User's Guide

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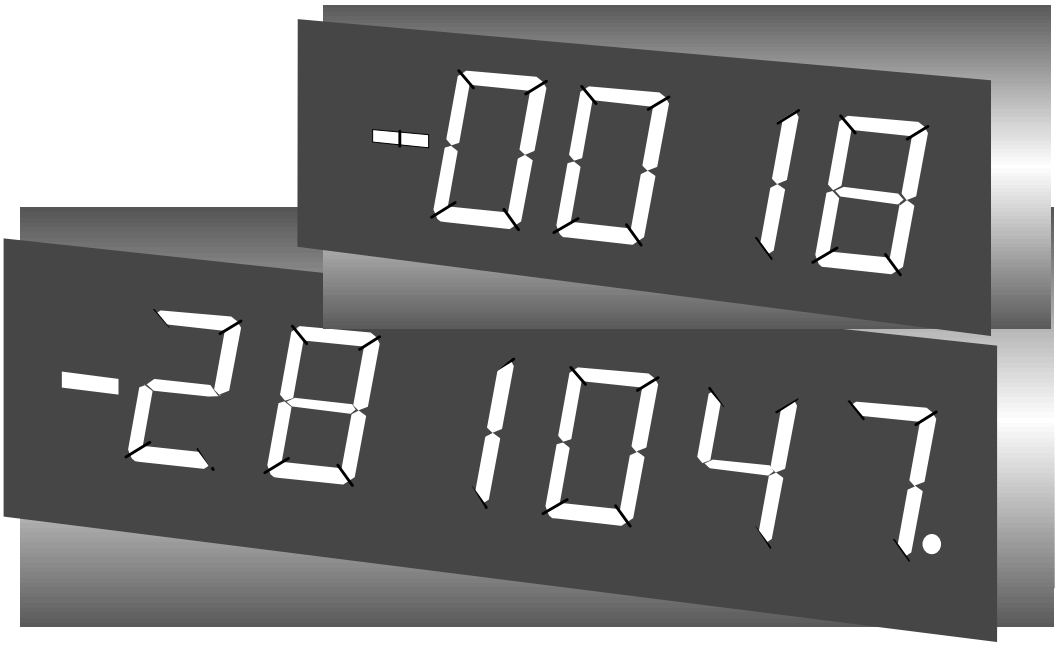

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LDP-124, LDP-126, LDP-144 AND LDP-146

PROGRAMMING MANUAL FOR RATE/TOTAL

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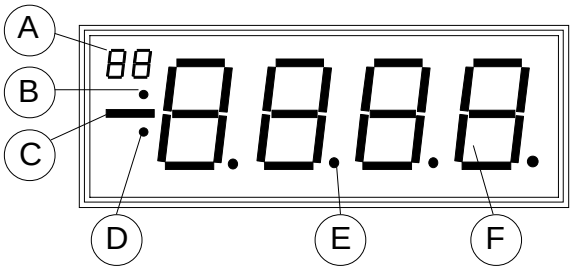
1.- GENERAL INFORMATION

The instruments of the series LDP-124, LDP-144, LDP-126 and LDP-146 are internally controlled by microprocessor which controls simultaneously two internal counters. One of them works as a TOTALIZER MODE (Instrument B) and the other one as a RATE MODE (Instrument A) showing only one of them on the display.
Therefore each instrument can be programmed as a rate or totalizer using only one instrument. With the adequate installation of control it is possible to show the two functions on the display but in alternating way, never simultaneously. Contact the Technical Department for instructions.
All the parameters of the instrument such as Scale Factor, Multipliers, Decimal Points, Update Time Base, etc... can be configurated and/or modified using the programming box model "KBD", independently for each function.

