RAM or Fe-RAM Writable infinite times.
RW*	Flash Read-Write: REGISTERS CONTAINED IN THE FLASH MEMORY: WRITABLE AT THE MAXIMUM ABOUT 10000 TIMES.
UNSIGNED 16 BIT	Unsigned integer register that can take values from 0 to 65535
SIGNED 16 BIT	Signed integer register that can take values from -32768 to +32767
UNSIGNED 32 BIT	Unsigned integer register that can take values from 0 to +4294967296
SIGNED 32 BIT	Signed integer register that can take values from -2147483648 to 2147483647
UNSIGNED 64 BIT	Unsigned integer register that can take values from 0 to 18446744073709551615
SIGNED 64 BIT	Signed integer register that can take values from -2^63 to 2^63-1
FLOAT 32 BIT	Single-precision, 32-bit floating point register (IEEE 754) https://en.wikipedia.org/wiki/IEEE_754
BIT	Boolean register, which can take values 0 (false) or 1 (true)

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10.1. NUMBERING OF "0-BASED" OR "1-BASED" MODBUS ADDRESSES

According to the Modbus standard the Holding Registers are addressable from 0 to 65535, there are 2 different conventions for numbering the addresses: "0-BASED" and "1-BASED".
For greater clarity, Seneca shows its register tables in both conventions.

ATTENTION!

CAREFULLY READ THE DOCUMENTATION OF THE MODBUS MASTER DEVICE IN ORDER TO UNDERSTAND WHICH OF THE TWO CONVENTIONS THE MANUFACTURER HAS DECIDED TO USE

10.2. NUMBERING OF MODBUS ADDRESSES WITH "0-BASED" CONVENTION

The numbering is:

HOLDING REGISTER MODBUS ADDRESS (OFFSET)	***MEANING***
0	FIRST REGISTER
1	SECOND REGISTER
2	THIRD REGISTER
3	FOURTH REGISTER
4	FIFTH REGISTER

Therefore, the first register is at address 0.
In the following tables, this convention is indicated with ***"ADDRESS OFFSET".***

10.3. NUMBERING OF MODBUS ADDRESSES WITH "1 BASED" CONVENTION (STANDARD)

The numbering is that established by the Modbus consortium and is of the type:

HOLDING REGISTER MODBUS ADDRESS 4x	***MEANING***
40001	FIRST REGISTER
40002	SECOND REGISTER
40003	THIRD REGISTER
40004	FOURTH REGISTER
40005	FIFTH REGISTER

In the following tables this convention is indicated with ***"ADDRESS 4x"*** since a 4 is added to the address so that the first Modbus register is 40001.

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A further convention is also possible where the number 4 is omitted in front of the register address:

HOLDING MODBUS ADDRESS WITHOUT 4x	*MEANING*
1	FIRST REGISTER
2	SECOND REGISTER
3	THIRD REGISTER
4	FOURTH REGISTER
5	FIFTH REGISTER

10.4. BIT CONVENTION WITHIN A MODBUS HOLDING REGISTER

A Modbus Holding Register consists of 16 bits with the following convention:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0

For instance, if the value of the register in decimal is
12300
the value 12300 in hexadecimal is:
0x300C

the hexadecimal 0x300C in binary value is:
11 0000 0000 1100

So, using the above convention, we get:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0

10.5. MSB and LSB BYTE CONVENTION WITHIN A MODBUS HOLDING REGISTER

A Modbus Holding Register consists of 16 bits with the following convention:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0

LSB Byte (Least Significant Byte) defines the 8 bits ranging from Bit 0 to Bit 7 included, we define MSB Byte (Most Significant Byte) the 8 bits ranging from Bit 8 to Bit 15 inclusive:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
BYTE MSB								BYTE LSB							

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10.6. REPRESENTATION OF A 32-BIT VALUE IN TWO CONSECUTIVE MODBUS HOLDING REGISTERS

The representation of a 32-bit value in the Modbus Holding Registers is made using 2 consecutive Holding Registers (a Holding Register is a 16-bit register). To obtain the 32-bit value it is therefore necessary to read two consecutive registers:
For example, if register 40064 contains the 16 most significant bits (MSW) while register 40065 contains the least significant 16 bits (LSW), the 32-bit value is obtained by composing the 2 registers:

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
40064 MOST SIGNIFICANT WORD															

BIT 15	BIT 14	BIT 13	BIT 12	BIT 11	BIT 10	BIT 9	BIT 8	BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
40065 LEAST SIGNIFICANT WORD															

$$Value_{32bit} = Register_{LSW} + (Register_{MSW} * 65536)$$

In the reading registers it is possible to swap the most significant word with the least significant word, therefore it is possible to obtain 40064 as LSW and 40065 as MSW.

