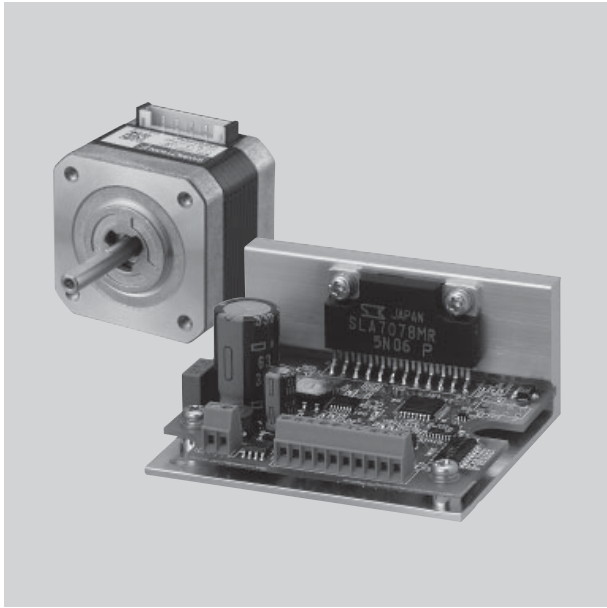


DC Input Set Orders

Unipolar/Bipolar

Items included in a set...▶p. 12 Specifications/Characteristics...▶p. 13 to 21
 Motor dimensions...▶p. 22 to 23 Motor specifications...▶p. 24
 Driver dimensions...▶p. 26 Driver specifications...▶p. 26



Items included in a set **RoHS**

Driver Terminal block type

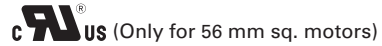


Unipolar Model no.: US1D200P10 Input voltage: 24/36 VDC

Bipolar Model no.: BS1D200P10 Input voltage: 24/36 VDC

- The Instruction Manual is available for download from our website.
 - Drivers are available for separate purchase.
- Connector-type drivers are also available. Contact us for details.

Motor



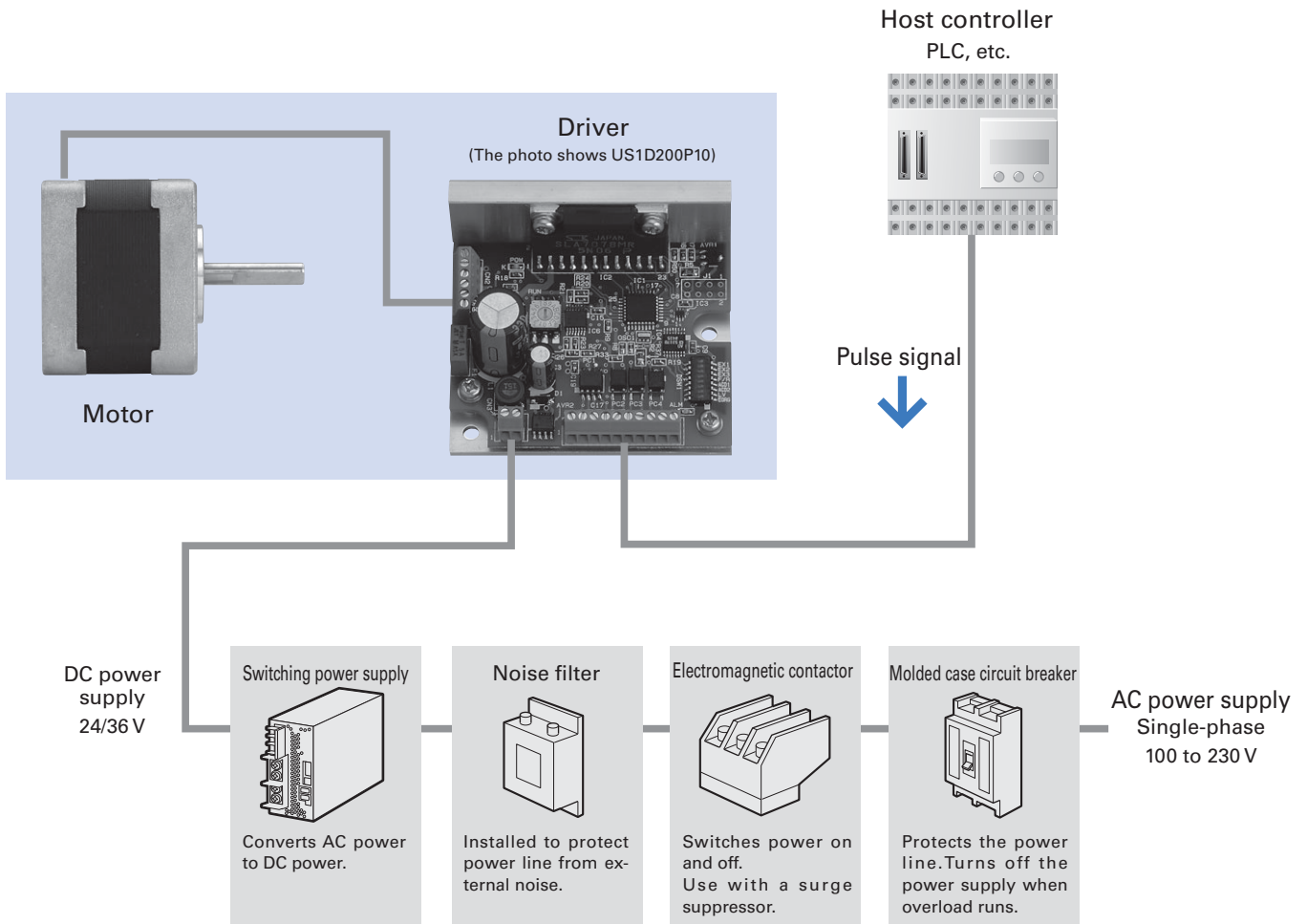
Unipolar motor sizes: 28 mm sq., 42 mm sq., 56 mm sq.

Bipolar motor sizes: 28 mm sq., 42 mm sq., 50 mm sq.,
56 mm sq., 60 mm sq.

Cable with connectors

Supplied only with connector-type motors

System Configuration



How to Read Set Order Numbers

Note that not all possible parameter combinations are valid. Contact us or see Items Included in a Set on the next page for details of the items included in individual sets.

e.g., The model number shown below is a set of a DC input driver (US1D200P10) and a motor (SM2561C20U41). The motor's specifications are: 56 mm sq. size, 41.8 mm length, and single shaft.

D U 1 6 M 71 1 S

Stepping motor shaft
S: Single shaft, D: Dual shaft

Stepping motor length

| Name | Motor size | | | | | | | | | | | |
|------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|-------------------|
| | 28 mm sq. | | 42 mm sq. | | | | 50 mm sq. | | 56 mm sq. | | 60 mm sq. | |
| | Motor model no. | Motor length [mm] | Motor model no. | Motor length [mm] | Motor model no. | Motor length [mm] | Motor model no. | Motor length [mm] | Motor model no. | Motor length [mm] | Motor model no. | Motor length [mm] |
| 1 | SH2281 | 32 | SF2421 | 33 | SH1421 | 33 | 103H6701 | 39.8 | SM2561 | 41.8 | SH1601 | 42 |
| 2 | | | SF2422 | 39 | SH1422 | 39 | | | SM2562 | 53.8 | SH1602 | 54 |
| 3 | | | SF2423 | 48 | | | 103H6703 | 51.3 | SM2563 | 75.8 | | |
| 4 | | | SF2424 | 59.5 | SH1424 | 48 | | | SM2564 | 85.8 | | |
| 5 | SH2285 | 51.5 | | | | | | | | | | |

Motor size Full step angle
 28: 28 mm sq., 1.8°
 42: 42 mm sq., 1.8°
 14: 42 mm sq., 0.9°
 67: 50 mm sq., 1.8°
 71: 56 mm sq., 1.8°
 16: 60 mm sq., 0.9°

Stepping motor series
 H : H series
 S : SH or SF series
 M : SM series

Rated current
 4: 1 A/phase, 5: 1.2 A/phase, 6: 2 A/phase

Model

Windings
 U: Unipolar, B: Bipolar

D: DC input

Items Included in a Set These sets include a driver, motor, and motor cable with connectors.

Motors marked with (L) are lead-type motors. 300 mm or longer leads are attached to the motor.
 Motors marked with (C) are connector-type motors. The following motor cables with connectors are included.

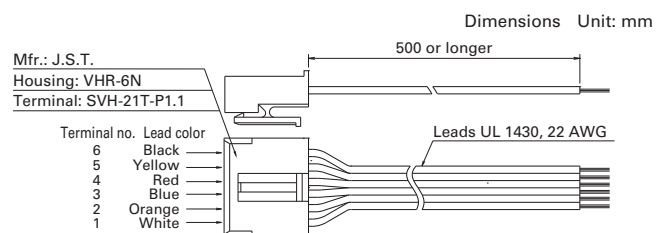
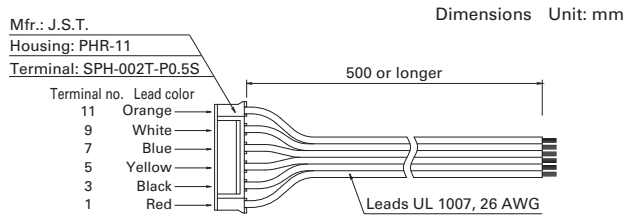
Unipolar Bundled driver model no.: US1D200P10

| Motor size | Single shaft | | | Dual shaft | | | Full step angle | Rated current [A/phase] | Page | |
|------------|---------------|-------------------------|---------------------------------------|---------------|-------------------------|---------------------------------------|-----------------|-------------------------|-----------------|-------------|
| | Set order no. | Items included in a set | | Set order no. | Items included in a set | | | | Specifi-cations | Dimen-sions |
| | | Motor model no. | Motor cable with connectors model no. | | Motor model no. | Motor cable with connectors model no. | | | | |
| 28 mm sq. | DU14S281S | SH2281-5271 | L - | DU14S281D | SH2281-5231 | L - | 1.8° | 1 | p. 13 | p. 22 |
| | DU14S285S | SH2285-5271 | L - | DU14S285D | SH2285-5231 | L - | 1.8° | 1 | p. 13 | p. 22 |
| 42 mm sq. | DU15S421S | SF2421-12U41 | C 4835774-1 | DU15S421D | SF2421-12U11 | C 4835774-1 | 1.8° | 1.2 | p. 13 | p. 22 |
| | DU15S422S | SF2422-12U41 | C 4835774-1 | DU15S422D | SF2422-12U11 | C 4835774-1 | 1.8° | 1.2 | p. 13 | p. 22 |
| | DU15S423S | SF2423-12U41 | C 4835774-1 | DU15S423D | SF2423-12U11 | C 4835774-1 | 1.8° | 1.2 | p. 14 | p. 22 |
| | DU15S424S | SF2424-12U41 | C 4835774-1 | DU15S424D | SF2424-12U11 | C 4835774-1 | 1.8° | 1.2 | p. 14 | p. 22 |
| | DU15S141S | SH1421-0441 | L - | DU15S141D | SH1421-0411 | L - | 0.9° | 1.2 | p. 14 | p. 22 |
| | DU15S142S | SH1422-0441 | L - | DU15S142D | SH1422-0411 | L - | 0.9° | 1.2 | p. 14 | p. 22 |
| | DU15S144S | SH1424-0441 | L - | DU15S144D | SH1424-0411 | L - | 0.9° | 1.2 | p. 15 | p. 22 |
| 56 mm sq. | DU16M711S | SM2561C20U41 | C 4837798-1 | DU16M711D | SM2561C20U11 | C 4837798-1 | 1.8° | 2 | p. 15 | p. 23 |
| | DU16M712S | SM2562C20U41 | C 4837798-1 | DU16M712D | SM2562C20U11 | C 4837798-1 | 1.8° | 2 | p. 15 | p. 23 |
| | DU16M713S | SM2563C20U41 | C 4837798-1 | DU16M713D | SM2563C20U11 | C 4837798-1 | 1.8° | 2 | p. 15 | p. 23 |
| | DU16M714S | SM2564C20U41 | C 4837798-1 | DU16M714D | SM2564C20U11 | C 4837798-1 | 1.8° | 2 | p. 16 | p. 23 |

