



FEATURES

- **4-20 mA INPUT, PASSIVE, ACTIVE OR LOOP POWER**
- **LINEAR OR SQUARE ROOT, PROGRAMMABLE**
- **SEVEN DIGIT RATE WITH PROGRAMMABLE DECIMAL PLACES**
- **ONE SEVEN DIGIT NON-RESETTABLE TOTAL UP TO 9 DIGITS WITH PROGRAMMABLE DECIMAL PLACES**
- **KFACTORS FROM 0.00001 TO 9,999,999**
- **MILLILITERS, LITERS, GALLONS, CUBIC FEET, CUBIC METERS, ACRE FEET**
- **PER SECOND, PER MINUTE, PER HOUR, PER DAY**
- **ISOLATED 12 BIT ANALOG 4-20 mA PASSIVE OUTPUT**
- **ISOLATED NO POLARITY 100V/100mA DC/AC PULSE OUTPUT, UP TO 1100 Hz**
- **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**
- **METERING PUMPS PRECISE CONTROL FOR DOSING APPLICATIONS**
- **SCADA**

1. DESCRIPTION

GFC240 is a low power flow computer / totalizer with a 4-20 mA input designed to be used with flow meters that provide an analog 4-20 mA (passive, active or loop power) signal for flow rate or with differential pressure sensors. It has an isolated 12 bit, 0.05%, 4-20 mA output and an isolated no polarity pulse output for up to 1100 Hz.

GFC240 can be programmed at any time to linearly use the flow input signal or to take a square root of it. A very large range for the KFACTOR allows GFC240 to be used with a variety of types and sizes of flow meters.

GFC240 has a version in one inch wider enclosure – GFC240E and another in DIN 72x72 mm panel mount enclosure – GFCE240.

GFC240 is the perfect solution for flow measurement and control applications that require high accuracy and reliability, high isolation, multi-functionality, small size, industrial grade performance and long time without service.

2. ABSOLUTE MAXIMUM RATINGS *

Operating temperature	-20 °C to +70 °C The electronics is industrial (-40 °C to +85 °C) and higher grade . The Liquid Crystal Display (LCD) is limiting the temperature range.
Power supply voltage	40 VDC
Voltage for the analog output	40 VDC
Digital output current	100 mA DC/AC. Alarm, batch, limit or pulse output
Digital output voltage	100 V DC, 70V AC. Alarm, batch, limit or pulse output

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

3. CHARACTERISTICS

Parameter	Conditions	Min	Typical	Max	Units
Power supply voltage	-20 °C to +70 °C, Note 1	8		36	V DC
Input					
Input resistance	4-20 mA, -20 °C to +70 °C		200		ohm
Voltage for the sensor	Note 2				
Analog Output					
Power Supply	-20 °C to +70 °C, Note 3	9.5		36	V DC
Resolution	-20 °C to +70 °C, 9.5 – 36 V DC		4		uA
Error	250 ohm load, 24 V, 25 °C, Note 4			0.05	% FS
Power supply error	9.5-36V, no load, output disabled, 25 °C			0.5	uA/V
Temperature coefficient	-20 °C to +70 °C, 24 V		35		ppm/°C
Current, output disabled	SET20 = 0.0, 24 V DC supply, 25 °C		3.85		mA
Digital Output					
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
Pulse rate	Note 5			30,000	p/min

Note 1: The minimum voltage must be high enough for the sensor to work properly

Note 2: The voltage for the sensor equals the power supply voltage

Note 3: The minimum voltage for the 4-20 mA output to operate is $V = 9.5 + R \text{ load [ohm]} * 0.020$ [V DC]
For GFC240 with a load of 250 ohm connected the minimum voltage would be 14.5 V DC.

Note 4: The parameter includes all errors except temperature error

Note 5: Pulse and pause have equal widths.

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
The buttons have some other special functions that are mentioned below.

There are two types of buttons accepted by the GFC240 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

GFC240 has one 4-20 mA input that can accept passive, active an loop power sensors.

3.3. OUTPUTS

GFC240 has two isolated outputs:

3.3.1. Analog output

The isolated analog output is 4-20 mA, two wire, loop power passive, 12 bit, with reverse polarity and surge protection, high accuracy and reliability. Using the **SET20** menu it can be programmed to represent the flow rate.

