



FEATURES

- UNIVERSAL INPUT, 5 kHz, CAN POWER THE SENSOR
- TEMPERATURE COMPENSATION FOR GASOLINE OR DIESEL
- 0 – 5V OUTPUT LINEAR TO THE TEMPERATURE
- 0 – 5V OUTPUT LINEAR TO THE FLOW RATE
- NO NEED OF AMPLIFIERS OR LINEARIZERS
- SEVEN DIGIT RATE WITH PROGRAMMABLE DECIMAL PLACES
- THREE SEVEN DIGIT TOTALS WITH PROGRAMMABLE DECIMAL PLACES. ONE NON-RESETTABLE, TWO RESETTABLE
- DISPLAYS TEMPERATURE IN °C OR °F
- SINGLE KFACTOR OR 10 POINT CALIBRATION CURVE
- KFACTORS FROM 0.001 TO 9,999,999
- MILLILITERS, LITERS, GALLONS, CUBIC FEET, CUBIC METERS, ACRE FEET
- PER SECOND, PER MINUTE, PER HOUR, PER DAY
- 64 DAYS DATALOGGER (TOTAL FOR EACH 24 HOURS)
- ALL SETTINGS STORED IN A NON-VOLATILE MEMORY
- SETTINGS LOCK/UNLOCK FOR SECURITY
- HIGH CONTRAST IN THE ENTIRE TEMPERATURE RANGE
- SIMPLE PROGRAMMING, SMALL SIZE

APPLICATIONS

- FLOW RATE AND TOTAL MEASUREMENT AND CONTROL OF MANY LIQUIDS INCLUDING GASOLINE AND DIESEL
- SCADA



1. DESCRIPTION

GFC201 is a low power flow computer / totalizer with an universal input and a variety of outputs. It provides power for many types of sensors and accepts their signal to measure flow rate and total of many types of liquids including gasoline and diesel. It precisely corrects the reading for the temperature of the fuel. GFC201 has a non-isolated 0-5V output linear to the temperature and another programmable non-isolated 0-5V output linear to the flow rate.

GFC201 is designed to have full functionality on a car battery.

GFC201 stores up to 64 totals for each 24 hours that can be easily viewed on the liquid crystal display.

For better accuracy GFC201 provides calibration curve capabilities for up to 10 points. In seconds the operator can switch between a single KFACTOR and the curve of up to 10 points.

The GFC201 software implements a version of our proprietary predictive/adaptive, self-adjusting digital filtering which provides extremely stable reading at any input frequency, plus very fast response to any change in the flow.

GFC201 is the perfect solution for flow measurement and control applications that require high accuracy and reliability, temperature correction of the volume measured, high isolation, multi-functionality, small size, industrial grade performance and low maintenance.

2. ABSOLUTE MAXIMUM RATINGS *

Operating temperature	-20 °C to +70 °C The electronics system is industrial (-40 °C to +85 °C) and higher grade . The Liquid Crystal Display (LCD) limits the temperature range.
Power supply voltage	40 VDC
Sensor consumption	10 mA DC

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

3. CHARACTERISTICS

Parameter	Conditions	Min	Typical	Max	Units
Power supply	Ambient -20 °C to +70 °C	10.5		36	V DC
Pulse Input					
Voltage for the sensor	Same as the power supply voltage	10.5		36	V DC
Threshold, low	Wave or logical signal (CMOS, TTL etc.)		1		V DC
Threshold, high	Wave or logical signal (CMOS, TTL etc.)		1.4		V DC
Coil voltage	Symmetrical signal from the coil (sine, triangle, saw etc)	20			mVpp
Reed switch current	-20 °C to +70 °C, Powered by GFC 201, Note 1			3.5	mA DC
Frequency, HF	Note 2		5 000		Hz
Frequency, MF	Note 2		1 000		Hz
Frequency, LF	Note 2		200		Hz
Analog Input					
Input current	The span must correspond to -18 to +149 °C, linear	4		20	mA
Input resistance			100		ohm
Transmitter	Connect GTT101-2, PN 30150 or similar				
Temperature Output					
Output voltage	Ambient -20 °C to +70 °C, 10.5 – 36 V DC	0		5	V DC
Error	Ambient -20 °C to +70 °C, 12V DC			0.3	% FS
Flow Rate Output					
Resolution	Ambient -20 °C to +70 °C, 10.5 – 36 V		1.25		mV
Error	100 kohm load, 12 V, Ambient 25 °C			0.05	% FS
Temperature coefficient	Ambient -20 °C to +70 °C, 12 V		35		ppm/°C

Note 1: If the 2 wire sensor uses external power, the external voltage must be 10 V DC or less.

