

Frequency Reference Options for Fluke Counters

Product Family	PM6660- series		PM6680- series				FLK160 - series		
Option model:	PM666-/-1-	PM666-/-3-	PM668-/-1-	PM668-/-5-	PM668-/-6-	PM668-/-7-	FLK-164	FLK-164T	FLK-164H
Retrofit-able option:	non retrofit.	PM9607/001	non retrofit.	PM9691/011	PM9692/011	non retrofit.	non retrofit	non retrofit.	non retrofit.
Time base type:	Standard	MTCXO	Standard	OCXO	OCXO	Rubidium	Standard	TCXO	OCXO
Uncertainty due to:									
- Calibration adjustment tolerance, at +23°C ± 3°C	< 1 x 10 ⁻⁶	< 1 x 10 ⁻⁷	< 1 x 10 ⁻⁶	< 2 x 10 ⁻⁸	< 5 x 10 ⁻⁹	< 5 x 10 ⁻¹¹	< 5 x 10 ⁻⁷	< 2 x 10 ⁻⁷	< 5 x 10 ⁻⁸
- Aging:									
per 24 hr.	n.a.	n.a.	n.a.	< 5 x 10 ⁻¹⁰ ❶	< 3 x 10 ⁻¹⁰ ❶	n.a.	n.a.	n.a.	< 1.5 x 10 ⁻⁹
per month	< 5 x 10 ⁻⁷	< 1 x 10 ⁻⁷	< 5 x 10 ⁻⁷	< 1 x 10 ⁻⁸	< 3 x 10 ⁻⁹	< 5 x 10 ⁻¹¹ ❷	< 5 x 10 ⁻⁷	< 1 x 10 ⁻⁷	< 3 x 10 ⁻⁸
per year	< 5 x 10 ⁻⁶	< 5 x 10 ⁻⁷	< 5 x 10 ⁻⁶	< 7.5x 10 ⁻⁸	< 2 x 10 ⁻⁸	< 2 x 10 ⁻¹⁰ ❸	< 5 x 10 ⁻⁶	< 1 x 10 ⁻⁶	< 1 x 10 ⁻⁷ ❹
- Temperature variation:									
0°C -50°C,	< 1 x 10 ⁻⁶	< 2 x 10 ⁻⁷	< 1 x 10 ⁻⁵	< 5 x 10 ⁻⁹	< 2.5 x 10 ⁻⁹	< 3 x 10 ⁻¹⁰	< 5 x 10 ⁻⁶	< 1 x 10 ⁻⁶	< 2 x 10 ⁻⁷
20°C -26°C (typ. values)	< 3 x 10 ⁻⁶	< 5 x 10 ⁻⁸	< 3 x 10 ⁻⁶	< 6 x 10 ⁻¹⁰	< 4 x 10 ⁻¹⁰	< 2 x 10 ⁻¹¹	< 2 x 10 ⁻⁶	< 7 x 10 ⁻⁷	< 5 x 10 ⁻⁸
- Power voltage variation:									
± 10%	< 1 x 10 ⁻⁸	< 1 x 10 ⁻⁹	< 1 x 10 ⁻⁸	< 5 x 10 ⁻¹⁰	< 5 x 10 ⁻¹⁰	< 1 x 10 ⁻¹¹	< 1 x 10 ⁻⁸	< 1 x 10 ⁻⁸	< 5 x 10 ⁻⁹
Short term stability:									
(Root Allan Variance)									
τ = 1s				5 x 10 ⁻¹²	5 x 10 ⁻¹²	5 x 10 ⁻¹¹			
(typical values)									
τ = 10s	n.a.	n.a.	n.a.	5 x 10 ⁻¹²	5 x 10 ⁻¹²	1.5 x 10 ⁻¹¹	n.a.	n.a.	n.a.
τ = 100s				n.a.	n.a.	5 x 10 ⁻¹²			
Power-on stability:									
- Deviation versus final value after	n.a.	n.a.	n.a.	1 x 10 ⁻⁸	5 x 10 ⁻⁹	4 x 10 ⁻¹⁰	n.a.	n.a.	2 x 10 ⁻⁷
24hr on time, after a warm-up time of:	30 min	30 min	30 min	10 min	10 min	10 min	30 min	30 min	1 min
Total uncertainty, for operating temperature									
0 °C to 50 °C, at 2σ (95 %) confidence interval:									
- 1 year after calibration	< 1.2 x 10 ⁻⁵	< 6 x 10 ⁻⁷	< 1.2 x 10 ⁻⁵	< 1 x 10 ⁻⁷	< 2.5 x 10 ⁻⁸	< 4 x 10 ⁻¹⁰ ❸	< 8 x 10 ⁻⁶	< 1.5 x 10 ⁻⁶	< 4 x 10 ⁻⁷
- 2 year after calibration	< 1.5 x 10 ⁻⁵	< 1 x 10 ⁻⁶	< 1.5 x 10 ⁻⁵	< 2 x 10 ⁻⁷	< 5 x 10 ⁻⁸	< 6 x 10 ⁻¹⁰	< 1.2 x 10 ⁻⁵	< 2.5 x 10 ⁻⁶	< 5 x 10 ⁻⁷
Typical total uncertainty, for operating									
temperature 20°C to 26°C, at 2σ (95 %) confidence interval:									
- 1 year after calibration	< 7 x 10 ⁻⁶	< 6 x 10 ⁻⁷	< 7 x 10 ⁻⁶	< 1 x 10 ⁻⁷	< 2.5 x 10 ⁻⁸	< 2.5 x 10 ⁻¹⁰ ❸	< 6 x 10 ⁻⁶	< 1.5 x 10 ⁻⁶	< 4 x 10 ⁻⁷
- 2 years after calibration	< 1.2 x 10 ⁻⁵	< 1 x 10 ⁻⁶	< 1.2 x 10 ⁻⁵	< 2 x 10 ⁻⁷	< 5 x 10 ⁻⁸	< 5 x 10 ⁻¹⁰	< 1 x 10 ⁻⁵	< 2.5 x 10 ⁻⁶	< 5 x 10 ⁻⁷

n.a. not discernible, neglectable versus 1°C temperature variation.

❶ after 48 hours of continuous operation. Typical value for PM 9692 is 1 x 10⁻¹⁰ / 24h

❷ after 1 month of continuous operation

❸ typical value, aging during 10 years: < 1 x 10⁻⁹

❹ after 1st year, aging during 1st year: < 3 x 10⁻⁷

Explanation

- Calibration Adjustment Tolerance: Is the maximal tolerated deviation from the nominal 10MHz frequency after a calibration. When the reference frequency does not exceed the tolerance limits at the moment of calibration, an adjustment is not needed.

- Total uncertainty Is the total possible deviation from the nominal 10MHz value under influence from frequency drift due to aging and ambient temperature variations versus the reference temperature. The operating temperature range and the calibration interval are part of this specification.