

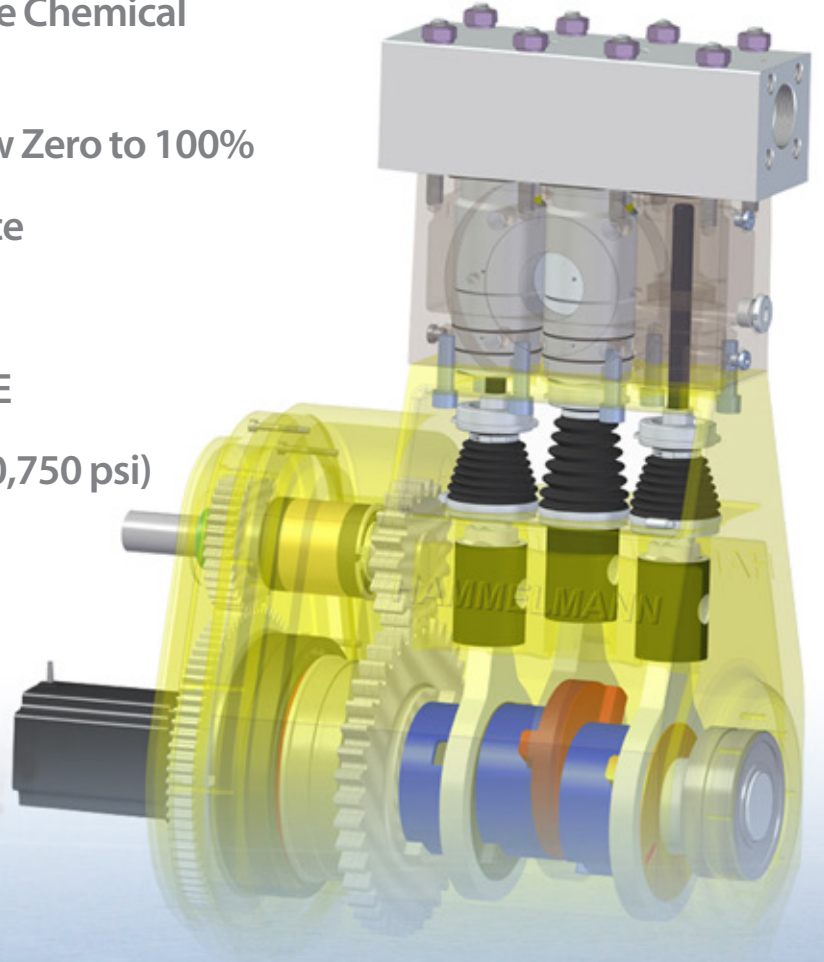
HDP 20V

INNOVATION THROUGH EXPERIENCE

CALDER
A PG FLOW SOLUTIONS COMPANY

CONTROLLED VOLUME INJECTION PUMP

- A Revolution in High Pressure Chemical Injection Pumping
- Variable Stroke/Variable Flow Zero to 100%
- API 674 & API 675 Compliance
- Zero Emissions
- Efficiency: >95%VE & 95%ME
- Pressures up to 3,500 bar (50,750 psi)
- MTBF: 12,000 hrs ++
- Reduced Footprint & Weight
- ATEX Zone I & II Compliant
- Material Options; 316SS, Duplex, Super Duplex