Note 2: 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 the GFC201 flow computer / totalizer:

- 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. INPUTS

GFC201 has two inputs:

- Pulse input from a flow sensor such as wave, logical signal, open drain/collector, npn/pnp, reed switches, dry contact, turbine meters, coils and others. The computer / totalizer 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.
- Analog 4-20 mA input providing signal from GTT101-2 linear to the temperature in the range of -18 to +149 °C. This signal is precisely measured, converted to temperature and is used to correct the volume measured. The software provides correction for gasoline and diesel only.

If this input is not connected the correction must be disabled in the special menu.

3.3. OUTPUTS

GFC201 has two non-isolated analog outputs:

3.3.1. Temperature output

It provides 0 – 5 V linear to the temperature measure by GTT101-2

3.3.2. Flow Rate output

This output is programmable and provides 0 – 5 V linear to the flow rate

3.4. DISPLAY

The liquid crystal display (LCD) has 7 digits with 1, 2 or 3 decimal places and many icons. It shows rate, total, temperature and all the variables and options that can be set or programmed. The rate and the totals have programmable auto, none, 1, 2 or 3 decimal places.

GFC201 software implements our latest proprietary algorithms for predictive / adaptive, self-adjusting digital filtering of the rate. It provides exceptionally stable reading at any input frequency, plus very fast response to any change in the flow.

A “**FLOW**” icon will always be displayed.

When the display shows rate, a “**RATE**” icon is displayed. If it shows total a “**TOTAL**” icon will be



displayed along with “A”, “B” or “C” (GFC201 has three totals).

When input pulses are present, an “INP” (input) icon will be displayed.

If the total on the LCD is allowed to be reset, a “RESET” icon will be displayed.

3.4.1. Volume and time units

- Milliliters (**mL**), liters (**L**), gallons (**G**), cubic feet (**CF**), cubic meters (**M³**) and acre feet (**AF**) per second (**S**), minute (**M**), hour (**H**) and day (**D**) are available.

3.4.2. Normal mode

Automatically after turning the power on or exiting a menu, GFC201 enters the normal mode.

Normal mode displays:

- Rate
- Total A, B or C. Total A reset can be enabled or disabled. It is stored in a non-volatile memory every 50 seconds or immediately when cleared.
If a total is allowed to be reset, the **RESET** icon is shown. Reset a total with long **RIGHT** button.
- Temperature in °C or °F (programmable)
- To switch between rate, total A, B, C and temperature use short **UP** button.

3.4.3. 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:

- **KFACTOR** icon along with **dP 1234** is shown. The decimal places for all **KFACTOR**s (single **KFACTOR** and all **KFACTOR**s in the calibration table) can be programmed using **UP** button. **KFACTOR**s ranging from 0.001 to 9,999,999 can be entered this way.

Use short **SET** to move to the next menu.

- **KFACTOR** icon is shown. The main **KFACTOR** for the particular FLOW meter connected to the GFC201 can be entered using **UP** and **RIGHT**. This is how many pulses the flow computer will receive for one gallon. While in this menu all the settings can be locked/unlocked. Use **RIGHT** button to move the cursor to the furthest digit on the right and then use long **SET**.
 - Use short **UP** to lock/unlock the settings. Then use short **SET** to go back to **KFACTOR** menu.
 - If the settings are locked, they can be viewed, not changed.

From the **KFACTOR** menu use short **SET** to enter the next menu.

NOTE: the computer will not accept zero for the KFACTOR.