• **Motor cable with connectors** Note: Included with connector-type motors only

For 42 mm sq. unipolar motors (Model no.: 4835774-1)

For 56 mm sq. unipolar motors (Model no.: 4837798-1)



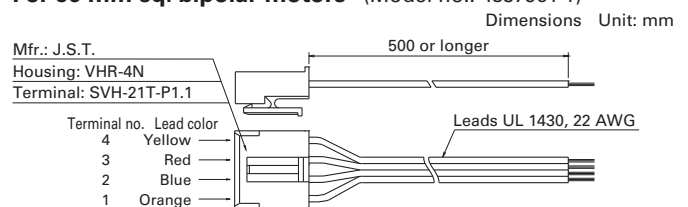
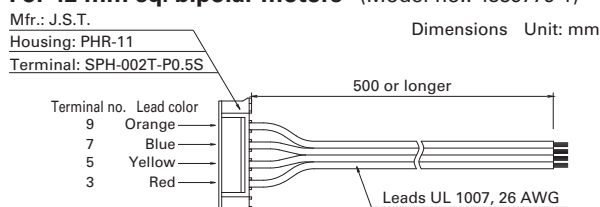
Bipolar Bundled driver model no.: BS1D200P10

| Motor size | Single shaft | | | Dual shaft | | | Full step angle | Rated current [A/phase] | Page | |
|------------|---------------|-------------------------|---------------------------------------|---------------|-------------------------|---------------------------------------|-----------------|-------------------------|-----------------|-------------|
| | Set order no. | Items included in a set | | Set order no. | Items included in a set | | | | Specifi-cations | Dimen-sions |
| | | Motor model no. | Motor cable with connectors model no. | | Motor model no. | Motor cable with connectors model no. | | | | |
| 28 mm sq. | DB14S281S | SH2281-5771 | L - | DB14S281D | SH2281-5731 | L - | 1.8° | 1 | p. 17 | p. 22 |
| | DB14S285S | SH2285-5771 | L - | DB14S285D | SH2285-5731 | L - | 1.8° | 1 | p. 17 | p. 22 |
| 42 mm sq. | DB14S421S | SF2421-10B41 | C 4835775-1 | DB14S421D | SF2421-10B11 | C 4835775-1 | 1.8° | 1 | p. 17 | p. 22 |
| | DB14S422S | SF2422-10B41 | C 4835775-1 | DB14S422D | SF2422-10B11 | C 4835775-1 | 1.8° | 1 | p. 17 | p. 22 |
| | DB14S423S | SF2423-10B41 | C 4835775-1 | DB14S423D | SF2423-10B11 | C 4835775-1 | 1.8° | 1 | p. 18 | p. 22 |
| | DB14S424S | SF2424-10B41 | C 4835775-1 | DB14S424D | SF2424-10B11 | C 4835775-1 | 1.8° | 1 | p. 18 | p. 22 |
| | DB16S141S | SH1421-5241 | L - | DB16S141D | SH1421-5211 | L - | 0.9° | 2 | p. 18 | p. 22 |
| | DB16S142S | SH1422-5241 | L - | DB16S142D | SH1422-5211 | L - | 0.9° | 2 | p. 18 | p. 22 |
| | DB16S144S | SH1424-5241 | L - | DB16S144D | SH1424-5211 | L - | 0.9° | 2 | p. 19 | p. 22 |
| 50 mm sq. | DB16H671S | 103H6701-5040 | L - | DB16H671D | 103H6701-5010 | L - | 1.8° | 2 | p. 19 | p. 23 |
| | DB16H673S | 103H6703-5040 | L - | DB16H673D | 103H6703-5010 | L - | 1.8° | 2 | p. 19 | p. 23 |
| 56 mm sq. | DB16M711S | SM2561C20B41 | C 4837961-1 | DB16M711D | SM2561C20B11 | C 4837961-1 | 1.8° | 2 | p. 19 | p. 23 |
| | DB16M712S | SM2562C20B41 | C 4837961-1 | DB16M712D | SM2562C20B11 | C 4837961-1 | 1.8° | 2 | p. 20 | p. 23 |
| | DB16M713S | SM2563C20B41 | C 4837961-1 | DB16M713D | SM2563C20B11 | C 4837961-1 | 1.8° | 2 | p. 20 | p. 23 |
| | DB16M714S | SM2564C20B41 | C 4837961-1 | DB16M714D | SM2564C20B11 | C 4837961-1 | 1.8° | 2 | p. 20 | p. 23 |
| 60 mm sq. | DB16S161S | SH1601-5240 | L - | DB16S161D | SH1601-5210 | L - | 0.9° | 2 | p. 20 | p. 23 |
| | DB16S162S | SH1602-5240 | L - | DB16S162D | SH1602-5210 | L - | 0.9° | 2 | p. 21 | p. 23 |

• **Motor cable with connectors** Note: Included with connector-type motors only

For 42 mm sq. bipolar motors (Model no.: 4835775-1)

For 56 mm sq. bipolar motors (Model no.: 4837961-1)



| Size | Motor size | 28 mm sq. (1.8° full step angle) | | 42 mm sq. (1.8° full step angle) | |
|--------------------------------------|-----------------|------------------------------------|-------------|----------------------------------|--------------|
| | Motor length | 32 mm | 51.5 mm | 33 mm | 39 mm |
| Single shaft | Set order no. | DU14S281S | DU14S285S | DU15S421S | DU15S422S |
| | Motor model no. | SH2281-5271 | SH2285-5271 | SF2421-12U41 | SF2422-12U41 |
| Dual shaft | Set order no. | DU14S281D | DU14S285D | DU15S421D | DU15S422D |
| | Motor model no. | SH2281-5231 | SH2285-5231 | SF2421-12U11 | SF2422-12U11 |
| Holding torque | | N·m | | 0.22 | 0.33 |
| Rotor inertia | | $\times 10^{-4}$ kg·m ² | | 0.031 | 0.046 |
| Rated current | | A/phase | | 1.2 | 1.2 |
| Motor mass ⁽¹⁾ | | kg | | 0.23 | 0.3 |
| Allowable thrust load | | N | | 10 | 10 |
| Allowable radial load ⁽²⁾ | | N | | 39 | 37 |

(1) For the driver mass, see ▶ p. 26

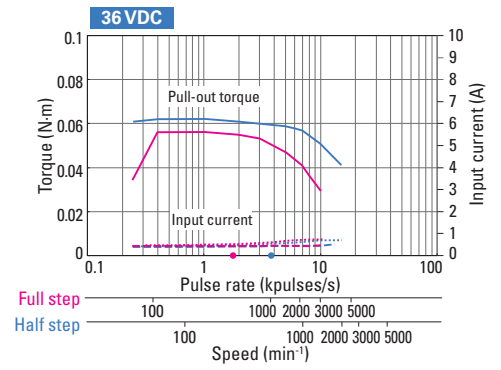
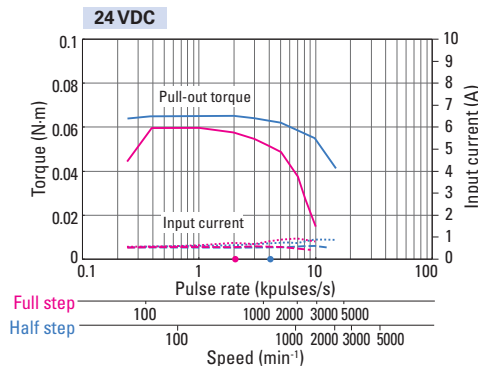
(2) Load is exerted to the shaft end.

Characteristics

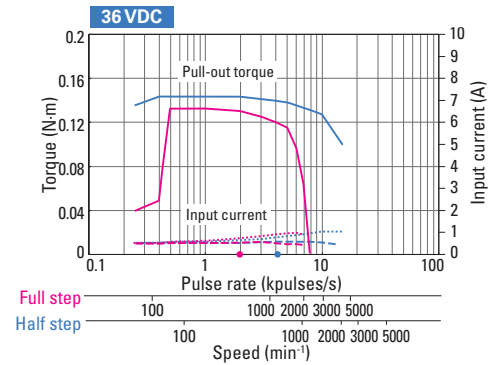
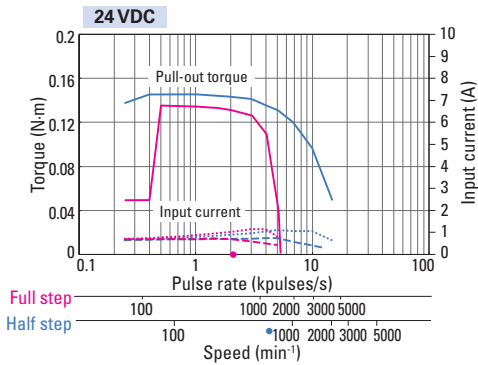
With rubber coupling used

Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step ····· Half step ·····

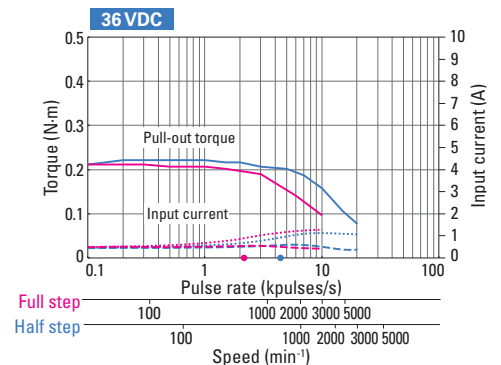
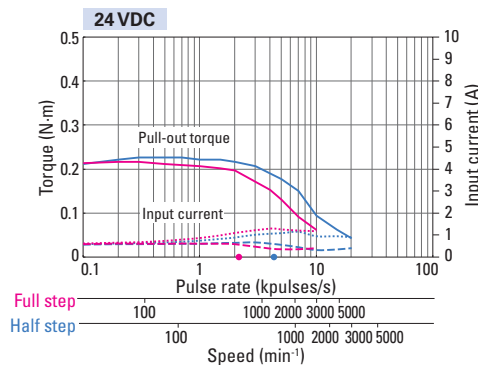
DU14S281S DU14S281D



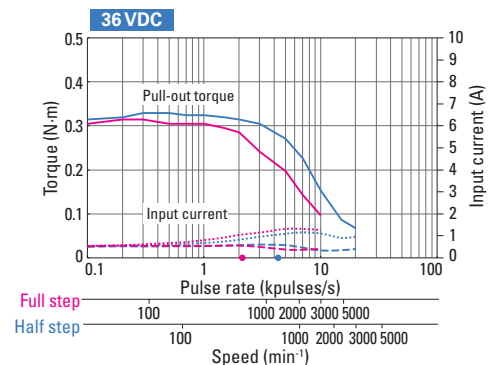
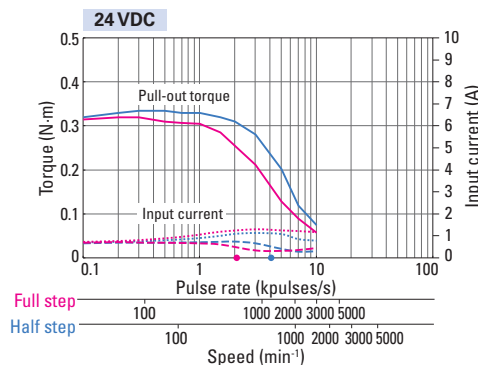
DU14S285S DU14S285D



