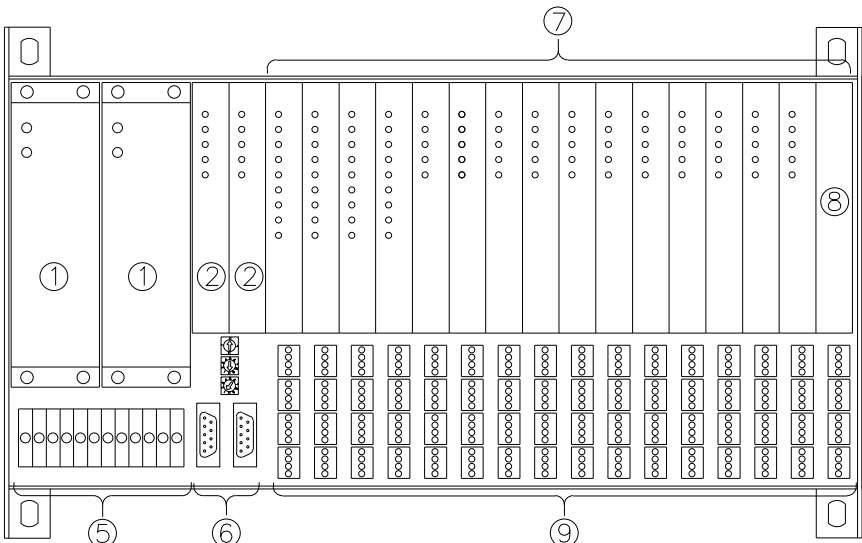
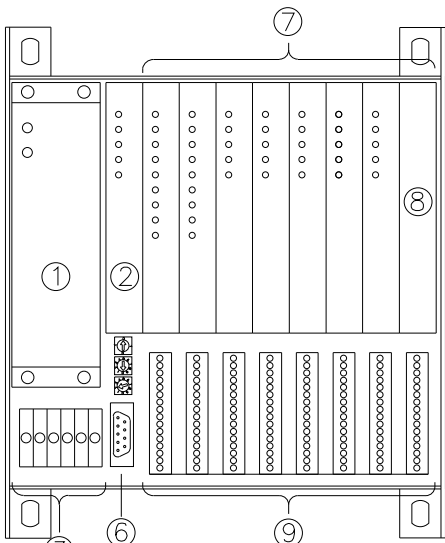


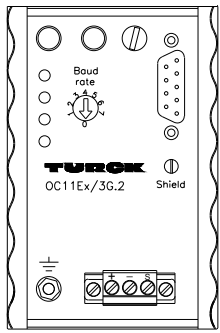
excom[®] SYSTEM COMPONENTS



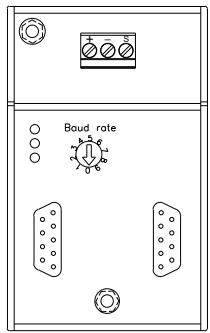
MT16-2G, MT16-2G/MSA, or MT18 Backplane



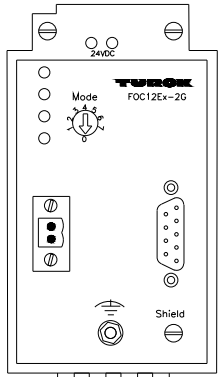
MT08-2G Backplane



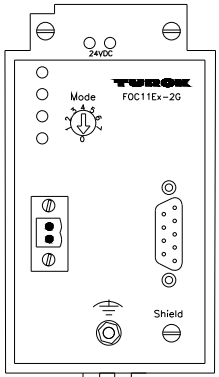
OC11Ex/..
Optocoupler



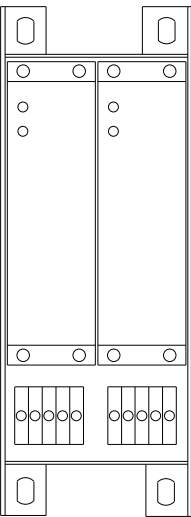
SC11Ex/..
SC11-3G/..
Segment Coupler



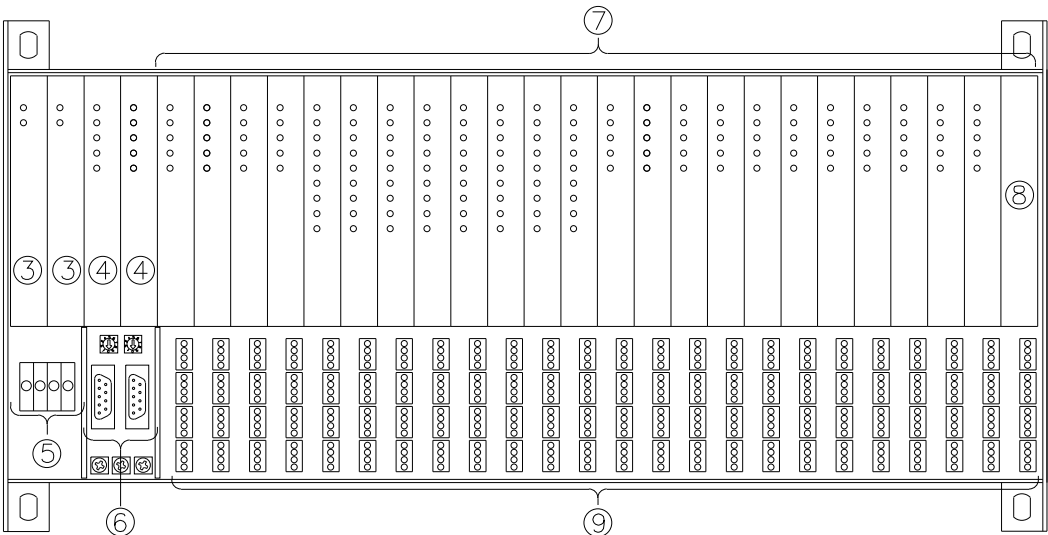
FOC12...
Optocoupler



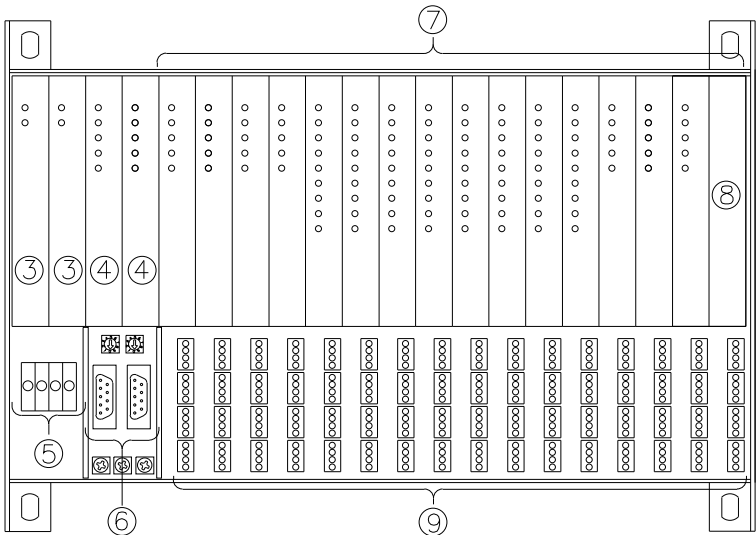
FOC11...
Optocoupler



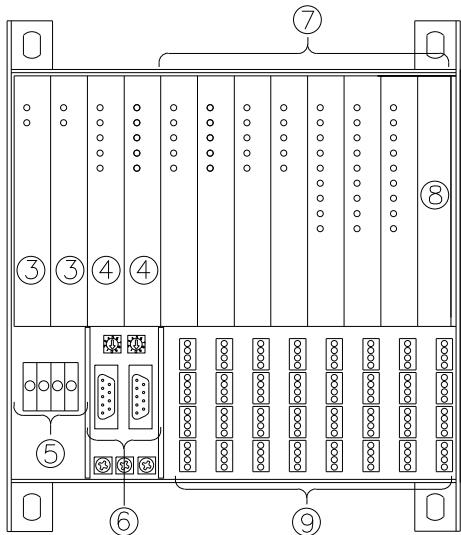
MT-PPS Backplane
with PPSA115EX
or PPSA230EX



MT24-3G Backplane



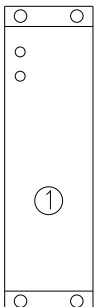
MT16-3G Backplane



MT08-3G Backplane



PSM24-3G.1



PSD24Ex

Note:

- ① Power supply module PSD24Ex. MT16-2G, MT16-2G/MSB, and MT18 backplanes may have 1 or 2 power supply modules, MT08-2G and MT9 backplanes have 1 power supply module. Power supply modules may be withdrawn or inserted without removing external power.
- ② Gateway GDP-IS. MT16-2G, MT16-2G/MSB and MT18 backplanes may have 1 or 2 gateways in the slots indicated. MT08-2G and MT9 backplanes have 1 gateway in the slot indicated. Gateways may be inserted or withdrawn without removing external power.
- ③ Power supply module PSM24-3G.1. MT24-3G, MT16-3G and MT08-3G backplanes may have 1 or 2 PSM24-3G.1 power supply modules. Power supply modules may be withdrawn or inserted without removing external power.
- ④ Gateway GDP-IS, GEN-3G or GDP-NI/FW2.3. Gateway GDP-IS must be used when the MT24-3G, MT16-3G or MT08-3G backplane is installed in a hazardous location (Division 2 or Zone 2). Gateway GDP-NI or GEN-3G may be used when MT24-3G, MT16-3G and MT08-3 backplanes are installed in a non-hazardous location. MT24-3G, MT16-3G and MT08-3G backplanes may have 1 or 2 gateways in the slots indicated. Gateways may be inserted or withdrawn without removing external power.
- ⑤ External power supply terminals:
- MT24-3G, MT16-3G, MT08-3G

MT16-2G, MT16-2G/MSB, MT18

MT08-2G, MT9, MT-PPS
- ⑥ Bus communication port(s). Standard DB9 receptacles with provision for jack-screw secured connection. MT24-3G, MT16-3G, MT16-2G, MT16-2G/MSB, MT18 and MT08-2G backplanes have 2 ports. MT08-2G and MT9 backplanes have 1 port.
- ⑦ I/O card slots. MT24-3G backplanes have 24 I/O card slots; MT16-3G, MT16-2G, MT16-2G/MSB and MT18 backplanes have 16 I/O card slots; MT08-3G, MT08-2G and MT9 backplanes have 8 I/O card slots in the positions indicated. Each slot may be occupied by any of the I/O cards listed in Table 1, Sheet 7, or be left empty. All I/O cards may be inserted or withdrawn without powering down the system.
- ⑧ Empty Gateway, power supply module, or I/O card slots must be filled by BM1 covers to maintain enclosure integrity.
- ⑨ Intrinsically safe field circuit terminals. Each I/O card slot has an associated blue 16-pole terminal directly below it for connection to intrinsically safe apparatus. See sheets 11, 12, 13, 14 and 15 for connection diagrams and circuit parameters for connection to intrinsically safe apparatus.



NOTE: The supplied terminal block cover must be secured in place before applying power in a hazardous location!

