

EE-206

Systemes de mesure

Perturbations ou parasites

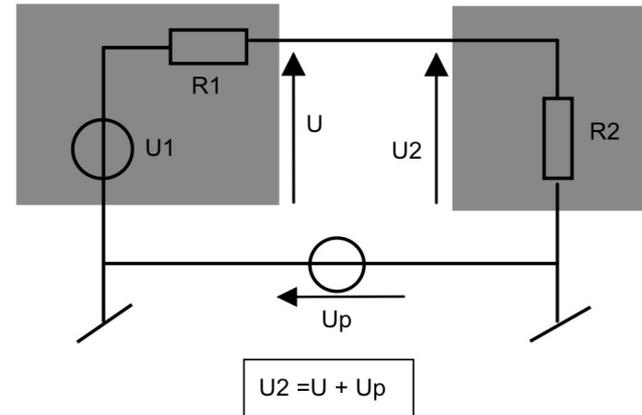
- Perturbations transitoires
- Perturbations transitoires répétitives
- Perturbations périodiques
- Perturbations HF
- Perturbations par décharge électrostatiques

Perturbations ou parasites

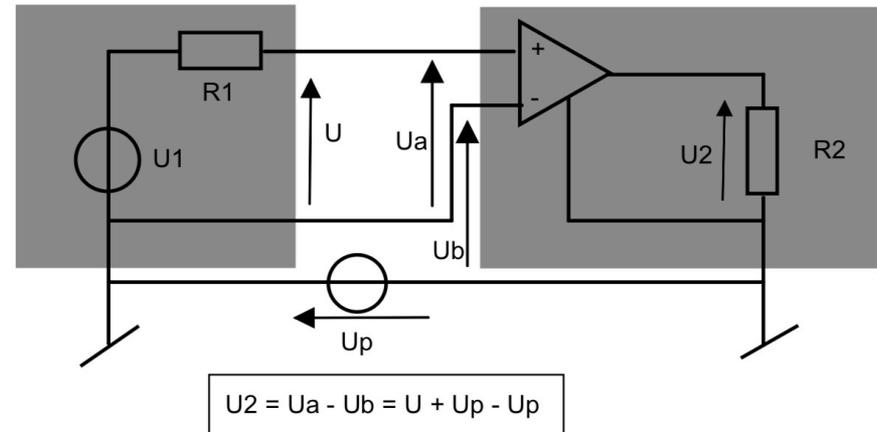
- Couplage direct
 - galvanique
- Couplages indirects :
 - Capacitifs
 - Inductifs
 - RF

Perturbations ou parasites

- Couplage direct
 - Galvanique

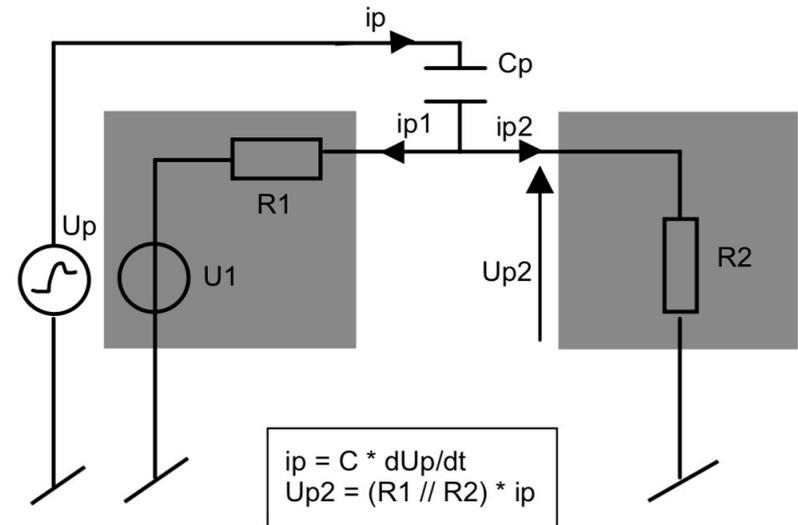


- Remède
 - Ampli différentiel



Perturbations ou parasites

- Couplages indirects :
 - Capacitifs



- Remèdes

- Déparasiter les sources alentours (fronts de tension)
- Minimiser C_p en éloignant les fils perturbateurs
- Blindage des fils de mesure