- In the **CURvE** menu, use short **UP** to change between blinking **CURvE** and blinking **KFACTOR**. The flow computer will use either the single **KFACTOR** or the calibration **CURvE** of up to 10 points for calculations. The points have to be entered before using the calibration curve. The factory default is 1.0 for the **KFACTOR** of each point. The curve is stored in a non-volatile memory, and the points can be entered in any order. The computer will order and validate them.

- Enter the calibration data mode by using long **SET** in the **CURvE** menu for either a blinking



CUrVE or KFACTOR.

- “**CAL Crv**” will appear on the LCD, and “**NO**” icon will be blinking. To continue choose **YES** and press short **SET**. To leave calibration curve data mode and leave the previous calibration data untouched, choose **NO** and press short **SET** to go back to the **CUrVE** menu.

This feature is very useful for flow meters that have a calibration sheet provided by the manufacturer or the calibration laboratory. Each point consists of an input frequency and a KFACTOR (in pulses per gallon) for that frequency.

Once you enter the calibration curve data menu, you have to go to the last point (point 9). If you have data for less points enter 0.0 for the frequency for all unused points. GFC201 will not accept 0.0 for any KFACTOR.

If **YES** has been chosen, “**Point 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 9 more points. After point 9, the flow computer will automatically return to the **CUrVE** menu.

- There is no need to enter the frequency at each point in a special (ascending/descending) order. The computer will automatically sort and validate the data and calculate all the parameters..

In the **CUrVE** menu press short **SET** to move to **SET20** menu.

- In the **SET20** menu, set the flow rate in G/M at which you want the flow rate output to be 5 V. It will be 0 V at 0.0 G/M. If **SET20** = 0.0 the flow rate output will be disabled and will stay at 0 V. Press short **SET** to move to the **Correction** menu
- In the **Correction** menu choose among **none**, **GAS** and **diESEL**.

If the temperature transmitter is not connected or the flow meter will measure liquids other than gasoline and diesel choose none.

- Press short **SET** to move to the **degree type** menu where you can choose the units for the temperature between °C and °F.

Use short **SET** to move to the **volume units** menu.

- In the **volume units (vU)** menu, use **UP** to choose the volume units among **mL**, **L**, **G**, **CF**, **M³** and **AF**. Press short **SET** to move to the **time unit** menu.
- In the **time unit (tU)** menu, use **UP** to choose the time units among **S**, **M**, **H** and **D**. Press short **SET** to move to the “Rate **decimal Places**” menu where (using short **UP**) auto, none, 1, 2, or 3 decimal places for the rate can be programmed.
- Press short **SET** to move to the “Total **decimal Places**” menu where (using short **UP**) auto, none, 1, 2, or 3 decimal places for all totals can be programmed.
- Press short **SET** to move to the **Total A Reset enable/disable** menu. In this menu using **UP** button the total A reset can be enabled or disabled.



If enabled and GFC201 is in normal mode displaying total A, the **RESET** icon will also be displayed and long **RIGHT** will clear total A.

Because this is the last menu, pressing long **SET** will move the computer to the **LOCK** menu. Use **UP** to lock the settings and press short **SET** to go back to **Total A Reset enable** menu. General practice would be to unlock the settings at the **KFACTOR** menu. Settings can be changed and locked again before exiting at the last menu. Press short **SET** to exit. After a couple of seconds during which all the settings are checked, validated and stored into the non-volatile memory, the computer will return to the normal mode.

NOTE: The software time out feature will reset the computer and force it to the normal mode WITHOUT saving any changes made in any of the menus. The changes will only be saved after exiting the Total A Reset enable menu by pressing short SET.

NOTE: Even in menu mode, the computer always continues to measure and calculate rate and total and control the outputs so no total will be lost. In some circumstances, such as changing the KFACTOR, the total accumulated will be invalidated. The user must take appropriate actions after changing the settings, such as resetting the total for an instance.