DU15S421S DU15S421D



DU15S422S DU15S422D



| Size | Motor size | 42 mm sq. (1.8° full step angle) | | 42 mm sq. (0.9° full step angle) | | |
|--------------------------------------|-----------------|------------------------------------|--------------|----------------------------------|-------------|-------|
| | Motor length | 48 mm | 59.5 mm | 33 mm | 39 mm | |
| Single shaft | Set order no. | DU15S423S | DU15S424S | DU15S141S | DU15S142S | |
| | Motor model no. | SF2423-12U41 | SF2424-12U41 | SH1421-0441 | SH1422-0441 | |
| Dual shaft | Set order no. | DU15S423D | DU15S424D | DU15S141D | DU15S142D | |
| | Motor model no. | SF2423-12U11 | SF2424-12U11 | SH1421-0411 | SH1422-0411 | |
| Holding torque | | N·m | 0.4 | 0.58 | 0.2 | 0.29 |
| Rotor inertia | | $\times 10^{-4}$ kg·m ² | 0.063 | 0.094 | 0.044 | 0.066 |
| Rated current | | A/phase | 1.2 | 1.2 | 1.2 | 1.2 |
| Motor mass ⁽¹⁾ | | kg | 0.38 | 0.51 | 0.24 | 0.29 |
| Allowable thrust load | | N | 10 | 10 | 10 | 10 |
| Allowable radial load ⁽²⁾ | | N | 35 | 29 | 25 | 24 |

(1) For the driver mass, see ▶ p. 26

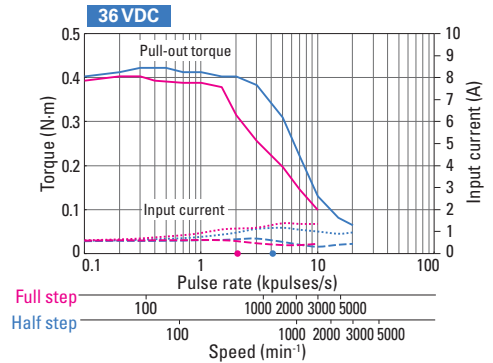
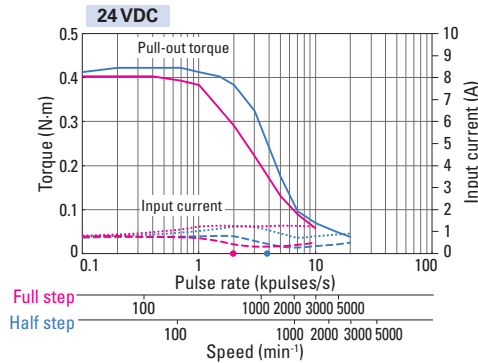
(2) Load is exerted to the shaft end.

Characteristics

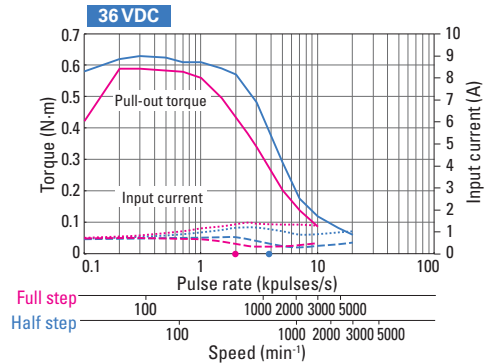
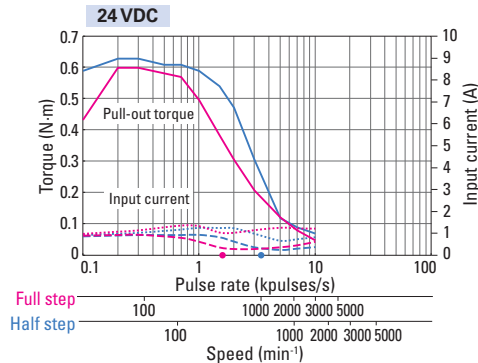
With rubber coupling used

Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step Half step

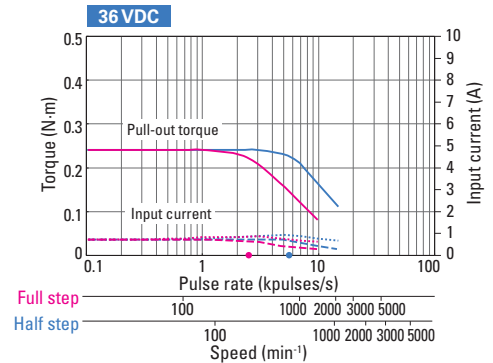
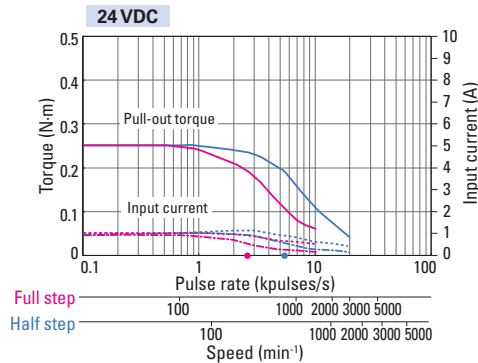
DU15S423S DU15S423D



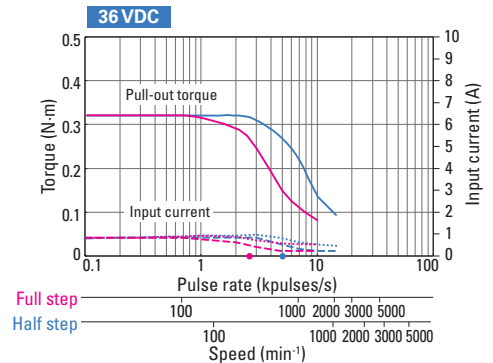
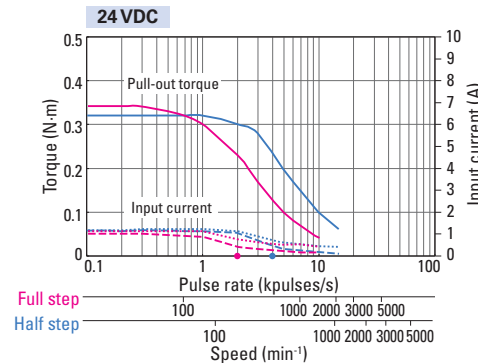
DU15S424S DU15S424D



DU15S141S DU15S141D



DU15S142S DU15S142D



| Size | Motor size | 42 mm sq. (0.9° full step angle) | 56 mm sq. (1.8° full step angle) | | | |
|--------------------------------------|-----------------|------------------------------------|----------------------------------|--------------|--------------|-----|
| | Motor length | 48 mm | 41.8 mm | 53.8 mm | 75.8 mm | |
| Single shaft | Set order no. | DU15S144S | DU16M711S | DU16M712S | DU16M713S | |
| | Motor model no. | SH1424-0441 | SM2561C20U41 | SM2562C20U41 | SM2563C20U41 | |
| Dual shaft | Set order no. | DU15S144D | DU16M711D | DU16M712D | DU16M713D | |
| | Motor model no. | SH1424-0411 | SM2561C20U11 | SM2562C20U11 | SM2563C20U11 | |
| Holding torque | | N·m | 0.39 | 0.53 | 1.1 | 1.7 |
| Rotor inertia | | $\times 10^{-4}$ kg·m ² | 0.089 | 0.14 | 0.28 | 0.5 |
| Rated current | | A/phase | 1.2 | 2 | 2 | 2 |
| Motor mass ⁽¹⁾ | | kg | 0.38 | 0.49 | 0.69 | 1.1 |
| Allowable thrust load | | N | 10 | 20 | 20 | 20 |
| Allowable radial load ⁽²⁾ | | N | 20 | 115 | 106 | 93 |

(1) For the driver mass, see ▶ p. 26

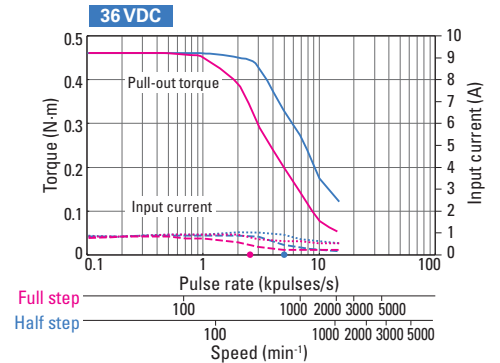
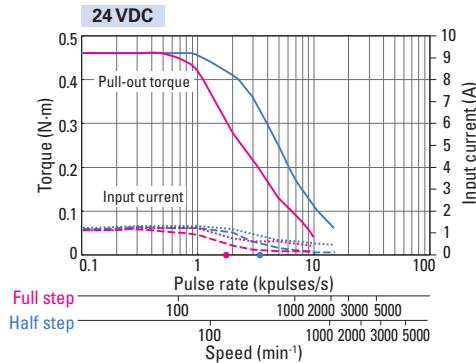
(2) Load is exerted to the shaft end.

Characteristics

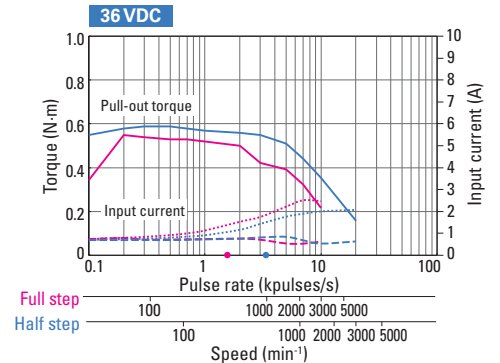
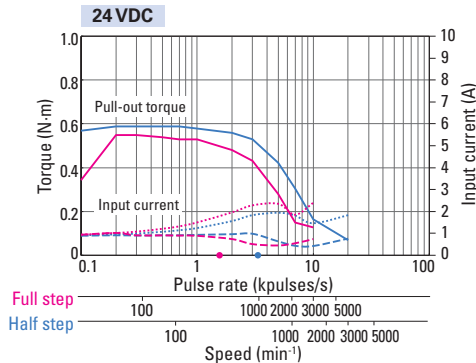
With rubber coupling used

Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step ····· Half step ·····

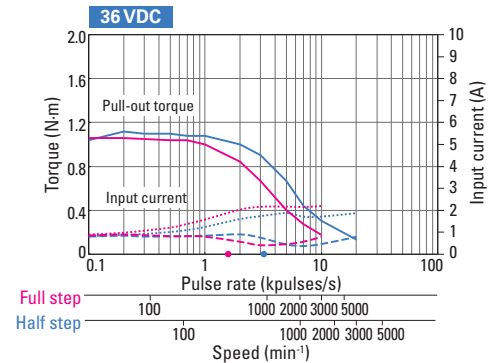
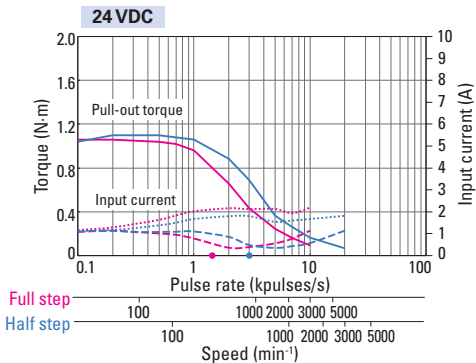
DU15S144S DU15S144D



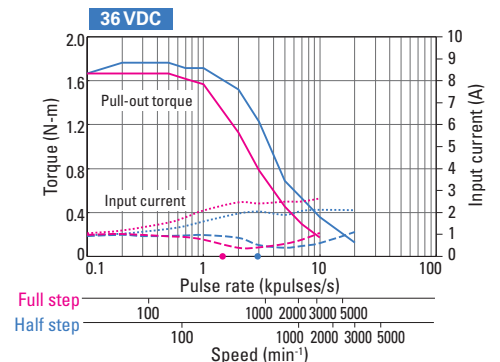
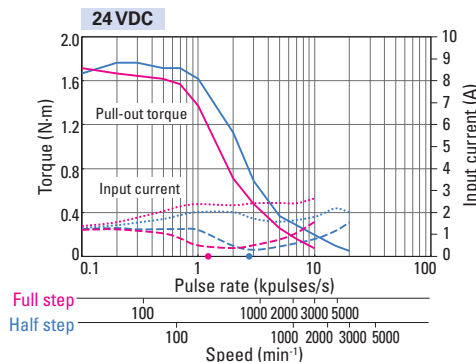
DU16M711S DU16M711D



