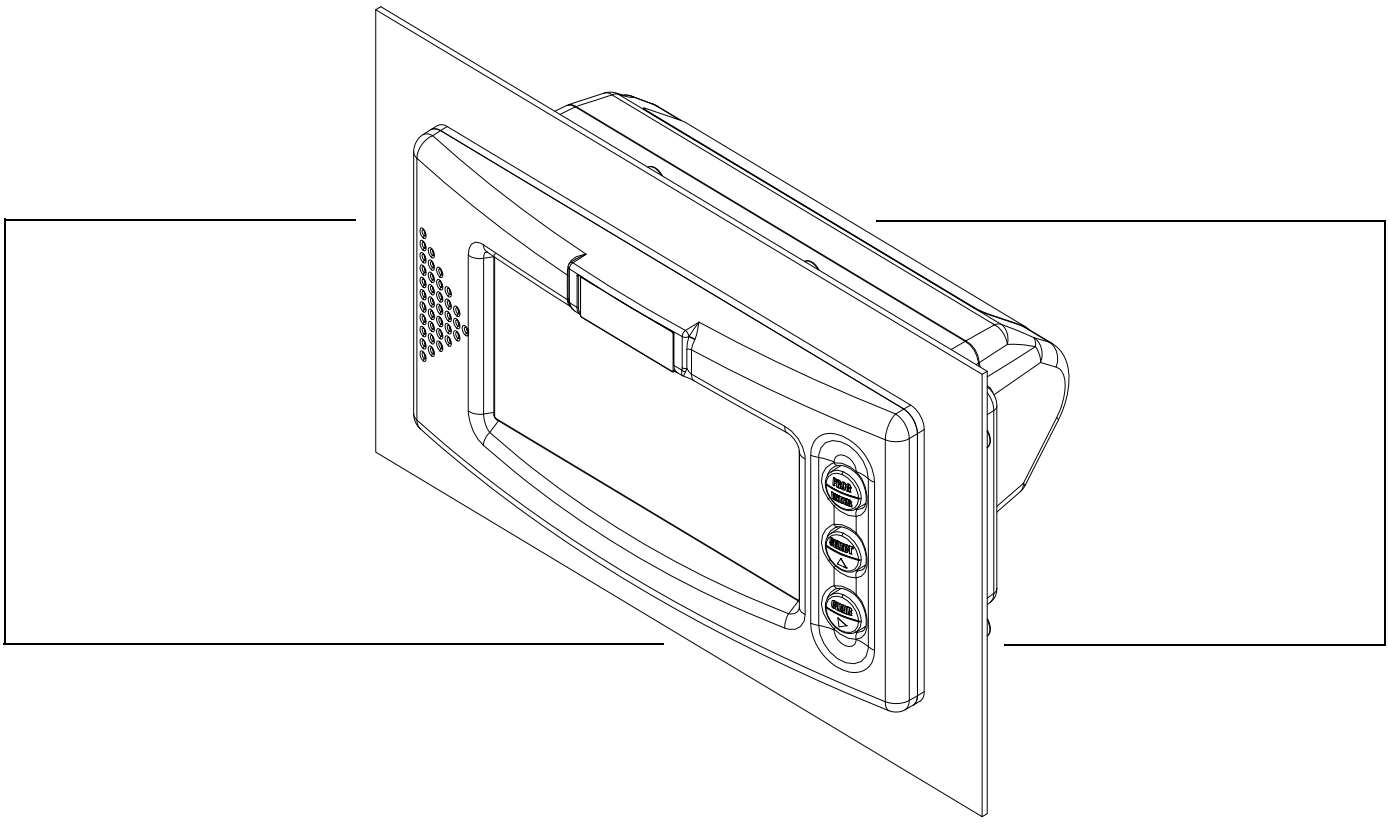
D030-P

BATCH CONTROLLER

WITH CONTROL OUTPUT



Signal input type P: pulse, Namur and coil

Control Output: one control output for one stage batching

CE

Health and Safety Information

Caution:

The D030-P must only be installed, operated and maintained by competent personnel that received proper training on regular basis, including instructions on the various types of protection and installation practices, relevant rules and regulations, and the general principles of area classification.

This instruction manual supplements the requirements of nationally accepted codes of practice. All installations must comply with the relevant sections of these codes and/or other comparable codes that applies in the region the D030-P is installed in.

In addition, particular industries or end users may have specific requirements relating to the safety of their installations. These requirements must also be met.

Disposal

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

Read Me First!

About This Guide

This manual describes all standard features and instructions related to the D030-P Batch Controller.

Note:

This version (*FW-D030-P-MAN-EN-V0102_02*) is written with a focus on software version 03.03.01. For other versions contact your supplier.

This manual is intended for all personnel involved in the operation, configuration, installation and troubleshooting of the D030-P Batch Controller.

Information in this manual is subject to change without prior notice. Fluidwell bv is not responsible for mistakes in this material or for incidental damage caused as a direct or indirect result of the delivery, performance or use of this material.

Prerequisites

All personnel working with the D030-P Batch Controller are assumed to fully understand, be capable of and act according to the information provided in this manual.

All personnel working with the D030-P are further assumed to be authorized and properly trained for the task at hand.

About Functions and Type Codes

Not all D030-P types share the same functions. Depending on the type codes on your particular D030-P, some functions described in this manual may –or may not– be available.

For details see this manual.

Conventions

The following conventions may have been used to emphasize information:

Warning:

This icon warns about actions that, when not performed correctly, may lead to product damage, personal injury or even death.

Warning:

Danger of electrical shock: this icon warns about actions that include the risk of electrical shock, resulting in product damage, personal injury or even death.
Such actions are best performed with power removed or made inaccessible.

Caution:

This icon warns about actions or procedures that may lead to incorrect functioning of the D030-P when not applied correctly.

Note:

This icon indicates a hint or provides important background information about the consequences of the described procedure or action.

Example:

This icon indicates a solution for a hypothetic situation, intended to help you interpret the related concept information.

How To Read This Manual

Caution:

- Before operating, configuring, opening or installing the D030-P you are expected to have read and understood all relevant sections in this manual.
- Before operation the D030-P MUST be installed in compliance with the installation instructions as described in "Installation Instructions" on page 8.

This guide consists of the following main sections:

chapter 1: "Introduction" on page 1	Provides an introduction and technical overview of the D030-P Batch Controller.
chapter 2: "Specifications of the D030-P" on page 4	Provides an overview of the D030-P specifications.
chapter 3: "Installation Instructions" on page 8	Provides mechanical and electrical installation instructions.
chapter 4: "Configuring the D030-P" on page 18	Provides an overview of configuration commands and programming sequence of the D030-P.
chapter 5: "Operating the D030-P" on page 27	Provides operating instructions for the daily use of the D030-P.
chapter 6: "Maintenance" on page 31	Provides maintenance instructions.

Power up, Power down and Storage of the D030-P

Your D030-P was shipped to you in a cardboard box and may be equipped with battery power. During transport the unit was switched off (shelf mode).

- If your D030-P is equipped with a battery you can press START twice to power it up.
- To power your D030-P down you must perform the following steps:
  a Press and hold PROG for 7 seconds. (See "Password Protection" on page 19 when password protected.)
  b Setup is indicated. Use ▲ to go to Setup Menu 4 — "Power Management"
  c Next press ▶ twice to go to SETUP 42 "Battery Mode" and press PROG
  d You enter SETUP menu 42. Select `shelf` and press PROG to switch the unit off.

Storage and Hot Spare Configuration

When storing or transporting the D030-P, put the unit back in `shelf` mode and store it at room temperature, in a dry place and in the original box.

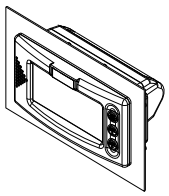
Note:

Before storing you may want to consider configuring a spare unit with identical settings as an active unit in the field. This way you have created a “hot spare” which can be taken from shelf and field mounted within minutes by electrical engineers.

Contents

Introduction

CHAPTER 1



System Description of the D030-P

Functions and Features

The Batch Controller model D030-P is a microprocessor controlled device for batching and filling of small batch sizes up to medium large quantities as well as displaying total and accumulated total .

The D030-P has been designed with a focus on:

- Ultra-low power consumption, to allow for battery operation of up to five years.
- Front panel mounting solution based on IP66/67 (Nema4X), suitable for harsh industrial surroundings.
- Very easy and user-friendly installation and programming through an easy menu-driven structure. Know one, know them all!
- Ability to process all type of signals.
- One control output for controlling a pump or valve.

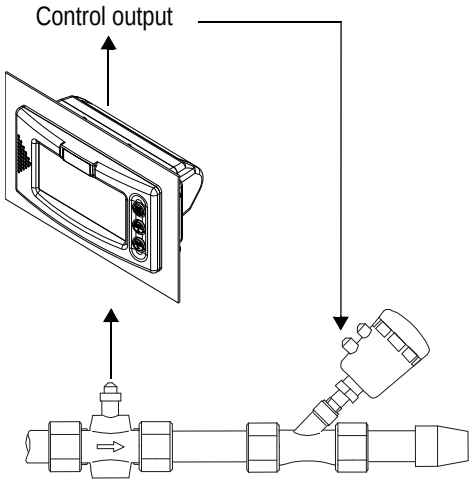


Figure 1: Typical application of the D030-P

Field Input

The “P” in D030-P indicates a pulse flowmeter input. Other versions are available to process (0)4-20mA “A” or 0-10V “U” flowmeter signals.

- The D030-P can read one passive or active flowmeter with a passive, active, Namur or sine wave (coil) pulse output.
- To power the flowmeter, several options are available.

Standard Outputs

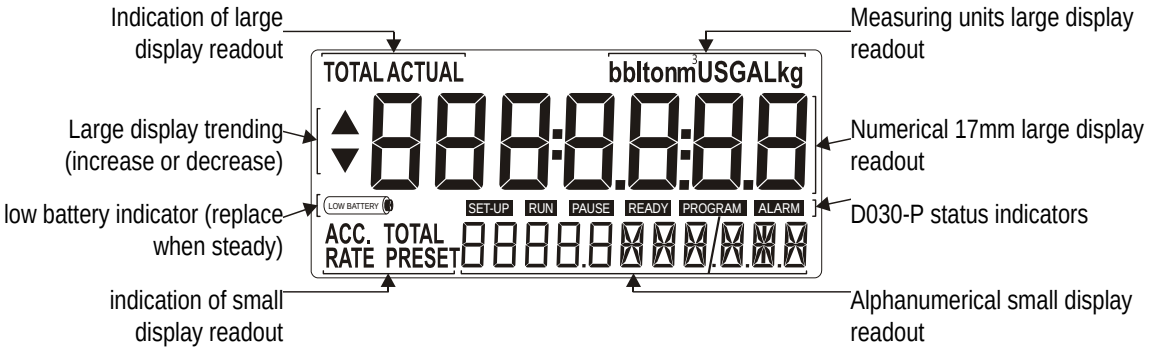
The following output is available for the D030-P:

- Control output: This passive transistor output controls the valve or pump for the batch process.

