

Certificate of Compliance

Certificate Number: LR 69005-6

Revision: LR 69005-17

Date Issued: March 30, 1999

Issued To: PALMSTIERNAS INSTRUMENT AB
Tulegatan 15, 3 tr
Stockholm, S-113 53
Sweden
Attention: Mr. Mats Ragnarsson

The products listed below are eligible to bear the CSA Mark shown, with adjacent indicator NRTL/C.



Issued by: J. da Silva, CET
Toronto, ON Canada

Signature:

PRODUCTS

CLASS

2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous

Locations

2258 83 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous

Locations

Class I, Groups A, B, C and D:

Model F5 Series Feed Back Units; input rated 28 Vdc, 24 mA max; intrinsically safe when connected through Certified safety barriers as per installation drawing F5-2-4-9516:



<u>Model #</u>		<u>Temperature Code Rating</u>
F5-SW/MEC		-
F5-SW/MEC-420		T3C
F5-SW/MEC-POT		-
F5-SW/NAM	-	
F5-SW/NAM-POT	-	
F5-POT	-	
F5-420	T3C	
F5-SW/PXY	-	
F5-SW/PXY/420	T3C	
F5-SW/PXY/POT	-	

Class I, Groups C and D:

Model F5 Series Feed Back Units; input rated 28 Vdc, 24 mA max; intrinsically safe when connected through Certified safety barriers as per installation drawing F5-2-4-9516:

<u>Model #</u>	<u>Temperature Code Rating</u>
F5-SW/MEC	-
F5-SW/MEC-420	T3C
F5-SW/NAM-420	T3C

APPLICABLE REQUIREMENTS

CSA Std C22.2 No.	142-M1987	-	Process Control Equipment
CAN/CSA-C22.2 No.	157-92	-	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
UL Std No.	508	-	Industrial Control Equipment
UL Std No.	913	-	Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous Locations

MARKINGS

- CSA Monogram
- CSA Monogram with NRTL/C indicator
- Submitter Identification
- Model Number
- Serial Number, Date Code or Month and Year of Manufacture
- Electrical Rating
- Hazardous Location Designation
- Temperature Code
- The words INTRINSICALLY SAFE/SECURITE INTRINSEQUE
- The Symbol Exia
- Reference to Installation Instructions
- Caution re Substitution of Components

Supplement to Certificate of Compliance

Certificate Number: LR 69005-6

Issued To: PALMSTIERNAS INSTRUMENT AB
 Tulegatan 15, 3tr
 Stockholm, S-113 53
 Sweden
 Attention: Mr. Mats Ragnarsson

The products listed, including the latest revision are eligible to be marked in accordance with the



described below, referenced Certificate.

Issued By: J. da Silva. C.E.T.
Toronto, ON Canada

Signature

Product Certification History

Revision	Date	Description
-17	March 30/99	Update Report to Include PCB P/N PMV 94001.813.
-16	Oct. 30/98	Alternate construction to cover use of Reed Switches (identified by PXY suffix).
-15	May 7/98	Use of metal nameplates as alternate method of marking.
-8	Mar. 29/96	Replacement of Marking Drawings and Schematic diagrams.

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REPORT NO: LR 69005-6

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Issued by R. Wildish

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Issued by J. da Silva, CET

Report Pages Reissued
Figures Replaced/Added: 11, 33/35, 36, 37

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Report Reissued
Figures Replaced - Figs 16, 18, 20, 22, 24, 26, 28, 30, 31, 32, 35, 36, 37
Figures Added - Figs 38, 39

Contents: Certificate of Compliance - Pages 1 to 2
Supplement to Certificate of Compliance - Page 1
Description and Tests - Pages 1 to 8
Figures - 1 to 39

PRODUCTS

CLASS

2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous	Locations
2258 83 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous	Locations

Class I, Groups A, B, C and D:

Model F5 Series Feed Back Units; input rated 28 Vdc, 24 mA max; intrinsically safe when connected through Certified safety barriers as per installation drawing F5-2-4-9516:

<u>Model #</u>	<u>Temperature Code Rating</u>
F5-SW/MEC	-
F5-SW/MEC-420	T3C
F5-SW/MEC-POT	-
F5-SW/NAM	-
F5-SW/NAM-POT	-
F5-POT	-
F5-420	T3C
F5-SW/PXY	-
F5-SW/PXY/420	T3C
F5-SW/PXY/POT	-

Class I, Groups C and D:

Model F5 Series Feed Back Units; input rated 28 Vdc, 24 mA max; intrinsically safe when connected through Certified safety barriers as per installation drawing F5-2-4-9516:

<u>Model #</u>	<u>Temperature Code Rating</u>
F5-SW/MEC	-
F5-SW/MEC-420	T3C
F5-SW/NAM-420	T3C

MARKINGS

Refer to Figs 1 to 10 for label details.

