Engineering Specification

SPEC, APPVL 17/2700 XMTR ATEX
EB-3600636
Revision: JA
Number of Pages: 9
Comments:

THIS COMPONENT MUST COMPLY WITH REGULATORY AGENCY REQUIREMENTS. NO CHANGES ARE ALLOWED WITHOUT PRIOR AUTHORIZATION FROM APPROVALS ENGINEERING.

Originator: CHB 3/23/01

Approved: CHB 3/23/01

Rev	ECN	Description	Approval	Date
C	1020022	Revise for Remote Mount Core Processor & FISCO	MZ	10/25/01
D	1020110	Update IS Output electrical parameters, model nomenclature for Zone 0 marking, and indicate T5 marking on cover sheet.	MZ	11/14/01
E	1030912	Added IIC Cover and Backlight Display Options	RCS	11/3/03
F	1031491	Add Dust Approval Marking	RCS	12/15/04
G	1034119	Revised to match Certificate and Added FEP Faceplate CEQ Option	RCS	4/11/06
H	1034276	Added Output Option Code “N” for Non-IS FieldBus, Incorporated new Standards, Change Marking from EEx to Ex, Added Ex tD A21 to Dust Marking	RCS	6/5/07
I	1035433	Added Model 2750 and Updated Fieldbus, Analog and Terminal Board Documentation	RCS	11/15/07
J	1035660	Added Window Cover Replacement Note 5.4 TO Conditions of Safe Use	RCS	3/27/08
JA	1038207	Added Output Option Codes 2-4 for Wireless HART	RCS	6/25/09

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Subject: Equipment type	**Transmitter type *700********** and Transmitter type *750********** **
Manufactured and submitted for examination	**Micro Motion, Inc.**
Address	**Boulder, Co. 80301, USA**
Standard basis	EN 60079-0:2006 — General requirements EN 60079-1:2007 — Flameproof enclosure ´d´ EN 60079-7:2007 — Increased safety ´e´ EN 60079-11:2007 — Intrinsic safety ´i´ EN 60079-15:2005 — Type of protection ´n´ EN 61241-0:2006 and EN 61241-1:2004 — Dust Evaluation ‘tD A’ EN 60079-26:2004 — Equipment Group ‘II’ Category 1G EN 60079-27:2006 — FISCO/FNICO
Code for type of protection	**II 2 G Ex d [ib] IIB + H_2 T6** **II 2 G Ex de [ib] IIB + H_2 T5/T6** **II (1) 2 G Ex d [ia/ib] IIB + H_2 T6,** **II (1) 2 G Ex de [ia/ib] IIB + H_2 T4/T5/T6** **II 2 G Ex d [ib] IIC T5/T6** **II 2 G Ex de [ib] IIC T5/T6** **II (1) 2 G Ex d [ia/ib] IIC T5/T6,** **II (1) 2 G Ex de [ia/ib] IIC T4/T5/T6** **II (2) 3 G Ex nA d e [ib] IIB + H_2 T4** **II (2) 3 G Ex nA d e [ib] IIC T4** **II 2D Ex tD A21 IP66/IP67 T65°C**
EC Type Examination Certificate	**DMT 01 ATEX E 082 X**

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1) Subject and Type

Transmitter type *700**********

Instead of the *** in the complete denomination letters and numerals will be inserted which characterize the following variations:

Type * 7 0 0 * 1 * * * * * * * *
Type * 7 5 0 * 1 * * * * * * * *

Options without influence on explosion protection

Approval
F = Ex d **** Zone 1 and 2
Z = Ex de **** Zone 1 and 2
L = Ex nA de **** Zone 2 only

Letter for conduits

Output Options
A = One mA, one frequency
B = Config I/O default
C = Config I/O Custom
D = Intrinsically Safe Outputs
E = Intrinsically Safe Foundation Fieldbus H1
G = Profibus PA
N = Non-I.S. Foundation Fieldbus H1
J = Config I/O default (Used with Model *750 Only)
K = Config I/O Custom (Used with Model *750 Only)
2 = One mA, one frequency, Wireless HART Ex nA (for Zone 2 only)
3 = Config I/O Custom, Wireless HART Ex nA (for Zone 2 only)
4 = Intrinsically Safe Outputs, Wireless HART Ex ia (for Zone 1 and Zone 2)

