Technical Note

Sample Calculation for Gearmotor with Brake/Gearmotor with Clutch/Brake

	SI Unit	Gravimetric Unit	Notes
Braking Time• Gearing Time of Clutch (ttb)	$t_{tb}=t_{ab}+t_a$ (s) $t_{ab}=\frac{(I_r+I_\ell)\times n}{9.57\times(Td\pm T\ell)}$ (s)	$t_{tb}=t_{ab}+t_a$ (s) $t_{ab}=\frac{(GD_r^2+GD_\ell^2)\times n}{375\times(Td\pm T\ell)}$ (s)	Note ❶ When the load torque become negative such as winding down, $T\ell$ should be $(-T\ell)$. ❷ For the mark「±」, Clutch should be「−」and B rake should be「+」.
Geared Total Work (E)	**Geared Total Work (E) of clutch brake or brake** $E=\frac{(I_r+I_\ell)\times n^2}{183}\times\frac{Td}{Td\pm T\ell}$ (J)	$E=\frac{(GD_r^2+GD_\ell^2)\times n^2}{7160}\times\frac{Td}{Td\pm T\ell}$ (kgf•m)	Note ❶ When the load torque become negative such as winding down, $T\ell$ should be $(-T\ell)$. ❷ For the mark「±」, Clutch should be「−」and B rake should be「+」.
Life	The life of clutch/brake lining varies according to surface pressure, temperature, slip speed, etc. Therefore, it is not possible to obtain exact value, however, the round number of life-time braking frequency can be estimated by the following formula: $Z=\frac{Emax}{E}$ (times of braking)		

【Explanations of Code】

ta ····· Brake delay time of gearmotor with brake ····· 〈Refer Table-15 on page E21〉
Armature braking time of gearmotor with clutch/brake ····· 〈Refer Table-16•17 on page E40〉

Ir{GD_r^2} ····· Gearmotor with brake ····· 〈Refer Table-8-1 o Table-8-2 on page E14〉
Gearmotor with clutch/brake ····· 〈Refer Table 9 or 10 on page E14〉

I_ℓ{GD_ℓ^2} ····· Inertia Moment of load I Motor shaft or reducer Input Shaft Equivalent of (GD^2) (kg•m^2) {kgf•m^2}

n ····· Rotation speed of clutch shaft or brake shaft (rpm)

Td ····· Dynamic friction torque against the corresponding rotation speed of clutch/brake (N•m) {kgf•m}
Gearmotor with brake ····· 〈Refer Table-13-1 or Table-13-2 on page E18〉
Gearmotor with clutch/brake ····· 〈Refer Table-16•17 on page E40〉

$T\ell$ ····· Equivalent load torque converted to reducer input shaft (N•m) {kgf•m}

Emax ····· Allowable total work(J)(kgf•m) of clutch/brake
Gearmotor with clutch ····· 〈Refer Table-13-1 or Table-13-2 on page E18〉
Gearmotor with clutch/brake ····· 〈Refer Table-16•17 on page E40〉