ARIAN
CONTROL & INSTRUMENTATION

DIN15:
10KV Din rail Isolator & transmitter

Features

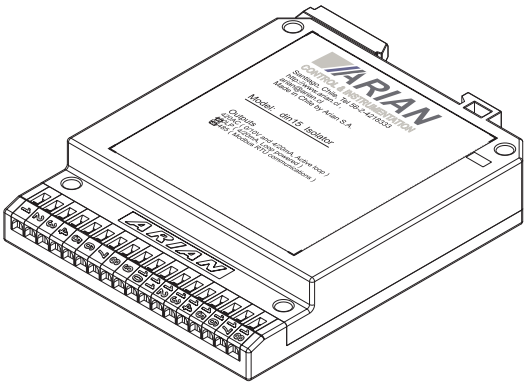
- **10KV AC continuous isolation.**
- **3 way isolation.**
- **User Configurable input, output**
- **4... 20mA or 0... 10V outputs**
- **User configured with RPS software.**
- **Reverse polarity protection**
- **5 years guarantee.**

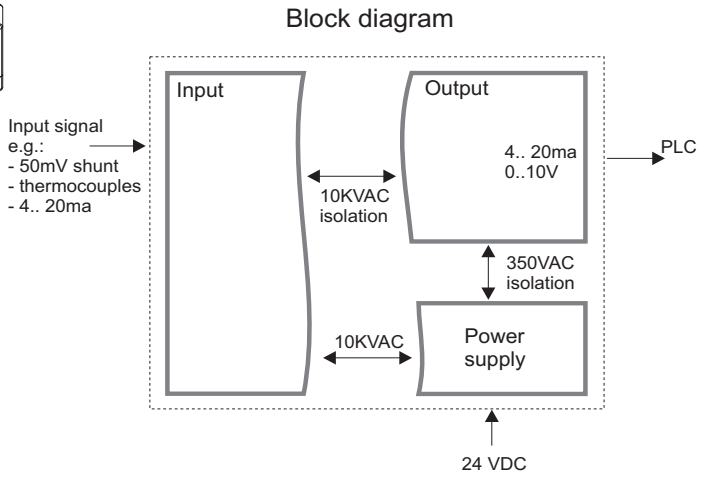
Applications

- **PLC/RTU inputs protection.**
- **Ground isolation.**
- **Analog sensor signal isolation**
- **Electrical isolation of input**
- **Zero/span adjustment**
- **Signal conversion/amplification/filtering.**

General description

The new DIN15 powered isolator converts common industrial low level input signals to a standard analog 4.. 20ma or 0..10v output for driving a safe area load (e.g PLC).
This new device was designed specially for withstanding continuously very high voltages such as found on railway locomotives motors. Isolation up to 10KV AC is specified as continuous, not just for 1 second or minutes, refer to the test report for more information.
Main isolation (10KV) is between the input port and the output and power supply ports. Additionally there is 350VAC isolation between the output port and power supply for simplifying connections having a floating ground output.
There are 2 variants for the DIN15 (DIN15T and DIN15V) depending on the required input signal.
Configuration and scaling is done in a personal computer using Arian RPS software
The DIN15 is a easy to configure microprocessor based device and consequently is rather slow. It will take about 1 second a change in the input to be reflected in the output. When a lower response time (10ms) is needed, the new Arian DIN-SD line of 10KV isolators are recommended.





Ordering information

Device types:

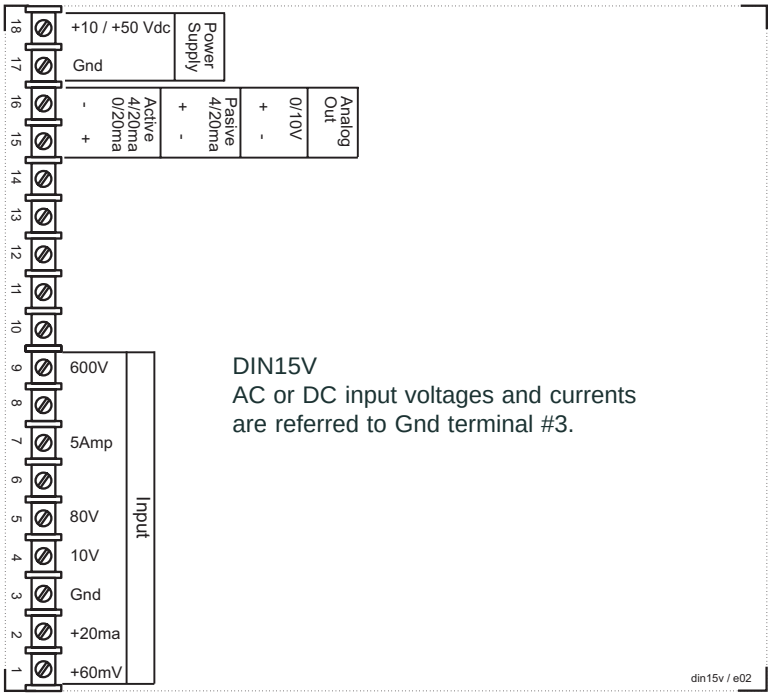
DIN15V	Scalable AC, DC voltage and current input.
DIN15T	Thermocouples, Pt100 and 4... 20ma input.

Output options:

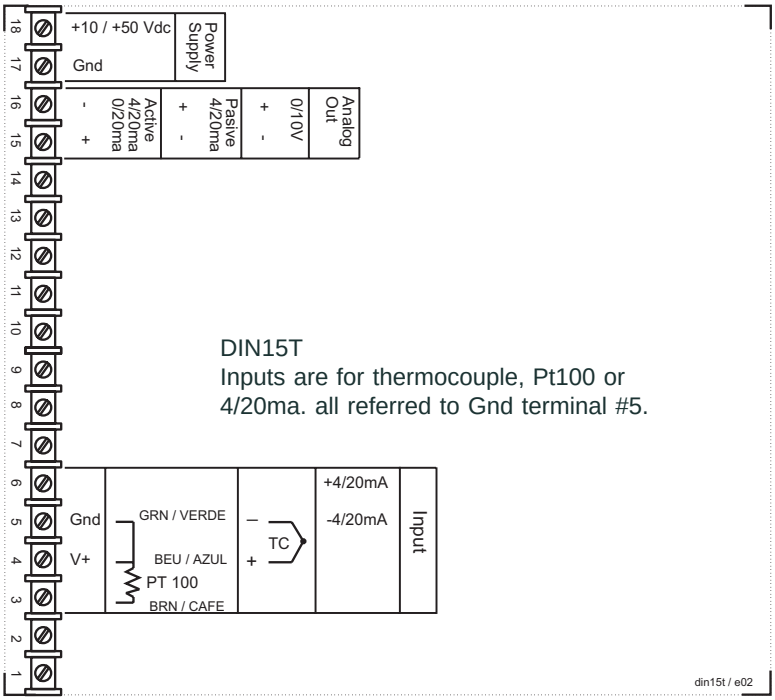
-A420	4.. 20ma active output
-A020	0.. 20ma active
-A010	0.. 10V output
-L420	4.. 20ma passive output

Example code:

DIN15T-A420



DIN15V
AC or DC input voltages and currents
are referred to Gnd terminal #3.



DIN15T
Inputs are for thermocouple, Pt100 or
4/20ma. all referred to Gnd terminal #5.

Technical Specifications

DIN15V Input

Resolution: 18 bit a/d, 1 sample/second
Dc: Bipolar symmetrical input (positive/negative voltages/currents)
Ac measure: Average absolute value, calibrated for sinusoidal wave.
Scales: DC: +/- 10V, 80V, 600V, 5A, 60mV, 120mV, 20mA, 5A,
AC: 10V, 80V, 600V, 5A

Input Impedance:

60mV and 120mV	> 10M ohms
20mA	7 ohms
5 Amperes	0.01 ohms
10V	35K ohms
80V	300K ohms
600V	2M ohms

DIN15T Input

Resolution: 16 bit a/d
Thermocouples (100 ohm max.): Centigrade Degrees or Fahrenheit

J	(-60, 760) °C
k	(-100, 1372) °C.
T	(-86, 400) °C.
R	-1 mV, 1767 °C.
S	-1 mV, 1764 °C.
B	-1 mV, 1815 °C.
N	(-139, 1298) °C.
E	(-176, 750) °C.
Platinel	(0, 1394) °C.
C	(0, 2314) °C.
D	(0, 2314) °C.
G	(0, 2313) °C.