2.- INSTRUMENTS DESCRIPTION

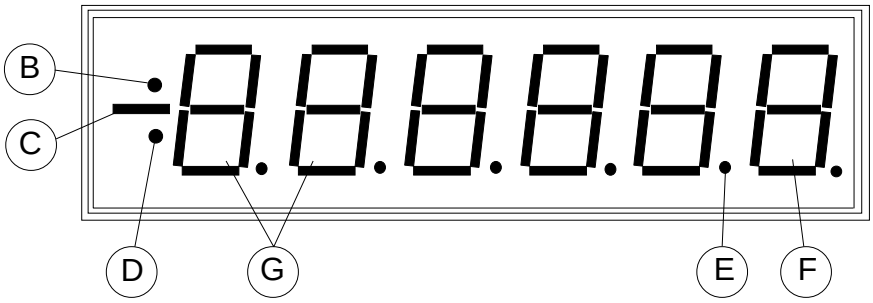
2.1 FRONT DESCRIPTION, SERIES : LDP-124 and LDP-144

A : Appears only when the programming box is connected. Shows the first part of the access code.
B : Rate function on the display when led is on. Only if the programming box is connected.
C : Minus sign.
D : Totalizer function on the display when led is on. Only if programming box is connected.
E : Decimal points.
F : 4 digits, seven segments. In programming mode shows the second part of the access code on the right digits.

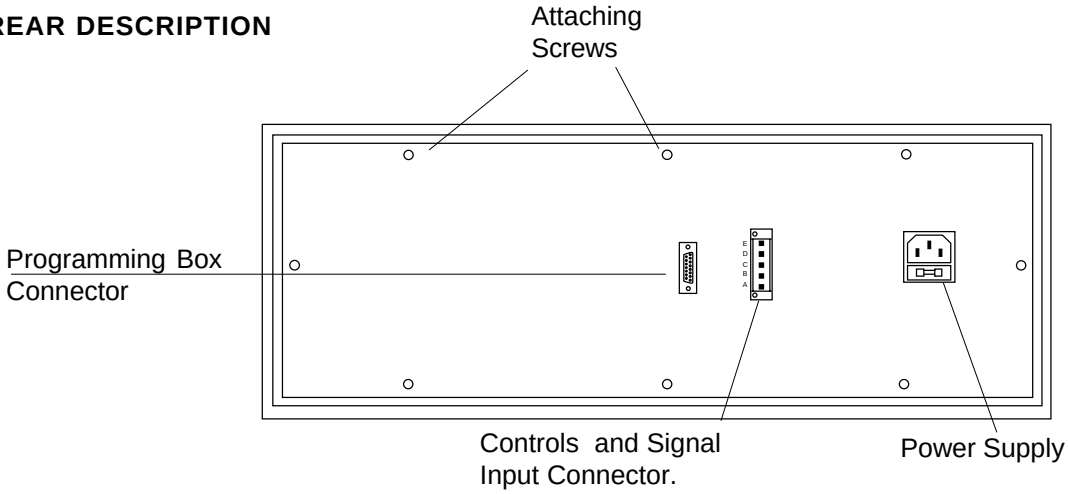


2.2 FRONT DESCRIPTION, SERIES : LDP-126 and LDP-146

B : Rate function on the display when led is on. Only if the programming box is connected.
C : Minus sign.
D : Totalizer function on the display when led is on. Only if the programming box is connected.
E : Decimal points.
F : 6 digits, seven segments.
In programming mode shows the second part of the access code.
G : In programming mode shows the first part of the access code.

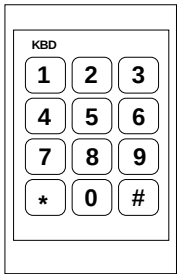


2.3 REAR DESCRIPTION



3.- PROGRAMMING BOX DESCRIPTION. Model LDP-TOT-KBD

The programming box allows the user to configurate in a total or in a partial, all access codes of the instruments Series LDP.
When the programming box is connected to the rear connector, then one of the two leds located at both sides of the minus sign will light up. See paragraph 2.1 and 2.2
In the instruments series 124 and 144 (4 digits) will appear two small seven segment digits on the left upper corner of the displaywhen any key on the programming box is pressed. Their function is to show the first part of the access code. See paragraph 2.1



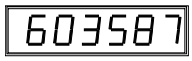
Programming box

1 to 6 : Keys for the programming codes. After introduce the code corresponding to the Scale Factor, these keys are also used to perform its value.
: Key for function Enter.
✶ : Key to change the display function, from Totalizer to Rate and reverse. Also to perform the negative sign for some codes.

