EZ-Mag

EZ-2US

BY
PROCESSAUTOMATIC

PRODUCT MANUAL FOR:
EZ-MAG / Model Premium.
By: ProcessAutomatic©

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1 CONTACT INFORMATION:

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2 WAVER:

For printing errors, please contact your nearest ProcessAutomatic reseller or our head office. Please note, ProcessAutomatic will not assume any responsibility for printing errors (E&OE). Please make sure that you always have the latest product manual available. The latest manual can always be downloaded directly from ProcessAutomatic's web site www.processautomatic.com or obtained thru request by contacting ProcessAutomatic or your nearest ProcessAutomatic Reseller.

3 SAFETY:

This product should only be used by persons familiar with the product or persons that have read and understood this manual in full. Any persons not familiar with this product should refrain from any use until they have read and understood the manual in its entirety.

Before using this product – refer to Safety section in Manual – EZ-Mag.

4 CAUTION:

Misuse of this product or use outside of what is recommended in this manual, may result in personal injury as well as damage to the product and other system installations.

Reference to safe use and handling of this product will be made throughout this manual.

5 MANUFACTURER STATEMENT:

This product fully complies with the EMC directive 2004/108/EEC as is also stated in the document that can be downloaded directly from ProcessAutomatic's web site www.processautomatic.com. This product has been tested according to EN 61326-1 and as such fully complies with CE and FCC approvals.

6 TRADEMARKS:

Proper reference is and will be given to used trademark products. All such reference is given where these trademarks are mentioned.

7 THE PURPOSE OF THIS MANUAL:

This manual is designed to guide any and all users of ”EZ-2US" to safe and proper handling. It is only thru safe and proper handling that the end user will get the most out of this product. EZ-Mag is a highly advanced measuring apparatus and has many different functions. By knowing how to access these functions and learning how to use them will undoubtedly aid in the end process.

The goal of this manual is to inform the user about the product, how it works and of how to use it. It is important that the end user is well accustomed to the product, as such, should there be a need for any additional information, please contact your nearest ProcessAutomatic reseller or our head office to forward your requirements.

8 SCOPE OF THIS MANUAL:

EZ-Mag comprises two main parts: the EZ-Mag Flow transmitter and the EZ-Mag Flow Tube. The flow transmitter is available with an integrated Flow Computer called EZ-2US. This manual only covers the EZ-Mag EZ-2US - it does not cover aspects of the flow tube or wiring of the outputs. For instructions on how to use the EZ-Mag flow tube or on how to wire the outputs, please refer to separate manual.

9 WHO SHOULD READ THIS MANUAL:

All persons intending to or that are intended to use EZ-Mag with EZ-2US should read this manual in its entirety. If after reading, any aspect of the use of EZ-2US is unclear or not understood, then please contact your nearest ProcessAutomatic reseller or our head office for further support. No person should use the EZ-2US if they are not fully aware of and fully understand how it works.

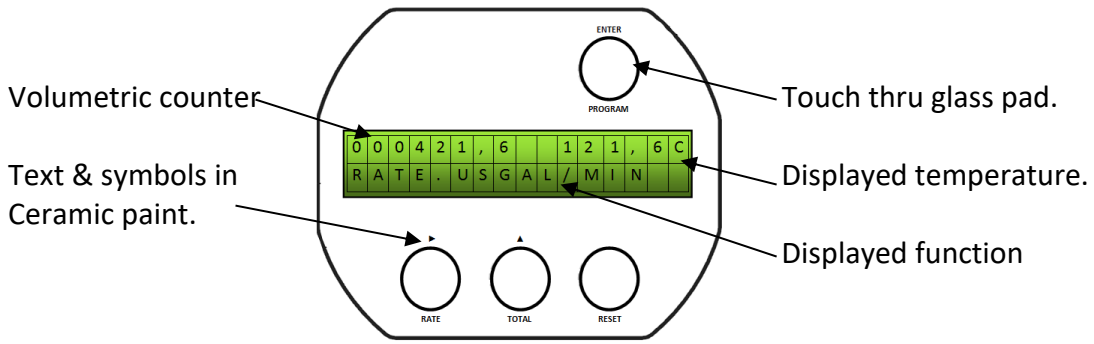
10 WHERE TO KEEP THIS MANUAL:

This manual should be kept near or at the location of EZ-Mag. It should be readily accessible to any and all users of this product. Laminated versions of this manual are able to be purchased directly from ProcessAutomatic or any of its resellers. Digital copies are readily available for downloading from ProcessAutomatics web site www.processautomatic.com.

NOTE: It is recommended to file this manual at a location readily accessible by personnel using or intended to use EZ-Mag. Paper copies should be kept dry and away from all forms of moisture, chemicals, corrosive substances or sharp objects.

11 What is the EZ-2US:

The EZ-2US is an advanced and integrated flow computer that is available as an optional feature to EZ-Mag. The EZ-2US allows the user to view flow and temperature conditions, to set parameters for the different outputs, to set maximum and minimum values for alarm features and to set preferred units for temperature, time and flow.



12 CONSTRUCTION:

EZ-2US is an integrated flow computer. The control panel consists of a large backlit 16 x 2-digit LCD and 4 function keys utilizing touch thru glass technology (EZ-Touch), all integrated into a solid metal front that is attached to the main transducer housing. So as to provide a compact design, the hardware and software are completely integrated into the transducer. The whole front can be positioned at 0, 90, 180, 270 degrees on the y axis so as to achieve an optimal viewing angle. The whole transducer can be positioned at 0, 90, 180 and 270 degrees on the x-axis, allowing for an unmatched flexibility in mounting options.