The D030-P Display Functions

The D030-P has a large transflective LCD with a number of symbols and digits to display measuring units, status information, trend indication and keyword messages.

Figure 2: The display functions of the D030-P



Configuration of the D030-P

"Available D030-P configurations" on page 3 shows that this unit is available in various hardware configurations to support a wide range of applications. Other models of this type have other configurations. Contact your reseller for details.

The configuration mode of the D030-P allows you to configure and shape your D030-P towards your specific requirements. The configuration mode supports all available hardware configurations of the D030-P and includes several important features such as K-factor, measurement units, signal settings, etc.

All setting as are stored in EEPROM memory and will not be lost in case of power breakdown or in the event of an empty battery.

Note:
You may optimize battery-life time (type PB only) by optimizing the power-management functions as described in "Power Management" on page 25.

EEPROM Memory

The D030-P contains EEPROM memory that does not loose its data upon power loss.

All configuration settings remain stored in case of a power failure or deactivation of the unit (e.g. during transport or storage).

Options of the D030-P

The following section describes the configuration options this particular D030-P may have been equipped with. Other models of this type have other options. Contact your reseller for details.

Available D030-P configurations

Your D030-P model is available in a number of hardwired configuration options.

A product label on the backside of the unit identifies which configuration options are included in your D030-P.

The following table identifies the options that may apply to your D030-P.

> **Note:**
> A combination of configuration options is not always possible: some options rule others out and some options require others to be included. Consult the product label on your D030-P enclosure to see which options are included on your particular unit.

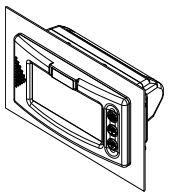
Standard confuguration: D030-P-HB-OT-PX-ZX

Coding information	D030-_	-HB	-O_	-P_	-Z_
flowmeter input signal(s)					
P	Pulse (coil, NAMUR, npn, pnp, reed switch)				
Front Panel mount enclosure - IP66/67 (NEMA4X)					
HB	Aluminum DIN 43700 / IEC 61554 front panel				
Control output					
OH	Active and passive transistor output - requires PD (DC). (PD (AC) and PM are pending).				
OR	Highly isolated mechanical relay output - requires PD (DC). (PD (AC) and PM are pending				
OT	Passive transistor output - standard configuration.				
Power supply					
PB	Long life lithium battery				
PD	24V DC/AC + sensor supply.				
PM	115 - 230V AC + sensor supply.				
PX	Basic power supply 8 - 30V DC				
Other options					
ZB	Backligh, Bi-colort green/amber				
ZF	Extra high sensitive coil input: 10mV p-p				
ZG	Very high sensitive coil input: 5mV p-p				
ZX	No options				

The bold marked text contains the standard configuration.

Specifications of the D030-P

CHAPTER 2



General specifications

Display

Type		High intensity reflective numeric and alphanumeric LCD, UV-resistant.
Digits		Seven 17mm (0.67") and eleven 8mm (0.31")digits. Various symbols and measuring units.
Refresh rate		User definable: fast - 1 sec - 3 sec - 15 sec - 30 sec - off.
Option ZB		Transflective LCD with bi-color LED backlight; green / amber. Intensity and color can be adjusted in the configuration menu. High contrast readings in full sunlight and darkness.

Panel Mount Enclosure

General		Die-cast ALU (aluminum) enclosure with Polycarbonate window and silicone. UV stabilized and flame retardant material. GRP back cover.
	Control Keys	Three industrial micro switch keys. UV-stabilized silicone keypad
	Painting	UV-resistant 2-component industrial paint
	Dimensions	144 x 72 x 71.4mm (5.67" x 2.83" x 2.81") – LxHxD
	Weight	325 gr.
	Classification	IP66, IP67 (NEMA4x) at the front-side
Panel cutout		138 x 68mm (5.43" x 2.68") – LxH
Panel thickness		Max. 6mm (¼")
	Type HB	Die-cast ALU panel-mount enclosure according: DIN 43700 / IEC 61554

Temperature

Operating	-40°C to +80°C (-40°F to +176°F) ambient

Approvals and compliances

EMC compatibility	Compliant ref: EN 61326 (1997), EN 61010-1 (1993).

Power supply

Type PB	3,6V Lithium battery life-time depends upon settings and configuration – up to 5 years.
Type PD	24V AC / DC + 10%. Power consumption max. 5 Watt.
Type PM	115-230V AC + 10%. Power consumption max. 15 Watt.
Type PX	8-30V DC. Power consumption max. 0.3 Watt.
Type ZB	20 - 30V DC. Power consumption max. 1 Watt. With type PD - PM: Internally powered

Sensor excitation

Sensor exitation specifications relate to the power supply type.

Type PB / PX	3V DC for pulse signals and 1.2V DC for coil pick-up.

Note:
To prevent battery drainage only use for pulse sensors with a very low power consumption such as coils (sine wave) and reed-switches.

Type PD / PM	Dipswitch adjustable sensor supply: 8.2V DC. Iout max 35mA @ 20°C 12V DC. Iout max 50mA @ 20°C 24V DC. Iout max 75mA @ 20°C (this voltage can vary depending on the input supply voltage).

Terminal connections

Type	Removable plug-in terminal strip.
Wire	max. 1.5mm^2 and 2.5mm^2 solid / stranded.
Screw thread	M3
Tightening torque	0.5-0.6 Nm

Data protection

Memory type	EEPROM; data retention >10 years Automatic backup of settings upon change & running totals every minute
Access restriction	Via configurable 4 digit numerical pass code

Inputs

Flowmeter

Type P		Coil/sine wave (minimum 20mVpp or 80mVpp - sensitivity selectable), NPN/PNP, open collector, reed-switch, Namur, active pulse signals 8 - 12 and 24V
	Frequency	Min. 0 Hz – max. 7 kHz for total and flowrate (max. frequency depends on signal type and internal low-pass filter). Reed switch with low-pass filter: max. frequency 120 Hz.
	K-Factor	0.00001 - 9,999,999 with variable decimal position.
	Low-pass filter	Available for all pulse signals.
	Option ZF:	coil sensitivity 10mVpp.
	Option ZG:	coil sensitivity 5mVpp.

Outputs

Control output

Output type		Control output according the batch process.
	Type OH	Active 24V DC transistor output; Requires PM/PD. Max load 75mA Passive transistor output - not isolated; Requires PM/PD. Max. 24V DC - 300mA.
	Type OR	Isolated electro-mechanical relay (NO/NC); max. resistive load: 2A@230Vac / 30V DC. Pilot duty rating: 0,5A @ 230Vac. Requires PM/PD (DC). **Note**: In case of inductive load, use RC snubbers.
	Type OT	Passive transistor output (NPN) - not isolated; Max. 50V DC - 300mA.

Operational

Operator functions

Displayed functions

- Preset value - can be entered by the operator
- Total and accumulated total
- Batched quantity or remaining quantity
- key-word messages

Preset and Total

Units	L, m3, GAL, USGAL, kg, lb, bbl - no units
Digits	7 digits
Displayed decimals	configurable 0 — 3

Note:
Total can be reset to zero by pressing the STOP key twice.

Accumulated total

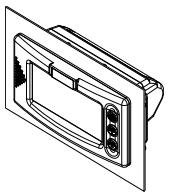
Units / Decimals	Identical to selection for "Total".
Digits	11 digits

Note:
Accumulated total can **not** be reset to zero.

This page is left blanc intentionally.

Installation Instructions

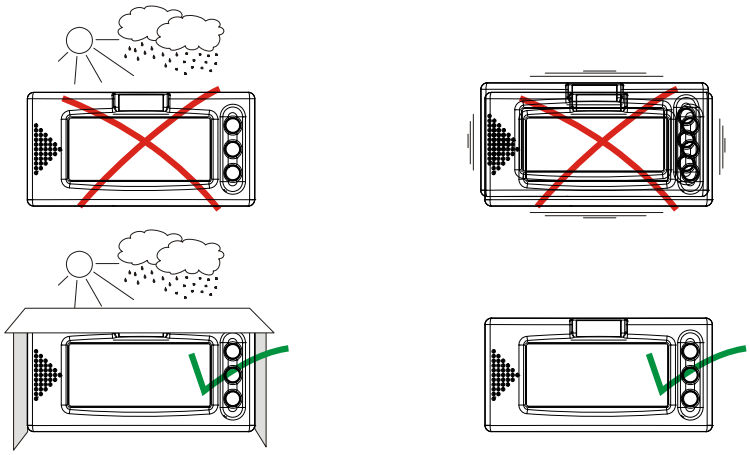
CHAPTER 3



Note:
This section describes various hardware configurations of the D030-P. Your particular model of the D030-P may not support all configuration options described.

Mechanical Installation

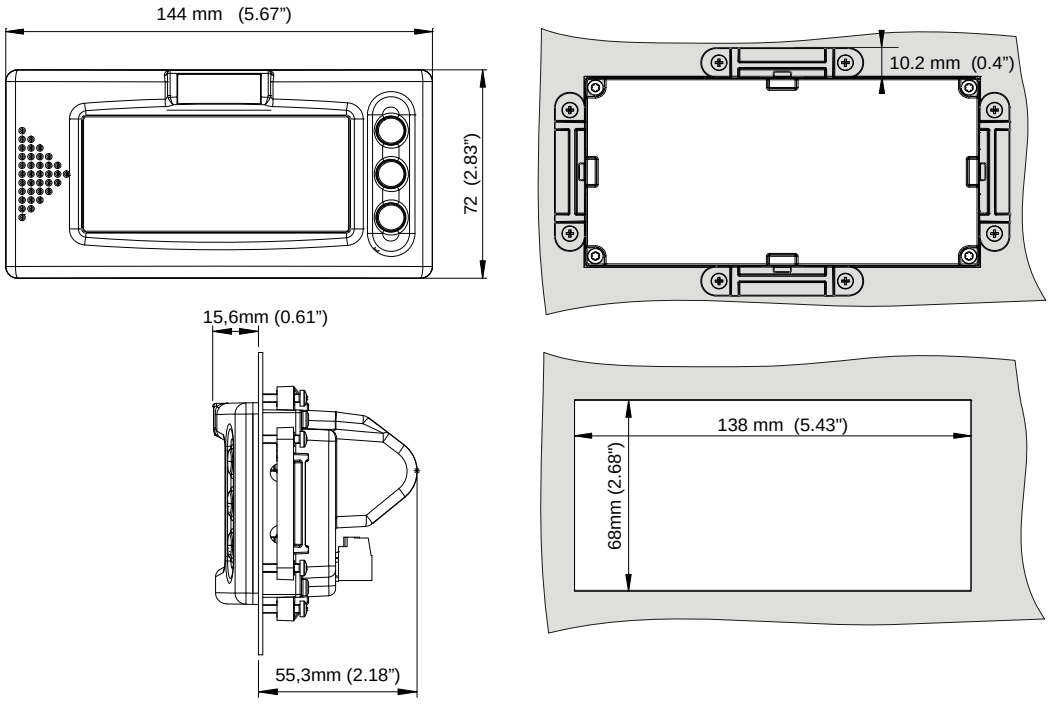
Figure 3: Mechanical mounting precautions



To extend life of your unit:

- Mount the D030-P on a solid base to avoid vibrations.
- Provide sufficient slack on cables to prevent stress on cable entries.
- Make sure the seal is mounted properly between the housing and the panel.
- The IP66, IP67 (NEMA4X) classification is valid for the front enclosure only.
- Do not expose the casing to strongly varying (weather) conditions, not even when rated IP67.