Blindage des fils de mesure

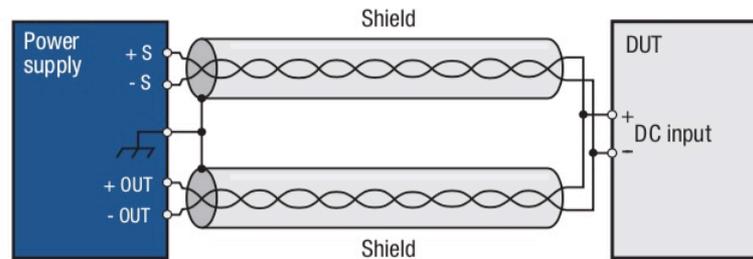
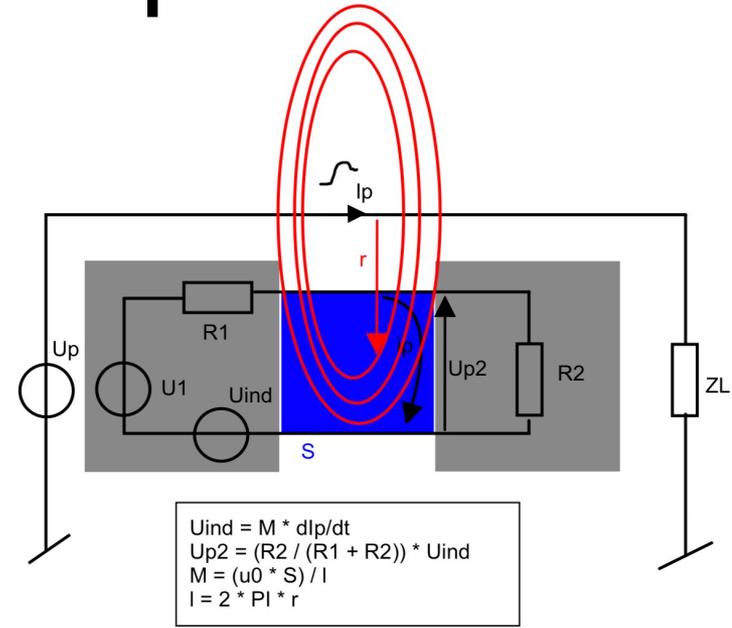


Figure 4: Shield is connected to earth ground only on one end of the cable.

Perturbations ou parasites

- Couplages indirects :
 - Inductifs



- Remèdes
 - Déparasiter les sources alentours (fronts de courant)
 - Éloigner les câbles de courant fort
 - Réduire la section S (paires torsadées)

Paires torsadées

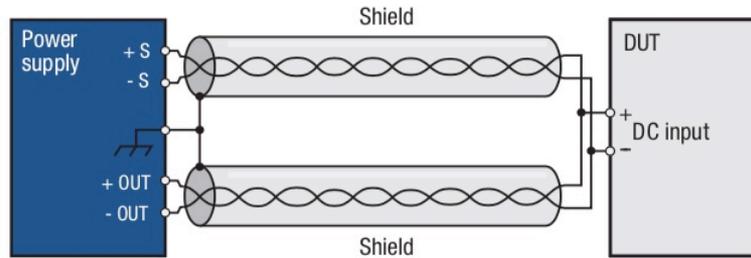
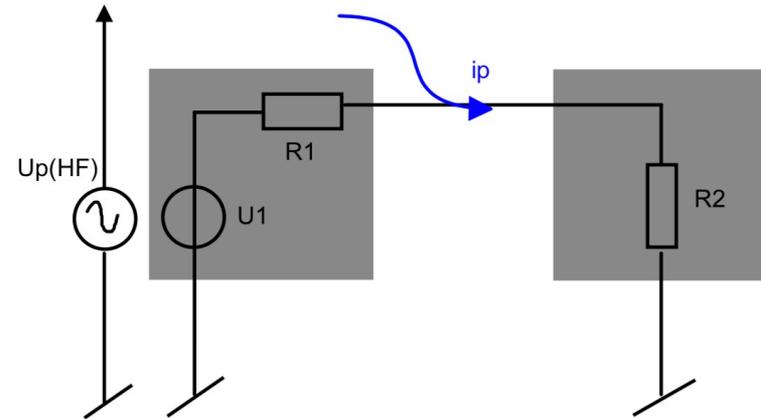


