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Integrated Vector-Type Pump Drive
Product Group D and W

Integrated Vector-Type Pump Drive

seepex has released a new integrated drive for its popular lines of MD and BW progressive cavity pumps. The drive integrates the pumps with a single reduction gear box, a four-pole, TEFC, inverter-rated ½ HP electric induction motor and a "vector" type, variable frequency drive in a NEMA 4 enclosure. External or special fabricated control enclosures are not required for high pressure or run dry protection, so installation is no more complicated than a typical home stereo. The pump and drive combination can cover a performance band of 0.08 gph to 60 gpm and pressures to 360 psi.

The MD unit operates from standard 1x120 VAC, 15 amp circuits with a 5-15 p grounded plug. The drive has an H-O-A switch with a 10-turn potentiometer for manual control and will accept a 4-20 mA process signal through a standard ½" UNF-connector. Other ½" UNF connectors are installed for external high pressure, low-flow or run-dry protection. The sensors and connector cables, in various lengths, are also available from seepex.

Run-Dry Control Receptacle [2)]
A 5-pin, ½" standard UNF connector supplies power and receives a 120 VAC signal that will inhibit the drive and indicate a fault. Using standard cables it can be connected to the seepex TSE run-dry protection device in a NEMA 4X enclosure or an IFM Efector® low flow switch. Neither device requires an external power source or installation wiring. Control cables are available in a variety of lengths.

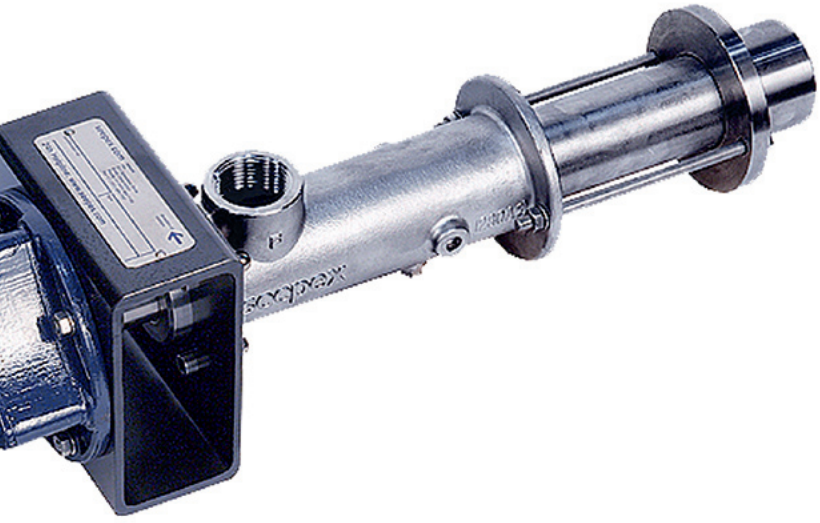
4-20 mA Input Receptacle [2)]
A 6-pin, ½" standard UNF connector links the controller to an external process control interface that can be from a variety of sources: a PLC, DCS or Scada system. The unit can also be stopped remotely without disconnecting power to the controller. Please read the description of the optional follower program for more operating options.

Over-pressure Control Receptacle [2)]
A 5-pin, ½" standard UNF connector supplies power and receives a 120 VAC signal that will inhibit the drive and indicate a fault. Using standard cables it can be connected to an IFM Efector® indicating and scalable pressure switch. The device does not require an external power source or installation wiring. Control cables are available in a variety of lengths.

1) BW5 and BW10 have a one-turn potentiometer
2) Not standard on BW5 or BW10

The effective speed range of the units is 20-600 rpm. The "vector" capability of the VFD has an internal sensor-less feedback system for superior but economical speed control and stability. The gear box provides the unit with strong torque capability across the entire speed range. Unlike DC units, this unit has excellent speed control even in areas, like agricultural or oil production fields, where input line voltages vary. There is also no concern for contamination or maintenance caused by the wearing of commutator brushes.

