User manual

Your success counts

FLUIDWELL

N414-P

BATCH CONTROLLER

WITH NUMERICAL KEYPAD, OPTIONAL RECEIPT PRINTER DRIVER, AND NTEP CERTIFICATION

Signal input:	***Pulse, NAMUR or coil flow meter signal***
Control inputs:	***Five inputs for remote control***
Control outputs:	***Five outputs to control valves, pumps or alarms***
Communication:	***Printer interface for receipt printing***

CE NTEP

N-Series - User friendly batch controllers
More info: www.fluidwell.com/nseries.

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1 ABOUT THIS MANUAL

1.1 HOW TO USE THIS MANUAL

This operation manual is divided into two main parts:

- The daily use of the N414-P is described in **Section 4: Operation [»9]**. These instructions are meant for users / operators.
- All subsequent sections and appendices are meant for electricians/technicians. These provide a detailed description of all software settings and hardware installation guidance.

Always follow the instructions in this manual, especially the safety information. For additional information, please contact your supplier.

1.2 USE OF PICTOGRAMS

A hazardous situation may occur if the unit is not used for the purpose it was designed for or is used incorrectly. The following pictograms inform you of important information:

A warning indicates a hazardous situation that could cause injury or death.

A caution indicates a condition that could cause:

- moderate/minor personal injury or equipment damage.
- incorrect functioning of the unit or connected instruments.

A note informs you of important information.

1.3 WARRANTY AND TECHNICAL SUPPORT

For warranty and technical support on your Fluidwell products, visit our internet site www.fluidwell.com or contact us at support@fluidwell.com.

1.4 MODEL REFERENCE

Hardware version:	
Software version:	03.06.xx
Document version:	FW_N414-P_M_v0301-02_EN
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2 SAFETY

2.1 PERSONAL SAFETY

- Risk of electric shock: Only open the unit if all leads are free of potential electrical energy.
- Immediately inform the person responsible for the installation if you disagree with the safety precautions or if you detect errors or danger.

2.2 END-USER RESPONSIBILITIES

- Installation, use, and servicing of the unit must be done by trained and authorized technicians.
- This unit is not designed for use in life support appliances, devices, or systems where malfunction of the product could result in 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.
- Check all connections, settings and technical specifications of all peripheral devices supplied with the unit.
- The unit must be installed in accordance with the EMC (Electro Magnetic Compatibility) guidelines.
- The local labor and safety laws, and regulations must be adhered to.
- Modifying the unit without prior written consent from the manufacturer will result in the immediate termination of product liability and warranty period.
- The manufacturer accepts no responsibility whatsoever if the safety information and instructions in this manual are not observed.

2.3 POTENTIAL EQUIPMENT DAMAGE

- Before installing the unit, check the mains voltage and information on the manufacturer's label for product configuration.
- Electro Static Discharge (ESD) causes irreparable damage to electronics. When installing or opening the unit, the technician should first discharge him- or herself by touching a well-grounded object.
- Never touch the electronic components without properly grounded tools.
- Never expose the unit to conditions that may exceed the enclosure classifications as indicated by the manufacturer's label and in the chapter **Section 6.1: Installation / environmental conditions [»26]**.

2.4 DISPOSAL OF ELECTRONIC WASTE

At the end of its life this product should be disposed of according to the (inter)national regulations regarding waste electronic equipment. If a battery is installed in this product, it should be disposed of separately. The separate collection and recycling of your waste equipment will help to conserve natural resources and ensure that it is recycled in a manner that protects the environment.

3 INTRODUCTION

3.1 SYSTEM DESCRIPTION

The batch controller model N414-P is a microprocessor-driven instrument designed for batching and filling of small and large quantities, with optional receipt printer driver (Type CB or CH).

The N414-P is suitable for stationary wholesale custody transfer applications within the United States of America and is certified following the National Type Evaluation Program (NTEP).

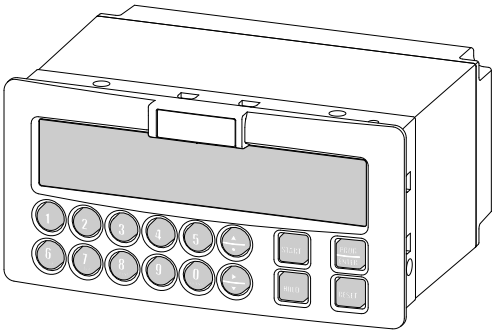


Fig. 1: The N414-P

This manual describes the daily use, configuration and installation of the N414-P with pulse input from a flow meter.

The following figure shows the N414-P used in a typical installation.

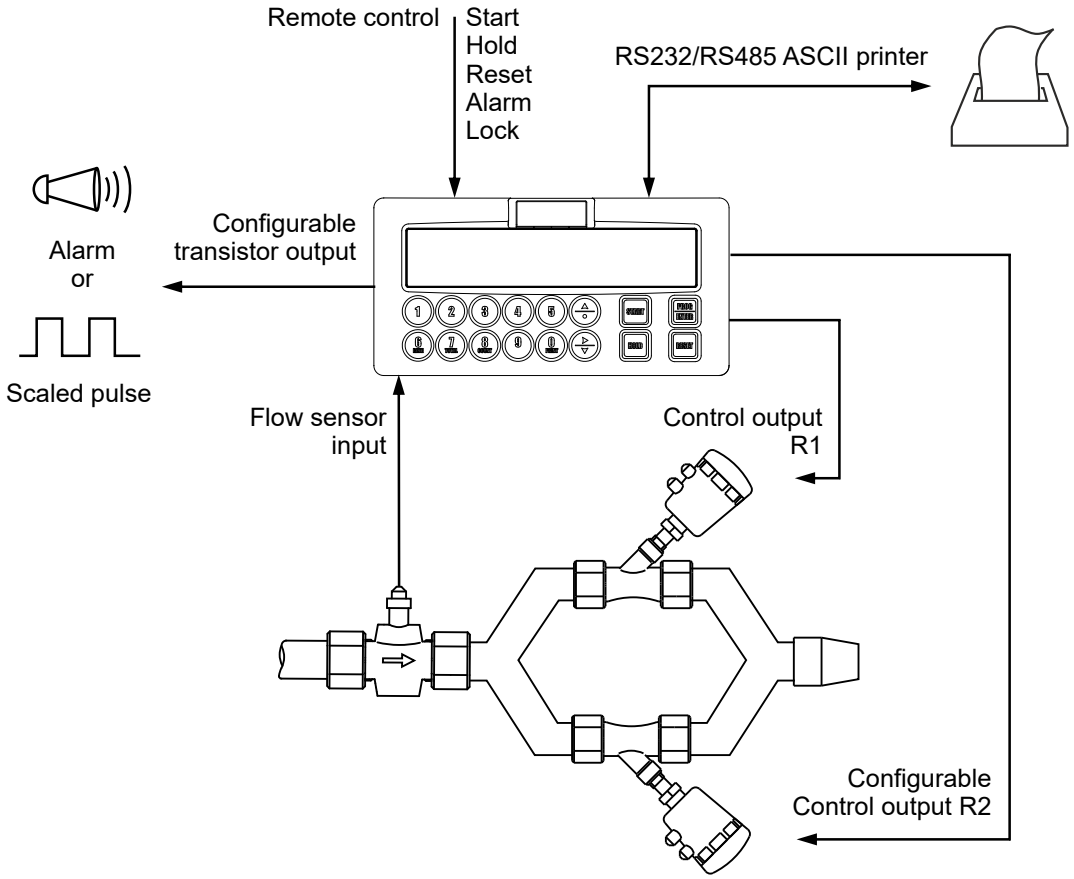


Fig. 2: Typical application

3.2 PRODUCT FEATURES

General characteristics

- User friendliness with numerical keypad
- Good readings in full sunlight and darkness through bright backlight
- Clear operator information: all relevant information in one screen

- Ability to process most common pulse signals
- Suitable for both AC and DC applications
- Certified according to NTEP
- External receipt printer interface (Type CB, CH).

Configuration

The N414-P can be used for many types of application and has a SETUP mode to allow for configuring it to your requirements. See **Section 5: Configuration [»15]** for further information.

All settings are stored in an EEPROM memory so they will not be lost if there is a power failure.

Power supply

The N414-P may be powered from a 24 V DC source or from mains (110 - 230 V AC).

Pulse input

- One flow meter with a passive or active pulse, NAMUR or coil signal output
- Several options are available for powering the sensor.

Control inputs

- Five control inputs available: START, HOLD, RESET, keyboard lock and external alarm.

Control outputs

- Two mechanic relay outputs for two-stage batch processing. One relay is default set for batch control, the other one may be configured for batch control or as two-stage batch control (pre-close), as alarm output or as scaled pulse output.
- Three transistor outputs: may be used for connection with a PLC or other controlling equipment. Each transistor output can be independently configured as batch control output, or as two-stage batch control (pre-close), as external alarm, pump control or as scaled pulse output.

Printer interface (Type CB, CH)

- An RS232 / RS485 based ASCII printer communication port is available for printing receipts per completed batch.

Backlight

A backlight is standard available.

3.3 WEIGHTS & MEASURES (W&M) INFORMATION

The performance is supported by the National Type Evaluation Program (NTEP) Certificate of Conformance and meets the National Institute of Standards and Technology (NIST) Handbook 44 requirements.

Weights & Measures Switch

The N414-P has a mechanically secured, tamper-proof W&M switch to lock (by hardware) the setup menu for editing of parameters. When the security cap is installed and safe-tied by a certified lock-wire and its compression seal, it is not possible to access the W&M switch. It is also not possible to remove the N414-P from the cabinet panel.

The certified lock-wire and compression seal are not included in the scope of the delivery and shall be provided and installed in accordance with the manufacturer’s instructions and the (inter)national Standards and Regulations.

W&M switch positions

The W&M switch, located at the back side of the N414-P (possibly covered with the security cap) has two positions.

W&M switch	
Cnfig.	Oper.

Oper. When the W&M switch is in the Operation position, it is not possible to change the settings. Settings can only be reviewed.

Cnfg. When the W&M switch is set to the Configuration position, settings may be reviewed and/or changed.

3.4 INSTALLATION EXAMPLE

Following parts can be recognized in below installation example.

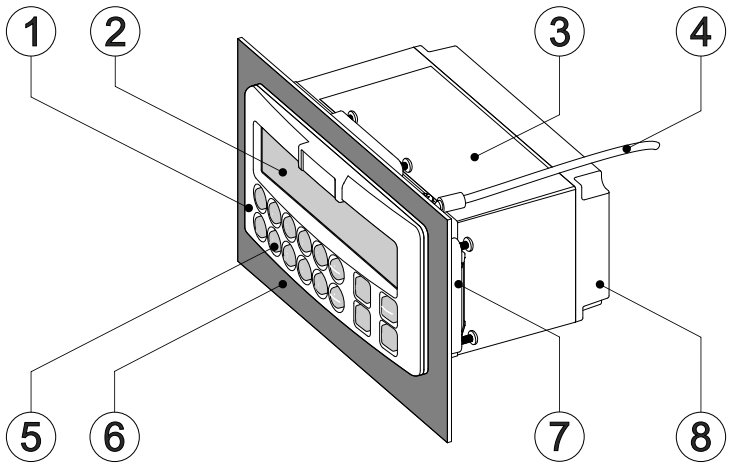


Fig. 3: Installation example N414-P

1.	Front cover	3.	Label	5.	Keys	7.	Clamp
2.	Display	4.	PE connection (not included)	6.	Mounting panel	8.	Back cover

4 OPERATION

CAUTION

This product may only be operated by authorized and trained personnel who have read and understood this manual, particularly **Section 2: Safety [»5]**.

4.1 INTRODUCTION

This chapter describes the daily use and operation of the N414-P. For this, the N414-P is equipped with a control panel that provides the operator with various functions, information and operating modes.

4.1.1 CUSTODY TRANSFER

The N414-P may be used for custody transfer operations only when the Weights and Measures switch is set to the Operation position and the security cap is installed in accordance with the manufacturer's instructions and the (inter)national Standards and Regulations (see **Section 3.3: Weights & Measures (W&M) information [»7]** and **Section 6.3.3: Weight and Measures switch and anti-tamper seal [»29]**). When the configuration mode indication PROG is shown, the controller may not be used for custody transfer.

4.1.2 OPERATING MODES

The following operating modes are available:

- **OPERATOR**-mode
  This is the default mode of operation. This mode is available for all operators and gives access to the other modes. The available functions and rights depend on the type of unit and configured settings. The unit will always return to this mode when there is no user interaction for some time in any of the other modes.
- **SETUP**-mode
  This mode allows to review all configuration settings using a SETUP-menu. The mode indicator SETUP is shown on the display and access can be restricted via a password. After selecting a configuration item, it can be changed using the PROGRAM-mode.
- **PROGRAM**-mode
  This mode is used to change settings in the SETUP-menu, enter values in OPERATOR-mode or enter a password. When a setting is being changed, this is indicated by the mode indicator PROG on the display.

The following paragraphs describe the modes of operation in more detail. SETUP-mode and PROGRAM-mode are described in **Section 5: Configuration [»15]**.

Weights & Measures (W&M) annunciation

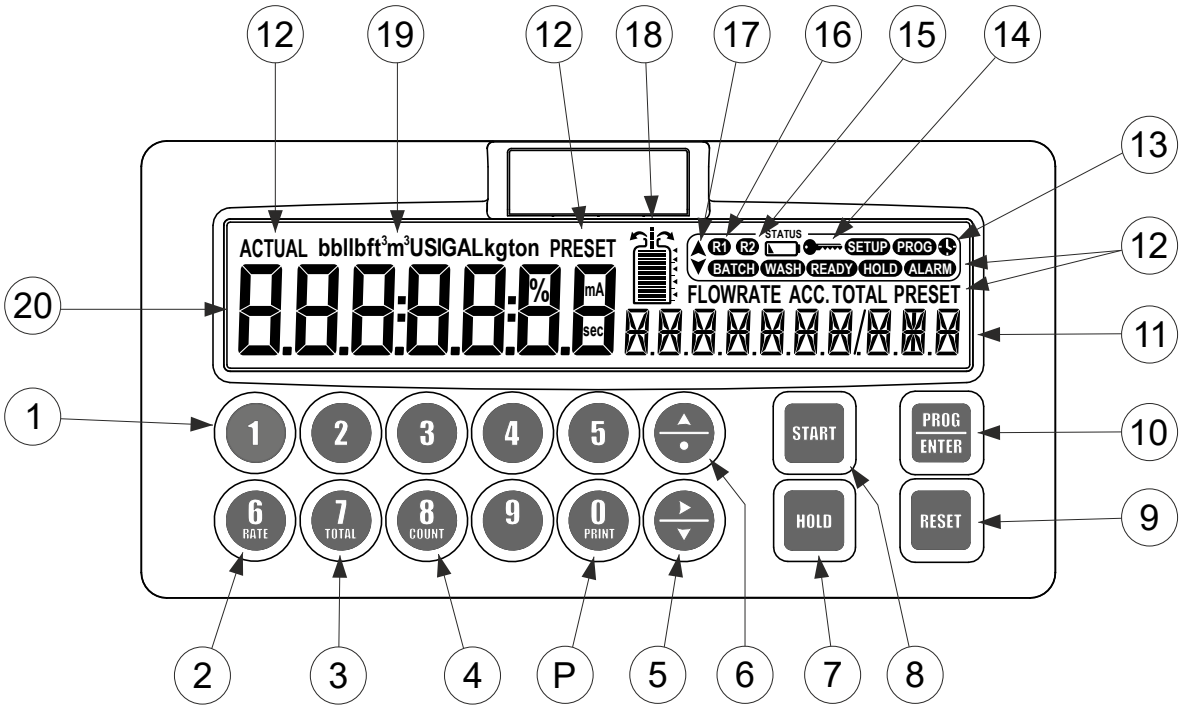
The N414-P has a mechanically secured, tamper proof W&M switch to lock (by hardware) metrologically relevant parameters in the SETUP- menu. When set to configuration position (unsecured), the CONFIGMODE indicator is shown and it is possible to make changes to these settings. When the switch is set to the Operation position, it is not possible to change these settings.

4.2 CONTROL PANEL

The control panel is located on the front side of the N-Series It consists of:

- A Liquid Cristal Display (LCD) to show process values and various other information
- Ten numerical keys (0 – 9), used for entering a PRESET or a configuration value
- Two selection keys and a PROG/ENTER key used in programming or configuration
- Three keys (START, STOP and RESET) used for managing the batching process.

Display and keys – overview



1.	Numerical keys	8.	Start/resume key	15.	Relay R2 indicator
2.	Rate key	9.	Reset key	16.	Relay R1 indicator
3.	Total key	10.	Program/confirm key	17.	Increase/decrease indicator
4.	Count key	11.	8 mm value display	18.	Tank fill/spill indicator
5.	Function select/digit delete	12.	Status indicators	19.	Unit indicators
6.	Function select/set period (.)	13.	Overrun/preopen busy *	20.	14 mm value display
7.	Interrupt key	14.	Key lock indicator	P	Print key **

* Preopen busy: Batch indicator and clock blinking
Overrun busy: Ready indicator and clock blinking

** Not functional on N410 models.

Functions of the keys in Operator Mode

0-9 – keys
Are used to enter a PRESET or a configuration value.

RATE - key
To display the actual flowrate during batching.

TOTAL - key
To display the actual total the accumulated total, and to reset the total.

COUNT – key
To display and reset the number of fully executed batches.

Arrow-UP – key
To enter a decimal value. In SETUP mode this key is used to select a function or value.

Arrow-RIGHT – key
In SETUP mode this key is used to select a function or value.

START – key
To START or RESUME the batch process.

HOLD – key
To interrupt the batch process.

PROG ENTER **PROG/ENTER** – key
To program and save a new PRESET value or other settings. Also, to gain access to SETUP mode.

RESET **RESET** – key
To terminate an interrupted batch process. Also, to accept alarms.

4.3 OPERATOR INFORMATION AND FUNCTIONS

The default mode of the N414-P is the OPERATOR mode. Information displayed and the function of various keys are dependent on the settings made in SETUP- mode, and the actual process status.

NOTE

*With SETUP **9.7: OTHER > KEYLOCK** one or more keys can be disabled for use in Operator- mode. When keys are locked, their function can still be called by using wired remote control inputs (see **Section 6.5.3: Terminals 8-12: Remote control [»33]**).*

When the symbol is displayed, the particular key(s) or functions are not available.

4.3.1 BATCHING

Entering a batch quantity

The PRESET value indicates the quantity that will be delivered by the batch process. The value can be set when the READY icon is visible. To change the PRESET value:

1. Press the PROG- key. The PROG indicator will start blinking, and the word PRESET is shown.
2. Use the numerical keypad (0 – 9) to enter the desired preset value. Note that the decimal position is set in SETUP menu **1.2*: PRESET > DECIMALS**.
3. Set the new value by pressing ENTER.

Fig. 4: Example display information during programming preset value

When data is changed but ENTER has not been pressed yet, the changes can be cancelled by pressing RESET. The previous entered value will be reinstated.
The programmed preset value will be used for each following batch, until a new value is set.

NOTE

*When a preset value outside of the programmed min-max range is entered, the increase ▲ or decrease ▼ sign will be displayed and the new value will not be accepted. Instead, the minimum or maximum allowed value will be set. These values are set with menu items **1.3*: PRESET > MINIMUM** and **1.4*: PRESET > MAXIMUM**.*

NOTE

*With SETUP **9.7: OTHER > KEYLOCK** the keys may be disabled in Operator mode. However, the preset batch quantity can always be entered in SETUP menu **1.5: PRESET > PRESET**.*

Starting the batch process

Batching can only be started when the READY indicator is shown, by pressing the START key. Then, the actual (batched) value is set to zero, the BATCH indicator is switched on, one or two mechanical relay outputs are switched on (R1 and R2, depending on configuration settings) and the flow is started. The displayed arrow indicates if the actual value is counting up ▲ or down ▼.

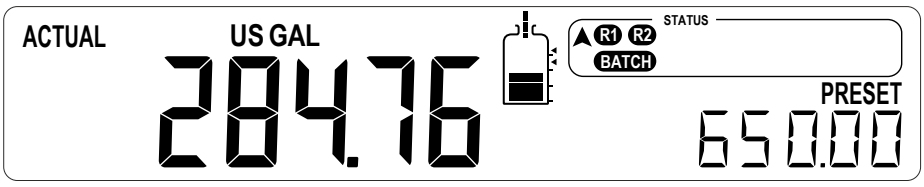


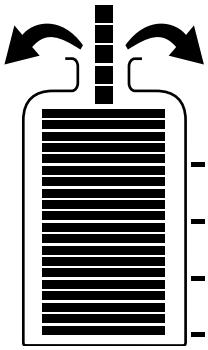
Fig. 5: Example display information during batching process

Once the PRESET value is reached, the outputs are switched off and the batch process is ended. A new batch can be started with the same PRESET quantity, or a new PRESET value can be set.

NOTE

*If print configuration setting **8.1: PRINTER > PRINT** is set to ON CONF(irmation), a new batch cannot be started before printing of the receipt of the last batch is ready (or cancelled).*

Tank fill symbol



The batch process can be visualized with the tank fill symbol. This graphical representation can be enabled or disabled (see SETUP **5.2: DISPLAY > TANK**).
While the outputs are switched on, the flow is symbolized by a flow entering the tank symbol. The input from the flow sensor is symbolized by the growing fill level. When the preset value is reached, the fill level will be at maximum height.
When the batch overfills the preset quantity by 2.5% the graph will show two overspill arrows.

Smart overrun correction

The N414-P is equipped with a smart, self-learning overrun correction. With this correction, the outputs will be switched off before the PRESET quantity is reached, allowing the measured overrun quantities of previous batches to fill off the batch. The result is an accurate batch, even in slowly varying circumstances. During overrun, a clock will be displayed and the symbols R1 and R2 will be flashing.

Interrupting and aborting the batch process

When HOLD is pressed during batching, the process is interrupted temporarily. The pump stays on and the actual data is kept while the display shows HOLD (blinking).

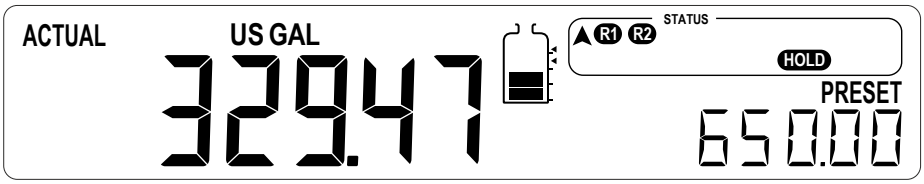


Fig. 6: Example display information when interrupted

To resume the interrupted process, press START.

The process can be ended entirely at all times while in HOLD mode, by pressing RESET. The batch sequence is ended as a completed batch and the remaining quantity is ignored. A ticket can still be printed.

Preparing for a new batch

Whan the batch is stopped and the display shows READY, press RESET for 3 seconds. The actual value is reset to 0 and a new batch can be started. A ticket referring to the stopped batch cannot be printed anymore.

Power failure while batching

When a power failure occurs during the batch process, the latest batch information is saved and made available again at power-up. However, it is not possible to resume the batch. After power failure, the display will show “powerfail”. Before a new batch is possible, the Operator must confirm by pressing the RESET- key.

4.3.2 PRINTING A TICKET (TYPE CB, CH)

In order to print a receipt ticket, the N414-P must be connected to a compatible printer.
Depending on the configuration setting **8.1: PRINTER > PRINT**, at the end of a completed or stopped batch the N414-P will:

- Print a ticket automatically

- Asks if a print is needed. The text RECEIPT PUSH PRINT is shown in the display. When the PRINT key is pressed, a ticket is printed. When a numerical key or the RESET key is pressed, printing will be skipped
- Prints a ticket only when the PRINT key is pressed.
- In case of a reprint, the text ** DUPLICATE ** will be printed on the ticket. When the W&M switch is set to Configuration, the text ** NOT FOR RESALE ** will be printed on the tickets (see **Section 3.3: Weights & Measures (W&M) information [»7]**).

The figure below shows examples of printed receipts.

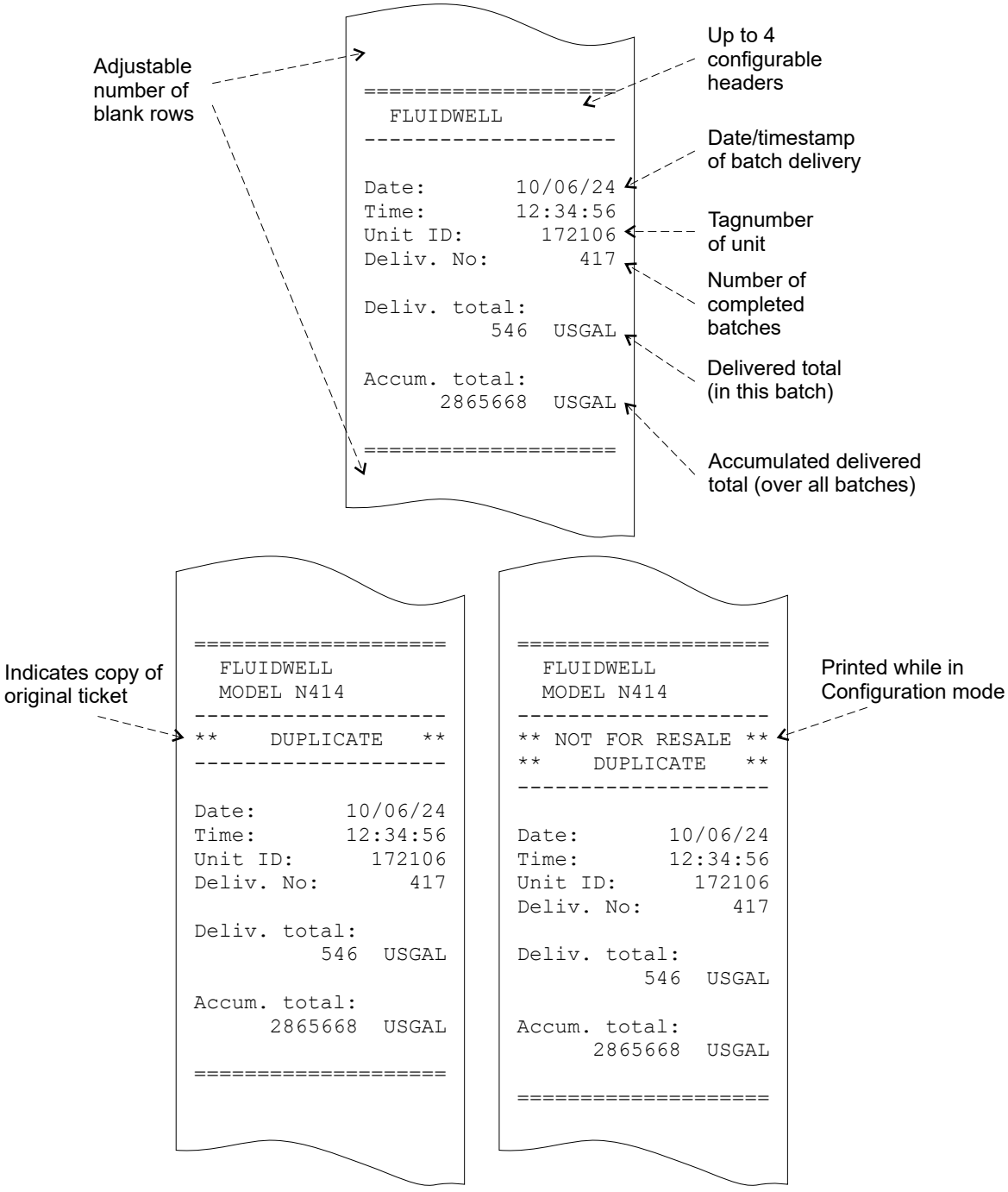


Fig. 7: Typical printed receipts

4.3.3 OTHER DISPLAYED INFORMATION

Flowrate indication

During batching, the actual flowrate will be displayed after pressing the RATE- key. Press RATE again or wait 20 seconds to return to the main display.

Total and accumulated total

When the TOTAL- key is pressed once, the (resettable) total will be displayed, with the indication TOTAL. When TOTAL is pressed again, the accumulated total is shown with the indication ACC.TOTAL. Measurement unit and decimal position will be according to the settings for Preset (see SETUP **1: PRESET**).

To return to the main display, press TOTAL again or wait 20 seconds.

Clear total

NOTE

Total cannot be reset during batching.

This function might not be available due to configuration settings.

Total can be reset by selecting TOTAL and then RESET. The text “PUSH RESET” will be shown. To avoid a reset, press another key than RESET or wait for 20 seconds. When RESET is pressed again, the value of Total will be cleared to zero.

Accumulated total is not resettable. It will count up to 9,999,999,999 until rolling over to 0.

Batch counter

The number of completed batches will be displayed (together with the text “BATCH NR”) after pressing COUNT. To return to the main display, press COUNT again or wait 20 seconds.

4.4 OPERATOR ALARMS

4.4.1 ALARM

When “ALARM” is displayed, press SELECT to display the alarm code. Consult **Section B: Troubleshooting [»43]** for more information.

4.4.2 NO-FLOW ALARM

The N414-P offers a no-flow monitoring feature. If the flow meter input detects no signal during a certain period, the unit will shut-off the control outputs, put the controller in HOLD mode and generate an alarm. The HOLD and ALARM icons start blinking, and an alarm message will be displayed: “NO FLOW”.