Figure 4: Panel cut-out dimensions



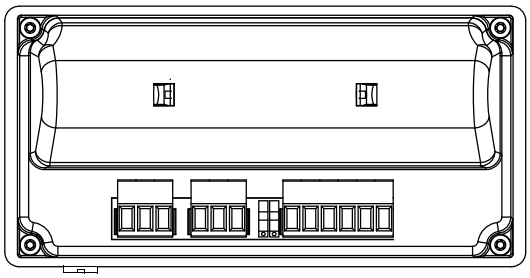
Electrical installation – general

Overview of Terminal Connectors

To gain access to the connectors open the panel containing the D030-P. You now see the battery cover with the battery and the connectors at the back side of the display unit as shown below.

The actual number and size of connectors depends on your particular model.

Figure 5: Connector location D030-P



flowmeter and Power

A 6-pole Classic COMBICON connector connects the flowmeter and (optional) power supply.

Pulse Output

A 3-pole Classic COMBICON connector connects the optional Pulse output.

Mains Power Supply

A 3-pole Classic COMBICON connector connects the mains power supply.(110/230V) (PM)

Figure 6: Pin layout options of main connector(s) –availability depends on model

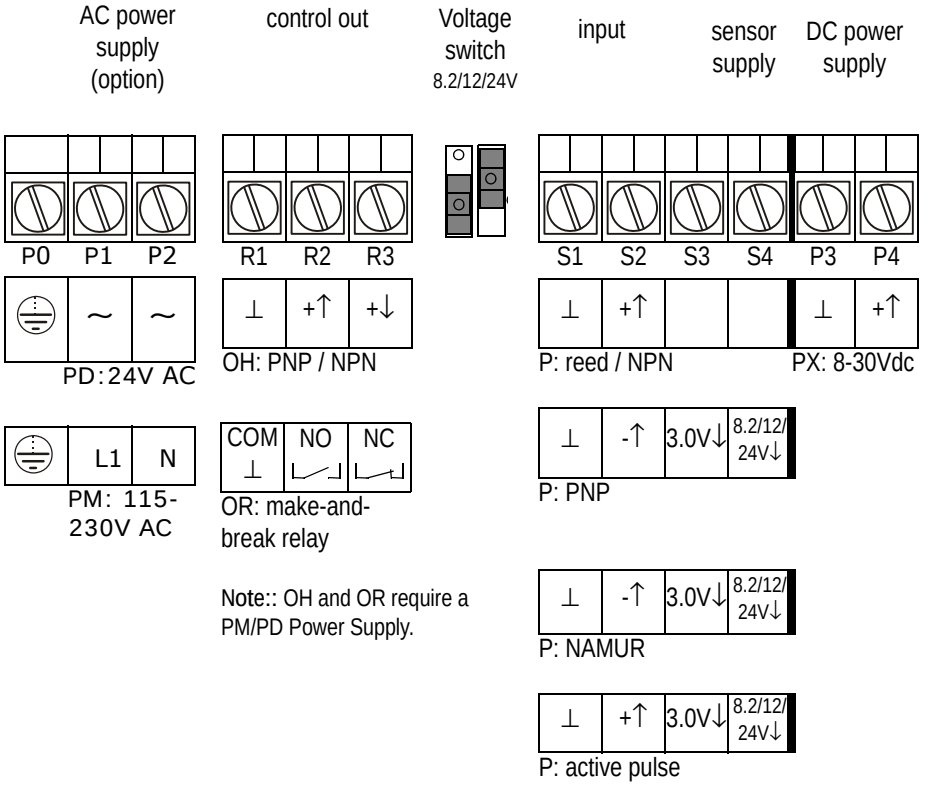
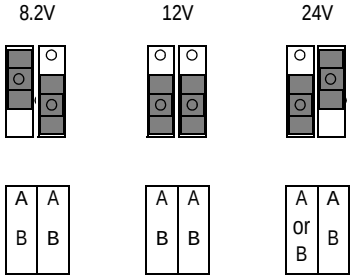
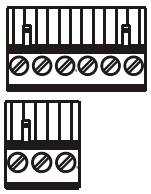


Figure 7: Voltage switch positions



Connector Types and Wiring Sizes

The following connector types are fitted. Wires are connected using a flat head screw driver:



Classic COMBICON

A screw connector with 5.08mm pitch, suitable for 0.2—2.5mm2 or AWG 24—12 wire. Max. torque 0.5Nm.

Power Supply Wiring

Below section describes the available power supply types for the D030-P. Which types are available in your particular D030-P depends on the ordering code.

Battery equipped models switch their internal battery off when an external supply is active.

The following power supply options are available:

- Battery powered. see "Battery powered type PB" on page 10 for details.
- Externaly powered, see ""External Power Supply wiring" on page 10" for details.

Battery powered type PB

Type PB is internally battery powered and does not require any external wiring.

When power supply PX is available (see below) the internal battery is switched off. This extends battery life and guarantees higher availability during power outages.

- A healthy battery has a life expectancy of several years, depending on its use and configuration settings. For details see "Battery life" on page 31.
- When installing verify that the battery is in good working condition by running the power-up sequence on page iv of this manual. If the battery needs to be replaced follow the battery replacement instructions delivered with the new battery.

External Power Supply wiring

The D030-P can be equipped with a power supply, type PX or PD.

- For type PX or PD DC your D030-P must be equipped with a 6 pole connector.
  Type PD can also power your flowmeter in the field, see "Power wiring type PD" on page 11 for details.

Note:

- Type PX < 16V does not foresee in the (optional) backlight power; see "Backlight" on page 12.
- The internal battery is on standby, when external power is supplied. Note that the internal battery *cannot* be used to power a flowmeter with 8.2V (pin S4)!

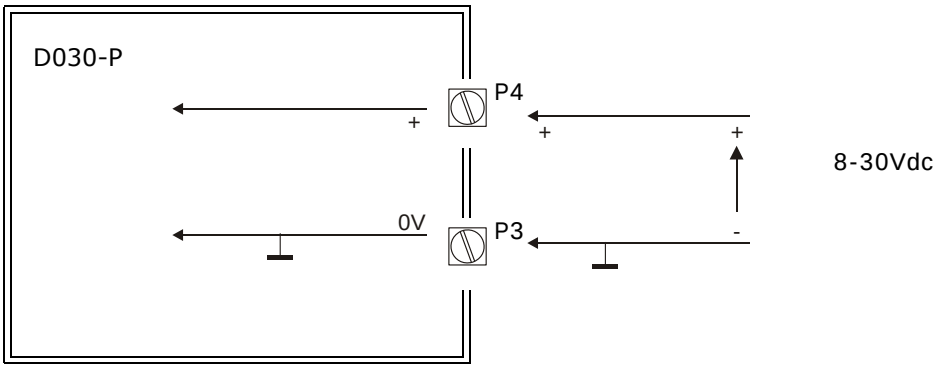
Caution:

The D030-P and it's field devices are functionally isolated to a maximum of 500V!

Power wiring type PX

Connect the "-", GND or "0V" wire of your external power supply to pin P3. Connect the "+" wire to pin P4.

Figure 8: Power wiring type PX

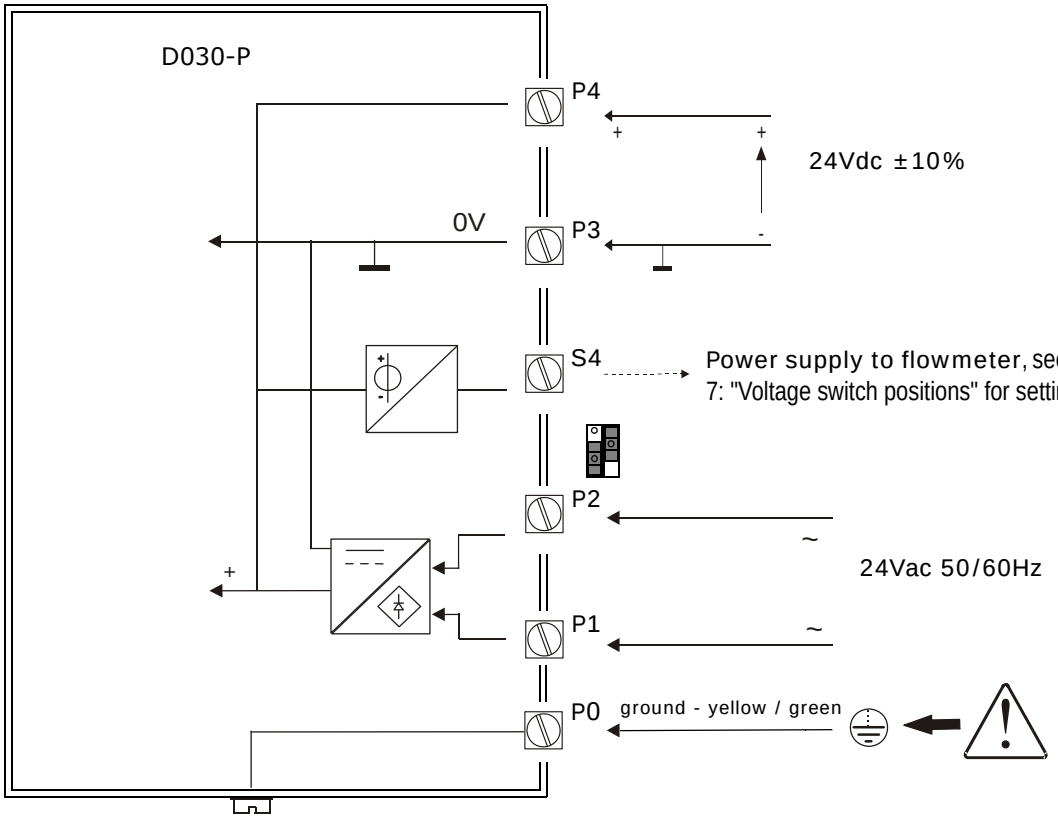


With power wiring type PX pin S4 offers 8.2V to power a device in the field

Power wiring type PD

With power wiring type PD / PM pin S4 offers a limited sensor supply (8.2/12/24V) to power the flowmeter in the field.

