



CSA INTERNATIONAL

Certificate of Compliance

Certificate: 1156566 (111752-1)

Master Contract: 188586

Project: 2115390

Date Issued: 2008/12/11

Issued to: Autoflow

15915 South San Pedro St
Gardena, CA 90248
USA

Attention: Mr. Richard Hughes

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Issued by: Wesley Van Hill, C.E.T.

Authorized by: Patricia Pasemko, Operations Manager

PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations -
Certified to US Standards

Class I, Division 1 and 2, Groups ABCD; Class II, Division 1 and 2, Groups E, F, G; Class III.

Class I, Zone 1, IIC; Ex d IIC T3.



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Model Series FS6202, FS6204, FS6702, FS6704 and FS6800 Flow Switches; rated 0.25 Amps maximum, @ 120 Vac maximum, 3.0 Watt Resistive or 2.46 VA and @ 100 Vdc maximum 3.0 Watt Resistive, Ambient temperature -40° C to 105° C, Temperature Code T3 and a maximum operating pressure of 3000 PSI.

Model Series FS6900 Flow Switches; rated 0.25 Amps maximum, @ 120 Vac maximum, 3.0 Watt Resistive or 2.46 VA and @ 100 Vdc maximum 3.0 Watt Resistive, Ambient temperature -40° C to 150° C, Temperature Code T3 and a maximum operating pressure of 1000 PSI.

Note:

1. There will be suffixes following the model number denoting supplemental information

APPLICABLE REQUIREMENTS

CSA Standard C22.2 No. 0-M1991 - General Requirements - Canadian Electrical Code Part II

CSA Standard C22.2 No. 0.5-M1982 – Threaded Conduit Entries

CSA Standard C22.2 No. 25-M1966 - Enclosures for Use in Class II Groups E, F and G Hazardous Locations

CSA Standard C22.2 No. 30-M1986 – Explosion-Proof Enclosures for Use in Class I Hazardous Locations

CSA Standard C22.2 No.142-M1987 – Process Control Equipment

CAN/CSA E60079-0:07 - Electrical apparatus for explosive gas atmospheres – Part 0: General requirements

CAN/CSA E60079-1:07 - Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof enclosures “d”

UL Standard 508, Seventeenth Edition – Industrial Control Equipment

UL Standard 1203, Fourth Edition – Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations

UL 60079-0, Fourth Edition - Electrical Apparatus for Explosive Gas Atmospheres – Part 0: General Requirements

UL 60079-1, Fifth Edition - Electrical Apparatus for Explosive Gas Atmospheres – Part 1: Flameproof Enclosures “d”



Descriptive Report and Test Results

MASTER CONTRACT: 188586

REPORT: 1156566

PROJECT: 2115390

- Edition 1:** 19 June 1998; Application No - Western Region
Issued by; Scott Friel, EIT; Reviewed by: Dave Adams, P. Eng.
- Edition 2:** December 19, 2000; Project 1156566 - Edmonton
Issued by Marty Klaassen P. Eng.; Reviewed by: Dave Adams
Report Pages Replace - All
Figures replaced - Figures 1 to 4
- Edition 3:** July 31, 2003; Project 1430322 - Edmonton
Issued by Marty Klaassen P. Eng; Reviewed by: Andrew Redeker C.E.T.
Figures Added – 6-11
Figures replaced – 2
- Edition 4:** September 20, 2004; Project 1590414 - Edmonton
Issued by Marty Klaassen P. Eng; Reviewed by: Andrew Redeker C.E.T.
- Edition 5:** March 27, 2008; Project 1980312 – Edmonton
Issued by Wesley Van Hill, C.E.T.; Reviewed by Andrew Redeker, C.E.T.
Figures Replaced: 1, 2, 3, 4, 5, 6 and 9
Report pages reissued
- Edition 6:** December 11, 2008; Project 2115390 – Edmonton
Issued by Wesley Van Hill, C.E.T.; Reviewed by Andrew Redeker, C.E.T.
Figure replaced: 7
Report pages reissued

Contents: Certificate of Compliance - Pages 1 to 2
Supplement to Certificate of Compliance - Page 1
Description and Tests - Page 1 to 9
Figures - 1 to 11

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CLASS

2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - Certified to US Standards

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Note:

1. There will be suffixes following the model number denoting supplemental information.

APPLICABLE REQUIREMENTS

The following standards were used as a guide in the evaluation of the products covered by this report.

