

N410-P

*BATCH-CONTROLLER
WITH NUMERICAL KEYPAD*



Signal input flowmeter: Pulse – NPN / PNP / Reed Switch / Active

Control input: Five inputs for remote control.

Control output: Three outputs to control valves, pumps and alarms.





SAFETY INSTRUCTIONS

- **DISCLAIMER:** *The information contained in this document is subject to change without notice. The manufacturer makes no representations or warranties with respect to the contents hereof and specifically disclaim any implied warranties of merchantability or fitness for a particular purpose.*
- **LIFE SUPPORT APPLICATIONS:** *The N410 is not designed for use in life support appliances, devices, or systems where malfunction of the product can reasonably be expected to result in a personal injury. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify the manufacturer and supplier for any damages resulting from such improper use or sale.*
- *Electro static discharge does inflict irreparable damage to electronics! Before installing or opening the unit, the installer must discharge himself by touching a well-grounded object.*
- *This unit must be installed in accordance with the EMC guidelines (Electro Magnetic Compatibility).*
- *Grounding: a proper grounding to the aluminum casing must be connected as directed.*

FEDERAL COMMUNICATIONS COMMITTEE (FCC)

This device complies with chapter 47 of part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) *This device may not cause harmful interference.*
- (2) *This device must accept any interference received, including interference that may cause undesired operation.*

DISPOSAL



At the end of its life this product should be disposed of according to local regulations regarding waste electronic equipment. If a battery is present 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.

SAFETY RULES AND PRECAUTIONARY MEASURES

- The manufacturer accepts no responsibility whatsoever if the following safety rules and precautions instructions and the procedures as described in this manual are not followed.
- Modifications of the N410 implemented without preceding written consent from the manufacturer, will result in the immediate termination of product liability and warranty period.
- Installation, use, maintenance and servicing of this equipment must be carried out by authorized technicians.
- Check the mains voltage and information on the manufacturer's plate before installing the unit.
- Check all connections, settings and technical specifications of the various peripheral devices with the N410 supplied.
- Open the casing only if all leads are free of potential.
- Never touch the electronic components (ESD sensitivity).
- Never expose the system to heavier conditions than allowed according to the casing classification (see manufacture's plate and chapter 4.2.).
- If the operator detects errors or dangers, or disagrees with the safety precautions taken, then inform the owner or principal responsible.
- The local labor and safety laws and regulations must be adhered to.

ABOUT THE OPERATION MANUAL

This operation manual is divided into two main sections:

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

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

A hazardous situation may occur if the N410 is not used for the purpose it was designed for or is used incorrectly. Please carefully note the information in this operating manual indicated by the pictograms:



A "**warning**" indicates actions or procedures which, if not performed correctly, may lead to personal injury, a safety hazard or damage of the N410 or connected instruments.



A "**caution**" indicates actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the N410 or connected instruments.



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

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Manual	:	FW-N410-P-MAN-EN_v0102_03
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1. INTRODUCTION

1.1. SYSTEM DESCRIPTION OF THE N410

Functions and features

The batch controller model N410 is a microprocessor driven instrument designed for batching and filling of small and large batch size quantities.

This product has been designed with a focus on:

- Ease of use with the numerical keypad,
- Ruggedness for its application with a robust enclosure, keypad and mechanical relays,
- Clear operator information: all relevant data can be monitored at a glance,
- User friendly installation with standard high quality plug and play terminals and suitable for both AC and DC applications.
- Wide range of inputs, outputs and functions to allow a broad fulfillment in many applications.

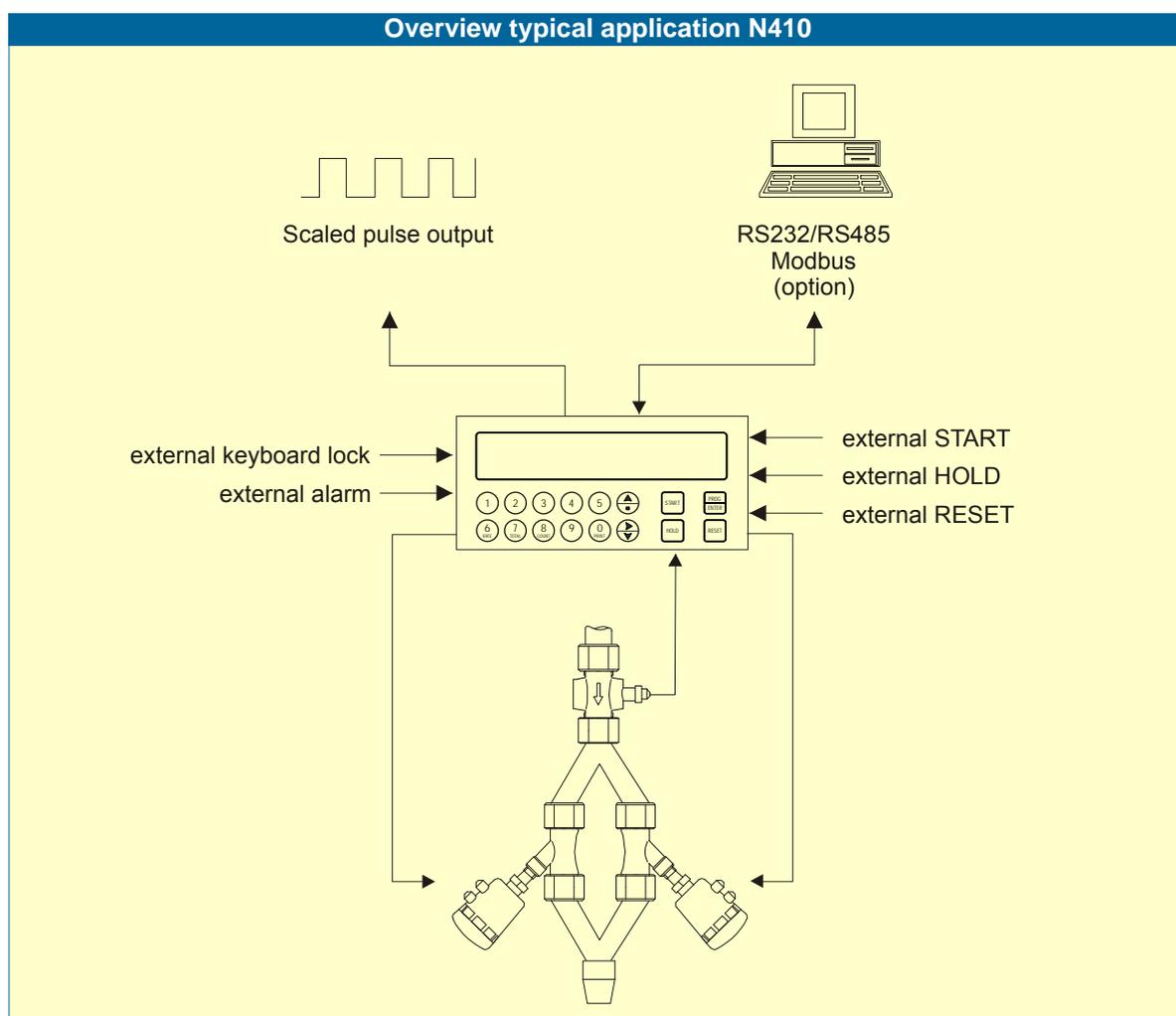


Fig. 1: Typical application for the N410

Flowmeter input

- One flowmeter: a passive NPN, PNP (Option -ZS) or active pulse signal output can be connected to the N410. The input circuit supports low and high frequency flowmeters. A proper sensor supply is available to power the sensor with 8 / 12 or 24V DC.

Control inputs

- Five control inputs: the functions available are START, HOLD, RESET, keyboard lock and External alarm.

Control outputs

- Two mechanic relay outputs (make-and break): mainly used for batching with two-stage control or one stage control.
The function of relay no. 1 is set to follow the batch process continuously.
The function of relay no. 2 can be configured to: batching / two-stage control / alarm or as scaled pulse output.
- One transistor output: mainly used for connection to PLC's or other controlling equipment. The function of the transistor can be configured to: batching / two-stage control / alarm or as scaled pulse output.

Power supply

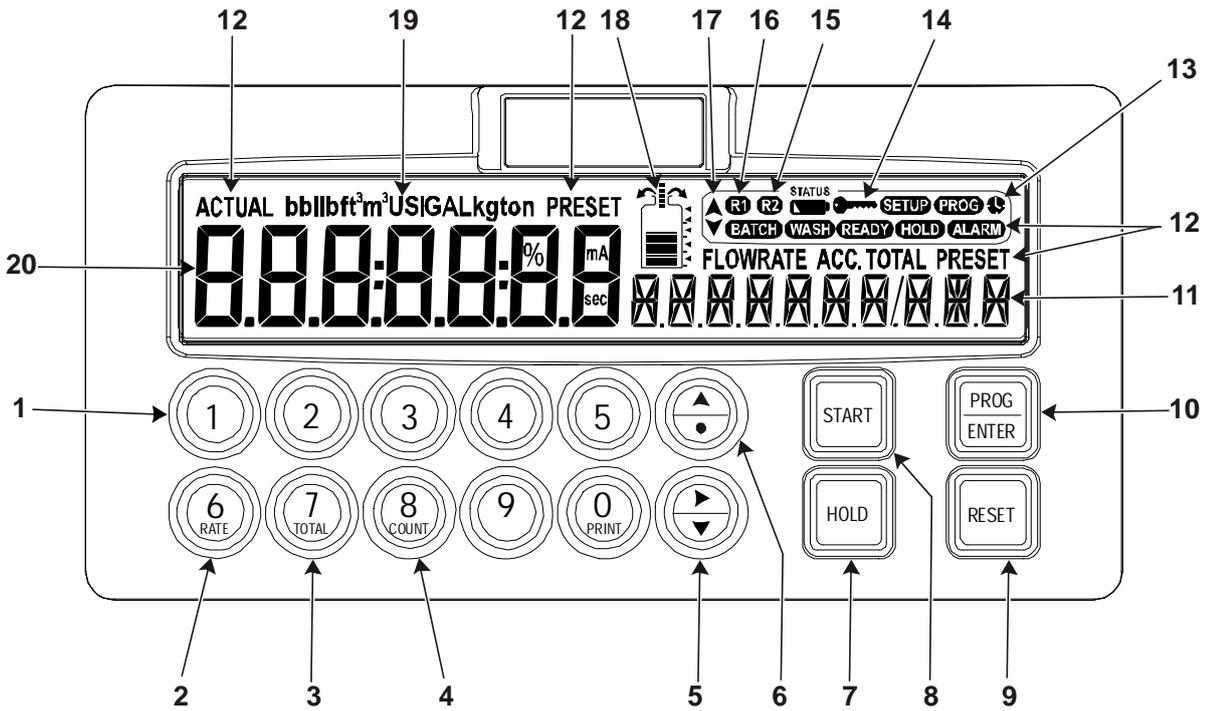
- AC power supply: as standard, the N410 will operate on 110-230V AC.
- DC power supply: as standard, the N410 can also operate on 24V DC.