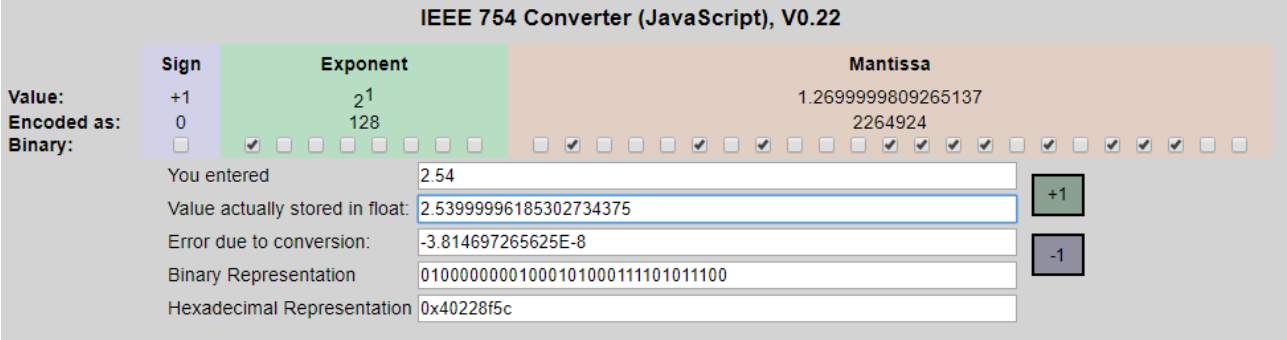
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10.7. TYPE OF 32-BIT FLOATING POINT DATA (IEEE 754)

The IEEE 754 standard (https://en.wikipedia.org/wiki/IEEE_754) defines the format for representing floating point numbers.
As already mentioned, since it is a 32-bit data type, its representation occupies two 16-bit holding registers.
To obtain a binary/hexadecimal conversion of a floating point value it is possible to refer to an online converter at this address:

http://www.h-schmidt.net/FloatConverter/IEEE754.html



Using the last representation, the value 2.54 is represented at 32 bits as:

0x40228F5C

Since we have 16-bit registers available, the value must be divided into MSW and LSW:

0x4022 (16418 decimal) are the 16 most significant bits (MSW) while 0x8F5C (36700 decimal) are the 16 least significant bits (LSW).

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10.8. SUPPORTED MODBUS COMMUNICATION PROTOCOLS

The Modbus communication protocols supported are:

- Modbus RTU Slave (from the RS485 port)
- Modbus TCP-IP Server (from Ethernet ports) 8 clients max (ZE-SG3 model only)

10.9. SUPPORTED MODBUS FUNCTION CODES

The following Modbus functions are supported:

- Read Holding Register (function 3)
- Read Coil Status (function 1)
- Write Coil (function 5)
- Write Multiple Coil (function 15)
- Write Single Register (function 6)
- Write Multiple Registers (function 16)

ATTENTION!

All 32-bit values are contained in 2 consecutive registers

ATTENTION!

Any registers with RW* (in flash memory) can be written up to 10000 times
The PLC/Master Modbus programmer must not exceed this limit

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11. MODBUS REGISTER TABLE FOR THE Z-SG3 / ZE-SG3 DEVICE

11.1. Z/ZE-SG3: MODBUS 4X HOLDING REGISTERS TABLE (FUNCTION CODE 3)

ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40001	0	MACHINE-ID	-	DEVICE IDENTIFICATION	RO	UNSIGNED 16
40002	1	FIRMWARE REVISION	-	FIRMWARE REVISION	RO	UNSIGNED 16
40003	2	MEASURE UNIT	-	Select the unit of measurement between: 0 = Kg 1=g 2=t 3=lb 4=l 5=N 6=bar 7=atm 8=other	RW	UNSIGNED 16
40004	3	UNIPOLAR	-	0 = compression and traction (Bipolar) 1 = Balance (Unipolar)	RW	UNSIGNED 16
40005	4	ANALOG OUTPUT TYPE (Only Model ZE-SG3, Z-SG3)	-	BIT[0] 0 = Analog Output Voltage 1 = Output Current BIT[1] Not used BIT[2] 0 = Analog Output linked to Net Weight 1 = Analog Output linked to MODBUS MANUAL ANALOG OUTPUT register	RW	UNSIGNED 16

