ZD134F-D/00/en/03.08
CCS/FM6.0
CSA/D 21.11.07
71072430

CSA Control Drawing
960402-2070 D

Micropilot M
FMR230/231/232/233/240/244/245
FISCO-Model
PROFIBUS PA, FOUNDATION Fieldbus

Endress+Hauser
People for Process Automation

FISCO-Concept

The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (Ui), the current (Ii) and the power (Pi) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo), the current (Io) and the power (Po) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (Ci) and inductance (Li) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 µH respectively.

In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The voltage Uo of the associated apparatus has to be limited to the range of 14 V to 24 V DC. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 50 µA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect the devices needs to have the parameters in the following range:

loop resistance R:	15...150 Ω/km
inductance per unit length L:	0.4...1 mH/km
capacitance per unit length C:	80...200 nF/km
C = C line/line + 0.5 C line/screen, if both lines are floating or	
C = C line/line + C line/screen, if the screen is connected to one line	
length of spur cable:	≤ 30 m
length of trunk cable:	≤ 1 km
length of splice:	≤ 1 m

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:
R = 90...100 Ω
C = 0...2.2 µF
One of the allowed terminations might already be intergrated in the associated apparatus.
The number of passive devices connected to the bus segment is not limited due to I.S. reasons. If the above rules are respected, up to a total lenght of 1000 m (sum of the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Notes:
1. CSA Certified apparatus must be installed in accordance with manufacturer instructions.
2. CSA Certified associated apparatus must meet the following requirements: Uo ≤ Ui and Io ≤ Ii and Po ≤ Pi.
3. The maximum non-hazardous area voltage must not exceed 250 V.
4. The installation must be in accordance with the Canadian Electrical Code.
5. Be aware of multiple earthing of the screen. The screen must be connected in accordance with the Canadian Electrical Code.
6. Caution: Use only supply wires suitable for 5 K above surrounding temperature.
7. Warning: Substitution of components may impair intrinsic safety.
8. The polarity for connecting + (2) and – (1) is of no importance due to an internal rectifier.
9. In case of use of PTFE rod antenna (white), planar, parabolic, enamelled horn, type 244 or type 245 avoid electrostatic charge at the antenna; (e.g. do not rub with dry cloth; do not install within the filling curtain).
10. Apparatus with faucet: In case of disconnection of Micropilot M from the faucet (e.g. for maintenance) we recommend to secure resp. to close the faucet e.g. with an additional blind flange. The responsibility for applicability of the arrangement behooves exclusive the operator.
11. Use specific cables, supplied with the Service Interface Commubox FXA193 or Remote Display FHX40. Refer to the applicable Control Drawing.

CLASS I, DIV. 2, GROUPS A, B, C, D or Ex nC IIC and DIP. for CLASS II and III, DIV. 1, GROUPS E, F, G HAZARDOUS LOCATION INSTALLATION

1. Install per Canadian Electrical Code (CEC) using threaded metal conduit. Intrinsic safety barrier not required max. supply voltage 30 V. For T-code see table.
2. Warning: Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
   Avertissement: Risque d'éxplosion - Avant de déconnecter l'équipement, couper le courant ou s'assurer que l'emplacement est désigne non dangereux.

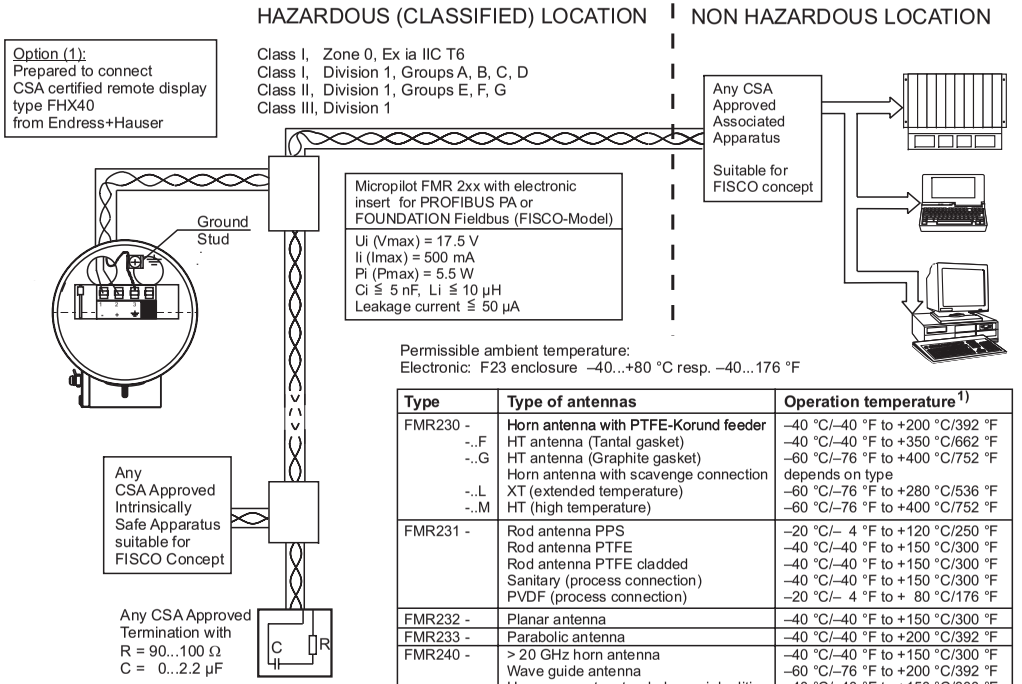
   Warning: Explosion Hazard - Substitution of components may impair suitability for Class I, Div. 2.
   Avertissement: Risque d'éxplosion - La substitution de composants peut rendre ce matèriel inacceptable pour les emplacements de Classe I, Div. 2.