- If long **SET** has been pressed in the **time units** menu, the computer will move to the **DATALOG** menu. “**DAYS back 00**” will appear on the LCD. Pressing **UP** will display the total after the last full 24 hours. Pressing **RIGHT** will bring back the **DAYS back XX** menu. Pressing **RIGHT** again will increment the **days back** number. The totals for up to 64 previous days are available. This feature allows the user to check the total liquid used per day for the last 64 days.
- Pressing short **SET** will move the computer to the **DATALOG RESET** menu. Choose **YES** or **NO** using **UP** button. Choosing **YES** will reset the data log to zero for all totals (1 to 64 days back).
- Press short **SET** to move to the **DTALOG INIT** menu. Choosing **YES** will initialize the data log – all the totals for all days back will remain untouched but the time for completing 24 hours total will change to the moment at which the short **SET** after **YES** was pressed. After the short **SET**, the computer will return to the **time units** menu.

Example: The owner did a **DATALOG INIT** at 11 o'clock. Exactly at the same time each day the total for the last 24 hours will be stored and a new cycle will start.

3.5. Checking the LCD

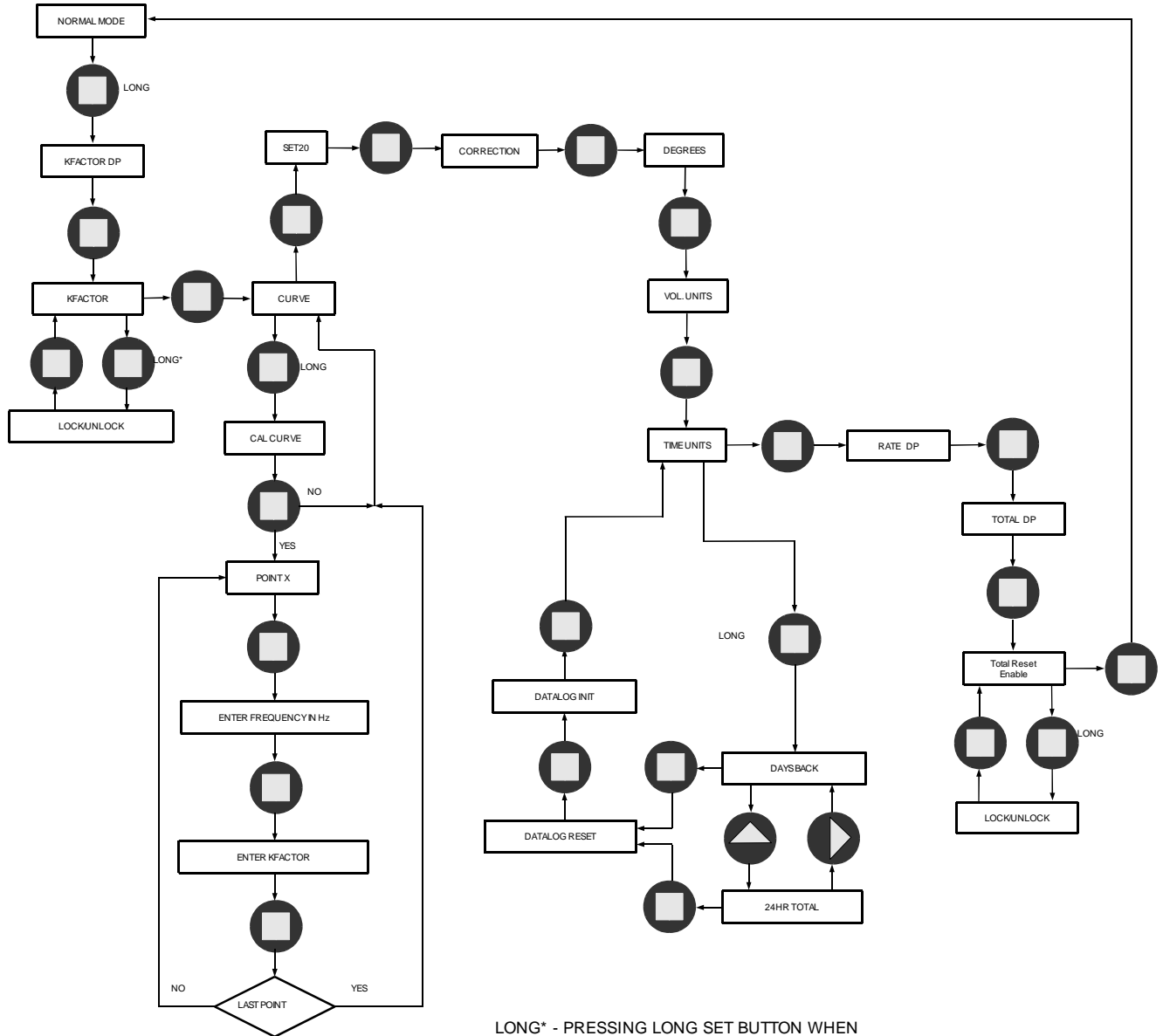
All the icons of the LCD can be checked by pressing and holding the **RIGHT** button while powering on or after exiting the last menu. Releasing the button will return the computer to normal mode.