To clear the alarm press RESET once, the controller will stay in HOLD mode. See **Section : Batching [»12]** for information how to continue or terminate the current batch.

4.4.3 EXTERNAL ALARM

The N414-P with Type IR can receive an external alarm during batching. When the alarm is activated the display will show “EXT ALARM”, the running batch will be interrupted immediately and any other function is blocked until the alarm is cleared.

To clear the alarm press RESET once, while the controller remains in HOLD mode. See **Section : Batching [»12]** for information how to continue or terminate the current batch.

5 CONFIGURATION

5.1 INTRODUCTION

This chapter describes how technicians can use configuration settings to configure the N414-P for optimal functionality. Configuration is done in SETUP mode, using the front keys.

5.2 CONFIGURING USING SETUP MODE

For an overview of Operating modes, see **Section 4.1.2: Operating modes [»9]**.

5.2.1 ENTERING SETUP MODE

SETUP mode can only be entered when the N414-P is in READY mode.

NOTE

In SETUP mode, the controller cannot be used for batching.

1. Press the PROG/ENTER-key for 7 seconds. During this, both arrows ▼▲ will be displayed. You may be prompted to enter a password.
2. To return to OPERATOR mode, press PROG again during 3 seconds or wait 2 minutes.
3. The PROG indicator is now activated on the display.

5.2.2 NAVIGATING THE SETUP MENU

The SETUP menu contains several menu groups, which each contain various menu items. Each menu item has a unique number which is displayed at the bottom of the display. Additionally, each menu item is expressed with a keyword.
The menu number is a combination of two figures separated by a dot:

- the first figure indicates the selected menu group (e.g. 1. TOTAL).
- the second figure indicates the menu item (e.g. 1.1 UNIT).

The following image shows the layout of the menu structure:

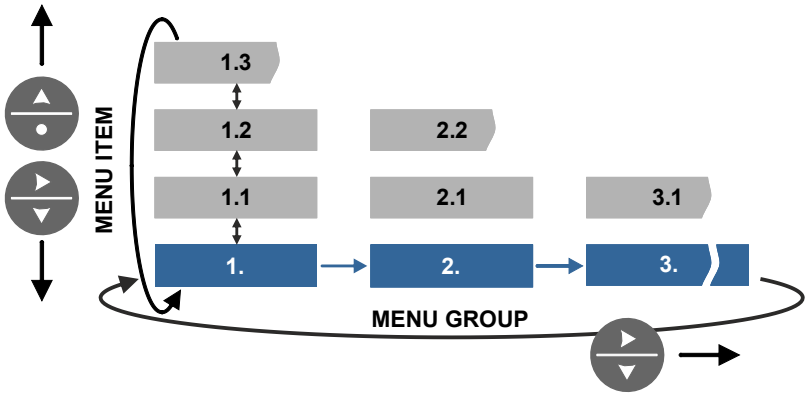


Fig. 8: SETUP menu layout and navigation

Navigate the SETUP menu with the following functions:

Arrow-UP - key
This key selects the next function in the list (e.g. 1. → 1.1. → 1.2. → 1.... → 1.)
When the top of the list is reached, it will return to the function group selection level.

Arrow-RIGHT - key
When only a function group is indicated in the display (one digit), this key scrolls through the function groups (1. → 2. → 3.)
When a function group is entered (two digits in display), this key is used to select the previous function in the list (e.g. 1.2 → 1.1 → 1). When the bottom of the list is reached, it will return to the function group selection.

5.2.3 CHANGING CONFIGURATION SETTINGS

A menu item either contains a value (a number with optionally a decimal point and sign, e.g. -123.45) or a selection list (e.g. L – m^3 - USGAL). After a menu item is selected in the SETUP menu, a new value can be programmed by performing the following steps. During the programming sequence, the PROG indicator is shown on the display.

NOTE

When the Weights and Measure switch is set to Operation, editing of metrologically relevant parameters via the SETUP menu is disabled. This is indicated by the indication LOCKED after trying to change a setting. See ***Section 3.3: Weights & Measures (W&M) information [»7]*** *for more information.*

Step 1: Start the programming sequence

PROG ENTER

PROG - key
When a menu item is selected in the SETUP menu, pressing the PROG - key starts the programming sequence. The PROG icon will start blinking.

Step 2a: Change a value

0 – 9

0 – 9
To change a value, use the numerical keys (0 – 9).

Arrow-UP and **Arrow-RIGHT** - keys
Use these keys to select a setting.

Step 2b: Change the selection in a list

Arrow-UP and **Arrow-RIGHT** - keys
These key are used to select the next item in the list (e.g. L → m^3 → USGAL).
At the end of the list, the selection will wrap around to the first selection.

Step 3: Finish the programming sequence

PROG ENTER

ENTER - key
Push the ENTER- key to change the data to the new selection. When ENTER is not pushed, the new data will not be programmed! Wait 20 seconds without any key or press ENTER for three seconds to leave the programming procedure and keep the old value.

Entering alphanumeric characters

Some setup values ask for input of alphanumeric characters. This is done in the following way.

1. Press PROG briefly. PROG starts blinking.
2. Optionally press RESET about 2 seconds to blank any existing text.
3. The cursor location is indicated by a blinking character or underscore. Place the cursor over the desired location by repeatedly pressing the '0'-key ('move left') or the ►-key ('move right').
4. Press the '5'-key ('next lower') or the ▲-key ('next higher') to change the character on the cursor location. The following character set can be chosen from:
   _, *, -, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z
5. Repeat steps 3 and 4 until the desired text is entered.
6. Press ENTER to store the new text. PROG is no longer shown.

Press RESET briefly to abort the editing session, previous values are restored, PROG is no longer shown.

NOTE

- *A blinking underscore '_' indicates a space, not an underscore.*
- *Arrows indicate more space available at the left or right of the visible screen.*
- *Pressing ▲ and ► simultaneously clears the character.*

5.2.4 RETURNING TO OPERATOR MODE

When all configuration settings are set correctly, return to OPERATOR mode by pressing the PROG- key for three seconds, or do not press any key for 2 minutes to return automatically. The READY indicator is now activated on the display and the PROG indicator is deactivated.

5.3 SETUP MENU OVERVIEW

NOTE

*Metrologically relevant parameters are marked with an *. These parameters are mechanically secured with the W&M switch (see **Section 3.3: Weights & Measures (W&M) information [»7]**).*

1	PRESET		DEFAULT
1.1*	UNIT	L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb	L
1.2*	DECIMALS	0 - 3	0
1.3*	MINIMUM	xxxxxxx	0
1.4*	MAXIMUM	xxxxxxx	0
1.5	PRESET	xxxxxxx	0

2	OVERRUN		DEFAULT
2.1*	OVERRUN	disable - enable	disable
2.2*	TIME	0.1 - 999.9	1
2.3*	SETTLE	0.0 - 99.9	0.0

3	FLOWRATE		DEFAULT
3.1	UNIT	L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb	L
3.2	TIME	sec - min - hour - day	min
3.3	DECIMALS	0 - 3	0
3.4	CALCULATION	1 - 255	10
3.5	CUT-OFF	0.1 - 999.9	30.0

4	ALARM		DEFAULT
4.1	NO-FLOW	disable - enable	disable
4.2	FLOWRATE TIME	0.0 - 999.9	10

5	DISPLAY		DEFAULT
5.1	DISPLAY	increase - decrease	increase
5.2	TANK	enable - disable	enable
5.3	LIGHT	off - 20% - 40% - 60% - 80% - 100%	100%
5.4	DIMMER	off - 20% - 40% - 60% - 80% - 100%	100%

6	FLOW METER		DEFAULT
6.1*	SIGNAL	coil lo, active, npn, npn lp, reed, reed lp, pnp, pnp lp, Namur, coil hi	coil lo
6.2*	UNIT	L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb	L
6.3*	K-FACTOR	0.000010 - 9999999	1

7	CONTROL		DEFAULT
7.1*	BATCH RELAY 2	Off, batch, preclose, alarm, pulse, external alarm, pump	Batch
7.2*	BATCH TRANS 1	Off, batch, preclose, alarm, pulse, external alarm, pump	Batch
7.3*	BATCH TRANS 2	Off, batch, preclose, alarm, pulse, external alarm, pump	Batch
7.4*	BATCH TRANS 3	Off, batch, preclose, alarm, pulse, external alarm, pump	Batch
7.5*	PREOPEN	0 - 999.9	0
7.6*	PRECLOSE	xxxxxxx	0
7.7	WIDTH	0.000 - 9.999	0.000
7.8	AMOUNT	xxxxxxx	1000
7.9	PULSE	Acc. Total - batch	Acc. Total

8	PRINTER		DEFAULT
8.1	PRINT	Auto, on confirmation, hand	auto
8.2	HEADER1	[16 alpha-numeric characters]	
8.3	HEADER2	[16 alpha-numeric characters]	
8.4	HEADER3	[16 alpha-numeric characters]	
8.5	HEADER4	[16 alpha-numeric characters]	
8.6	LINETERMINATION	CR/LF, CR, LF	CR/LF
8.7	STARTROW	0...9	2
8.8	ENDROW	0...9	4
8.9	FORMFEED	Enable, disable	disable
8.A	DATEFORMAT	Y.M.D, D.M.Y, M.D.Y	Y.M.D
8.B	TOTAL	Print, skip	print
8.C	SPEED	1200, 2400, 4800, 9600, 9600hp, 19200, 38400	9600

9	OTHER		DEFAULT
9.1	MODEL	fixed	N414-P
9.2	SOFTWARE VERSION	fixed	03.06.xx
9.3	SERIAL NUMBER	fixed	xxxxxxx
9.4	TIME	xx:xx:xx	00:00:00
9.5	DATE	xx.xx.xx	01.01.01
9.6	PASSWORD	0000 - 9999	0000
9.7	KEYLOCK	start - hold - preset - control - all - off	off
9.8	TAG-NR	xxxxxxx	0

5.4 SETUP MENU EXPLANATIONS

5.4.1 MENU 1: PRESET

NOTE

*Metrologically relevant parameters are marked with an *. These parameters are mechanically secured with the W&M switch (see **Section 3.3: Weights & Measures (W&M) information [»7]**).*

1	PRESET	
1.1*	UNIT NOTE	Determines the measurement unit for preset, total and accumulated total. The following units can be selected: L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb Changing this setting has consequences for Operator and Setup values. *Based on SETUP **6.2*: FLOW METER > UNIT** selection is limited to either volumetric or mass related units of measure only.*
1.2*	DECIMALS	Determines for Preset, Total and Accumulated Total the number of digits after the decimal point. The following can be set: 0 - 3.
1.3*	MINIMUM	Sets the lower limit for a preset batch. A preset value below this limit cannot be set in Operator mode.
1.4*	MAXIMUM	Sets the upper limit for a preset batch. A preset value above this limit cannot be set in Operator mode.
1.5	PRESET	With SETUP **9.7: OTHER > KEYLOCK** or an external input (see **Section 6.5.1: Terminals 1-2: Keyboard lock [»32]**), entering a Preset value may be disabled in Operator mode. However, setting a preset value with this menu entry is still possible. Note that the SETUP- mode may be password protected (**9.6: OTHER > PASSWORD**).

5.4.2 MENU 2: OVERRUN

Overrun can occur at the end of the batch process, as a result of slowness of a valve / pump. Consequently, the accuracy is less. With this function, the N414-P analyses the actual overrun characteristic after every batch. This information is used to correct the overrun automatically.

*Metrologically relevant parameters are marked with an *. These parameters are mechanically secured with the W&M switch (see **Section 3.3: Weights & Measures (W&M) information [»7]**).*

2	OVERRUN	
2.1*	OVERRUN	Enables or disables the self-learning overrun correction. Please note that for accurate overrun correction, it is necessary that the flow meter meets certain technical demands such as an adequate resolution, and shows no false overrun due to f.i. slow update time. Overrun correction should not be used when the flow meter is not compatible with this function.
2.2*	TIME	The overrun characteristic of the system will be analyzed for a certain period after the relay output is switched off. This eliminates false signals due to leakage. Please enter the expected time in seconds needed by the system to stop a batch. It is advisable to provide some extra time in order to prevent incorrect overrun correction or false leakage alarms. *The next batch may only be started after the set overrun time has passed.*
2.3*	SETTLE	Sets the settle time. Settle time starts counting when the batch is stopped and overrun time has passed. During settle time, any flow measured will be added to the delivered quantity. The display will show the word SETTLE, and printing a receipt or starting the next batch is not possible until settle time has passed.

5.4.3 MENU 3: FLOWRATE

Flowrate settings also apply to the High and Low Alarm Level settings.