F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		6/17/22
E	Add MT..-3G, PSM24-3G, GDP-NI, GEN-3G, PPSA...EX, AIH401EX AOH401EX, DI401EX, TI41EX, SC11-3G, SC11EX-3G, FOC11*, FOC12*	TKM	BVL	4/21/22
D	Add MT8-2G, MT16-2G and MT16-2G/MSA	BVL		7/5/17
C	Update to new Std, Add new I/O card models	BVL		8/8/12
B	Add SC12Ex, correct Note 8 Sheets 2 and 3	BVL		9/29/04
A	Release	BVL		12/10/01
Rev	Description	Drft	Chk	Date

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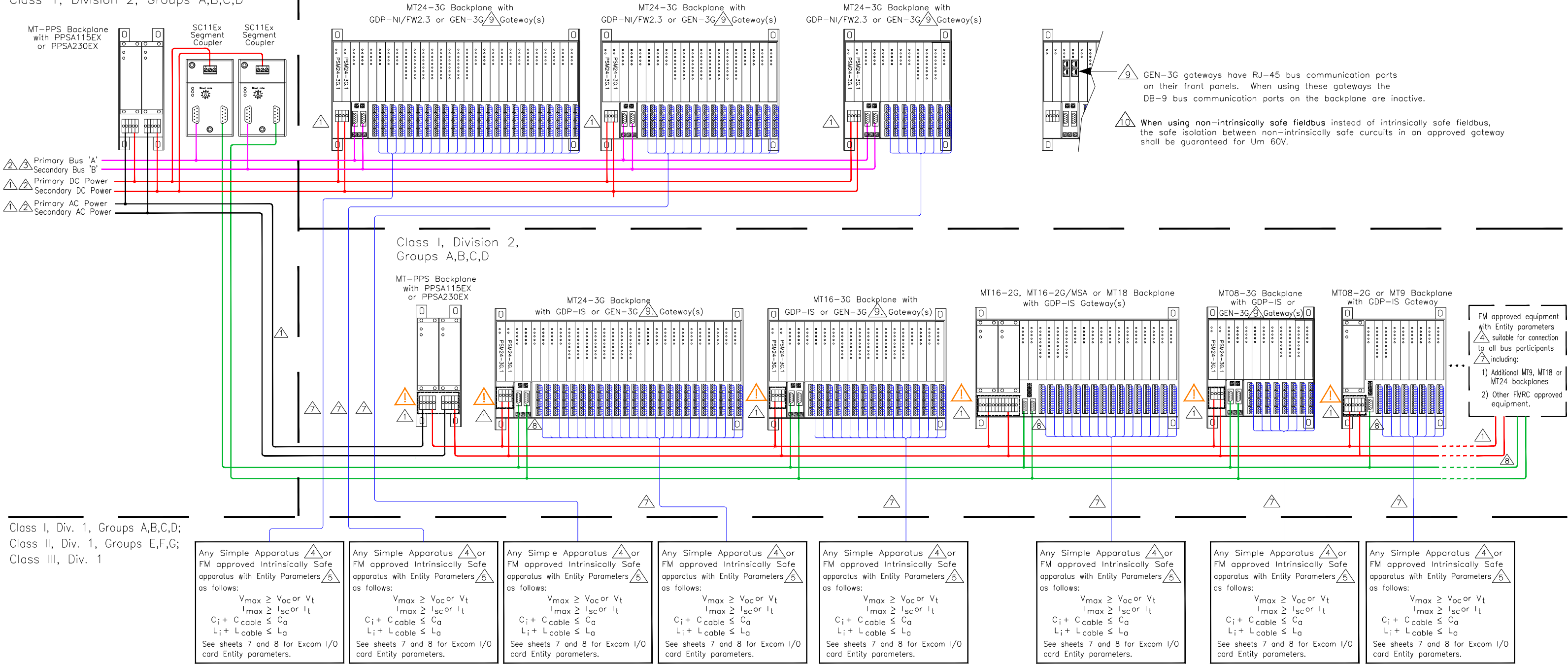
Title FM Approvals Control Drawing
For excom[®] Remote I/O System

Scale: None

Sheet 1 of 15

INSTALLATIONS IN CLASS/DIVISION CLASSIFIED LOCATIONS WITH SC11EX SEGMENT COUPLERS

Nonhazardous Location, or
Class 1, Division 2, Groups A,B,C,D



Class I, Div. 1, Groups A,B,C,D;
Class II, Div. 1, Groups E,F,G;
Class III, Div. 1

Notes:

1. The MT.. backplanes and SC11Ex/.. segment couplers must be installed in a suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03. Primary, secondary or AC power wiring external to the enclosure in Class I, Division 2 must be in accordance with Class I, Division 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. Th MT-PPS may be installed in a nonhazardous location or a Class I, Division 2 location.
- NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.
2. Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G and MT16-2G backplanes with slots for two power supply modules.
3. A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
4. A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20uJ, or 25mW.
5. The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:
 $V_{max} \geq V_{oc} \text{ or } V_t$ $I_{max} \geq I_{sc} \text{ or } I_t$ $C_i + C_{cable} \leq C_a$ $L_i + L_{cable} \leq L_a$
Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.
6. If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance – 60pF/foot Inductance – 0.2uH/foot
7. For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.
8. Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are V_{oc} and I_{sc} . Input parameters are V_{max} and I_{max} . The interconnection of multiple bus participants is acceptable when the following conditions are met:

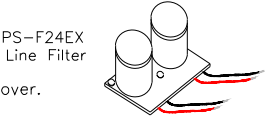
Each $V_{max} \geq$ each V_{oc} of all connected apparatus Each $I_{max} \geq$ the sum of the I_{sc} values of all connected apparatus (If no I_{max} is specified for an apparatus, this comparison is not necessary)

Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes:

Output: $V_{oc} = 3.6 \text{ V}$, $I_{sc} = 125 \text{ mA}$, $P_o = 112.5 \text{ mW}$ Input: $V_{max} = 4.2 \text{ V}$, $I_{max} = 4.8 \text{ A}$

Cable capacitance $\leq 250 \text{ nF/km}$ (76 nF/1000 ft) Cable L/R $\leq 15 \text{ }\mu\text{H/Ohm}$

C and L values not specified as the cable capacitance and inductance are limited to these values



F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		6/17/22	Drawing No.: IS-2.500
Rev	Description	Drft	Chk	Date	Scale: None
					Sheet 2 of 15

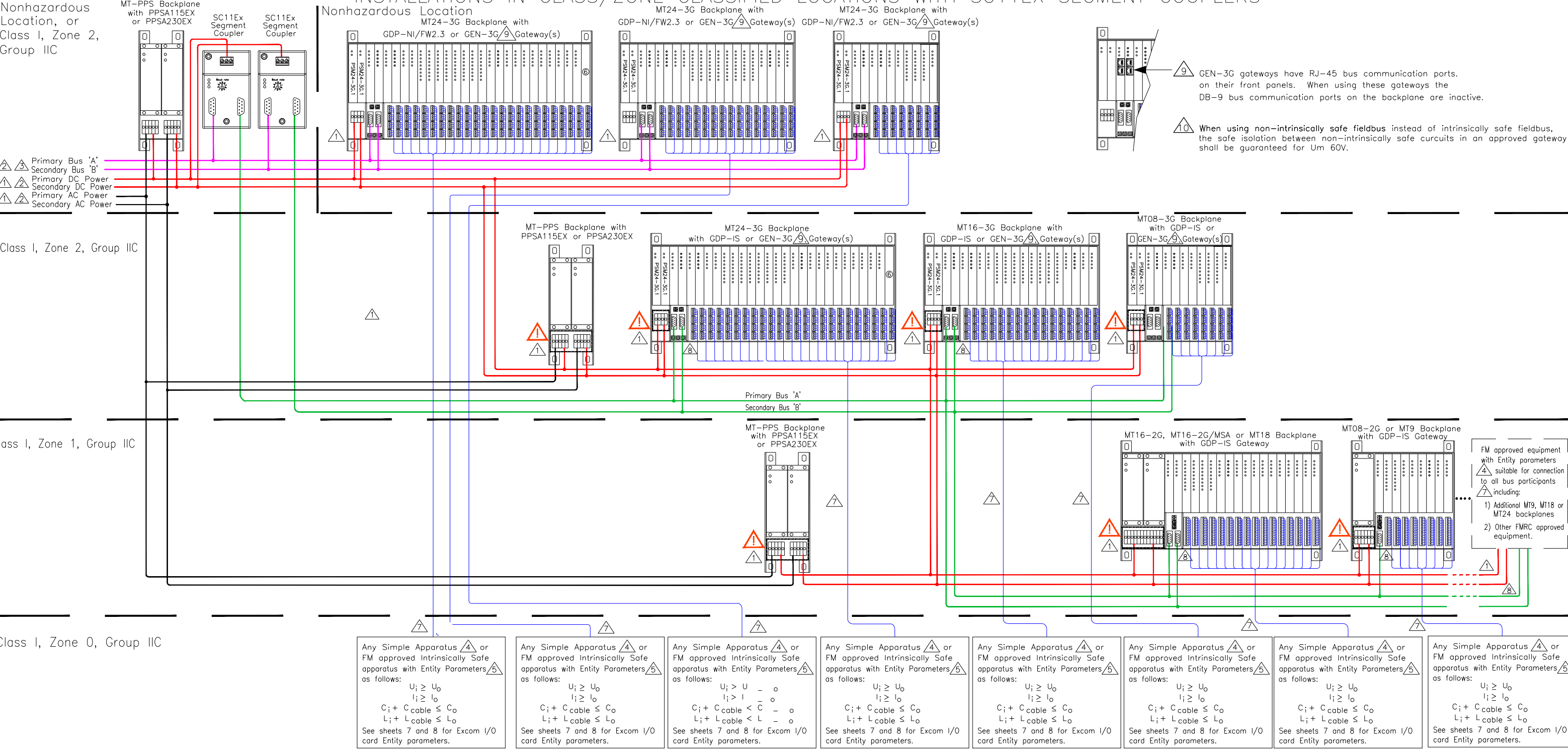
Nonhazardous
Location, or
Class I, Zone 2,
Group IIC

Class I, Zone 2, Group IIC

Class I, Zone 1, Group IIC

Class I, Zone 0, Group IIC

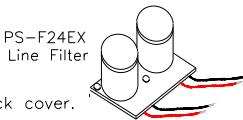
INSTALLATIONS IN CLASS/ZONE CLASSIFIED LOCATIONS WITH SC11EX SEGMENT COUPLERS



Notes:

- $\triangle 1$ The MT.. backplanes and SC11Ex/.. segment couplers must be installed in an equipment enclosure in compliance with the mounting, spacing and segregation requirements of Zone 1 or Zone 2 as appropriate. Primary, secondary or AC power wiring external to the enclosure in Class I, Zone 1 or 2 must be in accordance with Class I, Zone 1 or 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location, a Class I, Zone 1 location, or a Class I, Zone 2 location. **NOTE:** The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.
- $\triangle 2$ Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- $\triangle 3$ A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- $\triangle 4$ A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20μJ, or 25mW.
- $\triangle 5$ The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:
$$U_i \geq U_o \quad I_i \geq I_o \quad C_i + C_{\text{cable}} \leq C_o \quad L_i + L_{\text{cable}} \leq L_o$$

Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division 1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.
- $\triangle 6$ If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance – 60pF/foot Inductance – 0.2μH/foot
- $\triangle 7$ For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.
- $\triangle 8$ Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are U_o and I_o . Input parameters are U_i and I_i . The interconnection of multiple bus participants is acceptable when the following conditions are met:
Each $U_i \geq$ each U_o of all connected apparatus Each $I_i \geq$ the sum of the I_o values of all connected apparatus (If no I_i is specified for an apparatus, this comparison is not necessary) Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes:
Output: $U_o = 3.6 \text{ V}$, $I_o = 125 \text{ mA}$, $P_o = 112.5 \text{ mW}$ Input: $U_i = 4.2 \text{ V}$, $I_i = 4.8 \text{ A}$
 $\text{Cable capacitance} \leq 250 \text{ nF/km (76 nF/1000 ft)}$ $\text{Cable L/R} \leq 15 \text{ μH/Ohm}$
C and L values not specified as the cable capacitance and inductance are limited to these values

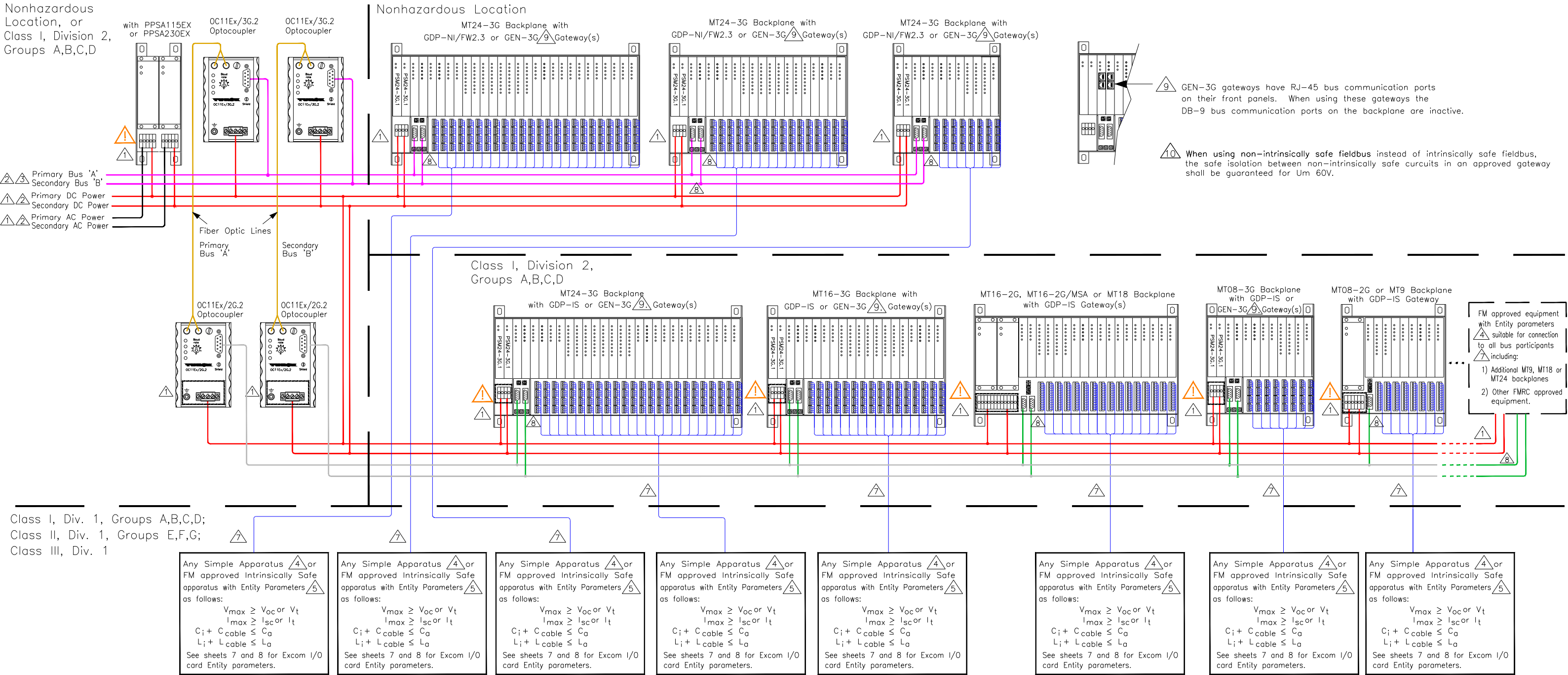


F	Add DI401Ex update lower Ta on couplers to -40°C TKM		6/17/22	Drawing No.: IS-2.500
Rev	Description	Drft	Chk	Scale: None
			Date	Sheet 3 of 15

INSTALLATIONS IN CLASS/DIVISION CLASSIFIED LOCATIONS WITH OC11EX OPTOCOUPLERS

Nonhazardous Location, or Class I, Division 2, Groups A,B,C,D

Class I, Div. 1, Groups A,B,C,D;
Class II, Div. 1, Groups E,F,G;
Class III, Div. 1



Notes:

$\triangle_1$ The MT.. backplanes and OC11Ex/.. optocouplers must be installed in a suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03. Primary, secondary or AC power wiring external to the enclosure in Class I, Division 2 must be in accordance with Class I, Division 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location or a Class I, Division 2 location.



NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.

$\triangle_2$ Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G and MT16-2G backplanes with slots for two power supply modules.

$\triangle_3$ A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.

$\triangle_4$ A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20uJ, or 25mW.

$\triangle_5$ The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:

$$V_{max} \geq V_{oc} \text{ or } V_t \quad I_{max} \geq I_{sc} \text{ or } I_t \quad C_i + C_{cable} \leq C_a \quad L_i + L_{cable} \leq L_a$$

Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division 1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.

6. If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance - 60pF/foot Inductance - 0.2uH/foot

$\triangle_7$ For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.

$\triangle_8$ Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are V_{oc} and I_{sc} . Input parameters are V_{max} and I_{max} . The interconnection of multiple bus participants is acceptable when the following conditions are met:

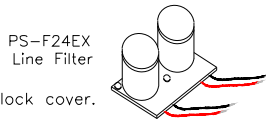
Each $V_{max} \geq$ each V_{oc} of all connected apparatus Each $I_{max} \geq$ the sum of the I_{sc} values of all connected apparatus (If no I_{max} is specified for an apparatus, this comparison is not necessary)

Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes:

Output: $V_{oc} = 3.6 \text{ V}$, $I_{sc} = 125 \text{ mA}$, $P_o = 112.5 \text{ mW}$ Input: $V_{max} = 4.2 \text{ V}$, $I_{max} = 4.8 \text{ A}$

Cable capacitance $\leq 250 \text{ nF/km}$ (76 nF/1000 ft) Cable L/R $\leq 15 \text{ } \mu\text{H/Ohm}$

C and L values not specified as the cable capacitance and inductance are limited to these values



F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		6/17/22	Drawing No.: IS-2.500
Rev	Description	Drft	Chk	Date	Scale: None Sheet 4 of 15

The diagram illustrates a complex industrial control system architecture across three safety zones:

- Non-hazardous Location (Class I, Zone 2):** Contains power supplies (MT-PPS Backplane with PPSA115EX or PPSA230EX) and communication modules (OC11Ex/3G.2 Optocoupler).
- Class I, Zone 1, Group IIC:** Houses the main processing units: MT24-3G, MT16-3G, and MT08-3G backplanes with GDP-NI/FW2.3 or GEN-3G Gateways.
- Class I, Zone 0, Group IIC:** Features additional backplane modules (MT24-3G, MT16-3G, MT08-3G) and communication modules (OC11Ex/2G.2 Optocoupler).

Key components and connections include:

- Backplane Modules:** MT24-3G, MT16-3G, and MT08-3G backplanes with various gateway configurations (GDP-IS, GDP-NI/FW2.3, GEN-3G).
- Communication:** Fiber optic lines connecting optocouplers across zones.
- Safety Zones:** Clearly demarcated by horizontal lines representing different levels of explosion protection.
- Legend:** Symbols for Primary Bus 'A', Secondary Bus 'B', Primary DC Power, Secondary DC Power, Primary AC Power, and Secondary AC Power.
- Notes:**
 - GEN-3G gateways have RJ-45 bus communication ports on their front panels. When using these gateways the DB-9 bus communication ports on the backplane are inactive.
 - When using non-intrinsically safe fieldbus instead of intrinsically safe fieldbus, the safe isolation between non-intrinsically safe circuits in an approved gateway shall be guaranteed for Um 60V.
- Entity Parameters:** A series of boxes at the bottom specify entity parameters for simple apparatus and FM-approved intrinsically safe apparatus, including conditions like $U_i \geq U_0$, $I_i \geq I_0$, $C_i + C_{cable} \leq C_0$, and $L_i + L_{cable} \leq L_0$.

1. The MT.. backplanes and OC11Ex../.. optocouplers must be installed in an equipment enclosure in compliance with the mounting, spacing and segregation requirements of Zone 1 or Zone 2 as appropriate. Primary, secondary or AC power wiring external to the enclosure in Class I, Zone 1 or 2 must be in accordance with Class I, Zone 1 or 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location, a Class I, Zone 1 location, or a Class I, Zone 2 location.  NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover. 

2. Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G and MT16-2G backplanes with slots for two power supply modules.

