Operating Instructions Edition 12/2006

SITRANS F RA 110

flowrate indicator

flow

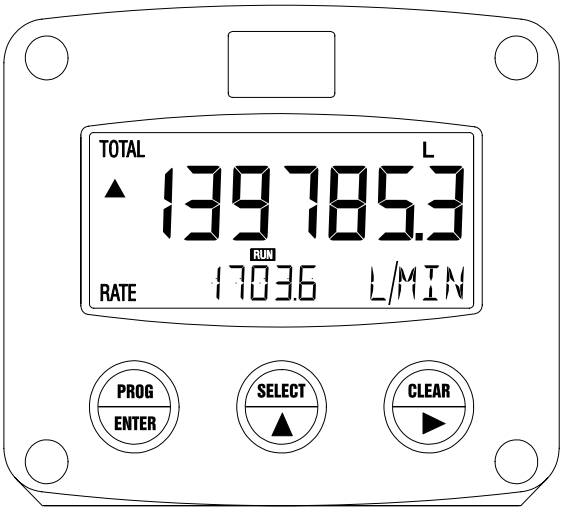
SIEMENS

SIEMENS

SITRANS F RA110

FLOW RATE INDICATOR

Signal inputs:
Namur, NPN, PNP



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SAFETY NOTES

- ***Any responsibility is lapsed if the instructions and procedures as described in this manual are not followed.***

- ***LIFE SUPPORT APPLICATIONS:***
  The product SITRANS F RA 110 is not designed for use in life support appliances, devices, or systems where malfunction of the product can reasonably be expected to result in a personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify the manufacturer and supplier for any damages resulting from such improper use or sale.

Electrostatic discharge does inflict irreparable damage to electronics! Before installing or opening the unit, the installer has to discharge himself by touching a well-grounded object.

- ***This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).***

- ***Do connect a proper grounding to the aluminum casing as indicated if the F RA110 has been supplied with the 115-230V AC power-supply option PM. The green/yellow wire between the back-casing and removable terminal-block may never be removed.***

SAFETY RULES AND PRECAUTIONARY MEASURES

- The manufacturer accepts no responsibility whatsoever if the following safety rules and precautions instructions and the procedures as described in this manual are not followed.
- Modifications of the SITRANS F RA110 implemented without preceding written consent from the manufacturer, will result in the immediate termination of product liability and warranty period.
- Installation, use, maintenance and servicing of this equipment must be carried out by authorized technicians.
- Check the mains voltage and information on the manufacturer's plate before installing the unit.
- Check all connections, settings and technical specifications of the various peripheral devices with the SITRANS F RA110 supplied.
- Open the casing only if all leads are free of potential.
- Never touch the electronic components (ESD sensitivity).
- Never expose the system to heavier conditions than allowed according to the casing classification (see manufacture's plate and chapter 4.2.).
- If the operator detects errors or dangers, or disagrees with the safety precautions taken, then inform the owner or principal responsible.
- The local labor and safety laws and regulations must be adhered to.

ABOUT THE OPERATION MANUAL

This operation manual is divided into two main sections:

- The daily use of the unit is described in chapter 2 "Operation". These instructions are meant for users.
- The following chapters and appendices are exclusively meant for electricians/technicians. These provide a detailed description of all software settings and hardware installation guidance.

This operation manual describes the standard unit as well as most of the options available. For additional information, please contact your supplier.

A hazardous situation may occur if the F RA110 is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information in this operating manual indicated by the pictograms:

A "**warning**" indicates actions or procedures which, if not performed correctly, may lead to personal injury, a safety hazard or damage of the F RA110 or connected instructions.


Caution !

A "**caution**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the F RA110 or connected instruments.


Note !

A "**note**" indicates actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.

Hardware version	:	MFB02.01.xx / Mi0212xx
Software version	:	02.11.xx
Manual	:	SITRANS_F_RA110.doc
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Information in this manual is subject to change without prior notice. The manufacturer is not responsible for mistakes in this material or for incidental damage caused as a direct or indirect result of the delivery, performance or use of this material.

OPERATING INSTRUCTIONS – CONTENTS

1. INTRODUCTION

1.1. SYSTEM DESCRIPTION OF THE SITRANS F RA110

Functions and features
The flowrate / totalizer model F RA110 is a microprocessor driven instrument designed to display flowrate, total and accumulated total. This product has been designed with a focus on:

- harsh industrial surroundings,
- ability to process all types of flowmeter signals,
- transmitting possibilities with analog and / or pulse outputs.

Flowmeter input
This manual describes the unit with a pulse type input from the flowmeter. Other versions are available to process (0)4-20 mA or 0-10 V flowmeter signals.
One flowmeter with a Namur, NPN or PNP signal output can be connected to the SITRANS F RA110.


Note !

Output options
Please note: the basic version of this product does not have output options, although the software functions are available; enabling or changing these output functions does not have any influence.

Following output options are available

- Configurable pulse output: a scaled pulse mirroring a certain totalized quantity. Maximum frequency 500 Hz.; the pulse length can be set from 0.001 up to 10 seconds.

- Configurable linear (0)4-20 mA analog output with 12-bits resolution mirroring the actual flowrate. Flowrate levels as well as the minimum and maximum signal output can be tuned.

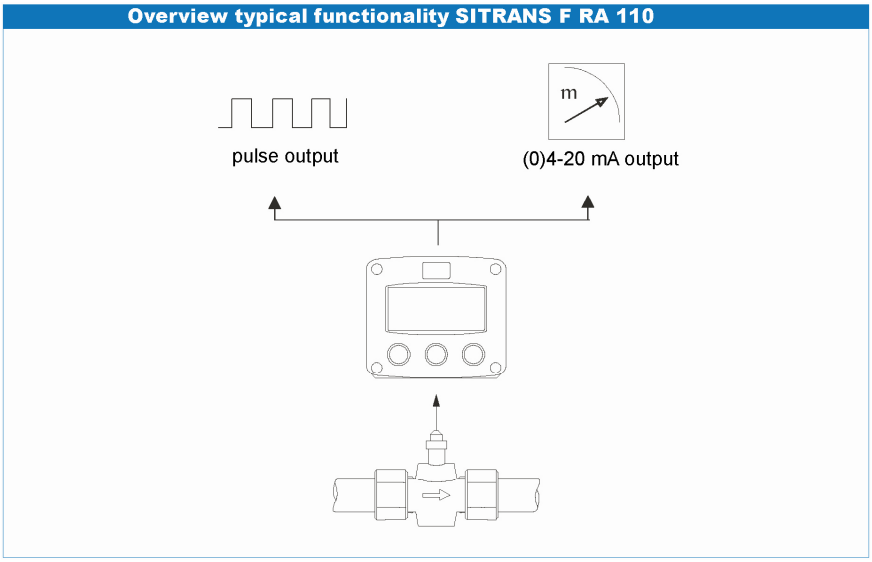


Fig. 1: Typical functionality of the SITRANS F RA110.

