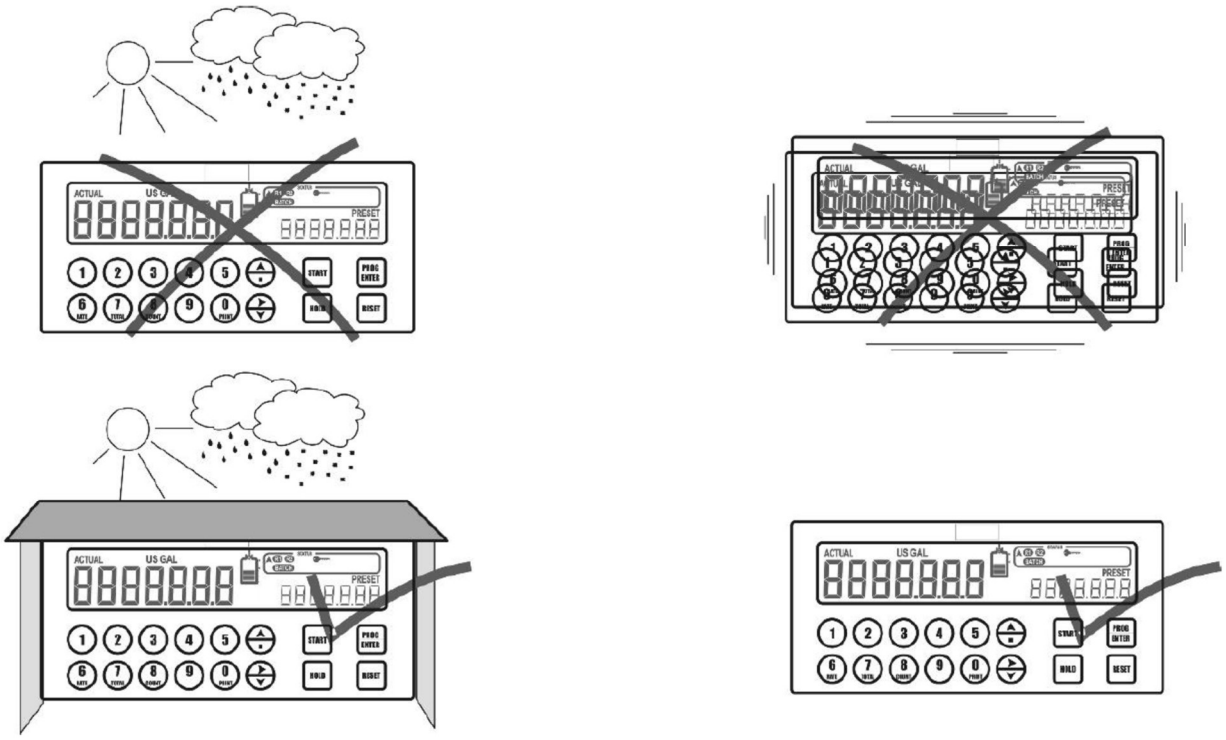
ICS PRESET OPERATING INSTRUCTIONS

FEATURING FLUIDWELL N414-P BATCH CONTROLLER

(For Software Version 03.06.01)

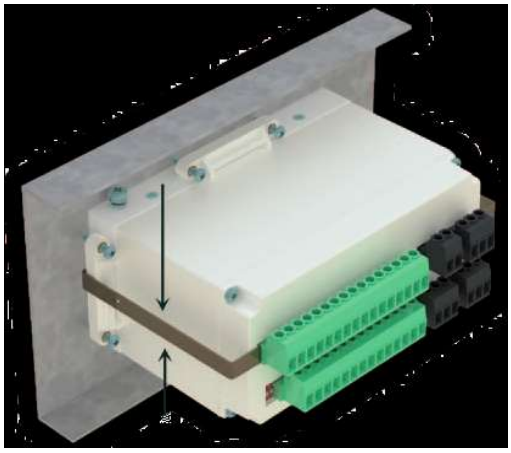
This manual provides instructions for basic operation, set-up and trouble-shooting of ICS PRESET control panels including the PRESET-1, PRESET-2 and PRESET-8. It is intended to be used in conjunction with the Fluidwell N414-P Instruction Manual and not as a replacement. The user should be familiar with both documents.