3. A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.

4. A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20μJ, or 25mW.

5. The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:

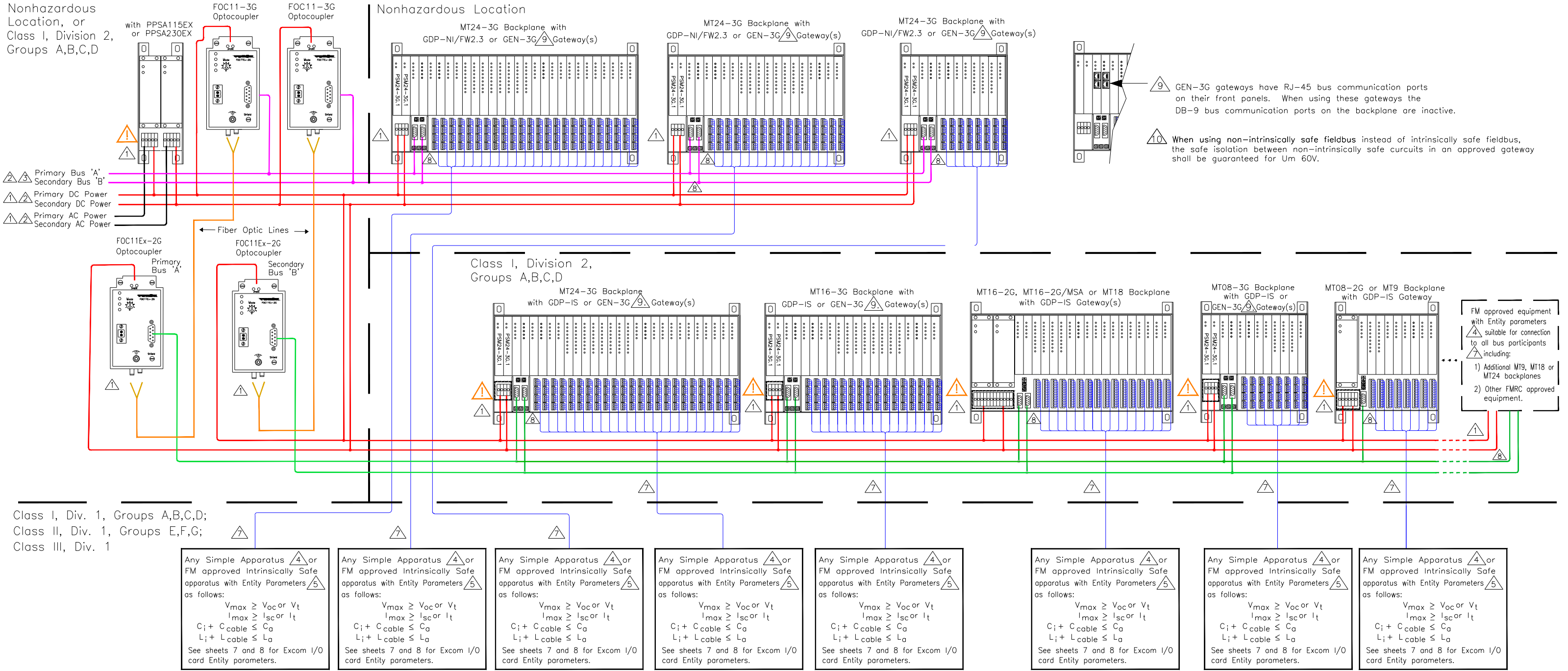
$$U_i \geq U_o \quad I_i \geq I_o \quad C_i + C_{cable} \leq C_o \quad L_i + L_{cable} \leq L_o$$
Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division 1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.

6. If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance – 60pF/foot Inductance – 0.2μH/foot

7. For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.

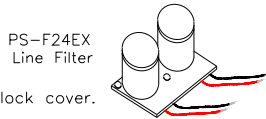
8. Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are U_o and I_o . Input parameters are U_i and I_i . The interconnection of multiple bus participants is acceptable when the following conditions are met.
Each $U_i \geq$ each U_o of all connected apparatus Each $I_i \geq$ the sum of the I_o values of all connected apparatus (If no I_i is specified for an apparatus, this comparison is not necessary) Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes:
Output: $U_o = 3.6 \text{ V}$, $I_o = 125 \text{ mA}$, $P_o = 112.5 \text{ mW}$ Input: $U_i = 4.2 \text{ V}$, $I_i = 4.8 \text{ A}$
Cable capacitance $\leq 250 \text{ nF/km}$ (76 nF/1000 ft) Cable L/R $\leq 15 \text{ μH/Ohm}$
C and L values not specified as the cable capacitance and inductance are limited to these values

INSTALLATIONS IN CLASS/DIVISION CLASSIFIED LOCATIONS WITH FOC11-3G and FOC11Ex-2G OPTOCOUPLEDERS



Notes:

- $\triangle_1$ The MT.. backplanes and FOC11... optocouplers must be installed in a suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03. Primary, secondary or AC power wiring external to the enclosure in Class I, Division 2 must be in accordance with Class I, Division 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location or a Class I, Division 2 location.
- $\triangle_1$ NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.
- $\triangle_2$ Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- $\triangle_3$ A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- $\triangle_4$ A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20uJ, or 25mW.
- $\triangle_5$ The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:
 $V_{max} \geq V_{oc}$ or V_t $I_{max} \geq I_{sc}$ or I_t $C_i + C_{cable} \leq C_a$ $L_i + L_{cable} \leq L_a$
Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.
6. If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance - 60pF/foot Inductance - 0.2uH/foot
- $\triangle_7$ For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.
- $\triangle_8$ Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are V_{oc} and I_{sc} . Input parameters are V_{max} and I_{max} . The interconnection of multiple bus participants is acceptable when the following conditions are met:
Each $V_{max} \geq$ each V_{oc} of all connected apparatus Each $I_{max} \geq$ the sum of the I_{sc} values of all connected apparatus (If no I_{max} is specified for an apparatus, this comparison is not necessary)
Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes:
Output: $V_{oc} = 3.6$ V, $I_{sc} = 125$ mA, $P_o = 112.5$ mW Input: $V_{max} = 4.2$ V, $I_{max} = 4.8$ A
Cable capacitance ≤ 250 nF/km (76 nF/1000 ft) Cable L/R ≤ 15 uH/Ohm,
C and L values not specified as the cable capacitance and inductance are limited to these values



F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		5/26/22	Drawing No.: IS-2.500
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Nonhazardous Location

Location, or Class I, Zone 2,

MT-PPS Backplane with PPSA115EX or PPSA230EX

FOC11-3G Optocoupler

FOC11-3G Optocoupler

Nonhazardous Location

MT24-3G Backplane with GDP-NI/FW2.3 or GEN-3G Gateway(s)

GDP-NI/FW2.3 or GEN-3G Gateway(s)

MT24-3G Backplane with GDP-NI/FW2.3 or GEN-3G Gateway(s)

GDP-NI/FW2.3 or GEN-3G Gateway(s)

MT24-3G Backplane with GDP-IS or GEN-3G Gateway(s)

GDP-IS or GEN-3G Gateway(s)

MT16-3G Backplane with GDP-IS or GEN-3G Gateway(s)

GDP-IS or GEN-3G Gateway(s)

MT08-3G Backplane with GDP-IS or GEN-3G Gateway(s)

GDP-IS or GEN-3G Gateway(s)

Class I, Zone 2, Group IIC

Primary Bus 'A'

Secondary Bus 'B'

Fiber Optic Lines

Class I, Zone 1, Group IIC

FOC11Ex-2G

FOC11Ex-2G

MT-PPS Backplane with PPSA115EX or PPSA230EX

MT16-2G, MT16-2G/MSA or MT18 Backplane with GDP-IS Gateway

MT08-2G or MT9 Backplane with GDP-IS Gateway

FM approved equipment with Entity parameters suitable for connection to all bus participants including:

- Additional MT08, MT9, MT16, MT18, MT24 backplanes
- Other FMRC approved equipment.

Class I, Zone 0, Group IIC

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &> U_o - o \\ I_i &> I_o - o \\ C_i + C_{\text{cable}} &< C_o - o \\ L_i + L_{\text{cable}} &< L_o - o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Any Simple Apparatus 4 or FM approved Intrinsically Safe apparatus with Entity Parameters 5 as follows:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$

See sheets 7 and 8 for Excom I/O card Entity parameters.

Note:

- The MT.. backplanes and FOC11... optocouplers must be installed in an equipment enclosure in compliance with the mounting, spacing and segregation requirements of Zone 1 or Zone 2 as appropriate. Primary, secondary or AC power wiring external to the enclosure in Class I, Zone 1 or 2 must be in accordance with Class I, Zone 1 or 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location, a Class I, Zone 1 location, or a Class I, Zone 2 location. NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.
- Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G and MT16-2G backplanes with slots for two power supply modules.
- A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20μJ, or 25mW.
- The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:

$$\begin{aligned} U_i &\geq U_o \\ I_i &\geq I_o \\ C_i + C_{\text{cable}} &\leq C_o \\ L_i + L_{\text{cable}} &\leq L_o \end{aligned}$$
Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division 1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.
- If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance – 60pF/foot Inductance – 0.2μH/foot
- For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.
- Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are U_o and I_o . Input parameters are U_i and I_i . The interconnection of multiple bus participants is acceptable when the following conditions are met.
Each $U_i \geq$ each U_o of all connected apparatus Each $I_i \geq$ the sum of the I_o values of all connected apparatus (If no I_i is specified for an apparatus, this comparison is not necessary)
Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes: Output: $U_o = 3.6 \text{ V}$, $I_o = 125 \text{ mA}$, $P_o = 112.5 \text{ mW}$ Input: $U_i = 4.2 \text{ V}$, $I_i = 4.8 \text{ A}$
Cable capacitance $\leq 250 \text{ nF/km}$ (76 nF/1000 ft) Cable L/R $\leq 15 \mu\text{H}/\Omega/\text{ft}$
C and L values not specified as the cable capacitance and inductance are limited to these values

PS-F24EX Line Filter

Rev	Description	Drft	Chk	Date	Scale:	None	Sheet	7 of
F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		5/26/22	Drawing No.:	IS-2.500		



A triangle with the number 1 inside.

The MT.. backplanes and FOC11... optocouplers must be installed in an equipment enclosure in compliance with the mounting, spacing and segregation requirements of Zone 1 or Zone 2 as appropriate. Primary, secondary or AC power wiring external to the enclosure in Class I, Zone 1 or 2 must be in accordance with Class I, Zone 1 or 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location, a Class I, Zone 1 location, or a Class I, Zone 2 location.

NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.

PS-F24EX
Line Filter

2. Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G and MT16-2G backplanes with slots for two power supply modules.

 A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.

4. A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20μJ, or 25mW.

5.3 The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:

$$U_i \geq U_o \quad I_i \geq I_o \quad C_i + C_{\text{cable}} \leq C_o \quad L_i + L_{\text{cable}} \leq L_o$$

Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division 1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.

 If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance – 60pF/foot Inductance – 0.2μH/foot

For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrical Code, CSA 22.1, Appendix F.

6.0. Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are U_o and I_o . Input parameters are U_i and I_i . The interconnection of multiple bus participants is acceptable when the following conditions are met.

