XtrapulsCD1-EM-400/70-90

Drives for AC servo motors in embedded applications
WARNING

This is a general manual describing a series of servo drives having output capability suitable for driving AC brushless sinusoidal servo motors.

Instructions for storage, use after storage, commissioning as well as all technical details require the MANDATORY reading of the manual before getting the drives operational.

Maintenance procedures should be attempted only by highly skilled technicians having good knowledge of electronics and servo systems with variable speed (EN 60204-1 standard) and using proper test equipment.

The conformity with the standards and the "CE" approval is only valid if the items are installed according to the recommendations of the drive manuals. Connections are the user's responsibility if recommendations and drawings requirements are not met.

Any contact with electrical parts, even after power down, may involve physical damage. Wait for at least 5 minutes after power down before handling the drives (a residual voltage of several hundreds of volts may remain during a few minutes).

ESD INFORMATION (ElectroStatic Discharge)

INFRANOR drives are conceived to be best protected against electrostatic discharges. However, some components are particularly sensitive and may be damaged if the drives are not properly stored and handled.

STORAGE
- The drives must be stored in their original package.
- When taken out of their package, they must be stored positioned on one of their flat metal surfaces and on a dissipating or electrostatically neutral support.
- Avoid any contact between the drive connectors and material with electrostatic potential (plastic film, polyester, carpet...).

HANDLING
- If no protection equipment is available (dissipating shoes or bracelets), the drives must be handled via their metal housing.
- Never get in contact with the connectors.

ELIMINATION

In order to comply with the 2002/96/EC directive of the European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE), all INFRANOR devices have got a sticker symbolizing a crossed-out wheel dustbin as shown in Appendix IV of the 2002/96/EC Directive. This symbol indicates that INFRANOR devices must be eliminated by selective disposal and not with standard waste.

INFRANOR does not assume any responsibility for any physical or material damage due to improper handling or wrong descriptions of the ordered items. Any intervention on the items, which is not specified in the manual, will immediately cancel the warranty.

Infranor reserves the right to change any information contained in this manual without notice.

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Chapter 1 – General description

1.1 - INTRODUCTION

XtrapulsCD1-EM-400/70-90 all-digital drives with sinusoidal PWM control are servo drives that provide the control of servo motors equipped with a position sensor. They can be configured for various position sensor types (resolver, incremental encoder, absolute encoder). The appropriate position sensor configuration is selectable by software and saved in the drive.

XtrapulsCD1-EM-400/70-90 drives power supply is 400 to 480 VAC three-phase mains. A soft start system of the power supply allows to limit the inrush current at power on. The maximum output current is available during 1 second. The drive rated output current is the current value available for permanent operation.

The EM version of the CD1-400/70-90 drive is dedicated to embedded applications. This version differs from the standard CD1-400/70-90 regarding the rugged mechanical housing and the modified mechanical mounting.

- The push through mounting allows to push the heatsink and the air forced cooling outside the electric cabinet.
- The flat fastening of the drive according to the larger surface area allows to improve its rigidity to shocks and vibrations.

The CD1a-EM-400/70-90 version is dedicated to applications with ± 10 V analog input command. The CD1k-EM-400/70-90 version is to be used in applications with input command via CAN fieldbus and is based on CANopen DSP402 protocol. The CD1pm-EM-400/70-90 version is to be used in stand-alone positioning applications or with input command via PROFIBUS fieldbus.

1.2 - OTHER DOCUMENTS REQUIRED FOR THE COMMISSIONING

Only the information specific to the EM-400/70-90 version of the XtrapulsCD1 drives can be found in this document. Please refer to the standard XtrapulsCD1 range manuals for the complete information:

- CD1-a servo drive manual,
- CD1-k Installation Guide,
- CD1-k User Guide,
- CANopen Communication Protocol for CD1-k drives,
- CD1-pm Installation Guide,
- CD1-pm User Guide,
- PROFIBUS Communication Protocol for CD1pm drives.
1.3 - ORDERING CODES

1.3.1 – DRIVE ORDERING CODE

XTRAPULS CD1 - x - EM - U / I - CT

- a: +/- 10 V analog interface
- k: CANopen interface
- pm: Profibus interface
- EM: Embedded applications
- U: 400: 400/480 Vac voltage rating
- I: 70 / 90 Arms current ratings
- CT: “Cogging torque compensation” option

1.3.2 - FAN REPLACEMENT KIT

FAN CD1 - EM - 90

The fan replacement kit consists in the complete fan carter, equipped with fans, grids and connectors:
Chapter 2 – Specifications

Operating power supply voltage
- 400 to 480 VAC ± 10 %/± 15 % 3~ mains, TN or TT system with earthed neutral point, 50 - 60 Hz (Phase/Ground voltage must be balanced)
- 140 to 700 Vdc DC link power supply

Auxiliary logic and motor brake supply voltage
24 Vdc ±15 % - 320 mA without brake

Motor RMS output voltage
95 % Udc/√2

Integrated braking system
External resistor: 16.5 Ω/560 W (EF 400)

Output current ratings

<table>
<thead>
<tr>
<th>Model</th>
<th>Max. output current (Arms) for 1 sec. +/- 5 %</th>
<th>Rated output current (Arms)</th>
<th>Power losses (W)</th>
<th>Rated input current (Arms) (400 VAC, 60 Hz)</th>
<th>Max. protection fuses for line circuit A60Q40 listed</th>
<th>Short-circuit power of the mains</th>
<th>UL listed</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD1-EM-400/70</td>
<td>70</td>
<td>35</td>
<td>650</td>
<td>35</td>
<td>40 A</td>
<td>5 kA</td>
<td>No</td>
</tr>
<tr>
<td>CD1-EM-400/90</td>
<td>90</td>
<td>35</td>
<td>650</td>
<td>35</td>
<td>40 A</td>
<td>5 kA</td>
<td>No</td>
</tr>
</tbody>
</table>

Mains filter on power supply
- Integrated EMC capacitors
- External common mode choke
- Recommended filter: F-400-70-90

Standard undervoltage threshold
140 Vdc

Standard braking threshold
790 Vdc

Standard overvoltage threshold
910 Vdc

Common mode filter on auxiliary supply
Integrated in the drive

Common mode filter on motor brake supply
Integrated in the drive

Motor brake control
Open collector output protected against load short-circuit. 2 A maximum with 24 Vdc.

Compliance with the standards: CE certification.
360° shield connection, equipotentiality according to the wiring rules and mains filter F-400-70/90.

EMC standards:
- Immunity: EN 61000.4-2-3-4-5
- Conducted and radiated disturbances: EN 55011, Group 1, C3 category
- Electrical standards for industrial machines:
  - EN 60204-1: Insulator 1500 Vac / 1 mn
    - Leakage current > 30 mA (EMI filters).

Temperature
Storage: -20° C to +70° C
Operation: +5° C to +60° C

Altitude
1000 m

Moisture
< 50% at 40° C and < 90% at 20° C: EN 60204-1 standard Condensation prohibited (storage and operation)

Cooling
Forced air (fan integrated in the drive)

Environment
- Electronic part is IP20: it must be mounted in a housing protecting the drive from conducting dust and condensation (pollution degree 2 environment).
- Heatsink part is IP64: it is protected against dust and splashed water. Periodic replacement is necessary, according to the environment
<table>
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<th>Mounting location</th>
<th>Closed cabinet without any conducting and/or corroding agents and according to the environment conditions requirements</th>
</tr>
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<tr>
<td>Weight</td>
<td>Approximately 8 kg</td>
</tr>
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</table>
Chapter 3 – Mechanical data

3.1 - DRIVE DIMENSIONS

FRONT VIEW

'A' VIEW

'B' VIEW
3.2 - CABINET LAYOUT

It is highly recommended to place a silicone seal around the cut-out in order to avoid any entry of dust or humidity inside the cabinet.

Recommended silicone reference: CAF530
Manufacturer: BLUESTAR SILICONES
Chapter 4 - Connections

4.1 - DRIVE CONNECTION

For complete information about the XtrapulsCD1-a, CD1-k or CD1-pm servo drive connections, please see the pertaining installation manuals.

4.2 - MOTOR CONNECTION

Take great care about the motor connections:

- Connect the shield on the drive just before the ferrite core, preferably with a metallic collar,
- The motor phases run through the ferrite core to be connected on U, V and W outputs.
- The ground wire runs outside the ferrite core to be connected on the ground screw.
- The brake wires run outside the ferrite core to be connected on the Br+ and Br- outputs.
Chapter 5 – Setup & Operation

The Visual Drive Setup software is PC compliant under Windows®¹ and allows an easy parameter setting of the XtrapulsCD1 drive range. Please see our website www.infranor.com for downloading this software.

For information about the XtrapulsCD1-a, CD1-k or CD1-pm servo drive setup, commissioning and operation, please see the appropriate manuals.

¹ Windows® is a registered trade mark of MICROSOFT® CORPORATION
6.1- FAN SPEED CONTROL

In order to increase the lifetime of fans, their rotation speed is controlled according to the motor current. A detailed description is available in the following diagram:
6.2 - FAN REPLACEMENT PROCEDURE

The drive is provided with two fans external to the cabinet. These fans are developed to work in hard conditions and have a life expectancy of: 50'000 hours at 25°C, 65 % humidity, 90 % CL.

Although the lifetime greatly depends on the real environment where the drive is working, it is advised to replace fans at least every 3 years.

To replace fans, proceed as follows:

1. Disable the drive
2. Switch off the power supply (power & auxiliary supplies) of the drive
3. Disconnect both fans
4. Remove the 6 screws fixing the fan carter
5. Mount the new fan carter with the 6 screws
6. Connect the two fans
7. Restart the drive.