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40006	5	DIGITAL IN TYPE/ DIGITAL IN-OUT	-	(MSB) DIGITAL IN TYPE: Select the input digital 1/2 type BIT[8] 0 = digital input 1 acquires the tare 1 = Status of the digital input 1 is shown on Modbus BIT[9] 0 = digital input 2 acquires the tare 1 = Status of the digital input 2 is shown on Modbus BIT[15..10] NOT USED (LSB) DIGITAL IN-OUT BIT[0] 0 = DIDO1 configured as Input 1 = DIDO1 configured as output BIT[1] 0 = DIDO2 configured as Input 1 = DIDO2 configured as output	R W	UNSIGNED 16
40007	6	CALIBRATION MODE	-	Set the calibration type mode: 0 = Factory calibration 1 = Calibration with standard weight	R W	UNSIGNED 16
40008	7	RESERVED	-	RESERVED MSW	R W	UNSIGNED 32
40009	8			RESERVER LSW	R W	
40010	9	RESERVED	-	RESERVED MSW	R W	UNSIGNED 32
40011	10			RESERVER LSW	R W	
40012	11	RESERVED	-	RESERVED MSW	R W	UNSIGNED 32
40013	12			RESERVER LSW	R W	

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40014	13	CELL SENSE RATIO [mV/V]	-	Load cell sensitivity value in [mV/V] MSW	R W	FLOATING POINT 32 BIT
40015	14			Load cell sensitivity value in [mV/V] LSW	R W	
40016	15	CELL FULL SCALE [kg/g/t…]	-	Full scale value of the load cell in technical units [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40017	16			Full scale value of the load cell in technical units [kg/g/t…] LSW	R W	
40018	17	STANDARD WEIGHT CELL FLOAT [kg/g/t…]	-	Standard weight value in technical units to use in calibration mode with sample weight [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40019	18			Standard weight value in technical units to use in calibration mode with sample weight [kg/g/t…] LSW	R W	
40020	19	THRESHOLD DO1 [kg/g/t…]	-	Alarm threshold value in technical units for digital output 1 [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40021	20			Alarm threshold value in technical units for digital output 1 [kg/g/t…] LSW	R W	
40022	21	OUTPUT WEIGHT START SCALE [kg/g/t…] (Only for model ZE-SG3, Z-SG3)	-	Initial scale value of the net weight for the analog output [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40023	22			Initial scale value of the net weight for the analog output [kg/g/t…] LSW	R W	
40024	23	OUTPUT WEIGHT STOP SCALE [kg/g/t…] (Only for model ZE-SG3, Z-SG3)	-	Full scale value of the net weight for the analog output [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40025	24			Full scale value of the net weight for the analog output [kg/g/t…] LSW	R W	
40026	25	OUTPUT STOP SCALE [V/mA] (Only for model ZE-SG3, Z-SG3)	-	Full scale value of the analog output in [V/mA] MSW	R W	FLOATING POINT 32 BIT
40027	26			Full scale value of the analog output in [V/mA] LSW	R W	
40028	27	OUTPUT START SCALE [V/mA]	-	Initial scale value of the analog output in [V/mA] MSW	R W	FLOATING POINT 32 BIT

