TEST REPORT

Report Number:

February 1, 2013

Product Designation: T9000 Series

Standard: IEC 61326-1 (Ed. 1): 2005 (EN 61326-1: 2006)- Electrical equipment for measurement, control and laboratory use - EMC requirements

Tested by:
Intertek Testing Services NA Inc.
1950 Evergreen Blvd., Suite 100
Duluth, GA 30096

Client:
Fairchild IPC, Inc
3920 West Point Blvd.
Winston-Salem, NC 27102
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Tests performed by:

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Report reviewed by:

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EMC Team Leader

1.0 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 3.0. The remaining test sections are the verbatum text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested complies with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2.0 Test Summary

Section	Test Full Name	Test Date	Result
4.0	System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)		
5.0	Performance Criterion of the Equipment when tested against the immunity requirements for the European CE Mark (CE Immunity Verification)		
6.0	Radiated emissions requirements in EN 61326. (EN 61326 Radiated Emissions)	11/27/2012	PASS
7.0	Electrostatic Discharge Immunity Test (IEC 61000-4-2)	01/03/2013	PASS
8.0	Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)	11/07/2012	PASS
9.0	Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)	09/27/2012	PASS
10.0	Surge Immunity Test (IEC 61000-4-5)	01/07/2013	PASS
11.0	Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)	09/27/2012	PASS
12.0	Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)	09/28/2012	PASS
13.0	Revision History (Revision History)		
NA	Electrical equipment for measurement, control and laboratory use — EMC requirements Conducted emissions requirements (EN 61326 (CE)) was waived due to the EUT is powered by 24VDC.		
NA	Harmonic current emissions (IEC 61000-3-2) was waived due to the EUT is powered by 24VDC.		
NA	Voltage fluctuations and flicker (IEC 61000-3-3) was waived due to the EUT is powered by 24VDC.		
NA	Voltage Dips, Short Interruptions and Voltage Variations Immunity Tests (IEC 61000-4-11) was waived due to Not applicable to dc powered devices		

3.0 Description of Equipment Under Test

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Digital Electronic Pressure Control	Fairchild	T9020-00402-MNNFE	1012-0073

EUT receive date:	09-18-2012
EUT receive condition:	Good

Description of EUT provided by Client:

The Fairchild T9000 Series Electro-Pneumatic Pressure Controller has a closed-loop, integrated, microprocessor control system that regulates outlet pressure. You can control the output from the Model T9000 using the keypad or from an analog control signal. You can control the output from the Model T9000D using the keypad and through DeviceNet™ communication network. This can be confirmed at Fairchild website www.fairchildproducts.com, scroll through the transducer section.

The T9000 series pressure controllers can also sense pressure from a remote location in the process system by employing the remote pressure sensing port. Remote pressure sensing can be useful for improving system response and eliminating the pressure drop associated with air flowing through the outlet tubing between pressure controller and the process.

Description of EUT exercising:

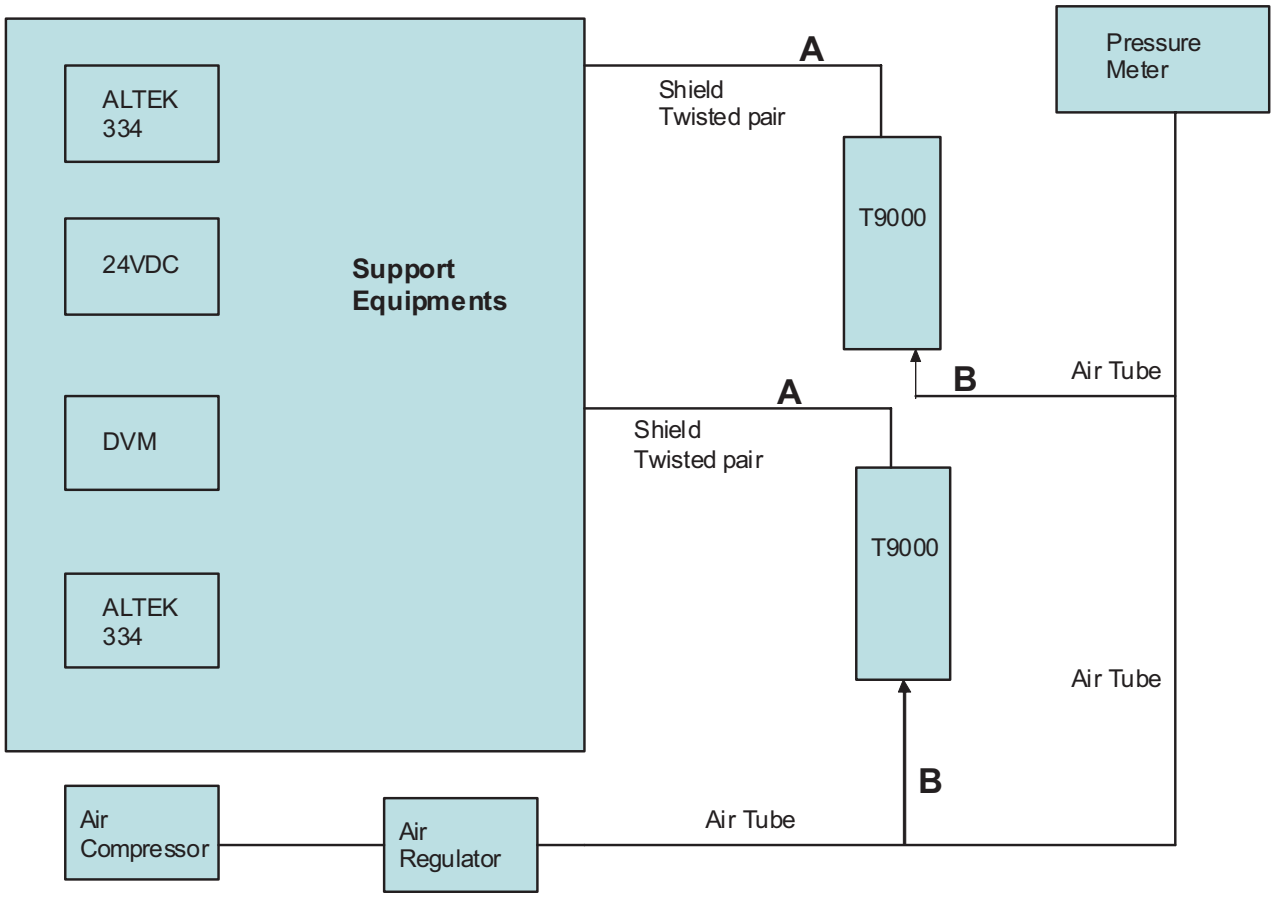
The EUT was operated with 24VDC and Air pressure control.

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)

Method:

Record the details of EUTcabling, document the support equipment, and show the interconnections in a block diagram.

Drawing:



Block diagram

4.0 System setup including cable interconnection details, support equipment and simplified block diagram. (System Setup)

Data:

EUT Cabling						
					Connection	
ID	Description	Length	Shielding	Ferrites	From	To
A	Shielded Twisted Pair	<10m	Yes	No	Support Equipments	EUT
B	Air Tube	<10m	No	No	Air Compressure	EUT

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
Loop Calibrate(Current Source)	Altek Industries Corp	ALT 334A	N/A
Loop Calibrate(Current Source)	Altek Industries Corp	ALT 334A	N/A
Power supply	Tektronik	PS280	PS280-TW56104
DVM	Fluke	179	92260178
Pressure Meter	Heise	PM	41636

5.0 Performance Criterion of the Equipment when tested against the immunity requirements for the European CE Mark (CE Immunity Verification)

Method:

The equipment under test (EUT) is to be installed in accordance with the manufacturer's instructions. The installation process includes, product assembly, connecting any support equipment, connecting power and configuration of the equipment under test. All unused ports should be terminated as instructed by the test standard. The EUT should indicate normal operation in accordance with the Operation Manual.

If, as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test.

A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer.

Performance criterion A: The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

Performance criterion D: EUT is physically damaged.

The letters in the Data tables (A, B, C, D) indicate the criterion to which the EUT complied.

5.0 Performance Criterion of the Equipment when tested against the immunity requirements for the European CE Mark (CE Immunity Verification)

Data:

Product Specific Performance Criterion:

No.	Description
1	Criteria A is defined as the pressure should not deviate more the +/-1 PSI.

Description of how performance was observed during testing:

No.	Description
1	The air pressure was monitored during testing.

General notes:

6.0 Radiated emissions requirements in EN 61326. (EN 61326 Radiated Emissions)

Method:

Measurements in the frequency range of 30 MHz to 1000 MHz shall be performed with a quasi-peak detector instrument that meets the requirements of Section One of CISPR 16. The measuring antenna shall correlate to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 3 or 10 meters from the EUT. The limit applied to the measurement shall be appropriate for the test distance. The test distance shall be indicated in the results section.

The EUT shall be arranged and connected with cables terminated in accordance with the product specification.

The antenna shall be adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.

The antenna-to-EUT azimuth shall be varied during the measurement to find the maximum field-strength readings.

The antenna-to-EUT polarization (horizontal and vertical) shall be varied during the measurements to find the maximum field-strength readings.

If the EUT is intended for tabletop use, it shall be placed on a table whose top is 0.8m above the ground plane. The table shall be constructed of non-conductive materials. Its dimensions are at least 1m by 1.5m, but may be extended for larger EUT. If EUT is floor standing, the EUT was placed on a horizontal metal ground plane and isolated from the ground plane by up to 12 mm of insulating material.

For equipment using ISM frequencies, see CISPR 11.

Equipment setup for radiated disturbance tests shall follow the guidelines of CISPR 16-1 and CISPR 16-2.

TEST SITE
The test site for radiated emissions is located at 1950 Evergreen Blvd, Suite 100, Duluth, Georgia 30096. The 10-meter semi-anechoic chamber meets the characteristics of CISPR 16-1: 1993 and ANSI C63.4: 2003. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
30 MHz to 1000 MHz at 3 meters: +/- 3.9 dB
30 MHz to 1000 MHz at 10 meters: +/- 3.6 dB
1 GHz to 18 GHz at 3 meters: +/- 4.2 dB

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
7m Cable, 0.01-18GHz	Storm Products Co.	A81-0303-275.6	ST-4	07/25/2012	07/25/2013
Antenna, BiLog, 20-2000MHz	Chase	CBL6112A	211518	02/21/2012	02/21/2013
Cable TW2	Andrews	Cable TW2	TW2 211411	05/07/2012	05/07/2013
Cable, N-N 3 meters, 18GHz	Megaphase	TM18 NKNK 118	E203	05/07/2012	05/07/2013
Cable, N-N, 3 meters, 18GHz	Megaphase	TM18-NKNK-118	E206	05/07/2012	05/07/2013
EMI Receiver	Hewlett Packard	8546A	213109	12/29/2011	12/29/2012
EMI Receiver, Preselector section	Hewlett Packard	85460A	213108	12/29/2011	12/29/2012
Excel spreadsheet for radiated emissions	Software	Excel - RE Worksh	SW004	12/08/2011	12/08/2012
Preamplifier, 10 MHz to 2000 MHz, 30 dB gain	Mini-Circuits	ZKL-2	200069	07/19/2012	07/19/2013
Tile - software profile for radiated and conducted emissions testing.	Software	Tile - Emissions	SW006	12/08/2011	12/08/2012

Results: The sample tested was found to Comply.