For CLASS II and III; DIV. 1
Warning: Keep cover tight unless power has been switched off or the area is known to be non-hazardous.

Area of application:

The compact instruments are suitable for use in areas subject to explosion caused by gases, vapours or mists.

For Installaion acc. -ENTITY- Concept see Control dwg. part 960402-2071



Permissible ambient temperature:
Electronic: F23 enclosure –40...+80 °C resp. –40...176 °F

Type	Type of antennas	Operation temperature [1]
FMR230 -	Horn antenna with PTFE-Korund feeder	–40 °C/–40 °F to +200 °C/392 °F
-..F	HT antenna (Tantal gasket)	–40 °C/–40 °F to +350 °C/662 °F
-..G	HT antenna (Graphite gasket)	–60 °C/–76 °F to +400 °C/752 °F
	Horn antenna with scavenge connection	depends on type
-..L	XT (extended temperature)	–60 °C/–76 °F to +280 °C/536 °F
-..M	HT (high temperature)	–60 °C/–76 °F to +400 °C/752 °F
FMR231 -	Rod antenna PPS	–20 °C/– 4 °F to +120 °C/250 °F
	Rod antenna PTFE	–40 °C/–40 °F to +150 °C/300 °F
	Rod antenna PTFE cladded	–40 °C/–40 °F to +150 °C/300 °F
	Sanitary (process connection)	–40 °C/–40 °F to +150 °C/300 °F
	PVDF (process connection)	–20 °C/– 4 °F to + 80 °C/176 °F
FMR232 -	Planar antenna	–40 °C/–40 °F to +150 °C/300 °F
FMR233 -	Parabolic antenna	–40 °C/–40 °F to +200 °C/392 °F
FMR240 -	> 20 GHz horn antenna	–40 °C/–40 °F to +150 °C/300 °F
	Wave guide antenna	–60 °C/–76 °F to +200 °C/392 °F
	Horn compact, extended, special edition	–40 °C/–40 °F to +150 °C/300 °F
FMR244 -	Compact antenna (PTFE capsuled)	–40 °C/–40 °F to +130 °C/266 °F
	80 mm/3", PP cladded (type 4)	–40 °C/–40 °F to + 80 °C/176 °F
FMR245 -	Compact antenna (types 3, 4)	–40 °C/–40 °F to +150 °C/302 °F
	DN50 + DN80 (types B, C, F, G)	–40 °C/–40 °F to +200 °C/392 °F