These units are available for quick delivery. Also available for the BW5 and BW10, high capacity wobble stator pumps, is a simplified "vector" drive that does not include a gear reducer. This unit has a single-turn potentiometer and a single connector to accept a 4-20 mA process signal. Since "wobble" stator pumps are not available with TSE run-dry protection, the run-dry and high pressure connections are not standard.



Potentiometer [1)]
The ten-turn potentiometer precisely sets the speed during manual (hand) operation. It has a lock to prevent accidental speed changes. In the standard automatic mode it functions to set the minimum speed/flow rate as a scaling device. When using the optional follower programming, it will allow the ratio between the 4-20 mA input and the pump speed to be varied.

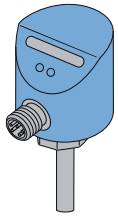
Fault Indication
An LED indicates a fault condition. The indicator lights up when either the drive is in an overload condition or one of the external instruments has actuated an inhibit signal back to the drive for a run-dry, high pressure or low-flow condition.

H-O-A Switch [2)]
This switch denies power to the controller and motor and allows the unit to operate either in the manual (hand) mode, controlled by the potentiometer, or the automatic (auto) mode, controlled by an externally generated 4-20 mA signal.

Accessories, Options

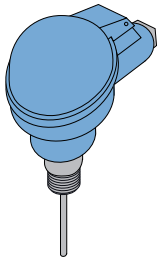
Available with AISI 316 or (optional) T4 titanium probe. Many low flow applications that use pumps with very small stator diameters cannot use the seepex TSE controller, this device is a reliable alternative to protect against dry-run damage to the pump. It is also recommended to protect the range W (wobble-stator) pumps from run-dry damage, since none of the pumps in that design can be fitted with the TSE device.

Flow Monitor
from IFM Efector® (Model SI5006)



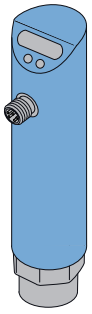
All but the smallest seepex metering pumps (range D) can be fitted with the proven TSE sensor and controller. Literally, thousands of these devices have been sold by seepex, each year over the last 20 years, as accessories for the industrial ranges of seepex pumps. No external wiring is required. A standard 5-pin UNF cable powers the TSE. The enclosure can be mounted to a wall with wood screws or plastic anchors. It is no more difficult than hanging a picture on a wall.

seepex TSE
Dry-Run Protector in a NEMA 4X enclosure



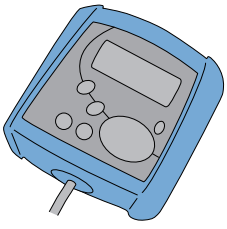
A second dedicated 5-pin standard UNF cable from the pump drive powers this device. It indicates the discharge pressure in an LED read-out and can be set to trip and send an inhibit signal to the drive to protect against over-pressure or dead head operation. Since seepex pumps are positive displacement devices if a line is closed or blocked, these pumps will continually build pressure until something in the system fails. This device protects the pump and other system components from damage due to over pressure conditions.

Indicating and Scalable Pressure Switch
from IFM Efector® (Model PN4223)



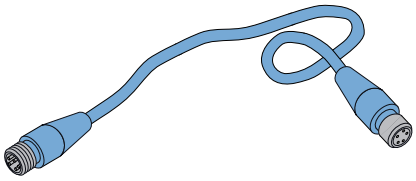
For users, like those making OEM chemical dilution skids or multiple component blending systems, that require more sophisticated operation and programming a keypad for programming the controller is available. The controller is a "Vector" drive with a variety of scalable and programmable functions including min and max speed, accel and decel, current boost and time delays.

HMI Key Pad



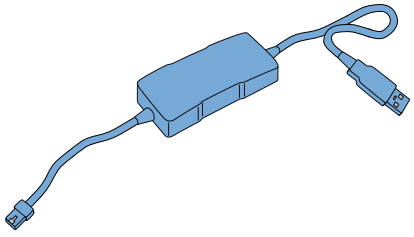
These cables are available in a number of lengths to connect the drive to the source of the external 4-20 mA control signal, the run-dry, low-flow or over-pressure protection devices. seepex stocks these cables in a number of lengths and configurations. Contact your distributor or a seepex factory representative to obtain the correct cables for your installation.