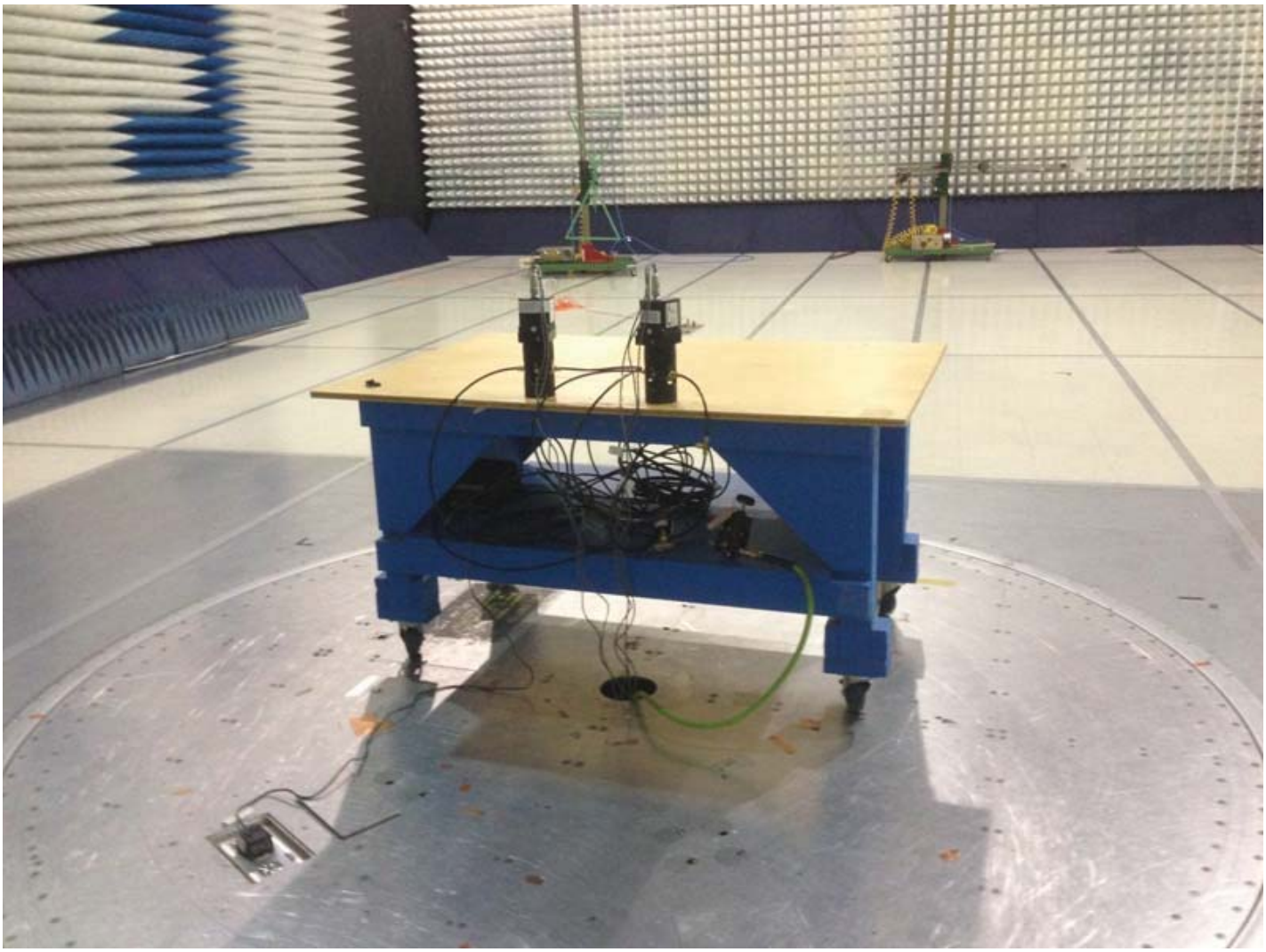
6.0 Radiated emissions requirements in EN 61326. (EN 61326 Radiated Emissions)

Photo:

Test Setup

6.0 Radiated emissions requirements in EN 61326. (EN 61326 Radiated Emissions)

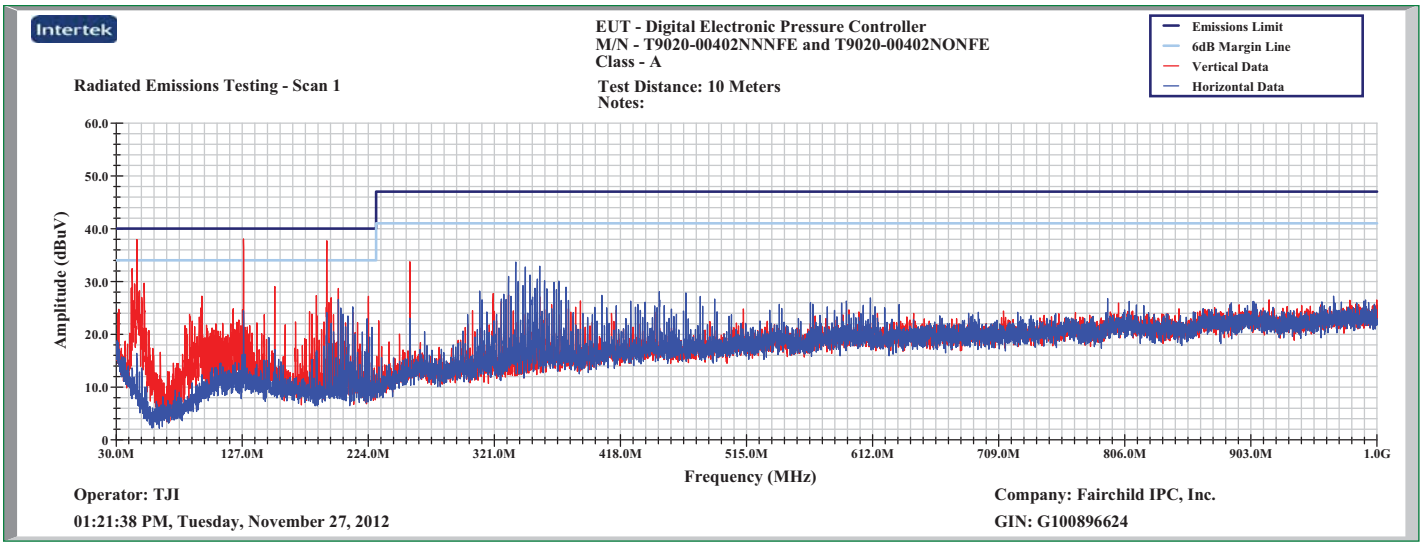
Photo:



Test Setup

6.0 Radiated emissions requirements in EN 61326. (EN 61326 Radiated Emissions)

Plot:



Radiated emissions plot

6.0 Radiated emissions requirements in EN 61326. (EN 61326 Radiated Emissions)

Data:

Frequency Range (MHz): 30-1000 **Test Distance (m):** 10

Input power: 24VDC **Limit:** CISPR Class A-10m

Modifications for compliance (y/n): n

A	B	C	D	E	F	G	H	I	J
Ant. Pol. (V/H)	**Frequency MHz**	**Reading dB(uV)**	**Antenna Factor dB(1/m)**	**Cable Loss dB**	**Pre-amp Factor dB**	**Net dB(uV/m)**	**10m Limit dB(uV/m)**	**Margin dB**	**Detectors / Bandwidths Det/RBW/VBW**
v	46.093	60.0	10.1	1.1	37.2	34.0	40.0	-6.0	QP/120k/300k
v	128.025	62.5	11.8	1.8	37.1	39.0	40.0	-1.0	QP/120k/300k
v	152.021	55.3	10.8	2.0	37.1	31.0	40.0	-9.0	QP/120k/300k
v	192.021	63.6	9.6	2.3	37.1	38.4	40.0	-1.6	QP/120k/300k
v	256.030	55.5	13.3	2.7	37.1	34.4	47.0	-12.6	QP/120k/300k
h	337.385	53.1	14.4	3.1	37.1	33.5	47.0	-13.5	QP/120k/300k
Calculations		G=C+D+E-F		I=G-H					

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Method:

The test set-up consists of the test generator, EUT and auxiliary instrumentation necessary to perform direct and indirect application of discharges to the EUT in the following manner:
a) contact discharge to the conductive surfaces and to coupling planes;
b) air discharge at insulating surfaces.

The EUT shall be arranged in accordance with the manufacturer's instructions for installation (if any).

In the case of air discharge testing, the climatic conditions shall be within the following ranges:
- ambient temperature: 15° C to 35° C;
- relative humidity: 30 % to 60 %;
- atmospheric pressure: 86 kPa (860 mbar) to 106 kPa (1 060 mbar).
NOTE Any other values are specified in the product specification. The EUT shall be operated within its intended climatic conditions.

GENERAL SETUP
A ground reference plane shall be provided on the floor of the laboratory. It shall be a metallic sheet (copper or aluminium) of 0.25 mm minimum thickness; other metallic materials may be used but they shall have at least 0.65 mm minimum thickness.

The minimum size of the reference plane is 1 m^2, the exact size depending on the dimensions of the EUT. It shall project beyond the EUT or coupling plane by at least 0.5 m on all sides, and shall be connected to the protective grounding system.

Local safety regulations shall always be met.

The EUT shall be arranged and connected according to its functional requirements.

A distance of 1 m minimum shall be provided between the equipment under test and the walls of the laboratory and any other metallic structure.

The EUT shall be connected to the grounding system, in accordance with its installation specifications. No additional grounding connections are allowed.

The positioning of the power and signal cables shall be representative of installation practice.

The discharge return cable of the ESD generator shall be connected to the ground reference plane. The total length of this cable is in general 2 m. In cases where this length exceeds the length necessary to apply the discharges to be selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2 m to other conductive parts in the test set-up.

The connection of the earth cables to the ground reference plane and all bondings shall be of low impedance, for example by using clamping devices for high frequency applications.

Where coupling planes are specified, for example to allow indirect application of the discharge, they shall be constructed from the same material type and thickness as that of the ground reference plane, and shall be connected to the GRP via a cable with a 470 kOhm resistor located at each end. These resistors shall be capable of withstanding the discharge voltage and shall be insulated to avoid short circuits to the GRP when the cable lies on the GRP.

TABLETOP EQUIPMENT
The test set-up shall consist of a wooden table, 0.8 m high, standing on the ground reference plane.

A horizontal coupling plane (HCP), 1.6 m x 0.8 m, shall be placed on the table. The EUT and cables shall be isolated from the coupling plane by an insulating support 0.5 mm thick.

If the EUT is too large to be located 0.1 m minimum from all sides of the HCP, an additional, identical HCP shall be used, placed 0.3 m from the first, with the short sides adjacent. The table has to be enlarged or two tables may be used. The HCPs shall not be bonded together, other than via resistive cables to the GRP.

Any mounting feet associated with the EUT shall remain in place.

FLOOR STANDING EQUIPMENT
The EUT and cables shall be isolated from the ground reference plane by an insulating support about 0.1 m thick.

Any mounting feet associated with the EUT shall remain in place.

TEST METHOD FOR UNGROUNDED EQUIPMENT
The test method described in this subclause is applicable to equipment or part(s) of equipment whose installation specifications or design preclude connection to any grounding system. Equipment, or parts thereof, includes portable, battery-operated and double-insulated equipment (class II equipment). Rationale: Ungrounded equipment, or ungrounded part(s) of equipment, cannot discharge itself similarly to class I mains-supplied equipment. If the charge is not removed before the next ESD pulse is applied, it is possible that the EUT or part(s) of the EUT be stressed up to twice the intended test voltage. Therefore, double-insulated equipment could be charged at an unrealistically high charge, by accumulating several ESD discharges on the capacitance of the class II insulation, and then discharge at the breakdown voltage of the insulation with a much higher energy.

To simulate a single ESD event (either by air or by contact discharge), the charge on the EUT shall be removed prior to each applied ESD pulse.

The charge on the metallic point or part to which the ESD pulse is to be applied, for example, connector shells, battery charge pins, metallic antennae, shall be removed prior to each applied ESD test pulse.

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Method:

When one or several metallic accessible parts are subject to the ESD test, the charge shall be removed from the point where the ESD pulse is to be applied, as no guarantee can be given about the resistance between this and other accessible points on the product.

A cable with 470 k-Ohm bleeder resistors, similar to the one used with the horizontal and vertical coupling planes, shall be used.

As the capacitance between EUT and HCP (tabletop) and between EUT and GRP (floor-standing) is determined by the size of the EUT, the cable with bleeder resistors may remain installed during the ESD test when functionally allowed. In the discharge cable, one resistor shall be connected as close as possible, preferably less than 20 mm from the EUT test point. The second resistor shall be connected near the end of the cable attached to the HCP for tabletop equipment (see Figure 8), or GRP for floor-standing equipment.

The presence of the cable with the bleeder resistors can influence the test results of some equipment. In case of dispute, a test with the cable disconnected during the ESD pulse takes precedence over the test with the cable installed during the test, provided that the charge has sufficiently decayed between the successive discharges.

As an alternative, the following options can be used:
- the time interval between successive discharges shall be extended to the time necessary to allow natural decay of the charge from the EUT;
- a carbon fibre brush with bleeder resistors (for example, 2 x 470 k-Ohm) in the grounding cable;
- an air-ionizer to speed-up the "natural" discharging process of the EUT to its environment. The ionizer shall be turned off when applying an air-discharge test. The use of any alternative method shall be reported in the test report. NOTE In case of dispute concerning the charge decay, the charge on the EUT can be monitored by a non-contacting electric field meter. When the charge has decayed below 10 % of the initial value, the EUT is considered to be discharged.

The tip of the ESD generator shall be held normal (perpendicular) to the surface of the EUT.