3.6. Removing the power

Total A is stored in the non-volatile memory every 50 seconds.
Before removing the power make sure that there was no flow for the last minute.

4. MENU DIAGRAM

The menu diagram for GFC201 flow computer / totalizer is shown below.



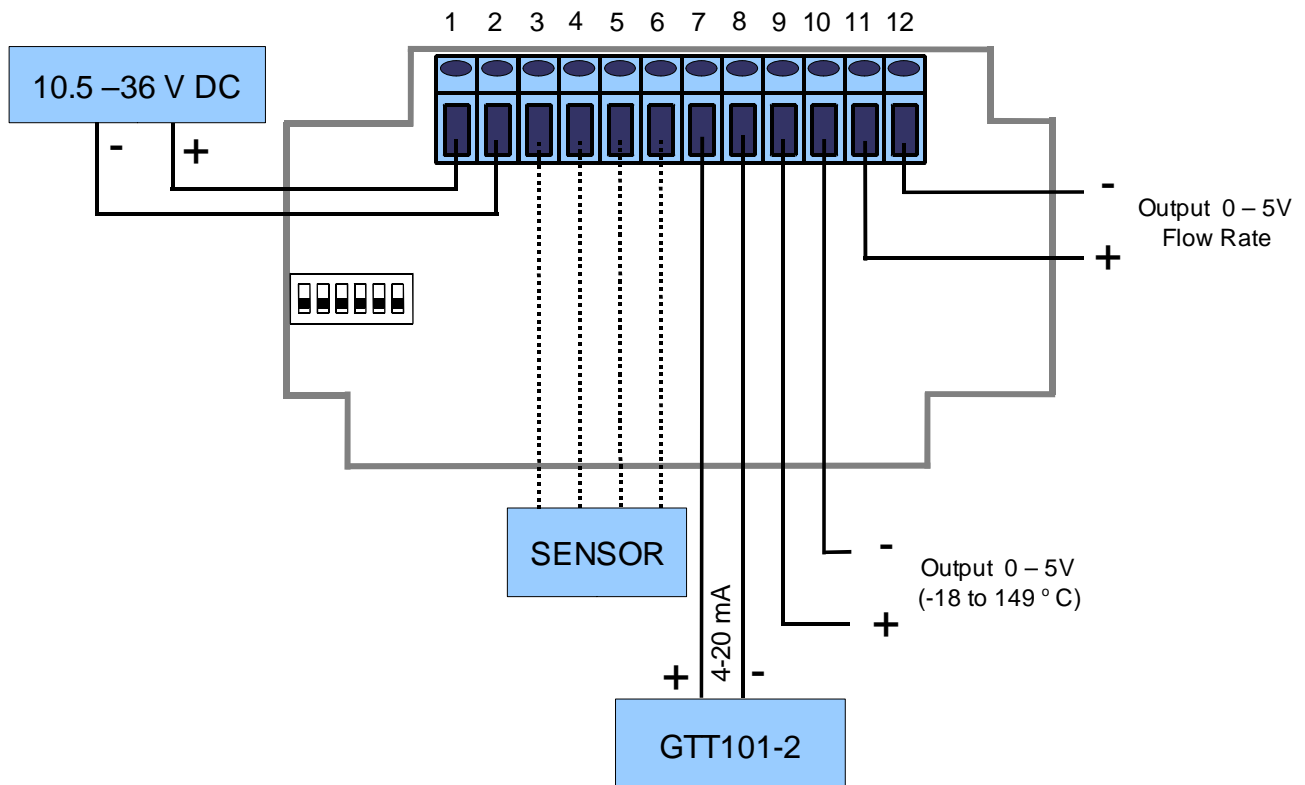
5. APPLICATION

5.1. ELECTRICAL

The wiring diagram is shown below.

