

## Motor units MTR-DCI, intelligent servo motors

**FESTO**



# Motor units MTR-DCI, intelligent servo motors



Key features

## General information

The motor unit MTR-DCI is an innovative motor with integrated power electronics for positioning tasks.

### Four components in one housing

Integrated in the MTR-DCI are the motor, gear unit, controller and power electronics. This means that there is no need for a control cabinet or extensive cabling.

### Reliable

The integrated power electronics and controller removes the need for motor cables and improves the electromagnetic compatibility. Additional monitoring functions are integrated.

### Uncomplicated

The complete commissioning process can be performed directly on the MTR-DCI via the optional LCD display or on a PC via the user-friendly menus in the FCT (Festo Configuration Tool). No matter which approach is used, all parameters are continuously controlled.

## At a glance

- Compact design
- Smooth profile prevents the ingress of dirt
- DC motor with planetary gear unit and encoder
- Gear unit ratio: 7:1; 14:1, 22:1
- Protection class IP54

### Positioning functionality

- 16 traversing records (including homing)
- Constant acceleration and braking
- Positioning control

### Protective functions

- Temperature monitoring
- Current monitoring
- Voltage failure detection
- Following error monitoring
- Software end-position detection

### Easy actuation via

- I/O interface
- Profibus
- CANopen
- DeviceNet



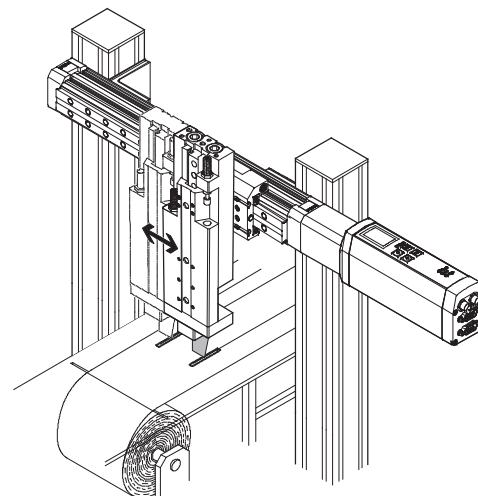
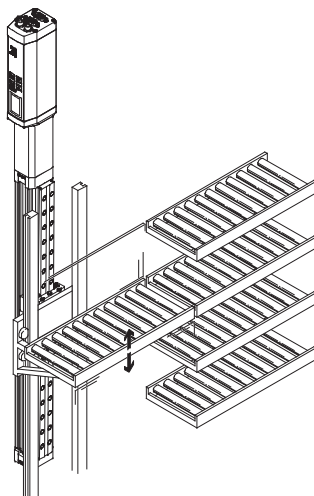
- 1 Control panel with integrated display (optional)
- 2 Input for reference limit switches
- 3 RS232 interface
- 4 Operator interface: I/O interface
- 5 Power supply
- 6 Gear unit



