Nidec Drives

5 YEAR WARRANTY

# Commander C

## Flexibility for countless applications

AC drives, general purpose

# The 6th generation of Excellence in motor control


## Commander C

0.25 kW to 132 kW (0.33 hp to 200 hp)

Continuous control of single and three phase asynchronous (induction) and permanent magnet motors. Linear V to F, Square V to F, Dynamic V to F, Set Point V to F, Stator Resistance Compensation, RFC-A (enhanced open-loop performance)

**Commander C combines efficiency and reliability to offer optimum performance for a wide range of applications.**

With 9 frame sizes, it covers powers from 0.25 to 132 kW / 0.33 to 200 hp. Essential features are built in, including PLC capabilities for simple programming needs, dual STO safety function (C300 variants only), braking transistor and PID control.

5 YEAR WARRANTY

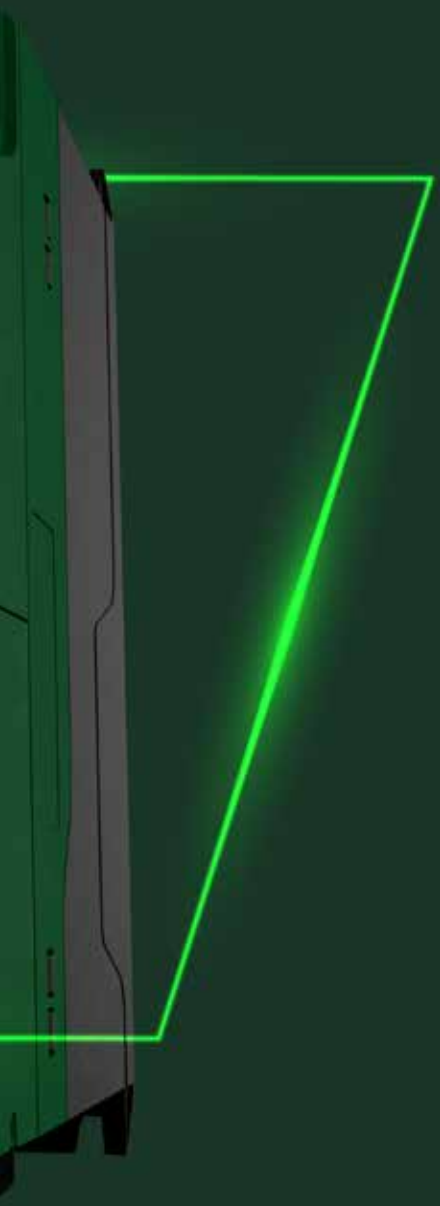
### 5-year warranty as standard*

Our Commander C series is so reliable we are confident enough to supply it with a five-year warranty as standard.

*Warranty terms and conditions apply.

# The ultimate all-in-one drive

# Key benefits



## Adaptable to your application

Whether you have a single application or a variety of different ones, Commander C fits right in. With all essential features built-in, it's ready to go right out of the box.

## Integrated functional safety

The Dual Safe Torque Off (STO) feature, certified to the highest level of machine safety, SIL3/PLe, and compliant to EN/IEC 61800-5-2, prevents the motor from moving unexpectedly, protecting both equipment and operators.

## On-board PLC

The generous 30kB user space allows for add-on programmable functions, more elaborate I/O features and special software that enables greater machine control. The on-board PLC also eliminates the need for an external controller, saving both on cost and space.

## Compact design

Commander C is one of the most compact drives within its category, taking little space in the cabinet and minimizing installation cost.

## Super quick start-up

To get started you only need to set-up 4 parameters (motor rated current, RPM, voltage and power) and for your convenience we've listed them on the front cover of the drive.

## Flexible connectivity

The plug in communication modules enable integration with the most common industrial fieldbuses.

## Worldwide availability and outstanding service

Need expert advice and support? Wherever you are in the world we've got you covered via our sales offices or Nidec Drives approved distributors.

# Commander C
# Specifications

## Power & Control

| | |
|---|---|
| **Supply Requirements** | 100 V to 120 V ±10 %<br>200 V to 240 V ±10 %<br>380 V to 480 V ±10 %<br>500 V to 575 V ±10 %<br>500 V to 690 V ±10 %<br>Maximum supply imbalance: 2 % negative phase sequence (equivalent to 3 % voltage imbalance between phases) |
| **Input Displacement Power Factor** | 0.97 |
| **Phase** | 1 and 3 (model dependent) |
| **Power Range** | 0.25 to 132 kW / 0.33 to 200 hp |
| **Input Frequency Range** | 45 to 66 Hz |
| **Output Frequency/Speed Range** | 0 to 599 Hz (C200, C300, C300PM, C300 Laundry), 0 to 3,000 Hz (HS30) |
| **Switching Frequency** | Size 1 - 4: 0.667, 1, 2, 3, 4, 6, 8 12 & 16 kHz<br>Size 5 - 9: 2, 3, 4, 6, 8 12 & 16 kHz<br>C300 PM: 2, 3, 4, 6, 8 & 12 kHz<br>(Factory default = 3kHz) |
| **Heavy Duty Overload Capability** | 150 % for 60 s (open-loop mode), 180 % for 3 s (RFC-A or PM mode) |
| **Motor Control** | Asynchronous (induction) motors (C200, C300, C300PM, HS30. C300 Laundry)<br>Sensorless permanent magnet motors (C300PM) |
| **Operating Modes** | Linear V to F<br>Square V to F<br>Energy Optimiser (Dynamic V to F)<br>Set Point V to F<br>Stator Resistance Compensation<br>RFC-A (enhanced open-loop performance)<br>Sensorless Permanent Magnet Motor Control (C300 PM Only) |
| **Stopping Modes** | C200, C300, HS30, C300 Laundry: Coast, Ramp, Ramp & DC Injection Braking, DC Injection Braking with 0 Hz detect, Timed DC Injection Braking, No Ramp<br>C300 PM: Coast, Ramp, No Ramp, Distance Stop |

## Communication & Interfaces

| | | |
|---|---|---|
| **Communications** | MODBUS RTU, EtherCAT, PROFIBUS, EtherNet IP, DeviceNET, CANopen, PROFINET, POWERLINK, BACnet IP, INTERBUS<br>(all available with AI/SI-options) | |
| **Keypads** | Fixed LED keypad<br>Remote IP54 Keypad (available as an accessory)<br>Remote RTC Keypad (available as an accessory)<br>HMI (available as an accessory) | |
| **User Software Tools (Free To Download)** | **Connect (PC commissioning & cloning tool):**<br>• Project based commissioning tool<br>• Clone and share parameter files<br>• Compare to defaults<br>• Trouble-shoot systems<br>• Run scope traces<br>• Parameter help & tips | **Machine Control Studio for on-board PLC programming**<br>• CODESYS based<br>• Included programming languages: ladder diagram, structure text, function block diagram, instruction list, sequential function chart, continuous function chart<br>• Function block libraries<br>• Online monitoring of program variables with user defined watch windows<br>• Support for online change of program |

## Programmable Inputs & Outputs

| | |
|---|---|
| **Functional Safety STO** | Dual STO SIL 3 PLe (C300, C300PM, HS30, C300 Laundry) |
| **Analogue** | 2 x Analogue input<br>Analogue input 1 possible settings: 0-10 V, 0-20 mA, 4-20 mA (Hold), 4-20 mA (Low), 4-20 mA (Stop), 4-20 mA (Error)<br>Analogue input 2 possible settings: 0-10 V, Digital<br>1 x Analogue Output<br>0-10 V |
| **Digital** | 4 x Digital inputs (1 frequency or thermistor input)<br>1 x Digital input / output (can be used as a frequency or PWM output to represent analogue value) |
| **Digital Input Logic** | Positive |
| **Relay** | 1 x Relay (single pole, single throw) |
| **Accuracy** | Frequency 0.02 %, Analogue input 1: 11 bit plus sign, Analogue input 2: 11 bit. Current typical 2 %. |
| **Extra I/O with SI-I/O Option Module (Available as an Accessory)** | 3 x Analogue inputs (default) / Digital inputs<br>4 x Digital input / output<br>1 x Digital input<br>2 x Relays (single pole, single throw)<br>Positive or Negative Logic (PNP or NPN) |
| **Supported Encoders with SI-Encoder (Available as an Accessory)** | Incremental AB (5 V, 8 V, or 15 V) |

Note: No Ramp will stop the motor as fast as possible under current-limit (external resistor required). Built-in braking transistor, external resistor required

## Mounting & Environment

| | |
|---|---|
| IP Rating | IP20<br>Conduit Box UL Type 1 ingress protection (available as an accessory) |
| Storage Temperature | -40 °C to 60 °C (-40 °F to 140 °F) |
| Operating Temperature without De-Rate | -20 °C to 40 °C (-4 °F to 104 °F) |
| Operating Temperature with De-Rate | -20 °C to 60 °C (-4 °F to 140 °F) Frames 1 to 4<br>-20 °C to 55 °C (-4 °F to 131 °F) Frames 5 to 9 |
| Cooling | Integral cooling fan |
| Altitude | ≤3000 m (≤1000 m  no de-rate; 1000 m to 3000 m derate 1 % every 100 m) |
| Humidity | 95 % non-condensing at 40 °C / 104 °F - EN61800-2(3k3) |
| Pollution | Pollution degree 2 - dry, non-conducting pollution only |
| Vibration | Reference standard IEC60068-2-27, IEC60068-2-29 bump test, IEC60068-2-64 random vibration test, IEC60068-2-6, EN61800-5-1 sinusoidal vibration test. Tested to Environmental Category ENV3 |
| Mechanical Shock | Tested in accordance with IEC 60068-2-27 and IEC 60068-2-29 |
| Mounting Methods | Frame 1 to 4 – Surface mount via mounting holes or DIN Rail mount<br>Frame 5 to 9 – Surface mount via mounting brackets or through-panel mount via through-panel mounting kit |
| Mounting Clearance | 0 mm either side, 100 mm above and below |
| Overvoltage Category | Category III |
| Corrosive Environments | EN 60721-3-3 ISO9223 Class C3 |
| Maximum Motor Cable Length | 75 m Frame 1 \| 100 m Frames 2 to 4 \| 200 m Frames 5 to 6 \| 250 m Frames 7 to 9 |

## Standards

| | | |
|---|---|---|
| Approvals | CE (European Union), cUL Listed (USA and Canada), DNV (marine applications), KC (Korea), RCM (Australia/ New Zealand), EAC (Russian Customs Union), UKCA (United Kingdom), C-Tick (Australia) | |
| Product Safety Standards | UL 508C<br>IEC/EN/KN 61800-5-1 | CSA C22.2 No.274<br>GB12668.501-2013 |
| TÜV | C300, C300PM, HS30, C300 Laundry models only:<br>The Safe Torque Off (STO) function may be used as a safety component of a machine.<br>Type examination certificates by TÜV Rheinland:<br>Frame sizes 1 - 4: No. 01/205/5383.03/18<br>Frame sizes 5 - 9: No. 01/205/5387.02/18 | Functional safety parameters:<br>EN ISO 13849-1 - Cat 4, PLe<br>EN61800-5-2/EN62061/IEC 61508 - SIL 3<br>UL functional safety approval: FSPC E171230 |
| Product EMC Standards | IEC/ EN 61800-3 Immunity and Emissions (Meets equipment category C3 with internal filter, with an external EMC filter C1 or C2 can be achieved)<br>EN 61000-6-2: Immunity for industrial environments (Complies)<br>EN 61000-6-4: Emissions for industrial environments (External EMC filter required to comply)<br>EN 61000-3-2: Harmonic current emissions (External line reactor required to comply) | |
| RoHS | Complies with the Restriction of Hazardous Substances Directive (2011/65/EU) | |
| Immunity Compliance | Second environment (Industrial) | |
| ISO | Manufacturing facilities comply with ISO 9001:2015 and ISO 14001 | |

## Warranty

| | |
|---|---|
| Warranty | 5 Years (warranty terms and conditions apply) |

## Accessories

| | |
|---|---|
| Remote Interfaces | Remote keypad IP66, Remote keypad RTC, HMI |
| Filters & Cables | External EMC filters, line reactors |
| PC Tools Programming Cable | CT communications cable |
| Communication & Feedback, SI-Options | AI-485 24 V Adaptor (MODBUS), SI-EtherCAT, SI-PROFIBUS, SI-Ethernet , SI-DeviceNET, SI-CANopen, SI-PROFINET , SI-POWERLINK, SI-Encoder, SI-I/O, SI-BACnet IP, SI-Interbus (500 kBd or 2 MBd) |
| Back-up & Cloning | AI-Back-up Adaptor & AI-Smart Adaptor (Includes 4GB SD card) |
| Conduit Box | For UL Type 1 ingress protection |

## Protection

| | |
|---|---|
| Conformal Coating | ✓ |
| Fire Mode | ✓ (C300PM) |
| DC Bus Undervoltage Error Level | 100 V models: 175 Vdc \| 200 V models: 175 Vdc \| 400 V models: 330 Vdc \| 575 V models: 435 Vdc \| 690 V models: 435 Vdc |
| DC Bus Overvoltage Error Level | Frame sizes 1 - 4: 100 V models: 510 Vdc \| 200 V models: 510 Vdc \| 400V models: 870 Vdc<br>Frame size 5 - 9: 200V models: 415 Vdc \| 400 V models: 830 Vdc \| 575 V models: 990 Vdc \| 690 V models: 1190 Vdc |
| Drive Overload Error | Programmable: Default settings: 180% for 3s, 150% for 60s |
| Instantaneous Overcurrent Error/Limit | 220% of rated motor current |
| Phase Loss Error | DC Bus Ripple Threshold Exceeded |
| Overtemperature Error | Control Board Over Temperature, Inverter Model Temperature, Inverter Thermistor Temperature, Drive heatsink temperature exceeds 95°C (203°F) |
| Short Circuit Error | Protection against output phase-to-phase fault |
| Ground Fault Error | Protection against output phase-to-ground fault |
| Motor Thermal Protection | Electronically protects the motor from over-heating due to loading conditions |
| Keep Running | Parameter set to avoid errors and machine downtime |
| Dedicated Thermistor Input | Avoid downtime or machine damage due to overheated motor |

## General

| | |
|---|---|
| Items supplied with the drive | Step-By-Step Guide, Safety Information, Grounding bracket, Surface mounting brackets (frame 5 to 9) |

# Commander C
# Functionality

| | |
|---|---|
| **Modbus RTU Communications (available with AI-485 Adaptor)** | |
| Control Word Control | ✓ |
| Serial Baud Rate | 600 to 115200 bps |
| Modbus RTU Mode | 8.2NP, 8.1NP, 8.1EP, 8.1OP, 7.1 EP, & 7.1 OP |
| **On Board PLC** | |
| User Memory Space | 30 KB |
| Pre-set Programs (Available on Request) | Unbalanced Load Detection (Laundry drive variant), Solar Pump (Available in Connect) |
| Custom Application Parameters | 64 |
| **Reference** | |
| Selectable References | Analogue input 1, analogue input 2, pre-set speeds, keypad reference, motorised pot reference, frequency input, PID output or communication control |
| Jog Reference | ✓ |
| Up / Down % Reference (Motorised Pot) | ✓ |
| Bi-Polar Reference | ✓ |
| Pre-set Speeds | 8 |
| Pre-set Timer | ✓ |
| Skip Frequencies | 3 |
| Skip Frequencies Dead Band | ✓ |
| Local/Remote | ✓ |
| S-Ramp | ✓ |
| Acceleration Rates | 8 |
| Deceleration Rates | 8 |
| Frequency Input Reference (Pulse Train) | 0 Hz to 100 kHz |
| Torque Reference | ✓ |
| **Application Specific** | |
| PID Controller | PID Control |
| PID Feedforward | ✓ |
| PID Threshold Detector | ✓ |
| PID Slew Rate | ✓ |
| Input Scaling | ✓ |
| Run Permit (Latching Run) | ✓ |

| Control | |
|---|---|
| Motor Stability Optimiser | ✓ |
| Slip Compensation | ✓ |
| Auto-tune | replace tick with: "Static, Rotating & Inertia" |
| Catch an Already Spinning Motor | ✓ |
| Speed Feedback via SI-Encoder Option | ✓ |
| Second Motor Set-up | ✓ |
| Motor Pre-Heat Control | ✓ |
| Built-in Braking Transistor (External Resistor Required) | ✓ |
| Mechanical Brake Controller | ✓ |
| Supply Loss Detection | ✓ |
| Motor Phase Loss Detection | ✓ |
| Low D.C. Link Operation | ✓ |
| Analogue Input Control | ✓ |
| Analogue Output Control | ✓ |
| Digital Input Control | ✓ |
| Digital Output Control | ✓ |
| Relay Control | ✓ |
| Logic Function Control | ✓ |
| Timer Function Control | ✓ |
| Limit Switch Control | ✓ |
| Temperature Monitoring | ✓ |
| Keypad Button Assignment | ✓ |
| Programmable Output Current Limit | ✓ |
| **General** | |
| Error History Log | 10 |
| Auto-Reset After Error | ✓ |
| Error Time Stamping | ✓ |
| Power Loss Ride Through | ✓ |
| Run Time Log | ✓ |
| Cloning | Via: SD Card, Connect |
| Energy Meter | ✓ |
| Security PIN | ✓ |

Nidec

All for dreams

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**www.drivesfromnidec.com**



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CONTROL TECHNIQUES

KB

CTD

SF BR_Commander C_Iss 01_EN 02/26