Display information
The unit has a large transflective LCD with all kinds of symbols and digits to display measuring units, status information, trend-indication and key-word messages.
Flowrate and totals can be displayed either with the small 8mm digits or with the 17mm digits.
A backup of the total and accumulated total in EEPROM memory is made every minute.

Configuration of the unit
The F RA110 has been designed to be implemented in many types of applications. For that reason, a SETUP-level is available to configure your F RA110 according to your specific requirements.

SETUP includes several important features, such as K factors, measurement units, signal selection etc. All setting are stored in EEPROM memory and will not be lost in the event of power failure.

Order numbers:

SITRANS F RA110 Order number setup																			
Standard version	**7**	**M**	**V**	**1**	**0**	**7**	**0**	**-**						-				**A**	**0**
Electr. Counter in an aluminium housing																			
For display of flowrate and totals																			
7 digit LCD, IP 67, (NEMA 4)																			
Signal input:																			
Namur signal									**1**										
NPN									**2**										
PNP									**3**										
Power supply: incl. IG supply 8,2 V DC																			
AC / DC 18 – 24 V										**A**									
AC 115 – 230 V										**B**									
Output functions:																			
Display of flowrate and totals											**A**	**0**							
Additional active pulse output											**B**	**1**							
Additional passive pulse output											**B**	**2**							
Additional active pulse and current output											**C**	**1**							
Additional passive pulse and current output											**C**	**2**							
Mounting:																			
For mountig on walls, racks and pipes													**0**						
Explosion protection:																			
without															**0**				
LED illumination:																			
without																	**A**		
Backlit illumination																	**B**		

2. OPERATION

2.1. GENERAL


Caution !

- ***The F RA110 may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.***
-
- ***Take careful notice of the " Safety rules, instructions and precautionary measures " in the front of this manual.***

This chapter describes the daily use of the F RA110. This instruction is meant for users / operators.

2.2. CONTROL PANEL

The following keys are available:

Fig. 2: Control Panel.

Functions of the keys

This key is used to program and save new values or settings.
It is also used to gain access to SETUP-level; please read chapter 3.

This key is used to SELECT accumulated total.
The arrow-key ▲ is used to increase a value after PROG has been pressed or to configure the unit; please read chapter 3.

Press this key twice to CLEAR the value for total.
The arrow-key ▶ is used to select a digit after PROG has been pressed or to configure the unit; please read chapter 3.

2.3. OPERATOR INFORMATION AND FUNCTIONS

In general, the SITRANS F RA110 will always function at Operator level. The information displayed is dependant upon the SETUP-settings. All pulses generated by the connected flowmeter are measured by the F RA110 in the background, whichever screen refresh rate setting is chosen. After pressing a key, the display will be updated very quickly during a 30 second period, after which it will slow-down again.

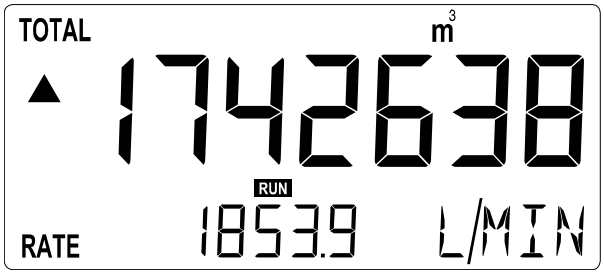


Fig. 3: Example of display information during process.

For the Operator, the following functions are available:

- **Display flowrate / total or flowrate**
  This is the main display information of the F RA110. After selecting any other information, it will always return to this main display automatically.
  Total is displayed on the upper-line of the display and flowrate on the bottom line.
  It is possible to display flowrate only with the large 17mm digits; in this instance press the SELECT-key to read the total.
  When "-------" is shown, then the flowrate value is too high to be displayed.
  The arrows ⬍ indicate the increase/decrease of the flowrate trend.

- **Clear total**
  The value for total can be re-initialized. To do so, select the display information with the totaliser and press CLEAR twice. After pressing CLEAR once, the flashing text "PUSH CLEAR" is displayed. To avoid re-initialization at this stage, press another key than CLEAR or wait for 20 seconds.
  Re-initialization of total DOES NOT influence the accumulated total.

- **Display accumulated total**
  When the SELECT-key is pressed, total and accumulated total are displayed. The accumulated total cannot be re-initialized. The value will count up to 99,999,999,999. The unit and number of decimals are displayed according to the configuration settings for total.

- **Alarm 01-04**
  When "alarm" is displayed, please consult Appendix B: problem solving.

3. CONFIGURATION

3.1. INTRODUCTION

This and the following chapters are exclusively meant for electricians and non-operators. In these, an extensive description of all software settings and hardware connections are provided.

- ***Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.***

- ***The F RA110 may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.***

- ***Ensure that the measuring system is correctly wired up according to the wiring diagrams. The housing may only be opened by trained personnel.***

  Take careful notice of the "Safety rules, instructions and precautionary measures" in the first part of this manual.

3.2. PROGRAMMING SETUP-LEVEL

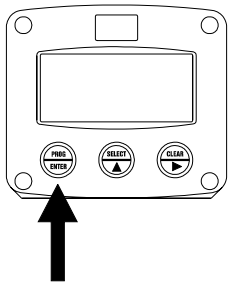
3.2.1. GENERAL

Configuration of the SITRANS F RA110 is done at SETUP-level. SETUP-level is reached by pressing the PROG/ENTER key for 7 seconds; at which time, both arrows ⬍ will be displayed. In order to return to the operator level, PROG will have to be pressed for three seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit SETUP automatically.
SETUP can be reached at all times while the F RA110 remains fully operational.

Note !

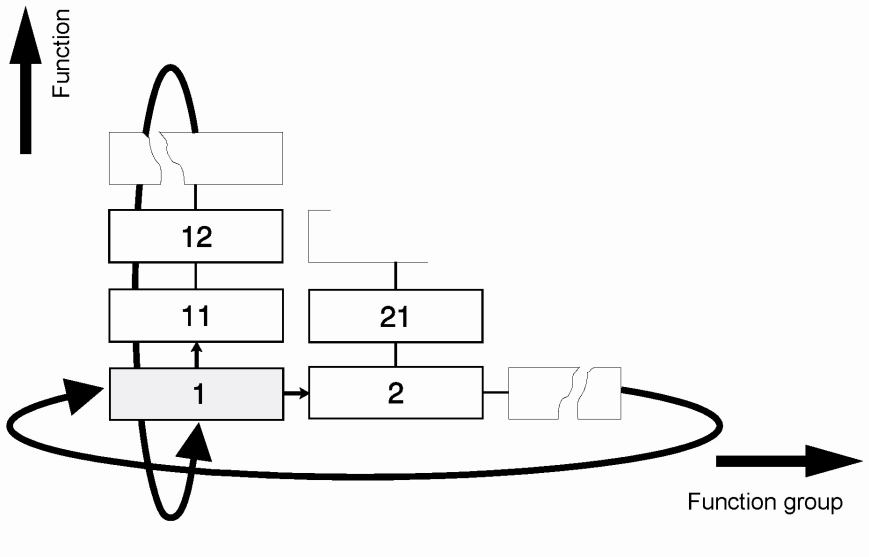
Note: *A pass code may be required to enter SETUP. Without this pass code access to SETUP is denied.*