Display Options
1 = Standard Display = Ex ***IIB + H_2
2 = Backlight Display = Ex ***IIB + H_2
3 = No Display = Ex ***IIC
4 = IIC Display = Ex ***IIC
4 with CEQ/ETO 12638 = IIC Display = Ex ***IIC with FEP Face Plate
5 = IIC Display with Backlight = Ex ***IIC
5 with CEQ/ETO 12638 = IIC Display with Backlight = Ex ***IIC with FEP Face Plate

Letter for mounting
R = Remote Mount Transmitter
I or S = Integral Mount Transmitter
C = Remote Mount with Core Processor (Model 700)
B = Remote Mount Transmitter and Remote Mount Core
D = Integral Mount Transmitter (Used with Model *750 Only)
E = Remote Mount Transmitter (Used with Model *750 Only)

Numeral 1 = Single Variable Transmitter
or 2 = Multi Variable Transmitter

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2) Description

The transmitter is, in combination with a sensor, used for measurement of mass flow and data transmission.

The electrical circuitry of the transmitters is mounted inside a metal enclosure type 1700/2700/*750..*..*.. which is divided into three compartments.

In the compartment type of protection „Flameproof Enclosure“ the Terminal Board, Power Supply Board, Feature Board, Digital Board and Fieldbus Board (only type 2700*1******** and type 2750*1********) are mounted.

When executed with display, there are two window covers available, one for IIB + H_2 and one for IIC. CEQ/ETO 12638 adds a FEP Plate over the Glass window in the Display Cover. When it is executed without display, the gas group is IIC.

The compartment „Increased Safety“ (type *7*0*1***Z****) or „Flameproof Enclosure” (type *7*0*1***F****) is equipped with terminals for the connection of intrinsically safe Fieldbus circuit as well as non intrinsically safe circuits as well as Intrinsically Safe Outputs.

The enclosure is constructed with a terminal compartment for the connection of remotely operating intrinsically safe sensors (type *700R1******** and type *750E1********) or to remote mount core (*700B1********). Alternatively, the enclosure can be mounted directly to the sensor via a transition compartment for the incorporation of the signal processing device type 700 (type *700I1******** and type *750D1********). This type of mounting has to be certified separately.

The transmitter type *7*0C1******** is constructed with a terminal compartment for the incorporation of the signal processing device type 700 and a connection board.

The transmitter is intended to be used in a hazardous dust environment without change to any of the electronics aspects of the design.

Amendment 8 to the ATEX Certificate DMT 01 ATEX E 082 X incorporates the new EN 60079 Series Standards and therefore the marking changed from EEx to Ex. Additionally this amendment uses the new Dust Standards EN 61241-0:2006 and EN 61241-1:2004 and therefore changed the dust marking by adding “ Ex tD A21“. This amendment also added the non-IS Fieldbus option N and changed the maximum voltage (Um) for the non-IS input/output circuits from 60 Vdc to 33 Vdc.

Amendment 9 to the ATEX Certificate DMT 01 ATEX E 082 X incorporates the new model *750*1********. Additionally this amendment incorporates the revised Fieldbus Board, Analog Board and Terminal Board. The revised Fieldbus Board corrects a digital communication issue when transmitting Fieldbus data and does not impact safety. The Analog Board was revised to eliminate a non-safety critical inductor (FL1) and added a pull up resistor to the HART Transmit line to correct communication error. The Terminal Board was revised to replace a obsolete non-safety critical inductor (FL3) with an equivalent inductor requiring an artwork change to accommodate the new inductor spacing.

Amendment 10 to the ATEX Certificate DMT 01 ATEX E 082 X incorporates a special Junction box version. That variation gets the denomination *700(R or B)1***(F or Z)**** ETO 16097.