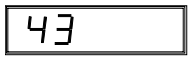
4.- INSTRUMENTS PROGRAMMING

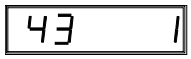
4.1 PROGRAMMING CODE PROCEDURE

All codes for Mode Selection and Programmable functions are made up by 3 or 4 characters followed by the function key ENTER. The function key ENTER is represented in this manual by the sign "# " located after the code.
If the instrument under programming corresponds at Series 124 or 144, then the first two digits of the code will appear on the two digits located on the left upper side corner.
However in the instruments Series 126 and 146 will appear on the two first left digits.
The other characters (normally one), preceded or not by the minus sign, will appear at the right side of the display.
When the first character is pressed on the keyboard the display is blanked and the characters appear on the display in their position as soon as they are pressed on the keyboard. If the instrument is operating, the internal counters continue operating.
If the function key ENTER is not pressed after the code was introduced on the display, then it will not be validated and after 8 seconds the display will return to show the actual MODE and value.
Example : To program Code 431

Actual value in the display 

Press key number 4, display changes and shows 

Press key number 3, display changes and shows 

Press key number 1, display changes and shows 

Press ENTER (Key #) and display will return to show the actual value.

4.2 SCALE FACTOR PROGRAMMING. (Code 3)

The function of the Scale Factor is multiplier or divide the pulses arrived to the instrument by the value programmed. It has five digits maximum and can be programmed any value from -5.9999 to 5.9999. The position of the decimal point is fixed and can not be modified.
It is necessary introduce the five digits of the Scale Factor, although they be zeros. .
The Scale Factor can be set independently for each one of the modes, Totalizer or Rate, and the programming is made over the function which is present on the display.
If the Scale Factor value is equal or superior than the unit (1.0000), then the pulses will be multiplied but if this value is lower than the unit then the pulses will be divided.

To show the actual value of the Scale Factor press 3. To return at the operative Mode press #.
To modify the Scale Factor proceed as follows :
Press 3 , display will show the actual value . At this moment the keys number 1 to 5 correspond to the digit position starting by the right. Key number 1 corresponds to the units, key number 2 corresponds to the tenths etc.

Example : Change the Scale Factor for a new value of 2.5678.
Press key number 3. On the display will appear the actual value of Scale Factor.
Press key number 1 as many times as needed, until the digit of the units shows the number 8.
Press key number 2 as many times as needed, until the digit of the tenths shows the number 7.
Press key number 3 as many times as needed, until the digit of the hundreds shows the number 6.
Press key number 4 as many times as needed, until the digit of the thousands shows the number 5.
Press key number 5 as many times as needed, until the digit of the units of thousands shows the number 2.
Press ENTER (Key #) to validate the new Scale Factor.
Remember that it is not necessary to program the position of the decimal point, it is automatically made.

4.3 DISPLAY TEST. (code 6)

When code 6✶ is entered the unit starts the self-test which allows the user to check if all the segments of the digits are operative. It can be performed at any time and not interferes with the normal counter operation.
To start the self-test proceed as follows.
Enter code [6✶] , the number displayed will disappear and the display starts the first step of the self-test.
All the decimal points are displayed, then the 9's, then the 8's, etc.. until 0's are shown.
The second step starts displaying number 010101 together with the negative LED, then 212121, followed by 232323 etc.. until 898989 is shown.
After a few seconds the display returns to the operating mode

4.4 DISPLAY FUNCTION CHANGE

To change the MODE function presented on the display, push key "✶". The visualization will change from Totalizer to Rate or reverse. It can be made as many times as wanted
Display shows the value corresponding to the Totalizer function if led B is light up.
Display shows the value corresponding to the Rate function if led D is light up.

