



## FEATURES

- UNIVERSAL INPUT, 5 kHz, CAN POWER THE SENSOR
- OUTPUT FREQUENCY UP TO 7 kHz
- NO NEED OF EXTERNAL AMPLIFIERS FOR THE INPUT SIGNAL
- SEVEN DIGIT DISPLAY
- 30 POINTS CALIBRATION / LINEARIZATION CURVE
- KFACTORS FROM 0.00001 TO 9,999,999
- PROGRAMMABLE DECIMAL PLACES FOR THE KFACTORS
- DISPLAYS INPUT FREQUENCY IN Hz WITH ONE DECIMAL PLACE
- ISOLATED LINEARIZED OUTPUT, 5 V SQUARE WAVE OR OPEN DRAIN
- NO NEED OF EXTERNAL POWER FOR THE ISOLATED OUTPUT
- THE OUTPUT IS SHORT PROTECTED, IF IT IS 5V SQUARE WAVE
- THE OUTPUT IS REVERSE POLARITY PROTECTED, IF IT IS OPEN DRAIN
- HIGH CONTRAST IN THE ENTIRE TEMPERATURE RANGE
- SIMPLE PROGRAMMING, SMALL SIZE

## APPLICATIONS

- LINEARIZING, ISOLATING AND CONDITIONING OF FLOW METERS OUTPUTS
- LINEARIZING AND CONDITIONING OTHER PULSES
- CHANGING THE INPUT – OUTPUT RELATION OF PULSE SENSORS TO ADAPT THEM TO ANOTHER DEVICE



## 1. DESCRIPTION

GPC5K is a low power pulse converter / linearizer with an universal input and an isolated output. It provides power for many types of sensors and accepts, measures, filters and conditions their signal. Then the input signal frequency is converted according to the 30 points calibration / linearization table to produce the output frequency, which can be higher or lower than the input frequency.

The output is isolated and does not need external power. It can be ordered as 5 V square wave or an open drain.

One typical application is to linearize a flow meter output in a very large range of pulses, making the output linear and with one only KFACTOR in the whole range.

All KFACTORS have programmable decimal places. All frequencies in the 30 point table always have 3 decimal places.

In normal mode GPC5K displays the input frequency with one decimal place.

## 2. ABSOLUTE MAXIMUM RATINGS \*

Operating temperature	-20 °C to +70 °C <b>The electronics system is industrial (-40 °C to +85 °C) and higher grade . The Liquid Crystal Display (LCD) limits the temperature range.</b>
Power supply voltage	40 VDC
Sensor consumption	20 mA DC
Open drain output current	100 mA DC/AC. The output is sinking current
Open drain output voltage	100 V DC, 70V AC. The output is OFF

**\* NOTE: Stresses above those ratings may cause permanent damage to the device.**

## 3. CHARACTERISTICS

Parameter	Conditions	Min	Typical	Max	Units
<b>Power supply</b>	-20 °C to +70 °C	12		36	V DC
<b>Input</b>					
Voltage for the sensor	-20 °C to +70 °C, max 20 mA, Note 1		10		V DC
Threshold, low	Wave or logical signal (CMOS, TTL etc.)		1.2		V DC
Threshold, high	Wave or logical signal (CMOS, TTL etc.)		1.6		V DC
Coil voltage	Symmetrical signal from the coil (sine, triangle, saw etc)	20			mVpp
NAMUR, low threshold	-20 °C to +70 °C, Powered by GPC5K, Note 2		1		mA DC
NAMUR, high threshold	-20 °C to +70 °C, Powered by GPC5K, Note 2		2.1		mA DC
Reed switch current	-20 °C to +70 °C, Powered by GPC5K, Note 2			3.5	mA DC
Max Frequency	Note 3		5 000		Hz
<b>5 V square wave output</b>					
Signal, low	Load 100 kohm			50	mV
Signal, high	Load 100 kohm	5			V DC
<b>Open drain output</b>					
Output ON resistance	-20 °C to +70 °C, 100 mA			8	ohm
Output OFF leakage	-20 °C to +70 °C, 100 V DC			5	nA

**Note 1:** When powering a 3 wire sensor. For 2 wire sensors the current is automatically limited.

**Note 2:** If the 2 wire sensor uses external power, the external voltage must be 10 V DC or less.

**Note 3:** The values are for reference only. The maximum frequency strongly depends on the duty cycle of the signal and the type of the sensor.