SET20 parameter means at what flow rate (in G/M) the output will be 20.00 mA.

3.3.2. Digital output

The isolated digital output has no polarity, can work with 100V/100mA and is a pulse output only. It is intended for use with metering/dosing pumps, SCADA, PLCs and other devices. It can provide up to 30 000 pulses per minute (500 Hz) with equal duration of the pulse and the pause.

Example: You are adding chlorine or fertilizer to the water and have connected the control input of a pump to this pulse output. You program the "**SETP**" factor at 3.762 Gallons per pulse. The pump will produce one pulse every 3.762 gallons and add the chlorine or the fertilizer in an exact proportion to the water.

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 and all the variables and options that can be set or programmed. The rate and the total have programmable auto, none, 1, 2 or 3 decimal places.

GFC240 software implements our latest proprietary algorithms for predictive / adaptive self-adjusting digital filtering of the rate. It provides exceptionally stable reading but in the same time 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.

When the input is correct an "**INP**" (input) icon will be displayed. If the input current drops below about 3.8 mA "**no inP**" (no input) will be displayed.

Whenever the digital output is ON the **pulse** icon for the cause 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 GFC240 enters the normal mode. In this mode it can only display:

- Rate
- and total. Total reset can be enabled or disabled and the total is stored in a non-volatile memory every 50 seconds or immediately when cleared. If the total is allowed to be reset the **RESET** icon is shown. Resetting a total is by using long **RIGHT** button.
- Switching between rate and total is by using short **UP** button.

3.4.3. Menus

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

- In the “**total volume units**” menu use **UP** to choose the volume units among **mL, L, G, CF, M³** and **AF**.

While in this menu all the settings can be locked/unlocked. Use long **SET**, then use short **UP** to lock/unlock the settings. Then use short **SET** to go back to **total volume units** menu. If the settings are locked then they can only be viewed but not changed.

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

- In the “**rate volume units**” menu use **UP** to choose the volume units among **mL, L, G, CF, M³** and **AF**. Press short **SET** to move to the next menu
- In the “**time units**” (**tU**) menu use **UP** to choose the time units among **S, M, H** and **D**. Press short **SET** to move to the next menu.
- **KFACTOR** icon along with a blinking decimal point and the KFACTOR number is shown. The decimal places for the KFACTOR can be programmed using **UP** button. KFACTORs ranging from 0.00001 to 9,999,999 can be entered this way. To move from the blinking decimal point away and start entering the KFACTOR digits use the **RIGHT** button. The main **KFACTOR** for the particular flow meter connected to the GFC240 can be entered.

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

- In the **input type** menu use short **UP** to change between **Lin** and **Sqrt**. If **Lin** is chosen GFC240 will calculate the flow rate according to the following formula:

Flow Rate = Input * 20 mA value / KFACTOR

If **Sqrt** has been chosen then GFC240 will use:

Flow Rate = sqrt(Input * 20 mA value) * KFACTOR

- “Input” is the normalized value of the input from 0.0 to 1.0, so 4 mA is 0.0, 20 mA is 1.0
- “20 mA value” is a value in engineering units that corresponds to an input of 20 mA
- “sqrt” means square root



- KFACTOR is a coefficient of proportion corresponding to the physics and specifics of the particular flow meter.
- The rate will be in **rate volume units per time unit**