½" Standard UNF Connector Cable



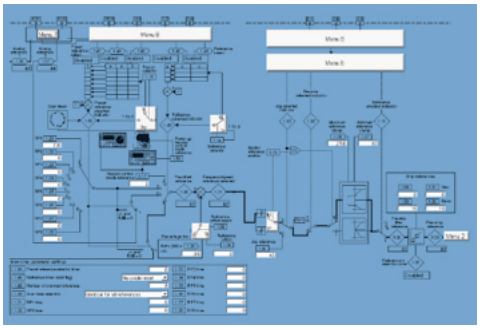
An even higher level of functionality is provided with this software package that not only provides the functionality of the key-pad but also allows the capability to store programs so that multiple units can be programmed with the same functions.

USB/RJ45 Cable and PC-Based Software



The standard controller is programmed to accept a 4-20 mA signal from a PLC or other device that has already been programmed to control the drive and the potentiometer. In automatic operation, it is used to set the minimum flow rate/ speed. An optional program is available that will make the unit operate in true follower mode. This makes it easy for many users to connect the output of an instrument to inject chemicals for disinfection, flocculation or single component blending. In the auto mode the potentiometer can be used to vary the dosing ratio of the pump relative to the signal received. It can also follow the signal from loads cells on tanks or capacitance probes in volumetric fillers to maintain a set level. For more information consult your local seepex representative.

Programmed Follower Operation



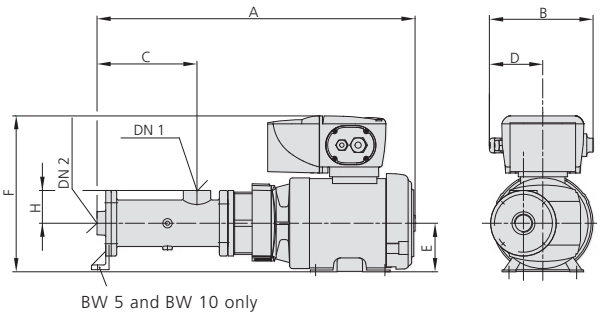
Dimensions and Drives

Model										Max GPH*
	A	B	F	C	D	E	H	DN1	DN2	@ 0 psi
0005-24	25 9/16"	7 7/16"	11 1/4"	8 5/16"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	2,27
0015-24	25 9/16"	7 7/16"	11 1/4"	8 5/16"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	5,76
003-12	25 9/16"	7 7/16"	11 1/4"	8 5/16"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	12,79
003-24	28 9/16"	7 7/16"	11 1/4"	11 11/32"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	13,98
006-12	26 7/8"	7 7/16"	11 1/4"	9 5/8"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	26,7
006-24	31 3/16"	7 7/16"	11 1/4"	13 31/32"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	27,76
012-12	27 5/8"	7 7/16"	11 1/4"	10 13/32"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	57,1
012-24	32 25/32"	7 7/16"	11 1/4"	15 35/64"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	53,9
025-6L	27 5/8"	7 7/16"	11 1/4"	10 13/32"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	152
025-12T	27 5/8"	7 7/16"	11 1/4"	10 13/32"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	144
05-6LT	27 5/8"	7 7/16"	11 1/4"	10 13/32"	3 7/8"	3 1/2"	1 11/16"	1" NPT	1/2" NPT	281
BW1	22 15/16"	7 15/32"	11 7/32"	7 7/32"	3 13/16"	3 5/32"	2 3/8"	1" NPT	1" NPT	102
BW2	22 15/16"	7 15/32"	11 7/32"	7 7/32"	3 13/16"	3 5/32"	2 3/8"	1" NPT	1" NPT	216
BW5	28"	6 3/4"	11 7/16"	14"	3"	3 1/2"	3"	1 1/4" NPT	1 1/2" NPT	2758
BW10	35 5/8"	8 21/32"	12 27/32"	18 9/32"	4 11/32"	4 13/32"	5 1/8"	2" NPT	2" NPT	3788

*H_2O at 200 °C

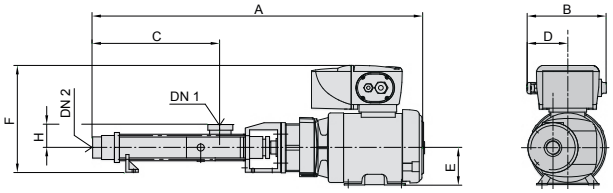
Note: Viscosity may affect performance. Consult your local seepex agent for correct pump selection.