## Typical applications

Adjusting sorting conveyors

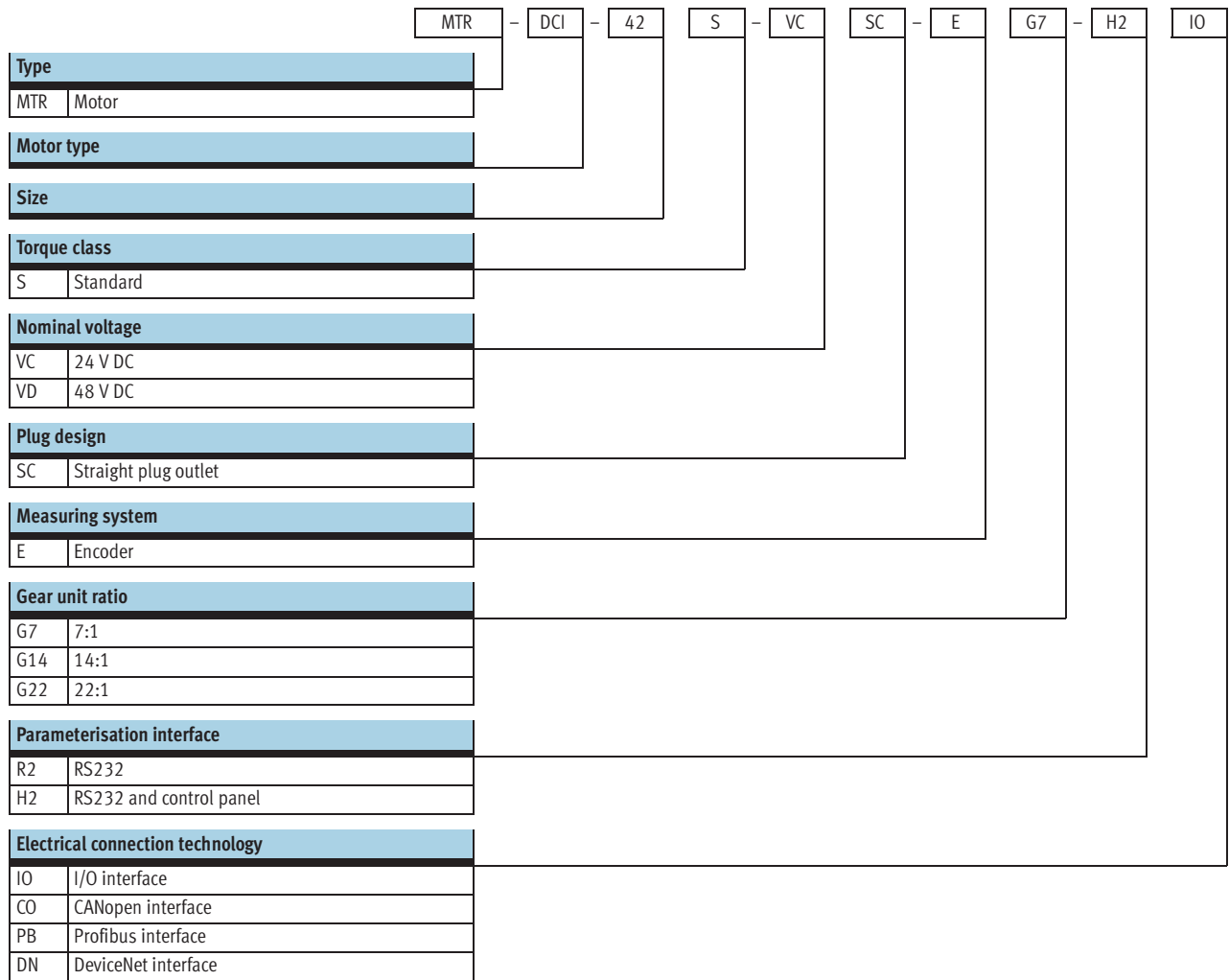
Programming formats for paper or foil cutting machines



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# Motor units MTR-DCI, intelligent servo motors

Type codes



# Motor units MTR-DCI, intelligent servo motors



Technical data

- Size  
32 ... 62 mm
- Voltage  
24, 48 V DC

Fieldbus interfaces



| General technical data       |  |                           |    |                           |                       |
|------------------------------|--|---------------------------|----|---------------------------|-----------------------|
| Size                         |  | 32                        | 42 | 52                        | 62                    |
| Rotary position generator    | Optical encoder                                    |                           |    |                           |                       |
| No. of increments/revolution |  | 300 (1,200) <sup>1)</sup> |    | 500 (2,000) <sup>1)</sup> |                       |
| Controller operating mode    | PWM MOSFET power amplifier                         |                           |    |                           |                       |
| Display resolution           | 128 x 64 pixels                                    |                           |    |                           |                       |
| Type of mounting             | Can be bolted on or clamped to gearing unit flange |                           |    |                           |                       |
| Gearing unit type            | Planetary gearing                                  |                           |    |                           |                       |
| Gear unit ratio              | G7   | 6.75 (7:1); 1-stage       |    |                           |                       |
|                              | G14  | 13.73 (14:1); 2-stage     |    |                           |                       |
|                              | G22  | -                         |    |                           | 22.21 (22:1); 2-stage |

