

Foxboro® Model CFT51 Digital Coriolis Mass Flow and Density Transmitter



Model CFT51 Transmitter Description

The Foxboro® Model CFT51 Digital Coriolis Mass Flow and Density Transmitter, developed by Foxboro, is an enhancement to the CFT50 which introduced game changing technology in the area of coriolis flowmetering. When combined with a Foxboro Model CFS10 or CFS20 Mass Flowtube, it forms an I/A Series Mass Flow and Density Meter. Use of digital signal processing (DSP) techniques provides enhanced flowmeter performance and adds new features over previous transmitter versions. The CFT51 uses HART or Modbus protocol for remote communications.

The 2-phase capability of the CFT51 prevents users from having to take extraordinary steps to remove gas from the liquid streams, provides the capability to start and finish empty batching, and facilitates tanker and railcar unloading applications. The CFT51 has the fastest response time in the industry, making it suitable for fast batching as well as for small volume proving, which is prevalent in upstream O&G markets. The CFT51 introduces required online validation capability and pressure compensation for high pressure high accuracy applications and is the enabler for some unique upstream O&G solutions as well as for bunkering applications.

Summary

The Foxboro CFT51 Digital Coriolis Mass Flow and Density Transmitter is an advanced generation of mass flow devices using DSP (digital signal processing) technology, which allows this transmitter to provide improved performance over other Coriolis flowmeters.

Business Value

The CFT51 breakthrough design allows mass flowmeters to operate uninterrupted during difficult-to-measure applications, including problematic liquid/gas flow. Fully capable of performing in batch applications starting with empty flowtube conditions, the CFT51 has one of the fastest response times in the industry that ultimately reduces costly material loss.

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Features / Benefits

Patented Digital Signal Processing (DSP) techniques allow:

- Continuous 2-phase measurement, partial empty tube conditions, start-from-empty batching, on-line flowtube verification and on-line pressure compensation
- User-configurable, externally powered I/O types isolated from each other include: analog current output and alarm, frequency or scaled pulse output, contact output, contact input
- Quadrature pulse output for custody transfer applications
- User-selectable HART or Modbus communication via LCD Indicator pushbuttons
- Remote communication with HART communicator or PC-based configurator
- Transmitter is backward compatible to existing CFS10 and CFS20 flowtube installations
- Enclosure meets NEMA 4X and IEC IP66/67 ratings
- Transmitter certified for use in hazardous area locations

Specifications

Operating, Transportation and Storage Conditions

Influence	Reference Operating Conditions	Normal Operating Condition Limits (a)	Transportation and Storage Limits (a)
Ambient Temperature (a)	23 ± 2°C (73 ± 3°F)	-40 and +60°C (b) (f) (-40 and +140°F) (b)	-40 and +85°C (-40 and +185°F)
Relative Humidity	50 ± 10%	5 and 100% (c)	5 and 100% (c)
ac Supply Voltage and Frequency	120/240 V ac, ± 1% 50/60 Hz, ± 1%	120/240 V ac, +10/-15% 50/60 Hz, ± 5%	N/A
dc Supply Voltage	24 V dc, ± 5%	10 and 36 V dc	
Current Output: Supply Voltage Load	24 V dc 250 Ω (d)	24 V dc, ± 10% 250 Ω (d)	
Pulse Output: Supply Voltage Load	24 V dc 73 mA	24 V dc, ± 10% 80 mA	
Contact Input: Supply Voltage Load	24 V dc 12 mA	24 V dc, ± 10% 15 mA maximum	
Contact Output: Supply Voltage Load	24 V dc 100 mA	24 V dc, ± 10% 100 mA maximum	
RS485: Receive Input Range	± 5 V dc	± 5 V dc (e)	
Vibration	1 m/s ² (0.1 "g")	5 m/s ² (0.5 "g") from 5 to 500 Hz	

(a) Including condensation.
 (b) Refer to the Electrical Safety Specifications section for a restriction in ambient temperature limits with certain electrical approvals and certifications.
 (c) Conditions producing sustained condensate are not allowed.
 (d) Minimum load required with HART Communicator or PC-based Configurator is 250 Ω. Operating below the 250 Ω requirement may cause communication problems.
 (e) The Operative Limits are -7 and +12 V dc.
 (f) If the temperature is between -20 and -40°C, the display may go blank, but the device is still operational.