12.1 EZ-Touch (TOUCH THRU GLASS TECHNOLOGY).

The touch thru glass technology allows for easier cleaning and better durability, compared to push buttons and diaphragms which ware and fade quickly. The symbols used are of ceramic paint that has been burned into the glass during hardening. To eliminate ware, this text has been placed on the reverse side of the glass. This way, the symbols will never ware or fade.

The EZ-Touch system utilizes filtered IR technology. This allows the use of light reflecting surfaces to be used to activate the buttons - such as the users finger. Even gloves of fabric, leather and latex can be worn when using the control panel; as long as it is a light reflecting surface. The large touch pads are clearly visible and allows for easy use - even when gloves are worn. The text and symbols used are large and clear. The sensitivity range is limited from 0,0-1,5 millimetres above the glass. The panel buttons will only work when a light reflecting object (such as the users finger) is placed very close to or directly on to the touch pad.

The control panel's electronics board is connected directly to the EZ-Mag CPU board. This universal connection allows for the EZ-2US to be available as an upgrade to the Classic model transducer.

NOTE: light scratches will not hamper the function.

NOTE: Oil stains on the glass cause disturbing light refraction. If the glass has oil stains, the touch pads may become less sensitive.

CAUTION: The touch thru glass buttons will not work in strong direct sunlight. The touch pads will work again when covered from direct sunlight or when shadow is cast on the display. It is not recommended to install the EZ-2US in direct sunlight. If this is unavoidable – a cover should be used when working with the display. Combinations of sunlight with light from 2 additional artificial light sources from a distance of ≤ 150 cm can cause light interference (also called super positioning) where the touch thru buttons can react falsely.

12.2 Using the EZ-2US:

The EZ-2US has 2 main states: **The working state**, where the rate totalizer is used in filling applications etc; **The programming mode** which is used to program the various outputs and to choose the value units for the Rate Totalizer - such as time, flow and temperature units.

12.3 The Rate Totalizer:

The EZ-2US Rate Totalizer shows the user the current volumetric rate per time unit, such as US-Gallons per hour or Litres per minute. It can also provide the user with information regarding the actual total volume that has passed thru EZ-Mag and the accumulated total that has passed thru EZ-Mag. During these 2 states, if EZ-Temp is chosen as an option, the in-line temperature is also shown in the chosen temperature unit; on the upper right side of the back-lit 16 x 2 - digit LCD.

RATE:

To show rate, press down on the touch pad with the text RATE (►).

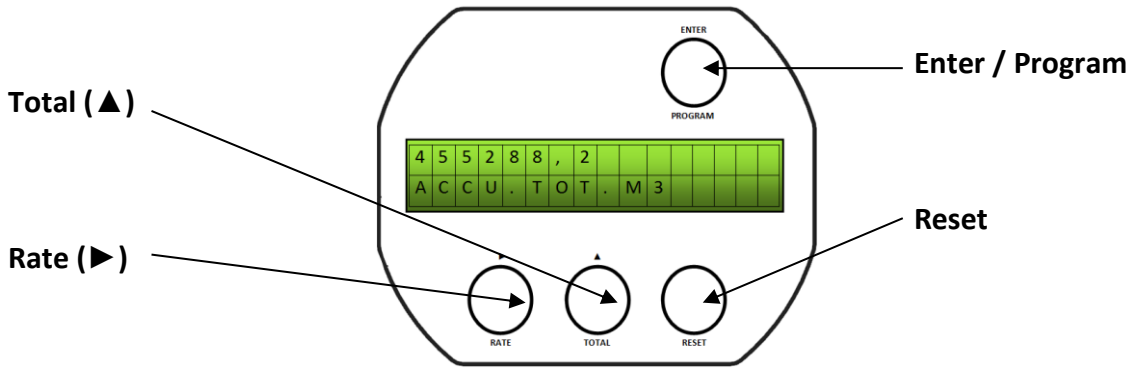
TOTAL:

To show the actual total, press down on the touch pad with the text TOTAL (▲). To show the accumulated total - also called the non resettable total, press down on the touch pad with the text TOTAL (▲) again, and the accumulated total can be viewed for 5 seconds.

RESET:

To reset the actual total, press down on the touch pad with the text TOTAL (▲). This will bring up the actual total on the display. Then press down on the touch pad with the text RESET. This will reset the actual total to 0.

NOTE: It is not possible to reset the accumulated total from the working state. To reset the accumulated total, enter register 15 (CLEAR.ACCU.TOTAL).



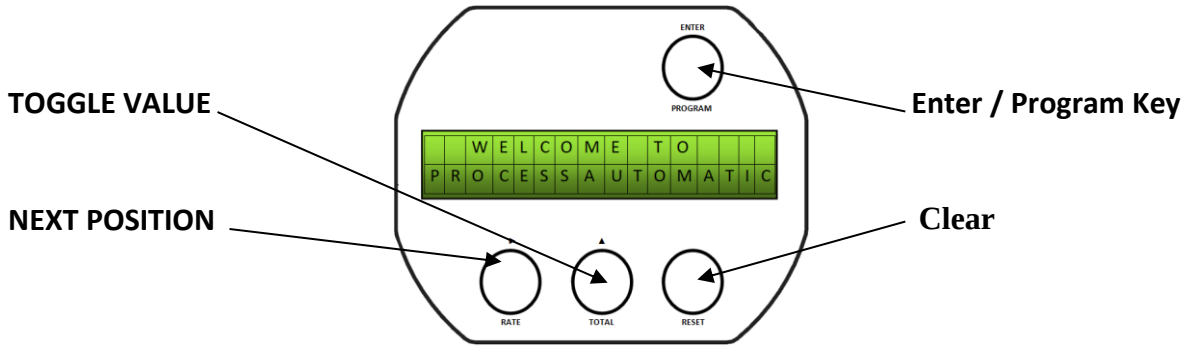
12.4 THE PROGRAMMING MODE:

To enter the programming mode, press down on the touch pad with the text ENTER/PROGRAM, and hold for 5 seconds. The LCD will now show the text Programming mode and the cursor will be placed at the start of 4 empty positions. To access the programming mode and to gain entry to the programmable registers, a correct password must be entered. **When your EZ-Mag is delivered as new – the password is 0000**. The password is displayed in the 1st register "Code.user.admin". This is the register in which the password can be changed. Whichever number sequence is entered into register 1 is the password necessary to gain entry to the programming mode.

NOTE / IMPORTANT: If you are using the password protection to gain entry to the programming mode – should the password be forgotten, only a qualified Processautomatic Technician will be able to gain entry to EZ-2US to reset the password. Alternatively, a new EEPROM with default settings can be purchased from ProcessAutomatic or ProcessAutomatic representative

12.4.1 Entering values in the EZ-2US during programming mode:

To enter a value on the LCD, toggle thru the numerical options with the Total key (▲). When the correct value has been found, toggle the cursor to the next position with the Rate key (►). Repeat the procedure until the whole value has been entered into the register. When the complete factor has been entered, store the value with the Enter/Program key. This will also take the user to the next register.



13 THE REGISTRY:

Following is the full registry that can be viewed in the programming mode. All registers are not possible to be viewed on all models. Only the registers that are active for each individual flow meter can be viewed. For example, a model which does not have EZ-Tune, will not provide the ability to view registers 28 thru to 36.

Under each of the following registers is a viewing screen which shows what each register window will look like.

NOTE: The EZ-2US will automatically exit the programming mode after 2 minutes if the control panel is not used.

13.1 REGISTER 1 (CODE.USER.ADMIN).

0	0	0	0											
C	O	D	E	.	U	S	E	R	.	A	D	M	I	N

In this register the user can manage the password needed to gain entry to the programming mode. The default password on new EZ-Mag flow meters is 0000. To change this password, simply enter the desired password in this register. **See Note/Important in 12,4 before changing the password.**

13.2 REGISTER 2 (CODE.USER.ADMIN).

0	0	0	0	0	0									
C	O	D	E	.	U	S	E	R	.	P	A			

This register is only to be used by authorized ProcessAutomatic Technician for on-site technical service.

13.3 REGISTER 3 (MASTER CALIBRATION FACTOR).

_	_	_	_	_	_									
M	A	S	T	E	R	.	C	A	L	.	F	A	C	T

The master calibration factor value is made up of the following numeric values: tens, ones, tenths, hundredths, thousandths and ten thousandths.

Enter the calibration factor in accordance to the corresponding numeric value. For example. A master calibration factor of 1,6681 is entered as 016681.

13.3.1 HOW TO CALCULATE A NEW CALIBRATION FACTOR.

If the master calibration factor is 01.2345 and the user wants to make the flowmeter read 5% more on all outputs, the factor should be increased by 5%. To do this, multiply the existing calibration factor by 1,05.

The new factor should then be 1.2345 x 1.05 = 1.2962.

The new master calibration factor will now be 1,2692. To use this, enter this new master calibration factor into register 1 as described in section 12.4.1.

If the master calibration factor is 01.2345 and to make the flowmeter read
5% less on all outputs, the factor should be decreased by 5%.
The new factor should then be 1.2345 x 0.95 = 1.1728.

13.4 REGISTER 4 (SCALING THE HF PULSE OUTPUT).

_	_	_	_	_	_									
H	F	.	P	U	L	S	E	.	O	U	T	P	U	T	.

The values in this register controls how many pulses from the pulse output represent one litre. The scaling permits the use of 2 decimal points.

To scale the output, simply enter the amount of pulses, including decimal points, that is required per litre. There are 6 available entries, where they represent (in order) the following numerical units, thousand, hundred, ten, ones, tenths, hundredths. For clarity, please refer to the following examples:

1. To enter 10,25 pulses per litre, enter the value: 001025.
2. To enter 1350 pulses per litre, enter the value: 135000.

IMPORTANT NOTE:
The highest output frequency is 2000 Hz. To ensure that this frequency is not exceeded, use the following formula:

$$\text{Output frequency (Hz)} = \frac{\text{flow rate (litres per hour) x pulse output scaling}}{3600}$$

For example, if the flow rate is 8,000 litres per hour and the pulse output is set to produce 100 pulses per litre, the output frequency =

$$\frac{8{,}000 \times 100}{3600} = 222 \text{ Hz}$$

NOTE: This output also works in symmetry with the multi-functional output. The multifunctional output is a factor of the pulse output. This is why the main pulse output is also referred to as the HF (high frequency) pulse output; in turn, the multifunctional output (when used as a pulse output) is referred to as the LF (low frequency) pulse output.

13.5 REGISTER 5 (CURRENT OUTPUT SPAN).

_	_	_	_	_	_									
C	U	R	R	.	O	U	T	.	S	P	A	N	.	

A span factor is the unit which represents 20mA on the output. This span factor is calculated based on the flow meters' maximum flow rate and on the desired maximum flow to be represented by 20mA (both factors require the use of the same volumetric unit).