1) Internal 4-fold evaluation

| Electrical data – Motor              |         |                   |     |     |             |
|--------------------------------------|---------|-------------------|-----|-----|-------------|
| Size                                 |         | 32                | 42  | 52  | 62          |
| Nominal voltage                      | [V DC]  | 24 ±10%           |     |     | 48 -10%/+5% |
| Nominal current (motor)              | [A]     | 0.73              | 2   | 5   | 6.19        |
| Peak current                         | [A]     | 2.1               | 3.8 | 7.7 | 20          |
| Motor constant                       | [Ncm/A] | 4.5               | 6.1 | 6.4 | 12.1        |
| Nominal power (motor)                | [W]     | 17                | 48  | 122 | 316         |
| Max. current (digital logic outputs) | [mA]    | 200               |     | 60  |             |
| Parameterisation interface           |         | RS232; 9,600 baud |     |     |             |

| Mechanical data – Motor               |                       |         |         |         |         |         |         |       |       |       |
|---------------------------------------|-----------------------|---------|---------|---------|---------|---------|---------|-------|-------|-------|
| Size                                  |                       | 32      |         | 42      |         | 52      |         | 62    |       |       |
| Gear unit ratio                       |                       | G7      | G14     | G7      | G14     | G7      | G14     | G7    | G14   | G22   |
| Gearing unit output speed             | [rpm]                 | 481     | 237     | 444     | 218     | 444     | 218     | 504   | 248   | 153   |
| Gearing unit torsional backlash       | [°]                   | ≤ 1.9   | ≤ 1.55  | ≤ 1.3   | ≤ 0.95  | ≤ 1.1   | ≤ 0.75  | ≤ 1   | ≤ 1.5 | ≤ 1.5 |
| Gearing unit output torque            | [Nm]                  | 0.15    | 0.29    | 0.59    | 1.13    | 1.62    | 3.08    | 3.78  | 7.2   | 11.66 |
| Gearing unit efficiency               |                       | 0.75    | 0.7     | 0.8     | 0.75    | 0.8     | 0.75    | 0.8   | 0.75  | 0.75  |
| Mass moment of inertia (rotor)        | [kg cm <sup>2</sup> ] | 0.024   |         | 0.323   |         | 1.209   |         | 3.3   |       |       |
| Mass moment of inertia (gearing unit) | [kg cm <sup>2</sup> ] | 0.00089 | 0.00149 | 0.00235 | 0.00441 | 0.01132 | 0.01711 | 0.017 | 0.035 | 0.022 |
| Radial shaft load                     | [N]                   | 40      | 70      | 160     | 230     | 200     | 320     | 240   | 360   | 360   |
| Axial shaft load                      | [N]                   | 10      | 20      | 50      | 80      | 60      | 100     | 50    | 70    | 70    |
| Product weight                        | [kg]                  | 0.72    | 0.74    | 1.72    | 1.83    | 3.1     | 3.3     | 7.6   | 8.0   | 8.0   |

# Motor units MTR-DCI, intelligent servo motors

Technical data

| Operating and environmental conditions   |      |  |    |                       |    |
|--|------|--|----|-----------------------|----|
| Size                                     |      | 32   | 42 | 52                    | 62 |
| Digital logic outputs                    |      | Not electrically isolated  |    | Electrically isolated |    |
| Insulation protection class to VDE 60034 |      | F  |    |                       |    |
| Protection class                         |      | IP54   |    |                       |    |
| Protective functions                     |      | I <sup>2</sup> T monitoring  |    |                       |    |
|  |      | Following error monitoring   |    |                       |    |
|  |      | Software end position detection  |    |                       |    |
|  |      | Voltage failure detection  |    |                       |    |
|  |      | Current monitoring   |    |                       |    |
|  |      | Temperature monitoring: Silicon absolute temperature sensor, switches off at temperatures >70 °C |    |                       |    |
| Ambient temperature                      | [°C] | 0 ... +50  |    |                       |    |
| Storage temperature                      | [°C] | -25 ... +60  |    |                       |    |
| Relative air humidity                    | [%]  | 0 ... 95 (non-condensing)  |    |                       |    |
| CE mark (see declaration of conformity)  |      | In accordance with EU EMC directive  |    |                       |    |
| Certification                            |      | C-Tick   |    |                       |    |
| Note on materials                        |      | Contains paint wetting impairment substances   |    |                       |    |

| Materials          |   |
|--------------------|---|
| Motor unit housing | Anodised aluminium                                    |
| Motor unit cover   | Aluminium, precision casting, coated (size 62 milled) |