DU16M712S DU16M712D



DU16M713S DU16M713D



| | | |
|--------------------------------------|------------------------------------|---|
| Size | Motor size | 56 mm sq. (1.8° full step angle) |
| | Motor length | 85.8 mm |
| Single shaft | Set order no. | DU16M714S |
| | Motor model no. | SM2564C20U41 |
| Dual shaft | Set order no. | DU16M714D |
| | Motor model no. | SM2564C20U11 |
| Holding torque | N·m | 1.75 |
| Rotor inertia | $\times 10^{-4}$ kg·m ² | 0.6 |
| Rated current | A/phase | 2 |
| Motor mass ⁽¹⁾ | kg | 1.27 |
| Allowable thrust load | N | 20 |
| Allowable radial load ⁽²⁾ | N | 86 |

(1) For the driver mass, see ▶ p. 26

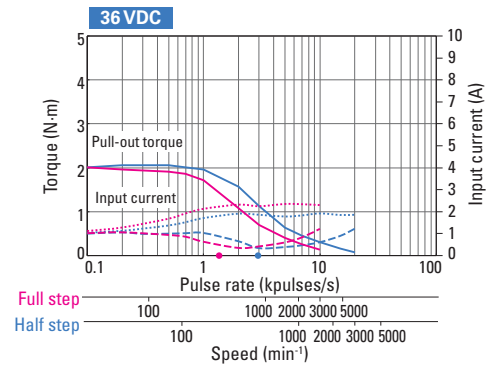
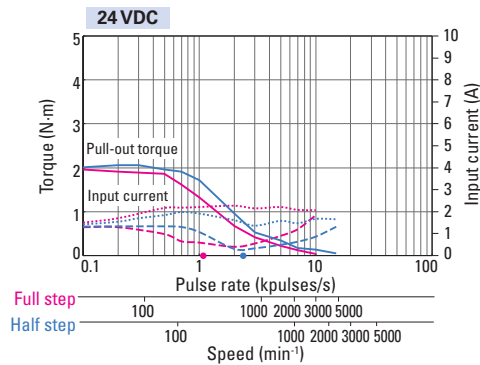
(2) Load is exerted to the shaft end.

Characteristics

With rubber coupling used

Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step Half step

DU16M714S
DU16M714D



| Size | Motor size | 28 mm sq. (1.8° full step angle) | | 42 mm sq. (1.8° full step angle) | |
|--------------------------------------|-----------------|------------------------------------|-------------|----------------------------------|--------------|
| | | 32 mm | 51.5 mm | 33 mm | 39 mm |
| Single shaft | Set order no. | DB14S281S | DB14S285S | DB14S421S | DB14S422S |
| | Motor model no. | SH2281-5771 | SH2285-5771 | SF2421-10B41 | SF2422-10B41 |
| Dual shaft | Set order no. | DB14S281D | DB14S285D | DB14S421D | DB14S422D |
| | Motor model no. | SH2281-5731 | SH2285-5731 | SF2421-10B11 | SF2422-10B11 |
| Holding torque | | N·m | | 0.07 | |
| Rotor inertia | | $\times 10^{-4}$ kg·m ² | | 0.01 | |
| Rated current | | A/phase | | 1 | |
| Motor mass ⁽¹⁾ | | kg | | 0.11 | |
| Allowable thrust load | | N | | 3 | |
| Allowable radial load ⁽²⁾ | | N | | 42 | |

(1) For the driver mass, see ▶ p. 26

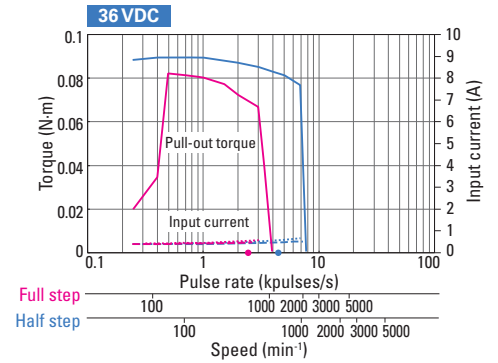
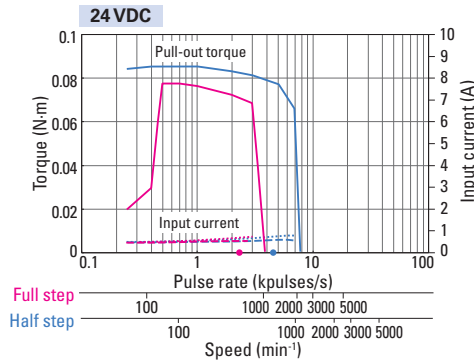
(2) Load is exerted to the shaft end.

Characteristics

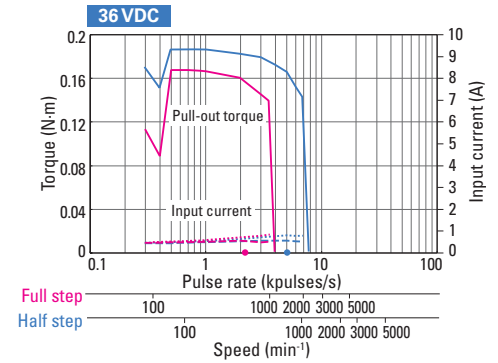
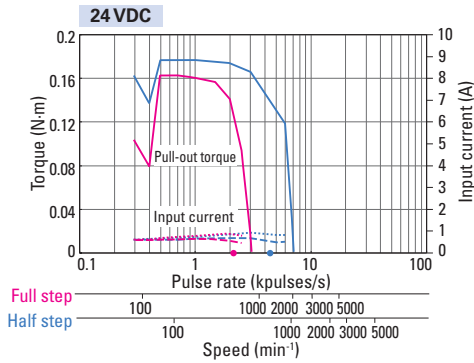
With rubber coupling used

Pull-out torque Full step —●— Half step —●— fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step Half step

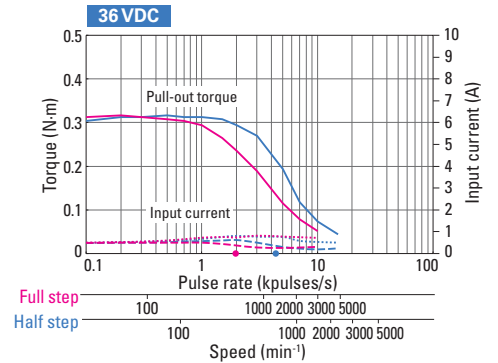
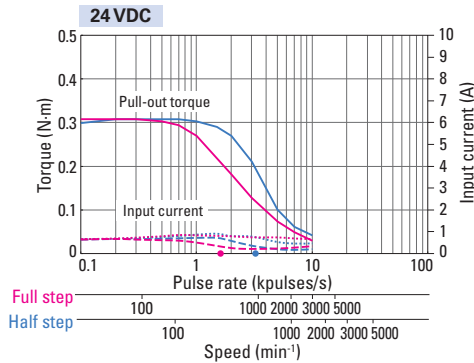
DB14S281S
DB14S281D



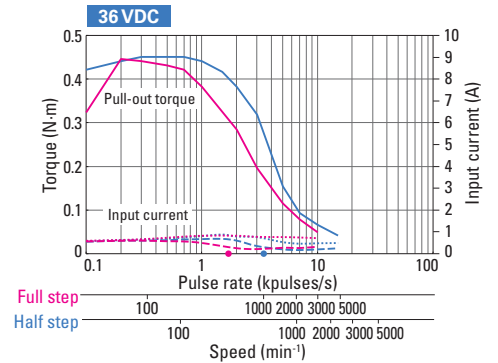
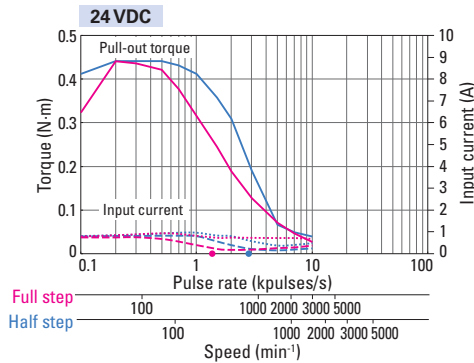
DB14S285S
DB14S285D



DB14S421S
DB14S421D



DB14S422S
DB14S422D



| Size | Motor size | 42 mm sq. (1.8° full step angle) | | 42 mm sq. (0.9° full step angle) | |
|--------------------------------------|------------------------------------|----------------------------------|--------------|----------------------------------|-------------|
| | | 48 mm | 59.5 mm | 33 mm | 39 mm |
| Single shaft | Set order no. | DB14S423S | DB14S424S | DB16S141S | DB16S142S |
| | Motor model no. | SF2423-10B41 | SF2424-10B41 | SH1421-5241 | SH1422-5241 |
| Dual shaft | Set order no. | DB14S423D | DB14S424D | DB16S141D | DB16S142D |
| | Motor model no. | SF2423-10B11 | SF2424-10B11 | SH1421-5211 | SH1422-5211 |
| Holding torque | N·m | 0.56 | 0.8 | 0.23 | 0.34 |
| Rotor inertia | $\times 10^{-4}$ kg·m ² | 0.063 | 0.094 | 0.044 | 0.066 |
| Rated current | A/phase | 1 | 1 | 2 | 2 |
| Motor mass ⁽¹⁾ | kg | 0.38 | 0.51 | 0.24 | 0.29 |
| Allowable thrust load | N | 10 | 10 | 10 | 10 |
| Allowable radial load ⁽²⁾ | N | 30 | 20 | 25 | 24 |

(1) For the driver mass, see ▶ p. 26

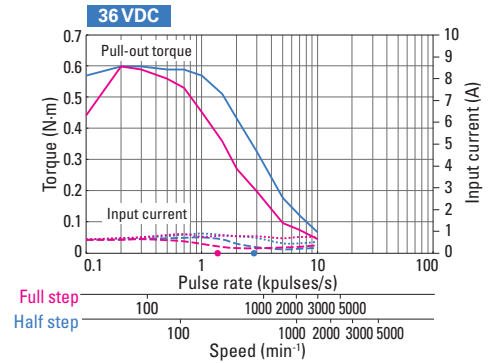
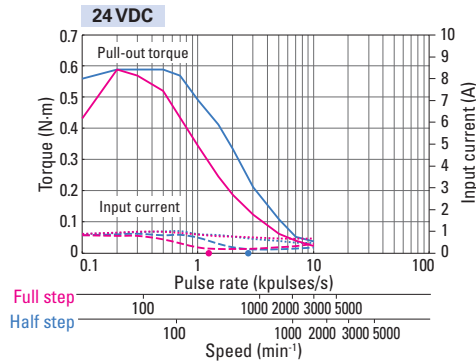
(2) Load is exerted to the shaft end.

