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Model FLSC-C3-XX DC Powered Microprocessor Controlled Transmitter



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1. Introduction

The FLSC-C3 is a versatile DC powered microprocessor-based transmitter, which provides pulse output, analog output and an optional Low flow alarm option.

The flowmeter input circuitry will accept a variety of signal types including, low level sinusoidal, MCP/RF, pulse and contact closure. Optional 20-point linearization is available to correct for flowmeter non-linearities, improving overall system accuracy. The FLSC-C3 is compatible with many Omega turbine flowmeters as well as the FTB3000 series positive displacement flowmeters.

FLSC-C3 Block Diagram



An RS232 communications port located under the top plate allows FLSC-C3 to be remotely configured using a Windows based application that is included with all units.

The standard unit is packaged in an extruded aluminum enclosure for wall mounting or may be mounted directly on FTBG Series Turbine optional NEMA 4X or EX enclosure. An optional bracket is also available for mounting on standard DIN rail.

2. Specifications

General Specifications

| Input Signal Type: | Magnetic pick up, MCP pick up, Contact Closure, Pulse |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Input frequency range: | 0.2 Hz to 4 KHz |
| Signal level: | 10 mV rms to 30 Vdc |
| Power supply: | 8-30 Vdc (Reverse polarity protected)100-240 Vac (Fuse rating 0.5A, 250 Vac)optional |
| Analog Output: | 4-20mA, 1-5V |
| Load resistance: | Max 650 Ohms at 24 Vdc |
| Accuracy: | +/- 0.02% of full scale @ 20° C |
| Temperature drift: | 40ppm/deg C |
| Pulse output | 0-5, 0-10V*, Open Collector, AC square *Requires 12-30 Vdc Power Supply Internal pull-up resistor 10k Ohms Recommended load min. 50k Ohms |
| Pulse Scaling | Per flow unit of measure, divide by 1, 10, 100 |
| Hi/Lo Alarm | Relay (2A, 30 Vdc), 0-5V, Open Collector (0.5A, 30 Vdc) |
| Communications | RS232 port for Configuration and diagnostics |
| Operating temperature: | -40 to 85 C ^o |
| Humidity: | 0-90% Non-condensing |
| Enclosure: | Extruded aluminum, DIN rail mount, or Explosion Proof |
| Regulatory: | CE compliant |
| | |

Options

20 point linearization

3. Installation and Operation

3.1. Power Supply

DC Power (8-30 VDC)



AC Power (100-240 VAC)

AC power for FLSC-C3 requires an optional circuit board, PCA182. The Alarm option (PCA184) is not available when the AC Power option is equipped.



3.2. Flowmeter Input

The Preamp circuitry for conditioning the flow signal is located on PCA180. The following drawings illustrate typical connections and switch settings on PCA180 for various input signals.

DC+ \oslash DC-SIG+ 0 0 SIG-ANLG Ø PULSE+ Ø PULSE-ØN/C **PCA180** ØN/C Mag Pickup Coil ØN/C SW1

Magnetic Pickup Coil

MCP/RF Coil





PCA180 SW1

Redi-Pulse (TTL Pulse)



Redi-Pulse (Open Collector)





3.3. Pulse Output

FLSC-C3 provides a Pulse Output option that is scaled per flow unit of measure by a factor of 1, 10 or 100. The following drawings illustrate typical connections and switch settings for various pulse output options.

TTL(0-5V), 0-10V, High Level (DC In), AC Square





PCA180 SW2

TTL(0-5V), 0-10V, AC Square



PCA180 SW2

High Level Pulse, AC Square

Open Collector, Isolated Pulse





SW2



PCA180 SW2

Open Collector

Isolated Pulse

3.4. Analog Output

FLSC-C3 provides an Analog Output option that will output an analog current or voltage that is proportional to the flow rate.

Analog Output



The Microcontroller, located on PCA183, accepts the squarewave output of the preamplifier and performs all of the calculations that are required to control the Loop Driver. After measuring the frequency of the square-wave, the Microcontroller uses the following equations to compute the flow rate and current.

$$flowrate = \frac{frequency}{Kfactor} x60^{FM} xCF$$

Where:

| Kfactor | = | Is dependent on the Flow Calculation Method setting and | |
|---------|---|------------------------------------------------------------|--|
| | | is either the Average K-Factor or the Linearized K- | |
| | | Factor from the Frequency / K-Factor table. | |
| FM | = | Is the Flow rate Units setting of 0, 1, or 2. Where "0" is | |
| | | for Seconds, "1" is for Minutes, and "2" is for Hours. | |
| CF | = | Is the Correction Factor setting. | |

$$current = 4mA + \left(16mAx\frac{flowrate}{AF}\right)$$

Where:

AF = Is the 20 mA maximum Flow rate value.

If the calculated flowrate is greater than the AF setting, the current will be set to 24mA to indicate an "Over-range" condition. After calculating the current, the Microcontroller digitally sends the current information to the Loop Driver. The loop driver, located on PCA183, uses the digital information sent to it by the Microcontroller to set the current of the loop. The Loop Driver also supplies power to the Microcontroller.