To enter SETUP-level:



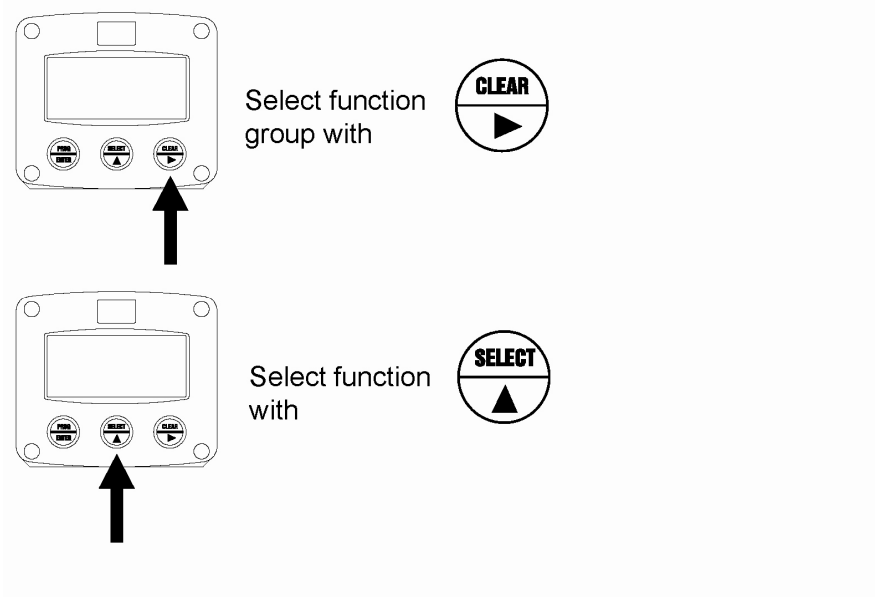
Press PROG/ENTER for 7 seconds

Matrix structure SETUP-level



SCROLLING THROUGH SETUP-LEVEL

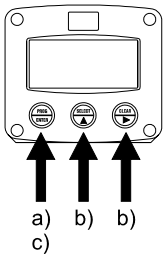
Selection of function-group and function:
SETUP is divided into several function groups and functions.



Each function has a unique number, which is displayed below the word "SETUP" at the bottom of the display. The number is a combination of two figures. The first figure indicates the function-group and the second figure the sub-function. Additionally, each function is expressed with a keyword.

After selecting a sub-function, the next main function is selected by scrolling through all "active" sub-functions (e.g. 1▲, 11▲, 12▲, 13▲, 14▲, 1▶, 2▶, 3▲, 31 etc.).

To change or select a value:



a) press PROG ENTER briefly; **PROGRAM** will start flash

b) select or enter value with SELECT and / or CLEAR

c) press PROG ENTER to confirm the value / selection.

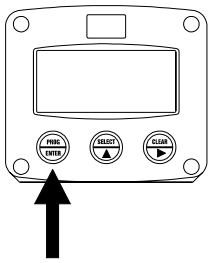
To change a value, use ▸ to select the digits and ▲ to increase that value.
To select a setting, both ▲ and ▸ can be used.
If the new value is invalid, the increase sign ▲ or decrease-sign ▼ will be displayed while you are programming.

When data is altered but ENTER is not pressed, then the alteration can still be cancelled by waiting for 20 seconds or by pressing ENTER for three seconds: the PROG-procedure will be left automatically and the former value reinstated.

Note !

Note: *alterations will only be set after ENTER has been pressed!*

To return to OPERATOR-level:



Press PROG ENTER for 3 seconds

In order to return to the operator level, PROG will have to be pressed for three seconds. Also, when no keys are pressed for 2 minutes, SETUP will be left automatically.

3.2.2. OVERVIEW FUNCTIONS SETUP LEVEL

SETUP FUNCTIONS			
1	**TOTAL**		
	11	UNIT	L – m3 – kg – lb – GAL – USGAL – bbl – no unit
	12	DECIMALS	0 – 1 – 2 – 3 (Ref.: displayed value)
	13	K FACTOR:	0.000010 – 9,999,999
	14	DECIMALS K FACTOR:	0 – 6
2	**FLOWRATE**		
	21	UNIT	mL – L – m3 – mg – g – kg – t – GAL – bbl – lb – cf – REV – no unit – scf – Nm3 – NL – P
	22	TIME UNIT	sec – min – hour – day
	23	DECIMALS	0 – 1 – 2 – 3 (Ref.: displayed value)
	24	K FACTOR	0.000010 – 9,999,999
	25	DECIMALS K FACTOR:	0 – 6
	26	CALCULATION	per 1 – 255 pulses
	27	CUT-OFF	0.1 – 999.9 seconds
3	**DISPLAY**		
	31	FUNCTION	Total - flowrate
	32	LCD UPDATE	fast – 1 second
	33	LANGUAGE	Deutsch – English
	34	BACKLIGHT BRIGHTNESS	0 – 100 %

SETUP FUNCTIONS			
4	**ANALOG OUTPUT (OPTION)**		
	41	OUTPUT	Disable - enable
	42	FLOWRATE MINIMUM VALUE	0000.000 – 9,999,999 unit / time unit
	43	FLOWRATE MAXIMUM VALUE	0000.000 – 9,999,999 unit / time unit
	44	CUT-OFF	0.0 – 9.9 %
	45	TUNE MINIMUM VALUE	0 – 9,999
	46	TUNE MAXIMUM VALUE	0 – 9,999
	47	FILTER	00 – 99
5	**PULSE OUTPUT (OPTION)**		
	51	PULSE WIDTH	0.001 – 9.999 Sek.
	52	DECIMALS	0 – 1 – 2 – 3
	53	PULSES PER	X quantity
6	**OTHERS**		
	61	MODEL	FRA110 A/B oder C
	62	SOFTWARE VERSION	02.11.xx
	63	SERIAL NO.	xxxxxxx
	64	PASSWORD	0000 – 9999
	65	TAGNUMBER	0000000 – 9999999

3.2.3. EXPLANATION OF SETUP FUNCTIONS

1 – TOTAL	
MEASUREMENT UNIT 11	SETUP - 11 determines the measurement unit for total, accumulated total and optional pulse output. The following units can be selected: L - m3 - kg - lb. - GAL - USGAL - bbl - _ (no unit). Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.
DECIMALS 12	The decimal point determines for total, accumulated total and pulse output the number of digits following the decimal point. The following can be selected: 0000000 - 111111.1 - 22222.22 - 3333.333
K FACTOR 13	With the K-factor, the flowmeter pulse signals are converted to a quantity. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 11), for example per cubic meter. The more accurate the K-factor, the more accurate the functioning of the system will be. **Example: Calculating the K-factor** *Let us assume that the flowmeter is a DN 25. The chamber volume of this flowmeter is 0.179 Liters and the pulse output is 10 pulses per revolution. Further, we want to display the total in cubic meters / m3" (which is 1.000 liter).* *First calculate the number of revolutions per m3:* *1.000 L / 0,179 = 5.586,5921 revolutions.* *As the pulse output generates 10 pulses per revolution, the number of pulses generater per m3 is: 10x 5.586,5921 = 55.865,921* *Enter for setting 13 (K-Factor) 5586592 and number of decimals K-factor (setting 14): 2.*