PT100 (-136, 450) °C DIN43760, alpha=0.0385
4...20 mA, 0...20 mA, 0..50 mV, scalable for engineering units.

Outputs

Option L420, Passive 4... 20ma loop
Operating voltage: 30V max.
Current limit: 25ma. max

Options A420, A020, A010
Active 4... 20ma, 0... 20ma loop and 0...10V.
Output voltage: 16V max, (at 20ma, 800ohms R load max)
Current limit: 25ma. max

Power Supply

Nominal: 24VDC
Voltage range: 10... 50 VDC
Power consumption: 1.5 W max.

General

Isolation between the 3 sections:

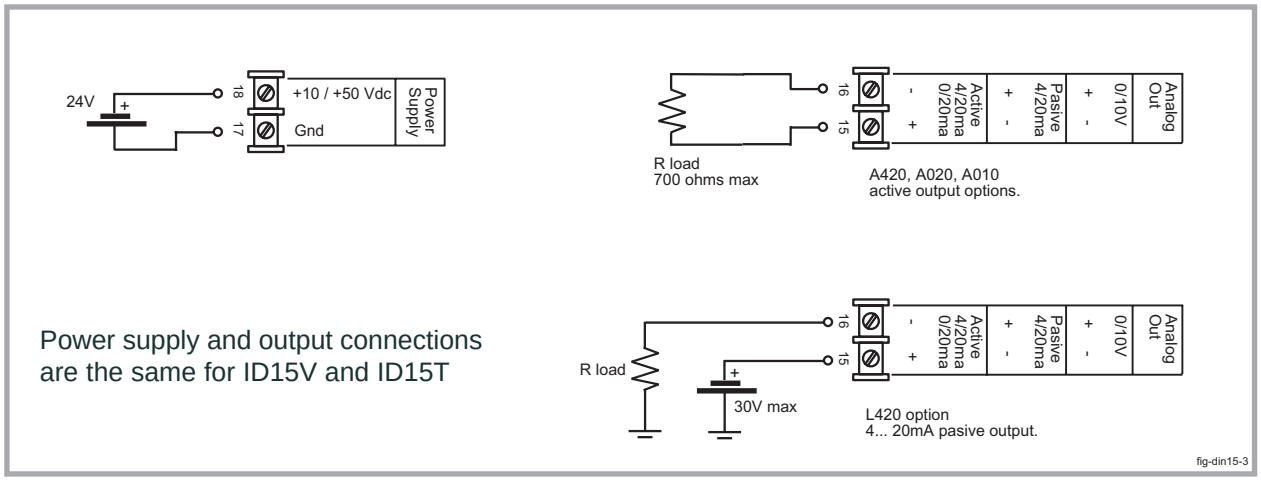
Input to output	10KV AC , > 12 hours Creepage path: 24mm
Input to power supply	10KV AC.
Output to power supply	350V AC.

Response time: 1 second
Defined as the time it takes an input step change to be reflected at the output.