### 3.1. BUTTONS

There are three buttons: **SET** , **UP**  and **RIGHT**  :

- **SET** is used to enter and exit menus and confirm options chosen
  - **UP** is used to change the data
  - **RIGHT** is used to move the cursor (blinking digit or icon) to the right
- Additional button functions:

There are two types of buttons accepted by GPC5K:

- Short is when the button is pressed and released in less than 0.5 second



- Long is when it is kept pressed for more than 5 seconds
- All other durations are ignored

**NOTE: The UP button will not change the value if the settings are locked.**

### 3.2. INPUT

GPC5K has one input:

Pulse input from a flow sensor such as wave, logical signal, open drain/collector, npn/pnp, reed switches, dry contact, proximity / NAMUR sensors, Data Industrial 2 wire flow meters, turbine meters, coils and others. GPC5K has all pull-up / down, current limiting and signal conditioning circuits built-in. The input also provides power for all types of sensors. There is no need to use external amplifiers for the coils if they provide more than 20 mVpp signal.

### 3.3. OUTPUT

GPC5K has one isolated output:

A pulse output which can be ordered as 5 V square wave or open drain. The output frequency is determined by the input frequency and the 30 point calibration / linearization table. The output frequency can be lower or higher than the input one, limited to about 7 kHz. The output can be related to the input by almost any function, described by the points of the table. GPC5K will interpolate between the points and extrapolate, when out of them.

### 3.4. DISPLAY

The liquid crystal display (LCD) has 7 digits with 5 decimal places and many icons. It shows the input frequency and all the variables and options that can be set or programmed. The KFACTORS have programmable none, 1, 2, 3, 4 or 5 decimal places.

#### 3.4.1. Normal mode

Automatically after turning the power on or exiting the menu, GPC5K enters the normal mode. Normal mode displays the input frequency in Hz with one decimal place.

#### 3.4.2. Menus

To enter the menus, use long **SET** button in normal mode. About 5 seconds after holding the **SET** button, the first menu will appear on the LCD:

- The **decimal places for all KFACTORS** can be programmed using **UP** button. KFACTORS ranging from 0.00001 to 9,999,999 can be entered this way. From the **KFACTOR decimal places** menu use short **SET** to enter the calibration (linearization) table menu.

**Once you enter this menu, you have to go to the last point (point 29). If you have data for less points enter 0.0 for the frequency for all unused points.**

“Pnt 0” will appear on the LCD. Press short **SET** and enter the input frequency in [Hz] for point 0. Press short **SET** and then enter the KFACTOR for that input frequency. Press short **SET** to do the same for the next point.

Repeat the above for up to 29 more points. After point 29 GPC5K will automatically sort and validate the points data, store it in the non-volatile EEPROM memory and exit the menu mode, automatically going to



the normal mode.

### 3.5. INPUT – OUTPUT RELATION

The output frequency will be related to the input frequency according to the 30 point table. The output will have only one KFACTOR, the same KFACTOR like the point with the highest frequency in the table.

**Example:**

You have a turbine flow meter that came from the manufacturer (or the calibration laboratory) with the following calibration table:

Frequency [Hz]	KFACTOR [pulses per gallon]
2612.1	3218.56
2235.4	3195.43
2014.6	3174.75
1805.3	3152.53
1611.2	3127.40
1445.7	3102.13
1212.5	3088.71
1008.8	3067.12
803.4	3044.23
607.9	3019.87
505.1	2996.64
403.2	2972.27
301.4	2944.33
202.2	2901.91
99.6	2849.74
54.3	2766.14

Connect the coil of the turbine flow meter directly the terminals “S” and “C” of GPC5K, set the DIP switches for “coils”, enter the menu mode, set 2 decimal places for the KFACTORS and then enter all points from the table above into the GPC5K menu.

The output of GPC5K will have one only KFACTOR, no matter the input frequency. This KFACTOR will be 3218.56, the factor for the highest frequency in the table. So, the output will be the linearized input.

## 4. APPLICATION

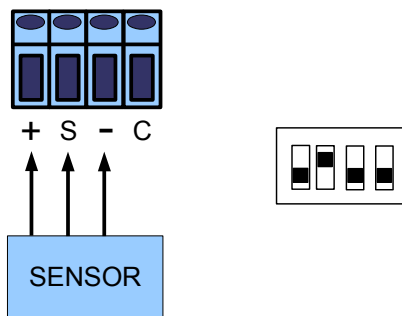
### 4.1. ELECTRICAL

**NOTE:** There is no isolation between the sensor input and the power supply. The output is isolated.

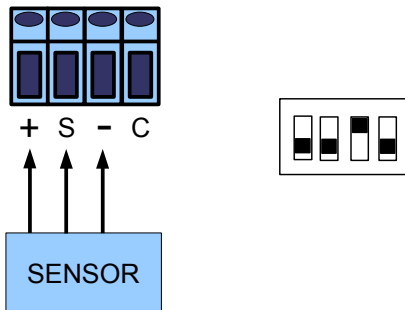
#### 4.1.1. Wiring the sensor

GPC5K accepts a variety of sensors. See below for wiring specifications and their particular wiring is shown below:

