



Daniel™ Compact Prover

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Daniel Compact Prover provides high accuracy, rapid operation and continuous flow for proving a flow meter in an operational line. This is accomplished without interrupting normal flow and without the use of manually operated bypass valves.

Its unique design features a piston assembly with an internal poppet valve in conjunction with optical position sensing, hydraulic piston return, pneumatic piston actuation and modern data processing techniques. The result is a complete packaged proving system significantly reduced in size, weight and cost while equalling or exceeding the performance of conventional provers.

Daniel Compact Prover offers flexible mounting configurations on a truck or trailer for field proving of flow meters, or can be permanently installed in a testing facility either vertically or horizontally.

Pulse interpolation electronics permit exact time determination and pulse counting which provides high accuracy proving with a smaller volume and fewer flow meter pulses than any previous prover technology. The use of a small displacement volume is made possible by the high resolution of Daniel Compact Prover which is attributed to two major factors; precision optical switches, and data acquisition using double chronometry.

Optical switches are used for defining prover volume by detecting the piston position. These switches are reliable, precise and have a fast response time (5 x 10⁻⁶ seconds). Data acquisition, using double chronometry, allows a much higher degree of meter pulse resolution than the ±1 pulse common to conventional pipe provers.

Control and operation of Daniel Compact Prover is accomplished by a microprocessor based device providing the advanced electronic capabilities necessary for control in proving volumetric or mass meters.

Daniel Compact Prover conforms to design guidelines prescribed in API Chapter 4.2 and Pulse Interpolation techniques in API Chapter 4.6. All proving report formats have been designed in accordance with API standard, Chapter 12 Calculation of Petroleum Quantities of the "Manual of Petroleum Measurement".

Features and Benefits

- Compact and portable – a single prover may be used in multiple locations for proving various sizes of meters
- 1000:1 flow rangeability
- Skid or trailer mounted
- Vertical mounting available for applications having space constraints
- Rapid proving operation offers single or multi-pass operation with immediate K-factor calculation
- Versatility – operates with virtually any pulse output flow meter
- Positive leak checking
- Automatic mechanical operation assures undisturbed product flow
- Corrosion resistant flow tube
- Flexibility-volumetric or mass meter proving

Application Range

- Typical Fluids
- Crude Oil
- Light Refined Product
- Refined Product

Compact Prover Range

- Flow Rate: 0.25 to 17,500 gpm
(0.357 bph to 25,000 bph)
- Temperature*: -46° F to 500° F
(- 43° C to 260° C)
- Pressure: 150 to 1,500 ANSI Class

**Subject to material specifications.*

Daniel™ Compact Prover is formerly known as the Brooks® Compact Prover™.

Product Datasheet

April 2011

SPECIFICATIONS

Please consult the factory if your requirements are outside the specifications noted here. Improved performance and other product and material offerings may be available depending on the application.

Performance

Repeatability: 0.02% or better (water draw)

Pressure Drop

- Piston only: Approximately 1" of water during prover pass
- Maximum flow: Approximately 10 psig across inlet/outlet flanges (on water)

Standard Materials of Construction

- Flow Tube: 17- 4 PH Stainless steel
- Piping and Flange: Carbon steel
- Poppet Seal: Fluoroelastomer (FKM)
- O-rings: Fluoroelastomer (FKM)

Available Mounting Configurations

- Horizontal
- Vertical
- Vertical Lift
- Mirror Image

Paint

- 2 Coat system: Epoxy primer/urethane
 - 3 Coat system: Inorganic zinc/epoxy/urethane
 - 4 Coat system: Inorganic zinc/epoxy (2 coats) urethane
- Color is light grey as standard top coat, white available by request.*

Electrical Connections

- 1/2" / 1" NPT
- M20 / M32

Cable Specifications

- 1000 ft (305m) max for distance between flow computer and prover

	<u>NEC</u>	<u>IEC</u>
Electric:	Sheathed	Armored
Control:	Sheathed	Armored

Pressure Ratings

		ANSI RATINGS				
		150	300	600	900	1500
PROVER SIZE	8"	✓	✓	✓	✓	CF
	12" mini	✓	✓	✓	✓	CF
	12"	✓	✓	✓	✓	CF
	18"	✓	✓	✓	✓	CF
	24"	✓	✓	✓	✓	CF
	34"	✓	✓	CF	NA	NA
	40"	✓	✓	CF	NA	NA

✓ = Available
CF = Consult factory
NA = Not available

Pressure and Temperature: Smart pressure and temperature transmitters are used where applicable. (Rosemount® 3051 and 3144 Series)

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Standard Compact Prover Capacities - Flow Rates, Dimensions and Weights:

NOMINAL FLOW TUBE DIAMETER	PROVER FLOW RATE RANGES		NOMINAL PROVER BASE VOLUME	INLET/ OUTLET FLANGE SIZE	NOMINAL PROVER SHIPPING DIMENSIONS (L X W X H)	APPROX. SHIPPING WEIGHT		
	MINIMUM	MAXIMUM						
8"	0.25 GPM	250 GPM	5 GAL	2"	121" X 56" X 50"	2,200 LBS		
	0.357 BPH	357 BPH						
	0.946 LPM	946 LPM	20 LITERS		307CM X 142CM X 127CM	998 KGS		
	0.057 M ³ PH	57 M ³ PH						
12" MINI	1.0 GPM	1,000 GPM	10 GAL	4"			147" X 62" X 55"	4,400 LBS
	1.43 BPH	1,430 BPH	40 LITERS				373CM X 157CM X 140 CM	1,995 KGS
	3.78 LPM	3,780 LPM						
	0.227 M ³ PH	227 M ³ PH						
12"	1.75 GPM	1750 GPM	15 GAL	6"	172" X 67" X 57"	4,900 LBS		
	2.5 BPH	2,500 BPH	60 LITERS		437CM X 170CM X 145CM	2,223 KGS		
	6.623 LPM	6,623 LPM						
	0.397 M ³ PH	397 M ³ PH						
18"	3.5 GPM	3,500 GPM	30 GAL	8"			193" X 76" X 56"	7,300 LBS
	5.0 BPH	5,000 BPH	120 LITERS		490CM X 193CM X 142CM	3,311 KGS		
	13.247 LPM	13,247 LPM						
	0.794 M ³ PH	794 M ³ PH						
24"	7.0 GPM	7,000 GPM	65 GAL	12"			220" X 96" X 66"	13,400 LBS
	10.0 BPH	10,000 BPH	250 LITERS		559CM X 244CM X 168CM	6,078 KGS		
	26.583 LPM	26,583 LPM						
	1.595 M ³ PH	1,595 M ³ PH						
34"	12.6 GPM	12,600 GPM	100 GAL	16"			230" X 102" X 74"	19,200 LBS
	18.0 BPH	18,000 BPH	400 LITERS		584CM X 259CM X 188CM	8,709 KGS		
	47.691 LPM	47,691 LPM						
	2.860 M ³ PH	2,860 M ³ PH						
40"	17.5 GPM	17,500 GPM	170 GAL	20"			240" X 130" X 77"	35,000 LBS
	25.0 BPH	25,000 BPH	650 LITERS		610CM X 330 CM X 196CM	13,876 KGS		
	66.237 LPM	66,237 LPM						
	3.972 M ³ PH	3,972 M ³ PH						

NOTE: Please consult the factory for your compact prover configuration. Improved performance and other product and material offerings may be available depending on the application.

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Power Requirements

POWER REQUIREMENTS					
SIZE	AC LINE VOLTAGE/ FREQUENCY/PHASE	HYDRAULIC MOTOR FULL LOAD AMPS	HYDRAULIC MOTOR CONFIGURATION	HYDRAULIC CONTROL VALVE IN-RUSH AMPERAGE	AVAILABILITY
8" and 12" mini	115/60/1	13.4	1 hp Single	10	AVAILABLE
	220/50/1 & 230/60/1	6.7	1 hp Single	5	AVAILABLE
	380/50/3	3.6	2.0 hp Single	NA	AVAILABLE
	415/50/3	3.3	2.0 hp Single	NA	AVAILABLE
	460/60/3	2.2	1.5 hp Single	5	AVAILABLE
12"	115/60/1	19	1.5 hp Single	10	CONSULT FACTORY
	220/50/1 & 230/60/1	8.4	1.5 hp Single	5	AVAILABLE
	380/50/3	3.6	2.0 hp Single	NA	AVAILABLE
	415/50/3	3.3	2.0 hp Single	NA	AVAILABLE
	460/60/3	2.2	1.5 hp Single	5	AVAILABLE
18"	115/60/1	19 x 2	1.5 hp Dual 2 circuits	NA	CONSULT FACTORY
	220/50/1 & 230/60/1	19	1.5 hp Dual 1 circuit	NA	AVAILABLE
	230/60/3	13	5 hp Single	NA	AVAILABLE
	380/50/3	9		NA	AVAILABLE
	415/50/3	8.3		NA	AVAILABLE
	460/60/3	6.5		NA	CONSULT FACTORY
	690/50/3	5		NA	CONSULT FACTORY
24"	230/60/3	13	5 hp Single	NA	AVAILABLE
	380/50/3	9		NA	AVAILABLE
	415/50/3	8.3		NA	AVAILABLE
	460/60/3	6.5		NA	CONSULT FACTORY
	690/50/3	5		NA	CONSULT FACTORY
34"	230/60/3	39	15 hp Single	NA	AVAILABLE
	380/50/3	22		NA	AVAILABLE
	415/50/3	20		NA	AVAILABLE
	460/60/3	19.5		NA	CONSULT FACTORY
	690/50/3	12.8		NA	CONSULT FACTORY
40"	230/60/3	50	20 hp Single	NA	CONSULT FACTORY
	380/50/3	28		NA	AVAILABLE
	415/50/3	26		NA	AVAILABLE
	460/60/3	25		NA	AVAILABLE

NA = Not available

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Standard Factory Tests

- **Hydrostatic:** Chart recorded pressure test to 1.5 times max working pressure
- **Water draw:** Calibration test within 0.02% repeatability traceable to NIST
- **Functional:** Verifies functionality of prover, components (i.e., instrumentation) and repeatability as per API Chapter 4

Weights and Measures Approvals

- National Conference of Weights & Measures (NCWM)
- National Type Evaluation Programs (NTEP)
- Measurement Canada - Canada
- Nederlands Meetinstituut (NMI)
- Physikalisch-Technische Bundesanstalt (PTB)
- Norwegian Weights and Measures
- Standards & Industrial Research Institute of Malaysia (SIRIM)
- Gosstandart (GOST)
- Directorate General of Oil and Gas (Migas) - Indonesia

Hazardous Location Approvals

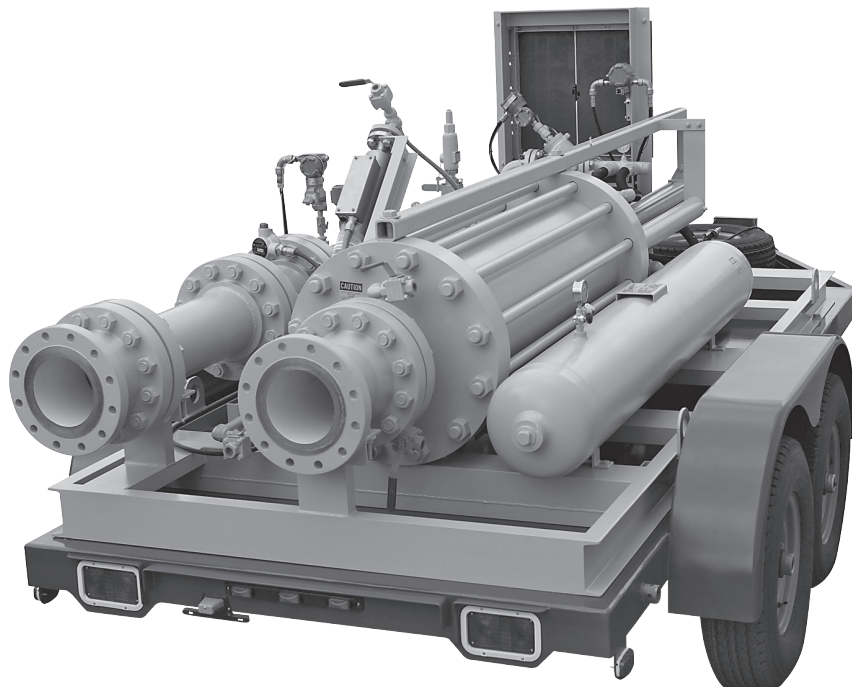
CE Mark for the European Community, including all applicable European directives and standards.
Ex de ia m IIB T3 (ATEX, PED)

Canadian Standards Association (CSA International) approval for hazardous locations, Class I, DIV. 1, Group D

Electrical systems conforming to National Electrical Code, Class I, Div. 1, Group D or CSA Std C22.2, Class I, DIV. 1, Group D, using UL/CSA approved components only

Weather Proofing

	NEC	IEC
Enclosure:	NEMA4	IP66
Motors:	NEMA3	IP54
- optional	NEMA3	IP66



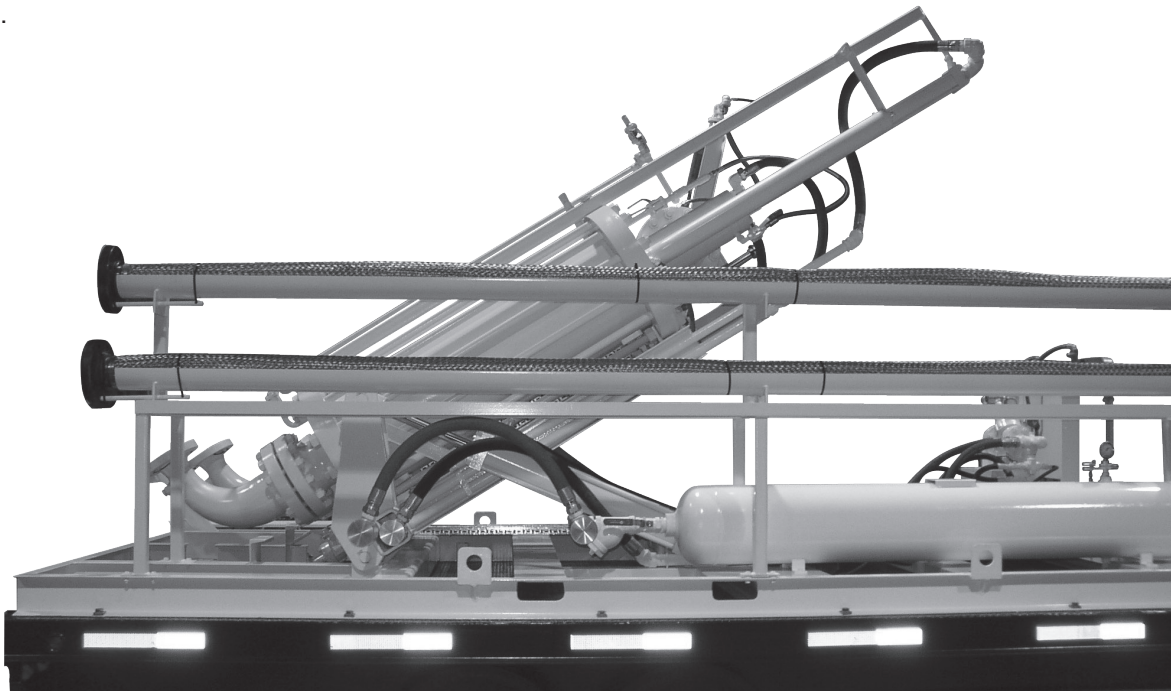
Engineered Proving Solutions

Daniel offers an engineered solution to all of today's proving challenges. From low pressure (150# ANSI) to high pressure (1500# ANSI) operations, to NACE certified materials, all aspects of the proving requirement are reviewed and the compact prover is engineered for safe, reliable service.