Characteristics

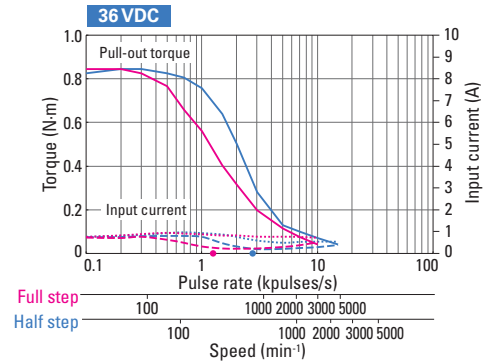
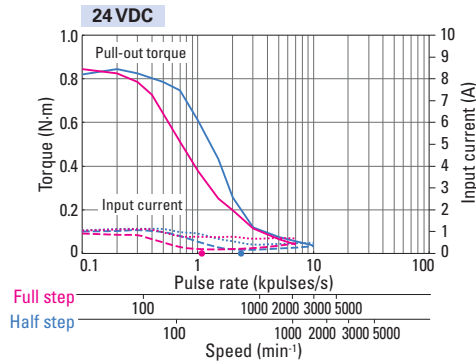
With rubber coupling used

Pull-out torque Full step —●— Half step —●— fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step Half step

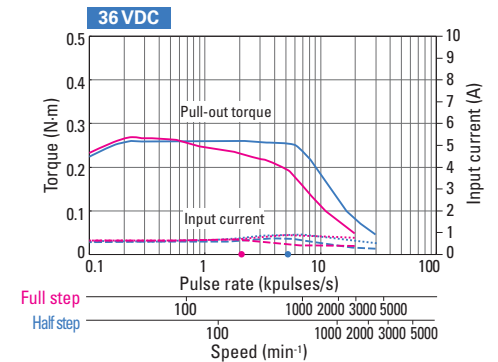
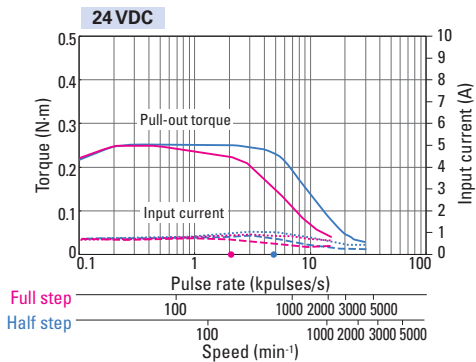
DB14S423S DB14S423D



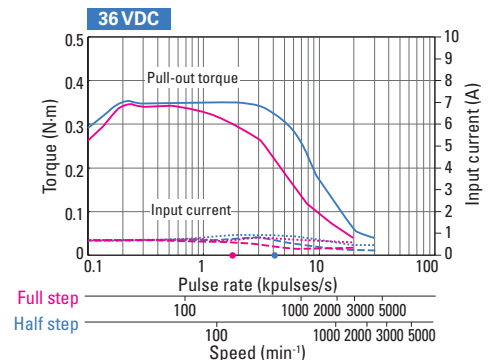
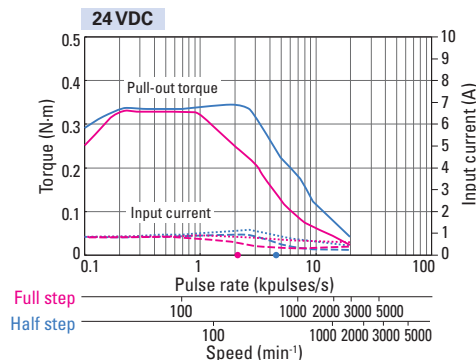
DB14S424S DB14S424D



DB16S141S DB16S141D



DB16S142S DB16S142D



| Size | Motor size | 42 mm sq. (0.9° full step angle) | 50 mm sq. (1.8° full step angle) | | 56 mm sq. (1.8° full step angle) | |
|--------------------------------------|-----------------|------------------------------------|----------------------------------|---------------|----------------------------------|------|
| | Motor length | 48 mm | 39.8 mm | 51.3 mm | 41.8 mm | |
| Single shaft | Set order no. | DB16S144S | DB16H671S | DB16H673S | DB16M711S | |
| | Motor model no. | SH1424-5241 | 103H6701-5040 | 103H6703-5040 | SM2561C20B41 | |
| Dual shaft | Set order no. | DB16S144D | DB16H671D | DB16H673D | DB16M711D | |
| | Motor model no. | SH1424-5211 | 103H6701-5010 | 103H6703-5010 | SM2561C20B11 | |
| Holding torque | | N·m | 0.48 | 0.28 | 0.49 | 0.75 |
| Rotor inertia | | $\times 10^{-4}$ kg·m ² | 0.089 | 0.057 | 0.118 | 0.14 |
| Rated current | | A/phase | 2 | 2 | 2 | 2 |
| Motor mass ⁽¹⁾ | | kg | 0.38 | 0.35 | 0.5 | 0.49 |
| Allowable thrust load | | N | 10 | 15 | 15 | 20 |
| Allowable radial load ⁽²⁾ | | N | 20 | 79 | 75 | 113 |

(1) For the driver mass, see ▶ p. 26

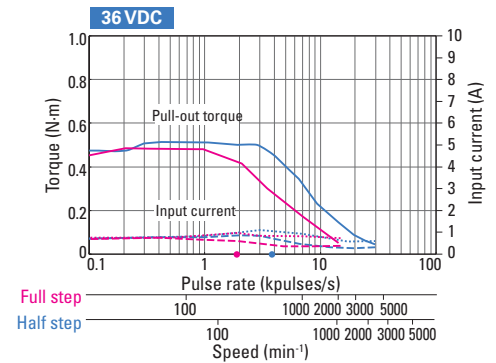
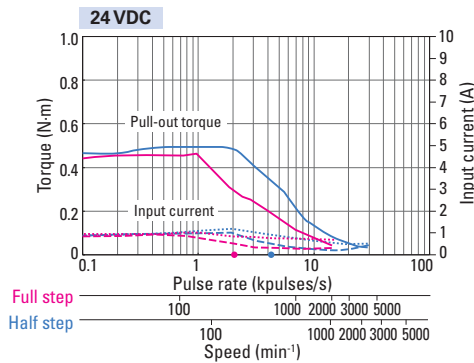
(2) Load is exerted to the shaft end.

Characteristics

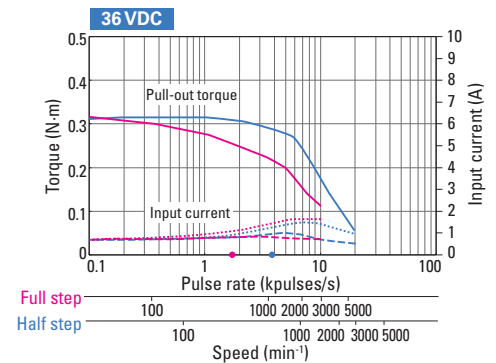
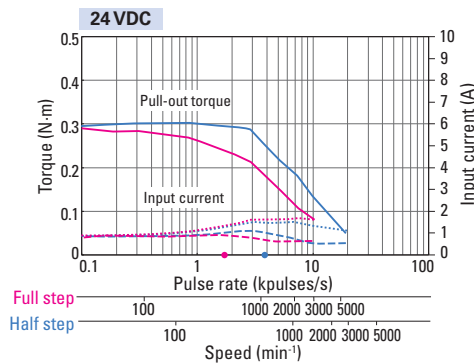
With rubber coupling used

Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step ····· Half step ·····

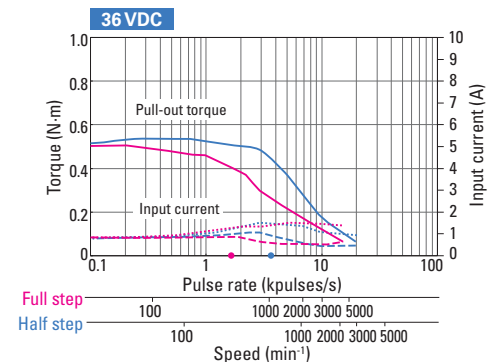
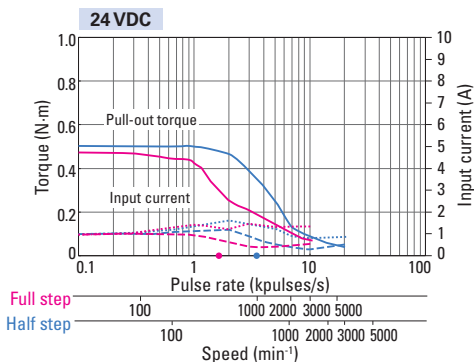
DB16S144S DB16S144D



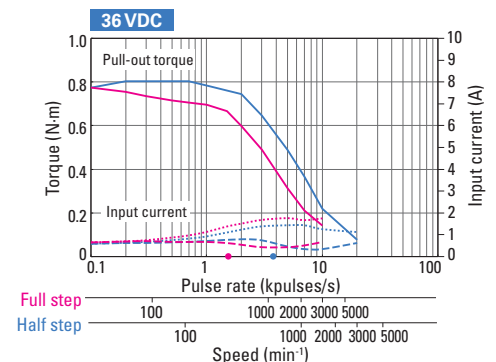
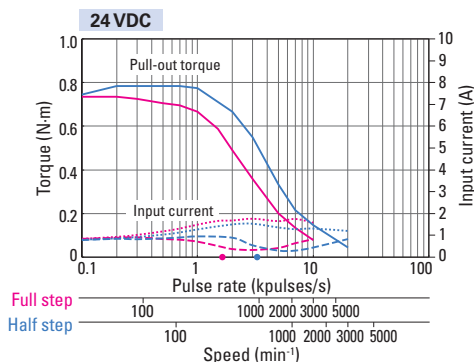
DB16H671S DB16H671D



DB16H673S DB16H673D



DB16M711S DB16M711D



| Size | Motor size | 56 mm sq. (1.8° full step angle) | | | 60 mm sq. (0.9° full step angle) | |
|--------------------------------------|-----------------|------------------------------------|--------------|--------------|----------------------------------|------|
| | Motor length | 53.8 mm | 75.8 mm | 85.8 mm | 42 mm | |
| Single shaft | Set order no. | DB16M712S | DB16M713S | DB16M714S | DB16S161S | |
| | Motor model no. | SM2562C20B41 | SM2563C20B41 | SM2564C20B41 | SH1601-5240 | |
| Dual shaft | Set order no. | DB16M712D | DB16M713D | DB16M714D | DB16S161D | |
| | Motor model no. | SM2562C20B11 | SM2563C20B11 | SM2564C20B11 | SH1601-5210 | |
| Holding torque | | N·m | 1.4 | 2.35 | 2.5 | 0.69 |
| Rotor inertia | | $\times 10^{-4}$ kg·m ² | 0.28 | 0.5 | 0.6 | 0.24 |
| Rated current | | A/phase | 2 | 2 | 2 | 2 |
| Motor mass ⁽¹⁾ | | kg | 0.69 | 1.1 | 1.27 | 0.55 |
| Allowable thrust load | | N | 20 | 20 | 20 | 15 |
| Allowable radial load ⁽²⁾ | | N | 102 | 78 | 70 | 78 |

(1) For the driver mass, see ▶ p. 26

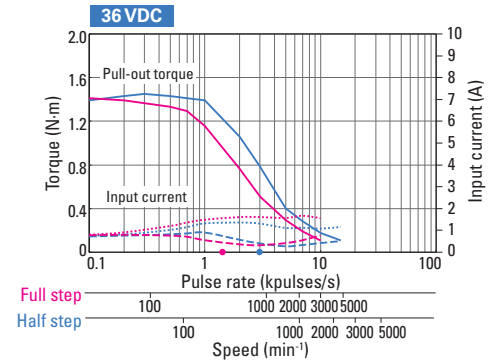
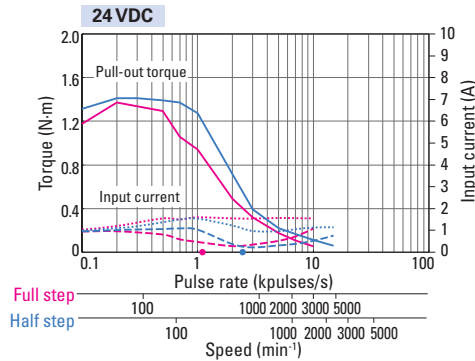
(2) Load is exerted to the shaft end.