Tabletop equipment: For tabletop equipment, the EUT is placed on the horizontal coupling plane on top of the insulating foil (0,5 mm thick). When a metallic accessible part, to which the ESD pulse is to be applied, is available on the EUT, this part shall be connected to the HCP via the cable with bleeder resistors.

Floor-standing equipment: Floor-standing equipment without any metallic connection to the ground reference plane shall be installed similarly to 7.1.2 and Figure 6 of EN 61000-4-2. A cable with bleeder resistors shall be used between the metallic accessible part, to which the ESD pulse is to be applied, and the ground reference plane (GRP).

EXECUTION OF TESTS
The testing shall be performed by direct and indirect application of discharges to the EUT as appropriate.

Direct application of discharges to the EUT:
The static electricity discharges shall be applied only to those points and surfaces of the EUT which are accessible to persons during normal use. The following exclusions apply (i.e. discharges are not applied to those items):
a) those points and surfaces which are only accessible under maintenance. In this case, special ESD mitigation procedures shall be given in the accompanying documentation;
b) those points and surfaces which are only accessible under service by the (end-)user. Examples of these rarely accessed points are as follows: battery contacts while changing batteries, a cassette in a telephone answering machine, etc.;
c) those points and surfaces of equipment which are no longer accessible after fixed installation or after following the instructions for use, for example, the bottom and/or wall-side of equipment or areas behind fitted connectors;
d) the contacts of coaxial and multi-pin connectors which are provided with a metallic connector shell. In this case, contact discharges shall only be applied to the metallic shell of that connector. Contacts within a non-conductive (for example, plastic) connector and which are accessible shall be tested by the air-discharge test only. This test shall be carried out by using the rounded tip finger on the ESD generator.
e) those contacts of connectors or other accessible parts that are ESD sensitive because of functional reasons and are provided with an ESD warning label, for example, r.f. inputs from measurement, receiving or other communication functions. Rationale: Many connector ports are designed to handle high-frequency information, either analogue or digital, and therefore cannot be provided with sufficient overvoltage protection devices. In the case of analogue signals, bandpass filters may be a solution. Overvoltage protecting diodes have too much stray capacitance to be useful at the frequencies at which the EUT is designed to operate.

The test voltage shall be increased from the minimum to the selected test level, in order to determine any threshold of failure. The final test level should not exceed the product specification value in order to avoid damage to the equipment.

The test shall be performed with single discharges. On preselected points at least ten single discharges (in the most sensitive polarity) shall be applied.

For the time interval between successive single discharges an initial value of 1 s is recommended. Longer intervals may be necessary to determine whether a system failure has occurred. NOTE The points to which the discharges should be applied may be selected by means of an exploration carried out at a repetition rate of 20 discharges per second, or more.

The ESD generator shall be held perpendicular to the surface to which the discharge is applied.

The discharge return cable of the generator shall be kept at a distance of at least 0.2 m from the EUT whilst the discharge is being applied.

In the case of contact discharges, the tip of the discharge electrode shall touch the EUT, before the discharge switch is operated.

In the case of painted surfaces covering a conducting substrate, the following procedure shall be adopted:
If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate. Coating declared as insulating by the manufacturer shall only be submitted to the air discharge. The contact discharge test shall not be applied to such surfaces.

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Method:

In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

Indirect application of the discharge:
Discharges to objects placed or installed near the EUT shall be simulated by applying the discharges of the ESD generator to a coupling plane, in the contact discharge mode.

Horizontal coupling plane (HCP) under the EUT:
Discharge to the HCP shall be made horizontally to the edge of the HCP. At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the centre point of each unit (if applicable) of the EUT and 0.1 m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge. The discharge electrode shall be in contact with the edge of the HCP. In addition, consideration should be given to exposing all sides of the EUT to this test.

Vertical coupling plane:
At least 10 single discharges (in the most sensitive polarity) shall be applied to the centre of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5 m x 0.5 m, is placed parallel to, and positioned at a distance of 0.1 m from, the EUT. Discharges shall be applied to the coupling plane, with sufficient different positions such that the four faces of the EUT are completely illuminated.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
Voltage: +\- 10%
Rise Time: +\- 30%

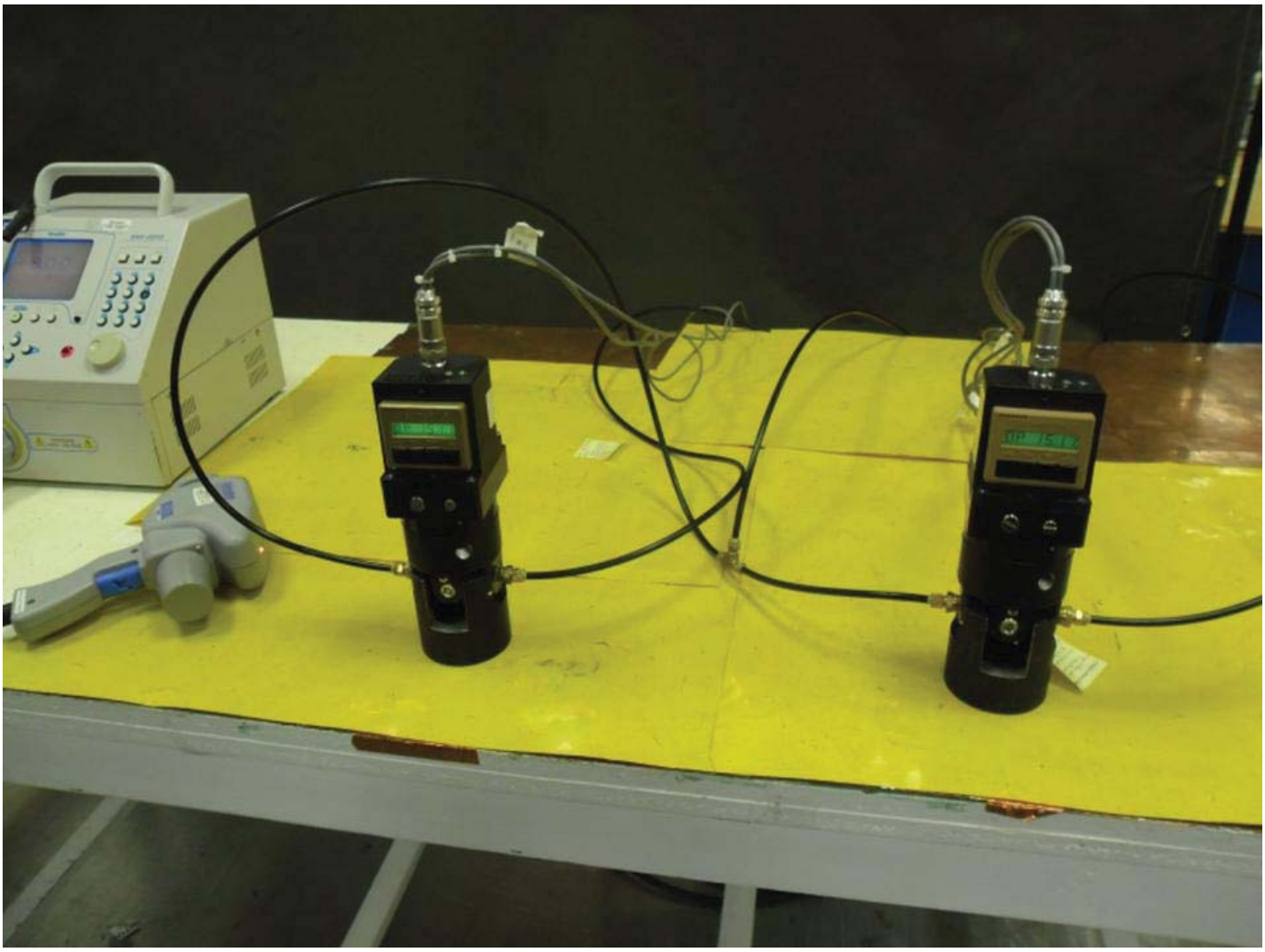
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
ESD Generator	NoiseKen	ESS-2000	211881	02/10/2012	02/10/2013
ESD Gun	NoiseKen	TC-815R	014450A	03/02/2012	03/02/2013
THDX	Oregon Scientific	BA888	T006217	12/09/2012	12/09/2013
Vertical Coupling Plane	Intertek	ESD-VCP	213120	VBU	VBU

Results: The sample tested was found to Comply.

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

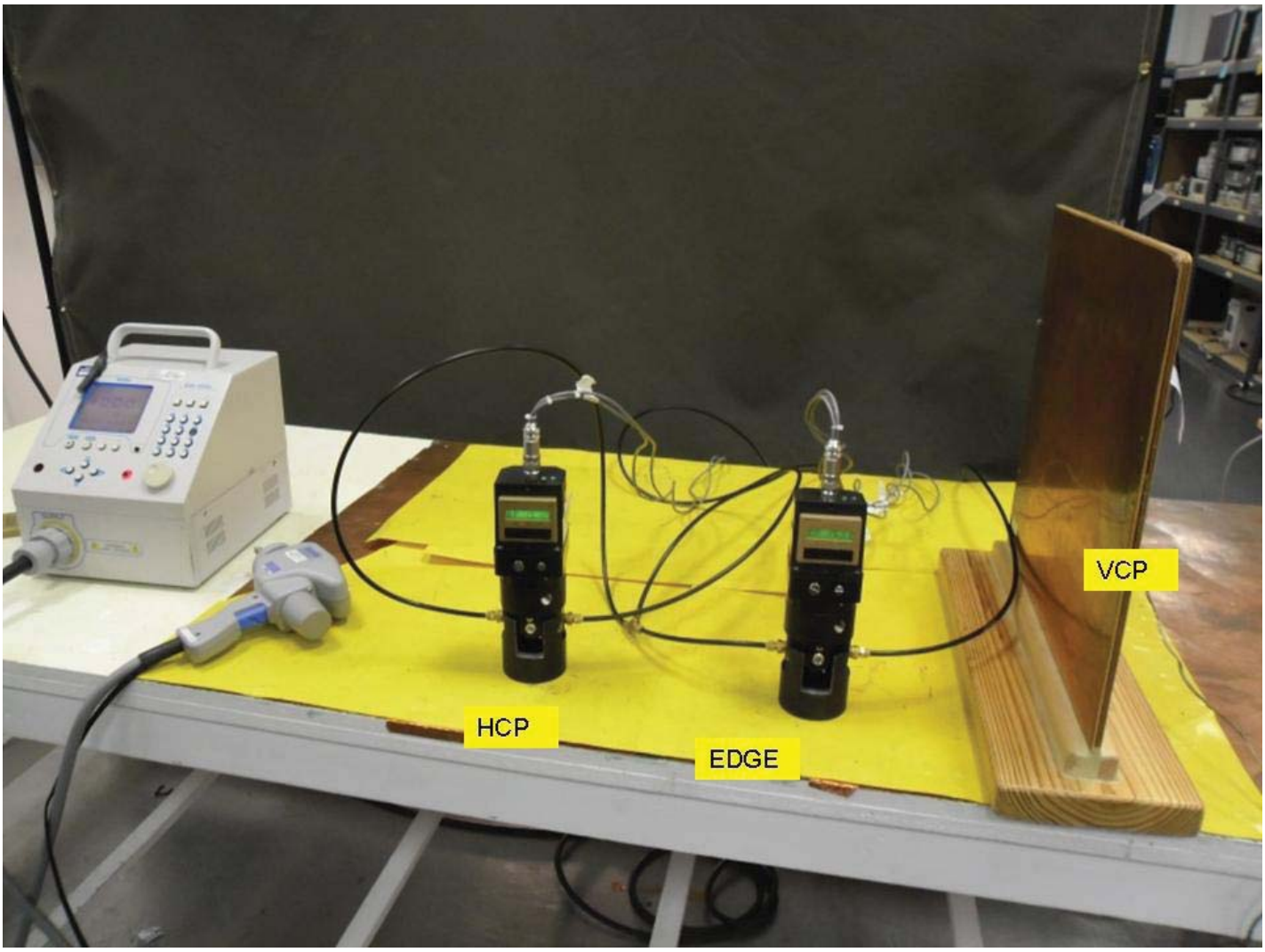
Photo:



Test Points

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Photo:



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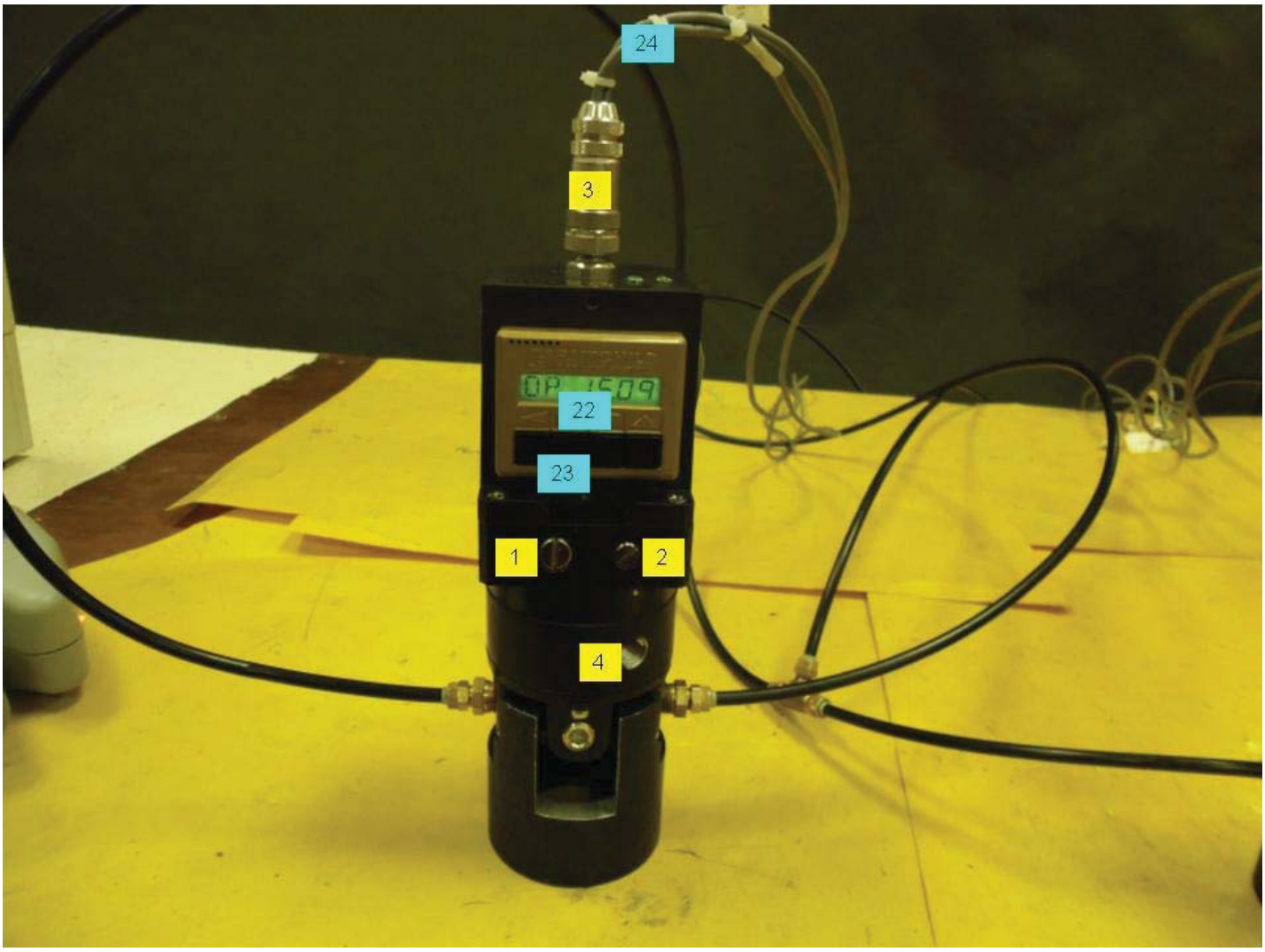

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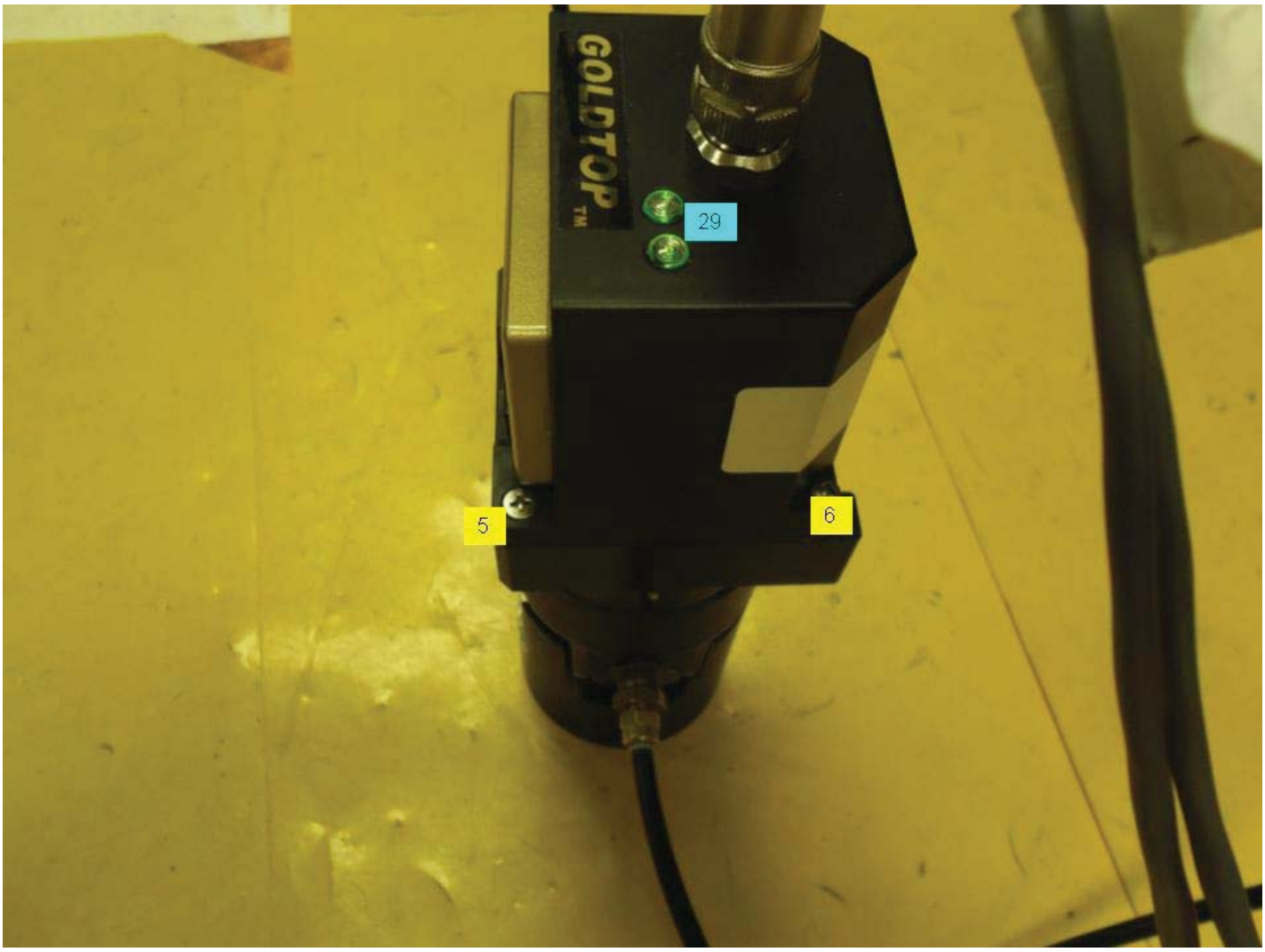

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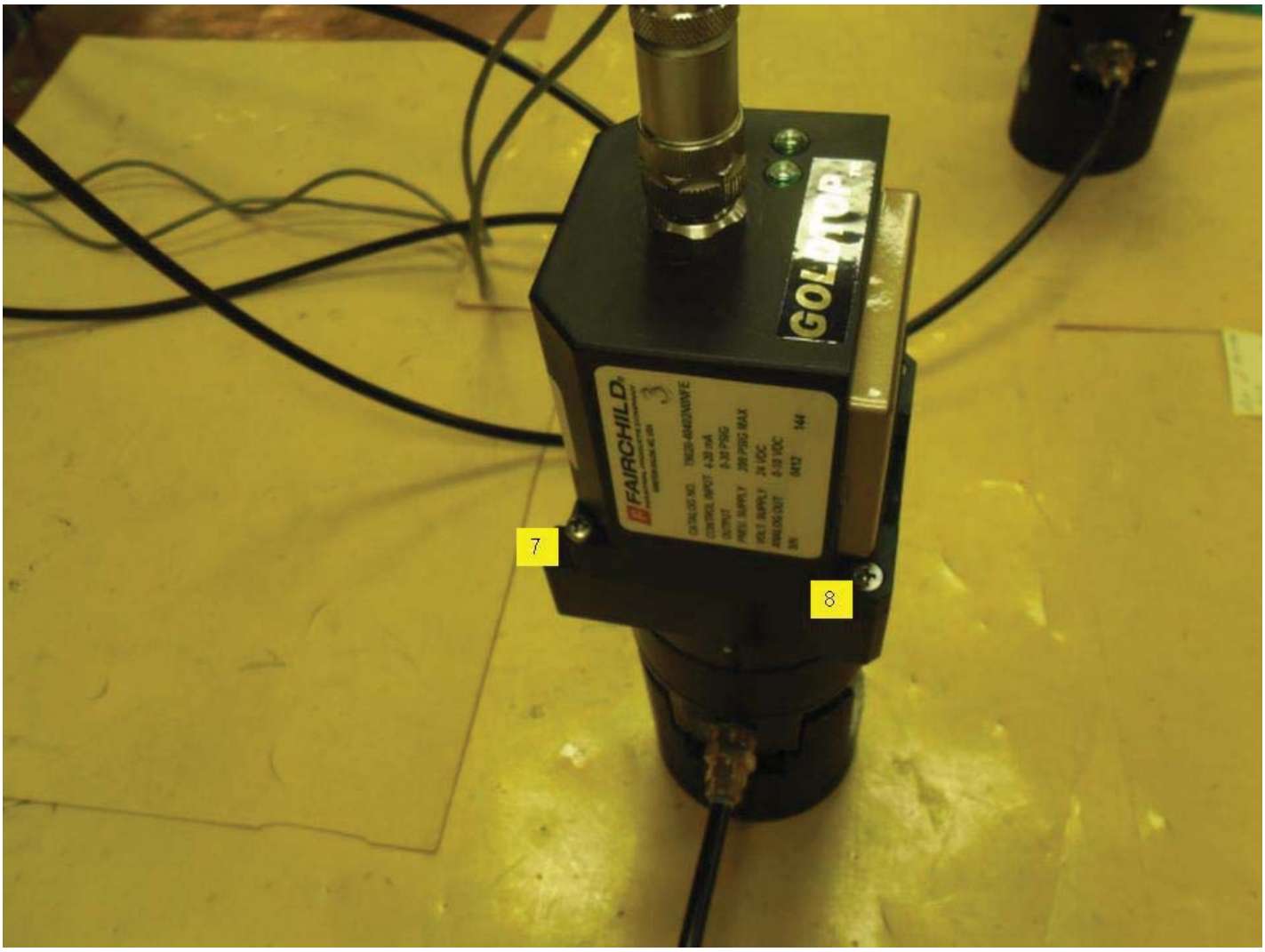