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40029	28	(Only for model ZE-SG3, Z-SG3)		Initial scale value of the analog output in [V/mA] LSW	R W	
40030	29	DELTA WEIGHT [kg/g/t…]	-	Delta weight value in technical units for stable weighing condition [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40031	30			Delta weight value in technical units for stable weighing condition [kg/g/t…] LSW	R W	
40032	31	DELTA TIME [*100 ms]	-	Value of the delta time in 100ms quantities for the stable weighing condition	R W	UNSIGNED 16 BIT
40033	32	DOUT MODE	1-2	BIT[0] 0 = DOUT1 NORMALLY OPEN 1 = DOUT1 NORMALLY CLOSE BIT[1] 0 = DOUT2 NORMALLY OPEN 1 = DOUT2 NORMALLY CLOSE BIT[2..7] NOT USED BIT[8..11] 0 = DOUT1 MODE FULL SCALE 1 = DOUT1 MODE OVERTHRESHOLD 2 = DOUT1 STABLE WEIGHT 3 = DOUT1 FROM MODBUS 4 = DOUT1 OVERTHRESHOLD WITH HYSTERESIS BIT[12..15] 0 = DOUT2 MODE FULL SCALE 1 = DOUT2 MODE OVERTHRESHOLD 2 = DOUT2 STABLE WEIGHT 3 = DOUT2 FROM MODBUS 4 = DOUT2 OVERTHRESHOLD WITH HYSTERESIS	R W	UNSIGNED 16 BIT

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40034	33	ADVANCED ADC SPEED	-	Configure the sampling rate of the ADC. It is active only if you set the filtering at level 7 (advanced). 0 = 960 Hz 1 = 300 Hz 2 = 150 Hz 3 = 100 Hz 4 = 60 Hz 5 = 12 Hz 6 = 4.7 Hz	R W	UNSIGNED 16 BIT
40035	34	AUTOMATIC TARE RESET	-	0 = Disable the tare tracker If >= 1 it is the value of ADC points within which the tare automatically will be reset . If after 5 seconds of stable weighing condition the ADC value of the net weight deviates by less than this value then a new tare is acquired ADC POINTS MSW	R W	UNSIGNED 32
40036	35		-	ADC POINTS LSW	R W	
40037	36	THRESHOLD HYSTERESIS DO 1 [kg/g/t…]	-	Hysteresis value for digital output 1 threshold MSW	R W	FLOATING POINT 32 BIT
40038	37		-	Hysteresis value for digital output 1 threshold LSW	R W	
40039	38	ADVANCED DENOISE FILTER VARIATION	-	It represents the change in ADC points due to noise alone. It is active only if you set the filtering at level 7 (advanced). ADC VALUE MSW	R W	FLOATING POINT 32 BIT
40040	39		-	ADC VALUE LSW	R W	
40041	40	ADVANCED DENOISE FILTER RESPONSE	-	Represents a parameter related to the response speed of the filter, it can vary from 0.001 (Slowest Response) to 1 (Fast Response). It is active only if you set the filtering at level 7 (advanced). RESPONSE SPEED MSW	R W	FLOATING POINT 32 BIT

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40042	41		-	RESPONSE SPEED LSW	R W	
40043	42	DENOISE FILTER VALUE	-	It is possible to configure a pre-established filter level The higher the filter level is, plus the weight measurement will be stable but slow. A value other than 7 will override the advanced parameters. In the "Advanced" mode it will be possible to act on the individual parameters of the ADVANCED NOISE FILTER VARIATION, ADVANCED NOISE FILTER RESPONSE, ADVANCED ADC SPEED 0 = FILTER RESPONSE TIME 2 ms 1 = FILTER RESPONSE TIME 6,7 ms 2 = FILTER RESPONSE TIME 13 ms 3 = FILTER RESPONSE TIME 30 ms 4 = FILTER RESPONSE TIME 50 ms 5 = FILTER RESPONSE TIME 250 ms 6 = FILTER RESPONSE TIME 850 ms 7 = ADVANCED	R W	UNSIGNED 16 BIT
40044	43	RESOLUTION MODE	-	Select the type of resolution to be used in the Weight measurement: 0 = Automatic Resolution (calculated on the basis of the full scale to obtain about 20000 points 1 = Manual resolution (Taken from MANUAL RESOLUTION register) 2 Max resolution (Full 24 bits resolution)	R W	UNSIGNED 16 BIT
40045	44	DENOISE FILTER ENABLE	-	0 = Noise filter disabled (advanced mode enabled) 1 = Noise filter enabled	R W	UNSIGNED 16 BIT
40046	45	MANUAL RESOLUTION [kg/g/t…]	-	Sets the manual resolution with which the weight measure is displayed in technical units [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40047	46		-	Sets the manual resolution with which the weight measure is displayed in technical units [kg/g/t…] LSW	R W	