Characteristics

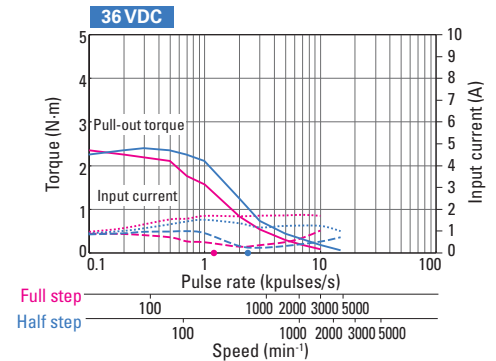
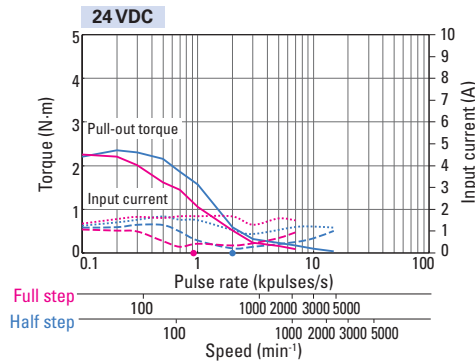
With rubber coupling used

Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step ····· Half step ·····

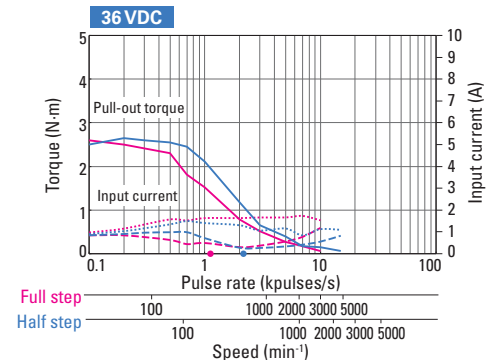
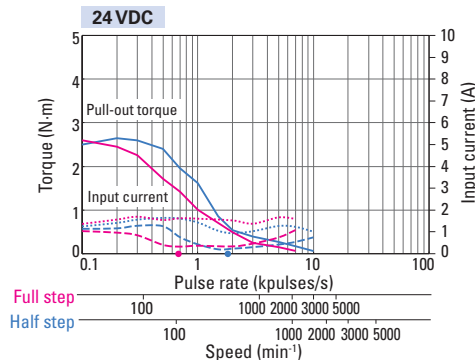
DB16M712S DB16M712D



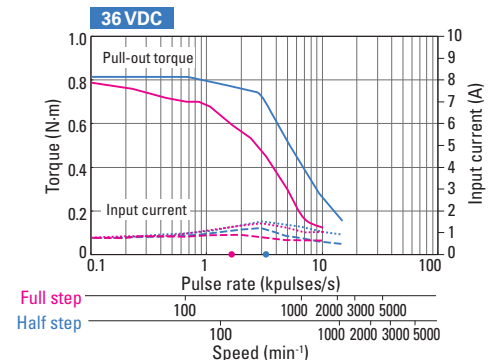
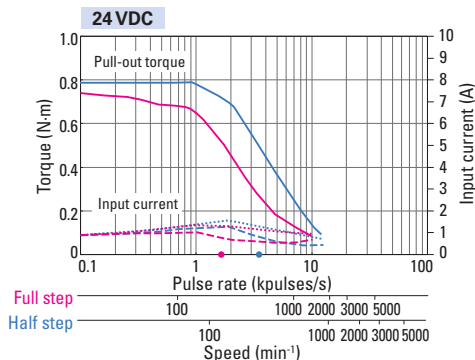
DB16M713S DB16M713D



DB16M714S DB16M714D



DB16S161S DB16S161D



| | | |
|--------------------------------------|------------------------------------|---|
| Size | Motor size | 60 mm sq. (0.9° full step angle) |
| | Motor length | 54 mm |
| Single shaft | Set order no. | DB16S162S |
| | Motor model no. | SH1602-5240 |
| Dual shaft | Set order no. | DB16S162D |
| | Motor model no. | SH1602-5210 |
| Holding torque | N·m | 1.28 |
| Rotor inertia | $\times 10^{-4}$ kg·m ² | 0.4 |
| Rated current | A/phase | 2 |
| Motor mass ⁽¹⁾ | kg | 0.8 |
| Allowable thrust load | N | 15 |
| Allowable radial load ⁽²⁾ | N | 65 |

(1) For the driver mass, see ▶ p. 26

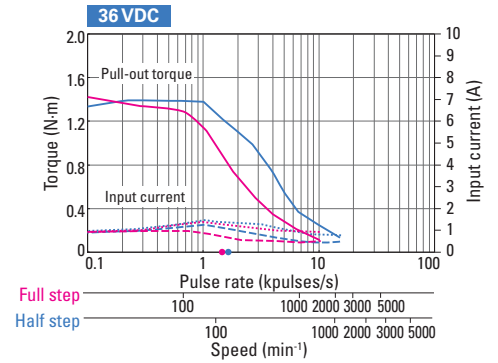
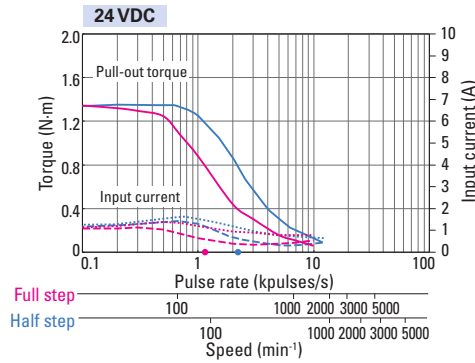
(2) Load is exerted to the shaft end.

Characteristics

With rubber coupling used

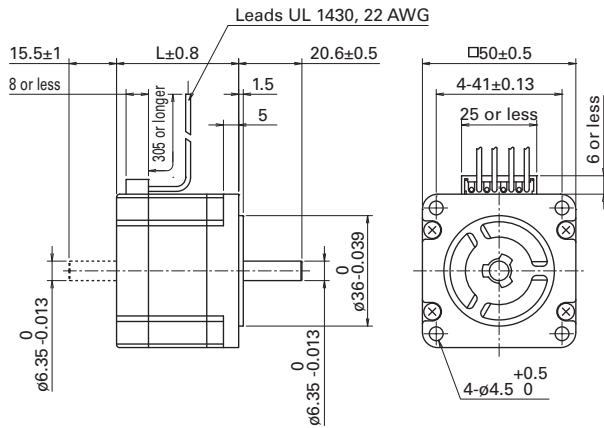
Pull-out torque Full step — Half step — fs: Maximum starting pulse rate with no load Full step ● Half step ●
 Input current (with no load) Full step - - - Half step - - - Input current (with load) Full step Half step

DB16S162S
DB16S162D



Stepping Motor Dimensions Unit: mm

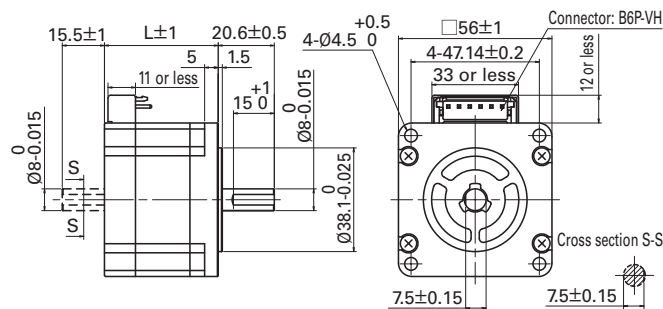
50 mm sq.



Bipolar

| Set order no. | | Motor model no. | | Motor length (L) |
|---------------|------------|-----------------|---------------|------------------|
| Single shaft | Dual shaft | Single shaft | Dual shaft | |
| DB16H671S | DB16H671D | 103H6701-5040 | 103H6701-5010 | 39.8 |
| DB16H673S | DB16H673D | 103H6703-5040 | 103H6703-5010 | 51.3 |

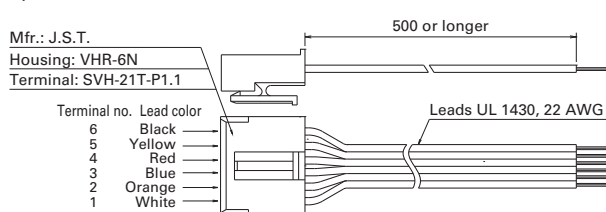
56 mm sq.



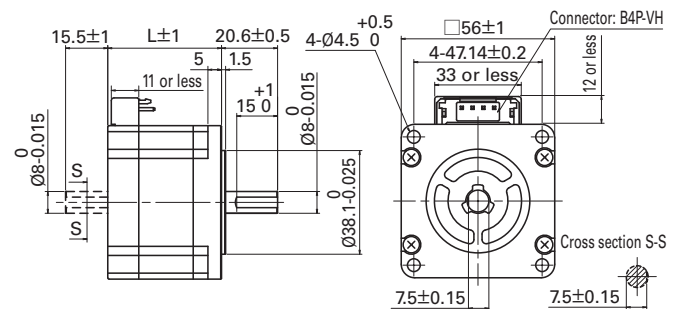
Unipolar

| Set order no. | | Motor model no. | | Motor length (L) |
|---------------|------------|-----------------|--------------|------------------|
| Single shaft | Dual shaft | Single shaft | Dual shaft | |
| DU16M711S | DU16M711D | SM2561C20U41 | SM2561C20U11 | 41.8 |
| DU16M712S | DU16M712D | SM2562C20U41 | SM2562C20U11 | 53.8 |
| DU16M713S | DU16M713D | SM2563C20U41 | SM2563C20U11 | 75.8 |
| DU16M714S | DU16M714D | SM2564C20U41 | SM2564C20U11 | 85.8 |

Unipolar motor cable 4837798-1



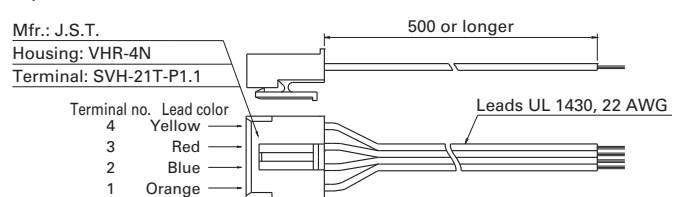
56 mm sq.



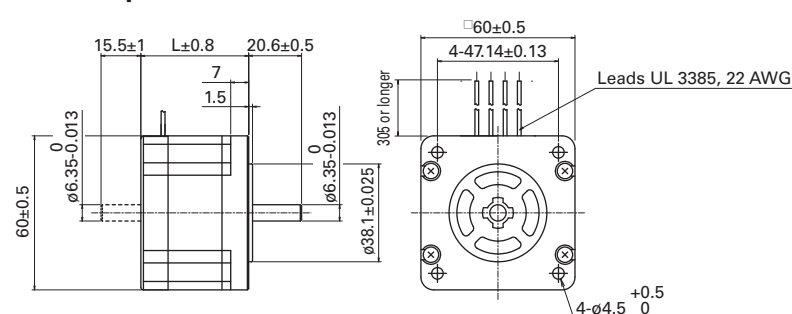
Bipolar

| Set order no. | | Motor model no. | | Motor length (L) |
|---------------|------------|-----------------|--------------|------------------|
| Single shaft | Dual shaft | Single shaft | Dual shaft | |
| DB16M711S | DB16M711D | SM2561C20B41 | SM2561C20B11 | 41.8 |
| DB16M712S | DB16M712D | SM2562C20B41 | SM2562C20B11 | 53.8 |
| DB16M713S | DB16M713D | SM2563C20B41 | SM2563C20B11 | 75.8 |
| DB16M714S | DB16M714D | SM2564C20B41 | SM2564C20B11 | 85.8 |

Bipolar motor cable 4837961-1



60 mm sq.



Bipolar

| Set order no. | | Motor model no. | | Motor length (L) |
|---------------|------------|-----------------|-------------|------------------|
| Single shaft | Dual shaft | Single shaft | Dual shaft | |
| DB16S161S | DB16S161D | SH1601-5240 | SH1601-5210 | 42 |
| DB16S162S | DB16S162D | SH1602-5240 | SH1602-5210 | 54 |

General Specifications of Stepping Motors

| Motor model no. | SH228□ | SH142□ | SF242□ | 103H670□ | SM256□ | SH160□ |
|--|---|---------------------------------------|-------------------------------|--|--|--|
| Operation type | - | | | | | |
| Operating ambient temperature | -10 to +50°C | | | | | |
| Storage temperature | -20 to +65°C | | | | | |
| Operating ambient humidity | 20 to 90% RH (non-condensing) | | | | | |
| Storage humidity | 5 to 95% RH (non-condensing) | | | | | |
| Operating altitude | Up to 1000 m above sea level | | | | | |
| Vibration resistance | Frequency 10 to 500 Hz, amplitude 1.52 mm (10 to 70 Hz), acceleration 150 m/s ² (70 to 500 Hz), sweep time 15 min/cycle, 12 cycles for each of both directions in each X, Y, and Z axes. | | | | | |
| Shock resistance | Acceleration 500 m/s ² , duration 11 ms, half sine wave, tested 3 times in both directions for each X, Y, and Z axis for a total of 18 times | | | | | |
| Thermal class | B (+130°C) | | | | B (+130°C) (A for UL models) | B (+130°C) |
| Dielectric strength | 500 VAC for one minute (between motor winding and frame) | | | 1000 VAC for one minute (between motor winding and frame) | 1120 VAC for one minute (between motor winding and frame) | 1000 VAC for one minute (between motor winding and frame) |
| Insulation resistance | 100 MΩ or more at 500 VDC (between motor winding and frame) | | | | | |
| Protection rating | - | | | | | |
| Winding temperature rise | 80 K or less (based on our own standard) | | | | | |
| Positional accuracy tolerance | ± 0.09° | ± 0.054° | ± 0.09° | | ± 0.054° | ± 0.054° |
| Thrust play ⁽¹⁾ | 0.075 mm or less (With a 1.5 N load) | 0.075 mm or less (With a 5 N load) | 0.075 mm (With a 5 N load) | 0.075 mm (With a 10 N load) | 0.075 mm (With a 10 N load) | 0.075 mm (With a 10 N load) |
| Radial play ⁽²⁾ | 0.025 mm (With a 5 N load) | | | | | |
| Shaft runout | 0.025 mm | | | | | |
| Concentricity of motor shaft and fitting part | ø0.05 mm | ø0.05 mm | ø0.05 mm | ø0.075 mm | ø0.075 mm | ø0.075 mm |
| Perpendicularity of mounting surface and motor shaft surface | 0.1 mm | 0.1 mm | 0.1 mm | 0.1 mm | 0.1 mm | 0.1 mm |
| Motor mounting orientation | Can be installed vertically or horizontally. | | | | | |

(1) Thrust play: Shaft position displacement when a load is exerted in a direction parallel to the motor shaft.

(2) Radial play: Maximum shaft position displacement when a load is exerted in a direction perpendicular to the motor shaft. Load is exerted on the point 1/3 the shaft length from the shaft end.

Safety standards

Model no.: SM256 □ UL models

| UL | Classification | Standards | File no. |
|----|---------------------|----------------------|----------|
| UL | UL | UL 1004-1, UL 1004-6 | E179832 |
| | UL for Canada (cUL) | CSA C22.2 No. 100 | |

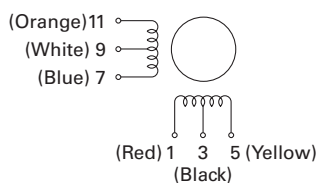
Internal Wiring and Rotational Directions

Unipolar winding

Connector type, model no.: SF242

Internal wiring

In parentheses are lead colors of the motor cable



Direction of motor rotation

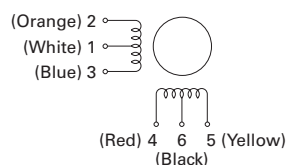
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

| | | Connector pin no. | | | | |
|---------------------|---|-------------------|---|---|---|----|
| | | 3, 9 | 1 | 7 | 5 | 11 |
| Excitation sequence | 1 | + | - | - | | |
| | 2 | + | | - | - | |
| | 3 | + | | | - | - |
| | 4 | + | - | | | - |

Connector type, model no.: SM256

Internal wiring

In parentheses are lead colors of the motor cable



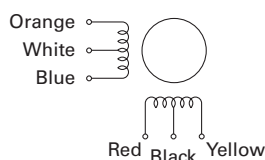
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

| | | Connector pin no. | | | | |
|---------------------|---|-------------------|---|---|---|---|
| | | 1, 6 | 4 | 3 | 5 | 2 |
| Excitation sequence | 1 | + | - | - | | |
| | 2 | + | | - | - | |
| | 3 | + | | | - | - |
| | 4 | + | - | | | - |

Lead type

Internal wiring



Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

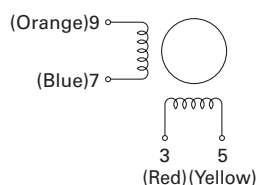
| | | Lead color | | | | |
|---------------------|---|--------------|-----|------|--------|--------|
| | | White, Black | Red | Blue | Yellow | Orange |
| Excitation sequence | 1 | + | - | - | | |
| | 2 | + | | - | - | |
| | 3 | + | | | - | - |
| | 4 | + | - | | | - |

Bipolar winding

Connector type, model no.: SF242

Internal wiring

In parentheses are lead colors of the motor cable



Direction of motor rotation

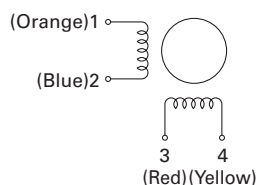
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

| | | Connector pin no. | | | |
|---------------------|---|-------------------|---|---|---|
| | | 3 | 7 | 5 | 9 |
| Excitation sequence | 1 | - | - | + | + |
| | 2 | + | - | - | + |
| | 3 | + | + | - | - |
| | 4 | - | + | + | - |

Connector type, model no.: SM256

Internal wiring

In parentheses are lead colors of the motor cable



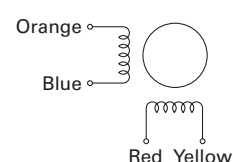
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

| | | Connector pin no. | | | |
|---------------------|---|-------------------|---|---|---|
| | | 3 | 2 | 4 | 1 |
| Excitation sequence | 1 | - | - | + | + |
| | 2 | + | - | - | + |
| | 3 | + | + | - | - |
| | 4 | - | + | + | - |

Lead type

Internal wiring

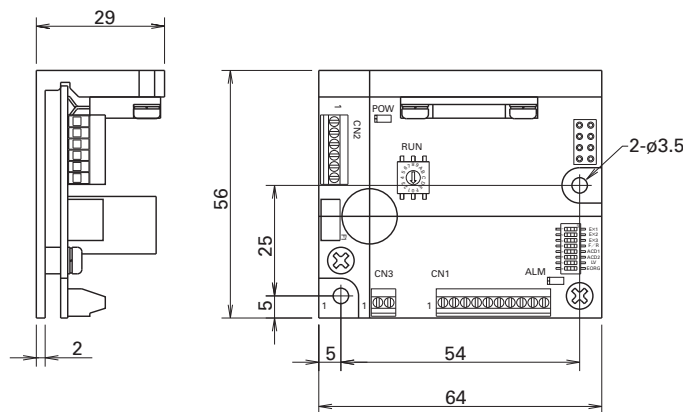


Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

| | | Lead color | | | |
|---------------------|---|------------|------|--------|--------|
| | | Red | Blue | Yellow | Orange |
| Excitation sequence | 1 | - | - | + | + |
| | 2 | + | - | - | + |
| | 3 | + | + | - | - |
| | 4 | - | + | + | - |

Driver Dimensions Unit: mm



Driver Specifications

General specifications

| | | Unipolar | Bipolar | |
|-----------------------|---|---|--|--|
| Basic specifications | Model no. | US1D200P10 | BS1D200P10 | |
| | Input voltage | 24/36 VDC ± 10% | | |
| | Input current | 3 A | | |
| | Environment | Protection class | Class III | |
| | | Operating environment | Installation category (Overvoltage category): I, pollution level: 2 | |
| | | Operating ambient temperature | 0 to +50° C | |
| | | Storage temperature | -20 to +70° C | |
| | | Operating ambient humidity | 35 to 85 % RH (non-condensing) | |
| | | Storage humidity | 10 to 90% RH (non-condensing) | |
| | | Operating altitude | Up to 1000 m above sea level | |
| | | Vibration resistance | 5 m/s ² freq. range 10 to 55 Hz tested for 2 hours in each X, Y and Z-axis directions | |
| | | Shock resistance | Not abnormality observed as per NDS-C-0110 section 3.2.2 category C. | |
| Dielectric strength | 500 VAC for one minute (between power input terminal and chassis) | | | |
| Insulation resistance | 10 MΩ or more at 500 VDC (between power input terminal and chassis) | | | |
| Mass | 0.09 kg | | | |
| Functions | Mode selection | Step angle mode, input pulse mode, low vibration mode, current at rest, operating current, initial excitation phase | | |
| | Protective functions | Open phase, main circuit power supply undervoltage | | |
| | LED indicators | Power supply monitoring, alarm indicator | | |
| I/O signal | Command pulse input signal | Photocoupler input method; input resistance: 220 Ω, high-level input signal voltage: 4.0 to 5.5 V, low-level input signal voltage: 0 to 0.5 V, maximum starting pulse rate 150 pulses/s | | |
| | Power down input signal | Photocoupler input method; input resistance: 220 Ω, high-level input signal voltage: 4.0 to 5.5 V, low-level input signal voltage: 0 to 0.5 V | | |
| | Phase origin monitor output | Open-collector output through photo coupler, V _{ceo} : 40 V or less, I _c : 10 mA or less | | |
| | Alarm output signal | Open-collector output through photo coupler, V _{ceo} : 40 V or less, I _c : 10 mA or less | | |

Safety standards

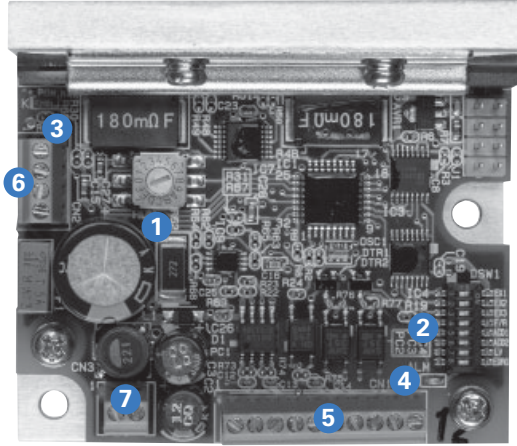
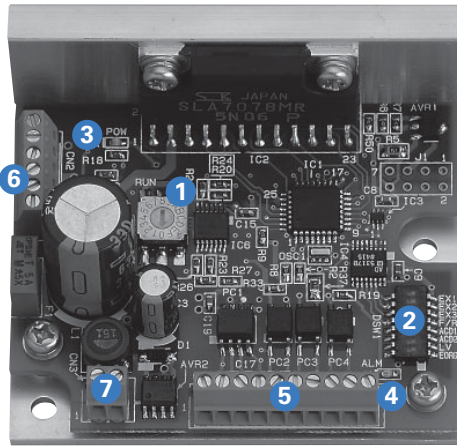
| CE(TÜV) | | UKCA <small>In compliance from July 2022 production onwards.</small> | | |
|-----------------------|---------------------------|--|--|---------------------------------------|
| Directive | Category | Directive | Standards | Name |
| Low Voltage Directive | — | Electrical Equipment (Safety) Regulations 2016 | EN 61010-1 | — |
| EMC Directive | Emission | Electromagnetic Compatibility Regulations 2016 | EN 61000-6-4 | Terminal disturbance voltage |
| | | | EN 61000-6-4 | Electromagnetic radiation disturbance |
| | EN 61000-4-2 | | ESD (Electrostatic discharge) | |
| | EN 61000-4-3 | | Radiated, radio-frequency, electromagnetic field | |
| | EN 61000-4-4 | | Fast transients/burst | |
| | Immunity | | EN 61000-4-6 | Conducted disturbances |
| RoHS | Directive | | Standards | |
| | RoHS Directive 2011/65/EU | | EN 63000:2018 | |
| UL | Classification | | Standards | File no. |
| | UL | | UL 508C | E179775 |
| | UL for Canada (cUL) | | | |

- Actual EMC levels vary depending on the configuration of the users' control panel where a driver and stepping motor are built in, and the placement layout of other electrical devices and wiring. EMC noise solution parts such as noise filters and toroidal type ferrite cores may be required in some cases.
- Validation test of drivers was performed as per Low-Voltage and EMC Directives at TÜV (TÜV product service) for self-declaration of CE and UKCA marking.
- Drivers can be purchased not only as a set but also as a single item. Connector-type drivers are also available. Contact us for details.

