IM-ENG-063/GB - PN 991006 DOC.TECN.

INSTRUCTION MANUAL

TYPES
1011/12 - 1061/62 - 1071/72

Signal Converters

1011 and 1012 *Volt/mA Input*
1061 and 1062 *mV/TC Input*
1071 and 1072 *RTD/Tx Pot Input*

Series 1000

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- REV. B3 - 28 JAN. 2000

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REV. B3 28 Jan. 2000

1. Introduction

This manual is intended to provide adequate guidance for the installation, operation and maintenance of 1011/1012, 1061/1062, 1071/1072 Intrinsically safe instruments.
To avoid damage, failure or improper operation, carefully read this manual before installing and operating the instrument.
This manual and the related intrinsically safe instruments should not be used by untrained personnel unless they are fully acquainted with the principles of intrinsically safe systems.
Elcon Instruments has published a complete tutorial manual titled "Introduction to Intrinsic Safety" covering every aspect of intrinsic safety. The book can be obtained from Elcon Instruments free of charge.

2. Unpacking

Upon receipt of the materials it is recommended to check integrity of packing and their contents.
In case of damage due to shipping, the receiver should promptly and properly report to the shipper supplying all necessary information.
If instruments are not for immediate use it is recommended that you check that all characteristics shown on the instruments label meet order specifications (model, supply voltage and frequency, input/output range, certification, tag etc.) as well as the actual application requirements.
If not installed, equipment should be stored following recommendations in the next paragraph, Storage.

3. Storage

In case of storage of instruments and accessories proper care should be taken to protect from any possible damage.
Always store instruments in their sealed original packaging until they are installed.
Provide adequate protection to prevent damages that may be caused by exposure to:

- Rain, excessive humidity and/or temperature excursions (inadequate sheltering).
- Dust (build-up of a corrosive patina that may cause oxidations and reduce isolation).
- Aggressive and polluting atmospheres (SO_2, H_2S, mists, salts, smokes, etc.) with consequent corrosion.
- Access by insects/rodents (damage of packing or content).
- Mechanical shocks or unauthorized packing opening.
- Intense vibrations (unloosening of fastened parts, fatigue failures etc.).
- Any other possible risk.

Make sure the storage temperature does not exceed the limits of -20 to + 60°C (-4 to 140 °F) for medium/long term storage (days/months) and -25 to +75°C (-13 to 167°F) for short term (a few hours) transportation/shipment.
If inspection is completed, pack instruments in their original packing, seal plastic bags including desiccant bags (i.e. silica gel) especially in humid environments.
List the contents on the packaging to avoid unnecessary further inspections.

4. Description and specifications

GENERAL INFORMATION.
Series 1000 instruments are an integrated intrinsically safe barrier system based on Termination Boards and modular plug-in Barrier Modules.

4.1 Termination board.

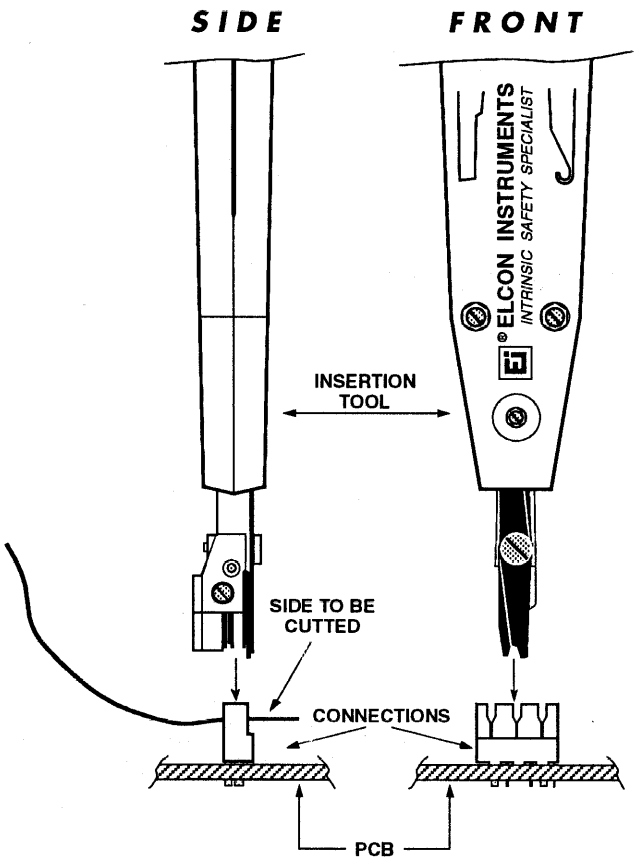
The Termination Board is available in 5 different basic versions for 1, 8 or 16 barrier modules with (/CW) or without (/TB) the optional cross-wiring feature (See 4.3.1 for specifications). It has terminals for direct connection of field, control room and supply cables and an optional array of isolation displacement quick connectors on the control room side for the cross-wiring feature.

FIELD TERMINALS.
For each barrier module position, 9 blue terminals are provided on the I.S. side of the single/dual channel module. (6 terminals are for the sensors/field devices, 2 terminals are for shields (if any), and 1 is a spare shield.

CROSS WIRING.
Optional cross wiring connectors can be installed (/CW suffix Termination Boards multi modules only) with 2 blocks of 3 terminals each adjacent to the Module, and 1 block of 4 terminals adjacent to the control room terminals (for example, connecting a NO or NC contact for each channel).
For each channel it is possible to quick connect any of 3 module's terminals to the corresponding 2 control room terminals.
Connection is made with Elcon type 1303/CA wire or with solid 0.4 to 0.65 mm (26 to 22 AWG) flame retardant PVC isolated wire (outside diam. 0.7 to 1.4 mm 0.027 to 0.055 Inches) like telephone wire, using a specific tool (ELCON Type 1301/PZ PN. 601075) which with a simple downward pressure inserts the wire and cuts its excess length.

CONTROL ROOM TERMINALS.
Two terminals per channel plus 1 for shield connection (if any) for a total of 6 terminals per module are available.
Termination boards with TB suffix (the one without cross-wiring feature) mount 9 terminals for non hazardous location (control room) connections; three for each channel (so the output can be for example a SPDT contact), 1 for shields and two for analog output that is only present in T.B. and single mounting (SM) Termination Board types.

