AC Linear Motor Servo Driver
- Auto tuning
- Visualized control loop
- User-friendly interface
- Highly efficient tuning algorithm
- Short tuning time
- Can tune for stable or fast system response

- Fast control loop up to 5k Hz
- Can test 3 groups of gain set
- Feedforward signal path
- Easy to fine tune
- Input response with profile position

- Auto phasing
- Hall sensor or force commutation
- Step by step phasing progress prompt

- 3 groups of position and velocity gains can be switched
- Gain-switch rule: Demand, Feedback, Error, Target, and Digital input
- Easy to fine tune for different application

- Fast control loop up to 10k Hz
- Can test 3 groups of gain set
- Easy to fine tune
- Feedforward signal path
- Response Bode plot
- Bandwidth label
- Input response test with step/sine/triangle
- 3 filters on force output

Performance without Gain-switch
Yellow: velocity profile
Red: Position Error [± 35 count]
### Scripting

Script could program motor motion with user-friendly interface.

### Ordering Information

<table>
<thead>
<tr>
<th>TC1-</th>
<th>B</th>
<th>9</th>
<th>P</th>
<th>/230-</th>
<th>H</th>
<th>R</th>
<th>E</th>
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<tbody>
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</tbody>
</table>

- **TC1-**
- **B**
- **9**
- **P**
- **/230-**
- **H**
- **R**
- **E**

- **CANopen**
- **EtherCAT**
- **No Resistor**
- **Brake Resistor**
- **No heatsink**
- **Passive heatsink**
- **Heatsink with fan**

**AC supply:** 230VAC

- Continuous current (Amps):
  - B, 20 (A-type only)
  - 3, 9 (B-type only)

**Servo Driver**

- **A-type**
- **B-type**

### Gain switch Test

- Distance: 0.6m
- Velocity: 3m/s
- Acceleration: 3g
- Deceleration: 3g

### Scope

- Scope provides a real time monitor of driver information.
- User could inspect motion detail without an oscilloscope.

### Homing

- Setup interface provides 35 kinds of homing methods.
- Also, the vivid animations explain how a homing method is performed.

**Performance with Gain-switch**

Yellow: velocity profile
Red: Position Error [±11 count]
## Specification

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Input Power</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage and Phase</td>
<td>10-120 VAC</td>
<td>30-250 VAC</td>
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<tr>
<td>DC Bus/Peak Voltage</td>
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<tr>
<td>(VDC)</td>
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<tr>
<td>Frequency (Hz)</td>
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<tr>
<td>Power (W)</td>
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<tr>
<td>Power Rating (W)</td>
<td>1125</td>
<td>3375</td>
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<tr>
<td><strong>Control/Log/Power</strong></td>
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<tr>
<td>Voltage Range (VDC)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(VDC)</td>
<td>24 VDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current (A)</td>
<td>1.3</td>
<td>4.4</td>
<td>6.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak power output (VA)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(VA)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Peak current output (A)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(A)</td>
<td>6</td>
<td>20</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cont. current output (A)</td>
<td>3</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Regenerative resistor</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Resistance (Ohm)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(Ohm)</td>
<td>60 (option)</td>
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<tr>
<td>Continuous dissipation (Watt)</td>
<td>100 (option)</td>
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<td></td>
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<tr>
<td>Pulse braking energy</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(Watt)</td>
<td>5000 (option)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Feedback position error mapping**
- Yes

**Controller type**
- Digital
- Work Frequency: 20 kHz
- Count Range: 2^20 counts

**Encoder Input**
- Analog
  - Amplitude: 2 Vp-p
  - Work Frequency: 100 kHz, 10416 Cnt/Period Interpolation
- Absolute Type: BISS-C, Tamagawa, In, Out 2.2, SIN

**Feedback type**
- Digital
  - Type: A/B Incremental (12T22 signaling)

**Current control**
- Loop Frequency: 20 kHz
- Command input: Serial, Fieldbus, ±10 V Analog, internal software

**Velocity control**
- Loop Frequency: 10 kHz
- Command input: Serial, Fieldbus, ±10 V Analog, internal software
- Output filter: 3 (Type, parameter, Note(s))
- Counter range: -1, 147, 483, 6483 to +1, 147, 483, 647 counts/second

**Position control**
- Loop Frequency: 5 kHz
- Command input: Pulse command (A/B, Step, DC, CW/CW), Serial, Fieldbus, ±10 V Analog, internal software
- Trajectory generator: Trapezoidal with S curve filter
- Counter range: -1, 147, 483, 6483 to +1, 147, 483, 647 counts
- Analog Input
  - Input type: x1 (±10 V differential), x1 (±10 V Single-end)
  - ADC resolution: 12 bit

**Pulse command frequency**
- RS422: Max. 10 kHz
- 5V single-end: Max. 1 kHz
- 24V single-end: Max. 50 kHz

**Total Digital Inputs**
- x12 (5-24 V)

**Total Digital Outputs(open-collector)**
- x1 (3-24V, 400 mA), x1 (24 V, 200 mA)

**Auto-tuner**
- Current/Velocity/Position loop gain, motor phasing setup, encoder calibrations

**Gain switch function**
- Yes

**Control panel**
- x1 (8 digit character LCD)

**Software protection**
- Dynamic brake, motor over-current, over-under position, over-velocity, Vioiltage physical position limit switch, writing hall signal, external fault trigger

**Hardware protection**
- Drive over-temperature (analog), 5V output short circuit, motor over-temperature (analog)

**Dimensions(LxWxH)(mm)**
- 200 x 134 x 53
- 200 x 164 x 53 (excluding optional heatsink)

**Weight (kg)**
- 1.2
- 1.8 (excluding optional heatsink)

**Operating temperature**
- 10-40°C

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**Notes:**
1. Only applicable for the TC1-B series.
2. Not applicable for the TC1-B series.
3. Additional features required to enable continuous operation at rated output.
## Product Overview

- **TC1**
  - Auto Phasing
  - Auto Tuning
  - Auto Gain Switch
  - Current Filter
  - Oscilloscope
  - S-curve Profile
  - Anti-Cogging
  - Scripting

## System status LEDs
- 5 Digit 7-Segment display

## Communication Interface
- CANopen

## DC motor Stage
- Virtual/physical position limit switch, missing hall signal, external fault trigger

## Dimension
- x2 (±10 V differential)
- x2 (5 digit 7-segment LED)
- x4 push buttons

## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>TC 1-8/230</th>
<th>TC 1-20/230</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Power</td>
<td>Voltage and Phase</td>
<td>50-230 VAC</td>
</tr>
<tr>
<td></td>
<td>DC Bus/Peak Voltage (V)</td>
<td>390</td>
</tr>
<tr>
<td></td>
<td>Frequency (Hz)</td>
<td>50 to 60</td>
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<tr>
<td></td>
<td>Power Rating (W)</td>
<td>3000</td>
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<tr>
<td></td>
<td>Voltage Range (VDC)</td>
<td>24</td>
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<tr>
<td></td>
<td>Current (A)</td>
<td>&gt;0.5</td>
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<tr>
<td></td>
<td>Peak power output (kW)</td>
<td>4.4</td>
</tr>
<tr>
<td></td>
<td>Peak current output (A)</td>
<td>&gt; 0.5</td>
</tr>
<tr>
<td></td>
<td>Cont. current output (A)</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Regenerative resistor</td>
<td>Resistance (Ohms)</td>
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<tr>
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<td>40</td>
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<td>25</td>
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<td>Continuous dissipation (Watt)</td>
<td>100</td>
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<td>200</td>
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<td>Pulse energy capacity (Joule)</td>
<td>2950</td>
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<td>10000</td>
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<tr>
<td></td>
<td>Regenerative resistor switch cont. current (A)</td>
<td>20</td>
</tr>
</tbody>
</table>

## Encoder Input
- A/B/Z (RS422)
- Sk/Cos (3V, 5V)
- SSI (RS422)
- RS232

## Feedback position encoding
- Yes

## Current control
- Loop Frequency
- PWM modulation
- Command input
- Serial, Fieldbus, ±10 V Analog, internal software

## Velocity control
- Loop Frequency
- Command input
- Serial, Fieldbus, ±10 V Analog, internal software
- Output filter
- x1 (Lure-pass or Notch)
- Counter range
- ~2, 147, 483, 648 to 2, 147, 483, 647 counts/second

## Position control
- Loop Frequency
- Command input
- Pulse command (A/B, Step/Dc, CW/CCW), Serial, Fieldbus, ±10 V Analog, internal software
- Trajectory generator with S-curve filter
- Counter range
- ~2, 147, 483, 648 to 2, 147, 483, 647 counts

## Analog Input
- Input type
- ±10 V differential
- ADC resolution
- 12 bit

## Pulse command frequency
- RS422
- Max. 10 MHz
- 5V single-end
- Max. 1 MHz
- 24V single-end
- -

## Total Digital Inputs
- x2 (5-3.3-5 V) differential)
- x2 (24 V, 500 mA)
- x2 (24 V, 20 mA)

## High-speed Position compare output
- -

## Total Analog Inputs
- x2 (±10 V differential)

## Autotuner
- Current/Velocity/Position loop gain, motor phasing setup, sincos encoder calibration

## Gain switch function
- Yes

## Control panel
- x1 (5 digit 7-segment LED)
- x4 push buttons

## Software protection
- Dynamic break, motor over-current, over/under-position, over-velocity
- Virtual/physical position limit switch, missing hall signal, external fault trigger

## Hardware protection
- Drive over-temperature (on/off), motor over-temperature (on/off)

## Dimensions (LxHxW)(mm)
- 320 x 195 x 94

## Weight (Kg)
- 1.6
- 3.7

## Operating temperature
- 10~40°C