1 – TOTAL				
DN	**CHAMBER VOLUME**	**NUMBER OF REVOLUTIONS PER LITER**	**K FACTOR BASED ON 10 PULSES PER REVOLUTION**	**K FACTOR BASED ON 100 PULSES PER REVOLUTION**
DN 15	0.033 L	1 L / 0.033 L = 30.30303	303.0303	3030.303
DN 25	0.179 L	1 L / 0.179 L = 5.586592	55.86592	558.6592
DN 50	1.500 L	1 L / 1.500 L = 0.666666	6.666666	66.66666
DN 80	4.320 L	1 L / 4.320 L = 0.231481	2.314810	23.14810
Please note: above examples are based on the measuring unit in LITERS ! All examples based on a SITRANS Rotary-Piston flowmeter - SITRANS F R				
DECIMALS K FACTOR 14	This setting determines the number of decimals for the K-factor entered. (SETUP 13). The following can be selected: 0 - 1 - 2 - 3 - 4 - 5 - 6 Please note that this setting influences the accuracy of the K-factor indirectly. (i.e. the position of the decimal point and thus the value given) This setting has NO influence on the displayed number of digits for total (SETUP 12)!			

2 – FLOWRATE	
Note !	The settings for total and flowrate are entirely separate. In this way, different units of measurement can be used for each e.g. cubic meters for total and liters for flowrate. The display update time for flowrate is one second or more. ***Note:*** *these settings also influence the optional analog output signal.*
MEASUREMENT UNIT **21**	SETUP - 21 determines the measurement unit for flowrate. The following units can be selected: mL - L - m3 - mg - g - kg - ton - GAL - bbl - lb - cf - REV - no unit - scf - Nm3 - NL - P. Alteration of the measurement unit will have consequences for operator and SETUP-level values. Please note that the K-factor has to be adapted as well; the calculation is not done automatically.
TIME UNIT **22**	The flowrate can be calculated per second (SEC), minute (MIN), hour (HR) or day (DAY).
DECIMALS **23**	This setting determines for flowrate the number of digits following the decimal point. The following can be selected: 00000 - 1111.1 - 2222.22 - 3333.333
K FACTOR **24**	With the K-factor, the flowmeter pulse signals are converted to a flowrate. The K-factor is based on the number of pulses generated by the flowmeter per selected measurement unit (SETUP 21), for example per liter. The more accurate the K-factor, the more accurate the functioning of the system will be. For examples read SETUP 13.

2 – FLOWRATE	
DECIMALS K FACTOR 25	This setting determines the number of decimals for the K-factor (SETUP 24). The following can be selected: 0 - 1 - 2 - 3 - 4 - 5 - 6 Please note that this SETUP - influences the accuracy of the K-factor indirectly. This setting has NO influence on the displayed number of digits for "flowrate" (SETUP 23)!
CALCULATION 26	The flowrate is calculated by measuring the time between a number of pulses, for example 10 pulses. The more pulses the more accurate the flowrate will be. The maximum value is 255 pulses.  Note ! ***Note:*** *this setting does influence the update time for the analog output directly (maximum update 10 times a second). If the output response is too slow, decrease the number of pulses.* ***Note:*** *for low frequency applications (below 10Hz): do not program more than 10 pulses else the update time will be very slow.* ***Note:*** *for high frequency application (above 1kHz) do program a value of 50 or more pulses.*
CUT-OFF TIME 27	With this setting, you determine a minimum flow requirement thresh-hold, if during this time less than XXX-pulses (SETUP 26) are generated, the flowrate will be displayed as zero. The cut-off time has to be entered in seconds - maximum time is 999 seconds (about 15 minutes).

3 – DISPLAY	
FUNCTION **31**	The large 17mm digits can be set to display total or flowrate. When "total" is selected, both total and flowrate are displayed simultaneously. When "flowrate" is selected, only flowrate will be displayed with it's measuring unit while total will be displayed after pressing SELECT.
LCD UPDATE **32**	The update frequency of the displayed information can be selected: **FAST:** the totalizer will be updated 8x per second - flowrate once per second. **1 SECOND:** the totalizer and flowrate will be updated 1x per second Please understand that NO information will be lost which ever update frequency is selected; every pulse will be counted and the output signals will be generated in the normal way.
LANGUAGE **33**	Following display languages can be selected: English - Deutsch
BRIGHTNESS (OPTION) **34**	The density of the optional backlight can be set in steps of 10%. 0% results in a switched-off backlight 100% results in a maximum brightness

4 – ANALOG OUTPUT (OPTION)

A linear (0)4-20mA signal output signal is generated according to the flowrate with a 12 bits resolution. The settings for flowrate (SETUP - 2) directly influence the analog output settings.
When the output is disabled, about 0mA will be generated.
The relationship between rate and analog output is set with the following functions:

DISABLE/ ENABLE 41	If the analog output is not being used, select "disable" to switch-off the converter.
MINIMUM FLOWRATE 42	Enter here the flowrate at which the output should generate a (0)4mA* signal - in most applications at flowrate "zero". The number of decimals displayed depend upon SETUP 23. The time and measuring units (L/min for example) are dependant upon SETUP 21 and 22 but are not displayed. Note ! ***) Note**: this minimum signal (0)4mA is determined with setting 45 but can be any value in the range 0-20mA.
MAXIMUM FLOWRATE 43	Enter here the flowrate at which the output should generate a 20mA*- in most applications at maximum flow. The number of decimals displayed depend upon SETUP 23. The time and measuring units (L/min for example) are dependant upon SETUP 21 and 22 but can not be displayed. Note ! ***) Note**: this maximum signal 20mA is determined with setting 46 but can be any value in the range 0-20mA.
CUT-OFF 44	To ignore leakage of the flow for example, a low flow cut-off can be set as a percentage of the full range of 16 mA (or 20mA). When the flow is less than the required rate, the current will be (0)4mA.

4 – ANALOG OUTPUT (OPTION) – CONTINUED	
TUNE MINIMUM VALUE (0)4mA 45	The initial minimum analog output value is 4mA. However, this value might differ slightly due to external influences such as temperature for example. The 4mA value or any other value in the range 0 - 21mA can be tuned precisely with this setting. ▪ ***Before tuning the signal, be sure that the analog signal is not being used for any application!*** After pressing PROG, the current will be about 4mA. The current can be increased / decreased with the arrow-keys and is directly active.
TUNE MAXIMUM VALUE 20MA 46	However, this value might differ slightly due to external influences such as temperature for example. The 20mA value or any other value in the range 0 - 21mA can be tuned precisely with this setting. ▪ ***Before tuning the signal, be sure that the analog signal is not being used for any application!*** ***Note:*** *before tuning the maximum value, first tune the minium value as it influences the maximum value.* After pressing PROG, the current will be about 20mA. The current can be increased / decreased with the arrow-keys and is directly active. Press ENTER to store the new value.

