E3 Series
AC Variable Speed Drive

General Purpose Drive
Easy control for all motor types

Easy to Use!

Bardac drives
AC Variable Speed Drive
E3 Series
NEMA 4X (IP66)
IP20

0.5HP–30HP / 0.37kW–22kW
110–480V Single & 3 Phase Input

0.5HP–30HP / 0.37kW–22kW
110–480V Single & 3 Phase Input
E3 SERIES

Easy to Use

General Purpose Drive

Focused on ease of use, E3 Series drives provide unrivalled simplicity of installation, connection and commissioning, allowing the user to benefit from precise motor control and energy savings within minutes.

Simple Commissioning
With just 14 basic parameters and application macro functions providing rapid set up, the E3 Series minimizes start-up time.

Intuitive Keypad Control
Precise digital control at the touch of a button.

Application Macros
Switch between Industrial, Pump & Fan modes to optimize E3 Series drives for your application.

Industrial | Pump | Fan
See Page 6

All E3 Series drives are drive.web ready

drive.web uses distributed control over Ethernet to provide cost effective, high performance integration of drives and controls in systems of any size or complexity.
Precise and reliable control for IE2, IE3 & IE4 motors

Sensorless Vector Control for all Motor Types

NEMA 4X (IP66)

Up to 30HP

- Outdoor rated
- Dust-tight
- Washdown ready

See Page 5

Key Features

- Internal PI control
- Dynamic brake switch (Frame 2 and up)
- Dual analogue inputs
- Operates up to 50°C
- Bluetooth® connectivity
- Optional Internal Category C1 EMC filter
- Option for control of single phase motors (see Page 8)

Modbus RTU on-board as standard

Sensorless Vector Control for all Motor Types

- IM Induction Motors
- PM AC Permanent Magnet Motors
- BLDC Brushless DC Motors
- SynRM Synchronous Reluctance Motors

Precise and reliable control for IE2, IE3 & IE4 motors

NEMA 4X (IP66)
E3 SERIES

**IP20** Up to 30HP

Compact, robust and reliable general purpose drive for panel mounting

Incredibly Easy to Use
- ✔ Built in PI control
- ✔ Dynamic brake switch (Frame 2 and up)
- ✔ Application macros for industrial, fan and pump operation
- ✔ Bluetooth connectivity
- ✔ Optional EMC filter (C1)

Simply Power Up
E3 Series drives provide precise motor control and energy savings using the factory settings. Simply power up and the drive can immediately deliver energy savings.

14 basic parameters allow simple adjustment for your application if required, with up to 50 parameters available in total for a highly flexible performance.

Controls Multiple Motor Types
- ✔ IE2, 3 & 4
- ✔ IM, PM, BLDC and SynRM

4 sizes cover global supply ratings
E3 SERIES

NEMA 4X Outdoor

Outdoor rated enclosed drives for direct machine mounting, dust tight and ready for washdown duty

NEMA 4X (IP66) outdoor rated
Built with tough polycarbonate plastics specifically chosen to withstand degradation by ultra violet (UV), greases, oils and acids. Also robust enough not to be brittle at -20°C.

Dust-Tight Design
Install directly on your processing equipment and be sure of protection from dust and contaminants.

Washdown Ready
With a sealed ABS enclosure and corrosion resistant heatsink, E3 Series NEMA 4X drives are ideal for high-pressure washdown applications.

Switched Models
Simply wire up the drive, turn the inbuilt potentiometer and the motor will start running – allowing immediate energy savings.

Conformal coating as standard
For ultimate ease of use

Coated Heatsink as Standard
Ideal for hygiene based operations requiring washdown — such as food and beverage

Switched or non-switched

Locally Customizable
Flat front to terminal cover with mounting points for switches and an internal PCB.

2 x RJ45 ports
eliminate the need for a splitter.

Easily accessible EMC disconnect

due to the large, accessible chamber and removeable gland plate.

Easy to wire

NEMA 4X (IP66)

Up to 30HP

E3 SERIES

Bardac drives

CE UL US □

Run Reverse / Off / Run Forward Switch

Lockable Mains Disconnect / Isolator

Local Speed Potentiometer

1 2 3

1

2

3
E3 SERIES

Application Macros

Switch modes at the touch of a button to optimize E3 Series drives for your application.