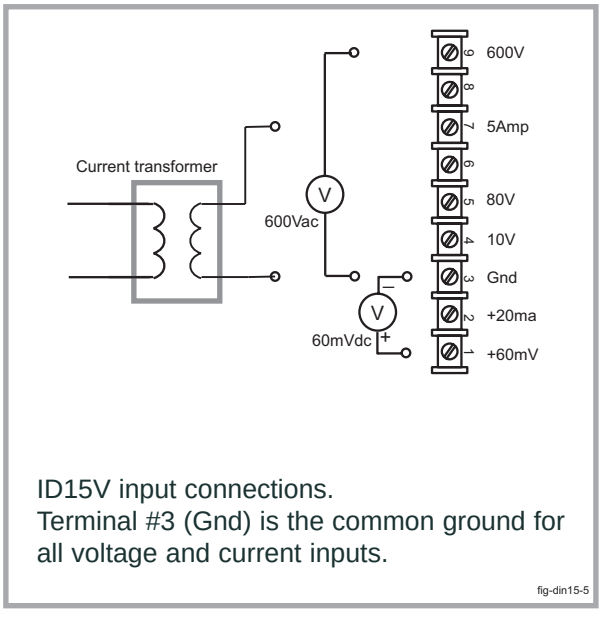
Construction

Case material: Reinforced polyester
Total Dimension: 121 x 98 x 23 mm.
Weight: 200 grams.
Operation temperature: -20 ... 50 °C.

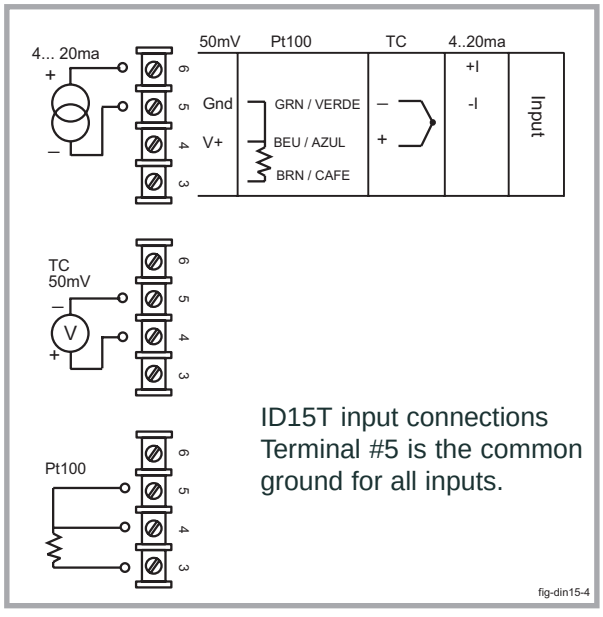
Depending on the input or sensor type, connections should be done as indicated in the following drawings.



Power supply and output connections are the same for ID15V and ID15T



ID15V input connections.
Terminal #3 (Gnd) is the common ground for all voltage and current inputs.



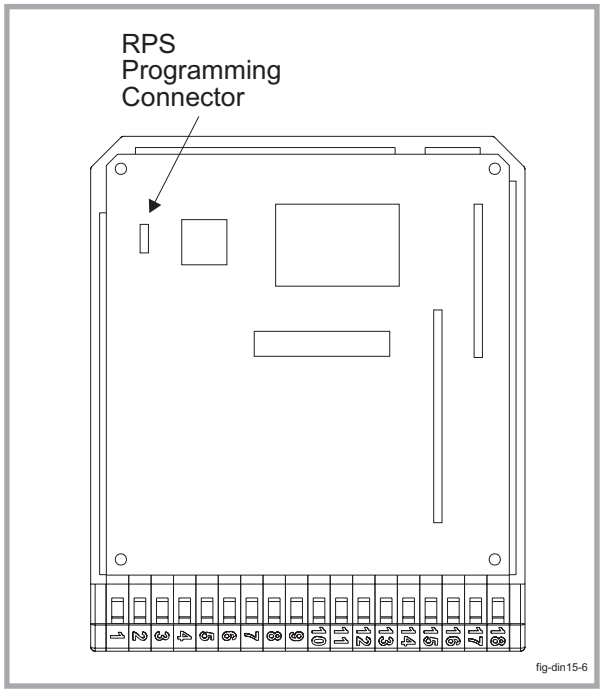
ID15T input connections
Terminal #5 is the common ground for all inputs.