5.- PERSONALIZING THE INSTRUMENT

5.1 GENERAL CONFIGURATION

To personalize the instrument use the general Access Code "411". To check if the code is correct, press key number 4 followed by key number 1 of the programming box, then on the display must appear number 1 on the right side. If not, then the unit must be totally reprogrammed starting from the general Access Code.
The unit can be reprogrammed with the default codes using code "41✶1#". See paragraph 7.

5.2 RESPONSE MODES

Code "431#". The unit is programmed as model F1 or model FF.
Press "✶" to change the display function from totalizer to rate or reverse. The leds B and D show which of the both functions is present on the display.
Code "432#". The unit is programmed as model F2, if led D is light up.
Code "433#". The unit is programmed as model F3, if led D is light up.
Code "435#". The unit is programmed as model F5, if led D is light up.
Code "436#". The unit is programmed as model F6, if led D is light up..

5.3 COUNTING MODE

Code "441#". The unit counts on the falling edge of the count input signal.
Code "442#". The unit counts on the rising and falling edges of the count signal input. This mode double the pulses to the counter and neither can be applied for Rate function, nor for code "436".

5.4 TOTALIZER FUNCTION, Models F1, F2, F3, F5 & F6

5.4.1 SCALE MULTIPLIER

There are four Scale Multipliers available and they effectively divide the internal count value. Do not use a small Scale Multiplier together with a low value of Scale Factor because the internal count value could be exceeded before arrive to the capability of the display.

Code "451#"	Multiplier by 1	Code "452#"	Multiplier by 0.1
Code "453#"	Multiplier by 0.01	Code "454#"	Multiplier by 0.001

5.4.2 DECIMAL POINT

Introduce the decimal point code corresponding to the position desired for the decimal point.

Zero Blanking Enabled			Zero Blanking Disabled	
Code	Display		Code	Display
"461#"	0		"46✶1#"	000000
"462#"	0.0		"46✶2#"	00000.0
"463#"	0.00		"46✶3#"	0000.00
"464#"	0.000		"46✶4#"	000.000
"465#"	0.0000	Only LDP-126 & 46	"46✶5#"	00.0000
"466#"	0.00000	Only LDP-126 & 46	"46✶6#"	0.00000

5.5 RATE FUNCTION , Model FF

5.5.1 RIGHT HAND DUMMY ZEROS

Use this function to avoid drifting on the display when the pulses frequency are not stable. Dummy zeros can be maximum 3 at the right hand.

Code "611#" 1 Dummy Zero (XXXXX0)
Code "612#" 2 Dummy Zeros (XXXX00)
Code "613#" 3 Dummy Zeros (XXX000)
Code "614#" No Dummy Zeros (XXXXXX). It is the default code.

5.5.2 CONVERSION FACTOR

This function allows to the operator to read directly on the display the input pulses per second, per minute or per hour. Corresponds to the input pulses multiplied by the seconds corresponding to every code.

"621#" per second (x1) "622#" per minute (x60) "623#" per hour (x3600)

5.5.3 UPDATE TIME BASE

This function calculates the elapsed time between the first and the last pulse of the updated period. The minimum update time can be as short as the time period allowable. Calculate the Update Time Base applying the formula "1/minimum frequency allowable" and program the code which contents this value or other higher.
Example : To read a frequency of 0.2 Hz. the updated time applying the formula is 1/0.2 = 5 sc. Therefore program a code 634 or higher to compensate a possible drifting of the input frequency.

Code "631#"	For a time value between	0.5	and	1	sc.
Code "632#"	For a time value between	1	and	2	sc.
Code "633#"	For a time value between	2	and	4	sc.
Code "634#"	For a time value between	4	and	8	sc.
Code "635#"	For a time value between	8	and	16	sc.
Code "636#"	For a time value between	16	and	32	sc.

The input frequency is limited at 7.5 KHz for code "635" and 3.2 KHz for code "636"

5.5.4 SCALE MULTIPLIER

There are six Scale Multipliers available and they effectively multiply the internal count value. They can be used in conjunction with Scale Factor and Factor Conversion.

