

FISCO rules

The Fieldbus Intrinsically Safe Concept (FISCO) allows the interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Vmax), the current (Imax) 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, Voc, Vt), the current (Io, Isc, It,) and the power (Po) which can be provided by the associated apparatus (supply unit). In addition, the maximum unprotected residual capacitance (Ci) and inductance (Li) of each apparatus (other than the terminators) connected to the Fieldbus must be less than or equal to 5 nF and 10 µH respectively.

In each I.S. Fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the Fieldbus. The allowed voltage (Uo, Voc, Vt) of the associated apparatus used to supply the bus must be limited to the range of 14V d.c. to 24V d.c. In this instance the 9121-IS and 9122-IS have Voc as given in the table below. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is 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 insure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance Rc: 15 ...150 Ω/KM

Inductance per unit length Lc: 0.4...1mH/km

Capacitance per unit length Cc: 80 ...200 nF/km

Cc = Cc line/line + 0.5 Cc line/screen, if both lines are floating

or

Cc= Cc line/line + Cc line/screen, if the screen is connected to one line

Length of spur Cable: max. 30m

Length of trunk cable: max. 1Km

Length of splice: max. 1m

Terminators

At each end of the trunk cable an approved line terminator with the following parameters is suitable: R = 90 ...100 Ω C = 0 ...2.2 µF.

The 9121-IS and 9122-IS each have a built-in line terminator for that end of the intrinsically safe trunk.

System evaluation

FISCO limits the number of passive devices like transmitters, actuators, etc connected to a single bus segment to 32 devices. Furthermore, if the above rules are respected, the inductance and capacitance of the cable need not to be considered and will not impair the intrinsic safety of the installation.

These FISCO power supplies can either be used in FISCO systems, or in IS systems using the entity concept.

Installation Notes For FISCO only:

1 The Intrinsic Safety FISCO concept allows the interconnection of FM Approved Intrinsically safe devices with FISCO parameters not specifically examined in combination as a system when:

$$U_o \text{ or } V_{oc} \text{ or } V_t \leq V_{max}, I_o \text{ or } I_{sc} \text{ or } I_t \leq I_{max}, P_o \leq P_i$$

FISCO Power Supply model	Voc (V)	Isc (mA)	Po(W)
9121-IS	14.0	180	2.52
9122-IS	14.8	359	5.31

Installation Notes For IS Entity Concepts only:

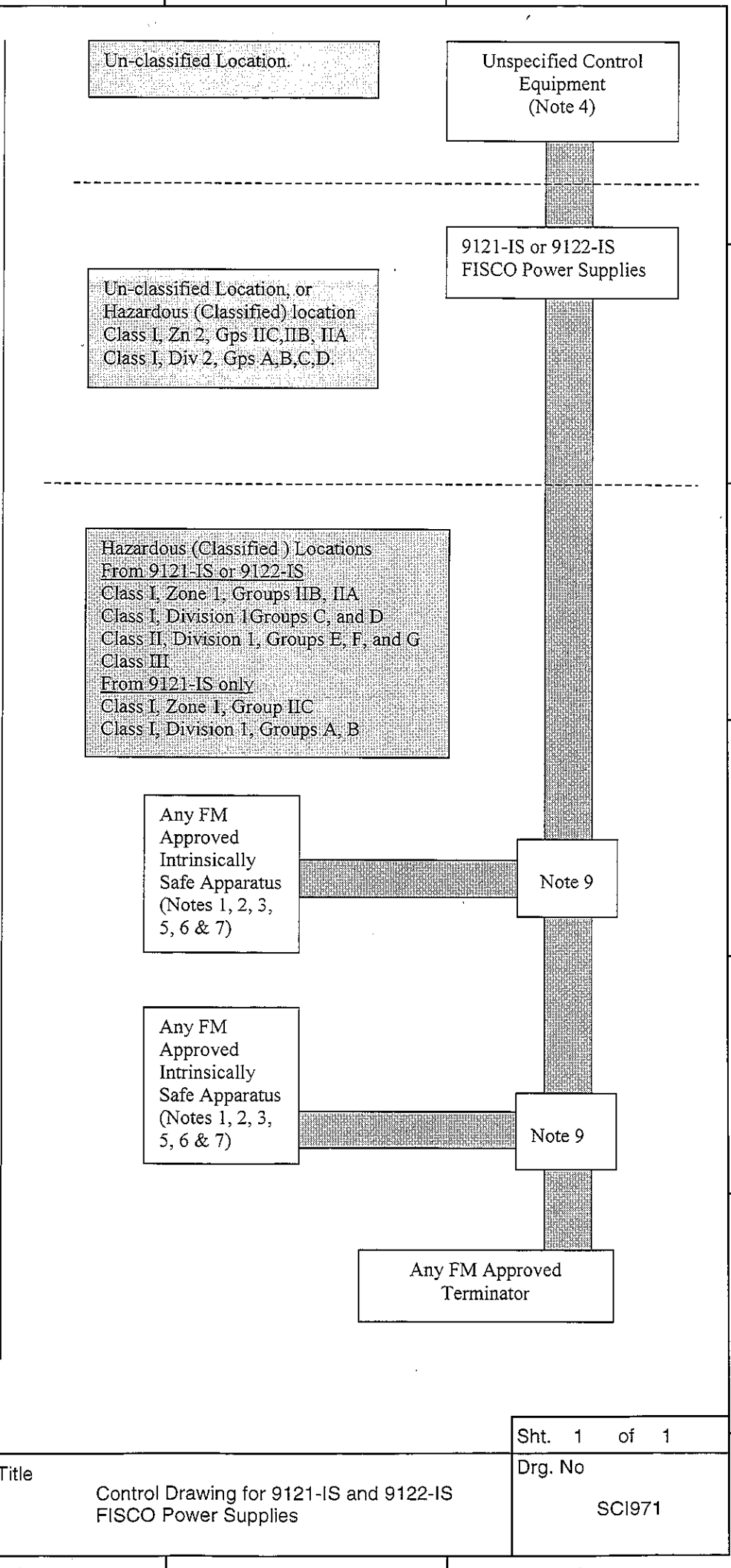
2 The Intrinsic Safety Entity concept allows the interconnection of FM Approved Intrinsically safe devices with entity parameters not specifically examined in combination as a system when:
 $U_o \text{ or } V_{oc} \text{ or } V_t \leq V_{max}, I_o \text{ or } I_{sc} \text{ or } I_t \leq I_{max}, P_o \leq P_i$
 $C_a \text{ or } C_o \geq \sum C_i + \sum C_{cable}$
 For inductance use either $L_a \text{ or } L_o \geq \sum L_i + \sum L_{cable}$ or $L_c/R_c \leq (L_a/R_a \text{ or } L_o/R_o)$ and $L_i/R_i \leq (L_a/R_a \text{ or } L_o/R_o)$

9121-IS					
Groups	Ca (µF)	La (µH)	Voc (V)	Isc (mA)	Po (W)
IIC/ AB	0.2	300	14.0	180	2.52
IIB/CE	1.32	1300			
IIA/DFG	5.05	2100			

9122-IS					
Groups	Ca (µF)	La (µH)	Voc (V)	Isc (mA)	Po (W)
IIB/CE	0.5	550	14.8	359	5.31
IIA/DFG	1.62	900			

Installation Notes common to FISCO and IS Entity concepts:

- 3 Dust-tight conduit seals must be used when installed in Class II and Class III environments.
- 4 Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.
- 5 Installation should be in accordance with ANSI/ISA RP12.06.01 (except chapter 5 for FISCO Installations) "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code® (ANSI/NFPA 70) Sections 504 and 505.
- 6 All field apparatus must be F M Approved
- 7 Field Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- 8 The 9121-IS and 9122-IS are Approved as an [AEx ib] Apparatus the I.S. circuit is only suitable for Class I Division 1, Class I Zone 1, or Class I Zone 2, and is not suitable for Class I Zone 0 Hazardous (Classified) Locations.
- 9 Optional connector. The connector must either be appropriately certified by FM or be Simple Apparatus in accordance with FM 3610. If certified, the connector may contain status indication and/or current limitation.
- 10 This drawing forms part of the FM Certification Documentation and must not be modified without reference to the certifying authority.



2 4.03 SB *TRMP* Replace R', L', and C' with Rc, Lc, and Cc. Clarify reference that trunk Terminator is not switched. Add FISCO limit of 32 devices. New note 9. Add "Unspecified Control Equipment" block and notes to diagram.

Iss	Date	Drawn	Chkd	Modification	Copyright Reserved Written Permission To Copy Should Be Obtained	Measurement Technology Ltd Power Court, Luton, England	Title Control Drawing for 9121-IS and 9122-IS FISCO Power Supplies	Sht. 1 of 1
1	10.02	SB		Scale N/A Tolerance N/A				Drg. No SCI971