Configuration of the unit

The N410 was designed to be implemented in many types of applications. For that reason a SETUP-level is available to configure your N410 according to your specific requirements. SETUP includes several important features, such as K-factors, measuring units, selection of the control outputs etc. All settings are stored in EEPROM memory and will not be lost in the event of power failure.

Display information

The unit has a large transfective LCD with a bright LED backlight and displays all kinds of symbols, digits and measuring units, status information and key-word messages. A backup of the total, accumulated total and batch counter is made in EEPROM memory every minute.



- | | |
|---|--|
| <ol style="list-style-type: none"> 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 | <ol style="list-style-type: none"> 10. Program/confirm key 11. 8 mm value display 12. Status indicators 13. Overrun 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 |
|---|--|

2. OPERATIONAL

2.1. GENERAL



- *The N410 may only be operated by authorized and trained personnel.*
- *All instructions in this manual are to be observed.*
- *Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.*

This chapter describes the daily use of the N410. This instruction is meant for users / operators.

2.2. CONTROL PANEL

The following keys are available:

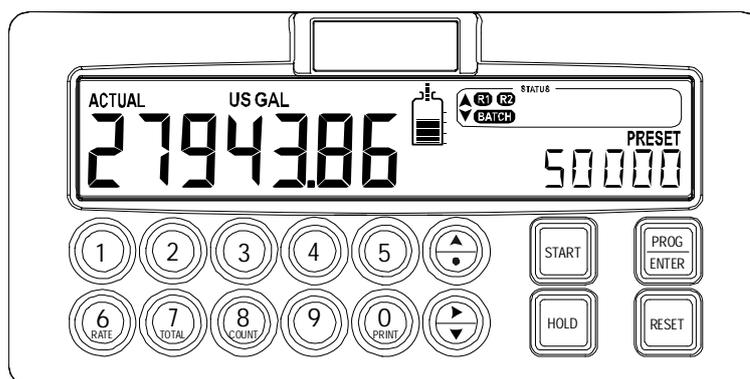


Fig. 2: Control Panel.

Functions of the keys



Once PROG has been pressed, the keys **0** to **9** and **•** are used to enter a PRESET value or configuration value.



RATE: to display the actual flowrate during batching.



TOTAL: to display and reset the actual Total and after pressing twice to display the accumulated total.



COUNT: to display and reset the number of fully executed batches.



To **START** the batch process or to resume after a **HOLD** command.



To interrupt the batch process.



Once **HOLD** has been pressed, the batch process is completely cancelled after pressing **RESET**. Reset is also used to initialize alarms.



To program and save a new **PRESET** value or other settings. It is also used to gain access to **SETUP**-level; please read chapter 3.



Once **PROG** has been pressed: to enter a decimal value. During configuration, this key is used to select a function or value; please read chapter 3.



During configuration, this key is used to select a function or value; please read chapter 3.

2.3. OPERATOR INFORMATION AND FUNCTIONS

In general, the N410 will always function at Operator level. The information displayed and the functional keys available are dependent upon the SETUP-settings and the active function.



Note !

Please note: if the key-sign  is displayed, the particular key(s) or Functions are not accessible!

▪ To enter a batch quantity

To change the PRESET-value, following procedure must be followed:

- 1) Press PROG: the word "PROGRAM" will be flashing,
- 2) Use the numerical keypad 0-9 and decimal position (set with **SETUP**12 of the configuration menu) to enter the desired value.
- 3) Set the new PRESET-value by pressing ENTER.



Fig. 3: Example display information during programming preset value.

When data is altered but ENTER has not been pressed, and then the alteration can still be cancelled by pressing RESET: the former value will be reinstated. The PRESET-value can be used time after time until a new value is programmed.



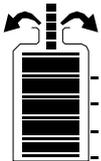
Note !

Please note that alterations will only be set after ENTER has been pressed!

▪ Batch maximum / minimum

When you program a new value which is not valid - the batch size is too large or too small - the increase or decrease-sign (e.g. ▼) will be displayed while you are programming; the new value will not be accepted but the minimum or maximum allowed value will be set.

▪ Tank fill symbol



The batch process can be visualized with the tank fill symbol. This graphical representation can be enabled or disabled with SETUP 52.

When the batch overfills the preset quantity by 2.5% the graph will show two overflow arrows indicating this condition.

▪ Starting up the batch process

The batch process can only be started up when "READY" is displayed. The batch process is started by pressing the START-key. Depending on the SETUP-settings, one or two relays will be switched. The arrows at the display indicate if the ACTUAL-value will be counting up or down.

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

The N410 is equipped with a smart – self learning – overrun correction: at the end of the process, the outputs will be switched-off earlier as the PRESET value, taking the overrun quantity of previous batches into account. The result is an accurate batch, even in slowly varying circumstances. During overrun, a clock will be displayed and R1 / R2 will be flashing.



Fig. 4: Example display information during the process.

- **Interrupting and ending the batch process**

When HOLD is pressed, the batch process will be temporarily interrupted; the actual values are not lost. At the display, the word "HOLD" will be flashing. From this stage, the batch process can be resumed with the START-key.

The process can be ended entirely at all times by pressing RESET in which case the actual values are "lost" and the system returns to steady state: the batch cannot be resumed.

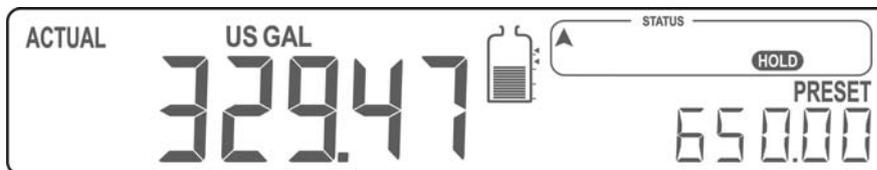


Fig. 5: Example display information when interrupted.

The following information is available on request:



- **Flowrate indication**

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-key is pressed once, the resettable total will be displayed. After pressing this key again, accumulated total will be displayed.

The accumulated total cannot be re-initialized. The value will count up to 9,999,999,999. The unit and 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**



Note !

Note: total can only be reset if no batch process is active (status: READY).

Note: this function might not be available due to configuration settings.

The value for total can be re-initialized. To do so, select Total and press RESET: the flashing text "PUSH RESET" will be displayed.

To avoid re-initialization at this stage, press another key than RESET or wait for 20 seconds. If RESET is pressed again, TOTAL will be reset to zero.

Re-initialization of total DOES NOT influence the accumulated total.



- **Display batch counter**

The number of completed batches is displayed after pressing COUNT. To return to the main display: press COUNT again or wait for 20 seconds.

- **Clear batch counter**



Note !

Note: Count can only be reset if no batch process is active (status: READY).

Note: this function might not be available due to configuration settings.

The value batch counter can be re-initialized. To do so, select Count and press RESET: the flashing text "PUSH RESET" will be displayed.

To avoid re-initialization at this stage, press another key than RESET or wait for 20 seconds. If RESET is pressed again, COUNT will be reset to zero.

2.4 OPERATOR ALARMS

▪ No flow alarm

The N410 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 mode: an alarm message will be displayed, indicating the type of alarm: "NO FLOW".

To clear the alarm press RESET once, while the batch controller remains in HOLD mode. When in HOLD mode, the batch can be continued or terminated. (See "Interrupting and ending the batch process" on page 9.)

▪ External alarm

The N410 can receive an external alarm during a batch. This can be set with SETUP 71 – Alarm. When the alarm is activated a running batch will be interrupted immediately and any other function will be blocked until the alarm status is cleared.

The display will show 'EXT ALARM'.

To clear the alarm press RESET once, while the batch controller remains in HOLD mode. When in HOLD mode, the batch can be continued or terminated. (See "Interrupting and ending the batch process" on page 9.)

▪ Alarm 01 to 03

When "ALARM" is displayed when no process alarm is present (e.g. no flow, press the "1" key to display the reason of the alarm: 1, 2 or 3.

Please consult Appendix B: Problem Solving.

3. CONFIGURATION

3.1. INTRODUCTION

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



Caution !

- *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 Operating Manual before carrying out its instructions.*
- *Ensure that the measuring system is correctly connected, according to the wiring diagrams. The housing may only be opened by trained personnel.*
- *Take careful notice of the "Safety rules, instructions and precautionary measures" in the front of this manual.*

3.2. PROGRAMMING SETUP-LEVEL

3.2.1. GENERAL

Configuration of the N410 is done at SETUP-level. SETUP-level is reached by pressing the PROG/ENTER key for 7 seconds; at which time, both arrows  will be displayed. In order to return to the operator level, PROG will need to be pressed for three seconds. Alternatively, if no keys are pressed for 2 minutes, the unit will exit SETUP automatically.



Note !

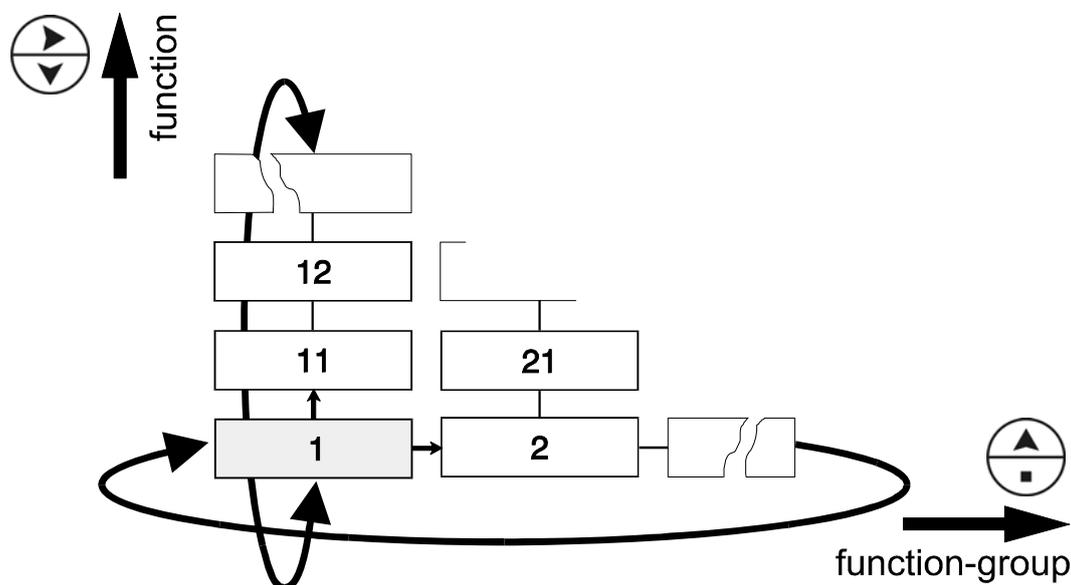
Note: *SETUP can only be reached if the N410 is in "READY" mode. During SETUP, the batch controller can NOT be used for batching!*



Note !