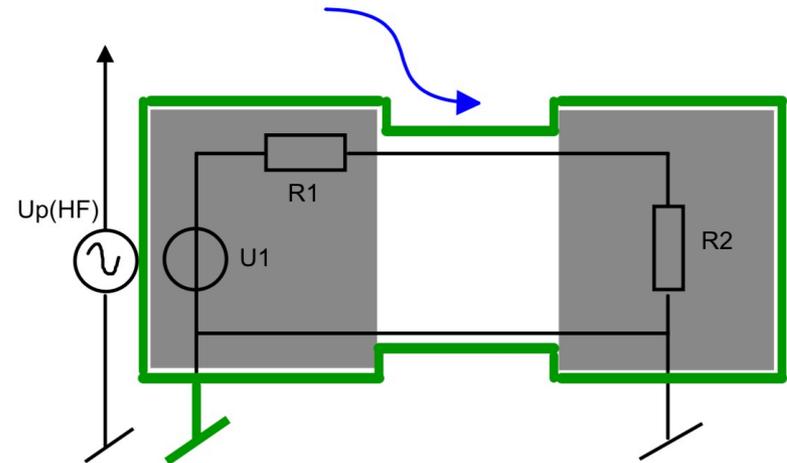
Figure 4: Shield is connected to earth ground only on one end of the cable.