Installation/Surrounding Conditions

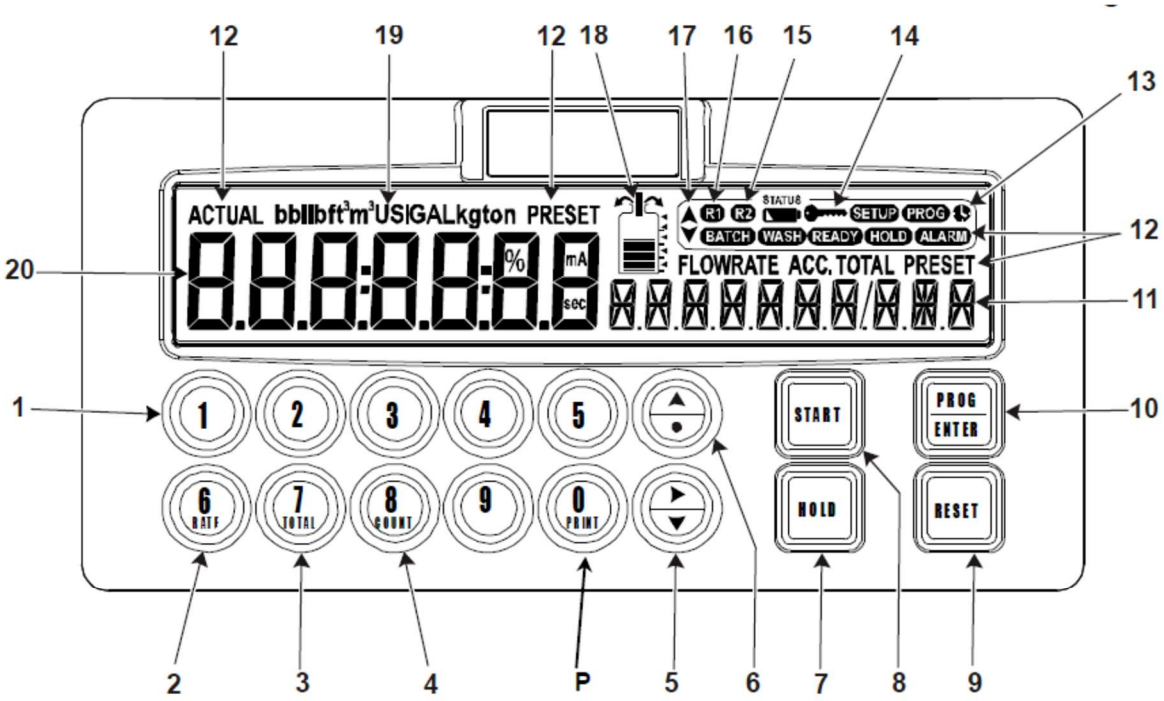


Take the relevant IP classification of the enclosure into account (see manufacturer's plate). The unit is in a Type 4X (IP67) enclosure, but it should not be exposed to unnecessarily harsh weather conditions.
When used in extreme cold surroundings or varying climatic conditions, take the necessary precautions against moisture by placing a dry sachet of silica gel, or another desiccant inside the control cabinet.

Mount the unit on a solid structure to avoid vibrations. Shock proof stainless steel mounting brackets are available as an option for applications where vibration is likely (e.g. truck mounted).



Display Information



1. Numeric keys
2. Rate key
3. Total key
4. Count key
5. Function select/digit delete key
6. Function select/period set key
7. Interrupt key
8. Start/Resume key
9. Reset key
10. Program/confirm key
11. 8 mm value display
12. Status indicators
13. Overrun/Preopen busy indicator*
14. Key lock indicator
15. Relay2 indicator
16. Relay1 indicator
17. Increase/decrease indicator
18. Tank fill/spill indicator
19. Unit indicator
20. 14mm value display

P Print key

*

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

Quick Loadout Operating Instructions

1. **Move control switches to correct positions.**

2. **Enter desired PRESET value.**

   To change the preset value, follow this procedure:
   1. Press and release PROG. The word *PRESET* will begin flashing.
   2. Use the numerical keypad 0-9 and decimal position to enter the desired value.
   3. Save the new preset value by pressing ENTER.

3. **Press green START button.** (Not start key on keypad.)

   The batch totalizer will reset to zero (0), and the status indicator will change to *BATCH.* Automated valves will open, and the pump will start (subject to time delay settings).

   If uninterrupted, the batch will continue until the preset value has been reached. If flow is stopped before the preset value is reached, press the RESET key until the batch is ended, and the status indicator changes to *READY.*

4. **Print delivery ticket.**

Standard Batching Operation

Enter Batch Quantity

To change the preset value, follow this procedure:

4. Press and release PROG. The word *PRESET* will begin flashing.
5. Use the numerical keypad 0-9 and decimal position to enter the desired value.
6. Save the new preset value by pressing ENTER.

When a value has been changed but ENTER has not been pressed, the change can be cancelled by pressing RESET. The former value will be reinstated. The preset value can be used time after time until a new value has been entered and saved.

Note: Changes will only be set after ENTER has been pressed.

Start Batch (A batch can only be started when *READY* status is displayed.)

Press the START button on the panel door. *The batch cannot be started with the start key on the N414-P keypad.* The button lights up, and the totalizer resets to "0". The status indicator changes to *BATCH*. Arrows indicate whether the *ACTUAL* total will count up or down. Depending on setup, relays will turn on pump and valve outputs. Relay R1 is displayed when the batch process is active. When relay R2 is displayed, the START button is deactivated.

When the preset quantity is reached, the batch outputs turn off and the batch process ends. Meter pulses will continue to be counted until flow stops. Counts will be included in ticket totals until *SETTLE* time expires. (See Programmable Features below for further explanation.) If the *PRECLOSE* function is used, the pump and valve outputs turn off when the preclose quantity is reached, but the batch process continues until the preset value is reached. If flow stops before the preset value is reached, the batch remains on *HOLD* indefinitely. It cannot be restarted. Press the RESET key to end the batch.