Amendment 11 to the ATEX Certificate DMT 01 ATEX E 082 X incorporates the new Output options 2, 3, and 4 for Housing with 3rd conduit opening. The 3rd conduit opening is used to install the SMART Wireless THUM Model 775 marked as Ex nA IIC T4 (Type Examination Certificate Baseefa 09ATEX 0131) or marked as Ex ia IIC T4 (EC-Type Examination Certificate Baseefa 09ATEX 0125X). When installed with the Ex nA IIC T4 THUM Model 775, the 1700/2700 transmitter can only be used in Zone 2 (II 3G) and gets the denomination type *7*0*1***L****. The THUM comes pre-installed from the factory.
Furthermore an alternative Profibus PA board has been added.

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3) **Parameters** 3.1 Mains circuit (terminals 9 - 10)

voltage		AC/DC	18 - 240 V + 10 %	
max. voltage	Um	AC/DC	265	V

3.2 Non intrinsically safe input/output circuits (terminals 1 - 6) only for type *700*1*(A, B, C, J, K, 2 or 3)******

voltage	Um	AC/DC	33	V

3.2.1 Non intrinsically safe circuits FIELDBUS (terminals FIELDBUS 1 - 2) only for type *700*1*N******

voltage	Um	DC	33	V
current	Im		380	mA
power	Pm		5,32	W
effective internal inductance	L		negligible	
effective internal capacitance	C		negligible	

for the connection of a FIELDBUS circuit in accordance with FNICO model.

3.3 Intrinsically safe output circuits type of protection Ex ia IIC.

3.3.1 Fieldbus circuit (terminals Fieldbus 1 and 2) only for type 27*0*1*E****** and type 27*0*1*G******

voltage	Ui	DC	33	V
current	Ii		380	mA
power	Pi		5,32	W
effective internal inductance	Li		negligible	
effective internal capacitance	Ci		negligible	

for the connection of a FIELDBUS circuit in accordance with FISCO model.

3.3.2 Intrinsically Safe Outputs (terminals 1 - 2 mA output 1 and terminals 5 - 6 mA output 2) only for type *7*0*1*D ****** , values for each circuit:

voltage	Ui	DC	30	V
current	Ii		300	mA
power	Pi		1	W
effective internal inductance	Li		negligible	
effective internal capacitance	Ci		negligible	

3.3.2.1 Intrinsically Safe Outputs (terminals 1 - 2 mA output 1) only for type *7*0*1* 4******:

voltage	Ui	DC	30	V
current	Ii		200	mA
power	Pi		1	W
effective internal inductance	Li		negligible	
effective internal capacitance	Ci		negligible	

Intrinsically Safe Outputs (terminals 5 - 6 mA output 2) only for type *7*0*1* 4******:

voltage	Ui	DC	30	V
current	Ii		300	mA
power	Pi		1	W
effective internal inductance	Li		negligible	
effective internal capacitance	Ci		negligible	

3.3.3 Intrinsically Safe Outputs (terminals 3 - 4 Frequency Output) only for type *7*0*1*(D or 4)****** :

voltage	Ui	DC	30	V
current	Ii		100	mA
power	Pi		0,75	W
effective internal inductance	Li		negligible	
effective internal capacitance	Ci		negligible	

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3.4 Intrinsically safe power and signal circuits for type *700B1******** or *700R1******** or *750E1********

voltage	Uo	DC	17,22	V
current	Io		0,484	A
limited by a fuse with a nominal value of			0,16	A
power	Po		2,05	W
type of protection Ex ib IIC				
max. external inductance	Lo		151	µH
max. external capacitance	Co		333	nF
max. inductance/resistance ratio	Lo/Ro		17,06	µH/Ω
type of protection Ex ib IIB				
max. external inductance	Lo		607	µH
max. external capacitance	Co		2,04	µF
max. inductance/resistance ratio	Lo/Ro		68,2	µH/Ω

3.4.1 Ambient temperature range

3.4.1.1 Models *7*0(B, R or E)1(1, 2 or 3)(A,B,C,D,E,G,N, J or K)******	Ta	-40°C to +60°C
3.4.1.2 Models *7*0(B,R or E)1(4 or 5)(A,B,C,D,E,G,N,J or K)******	Ta	-20°C to +60°C
3.4.1.3 Models *7*0(B, R or E)1(1, 2 or 3)(2, 3 or 4)******	Ta	-40°C to +60°C
3.4.1.4 Models *7*0(B, R or E)1(1, 2 or 3)(A,B,C,D,E,G,N,J or K)****** ETO16097	Ta	-35°C to +60°C
3.4.1.5 Models *7*0(B, R or E)1(1, 2 or 3)(2, 3 or 4)****** ETO16097	Ta	-35°C to +60°C
3.4.1.6 Models *7*0(B, R or E)1(4 or 5)(2, 3 or 4)******	Ta	-20°C to +60°C