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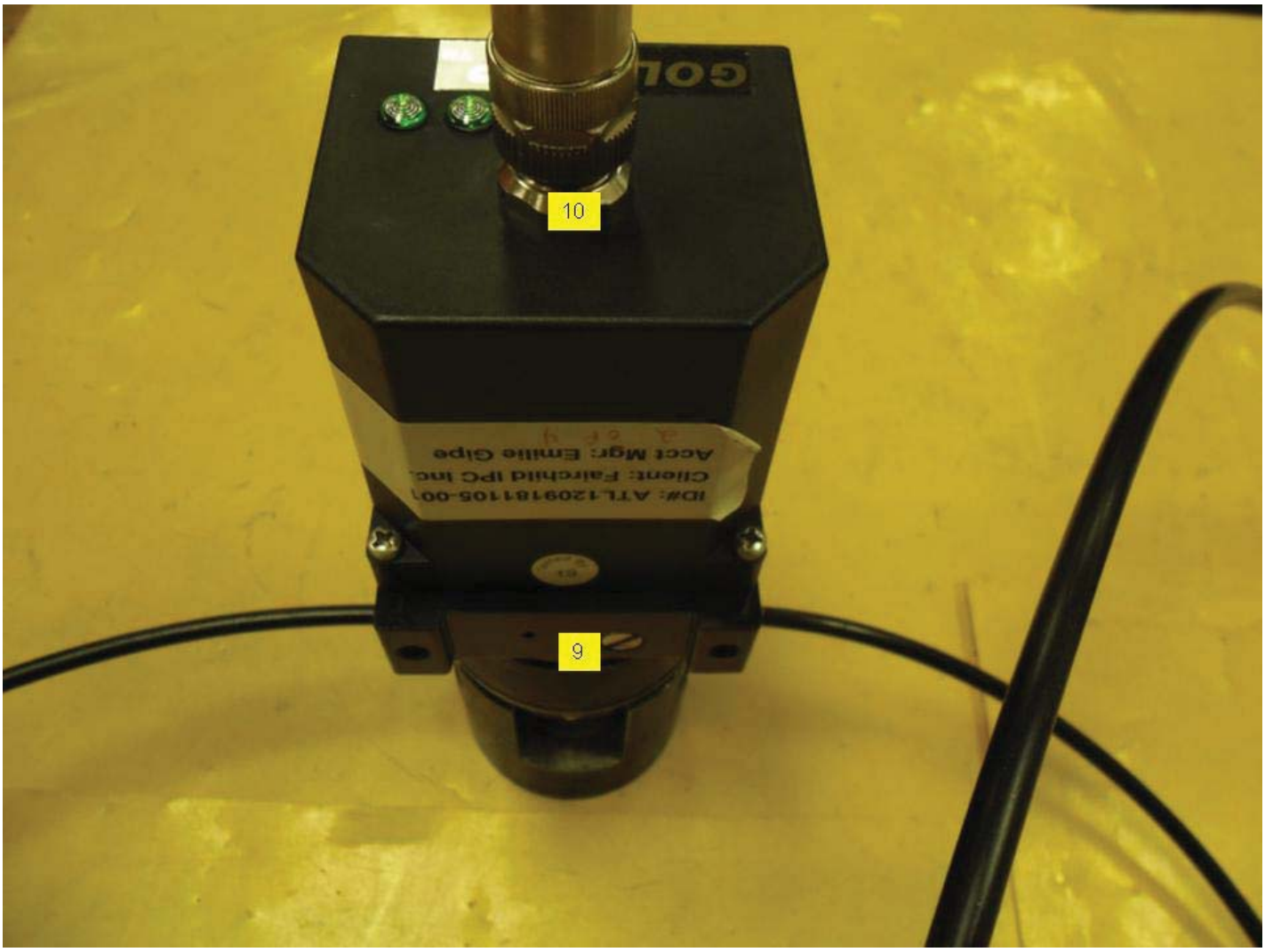
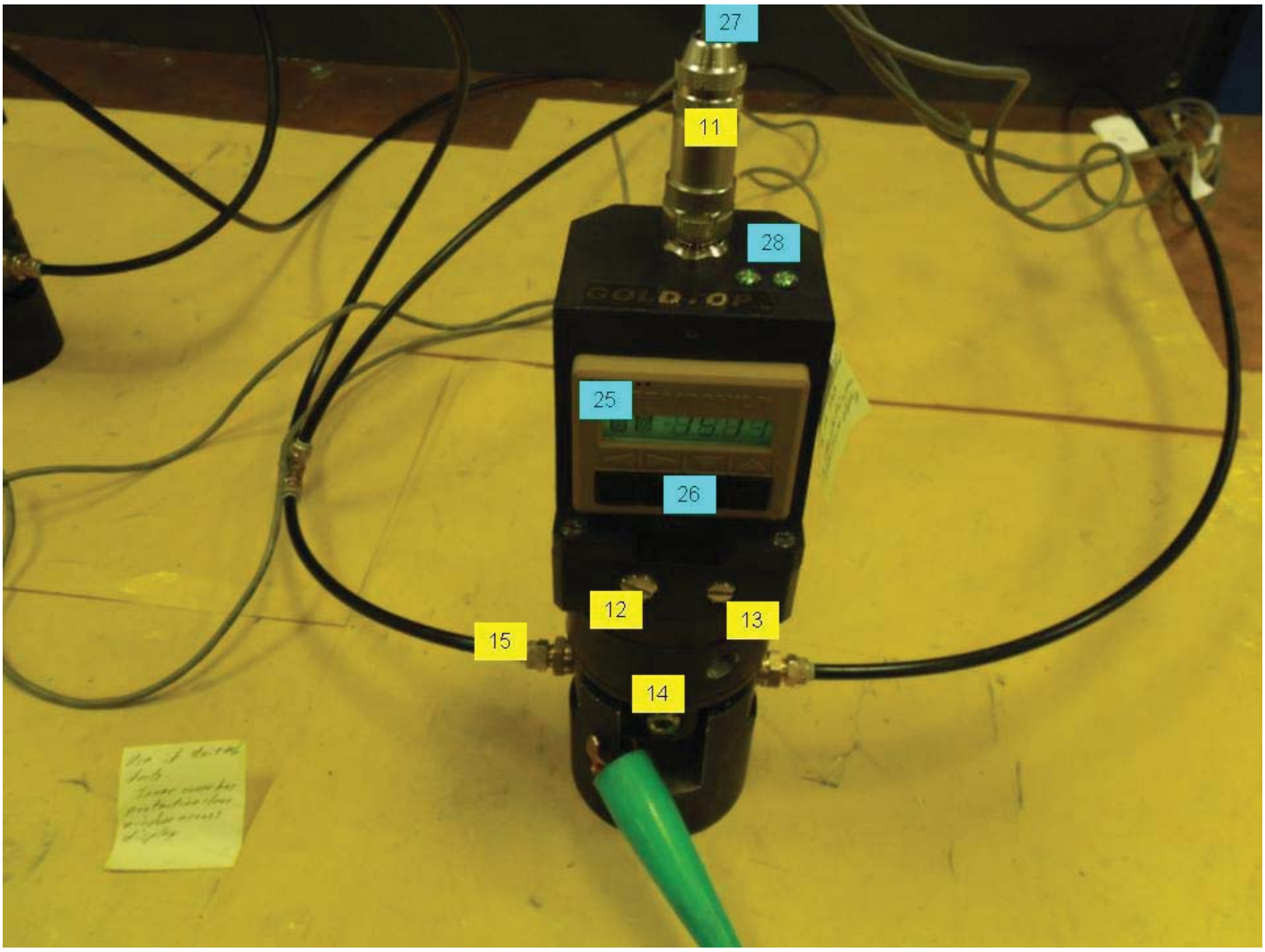


Test Points

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

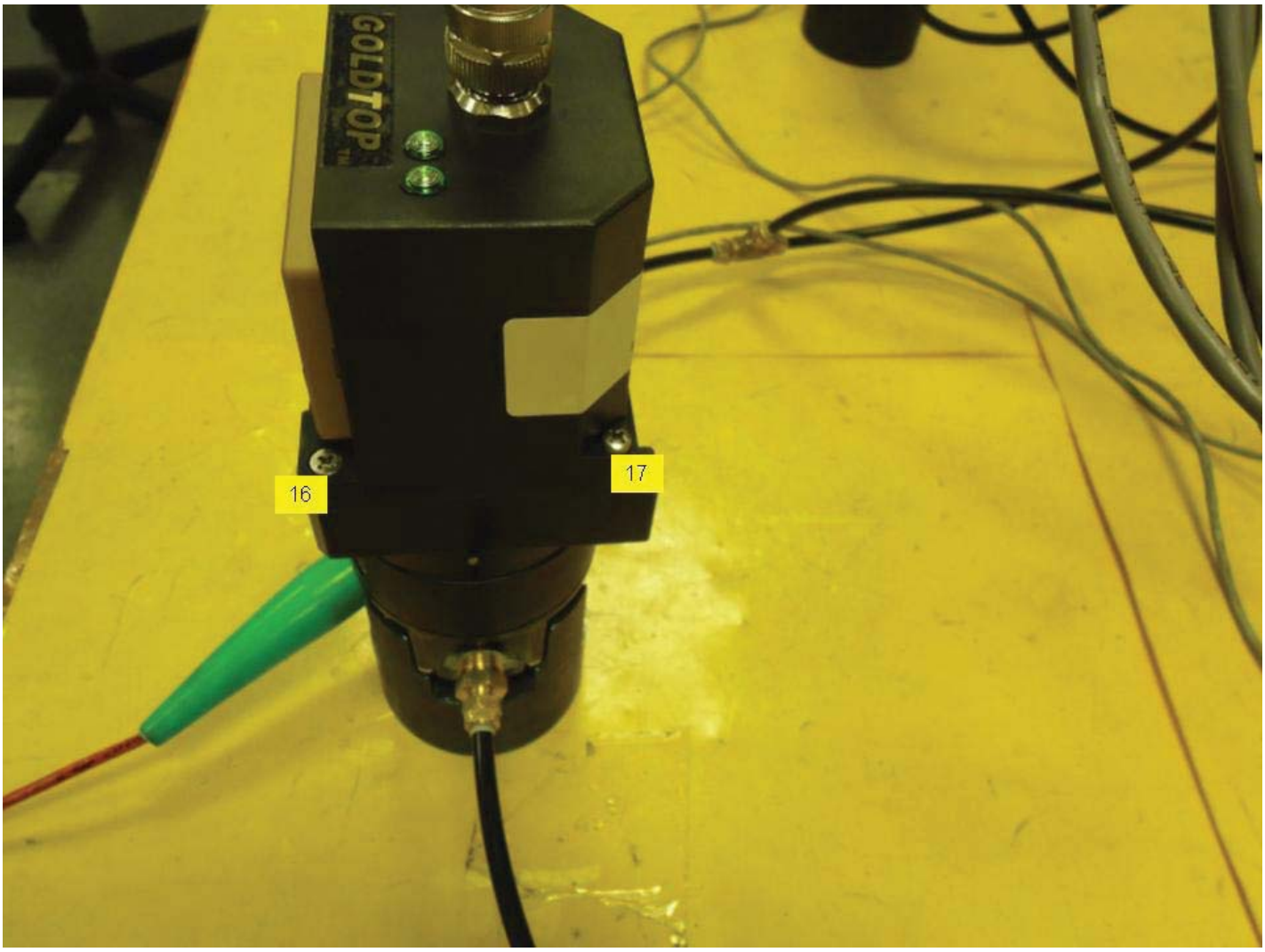
Photo:



Test Points

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

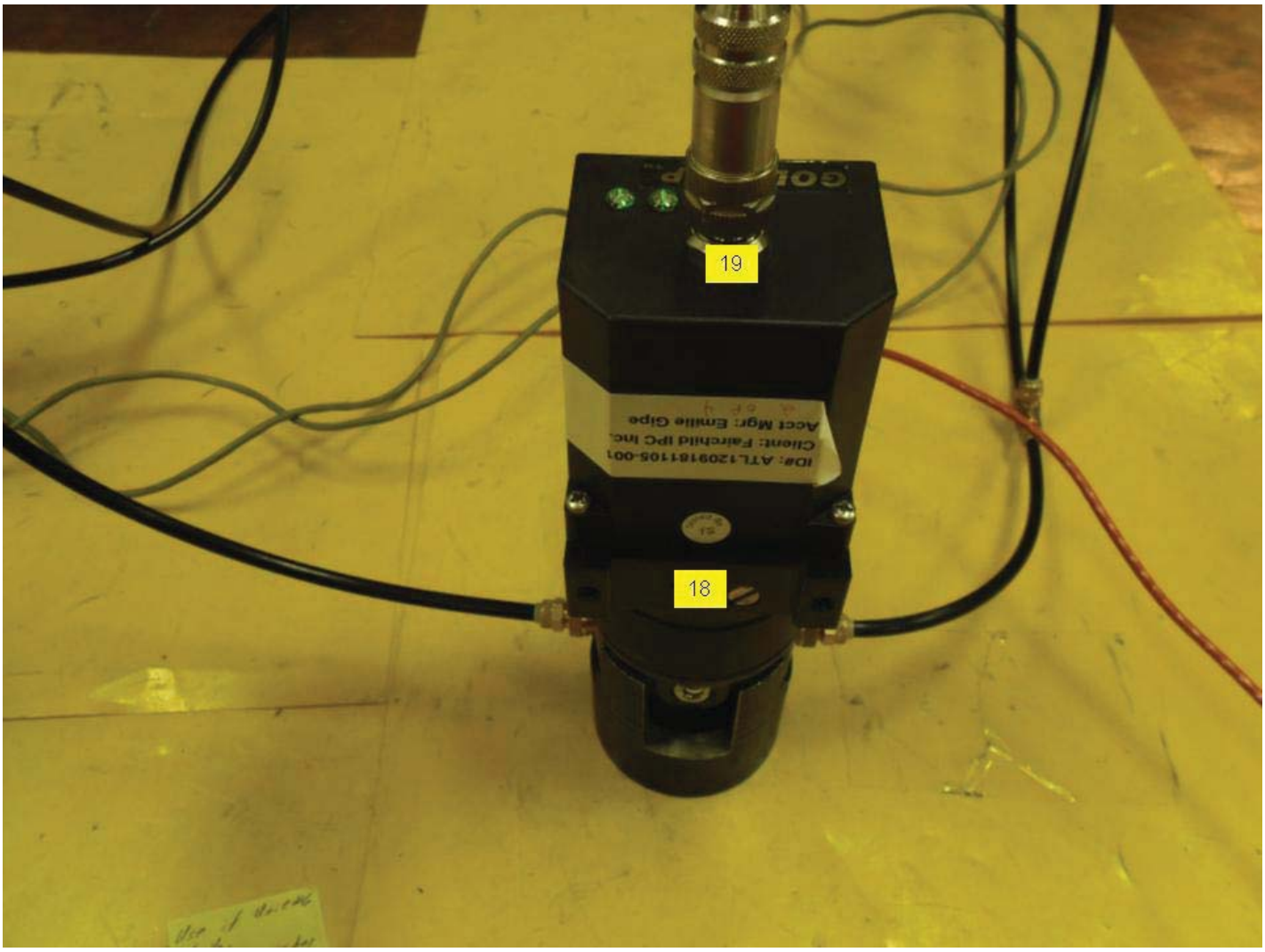
Photo:



Test Points

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

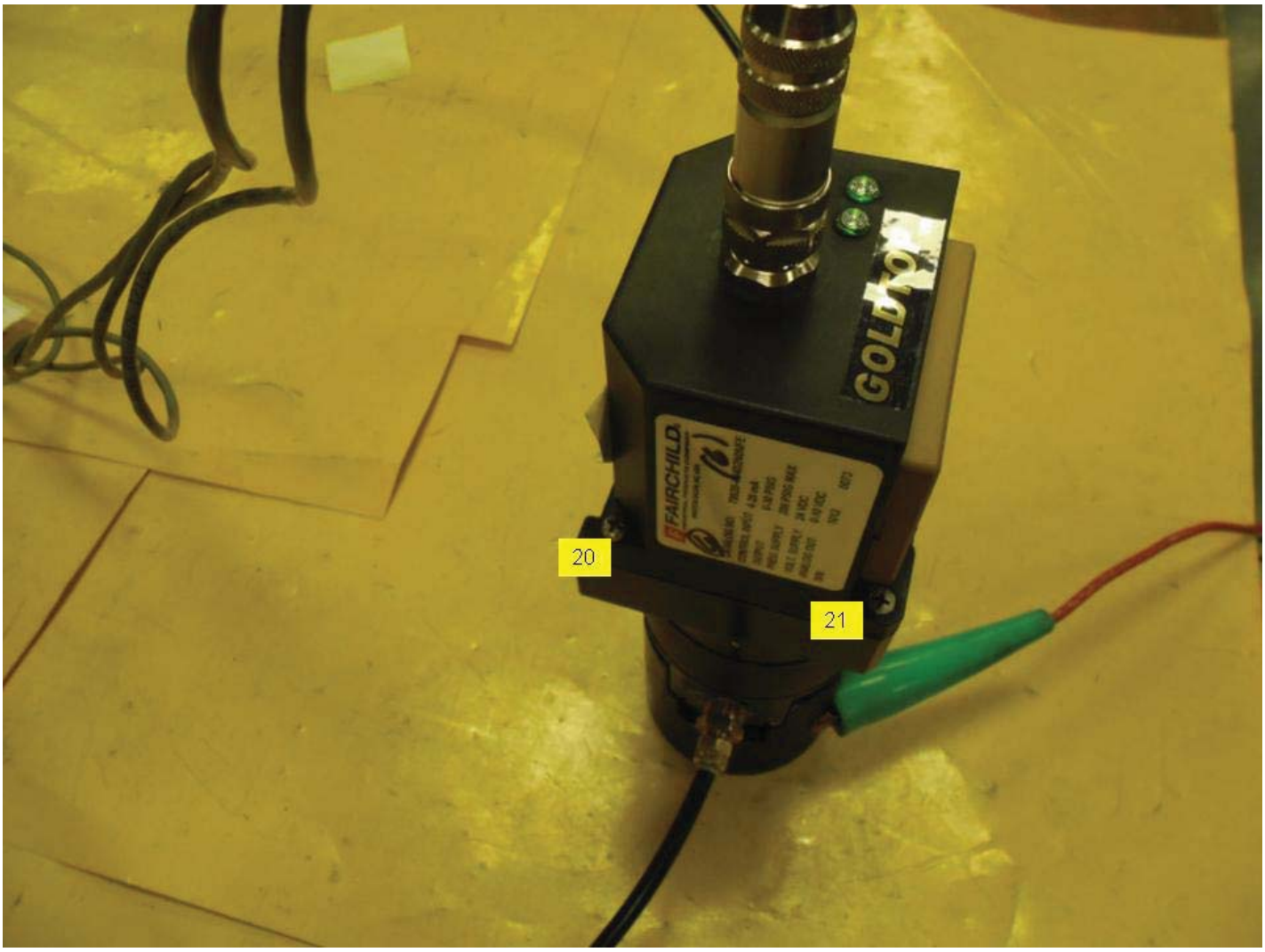
Photo:



Test Points

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Photo:



Test Points

7.0 Electrostatic Discharge Immunity Test (IEC 61000-4-2)

Data:

Test Point	Discharge Voltage > Type	Test Voltages, Polarities and Result Classification								Air Disc				
		2 kV		4 kV		6 kV		8 kV			15 kV		___kV	
		Pos	Neg	Pos	Neg	Pos	Neg	Pos	Neg		Pos	Neg	Pos	Neg
HCP	Contact	A(1)	A(1)	A(1)	A(1)									
Edge	Contact	A(2)	A(2)	A(2)	A(2)									
VCP	Contact	A(3)	A(3)	A(3)	A(3)									
1~ 21	Contact	A	A	B(4)	B(4)									
22~29	Air	A	A	A	A	A	A	A	A					

Standard: IEC61326
Input Voltage: 24VDC
Resistor Value: 990 kOhms
Waveform Verifed: **Yes**

Test Levels: See Matrix

Ambient Temperature: 22 °C
Relative Humidity: 35 %
Atmospheric Pressure: 986 mbars

Notes:
(1) Discharged to Horizontal Coupling Plane, 4 locations.
(2) Discharged to front edge of Horizontal Coupling Plane
(3) Discharged to Vertical Coupling Plane, 4 locations.
(4) During the discharged PSI reading drop from15 to 13.5 ~14 and the LED turn red and back to normal by itself
(5) The EUT were test with both ground point and no ground for both EUT and the result stay the same.

8.0 Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)

Method:

TEST SIGNAL VERIFICATION
During the testing described below, the field probe should be located in the test area and monitored to verify that an electromagnetic field is indeed being generated.

CALIBRATION OF THE UNIFORM FIELD
The uniform field area is a 1.5 m x 1.5 m vertical plane of the field in which its magnitude over the defined area is within 0 dB to +6 dB of 18V/m, over 75% of the surface (i.e. if at least 12 of the 16 points measured are within the tolerance). The uniform area is calibrated in the empty test enclosure. The transmitting antenna shall be placed at a distance sufficient to allow the calibration area to fall within the beam width of the transmitted field. 3 m is sufficient.

If the area intended to be occupied by the face of the actual EUT is larger than 1.5 m x 1.5 m, a calibration will be necessary at different radiating antenna locations to allow the EUT to be illuminated in a series of tests. In the test set-up, the EUT shall have its face illuminated coincident with this plane. In order to establish the severity of the test for EUTs and wires which must be tested close to the earth reference plane or which have larger sides than 1.5 m x 1.5 m, the intensity of the field is also recorded at 0.4m height, and for the full width and height of the EUT, and reported in the test report.

Calibration of the uniform area is controlled by the automated test software. The procedure is to run the software and follow its direction.

EQUIPMENT UNDER TEST (EUT) SETUP
All testing of equipment shall be performed in a configuration as close as possible to the installed case. The equipment shall be in its housing with all covers and access panels in place.

When an EUT consists of floor-standing and table-top components, the correct relative positions shall be maintained.

Table top equipment shall be placed on a non-conducting 0.8 m platform. Floor-standing equipment shall be mounted on a non-conducting support 0.1 m above the supporting plane. Floor-standing equipment which is capable of being stood on a non-conducting 0.8 m high platform, i.e. equipment which is not too large or heavy, or where its elevation would not create a safety hazard, may be so arranged.

If the wiring to and from the EUT is not specified, unshielded parallel conductors shall be used. Wiring is left exposed to the electromagnetic field for a distance of 1 m from the EUT. The bundled length of exposed wiring is run in a configuration which essentially simulates normal wiring; that is, the wiring is run to the side of the EUT, then either up or down as specified in the installation instructions. A non-conductive rack should be used to hold the cables if the cable management is undefined. Route the cables over the product in a horizontal manner in the plane of the uniform field. The horizontal/vertical arrangement helps to ensure worst case condition.

Wiring between enclosures of the EUT shall be treated as follows:
1) The manufacturer's specified wiring types and connectors shall be used;
2) If the manufacturer's specification requires a wiring length of less than or equal to 3 m, then the specified length shall be used. The wiring shall be bundled low-inductively to 1 m length;
3) If the specified length is greater than 3 m, or is not specified, then the illuminated length shall be 1 m. The remainder is decoupled, for instance via lossy r.f. ferrite tubes.
The EMI filtering used shall not impair the operation of the EUT. The method used shall be recorded in the test report.

TEST PROCEDURE
Position the EUT such that the front of the unit faces the antenna at the 0 deg position of the turntable. Care should be taken to ensure that the EUT is positioned square to the antenna at each test position.

The test is controlled by the test software. The operator is responsible to input the correct field strength and other test parameters and to position the EUT for each test run.

The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and be able to respond.

During the test, the applied signal will be 80% AM modulated (1 kHz, sinusoidal).

The test shall normally be performed with the generating antenna facing each of the four sides of the EUT. When equipment can be used in different orientations (i.e. vertical or horizontal), the test shall be performed on all sides. Photographs of each orientation are to be taken.

The polarization of the field generated by each antenna necessitates testing each side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally.

For testing below 1GHz, the biconilog antenna shall be positioned at 3 meters from the plane of field uniformity.
For testing above 1GHz, the horn antenna shall be positioned at 2.5 meters from the plane of field uniformity.

EVALUATION OF THE TEST RESULTS
Before, during and after each event, the CE Immunity Verification Method should be used to exercise, verify and classify any resulting observations. All results should be recorded below.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
80 MHz to 1 GHz: 2.4 dB
1 to 2.7 GHz: 2.6 dB

8.0 Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
150W Amplifier, 10kHz-220MHz	Amplifier Research	150A220	200136	VBU	VBU
50-Watt Amplifier, 0.8-4.2GHz	Amplifier Research	50S1G4A	09-085	VBU	VBU
Amplifier	IFI	CMX5001	213177	VBU	VBU
Antenna, Biconlog, 80-1000MHz	EMCO	3143	213008	VBU	VBU
Antenna, Horn, <18 GHz	EMCO	3115	BOX-HORN1	08/28/2012	08/28/2013
Digital Pocket Thermometer and Hydrometer	Mannix	SAM700BAR	211897	12/09/2011	12/09/2012
Field Monitor	ETS-Lindgren	HI-6100	200143	10/10/2011	VBU
Isotropic Field Probe (10MHz-40GHz)	ETS-Lindgren	HI-6053	200142	01/18/2012	01/18/2013
Power Meter	Boonton	4321A	003178	03/20/2012	03/20/2013
Power Sensor, Dual Diode, 10kHz to 8GHz, 20dBm	Boonton	51011-EMC	200125	12/15/2011	12/15/2012
Signal Generator, 9kHz-3200MHz	Hewlett Packard	8648C	200148	06/27/2012	06/27/2013
Tile - software profile for radiated immunity testing	Software	Tile - Rad Imm	SW013	12/08/2011	12/08/2012

Results: The sample tested was found to Comply.

8.0 Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)

Photo:

Test Setup

8.0 Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)

Photo:

Test Setup HF

8.0 Radiated, radio-frequency, electromagnetic field immunity test (IEC 61000-4-3)

Data:

Field Level (V/m)	Frequency Range MHz	Antenna Polarity, Azimuths and Result Classification							
		Vertical				Horizontal			
		0	90	180	270	0	90	180	270
10	80-1000	A	A	A	A	A	A	A	A
3	1400-2000	A	A	A	A	A	A	A	A
1	2000-2700	A	A	A	A	A	A	A	A

Standard: IEC 61326-1

Input Voltage: 24VDC

Observed on field probe: Yes

Test Levels: 10 V/m 80-1000 MHz
3 V/m 1.4-2.0 GHz
1 V/m 2.0-2.7 GHz

Ambient Temp: 22 °C
Relative Humididty: 51%
Atmospheric Pressure: 991 mbars

Notes:
None

Deviations, additions, or exclusions: None

9.0 Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)

Method:

TEST SIGNAL VERIFICATION
An oscilloscope should be used to verify the application of the EFT.