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CSA Standard C22.2 No. 0.5-M1982 – Threaded Conduit Entries

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MARKINGS

- (1) Submitter's name, trademark, or the CSA file number (adjacent the CSA Mark).
- (2) Catalogue / Model designation.
- (3) Complete electrical rating (amps, hertz, and volts).
- (4) Date code / Serial number traceable to month and year of manufacture.
- (5) Hazardous Location designations.
- (6) Maximum ambient.
- (7) Maximum working pressure
- (8) The CSA Mark, with the NRTL/C indicator or the equivalent CUS mark
- (9) The following bilingual cautions:

“WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS” and,

“ AVERTISSEMENT - RISQUE D'EXPLOSION - AVANT DE DECONNECTER L'EQUIPEMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.”

NOTE: French Markings for products with CSA Mark or CSA Mark and the NRTL/C indicator are optional.

Jurisdictions in Canada may require markings to be also in French. It is the responsibility of the Customer to provide bilingual marking, where applicable, in accordance with the requirements of the Provincial Regulatory Authorities. It is the responsibility of the Customer to determine this requirement and have bilingual wording added to the "Markings".

REQUIRED METHOD OF MARKING:

The marking shall be permanent, such as a 0.5-mm thick metal nameplate secured by drive pins or screws in bottomed holes, cast, etched, or engraved or if using an adhesive label it should utilize a CSA Accepted self-adhesive nameplate material.

ALTERATIONS

1. Adding appropriate grounding provisions for the CEC and NEC. Two (2) #6-32 Binding head screws: one for internal conduit connection and another for an external (European) connection stipulating the use of #18 AWG wire.

FACTORY TESTS

Dielectric Strength Test:

The equipment at the conclusion of manufacture, prior to shipment, shall withstand for one minute without breakdown, the application of the following ac potentials:

- (1) 1000 Vac plus twice the rated voltage between low voltage circuits and non-current carrying parts.
- (2) 1000 Vac plus twice the rated voltage between low voltage circuits and other low voltage or extra-low voltage circuits if such circuits leave or enter the enclosure.
- (3) 500 Vac between extra-low voltage circuits and non current carrying parts if such circuits leave or enter the enclosure.

NOTES:

- (1) As an alternative, potentials 20 percent higher may be applied for one second.
- (2) The required dielectric strength test may be made by applying a dc potential, providing it is 1.414 times the ac test potential
- (3) Capacitors in the extra-low voltage circuits may be disconnected during the dielectric test.
- (4) The dielectric test between extra-low voltage circuits and non current carrying parts may be waived on grounded limited energy (Class 2) circuits.

WARNING:

The factory test(s) specified may present a hazard of injury to personnel and/or property, and should be performed by persons knowledgeable of such hazards, and under conditions designed to minimize the possibility of injury.

FIELD SERVICE INSTRUCTION:

This report contains reference to certain construction and engineering documents that have been deemed critical to ensuring continued compliance with applicable construction and performance requirements. A list of these documents, with drawing numbers and the appropriate revision levels is summarized in this report. Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request. Failure to produce these documents in a timely manner constitutes noncompliance and is subject to the actions outlined in the CSA Product Service Agreement.

DESCRIPTIVE DOCUMENTS

NOTE: Documents detailed herein are subject to inspection by CSA International personnel and shall be made available in the manufacturing location upon request.