Code "641#"	Multiplier by 1000	Code "642#"	Multiplier by 100
Code "643#"	Multiplier by 10	Code "644#"	Multiplier by 1
Code "645#"	Multiplier by 0.1	Code "646#"	Multiplier by 0.01

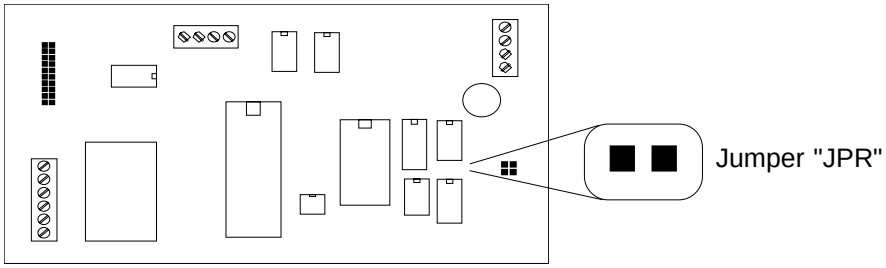
5.5.5 DECIMAL POINT

Introduce the decimal point code corresponding to the position desired for the decimal point.

Zero Blanking Enabled			Zero Blanking Disabled	
Code	Display		Code	Display
"651#"	0		"65✶1#"	000000
"652#"	0.0		"65✶2#"	00000.0
"653#"	0.00		"65✶3#"	0000.00
"654#"	0.000		"65✶4#"	000.000
"655#"	0.0000	..... Only LDP-126 & 146	"65✶5#"	00.0000
"656#"	0.00000	..... Only LDP-126 & 146	"65✶6#"	0.00000

6.- OPERATOR ACCESSIBLE FUNCTIONS

After the personalizing unit is finished and if the jumper "JPR" located on the Control Board is installed, then the access to all functions is disabled except for the functions corresponding to the below listed codes, if previously they had been programmed before instal the jumper "JPR".



"661#" Only remote Reset and no other functions are allowed.
"663#" Allows Remote Reset and Scale Factor.

7.- DEFAULT CODES

If it is necessary to reprogram the unit with the original default codes then introduce the code "41✶1#" and all codes will be automatically programmed. The list of default codes is:

CODE	FUNCTION
"431#"	: Program the unit as a Totalizer model T1 or Rate model TF.
"441#"	: Counting Mode.
"451#"	: Totalizer Function : Scale Multiplier = 1.
"461#"	: Totalizer Function : Zero Blanking Enabled and no decimal point.
"614#"	: Rate Function : No Dummy Zeros.
"621#"	: Rate Function : Conversion Factor = 1.
"631#"	: Rate Function : Update Time Base = 0.5 sc.
"644#"	: Rate Function : Scale Multiplier = 1.
"651#"	: Rate Function : Zero Blanking Enabled and no decimal point.
"661#"	: Access to the programming system held if jumper "JPR" is installed.

8.- FREQUENCY COUNTER : TOTALIZERS & RATE

The maximum frequency pulses allowed on the Channels 1 and 3 for each Response Mode are indicated on the table below.
The Counting Mode code "442" reduce the maximum frequency allowable and it can be applied to the Totalizers only.

RESPONSE MODE CODE PROGRAMMED	COUNTING MODE CODE 441	442
431 y 432	10 KHz	5 KHz
433	4 KHz	2.5 KHz
435	5 KHz	4.5 KHz
436	2.5 KHz	

9.- PROGRAMMING PROCEDURE

1.- Check that the general Access Code has been programmed with code 411, press key 4 and key 1. Number 1 must appear on the right digit if not, press key number 1 again followed by Enter.

9.1 MODELS F1, F2, F3, F5 & F6

3.- Check if the Totalizer function is on the display led D must be light up. (See paragraph 2.1 and 2.2). To change from one function to other press "✶".
4.- Program the Response Mode.
5.- Program the Counting Mode.
6.- Program the Scale Factor. (See paragraph 4.2).
7.- Program the Scale Multiplier and Decimal Point position.
8.- Program the Operator Accessible Functions.
9.- Install the jumper "PDIS" to disable the access to the programming system.