[1] Note: take care to specific temperature ranges of antenna versions

Temperature class with/without display VU331	Permissible max. medium temperature at the antenna process connection (Tmed)	Permissible max. ambient temperature of the electronic compartment (Ta) (enclosure F23)										
		FMR230 - ..E/V/K/D/H	FMR230 - ..L	FMR230 - ..M	FMR230 - ..F/G	FMR231	FMR232	FMR233	FMR240	FMR240 Wave Guide	FMR244	FMR245
T6	+ 80 °C + 60 °C	+50/45 °C +60/55 °C	+55/50 °C +60/55 °C	+55/50 °C +60/55 °C	+55/50 °C +60/55 °C	+50/45 °C +60/55 °C	+50/45 °C +60/55 °C	+50/45 °C +60/55 °C	+55/50 °C +60/55 °C	+60/55 °C +60/55 °C	+55/50 °C +60/55 °C	+55/50 °C +60/55 °C
T5	+ 95 °C + 75 °C	+65/60 °C +75/70 °C	+70/65 °C +75/70 °C	+70/65 °C +75/70 °C	+70/65 °C +75/70 °C	+65/60 °C +75/70 °C	+65/60 °C +75/70 °C	+65/60 °C +75/70 °C	+70/65 °C +75/70 °C	+75/70 °C +75/70 °C	+70/65 °C +75/70 °C	+70/65 °C +75/70 °C
T4	+130 °C + 80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+70 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C	+60 °C +80 °C	+60 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+65 °C +80 °C
T3C (functional)	+150 °C + 80 °C	+60 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	+45 °C +80 °C	+60 °C +80 °C	+45 °C +80 °C	+55 °C +80 °C	+65 °C +80 °C	not allowed	+60 °C +80 °C
T3	+195 °C + 80 °C	+45 °C +80 °C	+65 °C +80 °C	+70 °C +80 °C	+65 °C +80 °C	not allowed	not allowed	+40 °C +80 °C	not allowed	+65 °C +80 °C	not allowed	+55 °C +80 °C
T2B (functional)	+250 °C + 80 °C	+30 °C +80 °C	+60 °C +80 °C	+65 °C +80 °C	+55 °C +80 °C	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
T2 (functional)	+280 °C + 80 °C	not allowed	+60 °C +80 °C	+65 °C +80 °C	+55 °C +80 °C	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
T2	+290 °C + 80 °C	not allowed	not allowed	+65 °C +80 °C	+55 °C +80 °C	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
T1 (functional)	+350 °C + 80 °C	not allowed	not allowed	+60 °C +80 °C	+45 °C +80 °C	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed
T1 (functional)	+400 °C + 80 °C	not allowed	not allowed	+60 °C +80 °C	+45 °C +80 °C	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed	not allowed

Note: the applicable temperature of antenna must be within their specified limits; Tx (functional) means limited through type of antenna;
T6 and T5 requires for FF electronic enlarged derating: for ambient; 1st number = PA electronic insert; 2nd number = FF electronic insert
e.g. +60/55 °C expression means: Apparatus with PA electronic insert max. ambient at housing = +60 °C;
Apparatus with FF electronic insert max. ambient at housing = +55 °C

ZD134F-D/00/en/03.08
CCS/FM6.0
CSA/D 21.11.07

CSA Control Drawing
960402-2071 D

Micropilot M
FMR230/231/232/233/240/244/245
ENTITY-Model
PROFIBUS PA, FOUNDATION Fieldbus

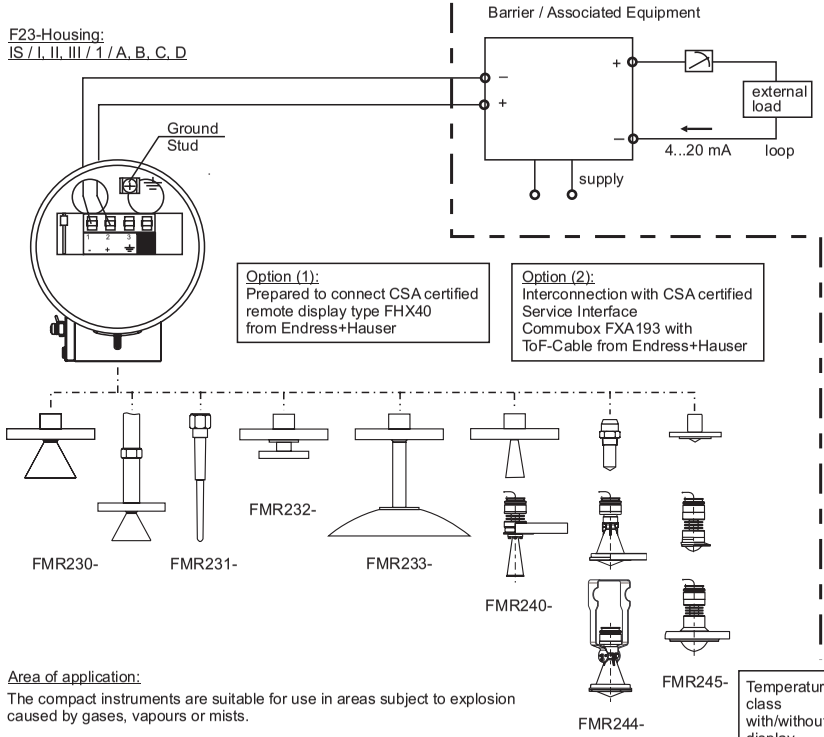
Endress+Hauser
People for Process Automation

HAZARDOUS LOCATION

Class I, Div. 1, Groups A, B, C, D
Ex ia IIC Tx
Class II, Div. 1, Groups E, F, G
Class III

F23-Housing:
IS / I, II, III / 1 / A, B, C, D

NON-HAZARDOUS LOCATION



Area of application:

The compact instruments are suitable for use in areas subject to explosion caused by gases, vapours or mists.