	Max. ΔP	Motor	Power	
@ Max. DP	psi	HP	ϕx VAC	Amps
2,19	360	1/2	1x120	10
5,52	360	1/2	1x120	10
12,13	180	1/2	1x120	10
13,45	360	1/2	1x120	10
25,27	180	1/2	1x120	10
26,7	360	1/2	1x120	10
51,3	180	1/2	1x120	10
52,3	360	1/2	1x120	10
147	90	1/2	1x120	10
137	180	1/2	1x120	10
267	90	1/2	1x120	10
72,2	90	1/2	1x120	10
153	60	1/2	1x120	10
1777	45	2,5	3x460	3
2236	45	4,3	3x460	7

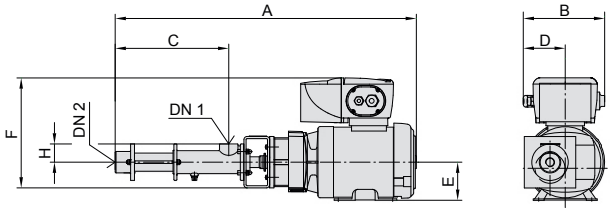


BW 5 and BW 10 only

Pump BW with seepex AC motor and controller



Pump BN with seepex AC motor and controller

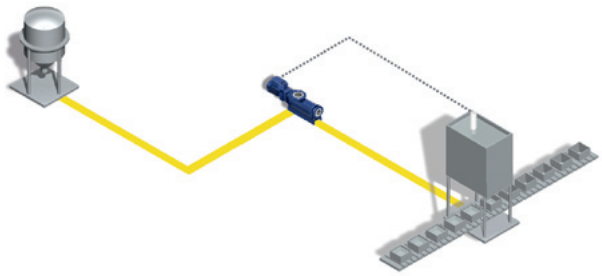


Pump MD with seepex AC motor and controller

Applications

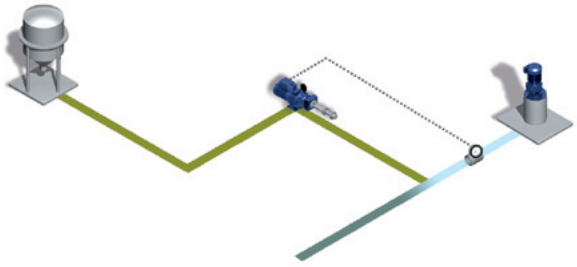
Filler Feeding

Volumetric fillers such as those used in the food industry to fill bottles, cans or cups have tanks above the piston actuated filling devices. The levels in the tank need to be maintained and are usually measured with capacitance probes that output a 4-20 mA signal. With the optional follower program the seepex integrated "vector" drive can be used to maintain a proper level in the supply tank, without requiring a separate controller or electrical panel.



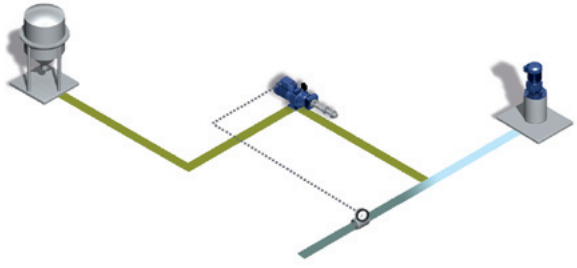
NaOCl Water Disinfection

Sodium Hypochlorite (NaOCl) can be reliably injected into the discharge of a vertical turbine pump in a water well to increase the contact time for more assured disinfection. The seepex integrated "vector" drive can follow the signal from a flow meter on the discharge of the centrifugal pump to maintain the proper dosage in ppm of Cl. Because NaOCl is prone to degrade in certain conditions or time, it may be needed to change the dosage rate of the sterilizing liquid. This can be done by turning the potentiometer, while in automatic operation, to change the feed ratio. This saves consumption of these expensive chemicals as well as degradation of pipes and controls in contact with the chlorinated water by eliminating the need to over-dose to maintain sterility or purchase expensive chlorine concentration instruments. Those who do use these devices can still use the seepex integrated "vector" drive in its optional PI program.