The analog output response time to reach steady state due to a change in the flow rate is approximately two (1/8) seconds. When flow stops, the time for the analog output to return to 4 mA will be between 3 and 12 seconds, depending on the Maximum Sample Time (MST) setting. MST is adjusted using the NB= (DATA) command, where NB is a value between 1 and 80. The default MST setting is NB= 1. Adjusting the MST is only recommended for low flow applications where the minimum input frequency is below 1 Hz.

3.5. Alarm Outputs

FLSC-C3 provides an optional High/Low Flow Alarm feature. Alarms require an optional circuit board, PCA184. The Alarm option is not available on AC Power units. The drawings below illustrate the typical connections and switch settings for various alarm options.



Hi/Lo Alarm Relay

Hi/Lo Alarm TTL(0-5V)





PCA184 SW1

Hi/Lo Alarm Open Collector



3.6. Communications Connections

FLSC-C3 is equipped with RS232 serial Communication port for changing FLSC-C3 configuration, diagnostic functions, and flow monitoring. Omega communication program DevConfig must be used to communicate with FLSC-C3.

The RS232 serial port connector is located under the top plate of FLSC-C3 and may be accessed by removing the two screws from the top plate. A matching connector is provided with OMEGA FLSC-C-CABLE Communications Cable. FLSC-C3 unit has to be powered from external supply in order to be able to communicate. Additional power for FLSC-C3 communication circuitry is supplied by the RS232 serial port of the computer/terminal. COM port settings must be set as follows:

| Baud Rate: | 2400 |
|--------------|------|
| Data Bits: | 8 |
| Parity: | None |
| Stop bits: | 1 |
| Handshaking: | None |

OMEGA FLSC-C-CABLE Communications Cable



3.7. Wiring

When installing FLSC-C3, it is a good practice to use shielded cables for all input and output signals. The shield should be connected to the earth ground lug on the FLSC-C3. The shield on the opposite end of the cable should be left open.

This wiring practice is mandatory in order to comply with the requirements for Electromagnetic Compatibility, as per EMC-Directive 89/336/EEC of the Council of European Community.

Appendix A – Default Configuration

Factory default configuration:

| FIELD | Value |
|-----------------------------|-------------|
| FLOW CALC. METHOD | 0 (Average) |
| K-FACTOR DECIMAL | 3 |
| AVERGAE K-FACTOR | 1.00 |
| NUMBER OF POINTS IN K-TABLE | 12 |
| FREQUENCY 01 | 4999.981 |
| FREQUENCY 02 | 4999.982 |
| FREQUENCY 03 | 4999.983 |
| FREQUENCY 04 | 4999.984 |
| FREQUENCY 05 | 4999.985 |
| FREQUENCY 06 | 4999.986 |
| FREQUENCY 07 | 4999.987 |
| FREQUENCY 08 | 4999.988 |
| FREQUENCY 09 | 4999.989 |
| FREQUENCY 10 | 4999.990 |
| FREQUENCY 11 | 4999.991 |
| FREQUENCY 12 | 4999.992 |
| FREQUENCY 13 | 4999.993 |
| FREQUENCY 14 | 4999.994 |
| FREQUENCY 15 | 4999.995 |
| FREQUENCY 16 | 4999.996 |
| FREQUENCY 17 | 4999.997 |
| FREQUENCY 18 | 4999.998 |
| FREQUENCY 19 | 4999.999 |
| FREQUENCY 20 | 5000.000 |
| K-FACTOR 01 | 1.00 |
| K-FACTOR 02 | 1.00 |
| K-FACTOR 03 | 1.00 |
| K-FACTOR 04 | 1.00 |
| K-FACTOR 05 | 1.00 |
| K-FACTOR 06 | 1.00 |
| K-FACTOR 07 | 1.00 |
| K-FACTOR 08 | 1.00 |
| K-FACTOR 09 | 1.00 |
| K-FACTOR 10 | 1.00 |
| K-FACTOR 11 | 1.00 |
| K-FACTOR 12 | 1.00 |
| K-FACTOR 13 | 1.00 |
| K-FACTOR 14 | 1.00 |
| K-FACTOR 15 | 1.00 |
| K-FACTOR 16 | 1.00 |

| K-FACTOR 18 | 1.00 |
|----------------------|-----------|
| K-FACTOR 19 | 1.00 |
| K-FACTOR 20 | 1.00 |
| MEASURING UNITS | GAL |
| FLOW RATE TIME UNITS | MIN |
| MAX SAMPLE TIME | 01 |
| ANALOG OUTPUT LOW | 00000.000 |
| ANALOG OUTPUT HIGH | 99.999 |
| PULSE SCALE | OFF |
| PULSE FREQUENCY | 100 |
| ALARM FUNCTION | Off |
| ALARM LEVEL | 99999.981 |



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