Each $U_i \geq$ each U_o of all connected apparatus

Each $I_i \geq$ the sum of the I_0 values of all connected apparatus

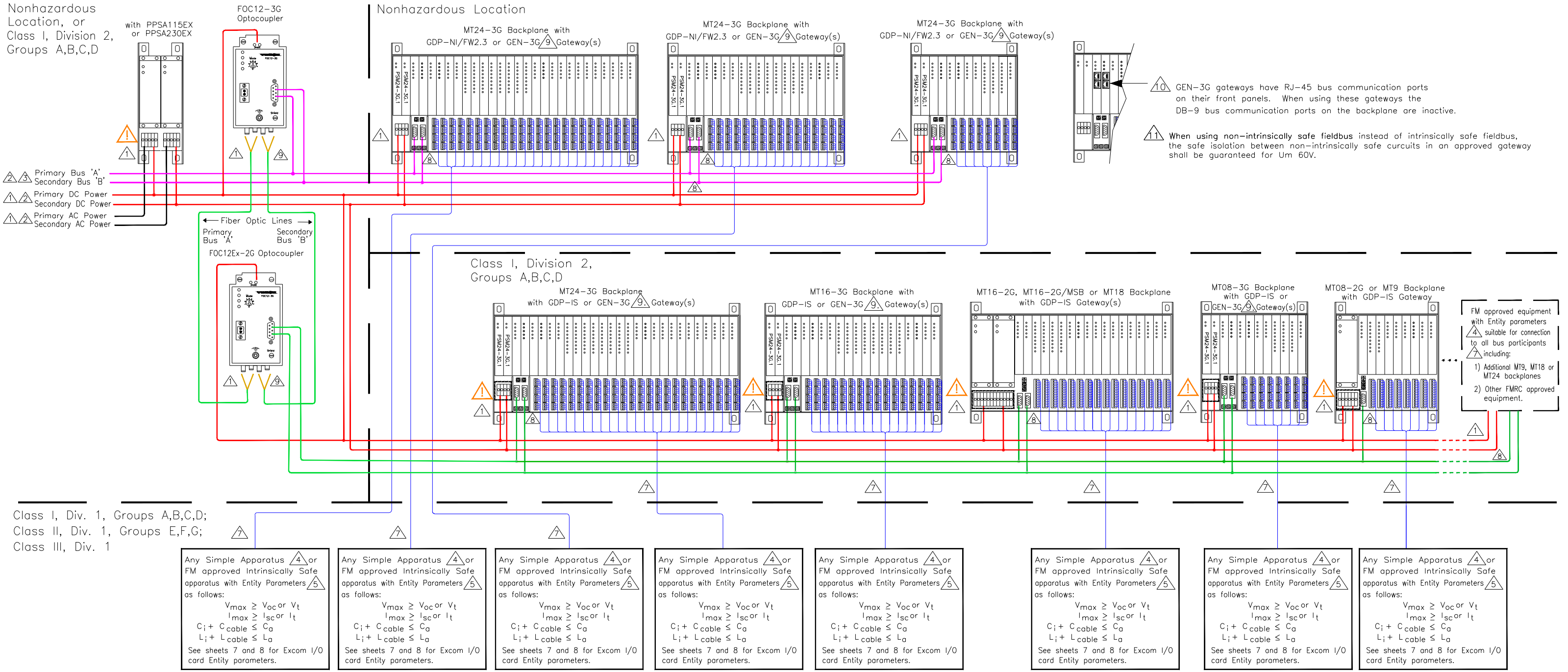
(If no I_i is specified for an apparatus, this comparison is not necessary)

Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes: Output: $U_o = 3.6$ V, $I_o = 125$ mA, $P_o = 112.5$ mW

Input: $U_i = 4.2 \text{ V}$, $I_i = 4.8 \text{ A}$

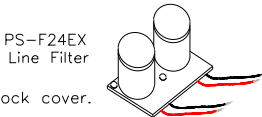
F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		5/26/22	Drawing No.: IS-2.500		
Rev	Description	Drft	Chk	Date	Scale: None	Sheet 7 of 15	

INSTALLATIONS IN CLASS/DIVISION CLASSIFIED LOCATIONS WITH FOC11-3G and FOC11Ex-2G OPTOCOUPLEDERS



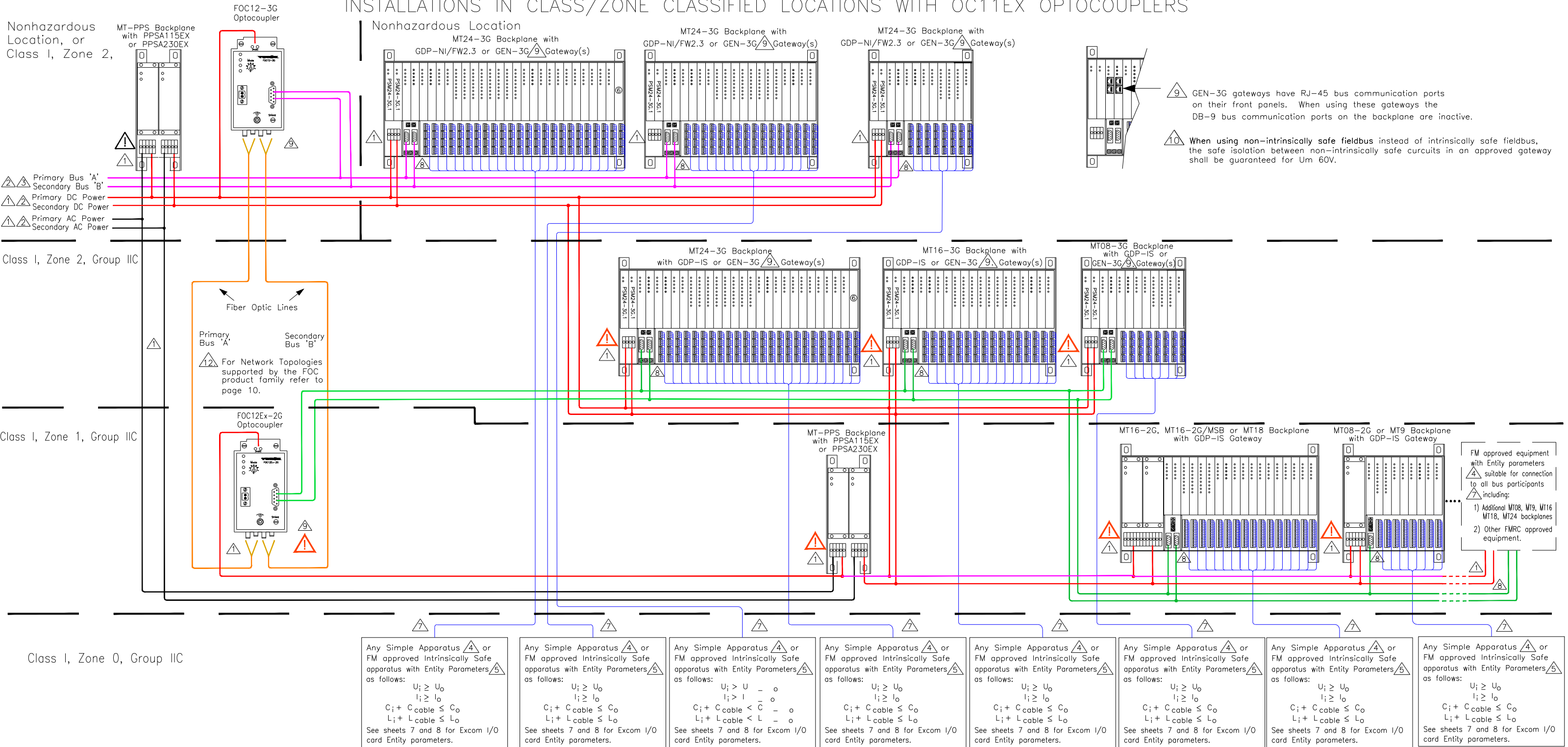
Notes:

- $\triangle_1$ The MT.. backplanes and FOC12... optocouplers must be installed in a suitable equipment enclosure in accordance with ANSI/ISA S82.01 and S82.03. Primary, secondary or AC power wiring external to the enclosure in Class I, Division 2 must be in accordance with Class I, Division 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location or a Class I, Division 2 location.
- $\triangle_2$ Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- $\triangle_3$ A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.
- $\triangle_4$ A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20uJ, or 25mW.
- $\triangle_5$ The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:
 $V_{max} \geq V_{oc} \text{ or } V_t$ $I_{max} \geq I_{sc} \text{ or } I_t$ $C_i + C_{cable} \leq C_a$ $L_i + L_{cable} \leq L_a$
Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.
6. If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance – 60pF/foot Inductance – 0.2uH/foot
- $\triangle_7$ For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.
- $\triangle_8$ Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are V_{oc} and I_{sc} . Input parameters are V_{max} and I_{max} . The interconnection of multiple bus participants is acceptable when the following conditions are met:
Each $V_{max} \geq$ each V_{oc} of all connected apparatus Each $I_{max} \geq$ the sum of the I_{sc} values of all connected apparatus (If no I_{max} is specified for an apparatus, this comparison is not necessary)
Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes: Output: $V_{oc} = 3.6 \text{ V}$, $I_{sc} = 125 \text{ mA}$, $P_O = 112.5 \text{ mW}$ Input: $V_{max} = 4.2 \text{ V}$, $I_{max} = 4.8 \text{ A}$
Cable capacitance $\leq 250 \text{ nF/km}$ (76 nF/1000 ft) Cable L/R $\leq 15 \text{ uH/Ohm}$
C and L values not specified as the cable capacitance and inductance are limited to these values
- $\triangle_9$ For Network Topologies supported by the FOC product family refer to page 10.



F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		5/26/22	Drawing No.: IS-2.500
Rev	Description	Drft	Chk	Date	Scale: None
					Sheet 8 of 15

INSTALLATIONS IN CLASS/ZONE CLASSIFIED LOCATIONS WITH OC11EX OPTOCOUPLED



Notes:

1. The MT.. backplanes and FOC12... optocouplers must be installed in an equipment enclosure in compliance with the mounting, spacing and segregation requirements of Zone 1 or Zone 2 as appropriate. Primary, secondary or AC power wiring external to the enclosure in Class I, Zone 1 or 2 must be in accordance with Class I, Zone 1 or 2 wiring practices (as appropriate) per the National Electrical Code, ANSI/NFPA 70. Primary and secondary power may be provided externally or via MT-PPS with PPSA115EX or PPSA230EX supply. The MT-PPS may be installed in a nonhazardous location, a Class I, Zone 1 location, or a Class I, Zone 2 location. NOTE: The supplied terminal block cover must be secured in place before applying power. Where needed for 24VDC power supply stability, a PS-F24EX may be substituted for the terminal block cover.

2. Associated apparatus must not be connected to any device that uses or generates in excess of 250Vrms unless it has been determined that the voltage is adequately isolated from the associated apparatus. Secondary power is optional for MT24-3G, MT18, MT16-3G and MT16-2G backplanes with slots for two power supply modules.

3. A Secondary bus is optional for MT24-3G, MT18, MT16-3G, MT16-2G and MT08-3G backplanes that have slots for two GDP or GEN gateway modules.

4. A simple apparatus is defined as a device that will neither generate nor store more than 1.2V, 0.1A, 20μJ, or 25mW.

5. The entity concept allows interconnection of intrinsically safe apparatus and associated apparatus not specifically examined in combination as a system when the following conditions are met:

$U_i \geq U_o$ $I_i \geq I_o$ $C_i + C_{cable} \leq C_o$ $L_i + L_{cable} \leq L_o$

Entity parameters are assigned to intrinsically safe apparatus and associated apparatus for circuits in Division 1 or 2. Nonincendive Field Wiring parameters are assigned to nonincendive equipment and associated nonincendive field wiring apparatus for nonincendive circuits in Division 2. For circuits in Division 1, entity parameters must be matched with Entity parameters for the same Class, Division, and Group. For Division 2 locations, Nonincendive Field Wiring parameters may be used interchangeably with entity parameters for the same Class and Group.

6. If the electrical parameters of the cable are unknown, the following default values may be used: Capacitance - 60pF/foot Inductance - 0.2μH/foot

7. For US installations, intrinsically safe circuits must use wiring methods in accordance with the National Electrical Code, ANSI/NFPA 70, Article 504. For Canadian installations, intrinsically safe circuits must be installed in accordance with the Canadian Electrocal Code, CSA 22.1, Appendix F.