Perturbations ou parasites

- Couplages indirects :
 - HF



- Remèdes
 - Blindage



Perturbations ou parasites

- Couplages indirects :
 - Décharges électrostatiques

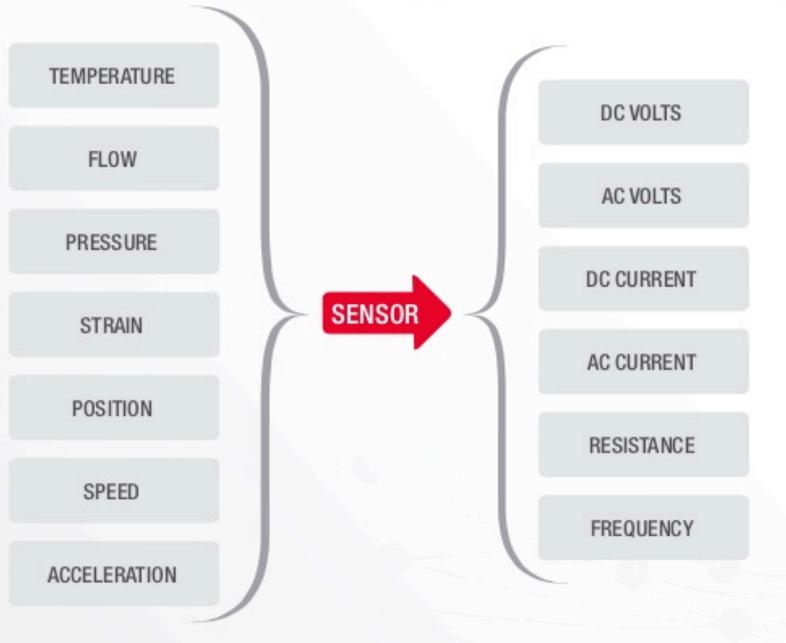


- Remèdes
 - Tapis et bracelets de mise à la masse

Interfacer des capteurs

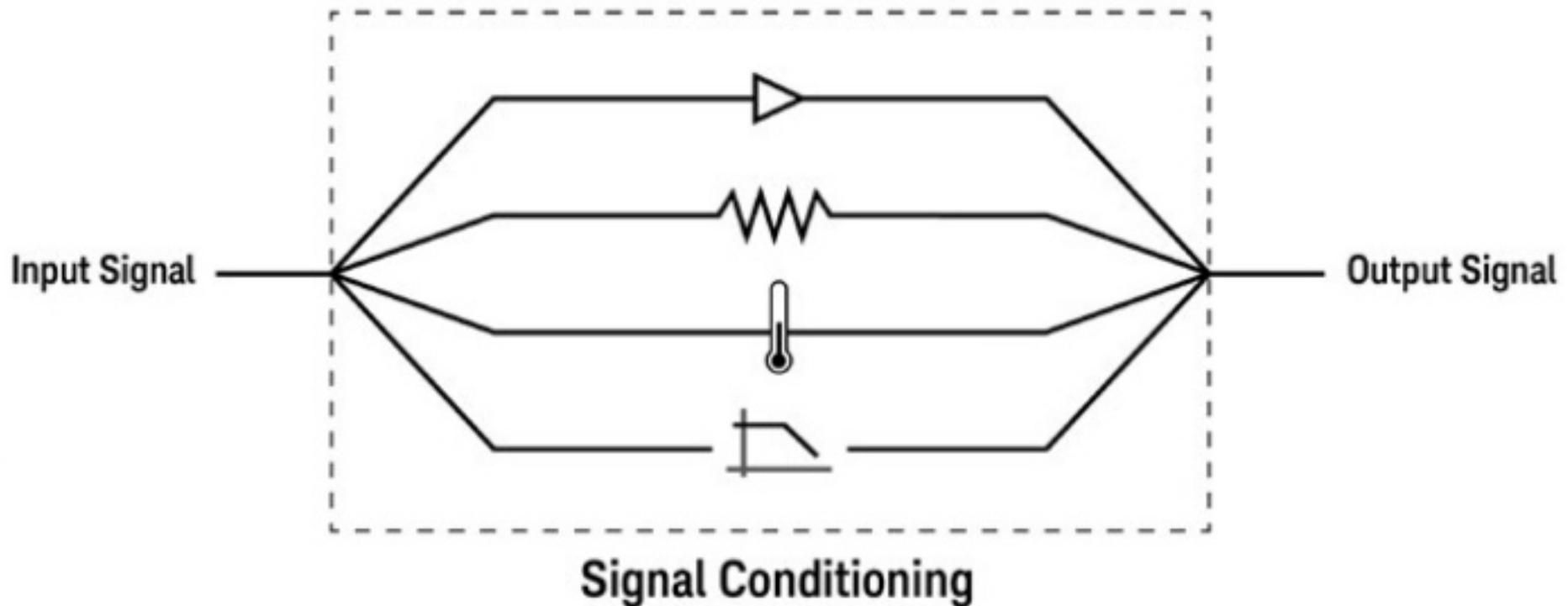
PHYSICAL PARAMETERS

ELECTRICAL SIGNALS

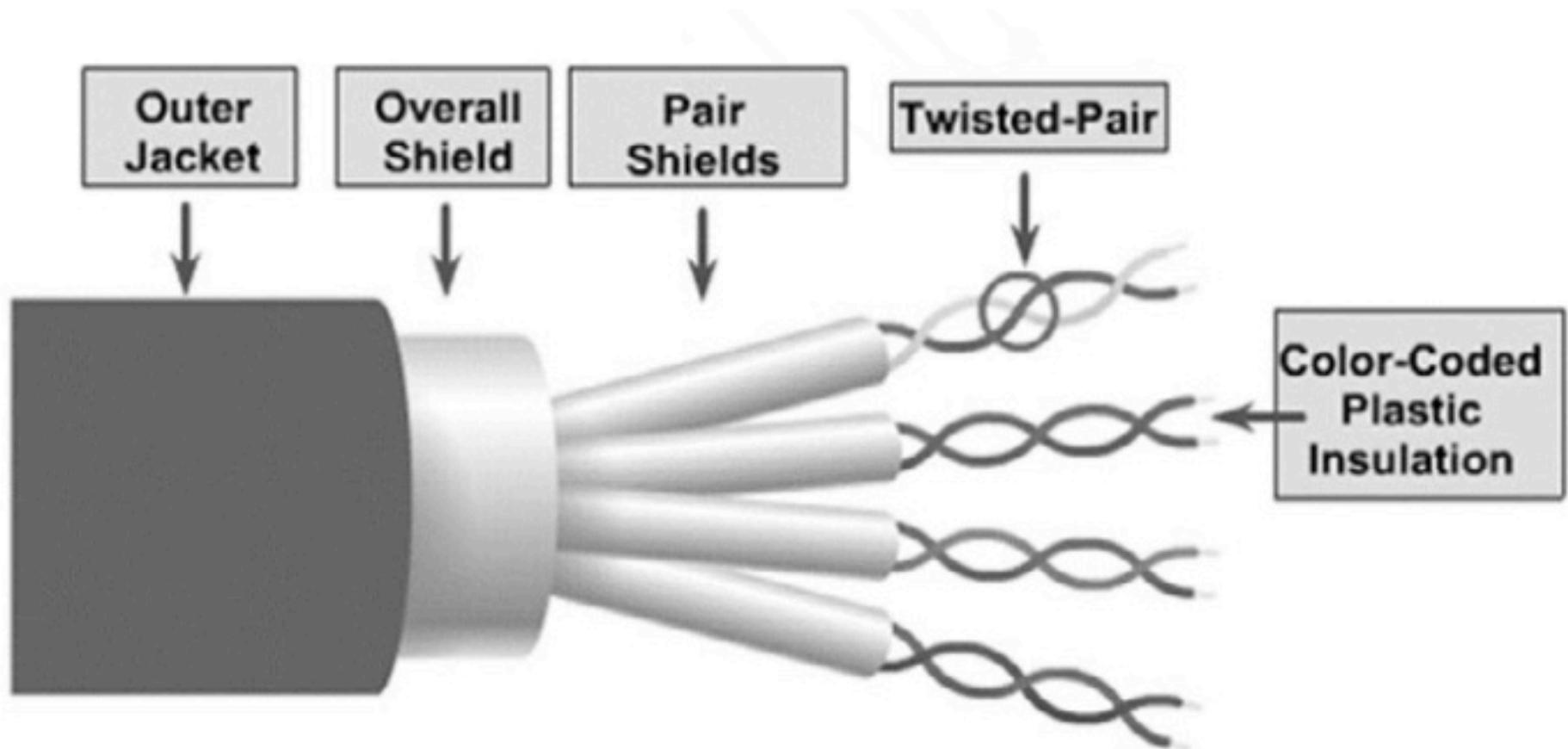


Measurement	Typical transducer types	Typical transducer output
Temperature	Thermocouple	0 mV to 80 mV
	RTD	2-wire or 4-wire resistance from 5 Ω to 500 Ω
	Thermistor	2-wire resistance from 10 Ω to 1 M Ω
Pressure	Solid state	± 10 Vdc
Flow	Rotary type Thermal type	4 mA to 20 mA
Strain	Resistive elements	4-wire resistance from 10 Ω to 10 k Ω
Events	Limit switches	0 V or 5 V Pulse train
	Optical counters	
	Rotary encoders	
Digital	System	TTL Levels