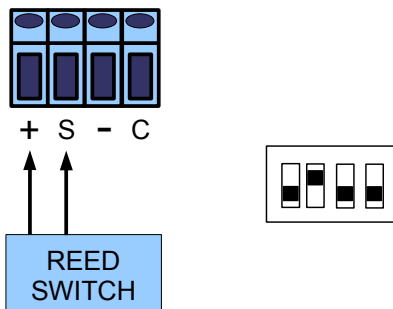
##### 4.1.1.1. NPN Open Drain, Open Collector



##### 4.1.1.2. PNP Open Drain, Open Collector

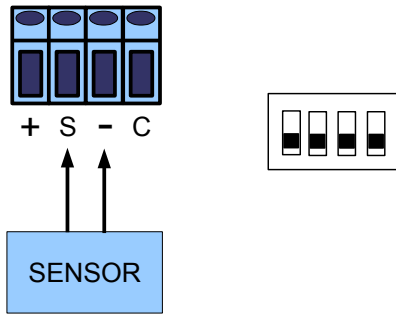


##### 4.1.1.3. Reed Switch, Dry Contact

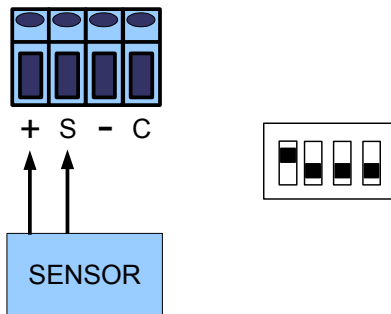


**NOTE:** Different reed switches and dry contacts have different bouncing time. Test and evaluate carefully to determine the right DIP switch setting.

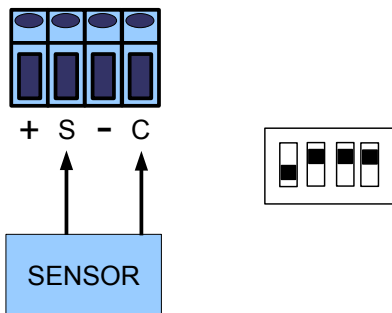
4.1.1.4. Wave (square, sine, triangle, saw etc.), Logical Signal (CMOS, TTL etc.)



4.1.1.5. NAMUR Sensors, Data Industrial Two Wire Flow Meters



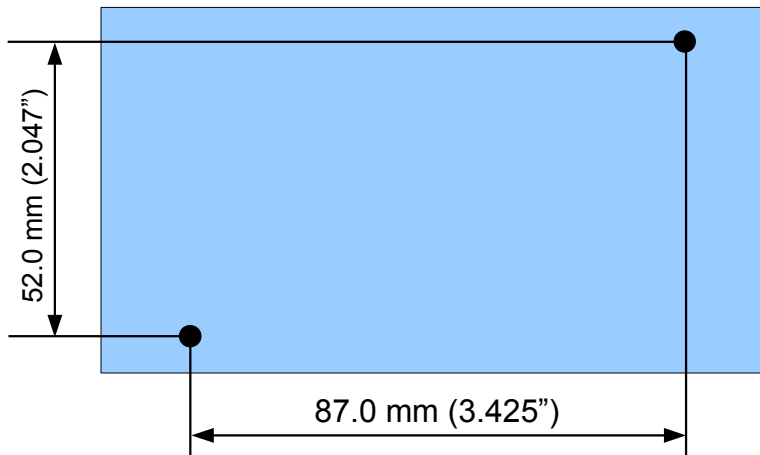
4.1.1.6. Coils



**NOTE: If the cable to the coil is shielded, connect the shield to “-” ONLY. Do not connect the shield to anything at the other (coil) end of the cable. The shield has to be isolated from earth ground and all other equipment or electrical connections.**

## 4.2. MECHANICAL

Mounting GPC5K on a wall requires an area of 120 x 65 mm (4.73 x 2.56 inches) and two screws:



**NOTE: The cable grips and the cables need additional space**

## 5. ORDERING

For ordering please use the following G Instruments part numbers:

<i>Description</i>	<i>G Instruments PN</i>
GPC5K, external DC power	30710
GPC5K with GPS115 (115 VAC power supply)	30711
GPC5K with GPS220 (220 VAC power supply)	30712
GPC5K with GPS122 (85-264 VAC power supply regulated, +/-0.5%, 5W)	30713



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