| Technical data – I/O/fieldbus interface      |        |  |                              |                              |                              |
|--|--------|--|------------------------------|------------------------------|------------------------------|
| Type   |        | MTR-DCI-...-IO                                     | MTR-DCI-...-CO               | MTR-DCI-...-PB               | MTR-DCI-...-DN               |
| Interface                                    |        | I/O interface for 15 traversing records and homing | CANopen                      | Profibus DP                  | DeviceNet                    |
| Number of digital logic inputs               |        | 6  | –                            | –                            | –                            |
| Number of digital logic outputs              |        | 2  | –                            | –                            | –                            |
| Max. current of digital logic outputs (size) | 32/42  | 200  | –                            | –                            | –                            |
|  | 52/62  | 60   | –                            | –                            | –                            |
| Bus terminating resistor <sup>1)</sup>       |        | –  | Not integrated in the device | Not integrated in the device | Not integrated in the device |
| Communication profile                        |        | –  | DS301 / FHPP                 | DP-V0/V1 / FHPP              | FHPP                         |
|  |        | –  | DS301; DSP402                | Step7 functional modules     | Device type 0C <sub>h</sub>  |
| Max. fieldbus baud rate                      | [kbps] | –  | 1,000                        | 12,000                       | 500                          |

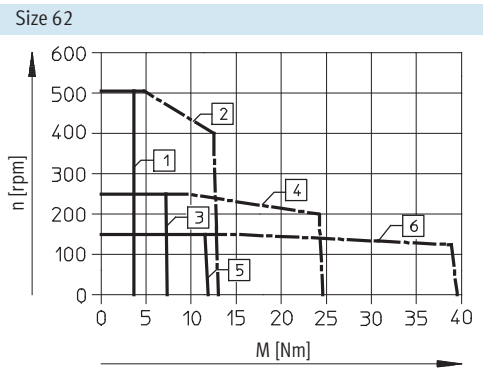
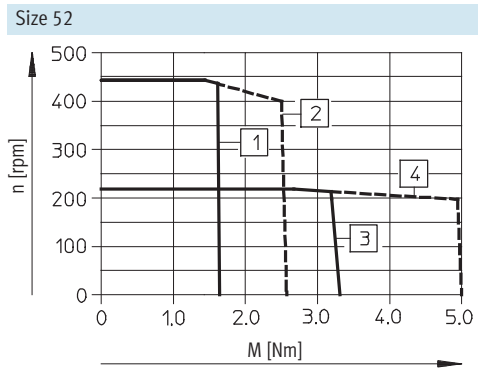
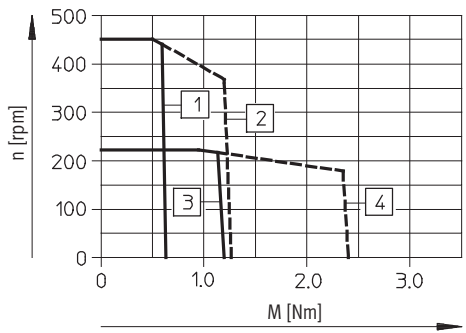
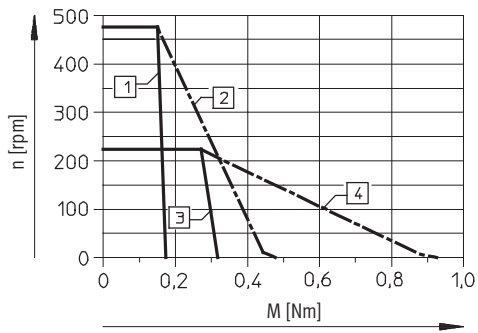
1) Details of bus terminating resistor → 10