Table 13:1 illustrates the flow meters' flow rates as reference for the below calculations.

Flow rates for current flow meter series:

	Type:	Min Flow in l/hr	Max Flow in l/hr
DN10	**10/2**	**138**	**2820**
DN15	**15/2**	**318**	**6360**
DN20	**20/2**	**564**	**11280**
DN25	**25/2**	**882**	**17640**
DN32	**32/2**	**1446**	**28920**
DN50	**50/2**	**3534**	**70650**
DN65	**65/2**	**5970**	**119400**

Table 13:1

13.5.1 How to calculate the span factor for the current output.:

Example 1: A flowmeter type 50/2 has a Max stated flow = 70,000 litres/hrs.

20 mA is required at 40,000 litres/hrs.

Span factor = 70,000 / 40,000 = 1.75

Example 2: A flowmeter type 65/2 has a Max stated flow = 119,400 litres/hrs.

20 mA is required at 119,400 litres/hrs.

Span factor = 119,400 / 119,400 = 1.00

Example 3: A flowmeter type 25/2 has a Max stated flow = 17,640 litres/hrs.

20 mA is required at 8,000 litres/hrs.

Span factor = 17,640 / 8,000 = 2.205

13.5.2 How to enter the span factor:

After calculating the desired span factor, enter this value into register 5 (CURR.OUT.SPAN).

There are 6 numerical positions available for the entry of the span factor. The positions are tens, ones, tenths, hundredths, thousandths, ten thousandths. The span factor value is entered according to the unit value.

As reference, the span factors from example 1-3 are used in below examples:

Example 1: The span factor 1,75 is entered as 017500
Example 2: The span factor 1,0 is entered as 010000
Example 3: The span factor 2,205 is entered as 022050

13.6 REGISTER 6 (CURRENT OUTPUT - FLOW OR TEMP).

_															
F	L	O	W	.	O	R	.	T	E	M	P	.			

The current output is a dual output. It can either be used as a flow indicating output, or it can be used as a temperature indicating output.

To choose which unit is to be represented by the current output, it is necessary to enter the corresponding value into register 6 (FLOW.OR.TEMP).

To choose the current output to be used as a flow indicating output, enter the value 0. This option activates register 5 & 7.

To choose the current output to be used as a temperature indicating output, enter the value 1. This option deactivates registers 3 & 5 (span & zero-point). The resolution on the temperature is synchronized to the full temperature range of -20C to +140C. This is a fixed setting and it is not possible to alter the span or the zero point. The (0)4-20 mA output will be pre-set so that (0)4 mA will be equal to -20C (-4 F) and 20 mA will be equal to 140 C (284F). The resolution is equal to 406,25 pts/^{o}C or 225,7 pts/^{o}F.

Please refer to table 13:2 for further reference.

Value in register 4	Current output indication.
0	Flow
1	Temperature

Table 13:2

13.7 REGISTER 7 (CURRENT OUTPUT ZERO POINT).

_															
C	U	R	R	.	O	U	T	.	Z	E	R	O	.		

The current output can be set to produce 4-20 mA or 0-20 mA for a certain flow range. 4-20 mA is the most commonly used configuration but 0-20 mA is available for use with specialty devices or older styles of analogue receivers. The value in register 7 (CURR.OUT.ZERO) determines which output configuration is used.

Please refer to table 13:3 for the available settings.

Value in register 5	Current output range
1	4 - 20 mA
0	0 - 20 mA

Table 13:3

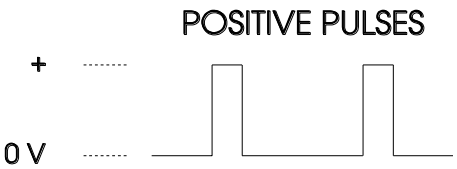
13.8 REGISTER 8 (PULSE OUTPUT CONFIGURATION).

_															
H	F	.	P	U	L	S	E	.	C	O	N	F	I	G	.

The value in register 8 (HF.PULSE.CONFIG) determines if the pulse output produces positive or negative pulses.

A positive pulse is defined by the output being normally low and the pulse beginning with a positive edge.

A negative pulse is defined by the output being normally high and the pulse beginning with a negative edge.



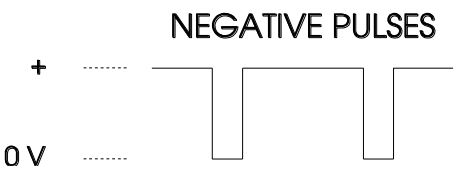


Table 13:4 provides further clarity regarding the entered value and corresponding pulse output configuration.

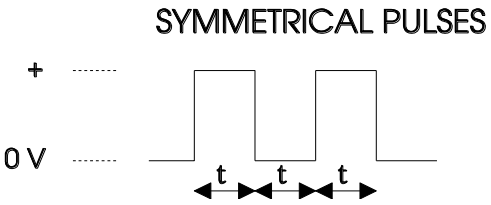
Value in register 6	Pulse output configuration
1	Positive pulses
0	Negative pulses

Table 13:4

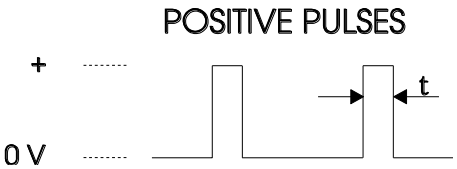
13.9 REGISTER 9 (PULSE OUTPUT LENGTH).

_	_														
H	F	.	P	U	L	S	E	.	L	E	N	G	T	H	.

The pulse output can be set to a symmetrical pulse (50% duty cycle).