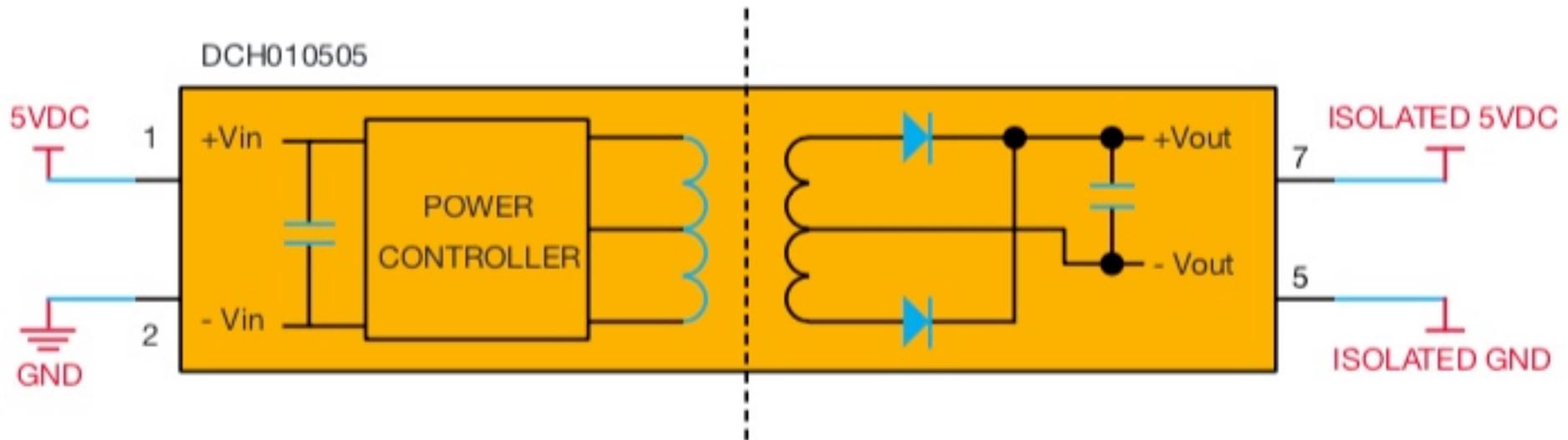
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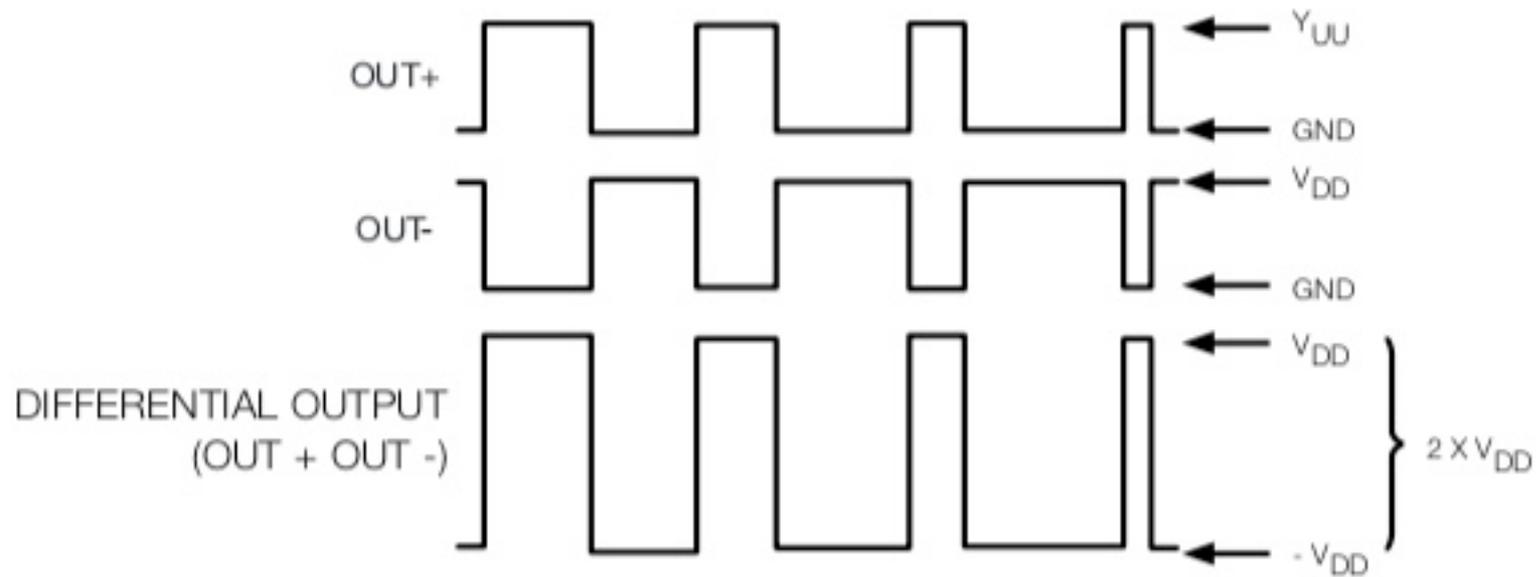
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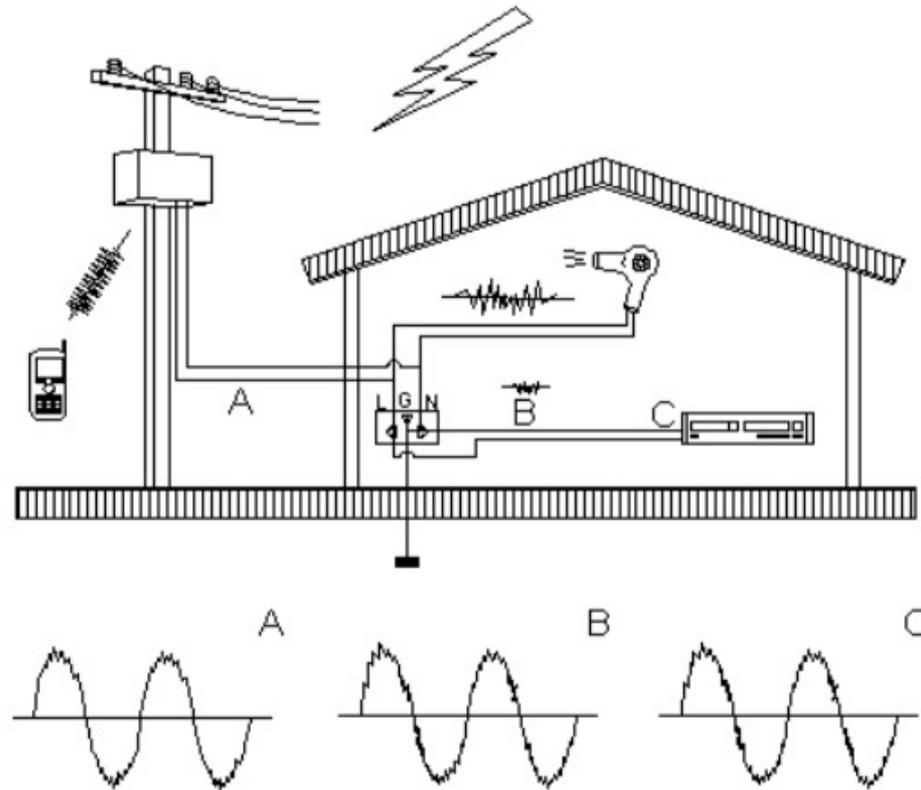