Interrupt/End Incomplete Batch

Press the red STOP button on the panel door to interrupt or pause the batch. *HOLD* (flashing) is displayed on the screen. *The hold button on the N413-P keypad will not pause or end the batch.*

Press the START button on the panel door to resume the batch, or press and release RESET on the keypad to end the batch. It is now treated as a completed batch, and the remaining quantity is ignored. You can now print a receipt or start another batch. *It is not possible to print a receipt for an incomplete batch.*

Print

If prompted to *PRINT RECEIPT* when a batch has ended, press PRINT (0 key) to print, or press RESET to continue without printing. If not prompted, you can still print a receipt by pressing the PRINT key twice. Duplicate receipts can be printed until the total has been reset or a new batch is started. (See Programmable Features below for further explanation.)

Repeat

To repeat a batch of the same size, just press the START button. The batch total displayed on the screen will automatically reset to "0". To enter a new batch size, see **Enter Batch Quantity** above. To reset the batch total to "0" without starting a new batch, press RESET for three (3) seconds.

Information Available on Request

- **Display Flowrate**

During batching, the actual flowrate will be displayed after pressing the RATE key. To return to the main display: press RATE again or wait for 20 seconds.

- **Display Total and Accumulated Total**

When the Total (7 key) is pressed once, the RESETTABLE TOTAL will be displayed. After pressing this key again, the ACCUMULATED TOTAL will be displayed.
The ACCUMULATED TOTAL cannot be reset. The value will count up to 9,999,999,999. The measurement unit and the number of decimals are displayed according to the configuration settings for preset. To return to the main display: press TOTAL again or wait for 20 seconds.

- **Clear Total**

TOTAL can only be reset if no batch process is active (status: READY). This function might not be available due to configuration settings. The value for TOTAL can be re-initialized. To do so, select Total (7 key) and press RESET. *PUSH RESET* (flashing) will be displayed. To avoid a reset at this stage, press a key other than RESET or wait for 20 seconds. If RESET is pressed again, TOTAL will be reset to zero. The reset of TOTAL does not influence the ACCUMULATED TOTAL.

Manual Switches

Depending on which model of ICS PRESET you have, your panel will have some or all of the following control switches. For help with any controls not covered in this manual call Murray Equipment.

START – Starts/resumes batch operations. Will be lighted (green) when energized, and *BATCH* is displayed on the screen. The start button must be active for the pump and valve switches to work. *(AIR PURGE is not part of the batching operation; it is the only control that will work when the start button is de-energized.)*

STOP – Pauses batching operations. *HOLD* (flashing) is displayed. The pump will stop and all actuated valves will close. *Pausing the batch does not end the batch*. Press the RESET key to end the batch when in hold mode.

PUMP OFF/ON – In the OFF position, prevents the pump motor from running. In the ON position, the pump motor will operate normally according to settings. Can be switched in either direction while a batch is in progress.

VALVE OFF/ON (or LO VALVE OFF/ON) – Controls the operation of the main loadout or meter valve, typically the first valve installed downstream of the flowmeter. In the OFF position, the valve will close (or remain closed). In the ON position, the valve will operate normally. ***Warning: Never turn this valve off while the pump is running. Serious damage can occur to plumbing and equipment.***

REC/LO OFF/LO ON – Controls both the loadout/meter valve and the product valves in PRESET-2, -3 AND -8. Push START button to engage.

- **REC** – All automated valves remain closed. Pump(s) will run.
- **LO OFF** – Loadout/meter valve remains closed. Power is sent to product selection switch to enable product/manifold valves. Pump(s) will run.
- **LO ON** – Loadout/meter valve opens. Rotary switch is enabled. Pump(s) will run.

PRODUCT SELECTION SWITCH – Enables one product or manifold valve at a time during batching operation. (In position "0" on 8-position rotary switch, no product/manifold valves will open.

AIR PURGE – Push and hold to open an actuated air purge control valve. Release to close the valve.

ICS PRESET Features

Some of the important features of the ICS PRESET Series of control panels are briefly discussed below. For more programmable features and the default settings see Setup Functions on pages 5 – 6 below. For a complete list of programmable features of the N414-P refer to the Fluidwell N414-P Instruction Manual.

PUMP DELAY – To minimize hydraulic hammering, a timer relay delays the start of the pump motor until the valves open and flow begins. The timer is installed on the back plate and is adjusted by turning the red dials to the desired delay. The numbers on the larger dial represent tenths of the time span indicated on the smaller dial. *Ex. The small dial is set to 10s (ten seconds), the larger dial is set to 4. The delay is therefore four tenths (4/10) of ten seconds, or 4 seconds.*

OVERRUN TIMER (SETTLE) – Meter pulses continue to be logged for a time after the end of a batch to ensure all pulses are included in ticket totals. (See Setup **Function 2.3**). The display will continue to count pulses independent of settle time.

NO FLOW ALARM – The N414-P offers a no-flow monitoring feature: if the flowmeter fails to generate a signal over a certain period of time, the unit will shut-off the control output(s) and bring the batch controller to hold and alarm mode: an alarm message will be displayed, indicating the type of alarm: *NO FLOW.* (See Setup **Function 4.1, 4.2**.)