Alternate: Aluminum metal nameplate, 0.5mm thick may be used in place of present method of marking. Refer to Fig 33 for further details.

METHOD OF MARKING

Marking details are silkscreened onto the painted metal enclosure cover.

INSTALLATION DRAWING

Refer to Fig. 11 for installation drawing referenced in MARKINGS.

ALTERATIONS

Markings as above.

FACTORY TESTS

The equipment at the conclusion of manufacture and before shipment, shall withstand for one min, without breakdown, the application of 500V between extra low potential live parts and exposed non-current-carrying metal parts or ground terminal, if such circuits leave or enter the enclosure.

Notes:

1. As an alternative, potentials 20 percent higher may be applied for one second.
2. Where it is more convenient to do so, the dielectric strength tests may be made by applying a direct current voltage instead of an ac voltage, provided that the voltage used is 1.414 times the values specified above.
3. Capacitors in the secondary circuit may be disconnected during the dielectric strength tests.
4. The test shall be waived on grounded or Class 2 circuits.

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

DESCRIPTION

General: The Feed Back Unit consists of one printed circuit board mounted inside a painted aluminum box. The box is 110 mm long by 100 mm wide by 55 mm high, and consists of base section and a screw-on cover. A potentiometer and/or proximity switches and/or mechanical switches and/or Reed switch, mounted to the pcb, sense the motion and position of a dial/shaft which passes through the bottom of the enclosure base. A 4-20 mA circuit on the pcb may be provided as an option.

There are eleven (11) variations of the Feed Back Unit, depending on which potentiometer/proximity switch/mechanical switch/Reed Switches/4-20 mA circuitry combination is provided.

- Fig 12 Enclosure Base Assembly
- Fig 13 Enclosure Cover Assembly
- Fig 14 Enclosure Cover Template

Main Printed Circuit Board: 1.6 mm thick glass epoxy, copper printed both sides, having overall dimensions of 92 mm by 76 mm. Board is secured to four bosses in the enclosure base, with screws. A three-terminal or six-terminal wiring terminal block (depending on which switch variation is provided) is soldered to the board.

Fig	15	Schematic Diagram -	Models MEC and PXY	
Fig	16	Component List -	Model MEC	
Fig	17	Schematic Diagram -	Models MEC-420 and PXY-420	
Fig	18	Component List -	Model MEC-420	
Fig	19	Schematic Diagram -	Models MEC-POT and PXY-POT	
Fig	20	Component List -	Model MEC-POT	
Fig	21	Schematic Diagram -	Model NAM	
Fig	22	Component List -	Model NAM	
Fig	23	Schematic Diagram -	Model NAM-420	
Fig	24	Component List -	Model NAM-420	
Fig	25	Schematic Diagram -	Model NAM-POT	
Fig	26	Component List -	Model NAM-POT	
Fig	27	Schematic Diagram -	Model POT	
Fig	28	Component List -	Model POT	
Fig	29	Schematic Diagram -	Model 420	
Fig	30	Component List -	Model 420	
Fig	34	Main Board Trace Layout		
		Fig	35	Component List - Model PXY
		Fig	36	Component List - Model PXY-420
		Fig	37	Component List - Model PXY-POT
Fig	38	Main Board Trae Layout (PMV 94001.813)		
Fig	39	Main Board Component Layout (PMV 94001.813)		

4-20 mA Printed Circuit Board: 1.0 mm thick glass epoxy copper printed both sides, having overall dimensions of 11 mm by 61 mm. The board is soldered to the main PCB using integral pins.

Fig	31	Schematic Diagram
Fig	32	Component List

The 4-20 mA board contains a total of 68 nF (including 20 % tolerance), assuming mass fault conditions.

Proximity Switches: Up to 2 switches may be provided, and are bolted to the main PCB. Two models of switch may be used, as listed below:

<u>Manufacturer</u>	<u>Model No.</u>
Pepperl & Fuchs	NJ2-V3-N
IFM	IS2002-N

The P & F Model NJ2-V3-N is CSA Certified with a max. capacitance value of 28.8nF, and a max. inductance value of 32.4uH.