LIST OF FIGURES:

Fig. No:	Pages	Drawing No.	Revision	Description
1	1	620226	D	Name Plate
2	1	FS6200	D	Flow Switch Assembly
3	1	FS6700	D	Flow Switch Assembly
4	1	620401	D	Body
5	1	620224	A	Switch Assembly
6	1	FS6900	A	Flow Switch Assembly
7	1	620234	A	Switch Assembly
8	1	620228	0	Filter Screen
9	1	620218	C	Plug
10	1		1/12/2001	FS6200/6700 Installation and Operating Instructions
11	1		3/12/2003	FS6900 Installation and Operating Instructions

DESCRIPTION

CATALOG (Ordering Information)

Part No. Example FS6202 C V -1 M

Where:

“FS6202” is the “Basic Series number”

FS6202 – 1/8 NPT process entry

FS6204 – 1/4 NPT process entry

“C” denotes “Material”

C – 316 Stainless Steel

M – Monel

H – Hasteloy

“V” denotes “Seal Material”

B - BUNA – N

E – Ethylene Propylene

K - KALREZ

V – Viton

The number “1” or “3” is the Adjustable Flow Rate Set Point

1 – 30 SCCM to 10 SLPM

3 – 1 SLPM to 20 SLPM

“M” denotes Optional Mounting Bracket

PRINCIPLE OF OPERATION:

The flow switch accurately detects increasing or decreasing flow rates and actuates an integral reed switch at a specific flow rate set point. Increasing flow rate creates a slight differential pressure across the control orifice, and acts on the sensing poppet. When differential pressure overcomes the spring force, the sensing poppet is extended, and the encapsulated Permanent Magnet actuates the hermetically sealed Electrical Reed Switch. The spring provides a positive reset of the switch as the flow rate is decreased. The Metering Screw varies the Control Orifice, thereby allowing the flow rate set point to be infinitely adjustable.

The Electrical switch is magnetically coupled to the sensing poppet. The electrical switch is completely isolated and hermetically isolated from the flow stream by a seamless Stainless Steel barrier. The permanent magnet is totally encapsulated, within the sensing poppet, isolating the magnet from the flow stream.

Both the FS6200 and the FS6700 series are physically identical are separated into series only by their applications and the trade size of the process entry. One is marketed specifically for gas service and the other is marketed specifically for Liquid service. Figure 2 and Figure 3 show the model information and basic construction of the complete unit. A detailed drawing of the main body can be seen in Figure 4. The minimum thickness of the wall shall be no less than 0.027 inches.

Proximity switches, Model 59025-030 (Accepted by UL File E61760) or the equivalent. Figure 5 details the switch assembly.

EXTERNAL ELECTRICAL CIRCUIT CONNECTIONS

The user shall make electrical terminations in the field using the #18 AWG wire leads provided. External Grounding can be accomplished, using #18 AWG wire, using a #6 screw, immediately adjacent to the exit of the lead wires from the electrical switch, or at the opposite end of the Flow Switch Assembly. There is no necessity for specific internal grounding provision since the Flow Switch Assembly is of one piece, 316 Stainless Steel construction. A suitable conduit connection shall be made to the ½ NPT thread provided for that purpose as required.

A minimum of 5 fully engaged NPT threads are required for attachment. This flow switch may be installed into an explosion-proof enclosure, or into a conduit run. If installed into a conduit run, a seal should be used within 450 mm of the switch; this is for the pressure piling effect. This is not considered an arcing or sparking component.

The FS6900.

1. The standard FS6200/ FS6700 Series uses a Hamlin standard 59025 Sensor (Autoflow part Number 620224), which is temperature limited by the electrical wires to 105 C using PVC Insulation. In the FS 6900 a modified **Reed Switch Developments Corporation** part (2230-1301-002 (Autoflow 620234)) is utilized which is a **similar** switch only constructed with Teflon wires (UL #1180) that is suitable for service temperatures to 200°C.
2. In the standard FS 6200/6700 Flow Switch Design, the switch assembly is held in place by a snap ring and allowed to rotate. This is a quite acceptable and a highly reliable design for the 105°C application. In the FS6900 it was felt necessary, because of the increased temperature effects on magnetic flux density, to secure the rotational position of the electrical switch through the use of High temperature Epoxy (Loctite HYSOL E-20HP) at the time of manufacture.
3. The three-piece wire mesh cloth filter used in the previous FS6200/ FS6700 has been replaced with a one-piece stainless steel perforated disk (Autoflow 620228). This disk is retained in place by a step in the body and the part number 620118 Plug.
4. The Maximum Operating pressure of the FS6900 Flow Switch has been reduced from 3000 PSI to 1000 Psig

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Model FS6800 is identical in all aspects to FS6200/FS6700 certified products with the exception of the pressure connections being swagelok (CAJON) ¼ VCR

TEST RESULTS

After evaluation of the device, the flame path would be along the 0.5" NPT thread, where there are 7 full threads, when there is 5 fully engaged threads the device would be adequately protected. To ensure the device would be able to withstand an internal explosion and not having significant internal volume, a Hydrostatic Overpressure test was used in addition to the Test for Explosive Fluid Seals.