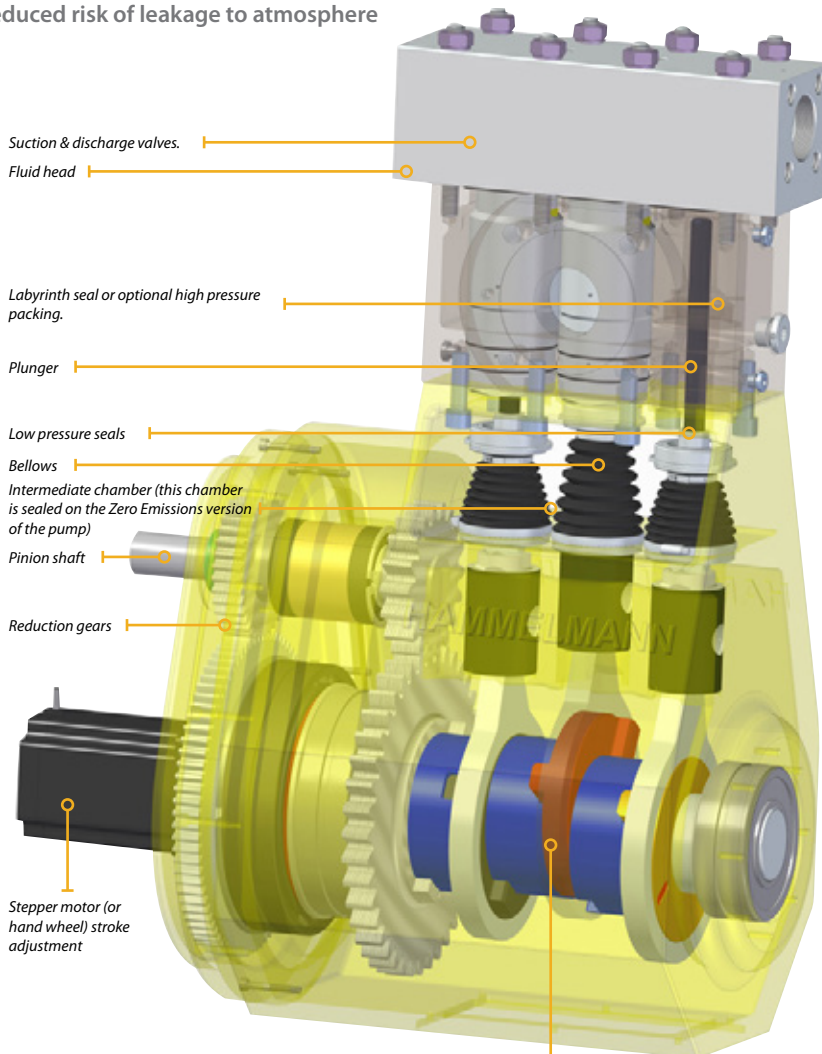
HDP 20V CONTROLLED VOLUME INJECTION PUMP

The Hammelmann High Pressure Pump revolution started in 1948 when engineer Paul Hammelmann built his first high pressure pump. Of his many patents the most significant is the 'labyrinth seal' technology and encapsulation of the HP components within the suction manifold, eliminating the risk of a high pressure leak to atmosphere and extending the life of high pressure seals to 12000 hours ++.

For almost 20 of our 32 years in business, Calder has worked together with Hammelmann, combining their pumps and Calder packaging experience to deliver Calder process packages to the Oil & Gas industry. Calder-designed-and-built packages operate under the most hostile environmental conditions, delivering industry compliant, lightweight, small footprint, environmentally friendly High Pressure Injection technology which leads the world in safety, efficiency and reliability.

The HDP 20V Variable Stroke Pump represents another chapter in the progress of this remarkable pump manufacturer. The HDP 20V pump delivers all of the advantages of the conventional API 675 Double Diaphragm type pump:

- Variable flow rate via stroke control from 0% to 100%
- Seamless, automatic or manual flow adjustment
- Flow repeatability
- Linearity
- Remote operation
- High turndown ratio
- Reduced risk of leakage to atmosphere



Suction & discharge valves.
Fluid head

Labyrinth seal or optional high pressure packing.

Plunger

Low pressure seals

Bellows

Intermediate chamber (this chamber is sealed on the Zero Emissions version of the pump)

