Model FLSC-C3-XX
DC Powered Microprocessor
Controlled Transmitter
SERVICING NORTH AMERICA:

U.S.A.:
Omega Engineering, Inc., One Omega Drive, P.O. Box 4047
Stamford, CT 06907-0047 USA
Toll Free: 1-800-826-6342
TEL: (203) 359-1660
FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec), H7L 5A1 Canada
Toll-Free: 1-800-826-6342
TEL: (514) 856-6928
FAX: (514) 856-6886
e-mail: info@omega.ca

FOR IMMEDIATE TECHNICAL OR APPLICATION ASSISTANCE:

U.S.A. and Canada: Sales Service: 1-800-826-6342/1-800-TC-OMEGA®
Customer Service: 1-800-622-2378/1-800-622-BEST®
Engineering Service: 1-800-872-9436/1-800-USA-WHEN®

Mexico/
Latin America:
En Español: 001 (203) 359-7803
FAX: 001 (203) 359-7807
e-mail: espanol@omega.com

SERVICING EUROPE:

Benelux:
Managed by the United Kingdom Office
Toll-Free: 0800 099 3344
FAX: +31 20 347 21 21
e-mail: sales@omegabng.nl

Czech Republic:
Frýchátska 184
733 01 Karvina, Czech Republic
Toll-Free: 0800-146342
FAX: +420-59-631114
TEL: +420-59-6311899
e-mail: info@omegashop.cz

France:
Managed by the United Kingdom Office
Toll-Free: 0800 466 342
FAX: +33 (0) 130 57 54 27
TEL: +33 (0) 161 37 29 00
e-mail: sales@omega.fr

Germany/Austria:
Daimlerstrasse 26
D-75392 Deckenpfronn, Germany
Toll-Free: 0800 6397678
FAX: +49 (0) 7056 9398-29
TEL: +49 (0) 7056 9398-0
e-mail: info@omega.de

United Kingdom: 
ISO 9001 Certified
Omega Engineering Ltd.
One Omega Drive, River Bend Technology Centre, Northbank
Irland, Manchester M44 5BD United Kingdom
Toll-Free: 0800-488-488
FAX: +44 (0) 161 777-6622
TEL: +44 (0) 161 777-6611
e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.
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°
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.

Magnetic Pickup Coil

![Diagram of Magnetic Pickup Coil]

MCP/RF Coil

![Diagram of MCP/RF Coil]
Redi-Pulse (TTL Pulse)

PCA180 SW1

Redi-Pulse (Open Collector)

PCA180 SW1
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

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

PCA180 SW2

High Level Pulse, AC Square
Open Collector, Isolated Pulse

USER DCS

PULSE INPUT

DC+
DC-
SIG+
SIG-
ANLG
PULSE+
PULSE-
N/C
N/C
N/C

V+
2.7K

PCA180
SW2

Open Collector

PCA180
SW2

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

\[
flowrate = \frac{frequency}{K\text{factor}} \times 60^{FM} \times CF
\]

The Microcontroller, located on PCA183, accepts the square-wave 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.
Where:

\[ K_{factor} = \text{Is dependent on the Flow Calculation Method setting and is either the Average K-Factor or the Linearized K-Factor from the Frequency / K-Factor table.} \]

\[ FM = \text{Is the Flow rate Units setting of 0, 1, or 2. Where “0” is for Seconds, “1” is for Minutes, and “2” is for Hours.} \]

\[ CF = \text{Is the Correction Factor setting.} \]

\[ current = 4mA + \left( 16mA \times \frac{flowrate}{AF} \right) \]

Where:

\[ AF = \text{Is the 20 mA maximum Flow rate value.} \]

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)
Hi/Lo Alarm Open Collector

PCA184
SW1
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:

<table>
<thead>
<tr>
<th>FIELD</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLOW CALC. METHOD</td>
<td>0 (Average)</td>
</tr>
<tr>
<td>K-FACTOR DECIMAL</td>
<td>3</td>
</tr>
<tr>
<td>AVERAGE K-FACTOR</td>
<td>1.00</td>
</tr>
<tr>
<td>NUMBER OF POINTS IN K-TABLE</td>
<td>12</td>
</tr>
<tr>
<td>FREQUENCY 01</td>
<td>4999.981</td>
</tr>
<tr>
<td>FREQUENCY 02</td>
<td>4999.982</td>
</tr>
<tr>
<td>FREQUENCY 03</td>
<td>4999.983</td>
</tr>
<tr>
<td>FREQUENCY 04</td>
<td>4999.984</td>
</tr>
<tr>
<td>FREQUENCY 05</td>
<td>4999.985</td>
</tr>
<tr>
<td>FREQUENCY 06</td>
<td>4999.986</td>
</tr>
<tr>
<td>FREQUENCY 07</td>
<td>4999.987</td>
</tr>
<tr>
<td>FREQUENCY 08</td>
<td>4999.988</td>
</tr>
<tr>
<td>FREQUENCY 09</td>
<td>4999.989</td>
</tr>
<tr>
<td>FREQUENCY 10</td>
<td>4999.990</td>
</tr>
<tr>
<td>FREQUENCY 11</td>
<td>4999.991</td>
</tr>
<tr>
<td>FREQUENCY 12</td>
<td>4999.992</td>
</tr>
<tr>
<td>FREQUENCY 13</td>
<td>4999.993</td>
</tr>
<tr>
<td>FREQUENCY 14</td>
<td>4999.994</td>
</tr>
<tr>
<td>FREQUENCY 15</td>
<td>4999.995</td>
</tr>
<tr>
<td>FREQUENCY 16</td>
<td>4999.996</td>
</tr>
<tr>
<td>FREQUENCY 17</td>
<td>4999.997</td>
</tr>
<tr>
<td>FREQUENCY 18</td>
<td>4999.998</td>
</tr>
<tr>
<td>FREQUENCY 19</td>
<td>4999.999</td>
</tr>
<tr>
<td>FREQUENCY 20</td>
<td>5000.000</td>
</tr>
<tr>
<td>K-FACTOR 01</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 02</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 03</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 04</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 05</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 06</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 07</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 08</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 09</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 10</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 11</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 12</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 13</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 14</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 15</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 16</td>
<td>1.00</td>
</tr>
<tr>
<td>Description</td>
<td>Value</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>K-FACTOR 18</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 19</td>
<td>1.00</td>
</tr>
<tr>
<td>K-FACTOR 20</td>
<td>1.00</td>
</tr>
<tr>
<td>MEASURING UNITS</td>
<td>GAL</td>
</tr>
<tr>
<td>FLOW RATE TIME UNITS</td>
<td>MIN</td>
</tr>
<tr>
<td>MAX SAMPLE TIME</td>
<td>01</td>
</tr>
<tr>
<td>ANALOG OUTPUT LOW</td>
<td>00000.000</td>
</tr>
<tr>
<td>ANALOG OUTPUT HIGH</td>
<td>99.999</td>
</tr>
<tr>
<td>PULSE SCALE</td>
<td>OFF</td>
</tr>
<tr>
<td>PULSE FREQUENCY</td>
<td>100</td>
</tr>
<tr>
<td>ALARM FUNCTION</td>
<td>Off</td>
</tr>
<tr>
<td>ALARM LEVEL</td>
<td>99999.981</td>
</tr>
</tbody>
</table>
WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and fuses.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), or used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2011 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.
Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!
Shop online at omega.com™

TEMPERATURE
- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE
- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL
- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY
- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION
- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Data Logging Systems
- Recorders, Printers & Plotters

HEATERS
- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL
- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments