Excellent Integrated System Limited

Stocking Distributor

Click to view price, real time Inventory, Delivery & Lifecycle Information:

Panasonic Industrial Automation Sales
MADDT1205

For any questions, you can email us directly:
sales@integrated-circuit.com
Panasonic Motion Control Solutions

Overview

- **FP-SERIES PLCs**
  The compact FPΣ (Sigma) is suitable for most applications. The FPΣ (Sigma) PLC itself has powerful features for up to two axes. Add FPΣ (Sigma) positioning units to control up to 10 independent axes. The new FP-X PLC with transistor outputs offers functionality similar to the FPΣ (Sigma). The FP2/FP2SH is also suitable for complex positioning applications, while the compact FP0 and FP-e can handle simple positioning tasks. RTEX units for FPΣ (Sigma) and FP2 offer real-time access to multiple Minas A4N drivers.

- **MINAS A4/A4N/A4P/E SERIES SERVO DRIVES**
  Powerful servo drives with cutting edge technology, high power density and a power range of 50W to 5kW. [Minas A4/A4N/Minas E (100 to 400W)].

- **SOFTWARE**
  Use any of the built-in functions for FPΣ (Sigma) or FP-X for up to two axes or the certified Motion Control Library for more complex tasks that require positioning units. PANATERM® and Configurator PM allow set-up, tuning, monitoring and analysis of the driven system.
A FP-Series PLCs

Overview

<table>
<thead>
<tr>
<th>PLC</th>
<th>FP0 / FPe</th>
<th>FP-X</th>
<th>FPΣ (Sigma)</th>
<th>FP2 / FP2SH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Transistor</td>
<td>Relay with cassette</td>
<td>Transistor</td>
<td>Relay</td>
</tr>
<tr>
<td><strong>Number of axes supported</strong></td>
<td>2x5kHz (1x10kHz) pulse train</td>
<td>–</td>
<td>4 (2x100kHz +2x20kHz) pulse train</td>
<td>–</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>Positioning</td>
<td>–</td>
<td>Linear interpolation 2x100kHz +2x20kHz</td>
<td>–</td>
</tr>
<tr>
<td><strong>Number of axes supported using expansion units</strong></td>
<td>–</td>
<td>2x80kHz (1x100kHz) pulse train</td>
<td>–</td>
<td>8x500kHz (2MHz line driver) pulse train, 16 x Ethernet 100MHz (RTEX)</td>
</tr>
<tr>
<td><strong>Number of axes per expansion unit</strong></td>
<td>–</td>
<td>1 pulse train</td>
<td>–</td>
<td>1 or 2 pulse train, 2, 4 or 8 via Ethernet (RTEX)</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>–</td>
<td>Independent positioning, linear interpolation</td>
<td>–</td>
<td>Independent positioning (pulse train), linear interpolation 2 or 3 axes, circular 2 axes, spiral 3 axes (Ethernet/RTEX)</td>
</tr>
</tbody>
</table>

**FPΣ (SIGMA)**
- Program capacity: 32k steps
- Memory capacity: 32k words
- Expansion capacity: 4 modules (left side), 3 modules (right side) up to 384 I/Os
- Processing speed: 0.32μs/basic instruction

**FP-X**
- Program capacity: FPXC30, FPXC60 32k steps, FPXC14 16k steps
- Memory capacity: 32k words
- Expansion capacity: Up to 8 units + up to 2 cassettes for FPXC14 or + up to 3 cassettes for FPXC30/C60
- Processing speed: 0.32μs/basic instructions

**FP2 / FP2SH**
- Program capacity: FP2 16 or 32k steps, FP2SH 60 or 120k steps
- Memory capacity: FP2 6000 words, FP2SH 10,240 words
- Expansion capacity: Up to 28 modules or 2048 I/Os
- Processing speed: FP2 0.35μs/basic instruction, FP2SH 0.03μs/basic instruction

04/2008
A FP-Series PLCs

Positioning with FPΣ (Sigma)

The FPΣ (Sigma) positioning unit supports ultra-high speed linear servo motors. All-purpose device capable of linear interpolation and circular interpolation.

Pulse output of up to 4Mpps and high-speed startup at 0.005ms enable linear servo motor control.

The linear and circular interpolation functions support a wide variety of applications.

These interpolation functions enable simultaneous two-axis control, which can support applications that up to now have been difficult to handle using conventional compact PLCs.

Error detection is available by using the high-speed counter in combination.

Unexpected accidents, such as errors in the driving system, can be detected by setting the counter so that it counts the feedback pulses from the encoder during positioning.

Smooth acceleration/deceleration enables smooth startup.

CW/CCW is also supported.

Pulse+Sign method. Cost reduction of the whole system can be achieved by using FPΣ (Sigma) with small stepping motors or servo motors that do not support the pulse-and-sign method.

The control unit on its own can provide two-axis control.

The control unit has a pulse output of 100kpps and startup speed of 0.02ms, which provide sufficient performance for normal positioning.

Convenient and easy programming and selectable home return mode.

- Uses a data table for setting parameters, such as startup speed, target speed, acceleration/deceleration time.
- Comes with dedicated instructions for each mode: trapezoidal control, home return, JOG operation, free table operation, linear interpolation and circular interpolation.
- The home return method is selectable depending on the design, e.g. when only a single sensor is being used.
- Output of the deviation counter reset signal upon completion of return to home position is also available.

Unit type and product number

<table>
<thead>
<tr>
<th>Type</th>
<th>Output type</th>
<th>Product number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-axis type</td>
<td>Transistor output type</td>
<td>FPGP-P11</td>
</tr>
<tr>
<td>2-axis type</td>
<td>Transistor output type</td>
<td>FPGP-P21</td>
</tr>
<tr>
<td>1-axis type</td>
<td>Line driver output type</td>
<td>FPGP-P12</td>
</tr>
<tr>
<td>2-axis type</td>
<td>Line driver output type</td>
<td>FPGP-P22</td>
</tr>
</tbody>
</table>

Type          Output type          Product number
FPΣ (Sigma) CPU Transistor output type NPN FPG-C32T2H-A
FPΣ (Sigma) CPU Transistor output type PNP FPG-C28P2H-A
A FP-Series PLCs
Positioning with FP-X

FP-X perfectly fits the need for low cost “multi-axis positioning control in small-scale equipment”.

Built-in 4-axis pulse output (transistor output type).
The transistor output type C14 comes with 3-axis pulse output while C30/40 comes with 4-axis pulse output inside the control unit. Multi-axis control, which previously required a higher-level PLC, additional positioning unit, or two or more PLC units, can now be achieved with only one FP-X transistor output type unit in a small space at a low cost. In addition, as this type does not require a pulse I/O cassette as needed for a relay output type, other function expansion cassettes such as communication or analog input can be attached for more diversified applications.

XY table + processing head
Semiconductor wafer takeout blade
3-axis control with C14
4-axis control with C30/C60

2-axis linear interpolation simultaneously in two sets (transistor output type).
2-axis linear interpolation simultaneously controls two motor shafts, allowing you, for example, to move a robot arm diagonally. It is used for palletising, component pick and place, XY table control, contour cutting of a PC board, etc. The FP-X transistor output type is capable of simultaneously controlling 2-axis linear interpolation, for the first time in the industry with a compact pulse-output PLC. This unit greatly expands the range of applications as well as providing the added convenience of programming by using the linear interpolation command F175 (SPSH).

The relay output type can control two axes by using expansion cassettes. 2-axis 80kHz pulse output is possible by attaching two pulse I/O cassettes (AFPX-PLS). This type is also capable of performing 2-axis linear interpolation. The pulse I/O cassette does not work with the control unit transistor output type.

The relay output type is also capable of 2-axis linear interpolation.
By adding two pulse I/O cassette units, linear interpolation is possible at a maximum composite speed of 80kHz. The command used for this unit is F175 (SPSH) as for the transistor output types.

FP-X type overview

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Output type</th>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC</td>
<td>Transistor NPN</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>100 to 240VAC</td>
<td>Transistor NPN</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>24VDC</td>
<td>Transistor PNP</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>100 to 240VAC</td>
<td>Transistor PNP</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>24VDC</td>
<td>Transistor NPN</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>100 to 240VAC</td>
<td>Transistor NPN</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>24VDC</td>
<td>Transistor PNP</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>100 to 240VAC</td>
<td>Transistor PNP</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

FP-X type overview

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Output type</th>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC</td>
<td>Transistor NPN</td>
<td>32</td>
<td>2B</td>
</tr>
<tr>
<td>100 to 240VAC</td>
<td>Transistor NPN</td>
<td>32</td>
<td>2B</td>
</tr>
<tr>
<td>24VDC</td>
<td>Transistor PNP</td>
<td>32</td>
<td>2B</td>
</tr>
<tr>
<td>100 to 240VAC</td>
<td>Transistor PNP</td>
<td>32</td>
<td>2B</td>
</tr>
</tbody>
</table>
A FP-Series PLCs

FP2 and FP2SH positioning units

FEATURES
- Maximum 4Mpps command gives high-speed, high-precision positioning.
- 0.005ms high-speed drive reduces tact-time (start-up time is the time from reception of the CPU unit start-up command to release of the pulse output by the positioning unit).
- 4 axes per unit means versatility and saves space.
- S (sight-shaped) acceleration/deceleration function provides smooth starting and stopping.
- Feedback pulse count function makes output pulse counting possible for encoders, etc.
- The pulse input function allows users to generate pulses manually to adjust machines, for example.

Operation modes:
- E-point control
- P-point control
- Homing function
- Jog operation function
- Pulser input function
- Interpolation
- Single speed acceleration/deceleration
- Multistage acceleration/deceleration
- Fast startup of 0.02 or 0.005ms makes cycle time reduction possible
- Acceleration/deceleration control: Linear or 4 types of S-curve: Sine, quadratic, cycloid and cubic curves (for smooth startup and stopping)

UP TO 4 AXES PER POSITIONING MODULE:

Motor
Driver
4-axis type FP2PP42
Motor
Driver

FP2 CPU types

<table>
<thead>
<tr>
<th>Type</th>
<th>Program capacity</th>
<th>Product number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP2 Standard CPU</td>
<td>16k steps</td>
<td>FP2C1</td>
</tr>
<tr>
<td>FP2SH CPU</td>
<td>60k steps</td>
<td>FP2C2</td>
</tr>
<tr>
<td>FP2SH CPU</td>
<td>120k steps</td>
<td>FP2C3</td>
</tr>
</tbody>
</table>

FP2 positioning units

<table>
<thead>
<tr>
<th>Number of axes</th>
<th>Output type</th>
<th>Product number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Transistor</td>
<td>FP2PP21</td>
</tr>
<tr>
<td>2</td>
<td>Line driver</td>
<td>FP2PP22</td>
</tr>
<tr>
<td>4</td>
<td>Transistor</td>
<td>FP2PP41</td>
</tr>
<tr>
<td>4</td>
<td>Line driver</td>
<td>FP2PP42</td>
</tr>
</tbody>
</table>

FP2 power supplies

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>Power</th>
<th>Product number</th>
</tr>
</thead>
<tbody>
<tr>
<td>200–240VAC</td>
<td>2.5A</td>
<td>FP2PSA2</td>
</tr>
<tr>
<td>100–240VAC</td>
<td>5A</td>
<td>FP2PSA3</td>
</tr>
</tbody>
</table>

FP2 backplanes

<table>
<thead>
<tr>
<th>Description</th>
<th>Product number</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP2 backplane 5 modules</td>
<td>FP2BP05</td>
</tr>
<tr>
<td>FP2 backplane 7 modules</td>
<td>FP2BP07</td>
</tr>
<tr>
<td>FP2 backplane 9 modules</td>
<td>FP2BP09</td>
</tr>
<tr>
<td>FP2 backplane 12 modules</td>
<td>FP2BP12</td>
</tr>
<tr>
<td>FP2 backplane 14 modules</td>
<td>FP2BP14</td>
</tr>
</tbody>
</table>
FP-Series PLCs

RTEX positioning units for FPΣ (Sigma) and FP2/FP2SH

REAL-TIME ETHERNET SERVO SYSTEM FOR MINAS A4N SERVO DRIVES

Positioning units for FPΣ (Sigma) and FP2 PLCs support Minas A4N network servo drives. A mutually optimised system consisting of PLC and servo drive greatly simplifies installation.

ADVANTAGES:
- Easy control of network servos with an ultracompact PLC.
- Allows highly accurate control of multi-axis positioning using high-speed 100Mbps communication.
- Commercial LAN cables greatly reduce wiring costs.
- New product lineup includes a new 2-axis unit in addition to the 4-axis and 8-axis units.
- Dedicated software tool ConfiguratorPM provides total support, from configuration and startup to monitoring.
- Includes manual pulser input allowing support for precision teaching.

SYSTEM CONFIGURATION

No. of positioning units per RTEX unit
FPΣ (Sigma): 2 units
FP2: 14 units (limited by consumption current)

Control of 2 to 8 axes in one positioning unit

CPU unit
Tool port
Commercially available LAN cable (Ethernet category 5 shielded type)
I/O signals, such as origin proximity, limit, etc., sent to A4N.
### FP-Series PLCs

**RTEX multi-axis network servo system**

#### FPΣ (SIGMA) POSITIONING UNIT RTEX – THE WORLD’S FIRST SERVO SYSTEM WITH ULTRACOMPACT PLC!

- Maximum number of control axes: 16 axes. Realisation of highly accurate 2-axis circular interpolation, 3-axis linear interpolation and 3-axis spiral interpolation with high-speed 100Mbps communication.
- With 3 types in the product range, for 2 axes, 4 axes and 8 axes, provides flexible support even for control of small numbers of axes.
- Provides a rich environment for total control of equipment including I/O control, with a powerful control unit with 32k step program capacity/max. 320 I/O points/serial communication on 3 ports.

#### ULTRA-HIGH-SPEED PROCESSING WITH FP2/FP2SH

- Installation of up to 14 units with 8 axes is possible bringing the number of control axes up to 112.
- With the addition of 2 axis, 4 axis and 8 axis units to the product lineup, flexible system configurations from small to large numbers of axes are possible.
- RTEX in combination with the ultra-high-speed and large capacity FP2SH CPU unit [20k steps/1ms (as measured in in-house experiments) and 120k step program capacity] provides sufficient support also for large-scale equipment.
A FP-Series PLCs

RTEX multi-axis network servo system

■ BROAD REDUCTION IN WIRING COSTS
Realtime Express* uses commercially available LAN cables as wiring for its network. In terms of cost efficiency, availability and workability, this is a great benefit.

* Matsushita Electric Industrial network servo systems

■ HIGH RELIABILITY WITH LOOP WIRING
Transmitted and received data in serial communication is normally sent and received at frequent intervals in the same cable making the communication state extremely sensitive to environmental conditions such as noise. However, by using loop wiring as shown in the figure below, Realtime Express provides high reliability by creating smooth communication conditions with the data flow always in the same direction. In addition, by utilising the 100Mbps high communication speed, Realtime Express reads the data transmissions which occur every 0.5ms twice and carries out data transfer in the extremely short period of 1ms, further improving reliability.

■ ADVANCED WIRING METHOD
Sensor input (origin proximity, limit) is wired directly to the servo amp of each axis and the signal is transferred through the network to the positioning unit. This enables you to check at a glance which sensor input is connected to which axis. Wiring errors are reduced and the time required for debugging shortened, especially when the system deals with large numbers of axes. In addition, even if the positioning unit and servo amp are far apart, it is not necessary to wire the signal from a sensor which is close to the servo amp to the distant positioning unit, further reducing the amount of wiring.
A FP-Series PLCs

RTEX multi-axis network servo system

FUNCTIONS

Operating patterns
• E-point trapezoidal control (PTP control)
• P-point change speed control (CP control)
• C-point repeated trapezoidal control (PTP control)

Control methods
• Absolute method, increment method

Movement unit settings
• Pulse (pulse), scale (μm, inch), angle (degree)

Acceleration/deceleration method
• Linear, S-curve

Origin return
• Origin proximity (DOG) search method

Low speed test operation mode (speed setting)
• The acceleration/deceleration time and target speed for each point indicated in the data table can be set to a low speed in the range of 1 to 100% without actually changing the data itself. Test operations can be carried out safely by checking the operation of the device at low speed.

Interpolation operation modes
• 2-axis circular, 2-axis linear
• 3-axis spiral, 3-axis linear

Auxiliary output
• Codes can be output during operation according to the data table number.

JOG operation
• Speed and acceleration/deceleration time can be changed during operation.

Pulser input
• 2-phase quad edge – max. 1Mpps
• Division ratio setting possible by specification of numerator/denominator.

SPECIFICATIONS OF RTEX POSITIONING UNITS

<table>
<thead>
<tr>
<th>Positioning control functions</th>
<th>2-axis type</th>
<th>4-axis type</th>
<th>8-axis type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product number FPGPN2AN</td>
<td>FPGPN4AN</td>
<td>FPGPN8AN</td>
<td>FPGPN8AN</td>
</tr>
<tr>
<td>Control method</td>
<td>PTP Control, Cursor Path (CP) Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpolation control</td>
<td>2-axis/3-axis linear interpolation • 2-axis circular interpolation • 3-axis spiral interpolation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control units</td>
<td>Pulse/μm/inch/degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position data</td>
<td>600 points for each axis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Backup</td>
<td>Parameters and data file can be saved to FROM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceleration/deceleration method</td>
<td>Linear acceleration/deceleration/S-curve acceleration/deceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceleration/deceleration time</td>
<td>0 to 10,000ms (1ms units) different settings for acceleration and deceleration are possible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning area</td>
<td>(-1,073,741,823 to 1,073,741,823 pulse) increment and absolute specification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed control functions</td>
<td>Supported with JOG operation (free rund operation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Origin functions</td>
<td>Search method</td>
<td>Origin proximity (DOG) search</td>
<td>Free settings possible</td>
</tr>
<tr>
<td>Creep speed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other functions</td>
<td>Pulser input operation support</td>
<td>Auxiliary output code, auxiliary output contact support</td>
<td>Dwell time support</td>
</tr>
</tbody>
</table>

Communication specifications

| Communication speed | 100Mbps |
| Cable | Commercially available LAN straight cable (shielded category 5e) |
| Connection method | Ring method |
| Communication cycle/no. of terminals | 0.5ms: Max. 8 axes/system (command cycle: 1ms) |
| Transmission distance | Between terminals: 60m; total length: 200m |
Minas A4/A4P/A4N/E Series Servo Drives

Main features – increased performance and accuracy

- Fast response frequency: 1000Hz (Minas E 400Hz)
- Completely adjustment-free, real-time auto-gain tuning
- High performance vibration control
- Command input up to 2Mpps
- Smaller motors and drivers versus the former series
- Position, velocity and torque control support – a wide range of applications in one driver
- Many more additional functions (Minas A4/A4N/A4P):
  - Hit & Stop homing, i.e. homing without a switch
  - Press/Tension control
  - 8 internal JOG speeds
  - Others
- Minas A4P Drivers
  - For simple positioning control. No positioning unit or pulse control necessary
  - Preset up to 60 position points with Software Tool PANATERM
  - Positioning with digital I/O

### Minas series

<table>
<thead>
<tr>
<th>Minas series</th>
<th>A4</th>
<th>AN</th>
<th>A4P</th>
<th>A4</th>
<th>AN</th>
<th>A4P</th>
<th>Minas E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated power</td>
<td>50W to 5kW</td>
<td>400W to 7.5kW</td>
<td>50W to 400W</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity response frequency</td>
<td>1000Hz</td>
<td>400Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated/max. rotational speed</td>
<td>3000/5000 rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated torque</td>
<td>0.16 to 15.8Nm</td>
<td>1.9 to 57.2Nm</td>
<td>0.16 to 1.3Nm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak torque</td>
<td>0.48 to 47.6Nm</td>
<td>5.3 to 137Nm</td>
<td>0.48 to 3.8Nm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment of inertia</td>
<td>0.025 to 19.7 x 10^-4kg m²</td>
<td>2.45 to 288 x 10^-4kg m²</td>
<td>0.021 to 0.2 x 10^-4kg m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Encoder
  - Incremental Pulses | 2500 pulses/rev. |
  - Resolution | 10,000 |
| Absolute
  - Pulses | 17-bit resolution |
  - Resolution | 131,072 |
| Control method
  - Pulse train | Ethernet | Digital input | Pulse train | Ethernet | Digital input | Pulse train |
| Control modes
  - Position, velocity, torque, full-closed |
  - Position, internal speed |
Minas A4/A4N/A4P/E Series Servo Drives

Details of features

**ADJUSTMENT-FREE OPERATION**

High-functionality real-time auto-gain tuning
- Automatically tunes in real-time to variations in load inertia. Real-time auto-gain tuning for machines with low or high stiffness.
- Supports vertical axis applications where the load torque varies depending on rotational direction.
- An over-travel detection function prevents the machine from over-travelling during real-time auto-gain tuning.
- Enables you to set and check while monitoring real-time automatic gain tuning conditions on the front panel.

**HIGH-SPEED AND FAST RESPONSE**

Velocity response (bandwidth) of 1kHz
- The instantaneous Velocity Observer detects the motor speed more quickly and with a higher resolution than the previous models.

High-functionality real-time auto-gain tuning
- Enables low stiffness machines (e.g. belt-driven machines) and high stiffness machines (e.g. short stroke ball-screw driven machines) to be used in high-speed positioning applications.
Minas A4/A4N/A4P/E Series Servo Drives

Details of features

**REDUCTION VIBRATION**

Adaptive Filter
- Enables the notch filter frequency to automatically follow the machine resonance frequency.
- Suppresses judder noise of the machine caused by a change in the resonance frequency (e.g. resulting from aging effects or changeovers).

![Effect of notch filter](image)

**2-CHANNEL NOTCH FILTERS**

Adaptive Filter
- The driver is equipped with 2-channel notch filters which operate independently from the adaptive filter.
- Both frequency and width for each of the 2 filters can be set. Frequency can be defined in units of 1Hz.
- Suppress judder noise of machines with multiple resonance points.

![2-channel notch filters](image)

**DAMPING CONTROL**

- The driver is equipped with a 2-channel damping filter. You can suppress vibration occurring at both starting and stopping in low stiffness machines by manually setting up vibration frequencies in 0.1Hz units.
- You can switch between the channels with the direction command or with an external input.
- Easy setup with input of only frequency and filter values. Incorrect setup values do not result in unstable operation.

![Damping control](image)

*On demand only*
Minas A4/A4N/A4P/E Series Servo Drives

Additional features

**SETUP SUPPORT WITH HELPFUL MONITORING FUNCTIONS**
- Faster communication speed of RS232C/RS485 (max. 57,600bps) establishes easy and comfortable operating conditions for setup support software PANATERM®.
- PANATERM® displays useful status information, e.g. to help you analyse motor problems.
- You can enable the panel operation lock via the front panel to inhibit operation, e.g. to prevent parameters from being changed unintentionally.

**COMMAND CONTROL MODES**
- Offers you “Position”, “Velocity (including internal 8-speed)” and “Torque” command control modes.
- You can select any one of the above command control modes, or select two command control modes by defining the parameters.
- You can combine command control modes in a hybrid mode and switch between them.

**MONITORING FUNCTION WITH FRONT PANEL**
- LED display and analog monitor terminals are installed in the front panel.
- Displays “Motor speed”, “Motor torque”, “Position deviation”, “Motor load factor” and “Regeneration load factor”.
- You can monitor “Motor speed”, “Motor torque” and “Position deviation” with analog monitor terminals.

**TRIAL RUN (JOG)**
- Features the function for trial run (JOG) through the front panel or console (option) without connecting to a host controller.
- Shortens machine setup time.

**FULL-CLOSED CONTROL (HIGH PRECISION POSITIONING)**
- Features the full-closed control of position and velocity, using the signals from the linear scale installed on the load side and the high resolution encoder.
- Best suited for high precision machines.

**INRUSH CURRENT SUPPRESSING FUNCTION**
- The driver is equipped with an inrush suppressing resistor which prevents circuit breaker shutdown of the power supply caused by inrush current at power-on.
- Prevents unintentional shutdown of the power supply circuit breaker in multi-axis applications and does not add load to the power line.

**REGENERATION DISCHARGING FUNCTION**
- Discharges regenerative energy, which is returned from the motor to the driver with a resistor, e.g. stopping a load with a large moment of inertia or with the up-down operation.
- Frame A and Frame B drivers do not have a built-in regeneration discharge resistor. We recommend connecting an optional regenerative resistor.
- Frame C – Frame F drivers have a built-in regeneration discharge resistor. However, connecting an optional regenerative resistor will add even more regenerative capability.

**BUILT-IN DYNAMIC BRAKE**
- The driver is equipped with a dynamic brake for emergency stop.
- The dynamic brake can be used in the following instances:
  - Main power OFF
  - Servo OFF
  - A protective function
  - Over-travel inhibit is activated

**POSITIONING PULSE**
- Up to 2Mpps of pulse input at positioning control possible.

**TORQUE LIMIT VALUE SWITCHING**
- You can set up 2 torque limits and use them for tension control or press & hold control.

**APPROVALS**

[Sources for various approvals]
## Overview drivers

### Minas A4/A4N/A4P/E Series Servo Drives

<table>
<thead>
<tr>
<th>Rated power</th>
<th>Minas A4 Drivers</th>
<th>Minas A4N Drivers</th>
<th>Minas A4P Drivers</th>
<th>Frame</th>
<th>Minas E Drivers</th>
<th>Frame Minas E</th>
</tr>
</thead>
<tbody>
<tr>
<td>50W</td>
<td>MADDT1205</td>
<td>MADDT1205N</td>
<td>MADDT1205P</td>
<td>A</td>
<td>MKDET1505P</td>
<td>K</td>
</tr>
<tr>
<td>100W</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200W</td>
<td>MADDT1207</td>
<td>MADDT1207N</td>
<td>MADDT1207P</td>
<td>B</td>
<td>MLDET2210P</td>
<td>L</td>
</tr>
<tr>
<td>400W</td>
<td>MBDDT2210</td>
<td>MBDDT2210N</td>
<td>MBDDT2210P</td>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>750W</td>
<td>MCDĐT3520</td>
<td>MCDĐT3520N</td>
<td>MCDĐT3520P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1kW</td>
<td>MDDĐT5540</td>
<td>MDDĐT5540N</td>
<td>MDDĐT5540P</td>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.5kW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2kW</td>
<td>MEDĐT7364</td>
<td>MEDĐT7364N</td>
<td>MEDĐT7364P</td>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3kW</td>
<td>MFDDTA390</td>
<td>MFDDTA390N</td>
<td>MFDDTA390P</td>
<td>F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4kW</td>
<td>MFDDTB3A2</td>
<td>MFDDTB3A2N</td>
<td>MFDDTB3A2P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5kW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Basic specifications

#### Input power

- **Frame A, B**: Single phase, 200–240V +10% 50/60Hz -15%
- **Frame C, D**: Single/3-phase, 200–240V +10% 50/60Hz -15%
- **Frame E, F**: Single/3-phase, 200–240V +10% 50/60Hz -15%

#### Environment

- **Temperature**: Operating: 0 to 55°C, Storage: -20 to +80°C
- **Humidity**: Both operating and storage: 90%RH or less (free from condensation)
- **Altitude**: 1000m or lower
- **Vibration**: 5.88m/s² or less, 10 to 60Hz (no continuous use at resonance frequency)

#### Control method

- IGBT PWM sinusoidal wave drive

#### Encoder feedback

- 17-bit (131,072 resolution) absolute/incremental encoder (on demand only)
- 2500P/r (10,000 resolution) incremental encoder (standard)
- Compatible with AT500 series, ST771 by Mitsutoyo

#### External scale feedback

- Torque in-limit. Other outputs vary depending on the control mode

#### Control signal

- Input: 10 inputs (1) Servo-ON, (2) Control mode switching, (3) Gain switching/torque limit switching, (4) Alarm clear other inputs vary depending on the control mode, (5) CW drive prohibition, (6) CCW drive prohibition
- Output: 6 outputs (1) Servo alarm, (2) Servo ready, (3) Release signal of external brake (4) Zero speed detection, (5) Torque in-limit. Other outputs vary depending on the control mode

#### Analog signal

- Input: 3 inputs (16Bit A/D : 1 input, 10Bit A/D : 2 inputs)
- Output: 2 outputs (for monitoring) (1) Speed monitor (actual motor speed or command speed). Select the content and scale with parameter. (2) Torque monitor [torque command (approx. 3V/rated torque)], deviation counter or full-closed deviation is enabled. Select the content or scale with parameter

#### Pulse signal

- Input: 2 inputs. Select the exclusive input for line driver or photo-coupler input with parameter
- Output: 4 outputs. Feed out the encoder pulse (A, B and Z-phase) or external scale pulse (EXA, EXB and EXZ-phase). Z-phase and EXZ-phase pulse is also fed out in open collector

#### Communication function

- RS232C: 1:1 communication to a host with RS232C interface is enabled
- RS485: 1:n communication up to 15 axes to a host with RS485 interface is enabled

#### Front panel

- (1) 5 keys (MODE, SET, UP, DOWN, SHIFT), (2) LED (6-digit)

#### Regeneration

- Frame A, B: no built-in regenerative resistor (external resistor only), Frame C to F: built-in regenerative resistor (external resistor is also enabled)

#### Dynamic brake

- Setup of action sequence at power-OFF, servo-OFF, at protective function activation and over-travel inhibit input is enabled

#### Control mode

- Switching among the following 7 modes is enabled, (1) Position control, (2) Velocity control, (3) Torque control, (4) Position/Velocity control, (5) Position/Torque control, (6) Velocity/Torque control and (7) Full-closed control
## Common driver specifications

<table>
<thead>
<tr>
<th>Analog functions</th>
<th>Torque control</th>
<th>Position control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque limit command input</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
<td>(1) Deviation counter clear, (2) Command pulse inhibition, (3) Electronic gear switching, (4) Damping control switching</td>
</tr>
<tr>
<td>Instantaneous speed observer</td>
<td>Usable</td>
<td>Position control complete (in-position)</td>
</tr>
<tr>
<td>Damping control</td>
<td>Usable</td>
<td>Full-closed positioning complete (in-position)</td>
</tr>
<tr>
<td>Control input</td>
<td>(1) Zero speed clamp, (2) Selection of internal speed setup, (3) Gain switching or torque limit switching input</td>
<td>Full-closed positioning complete (in-position)</td>
</tr>
<tr>
<td>Control output</td>
<td>Speed arrival (at-speed)</td>
<td>Max. command pulse frequency</td>
</tr>
<tr>
<td>Max. command pulse frequency</td>
<td></td>
<td>Exclusive interface for line driver: 2Mpps, Line driver: 500kpps, Open collector: 200kpps</td>
</tr>
<tr>
<td>Input pulse signal format</td>
<td>Support (1) RS422 line drive signal and (2) Open collector signal from controller</td>
<td>Differential input. Selectable with parameter. (1) CW/CCW, (2) A and B-phase, (3) Command and direction</td>
</tr>
<tr>
<td>Electronic gear (division/multiplication of command pulse)</td>
<td>Process the command pulse frequency x (1 to 10,000) x 2^[-17] as a position command input</td>
<td>Input pulse signal format</td>
</tr>
<tr>
<td>Smoothing filter</td>
<td>Primary delay filter or FIF type filter is selectable to the command input</td>
<td>Differential input. Selectable with parameter. (1) CW/CCW, (2) A and B-phase, (3) Command and direction</td>
</tr>
<tr>
<td>Torque limit command input</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
<td>Max. command pulse frequency</td>
</tr>
<tr>
<td>Speed command range</td>
<td>1:5000</td>
<td>Exclusive interface for line driver: 2Mpps, Line driver: 500kpps, Open collector: 200kpps</td>
</tr>
<tr>
<td>Internal speed command</td>
<td>8-speed with parameter setup</td>
<td>Differential input. Selectable with parameter, (1) CW/CCW, (2) A and B-phase, (3) Command and direction</td>
</tr>
<tr>
<td>Soft-start/down function</td>
<td>Individual setup of acceleration and deceleration is enabled, with 0 to 10s/1000r/min. Sinusoidal acceleration/deceleration is also enabled</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
</tr>
<tr>
<td>Zero speed clamp</td>
<td>Zero speed clamp for internal speed command</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
</tr>
<tr>
<td>Instantaneous speed observer</td>
<td>Usable</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
</tr>
<tr>
<td>Speed command filter</td>
<td>Usable</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
</tr>
<tr>
<td>Control input</td>
<td>(1) CW over-travel inhibition, (2) CCW over-travel inhibition, (3) Zero speed clamp</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
</tr>
<tr>
<td>Control output</td>
<td>Speed arrival (at-speed)</td>
<td>Max. command pulse frequency</td>
</tr>
<tr>
<td>Max. command pulse frequency</td>
<td>Exclusive interface for line driver: 2Mpps, Line driver: 500kpps, Open collector: 200kpps</td>
<td>Differential input. Selectable with parameter. (1) CCW/CW, (2) A and B-phase, (3) Command and direction</td>
</tr>
<tr>
<td>Input pulse signal format</td>
<td>Support (1) RS422 line drive signal and (2) Open collector signal from controller</td>
<td>Process the command pulse frequency x (1 to 10,000) x 2^[-17] as a position command input</td>
</tr>
<tr>
<td>Electronic gear (division/multiplication of command pulse)</td>
<td>Process the command pulse frequency x (1 to 10,000) x 2^[-17] as a position command input</td>
<td>Input pulse signal format</td>
</tr>
<tr>
<td>Smoothing filter</td>
<td>Primary delay filter is adaptable to the command input</td>
<td>Differential input. Selectable with parameter, (1) CW/CCW, (2) A and B-phase, (3) Command and direction</td>
</tr>
<tr>
<td>Torque limit command input</td>
<td>Individual torque limit for both CW and CCW direction is enabled (3V/rated torque)</td>
<td>Input pulse signal format</td>
</tr>
<tr>
<td>Setup range of division/multiplication of external scale</td>
<td>Setting ratio between encoder pulse (denominator) and external scale pulse (numerator) is enabled within a range of (1 to 10,000) x 2^[-17] / (1 to 10,000)</td>
<td>Max. command pulse frequency</td>
</tr>
<tr>
<td>Damping control function</td>
<td>Manual setup with parameter</td>
<td>Mode</td>
</tr>
</tbody>
</table>
Minas E Series Servo Drives

Driver dimensions

**FRAME K**
MKDET1505P

- Connector for communication
- Connector for control signal connection
- Connector for encoder connection, CNX4
- Connector for motor connection, CNX3
- Connector for main circuit connection, CNX1
- Earth terminal screws

**FRAME L**
MLDET2210P, MLDET2510P

- Connector for communication
- Connector for control signal connection
- Connector for encoder connection, CNX4
- Connector for motor connection, CNX3
- Connector for main circuit connection, CNX1
- Earth terminal screws

All measurements in mm
B Minas A4/A4N/A4P Series Servo Drives

Driver dimensions

**FRAME A**

**Minas A4N**
- Rotary switch for node address
- Network link LEDs
- RX Ethernet connection
- TX Ethernet connection
- Parallel I/O connection

**Minas A4**
- Main power input terminals, CN 1
- Control power input terminals, CN 1
- Regenerative resistor connecting terminals, CN X2
- Motor connecting terminals, CN X2
- Motor encoder terminals, CN X7
- External power terminals, CN X7
- RS485 communication terminal, CN 13
- RS232C/RS485 communication terminal, CN 14

**FRAME B**

**Minas A4N**
- Rotary switch for node address
- Network link LEDs
- RX Ethernet connection
- TX Ethernet connection
- Parallel I/O connection

**Minas A4**
- Main power input terminals, CN 1
- Control power input terminals, CN 1
- Regenerative resistor connecting terminal, CN X2
- Motor connecting terminals, CN X2
- Motor encoder terminals, CN X7
- External input terminal, CN X7
- RS485 communication terminal, CN 13
- RS232C/RS485 communication terminal, CN 14

**FRAME C**

**Minas A4N**
- Rotary switch for node address
- Network link LEDs
- RX Ethernet connection
- TX Ethernet connection
- Parallel I/O connection

**Minas A4**
- Main power input terminals, CN 1
- Control power input terminals, CN 1
- Regenerative resistor connecting terminal, CN X2
- Motor connecting terminals, CN X2
- Motor encoder terminals, CN X7
- External input terminal, CN X7
- RS485 communication terminal, CN 13
- RS232C/RS485 communication terminal, CN 14

All measurements in mm

Same dimensions for Minas A4P drivers

04/2008
## Minas A4/A4N/A4P/E Series Servo Drives

### Motor types

<table>
<thead>
<tr>
<th>Motor product number</th>
<th>Rated power</th>
<th>Driver product number</th>
<th>Torque Moment</th>
<th>Moment of inertia *10^-4kgm²</th>
<th>Shaft</th>
<th>Oil seal</th>
<th>Holding brake</th>
<th>Encoder</th>
<th>With IP67 connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSMD022P1A</td>
<td>200W</td>
<td>MADDT1205 or</td>
<td>0.16Nm</td>
<td>0.48Nm</td>
<td>0.025</td>
<td>Round</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MADDT1205N or MADDT1205P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.027</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.025</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.027</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.025</td>
<td>Keyway</td>
<td>Absolute</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.051</td>
<td>Round</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.051</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.051</td>
<td>Keyway</td>
<td>Absolute</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td>MSMD022P1C</td>
<td>200W</td>
<td>MADDT1207 or</td>
<td>0.46Nm</td>
<td>1.91Nm</td>
<td>0.026</td>
<td>Round</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MADDT1207N or MADDT1207P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.026</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.028</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.016</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.046</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td>MSMD042P1A</td>
<td>400W</td>
<td>MBBDDT2210 or</td>
<td>1.3Nm</td>
<td>3.8Nm</td>
<td>0.026</td>
<td>Round</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MBBDDT22110 or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MBDDT22110P</td>
<td></td>
<td></td>
<td>0.026</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.028</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.026</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.028</td>
<td>Keyway</td>
<td>Absolute</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td>MSMD042P1C</td>
<td>400W</td>
<td>MBBDDT2210 or</td>
<td>2.4Nm</td>
<td>7.1Nm</td>
<td>0.026</td>
<td>Round</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MBBDDT22110 or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MBDDT22110P</td>
<td></td>
<td></td>
<td>0.026</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.028</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.026</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.028</td>
<td>Keyway</td>
<td>Absolute</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td>MSMD082P1A</td>
<td>750W</td>
<td>MCCDT3520 or</td>
<td>3.18Nm</td>
<td>9.5Nm</td>
<td>0.016</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MCCDT3520N or MCCDT3520P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.188</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.259</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.284</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>MSMD082P1C</td>
<td>750W</td>
<td>MCCDT3520 or</td>
<td>4.77Nm</td>
<td>14.3Nm</td>
<td>0.087</td>
<td>Round</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MCCDT3520N or MCCDT3520P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.087</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.097</td>
<td>Round x</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.087</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.097</td>
<td>Keyway</td>
<td>Incremental</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.087</td>
<td>Keyway</td>
<td>Absolute</td>
<td>Option available*</td>
<td></td>
</tr>
<tr>
<td>MSMA020P1G</td>
<td>1kW</td>
<td>MDDDT5540 or</td>
<td>1.69</td>
<td>4.95m</td>
<td>0.026</td>
<td>Round</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDDDT554O4N or MDDDT5540P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.188</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.259</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.284</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>MSMA020P1H</td>
<td>1.5kW</td>
<td>MDDDT5540 or</td>
<td>2.47Nm</td>
<td>14.3Nm</td>
<td>0.036</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDDDT5540P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.087</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.097</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.087</td>
<td>Keyway</td>
<td>Absolute</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>MSMA020P1G</td>
<td>2kW</td>
<td>MEADDT364A, MEADDT364B</td>
<td>3.46</td>
<td>19.1m</td>
<td>0.036</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MEADDT364C, MEADDT364D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.381</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.677</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>MSMA030P1G</td>
<td>3kW</td>
<td>MFDDT390, MFDDT390N,</td>
<td>12.7</td>
<td>37.9m</td>
<td>0.10</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MFDDT390P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.14</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.14</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>MSMA040P1G</td>
<td>4kW</td>
<td>MFDDT3A2 or MFDDT3A2N</td>
<td>14.1</td>
<td>47.8m</td>
<td>0.17</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MFDDT3A2P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.20</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>MSMA050P1G</td>
<td>5kW</td>
<td>MFDDT3A2 or MFDDT3A2P</td>
<td>19.7</td>
<td>57.6m</td>
<td>0.20</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MFDDT3A2P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Minas E

<table>
<thead>
<tr>
<th>Motor product number</th>
<th>Rated power</th>
<th>Driver product number</th>
<th>Torque Moment</th>
<th>Moment of inertia *10^-4kgm²</th>
<th>Shaft</th>
<th>Oil seal</th>
<th>Holding brake</th>
<th>Encoder</th>
<th>With IP67 connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUMA012P1S</td>
<td>100W</td>
<td>MMEDET15050 or</td>
<td>0.32m</td>
<td>0.95m</td>
<td>0.032</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MMEDET15051 or</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MMEDET15052</td>
<td></td>
<td></td>
<td>0.036</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.01</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.13</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.17</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.20</td>
<td>Keyway</td>
<td>Incremental</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

* To order a motor with IP67 connectors, simply add an X to the PN, e.g. MSMD042P1SX, or MSMD042P1TX (brake motor).
### Motor specifications

#### 50W–400W

<table>
<thead>
<tr>
<th>Motor model</th>
<th>MUMA</th>
<th>5AZP1</th>
<th>012P</th>
<th>022P</th>
<th>042P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable driver</td>
<td>Model no.</td>
<td>MKDET1505P</td>
<td>MKDET1310P</td>
<td>MLDET2310P</td>
<td></td>
</tr>
<tr>
<td>Frame symbol</td>
<td>Frame K</td>
<td>Frame K</td>
<td>Frame K</td>
<td>Frame L</td>
<td></td>
</tr>
<tr>
<td>Power supply capacity (kVA)</td>
<td>0.3</td>
<td>0.5</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated output (W)</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Rated torque (N • m)</td>
<td>0.16</td>
<td>0.32</td>
<td>0.64</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Momentary max. peak torque (N • m)</td>
<td>0.48</td>
<td>0.95</td>
<td>1.91</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Rated current (Arms*)</td>
<td>1.0</td>
<td>1.6</td>
<td>2.5</td>
<td>3.8</td>
<td></td>
</tr>
<tr>
<td>Max. current (Ao-p)</td>
<td>4.3</td>
<td>7.5</td>
<td>11.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Regenerative brake frequency (times/min)
| Without option | No limit |
| DV0P2891-1 | No limit |
| Rated rotational speed (r/min) | 3000 |
| Max. rotational speed (r/min) | 5000 |
| Moment of inertia of rotor (x10-4 kg • m²)
| Without brake | 0.021 | 0.032 | 0.10 | 0.17 |
| With brake | 0.026 | 0.036 | 0.13 | 0.20 |
| Recommended moment of inertia ratio of the load and the rotor
| Smaller than 30 times |
| Rotary encoder specifications
| 2500P/r | Incremental |
| Resolution per single turn | 10,000 |
| Protective enclosure rating
| IP65 (except shaft through hole and cable end connector) |
| Environment
| Ambient temperature | 0°C to 40°C, storage: -20°C to + 80°C |
| Ambient humidity | 85%RH or lower (free of condensation) |
| Installation location | Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust |
| Altitude | 1000m or lower |
| Vibration resistance | 49m/s² or less |
| Mass (kg), ( ) represents holding brake type
| 0.4 | 0.6 |
| 0.5 | 0.7 |
| 0.96 | 1.36 |
| 1.5 | 1.9 |
| Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor while it is running.)
| Static friction torque (N • m) | 0.29 | 1.27 |
| Engaging time (ms) | 25 | 50 |
| Releasing time (ms) | 20 (30) | 15 (100) |
| Operating current (DC) (A) | 0.26 | 0.36 |
| Releasing voltage | DC 1V or more |
| Operating voltage | DC 24V ±10% |
| Permissible load
| During assembly
| Radial load P-direction (N) | 147 | 392 |
| Thrust load A-direction (N) | 88 | 147 |
| Thrust load B-direction (N) | 117 | 196 |
| During operation
| Radial load P-direction (N) | 68 | 245 |
| Thrust load A-direction (N) | 58 | 98 |
| Thrust load B-direction (N) | 58 | 98 |

---

For notes 1–4, see page 26

*rms = root mean square

Note: Driver for 50W and 100W has a common power supply of single phase and 3-phase, 200V
### Minas A4/A4N/A4P Series Servo Drives

#### Motor specifications

#### 50W–750W

<table>
<thead>
<tr>
<th>Model no.</th>
<th>MSMD5AZP1</th>
<th>MSMD012P1</th>
<th>MSMD022P1</th>
<th>MSMD042P1</th>
<th>MSMD082P1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable driver</td>
<td>MADDT1205 / MADDT1205N</td>
<td>MADDT1207 (N)</td>
<td>MBDDT2210 (N)</td>
<td>MCDDT3520 (N)</td>
<td></td>
</tr>
<tr>
<td>Frame symbol</td>
<td>Frame A</td>
<td>Frame B</td>
<td>Frame C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply capacity (kVA)</td>
<td>0.3</td>
<td>0.5</td>
<td>0.9</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Rated output (W)</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>750</td>
</tr>
<tr>
<td>Rated torque (N • m)</td>
<td>0.16</td>
<td>0.32</td>
<td>0.64</td>
<td>1.3</td>
<td>2.4</td>
</tr>
<tr>
<td>Momentary max. peak torque (N • m)</td>
<td>0.48</td>
<td>0.95</td>
<td>1.91</td>
<td>3.8</td>
<td>7.1</td>
</tr>
<tr>
<td>Rated current (Arms*)</td>
<td>1.1</td>
<td>1.6</td>
<td>2.6</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Max. current (Ao-p)</td>
<td>4.7</td>
<td>6.9</td>
<td>11.0</td>
<td>17.0</td>
<td></td>
</tr>
<tr>
<td>Regenerative brake frequency (times/min)</td>
<td>Without option</td>
<td>No limit</td>
<td>With external brake resistor</td>
<td>No limit</td>
<td></td>
</tr>
<tr>
<td>Max. rotational speed (r/min)</td>
<td>5000</td>
<td>4500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment of inertia of rotor (x10-4 kg • m²)</td>
<td>Without brake</td>
<td>0.025</td>
<td>0.051</td>
<td>0.14</td>
<td>0.26</td>
</tr>
<tr>
<td>With brake</td>
<td>0.027</td>
<td>0.054</td>
<td>0.16</td>
<td>0.28</td>
<td>0.97</td>
</tr>
<tr>
<td>Recommended moment of inertia ratio of the load and the rotor (^1)</td>
<td>Smaller than 30 times</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smaller than 20 times</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotary encoder specifications</td>
<td>2500P/r</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incremental</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution per single turn</td>
<td>10,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective enclosure rating</td>
<td>IP65 (except shaft through hole and cable end connector)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0°C to 40°C, storage: -20°C to + 80°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>85%RH or lower (free of condensation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Installation location</td>
<td>Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>1000m or lower</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>49m/s² or less</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (kg), () represents holding brake type</td>
<td>0.32 (0.53)</td>
<td>0.47 (0.68)</td>
<td>0.82 (1.3)</td>
<td>1.2 (1.7)</td>
<td>2.3 (3.1)</td>
</tr>
<tr>
<td>Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor while it is running.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static friction torque (N • m)</td>
<td>0.29</td>
<td>1.27</td>
<td>2.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engaging time (ms)</td>
<td>35</td>
<td>50</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Releasing time (ms) (^4)</td>
<td>20 (-)</td>
<td>15 (-)</td>
<td>20 (-)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating current (DC) (A)</td>
<td>0.30</td>
<td>0.36</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Releasing voltage</td>
<td>DC 1V or more</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating voltage</td>
<td>DC 24V ±5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible load</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During assembly</td>
<td>Radial load P-direction (N)</td>
<td>147</td>
<td>392</td>
<td>686</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrust load A-direction (N)</td>
<td>88</td>
<td>147</td>
<td>294</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrust load B-direction (N)</td>
<td>117</td>
<td>196</td>
<td>392</td>
<td></td>
</tr>
<tr>
<td>During operation</td>
<td>Radial load P-direction (N)</td>
<td>68</td>
<td>245</td>
<td>392</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrust load A-direction (N)</td>
<td>58</td>
<td>98</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thrust load B-direction (N)</td>
<td>58</td>
<td>98</td>
<td>147</td>
<td></td>
</tr>
</tbody>
</table>

For notes 1–4, see page 26

\( \text{rms} = \text{root mean square} \)
Minas A4/A4N/A4P Series Servo Drives

Torque characteristics

**MSMD5AZ**

- **With oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

- **Without oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

**MSMD012**

- **With oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

- **Without oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

**MSMD022**

- **With oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

- **Without oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

**MSMD042**

- **With oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

- **Without oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

**MSMD082**

- **With oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

- **Without oil seal**
  - Torque [N·m]
  - Peak run range
  - Continuous torque, ambient temperature
  - Versus rated torque (%)
  - Rotational speed [r/min]
  - Ambient temperature [°C]

*When you lower the torque limit setup (Pr5E and 5F), running range at high speed might be lowered as well.*
Minas A4/A4N/A4P Series Servo Drives

Motor dimensions

- **MSMD 50W–750W (LOW INERTIA)**

<table>
<thead>
<tr>
<th>Motor output</th>
<th>50W</th>
<th>100W</th>
<th>200W</th>
<th>400W</th>
<th>750W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor model</td>
<td>MSMD5AZP1</td>
<td>MSMD012P1</td>
<td>MSMD022P1</td>
<td>MSMD042P1</td>
<td>MSMD082P1</td>
</tr>
<tr>
<td>Rotary encoder specifications</td>
<td>2500P/r incremental</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LL Without brake</td>
<td>72</td>
<td>92</td>
<td>79</td>
<td>98.5</td>
<td>112</td>
</tr>
<tr>
<td>LL With brake</td>
<td>102</td>
<td>122</td>
<td>115.5</td>
<td>135</td>
<td>149</td>
</tr>
<tr>
<td>LR</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>8</td>
<td>11</td>
<td>14</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>45</td>
<td>70</td>
<td>90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LB</td>
<td>30</td>
<td>50</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LC</td>
<td>38</td>
<td>60</td>
<td>80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LD</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LF</td>
<td>6</td>
<td>6.5</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LG</td>
<td>—</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH</td>
<td>32</td>
<td>43</td>
<td>53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN Without brake</td>
<td>26.5</td>
<td>46.5</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LN With brake</td>
<td>3.4</td>
<td>4.5</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keyway</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LW</td>
<td>14</td>
<td>20</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LK</td>
<td>12.5</td>
<td>18</td>
<td>22.5</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>KW</td>
<td>3h9</td>
<td>4h9</td>
<td>5h9</td>
<td>6h9</td>
<td></td>
</tr>
<tr>
<td>KH</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>RH</td>
<td>6.2</td>
<td>8.5</td>
<td>11</td>
<td>15.5</td>
<td></td>
</tr>
<tr>
<td>TP</td>
<td>M3 x 6 (depth)</td>
<td>M4 x 8 (depth)</td>
<td>M5 x 10 (depth)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass (kg) Without brake</td>
<td>0.32</td>
<td>0.47</td>
<td>0.82</td>
<td>1.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Mass (kg) With brake</td>
<td>0.53</td>
<td>0.68</td>
<td>1.3</td>
<td>1.7</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Dimensions are subject to change without notice. Contact us or a dealer for the latest information.

**HIGH QUALITY CONNECTORS**
# Minas A4/A4N/A4P Series Servo Drives

## Motor specifications

### 1kW–5kW

#### Motor specifications

<table>
<thead>
<tr>
<th>AC200V</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Motor model</th>
<th>MSMA102P1</th>
<th>MSMA152P1</th>
<th>MSMA202P1</th>
<th>MSMA302P1</th>
<th>MSMA402P1</th>
<th>MSMA502P1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable driver</td>
<td>Frame D</td>
<td>Frame E</td>
<td>Frame F</td>
<td>Frame D</td>
<td>Frame E</td>
<td>Frame F</td>
</tr>
<tr>
<td>Power supply capacity (kVA)</td>
<td>1.8</td>
<td>2.3</td>
<td>3.3</td>
<td>4.5</td>
<td>6.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Rated output (W)</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
<td>5000</td>
</tr>
<tr>
<td>Rated torque (N • m)</td>
<td>3.18</td>
<td>4.77</td>
<td>6.36</td>
<td>9.54</td>
<td>12.6</td>
<td>15.8</td>
</tr>
<tr>
<td>Momentary max. peak torque (N • m)</td>
<td>9.5</td>
<td>14.3</td>
<td>19.1</td>
<td>26.8</td>
<td>37.9</td>
<td>47.6</td>
</tr>
<tr>
<td>Rated current (Arms*)</td>
<td>7.2</td>
<td>9.4</td>
<td>13.0</td>
<td>18.6</td>
<td>24.7</td>
<td>28.5</td>
</tr>
<tr>
<td>Max. current (Ao-p)</td>
<td>30</td>
<td>40</td>
<td>56</td>
<td>60</td>
<td>105</td>
<td>120</td>
</tr>
</tbody>
</table>

### Regenerative brake frequency (times/min) ¹

- Without option: No limit ²
- With external brake resistor: No limit ²

### Rated rotational speed (r/min)

- Without brake: 3000
- With brake: 5000

### Max. rotational speed (r/min)

- Without brake: 4500
- With brake: 3600

### Moment of inertia of rotor (x10⁻⁴ kg • m²)

- Without brake: 1.69
- With brake: 2.94

### Recommended moment of inertia ratio of the load and the rotor ³

- Smaller than 15 times

### Rotary encoder specifications

- Resolution per single turn: 2500P/r
- Incremental

### Protective enclosure rating

- IP65 (except shaft through hole and cable end connector)

### Environment

- Ambient temperature: 0°C to 40°C (free from freezing), Storage: -20°C to + 80°C
- Ambient humidity: 85%RH or lower (free from condensing)
- Installation location: Indoors (no direct sunlight), free from corrosive gas, inflammable gas, oil mist and dust
- Altitude: 1000m or lower
- Vibration resistance: 49m/s² or less

### Mass (kg), ( ) represents holding brake type

- 4.5 (5.1)
- 5.1 (6.5)
- 6.5 (7.9)
- 9.3 (11.0)
- 12.9 (14.8)
- 17.3 (19.2)

### Brake specifications (This brake will be released when it is energized. Do not use this for braking the motor in motion.)

- Static friction torque (N • m) 4.9
- Engaging time (ms) 50
- Releasing time (ms) ¹ 15 (100)
- Operating current (DC) (A) 0.74
- Releasing voltage DC 2V or more
- Operating voltage DC 24V ±10%

### Permissible load

#### During assembly

- Radial load P-direction (N) 686
- Thrust load A-direction (N) 392
- Thrust load B-direction (N) 490

#### During operation

- Radial load P-direction (N) 392
- Thrust load A-direction (N) 147
- Thrust load B-direction (N) 147

For notes 1–4 see Page 26

*rms= root mean square
B Minas A4/A4N/A4P Series Servo Drives

Motor characteristics 1kW to 5kW

**MSMA102**

- **Torque (N·m)**
  - **Peak run range**
  - **Continuous run range**

- **Rotational speed [r/min]**
  - **Ambient temperature [°C]**

**MSMA152**

- **Torque (N·m)**
  - **Peak run range**
  - **Continuous run range**

- **Rotational speed [r/min]**
  - **Ambient temperature [°C]**

**MSMA202**

- **Torque (N·m)**
  - **Peak run range**
  - **Continuous run range**

- **Rotational speed [r/min]**
  - **Ambient temperature [°C]**

**MSMA302**

- **Torque (N·m)**
  - **Peak run range**
  - **Continuous run range**

- **Rotational speed [r/min]**
  - **Ambient temperature [°C]**

**MSMA402**

- **Torque (N·m)**
  - **Peak run range**
  - **Continuous run range**

- **Rotational speed [r/min]**
  - **Ambient temperature [°C]**

**MSMA502**

- **Torque (N·m)**
  - **Peak run range**
  - **Continuous run range**

- **Rotational speed [r/min]**
  - **Ambient temperature [°C]**

*When you lower the torque limit setup (P#6E and 5F), running range at high speed might be lowered as well.*

Notes:
1. Regenerative brake frequency represents the frequency of the motor’s stops from the rated speed with deceleration without load.
   - If the load is connected, frequency will be defined as 1/(m+1), where m=load moment of inertia/rotor moment of inertia.
   - When the motor speed exceeds the rated speed, regenerative brake frequency is in inverse proportion to the square of (running speed/rated speed).
2. If the effective torque is within the rated torque, there is no limit in generative brake.
3. Consult us or a dealer if the load moment of inertia exceeds the specified value.
4. Specified releasing time is obtained with the use of surge absorber for brake (Z15D151 by Ishizuka Electronic or equivalent).
   - ) Represents the actually measured value using a diode (200V, 1A or equivalent).
Minas A4/A4N/A4P Series Servo Drives

Motor dimensions

MSMA 1kW–5kW (LOW INERTIA)

Dimensions are subject to change without notice. Contact us or a dealer for the latest information.
Minas E Series Servo Drives

Motor dimensions Minas E 100W–400W

**MUMA (LOW INERTIA)**

Dimensions are subject to change without notice; please contact us or a dealer for current information.

<table>
<thead>
<tr>
<th>MUTMA series (ultra low inertia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor output</td>
</tr>
<tr>
<td>Motor model</td>
</tr>
<tr>
<td>Rotary encoder specifications</td>
</tr>
<tr>
<td>LL</td>
</tr>
<tr>
<td>With brake</td>
</tr>
<tr>
<td>LR</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>LA</td>
</tr>
<tr>
<td>LB</td>
</tr>
<tr>
<td>LC</td>
</tr>
<tr>
<td>LE</td>
</tr>
<tr>
<td>LF</td>
</tr>
<tr>
<td>LH</td>
</tr>
<tr>
<td>LZ</td>
</tr>
</tbody>
</table>

**Keyway**

<table>
<thead>
<tr>
<th>Keyway</th>
<th>LW</th>
<th>14</th>
<th>20</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LK</td>
<td>12.5</td>
<td>18</td>
<td>22.5</td>
</tr>
<tr>
<td></td>
<td>KW</td>
<td>3h9</td>
<td>4h9</td>
<td>5h9</td>
</tr>
<tr>
<td></td>
<td>KH</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>RH</td>
<td>6.2</td>
<td>8.5</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>TP</td>
<td>M3X6 (depth)</td>
<td>M4X8 (depth)</td>
<td>M5X10 (depth)</td>
</tr>
<tr>
<td>Mass (kg)</td>
<td>Without brake</td>
<td>0.40</td>
<td>0.50</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>With brake</td>
<td>0.60</td>
<td>0.70</td>
<td>1.36</td>
</tr>
</tbody>
</table>

*Cautions: Reduce the moment of inertia if high speed response operation is required.

Read the Instruction Manual carefully and understand all precautions and remarks before using the products.*
C Software

Setup support software

**SETUP SUPPORT SOFTWARE PANATERM® FOR MINAS SERIES AC SERVO MOTOR & DRIVER**

PANATERM® assists users in setting parameters, monitoring control conditions, setup support and analysing mechanical operation data on the PC screen when installed in a commercially available personal computer and connected to the Minas series through the RS232C serial interface.

**BASIC FUNCTION**

Parameter setup
- After a parameter has been defined on the screen, it will immediately be sent to the driver.
- Once you register the parameters you frequently use, they can easily be set up on the screen.
- Enter position data for Minas ACP drivers.

**MONITORING CONTROL CONDITIONS**

Monitor
- Control conditions: control mode, velocity, torque, error and warning.
- Driver input signal.
- Load conditions: total count of command/feedback pulses, load ratio, regenerative resistor load ratio.

Alarm
- Displays the numbers and contents of the current alarm and a history of the last 14 error events.
- Clears the numbers and contents of the current alarm and a history of the last 14 error events.

**SETUP**

Auto tuning
- Gain adjustment and inertia ratio measurement.

Graphic waveform display
- The graphic display shows command velocity, actual velocity, torque, and error waveforms.

Absolute encoder setup
- Clears absolute encoder at the origin.
- Displays single revolution/multirevolution data.
- Displays absolute encoder status.

**ANALYSIS OF MECHANICAL OPERATION DATA**

Frequency analysis
- Measures frequency characteristics of the machine; displays Bode diagram.

Product number: DVOP4460
Software

Motion Control Library for FPWIN Pro

Panasonic’s Motion Control Library is designed to save programming time with a sophisticated yet user-friendly software solution. Our library includes function blocks programmed according to PLCopen's specifications. Developed to simplify programming of FP2 and FPΣ (Sigma) positioning units.

PLCopen, an independent international organization, aims to harmonize access across platforms during development, installation and maintenance based on the IEC61131-3 environment.

See also: www.plcopen.org/MC_Certification/Panasonic/shortform_statement_Panasonic.htm

<table>
<thead>
<tr>
<th>Administrative</th>
<th>Multiple Axis</th>
<th>Single Axis</th>
<th>Multiple Axis</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC_Power</td>
<td>MC_CamTableSelect</td>
<td>MC_MoveAbsolute</td>
<td>MC_CamIn</td>
</tr>
<tr>
<td>MC_ReadStatus</td>
<td>MC_MoveRelative</td>
<td>MC_MoveRelative</td>
<td>MC_CamOut</td>
</tr>
<tr>
<td>MC_ReadAxisError</td>
<td>MC_MoveAdditive*</td>
<td>MC_MoveAbsolute</td>
<td>MC_GearIn</td>
</tr>
<tr>
<td>MC_ReadParameter</td>
<td>MC_MoveSuperimposed</td>
<td>MC_MoveVelocity</td>
<td>MC_GearOut</td>
</tr>
<tr>
<td>MC_ReadBoolParameter</td>
<td>MC_MoveVelocity</td>
<td>MC_WriteParameter</td>
<td>MC_VelocityProfile</td>
</tr>
<tr>
<td>MC_WriteParameter</td>
<td>MC_Stop</td>
<td>MC_ReadActualPosition</td>
<td>MC_PositionProfile</td>
</tr>
<tr>
<td>MC_Reset</td>
<td>MC_Reset</td>
<td>MC_ReadParameter</td>
<td>MC_AccelerationProfile</td>
</tr>
</tbody>
</table>

*If executed, the current motion is briefly interrupted due to hardware reasons.

PROGRAM, LADDER DIAGRAM BODY

EXAMPLE FOR CONSECUTIVE MOVEMENT IN A DRILLING APPLICATION

ADVANTAGES OF PLC PROGRAMS USING THE MOTION CONTROL LIBRARY COMPLIANT WITH THE PLCOPEN STANDARD:

- Simple – Easy programming and installation, even for complex applications
- Efficient – In the number of function blocks and in design and understanding
- Consistent – Compliant with the IEC 61131-3 PLC programming standard
- Universal – Hardware-independent
- Flexible – Add hardware or expand range of applications at any time
- Complete – Comprehensive product line solves typical positioning applications easily

Motion Control Library

Product number NCL-MC-LIB D

Note: FP2 positioning unit multifunction type version 5.4 or newer usable with FPΣ (Sigma) positioning unit

04/2008
C Software
Configurator PM software tool for RTEX

The Configurator PM provides powerful yet simple full support ranging from configuration settings and startup to operation monitoring. This reduces the time and man hours required for system setup.

Axis settings
Check the axis to be used. Select axis no. used.

Parameter settings
The details of the settings can be displayed in a table. Details on how to create settings for each category are explained in the box below.

Data table creation
Simple input as in Excel.

Each axis (or each interpolation axis group) has a separate sheet, and data tables for each axis are displayed in an easy-to-understand manner.

Data tables can be exported as text files in CSV format. This is effective when making printouts for document management.

You can copy parts of a CSV file to a data table using Cut & Paste.

TOOL OPERATIONS
• Each axis can be operated by tool operation independently from the operation modes (PROG and RUN) of the FP control unit (or the FP2CPU unit).
• JOG operation and teaching can be carried out easily to index positioning points. Test operation is possible without having to create a rudder program.

DATA MONITOR
• Data table no. during operation
• Auxiliary output
• Current position, speed and vector
• Error code, warning code (Errors and warnings can also be cleared)

STATUS MONITOR
• Connection status of each axis
• Model code of each motor amp and motor connected
• Servo lock status
• Origin proximity input, limit input
**Software**

**Encoder cables**

Encoder cables for Minas A4 and E servo drives, standard connectors, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range Minas A4</th>
<th>Power range Minas E</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFECA0010EAM</td>
<td>50–750W</td>
<td>50–400W</td>
<td>1m</td>
</tr>
<tr>
<td>MFECA0020EAM</td>
<td>50–750W</td>
<td>50–400W</td>
<td>2m</td>
</tr>
<tr>
<td>MFECA0030EAM</td>
<td>50–750W</td>
<td>50–400W</td>
<td>3m</td>
</tr>
<tr>
<td>MFECA0050EAM</td>
<td>50–750W</td>
<td>50–400W</td>
<td>5m</td>
</tr>
<tr>
<td>MFECA0100EAM</td>
<td>50–750W</td>
<td>50–400W</td>
<td>10m</td>
</tr>
</tbody>
</table>

Encoder cable for Minas A4 servo drives, high quality connectors, IP67, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range Minas A4</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFECA020EAB</td>
<td>50–750W</td>
<td>2m</td>
</tr>
<tr>
<td>MFECA030EAB</td>
<td>50–750W</td>
<td>3m</td>
</tr>
<tr>
<td>MFECA040EAB</td>
<td>50–750W</td>
<td>4m</td>
</tr>
<tr>
<td>MFECA050EAB</td>
<td>50–750W</td>
<td>5m</td>
</tr>
<tr>
<td>MFECA070EAB</td>
<td>50–750W</td>
<td>7m</td>
</tr>
<tr>
<td>MFECA100EAB</td>
<td>50–750W</td>
<td>10m</td>
</tr>
<tr>
<td>MFECA150EAB</td>
<td>50–750W</td>
<td>15m</td>
</tr>
<tr>
<td>MFECA200EAB</td>
<td>50–750W</td>
<td>20m</td>
</tr>
</tbody>
</table>

Encoder cable for Minas A4 with 17-bit absolute encoder, standard connectors, without battery holder

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range Minas A4</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFECA030EAD</td>
<td>50–750W</td>
<td>3m</td>
</tr>
<tr>
<td>MFECA050EAD</td>
<td>50–750W</td>
<td>5m</td>
</tr>
<tr>
<td>MFECA100EAD</td>
<td>50–750W</td>
<td>10m</td>
</tr>
</tbody>
</table>

Encoder cable for Minas A4 with 17-bit absolute encoder, standard connectors, with battery holder

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range Minas A4</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFECA030EAE</td>
<td>50–750W</td>
<td>3m</td>
</tr>
<tr>
<td>MFECA050EAE</td>
<td>50–750W</td>
<td>5m</td>
</tr>
<tr>
<td>MFECA100EAE</td>
<td>50–750W</td>
<td>10m</td>
</tr>
</tbody>
</table>

Encoder cable for Minas A4 with incremental encoder, IP67 metal connectors, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range Minas A4</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFECA030ESD</td>
<td>1–5kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFECA050ESD</td>
<td>1–5kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFECA100ESD</td>
<td>1–5kW</td>
<td>10m</td>
</tr>
</tbody>
</table>
## Accessories