Figure 9: Power wiring type PD DC / AC – with flowmeter supply



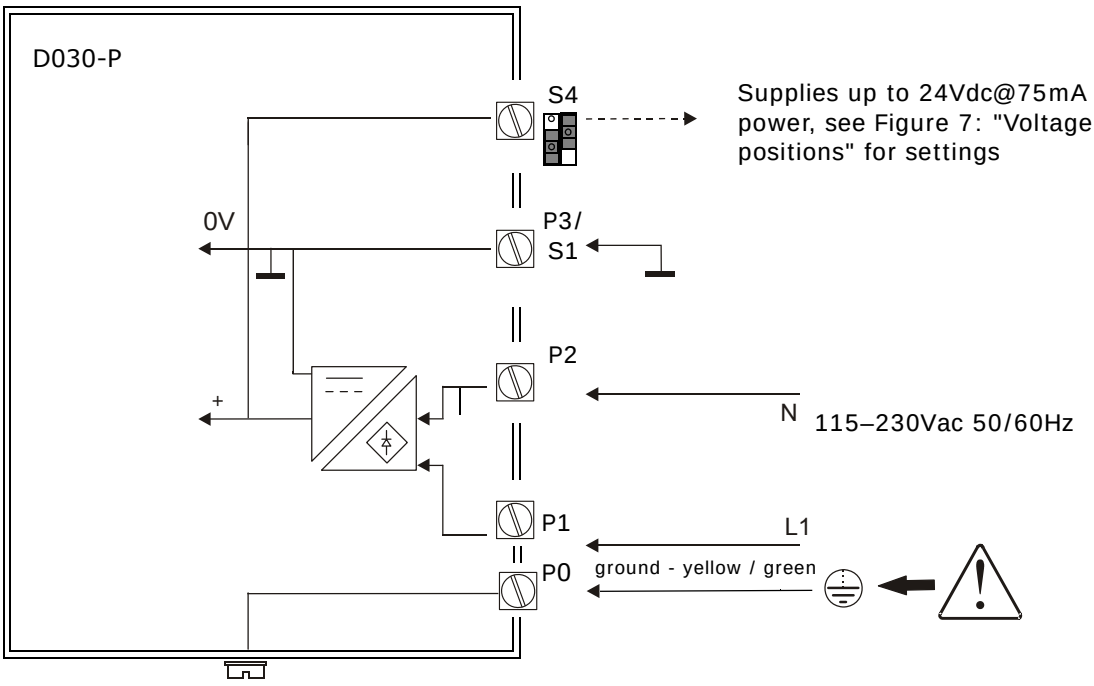
Power wiring type PM

Type PM is a galvanically isolated high power switching power supply, converting 115–230Vac mains (50/60Hz) to power the D030-P, the backlight (option) and provides up to 24V sensor supply to the field.

Warning
- **HIGH VOLTAGE!** Danger of electrical shock: remove power from the supply lines before connecting.

Warning
- Never connect 24V AC and DC together on the same unit, this will damage the unit.

Figure 10: Power wiring type PM



Backlight

For those applications where readability during day and night is an issue, a bi-color backlight is available. The background color can be set to green or amber and the intensity can be adjusted in the configuration menu, see 32 "Backlight" on page 24

Backlight requires a power supply of at least 16V and is internally powered by options PD, PM or PX above 16V.

I/O wiring options

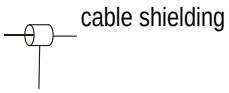
Batch Controller Input Wiring Options Type P

Below flowmeter signal types can be connected to the D030-P.

The screen of the signal wire must be connected to the common ground if not earthed at the sensor itself.

The maximum input frequency is approximately 10 kHz (depending on the type of signal). The input signal type has to be selected with the correct SETUP-function (see "Signal" on page 25).

Explanation of symbol 'cable shielding'



Low pass filter

A low-pass filter is an electronic filter that passes low-frequency signals and attenuates (reduces the amplitude of) signals with frequencies higher than the cutoff frequency.

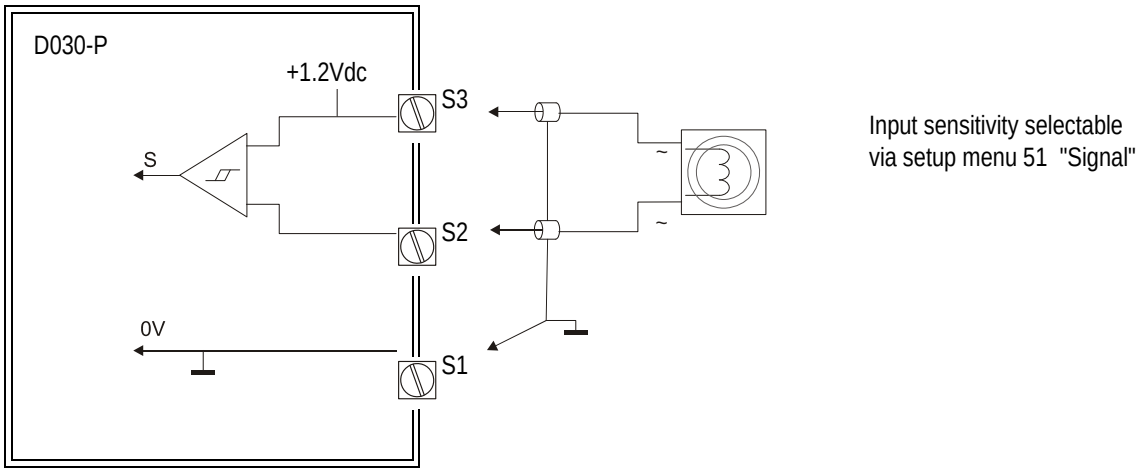
Sine-wave (Coil) Signal

The D030-P can be connected to flowmeters with a coil output signal.

Two sensitivity levels can be selected with setup menu 51 "Signal":

- COIL LO: sensitivity about 120mVp-p.
- COIL HI: default sensitivity about 20mVp-p.
  (with type ZF COIL HI sensitivity is increased to 10mVp-p and with type ZG to 5mV p-p.)

Figure 11: Coil signal input

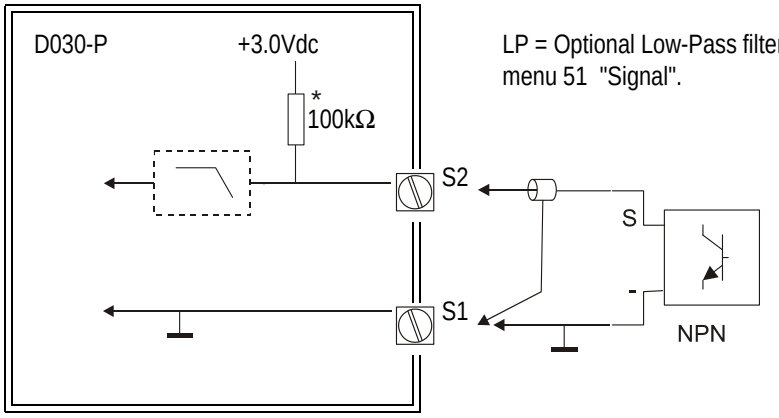


Pulse-signal NPN / NPN-LP

The D030-P is suitable for use with flowmeters which have a NPN output signal.

For reliable pulse detection, the pulse amplitude has to go below 1.2V. Signal setting NPN-LP employs a low-pass signal noise filter, which limits the maximum input frequency. See "Low pass filter" on page 13.

Figure 12: NPN pulse signal input



Pulse-signal PNP / PNP-LP

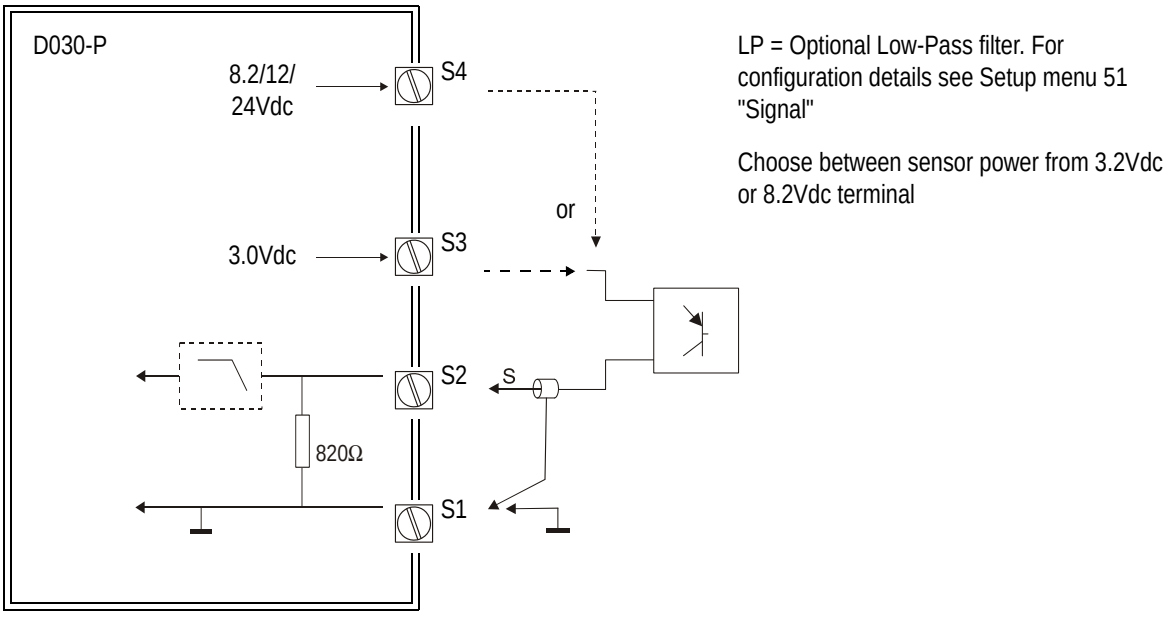
The D030-P is suitable for use with flowmeters which have a PNP output signal.

3.0V is offered as a pull-up voltage which has to be switched by the PNP sensor. Optionally an 8.2/12/24V pull-up voltage can be wired, when powered with a power supply type PD/PM.

For a reliable pulse detection, the pulse amplitude has to go above 1.2V. Signal setting PNP-LP employs a low-pass signal noise filter, which limits the maximum input frequency. See "Low pass filter" on page 13.

For a signal detection level of 50% of the supply voltage: please refer to "Flowmeter Pickup Signal Types Supported" on page 33

Figure 13: PNP pulse signal input

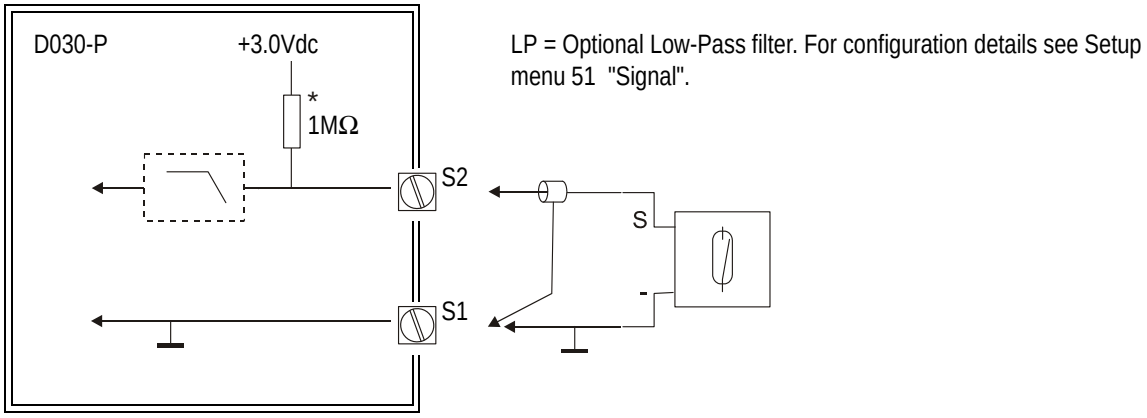


Reed Switch

The D030-P is suitable for use with flowmeters which have a reed switch output signal.