To clear the alarm press RESET once; the batch controller remains in HOLD mode. When in HOLD mode, the batch can be continued (Press the START button) or terminated (Press the RESET key).

DISPLAY – Program the N414-P to count up or down; set the brightness of the backlight; automatically dim or turn off the backlight after 5 minutes of inactivity. (See Setup **Function Group 5**.)

PRECLOSE (PRESTOP, PRE-ACT) – Pump and valve outputs are turned off before the end of the batch to compensate for flow overrun. (See Setup **Function 7.6**.)

PRINTING – The ICS PRESET can print to a serial printer such as the EPSON 295 TMU. Automatically print a receipt at the end of a batch or choose when to print. Ticket header, date format, unit ID and printed totals can be defined. (See Setup **Function Group 8**.)

Weight & Measurements (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 and Measures (W&M) switch

The N414-P has a mechanically secured, tamper-proof W&M switch to lock (by hardware) the setup menu for editing of the parameters. When the security cap is installed and safe-tied by a certified lock-wire and a 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 the compression seal are not included in the scope of delivery and shall be provided and installed in accordance with the manufacturer's instructions and the (inter)national Standards and Regulations.

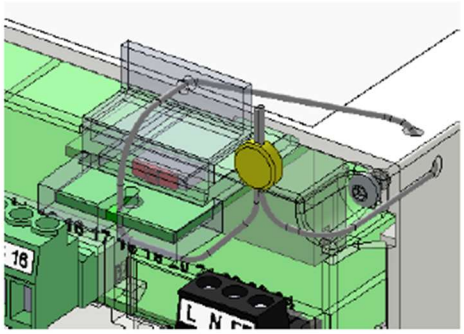


Fig. 5: W&M switch and seal

W&M switch positions

Oper. : When the W&M switch is set to the operation position, it is not possible to change the settings. You can only review the settings.

Cnfig. : When the W&M switch is set to the configuration (programming) position, it is possible to change and review the settings.

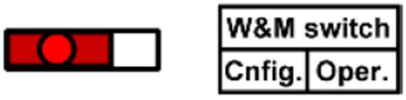


Fig. 6: W&M Config./Oper. selection

A locked setup menu is indicated by the *LOCKED* (key) symbol if you try to change a setting.

Enter SETUP Level

Set the W&M switch to "Config". Press the PROG/ENTER key for 7 seconds to enter the SETUP level, at which time both arrows will be displayed. To return to the operator level, PROG must be pressed for three seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit SETUP automatically.

SETUP can only be reached if the N414-P is in "READY" mode. During SETUP, the batch controller cannot be used for batching! A password may be required to enter SETUP. Without this password, access to SETUP is denied.

Scroll through the SETUP level

SETUP is divided into several function groups and functions. Each function has a unique number. 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.

The functions can be selected with these arrow keys. After selecting a sub-function, the next main function is selected by scrolling through all sub-functions (e.g. 1. ▲, 1.1▲, 1.2▲, 1.3▲, 1.4▲, 1. ►, 2. ►, 3. ▲, 3.1 etc.).

Change or Select a Value

After PROG has been pressed:
- To change a value, use the numerical keypad.
- 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. Press and release ENTER to save your changes.

When data is altered but ENTER is not pressed, then the change can still be cancelled by waiting for 20 seconds or by pressing ENTER for three seconds: the PROG-procedure will be abandoned automatically and the former value reinstated. *Changes will only be set after ENTER has been pressed!*

Return to OPERATOR-level

To return to the operator level, press the PROG key for three seconds. (If no keys are pressed for 2 minutes, the unit will return to the operator level automatically.)

Setup Functions

The following setup functions are typical of ICS PRESET panels. For complete programming instructions refer to the Fluidwell N414-P Instruction Manual. **ICS PRESET default settings are in parenthesis.** *Fluidwell N414-P default settings may be different for some parameters.*

1. PRESET

1.1. Unit (USGAL) The measuring unit for preset, total, accumulated total and pulse output. Available choices are L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb. *Based on SETUP 6.2, the selection is limited to either volumetric OR mass flow units. Units chosen in 1.1 must match units in 6.2 for correct totals.*

1.2. Decimals (0000000) The number of digits following the decimal point. Available for selection: 0000000, 111111.1, 22222.22, 3333.333

2. OVERRUN

2.3. Settle (1.0) The amount of time after the batch is ended that flow is registered to compensate for overrun. During this time the display shows *SETTLE*. You cannot print a ticket or start a new batch until the SETTLE timer has ended. If not printing, leave at 1.0; counts will continue to be displayed.

3. FLOWRATE

3.1. Unit (USGAL) The unit for flowrate. Available choices are: L – m3 – USGAL – IGAL –ft3 – bbl –kg – ton – US ton – lb. *Based on SETUP 6.2, the selection is limited to either volumetric OR mass flow units.*

3.2. Time (/MIN) The time period for flowrate calculation. Available choices are per second, per minute, per hour or per day.