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

- In the “**100% value**” (full scale, **FS**) menu program the value in engineering units that corresponds to a 20 mA input. Press short **SET** to move to the next menu.
- In that menu a cut off from 0.0% to 9.9 % can be programmed. This feature is very useful because the input is analog and there always be some small mismatch of the real value of the input 4 mA and the value that GFC240 considers to be a 4 mA signal. The cut off can also be used to cut some very low flow from leaks or jitter of the liquid. Press short **SET** to move to the next menu.
- In the **SET20** menu program the flow rate (in **rate volume units per time unit**) at which you want the analog output to be 20.00 mA. Analog output will be 4.00 mA at zero rate. If **SET20** = 0.0 the analog output will stay about 3.85 mA and will not change with the rate. Press short **SET** to move to the next menu – **SETP**.
- The value for **SETP** must be in **total volume units per pulse** and the computer will not accept zero for this setting.
- Press short **SET** to move to the “Rate **decimal Places**” menu where using short **UP** auto, none, 1, 2, 3, 4 or 5 decimal places for the flow rate can be programmed.
- Press short **SET** to move to the “Total **decimal Places**” menu where using short **UP** auto, none, 1, 2, 3, 4 or 5 decimal places for all totals can be programmed.
- Press short **SET** to move to the **Total Reset enable/disable** menu. In this menu using **UP** button the total reset can be enabled or disabled.
If enabled and GFC240 is in normal mode displaying total the **RESET** icon will also be displayed and long **RIGHT** will clear the total.

Because this menu is the last one pressing a 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 Reset enable** menu. General practice would be the settings to be unlocked at the first menu, then changed and locked again before exiting at the last menu. Press short **SET** to exit the last menu. After a couple of seconds during which all the settings are being checked, validated and stored into the non-volatile memory, the computer will move to the normal mode.

NOTE: There is a time out built-in the software that 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: During menus the computer continues to measure and calculate rate and total and control the outputs so no total will be lost. But changing for an instance the KFACTOR will invalidate the total accumulated. So it would be the user's responsibility to take appropriate actions after changing the settings like resetting the totals or leaving them as they were, for an instance.

3.5. Checking the LCD

All the icons of the LCD can be checked by pressing and holding the **RIGHT** button during turning the power supply on or after exiting the last menu. Releasing the button will allow the computer to go to

normal mode.