For reliable pulse detection a low-pass signal noise filter can be applied, which limits the pulse bounce. See "Low pass filter" on page 13.

Figure 14: Reed Switch signal input

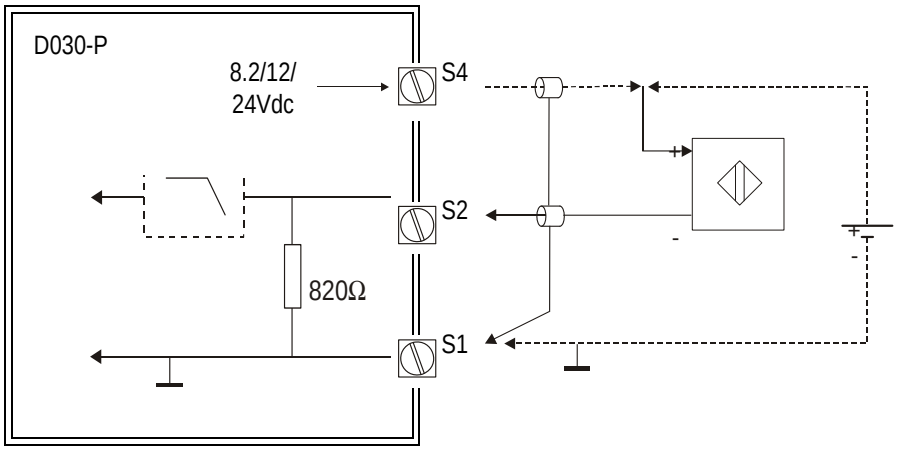


Namur Input Signal

The D030-P is suitable for use with flowmeters whith a Namur output signal.

The NAMUR based flowmeter can be powered externally or via the 8.2/12/24Vdc sensor power terminal, provided with power supply PD and PM.

Figure 15: NAMUR signal input

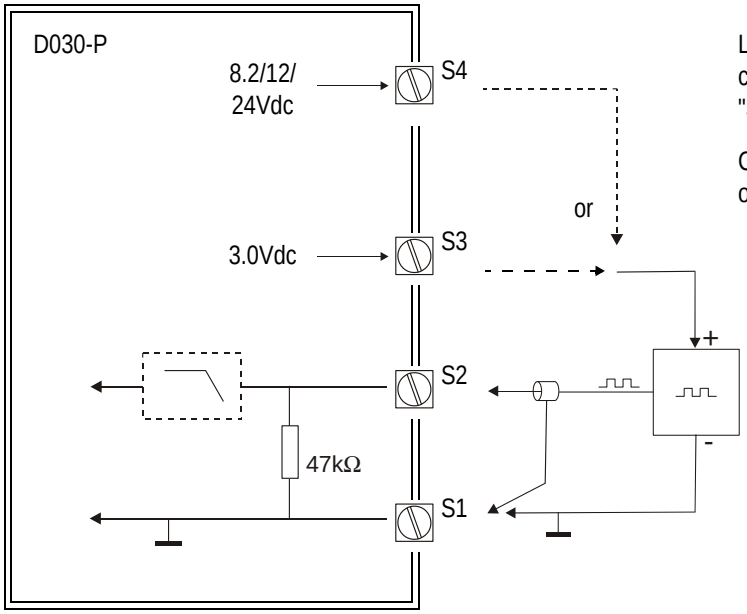


Active Input Signal

The D030-P is suitable for use with flowmeters which actively provide an output signal.

The active output based flowmeter can be powered externally or via the 8.2/12/24Vdc sensor power terminal, provided with power supply PD and PM.

Figure 16: Active signal input



LP = Optional Low-Pass filter. For configuration details see Setup menu 51 "Signal"

Choose between sensor power from 3.2Vdc or 8.2Vdc terminal

Control output wiring

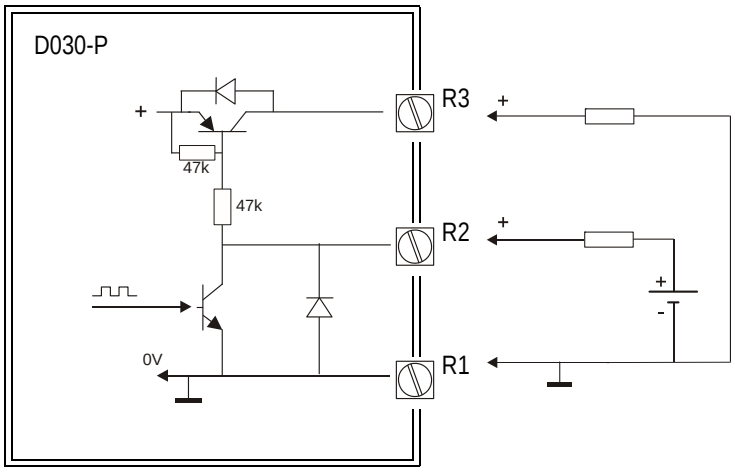
Active / Passive output, Type OH

Type OH provides an active pull up output and a passive pull down output.

The active pull up output is capable of sourcing 75mA depending on the power supply used. Note that for the AC supplied inputs the total output current is reduced by the used nominal D030-P current.

The passive pull down output, is capable of sinking 300mA@24Vdc.

Figure 17: Active / Passive output - type OH



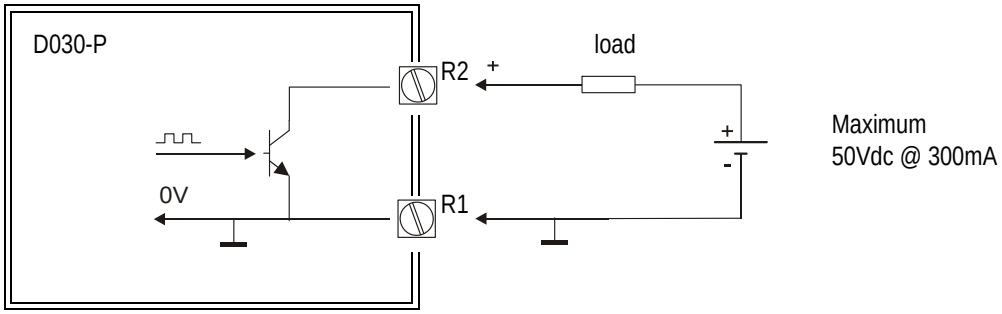
Total load @ 24Vdc:
max. 75mA @ PSU type PM

Maximum
24Vdc @ 300mA

Passive output, Type OT

Type OT provides a passive pull down output, capable of sinking 300mA@50Vdc.

Figure 18: Passive output type OT



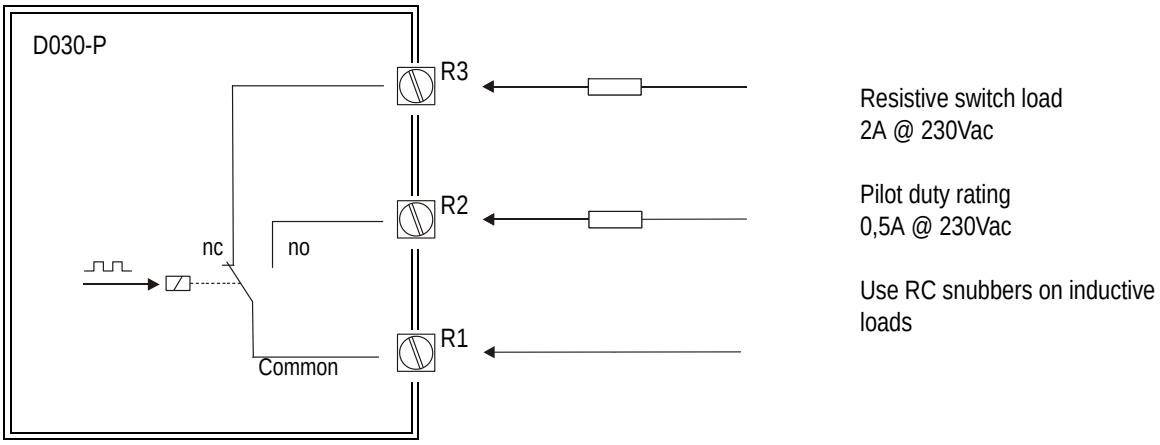
Relay Contact Output, Type OR

Type OR provides a potential free output contact, capable of driving 2A @ 230V.

When used for switching loads on another relay or solenoid valve coils the pilot duty rating is 0,5A @ 230Vac

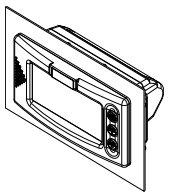
Note that (configured) output frequencies of 5Hz or higher reduce relay life time significantly.

Figure 19: Relay contact output type OR



Configuring the D030-P

CHAPTER 4



General

The D030-P has three buttons and four modes of operation, one of which is “off”.

The active modes are displayed by status indicators. Configuration of the D030-P is possible via the Setup and Program modes, which are indicated by SETUP and PROGRAM.

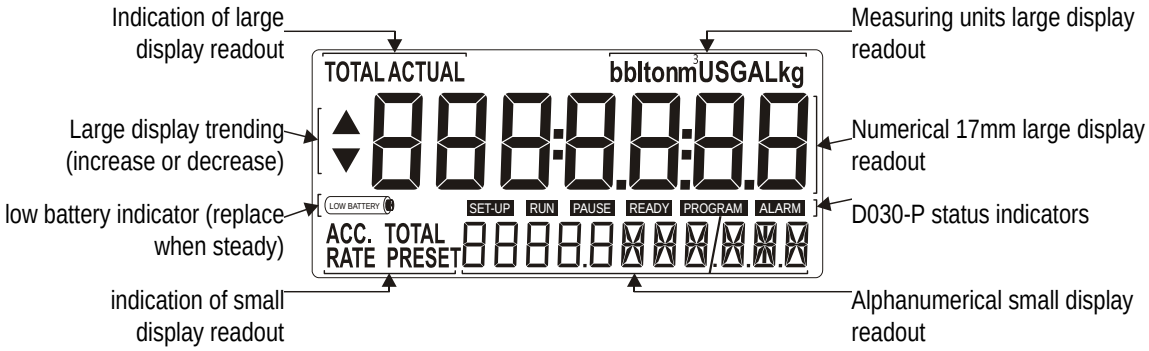
Warning:
Not understanding the effect of your changes can cause unexpected system responses, resulting in process inefficiency, product spilling and downtime.

- Familiarize yourself with the next sections on display functions, keypad functions and the quick reference menu –before accessing the D030-P configuration modes.
- Also familiarize yourself with the sections on the D030-P setup functions and what *immediate* impact they have on its response, before attempting to modify them.

