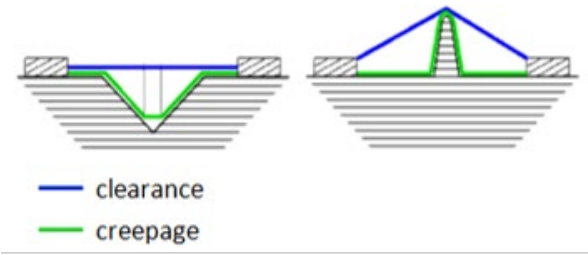
Clearance and creepage schematic diagram



Inside the transducer there is the primary winding and the secondary winding. They have also clearance and creepage distances which you cannot see but they are specified in the datasheet. They are smaller than for the normal transducers. As a result you have lower test voltages between primary winding and secondary (rms voltage 2.4 kV and impulse withstand voltage 4.4 kV)

The transducer is specified as CAT II 300 V.

Minimum rated impulse withstand voltage according to IEC 61010-1 are specified in the following table

Nominal system supply voltage U_n		**Voltage line to neutral derived from nominal voltages AC or DC up to and including** V	**Rated impulse withstand voltage**			
			Overvoltage category			
Three-phase V	**Single phase** V		**OVC I** V	**OVC II** V	**OVC III** V	**OVC IV** V
		50	330	500	800	1500
		100	500	800	1500	2500
	120 to 240	150	800	1500	2500	4000
230/400 277/480		300	1500	**2500**	4000	6000
400/690		600	2500	4000	6000	8000
1000		1000	4000	6000	8000	12000
	>1000 ≤ 1250	1250	4000	6000	8000	12000
	>1250 ≤ 1500	1500	6000	8000	10000	15000

What is “Pollution Degree”?

Pollution degree is a classification according to the amount of dry pollution and condensation present in the environment. This classification is important since it affects creepage and clearance distances required to ensure the safety of a product. Office and laboratory areas are considered pollution degree 2 environments according to safety standards and certification bodies. Pollution degree 1 may be considered inside sealed components and within air/water tight enclosures. Pollution degree 3 is a

harsher environment typical in many industrial manufacturing areas. Safety standards bodies such as Underwriters Laboratories (UL) and IEC [1] categorize them as follows:

Pollution Degree 1: No pollution or only dry, nonconductive pollution occurs. The pollution has no effect.

Pollution Degree 2: Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected.

Pollution Degree 3: Conductive pollution or dry nonconductive pollution that becomes conductive due to condensation occurs. To be found in industrial environment or construction sites (harsh environments).

Pollution Degree 4: The pollution generates persistent conductivity caused by conductive dust, rain, or snow.

See table 1 for examples of each of these environments [2,3].

Pollution Degree 1	Pollution Degree 2	Pollution Degree 3	Pollution Degree 4
Clean room environments	Equipment being evaluated to 60950	Electrical equipment in industrial and farming areas	Electrical equipment for outdoor use
Inside of sealed components	Laboratories	Unheated rooms	
	Test stations	Boiler rooms	
	Office environment		

Table 1. Examples of pollution degree environments

Clearly, ATE (Automated Test Equipment) environments (i.e. Test Stations) are categorized as “Pollution Degree 2”. Any equipment designed for, or placed in a test station environment should have a pollution degree 2 rating in order to meet recognized safety standards.

Why is pollution degree important to you?

Safety standards, such as UL and IEC, specify appropriate distances between high voltage and safety low voltage signals. These distances help to ensure operator safety and are dependent on environmental conditions, (i.e. pollution degree). Table 2 shows a comparison of the required distances between high and low voltage signals in a pollution degree 1 and pollution degree 2 environment.

	Condition	Pollution Degree 1	Pollution Degree 2
Creepage (in equipment)	Basic Insulation, 300V, Category 1, CTI >100	0.7mm	3.0mm
Creepage (on PCB)		0.7mm	1.4mm
Clearance		0.5mm	0.5mm
Creepage (in equipment)	Basic Insulation, 150V, Category 1, CTI >100	0.3mm	1.6mm
Creepage (on PCB)		0.22mm	0.35mm
Clearance		0.1mm	0.2mm

Table 2. Affect of Pollution degree on safety distances

Note:
1. The creepage distance is much larger than the clearance distance.
2. The creepage distance for pollution degree 2 is 2 to 4 times longer than for pollution degree 1.