Industrial Mode

- **Industrial Mode** optimizes E3 Series drives for load characteristics of typical industrial applications.
  - Applications include:
    - Conveyors
    - Mixers
    - Treadmills
  - Sensorless Vector provides high starting torque and excellent speed regulation
  - IP20 panel mount units or NEMA 4X for direct machine mounting
  - Rapid parameter cloning using OPTISTICK Smart

Pump Mode

- **Pump Mode** makes energy efficient pump control easier than ever.
  - Applications include:
    - Dosing Pumps
    - Borehole Pumps
    - Transfer Pumps
    - Swimming Pools
    - Spas
    - Fountains
  - Constant or variable torque
  - Internal PI control

Fan Mode

- **Fan Mode** (inc. fire operation) makes air handling a breeze, ideal for simple HVAC systems.
  - Applications include:
    - Air Handling Units
    - Ventilation Fans
    - Circulating Fans
    - Air Curtains
    - Kitchen Extract
  - High efficiency variable torque motor control
  - Flying start capability
  - Mains loss ride through
  - PI control

Instant Power Savings

The graph below shows the incredible efficiency of the E3 Series for controlling airflow compared to traditional damper control methods.

How much energy could you save?

Estimate potential energy savings, CO₂ emissions and financial savings for your application with the Bardac Drives Energy Savings Calculator tool.

bardac.com/calculator

Modbus RTU CAN

on-board as standard
**Drive Specification**

**Input Ratings**
- **Supply Voltage**:
  - 110 – 115V ± 10%
  - 200 – 240V ± 10%
  - 380 – 480V ± 10%
- **Supply Frequency**: 48 – 62Hz
- **Displacement Power Factor**: >0.9
- **Phase Imbalance**: 3% Maximum allowed
- **Inrush Current**: < rated current
- **Power Cycles**: 120 per hour maximum, evenly spaced

**Output Ratings**
- **Output Power**: 110V 1 Ph Input: 0.5–1.5HP, 230V 3 Ph Output: 3.7–10HP, 480V 3 Ph Input: 0.5–220kW
- **Overload Capacity**: 150% for 60 Seconds
- **Output Frequency**: 0 – 500Hz, 0.1Hz resolution
- **Acceleration Time**: 0.01 – 600 seconds
- **Deceleration Time**: 0.01 – 600 seconds
- **Typical Efficiency**: >98%

**Ambient Conditions**
- **Temperature**: IP20: Storage: -40 to 140°F, Operating: 14 to 122°F
- **NEMA 4X**: Storage: -40 to 140°F, Operating: 14 to 104°F
- **Altitude**: Up to 1000m ASL without derating
- **Humidity**: 95% Max, non condensing

**Enclosure**
- **Protection**: IP54, NEMA 4X (IP65)

**Programming**
- **Keyboard**: Built-in keypad as standard
- **Optional remote mountable keypad**: 
- **Display**: 7 Segment LED
- **Computer**: drive.ub-swsvr-SPD software

**Control Specification**
- **Sensorless Vector Speed Control**: PM Vector Control
- **Synchronous Reluctance**: BLDC Control
- **PWM Frequency**: 4 – 120Hz Effective
- **Stopping Mode**: Ramp to stop: User Adjustable 0.1 – 600 sec
- **Braking**: Motor Braking
- **Motor Braking trans**: Built-in braking transistor (not frame size 1)
- **Skip Frequency**: Single point, user adjustable

**Fieldbus**
- **Built-in**
  - CANopen
  - Modbus RTU
  - CANopen
  - EtherNet/IP

**I/O Specification**
- **Power Supply**: 24 Volt DC, 100mA, Short Circuit Protected
- **Programmable Inputs**: 4 Total, 2 Digital, 2 Analog (Digital selectable)
- **Digital Inputs**: 8 – 30 Volt DC, internal or external supply
- **Analog Inputs**: Resolution: 12 bits, Accuracy: >2% full scale
- **Programmable Outputs**: 2 Total, 1 Analog / Digital, 1 Relay
- **Relay Outputs**: Maximum Voltage: 250 VAC, 30 VDC
- **Switching Current Capacity**: 5A AC, 3A DC
- **Analog Outputs**: 0 to 10 Volt

**Application Features**
- **Pl Cntrl**: Internal PI Controller
- **Step Motor**: 3 Phase, Speed Step Function
- **Fire Mode**: Bidirectional, Selectable Speed Setpoint (Fixed / Pl / Analog / Fieldbus)

**Maintenance & Diagnostics**
- **Fault Memory**: Last 4 Trips stored with time stamp
- **Data Logging**: Logging of data prior to trip for diagnostic purposes
- **Output Current**: 3 Phase, Adjustable
- **DC Bus Voltage**: Monitoring
- **Hours Run Meter**:

**Standards Compliance**
- **Low Voltage Directive**: Adjusting speed electrical power drive systems, EMC requirements
- **EMC Directive**: 2014/35/EU Cat C1 according to EN61800-3:2004
- **Machinery Directive**: 2006/42/EC
- **Conformance**: CE, UL, CUL, CE, TUV, SEMKO, CSA, VDE
E3 SERIES  
For Single Phase Motors

Special Boost Phase
To ensure reliable starting of single phase motors, the drive initially ramps the motor voltage up to rated voltage while maintaining a fixed starting frequency, before reducing the frequency and voltage to the desired operating point.

150% overload for 60 secs (175% for 2 secs)

Key Features
- 110–115V and 200–240V models
- Small mechanical envelope
- Rugged industrial operation
- Fast setup, and simple operation with 14 basic parameters
- Unique motor control strategy optimized for single phase motors
- Motor current and rpm indication
- Built in PI control
- Dynamic brake switch (Frame 2 and up)
- Application macros for industrial, fan and pump operation
- Bluetooth® connectivity
- Optional EMC filter (C1)

Modbus RTU
CAN
on-board as standard

Simple airflow control

Dedicated to Single Phase Motor Control
Designed to be cost effective and easy to use, the E3 Series for Single Phase Motors is for use with PSC (Permanent Split Capacitor) or Shaded-Pole Single Phase induction motors. Only for use in variable torque applications such as pumps and fans.

The E3 Series for Single Phase Motors uses a revolutionary motor control strategy to achieve reliable intelligent starting of single phase motors.

- Removes the need for 3 phase supply wiring
- Provides the same performance features as the 3 phase E3 Series
- The ideal energy saving solution where high starting torque is not required — typically including fans, blowers, centrifugal pumps, fume extractors and air flow controllers

IP20  NEMA 4X (IP66)

Up to 1.5HP

Single Phase Motor Control for PSC & Shaded-Pole Motors

Pump control in swimming pools & spas

- 150% overload for 60 secs (175% for 2 secs)

CE C UL US □
**E3 SERIES**

**Input Ratings**
- Supply Voltage: 110 – 115V ± 10%; 200 – 240V ± 10%
- Frequency: 48 – 62Hz
- Displacement Power Factor: > 0.98
- Phase Imbalance: 3%
- Inrush Current: < rated current
- Power Cycles: 120 per hour maximum, evenly spaced

**Output Ratings**
- Output Power: 110V 1 Ph Input: 0.5–1.5HP (0.37–1.1kW)
- Overload Capacity: 150% for 60 Seconds; 175% for 2.5 seconds
- Output Frequency: 0 – 500Hz, 0.1Hz resolution
- Acceleration Time: 0.01 – 600 seconds
- Deceleration Time: 0.01 – 600 seconds
- Typical Efficiency: > 98%

**Ambient Conditions**
- Temperature: IP20: Storage: –40 to 140°F; Operating: 14 to 122°F
- NEMA 4X: Storage: –40 to 140°F; Operating: 14 to 104°F
- Humidity: 95% Max, non condensing
- Altitude: Up to 1000m ASL without derating; Up to 2000m maximum UL approved; Up to 4000m maximum (non-UL)

**Enclosure**
- IP20: NEMA 4X (IP66)
- Protection: Conform to EN60529-5-1

**Fieldbus**
- Built-in: CANopen 125–1000 kbps; Modbus RTU 9.6–115.2 kbps selectable

**I/O Specification**
- Power Supply: 24 Volt DC, 100mA, Short Circuit Protected; 10 Volt DC, 10mA for Potentiometer
- Programmable Inputs: 4 Total; 2 Digital; 2 Analog / Digital selectable
- Digital Inputs: 8 – 30 Volt DC, internal or external supply; Response time < 4ms
- Analog Inputs: Resolution: 12 bits; Response time: < 4ms; Accuracy: ± 2% full scale; Parameter adjustable; scaling and offset
- Programmable Outputs: 2 Total; 1 Analog / Digital; 1 Relay
- Relay Outputs: Maximum Voltage: 250 VAC, 30 VDC; Switching Current Capacity: 6A AC, 5A DC
- Analog Outputs: 0 to 10 Volt