The D030-P Display Functions

The D030-P has a large transflective LCD with a number of symbols and digits to display measuring units, status information, trend indication and keyword messages.

Figure 20: The display functions of the D030-P



The D030-P Key Functions

The following keys are available:

PROG ENTER — This key is used to access various configuration modes, program items and enter values.
Use this key when you see PROG or ENTER in the text.

START ▲ — This key is used to START the batch process and to change blinking values and states or to configure the unit.
Use this key when you see START or ▲ in the text.

STOP ▶ — Press STOP to "PAUSE" the batch process. Pressing this key twice finishes the process completely and it can't be continued. STOP is also used to select Total and accumulated total and to select a value (In Program mode).
Use this key when you see STOP or ▶ in the text.

Quick Reference Menu

Shelf mode

Mode to deactivate the unit for storage. The unit is switched off. Press START twice to switch the unit on and perform a self test.

Operator mode → **Setup mode** → **Program mode**

Default operation mode of the unit. Display indicators: RUN or READY (optional).

- Unit always returns to this menu when not operated for 20 seconds.
- Operator functions and rights depend on settings and available options of your unit.

Mode to select setup items and see their settings. Display indicator: SETUP.

- To access press and hold PROG 7 seconds. While waiting the display shows ▲▼.
- You may have to use ▶ and ▲ to enter a 4-digit password. Confirm with PROG.
- To select an item use buttons ▶ and ▲.
- To exit press and hold PROG 3 seconds or wait 20 seconds.

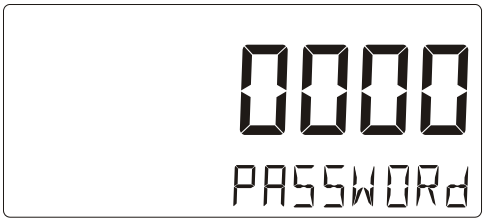
Mode to change settings. Display indicators: SETUP and (blinking) PROGRAM.

- To access the selected item press PROG.
- To change an item use buttons ▶ and ▲.
- To save changes and exit press ENTER.
- To cancel press and hold PROG 3 seconds or wait 20 seconds.

Password Protection

If Setup mode is password protected you get below screen when trying to access: `Password` and `0000` are displayed, the left digit is blinking.

Figure 21: Enter a password to continue



1 Press ▲ repeatitly until the correct number in the blinking digit is displayed.
2 Press ▶ to move to the next digit and repeat above step for all four digits.
3 When done with all four digits press ENTER to confirm:
   - When correct, you enter Setup mode and the SETUP indicator lights up.
   - When incorrect, you return to Operator mode: Try again.

See "No access (unknown password)" on page 35 for troubleshooting information.

Modes of Operation

Shelf Mode

In Shelf mode the D030-P shuts down and can be shelved, stored or transported without draining the battery. All settings in EEPROM remain stored, even when the battery is removed.

To wake the unit up press the center button (START /▲) twice to bring it in Operator mode.

Operator Mode

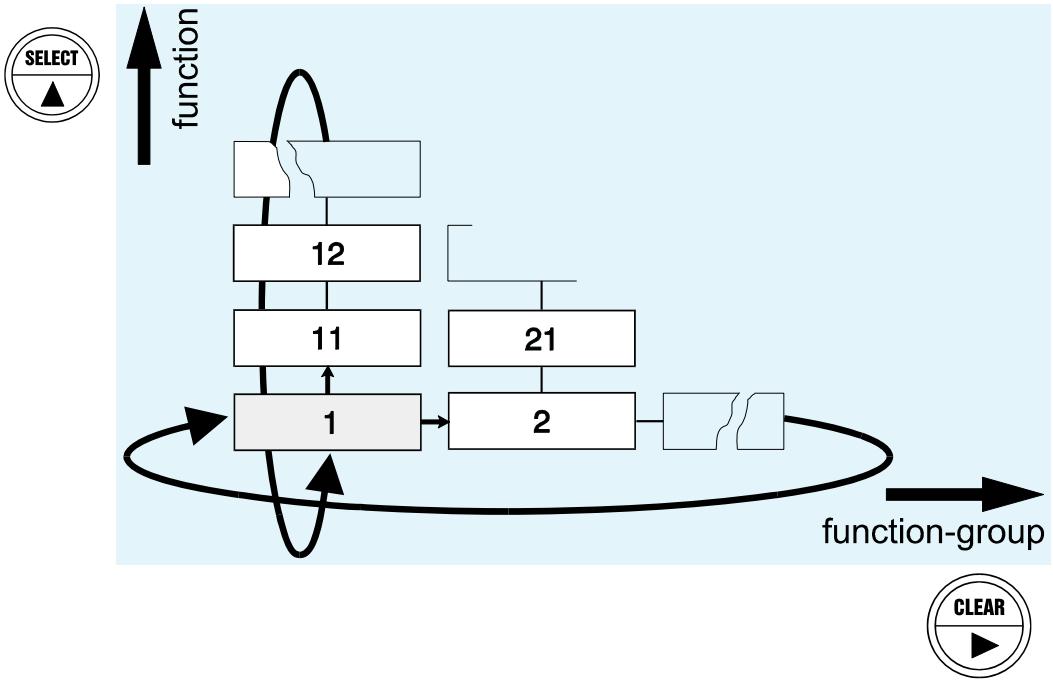
Operator functions and rights can differ per unit: they depend on settings and options. For information on Operator mode see "Operating the D030-P" on page 27.

Setup Mode

In Setup mode you can browse, select and view all function items. From here you can also access Program mode to change current settings.

Function items are arranged in function groups, and can be accessed as shown below.

Figure 22: Matrix structure SETUP-level



1 To access Setup mode press and hold PROG 7 seconds. While waiting the display shows ▲▼. When asked for a password, follow the instructions in "Password Protection" on page 19.
You enter Setup mode in function group 1. The SETUP indicator lights up.
2 How function items are arranged in groups is listed on page 22. To browse to the desired function item:
   a select the function group containing the item by repeatitly pressing ▶.
   b select the function item by repeatitly pressing ▲.
3 You now have the following options:
   - **To change the value** of selected function item press PROG. See "Program Mode" on page 21 for follow-up instructions.
   - **To select another function item** go back to step 2.
   - **To exit** wait 20 seconds. The D030-P automatically returns to Operator mode. Alternatively you can press and hold ENTER 3 seconds. This has the same effect.

Program Mode

In Program mode you can change the properties (value or setting) of a selected Function item.

Warning:
Not understanding the effect of your changes can cause unexpected system responses, resulting in process inefficiency, product spilling and downtime.

Note:
To cancel at any time press and hold PROG for 3 seconds or wait 20 seconds.

1 Select a Function item (see "Setup Mode" on page 20).
2 Press PROG with the function item selected. The PROGRAM indicator starts blinking.
Depending on the function item selected you can now enter a value or a setting.
3 To program a function item that contains a value:
   a Press ▶ to select the digit you want to change (selected digit flashes).
   b Press ▲ to change the value of the flashing digit.
   c Repeat above steps for all digits of the value and press ENTER to store the new value.
4 To program a function item that contains a setting:
   a Use ▶ and ▲ to browse through the various options.
   b Press ENTER to store the new setting.

Overview of Setup Functions and Settings

SETUP FUNCTION	SETTINGS & DEFAULT VALUE
1 – TOTAL	
11 Unit	L, M3, GAL, USGAL, KG, LB, BBL - NO UNITS
12 Decimals	0000000 - 111111.1 - 22222.22 - 3333.333
13 K-factor	0.000010 - 9,999,999
14 Decimal K-factor	0 - 1 - 2 - 3 - 4 - 5 - 6
15 Batch Maximum	X,XXX,XXX QUANTITY
2 – OVERRUN	
21 Overrun	DISABLE - ENABLE
22 Time	0.1 - 999.9 SECONDS
3 – DISPLAY	
31 Display	INCREASE - DECREASE
32 Backlight	OFF - AMBER - GREEN
33 Brightness	1 - 2 - 3 - 4 - 5
4 – POWER MANAGEMENT	
41 LCD New	FAST - 1 SEC - 3 SEC - 15 SEC - 30 SEC - OFF
42 Battery Mode	SHELF - OPERATE
5 – FLOWMETER	
51 Signal	NPN - NPN-LP - REED - REED-LP - PNP - PNP-LP - NAMUR - COIL HI - COIL LO - ACT_8.1 - ACT_12 - ACT_24
6 – OTHERS	
61 Type of Model	D030-P
62 Software Version	03.03.01
63 Serial Number	7-DIGITS NUMERIC VALUE
64 Password	0000 - 9999 (4-DIGIT NUMERIC)
65 Tag Number	0000000 - 9999999 (7 DIGIT NUMERIC)

The D030-P Setup Functions Explained

Warning:
Disconnect the D030-P from the process before modifying setup items:
Changes to setup items take immediate effect!

SETUP MENU 1 — TOTAL

Below setup items determine the calculation and visualisation of the total volume.

- For configuration examples to calculate the K-factor see "Calculating the K-factor for Totals" on page 33.

SETUP 11 Unit

Unit determines the measurement unit for total, accumulated total and control output. The following units can be selected:

L, m3, GAL, USGAL, kg, lb, bbl - no units

Caution:
Alteration of the measurement unit will impact readout at operator level and configuration level.
Please note that total related settings, such as K-factor, have to be adapted as well; the conversion is not done automatically.

SETUP 12 Decimals

Decimals determines with how many decimals the measured total is *displayed*.

You can select one of the following display configurations:

0000000 - 111111.1 - 22222.22 - 3333.333

SETUP 13 K-factor

K-factor determines the nominal K-factor used to convert the flowmeter signal into quantity.

The K-factor represents the number of pulses per volume. A pulse generated by the flowmeter represents an amount of volume that must be recalculated to the selected measurement unit, for example cubic meter.

Enter the nominal K-factor as:

0.000010 - 9,999,999

You must enter the nominal K-factor in whole numbers and set the decimals with SETUP 14 "Decimal K-factor".

Note:
The more accurate you define the K-factor, the more accurate the D030-P will measure.
For calculation examples see "Calculating the K-factor for Totals" on page 33.

SETUP 14 Decimal K-factor

Decimal K-factor determines the number of decimals for SETUP 13 "K-factor". The following can be selected:

0 - 1 - 2 - 3 - 4 - 5 - 6

Caution:

- These changes influence the accuracy of SETUP 13 "K-factor".
- These changes do not affect the Decimals, defined in SETUP 12.

SETUP
15 Batch Maximum

Batch Maximum limits the operator to enter a new preset-value which is more as the entered batch maximum.

The following options are available:

X,XXX,XXX quantity

SETUP MENU 2 — OVERRUN

Overrun can occur at the end of the batch process, as a result of slowness of a valve / pump. Consequently, the accuracy is less. With this function, the D030-P analyses the actual overrun characteristic after every batch. This information is used to correct the overrun automatically.

SETUP
21 Overrun

For an accurate overrun correction, it is necessary that the batch controller meets certain technical demands, such as "high resolution" and shows no "false" overrun due to a slow update time.