3	FLOWRATE	
3.1	UNIT	Sets the measurement unit for the flow rate. Available units are: L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb *Based on SETUP **6.2*: FLOW METER > UNIT** selection is limited to either volumetric or mass related units of measure only.*
3.2	TIME	The flow rate can be calculated in units per second (SEC), minute (MIN), hour (HR) or day (DAY).
3.3	DECIMALS	Determines the number of decimals for the flowrate. The following can be selected: 0 - 3
3.4	CALCULATION	The flowrate is calculated by measuring the time needed to detect a preset number of flow meter pulses. Higher settings will make the measurement more accurate, but slower in response. Please enter the number of pulses, from 1 - 255. *For low frequency applications (below 10 Hz) it is not advised to set this value above 10, or the response of the controller will become slow. For high frequency applications (above 1 kHz) a setting of at least 50 is advised.*

3	FLOWRATE	
3.5	CUT-OFF	Sets the minimum flow threshold. If the time needed to reach the number of pulses set at SETUP **3.4: FLOWRATE > CALCULATION** is longer than this setting, the flow is ignored and will be displayed as zero. Please enter this period in seconds. Allowed range is 0.1 - 999.9

5.4.4 MENU 4: ALARM

4	ALARM	
4.1	NO-FLOW	When the sensor signal is zero for a preset time (see **4.2: ALARM > FLOWRATE TIME**) while batching, the N414-P can switch off the control outputs and set the controller in alarm state. This monitoring function can be enabled or disabled with this setting. Select the desired action when the flow meter signal becomes zero: • **Enable**: the control output is switched off, and the alarm is indicated on the display. • **Ignore**: the alarm output is **not** switched, and **no alarm** is indicated on the display.
4.2	FLOWRATE TIME	Sets the monitoring period before entering the no-flow alarm state. When the alarm condition is still valid after this period, the no-flow alarm is set (if enabled, see **4.1: ALARM > NO-FLOW**). The monitoring period is set in seconds, in the range 0.0 - 999.9

5.4.5 MENU 5: DISPLAY

5	DISPLAY	
5.1	DISPLAY	Sets the direction of the actual volume display during batching. • **Increase:** Actual volume counts from zero up to the preset volume (quantity done) • **Decrease:** Actual volume counts from preset value down to zero (quantity left)
5.2	TANK	Enables or disables the animated tank icon on the display (see **Section : Batching [»12]**).
5.3	LIGHT	Adjusts backlight brightness. Possible settings are: off - 20% - 40% - 60% - 80% - 100%
5.4	DIMMER	In order to save backlight life and energy, backlight brightness will fall to the entered level after five minutes of inactivity. Possible settings are: off - 20% - 40% - 60% - 80% - 100%

5.4.6 MENU 6: FLOW METER

NOTE

*Metrologically relevant parameters are marked with an *. These parameters are mechanically secured with the W&M switch (see **Section 3.3: Weights & Measures (W&M) information [»7]**).*

<table>
<tr><td>6</td><td colspan="5">FLOW METER</td></tr>
<tr><td>6.1*</td><td>SIGNAL</td><td colspan="4">Selects the type of input sensor pickup / signal. The N414-P can process several types of input signal.</td></tr>
<tr><td></td><td colspan="5">FLOW METER SELECTION CHARACTERISTICS</td></tr>
<tr><td></td><td>TYPE OF SIGNAL</td><td>EXPLANATION</td><td>RESISTANCE</td><td>FREQ / mV pp</td><td>REMARKS</td></tr>
<tr><td></td><td>NPN</td><td>NPN input</td><td>100 kΩ pull-up</td><td>max. 6 kHz</td><td>Open collector</td></tr>
<tr><td></td><td>NPN-LP</td><td>NPN input with low-pass filter</td><td>100 kΩ pull-up</td><td>max. 2.2 kHz</td><td>Open collector</td></tr>
<tr><td></td><td>REED</td><td>Reed-switch input</td><td>1 MΩ pull-up</td><td>max. 1.2 kHz</td><td></td></tr>
<tr><td></td><td>REED</td><td>Reed-switch input with low-pass filter</td><td>1 MΩ pull-up</td><td>max. 120 Hz</td><td></td></tr>
<tr><td></td><td>PNP</td><td>PNP input</td><td>100 kΩ pull-down</td><td>max. 6 kHz</td><td></td></tr>
<tr><td></td><td>PNP-LP</td><td>PNP input with low-pass filter</td><td>100 kΩ pull-down</td><td>max. 700 Hz</td><td></td></tr>
<tr><td></td><td>NAMUR</td><td>NAMUR input</td><td>820 Ω pull-down</td><td>max. 4 kHz</td><td>External power required</td></tr>
<tr><td></td><td>COIL HI</td><td>High sensitive coil input</td><td>-</td><td>min. 20 mV pp</td><td>Sensitive for interference</td></tr>
<tr><td></td><td>COIL LO</td><td>Low sensitive coil input</td><td>-</td><td>min. 90 mV pp</td><td></td></tr>
<tr><td></td><td>ACT</td><td>Active pulse input</td><td>3.9 kΩ</td><td>min. 10 Hz</td><td></td></tr>
<tr><td>6.2*</td><td>UNIT
NOTE</td><td colspan="4">Sets the measurement unit for the flow meter. Available units are
L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb
Based on the selection for a volumetric or a mass unit of measurement, consequently only equivalent units will be available in 1.1*: PRESET > UNIT and 3.1: FLOWRATE > UNIT.</td></tr>
<tr><td>6.3*</td><td>K-FACTOR
NOTE</td><td colspan="4">This value is used to convert the flow meter pulse signals into a quantity. The K-Factor is based on the number of pulses generated by the flow meter per measurement unit selected in 6.2*: FLOW METER > UNIT.
The K-Factor is entered with the numeric keys. The decimal point is entered with the Arrow-Up-key.
Example 1
The flow meter generates 2.4813 pulses per liter, the selected unit of measurement is m3, which equals 1000 L. Thus, 1000 * 2.4813 = 2481.3 pulses are needed for 1 m3. In this case, the K-factor is 2481.3. Enter 2481.3 at 6.3*: FLOW METER > K-FACTOR. Note the location of the decimal point, which is entered with the Arrow-Up-key.
Example 2
The flow meter generates 6.5231 pulses per gallon, and the set measurement unit is gallons. Thus, the K-factor is 6.5231. Enter 6.5231 at 6.3*: FLOW METER > K-FACTOR.
Accuracy of the measurement system depends on the accuracy of the K-factor.</td></tr>
</table>

5.4.7 MENU 7: CONTROL

Three outputs to control relays or valves are available: two mechanical and one transistor output. **Relay 1** is always used as main batch controlling output. This function is fixed.

Function of **Relay 2** as well as of the **Transistor output** may be configured independently, with the following functions.

- **Off**: the output is switched off
- **Batch**: function equals R1
- **Preclose**: used for two-stage control (see also **7.6*: CONTROL > PRECLOSE**)
- **Alarm**: used for no-flow alarm (see also **4: ALARM**)
- **Pulse**: used as scaled pulse output (configured with **7.7: CONTROL > WIDTH**, **7.8: CONTROL > AMOUNT** and **7.9: CONTROL > PULSE**)
- **External alarm**: output is switched when an external alarm is triggered

- **Pump**: switches a predefined time before the batch is started (see SETUP **7.5*: CONTROL > PREOPEN**).

7	CONTROL	
7.1*	BATCH RELAY 2	Sets the function of related output R2. Options are explained above this table.
7.2*	BATCH TRANS 1	Sets the function of the related transistor output. Options are explained above this table.
7.3*	BATCH TRANS 2	
7.4*	BATCH TRANS 3	
7.5*	PREOPEN	When the **Pump** function is selected for one or more of the outputs, this output is switched on during a period before the batching starts (with switching of R1). Please enter the preopen period in this variable (in seconds). Possible values are 0 - 999.9 With value 0 (zero) the function is disabled.
7.6*	PRECLOSE	When the **Preclose** function is selected for one of the outputs, this output is switched off when the remaining batch quantity is equal to the value entered here. With value 0 (zero) the function is disabled.
7.7	WIDTH	When the **Pulse** function is selected for one of the outputs, this setting determines the pulse length. Pulse length (or width) is set in milliseconds, in the range 0.000 - 9.999 Entering a value of 0 (zero) disables this function. The selected length also limits the maximum pulse frequency, based on a 50/50 duty cycle. *Maximum frequency* = 1 / (2**entered pulse length*) where *entered pulse length* is given in seconds. NOTE *If the output frequency goes out of range, an internal buffer will store the excess pulses. As soon as the input frequency falls, the buffered pulses will be processed. However, the buffer might overflow and loose input if the number of pulses stored is too high. It is advised to minimize the chance of buffer overflow by choosing settings carefully.*
7.8	AMOUNT	Sets the quantity to be added to the total, after which a pulse will be generated. The quantity should be input according to the settings for unit and decimals entered at **1.1*: PRESET > UNIT** and **1.2*: PRESET > DECIMALS**.
7.9	PULSE	Sets whether an output set to **Pulse** refers to the batched quantity or the accumulated total quantity. • **Batch:** measurement of the quantity set at **7.8: CONTROL > AMOUNT** will start at 0 at the start of each batch. • **Accumulated Total**: measurement of the quantity after which a pulse will be generated will be continued after starting a new batch.

5.4.8 MENU 8: PRINTER

NOTE *Printer interface hardware is only available with Type CB or CH. The following function group is available on every N414-P but has no relevance without a printer.*

The printer settings of menu 8 Printer relate to the application of an external printer, not part of standard delivery of the N414-P. For proper functionality, this printer must be compatible and should be installed correctly. For more information see your printers' manual, and **Section 6.5.9: Terminals 35-37: Printer [»37]**.

8	PRINTER	
8.1	PRINT	Selects the print function after a batch is completed. • **AUTO**: The controller automatically prints a ticket • **ON CONF**: The controller asks the operator to confirm printing by pushing the PRINT key. • **HAND**: The controller does not print automatically nor asks for a confirmation. If a receipt is wanted, press the PRINT key.

8	PRINTER	
8.2	HEADER1	Up to four user defined 16 character ticket headers may be entered. An explanation how to enter alphanumeric characters is given in **Section : Changing configuration settings [»16]**. Please note that all empty headers before the first filled one will be printed as empty lines. All empty headers after the last filled one will be ignored. See also **Section 4.3.2: Printing a ticket (Type CB, CH) [»12]**.
8.3	HEADER2	
8.4	HEADER3	
8.5	HEADER4	
8.6	LINETERMINATION	Sets the character(s) to be added at the end of a printed line. Please select one of the following: CR/LF, CR, LF
8.7	STARTROW	Sets the number of empty rows skipped on the ticket before starting printing. Select an integer in the range 0...9
8.8	ENDROW	Sets the number of empty rows skipped on the ticket after printing was finished. Select an integer in the range 0...9
8.9	FORMFEED	Selects if a 'form feed' character has to be sent to the printer before printing a ticket is started. Select disable when the character is not required.
8.A	DATEFORMAT	This setting is used to define the format in which the date will be printed. Three options are available: Y.M.D, D.M.Y, M.D.Y Choice Y.M.D, for instance, will lead to June 11, 2024 printed as 24-06-11.
8.B	TOTAL	• **Total**: prints the accumulated total on each receipt. • **Skip**: accumulated total will not be printed.
8.C	SPEED	Sets the baud rate for communication between controller and printer. Check your printer manual for the correct setting. Choose from: 1200, 2400, 4800, 9600, 9600hp, 19200, 38400

5.4.9 MENU 9: OTHER

9	OTHER	
9.1	MODEL	Provides important information on your product. This information may be required for maintenance or support.
9.2	SOFTWARE VERSION	
9.3	SERIAL NUMBER	
9.4	TIME	Enter the correct time for the system clock. Format is HH.MM.SS, in 24 hour notation.
9.5	DATE NOTE	Enter the correct date for the system clock. Format is YY.MM.DD. *The clock is used to print a timestamp on the receipt when a batch is delivered.*
9.6	PASSWORD	All SETUP values can be password protected. A four-digit PIN (password) can be programmed, for example 1234. To disable password protection, enter four zeros (0000).
9.7	KEYLOCK NOTE	With this setting certain keyboard functions can be disabled. **Start**: locks the START key, a batch cannot be started **Hold**: locks the HOLD key, interruption of a batch is disabled **Control**: START and HOLD keys are both disabled **Preset**: disables setting a preset quantity from the keyboard (see also SETUP **1.5: PRESET > PRESET [»19]**) **All**: all keys are disabled, except the SETUP key **Off**: no keys disabled. *Process management via wired inputs remains available, regardless of Keylock setting. See **Section 6.5.3: Terminals 8-12: Remote control [»33]** for more info.*

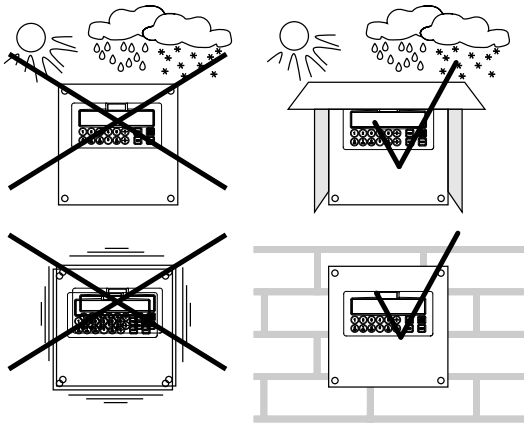
9	OTHER	
9.8	TAG-NR	For identification of the N414-P and communication purposes, a unique 7-digit tag number may be entered.

6 INSTALLATION

CAUTION

- 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.
- The N414-P 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 **Section 2: Safety [»5]**.

6.1 INSTALLATION / ENVIRONMENTAL CONDITIONS



Take the relevant IP classification of the enclosure into account (see identification plate). Even an enclosure rated for IP67 / NEMA Type 4X should NEVER be exposed to strongly varying (weather) conditions.

When used in very cold environment or varying climatic conditions, take the necessary precautions against moisture inside the instrument case.

Mount the N414-P onto a solid structure to avoid vibrations.

Relative humidity	< 85% RH
Outdoor use	Not suitable for outdoor use
IP and NEMA rating	Front: IP67, NEMA Type 4X. Rear: IP20
Supply voltage fluctuation	+/- 10% unless stated otherwise
Means of protection	Appliance Class I (protective earth) and Appliance Class II (double insulated)
Over-voltage category	II
Pollution degree	2 (internal environment), 3 (external environment)
Ambient	-20 °C to +60 °C, -4 °F to +140 °F
Altitude	up to 2000 meters (6600 feet)

6.2 IDENTIFICATION

Identification label

To identify your N-series device, all enclosures have a weatherproof identification label placed on top.

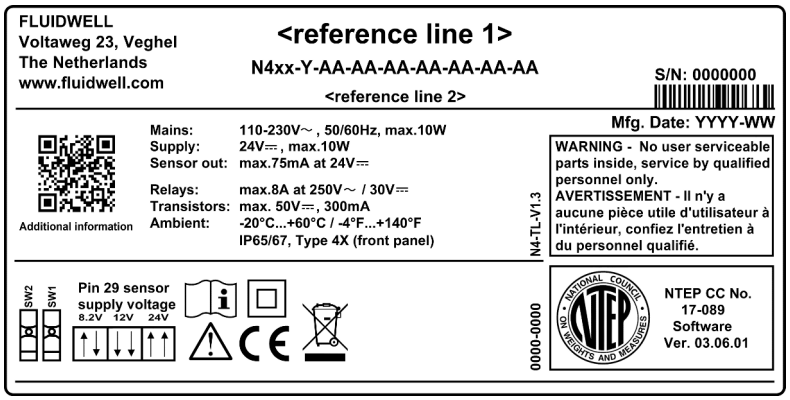


Fig. 9: Example of N-series top label

Serial number and year of production

The serial number can be reviewed on the top label, or in SETUP **9.3: OTHER > SERIAL NUMBER**. The production date is indicated by the first 4 digits of the serial number, representing year and week number (YYWW).

6.3 MECHANICAL INSTALLATION

6.3.1 MECHANICAL DIMENSIONS

Enclosure dimensions

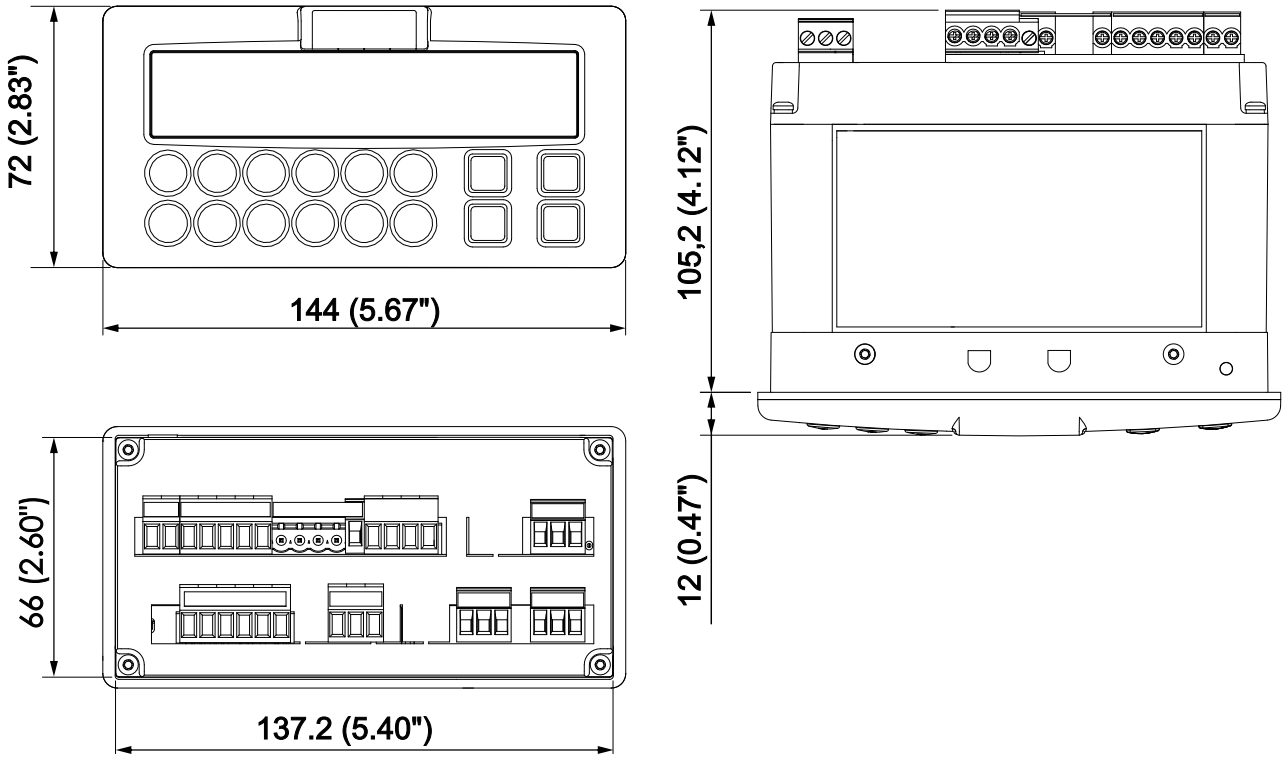


Fig. 10: Dimensions

6.3.2 MOUNTING

Cabinet cut-out

The enclosure must be mounted on a cabinet or panel. Take care to add enough space between two or more controllers. Maximum panel thickness is 6 mm (1/4”).

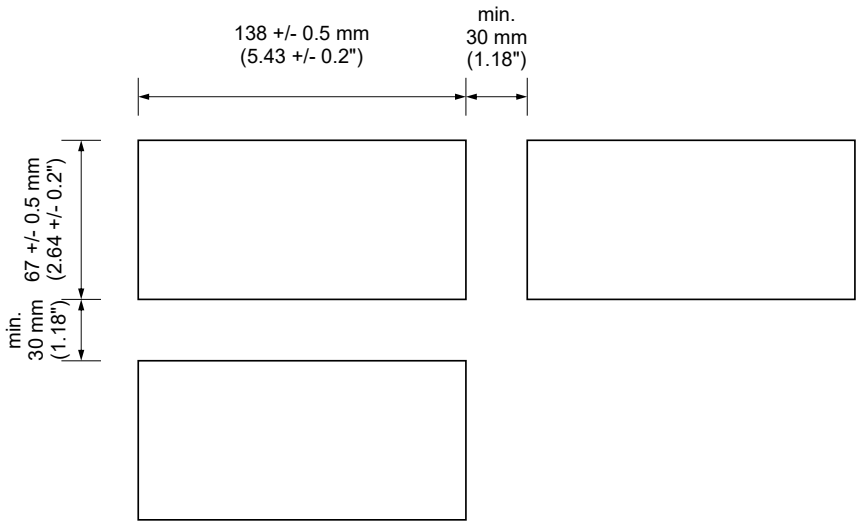


Fig. 11: Cut-out dimensions with required spacing between modules

Mounting

The back side of the N414-P is inserted in the cut-out, until the gasket directly behind the front edge is pushed against the panel. Then, the clamps are installed to secure the controller to the panel.

1. Check that the cut-out opening and surrounding surface of the panel are suitable for the installation (dimensions, flatness).
2. Place the rectangular gasket around the unit and slide it all the way to the front edge.
3. Pre-install the 8 screws in the 4 clamps.
4. Slide the unit, without wires connected, from the front side into the opening through the panel and push it tight against the surface so that the gasket closes properly.
5. Install the top clamp by inserting the two barbs into the D-shaped holes located at the top side of the unit, just behind the backside of the panel. Tighten the screws loosely.
6. Install the bottom and side clamps in the same way.
7. Adjust the unit so that it is installed in the correct position and make sure that the gasket fits snugly against the front edge without any twists or bulges.
8. Torque-tighten the screws in the clamps with 0.5 – 0.7 Nm in the order top – bottom – left – right.

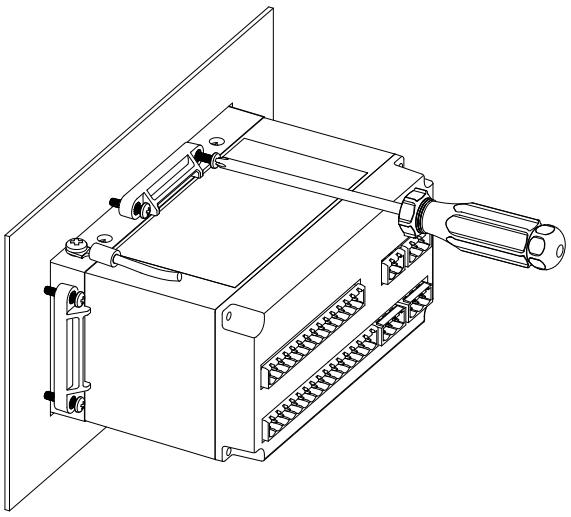


Fig. 12: Securing the unit with the clamps

6.3.3 WEIGHT AND MEASURES SWITCH AND ANTI-TAMPER SEAL

As explained in **Section 3.3: Weights & Measures (W&M) information [»7]** and **Section : Operating modes [»9]**, the N414-P has a mechanically secured tamper proof W&M switch to lock metrologically relevant parameters in the SETUP- menu. When the switch is set to the CONFIGURATION position, it is possible to make changes to these settings.

When programming of the parameters is finished, the W&M switch shall be set to the OPERATION position and the security cap shall be installed and secured with a certified wire and a compression seal.

Installation of the security anti-tamper seal

1. Make sure, setup is correct (see **Section 5.3: SETUP menu overview [»18]**)
2. Set the W&M switch to **Oper**
3. Install the security cap (1) over the W&M switch
4. Install the certified lock-wire (2) as indicated
5. Install the certified security seal (3)

Make sure the seal and wire are installed as tight as possible and lock the compression seal (3) in accordance with applicable (inter)national Rules and Regulations.

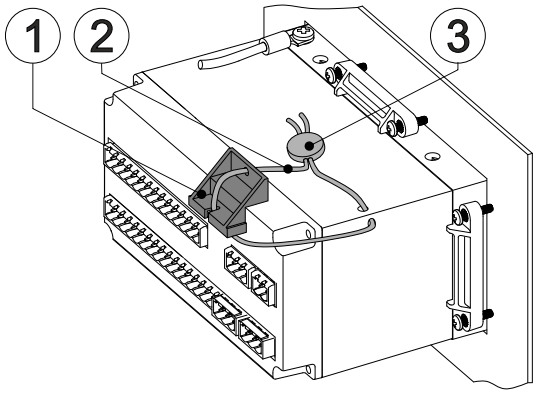


Fig. 13: Sealed security cap installed

6.4 ELECTRICAL INSTALLATION

First consult the table with limiting environmental conditions and safety parameters in **Section 6.1: Installation / environmental conditions [»26]**.

WARNING

HIGH VOLTAGE 230 V, combined with relays up to 400 V
Be sure that all the leads to the terminals are disconnected from the N414-P when the plastic protection cover has been removed.

WARNING

- The installation must comply with (inter)national requirements and local ordinances. Within the United States all field wiring must conform to the National Electrical Code, NFPA 70. Within Canada all field wiring must conform to the Canadian Electrical Code.
- The N414-P must be installed in accordance with EMC guidelines (Electro Magnetic Compatibility)

CAUTION

- Electro static discharge can inflict irreparable damage to electronics! Before installing or opening the product, always first discharge yourself by touching a well-grounded object.

NOTE

Use effective screened cable for input / output signals and provide grounding of its screen to the '⊥' terminal (for isolated signals use the corresponding '-' terminal), or at the external device, whichever is appropriate to the application. Do not create ground loops!

6.4.1 ELECTRICAL SAFETY

General remarks

- In case this instrument is connected to a supply by means of a permanent connection, a switch or circuit-breaker shall be included in the installation. This shall be installed in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment. Furthermore, a protective over-current device with a maximum rating of 0.5 A (e.g. fuse or circuit breaker) must be inserted in the positive supply line.
- The external power supply must be an approved ELV source, insulated form AC mains by double / reinforced insulation per IEC 61010-1. All other inputs and outputs shall at least be reinforced insulated from mains.

6.4.2 PROTECTIVE EARTH (PE) CONNECTIONS

Inside the product, different types of bonding and earthing are used. The common ground is mostly used for termination of the wire shields; the Protective Earth (PE) is used for electrical safety.

CAUTION

Risk of equipment damage

Be very careful when connecting the common ground of the system to Protective Earth (PE).

Connecting the common ground to Protective Earth (PE) (especially when multiple power supplies are connected) can cause ground loop currents that could damage the equipment.

Connecting Protective Earth to a metal enclosure

The N414-P is supplied with a metal front. It must be grounded in accordance with national and local electrical codes.
To ground the unit, a PE conductor must be connected to the front. To connect the conductor, a screw (M4 x 6 mm) with a serrated washer, a terminal and a washer is used (torque: 2 Nm). Two PE connection points are provided, one at the top and one at the bottom of the front. Please use one.

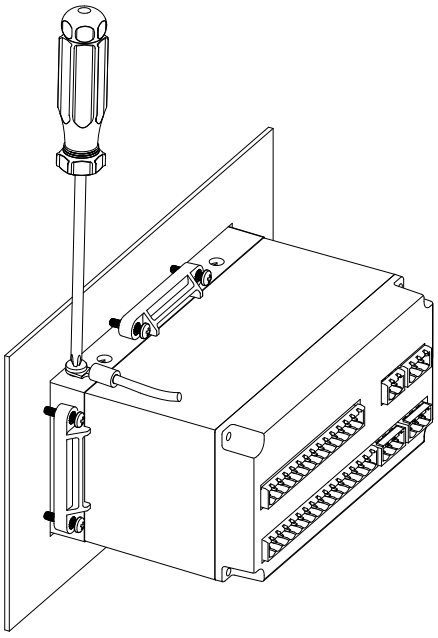


Fig. 14: Protective earth (PE) connection

6.4.3 FIELD WIRING CONNECTIONS

WARNING

- Do ground the aluminum enclosure properly with a PE wire as indicated to the Protective Earth terminal. It is the responsibility of the installer to install, connect and test the Protective Earth connections in accordance with the local and (inter)national Rules and Regulations.
- When a power supply is connected to the field wiring connections, please also consider the demands for power supply wiring shown in **Section 6.4.4: Power supply [»31]**.
- The installation must comply with (inter)national requirements and local ordinances.

All field wiring enters the N414-P from the back side and connects to the circuit assembly though terminal connectors.

The wire screens (shield) are meant to prevent electromagnetic interference and shall be terminated at one side to prevent ground loops. Connection of the screen can either be made to the common ground terminal or at the sensor itself, whichever is appropriate to the application.

Inside of the N414-P, the various common ground terminals are connected to each other. It is advised to terminate the wire screens in the vicinity of the sensor and to insulate the wire screen with a shrink tube at the N414-P side.

6.4.4 POWER SUPPLY

When not directly supplied from mains, the external power supply must be an approved ELV source, insulated from AC mains by double / reinforced insulation per CSA C22.2 No. 61010-1 / UL 61010-1 / EN-IEC 61010-1.

The N414-P may be powered from mains (110 – 230 V AC) or from a DC source (24 V DC, +/- 10%). Maximum power consumption will be 10 W.

6.4.5 SENSOR SUPPLY

Terminal 5: Supply voltage 12 V DC

Terminal 5 provides a sensor supply voltage of 12 V DC with a maximum current of 30 mA.

Terminal 29: Sensor supply 8.2, 12 or 24 V DC

Terminal 29 offers a selectable sensor supply voltage. Selection is done by two micro switches located at the back side of the N414-P. Please note that maximum power consumption is 50 mA @ 24 V DC.

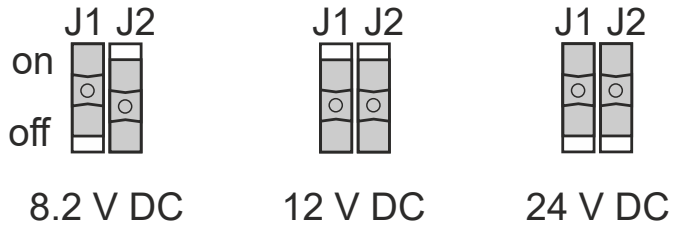


Fig. 15: Jumper positions sensor supply voltage selection

Sensor supply voltage	Jumper setting	
	J1	J2
8.2 V DC	on	off
12 V DC	off	off
24 V DC	on	on

Terminal 31: Reference voltage 1.2 or 3 V DC

Terminal 31 provides a reference voltage for low power sensors: coil or reed switch. For coil sensors, the voltage will be 1.2 V DC; for reed switch devices the voltage will be 3 V DC.

This voltage may not be used to power the sensor electronics, converters etc., as it will not provide adequate sustained power!

6.5 TERMINAL CONNECTORS

The following terminal connectors are available on the N414-P.