9.2 MODEL FF

3.- Check if the rate function is on the display led B must be light up. (See paragraph 2.1 and 2.2). To change from one function to other press "✶".
4.- Program the Response Mode.
5.- Program the Counting Mode.
Only code "441".
6.- Program the Scale Factor.
(See paragraph 4.2).
7.- Program the Scale Multiplier and Decimal Point position.
8.- Program Dummy Zeros if is needed.
9.- Program the Conversion Factor.
10.- Program the Update Time Base.
11.- Program the Operator Accessible Functions.
12.- Install the jumper "JPR" for disable the access to the programming system.

10.- PROGRAMMING EXAMPLES

10.1.- CONFIGURATE THE UNIT AS A TOTALIZER

This paragraph and its examples are applicable to the instrument operating as a Totalizer Mode.

To configurate the unit as a Totalizer a first step is required, to determine if the display reading must be scaled in engineering units which do not fit directly with the input pulses, since the set-up factory value is 1 count by pulse.

The number of pulses can be modified using in combined or individual form, those three different Functions : Scale Factor, Scale Multiplier and/or Count Edges.

Each Mode has available their own Scale Factor and Scale Multiplier. The Count Edge Functions are common for both Modes

Also it is possible multiplier the input pulses by 4, using the Response Mode Function "436#". For this case it cannot be used also the Count Edge Function "442#".

The Final Scale Multiplier, "FMF", which can be obtained combining those four Functions, can vary from a minimum value of 0.0000001 to a maximum value of 23.9996. However in order to achieve the highest accuracy this "FMF" should have the maximum significant digits number. The Final Scale Multiplier if it is possible, never should be less than 0.0500.

EXAMPLE 1

An incremental Encoder that provides 500 pulses per revolution is coupled to a roll that is 50 cm. in diameter which pulls a sheet of paper and the desired reading is the total amount of meters passed with a resolution of 0.1 mt. First we must calculate the circumference of the roll whose value will correspond to the meters passed by each 500 pulses and following the Scale Factor.

Scale Factor calculation

The Scale Factor must be used as a corrective number by which the input pulses should be multiplied until the desired reading appears in display

Length of the roll circumference = D x π = 50 x 3.1416 = 157.08 cm.

As the desired reading is in meters with one decimal point, for each revolution of the Encoder will correspond a display reading of 15. The remaining 7.08 cm. will be kept in the internal memory and they will be accumulated with the other ones kept in each next revolution. Decimal points must not be considered, since their programming is made by an independent Code.

Scale Factor "Fe" = Desired Reading (+ Decimal numbers kept in memory) / Numbers of pulses.
Fe = 15.708 / 500 = 0.031416.

With the decimal point programmed the reading after the first revolution should be 1.5; after the second 3.1 and after the tenth 15.7, etc...
However in order to achieve the highest accuracy, the Final Scale Multiplier (FMF) should have the maximum significant digits number, therefore we will use a Scale Multiplier value of 0.01, Code [45 3] for reduce the number of pulses by display unit. The Final Scale Multiplier (FMF) will be :

FMF = 15.708 / (500 x 0.01) =15.708 / 5 = 3.1416

The definite programming for this example will be :
1.- Programme Code "453#". Scale Multiplier = 0.01
2.- Programme a Scale Factor "3" with a value = 3.1416
3.- Programme Code "462#" for achieve a decimal point.

EXAMPLE 2

A Flow-meter that provides 160 pulses by $\mathbf{m^3}$ and the Counter must totalize the total amount of litres flowing through this device. The desired reading must be in litres, then by each 160 pulses provided by the Flow-meter the reading should be 1000 litres.