NOTE: There is no isolation between the inputs, the outputs and the power supply. Terminals 2, 5, 10 and 12 are shorted inside the device. It is the user's responsibility to consider this fact and implement appropriate wiring in the user's specific application.

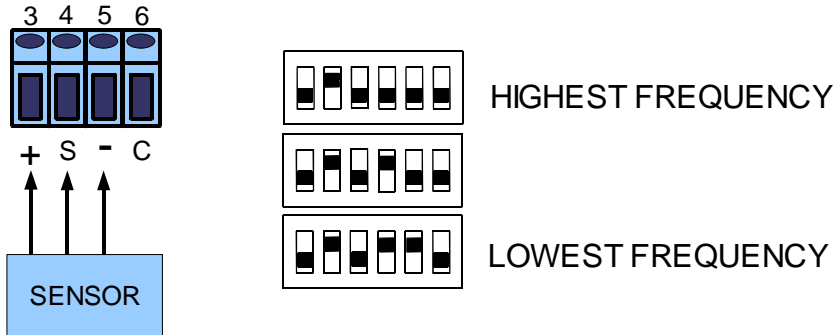
- 1 – Power supply plus
- 2 – Power supply minus
- 3 – Power for the sensor, plus
- 4 – Signal/Coil
- 5 – Power for the sensor, minus
- 6 – Coil, only
- 7 – Temperature transmitter plus
- 8 – Temperature transmitter minus
- 9 – Temperature output plus
- 10 – Temperature output minus
- 11 – Flow Rate output plus
- 12 – Flow Rate output minus



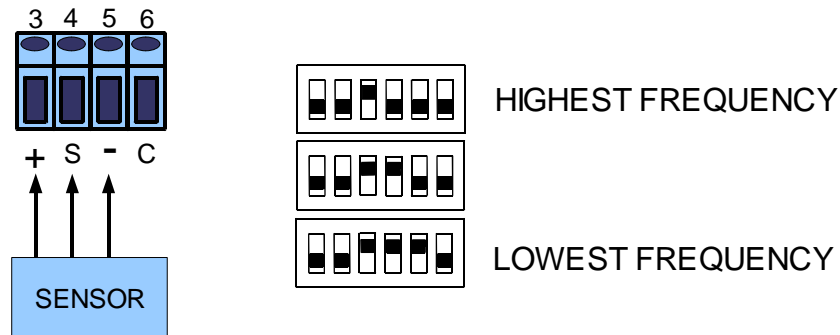
5.1.1. Wiring the sensor

GFC201 accepts a variety of sensors. See below for wiring specifications and their particular wiring is shown below:

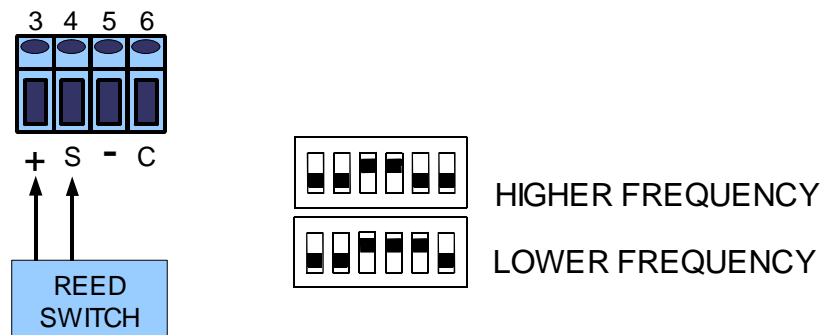
5.1.1.1. NPN Open Drain, Open Collector



5.1.1.2. PNP Open Drain, Open Collector

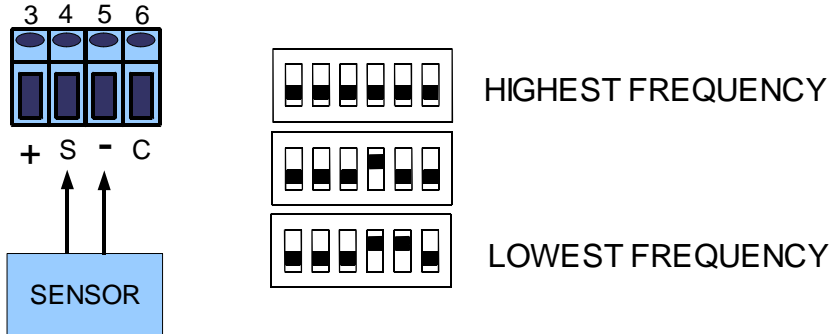


5.1.1.3. Reed Switch, Dry Contact

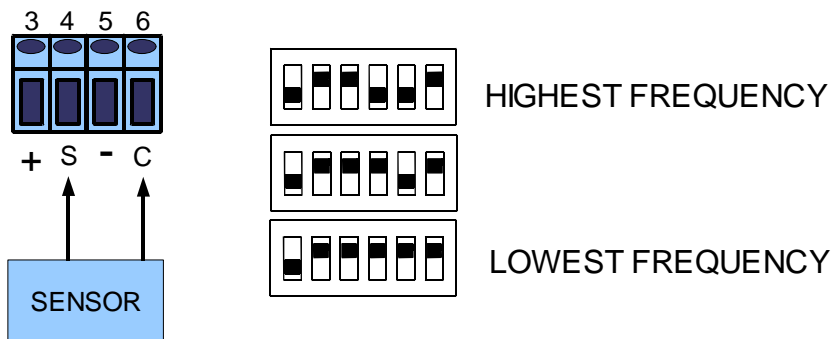


NOTE: Different reed switches and dry contacts have different bouncing time. Test and evaluate carefully to determine the right DIP switch setting.

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



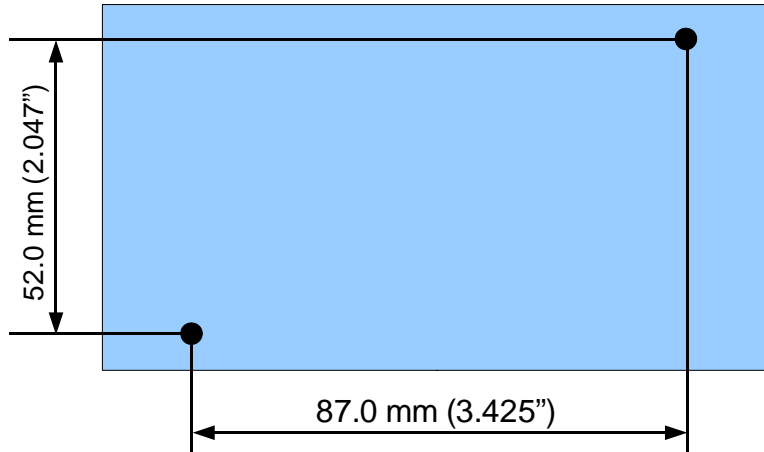
5.1.1.5. Coils



NOTE: If the cable to the coil is shielded, connect the shield to “-” (terminal 5) 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.

5.2. MECHANICAL

Mounting GFC201 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

6. ORDERING

For ordering please use the following G Instruments part numbers:

<i>Description</i>	<i>G Instruments PN</i>
GFC201 flow computer (external isolated 10.5 – 36 V DC needed)	30170
GFC201 flow computer with GPS115 (115 VAC power supply)	30184
GFC201 flow computer with GPS220 (220 VAC power supply)	30185
GFC201 flow computer with GPS122 (85-264 VAC power supply)	30239
GTT101-2, -18 to 149° C, Pt100, alpha = 0.00385 temperature transmitter	30150



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