Do not enable this function if the flow meter does not meet these technical demands.

disable - enable

SETUP
22 Time

The overrun characteristic of the system will be analyzed during a certain time after the batch. 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 extra time in order to avoid an incorrect overrun correction or false leakage alarms.

Note that the next batch can only be started after elapsing of this overrun time!

The minimum overrun time is 0.1 second, maximum 999.9 seconds

0.1 - 999.9 seconds

SETUP MENU 3 — DISPLAY

Below setup options define the display functions for the operator.

SETUP
31 Display

The large 17mm digits can be set to display the actual batched quantity (increase) OR to display the remaining quantity to be batched (decrease).

increase - decrease

SETUP
32 Backlight

Backlight determines the active color of the optionally supplied LED backlight. If no backlight has been supplied this setting has no impact.

off - amber - green

SETUP
33 Brightness

Brightness determines the intensity of the optionally supplied LED backlight. If no backlight has been supplied this setting has no impact.

The following can be selected (from dark to bright):

1 - 2 - 3 - 4 - 5

SETUP MENU 4 — POWER MANAGEMENT

Below setup options are smart power management functions to set the optimum between the response time of the unit and the (optional) battery life time.

SETUP **41**

LCD New

LCD New defines the display update frequency when the D030-P is unmanned (no buttons pressed).

A slow update frequency extends battery life but reduces display response.

Example:
- Expected battery life with a coil pick-up, 1KHz. pulses and `fast` update: about 2 years.
- Expected battery life with a coil pick-up, 1KHz. pulses and `1 sec` update: about 5 years.

The following options are available:

fast - 1 sec - 3 sec - 15 sec - 30 sec - off

Notes:
- This setting does not impact the data processing speed. Irrespective of this setting, field data is always processed at at high speed.
- When manned (buttons pressed) the display switches to `fast` for 30 seconds.
- When `off` is selected press a button to activate the display.

SETUP **42**

Battery Mode

Battery Mode initiates a power down to prevent battery drainage during transport and/or storage. Two settings are provided:

shelf - operate

`shelf`	Puts the D030-P in standby to allow storage for years with minimal battery drainage. The D030-P will not function but saved totals and settings remain stored in this mode. *Press* START *twice to awake an D030-P in* `standby`.
`operate`	Powers up the D030-P and performs a self test, after which it will switch to operator mode.

SETUP MENU 5 — FLOWMETER

Below setup items adjust the D030-P to accomodate to your type of flowmeter signal.

SETUP **51**

Signal

Signal defines the type of flowmeter pickup signal for this input. You can choose one of the following flowmeter signal types:

NPN - NPN-LP - REED - REED-LP - PNP - PNP-LP - NAMUR - COIL HI - COIL LO - ACT_8.1 - ACT_12 - ACT_24

For configuration details see "Flowmeter Pickup Signal Types Supported" on page 33.

SETUP MENU 6 — OTHERS

Below setup items identify the characteristics, location and accessibility of your D030-P.

Below information may be requested when you call for support or maintenance –e.g. in the case of a serious breakdown– or when assessing upgrade considerations.

SETUP **61**

Type of Model

Type of Model shows the model type of your D030-P. This number is factory set and cannot be changed.

D030-P

SETUP **62**

Software Version

Software Version shows the software version of the D030-P. This number is factory set and cannot be changed.

03.03.01

SETUP **63**

Serial Number

Serial Number shows the unique 7-digit serial number of the D030-P. This number is factory set and cannot be changed.

7-digits numeric value

SETUP **64**

Password

Setup mode access can be protected with a 4-digit password or PIN code.

Password is used to set the value of this 4-digit code.

0000 - 9999 (4-digit numeric)

Caution:

Make sure you remember the password (e.g. 1234) when enabling password protection. *If you lose your password the unit must be returned to factory!*
The default value 0000 (zero) disables password access protection.

SETUP **65**

Tag Number

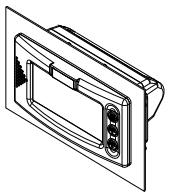
For identification and communication purposes, a unique tagnumber of maximum 7 digits can be entered.

Tag Number determines the value of the tag number.

0000000 - 9999999 (7 digit numeric)

Operating the D030-P

CHAPTER 5



The D030-P default mode of operation is the Operator mode.

In Operator mode field information is processed and displayed. What information is displayed how depends on the configuration settings, as described in "Configuring the D030-P" on page 18

Signals, generated by the flowmeter in the field, are processed real time in the background, independent from the configured display update speed.

When you press a button, the display will update real time during 30 seconds, after which it will return to the configured update speed (the lower the configured update speed, the longer the onboard batteries last).

If the display appears “off”, press a button to see if it activates.

The D030-P button and display functions

The D030-P has three buttons and several operation modes.

The function of each key depends on the active operation mode in the D030-P. The active operation mode is visualized by the display.

The default Operator mode is indicated by the status indicators RUN, READY or PAUSE.

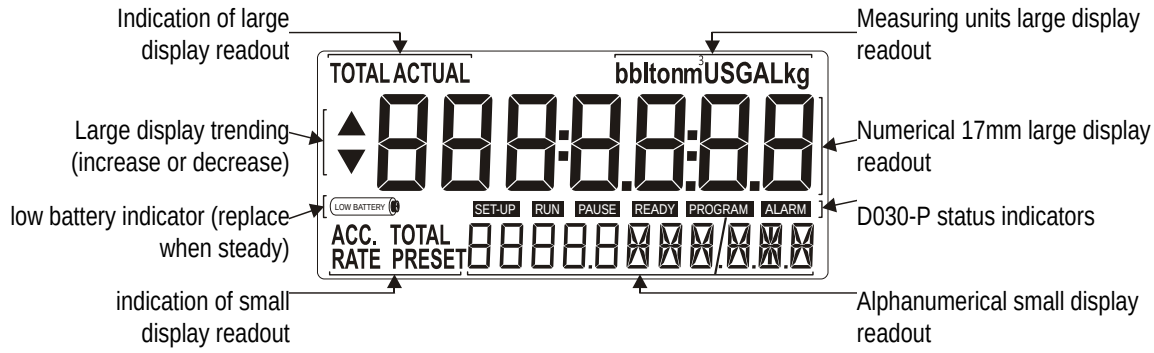
Caution:

- If ALARM is lit, refer to See “Troubleshooting the D030-P” on page 35.
- If the display is blank, PROGRAM or SETUP are lit, contact maintenance.

The D030-P Display Functions

The D030-P has a large transflective LCD with a number of symbols and digits to display measuring units, status information, trend indication and keyword messages.

Figure 23: The display functions of the D030-P



The D030-P Key Functions

The following keys are available:

This key is used to access various configuration modes, program items and enter values.
Use this key when you see PROG or ENTER in the text.

This key is used to START the batch process and to change blinking values and states or to configure the unit.
Use this key when you see START or ▲ in the text.

Press STOP to "PAUSE" the batch process. Pressing this key twice finishes the process completely and it can't be continued. STOP is also used to select Total and accumulated total and to select a value (In Program mode).
Use this key when you see STOP or ▶ in the text.

Operator functions

For the operator the following functions are available:

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 ▸ to select the digits and ▲ to increase that value,
3 Set the new PRESET-value by pressing ENTER.

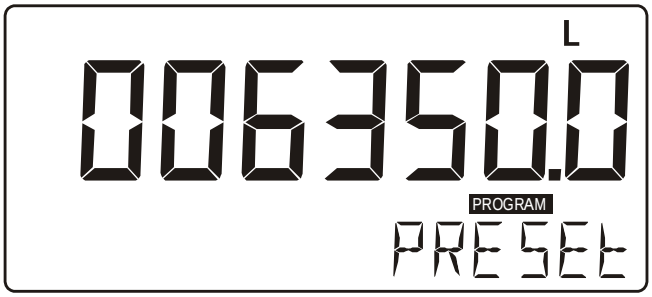


Figure 24: Example display information during programming preset value.

When data is altered but ENTER has not been pressed yet, then the alteration can still be cancelled by waiting for 20 seconds or by pressing ENTER during three seconds: the former value will be reinstated. The PRESET-value can be used time after time till a new value is programmed.

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

Batch maximum

When you program a new value which is not valid - the batch size is too large - the decrease-sign▼ will be displayed while you are programming; the new value will not be accepted!

Starting up the batch process

The batch process can only be started up when "READY" is displayed. The batch process is started-up by pressing the START-key.

The arrows at the display indicate if the ACTUAL-value is / was counting up or down.

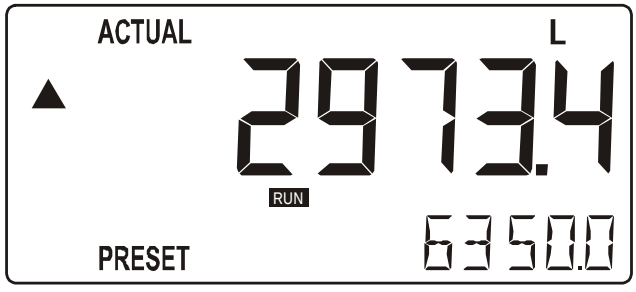


Figure 25: Example display information during the process.

Interrupting and ending the batch process

When STOP is pressed once, the batch process will be temporarily interrupted; the actual values are not lost. At the display, the word "PAUSE" 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 STOP twice in which case the actual values are "lost" and the system returns to steady state: the batch can not be resumed.

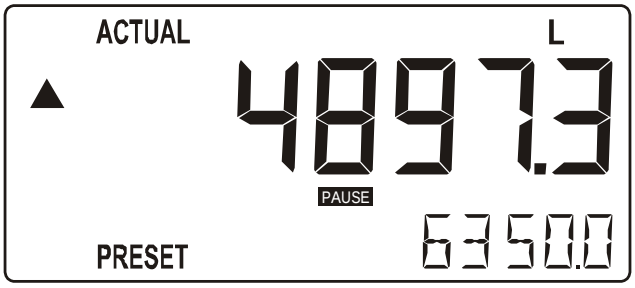


Figure 26: Example display information when interrupted.

After batching, following functions are available:

Display total and accumulated total

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

Clear total

The value for total can be re-initialized. To do so, select the Total display and press PROG followed by STOP. After pressing PROG, the flashing text "PUSH STOP" is displayed.

To avoid re-initialization at this stage, press another PROG again or wait for 20 seconds.

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

Display accumulated total

When START is pressed, total and `accumulated total` are displayed. The `accumulated total` cannot be cleared. The value will count up to `99,999,999,999`. The unit and number of decimals are displayed according to the configuration settings for `total`.

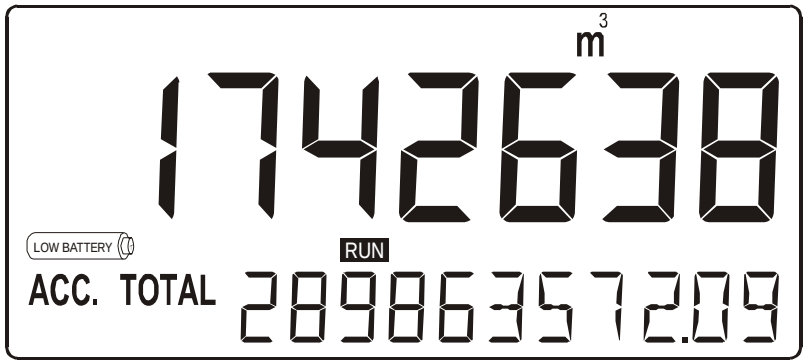
Operator alarms

Low-battery alarm

When the battery voltage drops LOW BATTERY starts flashing. When flashing the battery is still ok.