SHIELD TERMINALS.
On multi module Termination Boards all field cable shield terminals are bus connected to a two-terminal block (SHIELD



- HOW TO USE INSERTION TOOL FOR CROSS WIRING -

I); similarly all control room cable shield terminals are bus connected independently from field shields to another two-terminal block (SHIELDS).
This allows grounding field cable shields to a ground point and control room shields to a different ground point (as sometimes required in DCS systems), or connecting both shield buses to a common ground point.
A grounding bolt suitable for 4 mm² wire is present to connect metallic chassis to ground.

SUPPLY TERMINALS.
On multi modules Termination Boards, modules are powered by a common 24 V supply bus on the printed circuit. This bus is terminated to a 3 poles connecting terminal block (1 for supply positive 1 for supply return 1 is for shield) . These terminal blocks are clearly identified by a label.
A series fuse and a shunt diode protect the board in case of supply polarity reversal. The fuse is rated to pass the current of all modules plugged on the board. A spare fuse holder and fuse is provided for the users convenience.

CUSTOM TERMINATION BOARDS.
Custom multi-module Termination Boards are available with or without cross wiring similar to the standard types described above except for control room cable terminations which are brought to one or more custom specified connectors providing a direct plug-in type of connection to the Distributed Control System. This solution saves space, wiring time and cost of a hard wired connection strategy using many cables for the control room side.

4.2 Modules characteristics.

All signal converters of Series 1000 are galvanically isolated, intrinsically safe barriers, accepting input from HAZARDOUS LOCATIONS and providing an isolated 4-20 mA or 1-5 V output in NON HAZARDOUS LOCATIONS.
Types 1011/1012, respectively Single/Double channel, accept Volt or mA inputs from externally powered intrinsically safe Signal Transmitters.
Types 1061/1062, respectively Single/Double channel, accept Millivolt or Thermocouples signals from intrinsically safe or simple electrical transducers. An optional upscale/ none/down scale burnout feature forces output to a min or max value in case of input sensor line opening.
Types 1071/1072, respectively Single/Double channel, accept input from Resistance Temperature Detectors (i.e. Pt 100 Ohms) or Transmitting Potentiometers defined as simple

- TABLE 1 -

TYPE	CHANN. per UNIT	INPUT from	OUTPUT to	FLOATING Tx + LINE SUPPLY	TYPICAL APPLICATION
1011	1	mA or Volt Haz. Loc. Zone 0, 1, 2 (Class I, II, III Div. 1, 2)	4-20 mA 1-5 V Non Haz. Loc.	NONE	To provide isolation and signal conversion from mA/Volt signals in Haz. Loc. to an output in Non Haz. Loc.
1012	2				
1061	1	TC or mV Haz. Loc. Zone 0, 1, 2 (Class I, II, III Div. 1, 2)	4-20 mA 1-5 V Non Haz. Loc.	NONE	To provide isolation and signal conversion from T.C. or mV signals in Haz. Loc. to an output in Non Haz. Loc.
1062	2				
1071	1	RTD or POT Haz. Loc. Zone 0, 1, 2 (Class I, II, III Div. 1, 2)	4-20 mA 1-5 V Non Haz. Loc.	NONE	To provide isolation and signal conversion from RTD or Pot sensors in Haz. Loc. to an output in Non Haz. Loc.
1072	2				

electrical apparatus. On RTD versions the output current is linearly related to Sensor Temperature, compensating automatically for sensor line resistance (3 wire connection).
In case of an open circuit or any sensor line the output is forced to the maximum value.
Table 1 page 3 summarizes the various types characteristics.

4.3 Specifications.

4.3.1 Termination Board Specifications.

Mounting	TYPE	Tot. No. Modules	Tot No. Chan.	Cross Wiring	Outline Dimensions	
Horizontal 19"	1101/SM	1	2	NO	184x33	(7.24"x1.3")
	1101/SM-AC	1	2	NO	184x33	(7.24"x1.3")
	1108/TB	8	16	NO	187x246	(7.40"x9.70")
	1108/CW	8	16	YES	239x246	(9.40"x9.70")
	1116/TB	16	32	NO	187x460	(7.40"x18.10")
	1116/TB-R	16	32	NO	483x177	(19"x6.97")
	1116/CW	16	32	YES	239x460	(9.40"x18.10")
	1116/CW-R	16	32	YES	483x222	(19"x8.7")
Vertical	1101/SM	1	2	NO	184x33	(7.24"x1.3")
	1101/SM-AC	1	2	NO	184x33	(7.24"x1.3")
	1208/TB	8	16	NO	187x282	(7.40"x11.2")
	1208/CW	8	16	YES	239x282	(9.40"x11.2")
	1208/CW-CON	8	16	YES	239x282	(9.40"x11.2")
	1216/TB	16	32	NO	187x535	(7.40"x21.06")
	1216/CW	16	32	YES	239x535	(9.40"x21.06")
	1216/TB-H	16	32	NO	239x580	(9.40"x22.8")
	1216/CW-H	16	32	YES	239x580	(9.40"x22.8")
	1132/TB	2	32	-	239x246	(9.40"x9.70")
	1132/CON-SH5	2	32	-	239x246	(9.40"x9.70")

- TABLE 2 -

MOUNTING:
Surface mounting by front accessible screws or DIN 46277, 35 mm TOP HAT rail mounting (1101/SM and 1101/SM-AC only).

FIELD TERMINATIONS:
Compression type, directly accepts skinned solid or braided conductors. 4 Terminals per channel (3 for signal, 1 for shield) conductor size up to 2.5 mm² (12 AWG) with no exposed conducting surfaces.

CONTROL ROOM TERMINATIONS:
3 Terminals per channel (4 for 1108/TB; 1208/TB and 1116/TB; 1216/TB):
2 for signal (3 on Termination Boards without CW)
1 for shield. All characteristics same as field terminations.

MODULE CONNECTOR:
21 PIN female polarized connector with gold plated contacts.