Permissible ambient temperature: Electronic: F23 enclosure –40...+80 °C resp. –40...176 °F

Type	Type of antennas	Operation temperature [1]
FMR230 -	Horn antenna with PTFE-Korund feeder	–40 °C/–40 °F to +200 °C/392 °F
-..F	HT antenna (Tantal gasket)	–40 °C/–40 °F to +350 °C/662 °F
-..G	HT antenna (Graphite gasket)	–60 °C/–76 °F to +400 °C/752 °F
	Horn antenna with scavenge connection	depends on type
-..L	XT (extended temperature)	–60 °C/–76 °F to +280 °C/536 °F
-..M	HT (high temperature)	–60 °C/–76 °F to +400 °C/752 °F
FMR231 -	Rod antenna PPS	–20 °C/– 4 °F to +120 °C/250 °F
	Rod antenna PTFE	–40 °C/–40 °F to +150 °C/300 °F
	Rod antenna PTFE cladded	–40 °C/–40 °F to +150 °C/300 °F
	Sanitary (process connection)	–40 °C/–40 °F to +150 °C/300 °F
	PVDF (process connection)	–20 °C/– 4 °F to + 80 °C/176 °F
FMR232 -	Planar antenna	–40 °C/–40 °F to +150 °C/300 °F
FMR233 -	Parabolic antenna	–40 °C/–40 °F to +200 °C/392 °F
FMR240 -	> 20 GHz horn antenna	–40 °C/–40 °F to +150 °C/300 °F
	Wave guide antenna	–60 °C/–76 °F to +200 °C/392 °F
	Horn compact, extended, special edition	–40 °C/–40 °F to +150 °C/300 °F
FMR244 -	Compact antenna (PTFE capsuled)	–40 °C/–40 °F to +130 °C/266 °F
	80 mm/3", PP cladded (type 4)	–40 °C/–40 °F to + 80 °C/176 °F
FMR245 -	Compact antenna (types 3, 4)	–40 °C/–40 °F to +150 °C/302 °F
	DN50 + DN80 (types B, C, F, G)	–40 °C/–40 °F to +200 °C/392 °F

[1] Note: take care to specific temperature ranges of antenna versions

For Installation acc. -FISCO- Concept see Control dwg. part 960402-2070

Notes.

INTRINSICALLY SAFE (Ex ia), CLASS I, DIV. 1, GROUPS A, B, C, D or Ex ia IIC
HAZARDOUS LOCATION INSTALLATION
DIVISION 1 INSTALLATION

1. Control room equipment may not use or generate over 250 Vrms.
2. Install per the Canadian Electrical Code.
3. Warning: Substitution of components may impair intrinsic safety.
   Avertissement: La substitution de composants peut compromettre la sécurité intrinsèque.
4. Ex ia IS defined as intrinsically safe / sécurité intrinsièque.
5. For entity installation use CSA certified safety barrier or other associated equipment that satisfy the following conditions: with Uo/ Voc ≤ Ii /Vmax, Io/ Isc ≤ Ii / Imax, Co/Ca ≥ Ci + Ccable, Lo/La ≥ Li + Lcable.

	Ui / Vmax (V)	Ii / Imax (mA)	Pi / Pmax (W)	Ci (nF)	Li (µH)
or	17.5	500	5.5	≤ 5	10
	24	250	1.2	≤ 5	10

6. For system installation use: CSA certified safety barriers as follows:
   (a) 28 V / 300 Ω + Ground or (b) 28 V / 300 Ω + 28 V / Diode or (c) 28 V / 300 Ω + 10 V / 50 Ω.
7. Use supply wires suitable for 5 K above surrounding ambient.
   Utiliser des fils d élimentation qui conviennent a une température de 5 K au-dessus de la température ambiante.
8. Install barrier / associated equipment in accordance with manufacturer's instruction.
9. In case of use of PTFE rod antenna (white), planar, parabolic, enamelled horn, type 244 or type 245 avoid electrostatic charge at the antenna; (e.g. do not rub with dry cloth; do not install within the filling curtain).
10. Apparatus with faucet: In case of disconnection of Micropilot M from the faucet (e.g. for maintenance) we recommend to secure resp. to close the faucet e.g. with an additional blind flange. The responsibility for applicability of the arrangement behooves exclusive the operator.
11. Use specific cables, supplied with the Service Interface Commubox FXA193 or Remote Display FHX40. Refer to the applicable Control Drawing.