GENERAL
The following is taken from IEC 1000-4-4. The operator is required to configure the EUT to test and execute the test program which included specifying the test parameters.
Testing should take place within an ambient temperature of 15 to 35°C, relative humidity of 25 to 75% and an atmospheric pressure of 860 to 1060 mbar.

TEST SETUP
EUTs, whether stationary floor-mounted or table top, and equipment designed to be mounted in other configurations, shall be placed on a ground reference plane and shall be insulated from it by an insulating support 0,1 m ± 0,01 m thick.
In the case of table-top equipment, the EUT should be located 0,1 m ± 0,01 m above the ground reference plane (see Figure 7). Equipment normally mounted on ceilings or walls shall be tested as table-top equipment with the EUT located 0,1m ± 0,01 m above the ground reference plane.
The test generator and the coupling/decoupling network shall be placed directly on, and bonded to, the ground reference plane.
The ground reference plane shall be a metallic sheet (copper or aluminium) of 0,25 mm minimum thickness; other metallic materials may be used but they shall have 0,65 mm minimum thickness.
The minimum area of the ground reference plane is 1 m × 1 m. The actual size depends on the dimensions of the EUT.
The ground reference plane shall project beyond the EUT by at least 0,1 m on all sides.
The ground reference plane shall be connected to the protective earth.
The EUT shall be arranged and connected to satisfy its functional requirements, according to the equipment installation specifications.
The minimum distance between the EUT and all other conductive structures (e.g. the walls of a shielded room), except the ground reference plane shall be more than 0,5 m.
All cables to the EUT shall be placed on the insulation support 0,1 m above the ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.
The EUT shall be connected to the earthing system in accordance with the manufacturer's installation specifications; no additional earthing connections are allowed.
The connection impedance of the coupling/decoupling network earth cables to the ground reference plane and all bondings shall provide a low inductance. Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages. The test voltages shall be coupled to all of the EUT ports including those between two units of equipment involved in the test, unless the length of the interconnecting cable makes it impossible to test.
Decoupling networks shall be used to protect auxiliary equipment and public networks.
When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces, except the ground reference plane beneath the coupling clamp, shall be 0,5 m.
Unless otherwise specified in the product standard or the product family standard, the length of the signal and power lines between the coupling device and the EUT shall be 0,5 m ± 0,05 m.
If the manufacturer provides a non-detachable supply cable more than 0,5 m ± 0,05 m long with the equipment, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0,1 m above the ground reference plane.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
Voltage: +\- 10%
Rise Time: +\- 30%

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
Application to control EMC Pro Plus for -4-4, -4-5, -4-8, -4-11	Software	CEWare 32 (v 4.00)	SW018	12/08/2011	12/08/2012
Coupling Clamp	Compliance Design	801-4-CC	213118	VBU	VBU
EMC Immunity Test System	KeyTek	EMC Pro Plus	012906	04/18/2012	04/18/2013
THDX	Oregon Scientific	BA888	T006217	11/14/2011	11/14/2012

Results: The sample tested was found to Comply.

9.0 Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)

Photo:

Setup

9.0 Electrical Fast Transient/Burst Immunity Test (IEC 61000-4-4)

Data:

Test Point	Coupling Method	Test Voltages, Polarities, and Result Classification									
		0.25kV		0.5kV		1 kV		2 kV		4 kV	
		pos	neg	pos	neg	pos	neg	pos	neg	pos	neg
T9020-00402NNNFE											
Cables 3/4	Capacitive Clamp			A	A	B1	A	B2	B2		
Cables 5/6	Capacitive Clamp			A	A	B1	A	B3	B3		
T9020-40402N0NFE											
Cables 1/2	Capacitive Clamp			A	A	A	A	B4	B5		
Cables 3/4	Capacitive Clamp			A	A	A	A	B6	B7		
Cables 5/6	Capacitive Clamp			A	A	B1	A	B8	B9		

Standard: EN61326-1
Input Voltage: 24Vdc
EFT observed on oscilloscope: Yes
Ground Strap used: Yes

Test Levels: Signal: 2k
Ambient Temperature: 22 °C
Relative Humidity: 47%
Atmospheric Pressure: 987 mbars

Notes:

(1) Display reading consjstently w ithin 1 Psi, but observed display reading around 13 Psi. Returns to normal after testing.
(2) Observed a display reading of V 3.47 during testing. Normal display reading returns after testing.
(3) Display reading V 3.47 frozen on display during testing. Normal display reading returns after testing.
(4) Display reading consjstently w ithin 1 Psi, but observed display reading around 10 & 17 Psi. Returns to normal after testing.
(5) Display reading consjstently w ithin 1 Psi, but observed display reading around 12 & 16 Psi. Returns to normal after testing.
(6) Display reading consjstently w ithin 1 Psi, but observed display reading around 8 & 20 Psi. Returns to normal after testing.
(7) Display reading consjstently w ithin 1 Psi, but observed display reading around 13 & 20 Psi. Returns to normal after testing.
(8) Display reading consjstently w ithin 1 Psi, bur observed display reading around 8 Psi. Returns to normal after testing.
(9) Display reading consjstently w ithin 1 Psi, but observed display reading around 12 & 18 Psi. Returns to normal after testing.

10.0 Surge Immunity Test (IEC 61000-4-5)

Method:

SIMULATOR VERIFICATION
Prior to conducting the surge test, verification should be performed to ensure proper operation of the simulator.

GENERAL
This test is performed in accordance with EN 61000-4-5.

CLIMATIC CONDITIONS
Testing should take place within an ambient temperature of 15 to 35°C, relative humidity of 10 to 75% and an atmospheric pressure of 860 to 1060 mbar.

TEST SETUP
The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines and to provide sufficient decoupling impedance to the surge wave so that the specified wave may be developed on the lines under test. The coupling/decoupling network is built into the test generator.

If not otherwise specified the power cord between the EUT and the coupling/decoupling network shall be 2 m in length (or shorter).

To simulate the representative coupling impedance, in some cases, additional specified resistors have to be used for the tests.

If the actual operating signal sources are not available, they may be simulated.

TEST DETAILS
The following items are met when the test sequence for full compliance is run on the EMC-Pro. This test sequence is included in the control software.

If not otherwise specified the surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the O.C. voltage wave (positive and negative).

The surges have to be applied line to line and line(s) and earth. When testing line to earth the test voltage has to be applied successively between each of the lines and earth, if there is no other specification.

The test procedure shall also consider the non-linear current-voltage characteristics of the equipment under test. Therefore the test voltage has to be increased by steps up to the test level specified in the results section. All lower levels including the selected test level shall be satisfied. To find all critical points of the duty cycle of the equipment, a sufficient number of positive and negative test pulses shall be applied.

Before, during and after each event, verify and classify any resulting observations. All results should be recorded below.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
Voltage: +\- 10%
Rise Time: +\- 30%

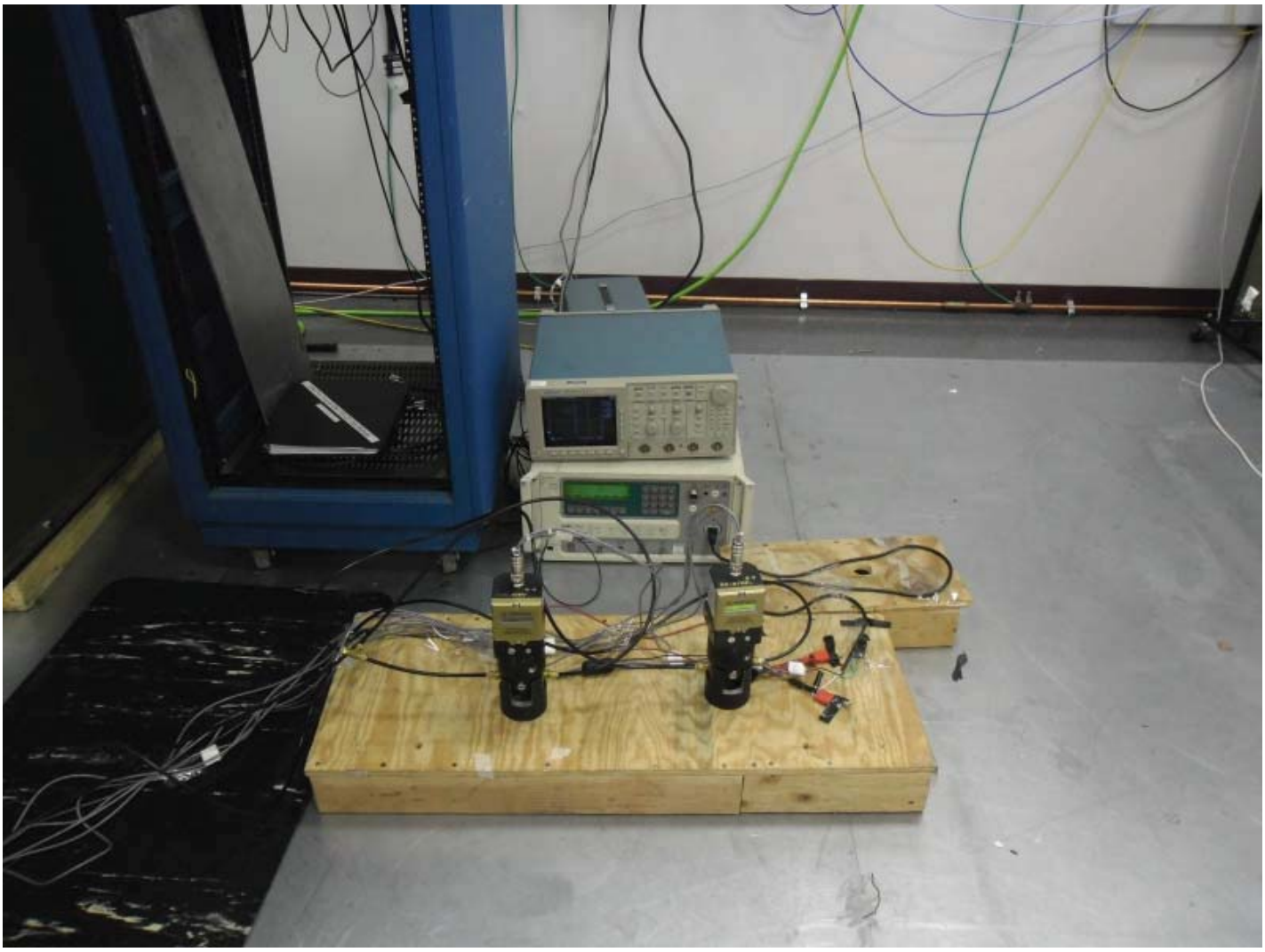
Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
EMC Immunity Test System	KeyTek	EMC Pro	213192	04/12/2012	04/12/2013
Power Supply	Tektronix	PS280	215027	VBU	VBU
THDX	Oregon Scientific	BA888	T006217	12/09/2012	12/09/2013

Results: The sample tested was found to Comply.

10.0 Surge Immunity Test (IEC 61000-4-5)

Photo:



Test Setup

10.0 Surge Immunity Test (IEC 61000-4-5)

Data:

Test	Test Voltages, Polarities, and Result Classification							
	0.5kV		1kV		2kV		4kV	
	pos	neg	pos	neg	pos	neg	pos	neg
L1-PE, at 0 deg	A	A	A	A	A	A		
N-PE, at 0 deg	A	A	A	A	A	A		
L1-N, at 0 deg	A	A	A	A				

Standard: EN61326
Input Voltage: 24VDC
Observed on oscilloscope: Yes
Test Levels: See matrix
Ambient Temperature: 22 °C
Relative Humidity: 35%
Atmospheric Pressure: 984 mbars

Notes:
(1) This is an example of how to record notes that accompany a degradation.

Test Matrix	Line to Physical Earth (ground)	Line to Line (or Neutral)
AC:	N/A	N/A
DC:	2KV	1KV
Indoor Signal:	N/A	N/A
Outdoor Signal:	N/A	N/A

Deviations, additions, or exclusions: None

11.0 Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)

Method:

TEST SIGNAL VERIFICATION
During the testing described below, a current clamp connected to the power meter should be placed on the cable to which the test signal is coupled. The power meter should then be monitored to verify that the signal is indeed being coupled onto the cable.