SUPPLY BUS:
2 plug-in Terminals conductor size up to 2.5 mm² (12 AWG) reverse polarity protected by shunt diode and series fuse (5 x 20 DIN).

FUSE RATING (5 x 20 glass T type)
TB Types 1108 and 1208 = 1.6 AMP TB Types 1116 and 1216 = 3.15 AMP (Spare fuse holder and fuse included).

CHASSIS TERMINATION:
A grounding bolt suitable for 4 mm² wire is present to connect metallic chassis to ground.

4.3.2 Cross Wiring Terminals Specifications (Types/CW only)

MECHANICAL CHARACTERISTICS AND TESTS :
3 Terminals per channel output (suitable for SPDT contact)
2 Terminals per output terminal board (each channel)
Contact Material : Silver plated special brass alloy
Isolating Material : Glass reinforced polyester

WIRE SIZE :
Solid Conductor from 0.4 to 0.65 mm (26 to 22 AWG)
Outside (Isolation) diam. 0.7 to 1.4 mm (0.027 to 0.055 inches)
Number of wires (of same diameter) that can be inserted on a terminal: 2 max
Number of connections that can be repeated on a terminal: 50 max
Insertion force : ≤ 50 N
Extraction force : ≤ 10 N
Effects of vibrations :
No measurable contact resistance change after 2 hours on each x, y, z axis (6 hours total) at 10G in the 10 to 150Hz band.

CONNECTION :
by Elcon insertion tool type 1301/PZ (PN. 601075)

ELECTRICAL CHARACTERISTICS
Isolation resistance : 50 GΩ (at 40°C 93% R.H.)
Dielectric strength : 2 KVrms 1 min
Contact resistance : 1 mΩ
Current carrying capacity :
max 2.2 to 4.2 Amp continuous (depending on wire size)
Peak current handling :
10 pulses 8/20 µs at 10 KA, 1sec at 20 Amp rms
Humidity test (IEC 68-2-3 test Ca) :
No measurable contact resistance change after 21 days (< 1 mΩ) at 40°C (104°F) and 93% R.H.
(Isolation resistance higher than 50 GΩ)

Salt Spray test (IEC 68-2-11 Test Ka)
(IEC 50B (CO) 145) :
No measurable contact resistance change on already inserted and newly inserted connections after 24 hour cycle at 35°C (< 1 mΩ)

Corrosive atmosphere test :
(IEC 68-2-2)
(IEC 68-2-43)
(DIN 4046 Part 36)
With a gas mixture containing 10 ppm SO_2 + 5 ppm H_2S at 75% RH and 25°C (77°F) after 10 day exposure no measurable contact resistance change on already inserted wires and newly inserted wires (< 1 mΩ).

4.3.3 Barrier module general specifications.

SUPPLY VOLTAGE
24 VDC nominal (21.5 V to 28 V)

FUSES
Wickmann Type TR5/IEC 127-3, 250 V Time Lag
(Breaking capacity 35A at 250 V)

SUPPLY 125 mA
PROTECTION
1 or 2 fuses 50 mA (single or dual channel)

ISOLATION
I.S. circuit from Supply :
1500 Vrms for 1 min.
I.S. circuit from Non I.S. circuit :
1500 Vrms for 1 min.
I.S. circuit from ground :
500 Vrms for 1 min.

ENVIRONMENTAL CONDIT. LIMITS
Operating temperature :
0 to 55°C (32 to 131°F)
Storage temperature :
-20 to 60°C (-4 to 140°F)
(Short term -25 to + 75°C / -13 to + 167°F)
Relative Humidity :
5 to 90% non condensing (up to 35°C)

RADIO FREQUENCY INTERFERENCE REJECTION
Filtered to limit effects of R.F. interferences in the VHF, UHF and CB Bands and from Walkie-Talkies

MODULE OVERALL DIMENSIONS IN mm (inches).
See figure 1 (page 6) Weight: Approx 250 g.

CASE MATERIAL :
Polycarbonate Self estinguishing UL 94 class V2

SUPPLY CURRENT
55 mA per channel max.

OUTPUT
4-20 mA (Overload limited at 120% on a 0 to 500 Ω load or 1-5 V across an internal precision 250 Ω shunt.
(Selected by J4 jumper, see Fig. 5).
Ripple content ≤ 10 mVrms on the 250 Ω.

LOAD EFFECT
≤ 0.1% of full scale change for a 250 to 500 Ω load change

REFERENCE OPERATING CONDITIONS
23°C (74°F) 50% R.H. Nominal Supply Voltage, 250 Ω load (Where applicable)

PERFORMANCES AT REFERENCE OPERATING CONDITIONS
Calibration accuracy : ± 0.1% of full scale
Linearity (terminal based) : ± 0.1% of full scale
Temperature influence on Zero & Span :
less than ± 0.015% of full scale shift for a 1°C (1.8°F) temperature change
Long term stability :
After 8000 hours less than ± 0.2% of full scale shift on output.

MEAN TIME BETWEEN FAILURES :
6 millions hrs at reference operating conditions

Safety Description	Maximum External Parameters				
	Groups Cenelec	Groups USA	Co (µF)	Lo (mH)	L/R (µH/Ω)
Voc = 13.1 V Isc = 26 mA	II C	A-B	1.1	47	373
	II B	C-E	3.3	180	1350
	II A	D-F-G	8.8	400	3100

APPROVALS

COUNTRY (AUTHORITY)	CERTIFICATE FILE No.	STANDARD	APPROVED FOR
Australia (SA)	**AUS Ex 1288 X**	AS 2380.7-1987	(Ex ia) IIC / IIB
Canada (CSA)	**LR 66529-7**	C 22.2 No. 157	Cl.I,II,III; Div 1; Gr.A to G
Europe (CESI)	**EX-90.C.117X**	EN 50.020 EN 50.014	[EEx ia] IIC / IIB
U.S.A. (FM)	**J.I. 3T3A3.AX**	FM Cl.No.3610 Entity	Cl.I,II,III; Div 1; Gr.A to G
		FM Cl.No.3611 Non Incend.	Cl.I; Div 2; Gr.A to D
U.S.S.R.(VNIIVE)	**161**	22782.5-78 22782.0-81	[Ex ia] IIC / IIB