4 – ANALOG OUTPUT (OPTION) – CONTINUED

FILTER **47**	This function is used to stabilize the analog output signal. The output value is updated every 0.1 second. With the help of this digital filter a more stable but less actual reading can be obtained. The filter principal is based on three input values: the filter level (01-99), the last analog output value and the last average value. The higher the filter level, the longer the response time on a value change will be. Below, several filter levels with their response times are indicated:			
FILTER VALUE	**RESPONSE TIME ON STEP CHANGE OF ANALOG VALUE. TIME IN SECONDS**			
	50 % INFLUENCE	**75 % INFLUENCE**	**90 % INFLUENCE**	**99 % INFLUENCE**
01	filter disabled	filter disabled	filter disabled	filter disabled
02	0.1 Sekunde	0.2 Sec	0.4 Sec.	0.7 Sec.
03	0.2 Sekunde	0.4 Sec.	0.6 Sec.	1.2 Sec.
05	0.4 Sekunden	0.7 Sec.	1.1 Sec.	2.1 Sec.
10	0.7 Sekunden	1.4 Sec.	2.2 Sec.	4.4 Sec.
20	1.4 Sekunden	2.8 Sec.	4.5 Sec.	9.0 Sec.
30	2.1 Sekunden	4 Sec.	7 Sec.	14 Sec.
50	3.5 Sekunden	7 Sec.	11 Sec.	23 Sec.
75	5.2 Sekunden	10 Sec.	17 Sec.	34 Sec.
99	6.9 Sekunden	14 Sec.	23 Sec.	45 Sec.

5 – PULSE OUTPUT (OPTION)	
One transistor output is available as scaled pulse output according to the accumulated total.	
PULSE WIDTH 51	The pulse width determines the time that the transistor will be switched; in other words the pulse length. The minimum time between the pulses is as long as the period time (50/50 duty cycle). The pulse width is set in milliseconds in the range 0.001 - 9.999 sec. Value “zero” disable the pulse output.  Note ! ***Note:*** *If the frequency should go out of range - when the flowrate increases for example - an internal buffer will be used to "store the missed pulses": As soon as the flowrate slows down, the buffer will be "emptied".* It might be that pulses will be missed due to a buffer-overflow, so it is advised to program this setting within its range!
DECIMALS 52	According to setting 53, a quantity has to be entered according which one pulse will be generated. This setting determines the decimal position.  Note ! ***Note:*** *the measuring unit is according to setting 11 (for total)*
PULSES PER 53	A pulse will be generated every X-quantity. Enter this quantity here while taking the displayed decimal position and measuring unit into account.

6 – OTHERS	
TYPE OF MODEL **61**	For support and maintenance it is important to have information about the characteristics of the F RA110 A, B or C. This letter indicates the type of functionality according the ordering code: • A: no outputs • B: impuls output • C: impuls and analog output Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
VERSION SOFTWARE **62**	For support and maintenance it is important to have information about the characteristics of the F RA110. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
SERIAL NUMBER **63**	For support and maintenance it is important to have information about the characteristics of the F RA110. Your supplier will ask for this information in the case of a serious breakdown or to assess the suitability of your model for upgrade considerations.
PASSWORD **64**	All SETUP-values can be password protected. This protection is disabled with value 0000 (zero). Up to and including 4 digits can be programmed, for example 1234.
TAGNUMBER **65**	For identification of the unit, a unique tag number of maximum 7 digits can be entered.

4. INSTALLATION

4.1. GENERAL DIRECTIONS

- ***Mounting, electrical installation, start-up and maintenance of this instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.***

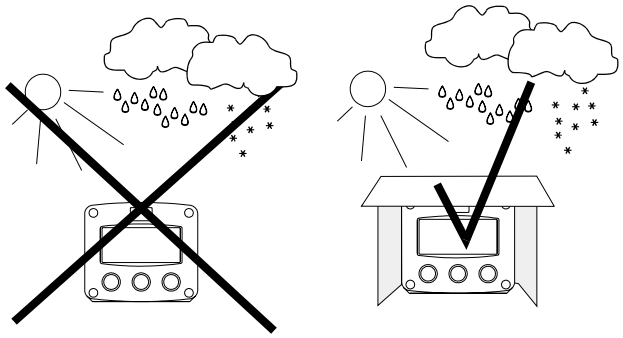
Caution !

- ***The F RA110 may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.***

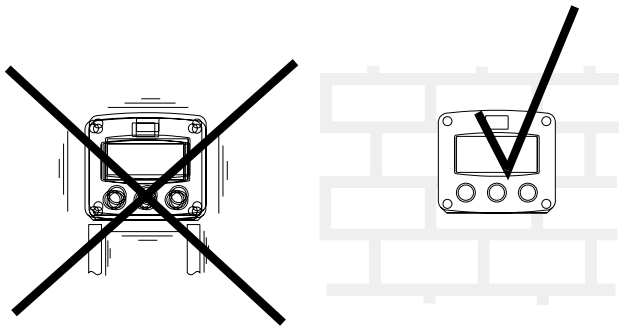
- ***Ensure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing may only be opened by trained personnel.***

- ***Take careful notice of the " Safety rules, instructions and precautionary measures " at the front of this manual.***

4.2. INSTALLATION / SURROUNDING CONDITIONS



Take the relevant IP classification of the casing into account (see manufactures plate). Even an IP67 (NEMA 4X) casing should NEVER be exposed to strongly varying (weather) conditions.
When panel-mounted, the unit is IP65 (NEMA 4)!
When used in very cold surroundings or varying climatic conditions, take the necessary precautions against moisture by placing a dry sachet of silica gel, for example, inside the instrument case.



Mount the F RA110 on a solid structure to avoid vibrations.

