Driver Specification for Linear Motor Drive Tables
### Table 1 Specifications for NCR

<table>
<thead>
<tr>
<th>Item</th>
<th>Identification Number</th>
<th>NCR-DCE503B-021D-S135</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electric specification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input/Output signal</td>
<td>8 input points and 4 output points (DC12～24V; photo coupler insulated)</td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>USB 2.0 (full speed); 1ch, RS-422A serial communication: 1ch</td>
<td></td>
</tr>
<tr>
<td><strong>Main function</strong></td>
<td>Speed control / pulse train operation, torque limit, self-diagnosis and forward / backward switching</td>
<td></td>
</tr>
<tr>
<td><strong>Functional specification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse train operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching of directional pulse / directional + shift pulse / Pulse with 90-degree phase difference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase sequence switching, electronic gear (pulse train command ratio), and command averaging function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed control operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analog command voltage gain switching, 7 internal speed command points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceleration/deceleration time: 0～9.999 sec</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque limitation</td>
<td>2 parameter setting points (forward / backward separately)</td>
<td></td>
</tr>
<tr>
<td>Servo performance improvement function</td>
<td>Speed gain switching: 3 points (normal, low speed and GSEL switching), torque command filter Field forward (speed, inertia and viscous friction) and 5 notch filter points</td>
<td></td>
</tr>
<tr>
<td>Control (input signal 8 points)</td>
<td>Startup, servo on, torque limit, speed gain selection, reset, mode selection, command selection, command pulse input prohibition, command direction inversion, emergency stop, internal pulse start, orig Li, orig marker forward direction overtravel, reverse direction overtravel, current position data output request forward inching, backward inching, alarm code output request and command data reflection prohibition</td>
<td></td>
</tr>
<tr>
<td>Control output signal (4 points)</td>
<td>Ready, alarm, deviation range A and B, brake release, speed zero, marker output, in emergency stop, return to origin complete</td>
<td></td>
</tr>
<tr>
<td>Monitoring function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confirmation of status by 4-point status indicator LEDs (PWR (green), RDY (green), ALM, red)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The following monitor can be used in the optional dedicated editing software</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various status indications, alarm indication, status indication by oscilloscope function, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protective function</td>
<td>Encoder failure, magnetic pole detection failure, overspeed, overload, under voltage, overvoltage, overcurrent failure, deviation error, DSP error and overheat protection</td>
<td></td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>90%RH or lower (keep condensation free), Storage: 85%RH or lower (keep condensation free)</td>
<td></td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>0.5 g (10~50 Hz) However, keep resonance free</td>
<td></td>
</tr>
<tr>
<td>Shock resistance</td>
<td>9 g</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>0.41 kg</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2 Specifications for NCR

<table>
<thead>
<tr>
<th>Item</th>
<th>Identification Number</th>
<th>NCR-DDA4A1A-001D-T08</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic specification</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum rated current</td>
<td>1.1 Arms</td>
<td></td>
</tr>
<tr>
<td>Power plant capacity</td>
<td>3.3 Arms</td>
<td></td>
</tr>
<tr>
<td>Power plant capacity</td>
<td>0.15kVA</td>
<td></td>
</tr>
<tr>
<td>Input power (main circuit and control circuit)</td>
<td>Single-phase AC100<del>115V (allowable power fluctuation AC900</del>121V 50/60Hz ±5%)</td>
<td></td>
</tr>
<tr>
<td><strong>Contact input signal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servo on, reset, command pulse input prohibition, mode selection 1, mode selection 2, startup, speed selection, torque selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Following signals are used by assigning remote control or input signals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergency stop, proportional control, address specification, speed override, deviation clear, torque limit, forward direction overtravel, reverse direction overtravel, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contact output signal</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Servo ready, alarm, warning, positioning complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Following signals are used by assigning remote control or output signals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torque limit, speed zero, in speed operation mode, in torque operation mode, in easy positioning mode, in pulse train operation mode, encoder marker, etc.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal function</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encoder feedback pulse input</td>
<td>Pulse train output with 90-degree phase difference (frequency dividing output allowed. The maximum output frequency of 2 signals of A / B phase is 25MHz after 4-time multiplication)</td>
<td></td>
</tr>
<tr>
<td><strong>Communication function</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various data can be transmitted / received via serial communication (RS-422A); Dedicated editing software can be connected via USB 2.0 (full speed)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Specification of driver NCR for NT38V

- Low-voltage (DC24V) specification and compact design of 115 x 100 x 33.8 mm. It contributes to miniaturization of devices and compactness.
- Setting time is reduced by selecting two types of parameters, inertia and viscous friction, and performing feed forward torque control.
- The PC editing software has 4ch real-time oscilloscope function, remote operation function and resonance frequency measurement function, etc. as well as parameter edit functions, allowing for easy machine diagnosis and startup / adjustment of the linear motor.

### Specification of NCR, a driver for NT...H

- The driver and positioning unit are integrated, and the system is miniaturized with its wiring streamlined.
- Higher reliability and usability such as driftless, elimination of adjustment fluctuation, improvement of man-machine interface have been pursued with digital control.
- Easy positioning operation and pulse train operation are supported by mode selection, for applications to wide range of usages.
- Torque control and speed control are available.
- Control suitable for machine rigidity is made possible by full-scale software servo functions such as linear / S-curve acceleration and deceleration, feed forward, torque command filter, gain switching at shutdown and low speed, disturbance compensation control, etc.
- Peripheral devices such as touch panel, higher-level controller, etc. can be connected via serial communication.
- Dedicated editing software can be connected via USB 2.0 (full speed).
Specifications for ADVA

Table 3 Specifications for ADVA

<table>
<thead>
<tr>
<th>Item</th>
<th>Basic specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input power</strong></td>
<td></td>
</tr>
<tr>
<td>Rated current/momentary current</td>
<td>ADVA-R5ML</td>
</tr>
<tr>
<td>Single-phase 3-phase</td>
<td>1.2Arms / 3.6Arms</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>100 to 230 V</td>
</tr>
<tr>
<td>Power input capacity</td>
<td>0.3kVA</td>
</tr>
</tbody>
</table>

**Control mode**

- Analog input: 0 to ±10 V (Maximum linear force/gain configurable) or EtherCAT
- Analog input: 0 to ±10 V (Maximum linear force/gain configurable) or EtherCAT

**Position command**

- Line driver signal: 20 Mbps (non-isolated input) or EtherCAT
- Line driver signal: 20 Mbps (non-isolated input) or EtherCAT

**Contact input/output**

- DC12 / 24 V (isolated input / after 4-time multiplication) or EtherCAT
- DC12 / 24 V (isolated input / after 4-time multiplication) or EtherCAT

**Built-in operator**

- Pulse train command specification: 2-digit numeric display, key pad push button, DIP switch, Modbus communication setting
- Pulse train command specification: 2-digit numeric display, key pad push button, DIP switch, Modbus communication setting

**Dynamic brake**

- Built-in (motion condition configurable)
- Built-in (motion condition configurable)

**Protective function**

- Overcurrent, overload, braking resistor overload, main circuit overvoltage, overcurrent error, main circuit under voltage, CT failure, CPU error, external trip (motor temperature error), servo ON ground detection, control circuit under voltage, servo amplifier temperature error, drive prohibition error, power module failure, safety circuit failure, emergency shutdown, encoder failure, mismatch error, power supply failure, request. Magnetic pole position estimation error, magnetic pole position estimation not executed, position deviation error, speed deviation error, overspeed error, momentary power failure, main circuit power supply failure, drive range error, network communication error, DC synchronization error (under voltage display)
- Overcurrent, overload, braking resistor overload, main circuit overvoltage, overcurrent error, external trip (motor temperature error), servo ON ground detection, control circuit under voltage, servo amplifier temperature error, drive prohibition error, power module failure, safety circuit failure, emergency shutdown, encoder failure, mismatch error, power supply failure, request. Magnetic pole position estimation error, magnetic pole position estimation not executed, position deviation error, speed deviation error, overspeed error, momentary power failure, main circuit power supply failure, drive range error, network communication error, DC synchronization error (under voltage display)

**Table 4 Operating environment of the setup software**

<table>
<thead>
<tr>
<th>Item</th>
<th>Operating conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>Windows 7/8 (32-bit, 64-bit)</td>
</tr>
<tr>
<td>OS</td>
<td>Windows Vista 32-bit SP1</td>
</tr>
<tr>
<td></td>
<td>Windows 7 (32-bit, 64-bit)</td>
</tr>
<tr>
<td></td>
<td>Windows 8 (32-bit, 64-bit)</td>
</tr>
</tbody>
</table>

**Remarks:**

- Windows® is a registered trademark of Microsoft Corporation in USA and other countries.
- Pentium is a registered trademark of Intel Corporation in USA and other countries.

**Fig. 1 Operation trace function**
**Automatic tuning function**

By using the automatic tuning function of the setup software for ADVA, non-expert users can easily perform high-accuracy gain adjustment.

**Operating conditions**

- Main body: NT50V25/05R + ADVA-01NL/NT55V25
- Carrying mass: 200g
- Speed: 500mm/s
- Positioning complete width: ±5μm
- Traveling distance: 10mm
- Acceleration/deceleration time: 12ms

**Before tuning**

The actual speed is found to be delayed from the command speed, and the settling time is about 40 ms.

**Tuning conditions**

You only need to select the simple adjustment condition from the pulldown menu.

**After tuning**

The actual speed is almost found to match the command speed, and the settling time is about 1 ms.

---

**Specifications for MR-J4**

- **Applicable model numbers**
  - NT series: NT50V, NT780V
  - SA series: all model numbers

- **Supports SSCNET III/H (high-speed serial bus). Higher speed and accuracy are realized by optical communication system.**

- **Servo gain adjustment, including machine resonance suppression filter, advanced vibration control II, and robust filter, can be completed simply by turning on the one-touch tuning function. Easy driving of the cutting-edge vibration suppression function allows the machine to produce its best performance.**

- **Machine diagnosis, startup and adjustment of linear motor can be easily performed thanks to parameter settings, monitor display and machine analyzer of the setup software (MR Configurator2).**

