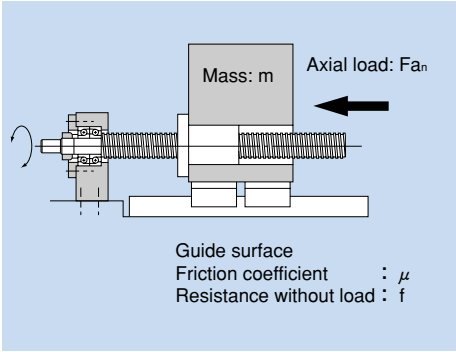
7.2. Calculating the Axial Load

7.2.1. In Horizontal Mount

With ordinary conveyance systems, the axial load (Fa_n) applied when horizontally reciprocating the workpiece is obtained in the equation below.

$$Fa_1 = \mu \cdot mg + f + m\alpha \quad \cdots\cdots (14)$$
$$Fa_2 = \mu \cdot mg + f \quad \cdots\cdots (15)$$
$$Fa_3 = \mu \cdot mg + f - m\alpha \quad \cdots\cdots (16)$$
$$Fa_4 = -\mu \cdot mg - f - m\alpha \quad \cdots\cdots (17)$$
$$Fa_5 = -\mu \cdot mg - f \quad \cdots\cdots (18)$$
$$Fa_6 = -\mu \cdot mg - f + m\alpha \quad \cdots\cdots (19)$$



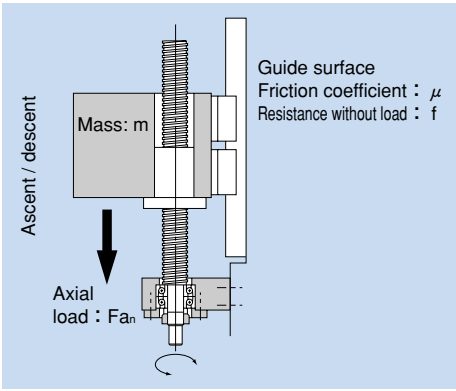
Maximum speed V_{max} (m/s)
Acceleration time t_1 (m/s)
Acceleration $\alpha = \frac{V_{max}}{t_1}$ (m/s²)

Axial load during forward acceleration Fa_1 (N)
Axial load during forward uniform motion Fa_2 (N)
Axial load during forward deceleration Fa_3 (N)
Axial load during backward acceleration Fa_4 (N)
Axial load during uniform backward motion Fa_5 (N)
Axial load during backward deceleration Fa_6 (N)
Transferred mass m (kg)
Friction coefficient of the guide surface μ (—)
Resistance of the guide surface (without load) f (N)

7.2.2. In Vertical Mount

With ordinary conveyance systems, the axial load (Fa_n) applied when vertically reciprocating the workpiece is obtained in the equation below.

$$Fa_1 = mg + f + m\alpha \quad \cdots\cdots (20)$$
$$Fa_2 = mg + f \quad \cdots\cdots (21)$$
$$Fa_3 = mg + f - m\alpha \quad \cdots\cdots (22)$$
$$Fa_4 = mg - f - m\alpha \quad \cdots\cdots (23)$$
$$Fa_5 = mg - f \quad \cdots\cdots (24)$$
$$Fa_6 = mg - f + m\alpha \quad \cdots\cdots (25)$$



Maximum speed V_{max} (m/s)
Acceleration time t_1 (m/s)
Acceleration $\alpha = \frac{V_{max}}{t_1}$ (m/s²)

Axial load during upward acceleration Fa_1 (N)
Axial load during uniform upward motion Fa_2 (N)
Axial load during upward deceleration Fa_3 (N)
Axial load during downward acceleration Fa_4 (N)
Axial load during uniform downward motion Fa_5 (N)
Axial load during downward deceleration Fa_6 (N)
Transferred mass m (kg)
Resistance of the guide surface (without load) f (N)