Alternatively, the pulse output on-time “t” can be set.



When programming the pulse duration, avoid the risk of “overlapping”. This is done by calculating the highest expected output frequency from the pulse output and ensuring that pulse duration is not too long.

For example, if the time “t” is 0.2 seconds, less than 5 pulses can be generated in any one second.

If unsure, using symmetrical pulses is recommended. Table 13:5 provides further clarity regarding the entered value and the corresponding description.

Value.	Description.
00	Symmetrical pulse output.
01	Pulse duration ‘t’ = 10 mS.
02	Pulse duration ‘t’ = 20 mS.
.	
99	Pulse duration ‘t’ = 990 mS.

Table 13:5

NOTE: Small variations in the pulse duration may occur.

13.10 REGISTER 10 (EMPTY PIPE SENSITIVITY).

_	_														
E	M	P	T	Y	.	P	I	P	E	.	S	E	N	S	.

Register 10 (EMPTY.PIPE.SENS.) enables the sensitivity to an empty pipe to be adjusted. This parameter minimizes the possibility of the flowmeter from registering flow when the metering pipe is empty.

NOTE: For best results, and to avoid false counting, the metering pipe should be full of liquid at all times.

Empty Pipe Detection with Sensitivity Adjustment automatically cuts off the output signal of the measured value when the space between the electrodes becomes conductively isolated by air. The sensitivity adjustment provides the user with the ability to adjust how sensitive EZ-Mag will be to the air in the measured media by adding a delay at which point EZ-Mag will resume measuring.

The table below shows the time delays that can be entered to adjust for air sensitivity. As an example, the value 50 will have EZ-Mag delay 1.0 seconds prior to resuming flow measurement.

Table 13:6 provides further description regarding the set value and corresponding delay.

Value.	Description.
01	0.2 sec.
10	0.4 sec.
50	1.0 sec.
90	1.6 sec.

Table 13:6

<u>The recommended value for Register 8, empty pipe is 50 (1.0 Sec)</u>

13.11 REGISTER 11 (MULTIFUNCTIONAL OUTPUT).

_															
M	U	L	T	I	–	F	.	O	U	T	P	U	T	.	

The multifunctional output can be set to one of four different states.

Table 13:7 shows the value to enter into register 11 and the corresponding function to this value.

Value	Description
0	Bidirectional flow indication is ON
1	Secondary pulse output (max-25Hz)
2	High & Low Alarm for flow & temp.
3	Disabled.

Table 13:7

13.11.1 BIDIRECTIONAL FLOW INDICATION:

To set the multifunctional output as a bidirectional indicator, the register value should be set to 00. When the bidirectional flow indication has been selected, the multifunctional output will be activated during reverse flow and will not be activated during forward flow; where forward flow is defined by the "In-Out" sign engraved on the flowmeter metering pipe. However, both the Pulse output and the analogue output will register flow in both directions.

13.11.2 SECONDARY PULSE OUTPUT (MAX 25Hz):

If the Multifunctional output (Pulse) is selected, the value in register 11 should be set to 01. The multifunctional output (pulse) is also referred to as the LF.PULSE.OUTPUT.

Registers 12, 13 and 14 set the pulse scaling and configuration when the Multifunctional Output is set as a second pulse output.

If the Multifunctional output is used as bidirectional flow indicator, the values in register 12, 13 and 14 should be set to 00, thus completely deactivating the Multifunctional pulse output.

If the multifunctional output has been selected as a pulse output, register 12 sets the pulse output scaling.

These pulses are scaled with reference to the pulse output (Please refer to register 2, section 13.2).

For example, if the Multifunctional output is scaled to 123, the multifunctional output will produce a pulse after each time the pulse output has produced 123 pulses.

Another example, if the Pulse output is scaled to 1 pulse per litre and the Multifunctional output is scaled to 1000, the Multifunctional output will produce one pulse per cubic metre (1000 litres).

A scaling factor on the Multifunctional output between 1 - 9999 is acceptable. When setting this scaling factor, please note that the highest frequency which can be produced is 25 Hz.

GOOD TO KNOW: This configuration is normally used in applications where a totalizer is required for display of kilolitres or similar.

13.11.3 HIGH & LOW ALARM FOR TEMPERATURE AND FLOW:

Available as an option, EZ-Monitor allows the multifunctional output to be used as a high/low alarm monitoring system for flow and temperature readings.

To set the multifunctional output to be active for EZ-Monitor, enter the value 2 in register 11.

The volumetric units used in the multifunctional output are found in registers: 18 (Time unit for Rate); 19 (volumetric unit) & 22 (temperature unit).

To set the flow rate range, please refer to register 23 for minimum flow rate and register 24 for maximum flow rate.

To set the temperature range, please refer to register 25 for maximum temperature and register 26 for minimum temperature.

When the multifunctional output has the EZ-Monitor function activated, the multifunctional output will be active when any of the set parameters in registers 23-26 are exceeded.

Example 1:

The multifunctional output has been set to the value 02 - activating EZ-Monitor.
Register 23 has been set to 100 (litres/minute);
Register 24 has been set to 150 (litres/minute);
Register 25 has been set to 75 (degrees C)
Register 26 has been set to 50 (degrees C)

Then:

If the flow rate is registered to go above 150 (litres/minute) OR
If the flow rate is registered to go below 100 (litres/minute) OR
If the temperature is registered to go above 75 (degrees C) OR
If the temperature is registered to go below 50 (degrees C) THEN

---The multifunctional output will be activated---.

If instead the set parameters in registers 23-26 are not breached, then the multifunctional output will not be activated.