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

Matrix structure SETUP-level:



SCROLLING THROUGH SETUP-LEVEL

Selection of function-group and function:

SETUP is divided into several function groups and functions.



Each function has a unique number. 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[▲], 11[▲], 12[▲], 13[▲], 14[▲], 1[▶], 2[▶], 3[▲], 31 etc.).

To 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.

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



Note !

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

To return to OPERATOR-level:

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

3.2.2. OVERVIEW FUNCTIONS SETUP LEVEL

SETUP FUNCTIONS AND VARIABLES			DEFAULT
1. PRESET			DEFAULT
11	UNIT	L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb	L
12	DECIMALS	0 – 1 – 2 – 3 (Ref: displayed value)	0
13	BATCH MINIMUM	X,XXX,XXX quantity	0 L
14	BATCH MAXIMUM	X,XXX,XXX quantity	0 L
15	PRESET VALUE	X,XXX,XXX quantity	0 L
2. OVERRUN			DEFAULT
21	OVERRUN	disable – enable	disable
22	TIME	0.1 – 999.9 seconds	1.0 sec
3. FLOWRATE			DEFAULT
31	UNIT	L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb	L
32	TIME UNIT	sec – min – hour – day	minute
33	DECIMALS	0 – 1 – 2 – 3 (Ref: displayed value)	0
34	CALCULATION	per 1 – 255 pulses	10
35	CUT-OFF	0.1 – 999.9 seconds	30.0 sec
4. ALARM			DEFAULT
41	NO-FLOW alarm	disable – enable	disable
42	NO-FLOW alarm	0.0 – 999.9 seconds	10.0 sec
5. DISPLAY			DEFAULT
51	COUNT	increase – decrease	increase
52	TANK	enable - disable	Enable
53	BACKLIGHT brightness	Off – 20% - 40% - 60% - 80% - 100%	100%
54	DIM BACKLIGHT	Off – 20% - 40% - 60% - 80% - 100%	100%
6. FLOWMETER			DEFAULT
61	UNIT K-FACTOR	L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton - lb	L
62	K-FACTOR	0.000010 – 9,999,999	1
7. CONTROL			DEFAULT
71	RELAY 2	disable - batch - preclose - alarm - pulse	Batch
72	TRANSISTOR 1	disable - batch - preclose - alarm - pulse	Batch
73	PRECLOSE volume	X,XXX,XXX quantity	0 L
74	PULSE WIDTH	0.001 - 9.999 sec	0.000 sec
75	PULSE PER	X,XXX,XXX quantity	0 L
76	PULSE ACCORDING	Acc. Total - batch	Acc.Total
8. COMMUNICATION			DEFAULT
81	SPEED / BAUDRATE	1200 - 2400 - 4800 - 9600	9600
82	ADDRESS	1 - 255	1
83	MODE	off - RTU - ASCII	RTU
9. OTHERS			DEFAULT
91	MODEL	N410	N410
92	SOFTWARE VERSION	--.--.--	-
93	SERIAL NO.	---.---.---	-
94	PASSWORD	0000 - 9999	0000
95	KEYBOARD LOCK	Start – hold – preset – control – all – off	off
96	TAGNUMBER	0000000 - 9999999	0

3.2.3. EXPLANATION OF SETUP-FUNCTIONS

1 - PRESET	
UNIT 11	<p>SETUP - 11 determines the measuring unit for preset, total, accumulated total and pulse output.</p> <p>The following units can be selected:</p> <p style="text-align: center;">L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb</p> <p>Alteration of the measuring unit will have consequences for operator and SETUP-level values.</p> <p>Note: based on setting 61, the selection is limited to volumetric or mass flow units of measure only.</p>
DECIMALS 12	<p>The decimal point determines for preset, total, accumulated total and pulse output the number of digits following the decimal point.</p> <p>The following can be selected:</p> <p style="text-align: center;">0000000 - 111111.1 - 22222.22 - 3333.333</p>
BATCH MINIMUM 13	<p>This function prevents the operator from entering a new preset-value which is less than the programmed batch minimum.</p> <p>Value zero (0) disables this function.</p>
BATCH MAXIMUM 14	<p>This function prevents the operator from entering a new preset-value which is greater than the programmed batch maximum.</p> <p>Value zero (0) disables this function.</p>
PRESET VALUE 15	<p>A Preset value usually will be entered by the Operator at Operator level. However, this function can be locked out by SETUP 84 or externally with the input terminal.</p> <p>With this function, a Preset value can be entered conveniently at configuration level (which can be password protected).</p>



Note !

2 - OVERRUN	
<p>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 N410 analyses the actual overrun characteristic for every batch. This information is used to correct the overrun automatically.</p>	
OVERRUN 21	<p>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.</p> <p>Do not enable this function if the flow meter does not meet these technical demands.</p>
TIME (OVERRUN) 22	<p>The 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.</p> <p>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.</p> <p><i>Note that the next batch can only be started after elapsing of this overrun time!</i></p> <p>The minimum overrun time is 0.1 second. The maximum overrun time is 999.9 seconds.</p>

3 - FLOWRATE

UNIT 31	<p>SETUP - 21 determines the measuring unit for flowrate. The following units can be selected:</p> <p style="text-align: center;">L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb</p> <p>Alteration of the measuring unit will have consequences for other SETUP-level values (high and low flowrate alarms).</p> <p>Note: based on setting 61, the selection is limited to volumetric or mass flow units of measure.</p>
TIME UNIT 32	<p>The flowrate can be calculated per second (SEC), minute (MIN), hour (HR) or day (DAY).</p> <p>Alteration of the time unit will have consequences for other SETUP-level values (high and low flowrate alarms).</p>
DECIMALS 33	<p>This setting determines for flowrate the number of digits following the decimal point. The following can be selected:</p> <p style="text-align: center;">00000 - 1111.1 - 2222.22 - 3333.333</p> <p>Alteration of the decimals will have consequences for other SETUP-level values (high and low flowrate alarms).</p>
CALCULATION 34	<p>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.</p> <p>Note: for low frequency applications (below 10Hz): do not program more than 10 pulses or the update time will be very slow.</p> <p>Note: for high frequency applications (above 1kHz) program a value of 50 or more pulses.</p>
CUT-OFF TIME 35	<p>With this setting, you determine a minimum flow requirement threshold, if during this time less than XXX-pulses (SETUP 34) are generated; the flowrate will be displayed as zero.</p> <p>The cut-off time must be entered in seconds - maximum time is 999.9 seconds (about 15 minutes).</p>



Note !



Note !

4 - ALARM

4 - ALARM	
The N410 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 41	The No-Flow alarm can be enabled or disabled
TIME 42	With this setting the time is set for the unit to be switched off after receiving no signal. The maximum time to generate a signal is 999.9 seconds (about 15 minutes).

5 - DISPLAY	
COUNT 51	The actual batched value can be set to display the batched quantity (increase), or to display the remaining quantity to be batched (decrease).
TANK 52	The graphical tank shape indication can be enabled or disabled.
BRIGHTNESS 53	The intensity of the backlight can be set in steps of 20% in the range: 0 – 100%
DIM BACKLIGHT 54	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	
<p>The N410 is able to handle high and low frequency pulses. Make sure to use the right terminal connection (see chapter 4).</p> <p>The N410 calculates automatically the internal K-Factors for selected measuring units for PRESET (SETUP 11) and Flowrate (SETUP 31).</p> <p>Note: based on the selection for a volumetric or mass unit of measure, consequently those measuring units only are available for setting 11 and 31.</p>	
UNIT K-FACTOR 61	<p>SETUP – 61 determines the measuring unit for the K-Factor entry (setting 62). According to the calibration sheet of your flowmeter, a certain amount of pulses are generated versus a certain volume and measuring unit. Do enter here this measuring unit.</p> <p>The following units can be selected:</p> <p style="text-align: center;">L – m3 – USGAL – IGAL – ft3 – bbl – kg – ton – US ton – lb</p> <p>Alteration of the measuring unit will have consequences for operator and SETUP-level values.</p>
K-FACTOR 62	<p>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 61), for example per cubic feet. The more accurate the K-factor, the more accurate the functioning of the system will be.</p> <p>Example 1: Calculating the K-factor. <i>Let us assume that the flowmeter generates 248.13 pulses per liter. So, the K-factor is 248.13. Enter for SETUP – 61: "Liter". Enter for SETUP – 62: "248.13".</i></p> <p>Example 2: Calculating the K-factor. <i>Let us assume that the flowmeter generates 6.5231 pulses per gallon. So, the K-Factor is 6.5231. Enter for SETUP – 61: "USGAL". Enter for SETUP – 62: "6.5231".</i></p>



Note !

7 - RELAY OUTPUT

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 changed.

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 (see SETUP 73).
- Any alarm: switched in case a no-flow or external alarm will be triggered.
- Pulse: for use as a scaled pulse output (see setup 74 - 76).

RELAY 2 71	Function according to: disable / batch / preclose / alarm / pulse
TRANSISTOR 1 72	Function according to: disable / batch / preclose / alarm / pulse
PRECLOSE QUANTITY 73	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.
PULSE WIDTH 74	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. 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: <i>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!</i>
IMPULSE PER 75	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 ACCORDING TO ACC. TOTAL / BATCH 76	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.



Note !

8 - COMMUNICATION (OPTIONAL)

The functions described below deal with hardware that may not be available in your system.

Programming of these functions does not have any effect if these options are not installed. Consult Appendix C and the Modbus communication protocol description for a detailed explanation.

BAUDRATE 81	For external control, the following communication speeds can be selected: 1200 - 2400 - 4800 - 9600 baud
BUS ADDRESS 82	For communication purposes, a unique identity can be attributed to every N410. This address can vary from 1-255.
MODE 83	The communication protocol is Modbus ASCII or RTU mode. Select OFF, to disable this communication function.

9 - OTHERS	
TYPE OF MODEL 91	For support and maintenance it is important to have information about the characteristics of the N410-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.
VERSION SOFTWARE 92	For support and maintenance: provide this information to your supplier.
SERIAL NUMBER 93	For support and maintenance: provide this information to your supplier.
PASS CODE 94	All SETUP-values can be pass code protected. This protection is disabled with value 0000 (zero). 4 digits can be programmed, for example 1234.
INHIBIT KEYBOARD 95	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. <i>Note: the functions available from the cable terminals remain in use!</i>
TAGNUMBER 96	For identification of the unit and communication purposes, a unique tag number of maximum 7 digits can be entered.