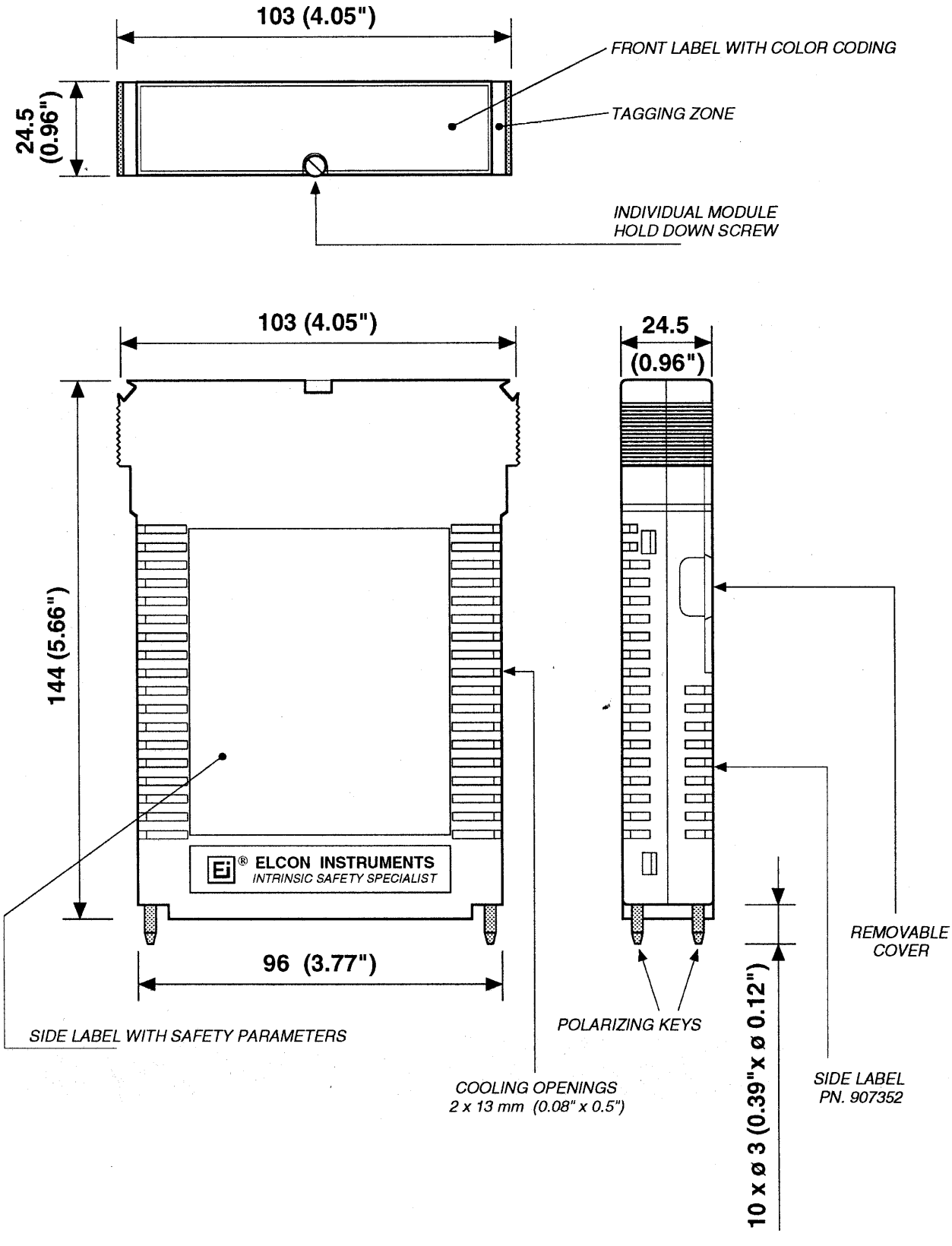
TYPES 1011 and 1012
ADDITIONAL SPECIFICATIONS
INPUT RANGES see tables 3 and 4 :

mA ANALOG INPUTS

Low mA	High mA	CODE
0	10	*0110*
4	12	*0141*
12	20	*0212*
0	20	*0202*
4	20	*0242*
20	4	*0224*
0	40	*0204*
10	50	*0215*
SPECIAL		*0222*

INPUT RESISTANCE: 50Ω
- TABLE 3 -

- FIG. 1 -


103 (4.05")
24.5 (0.96")
FRONT LABEL WITH COLOR CODING
TAGGING ZONE
INDIVIDUAL MODULE HOLD DOWN SCREW
103 (4.05")
24.5 (0.96")
144 (5.66")
ELCON INSTRUMENTS
INTRINSIC SAFETY SPECIALIST
96 (3.77")
SIDE LABEL WITH SAFETY PARAMETERS
COOLING OPENINGS 2 x 13 mm (0.08" x 0.5")
POLARIZING KEYS
REMOVABLE COVER
SIDE LABEL PN. 907352
10 x ø 3 (0.39" x ø 0.12")

Volt ANALOG INPUTS

Volt Low	Volt High	CODE
0	1	0301
0	2	0302
0	4	0304
0	5	0305
1	5	0315
SPECIAL		0444

INPUT RESISTANCE: 1MΩ

- TABLE 4 -

TYPES 1061 and 1062
ADDITIONAL SPECIFICATIONS
INPUT RANGES (all field programmable)
Millivolt (See table 5) :
Span limits = 2 mV Min 75 mV max
Zero Suppression ± 300% of span up to 100% of max Span

mVolt ANALOG INPUTS

mV Low	mV High	CODE
0	2	0620
0	3	0630
0	5	0650
0	10	0710
0	15	0715
0	20	0720
0	30	0730
0	50	0750
0	60	0760
0	100	0810
SPECIAL		0999

- TABLE 5 -

TC (See TC Temperature table 6 on page 8) :
Type B, E, J, K, R, S, T on all usable T.C. Measuring Ranges
Span limits = 2 mV min (50°C on types E,J,K,T) 75 mV max
Zero Suppression ± 300% of span up to 100% of max span

BURNOUT
Field programmable Upscale / None / Downscale (burnout current 25 nA)

REFERENCE JUNCTION COMPENSATION (TC Ranges) :
Compensation error ± 1°C max.
For TC input isolators, a reference junction compensator is necessary near to the input terminals (Haz. Area side) its value must be 109 Ω, 0.1% precision.
If the board configuration is know when ordering, the junction compensator is fitted on the board during the production phase (see Fig. A).
If the RJ must be installed lately (on the field), it can be obtained from Elcon (PN. 205002) and connected to the board using the input terminals as shown in Fig. B (terminals A-B ch. 1 ; D-E ch. 2).