When LOW BATTERY is on continuously, the battery is drained and MUST be replaced ASAP!

Figure 27: Example of Low-Battery alarm



Caution:

Immediately inform maintenance when you notice LOW BATTERY flashing: the remaining lifetime after the first moment of indication is generally several days up to some weeks and it may take some time to purchase a new battery.

Warning:

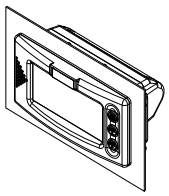
For your own safety *use only original batteries supplied by the manufacturer.* Non-certified batteries pose a serious risk of explosion!

Alarm 01-03

When ALARM is displayed consult "Troubleshooting the D030-P" on page 35.

Maintenance

CHAPTER 6



General directions

The D030-P does not require special maintenance unless when used in
- low-temperature applications,
- high humidity environments (above 90% annual mean).
  It is the customers' responsibility to take all precautions necessary to dehumidify the internal atmosphere of the D030-P enclosure in such a way that no condensation or ice deposition can occur.

Note:
Dehumidifying can be achieved by placing dry silica-gel sachet in the enclosure before closing it. You must replace the silica gel periodically as advised by the silica gel supplier.

Battery life

Your D030-P may have been equipped with an internal battery. The battery can last upto five years but when applied incorrectly it may be depleted in a matter of hours.

It is influenced by several issues:
- Display update: fast display update uses significantly more power.
- Type of sensor: read "I/O wiring options" on page 13, NPN and PNP inputs consume more energy than coil inputs.
- Input frequency: the higher the frequency, the shorter the battery life-time.
- Control output.
- Low temperatures; the available power will be less due to battery chemistry.

Note:
It is strongly advised to use only necessary functions.

Replacing the battery

Caution:
Only qualified personell should open the D030-P battery cover.
Before opening the D030-P:
- Make sure the battery cover is dry and clean and the area is free from moist, wind and dust.
- (When applied) remove external power to prevent an electrical shock when opening the D030-P.
- When battery powered, enter setup to deactivate the battery. (See SETUP 42 "Battery Mode" on page 25.)
- Wear a properly grounded ESD discharge strap while handling an open D030-P.

To replace the battery you must gain access to the rear of the D030-P.
1 Open the panel and check the interior for moist and polution.
2 Check the wires for breaks, kinks and stress and check the connectors for corrosion.
3 Check the seal; when damaged send the D030-P for repair.
4 When replacing the battery, follow the instructions provided with the spare battery.

Warning:
Make sure you have an original replacement battery.
D030-P batteries contain Lithium: Dispose of the old battery in an environmental friendly way and do not heat, burn or try to charge the battery.

5 Carefully reinstall the D030-P, making sure no wires are stressed and no dirt or wires are jammed.
6 After closure, power-up the D030-P and perform basic checks.

Preventive maintenance checks

The following checks can be performed on a regular basis and can best be made part of the factory *preventive maintenance procedures*:

1 Check the condition of the D030-P front panel, cable glands and housing;
You should not see any damage or deformation.
2 Check the LCD display and buttons for cracks and damage;
If you detect any, send the D030-P for repair.
3 Check the external cabling for tension, tears, aging and presence of cable tags;
Fix or repair the cabling as required.
4 Clean the casing with a soft cloth or mild soapy water. *Do not use aggressive solvents as these might damage the coating.*
5 Check the functions and process accuracy: As a result of wear and tear, re-calibration of the D030-P might be required.
6 Check for a low-battery indication (applies to battery operated D030-P only);
When bAttERY LOW is indicated, prepare to gain access to the D030-P battery holder and replace the battery.

Repairs

The harsh environmental requirements and accuracy that a D030-P must comply to, require the use of special procedures, tools and components for the production and repair of your D030-P.

Warning:

A defective D030-P cannot be adequately repaired by the user or supplier –especially when the unit is being used in a potentially explosive or aggressive environment!
Even when repairs seem easy, always send your D030-P to your supplier along with a request to have it repaired by an authorized repair centre. **Failure to do so may result in a potentionally hazardous situation.**

Caution:

Caution:

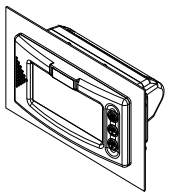
Warrantee and certification of the D030-P are waived when repairs are carried out by others than Fluidwell bv or his authorized repair centre.

Repair actions that customers are allowed do themselves are

- "Replacing the battery" on page 31

Setup Configuration Examples

APPENDIX A



This appendix provides information and examples that might help you configure a number of setup functions.

Calculating the K-factor

Calculating the K-factor for Totals

Below examples show ways to calculate the K-factor and corresponding decimals.

Example: Calculating the K-factor for Totals (1)

Let us assume that the flowmeter generates 2.4813 pulses per liter and the selected unit is m3 (see SETUP 11).

A cubic meter consists of 1000 parts of one liter which implies 2,481.3 pulses per m3. So, the K-factor is 2,481.3.

- For "K-factor", SETUP 13 enter `2481300`
- To set the decimal position enter `3` for "Decimal K-factor", SETUP 14.

Example: Calculating the K-factor for Totals (2)

Let us assume that the flowmeter generates 6.5231 pulses per gallon and the selected measurement unit is gallons (see SETUP 11).

This makes the K-factor 2,481.3.

- For "K-factor", SETUP 13 enter `2481300`
- To set the decimal position enter `3` for "Decimal K-factor", SETUP 14.

Flowmeter Settings

Flowmeter Pickup Signal Types Supported

Table 1: Types of flowmeter pickup signal supported

Signal type	Explanation	Resistance	Freq. / mV	Remark
`NPN`	NPN input	pull-up 100k	6 kHz	open collector
`NPN-LP`	NPN input with low pass filter	pull-up 100k	2.2 kHz	open collector less sensitive
`REED`	Reed-switch input	pull-up 1M	1.2 kHz	
`REED-LP`	Reed-switch input with low pass filter	pull-up 1M	120 Hz	less sensitive
`PNP`	PNP input	pull-down 100k	6 kHz	
`PNP-LP`	PNP input with low pass filter	pull-down 100k	700 Hz	less sensitive
`NAMUR`	Namur input	pull-down 820	4 kHz	external power required
`COIL HI`	High sensitive coil input	—	20 mV p.t.p.	sensitive to disturbances when not properly shielded

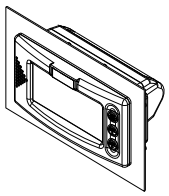
Table 1: Types of flowmeter pickup signal supported (Continued)

Signal type	Explanation	Resistance	Freq. / mV	Remark
COIL LO	Low sensitive coil input	—	90 mV p.t.p.	normal sensitivity
ACT_8.1	Active pulse input 8.1 VDC	3k9	10 kHz	external power required
ACT_12	Active pulse input 12 VDC	4k	10 kHz	external power required
ACT_24	Active pulse input 24 VDC	3k	10 kHz	external power required

Notes:
- Some signal types rely on available power options to be supported.
- The selection options for ACT_XX (active pulse) offer a detection level of 50% of the supply voltage.

Troubleshooting the D030-P

APPENDIX B



In this appendix several issues are described that may occur during installation or operation of your D030-P.
If you have an issue that is not reported here, please contact your supplier.

Response not as expected

Flowmeter does not generate pulses

Check:

- Signal selection - See SETUP 51 "Signal" on page 25,
- Pulse amplitude - See “I/O wiring options” on page 13.
- Flowmeter, wiring and connection of terminal connectors - See “Electrical installation – general” on page 9.,
- Power supply of flowmeter - See “Power Supply Wiring” on page 10..

Flowmeter generates "too many pulses"

Check:

- Settings for Total - See SETUP 11-15,
- Type of signal selected with actual signal generated - See SETUP 51 "Signal" on page 25,
- Sensitivity of coil input - See SETUP 51 "Signal" on page 25 and "Sine-wave (Coil) Signal" on page 13.
- Proper grounding of the F030-P - See “Electrical installation – general” on page 9.
- Use screened wire for flowmeter signals and connect screen to terminal 9. (unless connected at sensor)

No access (unknown password)

If the password is unknown and it is not `1234 (default password)`, there is only one possibility left: call your supplier.

Alarm

When ALARM starts to blink a system alarm has occurred.

System alarms

To view system alarms press the START/▲ button several times. This displays the 5-digit error code.

Note:
Only one code is displayed. When more alarms are active simultaneously the alarm codes are added.

Possible 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

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

Declaration of Conformity

Fluidwell D0-series

Veghel, April 2013

Fluidwell bv declares that the D0-series is designed and will operate conform the following applicable European Directives and Harmonized Standards, when installed and operated according to the manual:

EMC Directive 2004/108/EC	EN61000-6-2:2005
	EN61000-6-3:2007
	EN61326-1:2006

Fluidwell bv

E. Rath

Managing Director

Fluidwell bv
P.O. Box 6 • 5460 AA • Veghel
Voltaweg 23 • 5466 AZ • Veghel
The Netherlands

Telephone: +31 (0) 413 - 343 786
Telefax: +31 (0) 413 - 363 443
Email: displays@fluidwell.com
Internet: www.fluidwell.com

Trade Reg. No: 17120985
VAT No: NL8085.29.699.B.01
Bank: ING-Bank
SWIFT Nr / BIC: INGBNL2A

EUR account no.: 66.63.96.078
IBAN: NL73 INGB 0666 3960 78
USD account no.: 02.20.81.771
IBAN: NL22 INGB 0022 0817 71

LIST OF CONFIGURATION SETTINGS

SETTINGS		DEFAULT	DATE:	DATE:
1 – TOTAL			Enter your settings here	
11	Unit	L		
12	Decimals	0000000		
13	K-factor	000001 /SEC	/ sec	/ sec
14	Decimal K-factor	0		
15	Batch Maximum			
2 – OVERRUN				
21	Overrun	L		
22	Time	/ MIN		
3 – DISPLAY				
31	Display	TOTAL - FLOWRATE		
32	Backlight	OFF		
33	Brightness	5		
4 – POWER MANAGEMENT				
41	LCD New	1 SEC		
42	Battery Mode	OPERATIONAL		
5 – FLOWMETER				
51	Signal	COIL-LO		
6 – OTHERS				
61	Type of Model	D030-P	D030-P	D030-P
62	Software Version	03.03.01	03.03.01	03.03.01
63	Serial Number			
64	Password	0000		
65	Tag Number	0000000		

Fluidwell bv
P.O. Box 6
5460 AA Veghel
The Netherlands

Voltaweg 23
5466 AZ
The Netherlands

T +31 (0)413 343 786
F +31 (0)413 363 443
E displays@fluidwell.com