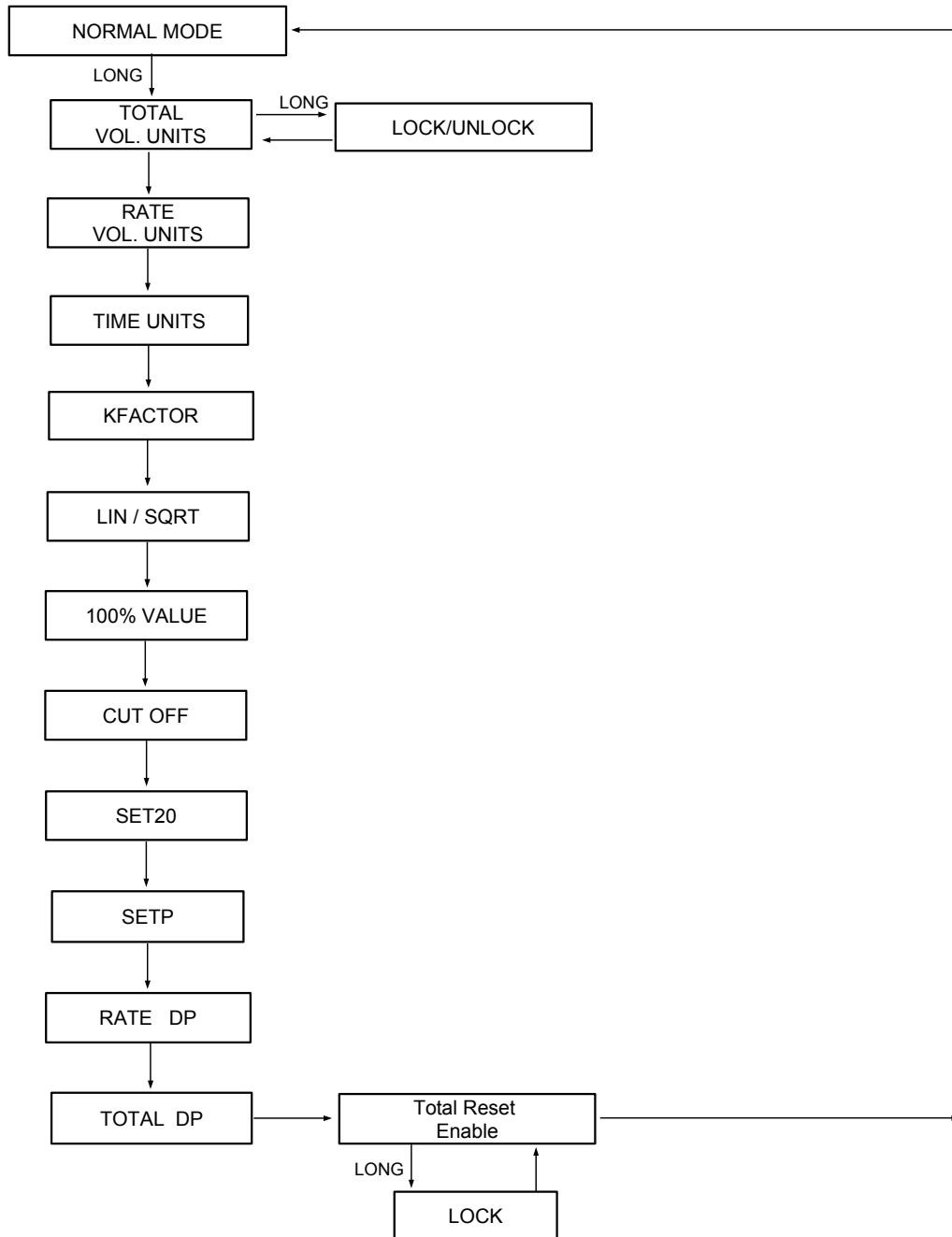
3.6. Removing the power

The total is stored in the non-volatile memory every 50 second.

Before removing the power make sure that there was no flow for the last minute.

4. MENU DIAGRAM

The menu diagram for GFC240 flow computer / totalizer is shown below.



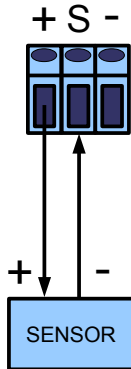
5. APPLICATION

5.1. ELECTRICAL

NOTE: There is no isolation between the sensor input and the power supply. Terminals 2 and 9 are shorted inside the device. It is the user's responsibility to consider this fact and implement appropriate wiring in the particular user's application.

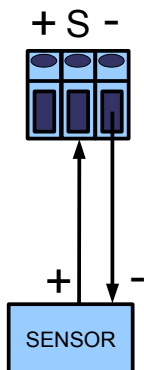
5.1.1. Wiring

5.1.1.1. Passive sensor, loop power



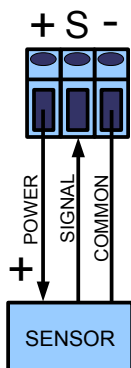
GFC240 powers the sensor and measure its current using 2 wires.

5.1.1.2. Two wire active sensor



The sensor has its own power and GFC240 only measures its signal (current).

5.1.1.3. Three wire connection



GFC240 powers the sensor and measures its signal (current). The sensor must be sourcing current out of "signal".

5.2. VERSIONS



WALL MOUNT GFC240



WALL MOUNT GFC240E



PANEL MOUNT
GFPC240

6. ORDERING

For ordering please use the following G Instruments part numbers:

<i>Description</i>	<i>G Instruments PN</i>
GFC240 flow computer, no power supply (external 8 – 36 V DC required)	30195
GFC240 flow computer with GPS115 (115 VAC power supply)	30196
GFC240 flow computer with GPS220 (220 VAC power supply)	30197
GFC240 flow computer with GPS122 (85-264 VAC power supply)	30240
GFC240E flow computer, no power supply (external 8 – 36 V DC required)	30253
GFC240E flow computer with GPS115E (115 VAC power supply)	30254
GFC240E flow computer with GPS220E (220 VAC power supply)	30255
GFC240E flow computer with GPS122E (85-264 VAC power supply)	30256
GFPC240 flow computer (external 8 – 36 V DC required)	30306



IMPORTANT NOTICE

G Instruments reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products at any time without notice.

Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete.

G Instruments does not assume any liability arising from the use of any device or circuit described herein, nor does it convey any license under its patent rights or the rights of others.

Customers are responsible for their products and applications using G Instruments devices. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

G Instruments products are not authorized for use as critical components in life support devices or systems without express written approval of G Instruments.

Trademarks and registered trademarks are the property of their respective owners.