Encore 700 Diaphragm Metering Pump

Sales Literature No. WPSSL0100

Precise Metering, Robust And Reliable

Years of Continued Service

The Encore® 700 diaphragm metering pump combines the robustness of hydraulic diaphragm pumps with the unparalleled economy, simplicity, and serviceability of a mechanical pump.

The Encore® 700 pump is engineered to handle industrial and municipal metering applications in water and wastewater treatment, swimming pools, food processing, chemical processing, brewing and distillation, and agriculture.

Key Benefits

- Efficient, reliable and smooth discharge pattern through the use of variable nonloss motion eccentric stroke adjustment
- High metering accuracy even at varying discharge pressures
- Fast and easy service of valve assemblies without disturbing the suction and discharge piping
- Choice of configurations—Simplex / Duplex / Double simplex to suit the complexity of the application / site layout restrictions
- The Encore gearbox is robust and reliable utilising high quality components
- Handles capacities to 2500 l/h (660 US GPH), back pressures to 12 bar (175 psi)
- Non-loss-motion (amplitude modulation) variable eccentric stroke adjust mechanism renders efficiency, longevity, and reliability, as well as a smooth discharge pattern
- Flexibility of direct coupled or pulley driven, for an additional 4:1 turndown on stroke frequency with a standard induction motor
- Precision-engineered liquid ends meter mild solutions, aggressive chemicals, high-viscosity polymers, and slurries with greater efficiency than conventional liquid ends
- Clear PVC cartridge valves for fast service with no piping disturbances and built-in visual indication of operation
- Premium composite diaphragm design ensures high metering accuracy, even at varying discharge pressures

Operational Performance & Configurations

The Encore 700 Non-Loss-Motion Pumps

Unlike Solenoid pumps which are the most simple and economical type of pump that provide a pulsed flow with huge pressure spikes, create considerable noise and wear, or the Loss of Motion pumps which are motor-driven with a higher capacity than Solenoid pumps. The Encore 700 Diaphragm Metering pump is driven by a rotating crankshaft. This is where the eccentricity can be smoothly adjusted during operation, there are no return springs and the diaphragm moves with simple harmonic motion. The fluid velocity profile is sinusoidal at all stroke lengths; adjusting stroke length simply alters the amplitude of the sine wave. This design provides reliability and longevity and pump valves operate with far greater efficiency and minimal system vibration.

Simplex Pump

Offers single head design on single gear box with stroke control.

Double Simplex Pump

Offers two heads with two gear boxes each with independent stroke length control, and a common motor.

Duplex Pump

Offers two identical sized heads on single gear box with common stroke length control, and a direct drive arrangement

Features

1

Short suction and discharge ports minimize friction losses and cavitation, improving hydraulic characteristics and providing far more efficient fluid metering than conventional liquid end designs.

2

Our premium composite diaphragm is manufactured to stringent specifications to ensure long life even with the most demanding applications. The design incorporates Teflon® facing, for the highest degree of chemical resistance, and nylon reinforcements, all bonded to a pre-formed elastomeric support. We've added convolutions for unconstrained rolling action, a steel backing plate to assure volumetric accuracy even at varying discharge pressures, and an O-ring groove in the head's diaphragm cavity for complete sealing.

3

A secondary diaphragm seal completely separates the pump head from the drive unit. This double diaphragm isolating design eliminates the risk of cross contaminating gearbox lubricant and process fluid.

4

High precision guided ball and seat, PVC, PVDF & 316SS cartridge valves are available to provide built in sight flow indication and fast fool-proof service. The patented design includes wide flow paths and four point guides to control ball rise and assure proper seating. The valve housing is compression sealed to the pump heads and connectors by O-rings and is easily removed for service or replacement without disturbing the external piping.

5

Available with standard induction, variable speed or inverter duty motors for wider operating ranges and automatic process controls.

6

This patented robust mechanical assembly features liberal use of heavy duty parts, including an epoxy painted cast iron gearbox for superior corrosion resistance, stainless steel fasteners, load absorbing tapered roller bearings, robust gears, and steel and nodular iron drive components.