13.11.4 DISABLED:

To disable the multifunctional output completely, the value 03 should be entered into register 11.

13.12 REGISTER 12 (MULTIFUNCTIONAL OUTPUT SCALING):

_	_	_	_												
L	F	.	P	U	L	S	E	.	O	U	T	P	U	T	.

Register 10 has 4 numerical positions for entry of the scaling factor. These are thousands, hundreds, tens and ones. the following four examples illustrate how to enter the scaling factor (Please also refer to section 13.9.2):

Scaling factor of 1000 is entered into register 12 as 1000.
Scaling factor of 200 is entered into register 12 as 0200.
Scaling factor of 50 is entered into register 12 as 0050.
Scaling factor of 9999 is entered into register 12 as 9999.

13.13 REGISTER 13 (MULTIFUNCTIONAL OUTPUT CONFIGURATION).

_															
L	F	.	P	U	L	S	E	.	C	O	N	F	I	G	.

Register 13 sets the Multifunctional pulse output configuration. Please refer to table 13:8 for a description of each entry value.

Value	Description
0	Transistor is normally not activated.
1	Transistor is normally activated.

Table 13:8

13.14 REGISTER 14: (MULTIFUNCTIONAL OUTPUT LENGTH).

_	_														
L	F	.	P	U	L	S	E	.	L	E	N	G	T	H	.

Register 14 sets the Multifunctional output pulse duration. Please refer to table 13:9 for a description of each entry value.

Value	Description
00	Deactivated.
01	20 mS.
02	30 ms
...	...
99	1000 mS.

Table 13:9

If the Multifunctional output is used as bidirectional flow indication, the values in registers 12, 13 & 14 should be set to 00, thus completely deactivating the Multifunctional pulse output.

13.15 REGISTER 15 (FLOW SIMULATION).

_															
F	L	O	W	.	S	I	M	.	O	N	/	O	F	F	.

Register 15 allows simulation of flow for the pulse output and the 4-20 mA output.

This procedure should normally be carried out directly after installation to test that the wiring is correct.

Please note that the multifunctional output cannot be simulated. Table 13:10 shows the entered value and corresponding description.

Value	Description
0	Flowmeter normal operation.
1	Flowmeter simulated flow is ON.

Table 13:10

When the simulated flow option has been selected, the pulse output and the current output will produce a signal even when there is no flow going through the flow meter. The multifunctional output will not be effected.

To activate the flow simulation, the value 01 has to be set in register 15.

After flow simulation has been successfully carried out, it is important to cancel the flow simulation to ensure correct output values are produced during actual measurement. To cancel the flow simulation, enter the value 00 in register 15. This will put the flow meter back into normal operation.

13.16 REGISTER 16 (CURRENT OUTPUT 0-POINT ADJUSTMENT).

_	_														
C	U	R	R	.	0	–	P	O	I	N	T	.	A	D	J

Register 16 allows for fine tuning the offset on the current output zero point.

The offset can be adjusted from – 0.03 mA to + 0.03 mA in 100 steps.
Please refer to the following table which provided 3 examples of entry values and corresponding offset. The factory setting is 50.

Value	Description
00	Offset is – 0.03 mA
50	No offset.
99	Offset is + 0.03 mA

13.17 REGISTER 17 (SET DECIMAL POINT - RATE).

_															
D	E	C	–	P	O	I	N	T	.	R	A	T	E	.	

The EZ-2US rate value can be set to include up to 2 decimal points. To choose if decimal points are to be included in the rate value, and to choose the number of decimal points, one of the following values must be entered into register 16.

- Value 0 = 0 decimal points. The rate value will be displayed without decimal points.
- Value 1 = 1 decimal point. The rate value will be displayed with 1 decimal point.
- Value 2 = 2 decimal points. The rate value will be displayed with 2 decimal points.

13.18 REGISTER 18 (SET TIME UNIT - RATE).

_															
T	I	M	E	–	U	N	I	T	.	R	A	T	E	.	

The EZ-2US can display the rate value in different time units. The available time units are minutes and hours. To choose the preferred time unit, one of the following values must be entered.

- Value 1 = Hours. EZ-2US will display the rate in volume units per hour
- Value 2 = Minutes. EZ-2US will display the rate in volume units per minute.

13.19 REGISTER 19 (SET VOLUMETRIC UNIT - RATE).

_															
V	O	L	U	M	E	.	U	N	I	T	.	R	A	T	E

The EZ-2US can display the rate value in different volumetric units. The available volumetric units are: Litre, Cubic Meters, US-Gallons and Imperial Gallons. To choose the preferred volumetric unit, one of the following values must be entered.

- Value 0 = Litres. EZ-2US will display the rate with litres per time unit.
- Value 1 = Cubic Meters. EZ-2US will display the rate with cubic meters per time unit.
- Value 2 = US-Gallons. EZ-2US will display the rate with US-Gallons per time units.
- Value 3 = Imperial Gallon. EZ-2US will display the rate with imperial gallons per time units.

13.20 REGISTER 20 (SET DECIMAL POINT - TOTAL).

_															
D	E	C	–	P	O	I	N	T	.	T	O	T	A	L	.

The EZ-2US actual total value can be set to include up to 2 decimal points. To choose if decimal points are to be included in the actual total value, and to choose the number of decimal points, one of the following values must be entered into register 19.

- Value 0 = 0 decimal points. The actual total value will be displayed without decimal points.
- Value 1 = 1 decimal point. The actual total value will be displayed with 1 decimal point.
- Value 2 = 2 decimal points. The actual total value will be displayed with 2 decimal points.