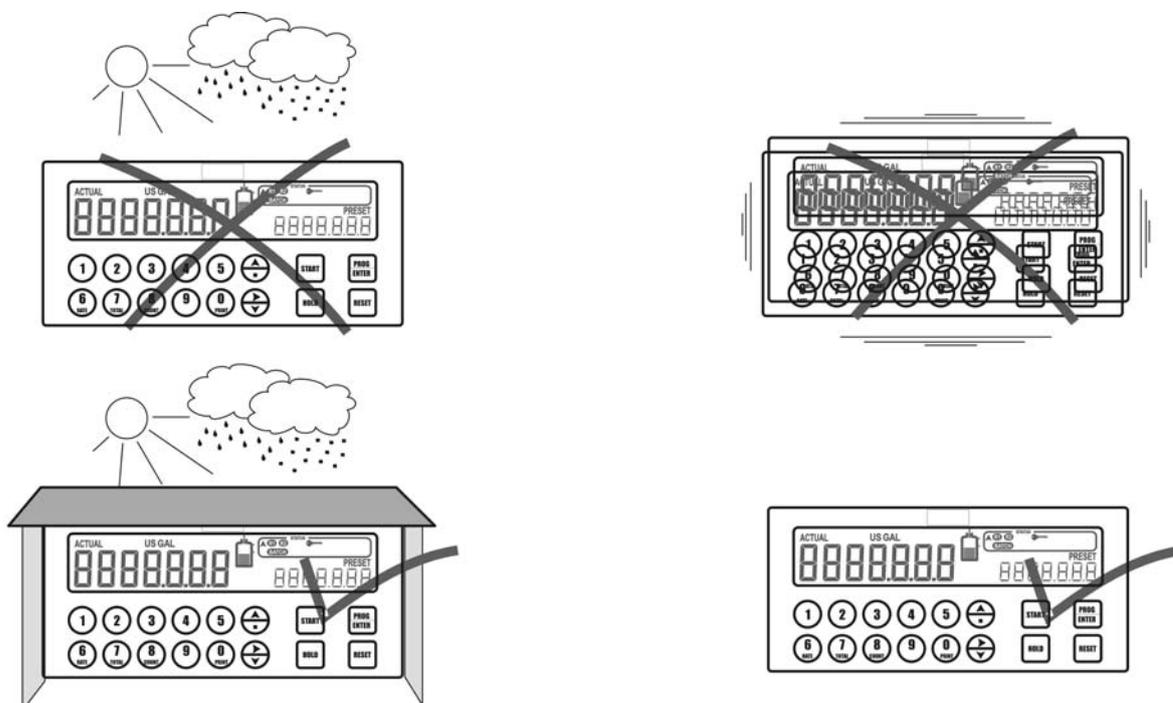
4. INSTALLATION

4.1. GENERAL DIRECTIONS



- Installation, electrical wiring, start-up and maintenance of this instrument may only be carried out by authorized and trained personnel. Personnel must read and understand this Operating Manual before carrying out its instructions.
- The N410 may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed.
- Ensure that the measuring system is correctly wired up according to the wiring diagrams. Protection against accidental contact is no longer assured when the housing cover is removed or the panel cabinet has been opened (danger from electrical shock). The housing may only be opened by trained personnel.
- Take careful notice of the "Safety rules, instructions and precautionary measures" at the front of this manual.

4.2. INSTALLATION / SURROUNDING CONDITIONS

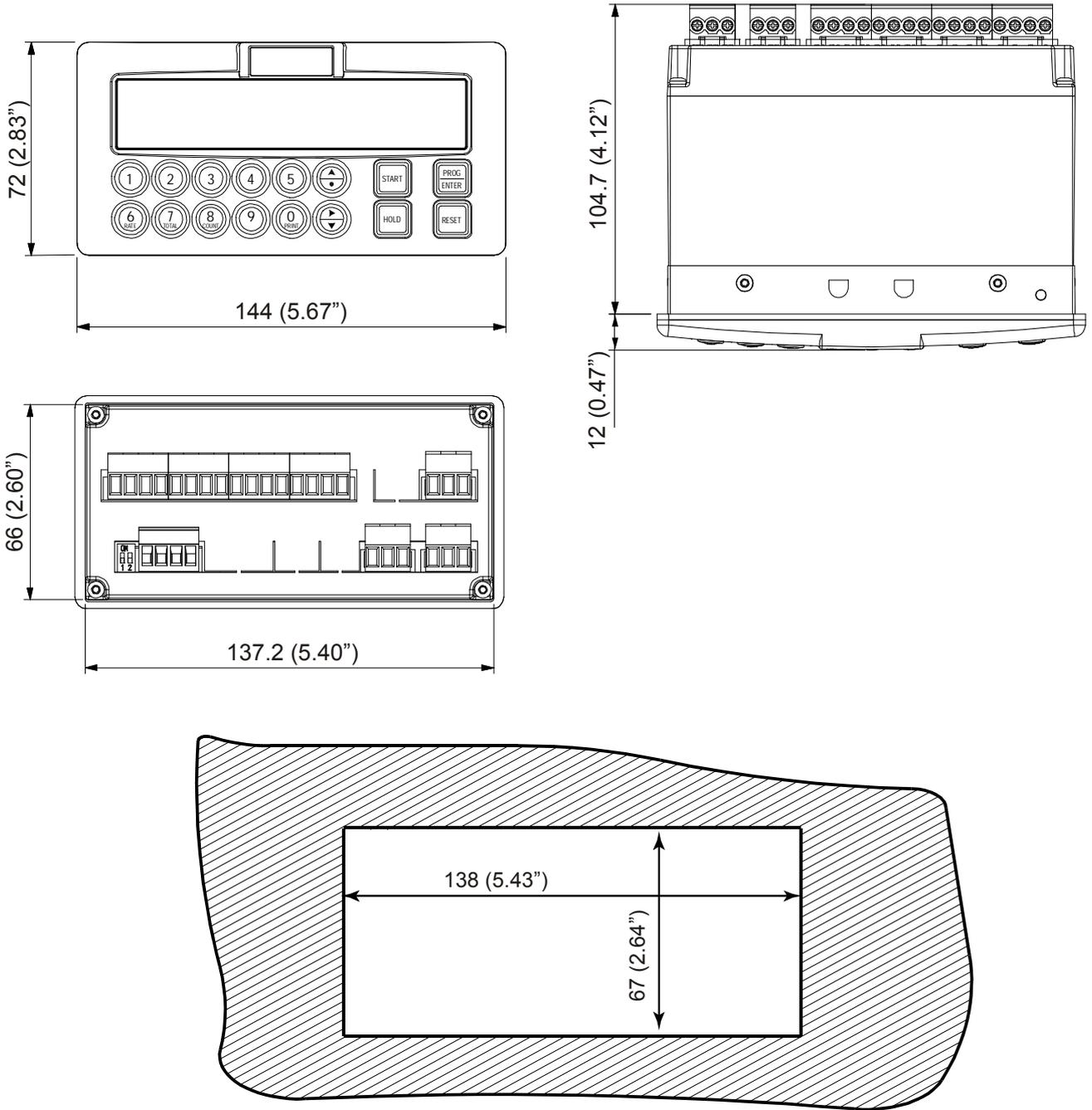


Take the relevant IP classification of the casing into account (see manufacturer's plate). Even with an IP67 (NEMA 4X) casing the unit should not be exposed to harsh unnecessary weather conditions.

When used in extreme cold surroundings or varying climatic conditions, take the necessary precautions against moisture by placing a dry sachet of silica gel, for example, inside the panel.

Mount the N410 on a solid structure to avoid vibrations.

4.3. DIMENSIONS- ENCLOSURE



Maximum panel thickness: 6mm (1/4")

Fig. 6: Dimensions enclosure.

4.4. INSTALLING THE HARDWARE

4.4.1. INTRODUCTION



- Electro static discharge may inflict irreparable damage to electronics! Before installing or opening the unit, the installer must be discharged by touching a well-grounded object.



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



- Grounding: Do ground the aluminum enclosure part properly as indicated. Two grounding positions are available: one on the top side (photo) and one on the bottom side. Use the supplied M4 x 6mm thread forming screw with a lock washer.



Fig. 7: Grounding enclosure.

FOR INSTALLATION, PAY CLOSE ATTENTION TO:

- A reliable ground connection for both the sensor, and if applicable for the metal casing.
- An effective shielded cable for the input signal, and grounding of its shield to the ground terminal or at the sensor itself, whichever is appropriate to the application.

4.4.2. VOLTAGE SELECTION SENSOR SUPPLY

Sensor supply: 8.2V - 12V or 24 V DC:

A real power supply for the sensor is available. The flowmeter can be powered with 8.2, 12 or 24V DC. Total power consumption: max. 50mA@24V.

The voltage is selected with the two switches at the left rear of the enclosure.

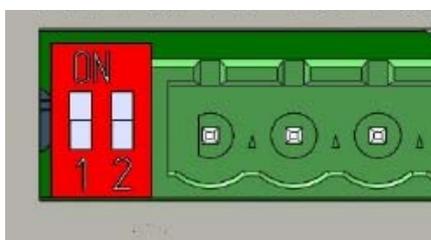


Fig. 8: Switch setting sensor supply voltage.

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

4.4.3. TERMINAL CONNECTORS

The following terminal connectors are available:

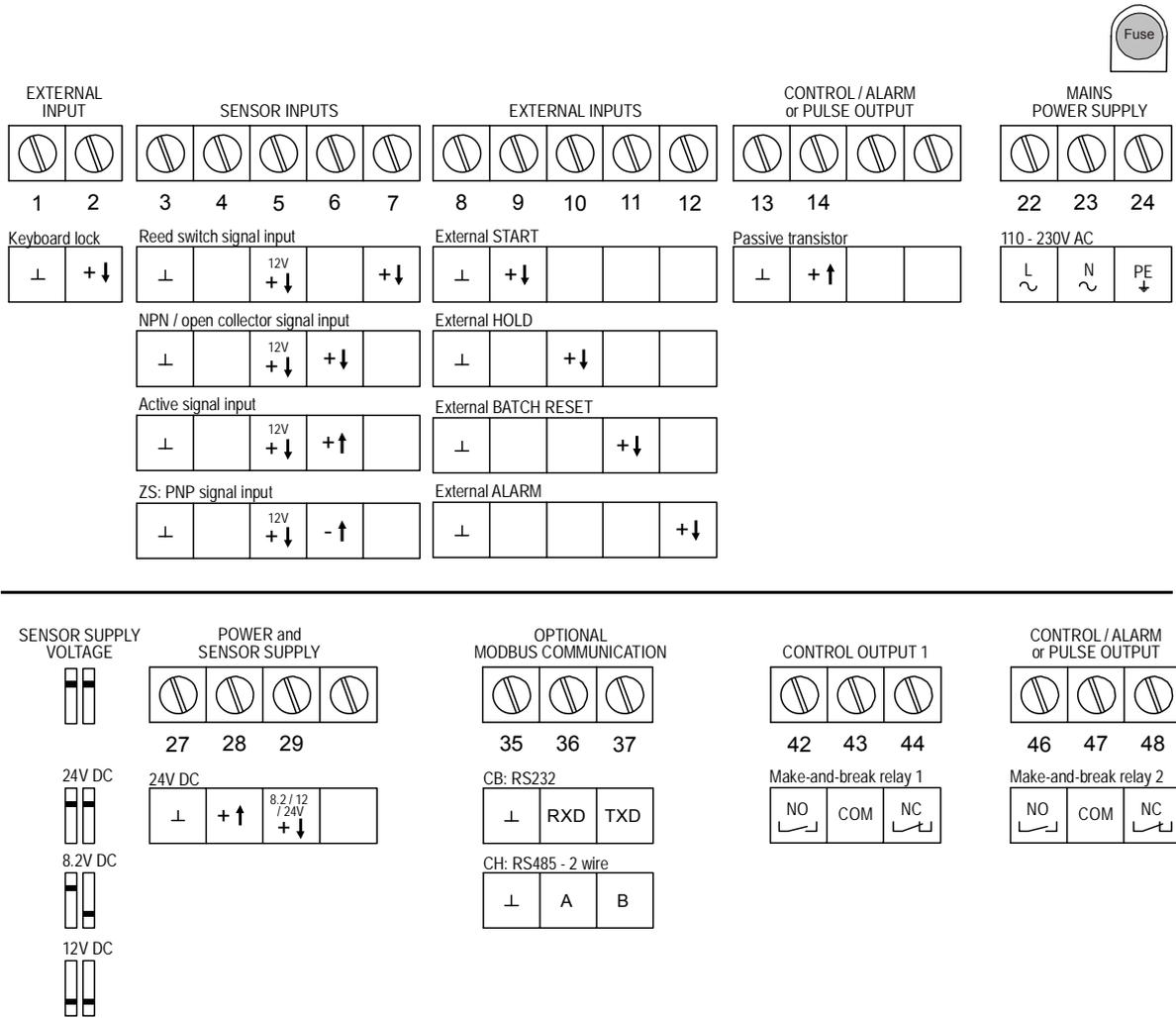


Fig. 9: Overview of terminal connectors N410.