3.3. Decimals (0000000) For flowrate, the number of digits following the decimal point. Available for selection: 0000000, 111111.1, 22222.22, 3333.333

4. ALARM

4.1. No-Flow (Disabled) Turns No-flow monitoring on or off.

4.2. Flowrate Time (10) If No-flow is enabled, this is the period of time in seconds without a flow signal before an alarm is triggered. If No-flow is disabled (default), time is ignored.

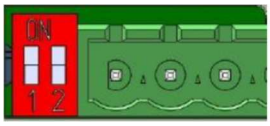
5. DISPLAY

5.1. Display (Increase) Determines whether the batched quantity counts up (increase) or down (decrease).
5.2. Tank (Disable) Graphic display of batch progress/overflow condition when enabled.
5.3. Backlight (100%) Sets the intensity of the display backlight.
5.4. Dimmer (100%) Dims the backlight to the entered intensity after 5 minutes of inactivity.

6. FLOWMETER

6.1. Signal (Active) Type of meter input signal. Will affect which terminal connections to use. (See Fig. 6.1)

Selecting Meter Voltage Supply: (12VDC) The voltage is selected with two switches at the left rear of the enclosure.



Switch Positions

VOLTAGE SELECTION		
SWITCH 1	SWITCH 2	VOLTAGE
on	on	24 V DC
on	off	8.2 V DC
off	off	12 V DC

Fig. 6.1 **Typical Meter Input/Wiring Combinations**

Meter	Signal Type	Signal Wiring (Meter-Term Block (N413-P)
Micro Motion Mass Flow	Active	
2700 Transmitter		Freq+ to P+ (29), Freq– to P1 (30)
5700 Transmitter		FO+ to P+ (29), FO– to P1 (30)
Endress+Hauser Mass Flow	Active	
84F Transmitter		24+ to P+ (29), 25– to P1 (30)
Endress+Hauser Mag Meter	Active	
50/53P & P300 Transmitter		24+ to P+ (29); 25– to P1 (30)
TCS Meter (10:1 Pulser)	Reed LP	Black & Black to P1 (30) & P- (32) No Polarity
Alternative Input Setting	NPN LP	Black & Black to P1 (30) & P- (32) No Polarity
TCS Meter (100:1 Pulser)	PNP LP	Red to P+ (29), Black to P1 (30), White to P- (32)
Ball Meter (Oil Gear)	NPN LP	Red to P+ (29), White to P1 (30), Black to P- (32)
Hoffer (Turbine) Meter		
-With Signal Conditioner*	NPN LP	To P1N (30) & P- (32) No Polarity
Without Signal Conditioner	Coil LP	To Fluidwell Term 30 & 31, Shield to 32

*Murray Equipment recommends using a signal conditioner for all turbine meters with the Fluidwell N414-P. (MEI Part # HOF PET-6-1-X)

Call Murray Equipment for other types of meters.

6.2. Unit (USGAL) The unit of measurement for PRESET and FLOWRATE are derived from this setting. Choose between (volumetric) L – m3 – USGAL – IGAL – ft3 – bbl. and (mass) kg – ton – US ton – lb.

6.3. K-factor (1) The number of pulse signals generated by the flowmeter per measuring unit as selected in **Setting 6.1**.

7. CONTROL

7.1. Batch Relay 2 (LURC) When LURC function enabled (**See 7A**.), pump and valve outputs will shut off at pre-determined quantity before the end of the preset quantity to compensate for flow overrun.

7.6. Preclose (0) The quantity to be subtracted from the preset value to determine when the Preclose is to take place. If the PRECLOSE value is set too high, flow may stop before the PRESET quantity is reached. In that case, the batch will not end until the RESET key is pushed.

7.A LURC (Enable) Turns LURC function on or off.

8. PRINTER

8.1. Print (Auto) Determines whether a batch receipt will be printed automatically at the end of a batch (AUTO), or upon confirmation (ON CONFirmation). *If not printing batch receipts, set to AUTO.*

8.2. Header Name or message to be printed at the top of the batch receipt. (Additional lines: **8.3-8.5**)

8.A. Date format (M/D/Y) Format in which the date is to be printed.

8.B. Total (Print) Print the accumulated total on the receipt (PRINT) or do not (SKIP).

8.C Speed (9600) Baud rate of printer speed. (See printer manual for preferred setting.)

9. OTHERS

9.4. Time Enter the correct time of the system clock. The format is HH.MM. SS in 24-hour notation. The time of delivery (batch completion) will be printed on the receipt.

9.5. Date Enter the correct date in YY-MM-DD format.

9.6. Password (0000) All SETUP values can be password protected. Protection will be disabled with value 0000 (zero). Program 4-digits 0000 – 9999.

9.7. Key(board) Lock (Control) This function inhibits certain functions of the keyboard: Start, Hold, Control (Start & Hold), Preset, All, Off. See the Fluidwell manual for more information.

Fluidwell N414-P MAINTENANCE

GENERAL DIRECTIONS

- ***Installation, electrical wiring, start-up and maintenance of the instrument may only be performed by authorized and trained personnel. Personnel must read and understand this N414-P Instruction Manual before carrying out its instructions.***
- ***All instructions in this manual are to be observed.***
- ***Ensure that the measuring system is correctly wired 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 N414-P does not require special maintenance unless it is used in low-temperature applications or exposed to high humidity (above 90% annual mean). It is the user's responsibility to take all precautions to dehumidify the internal atmosphere of the N414-P in such a way that no condensation will build up, for example by placing dry silica-gel sachet in the panel. 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 gasket and buttons.
- The input/output wiring for reliability and aging symptoms.
- The process accuracy. Because 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 coating.

