



# M12 Tubular Metal Photoelectric Sensors FDM Series

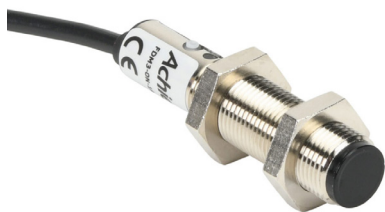
## M12 (12mm) Tubular Metal - DC FDM Series

### Overview

The AchieVe FDM series M12 tubular photoelectric sensors offers DC Digital sensitivity adjustment by teach-in button or remote cable, and multifunction LED status indicator. This series offers diffuse reflection, polarized retroreflective, and through-beam models. Housings have an IP67 enclosure rating with complete protection against electrical damage.

### Features

- Diffuse reflection, polarized retroreflective, and through-beam models available
- M12 quick-disconnect (purchase cable separately) or pigtail models
- Multifunction LED status indicator
- Red and infrared models
- Complete protection against electrical damages
- IP67 protection degree
- 3-year warranty



**FDM3-0N-1A**



**FDM3-0N-1H**



### M12 (12mm) Tubular Metal -DC FDM Series

| Part Number                                    | Price   | Sensing Distance   | Switching Frequency | Light Emission             | Logic | Output Function                | Connection Type *            | Wiring    | Drawing Link        |
|------------------------------------------------|---------|--------------------|---------------------|----------------------------|-------|--------------------------------|------------------------------|-----------|---------------------|
| Diffuse Reflection with Sensitivity Adjustment |         |                    |                     |                            |       |                                |                              |           |                     |
| <a href="#">FDM3-0N-1A</a>                     | \$35.00 | 100mm<br>[3.9 in]  | 1 kHz               | Infrared LED<br>(880nm)    | NPN   | Selectable<br>Light-on/Dark-on | 4-wire, 2m [6.5 ft] pigtail  | Diagram 1 | <a href="#">PDF</a> |
| <a href="#">FDM3-0N-1H</a>                     | \$35.00 |                    |                     |                            | NPN   |                                | 4-pin M12 quick-disconnect   | Diagram 1 | <a href="#">PDF</a> |
| <a href="#">FDM3-0P-1A</a>                     | \$35.00 |                    |                     |                            | PNP   |                                | 4-wire, 2m [6.5 ft] pigtail  | Diagram 2 | <a href="#">PDF</a> |
| <a href="#">FDM3-0P-1H</a>                     | \$35.00 |                    |                     |                            | PNP   |                                | 4-pin M12 quick-disconnect   | Diagram 2 | <a href="#">PDF</a> |
| <a href="#">FDM7-0N-1A</a>                     | \$36.00 | 300mm<br>[11.8 in] |                     |                            | NPN   |                                | 4-wire, 2m [6.5 ft] pigtail  | Diagram 1 | <a href="#">PDF</a> |
| <a href="#">FDM7-0N-1H</a>                     | \$36.00 |                    |                     |                            | NPN   |                                | , 4-pin M12 quick-disconnect | Diagram 1 | <a href="#">PDF</a> |
| <a href="#">FDM7-0P-1A</a>                     | \$36.00 |                    |                     |                            | PNP   |                                | 4-wire, 2m [6.5 ft] pigtail  | Diagram 2 | <a href="#">PDF</a> |
| <a href="#">FDM7-0P-1H</a>                     | \$36.00 |                    |                     |                            | PNP   |                                | , 4-pin M12 quick-disconnect | Diagram 2 | <a href="#">PDF</a> |
| Polarized Retroreflective Teach-in **          |         |                    |                     |                            |       |                                |                              |           |                     |
| <a href="#">FDMP-0N-1A</a>                     | \$39.00 | 2m<br>[6.5 ft]     | 1 kHz               | Visible red LED<br>(660nm) | NPN   | Selectable<br>Light-on/Dark-on | 4-wire, 2m [6.5 ft] pigtail  | Diagram 3 | <a href="#">PDF</a> |
| <a href="#">FDMP-0N-1H</a>                     | \$39.00 |                    |                     |                            | NPN   |                                | 4-pin M12 quick-disconnect   | Diagram 3 | <a href="#">PDF</a> |
| <a href="#">FDMP-0P-1A</a>                     | \$39.00 |                    |                     |                            | PNP   |                                | 4-wire, 2m [6.5 ft] pigtail  | Diagram 4 | <a href="#">PDF</a> |
| <a href="#">FDMP-0P-1H</a>                     | \$39.00 |                    |                     |                            | PNP   |                                | 4-pin M12 quick-disconnect   | Diagram 4 | <a href="#">PDF</a> |
| Through-beam Receiver ***                      |         |                    |                     |                            |       |                                |                              |           |                     |
| <a href="#">FDMR-0N-1A</a>                     | \$30.00 | 4m<br>[13.1 ft]    | 250 Hz              | —                          | NPN   | Selectable<br>Light-on/Dark-on | 4-wire, 2m [6.5 ft] pigtail  | Diagram 5 | <a href="#">PDF</a> |
| <a href="#">FDMR-0N-1H</a>                     | \$30.00 |                    |                     | —                          | NPN   |                                | 4-pin M12 quick-disconnect   | Diagram 5 | <a href="#">PDF</a> |
| <a href="#">FDMR-0P-1A</a>                     | \$30.00 |                    |                     | —                          | PNP   |                                | 4-wire, 2m [6.5 ft] pigtail  | Diagram 6 | <a href="#">PDF</a> |
| <a href="#">FDMR-0P-1H</a>                     | \$30.00 |                    |                     | —                          | PNP   |                                | 4-pin M12 quick-disconnect   | Diagram 6 | <a href="#">PDF</a> |
| Through-beam Emitter - Potentiometer ***       |         |                    |                     |                            |       |                                |                              |           |                     |
| <a href="#">FDME-00-1A</a>                     | \$24.00 | 4m<br>[13.1 ft]    | —                   | Infrared LED<br>(880nm)    | —     | —                              | 4-wire, 2m [6.5 ft] pigtail  | Diagram 7 | <a href="#">PDF</a> |
| <a href="#">FDME-00-1H</a>                     | \$24.00 |                    | —                   |                            | —     | —                              | 4-pin M12 quick-disconnect   | Diagram 7 | <a href="#">PDF</a> |