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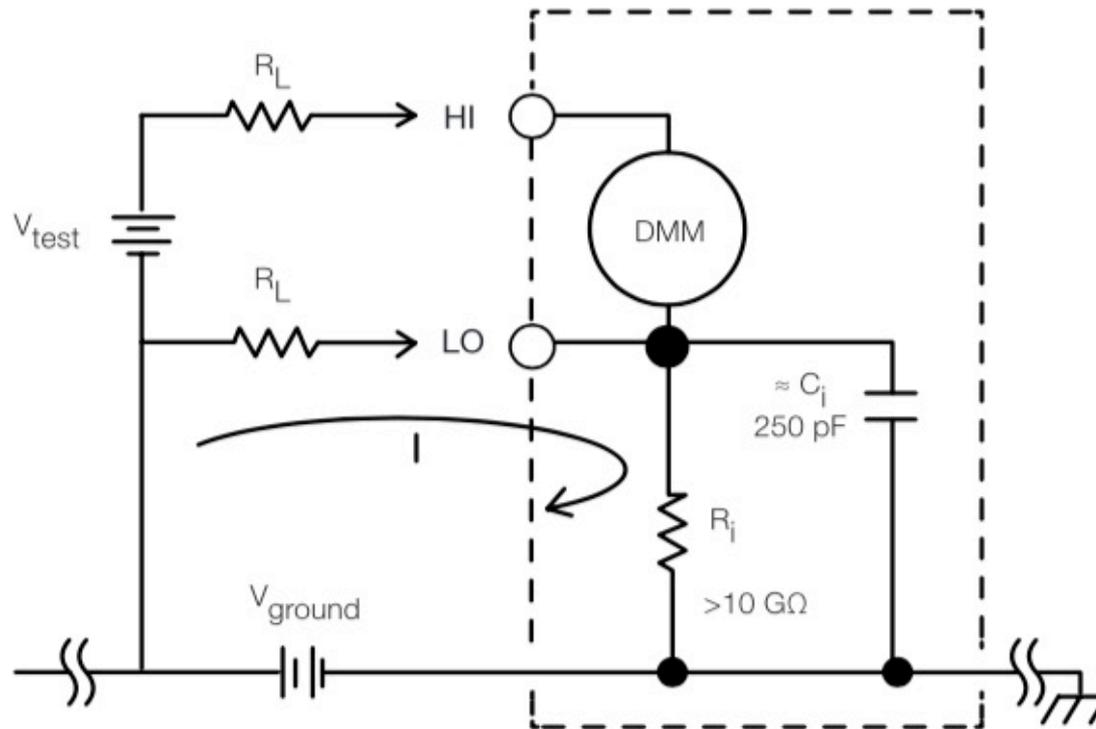
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Interfacer des capteurs

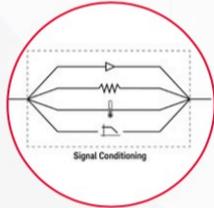


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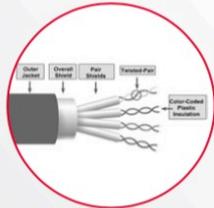
Key Learnings



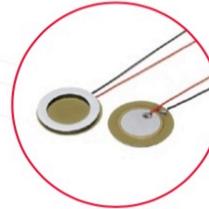
Choose a sensor that matches the behavior of the physical phenomenon



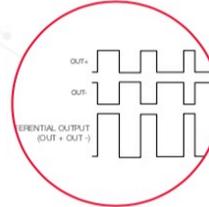
Apply the appropriate signal conditioning, if needed



Use shielded, twisted pair cables, especially in noisy places



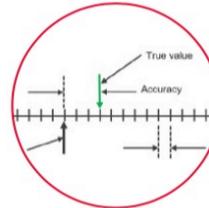
Choose a measurement device with amplitude ranges and frequency bandwidth to match the physical phenomenon



Use a measurement device that has differential inputs

Integration Time	Resolution
60 Hz (50Hz)	
400.7 μ s (400 μ s)	-
16.7 ms (20 ms)	60 dB
3 ms (3 ms)	-
167 ms (200 ms)	60 dB
167 ms (200 ms)	60
67 sec (2 sec)	-

Use a measurement device that has noise rejection



Use a measurement device that optimizes its resolution