

MODBUS REGISTERS
Z-SC 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.

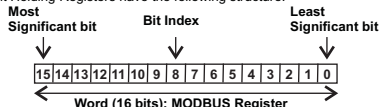
Supported MODBUS Commands

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: Writable

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 0xFF (decimal values in the range of 0-255). Default address: 1.		



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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		



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(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 (when ever 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



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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).		



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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
WEIGHT_FLOAT_H	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 corresponding to the maximum value of the analog output). Values=0 if WEIGHT_FLOAT<MINOUT_FL. Limited: -31000..+31000.	40064	R
WEIGHT_FLOAT_L	Register containing the net weight value in technical units of weight (floating point format, least significant word).	40065	R



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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.		



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Remote Memorizing of the Tare

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

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

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



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