Fig. A

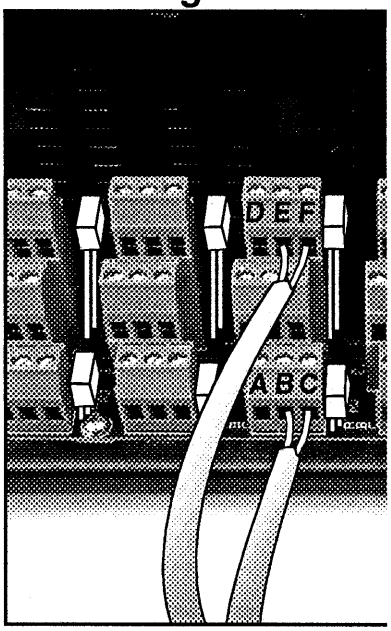
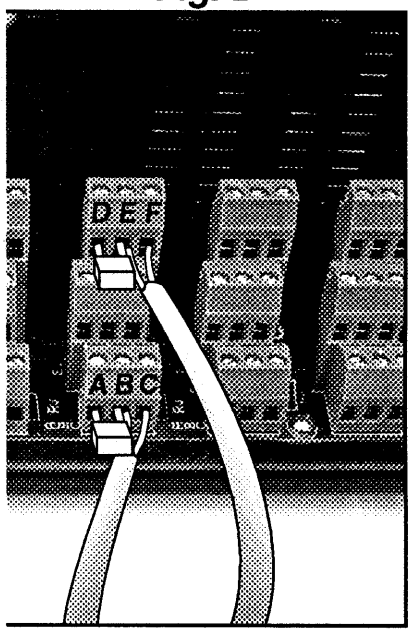


Fig. B



TYPES 1071 and 1072
ADDITIONAL SPECIFICATIONS
INPUT TEMPERATURE RANGES FOR Pt 100 DIN
(On demand Ni 100 can be supplied) (See table 6 on page 8)
Span limits = 25°C min 760°C max
Zero Suppression ± 300% of Span up to 100% of max Span

OUTPUT IS LINEAR IN TEMPERATURE TERMS

RTD MEASURING CURRENT
0.5 mA max

LINE RESISTANCE COMPENSATION (3 wire connection)
Less than 0.1% calibration shift for a line resistance change from 0Ω to 10Ω (each wire).

BURNOUT
Active on all three wires of the RTD, forces output upscale
INPUT RANGES FOR TRANSMITTING POTENTIOMETERS
(See table 7)

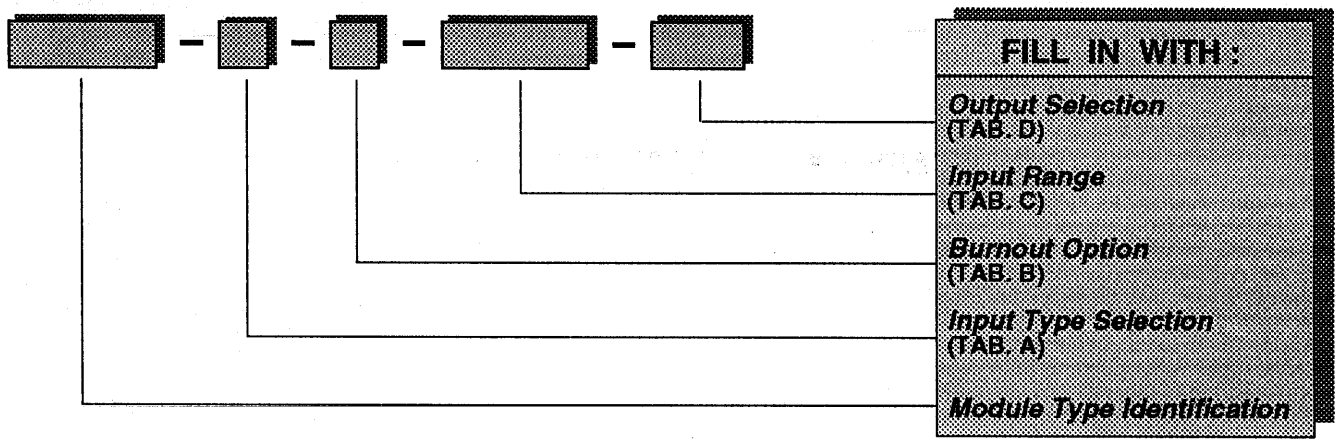
TRANSMITTING Pot. Ohm (linear) ANALOG INP.

Pot Ω Low	Pot Ω High	CODE
0	50	0505
0	100	0510
0	200	0520
0	500	0550
0	1000	0561
0	2000	0571
0	5000	0581
0	10000	0591
SPECIAL		0555

- TABLE 7 -

4.4 Ordering Information

(How to obtain and understand the code)



Models coding table

Inp. Ch. Avail. 1 Ch	Inp. Ch. Avail. 2Ch	Input *See Tab. A*	Burnout *See Tab. B*	Input *See Tab. C*	Output *See Tab. D*	Application
1011	1012	H V	0	See Table C	AA VV	Volt / mA
1061	1062	B, E, J, K, R S, T, M, X	1 2 3	See Table C	AA VV	mV / TC
1071	1072	D, F N, X	3	See Table C	AA VV	RTD / Pot