### Motor and brake cables

Motor cable for Minas A4 servo drives, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0010EED</td>
<td>50 – 750W</td>
<td>1m</td>
</tr>
<tr>
<td>MFMCA0020EED</td>
<td>50 – 750W</td>
<td>2m</td>
</tr>
<tr>
<td>MFMCA0030EED</td>
<td>50 – 750W</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0050EED</td>
<td>50 – 750W</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0100EED</td>
<td>50 – 750W</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas E servo drives, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0050AEB</td>
<td>50 – 400W</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0100AEB</td>
<td>50 – 400W</td>
<td>10m</td>
</tr>
<tr>
<td>MFMCA0200AE</td>
<td>50 – 400W</td>
<td>20m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, high quality connectors, IP67, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0020EBD</td>
<td>50 – 750W</td>
<td>2m</td>
</tr>
<tr>
<td>MFMCA0030EBD</td>
<td>50 – 750W</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0050EBD</td>
<td>50 – 750W</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0100EBD</td>
<td>50 – 750W</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4 motors with brake, high quality connectors, IP67, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0020EBDB</td>
<td>50 – 750W</td>
<td>2m</td>
</tr>
<tr>
<td>MFMCA0030EBDB</td>
<td>50 – 750W</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0050EBDB</td>
<td>50 – 750W</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0070EBDB</td>
<td>50 – 750W</td>
<td>7m</td>
</tr>
<tr>
<td>MFMCA0100EBDB</td>
<td>50 – 750W</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, without brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCD0032ECD</td>
<td>1 – 1.5kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCD0052ECD</td>
<td>1 – 1.5kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCD0102ECD</td>
<td>1 – 1.5kW</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, without brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCD0032ECT</td>
<td>2kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCD0052ECT</td>
<td>2kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCD0102ECT</td>
<td>2kW</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, without brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0033ECT</td>
<td>3-5kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0053ECT</td>
<td>3-5kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0103ECT</td>
<td>3-5kW</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, with brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0032FCD</td>
<td>1-1.5kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0052FCD</td>
<td>1-1.5kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0102FCD</td>
<td>1-1.5kW</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, with brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0032FCT</td>
<td>2kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0052FCT</td>
<td>2kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0102FCT</td>
<td>2kW</td>
<td>10m</td>
</tr>
</tbody>
</table>

Motor cable for Minas A4, with brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCA0033FCT</td>
<td>3-5kW</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCA0053FCT</td>
<td>3-5kW</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCA0103FCT</td>
<td>3-5kW</td>
<td>10m</td>
</tr>
</tbody>
</table>

Brake junction cable for Minas A 4 and E motors with brake, usable for drag chain

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range Minas A</th>
<th>Power range Minas E</th>
<th>Length L</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFMCB0030GET</td>
<td>50 – 750W</td>
<td>50 – 400W</td>
<td>3m</td>
</tr>
<tr>
<td>MFMCB0050GET</td>
<td>50 – 750W</td>
<td>50 – 400W</td>
<td>5m</td>
</tr>
<tr>
<td>MFMCB0100GET</td>
<td>50 – 750W</td>
<td>50 – 400W</td>
<td>10m</td>
</tr>
</tbody>
</table>
Accessories

Direct connection cables to FPΣ (Sigma) and FP2

For pulse control, not for Minas A4N / RTEX

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
<th>Number of axes</th>
<th>Power range</th>
<th>Length</th>
<th>Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVOP0980W-1</td>
<td>FPΣ (Sigma) NPN to CN ΣF</td>
<td>1</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>50 pin Molex to 2x10 pin MIL</td>
</tr>
<tr>
<td>DVOP0981W-1</td>
<td>FPΣ (Sigma) NPN to CN ΣF</td>
<td>2</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>2x50 pin Molex to 3x10 pin MIL</td>
</tr>
<tr>
<td>DVOP0982W-1</td>
<td>FPΣ (Sigma) PNP to CN ΣF</td>
<td>1</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>50 pin Molex to 2x10 pin MIL</td>
</tr>
<tr>
<td>DVOP0983W-1</td>
<td>FPΣ (Sigma) PNP to CN ΣF</td>
<td>2</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>2x50 pin Molex to 3x10 pin MIL</td>
</tr>
<tr>
<td>DVOP0984W-1</td>
<td>FPΣ (Sigma) NPN to CN ΣF, with TLC-signal</td>
<td>2</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>50 pin Molex to 2x10 pin MIL, with TLC-signal</td>
</tr>
<tr>
<td>DVOP0985W-1</td>
<td>FPΣ (Sigma) / FPΣ Positioning units transistor type</td>
<td>2</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>50 pin Molex to 1x40 pin MIL</td>
</tr>
<tr>
<td>DVOP0986W-1</td>
<td>FPΣ (Sigma) / FPΣ Positioning units line driver type</td>
<td>2</td>
<td>0.05–5kW</td>
<td>1m</td>
<td>50 pin Molex to 1x40 pin MIL</td>
</tr>
</tbody>
</table>

For FPΣ (Sigma) CPU PNP or NPN

In/out connectors for the PLC FPΣ (Sigma). Unused inputs/outputs can be used for other purposes.

DIRECT CONNECTION TO FPΣ (SIGMA) AND FP2 POSITIONING UNITS
(Not for Minas A4N/RTEX transistor or line driver types)
## Accessories

Other cables, connectors, brake resistors, filters

### COMMUNICATION CABLES

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVOP1960</td>
<td>RS232C communication cable to PC9 pin Sub-D</td>
</tr>
<tr>
<td>DVOP1972</td>
<td>RS485 communication cable Mini-DIN 8Pin-MD connector, 1m</td>
</tr>
</tbody>
</table>

### CONNECTOR UNITS

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVOP3670</td>
<td>Connector kit for motor and encoder</td>
</tr>
<tr>
<td>DVOP4310</td>
<td>Connector kit for Minas A4 servo drives 1 to 2kW, without brake</td>
</tr>
<tr>
<td>DVOP4320</td>
<td>Connector kit for Minas A4 servo drives 3 to 5kW, without brake</td>
</tr>
<tr>
<td>DVOP4330</td>
<td>Connector kit for Minas A4 servo drives 1 to 2kW, with brake</td>
</tr>
<tr>
<td>DVOP4340</td>
<td>Connector kit for Minas A4 servo drives 3 to 5kW, with brake</td>
</tr>
<tr>
<td>DVOP4350</td>
<td>Connector kit for Minas A4 servo drives 1 to 2kW, with brake</td>
</tr>
<tr>
<td>DVOP4360</td>
<td>Connector kit for Minas A4 servo drives 3 to 5kW, with brake</td>
</tr>
<tr>
<td>DVOP4370</td>
<td>Connector kit for Minas A4 servo drives 1 to 2kW, with brake</td>
</tr>
<tr>
<td>DVOP4380</td>
<td>Connector kit for Minas A4 servo drives 3 to 5kW, with brake</td>
</tr>
</tbody>
</table>

### FILTERS

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN2060-6-06</td>
<td>EMC filter for control circle, Minas A4 servo drives 1 to 2kW</td>
</tr>
<tr>
<td>FN2090-10-06</td>
<td>Multi-stage EMI filter, 1-phase, for Minas A4/N servo driver MDDT5540, 1 to 1.5kW</td>
</tr>
<tr>
<td>FN2410-32-33</td>
<td>Multi-stage EMI filter, 1-phase, for Minas A4/N servo driver 2 to 5kW</td>
</tr>
<tr>
<td>FS21238-6-07</td>
<td>FS21238-6-07 EMI filter for Minas A4 servo drives 50 to 750W</td>
</tr>
<tr>
<td>DVOP4160</td>
<td>EMC filter for Minas E</td>
</tr>
</tbody>
</table>

### INTERFACE CABLES

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVOP0800</td>
<td>Interface cable for Minas E driver 26 pins</td>
</tr>
<tr>
<td>DVOP4360</td>
<td>Interface Connector cable for Minas A4 drivers, length 2m</td>
</tr>
<tr>
<td>DVOP4510</td>
<td>I/O Interface cable for Minas A4N and A4P servo drivers, length 2m</td>
</tr>
</tbody>
</table>

### BRAKE RESISTORS

<table>
<thead>
<tr>
<th>Product number</th>
<th>Power range</th>
<th>Additional information / description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BWD250100</td>
<td>30–750W</td>
<td>100 Ohm/100W</td>
</tr>
<tr>
<td>BWD600027</td>
<td>1–5kW</td>
<td>27 Ohm/240W</td>
</tr>
</tbody>
</table>

### OTHER ACCESSORIES

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVOP2990</td>
<td>Lithium battery for absolute encoder, Minas A4, 3.6V 2000mAh</td>
</tr>
<tr>
<td>DVOP37300</td>
<td>Cable set (3m) interface, encoder and motor cable and connector kit of drive power</td>
</tr>
<tr>
<td>DVOP3811</td>
<td>DIN rail mounting kit for Minas E drivers</td>
</tr>
<tr>
<td>DVOP39200</td>
<td>Cable set (5m) interface, encoder and motor cable and connector kit of drive power</td>
</tr>
<tr>
<td>DVOP4420</td>
<td>Operating Console for Minas A4 and E servo drivers</td>
</tr>
<tr>
<td>DVOP4460</td>
<td>PANATERM Software for Minas servo drives, CD-ROM</td>
</tr>
</tbody>
</table>

### MANUALS

<table>
<thead>
<tr>
<th>Product number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DVOP4210</td>
<td>Minas A4-series manual</td>
</tr>
<tr>
<td>DVOP4490</td>
<td>Minas A4P-series manual</td>
</tr>
<tr>
<td>DVOP3700</td>
<td>Minas E-series manual</td>
</tr>
</tbody>
</table>

Minas A4N manual is only available as PDF file from panasonic-electric-works.com