Terminal 1 - 2; Lock keypad:

This function allows you to connect a lock or jumper in order to completely disable the keypad while the functions from the terminals remain available. Note that certain keys on the keypad can be locked-out with SETUP 95 or pass code protected with SETUP 94. Read "Terminal 11" to lock the batch process.

Terminal 3 to 7; Flowmeter inputs:

A high or low frequency NPN signal can be connected to the N410-P.

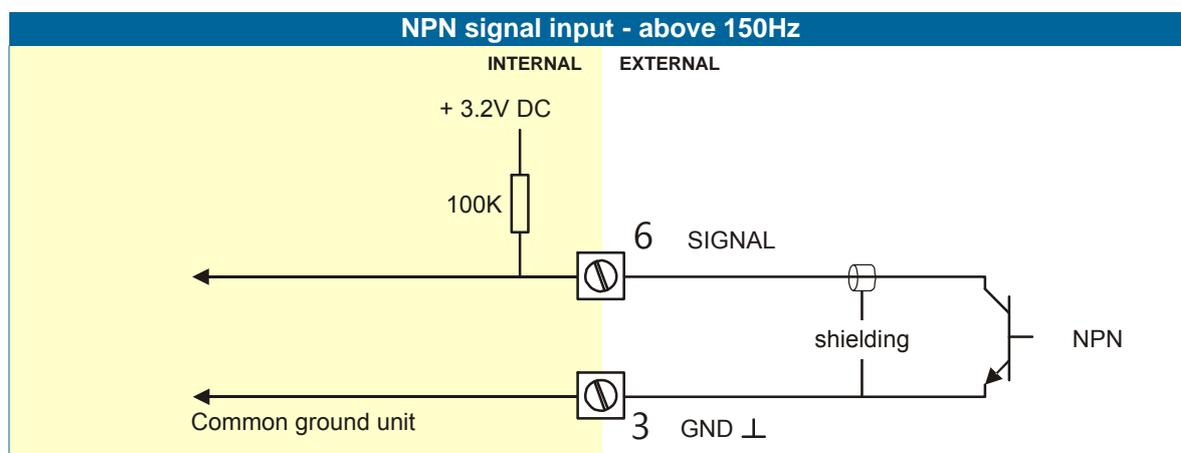
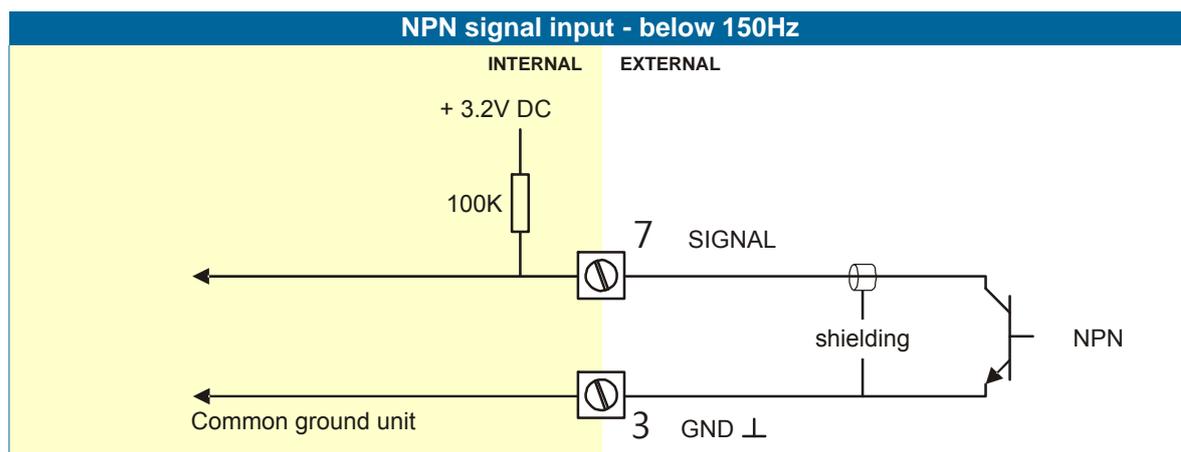
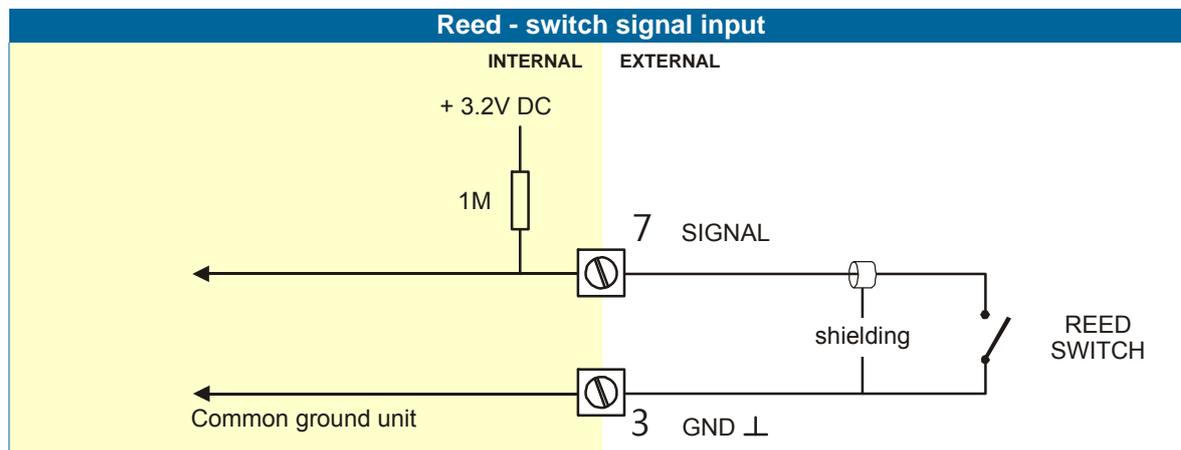
Low Frequency: for low frequency sensors like a Reed switch, a low pass filter is offered on terminal 7 to eliminate contact bounce.

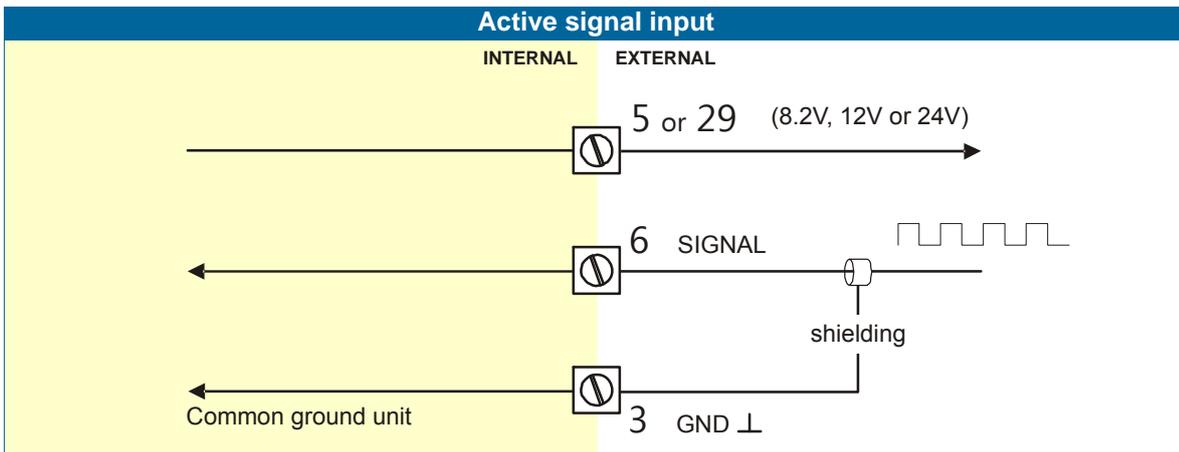
High frequency: for higher frequencies use terminal 6.

Terminal 5 offers a 12V DC sensor supply while Terminal 29 offers 8.2, 12 or 24V DC.

The shield of the signal wire must be connected to the common ground terminal 3 (unless earthed at the sensor itself). Terminal 4 is not used.

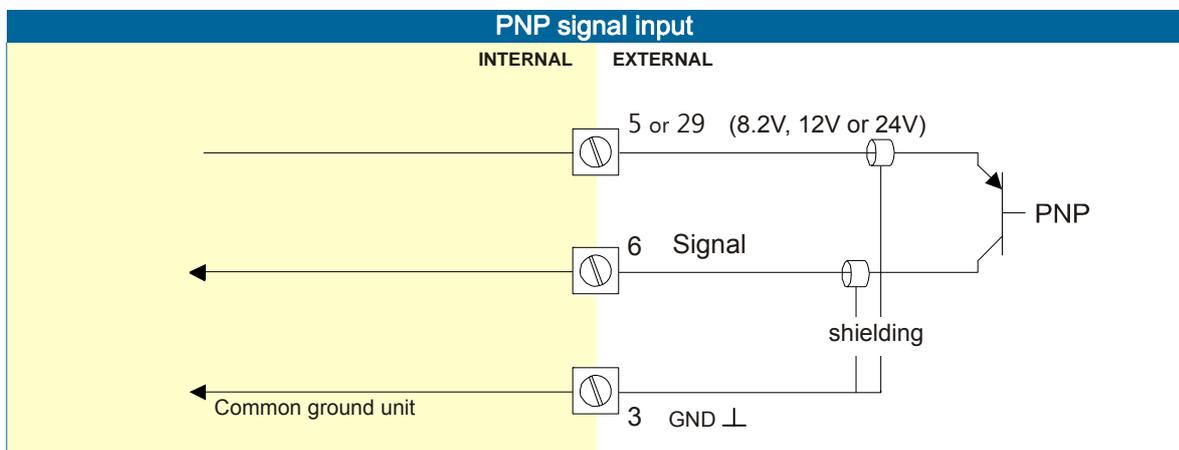
Active signals switching between 0V and 8, 12 or 24V DC can be connected as well.