**Table 5 Specifications for MR-J4**

<table>
<thead>
<tr>
<th>Item</th>
<th>MR-J4-10B-RJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification Number</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>Three-phase AC170V</td>
</tr>
<tr>
<td>Rated current</td>
<td>1.1A</td>
</tr>
<tr>
<td>Main circuit power supply</td>
<td></td>
</tr>
<tr>
<td>Voltage / Frequency</td>
<td>Single-phase / Three-phase AC200-240V 50/60Hz</td>
</tr>
<tr>
<td>Allowable power fluctuation</td>
<td>Single-phase / Three-phase AC170-264V</td>
</tr>
<tr>
<td>Allowable frequency fluctuation</td>
<td>Within ± 5%</td>
</tr>
<tr>
<td>Control circuit power supply</td>
<td></td>
</tr>
<tr>
<td>Voltage / Frequency</td>
<td>Single-phase AC200-240V 50/60Hz</td>
</tr>
<tr>
<td>Allowable power fluctuation</td>
<td>Single-phase AC170-264V</td>
</tr>
<tr>
<td>Allowable frequency fluctuation</td>
<td>Within ± 5%</td>
</tr>
<tr>
<td>Power consumption</td>
<td>30W</td>
</tr>
<tr>
<td>Power supply for interface</td>
<td>DC24V ± 10% (required current capacity: 0.3A (includes CN8 connector signal))</td>
</tr>
<tr>
<td>Structure (protection class)</td>
<td>Natural air cooling and opening (IP20)</td>
</tr>
<tr>
<td>Control method</td>
<td>Sine wave PWM control/current control method</td>
</tr>
<tr>
<td>Machine end encoder interface</td>
<td>Mitsubishi high-speed serial communication / ABZ-phase differential input signal</td>
</tr>
<tr>
<td>Input/Output function</td>
<td></td>
</tr>
<tr>
<td>Encoder output pulse</td>
<td>Supported (ABZ phase pulse)</td>
</tr>
<tr>
<td>Analog monitor</td>
<td>2ch</td>
</tr>
<tr>
<td>Communication function</td>
<td>USB: connection with personal computer, etc. (MR Configurator2 supported)</td>
</tr>
<tr>
<td>Dynamic brake</td>
<td></td>
</tr>
<tr>
<td>Protective function</td>
<td>Overcurrent interrupt, regeneration overvoltage interrupt, overloading interrupt (electric thermal), servomotor overheat protection, encoder error protection, regeneration error protection, undervoltage protection, momentary power failure protection, overspeed protection, excessive error protection, magnetic pole detection protection, linear servo control error protection</td>
</tr>
<tr>
<td>Operating environment</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to 55°C (keep freeze free), Storage: 20 to 65°C (keep freeze free)</td>
</tr>
<tr>
<td>Ambient humidity</td>
<td>90%RH or lower (keep condensation free), Storage: 80%RH or lower (keep condensation free)</td>
</tr>
<tr>
<td>Atmosphere</td>
<td>Indoor (no exposure to direct sun light), must be free from corrosive gas, flammable gas, oil mist and dust</td>
</tr>
<tr>
<td>Altitude</td>
<td>1000m or lower</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>5.9m/s² or less, 15m/s² at 50°C (X, Y, Z directions)</td>
</tr>
<tr>
<td>Mass</td>
<td>0.8kg</td>
</tr>
</tbody>
</table>
Specifications for programmable control unit NCD171G for LT series

- Programmable controller and servo driver are unified into a compact unit.
- This unit requires fewer connection cords, which largely reduces the number of man-hours for wiring.
- Single unit of teaching box is sufficient even for operation of multiple axes.
- DC24V power supply for external I/O and sensor is built in the unit.
- Built-in I/O sequence function does not require use of sequencer if the system is not complicated.
- Various check functions make it easier to check external I/O connection.
- The program is composed of easy-to-understand command language, which helps you easily create a program.
- Flash memory is used for memory backup, so that you don’t need battery change.
- Monitoring and limiting thrust force during movement is possible.
- A teaching box is available as an auxiliary storage device.
- Various return to origin methods enable return to origin operation without externally mounting a sensor.
- Using RS232C interface enables the connection to PC.
- Conformance with CE marking (low voltage command and EMC command) is confirmed.