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40048	47	ONE PIECE WEIGHT [kg/g/t…]	-	Sets the weight of a single piece (used for pieces counter) MSW	R W	FLOATING POINT 32 BIT
40049	48		-	Sets the weight of a single piece (used for pieces counter) LSW	R W	
40050	49	THRESHOLD DO2 [kg/g/t…]	-	Alarm threshold value in technical units for digital output 2 [kg/g/t…] MSW	R W	FLOATING POINT 32 BIT
40051	50		-	Alarm threshold value in technical units for digital output 2 [kg/g/t…] LSW	R W	
40052	51	THRESHOLD HYSTERESIS DO 2 [kg/g/t…]	-	Hysteresis value for digital output 1 threshold MSW	R W	FLOATING POINT 32 BIT
40053	52		-	Hysteresis value for digital output 1 threshold LSW	R W	
40061	60	RESERVED	-	Reserved	R O	FLOATING POINT 32 BIT
40062	61			Reserved	R O	
40063	62	16 BIT ADC FILTERED	-	ADC Converted in 16 Bit filtered value	R O	UNSIGNED 16 BIT
40064	63	NET WEIGHT VALUE [Kg/g/t..]	-	Net weight in technical units MSW	R O	FLOATING POINT 32 BIT
40065	64			Net weight in technical units LSW	R O	
40066	65	GROSS WEIGHT VALUE [Kg/g/t..]	-	Gross weight in technical units MSW	R O	FLOATING POINT 32 BIT
40067	66			Gross weight in technical units LSW	R O	
40068	67	TARE WEIGHT VALUE [kg/g/t…]	-	Tare weight in technical units MSW	R O	FLOATING POINT 32 BIT
40069	68		-	Tare weight in technical units LSW	R O	
40070	69	INTEGER NET WEIGHT VALUE [kg/g/t…]	-	Net weight in technical units MSW	R O	SIGNED 32 BIT
40071	70		-	Net weight in technical units LSW	R O	

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40072	71	INTEGER GROSS WEIGHT VALUE [kg/g/t…]	-	Gross weight in technical units MSW	RO	SIGNED 32 BIT
40073	72		-	Gross weight in technical units LSW	RO	
40074	73	INTEGER TARE WEIGHT VALUE [kg/g/t…]	-	Tare weight in technical units MSW	RO	SIGNED 32 BIT
40075	74		-	Tare weight in technical units LSW	RO	
40076	75	FACTORY MANUAL TARE [kg/g/t…]	-	Value to use for the manual tare in the factory mode calibration (MSW)	RW	FLOATING POINT 32 BIT
40077	76		-	Value to use for the manual tare in the factory mode calibration (LSW)	RW	
40078	77	STATUS	-	Status register: BIT 0 LSBIT (RO) Bit 0 = 1 THRESHOLD AND STABLE WEIGHT for DIDO 1 BIT 1 (RO) Bit 1 = 1 FULL SCALE CELL BIT 2 (RO) Bit 2 = 1 NET WEIGHT < 0 BIT 3 (RO) Bit 3 =1 THRESHOLD AND STABLE WEIGHT for DIDO 2 BIT 4 (RO) Bit 4 = 1 Stable weight BIT 5-6 (R/W) Only if the output mode commandable from modbus has been chosen: Bit 5 = 1 digital output 2 on Bit 5 = 0 digital output 2 off Bit 6= 1 digital output 1 on Bit 6 = 0 digital output 1 off BIT 7 (RO) Bit 7 = 1 Threshold with hysteresis for DIDO 1 BIT 8 (RO) Bit 8 = 1 tare tracker (if enabled) BIT 9 (RO) Bit 9 = 1 Threshold with hysteresis for DIDO 2 BIT 10..15 Not used	RW	UNSIGNED 16 BIT
40079	78	PASSWORD	-	Reserved	RO	UNSIGNED 16 BIT