REPAIR

The two field-replaceable, heavy duty, mechanical relays (make-and-break / NO-NC), configurable for i.e. batching with one-stage or two-stage control, can be repaired by the user and must be replaced with equivalent certified parts. These relays are of type: Panasonic DK1A1B24V and have Farnell order number: 1423190.
The fuse, located on the PCB above the supply connectors, must be replaced with an equivalent certified part.

> The fuse is of type: FUSE SLOW 250VAC 1.25A RADIAL by Littelfuse 37211250411 and has Digikey order number: WK4250BK-ND

EXPLANATION OF N413-P SETUP-FUNCTIONS

1. - PRESET	
UNIT **1.1** Note !	SETUP 1.1 determines the measuring unit for preset, total, accumulated total and pulse output. The following units can be selected: L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb Alteration of the measuring unit will have consequences for operator and SETUP-level values. *Based on SETUP 6.2, the selection is limited to volumetric or mass flow units of measure only.*
DECIMALS **1.2**	The decimal point determines for preset, 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
MINIMUM **1.3**	This function (batch minimum) prevents the operator from entering a new preset-value which is less than the programmed batch minimum. Value zero (0) disables this function.
MAXIMUM **1.4**	This function (batch maximum) prevents the operator from entering a new preset-value which is greater than the programmed batch maximum. Value zero (0) disables this function.
PRESET **1.5**	A Preset value usually will be entered by the Operator at Operator level. However, this function can be locked out by SETUP 8.4 or externally with the input terminal. With this function, a Preset value can be entered conveniently at configuration level (which can be password protected).

2. - OVERRUN	
Overrun can occur at the end of the batch process, as a result of a slow valve or pump. Thus affecting the accuracy. With this function, the N413-P analyses the actual overrun characteristic for every batch. This information is used to correct the overrun automatically.	
OVERRUN **2.1**	For an accurate overrun correction, it is necessary that the flow meter meets certain technical demands, such as "high resolution" and shows no "false" overrun due to a slow update time or spinning flowmeter once the valve is closed. Do not enable this function if the flow meter does not meet these technical demands.
TIME **2.2** Note !	The time overrun characteristic of the system will be analyzed during a certain time after switching-off the valve(s). In this way, false signal generated through leakage are eliminated. Enter here the expected time needed by the system to stop a batch. It is advisable to provide additional time in order to avoid an incorrect overrun correction. *The next batch can only be started after elapsing of this overrun time!* The minimum overrun time is 0.1 second. The maximum overrun time is 999.9 seconds.
SETTLE **2.3** Note !	This is setting influences the ticket data. During this time, after the batch is stopped, the amount of (overrun) flow is registered, added to the total and printed in the ticket. During this SETTLE time, the display shows SETTLE. You cannot print the ticket yet because the flow during the SETTLE time is regarded as delivered flow. When the SETTLE timer has ended (0 sec), you can print the ticket.

3. - FLOWRATE	
UNIT **3.1**	SETUP – 3.1 determines the measuring unit for flowrate. The following units can be selected: L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb Alteration of the measuring unit will have consequences for other SETUP-level values (high and low flowrate alarms). *Based on setting 6.1, the selection is limited to volumetric or mass flow units of measure.*
TIME **3.2** Note !	The flowrate can be calculated per second (/SEC), minute (/MIN), hour (/HR) or day (/DAY). Alteration of the time unit will have consequences for other SETUP-level values (high and low flowrate alarms).
DECIMALS **3.3**	This setting determines for flowrate the number of digits following the decimal point. The following can be selected: 0000000 – 111111.1 - 22222.22 - 3333.333 Alteration of the decimals will have consequences for other SETUP-level values (high and low flowrate alarms).
CALCULATION **3.4** Note !	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. • *For low frequency applications (below 10Hz): do not program more than 10 pulses or the update time will be very slow.* • *For high frequency applications (above 1kHz): do program a value of 50 or more pulses.*
CUT-OFF **3.5**	With the cut-off time, you determine a minimum flow requirement thresh-hold, if during this time less than XXX-pulses (SETUP 3.4) are generated; the flowrate will be displayed as zero. The cut-off time must be entered in seconds - maximum time is 999.9 seconds (approx. 15 minutes).

4. - ALARM	
The N413-P offers a no-flow monitoring feature: if the flowmeter fails to generate a signal during a certain period of time, the unit will shut-off the control output(s) and bring the batch controller in HOLD and alarm status. After clearing the alarm, the batch can be continued or terminated.	
NO-FLOW **4.1**	With this function, the no-flow monitoring can be enabled / disabled.
FLOWRATE TIME **4.2**	In case of a failing signal, this function determines the period of time after which an alarm has to be triggered.