The PI Alternative Program

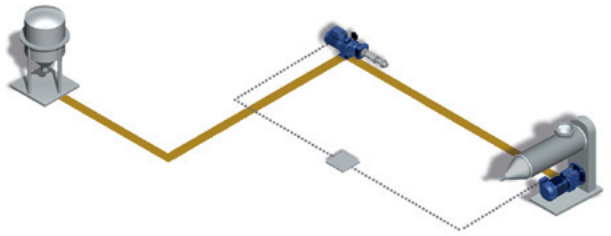
This is also the driver to maintain a set-point. It could be the level in a tank, density, brightness or, in this case, the ppm of Cl in water. The "hand" mode is for manual control of pump. The pump runs at speed set by 10-turn pot when switched to "hand" position of selector switch. The "off" position of selector switch shuts the pump off. The auto mode is for automatic regulation of an external parameter. In "auto" position of selector switch, the pump runs at a speed that regulates ph, chemical concentration, flow rate, etc. The 4-20 mA signal provides feedback proportional to the regulated parameter. The 10-turn pot then sets desired value of regulated parameter.



Example: set the pot to 8 ppm chlorine concentration. The 4-20 mA signal indicates actual chlorine concentration, and the pump is commanded to run at a speed to maintain that concentration. The pump will increase or decrease the speed to maintain the set point even if the water flow increases or the concentration if the NaOCl degrades due to temperature or time.

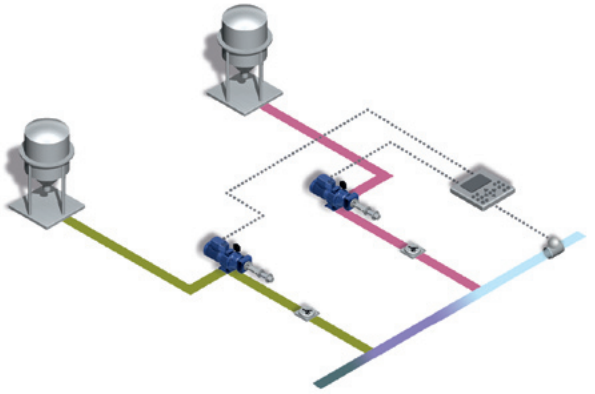
Liquid Injection into Extruders

Extruders are commonly used to form a variety of shapes in the manufacturing of breakfast cereals, dry pet food and certain snack products. The seepex integrated "vector" drive can be used in conjunction with a PLC to inject liquids or dyes and change the color of the product continuously, without a system shutdown. They can also be used to inject vitamins, oils, syrups or other liquids. With the optional follower program, the drive can be set to track the speed of the extruder if a hall effect or "roto-pulser" is affixed to the extruder drive or motor. The normal 5 VDC signal can be conditioned through a digital to analog converter and send a 4-20 mA signal that can be read by the drive. Again the pump drive will follow the extruder drive and using the 10-turn potentiometer on the seepex integrated "vector" drive can vary the injection ratio.



PH Control

By using two pumps with the seepex integrated "vector" drive, the pH of a process or waste stream can be controlled. The standard program is used and the pumps are controlled by a PLC that defines a pump handling a base to increase its speed as the pH drops or a pump handling an acid to increase its speed as the pH climbs. The length between a VFD and a motor is limited, it is often not practical to locate the pump drive near the pH meter or the PLC. Using the seepex integrated "vector" drive, users can significantly reduce the installation time and cost because they do not need remote panels. Since the motors used by seepex are totally enclosed and the enclosures are of a NEMA 4 design, the entire unit can be installed outdoors.



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VFD 5.09E