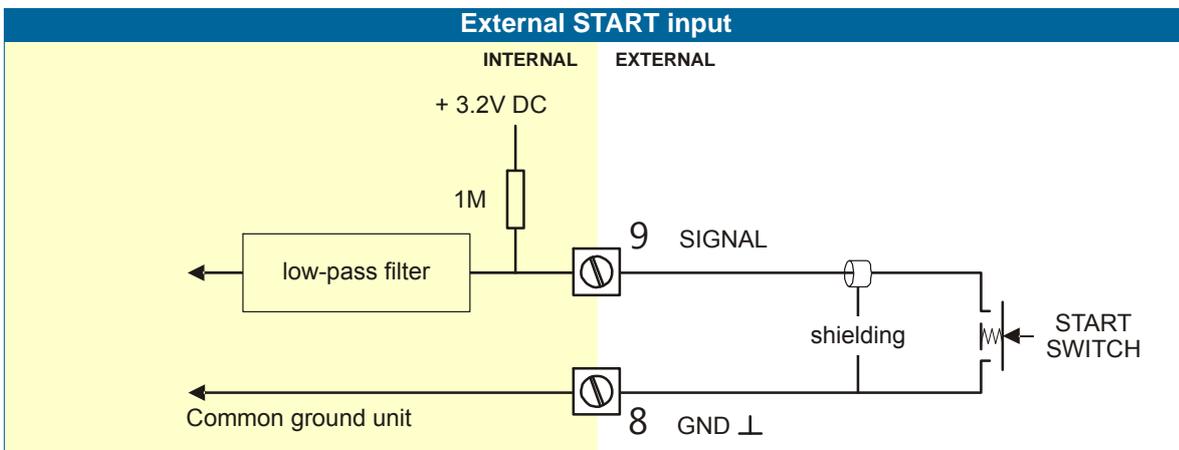
Pulse-signal PNP (Option -ZS):

With option -ZS the N410 is suitable for use with sensors which have a PNP output signal. 3.0V is offered on terminal 5 which has to be switched by the sensor to terminal 6 (SIGNAL). For reliable pulse detection, the pulse amplitude has to go above 1.2V. A sensor supply voltage of 8.2, 12 or 24V DC can be provided by Terminal 29.



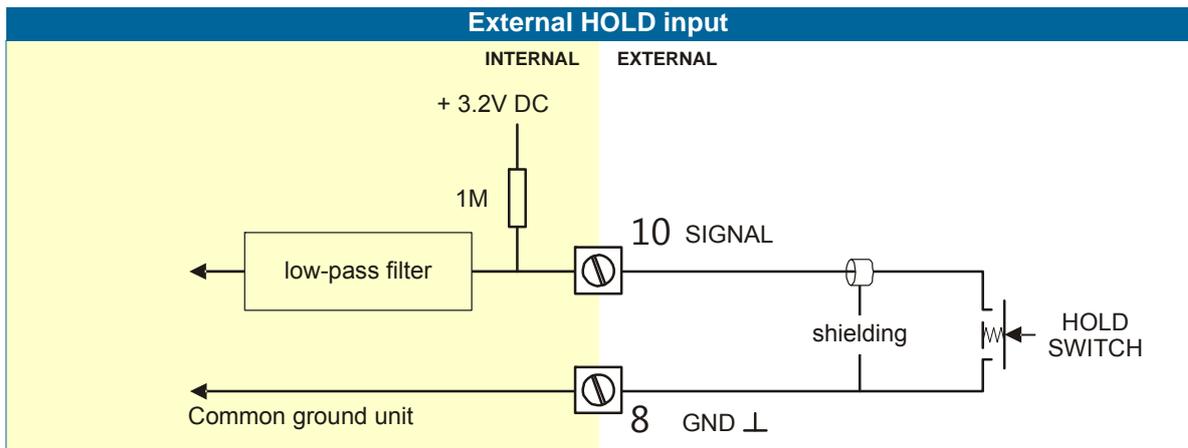
Terminal 8 - 9; External control - Start

With this function, the batch controller can be STARTED remotely. The input must be switched with a potential free contact to the GND-terminal number 8 for at least 100msec.



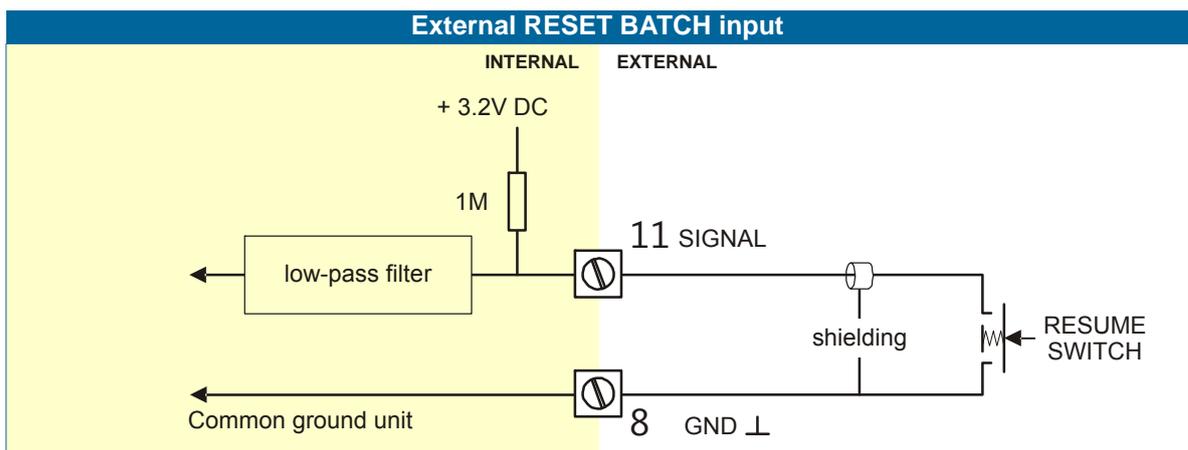
Terminal 8-10; External control - Hold

With this function, the batch process can be interrupted and brought to HOLD status. The input must be switched with a potential free contact to the GND-terminal number 8 for at least 100msec.

**Terminal 8-11; External control - Reset Batch**

With this function, the batch process in HOLD status can be cleared remotely with this RESET function. The input must be switched with a potential free contact to the GND-terminal number 8 for at least 100msec.

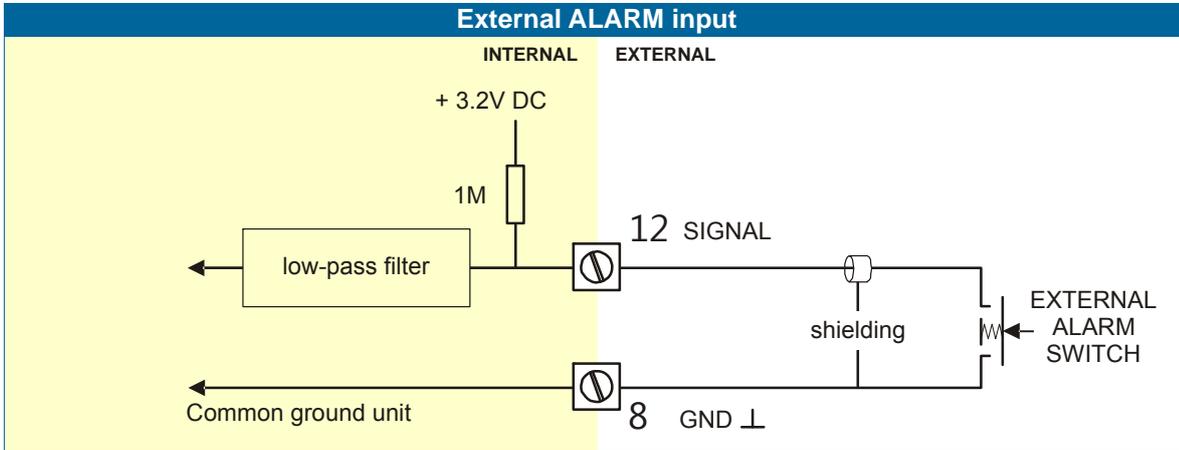
Terminal 11 can also be used to block the batch process: as long as this input is switched to Terminal 8, it is not possible to start a batch (the START button on the keyboard is blocked as well).



Terminal 8-12; External Alarm:

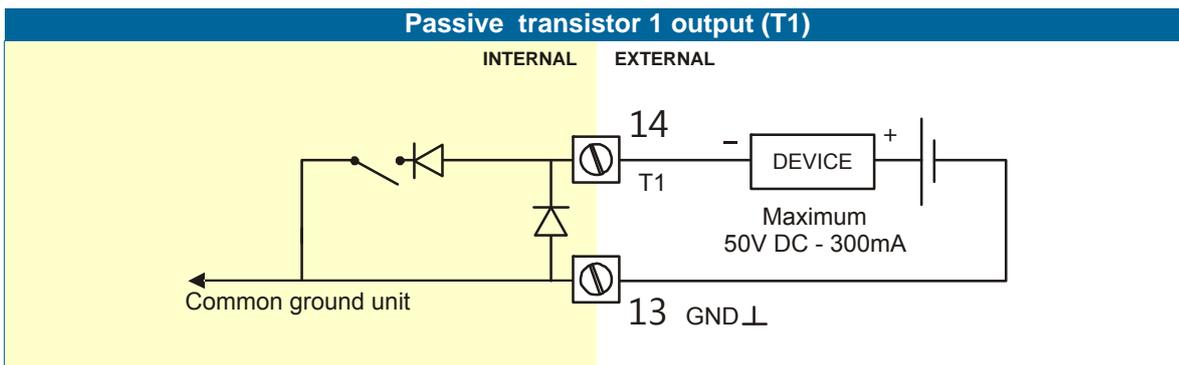
With this function an external alarm release can be connected to the N410. A running batch will be interrupted immediately and will be blocked till the alarm status is initialized. Initialization is only accepted if the input is released.

Initialization can be done by pressing the RESET button or by switching terminal 12 (EXTERNAL ALARM) to terminal 8. The input must be switched with a potential free contact to the GND-terminal 8 for at least 100msec.