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40080	79	COMMAND REGISTER	-	Command register once the command has been executed, the register returns to the value 0 43948 (decimal) Reboot the device 49594 (decimal) Acquires the tare in RAM (at reboot is lost) 49914 (decimal) Acquires the tare in Flash for the calibration procedure in both operating modes (factory calibration and with sample weight) 50700 (decimal) Acquires the sample weight value in Flash for calibration with standard weight 50773 (decimal) Acquires the tare value from the register MANUAL TARE (only for the factory calibration mode) 49151 (decimal) Reset the maximum net weight 45056 (decimal) Reset the register with the minimum net weight	R W	UNSIGNED 16 BIT
40081	80	PIECES NR	-	PIECES COUNTER VALUE	R O	UNSIGNED 16 BIT
40082	81	MAX NET WEIGHT [Kg/g/t…]	-	Maximum weight value net in technical units from last reboot [MSW]	R O	FLOATING POINT 32 BIT
40083	82		-	Maximum weight value net in technical units from last reboot [LSW]	R O	
40084	83	MIN NET WEIGHT [Kg/g/t…]	-	Minimum weight value net in technical units from last reboot [MSW]	R O	FLOATING POINT 32 BIT
40085	84		-	Minimum weight value net in technical units from last reboot [LSW]	R O	
40086	85	RESERVED	-	Reserved	R O	UNSIGNED 32 BIT
40087	86		-	Reserved	R O	

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ADDRESS (4x)	OFFSET ADDRESS (4x)	REGISTER	CHANNEL	DESCRIPTION	W/R	TYPE
40088	87	RESERVED	-	Reserved	RO	UNSIGNED 32 BIT
40089	88		-	Reserved	RO	
40090	89	RESERVED	-	Reserved	RO	UNSIGNED 32 BIT
40091	90		-	Reserved	RO	
40092	91	ADC RAW 24 BIT	-	ADC 24 bit value not filtered	RO	UNSIGNED 32 BIT
40093	92		-	ADC 24 bit value not filtered	RO	
40094	93	ADC RAW 24 BIT FILTERED	-	ADC 24 bit value filtered	RO	UNSIGNED 32 BIT
40095	94		-	ADC 24 bit value filtered	RO	
40096	95	MODBUS MANUAL ANALOG OUTPUT [mV / uA] (Only Model ZE-SG3, Z-SG3)	-	Value in mV or uA for the modbus manual analog output mode.	RW	UNSIGNED 16 BIT

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12. INTERPRETATION OF RAW ADC REGISTERS

In the modbus registers, registers with the value of the raw ADC and filtered raw ADC are available. This register is not affected by the calibration carried out nor by any tare, as it represents the measurement of the unbalance of the cell.

The coding of this value is represented by the following formula:

With ADC set to Unipolar ADC RAW mode = $\frac{2^{24} \times Vcell \times PGA}{5000}$

With ADC set to Bipolar mode ADC RAW = $2^{23} \times (\frac{(Vcell \times PGA)}{5000} + 1)$

Where: Vcell is the voltage at the ends of the load cell in [mV] PGA is the amplification from the table:

Cell sensitivity [mV/V]	***PGA***
<= 4.05	128
<= 8.05	64
<=16.05	32
<=32.05	16
>32.05	8

For example, if you set the ADC to bipolar mode and the cell sensitivity to 2mV/V, you have that:

Vcell = -10 mV -> ADC RAW = 6241124 = 0x5F3B64
Vcell = 0 mV -> ADC RAW = 8388608 = 0x800000
Vcell = +10 mV -> ADC RAW = 6241124 = 0xA0C49C

13. PS1 BUTTON

The PS1 button allows you to acquire the tare (in RAM); to acquire the tare, keep the button pressed for at least 3 seconds.

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14. FIRMWARE UPDATE

In order to improve, add, optimize the functions of the product, Seneca releases firmware updates on the device section on the www.seneca.it website

ATTENTION!

NOT TO DAMAGE THE DEVICE DO NOT REMOVE THE POWER SUPPLY DURING THE FIRMWARE UPDATE OPERATION.

14.1. ZE-SG3

The firmware update takes place via the web server in the appropriate section.