# Motor units MTR-DCI, intelligent servo motors

Technical data



## Torque M as a function of rotational speed n

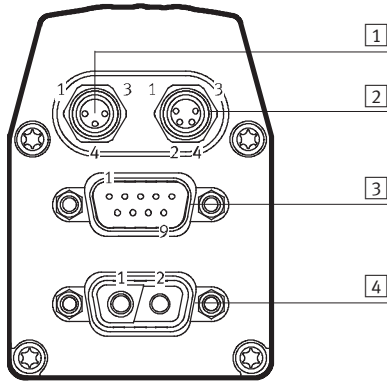


| Gear unit ratio 7:1 |              | Gear unit ratio 14:1 |              | Gear unit ratio 22:1 |              |
|---------------------|--------------|----------------------|--------------|----------------------|--------------|
| 1                   | Torque, nom. | 3                    | Torque, nom. | 5                    | Torque, nom. |
| 2                   | Torque, max. | 4                    | Torque, max. | 6                    | Torque, max. |

# Motor units MTR-DCI, intelligent servo motors

Technical data

## Pin allocation



### 1 Reference switch, 3-pin M8 socket

| Pin | Function        |
|-----|-----------------|
| 1   | 24 V            |
| 4   | Reference input |
| 3   | 0 V             |
| -   |                 |

### 2 RS 232 interface, 4-pin M8 socket

| Pin | Function               |
|-----|------------------------|
| 1   | 0 V                    |
| 2   | Transmitted data (TxD) |
| 3   | Received data (RxD)    |
| 4   | -                      |

### 3 I/O interface, 9-pin Sub-D plug

| Pin | Function                        |
|-----|---------------------------------|
| 1   | Traversing record coding, bit 0 |
| 2   | Traversing record coding, bit 1 |
| 3   | Traversing record coding, bit 2 |
| 4   | Traversing record coding, bit 3 |
| 5   | Start bit                       |
| 6   | Enable bit                      |
| 7   | Ready signal output             |
| 8   | MC signal output                |
| 9   | 0 V                             |

### 3 CANopen interface, 9-pin Sub-D plug

| Pin | Function |
|-----|----------|
| 1   | -        |
| 2   | CAN_L    |
| 3   | CAN_GND  |
| 4   | -        |
| 5   | CAN_SHLD |
| 6   | CAN_V-   |
| 7   | CAN_H    |
| 8   | -        |
| 9   | CAN_V+   |

### 3 Profibus interface, 9-pin Sub-D socket

| Pin | Function          |
|-----|-------------------|
| 1   | -                 |
| 2   | Logic_GND         |
| 3   | RxD/TxD-P         |
| 4   | CNTR-P            |
| 5   | DGND              |
| 6   | VP                |
| 7   | Logic_V (24 V DC) |
| 8   | RxD/TxD-N         |
| 9   | -                 |

### 3 DeviceNet interface, 9-pin Sub-D plug

| Pin | Function |
|-----|----------|
| 1   | -        |
| 2   | CAN_L    |
| 3   | CAN_GND  |
| 4   | -        |
| 5   | CAN_SHLD |
| 6   | CAN_V-   |
| 7   | CAN_H    |
| 8   | -        |
| 9   | CAN_V+   |

### 4 Power supply, 2-pin plug

| Pin | Function   |
|-----|--|
| 1   | 24 V DC (for MTR-DCI-32/42/52), 48 V DC (for MTR-DCI-62) |
| 2   | 0 V  |
| -   |  |
| -   |  |
| -   |  |
| -   |  |
| -   |  |
| -   |  |
| -   |  |

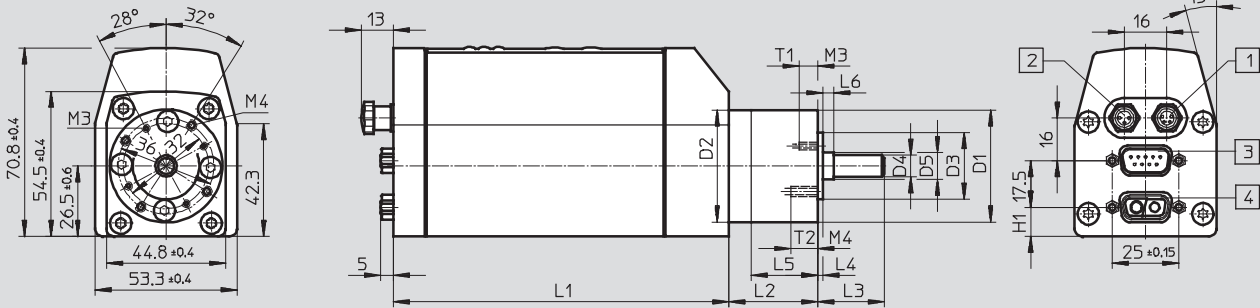
# Motor units MTR-DCI, intelligent servo motors