4.3. DIMENSIONS- ENCLOSURE

IP67 Aluminum Field enclosure with 2xM20 tapped holes:

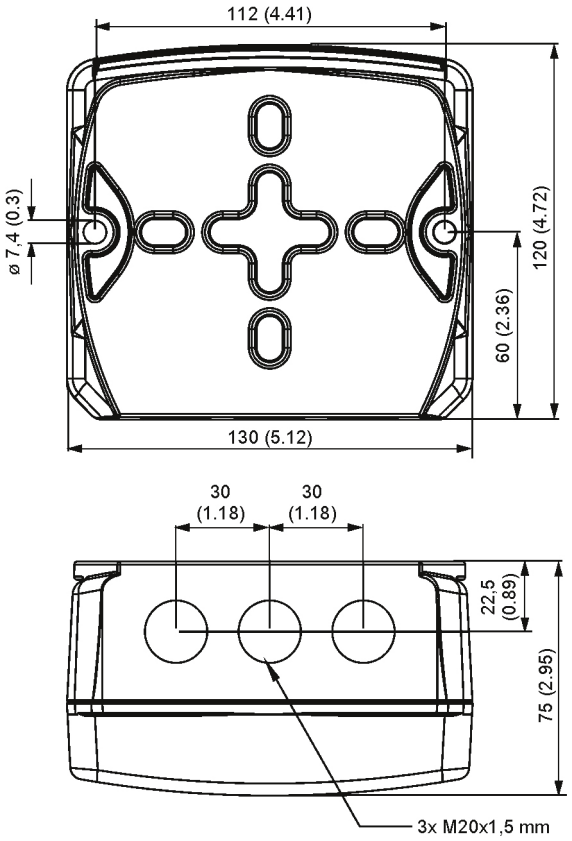


Fig. 4: Dimensions aluminum Field enclosure with 2x M20 drilling

4.4. INSTALLING THE HARDWARE

4.4.1. INTRODUCTION

- ***Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the unit, the installer has to discharge himself by touching a well-grounded object.***

- ***This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).***

- ***Do ground the aluminum casing properly as indicated, if the F RA110 has been supplied with the 115-230V AC power-supply option PM. The green / yellow wire between the back-casing and removable terminal-block may never be removed!***

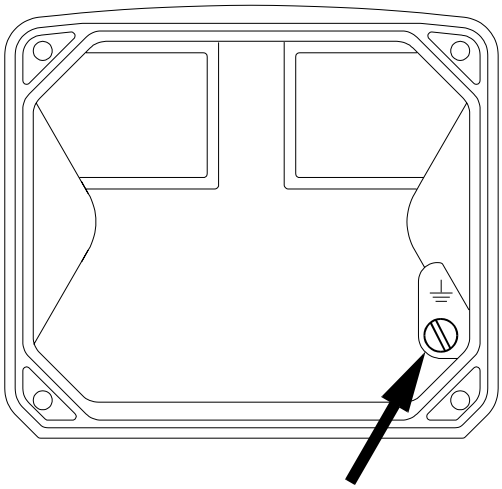


Fig. 5: Grounding aluminum enclosure with mains power supply 115-230V AC.

FOR INSTALLATION, PAY EMPHATIC ATTENTION TO:

- Separate cable glands with effective IP67 (NEMA4X) seals for all wires.
- Unused cable entries: ensure that you fit IP67 (NEMA4X) plugs to maintain rating.
- A reliable ground connection for both the sensor, and if applicable, for the metal casing. (above)

4.4.2. TERMINAL CONNECTORS

The following terminal connectors are always available:

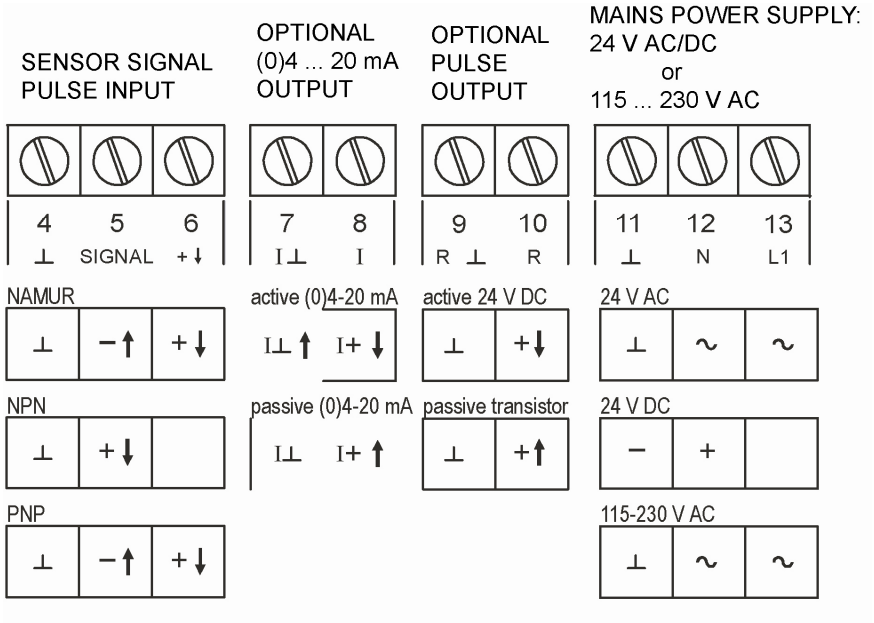


Fig. 6: Overview of terminal connectors standard configuration F RA110 and options.

Caution !

Caution:
If for the power supply (terminal 11 -13) black terminal blocks have been supplied, the unit can be powered with 115-230V AC.
If these terminals are green, the mains power supply is 24V AC/DC.

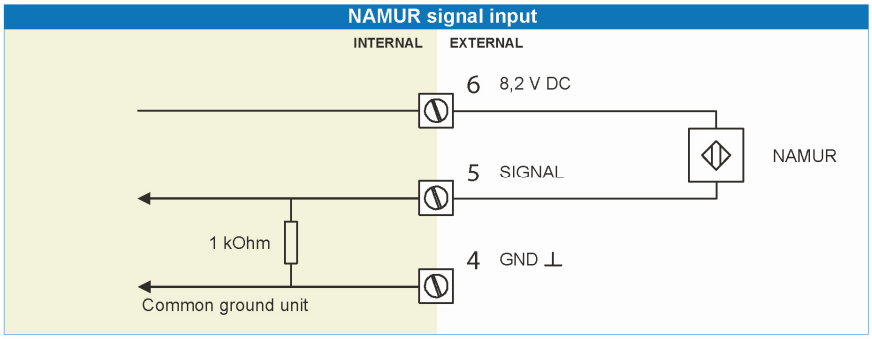
REMARKS: TERMINAL CONNECTORS:

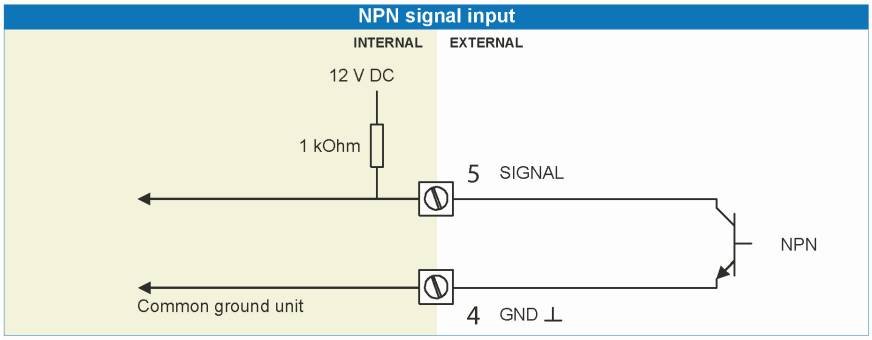
Terminals 04-06; Flowmeter input:
Three basic types of flowmeter pulse signals can be connected to the unit:

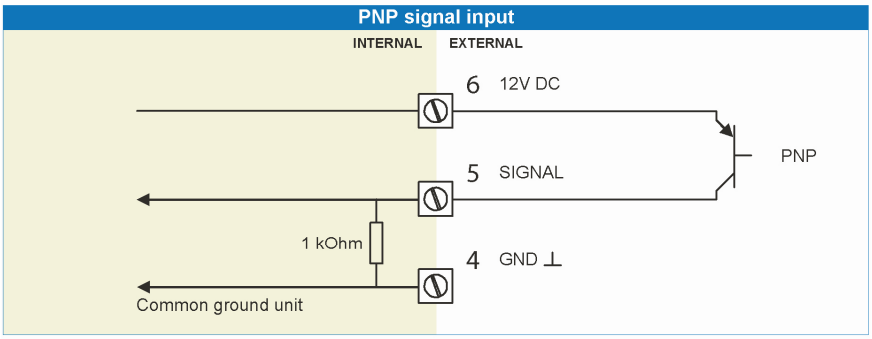
- Namur (acc. DIN19234). The maximum input frequency is 500Hz.
- NPN. The maximum input frequency is 10 kHz.
- PNP. The maximum input frequency is 10 kHz.

The type of signal input has to be determined BEFORE ordering the SITRANS F R110.

Sensor supply:
Terminal 6 offers a 8.2V DC sensor supply voltage. Maximum current is 30mA.





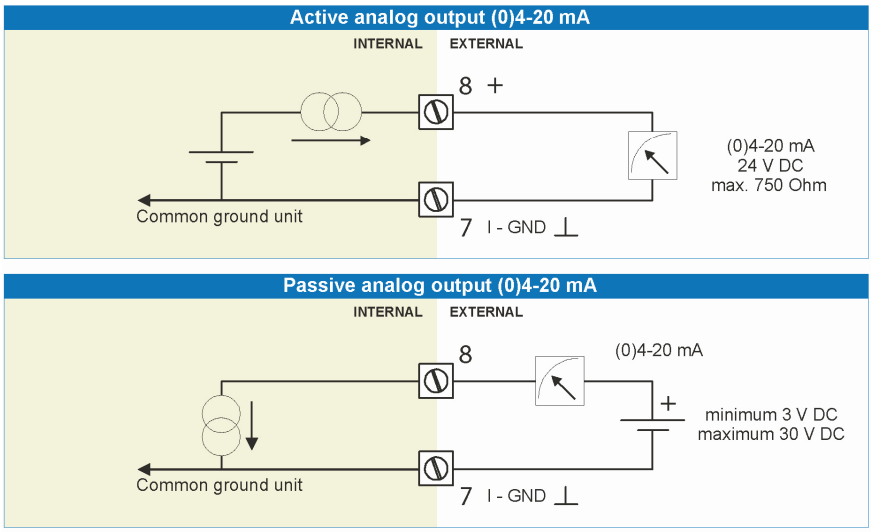

PNP signal input
INTERNAL
EXTERNAL
6 12V DC
5 SIGNAL
PNP
1 kOhm
4 GND ⊥
Common ground unit

Terminals 07-08 analog output (SETUP 4) :
The SITRANS F RA110 can be equipped with an analog output signal proportional to the flowrate.
Although the terminals are always available, it does not mean the output has been supplied as is has to be ordered up front.

Three basic types of analog output signals are available:

- passive current sink (0)4-20mA; min. voltage 3V DC.
- active (0)4-20mA; max. driving capacity 750 Ohm.

The type of signal output has to be determined BEFORE ordering the F R110.
The analog output is tuned with setup function 4 - par. 3.2.3.

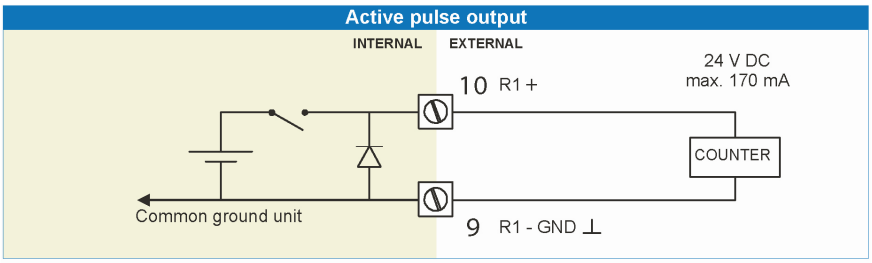


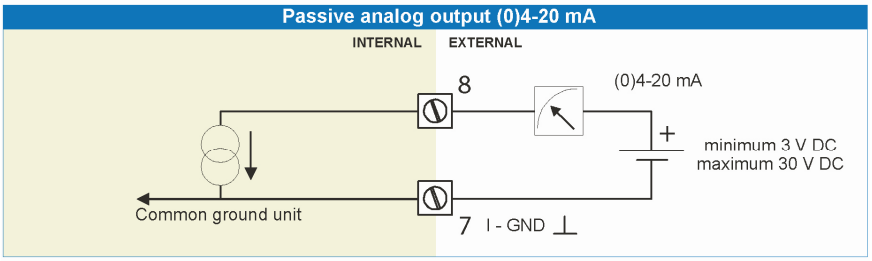
Terminals 09-10; pulse output (SETUP 5):
The F RA110 can be equipped with a scaled pulse output proportional to the accumulated total. Although the terminals are always available, it does not mean the output has been supplied as is has to be ordered up front.

Two basic types of pulse output signals are available:

- passive pulse; max. driving capacity 50V DC - 300mA.; maximum frequency 500Hz.
- active 24V DC pulse; max. driving 170mA; maximum frequency 500Hz..

The type of signal output has to be determined BEFORE ordering the F R110.
The pulse output is tuned with setup function 5 - par. 3.2.3.





Terminals 12-13 POWER SUPPLY:

The F RA110 can be powered with:

- 24V AC/DC
- 115 - 230V AC

The type of power supply has to be determined BEFORE ordering the F R110.

The unit is - internally fused with a replaceable TR fuse T1,25A

5. MAINTENANCE

5.1. GENERAL DIRECTIONS


Caution !

- ***Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility. Personnel must read and understand this Operating Manual before carrying out its instructions.***

- ***The SITRANS F RA110 may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.***

- ***Ensure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing may only be opened by trained personnel.***

- ***Take careful notice of the " Safety rules, instructions and precautionary measures " in the front of this manual.***

The F RA110 does not require special maintenance unless it is used in low-temperature applications or surroundings with high humidity (above 90% annual mean). It is the users responsibility to take all precautions to dehumidify the internal atmosphere of the F RA110 in such a way that no condensation will occur, for example by placing dry silica-gel sachet in the casing just before closing it. Furthermore, it is required to replace or dry the silica gel periodically as advised by the silica gel supplier.

