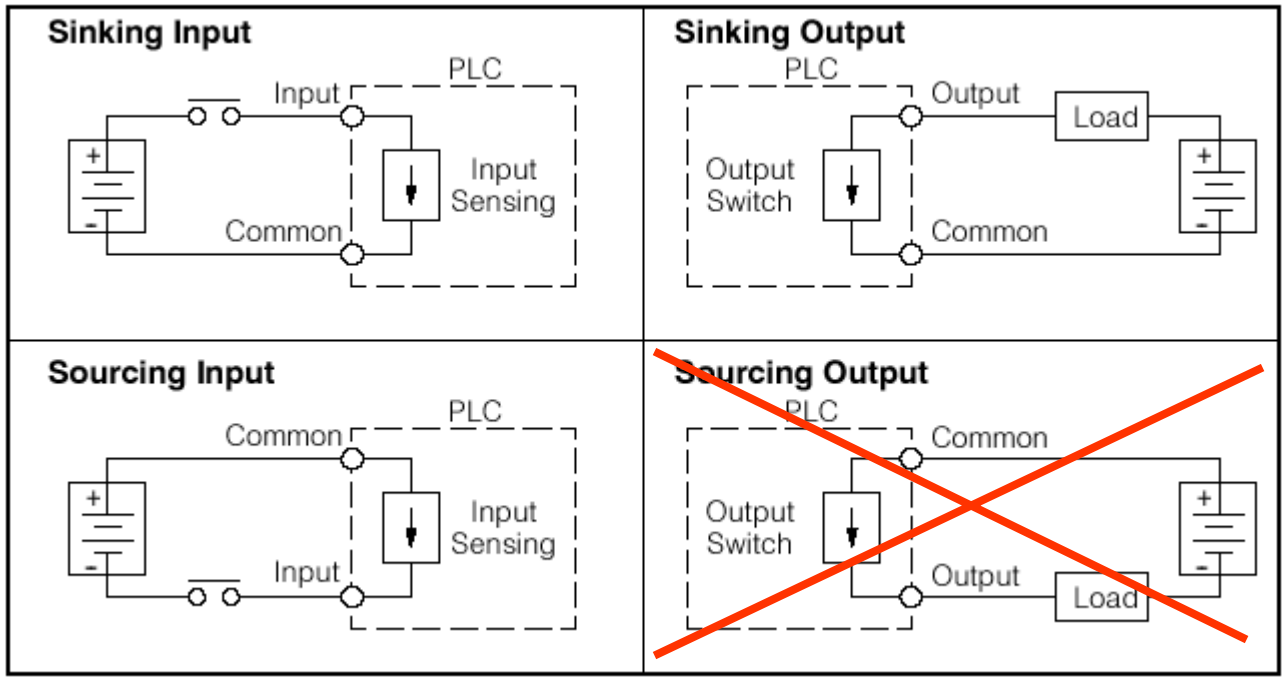
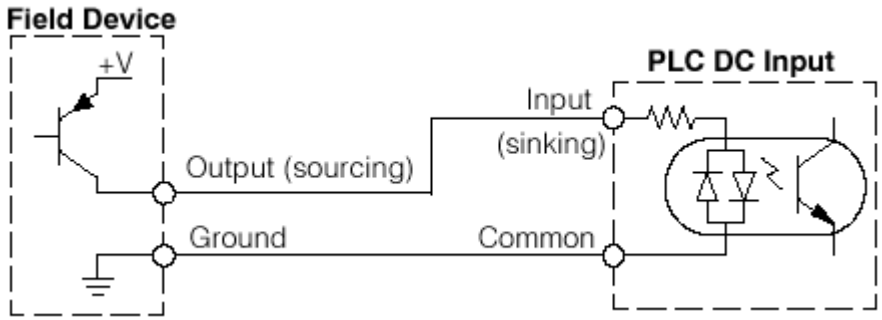
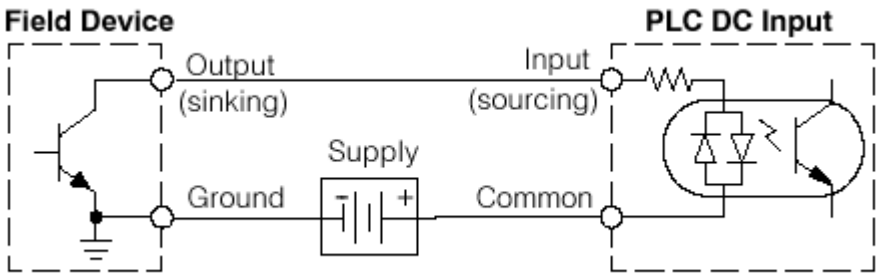
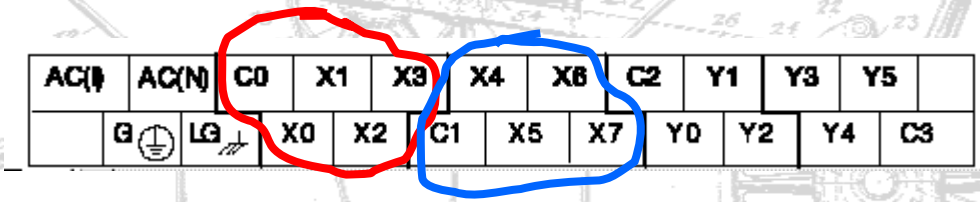
PLC Inputs and Outputs



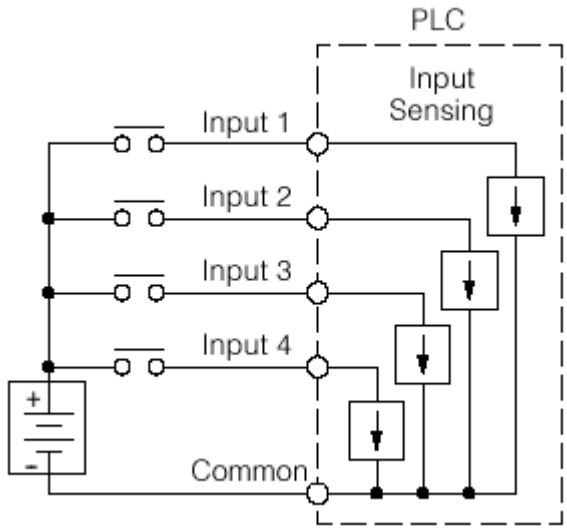
Signal Inputs





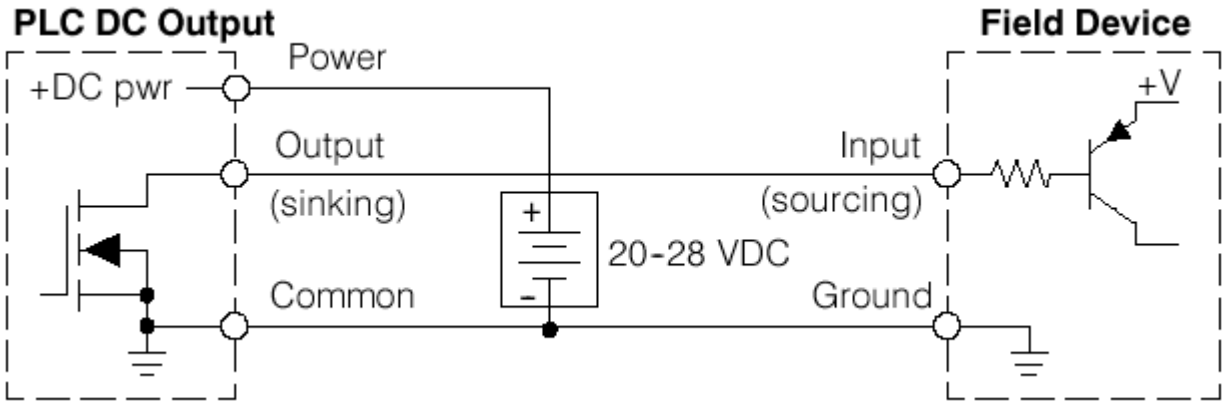


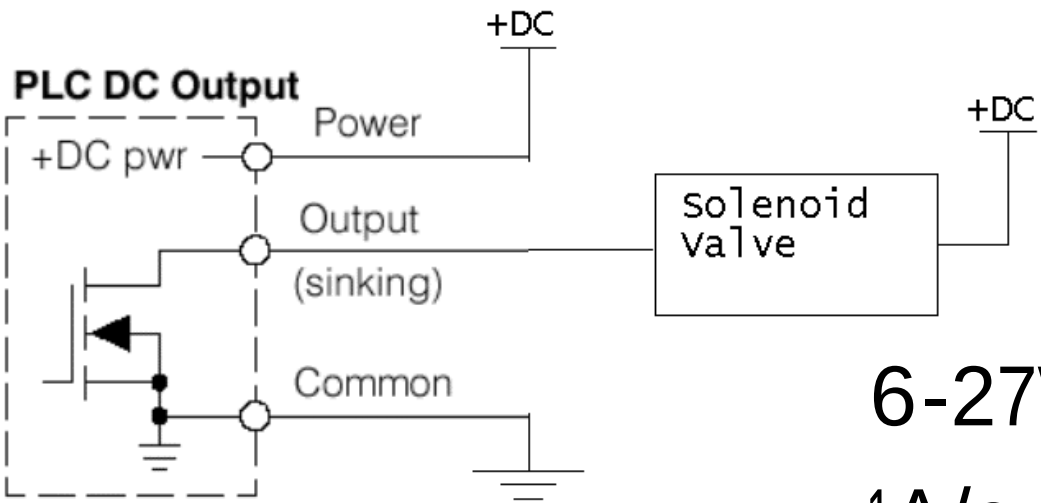
Signal Inputs



Multiple sinking inputs

DC Control Outputs

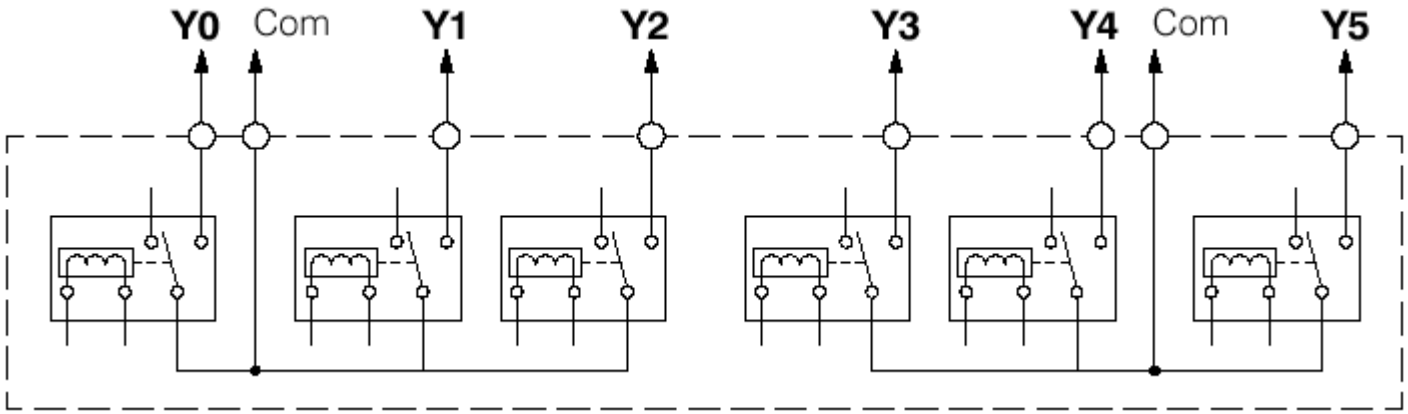




6-27VDC

1A/output

Relay Outputs

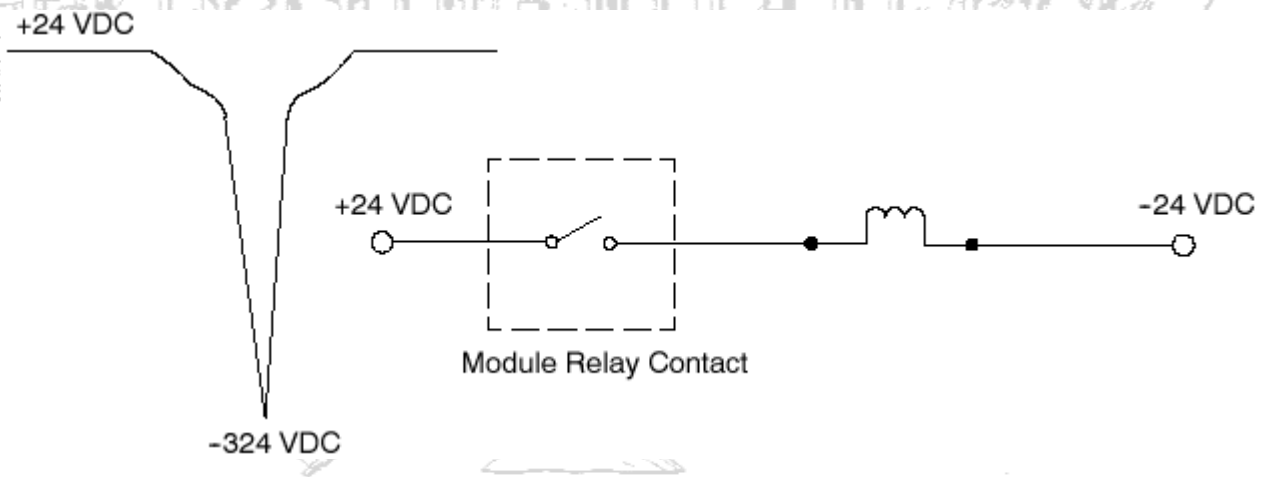


- If you need both AC and DC, or higher current or voltage, use the relay output model.
- DL05AR or DL05DR:
  - 6-240VAC, 6-27VDC
  - 0-2A/contact, 6A/common
- Slower than DC outputs (15mS vs. 30 : S)

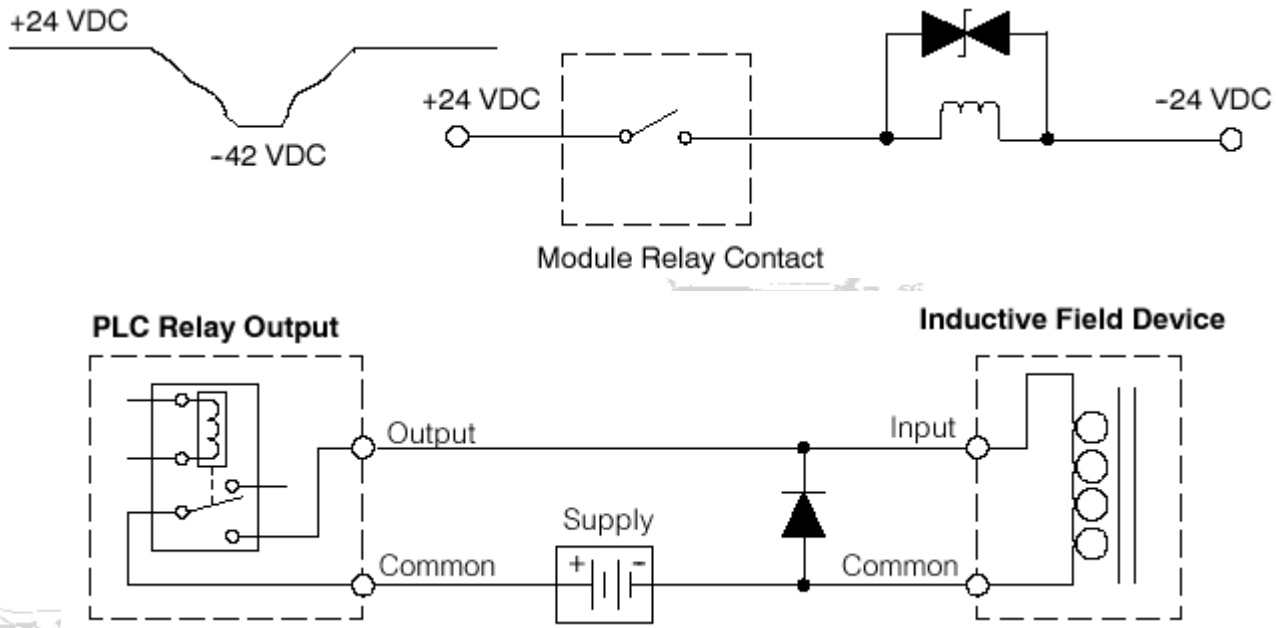
Output Protection

- DC outputs need fuse protection
- Relay contacts need inductive transient protection

$$V = -L\frac{di}{dt}$$



Inductive Transients

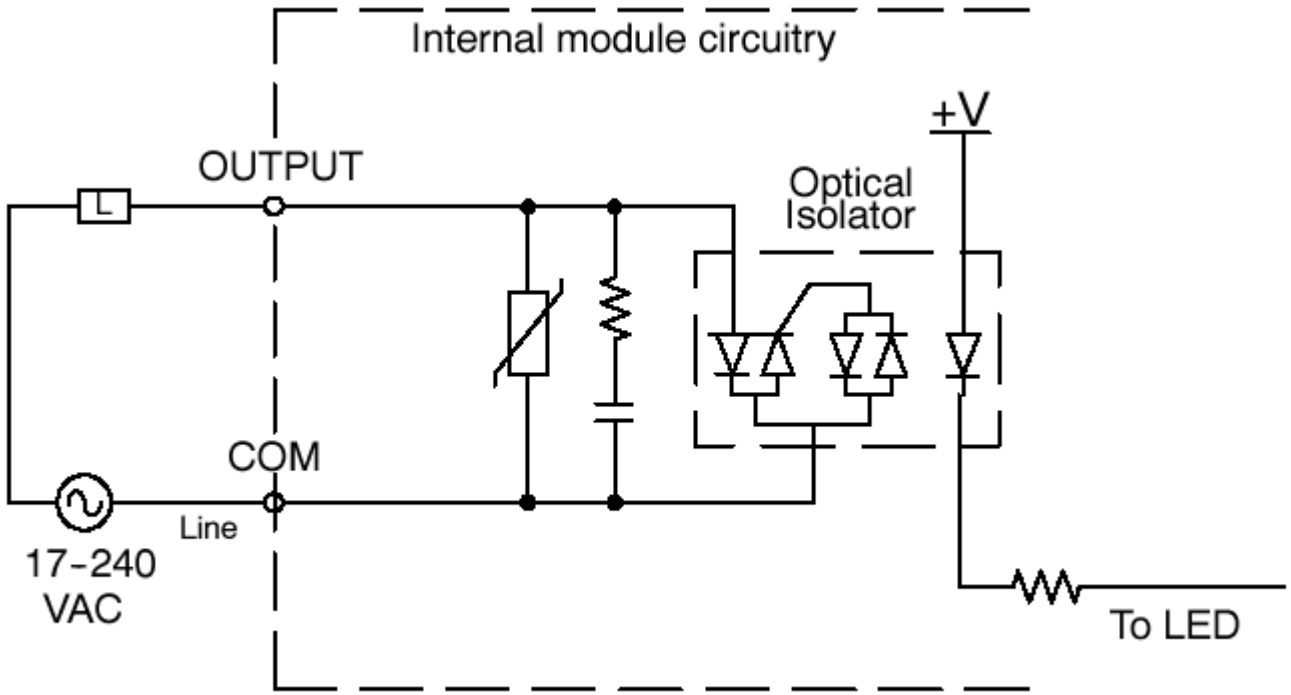


- TVS (Transient Voltage Suppressor) or MOV (metal oxide varistor) for AC
- Diode for DC

Motor Starting

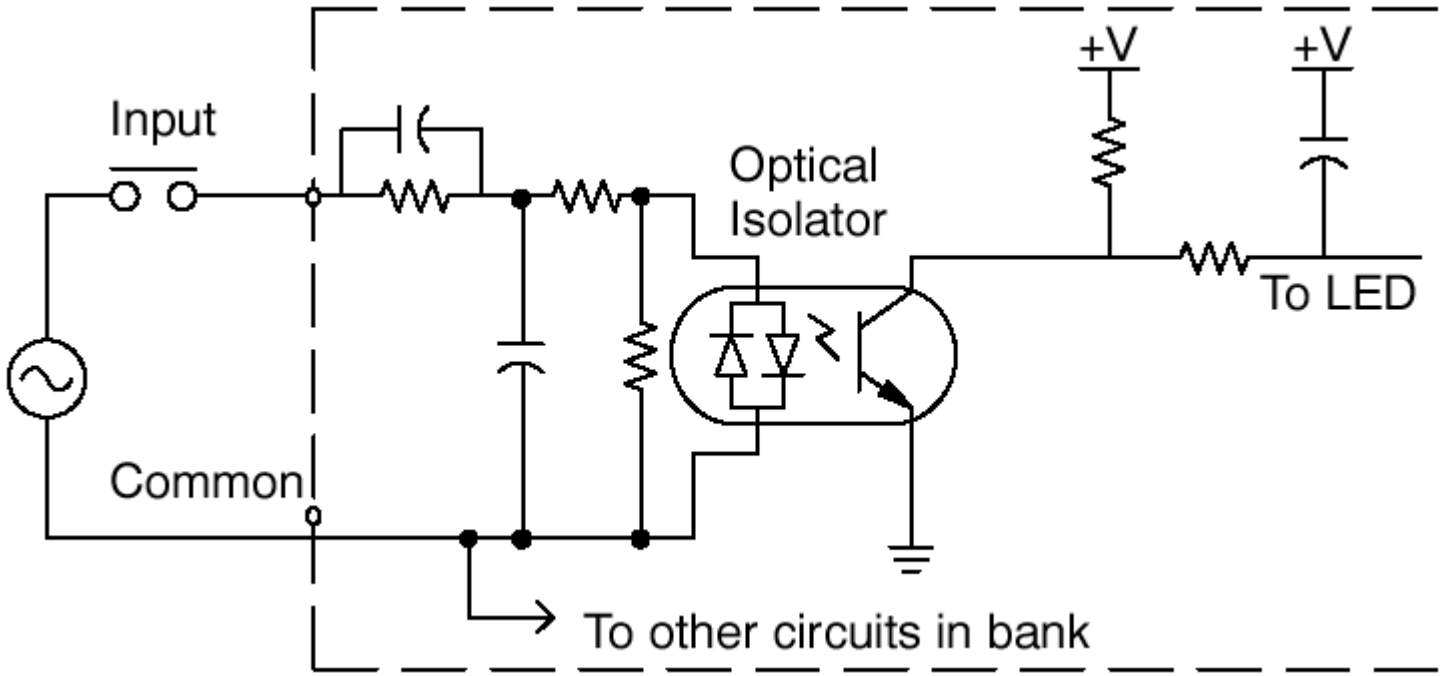
- Motors take a huge current to start (typ 3x run current)
- Normal relay contacts get welded by even “small” motors
- Use “Contactors” or “Motor Starters”

AC Outputs



Triac switch turns on or off at AC zero voltage points.

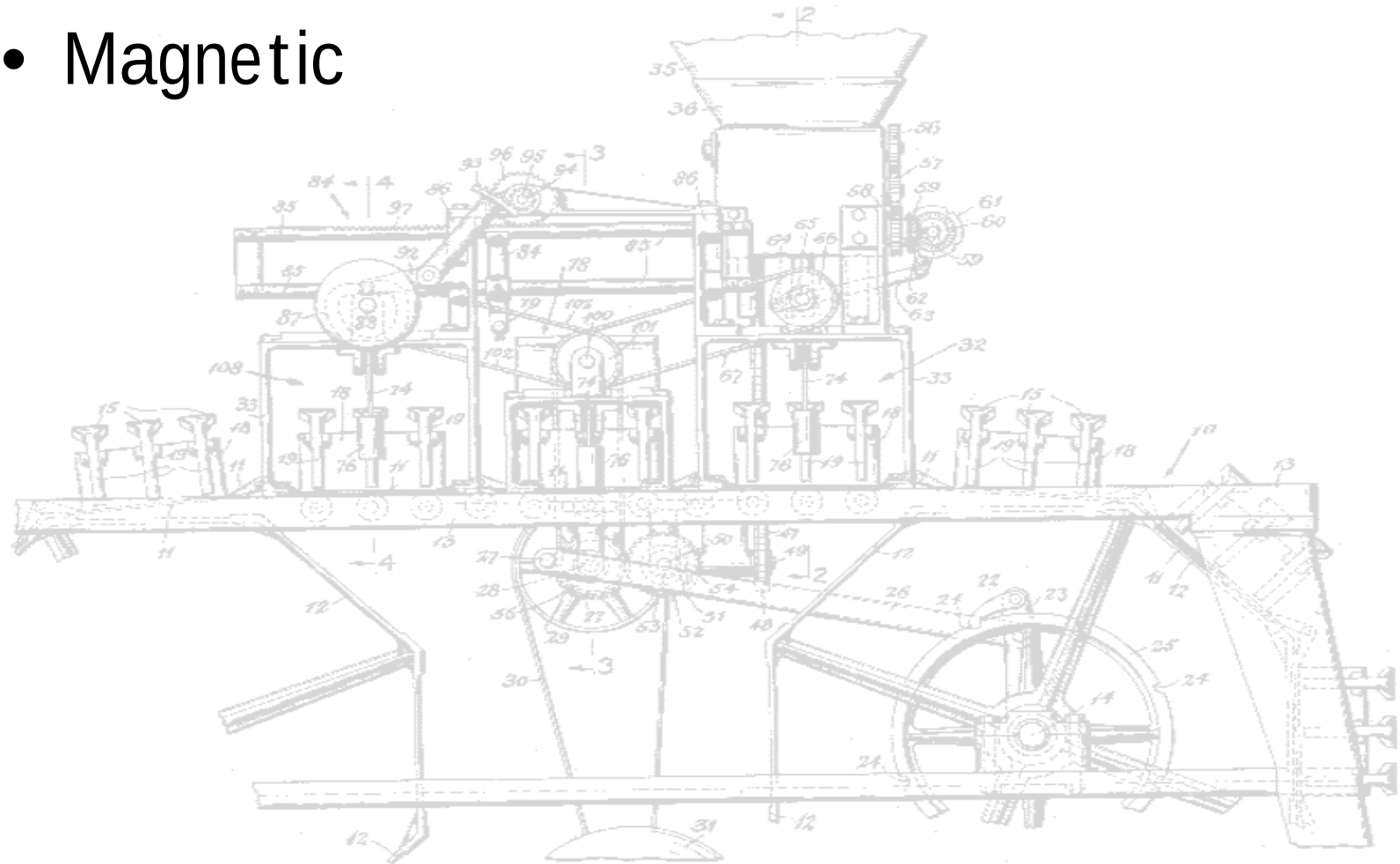
AC Inputs



- Voltage divider and filter in front of sourcing/sinking DC input.
- Slow response! Up to 8.3msec delay.

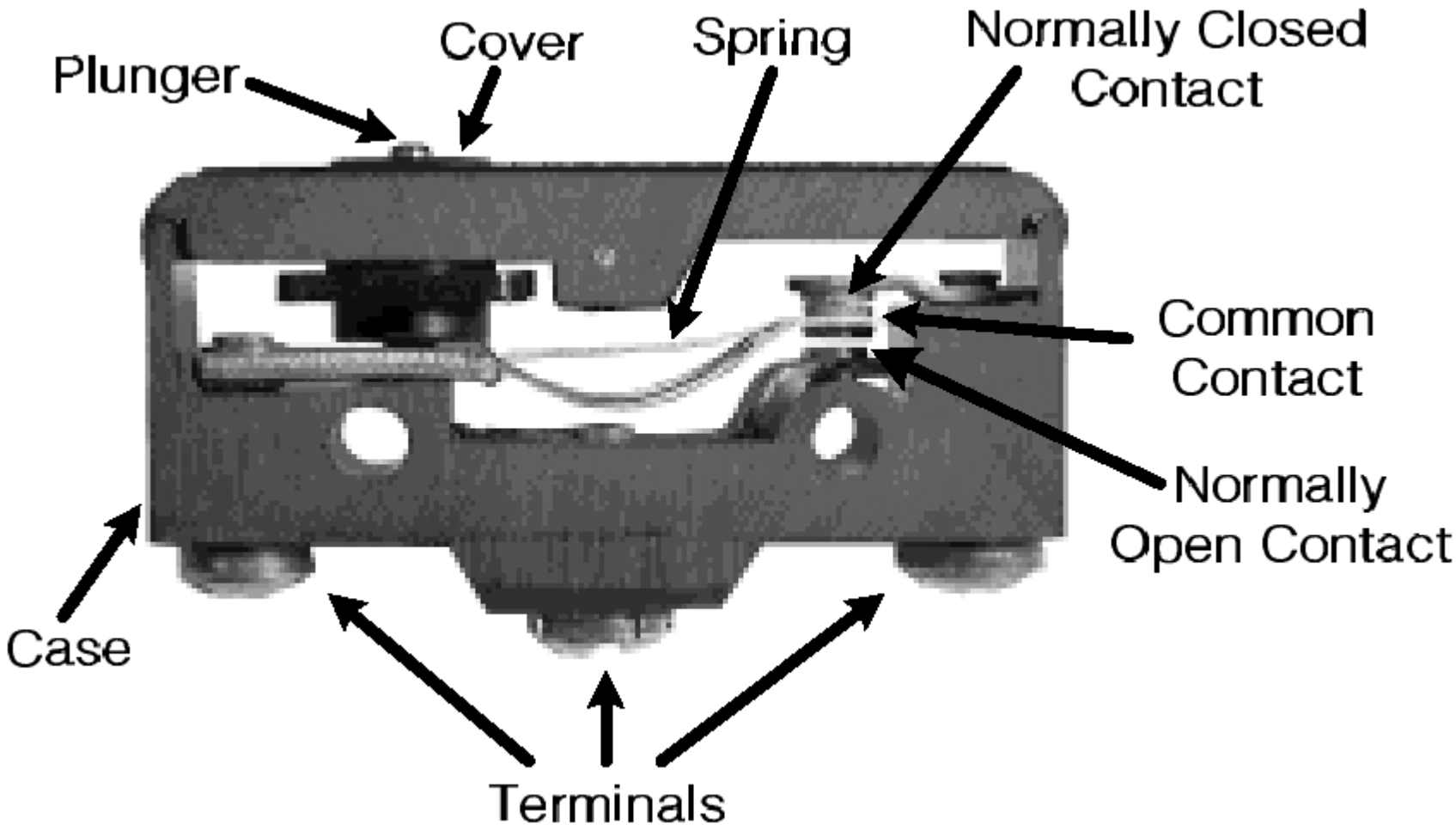
Position Sensing

- Mechanical
- Optical
- Magnetic

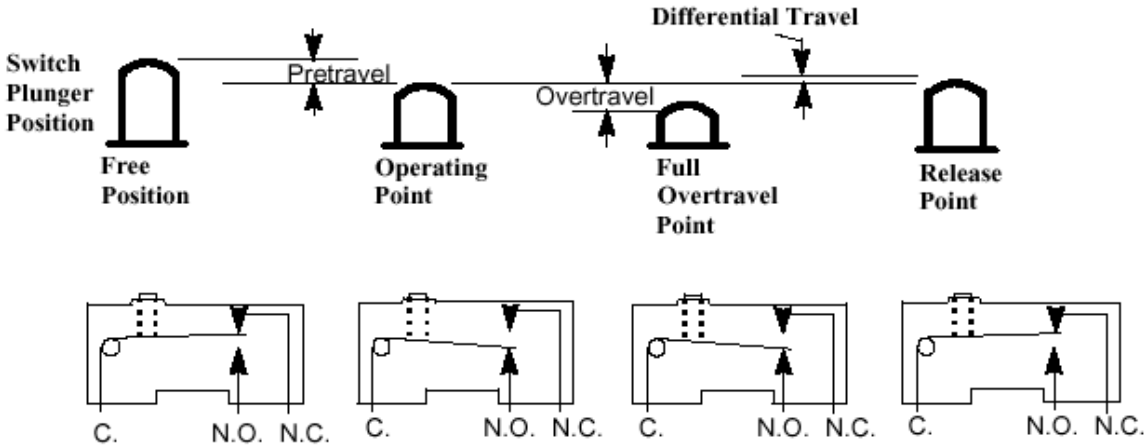


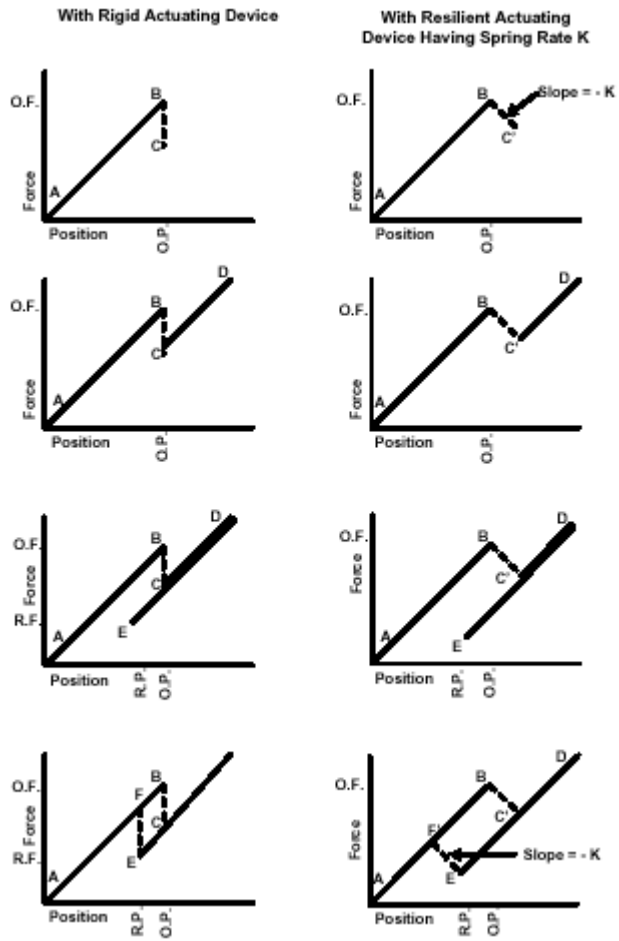
Mechanical Sensing

Snap-action microswitches



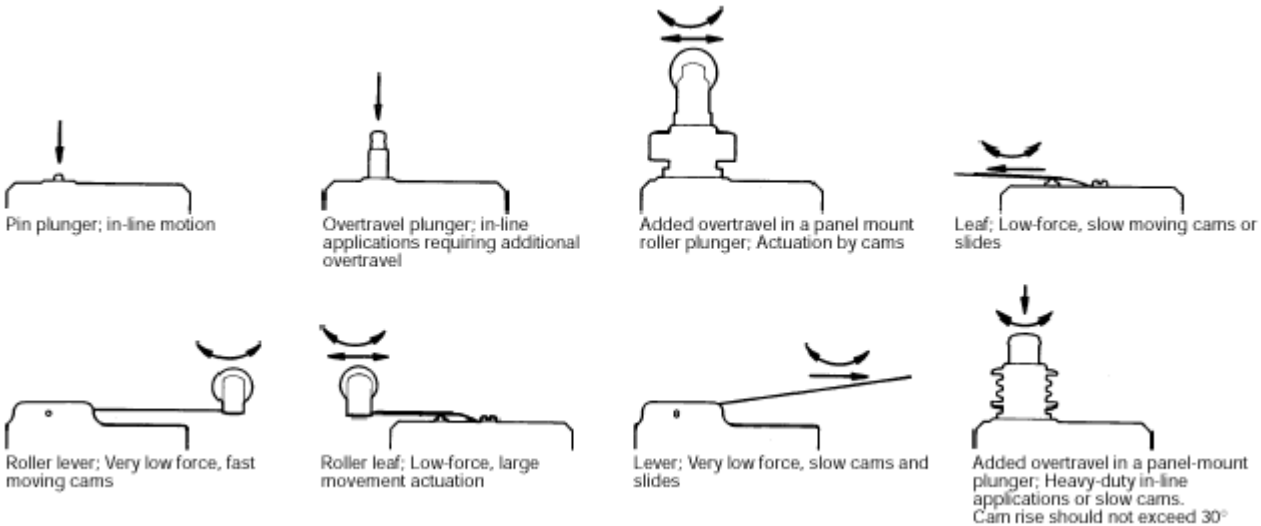
Microswitch Operation





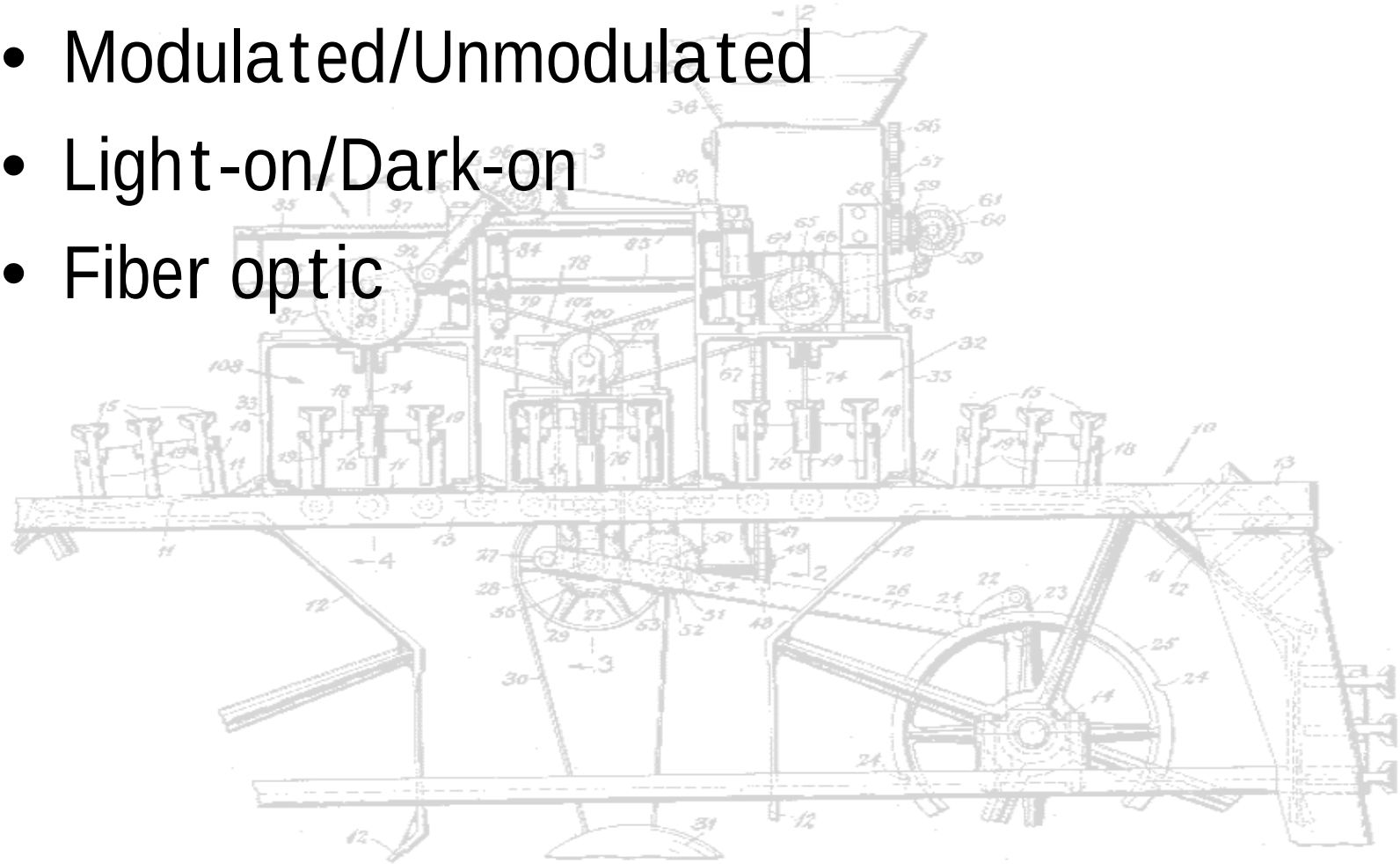
Switch exhibits mechanical hysterisis.

Microswitch Actuators

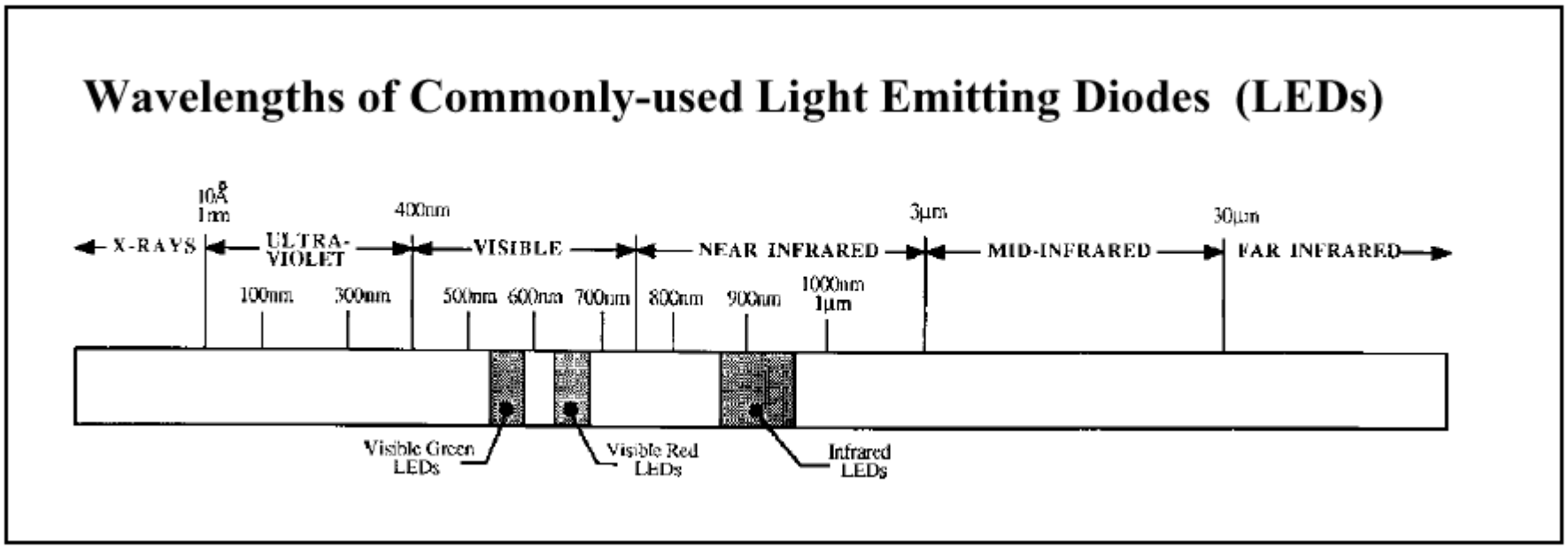


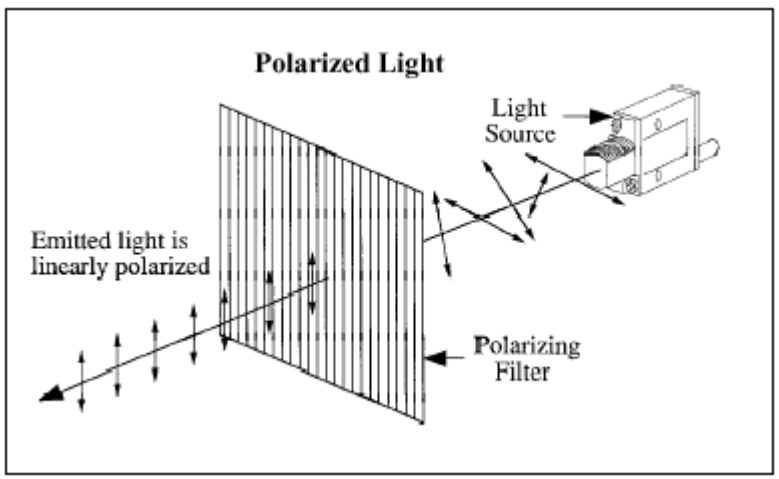
Optical Sensing

- LED's and Photodiodes
- Transmissive/Reflective
- Modulated/Unmodulated
- Light-on/Dark-on
- Fiber optic



LED and Photodiode Properties

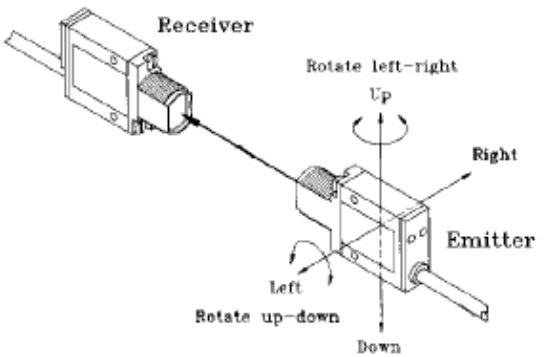




Transmissive & Reflective Photoswitches

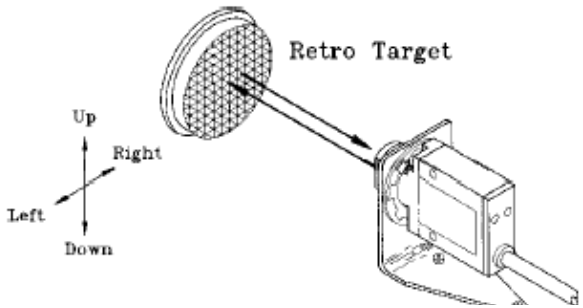
Opposed Mode Alignment

Opposed Mode Alignment: Move Emitter or Receiver Up-Down, Left-Right, and Rotate



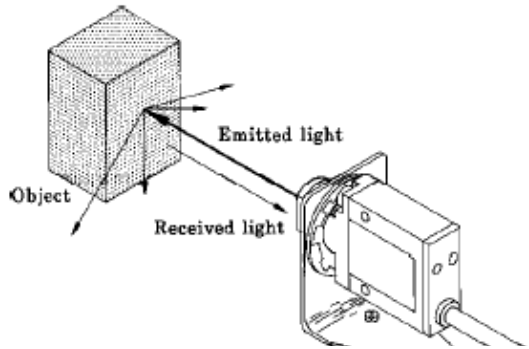
Retroreflective Mode Alignment

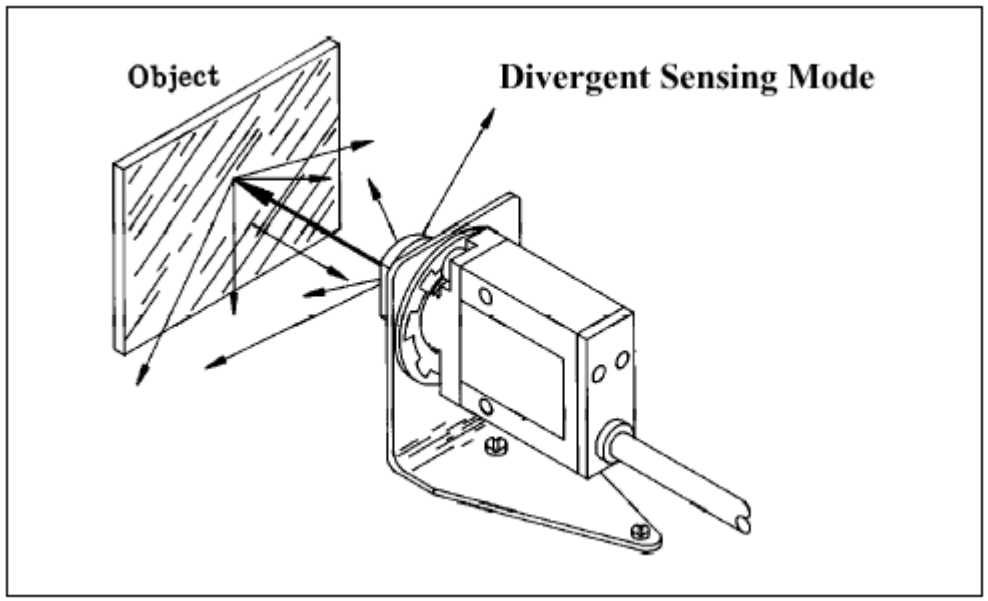
Retroreflective Mode Alignment:
Move Target Up-Down, Left-Right



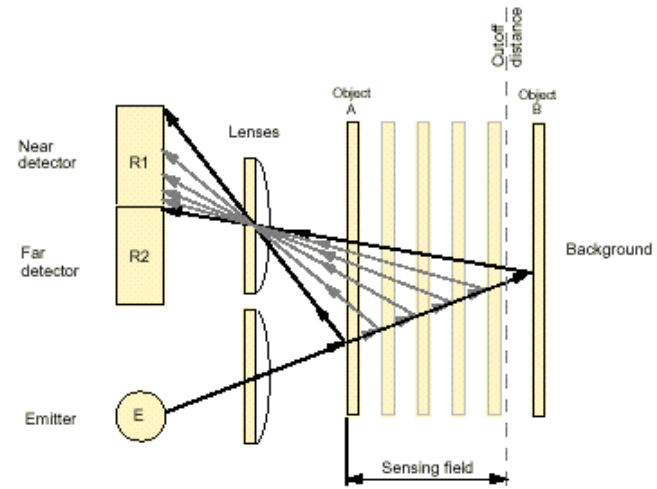
Proximity (Diffuse) Mode Alignment

Diffuse Mode Alignment:
Rotate Up-Down, Left-Right



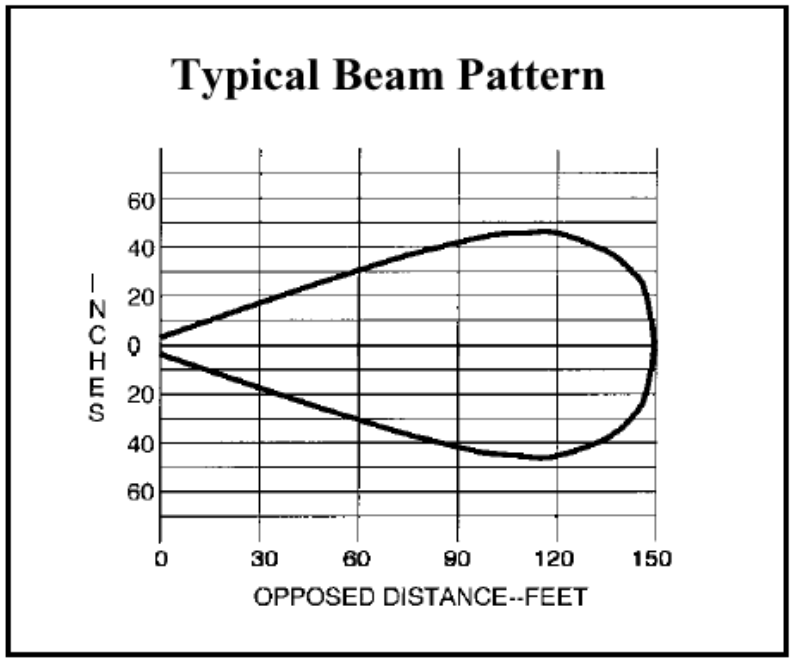


Fixed-field Diffuse Sensing



Object is sensed if amount of light at R1 is greater than the amount of light at R2

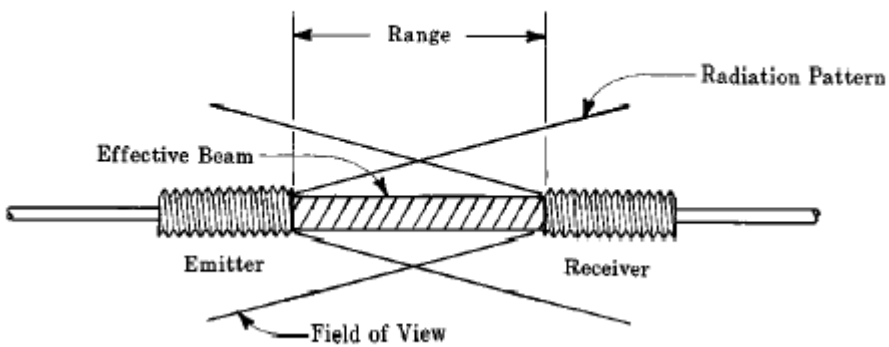
Beam Pattern and Reflectance



RELATIVE REFLECTIVITY TABLE

Material	Reflectivity (%)	Excess Gain Required
Kodak white test card	90%	1
White paper	80%	1.1
Masking tape	75%	1.2
Beer foam	70%	1.3
Clear Plastic*	40%	2.3
Rough wood pallet (clean)	20%	4.5
Black neoprene	4%	22.5
Natural aluminum, unfinished*	140%	0.6
Stainless steel, microfinish	400%	0.2
Black anodized aluminum*	50%	1.8

*NOTE: For materials with shiny or glossy surfaces, the reflectivity figure represents the maximum light return, with the sensor beam *exactly perpendicular* to the material surface



Specular Reflection