\* Purchase cable separately for the M12 quick-disconnect models.

\*\* Purchase reflector separately.

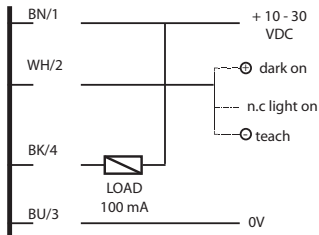
\*\* Purchase one receiver and one emitter for a complete set.



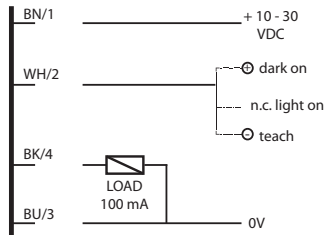
# M12 Tubular Metal Photoelectric Sensors FDM Series

## Wiring Diagrams

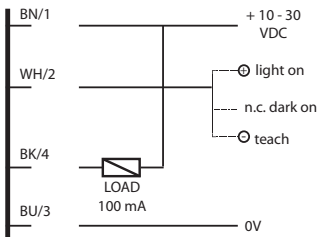
**Diagram 1**  
4-Wire NPN Output  
DM3/DM7



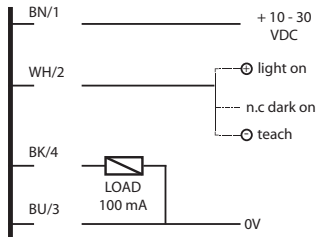
**Diagram 2**  
4-Wire PNP Output  
DM3/DM7