Pinion shaft

Reduction gears

Stepper motor (or hand wheel) stroke adjustment

Variable stroke crankshaft – Zero to 30mm stroke adjustment

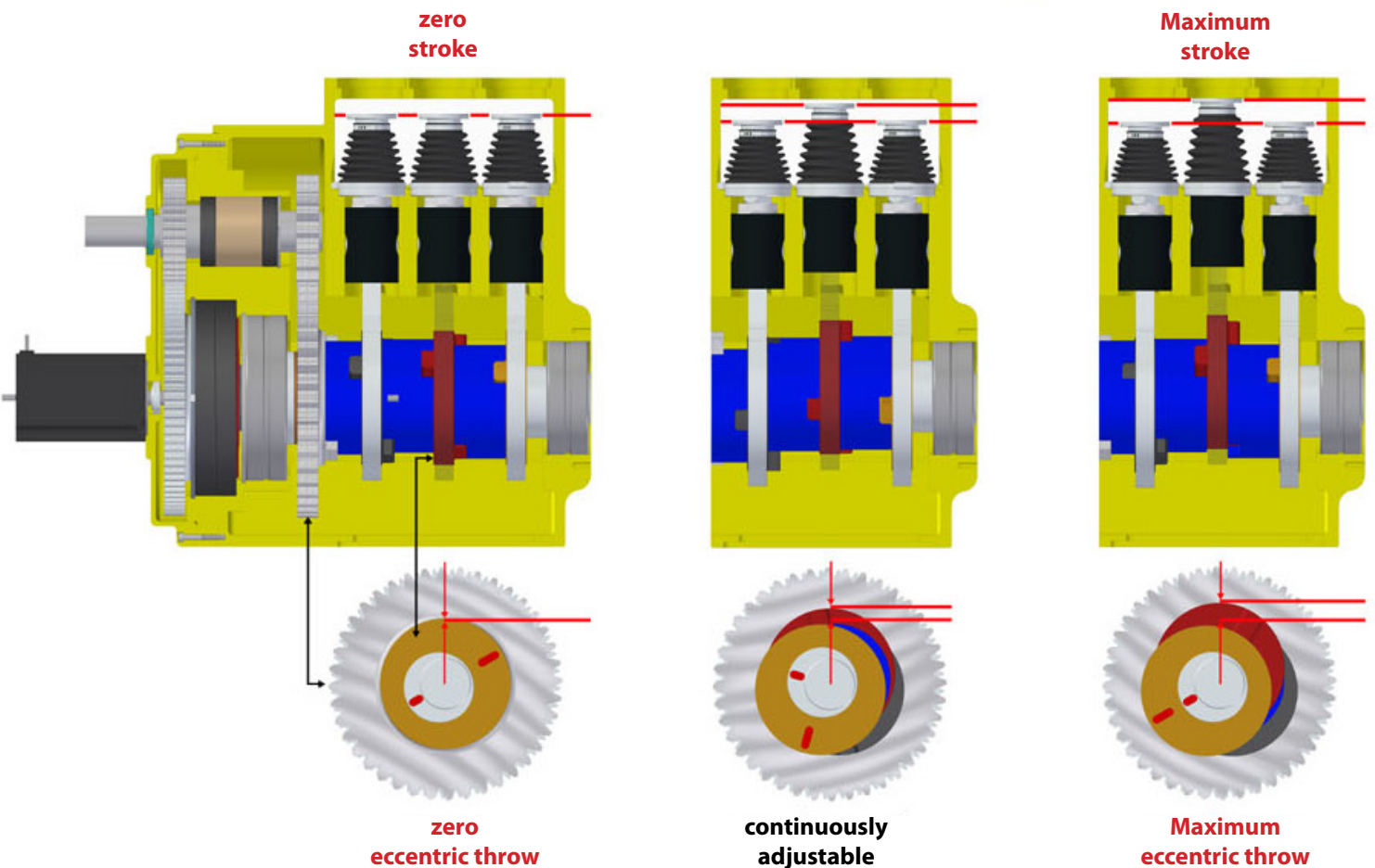
Calder 20V Pump Package:

Additional advantages particularly at higher volumes and pressures ≥ 200 bar:

- Significantly smaller footprint
- Significant package weight savings
- Energy efficient pump, converting 93% to 98% of the shaft power to hydraulic energy
- High reliability delivering extended Mean-Time -Between-Failures (MTBF)
- Capacity to handle dirtier fluids at higher pressures
- Reduced levels of vibration/pulsation.
- Lower noise levels
- Zero risk of high pressure process fluid leakage to atmosphere with zero emissions option
- Reliable control and containment of low pressure leakage
- Eliminates the risk of contaminating hydraulic fluid
- Pressurised power end oil lubrication & filtration system
- Power end cooling is not required due to the high mechanical efficiency of the pump



Variable Stroke Operation



Description of Operation, Variable Stroke:

- The pinion shaft is driven by a constant speed electric motor
- The pinion gear wheel drives the crankshaft through the 2.2:1 reduction gear which is incorporated into the HP pump power end
- The stroke length is altered by turning the variator shaft
- The stepper motor maintains the pre-set position of the variator shaft
- The stepper motor (or hand wheel) mounted to the crankshaft orientates the crankshaft double eccentric journals to achieve the desired stroke length range from zero to 30mm
- Stroke length adjustment can be made while the pump is on or off load

Materials

Wetted part materials selection is dictated by customer preference and the process liquid to be pumped.