Table 7  Programmable control unit specification

<table>
<thead>
<tr>
<th>Item</th>
<th>Control specification</th>
<th>Program specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicable linear motor</td>
<td>LT1000C, LT1500C, LT150LD, LT170LD</td>
<td>LT170H</td>
</tr>
<tr>
<td>Feedback</td>
<td>Incremental linear encoder</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 μm, 0.5 μm, and 1.0 μm</td>
<td></td>
</tr>
<tr>
<td>Control input</td>
<td>External (direction / direction pulse, position command / direct command, acceleration / deceleration)</td>
<td></td>
</tr>
<tr>
<td>Program control</td>
<td>LT1747483647 pulse (command maximum value)</td>
<td></td>
</tr>
<tr>
<td>Speed control</td>
<td>Analog</td>
<td></td>
</tr>
<tr>
<td>Input method</td>
<td>TTL, teaching, and PC input via RS232C</td>
<td></td>
</tr>
<tr>
<td>Command input type</td>
<td>Absolute command or incremental command</td>
<td></td>
</tr>
<tr>
<td>Program capacity</td>
<td>1K byte (100 steps or more)</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>Jump, call, repeat, speed setting, acceleration/deceleration setting, timer control, I/O control, input condition branching, various editing functions (creating, erasing, deleting, inserting, etc.)</td>
<td></td>
</tr>
<tr>
<td>No. of input points</td>
<td>5/3 points</td>
<td></td>
</tr>
<tr>
<td>No. of output points</td>
<td>12 points</td>
<td></td>
</tr>
<tr>
<td>Input</td>
<td>Universal (interface, direction, voltage pulse, direction command pulse, direct command, acceleration / deceleration)</td>
<td></td>
</tr>
<tr>
<td>Control input</td>
<td>Start, stop, emergency stop, direction movement manual operation, return to origin, alarm reset, deviation counter reset, servo control, interrupt, etc. (assignment to I/O input by parameters)</td>
<td></td>
</tr>
<tr>
<td>Input method</td>
<td>Photo coupler bi-directional input (non-voltage contact, open collector, and open emitter are supported)</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>In automatic operation, limit actuation, emergency stop, return to origin, complete alarm, position monitoring, pre-origin sensor (assignment to I/O output by parameters)</td>
<td></td>
</tr>
<tr>
<td>Output type</td>
<td>Open emitter output (maximum open / close voltage = 200V, Maximum load current = 100mA)</td>
<td></td>
</tr>
<tr>
<td>Input &amp; output power voltage</td>
<td>DC24V ± 5% 500mA</td>
<td></td>
</tr>
</tbody>
</table>

Protective function
- Overcurrent, overload, oscillation, voltage drop, encoder loss, deviation angle, regenerative existence oscillation, CPU error, etc.

Other major functions
- RS232C (read, write, direct execution, etc.), software limit, thrust force limit, thrust force monitoring, speed control during travel, changing LS logic, various check functions
- Single-phase AC200–230V ±10% (1) 50/60Hz
- 0.6 Arms
- 2.4 Arms
- 4.7 Arms
- 15.9 Arms

Ambient temperature
- 0 to 40°C Storage / –10 to 60°C

Ambient humidity
- 3% to 85%RH (keep condensation free)

Note (1) If you need AC100V specification for NCD171G-L6820, please contact IKO.

CE marking
Programmable control unit’s CE marking is based on confirmation of conformance with the following evaluation standard.
- Low voltage command: EN60778
- EMC command: EN55011 Gr1 ClassA and EN61000-6-2

Conformance with EMC command has been confirmed in our selected system configuration. When the unit is incorporated into an actual machine or device, the wiring and installation conditions may be different, so that the conformance with EMC command in the machine or device requires measurement of the machine or device in the final state with LT incorporated.

Motion Network

Drivers for linear motor drive tables include those supporting motion network EtherCAT, SSCNET II/H, and MECHATROLINK. Motion network realizes higher performance and higher accuracy of devices free from pulse frequency constraint in pulse train command, noise effects in analog command (voltage command), voltage drop due to cable length and effects of temperature drifting. Reduction of wiring can also be achieved, so synchronization system with more than one table can easily be established.

<table>
<thead>
<tr>
<th>Model</th>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>EtherCAT</td>
<td>This is an Ethernet-based open network communication system developed by Beihoff of Germany, allowing the real-time control. High speed communication and high accuracy inter-node synchronization realize the higher performance and higher accuracy of devices. In addition, Ethernet cables available on the market can be used and various wiring types can be supported.</td>
</tr>
<tr>
<td>SSCNET II/H</td>
<td>This is a motion network communication system for servo system control developed by Mitsubishi Electric Corporation. It applies the optical fiber cables, so noise immunity is improved relative to conventional SSCNET.</td>
</tr>
<tr>
<td>MECHATROLINK</td>
<td>The open field network communication that connects the controller and various components. Developed by Yaskawa Electric Corporation and managed by MECHATROLINK Members Association.</td>
</tr>
</tbody>
</table>

Other field networks include those supporting motion network EtherCAT, SSCNET II/H, and MECHATROLINK.