8. Bus communication ports and end-of-line terminators are bi-directional, thus they will have both output and input Entity or Nonincendive Field Wiring parameters. Output parameters are U_o and I_o . Input parameters are U_i and I_i . The interconnection of multiple bus participants is acceptable when the following conditions are met:

Each $U_i \geq$ each U_o of all connected apparatus Each $I_i \geq$ the sum of the I_o values of all connected apparatus (If no I_i is specified for an apparatus, this comparison is not necessary)

Entity parameters for each bus communication port on MT24-3G, MT16-3G, MT18 and MT9 backplanes: Output: $U_o = 3.6$ V, $I_o = 125$ mA, $P_o = 112.5$ mW Input: $U_i = 4.2$ V, $I_i = 4.8$ A

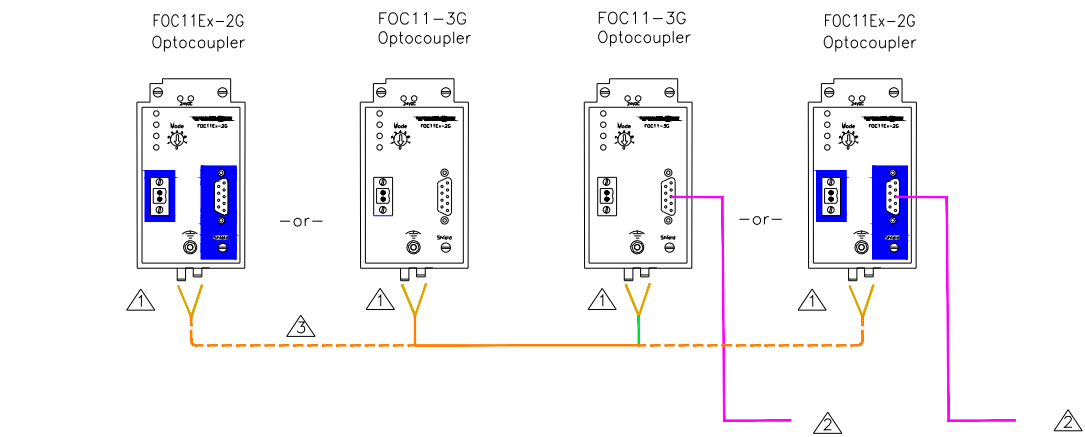
Cable capacitance ≤ 250 nF/km (76 nF/1000 ft) Cable L/R ≤ 15 μH/Ohm

C and L values not specified as the cable capacitance and inductance are limited to these values

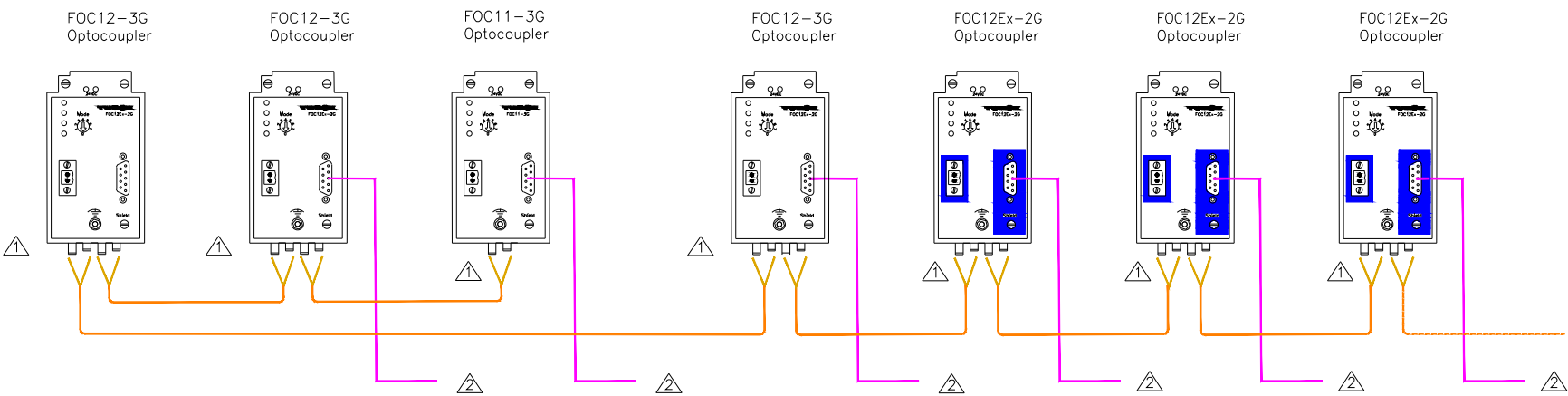
F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		5/26/22	Drawing No.: IS-2.500
Rev	Description	Drft	Chk	Date	Scale: None
					Sheet 9 of 15

INSTALLATIONS IN CLASS/DIVISION and CLASS/ZONE CLASSIFIED LOCATIONS WITH FOC OPTOCOUPLEDERS CONNECTION SCHEMES

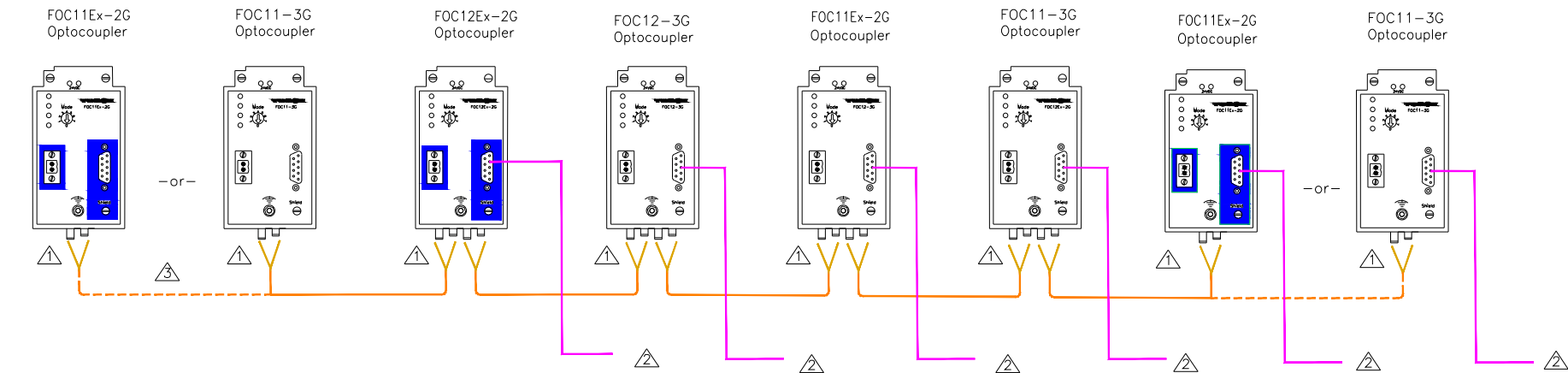
SIMPLE FOC POINT-to-POINT CONNECTION TOPOLOGY



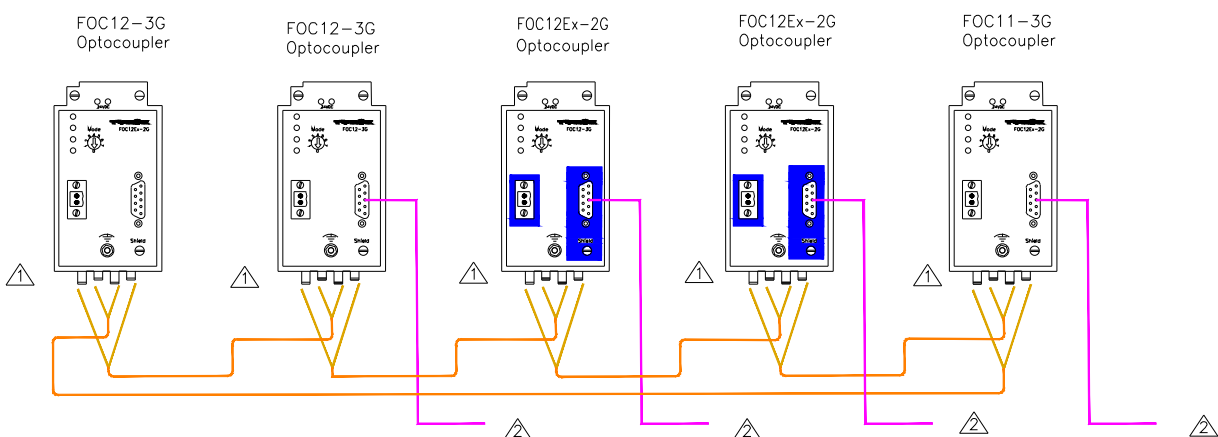
”Y” CONNECTION TOPOLOGY



CASCADED FOC POINT-to-POINT CONNECTION TOPOLOGY



PROFIBUS DP FOC RING CONNECTION TOPOLOGY

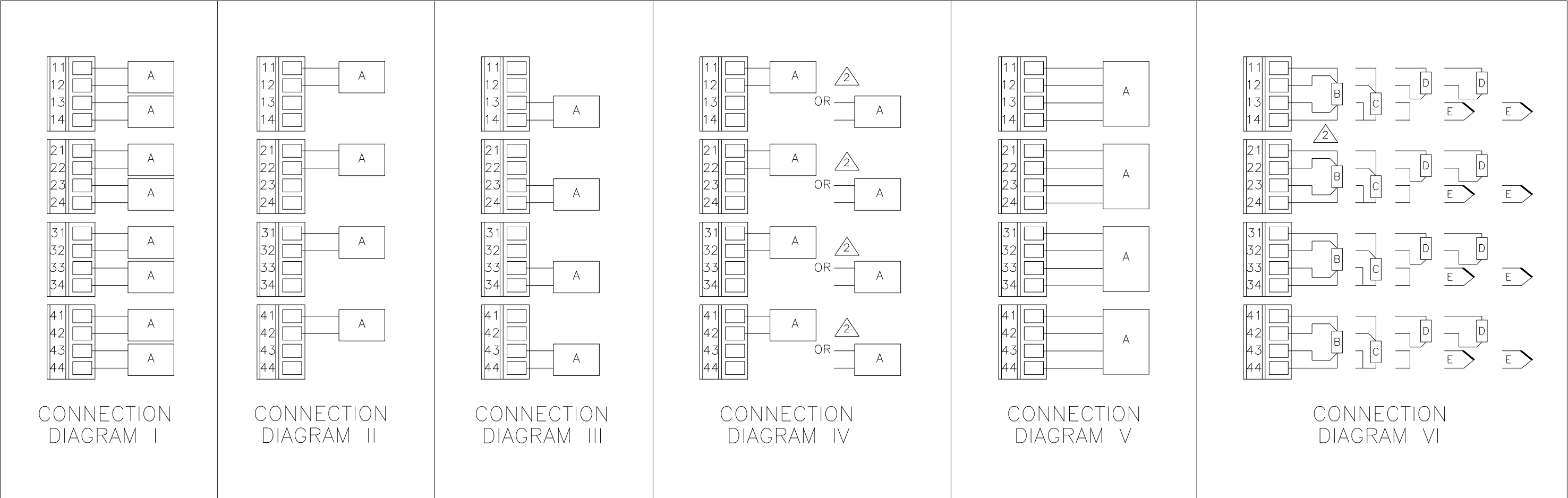


Notes:

- 1. This drawing is intended to represent implementation of various optical network topology schemes for the FOC Optical Coupler product.
- 2. For installation and connection to backplanes, power and bus connections on all FOC models refer to pages 6 and 8 for all Class/Division connections and pages 7 and 9 for all Class/Zone Division connections.
- 3. Additional models depicted with dashed line are to demonstrate optional models may be used as the master.