CLASS I, DIV. 2, GROUPS A, B, C, D or Ex nC IIC and DIP. for CLASS II and III, DIV. 1, GROUPS E, F, G
HAZARDOUS LOCATION INSTALLATION

1. Install per Canadian Electrical Code (CEC) using threaded metal conduit.
   Intrinsic safety barrier not required max. supply voltage 30 V. For T-code see table.
2. Warning: Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
   Avertissement: Risque d'explosion - Avant de déconnecter l équipement, couper le courant ou s'assurer que l'emplacement est désigne non dangereux.

   Warning: Explosion Hazard - Substitution of components may impair suitability for Class I, Div. 2.
   Avertissement: Risque d'explosion - la substitution de composants peut rendre ce matèriel inacceptable pour les emplacements de Classe I, Div. 2.

For CLASS II and III; Div. 1:

WARNING: Keep cover tight unless power has been switched off or the area is known to be non-hazardous.

Temperature class with/without display VU331	Permissible max. medium temperature at the antenna process connection (Tmed)	Permissible max. ambient temperature of the electronic compartment (Ta) (enclosure F23)										
		FMR230 - ..E/V/K/D/H	FMR230 - ..L	FMR230 - ..M	FMR230 - ..F/G	FMR231	FMR232	FMR233	FMR240	FMR240 Wave Guide	FMR244	FMR245
T6	+ 80 °C	+50/45 °C	+55/50 °C	+55/50 °C	+55/50 °C	+50/45 °C	+50/45 °C	+50/45 °C	+55/50 °C	+60/55 °C	+55/50 °C	+55/50 °C
	+ 60 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C	+60/55 °C
T5	+ 95 °C	+65/60 °C	+70/65 °C	+70/65 °C	+70/65 °C	+65/60 °C	+65/60 °C	+65/60 °C	+70/65 °C	+75/70 °C	+70/65 °C	+70/65 °C
	+ 75 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C	+75/70 °C
T4	+130 °C	+65 °C	+75 °C	+75 °C	+70 °C	+55 °C	+65 °C	+60 °C	+60 °C	+70 °C	+65 °C	+65 °C
	+ 80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C
T3C (functional)	+150 °C	+60 °C	+65 °C	+70 °C	+65 °C	+45 °C	+60 °C	+45 °C	+55 °C	+65 °C	not	+60 °C
	+ 80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	+80 °C	allowed	+80 °C
T3	+195 °C	+45 °C	+65 °C	+70 °C	+65 °C	not	not	+40 °C	not	+65 °C	not	+55 °C
	+ 80 °C	+80 °C	+80 °C	+80 °C	+80 °C	allowed	allowed	+80 °C	allowed	+80 °C	allowed	+80 °C
T2B (functional)	+250 °C	+30 °C	+60 °C	+65 °C	+55 °C	not	not	not	not	not	not	not
	+ 80 °C	+80 °C	+80 °C	+80 °C	+80 °C	allowed	allowed	allowed	allowed	allowed	allowed	allowed
T2 (functional)	+280 °C	not	+60 °C	+65 °C	+55 °C	not	not	not	not	not	not	not
	+ 80 °C	allowed	+80 °C	+80 °C	+80 °C	allowed	allowed	allowed	allowed	allowed	allowed	allowed
T2	+290 °C	not	not	+65 °C	+55 °C	not	not	not	not	not	not	not
	+ 80 °C	allowed	allowed	+80 °C	+80 °C	allowed	allowed	allowed	allowed	allowed	allowed	allowed
T1 (functional)	+350 °C	not	not	+60 °C	+45 °C	not	not	not	not	not	not	not
	+ 80 °C	allowed	allowed	+80 °C	+80 °C	allowed	allowed	allowed	allowed	allowed	allowed	allowed
T1 (functional)	+400 °C	not	not	+60 °C	+45 °C	not	not	not	not	not	not	not
	+ 80 °C	allowed	allowed	+80 °C	+80 °C	allowed	allowed	allowed	allowed	allowed	allowed	allowed

Note: the applicable temperature of antenna must be within their specified limits; Tx (functional) means limited through type of antenna;
T6 and T5 requires for FF electronic enlarged derating: for ambient; 1st number = PA electronic insert; 2nd number = FF electronic insert
e.g. +60/55 °C expression means: Apparatus with PA electronic insert max. ambient at housing = +60 °C;
Apparatus with FF electronic insert max. ambient at housing = +55 °C