Technical data

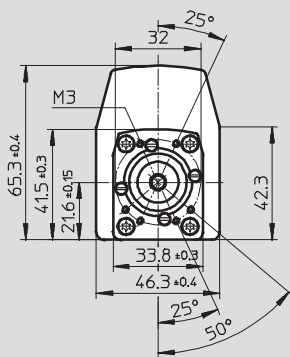
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Dimensions Download CAD data → [www.festo.com](http://www.festo.com)

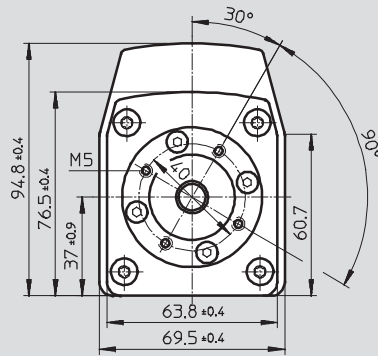
Size 42



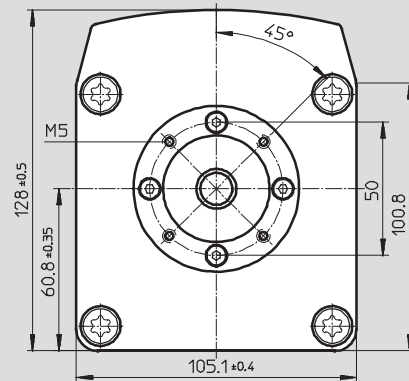
Size 32



Size 52



Size 62



- 1 M8x1, 4-pin
- 2 M8x1, 3-pin

- 3 Sub-D, 9-pin
- 4 Sub-D, 2-pin

| Type                | D1<br>∅<br>g10 | D2<br>∅<br>±0.1 | D3<br>∅<br>h8 | D4<br>∅<br>h7 | D5<br>∅ | H1     | L1<br>±1 | L2<br>±1 | L3       | L4      | L5   | L6 | T1  | T2<br>+2 |
|---------------------|----------------|-----------------|---------------|---------------|---------|--------|----------|----------|----------|---------|------|----|-----|----------|
| MTR-DCI-32S-...-G7  | -              | -               | 21.5          | 6             | -       | 13±0.2 | 175.5    | -        | 18.7±0.6 | 2.5±0.3 | -    | -  | 6   | -        |
| MTR-DCI-32S-...-G14 | -              | -               | 21.5          | 6             | -       | 13±0.2 | 175.5    | -        | 18.7±0.6 | 2.5±0.3 | -    | -  | 6   | -        |
| MTR-DCI-42S-...-G7  | 42             | 42              | 25            | 8             | -       | 11     | 176      | 33.3     | 25±1     | 2±0.1   | 25   | -  | 7±2 | 10       |
| MTR-DCI-42S-...-G14 | 42             | 42              | 25            | 8             | -       | 11     | 176      | 46.3     | 25±1     | 2±0.1   | 25   | -  | 7±2 | 10       |
| MTR-DCI-52S-...-G7  | 52             | 52              | 32            | 12            | -       | 17.3   | 194      | 39       | 33±1     | 3±0.3   | 31   | -  | 10  | -        |
| MTR-DCI-52S-...-G14 | 52             | 52              | 32            | 12            | -       | 17.3   | 194      | 53       | 33±1     | 3±0.3   | 31   | -  | 10  | -        |
| MTR-DCI-62S-...-G7  | 62             | 62              | 40            | 14            | 15      | 61.3   | 270      | 47       | 39±1     | 5±0.3   | 31.3 | 9  | 10  | -        |
| MTR-DCI-62S-...-G14 | 62             | 62              | 40            | 14            | 15      | 61.3   | 270      | 47       | 39±1     | 5±0.3   | 31.3 | 9  | 10  | -        |
| MTR-DCI-62S-...-G22 | 62             | 62              | 40            | 14            | 15      | 61.3   | 270      | 47       | 39±1     | 5±0.3   | 31.3 | 9  | 10  | -        |



