

MTBF Report

Eletta D-series Flow Monitors

Field-experienced MTBF estimate based on deliveries
and quality records

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Purpose and scope

This report provides an estimate of the Mean Time Between Failures (MTBF) for Eletta D-series flow monitors, based on deliveries and recorded quality reclamations during the specified data window. The estimate is intended as reliability information for customers and does not constitute a warranty statement.

Definitions

MTBF (Mean Time Between Failures): Statistical estimate of the average operating time between failures for a repairable product population.

Failure rate (λ): When a constant failure rate model is used, $\lambda = 1/MTBF$.

Failure (in this report): A D-series unit recorded in Eletta's quality system as a product failure requiring repair or replacement. Exclusions are listed in "Data sources and failure definition".

Product description

Eletta D-series flow monitors are used to supervise flow in closed conduits based on a differential pressure (DP) principle. An obstruction in the process pipe creates a DP that is detected mechanically (diaphragm). The monitor provides adjustable alarm settings via relay outputs and is factory calibrated prior to shipment.

Data sources and failure definition

Delivered quantities are extracted from Eletta's system. Reclamations are taken from Eletta's quality records in accordance with the ISO 9001 quality management system.

Included failures (examples):

- Leakage due to deterioration of sealing/rubber parts.
- Leakage of cast parts affecting integrity.
- Microswitch/relay breakdown that prevents the alarm function.

Excluded events (examples):

- Temporary process conditions such as blockage/foreign substance that is resolved without repair.
- Damage caused by transport, installation, misuse, or external process conditions outside product specification.

Method and assumptions

MTBF is estimated from the total accumulated operating time divided by the number of observed failures.

$$MTBF = \frac{T}{r}$$

T is the total accumulated operating time [hours]

r is the number of failures.

We have used the following methodology.

"T" The total accumulated operating time equal to "N" delivered units in a data window multiplied by "f_installed" the assumed fraction installed and operating multiplied by "H" the assumed average exposure time per unit in the same data window.

$$T \text{ [hours]} = N \times f_{\text{installed}} \times H$$

Conservative assumption that not all delivered units are installed/operating

$$f_{\text{installed}} = 0.9$$

Full 2-year exposure per unit

$$H = 17520 \text{ hours}$$

$$\text{Delivered D-series units during 2024-2025} = 2650 \text{ pcs}$$

$$\text{Recorded product failures (quality records) during 2024-2025} = 5 \text{ pcs}$$

$$MTBF = \frac{2650 \times 0,9 \times 17520}{5}$$

$$= 8.3 \times 10^6 \text{ hours}$$

$$= 954 \text{ years}$$

We then give MTBF in hours as a failure rate.

$$\text{Failure rate: } \lambda = 1/MTBF$$

$$\text{Failure rate} = 1.2 \times 10^{-7} \text{ 1/hour}$$