5. - DISPLAY	
DISPLAY **5.1**	The actual batched value can be set to display the batched quantity (increase), or to display the remaining quantity to be batched (decrease).
TANK **5.2**	The tank indication can be enabled or disabled. During the preopen phase, the indicator is inactive.
(BACK)LIGHT **5.3**	The density of the backlight can be set in following range: 0% (OFF) - 20% - 40% - 60% - 80% - 100% (FULL BRIGHTNESS).
DIMMER **5.4**	With the DIM function, the backlight will be switched to the entered intensity after five minutes of no activity. This is to extend the lifetime of the backlight and to save energy.

6. – FLOWMETER

The N413-P is able to handle high and low frequency pulses. Make sure to use the right terminal connection (see chapter 4). The N413-P calculates automatically the internal K-Factors for selected measuring units for PRESET (SETUP 1.1) and Flowrate (SETUP 3.1).

Based on the selection for a volumetric or mass unit of measure, consequently those measuring units only are available for setting 11 and 31.

SIGNAL
6.1

TYPE OF SIGNAL	EXPLANATION	RESISTANCE	FREQ. / mV	REMARK
NPN	NPN input	100K pull-up	6 kHz.	(open collector)
NPN - LP	NPN input with low pass filter	100K pull-up	2.2 kHz.	(open collector) less sensitive
REED	Reed-switch input	1M pull-up	1.2 kHz.	
REED - LP	Reed-switch input with low pass filter	1M pull-up	120 Hz.	Less sensitive
PNP	PNP input	100K pull-down	6 kHz.	
PNP - LP	PNP input with low pass filter	100K pull-down	700 Hz.	Less sensitive
NAMUR	Namur input	820 Ohm pull-down	4 kHz.	External power required
COIL HI	High sensitive coil input	-	20mV p.t.p.	Sensitive for disturbance!
COIL LO	Low sensitive coil input	-	90mV p.t.p.	Normal sensitivity
ACT	Active pulse input	3K9	10KHz.	External power required

UNIT
6.2

This setting determines the measurement unit for the flowmeter.
With automatic unit conversion, the units for Preset and Flowrate are derived from this setting. The following can be selected:
Volumetric: L – m3 – USGAL – IGAL – ft3 – bbl
Mass: kg – ton – US ton – lb

K-FACTOR
6.3

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 measuring unit (SETUP 6.1), for example per cubic feet. The more accurate the K-factor, the more accurate the functioning of the system will be.

Example 1: **Calculating the K-factor.**
Let us assume that the flowmeter generates 248.13 pulses per liter. So, the K-factor is 248.13.
Enter for SETUP – 6.2: "Liter".
Enter for SETUP – 6.3: "248.13".

Example 2: **Calculating the K-factor.**
Let us assume that the flowmeter generates 6.5231 pulses per gallon. So, the K-Factor is 6.5231.
Enter for SETUP – 6.2: "USGAL".
Enter for SETUP – 6.3: "6.5231".

7. - CONTROL

Two mechanical control outputs are available to control relays or valves. **RELAY 1** is always used as the main batch control relay, its function is fixed and cannot be charged.
The second relay as well as the transistor output can be used for the desired function:

- Batch: the function is equal to relay 1.
- Preclose: used for two-stage control.
- Any alarm: switched in case a no-flow or external alarm will be triggered.
- Pulse: for use as a scaled pulse output.
- Pump: to start the pump n-seconds before the process valve opens (as set in Preopen)

BATCH RELAY 2 **7.1**	Function according to: Off, batch, preclose, alarm, pulse, external alarm, pump
BATCH TRANS 1 **7.2**	Function according to: Off, batch, preclose, alarm, pulse, external alarm, pump
BATCH TRANS 2 **7.3**	Function according to: Off, batch, preclose, alarm, pulse, external alarm, pump
BATCH TRANS 3 **7.4**	Function according to: Off, batch, preclose, alarm, pulse, external alarm, pump
PREOPEN **7.5**	According to the setting "Preopen", the switch moment of the output is a time delay for the start of batch. With value zero (0) this function is disabled.
PRECLOSE **7.6**	According to the setting "Preclose", the switch moment of the output is based on the remaining quantity before the end of batch. With value zero (0) this function is disabled.
WIDTH **7.7**	The pulse width determines the time that the output will be switched; in other words the pulse length. This pulse length determines also the maximum frequency based on a 50/50 duty cycle. $\text{Maximum frequency} = \frac{1}{2 * \text{pulse length (in seconds)}}$ The pulse width is set in milliseconds in the range 0.001 - 9.999 sec. Value "zero" disables the pulse output. 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 **7.8**	This setting determines for the amount (setting 7.9) the number of digits following the decimal point. The following can be selected: 0000000 – 111111.1 - 22222.22 - 3333.333 *The measuring unit is according to setting 11 (Preset – Unit).*
AMOUNT **7.9**	A pulse will be generated every X-quantity. Enter this quantity here while taking the displayed decimal position and measuring unit into account (according to PRESET).
PULSE **7.A**	With this function, it is determined if a pulse will be generated according to the quantity batched or according to accumulated total. With setting "batch" the pulse generator will be set to zero when a new batch is started and does not reflect the complete totalized volume.