C22.2 No 30, Clause 4.10.6.3B and 4.10.6.4B, test for Explosive Fluid seals was passed satisfactorily. The flow switch was then pressurized from the switch side, and was tested up to 58.7 Mpa for a period of 1 minute without deformation or leakage. This test would be considered representative of Explosive Pressure, and Flame Propagation, as long as the minimum thread engagement was met.

It was deemed necessary to require a seal if this device was to be mounted into conduit without a suitable enclosure. When mounted with a suitable enclosure, the device (itself) need not be sealed.

After reviewing the UL reports for the switching apparatus, their tests were accepted as representative for CSA.

No further testing was deemed necessary.

Project # 1156566

Axial length of the flow switch increased from 1.65 to 1.85 to accommodate reed switch.

Replaced Figures 1 to 4.

Label changes:

- CSA logo to be changed to CSA with NRTL indication
- EEx d IIC T6 to be change to EEx d IIC T3
- LCIE98....x to be changed to LCIE99.E6078 x

Project # 1430322

Added F6900 Model with enhanced temperature rating of 150 C and modified Switch rating to remove VA limit on Maximum DC voltage. Revised Drawing list and product description.

Modifications to the standard Hamlin 59025 Sensor (Autoflow part Number 620234) using Teflon wires (UL #1180) that are suitable for service temperatures to 200 C. This is satisfactory to support a 150 C rating on the FS6900 switch.

Clocking the Switch in place using High Temperature Epoxy is acceptable.

Because the wire mesh filter cloth or its replacement stainless steel perforated disk are in no way associated to any electrical part there is no requirement here for additional testing. This is acceptable.

The Maximum Operating pressure of the FS6900 Flow Switch has been reduced from 3000 PSI to 1000 Psig

No further testing is deemed necessary.

Project # 1590414

Added F6800 Model which is identical in all aspects to the existing certified products with the exception of the pressure connections being Swagelok (CAJON) ¼ VCR

No further testing is deemed necessary.

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Project # 1980312

Update to report 1156566 to replace obsolete drawings and correct minor errors and inconsistencies within the report. Error in Project 1430322 test section corrected “Autoflow part number 900010” replaced with “Autoflow part number 620234” as this was the part number evaluated in project 1430322

No further testing is deemed necessary.

Project # 2115390

Update to report 1156566 to update reed switch part number on the FS6900 from Hamlin part number 59025-610 to Reed Switch Developments Corporation part number 2230-1301-002. No testing was deemed necessary

END OF REPORT



Supplement to Certificate of Compliance

Certificate: 1156566

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The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
2701718	Mar 10, 2014	Update to report 1156566 based on FIR issued September 3, 2013. The size of the lead wire mistakenly reported as 18 gauge in the report has been corrected to 24 gauge, and it is per CSA figure 7, drawing # 620234.
2115390	Dec 11, 2008	Update of report 1156566 to include clerical update of Descriptive Drawings
1980312	Mar 27, 2008	Update to report 1156566 to update drawings and correct minor errors and inconsistencies within the report (Explosion-Proof)
1590414	Sep 20, 2004	Update to Report 1156566 to include Model FS6800 Flow Switch

History

LR 111752-1 June 19, 1998 Certification of the FS6200 and FS6700 Flow switches to CSA and US standards, for Hazardous Locations.

1156566 December 19, 2000 Supercedes report LR 111752-1 to include dimensional change to switch body, Nameplate changes

1430322 July 31, 2003 Update to 1156566 to include revised temperature specification and Model number changes.



Certificate of Compliance

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Project: 2701718

Date Issued: March 10, 2014

Issued to: Autoflow

10062 Streeter Rd, Unit 1
Auburn, CA 95602
USA
Attention: Peggy Stevens

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Virali Shah

Issued by: Virali Shah

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