13.21 REGISTER 21 (CURRENT OUTPUT - CONDITIONING).

_															
4	–	20	m	A	.	F	I	L	T	E	R				

EZ-Mag has the ability of flow conditioning. This is useful during pulsating flows. EZ-Mag can be programmed to calculate actual flow rates based upon an optional 2-9 median counts. To choose if EZ-Mag is to use flow conditioning and if so on how many median counts, one of the following values must be entered.

- Value 0 = No flow conditioning.
- Value 2 = 2 median counts used for conditioning.
- .....
- Value 9 = 9 median counts used for conditioning.

13.22 REGISTER 22 (SELECTION OF TEMPERATURE UNIT).

_															
U	N	I	T		F	.	O	R	.	C					

If chosen as an option, the EZ-2US can display the in-line temperature on the 16 digit back-lit LCD. The displayed temperature unit can be viewed in Celsius or Fahrenheit.

Also, if chosen as an option, EZ-2US can be supplied with EZ-ACT, an Actively Compensating Thermometer - or also referred to as temperature compensation. The temperature coefficient is entered into register 37.

NOTE/IMPORTANT: The opted temperature unit in register 22 will also affect the chosen coefficient unit in register 37. Temperature coefficients are available in Celsius or Fahrenheit. If Celsius and Fahrenheit are combined, the inaccuracy of the compensated value can be very large.

To choose which temperature unit is to be displayed, one of the following values must be entered.

- Value 0 = Celsius.
- Value 1 = Fahrenheit.

13.23 EZ-Monitor (FLOW + TEMPERATURE MONITOR):

If chosen as an option, EZ-2US is available with EZ-Monitor. The function of this option is covered in detail in section 13.9.3 regarding the Multifunctional output in Register 11.

The parameters used in EZ-Monitor are the same as those set for Rate and temperature in registers 17 (Time unit for Rate), 18 (volumetric unit) & 21 (temperature unit). As such, it is important to remember to use the same unit values.

To set the values for EZ-Monitor, please set the corresponding values in registers 23-26:

13.23.1 REGISTER 23 (SET LOW FLOW LIMIT).

_	_	_	_	_	_	_	_								
S	E	T	.	A	L	A	R	M	.	L	O	W	.	F	L

There are 8 numerical positions that make up the minimum flow boundary. These are tens of millions to ones.

Example:
To enter 150 (units of flow per units of time), enter the value 00000150 into register 23.

13.23.2 REGISTER 24 (SET HIGH FLOW LIMIT).

_	_	_	_	_	_	_	_								
S	E	T	.	A	L	A	R	M	.	H	I	.	F	L	

There are 8 numerical positions that make up the maximum flow boundary. These are tens of millions to ones.

Example:
To enter 1650 (units of flow per units of time), enter the value 00001650 into register 24.

13.23.3 REGISTER 25 (SET HIGH TEMPERATURE LIMIT).

_	_	_													
S	E	T	.	A	L	A	R	M	.	H	I	–	T		

There are 3 numerical positions that make up the maximum temperature boundary. These are hundreds, tens and ones.

Example:
To enter 130 (units of temperature), enter the value 130 into register 25.

13.23.4 REGISTER 26 (SET LOW TEMPERATURE LIMIT).

_	_	_													
S	E	T	.	A	L	A	R	M	.	L	O	W	–	T	

There are 3 numerical positions that make up the minimum temperature boundary. These are hundreds, tens and ones.

Example:
To enter 12 (units of temperature), enter the value 012 into register 26.

13.24 EZ-TUNE - (10 POINT LINEARIZATION):

EZ-Mag has the available option of 10-point linearization. To provide maximum effect, these 10 points are pre-set to the lower 25% of the flow range. These 10 points can be set at intervals of 2,5%, starting from 0-2,5%.

A calibrated magnetic flow meter can show either a negative inaccuracy or a positive inaccuracy. As such, so that the inaccuracy can be compensated for regardless if it is negative or positive, each entered value can be negative (-) or positive (+). This is followed by a value of 0-199. The value to be entered is completely dependent upon what the calibration shows the inaccuracy to be at each level of measurement.

NOTE: It is not recommended for users unfamiliar with flow meter calibration to enter any values into EZ-Tune. ProcessAutomatic reserves the right to only provide information on how to program the linearization function to an authorized calibration institute.

Registers 27 - 36 are reserved for the 10-point linearization.

13.24.1 REGISTER 27 (LINEARIZATION - POINT 1).

+/-	_	_	_												
L	I	N	E	A	R					0	–	2	,	5	%

13.24.2 REGISTER 28 (LINEARIZATION - POINT 2).

+/-	_	_	_												
L	I	N	E	A	R					2	,	5	–	5	%

13.24.3 REGISTER 29 (LINEARIZATION - POINT 3).

+/-	_	_	_												
L	I	N	E	A	R					5	–	7	,	5	%

13.24.4 REGISTER 30 (LINEARIZATION - POINT 4).

+/-	_	_	_												
L	I	N	E	A	R				7	,	5	–	1	0	%

13.24.5 REGISTER 31 (LINEARIZATION - POINT 5).

+/-	_	_	_												
L	I	N	E	A	R			1	0	–	1	2	,	5	%

13.24.6 REGISTER 32 (LINEARIZATION - POINT 6).

+/-	_	_	_												
L	I	N	E	A	R			1	2	,	5	–	1	5	%

13.24.7 REGISTER 33 (LINEARIZATION - POINT 7).

+/-	_	_	_												
L	I	N	E	A	R			1	5	–	1	7	,	5	%

13.24.8 REGISTER 34 (LINEARIZATION - POINT 8).

+/-	_	_	_												
L	I	N	E	A	R			1	7	,	5	–	2	0	%

13.24.9 REGISTER 35 (LINEARIZATION - POINT 9).

+/-	_	_	_												
L	I	N	E	A	R			2	0	–	2	2	,	5	%

13.24.10 REGISTER 36 (LINEARIZATION - POINT 10).

+/-	_	_	_												
L	I	N	E	A	R			2	2	,	5	–	2	5	%

NOTE: For any questions regarding EZ-Tune, please contact your local reseller of ProcessAutomatic products or ProcessAutomatic directly.

13.25 REGISTER 37 (TEMPERATURE COMPENSATION).

_	_	_	_	_	_										
T	E	M	P	–	C	O	M	P		F	A	C	T	O	R

Available as an option to EZ-2US, EZ-ACT provides the option of temperature compensation by using the liquid medias specific thermal coefficient of expansion.

Prior to entering the value of the coefficient of expansion, make sure that the coefficient used corresponds to the same temperature unit as is set in register 22.

There are six positions in the unit value for the coefficient of expansion. These are represented by the numeric units of tenths, hundredths ..... etc.

A thermal coefficient of expansion factor is a value beginning with a numeric one, then followed by up to 6 decimal points. The following is an example of how to enter a thermal coefficient factor.

For a factor of 0,000214, the corresponding value to enter into register 35 is 000214.

For more information, please also see section 31,2 in the EZ-Mag manual.

13.26 REGISTER 38 (CLEAR ALL TOTAL).

1	2	3	4	5	6	7	8								
C	L	E	A	R	.	A	C	C	U	.	T	O	T	A	L

The EZ-2US has 2 different totals. The actual total, which is reset from the working state, and the accumulated total, which can only be reset in register 38 from the programming mode.

To reset the accumulated total, first change the preprogramed 1, to 0 using the Total key (▲). Once the value is set to 1 press reset. This will reset the accumulated total register.

NOTE: Clearing the accumulated total will also clear the actual total.

NOTE: After resetting, the programed value will return to 1 automatically.

13.27 REGISTER 39 (END - RETURN TO START).

R	E	T	U	R	N	.	T	O	.	S	T	A	R	T	

When the user reaches the end of the register, the text "Return to start" will show. By pressing down on the touch pad ENTER/PROGRAM, the user will exit the programming mode and return to the working state.

14 MAINTANANCE:

Exterior Cleaning Instructions:

EZ-2US is mounted on to the metal transducer. All maintenance and cleaning instructions refer to when EZ-2US is in a mounted position with front and rear covers attached. Never clean or wet EZ-2US when not attached to the main transducer or when the front and rear is not completely attached.

For Sanitary purposes and to allow for proper self-drainage of the transducer, the Premium model transducer must be installed so that the face of the connecting bolts on the front and rear end of the unit are vertically aligned.

In general, EZ-2US has no moving parts and is as such maintenance free. The following is a guideline on how to keep your EZ-2US in good working order and in a good condition.

- Clean the exterior on a regular basis in accordance with the IP rating on your EZ-Mag. The IP rating is clearly marked on the side of the main flow tube.
- Keep the glass from free from fatty or oily residues with appropriate cleaning agents.
- Make sure that the serial number and any other eventual markings are clearly visible. This helps to identify the flow meter for future service.
- Make sure that any and all nuts or bolts are correctly tightened; they must not be loose.
- The IP-Rating only applies when the O-ring seal is properly mounted.

NOTE: The term maintenance free only refers to the functionality of EZ-Mag and is not meant to infer on any local or in house routines or other general local or governing maintenance procedures.

15 Warranty:

All EZ-Mag flowmeters and new parts are supplied with a 10-year factory warranty. This warranty suits as a guarantee that the product is delivered free from defects and that it will work and perform as is stated in this manual - provided that it is handled as is stated in this manual. This warranty is valid from the date of dispatch.

Issued warranty is traced thru the serial number. If the serial numbers do not match, warranty claims may be declined.

Issued warranty is only valid within the stated maximum parameters. Exceeding these parameters; such as IP rating and temperature limits, will render warranty void.

EZ-2US may only be used within the set technical specification as specified in the EZ-Mag manual.

EZ-2US is delivered with tamper proof seals on vital areas. These seals are clearly visible and marked with individual serial numbers. If any part of such a seal is broken or missing, Processautomatic reserves the right to decline warranty claims for that part of the product or the product as a whole.

Unless otherwise stated or there is another written agreement regulating other conditions, then General Conditions of Sale IML 2009 shall apply.

All claims of non-conformity must be made within 15 days from confirmed delivery else 21 days from the date on the Invoice.

Buyer shall have fifteen (15) days upon receipt to inspect and test the Products (”Inspection Period”). If the buyer determines any unit of Products defective, the buyer shall promptly notify Processautomatic of such defects. Defective Products may be returned for re-test, evaluation and examination subject to Processautomatic´s Returned Material Authorization (“RMA”) procedure; provided, that such written notification and request for an RMA number must be received by Processautomatic during the Inspection Period. Returns must be prepaid by the buyer. When requesting a return authorization, the buyer must supply the buyers purchase order number and Processautomatic’s invoice number. Product description must include product serial number.

Exclusion. Processautomatic will inspect all Products returned pursuant to the foregoing RMA procedures, and Processautomatic will not replace products where the defect is due to misuse, neglect, alteration or improper storage.