7

An optional diaphragm leak detection system senses the early stages of diaphragm failure. The system consists of a solid-state, electro-optic sensor that mounts to the liquid end and a control box. This box, which can be mounted at the pump, or up to 30m (100ft) away, can monitor two liquid ends. LED's and a relay provide both local and remote indication of failure.

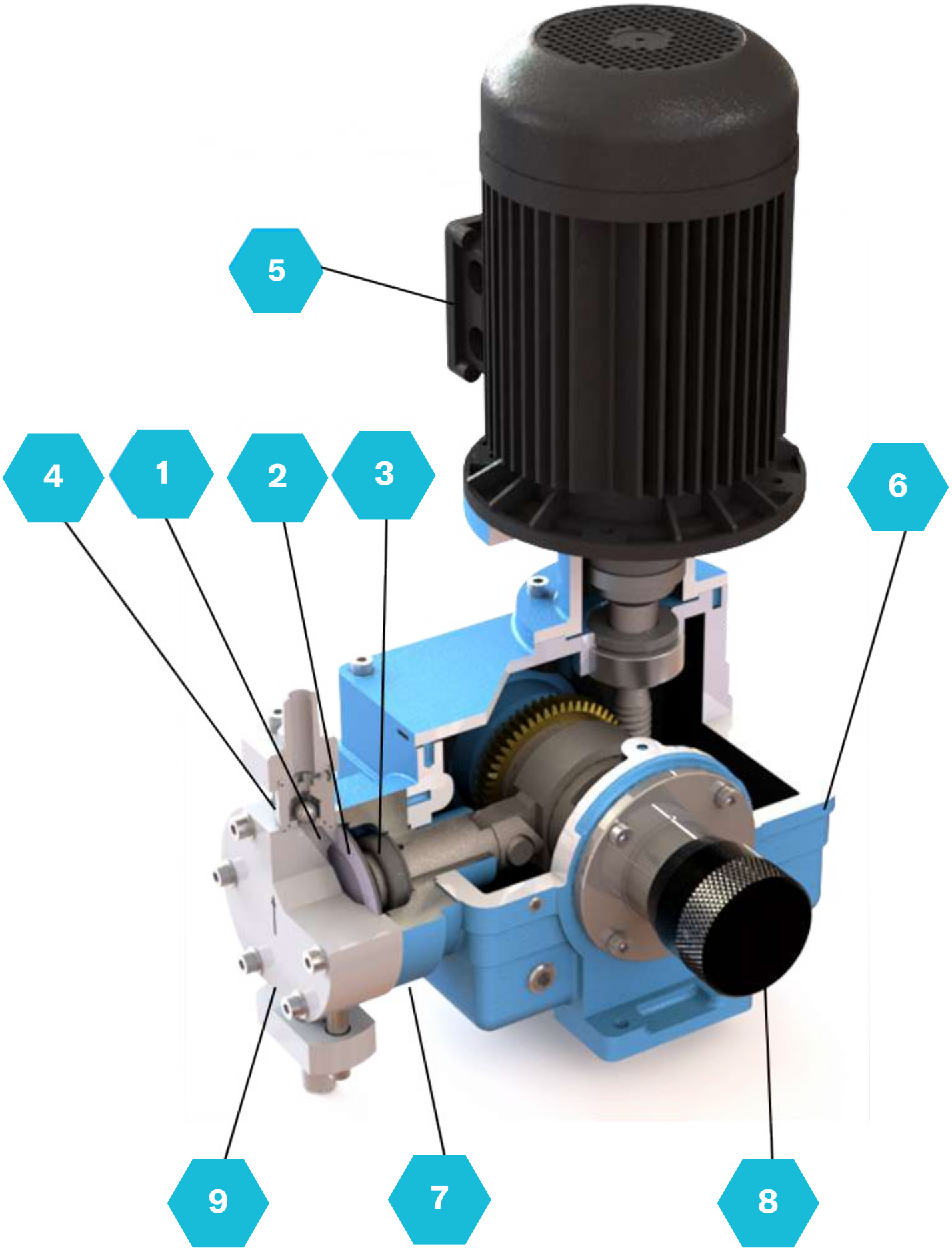
8

Obtain precise and highly repeatable feed rate settings with a 10-turn, micrometer- type stroke length adjuster. A percent scale and vernier indicate stroke length in 0.25% increments. Feed rate is infinitely adjustable from 0 to 100%. Optional automatic capacity control via stroke length is also available.

9

Patented drive and control mechanism with precision liquid end design offer superior metering and process control performance.

The Encore® 700 diaphragm metering pump is available in two compact drive arrangements: direct drive or pulley drive for an additional 4:1 range ability on stroke frequency with a standard induction motor. When the pulley drive arrangement is combined with a DC variable speed motor, total operating turndown can be as high as 800:1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Operation

Controls

The Encore®700 diaphragm metering pump can be controlled by varying the stroke length or stroke frequency. The following control schemes are available:

- Manual or Automatic Control
- Start-Stop Control where the motor is wired into the circuit of a transfer pump, switch, timer, or controller
- Flow Proportional Control from a single process variable
- Residual, Compound Loop, or Set point Control using one or two process variables.

Manual Stroke Length Control

A 10-turn micrometer gives continuous feed rate adjustment over a 10:1 range. A percent scale and vernier indicate stroke length setting to 1 part in 400. Each revolution of the knob changes feed rate by 10%. Stroke length is infinitely adjustable from 0 to 100%. The stroke control mechanism provides positive positioning and locking of the stroke mechanism, eliminating the need for external manual locks.

Automatic Stroke Length Control

For automatic capacity control via stroke length our NEMA 4X / IP66 actuator is used in conjunction with either process variable controllers or direct mA input. The compact field retrofittable actuator easily installs on the pump and features local manual override and a window for clear indication of stroke length.

Temperature Limits

With PVC liquid end: ambient temperatures from 2-52°C (35-125°F), process fluid temperatures up to 52°C (125°F). With Kynar® and Stainless Steel liquid end: process fluid temperatures up to 82°C (180°F).

Electrical Requirements

Standard induction motor arrangement is 1450 rpm (50 Hz)/1725 rpm (60Hz), single phase, TEFC, UL® Listed, CSA® Approved. Motors with other electrical characteristics are available as an option. Diaphragm leak detector equires 115/230 Volts. Relay rating 5 Amps @ 250 Volts, 30 VDC. NEMA® 4X (IP66) enclosure.

Variable speed drive control unit requires 115/230 Volts, 50/60 Hz, single phase, 200 mA (115V, 100 mA (230V). Variable Frequency Drive requires 230 or 460 Volt, 3-phase power. Automatic stroke length actuator - three alarm contacts (high, low, actuator disengaged) N.O., rated 5 Amps @ 250 Volts.

Chemical Metering Integrated Skid System

To simplify liquid feed system design, installation, and startup, integrated pump skid packages are available from stock components. All systems are laid out on an easily accessible and open frame design with a small foot print. Skid systems also include standard metering pump control panels that are pre-tested and fully integrated with the liquid feed system. They are pre-piped and include many installation accessories, such as back pressure and relief valves, pulsation dampeners, and calibration chambers. Multiple sizes provide a unit tailored to meet a wide range of flows and pressures.

Materials of Construction

- Gear box and liquid end adapter: epoxy painted, cast iron
- Actuator enclosure: epoxy painted, cast aluminum
- Pump head: PVC, Kynar®, or Stainless Steel
- Suction and discharge valve housings: clear PVC, grey PVC, Kynar®, or stainless steel
- Valve balls: 316 stainless, TFE, ceramic and polyurethane (for slurry service)
- Valve seals: Hypalon®, Viton®, and EPDM
- Valve seats: PVC, Kynar®, 316 SS, ceramic (for slurry service)
- Diaphragm: TFE-faced, fabric reinforced, elastomer backed, with a steel backing plate

Mounting base:
A mounting base is available with single simplex pumps and standard with double simplex and duplex pumps. The pump is UV resistant.

Polymer and slurry handling capabilities:
Polymer solutions at viscosities up to 5,000 cPs at 144 spm. Viscosities measured with a Brookfield® Viscometer with No. 2 spindle at 3 rpm.

Hydrated lime slurries:
Up to 100kg/m3 (0.8 lbs per US gallon) of water; activated carbon slurries up to 131kg/m3 (1.1 lbs per US gallon of water); diatomaceous earth slurries up to 204kg/m3 (1.7 lbs per US gallon) of water.

Technical Information & Operating Range

Accuracy

Repeatable metering accuracy is ± 2% of full scale, at constant hydraulic conditions, over a 10:1 operating range.

Liquid Ends

Diaphragm sizes are 35mm (1-3/8”), 50mm (2”), 75mm (3”), 100mm (4”), 125mm (5”), and 165mm (6-1/2”).

Feed Rate Adjustment

Feed rate is adjustable from 0 to 100% Increments of 0.25% is indicated on the vernier percent scale. Each revolution of the knob changes stroke length by 10%.

Direct Drive Arrangement:

Stroke length is adjustable over a 10:1 range; stroke frequency is adjustable over a 20:1 range (using an optional variable speed drive and DC motor) and 10:1 (using an optional variable frequency drive and inverter duty motor). Total combined maximum operating turndown can be as high as 200:1. Above 100:1 continuous turndown, total available operating range should be evaluated against specific chemicals being metered.

	50Hz	1450 RPM		60Hz	1750 RPM		Maxiumum Discharge Pressure bar (PSI)			
Diaphragm Size mm (inches)	Stroke Frequency SPM	Capacity*		Stroke Frequency SPM	Capacity*		Motor Kilowatts (Horsepower) @1750rpm {Vaiable speed}			Connections BSP(NTP) [tubing]
		l/h	USGPH		l/h	USGPH	.19 (1/4) {.37 (1/2)}	.37 (1/2) {.56 (3/4)}	.55 (3/4) {.75 (1)}	
35 (1-3/8”)	30 60 120 144	3.9 7.9 15.8 18.9	1 2.1 4.2 5	36 72 144	4.7 9.5 18.9	1.3 2.6 5	12 (175)			R1/2 (1/2”) [1/4” ID x 3/8” OD]
50 (2”)	30 60 120 144	20.5 41 82 98.4	5.4 10.8 21.7 26	36 72 144	24.6 49.2 98.4	6.5 13 26	12 (175)			R1/2 (1/2”) [1/4” ID x 3/8” OD]
75 (3”)	30 60 120 144	39.5 79 158 190	10.4 21 41 50.2	36 72 144	47 95 190	12.5 25 50	10 (150) 7 (100) 3 (50) 3 (50)	10 (150) 8 (120) 8 (120)	10 (150) 10 (150)	R1/2 (1/2”)
100 (4”)	30 60 120 144	60.7 121.4 242.9 291.4	16 32.1 64.2 77	36 72 144	72.9 145.7 291.4	19.3 38.6 77.2	9 (130) 5 (75) 3 (30) 2 (30)	9 (130) 5 (75) 5 (75)	9 (130) 9 (130)	R3/4 (3/4”)
125 (5”)	30 60 120 144	141.9 283.9 567.8 681.3	37.5 75 150 180	36 72 144	170.3 340 681.4	45 90 180	5 (75) 3 (40) 1.4 (20) 1.4 (20)	5 (75) 3 (40) 3 (40)	5 (75) 5 (75)	R1 (1”)
165 (6-1/2”)	30 60 120 144	260 520 1040 1250	68.7 137.4 275 330	36 72 144	312.3 624.6 1250	82.5 165 330	3 (45) 1.7 (25) 1 (15) 1 (15)	3 (45) 1.7 (25) 1.7 (25)	3 (45) 3 (45)	R1 1/2 (1 1/2”)

* Reflects simplex capacities, double-simplex arrangements must be configured with the same stroke frequency on both liquid ends.

** For pulley drive arrangements capacities listed are for pulley step 1. Capacities for steps 2, 3 and 4 are 75%, 50% and 25% respectively.

Note: Minimum motor horsepower for 6-1/2” head is 1/2 Induction (1 variable speed)

Pulley Drive Arrangement:

Stroke length is adjustable over a 10:1 range; stroke frequency is adjustable over an 80:1 range (using an optional variable speed drive), and 40:1 range (using an optional variable frequency drive). Total combined maximum operating turndown can be as high as 800:1. Above 100:1 continuous turndown, total available operating range should be evaluated against specific chemicals being metered.

Speed of Response

Automatic stroke length control response time is 100 seconds from 0 to 100%. Variable speed control response time is under three seconds from 0 to 100%.

Suction Lift

The pump will self-prime with a 3m (10ft) of water suction lift (wetted valves, zero back pressure, full stroke and speed, water-like solutions). Once primed, the pump will operate with a 3m (10ft) suction lift. Flooded suction is recommended.

Weight and Shipping Weight

Single simplex 50 kg; 58 kg (110 lb: 127 lb); double simplex 73kg; 84kg (160 lb: 184 lb) duplex 64 kg (140 lb). For arrangements wit automatic stroke length control add 5.5 kg; 7.3 kg (12 lb; 16 lb).

Pump Head Size	A*	B	C	D	E	F	G	H
1-3/8”	1/16” (2mm)	8-11/16” (413mm)	16-1/4” (413mm)	3-1/16” (78mm)	4-13/16” (123mm)	1-1/8” (29mm)	2-3/4” (71mm)	1/2” NPT OR 1/4” x 3/8” TUBING
2”	7/8 (23mm)	10-5/16” (262mm)	16-1/2” (420mm)	3-5/16” (85mm)	5” (127mm)	1-5/16” (34mm)	2-7/8” (72mm)	1/2” NPT OR 1/4” x 3/8” TUBING
3”	1-5/16” (34mm)	11-1/8” (283mm)	16-5/16” (415mm)	3-3/16” (81mm)	4-7/8” (124mm)	1-1/4” (32mm)	2-13/16” (71mm)	1/2” NPT
4”	2-3/16” (56mm)	12-7/8” (328mm)	16-13/16” (428mm)	3-5/8” (93mm)	5-3/8” (137mm)	1-7/16” (37mm)	3-1/16” (78mm)	3/4” NPT
5”	3-5/8” (92mm)	15-13/16” (401mm)	17-1/8” (435mm)	3-15/16” (101mm)	5-11/16” (144mm)	1/11/16” (43mm)	3-1/4” (83mm)	1” NPT
6-1/2”	5-3/4” (146mm)	20” (508mm)	19” (483mm)	5-7/16” (138mm)	7-1/8” (181mm)	2-1/2” (64mm)	3-15/16” (99mm)	1-1/2” NPT

* NOTE: OPTIONAL PUMP BASE HEIGHT - 7”

Encore 700 Diaphragm Metering Pump
Direct Drive Arrangement
Simplex with Manual Stroke Control

WATER PROCESS SOLUTIONS

Custom Packaged Skid Builds.

We can utilise the Encore 700 pumps in many different configurations to suit your application needs. These configurations can incorporate all the accessories usually applied in one convenient package ready to be used. These systems will come pre-tested and built to a high standard. In general they can provide duty/standby pumps with pressure relief valves, back pressure valves, pulsation dampeners and calibration columns to suit your individual application needs.

Auto Degas Valve

An optional auto degas valve is available for metering liquids, for capacities up to 91 l/h (24 GPH US), such as sodium hypochlorite, that tend to gas off especially at low chemical feed rates and/or start-stop operation. With the auto degas valve installed, the pump can be restarted under high back pressure conditions without the need for manually priming the liquid end. This can be a major advantage especially for unmanned stations. The valve has a PVDF housing, Viton® and EPDM O-rings, a PTFE diaphragm, and a Hastelloy® C spring. Retrofit kits are available for existing installations. For more information see publication CF.470.250.000.PS

Diaphragm Leak Detector

An optional diaphragm leak detector system is available. It senses the early stages of diaphragm failure. The system contains an ectro-optic sensor mounted to the liquid end and a NEMA® 4X (IP66) control box. It can monitor two liquid ends and it includes a relay for remote indication of diaphragm failure.

Optional Installation Accessories

Available accessories include back pressure valves, pressure relief valves, anti syphon suction demand valves, main connections, suction line strainers, pulsation dampeners, calibration columns, solution tanks, mixers, and level switches.

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