Configuration

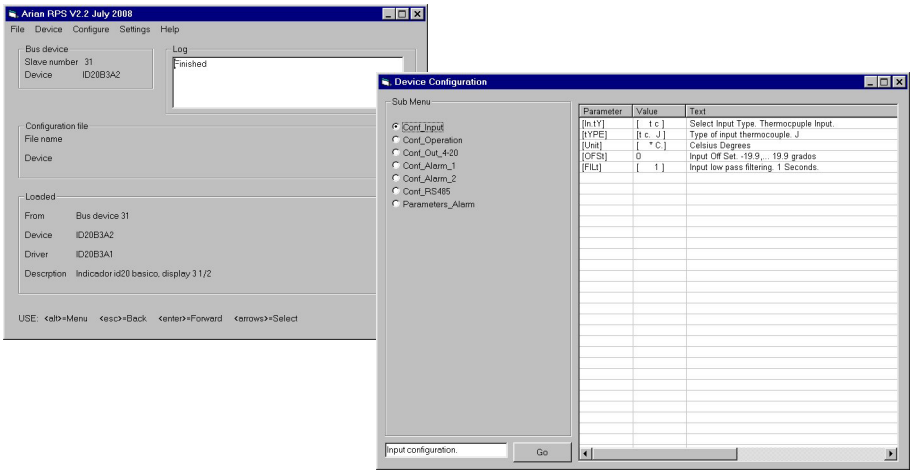
Set up configuration is done with the RPS interface cable and the software provided on http://www.arian.cl/downloads/arianrps.zip
The following is needed:

-PC compatible computer with USB port and windows OS.
-RPS software, download latest version.
-Isolating cable interface. Part# RPS-USB-V3

Remove the four top cover screws for accessing the RPS connector.



Connect the interface cable by one side to the internal connector and other side to the PC USB port. Once done the connection, execute the RPS software, it will identify the device and load the proper driver for reading and writing configuration parameters.
There is no need to energize the instrument while is configured.
The interface optically isolates PC from instrument for safety.
Concluded the programming unplug the interface from the device.



ID15V parameters:

The following are the parameters to be set for the DIN15V.
For didactic purposes, the following application example is used:
A 5 amp AC signal coming from a 250/5 ratio current transformer must be isolated and scaled 4..20ma for 0.. 250 amp., using a DIN15V-A420.

A c. d c. Select AC or DC type for input current or voltage.

A c.	AC
d c.	DC

example = A c.

I n. t Y Select scale and type for the AC or DC input.
Input signal must be contained in one of the following ranges.

1 0.V.	-10 to +10 VDC, 0 to 10VAC
8 0.V.	-80 to +80 VDC, 0 to 80VAC
6 0 0.V.	-600 to +600 VDC, 0 to 600VAC
5. A.	Current, -5 to +5A DC, 0 to 5A AC.
6 0 mV.	-60mV to +60mV DC
1 2 0 m.	-120mV to +120mV DC
2 0 m A.	-20mAV to +20mA DC

example = 5. A.

I n. L o Input signal (voltage or current) lower limit
example = 0

I n. H i Input signal (voltage or current) higher limit
example = 5

L c. L o = -999... 9999
Lower value for a internal variable representing the lower input limit.
example = 0

L c. H i = -999... 9999
Higher value for a internal variable representing the higher input limit.
example = 250,
So a 0..5amp input will have a 0.. 250 range for the internal variable

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F I L t = 1 ... 16
Time constant for filtering or conditioning noisy inputs. Internally the instrument carries out a first order low pass filter calculation with time constant "FILt". Can be set between 1 and 16 seconds.
Leave this value set to 1 second, increasing it only if its required by having noisy readings.

E. i n F = -999... 9999

Value of the internal variable that will correspond to the lower output limit 4ma.

For our example = 0

E. S u P = -1999... 9999

Value of the internal variable that will correspond to the higher output limit, (20ma. in this case)

For our example = 250

So the input range 0.. 250 will correspond to a 4..20ma output range

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Example 1

A field sensor output is dc voltage with the range -2V... +10V corresponding to a process value PV = 0... 100% on a linear ratio.

Output range 4..20ma is required for 0.. 80% input range

A c. d c. = d c.
I n t Y = 1 0 V.
I n. L o = -2
I n. H i = 10
L c. L o = 0
L c. H i = 100
F I L t = 1
E. i n F = 0
E. S u P = 80

Example 2

A process value 0..1000 is transmitted as 4..20mA current loop..

This same signal must be repeated in the output.

A c. d c. = d c.
I n t Y = 2 0 m A
I n. L o = 4
I n. H i = 20
L c. L o = 0
L c. H i = 1000
F I L t = 1
E. i n F = 0
E. S u P = 1000

Example 3

You have a 0..150VAC input generated proportional from a taco dynamo frequency range 0.. 1200Hz.

Output range must be 4..20ma. for a 0..1000Hz range

A c. d c. = A c.
I n t Y = 6 0 0 V.
I n. L o = 0
I n. H i = 150
L c. L o = 0
L c. H i = 1200
E. i n F = 0
E. S u P = 1000

ID15T parameters:

I n t Y Input type.

t c	thermocouple input
P100	RTD type Pt100 DIN43760 (-136, 450) C.
PrcS	processes input 4-20mA, 0-10Volts and others.

Selecting input as thermocouple or pt100, the instrument will ask for temperature units. While, if selected process variable input (0-20mA,4-20mA,..,0-50 millivolts), the instrument will ask for the limits or input calibration.

t Y P E Thermocouple type.
If select thermocouple input, now is set the type and temperature units.

	Type	Range
t c J	J	(-60, 760) C.
t c k	k	(-100, 1372) C.
t c t	T	(-86, 400) C.
t c r	R	-1 mV, 1767 C.
t c s	S	-1 mV, 1764 C.
t c b	B	-1 mV, 1815 C.
t c n	N	(-139, 1298) C.
t c E	E	(-176, 750) C.
t c PL	Platinel	(0, 1394) C.
t c C	C	(0, 2314) C.
t c d	D	(0, 2314) C.
t c G	G	(0, 2313) C.

t Y P E

Processes input	Type	Range
0 - 20.	0- 20 milliamperes.	-24 mA, 24 mA.
4 - 20.	4- 20 milliamperes.	2 mA, 24 mA.
0 - 50	0- 50 millivolts.	-10 mV, +60 mV

U n i t = °C. , °F.
Select Centigrade or Fahrenheit degrees. (only for temperature inputs)

O F S t = -19.9° ..., 19.9°
Input sensor off set adjustment. The programmed number will be added to measured temperature in order to compensate known errors.
Normally must be set to zero.

L. i n F = -999... 9999 (only for processes input type)
Introduce internal variable value for input at the lower limit of selected input type.
For example the input is 4-20mA originated in a temperature transducer that delivers 4 mA at 0 degrees and 20 mA at 1000 degrees.
In this case is being asked for the reading at 4 mA, that is LinF = 0.

L. S u P = -999... 9999 (only for processes input type)

Introduce internal variable value for input at the higher limit for selected input type.

For the same previous example, it is asking for reading at 20mA input, that is LSuP = 1000.

F I L t = 1 ... 16

Time constant for filtering or conditioning noisy inputs. Internally the instrument carries out a first order low pass filter calculation with time constant "FILt". Can be set between 1 and 16 seconds.

Leave this value set to 1 second, increasing it only if its required by having noisy readings.

E. i n F = -999... 9999

Value of the internal variable that will correspond to the lower output limit 4ma.

E. S u P = -1999... 9999

Value of the internal variable that will correspond to the higher output limit, (20ma. in this case)

Example 1 A a signal coming from a J type thermocouple must be isolated and traduced to a 4...20ma scaled 0 to 160C degrees.

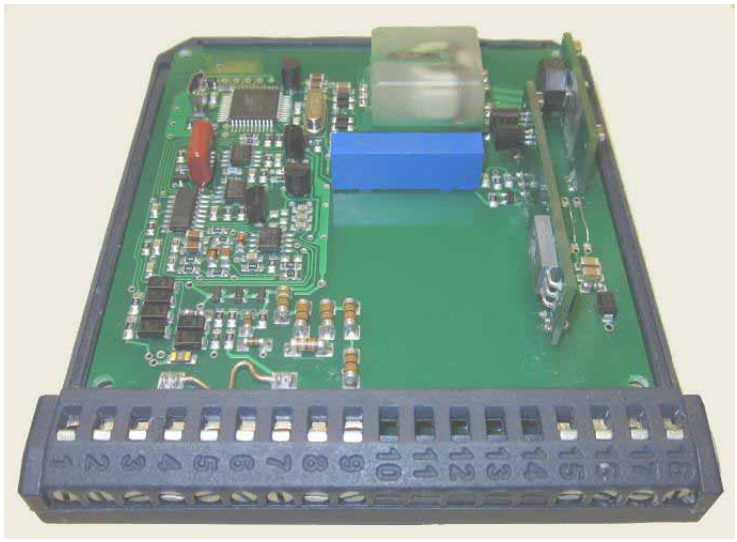
I n t Y	= tc
t y P E	= tc J
U n i t	= C
O F S t	= 0
F I L t	= 1
E. i n F	= 0
E. S u P	= 160

Example 2 A process value 0..100% is transmitted as 4..20mA current loop. This signal must be isolated but with no scale change.

I n t Y	= P r c S
t y P E	= 4 - 20.
L. i n F	= 0
L. S u P	= 100
F I L t	= 1
E. i n F	= 0
E. S u P	= 100

Isolation tests summary:

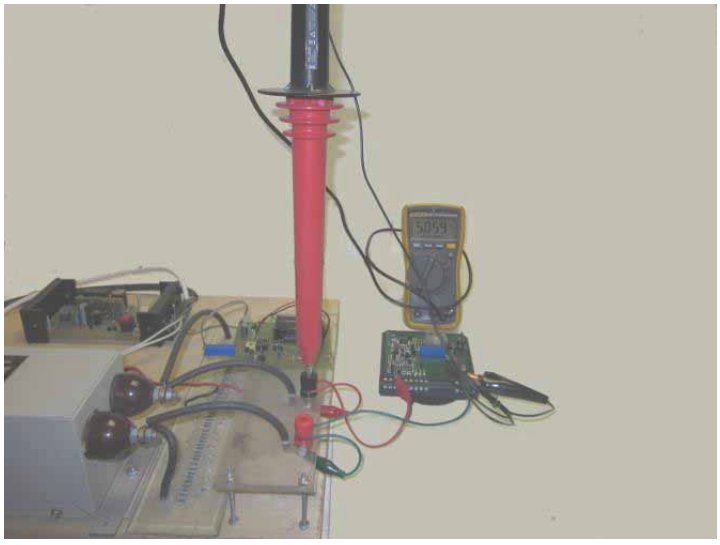
A sample DIN15V-A420 was tested for isolation between input and output ports.
For tests 1 and 2 the high voltage generator used is a Biddle-Megger AC/DC High-Pot tester model 230425. The leakage sensitivity was set at it's minimum (0.3ma). The maximum output voltages for this device are 4KV AC and 5KV DC
High voltage was applied between input ground (terminal 3) and output ground in common with power supply ground (terminals 16 and 17 connected together).
Testing is done with the uncovered device in order to see possible sparks or corona effect. The internal creepage path between input and the two other ports is 24mm so this effects are not expected to be found.



Test 1, 4KV AC:
With the high voltage generator the DIN15V-A420 was tested for leakage currents applying a 4KV AC potential for 10 minutes. Neither leakages nor corona effect was found.
During the test the DIN15V-A420 was energized to verify operation. Some electric noise (+- 0.02ma) originated by AC coupling was observed in the output 4ma signal.

Test 2, 5KV DC:
The same previous test was performed with a 5KV DC potential during 10 minutes.
Again neither leakage nor corona effect was found.
In this case no electric noise was observed on the output.

Test 3, 10KV AC:
A 10kV AC potential is applied to the device under test searching for leakage currents and corona effect.
Since we did not find a commercial high voltage testing instruments up to 10kV, an in house testing device was fabricated using a neon light transformer, a variac and electronic circuits for current sensing and limiting.
Voltage measurement was done with a Fluke 80k-40 HV probe.
Again no leakage was detected (10uA limit) .
No corona effect was observed. Care was taken to separate the base of the DIN15V-A420 more than 20mm from any conductive material.



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