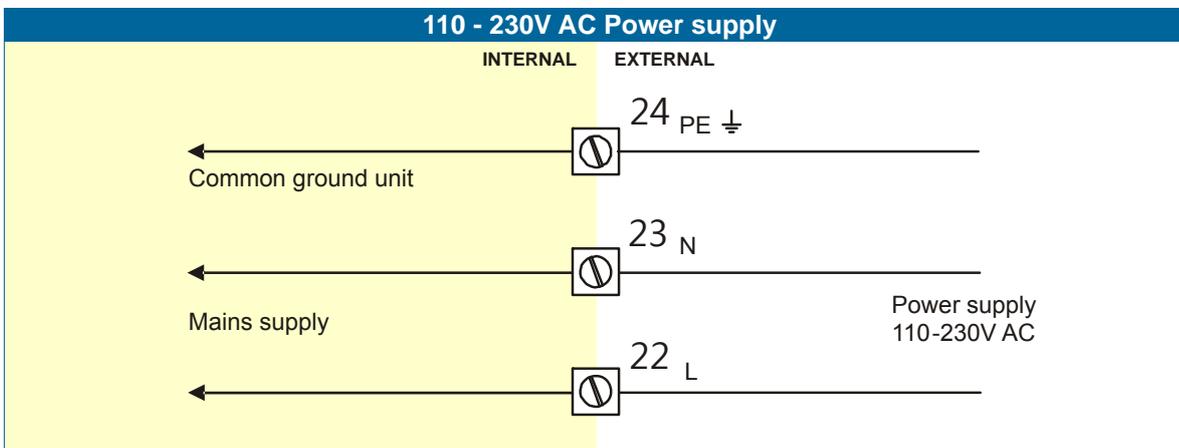
Terminal 13-14; Transistor 1 output (T1):

The function of this output is determined by SETUP functions 72-76. Max. Driving capacity 300mA@50V DC per transistor.



Terminal 22 to 24; 110-230V AC Power Supply:

Connect AC power only after all other wiring has been completed. The N410 has an internally mounted line filter and fuse for surge protection. The unit is designed to operate with 110 to 230V AC power or DC voltages (see terminals 27-28). Always make sure to connect Terminal 24 to the electrical system ground.



Terminal 27-28; 24V DC Power Supply:

Use these terminals ONLY for DC operated applications. The supply must be a 24V DC $\pm 10\%$. For AC applications, use terminals 22-24.

Terminal 35 to 37: Type CB / CH - RS232/485 (2-wire) communication (optional) :

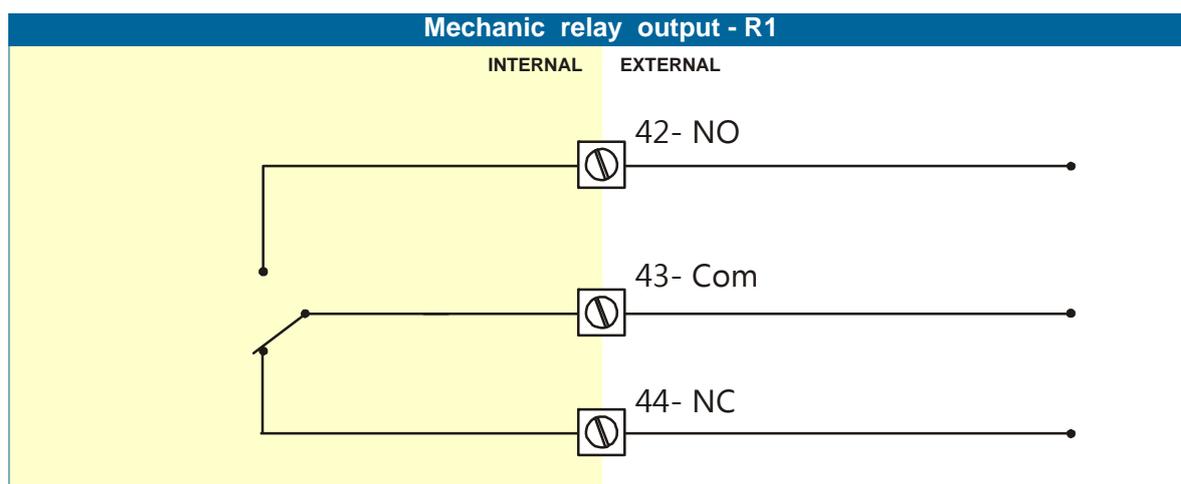
- Full serial communications and computer control in accordance with RS232 (length of cable max. 15 meters) or RS485 (length of cable max. 1200 meters) is possible.
- Read the Modbus communication protocol and Appendix C.

Terminal 42 to 45; control output R1:

This mechanical relay output is available to control the batch process. Relay 1 is switched-on during the whole batch process.

Max. Switching capacity (resistive load): 8A @ 250V AC / 30V DC.

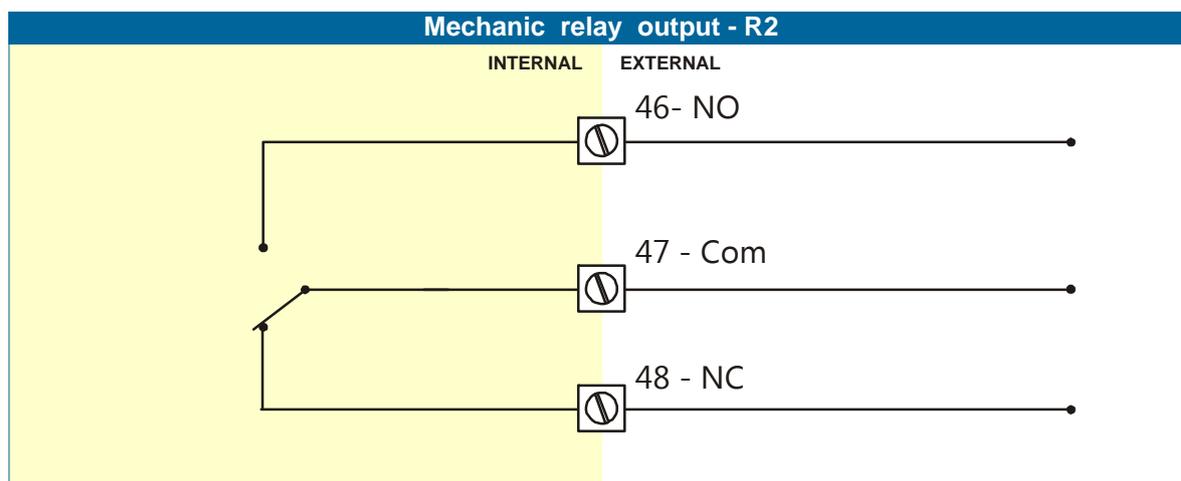
Max. Switching power (resistive load): 2000VA 240W.

**Terminal 46 to 48; control output R2:**

The function of the mechanical relay 2 is determined by SETUP function 71.

Max. Switching capacity (resistive load): 8A @ 250V AC / 30V DC.

Max. Switching power (resistive load): 2000VA 240W.



5. MAINTENANCE

5.1. 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 Operating 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 N410 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 N410 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. As a result of wear and tear, re-calibration of the flowmeter might be necessary. Do not forget to re-enter any subsequent K-factor alterations.
- Clean the casing with soapy-water. Do not use any aggressive solvents as these might damage the coating.

5.2. 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 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 type: FUSE SLOW 250VAC 1.25A RADIAL by Littelfuse 37211250411 and has Digikey order number: WK4250BK-ND

APPENDIX A: TECHNICAL SPECIFICATION

General

Display	
Type	High intensity transfective numeric and alphanumeric LCD, UV-resistant. White LED backlight. Intensity adjustable from 0 – 100% in steps of 20%. Good readings in full sunlight and darkness.
Dimensions	22 x 116mm (0.87 x 4.57").
Digits	Seven 14mm (0.56") and ten 8mm (0.3"). Various symbols and measuring units.
Refresh rate	8 times/sec.

Enclosure	
General	Die-cast aluminum front panel, GRP back enclosure. Polycarbonate window, silicone gasket; UV stabilized and flame retardant material.
Key pad	Sixteen industrial micro-switch keys; UV-resistant silicone keypad; replaceable front.
Painting	UV-resistant 2-component industrial painting.
Dimension	Dimensions: 144 x 72 x 110mm (5.67" x 2.83" x 4.33") – W x H x D.
Classification	IP67 / (NEMA4X) at the front side. IP20 at the back side.
Panel cut-out	138 x 67mm (5.43" x 2.64") W x H.
Weight	650 gram / 1.7 lbs.
Panel thickness	Max. 6mm (1/4")

Environment	
Operational	-20°C to +60°C (-4°F to +140°F)
Storage	-40°C to +80°C (-40°F to +176°F)
Humidity	85% non-condensing, relative

Power	
Type PG	110-230V AC. Power consumption max. 10 Watt. 24V DC \pm 10%. Power consumption max. 10 Watt.
Sensor excitation	Terminal 5: 12V DC, I _{out} max. 30mA Terminal 29: 8.2 / 12 or 24V DC 8.2V DC, I _{out} max. 20mA 12V DC, I _{out} max. 30mA 24V DC, I _{out} max. 75mA

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

Data protection	
Type	EEPROM backup of all setting. Backup of running totals every minute. Data retention at least 10 years.
Pass code	Configuration settings and control keys can be pass code protected.
Lock function	Complete keypad can be locked with external input (e.g. key lock or PLC).

Directives	
EMC	Compliant ref: EN61326-1, EN61000-6-2, EN61000-6-3, FCC 47 CFR part 15, CE and FPP certified.
Low voltage	Compliant ref: EN61010-1.

Inputs

Flowmeter	
Type P	NPN, open collector, Reed-switch, Active pulse signals 8, 12 and 24V.
Option -ZS	PNP input signal instead of NPN.
Frequency	Minimum 0 Hz - maximum 5kHz for total and flowrate. Maximum frequency depends on signal type and internal low-pass filter. E.g. Reed switch with low-pass filter: max. frequency 120Hz.
K-Factor	0.000010 - 9,999,999 with variable decimal position.
Low-pass filter	Available for all pulse signals.
Low Level	0V DC min. to 3V DC max.
High Level	8V DC min. to 24V DC max.
Impedance	4.7 K Ohm pull up to +12V DC
VDC Current	2.5 mA steady state

Control inputs	
Function	Five remote inputs: START, HOLD, RESET, keypad lock and external alarm.
Type	Current sinking
Logic	Level sensitive
Low Level	0V DC min. to 3V DC max.
High Level	8V DC min. to 24V DC max.
Impedance	4.7 K Ohm pull up to +12V DC
Current	2.5 mA steady state
Response	100ms make and break time

Outputs

Control outputs	
Function	One batch output (always a mechanical relay). Two user defined outputs (one mechanical relay and one transistor): Batch / two-stage control / any alarm / scaled pulse output.
Scaled pulse output	Max. Frequency 500Hz. Pulse width is user definable 0.001 to 10 seconds.
Mechanical relays	Two field replaceable mechanical relay outputs; SPDT form C max. Switch power 230V AC - 3A.
Transistor	One passive transistor output - not isolated. Load max. 50V DC - 300mA.