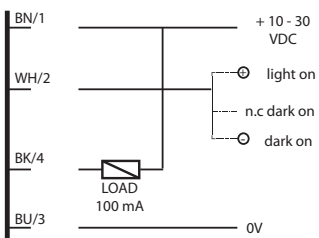
**Diagram 3**  
4-Wire NPN Output  
DMP



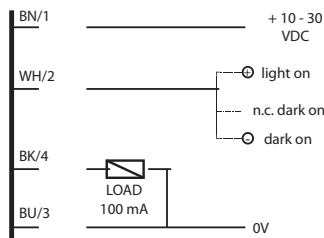
**Diagram 4**  
4-Wire PNP Output  
DMP



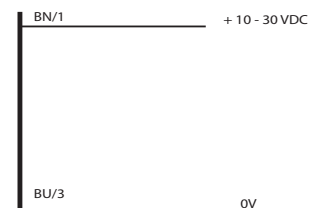
**Diagram 5**  
4-Wire NPN Output  
DMR



**Diagram 6**  
4-Wire PNP Output  
DMR

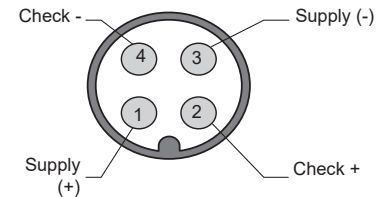
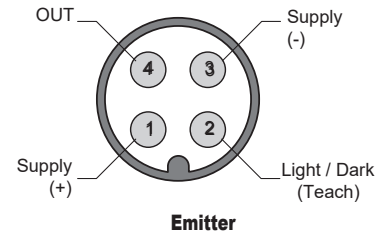


**Diagram 7**  
Emitter  
DME



### M12 Connector

Diffuse reflection polarized receiver





# M12 Tubular Metal Photoelectric Sensors FDM Series

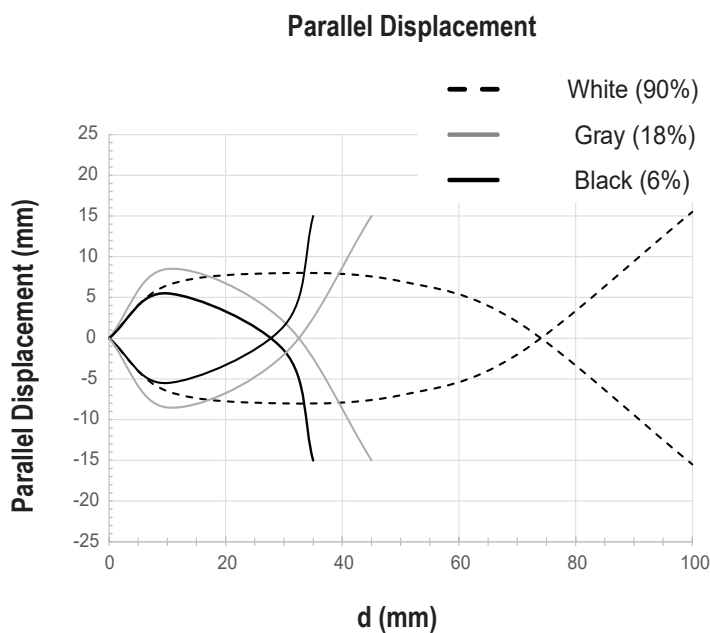
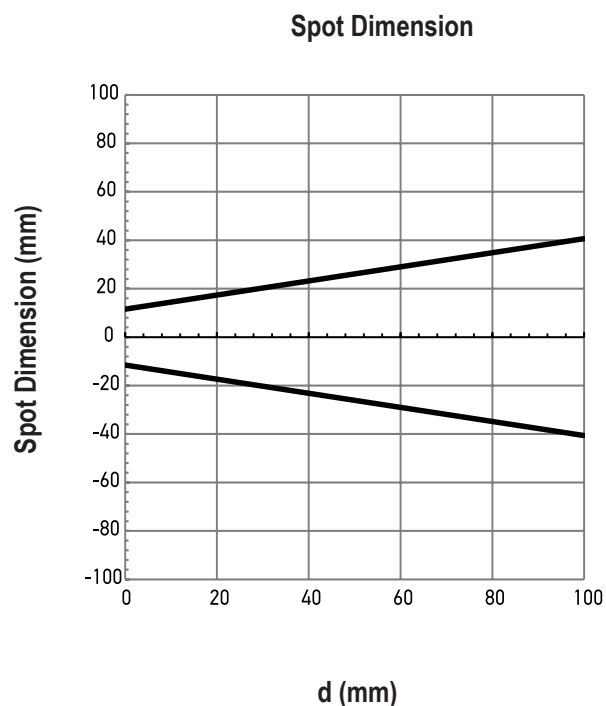
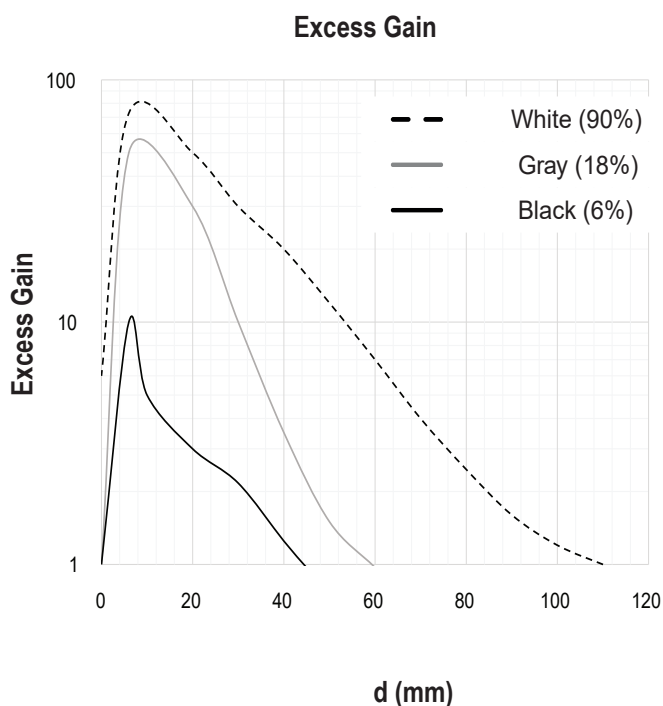
## M12 (12mm) Tubular Metal -DC FDM Series Specifications

| Sensor Type                      | Diffuse Reflection                                              | Polarized Retroreflective Teach-in | Through-beam                                                                   |
|----------------------------------|-----------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------|
| Sensing Distance                 | FDM3: 100mm [3.9 in]<br>FDM7: 300mm [11.8 in]                   | 2.5m [8ft]                         | 4m [13.1 ft]                                                                   |
| Thermal Drift                    | ≤ 10% Sr                                                        |                                    |                                                                                |
| Repeatability                    | ≤ 5%                                                            |                                    |                                                                                |
| Response Time Maximum            | 500μs                                                           | 500μs                              | 2ms (Receiver only)                                                            |
| Output Types                     | NPN, PNP                                                        | NPN, PNP                           | NPN, PNP (Receiver only)                                                       |
| Operating Voltage                | 10-30 VDC                                                       |                                    |                                                                                |
| Maximum Residual Ripple          | 10%                                                             |                                    |                                                                                |
| Leakage Current                  | ≤ 130μA                                                         | ≤ 130μA                            | ≤ 130μA (Receiver only)                                                        |
| No Load Supply Current           | 30mA                                                            |                                    |                                                                                |
| Maximum DC Output Voltage Drop   | 2V @ IL - 100mA                                                 | 2V @ IL - 100mA                    | 2V @ IL - 100mA (Receiver only)                                                |
| Operating (Load) Current         | 100mA                                                           | 100mA                              | 100mA (Receiver only)                                                          |
| Short-circuit Protection         | Yes                                                             |                                    |                                                                                |
| Reverse Polarity Protection      | Yes                                                             |                                    |                                                                                |
| Impulsive Overvoltage Protection | Yes                                                             |                                    |                                                                                |
| Delay to Availability            | ≤ 150ms                                                         |                                    |                                                                                |
| Operating Temperature            | -25 to 70°C [-13 to 158°F]                                      |                                    |                                                                                |
| Protection Degree                | IP67                                                            |                                    |                                                                                |
| LED Indicators                   | Yellow (output status)                                          |                                    | Emitter: Yellow (power on)<br>Receiver: Yellow (output status)                 |
| Housing Material                 | Nickel plated brass / PBT cable exit                            |                                    |                                                                                |
| Lens Material                    | PMMA - Poly (methyl methacrylate)                               |                                    |                                                                                |
| Optical Location                 | Axial                                                           |                                    |                                                                                |
| Shock/Vibration                  | Shock IEC 60068-2-27 / Vibration IEC 60068-2-6                  |                                    |                                                                                |
| Ambient Light Immunity           | 15000 lux (incandescent lamp),<br>< 1000 lux (fluorescent lamp) |                                    | 5000 lux (incandescent lamp)<br>> 3000 lux fluorescent lamp<br>(Receiver only) |
| Tightening Torque                | 10 N•m [7.37 lb•ft] (mounted)                                   |                                    |                                                                                |
| Weight                           | 52g [1.83 oz] Connector version / 16g [0.56 oz] Cable version   |                                    |                                                                                |
| IO-Link                          | N/A                                                             |                                    |                                                                                |
| Connectors                       | PVC, 2m [6.5 ft] 3-wire or 4-wire, 26AWG M12 4-pin connector    |                                    |                                                                                |
| Agency Approvals                 | cULus File E328811, CE, UKCA                                    |                                    |                                                                                |



# M12 Tubular Metal Photoelectric Sensors FDM Series

## Characteristic Curves FDM3 Models Diffuse Reflection

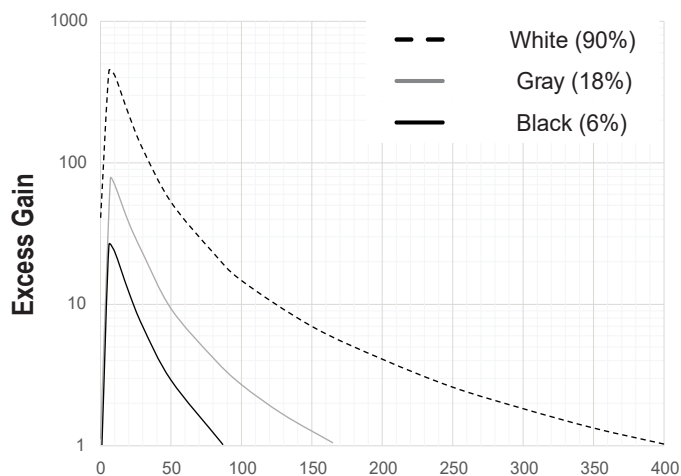




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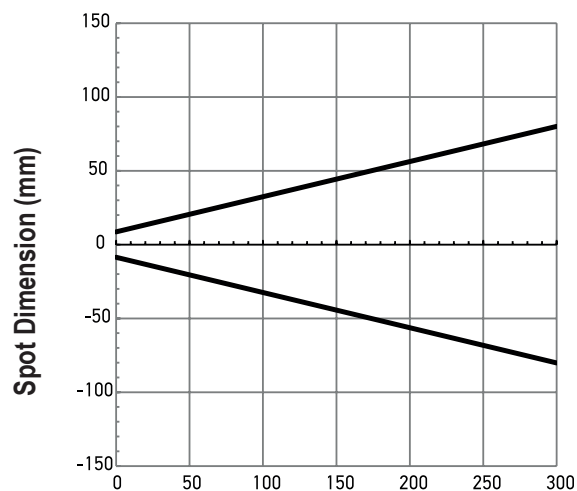
## Characteristic Curves FDM7 Models Diffuse Reflection

**Excess Gain**



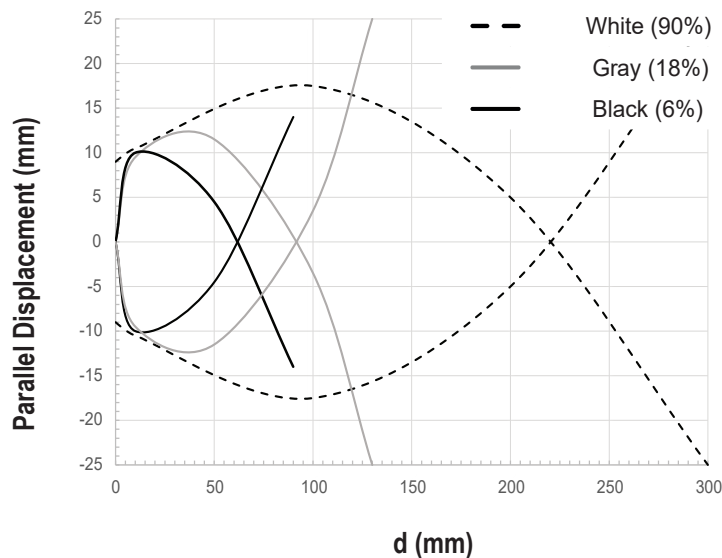
d (mm)

**Spot Dimension**



d (m)

**Parallel Displacement**

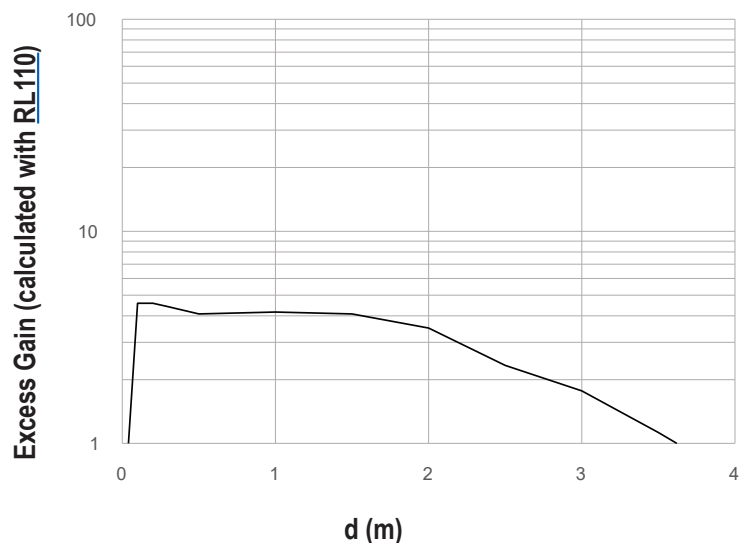




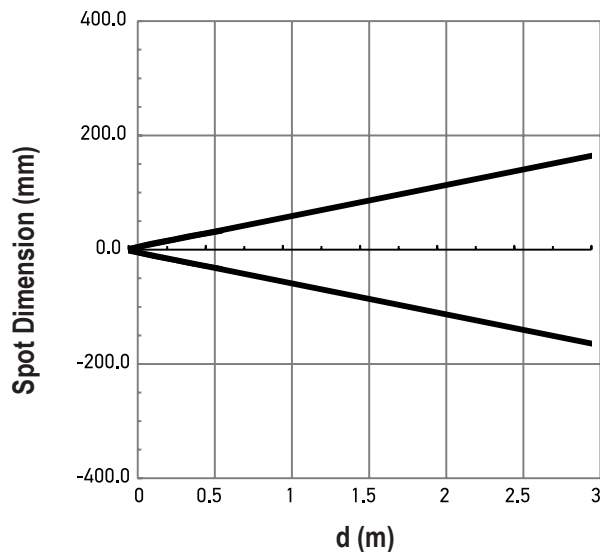
# M12 Tubular Metal Photoelectric Sensors FDM Series

## Characteristic Curves FDMP Models Polarized Retroreflective

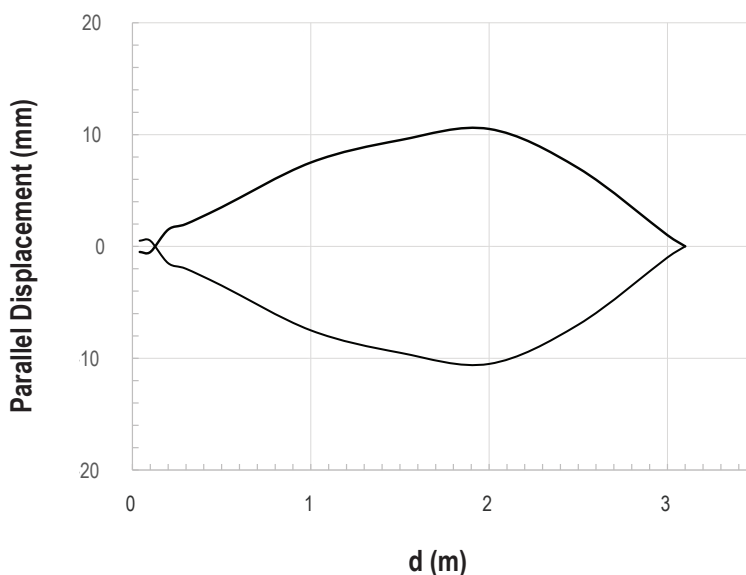
Excess Gain (calculated with [RL110](#))



Spot Dimension



Parallel Displacement (calculated with [RL110](#))

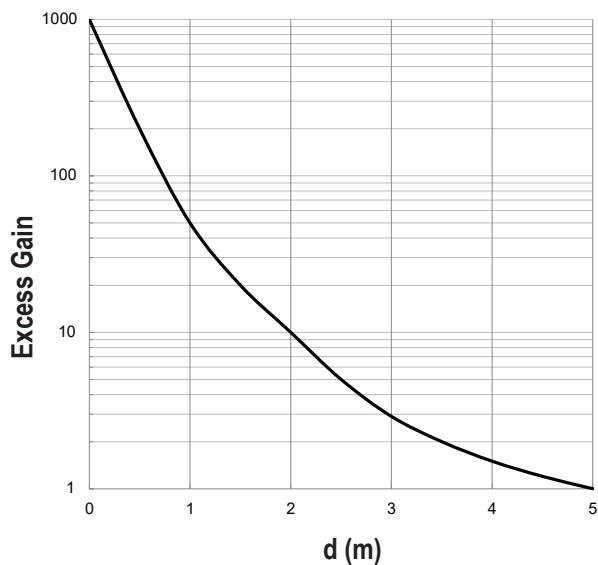




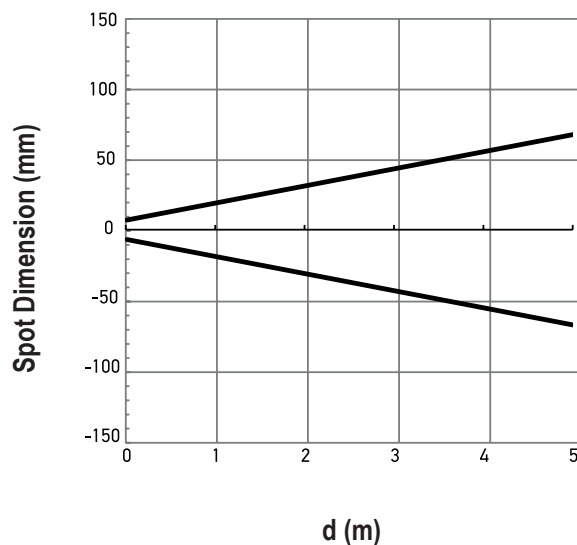
# M12 Tubular Metal Photoelectric Sensors FDM Series

## Characteristic Curves FDME Models Emitters and Receivers

Excess Gain



Spot Dimension



Parallel Displacement