F	Add DI401Ex update lower Ta on couplers to -40°C	TKM		5/26/22	Drawing No.: IS-2.500		
Rev	Description	Drft	Chk	Date	Scale: None	Sheet	10 of 15

CONNECTION DIAGRAMS FOR EXCOM I/O CARDS



A = Any smple apparatus, or any FM approved intrinsically safe apparatus with compatable Entity Concept parameters
B = Any 4–wire Pt100, PT1000, or Ni100 resistance temperature detector; or any simple apparatus; or any FM approved intrinsically safe apparatus with compatable Entity Concept parameters
C = Any 3–wire Pt100, PT1000, or Ni100 resistance temperature detector; or any simple apparatus; or any FM approved intrinsically safe apparatus with compatable Entity Concept parameters
D = Any 2–wire Pt100, PT1000, or Ni100 resistance temperature detector; or any simple apparatus; or any FM approved intrinsically safe apparatus with compatable Entity Concept parameters
E = Any type B, E, J, K, L, N, R, S, or T thermocouple; or any simple apparatus; or any FM approved intrinsically safe apparatus with compatable Entity Concept parameters.

Notes:

1. The connection diagrams above represent the field connection terminal block corresponding to a given single I/O card slot. MT9 and MT08–3G backplanes have 8 such slots, MT18 and MT16–3G backplanes have 16, and MT24–3G backplane has 24.
2. Each of the four channels may be considered separately as to which of the wiring configurations shown is used.
3. See Tables 1 and 2, Sheet 7, for the Entity parameters of specific I/O cards.

TABLE 1: I/O CARD ENTITY PARAMETERS

Model	Terminals	Connection Diagram	V _{oc} (V)	I _{sc} (mA)	V _t (V)	I _t (mA)	U _o (V)	I _o (mA)	P _o (mW)	Circuit Type	U _Q (V)	R _i (Ω)	L _i (mH)	C _i (uF)	L _a (mH) L _o IIC/IIB AB/CDEFG	C _a (uF) C _o IIC/IIB AB/CDEFG
AIH401Ex	13-14, 23-24, 33-34, 43-44	III	6.0	1.0	na	na	6.0	1.0	2.0	Linear	na	na	neg.	neg.	5.0/5.0 *	2.0/10 *
															2.0/2.0 *	2.3/12 *
															0.4/0.4 *	2.6/14 *
															0.2/0.2 *	3.0/17 *
															0.1/0.1 *	3.7/22 *
AIH401Ex, AIH401Ex, AOH401Ex	11-12, 21-22, 31-32, 41-42	II	19.7	90	na	na	19.7	90	633	Trapezoidal	28.1	312	neg.	neg.	2.0/2.0 *	--/0.84 *
															1.0/1.0 *	--/0.84 *
															0.4/0.4 *	0.11/0.88 *
															0.2/0.2 *	0.14/1 *
															0.1/0.1 *	0.18/1.2 *
AIH40Ex, AI42Ex, AOH40Ex	11-12, 21-22, 31-32, 41-42	II	22.1	93	na	na	22.1	93	640	Trapezoidal	27.54	298	0.22	1.1 nF	0.5/2.0	0.065/0.27
AIH41Ex	13-14, 23-24, 33-34, 43-44	III	7.2	16	na	na	7.2	16	29	Linear	na	na	0.11	1.1 nF	*	*
DM80Ex, DF20Ex	11-12, 13-14, 21-22, 23-24, 31-32, 33-34, 41-42, 43-44	I	9.6	44	na	na	9.6	44	106	Linear	na	na	neg.	60 nF	2.0/2.0	0.9/5.1
															1.0/1.0	1.1/6.1
															0.5/0.5	1.3/7.3
															0.2/0.2	1.7/8.6
DI401Ex	11-12, 21-22, 31-32, 41-42	II	8.7	9.3	na	na	8.7	9.3	21		na	na	neg.	2 nF	1.0/1.0	1.4/7.4
															2.0/2.0	1.2/6.3
															5.0/5.0	1.0/5.2
DO401Ex	11-12, 21-22, 31-32, 41-42	IV	25.0	80	na	na	25.0	80	750	Rectangular	na	na	neg.	neg.	na/2.0	na/0.35
															na/1.0	na/0.41
															na/0.5	na/0.50
															na/0.2	na/0.66
															0.1/0.1	0.11/0.82
	13-14, 23-24, 33-34, 43-44	IV	19.0	100	na	na	19.0	100	710	Rectangular	na	na	2	1	2.0/2.0	na/1.0
															1.0/1.0	0.13/1.0
															0.5/0.5	0.14/1.0
TI40Ex	11-12-13-14, 21-22-23-24, 31-32-33-34, 41-42-43-44	V, VI	na	na	5.5	25	5.5	25	35	Linear	na	na	neg.	0.06	2.0/2.0 *	2.6/15 *
															1.0/1.0 *	2.9/17 *
															0.5/0.5 *	3.6/21 *
															0.2/0.2 *	4.5/27 *
TI41Ex	11-12-13-14, 21-22-23-24, 31-32-33-34, 41-42-43-44	V, VI	na	na	5.3	4.5	5.3	4.5	6	Linear	na	na	2	1	3.0/3.0	1.6/12
															2.0/2.0	2.0/15
															1.0/1.0	2.5/18
															0.5/0.5	3.0/22
															0.2/0.2	4.0/29
															0.1/0.1	5.1/37

*See Table 2 for connection to active source devices.

TABLE 2: PARAMETERS FOR CONNECTION TO ACTIVE SOURCE DEVICES

Parameters Model	Parameters for connection to active sources with linear output characteristics							Parameters for connection to active sources with trapezoidal output characteristics							Parameters for connection to active sources with right angle output characteristics													
	V _{oc} /U _o (V)	I _{sc} /I _o (mA)	P _i (mW)	L _a /L _o (mH) AB/IIC	C _a /C _o (uF) AB/IIC	L _a /L _o (mH) CDEFG/IIB	C _a /C _o (uF) CDEFG/IIB	V _{oc} /U _o (V)	I _{sc} /I _o (mA)	P _i (mW)	L _a /L _o (mH) AB/IIC	C _a /C _o (uF) AB/IIC	L _a /L _o (mH) AB/IIC	C _a /C _o (uF) AB/IIC	V _{oc} /U _o (V)	I _{sc} /I _o (mA)	P _i (mW)	L _a /L _o (mH) AB/IIC	C _a /C _o (uF) AB/IIC	L _a /L _o (mH) AB/IIC	C _a /C _o (uF) AB/IIC							
AIH401Ex	30	107	644	5	2	5	10	30	107	644	5	2	5	10	30	107	644	5	2	5	10							
				2	2.3	2	12				2	2.3	2	12				2	2.3	2	12							
				1	2.6	1	14				1	2.6	1	14				1	2.6	1	14							
				0.5	3	0.5	17				0.5	3	0.5	17				0.5	3	0.5	17							
				0.1	3.7	0.1	22				0.1	3.7	0.1	22				0.1	3.7	0.1	22							
AI401Ex	30	107	644	10	0.19	20	8.6	30	107	644	10	0.19	20	8.6	30	107	644	10	0.19	20	8.6							
AIH41Ex	2	100		2.4	4.2	9.8	33	22.1	93		0.5	60 nF	2	250 nF	2	100		1.99	0.5	4.89	3							
	5	100		2.4	1.3	9.8	8.3								5	100		1.99	0.3	4.89	1.5							
	10	100		2.4	0.358	9.8	2.1								10	90		1.99	0.2	4.89	1							
	15	100		2.4	0.158	9.8	1.1								15	56		0.99	100 nF	4.89	0.5							
	16.5	100		2.4	0.126	9.8	0.95								16.5	49		0.99	100 nF	4.89	0.5							
															16.5	97		—	—	1.99	0.4							
	20	100		2.4	0.087	9.8	0.688								20	35		0.99	70 nF	4.89	0.3							
	22	100		2.4	0.071	9.8	0.594								20	80		—	—	0.99	0.3							
	25	100		2.4	0.054	9.8	0.465								22	65		—	—	0.99	0.3							
	30	100		2.4	0.037	9.8	0.345								30	50		—	—	0.99	0.25							
TI40Ex	1.2	50		2	1.6	2	9.8	1.2	50		2	1.6	2	9.8	1.2	50		2	1.6	2	9.8							
				1	1.9	1	12				1	1.9	1	12				1	1.9	1	12							
				0.5	2.3	0.5	14				0.5	2.3	0.5	14				0.5	2.3	0.5	14							
				0.2	3.0	0.2	19				0.2	3.0	0.2	19				0.2	3.0	0.2	19							

PRODUCT MARKINGS

MT08–3G, MT16–3G and MT24–3G Backplanes

CI I, Div 2, Grps A, B, C, D; T4
with IS Entity connections to CI I,II,III Div 1, Grps A, B, C, D, E, F, G
CI I Zn 2 AEx/Ex ec ib ic [ia Ga] IIC T4 Gc
T_a –20 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

PS–F24Ex Power Conditioner Module

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 1, AEx/Ex ec qb IIC T4 Gb
T_a –20 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

SC11Ex–3G Segment Coupler

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 2, AEx/Ex ec ic [ib Gb] IIC T4 Gc
Zn 21 AEx/EX [AEx/Ex ib Db] IIC
T_a –40 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

FOC11Ex–2G, FOC12Ex–2G Optical Couplers

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 1, AEx/Ex ib mb [op is Ga] IIC T4 Gb; Entity – IS-2.500
Zn 20 [AEx/Ex op is Da] IIC
Zn 21 [AEx/Ex ib Db] IIC
T_a –40 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

MT–PPS Power Supply Backplane

CI I, Div 2, Grps A, B, C, D; T4
CI I Zn1 AEx/Ex eb IIC T4 Gb
T_a –20 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

OC11Ex/2G.2 Optical Coupler

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 1, AEx/Ex eb mb [ib op is Gb] IIC T4 Gb
T_a –20 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

GDP–NI/FW2.3 Gateway

CI I, Div 2, Grps A, B, C, D; T4
CI I Zn 1 AEx/Ex ec ic [ib Gb] IIC T4 Gc
T_a –20 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

FOC11–3G, FOC12–3G Optical Couplers

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 2, AEx/Ex ec mc ic [op is Ga] IIC T4 Gc
Zn 20 [AEx/Ex op is Da] IIC
T_a –40 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

PPSA115Ex and PPSA230Ex Power Supplys

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 1 AEx/Ex eb mb IIC T4 Gb
T_a –20 C to +70 C FM21US0117X FM21CA0084X