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Model Code Specifications

Description	Mode
Digital Coriolis Mass Flow Transmitter	CFT51
Communication Interface (c)	
HART Communication Protocol	-T
Modbus Communication Protocol	-M
Mass Flowtube Sensor	
Models CFS10 and CFS20 Mass Flowtubes	B
Transmitter Mounting	
Remote Mounted Transmitter	1
Supply Voltage	
120/240 V ac, 50/60 Hz, Externally Powered I/O	A
10 to 36 V dc, Externally Powered I/O	B
Housing Field Cable Entries	
1/2 NPT Connection (Two places)	A
M20 Connection (Two places)	B
Interconnecting Cable Material	
No Cable	N
IPVC Insulated Cable; Temperature Range from -20 to +80°C (-4 to +176°F)	P
FEP Insulated Cable; Temperature Range from -40 to +85°C (-40 to +185°F)	F
Interconnecting Cable Length	
No Cable	N
20 foot cable/6 meter cable	G
50 foot cable/15 meter cable	P
100 foot cable/31 meter cable	H
200 foot cable/61 meter cable	J
500 foot cable/152 meter cable	K
750 foot cable/229 meter cable	L
750 foot cable/229 meter cable	L
1000 foot cable/305 meter cable	M
Tamperproof and Custody Transfer Options	
Tamperproof Sealing for Housing and Terminal Block Covers	-S
Weights and Measures Custody Transfer (a) (d)	-T

(a) When used with the Models CFS10 and CFS20 Style B Flowtubes, the flowtubes must also have Option -T (NTEP). Also, Option -T is only available with Electrical Safety Codes FDA, FDN, FNA, and FNN, and only available with LCD Indicator with Keypad Code B.

(b) Epoxy paint finish option applies to the enclosure body; the enclosure covers use an epoxy paint finish as standard.

(c) Factory default setting. Transmitters with display and keypad may be changed in the field.

(d) Please contact Foxboro for status of this certification.

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Model Code Specifications (continued)

Cable Gland and Adapter Options

M20 to 1/2 NPT Adapter	-A
M20 to 3/4 NPT Adapter	-B

Paint Options

Epoxy Paint (b).....	-E
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Electrical Safety

ATEX flameproof with intrinsically safe flowtube connections	ADA
ATEX flameproof with energy limited flowtube connections.....	ADN
ATEX non-sparking with intrinsically safe flowtube connections	ANA
ATEX non-sparking with energy limited flowtube connections.....	ANN
CSA explosion-proof with intrinsically safe flowtube connections.....	CDA
CSA explosion-proof with non-incendive flowtube connections	CDN
CSA non-incendive and energy limited with intrinsically safe flowtube connections.....	CNA
CSA non-incendive with non-incendive flowtube connections	CNN
FM explosion-proof with intrinsically safe flowtube connections (d)	FDA
FM explosion-proof with non-incendive flowtube connections (d)	FDN
FM non-incendive with intrinsically safe flowtube connections (d).....	FNA
FM non-incendive with non-incendive safe flowtube connections (d)	FNN
IECEX flameproof with intrinsically safe flowtube connections.....	EDA
IECEX flameproof with energy limited flowtube connections	EDN
IECEX non-sparking with intrinsically safe flowtube connections	ENA
IECEX non-sparking with energy limited flowtube connections.....	ENN
NEPSI flameproof with intrinsically safe flowtube connections (d).....	NDA
NEPSI flameproof with energy limited flowtube connections (d)	NDN
NEPSI non-sparking with intrinsically safe flowtube connections (d)	NNA
NEPSI non-sparking with energy limited flowtube connections (d).....	.NNN
No Certifications	ZZZ

- (a) When used with the Models CFS10 and CFS20 Style B Flowtubes, the flowtubes must also have Option -T (NTEP). Also, Option -T is only available with Electrical Safety Codes FDA, FDN, FNA, and FNN, and only available with LCD Indicator with Keypad Code B.
- (b) Epoxy paint finish option applies to the enclosure body; the enclosure covers use an epoxy paint finish as standard.
- (c) Factory default setting. Transmitters with display and keypad may be changed in the field.
- (d) Please contact Foxboro for status of this certification.

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