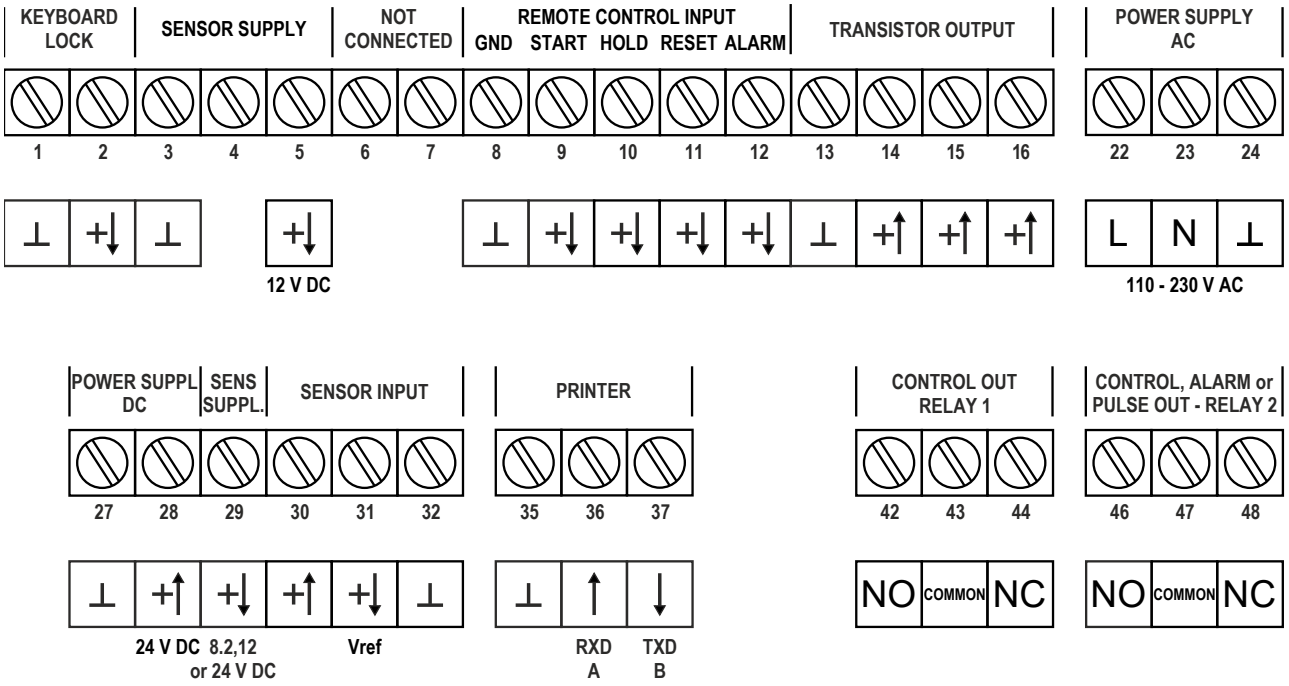


Fig. 16: Overview of terminal connectors

6.5.1 TERMINALS 1-2: KEYBOARD LOCK

When terminal 2 is connected with terminal 1, the keyboard will be locked. External control (via terminals 8 to 12, see **Section 6.5.3: Terminals 8-12: Remote control [»33]**) remains available. Note that certain keys can also be locked through the setup menu (see SETUP **9.7: OTHER > KEYLOCK**).

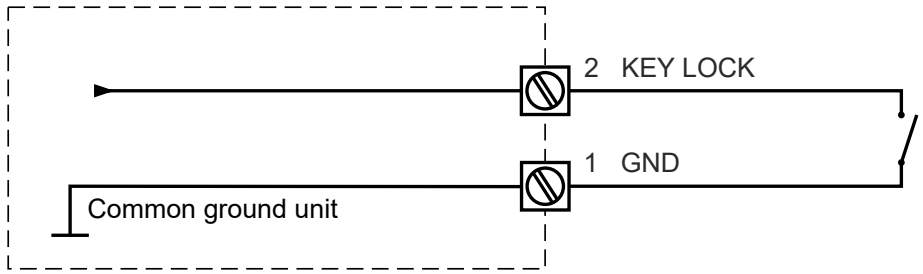


Fig. 17: Terminals 1-2: Keyboard lock

6.5.2 TERMINALS 3-5: SENSOR SUPPLY (12 V DC)

With terminal 5, 12 V DC is available for powering the sensor. Maximum current is 30 mA. Please note that signal output from the sensor should be connected to terminal 30, and that terminal 4 is not in use.

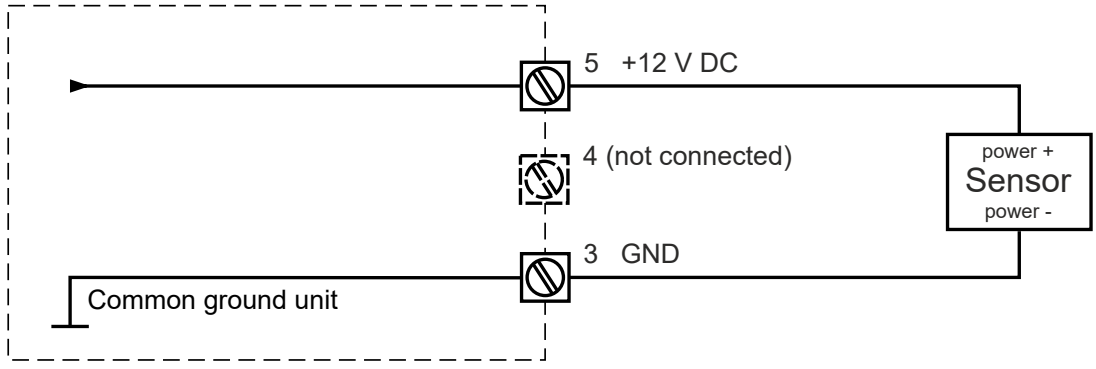


Fig. 18: Terminals 3-5: Sensor power supply

6.5.3 TERMINALS 8-12: REMOTE CONTROL

The batch process of the N414-P can be remotely controlled by applying potential free contacts. When a contact is made, the controller functions as if the equivalent key was pressed. Note that terminals 8-12 remain functional, even when the keys are disabled (see SETUP **9.7: OTHER > KEYLOCK** and **Section 6.5.1: Terminals 1-2: Keyboard lock [»32]**)
Minimum contact time is 100 ms.

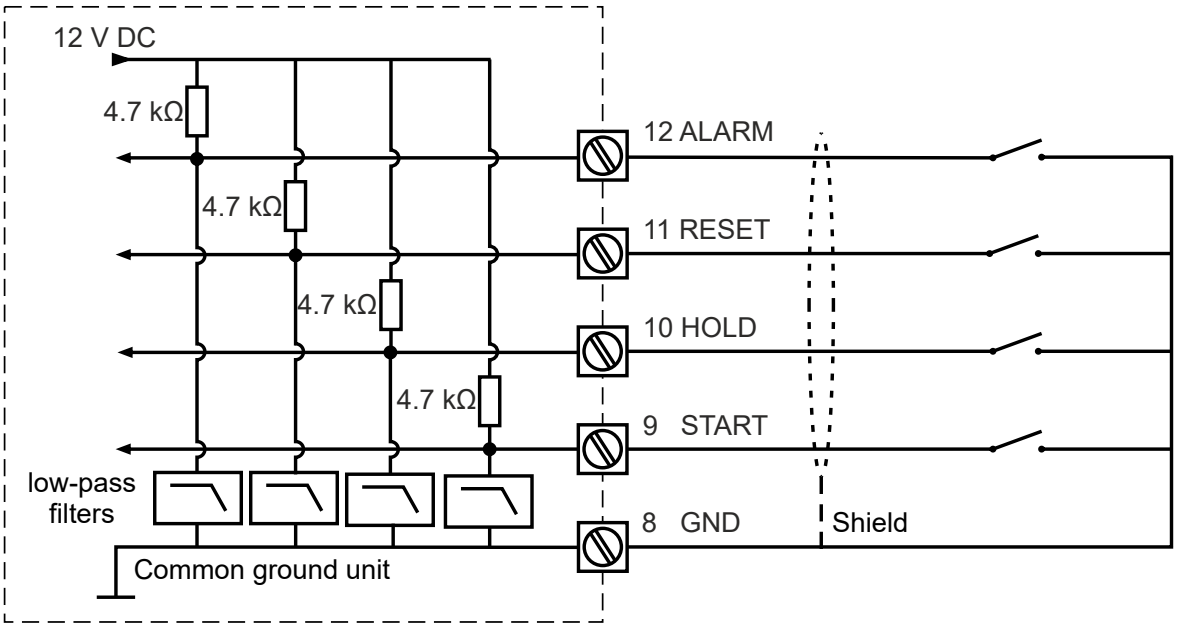


Fig. 19: Terminals 8-12: Remote control

Reset

Terminal 11 (Reset) can also be used to block the batch process. As long as this input is connected to ground (terminal 8) it is not possible to start a batch.

Alarm

When terminal 12 (Alarm) is connected to ground (terminal 8), a running batch will be interrupted immediately, and the process is blocked until the alarm status is reset. Resetting is not possible while terminal 12 remains active.

Resetting the alarm status is done by pressing the RESET key, or by activating terminal 11 (Reset).

6.5.4 TERMINALS 13-16: DIGITAL OUTPUTS

Terminals 14, 15 and 16 connect to three independent transistor outputs. Below, only transistor output 1 is discussed (terminal 14). Output 2 (terminal 15) and output 3 (terminal 16) are equivalent, and managed via SETUP **7.3*: CONTROL > BATCH TRANS 2** and **7.4*: CONTROL > BATCH TRANS 3**, respectively.

Passive transistor output 1

A passive transistor output is available with a maximum driving capacity of 300 mA @ 50 V DC. The functionality of the digital output (batch control, preclose control, alarm output or quantity related pulse output) is set in the configuration menu (SETUP **7.2*: CONTROL > BATCH TRANS 1**).

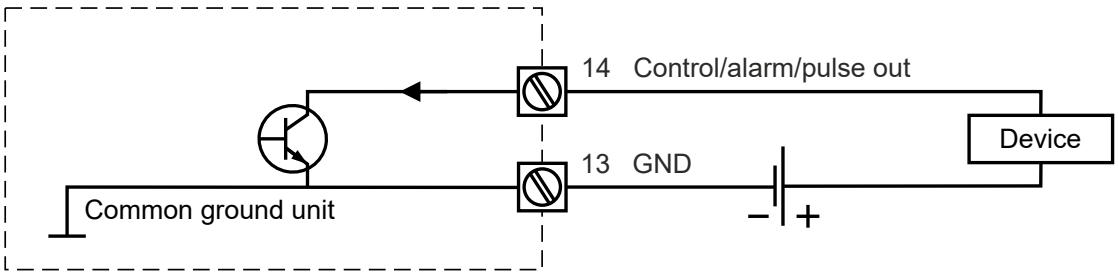


Fig. 20: Terminals 13-14: Passive transistor output

6.5.5 TERMINALS 22-24: POWER SUPPLY (110-230 V AC)

The N414-P may be powered from mains. Connect the L- line (110 – 230 V AC) to terminal 22, and N to 23. Maximum power consumption will be 10 W.

Connect (functional) ground to terminal 24. Please note that all ground terminals are connected inside the N414-P.

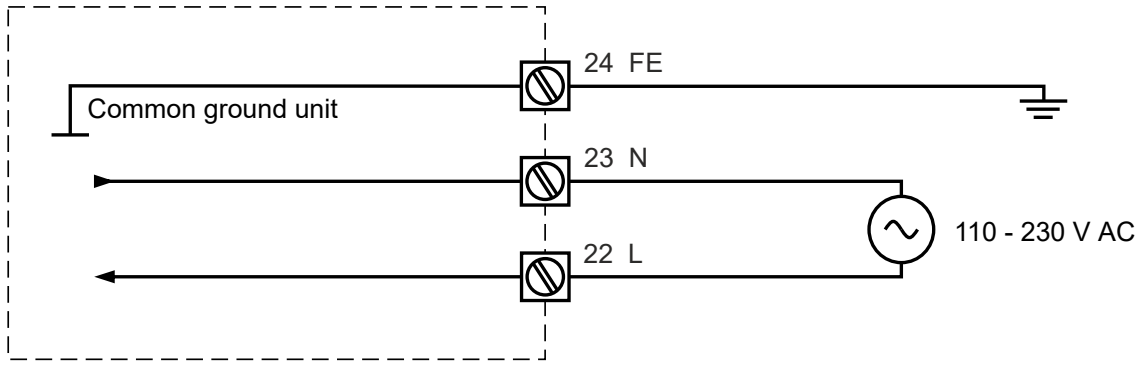


Fig. 21: Terminals 22-24: Mains power supply

6.5.6 TERMINALS 27-28: POWER SUPPLY (24 V DC)

The N414-P may be powered from an external 24 V DC source. Maximum power consumption will be 10 W.

Connect ground to terminal 27 and + to terminal 28. Please note that all ground terminals are connected inside the N414-P.

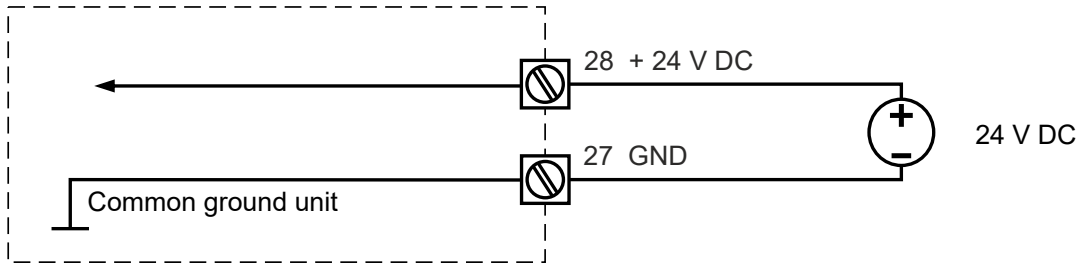


Fig. 22: Terminals 27-28: Power 24 V DC

6.5.7 TERMINAL 29: SENSOR SUPPLY (8.2 - 12 - 24 V DC)

Terminal 29 offers a selectable sensor supply with a maximum power consumption of 50 mA @ 24 V DC. Selection of the voltage is made by setting the three switches at the rear side of the controller (see **Section : Sensor supply [»31]**). Any of the terminals 1, 3, 8, 24, 27, 32 or 35 may be used as ground.

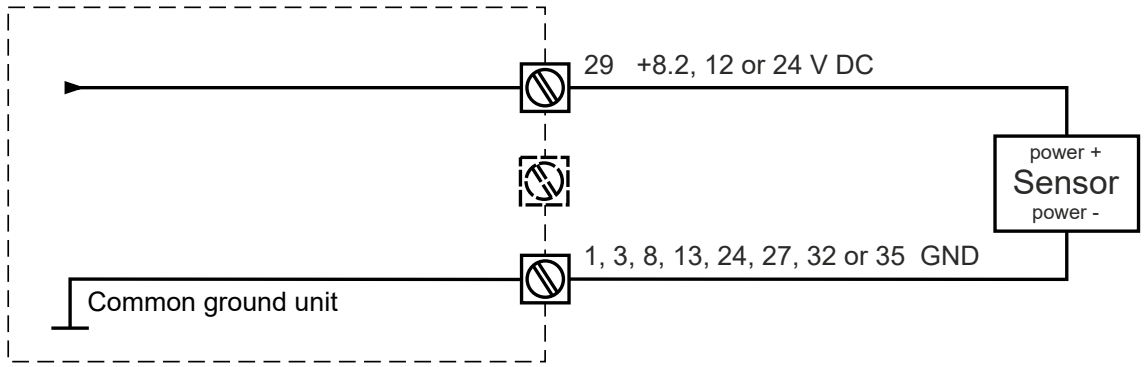


Fig. 23: Terminal 29: Selectable sensor power supply

6.5.8 TERMINALS 30-32: FLOWMETER INPUT

Three basic types of flow meter signals can be connected to the N414-P: pulse, active pulse or coil. The screen of the signal wire can be connected to one of the common ground terminals. The signal input type has to be selected in the setup menu: **6.1*: FLOW METER > SIGNAL**.
The N414-P offers one fixed and one configurable sensor supply, plus a low-power reference voltage. For more info, please read **Section 6.4.5: Sensor supply [»31]**.