A

INPUT TYPE SELECTION

B	=	TC type "B"
D	=	RTD Pt100 Din
E	=	TC type "E"
F	=	RTD Pt100 ANSI
H	=	mA
K	=	TC type "K"
M	=	mV
N	=	RTD Ni100
R	=	TC type "R"
S	=	TC type "S"
T	=	TC type "T"
V	=	Volts DC
X	=	Input "X" Special
J	=	TC type "J"

B

BURNOUT OPTION

(Only for mod. 1061-62/1071-72)

0	=	Not Applicable
1	=	None
2	=	Downscale
3	=	Upscale

C

INPUT RANGE CODE

See following Tables in this section

Table 3	mA Analog inputs
Table 4	Volt Analog inputs
Table 5	mV Analog inputs
Table 6	Temp. Ranges °C
Table 6	Temp. Ranges °F
Table 7	Tx Pot inputs

D

OUTPUT TYPE

AA	=	4-20 mA
VV	=	1-5 V (on 250 Ω shunt)

Mod. 1061 - K - 2 - 3400 - VV

EXAMPLE:

SINGLE CHANNEL TC CONVERTER

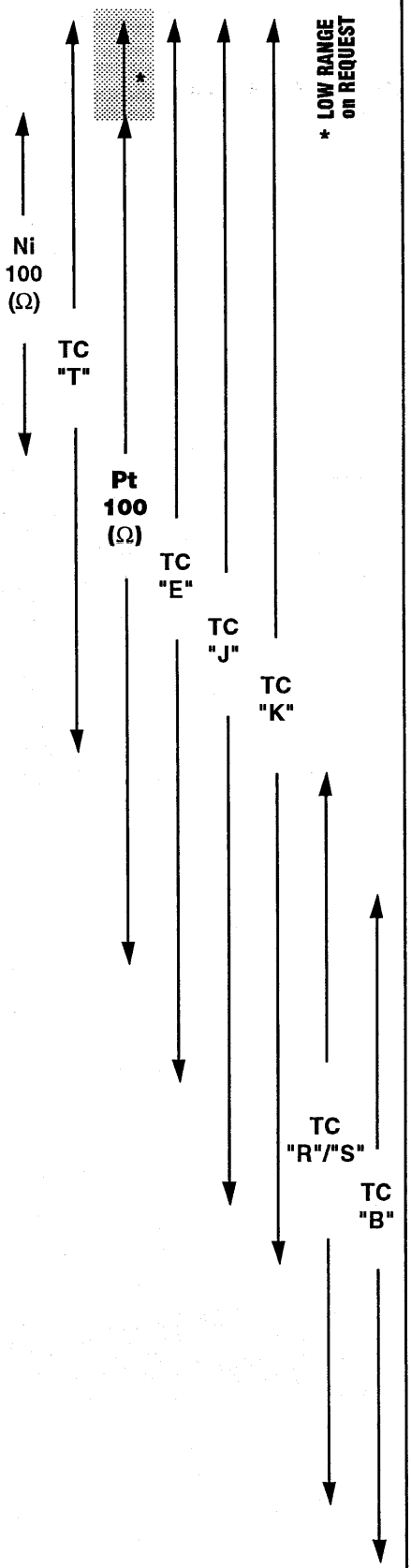
- ***Output range 1-5V (on 250Ω shunt)***
- ***Input Range 0-400°C***
- ***Burnout Down Scale***
- ***TC type "K" Input***
- ***Type (Single Channel)***

- TABLE 6 -

TEMPERATURE RANGES in °C

T Low	T High	CODE
-200	0	1100
-150	0	1200
-100	0	1300
-50	50	1400
-20	40	1500
-10	50	1600
0	80	1700
0	100	1800
50	100	1900
0	120	2000
0	150	2100
50	150	2200
100	150	2300
0	180	2400
120	180	2500
0	200	2600
0	220	2700
0	250	2800
150	250	2900
0	300	3000
200	300	3100
0	350	3200
250	350	3300
0	400	3400
200	400	3500
0	500	3600
0	550	3700
0	600	3800
0	700	3900
0	800	4000
300	800	4100
500	800	4200
0	850	4300
0	900	4400
0	1000	4500
500	1000	4600
0	1100	4700
0	1200	4800
600	1200	4900
800	1200	5000
0	1300	5100
800	1300	5200
0	1400	5300
900	1400	5400
0	1500	5500
1000	1500	5600
0	1600	5700
1100	1600	5800
0	1750	5900
1000	1750	6000
0	1800	6100
1000	1800	6200
Spec. Range		6666

