# FS・F3S-Type Torque Arm



## Fixing a Reducer and a Torque Arm

❶ Torque arms are subjected to rotation reaction torque, therefore, they must be strong by using materials of enough thickness and bolts to endure the shock load on starting/braking. Choosing our optional torque arms is the most appropriate solution. (Refer to page E61.)

❷ When installing a reducer with a torque arm, be sure to tighten the bolt using helical spring lock washers and plain washers. For proper tightening torque, refer to the table shown on the right.

**Bolt Size and Respective Tightening Torque**

| Bolt Size | Tightening Torque N•m{kgf•m} |
|---|---|
| M5 | 2.9{ 0.3} |
| M6 | 4.9{ 0.5} |
| M8 | 13 { 1.3} |
| M10 | 25 { 2.6} |
| M12 | 44 { 4.5} |
| M14 | 69 { 7.0} |
| M16 | 108 {11 } |
| M20 | 294 {30 } |

## How to fix the Torque Arm Fixing Part

❶ In case of Normal/Reverse Operation

Firmly fix the fixing part of the torque arm. Make sure that there is no radial load (suspending load) imposed between the driven shaft and the hollow shaft of the reducer, caused by poor alignment between the hole of fixing part and the connecting machine. (Refer to the Figure-6)

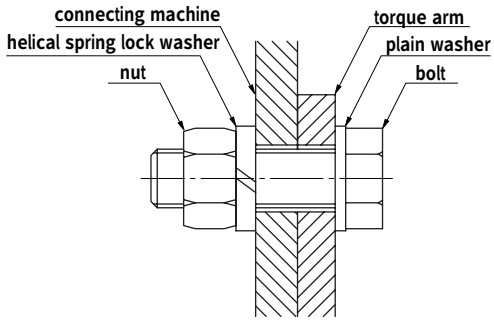
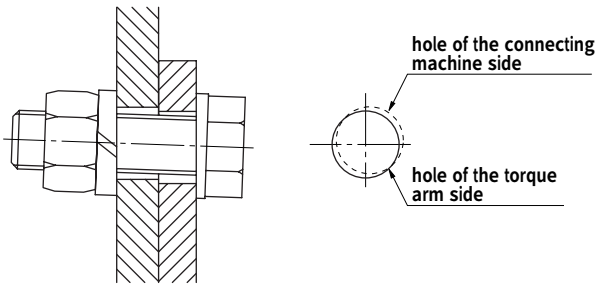



**Figure-6 Attaching the fixing part**




Excess force arisen in the driven shaft and the hollow shaft may cause failure of the machine.

**Bad example**

Note) When a backlash in the attaching part arose by normal/reverse operations or by high frequency of starting/stopping, the intense impact given to the torque arm in each starting may cause the failures such as loosening of the tightening bolt.

❷ In case of One-Direction Operation

If the frequent staring torque like in the normal/reverse operation, is not observed, operation with the released fixing part of torque arm is possible. However, it is necessary to fix the driven shaft and the hollow shaft. (Refer to page E56～E-57, Figure -2～Figure-4)

In this case, be sure to secure enough space both for radial direction and for thrust direction in the alignment between the connecting machine and the fixing part.

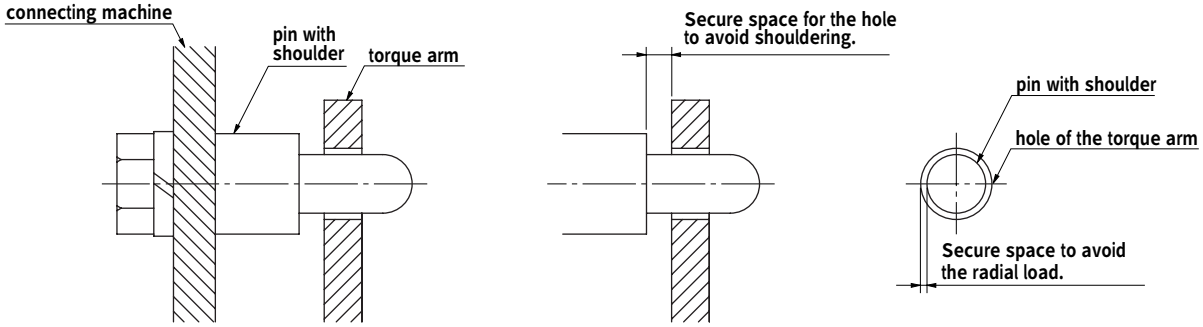



**Figure-7 Example of using pin with shoulder**

## FS Type (Hollow Shaft)•Torque Arm (Option)

**Figure No. 1**

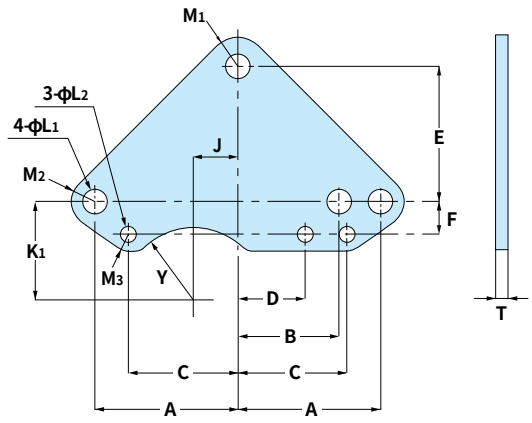
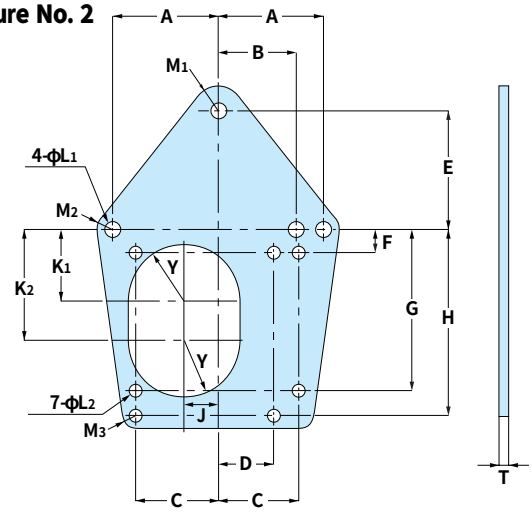



**Figure No. 2**

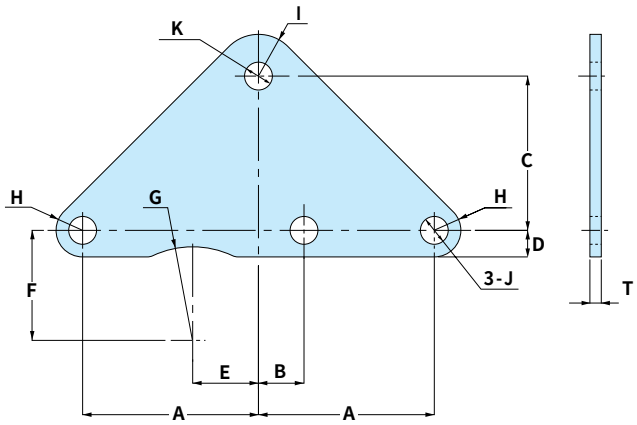



| Model Number | Frame Number | Figure No. | A | B | C | D | E | F | G | H | J | K1 | K2 | L1 | L2 | M1 | M2 | M3 | Y | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TA-20 | 20 | 1 | 55 | 39 | 42 | 26 | 52 | 13 | — | — | 17 | 38 | — | φ9 | φ5.5 | R11 | R 9 | R 6 | R28 | 4.5 |
| TA-25 | 25 | 1 | 63 | 47 | 47 | 31 | 61 | 16 | — | — | 19 | 44 | — | φ11 | φ6.5 | R15 | R10.5 | R 7 | R34 | 4.5 |
| TA-30 | 30 | 1 | 70 | 52 | 53 | 35 | 70 | 17 | — | — | 20 | 50 | — | φ11 | φ9 | R15 | R12 | R 9 | R39 | 6 |
| TA-35 | 35 | 2 | 82 | 62 | 64 | 44 | 94 | 18 | 126 | 146 | 26 | 56 | 88 | φ13 | φ9 | R18 | R12 | R10 | R43.5 | 6 |
| TA-45 | 45 | 2 | 102 | 72 | 80 | 50 | 110 | 22 | 152 | 182 | 32 | 70 | 104 | φ15 | φ11 | R20 | R15 | R11 | R51 | 9 |
| TA-55 | 55 | 2 | 129 | 93 | 97 | 61 | 160 | 32 | 190 | 226 | 39 | 90 | 132 | φ18 | φ13 | R25 | R20 | R13 | R70 | 9 |

| Material | Surface Treatment | Color |
|---|---|---|
| SS400 | uni-chrome coating | white |

# FS•F3S-Type Torque Arm

## F3S Type (Hollow Shaft)•Torque Arm (Option)




### Specificaiton

| Frame Number | Name of product | Capacity | Reduction Ratio | A | B | C | D | E | F | G | H | I | J | K | T | Round Weight (kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | TAF3S-20-2 | 0.1 kW | 1／ 5~1／ 60 | 53.5 | 23.5 | 52 | 10.5 | — | — | — | R10.5 | R11 | ϕ11 | ϕ 9 | 3.2 | 0.1 |
| 25 | TAF3S-25-2 | 0.2 kW | 1／ 5~1／ 60 | 60 | 27 | 61 | 10.5 | 16.5 | 43.5 | R37 | R10.5 | R15 | ϕ11 | ϕ 9 | 3.2 | 0.2 |
| | TAF3S-25-3 | 0.1 kW | 1／ 80~1／ 240 | 69.5 | 17.5 | 61 | 10.5 | 26 | 43.5 | R37 | R10.5 | R 6.5 | ϕ11 | ϕ11 | 4.5 | 0.2 |
| 30 | TAF3S-30-2 | 0.4 kW | 1／ 5~1／ 60 | 69.5 | 26.5 | 70 | 10.5 | 21.5 | 48 | R41.5 | R10.5 | R15 | ϕ11 | ϕ11 | 4.5 | 0.3 |
| | TAF3S-30-3 | 0.1 kW | 1／ 300~1／ 375 | 78 | 14 | 70 | 12 | 32 | 46 | R41.5 | R12 | R16.5 | ϕ13.5 | ϕ13.5 | 6 | 0.4 |
| | | 0.2 kW | 1／ 80~1／ 240 | | | | | | | | | | | | | |
| 35 | TAF3S-35-2 | 0.75kW | 1／ 5~1／ 80 | 80.5 | 31.5 | 94 | 12 | 24.5 | 56 | R46.5 | R12 | R18 | ϕ13.5 | ϕ13.5 | 6 | 0.6 |
| | TAF3S-35-3 | 0.1 kW | 1／ 450~1／ 750 | 97 | 11 | 94 | 15 | 43 | 54 | R46.5 | R15 | R22.5 | ϕ17.5 | ϕ17.5 | 9 | 1.2 |
| | | 0.2 kW | 1／ 300~1／ 375 | | | | | | | | | | | | | |
| | | 0.4 kW | 1／ 80~1／ 240 | | | | | | | | | | | | | |
| 45 | TAF3S-45-2 | 1.5 kW | 1／ 5~1／ 60 | 103.5 | 42.5 | 110 | 15 | — | — | — | R15 | R20 | ϕ17.5 | ϕ17.5 | 9 | 1.4 |
| | | 2.2 kW | 1／ 5~1／ 30 | | | | | | | | | | | | | |
| | TAF3S-45-3 | 0.1 kW | 1／ 900~1／1200 | 118 | 20 | 110 | 18.5 | 49 | 69 | R54 | R18.5 | R28.5 | ϕ22 | ϕ22 | 9 | 1.7 |
| | | 0.2 kW | 1／ 450~1／ 750 | | | | | | | | | | | | | |
| | | 0.4 kW | 1／ 300~1／ 375 | | | | | | | | | | | | | |
| | | 0.75kW | 1／ 80~1／2400 | | | | | | | | | | | | | |
| 50 | TAF3S-50-2 | 2.2 kW | 1／ 40~1／ 60 | 136 | 44 | 140 | 15 | — | — | — | R15 | R20 | ϕ17.5 | ϕ17.5 | 9 | 2.1 |
| 55 | TAF3S-55-3 | 0.1 kW | 1／1500 | 146 | 70 | 160 | 18.5 | — | — | — | R18.5 | R28.5 | ϕ20.5 | ϕ20.5 | 12 | 3.6 |
| | | 0.2 kW | 1／ 900~1／1200 | | | | | | | | | | | | | |
| | | 0.4 kW | 1／ 450~1／ 600 | | | | | | | | | | | | | |
| | | 0.75kW | 1／ 300 | | | | | | | | | | | | | |
| | | 1.5 kW | 1／ 80~1／ 240 | | | | | | | | | | | | | |
| | | 2.2 kW | 1／ 80~1／ 120 | | | | | | | | | | | | | |

| Material | Surface Treatment | Color |
|---|---|---|
| SS400 | uni-chrome coating | white |

# Overhung Load (O.H.L.) on a Hollow Shaft

## ■Designing the Torque Arm

In case customer does not use our optional torque arm and use their manufactured torque arm as shown in the Figure-8, the distance between the center of the output shaft and the fixing point(r) can be calculated with the following formulas:

**SI Unit**

$$r\,(mm) \geqq \frac{\text{Actual load torque}\,(N\cdot m)\times 1000}{\text{Allowable O.H.L.}\,(N) - 9.8\times \text{Mass of the reducer}\,(kg)}$$

**Gravimetric Unit**

$$r\,(mm) \geqq \frac{\text{Actual load torque}\,(kgf\cdot m)\times 1000}{\text{Allowable O.H.L.}\,(kgf) - \text{Weight of the reducer}\,(kgf)}$$

In case of using the torque arm as shown in the Figure-9, the distance between the center of the output shaft and the fixing point(r) can be calculated with the following formulas:

**SI Unit**

$$r\,(mm) \geqq \frac{\text{Actual load torque}\,(N\cdot m)\times (A+M)\times 1000}{\{\text{Allowable O.H.L.}\,(N) - 9.8\times \text{Mass of the reducer}\,(kg)\}\times (A+20)}$$

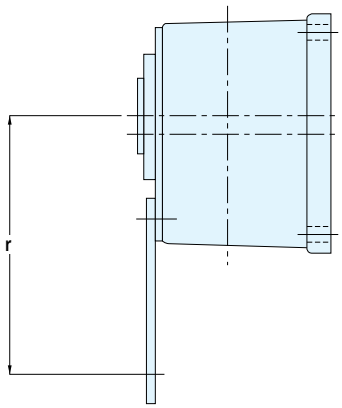
**Gravimetric Unit**

$$r\,(mm) \geqq \frac{\text{Actual load torque}\,(kgf\cdot m)\times (A+M)\times 1000}{\{\text{Allowable O.H.L.}\,(kgf) - \text{Weight of the reducer}\,(kgf)\}\times (A+20)}$$

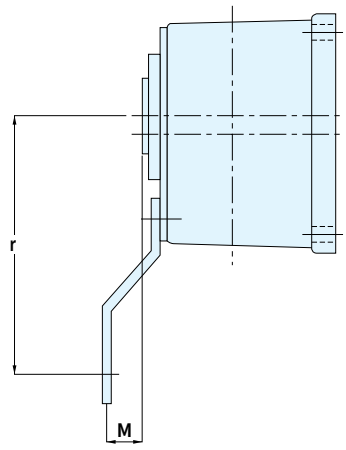
Note) Refer to the table below for "A".

| Ratio | A (mm) |
|---|---|
| 20 | 68.5 |
| 25 | 84.5 |
| 30 | 91 |
| 35 | 98 |
| 45 | 113 |
| 55 | 150 |

〈Figure-8〉




〈Figure-9〉




Note) For the thickness of torque arm, refer to the "Torque Arm(Option)" in page E61.