**Control Specification**
- Control Method: V/F Voltage Energy Optimised V/F
- PWM Frequency: 4–32Hz Effective
- Stopping Mode: Ramp to stop: User Adjustable 0.1–400 secs; Coast to stop
- Braking: Motor Flux Braking (Built-in braking transistor (frame size 2))
- Skip Frequency: Single point, user adjustable
- Analog Signal: 0 to 10 Volts; 0 to 20mA; 20 to 420mA; 4 to 20mA; 20 to 4mA
- Digital: Motorised Potentiometer; Keypad; Modbus RTU; CANopen; EtherCAT/IP

**Application Features**
- PI Control: Internal PI Controller
-Standby / Sleep Function
- Selectable Speed Setpoint (Fixed / PI / Analog / Fieldbus)

**Maintenance & Diagnostics**
- Fault Memory: Last 4 Trips stored with time stamp
- Data Logging: Logging of data prior to trip for diagnostic purposes
- Output Current: Drive Temperature
- DC Bus Voltage: Monitoring
- Hours Run Meter

**Standards Compliance**
- Low Voltage Directive
- EMC Directive: 2014/35/EU 250V; 91, Filtered Units – Cat C1 according to EN61800-3:2004
- Machinery Directive: 2006/42/EC
- Conformance: CE, UL, RCM

**Pressures & Generation**
- 110 – 115V ± 10%
- 200 – 240V ± 10%

**Model Code Guide:**
- E3 - 120043 - 3F12-01

**Replace # in model code with color-coded option as below**

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<th>Enclosure Types</th>
<th>Description</th>
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<td>NEMA 4X Outdoor Use Non-switched</td>
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<td>B</td>
<td>NEMA 4X Outdoor Use Switched</td>
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**Drive Specification**

![Drive Specification Diagram]
drive.web uses distributed control over Ethernet to provide cost effective, high performance integration of drives and controls in systems of any size or complexity.

**smartty dw240 series**
controllers with a wide range of I/O

Used for all programmable control, peer-to-peer Ethernet networking and system integration tasks.

- DIN mount controllers with flexible analog, logic, and encoder I/O
- 51 points of high resolution I/O
- Includes gateway to ModbusTCP/IP, ModbusRTU, EIP/PCCC, etc.
- USB port for easy system-wide programming

**smartty dw210 series**
controllers with a wide range of I/O

Used for all programmable control, peer-to-peer Ethernet networking and system integration tasks.

- DIN mount controllers with flexible analog, logic, and encoder I/O
- 16 points of high resolution I/O
- Includes gateway to ModbusTCP/IP, ModbusRTU, EIP/PCCC, etc.
- USB port for easy system-wide programming

**speedy**
miniature, full-featured controllers

Tiny, full-featured, programmable controllers for embedding into drives, sensors, HMI’s, etc.

- The easiest, affordable way to get all your drives & devices up onto peer-to-peer Ethernet
- Includes gateway to ModbusTCP/IP, ModbusRTU, EIP/PCCC, etc.
- USB port for easy system-wide programming
E3 SERIES
Installation & Peripheral Options
A range of external EMC Filters, Brake Resistors, Input Chokes and Output Filters are available, to suit all installation requirements.
E3 SERIES

E3 Series - AC Variable Speed Drive

✓ Low Power Applications
Dedicated to low power applications, E3 Series drives combine innovative technology, reliability, robustness and ease of use in a range of compact IP20 & NEMA 4X enclosures.

✓ Simple Commissioning
14 parameter basic setup. Default settings suitable for most applications. Contactor style connection for simple wiring.

✓ E3 Series NEMA 4X
Environmentally protected, NEMA 4X rated models can be mounted directly on your processing equipment.

✓ Washdown Ready
With a sealed ABS enclosure and corrosion resistant heatsink, E3 Series NEMA 4X models are ideal for high-pressure washdown applications.

✓ On-drive Control
NEMA 4X models feature optional, convenient controls for speed control, REV/OFF/FWD and Power ON/OFF, complete with safety lock.

✓ Single Phase Motor Control
E3 Series drives for Single Phase Motors provides accurate speed control of single phase PSC or shaded pole motors. Special boost phase ensures reliable starting, initially ramping the motor voltage up to rated voltage while maintaining a fixed starting frequency, before reducing the frequency and voltage to the desired operating point.

For more about the E3 Series: bardac.com/e3-series/

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About Bardac Drives
Since our founding in 1992, Bardac has worked hard to build our reputation around key goals:

- Innovative technologies
- Reliable products
- Focus on automation; Distributed Control, AC Drives, DC Drives, and Motors
- All catalog items normally in stock
- Competitive pricing
- Unrelenting customer support