Operational

Operator functions	
Functions	<ul style="list-style-type: none"> Enter a preset value, Start / hold and stop the batch process, Total can be reset to zero, Batch counter can be reset to zero.
Displayed information	<ul style="list-style-type: none"> Preset value Running batch total or remaining quantity, Total and accumulated total. Flowrate Batch counter Graphical indication progress of the actual batch – percentage wise.
Additional functions	<ul style="list-style-type: none"> Active overrun correction Minimum / maximum preset value

Preset / Total	
Digits	7 digits.
Units	L - m3 - USGAL - IGAL - ft3 - bbl - kg - Ton - US Ton - lb
Decimals	0 - 1 - 2 or 3.
Note	Total can be reset to zero.

Accumulated total	
Digits	10 digits
Units / decimals	According to selection for preset.
Note:	cannot be reset to zero

Batch counter	
Digits	10 digits
Note:	Counter can be reset to zero.

Flowrate	
Digits	7 digits
Units	L - m ³ - USGAL - IGAL - ft ³ - bbl - kg - Ton - US Ton - lb
Time unit	/sec - /min - /hour - /day
Decimals	0 - 1 - 2 or 3

APPENDIX B: PROBLEM SOLVING

In this appendix, several problems are included that can occur when the N410 is going to be installed or while it is in operation.

N410-P will not switch on, seems to have no power:

Fuse blown

- Replace fuse:
 - Remove unit from panel.
 - Remove back cover.
 - Fuse is located just above the power supply connectors.

Flowmeter does not generate pulses:

Check:

- Signal selection: if the sensor generates above 150Hz it should be connected to high frequency input.
- Flowmeter, wiring and connection of terminal connectors (par. 4.4.3.),
- Power supply of flowmeter (par. 4.4.2.).

Flowmeter generates "too many pulses":

Check:

- Signal selection: if the sensor is a reed switch: make sure it is connected to the low frequency input.
- Proper grounding of the N410 and flowmeter - par. 4.4.1.

The pass code is unknown:

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

ALARM

When the alarm flag starts to blink and an internal alarm condition has occurred. Press the "1" key to display the 5-digit error code. The codes are:

0001: irrecoverable display-data error: data on the display might be corrupted.

0002: irrecoverable data-storage error: the programming cycle might have gone wrong: check Programmed values.

0003: error 1 and error 2 occurred simultaneously

If the alarm occurs more often or stays active for a longer time, please contact your supplier.

APPENDIX C: COMMUNICATION VARIABLES

Remarks:

- Below, an overview of the N410-P specific variables; other common variables are described in the standard table.
- All numbers are decimal numbers, unless otherwise noted.
- The following variables of the standard table (var00-var30) are not valid for this product and will be responded with value 1: var00, 03-05, 07, 08, 16-22, 24, 26-29.

VAR	RUN-TIME VALUES	REGs	R/W	TYPE	VALUE / REMARKS
572 0x23C	flow rate	1	r	int32	0...9999999 Representation: unit, time, decimals depending on variables 48, 49, 50
566 0x236	total	3	r	int48	0...9999999999 Representation: unit, decimals depending on variables 32, 33
560 0x230	accumulated total	3	r	int48	0...99999999999999 Representation: unit, decimals depending on variables 32, 33
37 (25h)	error status	1	r	int16	Bitfield: 0x0001=Display error 0x0002=EEPROM error
VAR	PRESET	REGs	R/W	TYPE	VALUE / REMARKS
108 (20h)	unit	1	r/w	int8	0=none 1=L 2=m3 3= usgal 4= ical 5=ft3 6=bbbl 7=kg 8=ton 9=uston 10=lb
33 (21h)	decimals	1	r/w	int8	0...3
218	Batch minimum	2	r/w	int8	1...9999999 Representation: 0.000010...9999999
218	Batch maximum	2	r/w	int8	1...9999999 Representation: 0.000010...9999999
200	Preset value	2	r/w	int	1...9999999 Representation: 0.000010...9999999
VAR	OVERRUN	REGs	R/W	TYPE	VALUE / REMARKS
194	Overrun enable	1	r/w	int8	0=disable 1=enable
	Overrun time	1	r/w	int8	1...9999 Representation: 0.0001 – 9.999 sec
VAR	FLOWRATE	REGs	R/W	TYPE	VALUE / REMARKS
109 (30h)	unit	1	r/w	int8	0=none 1=L 2=m3 3= usgal 4= ical 5=ft3 6=bbbl 7=kg 8=ton 9=uston 10=lb
49 (31h)	time unit	1	r/w	int8	0=sec 1=min 2=hour 3=day
50 (32h)	decimals	1	r/w	int8	0...3
55 (37h)	number of pulses	1	r/w	int8	1...255
56 (38h)	cut-off time	1	r/w	int16	1...9999 Representation: 0.0001 – 9.999 sec
VAR	ALARM	REGs	R/W	TYPE	VALUE / REMARKS
68	No-flow alarm	1	r/w	int8	0=disable 1=enable
46	No-flow time	1	r/w	int8	1...9999 Representation: 0.0001 – 9.999 sec

VAR	DISPLAY	REGs	R/W	TYPE	VALUE / REMARKS
64 (40h)	direction	1	r/w	int8	0=decreasing 1=increasing
58 (3Ah)	show barrel	1	r/w	int8	0=disable 1=enable
67 (43h)	backlight	1	r/w	int8	0=0% 1=20% 2=40% 3=60% 4=80% 5=100%
110	backlight dimmed	1	r/w	int8	0=0% 1=20% 2=40% 3=60% 4=80% 5=100%
VAR	FLOWMETER	REGs	R/W	TYPE	VALUE / REMARKS
224	unit	1	r/w	int8	0=none 1=L 2=m3 3= usgal 4= igal 5=ft3 6=bbbl 7=kg 8=ton 9=uston 10=lb
227	k-factor	1	r/w	int8	1...9999999 Representation: 0.000010...9999999 depending on variable 230: decimals K-factor
VAR	CONTROL	REGs	R/W	TYPE	VALUE / REMARKS
85	Relay 2	1	r/w	int8	0=disabled 1=batch 2=preclose 3= alarm 4= impulse
86	Transistor 1	1	r/w	int8	0=disabled 1=batch 2=preclose 3= alarm 4= impulse
197	preclose	2	r/w	int8	1...9999999 Representation: 0.000010...9999999
128 (80h)	width	1	r/w	int8	0...9999 Representation: 0.001 – 9.999 sec
130 (82h)	quantity decimals	2	r/w	int8	1...9999999 Representation: 0.000010...9999999
133	source	2	r/w	int32	0=acc. total 1=batch total
VAR	COMMUNICATION	REGs	R/W	TYPE	VALUE / REMARKS
144 0x090	speed (baud rate)	1	r/w	int8	0=1200 1=2400 2=4800 3=9600
145 0x091	Modbus address	1	r/w	int8	1...255
146 0x092	Modbus mode	1	r/w	int8	0=off 1=RTU 2=ASCII
VAR	OTHERS	REGs	R/W	TYPE	VALUE / REMARKS
160 (A0h)	Model number	1	r	int16	0...9999
173 (ADh)	Model suffix	1	r	char	Representation:ASCII character
162 (A2h)	Firmware version	2	r	int32	0...9999999 Representation: xx.xx.xx
165 (A5h)	Serial number	2	r	int32	0...99999999
168 (A8h)	pass code	1	r	int16	0...9999
139 (8Bh)	Keyboard lock	1	r/w		0=off 1=start 2=hold 3=preset 4=control 5=all
170 (AAh)	tag number	2	r/w	int32	0...99999999

OTHER N410-P VARIABLES FOR COMMUNICATION

BATCH MODE				
221 DFh	batch mode	1	1 = Batch running 2 = Batch pausing 4 = Batch finished 8 = Batch in over-run time	read only
BATCH KEYLOCK				
154 9Ah	Batch key lock	2	Range: 0000h..FFFFh	steps of 0.1 second
BATCH KEYLOCK MASK				
156 9Ch	Batch Key lock mask keys set are not detected	1	Key 1: 0x01 Key 2: 0x02 Key 3: 0x04	bit field
BATCH COMMAND				
157 9Dh	Batch Command Read out returns last executed command entered through communication	1	Commands: 1 = Start 2 = Pause 3 = Stop 4 = Release	Before a new batch can be initiated through communication, the release command must be send. This way, when combined with the Key lock, overwriting of batch information (total/preset) data can be prevented.

ACTUAL - variable number 208 (DOh) – 6 bytes

READ ACTUAL: The value of actual read using communication might differ from the value that appears on the display. This is due to the fact that the display can only display up to seven digits (e.g. when two decimals are selected for "preset" and actual has a value of 123456.78 the display will show 23456.78 while communication will read an "actual" of 12345678 and a "actual decimals" of 2).

TOTAL - variable number 566 (236h) – 6 bytes

Read total: The value of total read using RS communications might differ from the value that appears on the display. This is due to the fact that the display can only display up to seven digits (for example when two decimals are selected for total and total has a value of 123456,78 the display will show 23456,78 while communication will read a "total" of 12345678 and a "total decimals" of 2).

Write total: total can only be cleared. This means writing a value different from 0 will result in the reply of an error message. Only writing 6 bytes of zeroes to total will be accepted.

ACCUMULATED TOTAL - variable number 560 (230h) – 6 bytes

Read acc. total: A difference between the read value and the display value, as explained for "Read total", might appear here too.

Write acc. total: Not possible.

When reading or writing total or accumulated total it should be noted that the used values are given including the decimals. This means that a read/write to one of these variables should be accompanied with a read/write to the variable that holds the number of decimals for this variable:

Example: read var. 566 for total:

Read var. 33 for total decimals and calculate the real value of total by multiplying total with $10^{(total\ decimals)}$

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LIST OF CONFIGURATION SETTINGS

SETTING	DEFAULT	DATE :	DATE :
1 - PRESET	Enter your settings here		
11 unit	L		
12 decimals	0000000		
13 minimum batch size	0 L		
14 maximum batch size	0 L		
15 PRESET value	0 L		
2 - OVERRUN			
21 overrun	disabled		
22 overrun time	1.0 sec		
3 - FLOWRATE			
31 unit	L		
32 time unit	minute		
33 decimals	0000000		
34 calculation	10 pulses		
35 cut-off	30.0 sec		
4 - ALARM			
41 no-flow alarm	disabled		
42 no-flow time	10.0 sec		
5 - DISPLAY			
51 count direction	increase		
52 tank	Enabled		
52 backlight	100%		
53 dim backlight	100%		
6 - FLOWMETER			
61 unit K-factor	L		
62 K-factor	0000001		
7 - CONTROL			
71 relay 2	Batch		
72 transistor 1	Batch		
73 Preclose volume	0 L		
74 pulse width	0.000 sec		
75 pulse per	1000		
76 pulse according	Acc. Total		
8 - COMMUNICATION			
81 baudrate	9600		
82 address	1		
83 mode	RTU		
9 - OTHERS			
91 model	N410	N410	N410
92 software version	03.01.____	03.01.____	03.01.____
93 serial number	-----	-----	-----
94 pass code	0000		
95 keyboard lock	Off		
96 tag number	0000000		