Available liquid end materials include: 316L Stainless Steel, Duplex SS, Super Duplex SS, Bronze, Hastelloy and Inconel.

Plungers: Solid Ceramic or Tungsten Carbide.

Fluid Head Assembly

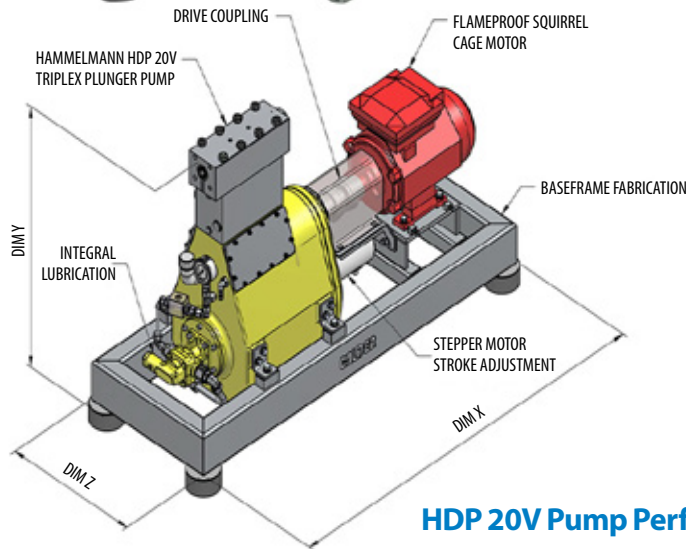
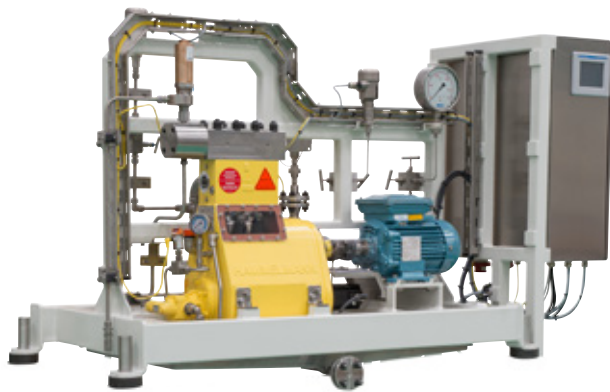
- The Hammelmann HDP 20V pump fluid head assembly is the industry-proven fluid end fitted to the full range of Hammelmann process pumps.

Features:

- Moderate plunger speeds result in low plunger and sealing element wear.
- Flow rate adjustment options:
 - Hand wheel manual adjustment
 - Stepper motor with amplifier
- Communication interface:
 - Analogue Interface
 - CANopen
 - Modbus
- High pressure sealing assemblies:
 - Dynamic labyrinth seal technology for exceptional long life reliability and high efficiency from 10% to 100% flow rate.
 - Kevlar/PTFE seal assembly for high volumetric efficiency from Zero to 100% flow rate.
- Stainless steel pump head free of alternating stress.
- Suction & discharge wing guided conical valves.
- The high pressure components are enclosed within the suction chamber of the high pressure pump, thereby eliminating any risk of a high pressure leak to atmosphere.