The IFM Model NS 5002 is SEV (Swiss Electrotechnical Association) Approved with a max capacitance value of 70nF, and a max inductance value of 190uF.

or

Reed Switches: Up to 2 switches may be provided, and are bolted to the main PCB. Two models of switch (U.L. Listed) may be used, as listed below:

<u>Manufacturer</u>	<u>Series No</u>
Hamlin	59145
Hamlin	59150

TESTS

Spark Ignition: Std. C22.2 No 157-92, C1 6.2

The following are the worst case test conditions considering possible faults and supply levels.

The barriers were simulated using a suitable dc supply and non-inductive current limiting resistance.

Hydrogen/Air Test Mixture

1. Model MEC-POT

- Barrier parameters of 22.1V/97 ohms were based on the worst case calculated series/parallel combination of barriers;
- tester contacts shorting barrier positive to negative; i.e. in field wiring;
- calculated SCC of 227.7mA increased by 1.5 factor by reduction of the series limiting resistance.

OCV 22.1V dc SCC 341.3mA

Evaluates resistive barrier output parameter with 1.5 factor applied to current.

Results:

2. Model NAM-POT

- Barrier parameters of 37.8V/841.5 ohms were based on the worst case series/ parallel combination of barriers;
- Inductance of 380uH connected across barrier output; (simulates total inductance of two IFM Type NS 5002 Namur switches.
- tester contacts series switching barrier positive ; i.e. in field wiring;
- calculated SCC of 45mA increased by 1.5 factor by reduction of the series limiting resistance.

OCV 37.8V dc CCC 67.4mA

Evaluates resistive barrier output parameter with 1.5 factor applied to current, combined with inductance of two proximity switches.

Results:

Ethylene/Air Test Mixture

3. Model NAM-4-20

- Barrier parameters of 49V/973 ohms were based on the worst case series/ parallel combination of barriers;
- Inductance of 380uH connected across barrier output; (simulates total inductance of two IFM Type NS 5002 Namur switches.
- tester contacts series switching barrier positive ; i.e. in field wiring;
- calculated SCC of 50.4mA increased by 1.5 factor by reduction of the series limiting resistance.

OCV 49V dc CCC 75.6mA

Evaluates resistive barrier output parameter with 1.5 factor applied to current, combined with inductance of two proximity switches.

Results:

4. Model NAM-4-20

- Barrier parameters of 49V/973 ohms were based on the worst case series/ parallel combination of barriers;
- Capacitance of 140nF connected across barrier output; (simulates total capacitance of two IFM Type NS 5002 Namur switches.
- tester contacts shorting barrier positive to negative; i.e. in field wiring;
- calculated SCC of 50.4mA increased by 1.5 factor by reduction of the series limiting resistance.

OCV 49V dc SCC 75.6mA

Evaluates resistive barrier output parameter with 1.5 factor applied to current, combined with capacitance of two proximity switches.

Results:

Temperature Code Rating: CAN/CSA-C22.2 No.157-92, CI 6.3

The following are worst case test conditions considering possible faults and supply levels (ie. considered as representative for all of the possible series/parallel barrier combinations).

The barriers were simulated using a suitable DC supply and current limiting resistance.

Temperatures were measured by thermocouples applied directly to component surfaces; ambient by thermometer.

100 mA applied through resistor R10 (maximum voltage drop limited to 28 V)

Maximum temperature on resistor R10 (270 ohms, 1/8 Watt, Surface Mount); 334 Deg C; ambient 23 Deg C.

Thermal Ignition Test for Components: CAN/CSA-C22.2 No.157-92, CI 6.7

The above Temperature Code Rating test was repeated with the subject component (resistor R10) placed in a suitable test chamber, containing 0.65 cc of Diethyl Ether/3L of Air, for a period of 5 minutes.

Results: Satisfactory - the component did not cause ignition of the test gas mixture.

Dielectric Strength: Std C22.2 No 142-M1987, CI 6.8

Clause 6.8.2(c): 500V ac between input terminals and chassis ground.

Results: Satisfactory

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The "NRTL/C" indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ANSI/UL and CSA Standards, for use in the U.S. and Canada. NRTL, i.e. Nationally Recognized Testing Laboratory, is a designation granted by the U.S. Occupational Safety and Health Administration (OSHA) to laboratories which have been recognized to perform certification to U.S. Standards.