LURC **7.A**	**With this function you can enable or disable the LURC function for the control relay R2 and the transistor outputs.**

8. – PRINTER

The functions described below relates to external printers that are not part of the standard delivery. Programming these functions has no result if the external printer has not been installed correctly. For details and more information see your printers' manual and the "Receipt information".

PRINT **8.1**	To select the print behavior after a batch is completed or stopped. **AUTO**: The N413-P automatically prints a ticket. **ON CONF**: The N413-P asks if you want to print a ticket. **HAND**: The N413-P does not automatically print or ask; If you want to print a ticket, just press the PRINT key.
HEADER **8.2; 8.3; 8.4; 8.5**  Note !	Define here the header text of the receipt. Each receipt starts with a default, free format line followed by 3 optional lines. Each line has 16 characters. The following characters are available: _ * – 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 *Leading empty lines are printed empty, trailing empty lines are omitted.*
LINETERMINATION **8.6**	Define here what the printer should do to terminate a printed line. The following options can be selected: CR/LF – CR – LF CR causes a carriage return, but no line feed. LF causes a line feed, but no carriage return. Choose CR/LF to get both (default).
STARTROW **8.7**	Enter a number of empty lines to advance before printing the receipt. 0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9
ENDROW **8.8**	Enter a number of empty lines to advance after printing the receipt. 0 – 1 – 2 – 3 – 4 – 5 – 6 – 7 – 8 – 9
FORMFEED **8.9**	Select enable if a form feed has to be given each time a receipt is printed. If a form feed is not required select disable.
DATEFORMAT **8.A**	Select the format in which the date is to be printed. Y.M.D – D.M.Y – M.D.Y
TOTAL **8.B**	With this setting you can choose to print the accumulated total on the ticket. TOTAL selects print the accumulated total, SKIP selects do not print the accumulated total.
SPEED **8.C**	To match the printer speed, the following baud rates can be selected: 1200 – 2400 – 4800 – 9600 – 9600HP – 19200 – 38400 See your printer manual for preferred setting.

9. – OTHERS	
MODEL **9.1**	For support and maintenance it is important to have information about the characteristics of the N413-P. Your supplier will ask for this information in the case of a serious breakdown, warranty or to assess the suitability of your unit for upgrade considerations.
SW-VERS **9.2**	For support and maintenance: provide this information to your supplier.
SERIAL NO **9.3**	For support and maintenance: provide this information to your supplier.
TIME **9.4** Note !	Enter the correct time of the system clock. The format is HH.MM.SS in 24 hour notation. *The clock is used to print a timestamp on the receipt when a batch is delivered.*
DATE **9.5**	Enter the correct date of the system clock. The entry format is YY-MM-DD.
PASSWORD **9.6**	All SETUP-values can be password protected. This protection is disabled with value 0000 (zero). 4 digits can be programmed, for example 1234.
KEY(BOARD) LOCK **9.7** Note !	This function inhibits certain functions of the keyboard: **Start**: to lock the START key; a batch cannot be executed. **Hold**: to lock the HOLD key: interruption of the batch is not possible. **Control**: START and HOLD are both locked out. **Preset**: to lock the ability to change the batch value. **All**: the complete keyboard is locked, except SETUP functionality. **Off**: this lock function is disabled. *The functions available from the cable terminals remain in use!*
TAG-NR **9.8**	For identification of the unit and communication purposes, a unique tag number of maximum 7 digits can be entered.

Troubleshooting

Problem	Possible Cause	Solution
Mass (Weight) Units (or Volume Units) not available in Preset or Flowrate Setup.	Flowmeter Setup not complete.	Set units first in Flowmeter Setup (6.2).
Start button does not light up when pushed.	No supply power. Batch has reached preclose but not preset value. HOLD is displayed.	Check circuit breaker and supply power. (120VAC). Press RESET key to end batch.
Indicator counting with no flow.	Incorrect flowmeter input setting. Signal noise	Program correct meter input type (6.1). Shielded cable should be landed at control panel only.
Batch stops; “NO-FLOW” flashes on display.	No product flowing through meter. Meter not counting/pulsing out.	Check pump/motor/valve operation. Verify product levels. Look for blocked lines. Check meter display (if applicable) to verify meter is counting. Check meter output settings & wiring.
Pump & valve(s) don’t turn off when preset value reached.	Fluidwell not in batching mode, (display doesn’t show “BATCH”).	Press start button firmly for 100ms.

	Master control relay not de-energizing at end of batch.	Increase SETTLE time to at least one (1) second.
Wrong pump or valves open.	Incorrect wiring to valve solenoid box. Air lines run to wrong valves.	Check indicator LED on solenoid. Operate valve manually (turn screw on solenoid) to verify air lines.
Indicator doesn't match meter display.	Incorrect K-Factor.	Check K-Factor (6.3).
Display shows more/less than actual amount delivered.	Incorrect K-Factor or meter pulse output factor. Signal noise. Meter out of calibration.	Increase/Decrease K-Factor (6.3). Check meter pulse factor. Shielded cable should be landed at control panel only. Check meter calibration.
Ticket shows less than displayed delivery.	"SETTLE" time is too low.	Increase SETTLE time (2.3)

NOTES: