

KBAC SERIES

ADJUSTABLE FREQUENCY DRIVES For 3-Phase AC Motors NEMA-4X / IP-65

Models KBAC-24D, 27D, 29, 45, 48

Washdown and Watertight for Indoor and Outdoor Use

Rated for 208-230 and 400/460 Volt 50 & 60 Hz

3-Phase AC Induction Motors from Subfractional thru 5 HP

Operates from 115, 208/230, and 400/460 Volt 50/60 Hz AC Line

TYPICAL APPLICATIONS



STANDARD FEATURES

- **Industrial Duty Die-Cast Aluminum Case with Hinged Cover** – Available in **black finish** or **FDA approved white finish**.
- **Simple to Operate** – Does not require programming. Uses trimpots and jumpers, which are factory set for most applications.
- **Motor HP Selection Jumper** – Allows the drive to be used on a wide range of motor horsepower without recalibration.
- **Diagnostic LEDs** – Power on (POWER) and drive status (STATUS).
- **Run/Fault Relay Output Contacts** – Can be used to turn on or off equipment or to signal a warning if the drive is put into the Stop Mode or a fault has occurred.
- **Start/Stop Switch** – Provides electronic start and stop functions.
- **Barrier Terminal Block** – Facilitates wiring of motor, AC line, and Run/Fault Relay Output Contacts.
- **Jumper Selection of Drive Output Frequency** – Increases the motor speed up to two times the rated RPM.
- **Compatible with GFCIs (with optional software)**.

PERFORMANCE FEATURES

- **Power Start™** – Provides more than 200% starting torque which ensures startup of high frictional loads.
- **Slip Compensation with Static Auto-Tune and Boost** – Provides excellent load regulation over a wide speed range.
- **Speed Range** – 60:1

PROTECTION FEATURES

- **Motor Overload (I²t) with RMS Current Limit** – Provides motor overload protection which prevents motor burnout and eliminates nuisance trips.²
- **Electronic Inrush Current Limit (EICL™)** – Eliminates harmful inrush AC line current during startup.
- **Short Circuit** – Shuts down the drive if a short circuit occurs at the motor (phase-to-phase).
- **Regeneration** – Eliminates tripping due to bus overvoltage caused by rapid deceleration of high inertial loads.
- **Undervoltage and Overvoltage** – Shuts down the drive if the AC line input voltage goes above or below the operating range.
- **MOV Input Transient Suppression**.
- **Microcontroller Self Monitoring and Auto-Reboot**.

*Requires CE approved RFI Filter. See AC Line Filters, in Optional Accessories.

Notes: 1. Requires optional software. 2. UL approved as an electronic overload protector for motors. 3. When the drive is set for DC Injection Braking, The DECEL Trimpot is used to adjust the braking intensity and time.



DESCRIPTION

The KBAC Adjustable Frequency Drives are variable speed controls housed in a NEMA-4X / IP-65 washdown and watertight enclosure. They are designed to operate 208-230 and 400/460 Volt 50 & 60 Hz 3-phase AC induction motors from subfractional thru 5 HP. The sine wave coded Pulse Width Modulated (PWM) output operates at a carrier frequency of 16 kHz which provides high motor efficiency and low noise. Adjustable Linear Acceleration and Deceleration make the drive suitable for soft-start applications.

Due to its user-friendly design, the KBAC is easy to install and operate. Tailoring to specific applications is accomplished with selectable jumpers and trimpots, which eliminate the computer-like programming required on other drives. However, for most applications no adjustments are necessary. For more advanced programming, PC based Drive-Link™ software is available.

Main features include adjustable RMS Current Limit and I²t Motor Overload Protection.² In addition, Adjustable Slip Compensation with Static Auto-Tune and Boost provides high torque and excellent load regulation over a wide speed range. Power Start™ delivers over 200% motor torque to ensure startup of high frictional loads. Electronic Inrush Current Limit (EICL™) eliminates harmful AC line inrush current. A Run/Fault Relay is provided, which can be used to turn on or off equipment or to signal a warning if the drive is put into the Stop Mode or a fault has occurred. The drive is suitable for machine or variable torque (HVAC) applications. Also, a jumper is provided for selection of Regenerative or DC Injection Braking.

Standard front panel features include diagnostic LEDs for power on and drive status, a Start/Stop Switch, and a Main Speed Potentiometer. Other features include a Barrier Terminal Block to facilitate wiring of the AC line and motor, adjustable trimpots (MIN, MAX, ACCEL, DECEL, COMP, CL, JOG, BOOST), customer selectable jumpers (Line Voltage (dual voltage models only), Motor Horsepower, Automatic or Manual Start/Reset, Motor Frequency, Frequency Multiplier, Fixed/Adjustable Boost, Regenerative/Injection Braking, "Run" or "Fault" Output Relay Operation, NO/NC Stop Contact, Constant/Variable Torque, Factory Assignable Function).

Optional accessories include: Forward-Stop-Reverse Switch, On/Off AC Line Switch, Run-Stop-Jog Switch, Signal Isolator, Auto/Manual Switch, Class "A" AC Line Filter, Multi-Speed Board, Programming Kit, Modbus Communication Module, and Liquidtight Fittings. A connector is provided for easy installation of accessories.

TRIMPOT ADJUSTMENTS

- **Minimum Speed (MIN)**
- **Acceleration (ACC)**
- **Slip Compensation (COMP)**
- **Boost (BOOST)**
- **Maximum Speed (MAX)**
- **Deceleration (DECEL)³**
- **Slip Compensation (COMP)**
- **Jog (JOG)**

PENTA KB POWER™

A Complete Line of Motor Drives

TABLE 1 – GENERAL PERFORMANCE SPECIFICATIONS

Description	Specification	Factory Setting
115 Volt AC Line Input Voltage Operating Range (Volts AC)	115 (±15%)	—
208/230 Volt AC Line Input Voltage Operating Range (Volts AC)	208 (-15%) / 230 (+15%)	—
400/460 Volt AC Line Input Voltage Operating Range (Volts AC)	380 (-15%) - 460 (+15%)	—
Maximum Load (% Current Overload for 2 Minutes)	150	—
Carrier, Switching Frequency (kHz)	16, 8	—
Signal Following Input Voltage Range ¹ (Volts DC)	0 - 5	—
Output Frequency Resolution (Bits, Hz)	10, .06	—
Minimum Speed Trimspot (MIN) Range (% Frequency Setting)	0 - 40	0
Maximum Speed Trimspot (MAX) Range (% Frequency Setting)	70 - 110	100
Acceleration Trimspot (ACCEL) and Deceleration Trimspot (DECEL) Range (Seconds)	.3 - 20	1.5
Boost Trimspot (BOOST) Range (50 Hz Only) (Volts/Hz)	0 - 30	5
Slip Compensation Trimspot (COMP) Range at Drive Rating (Volts/Hz)	0 - 3	1.5
Current Limit Trimspot (CL) Range (% Full Load)	0 - 200	160
Jog Trimspot (JOG) Range (% Frequency Setting)	0 - 100	35
Motor Frequency Setting (Hz) (Jumper J5)	50, 60	60
Output Frequency Multiplier (1X, 2X) (Jumper J4) ²	1, 2	1
Minimum Operating Frequency at Motor (Hz)	1	—
Speed Range (Ratio)	60:1	—
Speed Regulation (30:1 Speed Range, 0 - Full Load) (% Base Speed) ³	2.5	—
Overload Protector Trip Time for Stalled Motor (Seconds)	6	—
Undervoltage/Overvoltage Trip Points for 115 Volt AC Line Input (±5%) (Volts AC) ⁴	76 - 141	—
Undervoltage/Overvoltage Trip Points for 208/230 Volt AC Line Input (±5%) (Volts AC) ⁴	151 - 282	—
Undervoltage/Overvoltage Trip Points for 400/460 Volt AC Line Input (±5%) (Volts AC) ⁴	302 - 567	—
Run/Fault Relay Output Contact Rating (Amps at 30 Volts DC, 125 Volts AC, 250 Volts AC)	1, 0.5, 0.25	—
Operating Temperature Range (°C)	0 - 45	—

Notes: 1. Requires an isolated signal. If a non-isolated signal voltage is used, install the SIAC – Signal Isolator (Part No. 9467). 2. Allows the motor to operate up to two times the rated RPM. Constant horsepower will result when operating the drive in the "X2" mode. 3. Dependent on motor performance. 4. Do not operate the drive outside the specified AC line input voltage operating range.

TABLE 2 – ELECTRICAL RATINGS & FEATURES

Model	Part No.		AC Line Input			Output			Motor Horsepower Selection ²					Net Wt.	
	Black	White ¹	Volts AC (50/60 Hz)	Phase (φ)	Maximum Current (Amps AC)	Volt Range (Volts AC)	Maximum Continuous Load Current (RMS Amps/Phase)	Maximum Horsepower (HP (kW))	Jumper J2					lbs	kg
KBAC-24D	9987	9988	115	1	16	0 - 230	3.6	1 (.75)	1	3/4	1/2	1/4	1/8	5.9	2.7
			208 / 230	1	10	0 - 230									
KBAC-27D	9520	9521	115	1	22	0 - 230	5.5	1½ (1.13)	2	1½	1	3/4	1/2	10.3	4.7
			208 / 230	1	15	0 - 230	6.7	2 (1.5)							
KBAC-29	9528	9529	208 / 230	1	15	0 - 230	6.7	2 (1.5)	3	2	1½	1	3/4	10.3	4.7
				3	10.8	0 - 230	9.0	3 (2.25)							
KBAC-45 ³	9530	9531	400 / 460	3	5.3	0 - 400 / 460	4.6	3 (2.25)	3	2	1½	1	3/4	10.3	4.7
KBAC-48 ³	9540	9541	400 / 460	3	9.6	0 - 400 / 460	8.3	5 (3.75)	5	3	2	1½	1	10.3	4.7

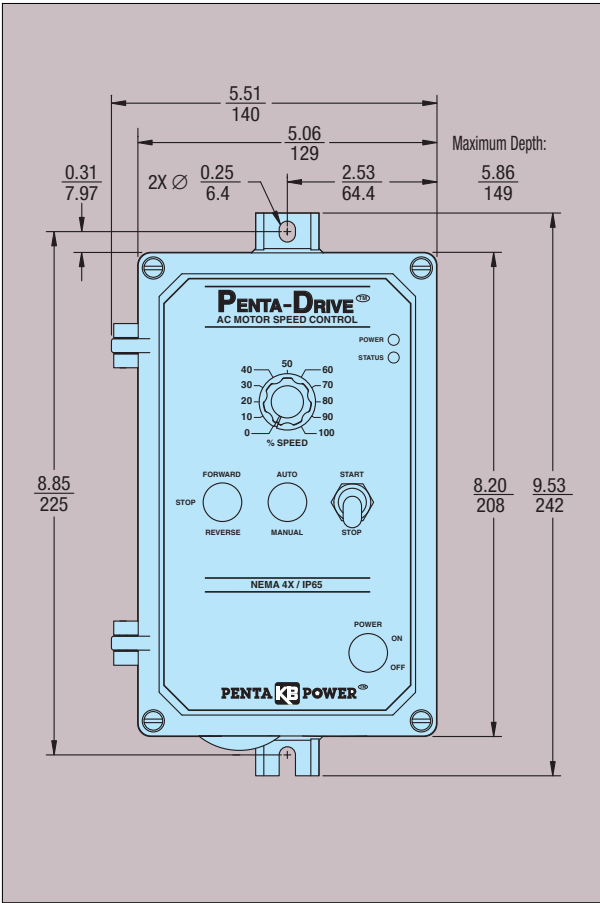
Notes: 1. White FDA approved finish. 2. Jumper J2 on Models KBAC-29, 45, 48 is labeled "A", "B", "C", "D", "E". Bold indicates factory setting. 3. Models KBAC-45, 48 are rated 0 - 400 Volts AC for 50 Hz motor operation and 0 - 460 Volts AC for 60 Hz motor operation.

TABLE 3 – JUMPER SELECTABLE FEATURES

Description (bold indicates factory setting)	Designation	KBAC-24D	KBAC-27D	KBAC-29	KBAC-45	KBAC-48
AC Line Input Voltage (115, 230)	J1	✓	✓	—	—	—
Motor Horsepower (see Table 2)	J2	✓	✓	✓	✓	✓
Automatic or Manual Start (A, M) [*]	J3	✓	✓	✓	✓	✓
Frequency Multiplier (1X , 2X)	J4	✓	✓	✓	✓	✓
Motor Frequency (50Hz, 60Hz)	J5	✓	✓	✓	✓	✓
Fixed or Adjustable Boost (FIX , ADJ)	J6	✓	✓	✓	✓	✓
Regenerative or DC Injection Braking (RG , INJ)	J7	✓	✓	✓	✓	✓
"Run" or "Fault" Output Relay Operation (R , F)	J8	✓	✓	✓	✓	✓
Normally Open or Closed Stop Contact (NO , NC)	J9	✓	✓	✓	✓	✓
Constant or Variable Torque (VT , CT)	J10	**	✓	✓	✓	✓
Factory Assignable function (1, 2)	J11	**	✓	✓	✓	✓

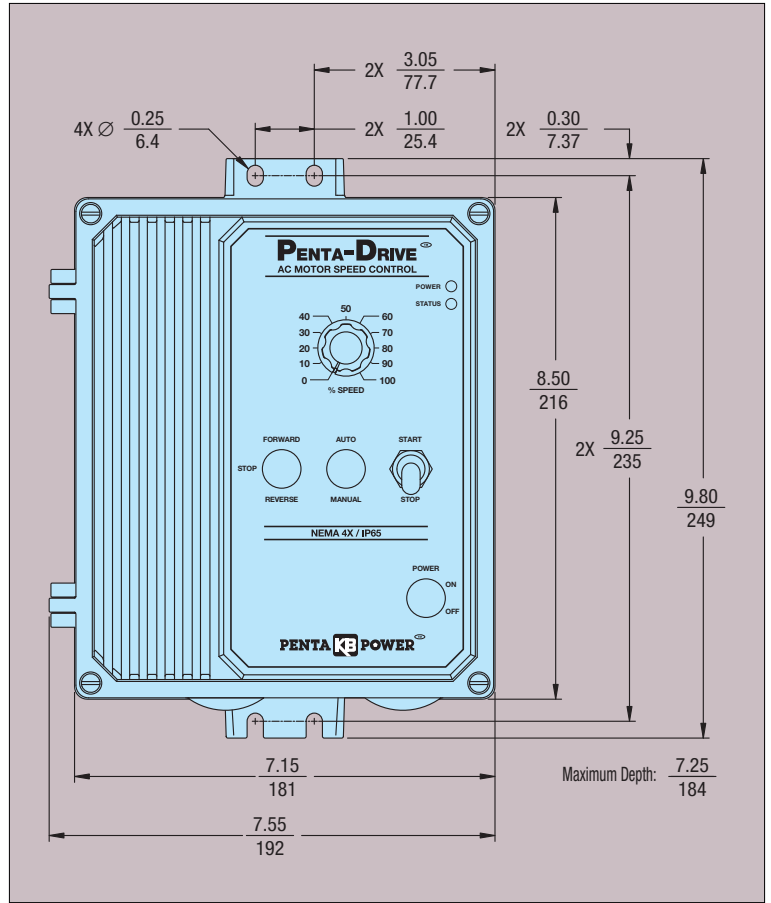
* In Auto Mode, the drive will automatically restart due to a momentary power loss of less than 5 seconds. ** Feature available 3rd Qtr. 2005.

**FIGURE 1 – MODELS KBAC-24D
MECHANICAL SPECIFICATIONS (Inches/mm)**



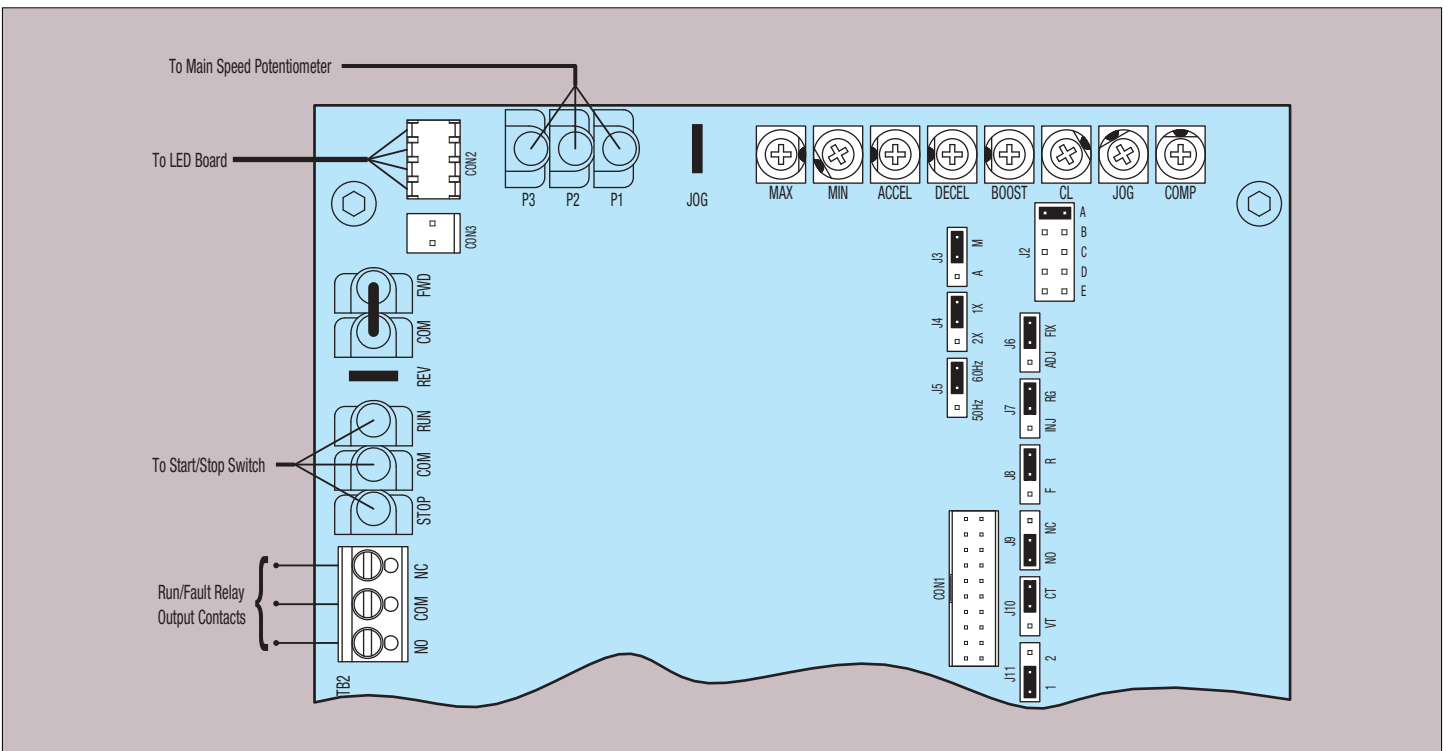
Contains 2 mounting holes for standard 1/2" liquidtight fittings.

**FIGURE 2 – MODELS KBAC-27D, 29, 45, 48
MECHANICAL SPECIFICATIONS (Inches/mm)**



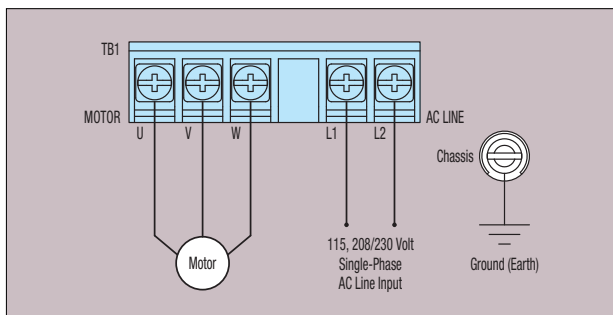
Contains 2 mounting holes for standard 1/2" liquidtight fittings and 1 mounting hole for standard 3/4" liquidtight fitting.

FIGURE 3 – CONTROL LAYOUT*

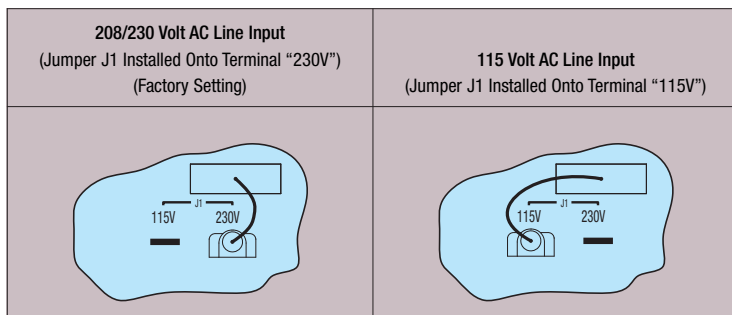


*Layout of Model KBAC-24D varies slightly.

**FIGURE 4 – MODELS KBAC-24D, 27D
MOTOR & AC LINE INPUT CONNECTIONS**



**FIGURE 5 – MODELS KBAC-24D*, 27D
AC LINE INPUT VOLTAGE SELECTION**



* Layout of Model KBAC-24D varies slightly.

FIGURE 6 – MODELS KBAC-29, 45, 48 MOTOR & AC LINE INPUT CONNECTIONS

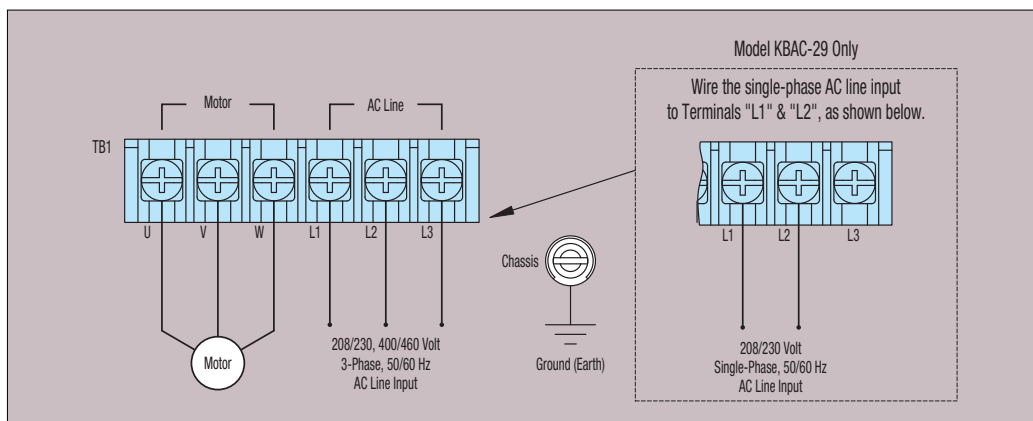


TABLE 4 – OPTIONAL ACCESSORIES

Description	Model KBAC-24D	Model KBAC-27D	Model KBAC-29	Model KBAC-45	Model KBAC-48
Forward-Stop-Reverse Switch – Provides motor reversing and stop functions. Mounts on the enclosure cover and is supplied with a switch seal to maintain liquidtight integrity.	9480	9480	9480	9480	9480
On/Off AC Line Switch – Disconnects the AC line. Mounts on the enclosure cover and is supplied with a switch seal to maintain liquidtight integrity.	9482	9523	9532	9532	9532
Run-Stop-Jog Switch – Selects speed setting from either the Main Speed Potentiometer or the JOG Trimpot. Mounts on the enclosure cover and is supplied with a switch seal to maintain liquidtight integrity.	9488	9488	9488	9488	9488
Signal Isolator – Provides isolation between a non-isolated signal voltage source and the drive. Mounts on the drive's PC board with four snap-ins.	9467*	9467*	9467*	9467*	9467*
Auto/Manual Switch – When used with the Signal Isolator, it selects remote process signal or the Main Speed Potentiometer. Mounts on the enclosure cover and is supplied with a switch seal to maintain liquidtight integrity.	9481	9481	9481	9481	9481
AC Line Filter¹ – Provides Class A RFI (EMI) suppression. Installs onto the drive's PC board with quick-connect terminals. Suffix "S": Filter must be used with built-in On/Off AC Line Switch. Suffix "NS": Filter must be used without On/Off AC Line Switch.	Suffix "S"	9516	9512	9479	9479
	Suffix "NS"	9507	9513	9515	9515
Multi-Speed Board – Provides multi-speed operation using external contacts or a PLC. Mounts on the drive's PC board with four snap-ins.	9489	9489	9489	9489	9489
Programming Kit² – Includes DownLoad Module™ (DLM) handheld programming device which uploads and downloads drive programs, PC to DLM serial communication cable, DLM to drive communication cable, and PC Windows® based Drive-Link™ communication software.	9582	9582	9582	9582	9582
Modbus Communication Module – Allows direct communication between drive and Modbus ³ protocol.	9517	9517	9517	9517	9517
Liquidtight Fittings – Provide a liquidtight seal for wiring the drive. Kit includes two 1/2" and one 3/4" liquidtight fittings.	9526	9526	9526	9526	9526

Notes: 1. Complies with CE Council Directive 39/336/EEC Industrial Standard. 2. If a USB communication cable is required, purchase Part No. 19008. 3. Other protocols available, contact our Sales Department.

* Warning! It is highly recommended that a Signal Isolator be installed when using the drive with external control signals.