3.5 Intrinsically safe power and signal circuits for type *7*0(C, I, S or D)1********

3.5.1 Drive circuit; terminal number 3 and 4

voltage	Uo	DC	10,5	V
current	Io		2,45	A
power	Po		2,54	W
internal resistance	Ri		4,32	Ω
for group IIC				
max. external capacitance	Co		2,41	µF
max. external inductance	Lo		5,9	µH
max. external inductance/resistance ratio	Lo/Ro		5,5	µH/Ω
for group IIB				
max. external capacitance	Co		16,8	µF
max. external inductance	Lo		24	µH
max. external inductance/resistance ratio	Lo/Ro		22	µH/Ω

The maximum external inductance L (sensor coil) can be calculated with the following term:

$$L = 2 \times E \times \left(\frac{Ri + Ro}{1.5 \times Uo} \right)^2$$

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whereby E = 40 µJ for group IIC and E = 160 µJ for group IIB will be inserted.

3.5.2 Pick-off circuits terminal numbers 5-6 and 7-8

voltage	Uo	DC	17,3	V
current	Io		6,9	mA
power	Po		30	mW
for group IIC				
max. external capacitance	Co		353	nF
max. external inductance	Lo		742	mH
max. external inductance/resistance ratio	Lo/Ro		1,19	mH/Ω
for group IIB				
max. external capacitance	Co		2,06	µF
max. external inductance	Lo		2,97	H
max. external inductance/resistance ratio	Lo/Ro		4,75	mH/Ω

3.5.3 Temperature circuit terminal number 1, 2 and 9

voltage	Uo	DC	17,3	V
current	Io		26	mA
power	Po		112	mW
for group IIC				
max. external capacitance	Co		353	nF
max. external inductance	Lo		52,6	mH
max. external inductance/resistance ratio	Lo/Ro		0,32	mH/Ω
for group IIB				
max. external capacitance	Co		2,06	µF
max. external inductance	Lo		210	mH
max. external inductance/resistance ratio	Lo/Ro		1,26	mH/Ω

3.5.4 Ambient temperature range

3.5.4.1	Models *7*0 (C, I, S or D) 1(1, 2 or 3) (A,B,C,D,E,G,N,J or K)******	Ta	-40°C to +55°C
3.5.4.2	Models *7*0 (C, I, S or D) 1(4 or 5) (A,B,C,D,E,G,N,J or K) *******	Ta	-20°C to +55°C
3.5.4.3	Models *7*0 (C, I, S or D) (1, 2 or 3) (2, 3 or 4)******	Ta	-40°C to +55°C
3.5.4.4	Models *7*0 (C, I, S or D) 1(4 or 5) (2, 3 or 4)******	Ta	-20°C to +55°C

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4) Marking

Models *7*0*1(1, 2 or 3)******* Ta -35°C or -40°C to +55°C or +60°C
Models *7*0*1(4 or 5)******* Ta -20°C to +55°C or +60°C