Check periodically:

- The condition of the casing, cable glands and front panel.
- The input / output wiring for reliability and aging symptoms.
- The process accuracy. As a result of wear and tear, re-calibration of the flowmeter might be necessary. Do not forget to re-enter any subsequent K-factor alterations.
- Clean the casing with soapy-water. Do not use any aggressive solvents as these might damage the polyester coating.

APPENDIX A: TECHNICAL SPECIFICATION

GENERAL

Display	
Type	High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Digits	Seven 17mm (0.67") and eleven 8mm (0.31"). Various symbols and measuring units
Refresh rate	User definable: 8 times/sec - 30 secs.
Optional	LED-backlight - green - brightness 0 - 100%

Casing	
Type	Die-cast aluminum IP67 / NEMA 4X with 2-component UV-resistant coating
Mounting	Wall-mount, sensor head-mount, panel-mount, horizontal/vertical pipes
Dimensions	130 x 120 x 78 mm (5,1" x 4,72" x 3") – LxHxD.
Cable entry	2xM20 tapped holes.
Window	Polycarbonate window
Sealing	Silicon
Control keys	Three industrial micro-switch keys. UV-resistant keypad.
Optional	mounting plates for pipe mounting or wall mounting

Operating temperature	
Operational	–40 °C to +80 °C (–40 °F to +176 °F).

Power requirements	
mains	24 AC/DC ± 10 % (green terminal strip 11 – 13).
mains	110 – 230 V AC ± 10 % (black terminal strip 11 – 13)

Sensor excitation	
Supply voltage	8,2 V DC – max. 30 mA

Terminal connections	
Type	Removable plug-in terminal strip. Wire max. 2.5 mm^2

Data protection	
Type	EEPROM backup of all setting. Backup of running totals every minute. Data retention at least 10 years.
Passcode	Configuration settings can be pass code protected.

Environment	
Electromagnetic compatibility	Compliant ref: EN 61326 (1997), EN 61010-1 (1993)

INPUTS

Flowmeter	
Type	Namur, NPN, PNP.
Frequency	Namur: Minimum 0 Hz - maximum 500Hz. NPN / PNP: Minimum 0 Hz - maximum 10 kHz.
K factor	0.000010 – 9,999,999 with variable decimal position.

OUTPUTS

Analog output	
Type	One active or passive (0)4-20mA - not isolated.
Function	transmitting the flowrate
Resolution	12 bit.
Error	< 0.1%. Software function to calibrate the 4.00 mA and 20.00 mA levels precisely within set-up.
Load active output	max. 750 Ohm
Voltage passive output	3 V DC minimum – 30 V DC maximum
Response time 10…90%	100 msec
Type	(0)4 – 20 mA

Pulse output	
Type	One active or passive transistor output - not isolated.
Function	pulse output - transmitting accumulated total.
Frequency	max. 500 Hz.
Pulse length	1msec up zu 9.999 msec – minimum duty cycle 50/50
Load	passive: max. 50 V – 300 mA active: 24 V DC – 170 mA

OPERATIONAL

Operator functions	
Displayed functions	• total and/or flowrate. • total and accumulated total. • total can be reset to zero by pressing the CLEAR-key twice.

Total	
Digits	7 digits
Units	L, m3, GAL, USGAL, KG, lb, bbl, no unit
Decimals	0 – 1 – 2 or 3.
Note	Total can be reset to zero

Accumulated total	
Digits	11 digits
Units/decimals	according to selection for total

Flowrate	
Digits	7 digits
Units	mL, L, m3, Gallons, KG, Tonnen, lb, bl, cf, RND, ft3, scf, Nm3, Nl, igal – no units.
Decimals	0 – 1 – 2 or 3.
Time units	/Sec – /min – /hr – /day

APPENDIX B: PROBLEM SOLVING

In this appendix, several problems are included that can occur when the F RA110 is going to be installed or while it is in operation.

Flowmeter does not generate pulses:
Check:
- Type of signal flowmeter with the supplied type of input signal
- Flowmeter, wiring and connection of terminal connectors (par. 4.4.3.),

Flowmeter generates "too many pulses":
Check:
- Settings for total and Flowrate: SETUP 11-14 and 21-27,
- Proper grounding of the F RA110 - par. 4.4.1.

Analog output does not function properly:
Check:
- SETUP 41 - is the function enabled?
- SETUP 42 / 43: are the flow-levels programmed correctly?

Pulse output does not function:
Check:
- SETUP 53 - pulse per “x” quantity; is the value programmed reasonable.
- SETUP 52 - impulse width; is the external device able to recognize the selected pulse width and frequency?

Flowrate displays "0 / zero" while there is flow (total is counting):
Check:
- SETUP 22 / 25: are the K-factor and time unit correct?
- SETUP 26 / 27: The unit has to count the number of pulses according to SETUP 26 within the time according to SETUP 27. Make sure that 27 is set to 10.0 seconds for example : the result is that the unit has at least 10 seconds time to measure the number of pulses according to SETUP 26.

The pass code is unknown:
If the pass code is not 1234, there is only one possibility left: call your supplier.

ALARM
When the alarm flag starts to blink an internal alarm condition has occurred. Press the "select button" several times to display the 5-digit error code. The codes are:

0001: irrecoverable display-data error: data on the display might be corrupted.
0002: irrecoverable data-storage error: the programming cycle might have gone wrong:
check programmed values.
0003: error 1 and error 2 occurred simultaneously
0004: DAC communication error
0008: DATA error

The alarm condition will almost certainly be handled internally and if all mentioned values still appear correct, no intervention by the operator is needed. If the alarm occurs more often or stays active for a longer time, please contact your supplier.

INDEX OF THIS MANUAL

LIST OF FIGURES IN THIS MANUAL

NOTES

LIST OF CONFIGURATION SETTINGS

SETTING	DEFAULT	DATE:	DATE:
1 – TOTAL	Enter your settings here		
11 Unit	L		
12 Decimals	0000000		
13 K factor	0000001		
14 Decimals K factor	0		
2 – FLOWRATE			
21 Unit	L		
22 Time unit	/min		
23 Decimals	0000000		
24 K factor	0000001		
25 Decimals K factor	0		
26 Calculation/pulses	010		
27 Cut-off time	30.0 sec		
3 – DISPLAY			
31 Function	total		
32 LCD update	fast		
33 Language	English		
34 Backlight brightness	0 %		
4 – ANALOG OUTPUT			
41 Output	disabled		
42 Minimum flowrate (0)4 mA	0000000		
43 Maximum flowrate 20 mA	9999999		
44 Cut-off percentage	0.0 %		
45 Tune minimum – (0)4 mA	-		
46 Tune maximum – 20 mA	-		
47 Filter	01 (aus)		

LIST OF CONFIGURATION SETTINGS

5 – PULSE OUTPUT			
51 Pulse width	0 sec		
52 Decimals	0		
53 Pulses per	1000/L		

6 – OTHERS			
61 Model	F RA110x		
62 Software version	02.11.xx		
63 Serial number	xxxxxxx		
64 Pass code	0000		
65 Tag number	0000000		

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A5E00207520-03

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