Excom Remote I/O System
Install per Control Drawing IS–2.500

PPSA115Ex PPSA230Ex
115 Vac 85W 230 Vac 85W

OC11Ex/3G.2 Optical Coupler

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 2, AEx/Ex nA [op is Gb] IIC T4 Gc
T_a –20 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

GEN–3G Gateway

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 2 AEx/Ex ec ib [ib Gb] IIC T4 Gc
T_a –40 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

PSM24–3G.1 Power Supply

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 2 AEx/Ex ec nC ic [ib Gb] IIC T4 Gc
T_a –40 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500
19.2–32Vdc 60W

SC11–3G Segment Coupler

CI I, Div 2, Grps A, B, C, D; T4
CI I, Zn 2, AEx/Ex ec ic IIC T4 Gc
T_a –40 C to +70 C FM21US0117X FM21CA0084X



Excom Remote I/O System
Install per Control Drawing IS–2.500

AIH401Ex, AOH401Ex, DI401Ex, TI41EX Modules

CI I, Div 2 Grps A, B, C, D; T4
with IS connections CI I,III Div 1 Grps A, B, C, D, E, F, G
CI I, Zn 1 AEx/Ex ib [ia Ga] IIC T4 Gb
Zn 20 [AEx/Ex ia IIC Da]



excom® Remote I/O System
Install per Control Drawing IS–2.500

Supply Terminal Cover Marking: Do Not Remove Cover When Circuit is Live

F	Add DI401Ex update lower Ta on couplers to	–40°C TKM		5/26/22	Drawing No.: IS–2.500
Rev	Description	Drft	Chk	Date	Scale: None Sheet 13 of 15

TABLE 3: ENTITY PARAMETERS

Model	Terminals	U _m (V)	U _{nom} (V)	P _{Max} (W)	I _{Max} (mA)	U _i (V)	P _{opt} (mW)	U _i (V)	U _o (V)	I _o (mA)	P _o (mW)	Circuit Type	R _i (Ω)	L _i (mH)	C _i (uF)
FOC11Ex-2G	RS485-IS					4.2			4.2	131	124			~0	35.7
FOC12Ex-2G	Fault signal	40	24			10								~0	.03
FOC11Ex-3G	RS485	40	5			10									
FOC12Ex-3G	Fault signal	40	24												
PSM24-3G.1		40	19.2-32												
GDP-NI/FW2.3	3,5,6,8	5.6	5												
GEN-3G	Supply		20										~0	~0	
	ETH1,ETH2	30	3.3												
SC11-3G	Supply		24	2.4											
	Profibus-DP	40	5												
	Link		3.3												
SC11Ex-3G	Supply	40	24	4											
	Profibus-DP (non-EX)	40	5												
	Profibus-IS (EX)							4.2	4.2	148	155	Linear	~0	~0	
	Link	4.2							4.2	5	5	Linear	~0	~0	
OC11EX/2G.2	Supply	32		2	100										
	EX-Profibus RS485-IS(DB9)							4.2	3.64	127	116	Linear	~0	~0	
	RS485 Comm. (M8 4-pin)								3.64	3.6	3	Linear	~0	~0	
	Optical						2.3								
OC11EX/3G.2	Supply	32		2	100										
	Profibus RS485 (DB9)	5													
	RS485 Comm. (M8 4-pin)	5													
	Optical						2.3								

TABLE 4: ENTITY PARAMETERS

Model	Terminals	$\Sigma L_{i<}$ (μ H)	$\Sigma C_{o\leq}$ (μ F)	$U_{in\leq}$ (V)	$I_{in\leq}$ (A)	$P_{in\leq}$ (W)	Σ (A)	$U_{out\leq}$ (V)	$I_{out\leq}$ (A)	f (kHz)	U_m (V)
MT08–3G and MT16–3G and MT24–3G	Power Supply										
	Pwr1 and Pwr2 JP12 or JP22 Pins 1...4, 11...14			40	6	100					
	AC Output voltage JP11 or JP21 Pins 1...4, 7...10							40 AC		300–314	
	Interconnection w/o external connection										
	PSU1 to PSU2 Clock Pulse JP11 or JP21 Pins 13, 14							40 DC	.250	300–314	
	Power Supply to Gateways JP11 or JP21 Pins 15, 16							10 DC	.250		
	Gateway and Module Supply JG11 or JG21 JM11–JM161 or JM241 Pins 15, 16			40 AC	1.6					300–314	
	Between Gateways JG11 or JG21 Pins 1...6							10 DC	.250		
	Address Encoder Switch JG12 or JG22 Pins 2,6...14							10 DC	2X.030		
	Profibus connection(internal) JG13 or JG23 Pins 1...6							10 DC	.250		
	Profibus connection(external) GW1 or GW2 Data–A,Pin 8 Data–B,Pin 3							10 DC	.250		
	Auxiliary voltage Pins 6+,5–							10 DC	.300		
	Profibus DP (non–intrinsic) GW1 or GW2 Data–A,Pin 8 Data–B,Pin 3							10 DC	.250		250
	CAN–Bus w/o external connection										
	CAN–Bus line–A JG11,JG21 JM11–JM161 or JM241 Pins 9,10 with electronic current regulation: Total current (26X150 mA) Note: 2 Gateways, 24 Modules						2.7	6	.150 per Module		
	Without current limitation:						2.7	6	.300		
	CAN–Bus line–B JG11,JG21 JM11–JM161 or JM241 Pins 11,12 with electronic current regulation: Total current (26X150 mA) Note: 2 Gateways, 24 Modules	1	600 w/ U_0 6V				3.9	6	.150 per Module		
	Without current limitation:	1	600 w/ U_0 6V				3.9	6	.300		
	Interconnection w/o external connection										
	Address encoding JM11–JM161 or JM241 Pins 1..6								.250		
	Field circuits(internal) JM012 at JF011...JF014 or JM162 at JF161...JF164 or JM242 at JF241...JF244			30 DC	.200						
								30 DC	.200		
	Interconnection w/external connection										
	Field circuits(external) JF011...JF014 or JF161...JF164 or JF241...JF244			30 DC	.200						
								30 DC	.200		

TABLE 5: ENTITY PARAMETERS

Model	Terminals	$\Sigma L_{i<}$ (μ H)	$\Sigma C_{o\leq}$ (μ F)	$U_{in\leq}$ (V)	$I_{in\leq}$ (A)	$P_{in\leq}$ (W)	Σ (A)	$U_{out\leq}$ (V)	$I_{out\leq}$ (A)	f (kHz)	U_m (V)	$P_{out\leq}$ (W)	$W_o\leq$ (μ J)	ΣI_o (A)	ΣI_o (A)
MT08–2G and MT16–2G and MT16–2G/MSA	Power Supply														
	Auxiliary power circuits Power supply unit 1 Terminals 1..6, J1–NT1 pins zbd 24, zbd 28 Power supply unit 2 Terminals 7..12, J1–NT2 pins zbd 24, zbd 28			32 AC/DC	11 AC/DC	100 AC/DC					60				
	Passive ballasts														
	Ballast 1 Terminals 21...24 J1–NT3 Pins zbd 24, zbd 28			250 AC Supply	5	130									
	Ballast 2 Terminals 27...30 J1–NT4 Pins zbd 24, zbd 28			250 AC Supply	5	130									
	Interconnection w/o external connection														
	Terminal strips J1–NT3, J1–NT4 Pins zbd 2, zbd 6							32 DC				100			
	Coupling between PSU1 and PSU2 Clock out (pins z14, z12) Clock in (pins z14, z12)							10 10	.250 .250	300–314 Square wave					
	Release circuit PSU–interlocking Pins z16, d16							10	.250				40		
	Fault signal, Gateways Pins d12, z12							10 DC	.250						
	Backplane w/o external connection														
	Terminal strip Gateway 1 J1=GW1, pins 15, 16 Terminal strip Gateway 2 J1=GW2, pins 15, 16 AC Supply			20 Amplitude						300–314 Square wave					
	Internal Communication terminal strips J1–GW1, Pins 1...6							10 DC	.250						
	Address encoding switch terminal strips J2–GW1, J2–GW2 Pins 2,5,6...14							10 DC	2X.030		2X.040				
	Fieldbus interface terminal strips J3–GW1, J3–GW2. pins 1...6			10				10	.250						
	Internal Address encoding terminal strips J2–M1...J2–M16 Pins 1...6							10	.250						
	CAN–Bus														
	w/o external connection CAN–Bus line–A terminal strips J1–GW1, J1GW2, J2.M1...J2–M16 Pins 9,10							10	.250						
	CAN–Bus line–B terminal strips J1–GW1, J1GW2, J2.M1...J2–M16 Pins 11,12							10	.250						
	the following values apply to the maximum of configuration with 16 modules and 2 gateways.							6						2.75	2.85
	Error free operation one defective current source in one module:	1	40												
	Excom Modules														
	Supply circuits terminal strips J2–M1...J2–M16, pins 15, 16			20 Amplitude						300–314 Square wave					
	Field circuits 1...4 terminal strips J3–M1...J3–M16, pins 1...22			30 DC	.200										
								30 DC	.200						

Notes: 1. Internal CAN–bus, when fitting the module rack MT... backplanes the maximum values for the internal inductance and capacitance are complied with by the specification of the respective maximum permissible values per module. These maximum permissible total values (cf.note) are also kept with complete fitting(16 modules and 2 Gateways used with EPL Gb module racks and 24 modules and 2 Gateways with EPL Gc module racks as the following maximum values are not exceeded:

maximum permissible internal capacitance per module: $C_i \leq 2.2\mu\text{F}$
maximum permissible internal inductance per module: $L_i \approx 0$

2. When fitting the module rack, the following maximum vales for internal inductance and capacitance as total values of all modules and gateways of the system–internal CAN–bus shall not be exceeded, to guarantee the type of protection Intrinsic Safety (cf.system–description):

permissible internal total capacitance: $C_i \leq 40\text{pF}$ (EPL Gb) resp. $C_i \leq 600\mu\text{F}$ (EPL Gc)
permissible internal total inductance: $\Sigma L_i \approx 1\mu\text{H}$

Specific Conditions of Use:

1. The excom® system forms part of the explosion protected remote I/O–fieldbus system and shall be operated only in combination with certified components of this system.

2. For Division installation, the excom® system shall be installed in compliance with the enclosure, mounting, spacing and segregation requirements of the ultimate application.

3. For Zone installation and operation in hazardous areas, the components shall be installed in a separate enclosure with the degrees of protection by enclosure IP54 in accordance of IEC 60529.

4. For installation and operation in a non hazardous area, the empty slots of the backplane shall have blanking plates for a degree of protection IP20 in accordance of IEC 60529.

5. For models OC11Ex–2G.2, FOC11EX–2G, FOC12Ex–2G, OC11Ex/3G.2, FOC11–3G and FOC12–3G, the optical waveguide must be electrically insulated and used without screening and shall not be armoured.

6. For model PSM24–3G.1, the equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664–1.

F	Add DI401Ex update lower Ta on couplers to –40°C	TKM		5/26/22	Drawing No.: IS–2.500	
Rev	Description		Drft	Chk	Date	Scale: None Sheet 15 of 15