# Motor units MTR-DCI, intelligent servo motors

Ordering data – Modular products

| M Mandatory data                         |            |       |              |   |                 |    |                  |     |                                  |    |
|--|------------|-------|--------------|---|-----------------|----|------------------|-----|----------------------------------|----|
| Module No.                               | Motor unit |       | Flange/size  |   | Nominal voltage |    | Measuring system |     | Parameterisation interface       |    |
| 533 736<br>533 742<br>533 748<br>533 754 | Motor type |       | Torque class |   | Plug design     |    | Gearing unit     |     | Electrical connection technology |    |
|  | MTR        | DCI   | 32           | S | VC              | SC | E                | G7  | R2                               | IO |
|  |            |       | 42           |   | VD              |    |                  | G14 | H2                               | CO |
|  |            |       | 52           |   |                 |    |                  | G22 |                                  | PB |
|  |            | 62    |              |   |                 |    |                  |     |                                  | DN |
| <b>Order example</b>                     |            |       |              |   |                 |    |                  |     |                                  |    |
| 533 742                                  | MTR        | - DCI | - 42         | S | - VC            | SC | - E              | G7  | - R2                             | IO |

| Ordering table |                                  |  |         |         |  |      |            |  |      |  |
|----------------|----------------------------------|--|---------|---------|--|------|------------|--|------|--|
| Size           | 32                               | 42   | 52      | 62      | Conditions                             | Code | Enter code |  |      |  |
| M              | Module No.                       | 533 736  | 533 742 | 533 748 | 533 754                                |      |            |  |      |  |
|                | Motor unit                       | Motor unit   |         |         |  |      | MTR        |  | MTR  |  |
|                | Motor type                       | DC servo motor with integrated position controller |         |         |  |      | -DCI       |  | -DCI |  |
|                | Flange/size                      | 32   | 42      | 52      | 62                                     |      | -...       |  |      |  |
|                | Torque class                     | Standard torque class                              |         |         |  |      | S          |  | S    |  |
|                | Nominal voltage [V]              | 24 DC  |         |         | -                                      |      | -VC        |  |      |  |
|                |                                  | -  |         |         | 48 DC                                  |      | -VD        |  |      |  |
|                | Plug design                      | Straight plug                                      |         |         |  |      | SC         |  | SC   |  |
|                | Measuring system                 | Encoder  |         |         |  |      | -E         |  | -E   |  |
|                | Gearing unit                     | Integrated planetary gearing i = 6.75              |         |         |  |      | G7         |  |      |  |
|                |                                  | Integrated planetary gearing i = 13.73             |         |         |  |      | G14        |  |      |  |
|                |                                  | -  |         |         | Integrated planetary gearing i = 22.21 |      | G22        |  |      |  |
|                | Parameterisation interface       | RS232 interface                                    |         |         |  |      | -R2        |  |      |  |
|                |                                  | RS232 interface + control panel                    |         |         |  |      | -H2        |  |      |  |
|                | Electrical connection technology | I/O interface                                      |         |         |  |      | IO         |  |      |  |
|                |                                  | CANopen  |         |         |  |      | CO         |  |      |  |
|                |                                  | Profibus DP  |         |         |  |      | PB         |  |      |  |
|                |                                  | DeviceNet  |         |         |  |      | DN         |  |      |  |


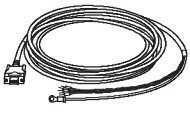
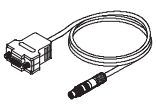
Transfer order code

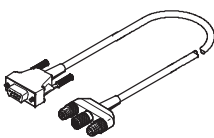
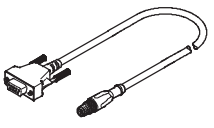
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# Motor units MTR-DCI, intelligent servo motors