COUPLING AND DECOUPLING NETWORKS (CDNs)
The disturbing signal shall be coupled to the supply lines, using type CDN-M1 (single wire), CDN-M2 (two wires) or CDN-M3 (three wires) networks. If in real installations the supply wires are individually routed, separate coupling and decoupling networks CDN-M1 shall be used and all input ports shall be treated separately.

If the EUT is provided with other earth terminals (e.g. for RF purposes or high leakage currents), they shall be connected to the ground reference plane:
- through the CDN-M1 when the characteristics or specification of the EUT permit. In this case, the (power) supply shall be provided through the CDN-M3 network;
- when the characteristics or specification of the EUT do not permit to have a CDN-M1 network in series with the earth terminal for RF or other reasons, the earth terminal shall be directly connected to the ground reference plane. In this case the CDN-M3 network shall be replaced by a CDN-M2 network to prevent an RF short circuit by the protective earth conductor. When the equipment was already supplied via CDN-M1 or CDN-M2 networks, these shall remain in operation.

For coupling and decoupling disturbing signals to an unscreened cable with balanced lines, a CDN-T2, CDN-T4 or CDN-T8 shall be used as coupling and decoupling network.
- CDN-T2 for a cable with 1 symmetrical pair (2 wires).
- CDN-T4 for a cable with 2 symmetrical pairs (4 wires).
- CDN-T8 for a cable with 4 symmetrical pairs (8 wires).

CLAMP INJECTION
For balanced or non-balanced multi-pair cables, clamp injection is more appropriate.

With clamp injection devices, the coupling and decoupling functions are separated. Coupling is provided by the clamp-on device while the common-mode impedance and the decoupling functions established at the auxiliary equipment. As such, the auxiliary equipment becomes part of the coupling and decoupling devices.

SETTING (CALIBRATION) OF THE TEST GENERATOR
During the setting of the test generator, all connections to the EUT and AE Port of the coupling and decoupling devices, other than those required, shall be disconnected either to avoid short-circuit conditions or to avoid destruction of the measurement equipment.

After the correct settings have been made, the modulation shall be switched on and checked using an RF oscilloscope.

During the tests the modulation shall remain switched on.

SETTING OF THE OUTPUT LEVEL AT THE EUT PORT OF THE COUPLING DEVICE
The test generator shall be connected to the RF input port of the coupling device. The EUT port of the coupling device shall be connected in common-mode through the 150 ohm to 50 ohm adapter to a measuring equipment having a 50 ohm input impedance. The AE port shall be loaded in common-mode with a 150 ohm to 50 ohm adapter, terminated with 50 ohms.

The setting has to be performed for each individual coupling and decoupling device.

TEST SET-UP
The equipment, both table-top and floor-standing, to be tested is placed on an insulating support of 0.1 m height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 m and 0.3 m from the projected geometry of the EUT on the ground reference plane.

All cables, selected for testing, shall be terminated functionally as close as possible to the real installation conditions.
When several cables coming from the EUT are in close proximity over a length of more than 10 m or going from the EUT to another equipment in a cable tray or conduit they shall be treated as one cable.

In general, it is sufficient that only a limited number, n (With 2 <= n <= 5) of current distributions through the EUT are excited. Testing shall be carried out using the most sensitive cable configuration. All other cables connected to the EUT shall either be disconnected (when functionally allowed) or provided with decoupling networks only.

= = > EUT comprising a single unit
The EUT shall be placed on an insulating support, 0.1 m above the ground reference plane. For table-top equipment the ground reference plane may be placed on a table.

On all cables to be tested, coupling and decoupling devices shall be inserted. The coupling and decoupling devices shall be placed on the ground reference plane, making direct contact with it at about 0.1 m to 0.3 m from the EUT. The cables between the coupling and decoupling devices and the EUT shall be as short as possible and shall not be bundled nor wrapped. Their height above the ground reference plane shall be between 30 mm and 50 mm.

If the EUT is provided with other earth terminals, they shall, when allowed, be connected to the ground reference plane through the coupling and decoupling network CDN-M1.

If the EUT is provided with a keyboard or hand-held accessory, then the artificial hand shall be placed on this keyboard or wrapped around the accessory and connected to the ground reference plane.

11.0 Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)

Method:

Auxiliary equipment (AE) required for the defined operation of the EUT, as well as auxiliary equipment necessary for ensuring any data transfer and assessment of the functions, shall be connected to the EUT through coupling and decoupling devices. However, as far as possible the number of cables to be tested should be limited by restricting attention to the representative functions.

= = > EUT comprising several units
Equipment comprising several units which are interconnected together, shall be tested using one of the following methods.

Preferred method:
Each sub-unit shall be treated and tested separately as an EUT considering all others as AE. Coupling and decoupling devices shall be placed on the cables of the sub-units considered as the EUT. All sub-units shall be tested in turn.

Alternative method:
Sub-units that are always connected together by short cables, i.e. <= 1 m, and that are part of the equipment to be tested can be considered as one EUT. No conducted immunity test shall be performed on their interconnecting cables, these cables being regarded as internal cables of the system.

The units being part of such an EUT shall be placed as close as possible to each other without making contact, all on the insulating support 0.1 m above the ground reference plane. The interconnecting cables of these units, shall also be placed on the insulating support. Coupling and decoupling devices shall be placed on all other cables of the EUT, e.g. on cables to the mains supply and auxiliary equipment.

= = > Injection Using the Current Clamp
Each AE used with clamp injection shall represent the functional installation conditions as closely as possible. To approximate the required common-mode impedance the following measures need to be taken.

- Each AE, used with clamp injection, shall be placed on an insulating support 0.1 m above the ground reference plane.

- All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. These decoupling networks shall be applied no further than 0.3 m from the AE. The cable(s) between the AE and the decoupling network(s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane.

- The cable length between the AE and the clamp injection device shall be as short as possible (<=0.3 m) to improve reproducibility at higher frequencies (>=30 MHz).

- At each AE the decoupling network installed on the cable, closest to the one(s) being connected to the EUT, shall be replaced by a CDN which is terminated at its input port with 50 ohms. This CDN represents the 150 ohm loading of the AE to the ground reference plane. In the case where the AE is provided with a (separate) earth terminal, this earth terminal shall be connected through a CDN-M1 network, terminated with 50 Ohm at the input port, to the ground reference plane while keeping decoupling networks on all other cables.

When using clamp injection and the common-mode impedance requirements cannot be met at the AE side, it is necessary that the common-mode impedance of the AE is less than or equal to the common-mode impedance of the EUT port being tested. If not, measures shall be taken, e.g. by using decoupling capacitors at the AE port, to satisfy this condition.

- Each AE and EUT used with clamp injection shall represent the functional installation conditions as close as possible e.g. either the EUT shall be connected to the ground reference plane or placed on an insulating support.

- By means of an extra current probe (having low insertion loss), inserted in between the injection clamp and the EUT, the current resulting from the induced voltage shall be monitored. If the current exceeds the nominal circuit value Imax given below, the test generator level shall be reduced until the measured current is equal to the Imax value:
Imax = Uo/150 ohm

TEST PROCEDURE
When using a CDN, a proper connection must be made between the ground plane and the CDN. Ensure that the ground plane and underside of the CDN are clean and free of anything which would prohibit complete surface to surface contact. Tape the CDN to the ground plane with copper tape.

The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn while the other non-excited RF input ports of the coupling devices are terminated by a 50 ohm load resistor.

The frequency range is swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80% amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal or to switch coupling devices as necessary. The rate of sweep shall not exceed 1.5 x 10^-3 decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.

The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and able to respond. Sensitive frequencies e.g. clock frequency(ies) and harmonics or frequencies of dominant interest shall be analyzed separately.

Before, during and after each event, the EC EMC Imm Verification: 6/01 Method should be used to verify and classify any resulting observations. All results should be recorded below. Photos should be taken of showing the setup of every coupling device used.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
150 kHz to 230 MHz: +/- 1.9 dB

11.0 Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
100W Amplifier (10kHz-1000MHz)	IFI	SMX100	200140	VBU	VBU
Attenuator, 06 dB, <18GHz	Weinschel Corp	59-6-34	211565	VBU	VBU
EM Injection Clamp (10kHz-1GHz)	Fischer Custom Comm	F-203I-23mm	200147	04/03/2012	04/03/2013
Power Meter	Boonton	4321A	003178	03/20/2012	03/20/2013
Power Meter	Boonton	4232A-01	211504	02/21/2012	02/21/2013
Power Sensor, Dual Diode, 10kHz to 8GHz, 20 dBm	Boonton	51011-EMC	200065	03/20/2012	03/20/2013
Signal Generator, 10kHz-990MHz	Hewlett Packard	8656B	LEX-1016	06/15/2012	06/15/2013
THDX	Oregon Scientific	BA888	T006217	11/14/2011	11/14/2012
Tile - software profile for conducted immunity testing	Software	Tile - Cond Imm	SW012	12/08/2011	12/08/2012

Results: The sample tested was found to Comply.

11.0 Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)

Photo:

Setup

11.0 Immunity to conducted disturbances, induced by radio-frequency fields (IEC 61000-4-6)

Data:

Injection Device Type	Port Description	Test Level (Vrms)	Result Classification
Clamp	Unit T9020-00402 NNNFE Cables 3/4	3	Pass
Clamp	Unit T9020-00402 NNNFE Cables 5/6	3	Pass
Clamp	Unit T9020-40402 N0NFE Cables 1/2	3	Pass
Clamp	Unit T9020-40402 N0NFE Cables 3/4	3	Pass
Clamp	Unit T9020-40402 N0NFE Cables 5/6	3	Pass

Standard: EN61326-1
Input Voltage: 24Vdc

Test Levels: 3Vrms 80% AM @1khz

Ambient Temperature: 22 °C
Relative Humidity: 47%
Atmospheric Pressure: 987 mbars

Notes:
All measurement reading w ere w ithin ± 1 PSI.

Deviations, additions, or exclusions: None

12.0 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)

Method:

A calibration is performed before testing was started. Place a magnetic field sensor in the center of the loop of 1-meter diameter. Input a current into the loop at the power frequency. Increase the current until the test level is read on the magnetic field sensor. De-energize the loop. Place the EUT in the center of the loop with a minimum buffer distance of 10 cm from the EUT to the edge of the loop. Re-energize the loop to generate the test level. Monitor the EUT for performance. If an error occurs, reduce the test level until the test system recovers. Increase the test level until the error occurs again. Record the current as the threshhold. Note this threshold and any error conditions.

MEASUREMENT UNCERTAINTY
Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes. The values given are the measurement uncertainty values with an expanded uncertainty of k=2.
20 Hz to 1 kHz: +/- 0.9 dB

Test Equipment Used:

Description:	Manufacturer:	Model:	Asset Number:	Cal Date:	Cal Due:
AC Power Source	California	1001P	211365	VBU	VBU
Digital Pocket Weatherman - Temperature, Humidity, and Barometric Pressure.	Mannix	SAM700BAR	211759	11/30/2011	11/30/2012
ELF Field Monitor	Walker Scientific In	ELF-60D	213197	12/16/2011	12/16/2012
Loop, Radiating, 30 A/m	Intertek	1000-4-8-1	200024	VBU	VBU

Results: The sample tested was found to Comply.

12.0 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)

Photo:

Test Setup

12.0 Power Frequency Magnetic Field Immunity Test (IEC 61000-4-8)

Data:

Test Location/ Mode/ EUT AC Input	Test Level (A/m)	Frequency (Hz)	Result Classification		
			X - Axis	Y - Axis	Z - Axis
Enclosure/ Operating/ 24 Vdc	30	50	A	A	A
Enclosure/ Operating/ 24 Vdc	30	60	A	A	A

Standard: EN 61326-1
Input Voltage: 24Vdc
Measured field prior to test (milliGauss): 0.7

Test Levels: 30A/m

Ambient Temperature: 21.5 °C
Relative Humidity: 49.60%
Atmospheric Pressure: 986.3 mbars

Notes:
None.

Deviations, additions, or exclusions: None

13.0 Revision History (Revision History)

Method:

Document the history of the report.

13.0 Revision History (Revision History)

Data:

Revision Level	Date	Report Number	Notes
Original issue	December 13, 2012	100896624ATL-001	--
1	January 10, 2013	100896624ATL-001	Additional ESD and Surge testing on completed in first report
2	January 22, 2013	100896624ATL-001	Spelling Correct P3,5&26
3	February 1, 2013	100896624ATL-001	Changed model to T9000. Added to product description