Driver Part Names and Functions

Unipolar

Bipolar



1 Operating current selection switch (RUN)

The value of the motor operating current can be set with a rotary switch.

| | | | | | | | | |
|-------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Dial | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Motor current (A) | 2.0 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| Dial | 8 | 9 | A | B | C | D | E | F |
| Motor current (A) | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 | 0.5 |

• The factory setting is F (0.5 A). Select the operating current after checking the rated current of the combination motor.

2 Function selection DIP switchpack

Functions can be selected to suit your application.

Factory settings

| | OFF | ON | |
|------|--------------------------|--------------------------|---|
| EX1 | <input type="checkbox"/> | <input type="checkbox"/> | 8 subdivisions |
| EX2 | <input type="checkbox"/> | <input type="checkbox"/> | |
| EX3 | <input type="checkbox"/> | <input type="checkbox"/> | |
| F/R | <input type="checkbox"/> | <input type="checkbox"/> | 2-input mode (CW, CCW pulse input) |
| ACD1 | <input type="checkbox"/> | <input type="checkbox"/> | Current at rest: 40% of driving current |
| ACD2 | <input type="checkbox"/> | <input type="checkbox"/> | |
| LV | <input type="checkbox"/> | <input type="checkbox"/> | Microstepping |
| EORG | <input type="checkbox"/> | <input type="checkbox"/> | Phase origin |

1. Step angle selection (EX1, EX2, EX3)

Number of full step angle subdivisions can be selected.

| EX1 | EX2 | EX3 | Microsteps |
|-----|-----|-----|-----------------|
| ON | ON | ON | 1 subdivision |
| OFF | ON | OFF | 2 subdivisions |
| ON | OFF | OFF | 4 subdivisions |
| OFF | OFF | OFF | 8 subdivisions |
| OFF | OFF | ON | 16 subdivisions |

2. Input mode selection (F/R)

Input pulse mode can be selected.

| F/R | Input pulse mode |
|-----|------------------------|
| ON | 1-input mode (CK, U/D) |
| OFF | 2-input mode (CW, CCW) |

3. Current selection when stopping (ACD1, ACD2)

Select the current value of the motor when stopping.

| ACD2 | ACD1 | Motor current |
|------|------|-------------------------|
| ON | ON | 100% of driving current |
| ON | OFF | 60% of driving current |
| OFF | ON | 50% of driving current |
| OFF | OFF | 40% of driving current |

• Initial factory setting is 40% of the rated value. Driver and motor should be operated at around 50% of rated value to reduce heat.

4. Low vibration mode select (LV)

Motors can smoothly operate even at low resolution settings such as full-step (1 subdivision) and half-step (2 subdivisions) modes.

| LV | Initial excitation phase |
|-----|--------------------------|
| ON | Low vibration |
| OFF | Microstepping |

5. Excitation selection (EORG)

The excitation phase at the time of power activation is selected.

| EORG | Initial excitation phase |
|------|------------------------------------|
| ON | Excitation phase at power shutdown |
| OFF | Phase origin |

• By turning on EORG, the excitation phase at the time of power shutdown will be saved. Therefore, there will be no shaft displacement when the power is turned on next time.

3 Power supply monitoring LED (POW)

Lights up when the main circuit power supply is turned on.

4 Alarm indicator LED (ALM)

The LED lights up in either of the followings:

- Motor cable is damaged
- The switching device in the driver is damaged
- The main circuit power supply voltage is outside the specification range (below 19 VDC).

When "ALM" is lit, the winding current of the stepping motor is cut off and the status will shift to a "non-excitation" state. At the same time, an output signal (photocoupler ON) is transmitted from the alarm output terminal (AL) to outside. When the alarm circuit is activated, this state is maintained until it is reset by turning on the power supply again. When an alarm goes off, please take corrective actions to eliminate the cause of the alarm before turning on the power supply again.

5 I/O signal terminals (CN1)

For input/output signal connections.

6 Motor connection terminals (CN2)

For motor power connection.

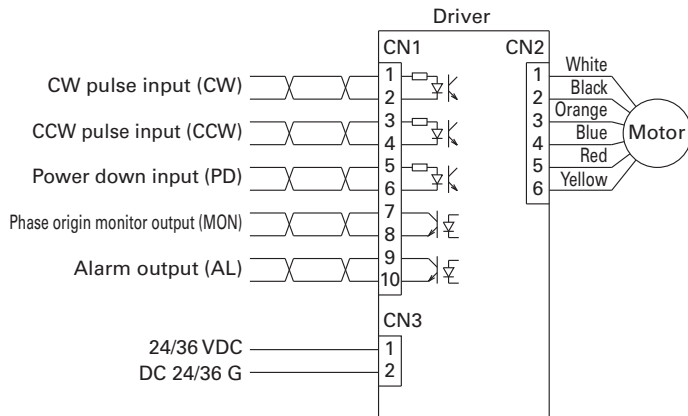
7 Power supply connection terminals (CN3)

For main circuit power supply connection.

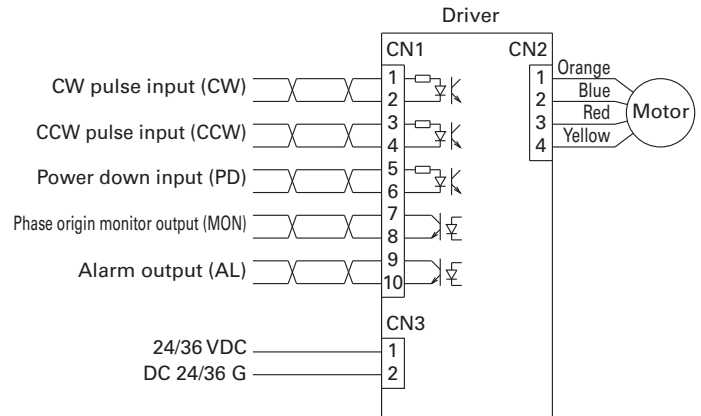
Connections and Signals

External wiring diagram

Unipolar



Bipolar



Cable size

| Type | Cable Size | Maximum length |
|------------------|--|----------------|
| Power cable | 22 AWG (0.3 mm ²) | 2 m or less |
| I/O signal cable | 24 AWG (0.2 mm ²) to 22 AWG (0.3 mm ²) | 2 m or less |
| Motor cable | 22 AWG (0.3 mm ²) | Below 3 m |

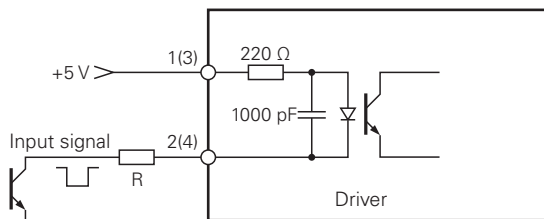
Input/output signal specification overview

| Signal | CN1 Pin no. | Function overview |
|-----------------------------------|-------------|---|
| CW pulse input (CW) (Standard) | 1 2 | When in 2-input mode, a CW-direction pulse is input. |
| Drive pulse input (CK) | 1 2 | When in 1-input mode, a drive pulse is input to rotate the motor. |
| CCW pulse input (CCW) (Standard) | 3 4 | When in 2-input mode, a CCW-direction pulse is input. |
| Rotational direction input (U/D) | 3 4 | When in 1-input mode, a drive pulse is input to designate the rotational direction. Internal photocoupler ON ... CW direction Internal photocoupler OFF ... CCW direction |
| Power down input (PD) | 5 6 | A PD signal input will cut off (power off) the current flowing to the motor. PD input signal on (internal photocoupler on) ... PD function is enabled. PD input signal off (internal photocoupler off) ... PD function is disabled. |
| Phase origin monitor output (MON) | 7 8 | Turned on when the excitation phase is at the origin (when power is turned on). In full step mode, turned on once for 4 pulses. In half step mode, turned on once for 8 pulses. |
| Alarm output (AL) | 9 10 | When the alarm circuit is activated inside the driver, an alarm signal (photocoupler on) is output to outside, which turns the stepping motor to non-excited state. |

Note: The CW direction refers to the clockwise direction when the motor is viewed from the output shaft side.

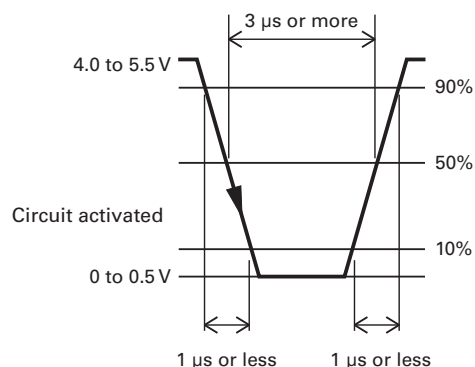
The CCW direction refers to the counter-clockwise direction when the motor is viewed from the output shaft side.

Circuit Configuration of Pulse Input CW (CK), CCW (U/D)



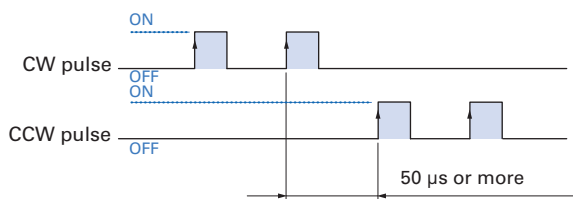
- Ensure that the pulse duty is 50% or less.
- Maximum starting pulse rate is 150 pulses/s.
- If the peak voltage of the input signal exceeds 5.5 V, add an external current-limiting resistor R to limit the input current to around 15 mA. (Take the photocoupler forward voltage of 1.5 V into consideration.)

Input signal specifications



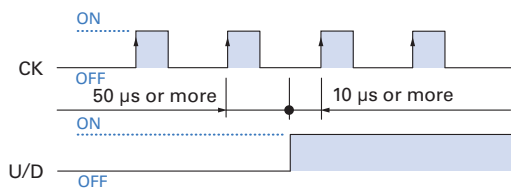
Command pulse timing

2-input mode (CW, CCW)



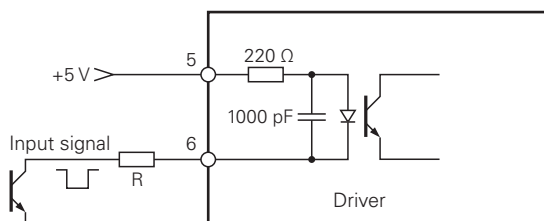
- Shaded areas indicate that internal photocoupler is ON. Internal circuit (motor) starts operating at leading edge of the photocoupler ON.
- When applying a pulse to CW, set the CCW side internal photocoupler to OFF.
- When applying a pulse to CCW, set the CW side internal photocoupler to OFF.

1-input mode (CK, U/D)



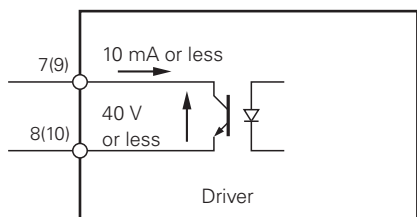
- Shaded areas indicate that internal photocoupler is ON. Internal circuit (motor) starts operating at leading edge of the CK-side photocoupler ON.
- Switching of U/D input signal must be done while the CK-side internal photocoupler is OFF.

Circuit Configuration of Power Down (PD) Input

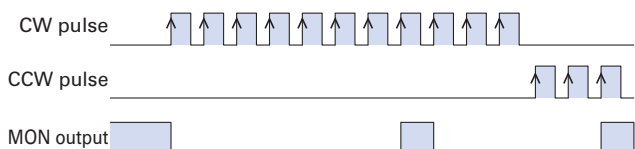


- If the peak voltage of the input signal exceeds 5.5 V, add an external current-limiting resistor R to limit the input current to around 15 mA. (Take the photocoupler forward voltage of 1.5 V into consideration.)

Circuit Configuration of Phase Origin Monitor Output (MON) and Alarm Output (AL)



MON output



- Photo coupler is turned on when the motor's excitation phase is at the origin (when power is turned on).
- MON output is output every 7.2° rotation of the motor output shaft from the phase origin. (The figure on the left is for when the step angle setting is in a half-step mode)