Accessories




| Ordering data – Cables  |   |              |          |                       |
|---|---|--------------|----------|-----------------------|
|   | Brief description   | Cable length | Part No. | Type                  |
|  | Supply cable<br>Allocation →7   | 2.5 m        | 537 931  | KPWR-MC-1-SUB-9HC-2,5 |
|   |   | 5 m          | 537 932  | KPWR-MC-1-SUB-9HC-5   |
|   |   | 10 m         | 537 933  | KPWR-MC-1-SUB-9HC-10  |
|  | Control cable for I/O connection to any PLC controller<br>Allocation →7   | 2.5 m        | 537 923  | KES-MC-1-SUB-9-2,5    |
|   |   | 5 m          | 537 924  | KES-MC-1-SUB-9-5      |
|   |   | 10 m         | 537 925  | KES-MC-1-SUB-9-10     |
|  | Programming cable<br>For parameterisation and commissioning via the RS232 interface using FCT software<br>Allocation →7 | 2.5 m        | 537 926  | KDI-MC-M8-SUB-9-2,5   |

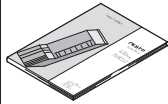
| Ordering data – Plugs   |   |          |                    |  |
|---|---|----------|--------------------|--|
|   | Brief description   | Part No. | Type               |  |
| Fieldbus adapter for Profibus   |   |          |                    |  |
|  | – 9-pin Sub-D plug to 5-pin round M12 plug/socket,<br>plus round M12 plug for logic voltage supply<br>– Bus terminating resistor must be connected externally | 537 934  | FBA-PB-SUB-9-3XM12 |  |
| Fieldbus adapter for CANopen and DeviceNet  |   |          |                    |  |
|  | – 9-pin Sub-D plug to 5-pin round M12 plug<br>– Bus terminating resistor must be connected externally   | 540 324  | FBA-CO-SUB-9-M12   |  |

# Motor units MTR-DCI, intelligent servo motors

Accessories



| Ordering data – Software  |  |                            |
|---|--|----------------------------|
|   | Brief description  | Part No. Type              |
|  | Operator package contains:<br>– CD-ROM<br>– with user documentation for MTR-DCI,<br>in the languages de, en, es, fr, it, sv<br>– with FCT (Festo Configuration Tool) configuration software<br>– Brief description<br>This package is included in the scope of delivery. | <b>550 905 PBP-MTR-DCI</b> |

| Ordering data – Documentation <sup>1)</sup>                                       |          |                   |                       |                        |                         |  |
|---|----------|-------------------|-----------------------|------------------------|-------------------------|--|
|   | Language | For I/O interface |                       | For Profibus interface |                         |  |
|   |          | Part No.          | Type                  | Part No.               | Type                    |  |
|  | DE       | 539 615           | P.BE-MTR-DCI-IO-DE    | 539 623                | P.BE-MTR-DCI-PB-DE      |  |
|   | EN       | 539 616           | P.BE-MTR-DCI-IO-EN    | 539 624                | P.BE-MTR-DCI-PB-EN      |  |
|   | ES       | 539 617           | P.BE-MTR-DCI-IO-ES    | 539 625                | P.BE-MTR-DCI-PB-ES      |  |
|   | FR       | 539 618           | P.BE-MTR-DCI-IO-FR    | 539 626                | P.BE-MTR-DCI-PB-FR      |  |
|   | IT       | 539 619           | P.BE-MTR-DCI-IO-IT    | 539 627                | P.BE-MTR-DCI-PB-IT      |  |
|   | SV       | 539 620           | P.BE-MTR-DCI-IO-SV    | 539 628                | P.BE-MTR-DCI-PB-SV      |  |
|   |          |                   | For CANopen interface |                        | For DeviceNet interface |  |
|   | DE       | 539 629           | P.BE-MTR-DCI-CO-DE    | 553 530                | P.BE-MTR-DCI-DN-DE      |  |
|   | EN       | 539 630           | P.BE-MTR-DCI-CO-EN    | 553 531                | P.BE-MTR-DCI-DN-EN      |  |
|   | ES       | 539 631           | P.BE-MTR-DCI-CO-ES    | 553 532                | P.BE-MTR-DCI-DN-ES      |  |
|   | FR       | 539 632           | P.BE-MTR-DCI-CO-FR    | 553 533                | P.BE-MTR-DCI-DN-FR      |  |
|   | IT       | 539 633           | P.BE-MTR-DCI-CO-IT    | 553 534                | P.BE-MTR-DCI-DN-IT      |  |
|   | SV       | 539 634           | P.BE-MTR-DCI-CO-SV    | 553 535                | P.BE-MTR-DCI-DN-SV      |  |

1) User documentation in paper form is not included in the scope of delivery