- type	- type of protection
*7*0(B, R or E)1(1 or 2)(A,B,C,N,J, K)*F****	CE 0575 Ex II 2G Ex d[ib] IIB+H_2 T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(1 or 2)(A,B,C,N,J, K)*Z****	CE 0575 Ex II 2G Ex de[ib] IIB+H_2 T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(3, 4 or 5)(A,B,C,N,J, K)*F****	CE 0575 Ex II 2G Ex d[ib] IIC T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(3, 4 or 5)(A,B,C,N,J, K)*Z****	CE 0575 Ex II 2G Ex de[ib] IIC T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(1 or 2)(D, E, G)*F****	CE 0575 Ex II 2 (1) G Ex d[ia/ib] IIB+H_2 T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(1 or 2)(D, E, G)*Z****	CE 0575 Ex II 2 (1) G Ex de[ia/ib] IIB+H_2 T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(3, 4 or 5)(D, E, G)*F****	CE 0575 Ex II 2 (1) G Ex d[ia/ib] IIC T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(3, 4 or 5)(D, E, G)*Z****	CE 0575 Ex II 2 (1) G Ex de[ia/ib] IIC T6 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(1 or 2)(A,B,C,N,J, K)*F****	CE 0575 Ex II 2G Ex d[ib] IIB+H_2 T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(1 or 2)(A,B,C,N,J, K)*Z****	CE 0575 Ex II 2G Ex de[ib] IIB+H_2 T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(3, 4 or 5)(A,B,C,N,J, K)*F****	CE 0575 Ex II 2G Ex d[ib] IIC T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(3, 4 or 5)(A,B,C,N,J, K)*Z****	CE 0575 Ex II 2G Ex de[ib] IIC T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(1 or 2)(D, E, G)*F****	CE 0575 Ex II 2 (1) G Ex d[ia/ib] IIB+H_2 T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(1 or 2)(D, E, G)*Z****	CE 0575 Ex II 2 (1) G Ex de[ia/ib] IIB+H_2 T5 II 2D Ex tD A21 IP66/IP67 T65°C

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- type	- type of protection
*7*0(C, I, S or D)1(3, 4 or 5)(D, E, G)*F****	CE 0575 Ex II 2 (1) G Ex d [ia/ib] IIC T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(C, I, S or D)1(3, 4 or 5)(D, E, G)*Z****	CE 0575 Ex II 2 (1) G Ex de [ia/ib] IIC T5 II 2D Ex tD A21 IP66/IP67 T65°C
*7*0(B, R or E)1(1 or 2)(2 or 3)*L****	CE 0575 Ex II 3 (2) G Ex nA d e [ib] IIB+H_2 T4
*7*0(B, R or E)1(3, 4 or 5)(2 or 3)*L****	CE 0575 Ex II 3 (2) G Ex nA d e [ib] IIC T4
*7*0(C, I, S or D)1(1 or 2)(2 or 3)*L****	CE 0575 Ex II 3 (2) G Ex nA d e [ib] IIB+H_2 T4
*7*0(C, I, S or D)1(3, 4 or 5)(2 or 3)*L****	CE 0575 Ex II 3 (2) G Ex nA d e [ib] IIC T4
*7*0(B, R or E)1(1 or 2) 4*Z****	CE 0575 Ex II 2 (1) G Ex d e [ia/ib] IIB+H_2 T4
*7*0(B, R or E)1(3, 4 or 5) 4*Z****	CE 0575 Ex II 2 (1) G Ex d e [ia/ib] IIC T4
*7*0(C, I, S or D)1(1 or 2) 4*Z****	CE 0575 Ex II 2 (1) G Ex d e [ia/ib] IIB+H_2 T4
*7*0(C, I, S or D)1(3, 4 or 5) 4*Z****	CE 0575 Ex II 2 (1) G Ex d e [ia/ib] IIC T4

5 min delay time after switch off

5) Special conditions for safe use / Installation instructions

5.1 For the application of the transmitter in an ambient temperature of less than - 20 °C suitable cable and cable entries or conduit entries certified for this condition shall be used.

5.2 If certified conduit entries are used for the connection of the transmitter enclosure, the associated stopping boxes shall be installed immediately at the enclosure.

5.3 Addition for version *7*0*1(4 or 5) ** (Z or F) **** CEQ/ETO 12638 only:
Using a dry cloth to clean the display cover can cause static discharge, which could result in an explosion in an explosive atmosphere.
To prevent an explosion, use a clean damp cloth to clean the display cover in an explosive atmosphere.

5.4 The window cover forms one unit and can not be taken apart without destroying the cover parts. If a cover is damaged it must be replaced by a new cover.

5.5 Addition for version *7*0*1 * (2 or 3) ** L **** only: These devices can only be installed in Zone 2 (II 3G).

5.5.1 For wiring instructions of the SMART Wireless THUM Model 775, see Installation drawings ATEX-D-IS EB-20015470 and EB-20015694.

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