Scale Factor calculation

The Scale Factor will be 1000 / 160 = 6.25
It is not possible to programme this value of Scale Factor because it is over 5.9999 which is the maximum value allowed for Scale Factor. Therefore in this case is necessary to search for a different Final Scale Multiplier which increases the number of pulses, so we will use the Count Edge Function "442#", in order that we can multiplier the pulses by 2. The Final Scale Multiplier will be :

FMF = 1000 / (160 x 2) = 1000 / 320 = 3.125

The definite programming for this example will be :
1.- Programme Code "442#". This Count Edge function multiplies by 2, using both edges of count input.
2.- Programme the Scale Factor "3" with a value of 3.1250.

10.2.- CONFIGURATE THE UNIT AS A RATE

This paragraph and its examples are applicable to the unit operating as a Rate Mode.
On the contrary of the usual units when operating as a Rate, this instrument does not operate measuring pulses by time unit.
The time format (Rate per second, Rate per minute, Rate per Hour) is simply selected by the programming procedure.
The Update Time for the display readings is programmable from 0.5 sc. to 32 sc. in order to make averages in some applications where the pulse frequency is not stable. The Update Time selected will not affect to the configuration of the unit.
The Rate configuration only affects the reading display scaling (revolutions, meters, pieces, etc...) and to the time format, and they only depend of the application type in which the unit be used.

EXAMPLE 1

Using the example 2 on paragraph 11.1, suppose that the flow provided is 1 m^3 / second.

As previously the Scale Factor was 6.25 and a Count Edges [44 2] was used to multiplier by 2 the pulses to obtain a Final Scale Multiplier (FMF) value of 3.125. The same value of Scale Factor must be applied to the Rate but remember that for the Rate can not be used the same Count Edge therefore it is necessary obtain a new value for the FMF.

As the maximum value for the Scale Factor is 5.9999, a Scale Multiplier value must be used to reduce its value. Therefore we will use a Scale Multiplier value of 10 to obtain the FMF.

FMF x Scale Multiplier = Fe FMF = Fe / Scale Multiplier = 6.25 / 10 = 0.625

Programming this value of Scale Factor (0.625) and this Scale Multiplier, the reading on display will be 1000 litres / second.

The definite programming for this example will be :

1.- Programme Code "643#". Multiplier the pulses by 10.
2.- Programme the Scale Factor value of 0.625. The reading will be 1000 litres / second.
3.- If the Code "622#" is programmed as a Conversion Factor, then the reading on display will be on litres / minute.

EXAMPLE 2

Supposing that a roll is drived by a motor which turns at 3000 RPM and provides 5 pulses per revolution, and for each revolution will pass 0.2 meters of material. The reading desired is the speed in meters / minute.

3000 RPM x 5 pulses = 15000 pulses / minute. 15000 / 60 seconds = 250 pulses / second.
3000 RPM x 0.2 mts. = 600 meters / minute. 600 / 250 = 2.4 mts per pulse = Fe

Programming the Scale Factor with this value the reading will be 600 meters / minute, since the calculation has been made taking as a basis the amount of meters passed when motor runs at 3000 RPM.

Therefore the definite programming for this example will be :

1.- Programme the Scale Factor with a value of 2.4

10.3.- FINAL NOTES

Normally, the procedure to configurate and/or programming the instrument are the following.

1.- Configurate the unit.
2.- Programme the Response Mode.
3.- Install Jumpers on Selector S1 for Sensor type selection. On Selector S2 for Input Trigger level and Frequency signal selection. On Selector S3 if front panel RESET must be disabled.
4.- Calculate the Final Scale Multiplier (FMF) using the Scale Factor, the Count Edges Function and the Scale Multiplier. For the programming of the Rate can be used also the Conversion Factor.
5.- Programme the decimal point position if it is required.
With these five steps the Totalizers will be ready to display the desired parameters. The steps 1, 2 and 3 are common for both Functions, whereas the steps 4 and 5 must be programmed for each one of them.

From this point proceed as follow if it is necessary, for :

6.- In the Rate must be programmed the time format with the appropriate read rate for the display reading.
7.- And finally consider the installation of the Jumper JPR to avoid any modification on the set up programming by not authorized personnel.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGAS'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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