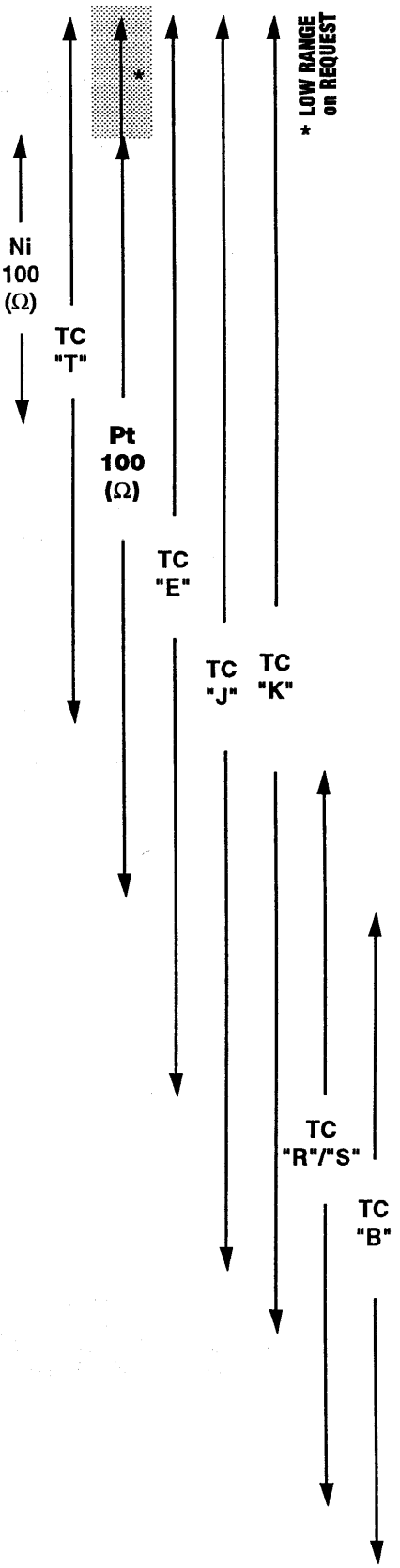
APPLICABILITY



TEMPERATURE RANGES in °F

T Low	T High	CODE	°C Low	°C High
-300	0	1150	-184	-18
-250	0	1350	-115	-18
-200	0	1360	-93	-18
-100	0	1370	-73	-18
-50	100	1450	-45	38
-20	100	1460	-28	38
0	200	1750	-18	93
0	250	2050	-18	121
50	250	2060	10	121
0	300	2150	-18	149
100	300	2250	38	149
200	300	2350	93	149
0	350	2450	-18	176
250	350	2550	121	176
0	400	2650	-18	204
0	450	2750	-18	232
0	500	2850	-18	260
300	500	2950	149	260
0	600	3050	-18	315
400	600	3150	204	315
0	700	3250	-18	371
500	700	3350	260	371
0	800	3450	-18	426
400	800	3550	204	426
0	900	3650	-18	482
0	1000	3750	-18	538
0	1100	3850	-18	593
0	1200	3860	-18	684
0	1300	3950	-18	704
0	1400	3960	-18	760
0	1500	4050	-18	815
600	1500	4150	315	815
900	1500	4250	482	815
0	1600	4350	-18	871
0	1700	4450	-18	926
0	1800	4550	-18	982
900	1800	4650	482	982
0	1900	4660	-18	1038
0	2000	4750	-18	1093
1000	2000	4760	538	1093
0	2200	4850	-18	1204
1100	2200	4950	593	1204
1500	2200	5050	815	1204
0	2400	5150	-18	1315
1500	2400	5250	815	1315
0	2700	5550	-18	1482
1900	2700	5650	1038	1482
0	2900	5750	-18	1593
2000	2900	5850	1093	1593
0	3200	5950	-18	1760
1800	3200	6050	982	1760
0	3300	6150	-18	1815
1800	3300	6250	982	1815
Spec. Range		6666		

APPLICABILITY



4.5 Quality Assurance.

All Elcon Instruments production is performed under a QUALITY ASSURANCE program following written procedures which are specific for each line of instruments during the manufacturing, intermediate test and inspection, and final inspection phases.
Each product undergoes accelerated thermic ageing (burn-in) for a minimum 100 hours at 55°C (131°F) with at least 1 cooling thermic cycle at 0°C (32°F) and back to 55°C (131°F).
The purpose is to identify weak components that may develop initial fault mechanisms due to "Infant Mortality".
Only after a positive burn-in test, instruments undergo a complete final inspection performed with computerized automatic testing equipment specifically developed by Elcon for this purpose.

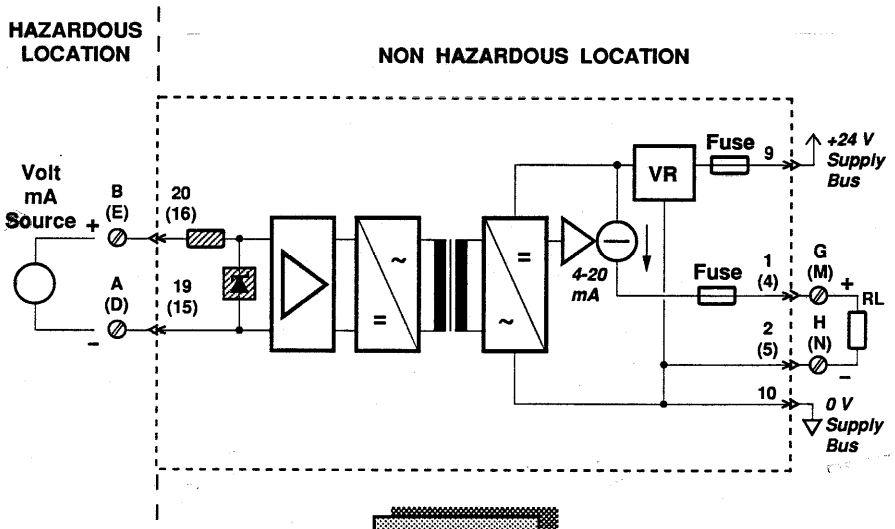
5. Theory of Operation

CIRCUIT DESCRIPTION.
The block diagram of Fig. 2a-2b-2c represents the circuit of the type 1011 (12); 1061 (62) and 1071 (72) respectively.
Starting from field terminals we can identify the following functional blocks:
Safety barrier - Measuring Circuit - Preamplifier - Voltage to current Converter - Rectifier and Filter - Signal isolating transformer - DC/AC converter or "chopper" - Current Mirror - Voltage Regulator.

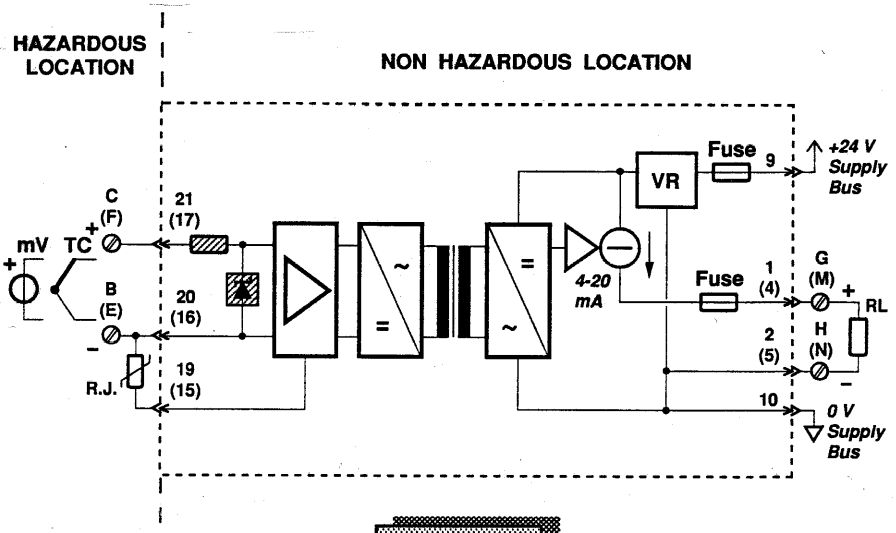
SAFETY BARRIER.
Consists of a series current limiting resistor and a set of shunt connected voltage limiting zeners so that the maximum voltage and current into the I.S. circuit are kept within safe limits even in case of fault.