Coil

The N414-P can be connected to a flowmeter with a coil output signal (sine wave). With SETUP **6.1*: FLOW METER > SIGNAL** two sensitivity levels can be selected.

- COIL LO: low sensitivity, from about 120 mV p-p
- COIL HI: high sensitivity, from about 20 mV p-p

Terminal 31 offers a low-power 1.2 V DC reference voltage. Please read **Section : Sensor supply [»31]**.

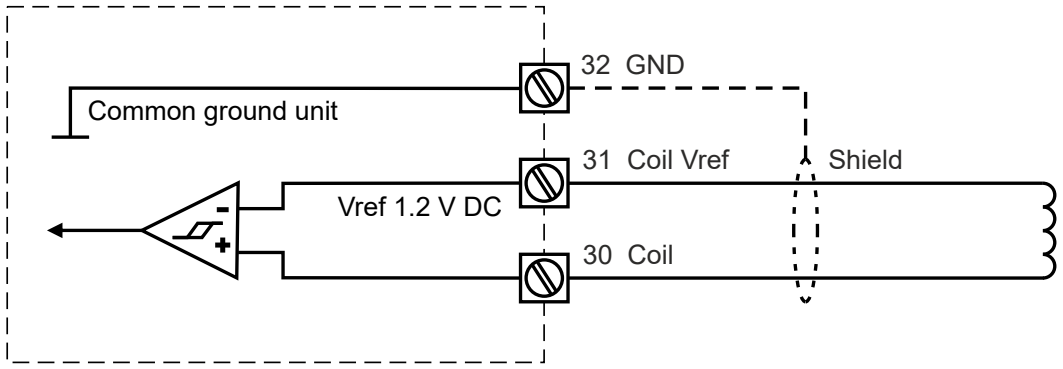


Fig. 24: Terminals 30-32: Coil signal input

Reed

The N414-P can be connected to a flowmeter with a reed output signal. With SETUP **6.1*: FLOW METER > SIGNAL** a low-pass filter can be applied to the signal line.

Terminal 31 offers a low-power 3 V DC voltage. Please read **Section : Sensor supply [»31]**.

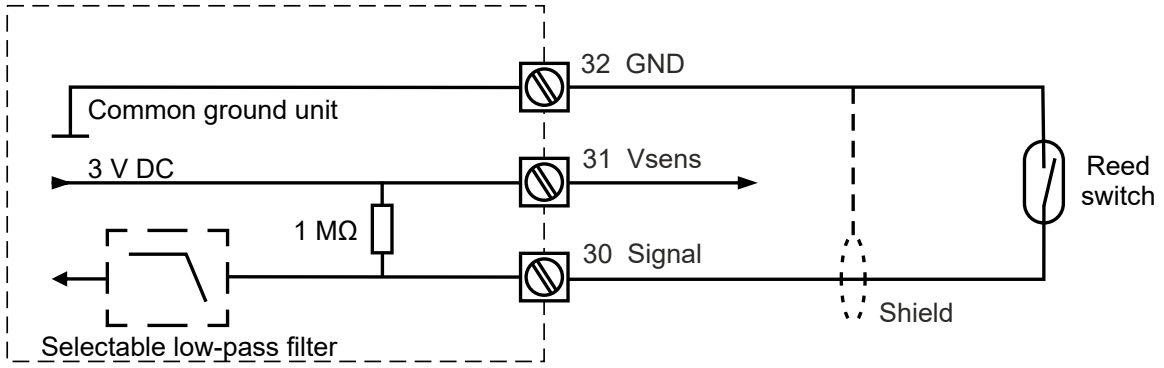


Fig. 25: Terminals 30-32: Reed signal input

Namur

The N414-P is suitable for use with a Namur-type flow meter. The sensor may be powered externally, or via the controller terminals 5 or 29 (**Section 6.4.5: Sensor supply [»31]**).

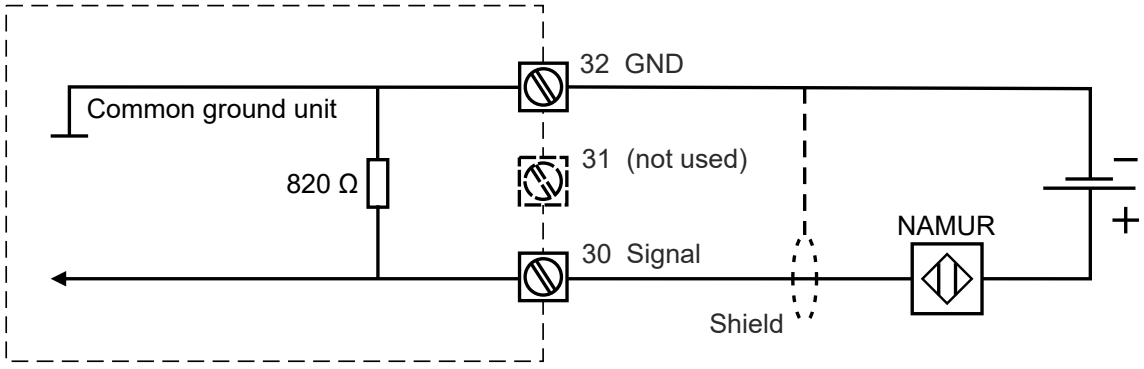


Fig. 26: Terminals 30-32: Namur signal input – example with external sensor supply

NPN

A flow meter with NPN pulse output can be used with the N414-P. For reliable pulse detection, pulse amplitude has to go above 1.2 V.
With setting **6.1*: FLOW METER > SIGNAL** a low-pass filter may be selected with this signal.

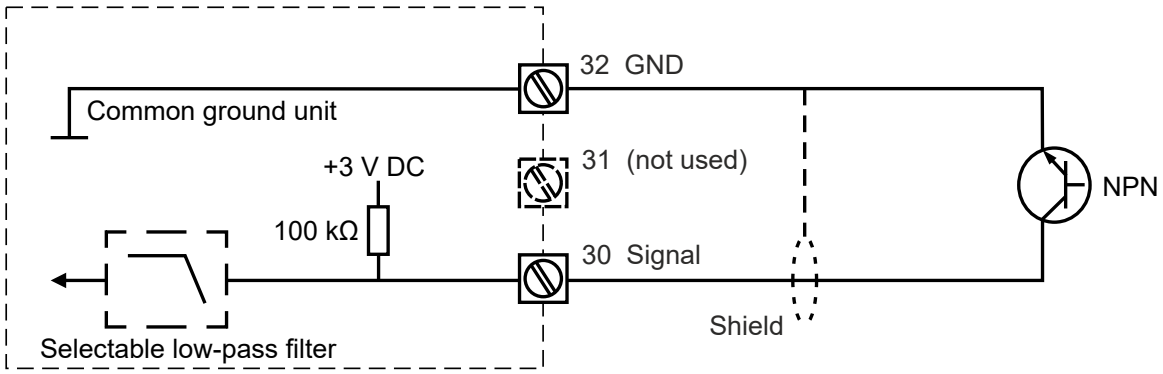


Fig. 27: Terminals 30-32: NPN signal input

Active pulse signal

An active pulse input signal can be connected to the N414-P. The detection level is 50% of the selected supply voltage (see **Section : Sensor supply [»31]**).

The sensor may be powered externally, or via the controller terminals 5 or 29 (**Section 6.4.5: Sensor supply [»31]**).

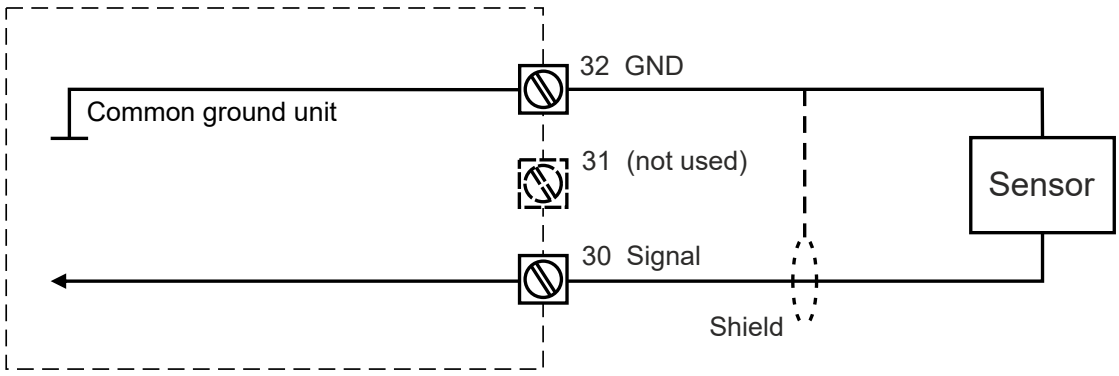


Fig. 28: Terminals 30-32: Active pulse signal input – example with external sensor supply

PNP

A flow meter with PNP pulse output can be used with the N414-P. For reliable pulse detection, pulse amplitude has to go above 1.2 V. Flow meter supply may be provided externally, or from terminals 5 or 29 (see **Section 6.4.5: Sensor supply [»31]**).
With setting **6.1*: FLOW METER > SIGNAL** a low-pass filter may be selected with this signal.

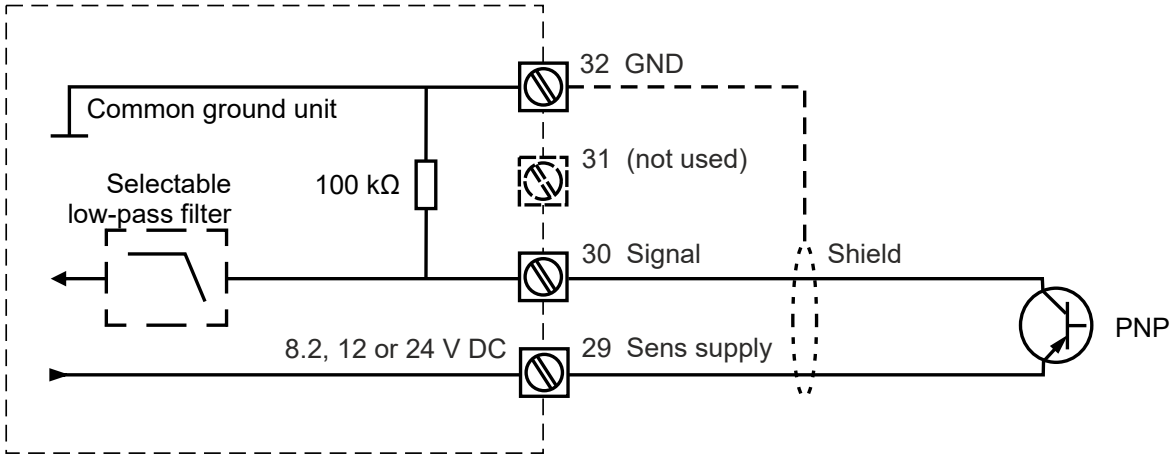


Fig. 29: Terminals 29-32: PNP signal input – example with sensor powered from terminal 29

6.5.9 TERMINALS 35-37: PRINTER

The N414-P Type CB or CH has a communication port for connection to a printer. Depending on the product type, the controller is equipped with an RS232 port (Type CB) or an RS485 port (Type CH). Maximum cable length for RS232 is 15 m (50 ft), for RS484 1200 m (1300 yd).

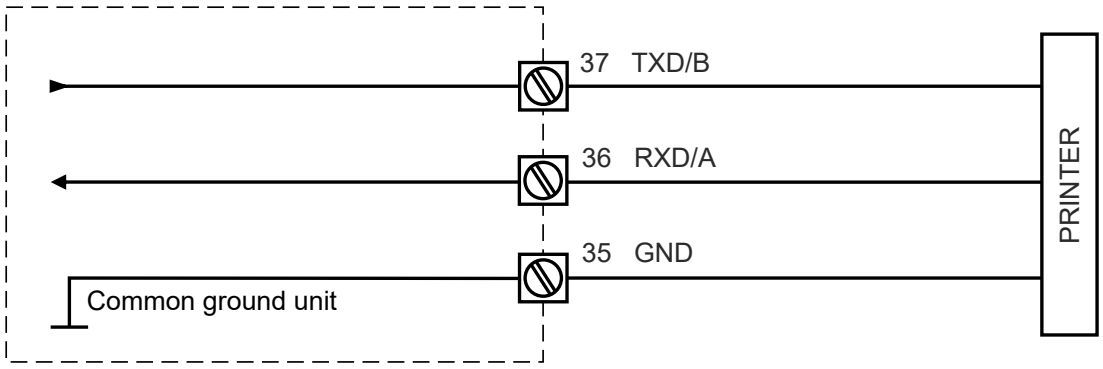


Fig. 30: Terminals 35-37: RS232 or RS485 printer communication port

8 Databits are used. There is no parity bit, and 1 stop bit.

6.5.10 TERMINALS 42-44: CONTROL OUTPUT (R1)

Control output R1 is used for controlling the main batching pump or valve. This output is switched 'on' (connecting terminal 42 with 43, and disconnecting terminal 43 from 44) during the whole batch process (see **Section 4.3.1: Batching [»11]**). Maximum switching capacity is 8 A @ 250 V AC or 30 V DC, and maximum switching power is 2000 VA or 240 W. (Resistive load.)