14.2. Z-SG3

To update the firmware of the device:

1) Remove power from the device
2) Turn SW2 dip switches 3 and 4 to ON.
3) Power and connect the device to the USB port
4) Follow the Easy Setup2 software instructions in the Firmware Update section.
5) At the end of the procedure, cut off the power to the device
6) Turn SW2 dip switches 3 and 4 to OFF.
7) Power up the device and check that the firmware revision has changed through the Easy Setup2 Software

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15. SEARCH AND CHANGE THE DEVICE IP WITH THE SENECA DISCOVERY DEVICE TOOL (ZE-SG3 MODEL ONLY)

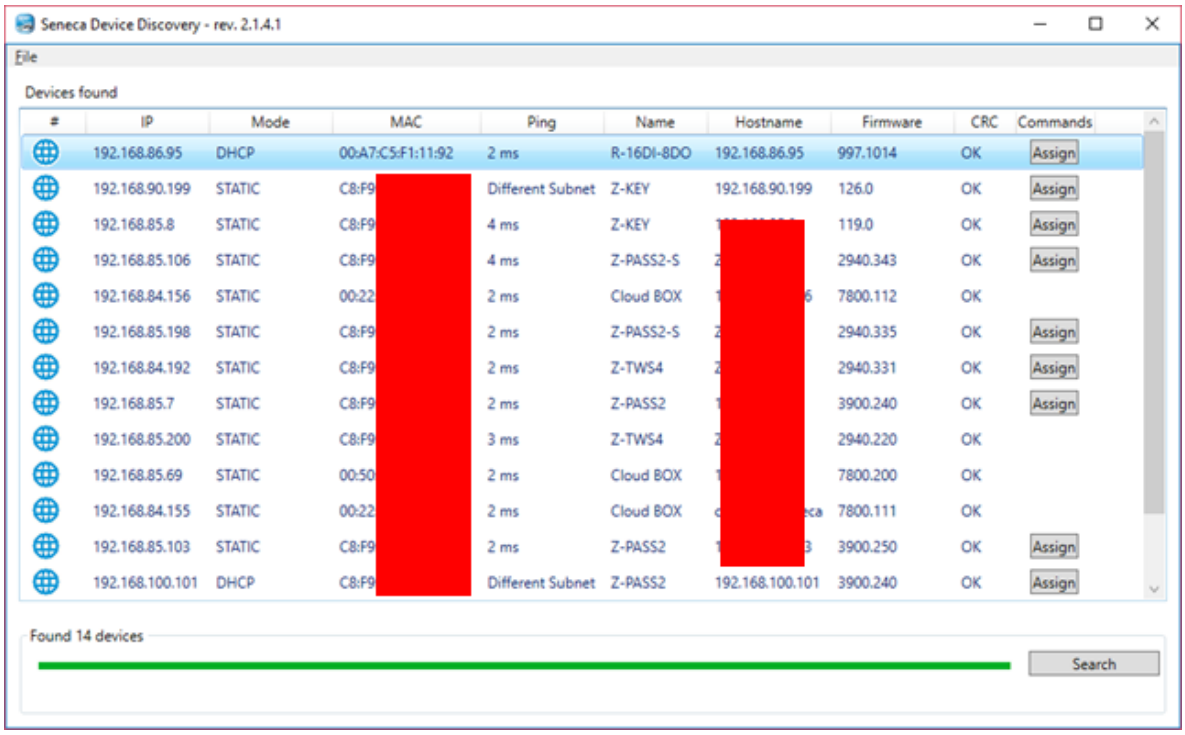
The search and modification of an IP of the device can be performed via the Seneca Discovery Device software.
If Seneca devices that are not part of the R series are also used, it is more convenient to set the addresses with a single software.

When in the R series device the STS LED is on steady, it is possible to obtain the IP address which has been set using the "Seneca Discovery Device" tool too.

The software can be downloaded from:

https://www.seneca.it/en/linee-di-prodotto/software/easy/sdd

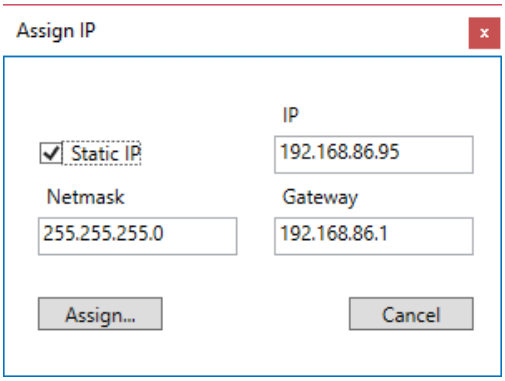
Pressing the "search" button starts the search for all Seneca devices present in the network even if with IP addresses not compatible with the current PC configuration:



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It is now possible to change the address by pressing the "Assign" button:



The software works on layer 2 level and it is therefore not necessary to have an Ethernet configuration compatible with the device you are looking for.

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