MEASURING CIRCUIT.
Provides the necessary Input Sensor Interfacing (i.e. burnout and R.J. compensation for TC or 3 wire bridge arrangement for RTD) to provide a millivolt signal output to the Preamplifier.

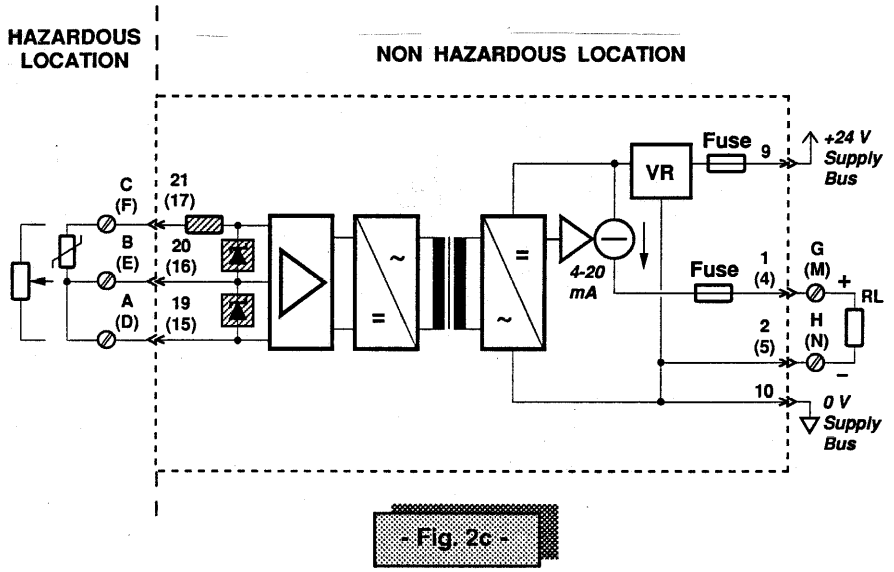
PREAMPLIFIER.
Provides input signal filtering, amplification and ZERO/SPAN ranging to give a normalized 0-2.5 V output signal to the voltage to current converter.



- Fig. 2a -



- Fig. 2b -



- Fig. 2c -

VOLTAGE TO CURRENT CONVERTER.
Accept the normalized Preamplifier output signal and converts it into a proportional current sink applied to the Rectifier Filter/Transformer assembly.

RECTIFIER FILTER.
Converts the AC supply of the secondary transformer winding into a smoothed DC to provide a suitable supply for the Volt Preamplifier and the voltage to current converter.

SUPPLY ISOLATION TRANSFORMER.
Provides isolation between intrinsically safe circuit and non intrinsically safe circuit while transferring supply voltage and signal current.
The transformer is protected by a shunt zener and fuse to prevent loss of isolating properties under fault conditions.

DC/AC CONVERTER.
Converts by "chopping" (alternatively switching) the direct current from the voltage regulator into an alternating current that can be transferred by the isolation transformer.

CURRENT MIRROR.
Duplicates the 4-20 mA current drained by the voltage to current converter, providing a 500 Ω load (an optional connection to an internal 250 Ω shunt allows changing the 4-20 mA output into a 1-5 V).

VOLTAGE REGULATOR.
Gives a constant supply voltage for the whole barrier, independent of supply voltage changes.
The voltage regulator also provides adequate supply current limiting to prevent a short in the circuit from blowing the barrier internal fuse.

FUSES.
On the supply section of the barrier module a miniature fuse is provided to prevent a dead short from propagating to the termination board supply bus (to prevent the higher sized Termination Board supply bus fuse from blowing).
As mentioned previously, a second fuse protects the isolating transformer properties from catastrophic faults (i.e. main voltage inadvertently connected at the analog signal output).

6. Installation

6.1 Operating environment.

Series 1000 instruments, like most modern electronic equipments, can operate on wide temperature and humidity ranges. Practical considerations suggest however, limiting the environmental stress, thus obtaining improved performance and higher reliability.

TEMPERATURE.
Every effort to provide a low to moderate operating temperature, i.e. 25°C (77°F) will significantly reduce instrument failure rates and increase life expectancy.

HUMIDITY.
Low humidity (below 40% RH) tends to increase accumulation of static charges in manned areas with consequent risk of harmful static discharges when handling instruments.
High humidity (above 60%) creates, especially in conjunction with corrosive atmosphere, chloride or sulfide condensation when the ambient temperature drops a few degrees.
This corrosive film tends to accumulate and concentrate at each temperature cycle on the boards, thus affecting its isolating properties and increasing contact resistance which can cause circuit calibration drifts or misoperation.

DUST.
Accumulation of dust on circuit board facilitates corrosion in humid environments producing effects similar to that of a corrosive atmosphere.

VIBRATION.
Excessive permanent vibration can induce component stress affecting connector contact quality and inducing fatigue failures on vibration sensitive components.

SUGGESTED GUIDELINES ON OPERATING ENVIRONMENT FOR BEST RESULTS.

A) Keep operating temperature below 35°C (95° F), ideally between 20°C and 25°C (68 and 77°F), avoiding wide and rapid temperature excursions.
For dense cabinet packaging follow direction in "high density installation" section 6.5 of this chapter.

B) Control relative humidity within 40 and 60% to avoid risks of static charges or condensation.

C) Limit the presence of corrosive atmosphere, fumes and dust, sealing and purifying the control room area and using air filters in the cabinet air intakes (clean cable entry path), if necessary.

D) Reduce to safe levels the presence of vibrations (if any).