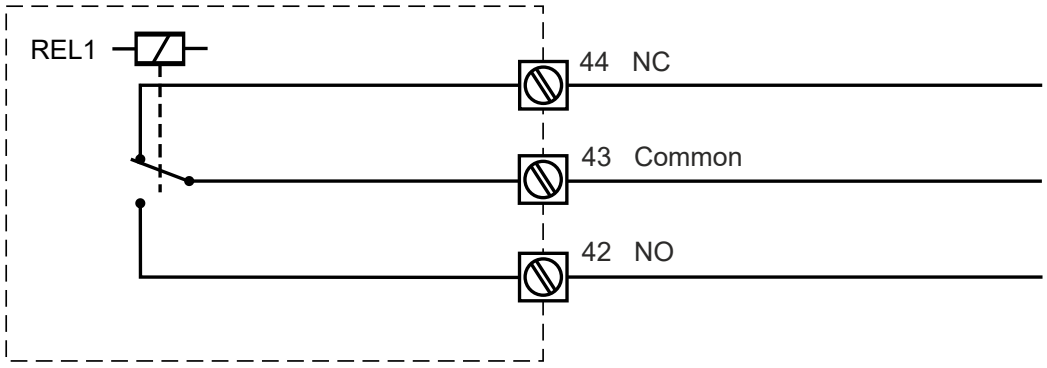


Fig. 31: Terminals 42-44: Main batching control output (R1)

6.5.11 TERMINALS 46-48: CONTROL, ALARM OR PULSE OUTPUT (R2)

The function of output terminals 46 to 48, R2, must be configured in SETUP **7.1*: CONTROL > BATCH RELAY 2**. When activated, terminal 46 is connected to 47, and terminal 48 is disconnected from 47.

Maximum switching capacity is 8 A @ 250 V AC or 30 V DC. Maximum switching power is 2000 VA or 240 W. (Resistive load.)

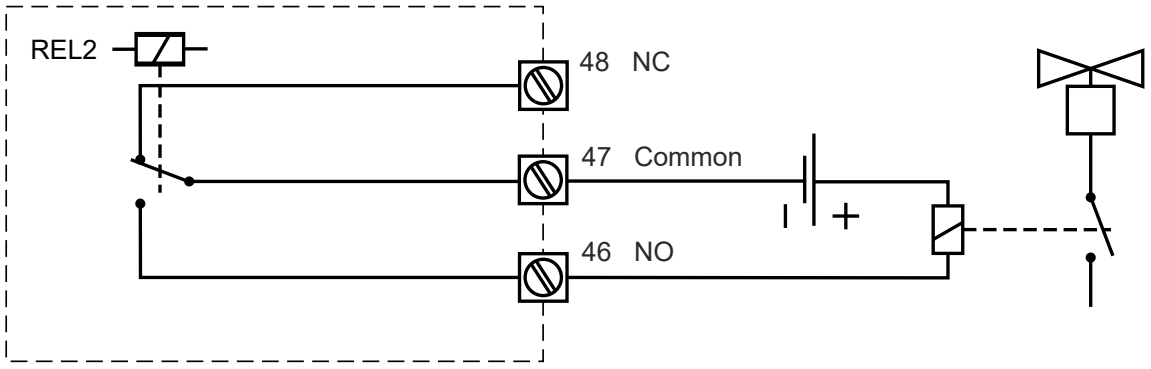


Fig. 32: Terminals 46-48: Output R2 - example activating external valve

7 MAINTENANCE

7.1 GENERAL DIRECTIONS

CAUTION

- 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.
- The N414-P 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 **Section 2: Safety [»5]**.

The N414-P 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 N414-P in such a way that no condensation will occur, for example by placing a dry silica gel sachet in the casing. For further instructions, please refer to the information which came with your silica gel sachet.

Check periodically

- Condition of casing, cable glands and front panel
- Input/output wiring: reliability and aging
- Process accuracy: because of wear and tear, re-calibration might be indicated

Clean the casing with soapy water. Do not use any aggressive solvents.

7.2 INSTRUCTIONS FOR REPAIR

NOTE

Following repair actions require the breaking of the W&M- seal.

The following parts may be replaced with equivalent certified components.

Heavy-duty mechanical relays Make/type: Panasonic DK1A1B-24V (Newark ordering number 92T1080).

Fuse Located on the PCB above the supply connectors. Make/type: Littelfuse 37211250411 (Newark ordering number 02P0257).

Real-time clock primary battery. Located on the interface board. Make/type: Energizer BR1225. (Newark ordering number 42M1340).

Repair policy

If you have any problem with your product and wish to have it repaired, please follow this procedure:

1. Obtain a Return Material Authorization (RMA) from your supplier or distributor. Together with the RMA, you need to complete a repair form to submit detailed information about the problem.
2. Send the product, within 30 days after authorization was obtained, to the address provided with the RMA. The RMA number must be indicated on the documents accompanying your physical return.

If the product falls under the warranty conditions, the product will be repaired or exchanged and returned within three weeks. Otherwise, you will receive a repair cost estimate.

APPENDIX A - TECHNICAL SPECIFICATION

A.1 GENERAL

DISPLAY	
Type	High intensity reflective numeric and alphanumeric LCD with adjustable backlight, UV-resistant.
Digits	7 with height 14 mm (0.56") and 10 with height 8 mm (0.3"). Various symbols and measuring units.
Dimensions	22 x 116 mm (0.87" x 4.57")
Refresh rate	8 times / second

ENCLOSURE	
Material	Die-cast aluminum front panel with polycarbonate window, Glass Reinforced Plastic (GRP) back enclosure. Silicone gasket. UV stabilized and flame retardant material.
Control keys	Industrial type microswitches. UV resistant polyester keypad.
Note	*The front panel may be replaced.*
Coating	UV-resistant 2-component industrial coating.
Dimensions	144 x 72 x 110 mm (5.67" x 2.83" x 4.33") (W x H x D)
Rating	IP67, NEMA type 4X at front side. IP20 at back side.
Weight	650 g / 1.7 lbs
Note	*Maximum panel thickness 6 mm (1/4")*

ENVIRONMENT	
Operating temp.	-20°C to +60°C (-4°F to +140°F)
Storage temp.	-40°C to +80°C (-40°F to +176°F)
Relative humidity	85% non-condensing

POWER	
External power supply	AC: 110 – 230 V DC: 24 V +/- 10%
Power consumption	Max 10 W

SENSOR EXCITATION		
Sensor excitation voltage	Terminal 5: Terminal 29: Terminal 31:	12 V DC 8.2, 12 or 24 V DC 1.2 V DC (coil pick-up) or 3.0 V DC (pulse signal reference)
Sensor excitation max current	Terminal 5: Terminal 29: Terminal 31:	I_{max} 30 mA I_{max} 20 mA @ 8.2 V DC I_{max} 30 mA @ 12 V DC I_{max} 75 mA @ 24 V DC I_{max} 0.1 mA
Note	*Sensor excitation from terminal 31 is only suitable for sensors with very low power consumption like coils (sine wave) and reed switches.*	

TERMINAL CONNECTIONS	
Type	Removable plug-in terminal strip. Wire max 2.5 mm^2

DATA PROTECTION	
Type	EEPROM backup of all settings. Backup of running totals every minute and at power-down. Data retention at least 10 years.
Key lock	Keypad or selected control keys can be locked by configuration settings or by external, wired input.
Password	Configuration settings can be password protected.

DIRECTIVES AND STANDARDS		
LVD	EN 61010-1	
EMC	EN 61000-6-2 EN 61326-1	EN 61000-6-3 FCC 47 CFR part 15
RoHS	EN 50581	EN IEC 63000
IP & TYPE	EN 60529	NEMA 250
Weights & Measures	NIST Handbook 44, NTEP Publication 14	
Note	*See the applicable Declaration of Conformity for specific revisions and publication dates of applicable standards.*	

A.2 INPUT

FLOWMETER	
Signal type	Coil / sine wave (sensitivity selectable: hi 20 mVpp, lo 120 mVpp), NPN / PNP (with or without low-pass filter), active pulse, reed switch, NAMUR.
Frequency	Max. 5 kHz, but depends on signal type and use of internal low-pass filter. For example, reed switch input with low-pass active: f_{max} = 120 Hz
K-factor	0.000010 - 9999999 with variable decimal position

CONTROL INPUTS	
Function	Five remote control inputs are available. Process control functions: START, HOLD, RESET Other functions: external alarm, keypad lock.
Type	Current sinking
Logic	Level sensitive
Low level	0 V DC to 3 V DC
High level	8 V DC to 24 V DC
Impedance	4.7 kΩ pull up to 12 V DC
Current	2.5 mA steady state
Response	100 ms make and break time

A.3 OUTPUT

CONTROL OUTPUT	
Function	One mechanical relay reserved for batch control Second mechanical relay plus three transistor outputs, independently configurable for batch control, two-stage batch control, alarm, or scaled pulse output.
Scaled pulse output	Max frequency 500 Hz. Pulse width user definable from 1 ms to 10 sec.
Mechanical relays	Isolated electro-mechanical relays (NO-NC), field replaceable. Max. switching capacity 8 A @ 250 V AC / 30 V DC (resistive load).
Transistor	Passive transistor output, not isolated. Max. load 50 V DC @ 300 mA

PRINTING		
Function	Send receipt print data referring to batch to external printer.	
Type	Type CB Type CH Type CX	Modbus ASCII – RS232 Modbus ASCII – RS485 (2-wire) No communication
Speed	Baud rates: 1200, 2400, 4800, 9600, 9600hp, 19200, 38400	
Parity	None	
Databits	8 databits	
Stopbits	1 bit	

A.4 OPERATIONAL

OPERATOR FUNCTIONS	
Process management	• Enter preset value • Start, interrupt and stop batch process
Displayed information	• Preset value • Actual batched quantity or remaining quantity • Total • Accumulated total • Flowrate • Batch counter • Graphical indication of batching process
Additional functions	• Print receipt ticket • Reset total to zero • Reset batch counter to zero • Active overrun correction • Manage minimum and maximum preset levels • No-flow monitoring

(ACCUMULATED) TOTAL, PRESET	
Digits	Preset and Total: 7 digits. Accumulated Total: 10 digits.
Units	L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb
Decimals	0 - 3

FLOW RATE	
Digits	7 digits
Units	L - m3 - USGAL - IGAL - ft3 - bbl - kg - ton - US ton - lb
Unit divisor	sec - min - hour - day
Decimals	0 - 3

BATCH COUNTER	
Digits	10 digits.

APPENDIX B - TROUBLESHOOTING

Table 1 lists and describes how to troubleshoot problems that can occur when installing or operating the N414-P.

Table 2 lists internal alarm codes and conditions signaled by a blinking ALARM flag on the display (ALARM). Press the “1” key several times to display the 4-digit error code shown in Table 2.

Observation	Possible cause	Check
Batched quantity counting too low, too fast or not at all	Wrong signal selection in SETUP menu	**6.1*: FLOW METER > SIGNAL**
	Unit not matching process	**1.1*: PRESET > UNIT** **6.2*: FLOW METER > UNIT**
	K-factor setting wrong	**6.3*: FLOW METER > K-FACTOR**
	Sensor power supply not sufficient	**Section 6.4.5: Sensor supply [»31]**
	Electrical connections wrong	**Section 6.5: Terminal connectors [»32]**
	Ground loops	Wiring of ground and screening
	Sensor not working properly	Sensor
Batching doesn’t stop when complete	Overrun time too long	**2.2*: OVERRUN > TIME**
SETUP- mode unavailable	Password setting	Enter correct password
	Password unknown	Call your supplier
Keys don’t respond	Keyboard externally locked	**Section 6.5.1: Terminals 1-2: Keyboard lock [»32]** **Section 6.5.3: Terminals 8-12: Remote control [»33]**
	Keyboard locked by setting	**9.7: OTHER > KEYLOCK**

Table 2: Internal alarms

Alarm	Explanation
0001	Display error
0002	Data storage error
0004	Initialization error
0008	Interface error 1
0016	Interface error 2
0032	Configuration error

When multiple alarms occur, the error code shown is the sum of the error codes as given below. For example 0003 is a combination of error code 0001 and 0002.

An ALARM condition will in most cases be handled internally. If all programmed and measured values appear to be correct, intervention by the Operator is not necessary.
If an ALARM occurs more often or stays active for a longer period, please contact your supplier.

APPENDIX C - LEGAL INFORMATION

C.1 DECLARATION OF CONFORMITY

EU Declaration of Conformity

Fluidwell N–Series indicators

Veghel, May 2024

We, Fluidwell BV, declare under our sole responsibility that the N–Series indicators are designed and will operate conform the following applicable European Directives and Harmonised Standards, when installed and operated according to the related manuals:

EMC Directive	2014/30/EU	EN 61000–6–2:2005; EN 61000–6–3:2007+A1:2011; EN 61326–1:2013
RoHS Directive	2011/65/EU (incl. current amendments)	EN 50581:2012 EN IEC 63000:2018
Low Voltage Directive	2014/35/EU	EN 61010–1:2010 +A1:201

Last two digits of the year in which the CE marking was affixed: 14.

I. Meij, Manager Technology

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Fluidwell BV is ISO9001 certified by DEKRA Certification BV, Meander 1051, 6825 MJ, Arnhem, The Netherlands.

LIST OF CONFIGURATION SETTINGS				
SETTING		DEFAULT	DATE:	DATE:
1	**PRESET**			
1.1*	UNIT	L		
1.2*	DECIMALS	0		
1.3*	MINIMUM	0		
1.4*	MAXIMUM	0		
1.5	PRESET	0		
2	**OVERRUN**			
2.1*	OVERRUN	disable		
2.2*	TIME	1		
2.3*	SETTLE	0.0		
3	**FLOWRATE**			
3.1	UNIT	L		
3.2	TIME	min		
3.3	DECIMALS	0		
3.4	CALCULATION	10		
3.5	CUT-OFF	30.0		
4	**ALARM**			
4.1	NO-FLOW	disable		
4.2	FLOWRATE TIME	10		
5	**DISPLAY**			
5.1	DISPLAY	increase		
5.2	TANK	enable		
5.3	LIGHT	100%		
5.4	DIMMER	100%		
6	**FLOW METER**			
6.1*	SIGNAL	coil lo		
6.2*	UNIT	L		
6.3*	K-FACTOR	1		
7	**CONTROL**			
7.1*	BATCH RELAY 2	Batch		
7.2*	BATCH TRANS 1	Batch		
7.3*	BATCH TRANS 2	Batch		
7.4*	BATCH TRANS 3	Batch		
7.5*	PREOPEN	0		
7.6*	PRECLOSE	0		
7.7	WIDTH	0.000		
7.8	AMOUNT	1000		
7.9	PULSE	Acc. Total		

8	**PRINTER**			
8.1	PRINT	auto		
8.2	HEADER1			
8.3	HEADER2			
8.4	HEADER3			
8.5	HEADER4			
8.6	LINETERMINATION	CR/LF		
8.7	STARTROW	2		
8.8	ENDROW	4		
8.9	FORMFEED	disable		
8.A	DATEFORMAT	Y.M.D		
8.B	TOTAL	print		
8.C	SPEED	9600		
9	**OTHER**			
9.1	MODEL	N414-P		
9.2	SOFTWARE VERSION	03.06.xx		
9.3	SERIAL NUMBER	xxxxxxx		
9.4	TIME	00:00:00		
9.5	DATE	01.01.01		
9.6	PASSWORD	0000		
9.7	KEYLOCK	off		
9.8	TAG-NR	0		

NOTES

Your success counts

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