HDP 20V Controlled Volume Injection Pump

INNOVATION THROUGH EXPERIENCE



Technical Information

- Vertical 3 plunger pump
- Rod force : ≤ 17.6 kN
- Stroke length : ≤ 30 mm
- Power rating: ≤ 18.5 kW
- API 674 & API 675 Compliant
- Pinion shaft speed 1500, 1800, 2150 rpm
- Maximum plunger speed:
 - At 2,100 rpm motor speed = 57m/min
 - At 1,800 rpm motor speed = 49m/min
 - At 1,500 rpm motor speed = 41m/min
- Power end lubrication: Pinion shaft driven lube pump

Motor Frame Size	kW	X (mm)	Y (mm)	Z (mm)
90	1.1 - 1.5	1205	750	440
100	2.2 - 3	1280	750	440
112	4	1280	750	440
132	5.5 - 7.5	1360	800	500
160	11 - 15	1510	850	525
180	18.5 - 22	1510	850	525

HDP 20V Pump Performance Chart:

Plunger Dia mm ϕ	Flow 0 - 100%	Power absorbed kW - Pump Model HDP 20V							
		2.20kW	3.00kW	4.00kW	5.50kW	7.50kW	11.00kW	15.00kW	18.50kW
8	≤ 3.45 lpm	345 bar	471 bar	628 bar	863 bar	1,177 bar	1,727 bar	2,354 bar	2,904 bar
	≤ 0.91 gpm	5,007 psi	6,828 psi	9,103 psi	12,517 psi	17,069 psi	25,035 psi	34,138 psi	42,104 psi
10	≤ 5.38 lpm	221 bar	302 bar	403 bar	554 bar	755 bar	1,107 bar	1,510 bar	1,862 bar
	≤ 1.42 gpm	3,211 psi	4,378 psi	5,838 psi	8,027 psi	10,946 psi	16,054 psi	21,891 psi	27,000 psi
12	≤ 7.75 lpm	154 bar	210 bar	279 bar	384 bar	524 bar	769 bar	1,048 bar	1,293 bar
	≤ 2.05 gpm	2,229 psi	3,039 psi	4,053 psi	5,572 psi	7,598 psi	11,144 psi	15,197 psi	18,743 psi
15	≤ 12.11 lpm	98 bar	134 bar	179 bar	246 bar	335 bar	492 bar	671 bar	827 bar
	≤ 3.20 gpm	1,426 psi	1,945 psi	2,593 psi	3,566 psi	4,863 psi	7,132 psi	9,726 psi	11,995 psi
17.5	≤ 16.50 lpm	72 bar	98 bar	131 bar	181 bar	246 bar	361 bar	492 bar	607 bar
	≤ 4.36 gpm	1,047 psi	1,428 psi	1,903 psi	2,617 psi	3,569 psi	5,235 psi	7,138 psi	8,803 psi
20	≤ 21.50 lpm	55 bar	76 bar	101 bar	139 bar	189 bar	277 bar	378 bar	466 bar
	≤ 5.68 gpm	803 psi	1,096 psi	1,461 psi	2,009 psi	2,739 psi	4,017 psi	5,478 psi	6,756 psi
25	≤ 33.65 lpm	35 bar	48 bar	64 bar	89 bar	121 bar	177 bar	241 bar	298 bar
	≤ 8.89 gpm	513 psi	700 psi	933 psi	1,283 psi	1,750 psi	2,567 psi	3,500 psi	4,317 psi
30	≤ 48.46 lpm	25 bar	34 bar	45 bar	61 bar	84 bar	123 bar	168 bar	207 bar
	≤ 12.80 gpm	356 psi	486 psi	648 psi	891 psi	1,215 psi	1,782 psi	2,430 psi	2,997 psi
35	≤ 66.00 lpm	18 bar	25 bar	33 bar	45 bar	62 bar	90 bar	123 bar	152 bar
	≤ 17.44 gpm	262 psi	357 psi	476 psi	654 psi	892 psi	1,309 psi	1,784 psi	2,201 psi
40	≤ 86.00 lpm	14 bar	19 bar	25 bar	35 bar	47 bar	69 bar	94 bar	116 bar
	≤ 22.72 gpm	201 psi	274 psi	365 psi	502 psi	685 psi	1,004 psi	1,369 psi	1,689 psi
45	≤ 109.00 lpm	11 bar	15 bar	20 bar	27 bar	37 bar	55 bar	75 bar	92 bar
	≤ 28.80 gpm	158 psi	216 psi	288 psi	396 psi	540 psi	792 psi	1,081 psi	1,333 psi



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