Compact prover systems can be engineered to include:

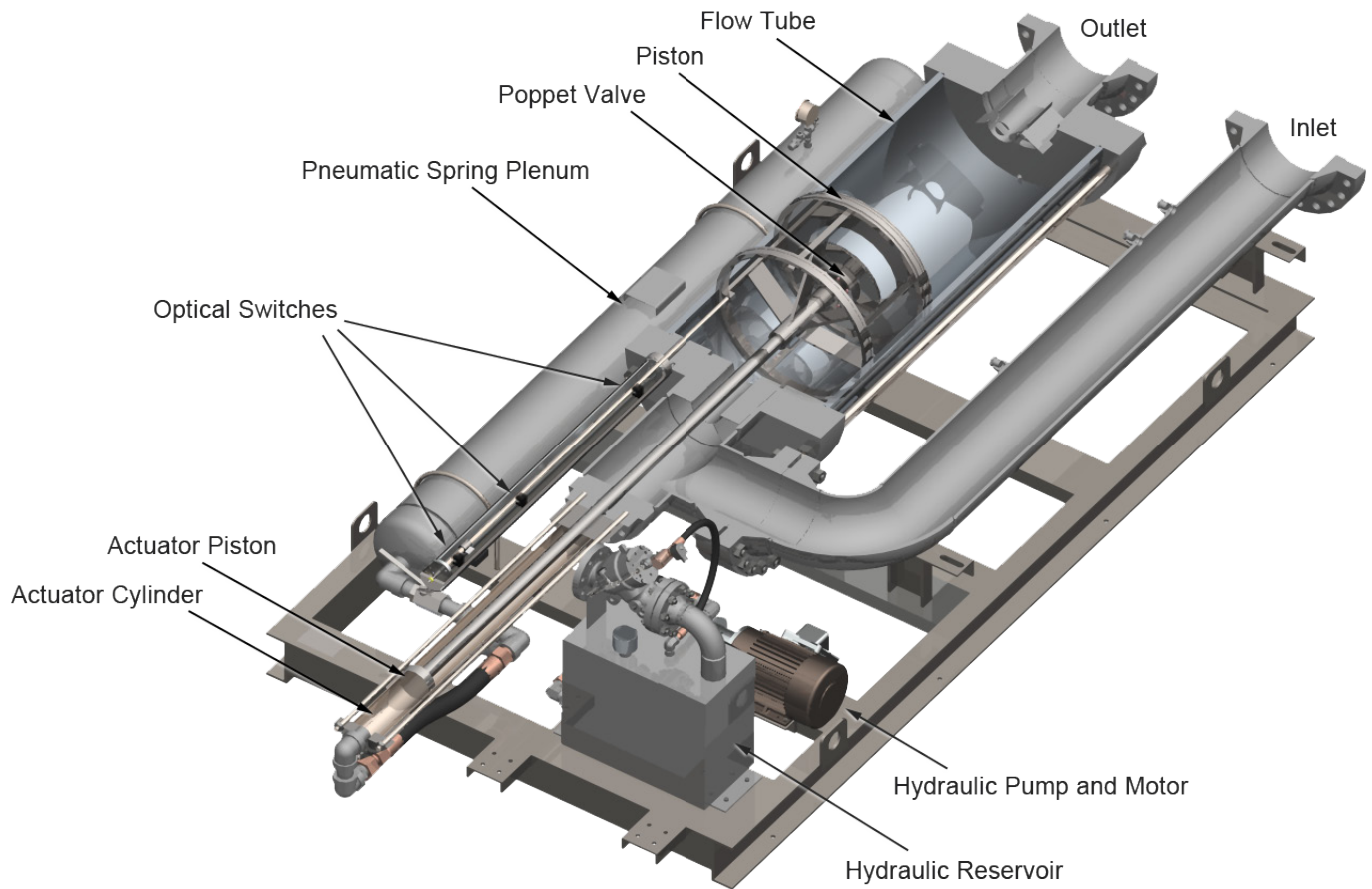
- Combination volumetric/mass meter prover
- Integrated density measurement
- Master Meters with flow conditioning
- Special materials, e.g., NACE compliant designs
- Custom instrumentation packages
- Trailer mounting (horizontal and vertical lift)
- Vertical lift and fixed vertical installation provers
- Local (hazardous area) electronics with UL and ATEX hazardous area approvals
- Local and remote proving flow computers
- Inlet and outlet pressure and temperature measurement
- Insulated and jacketed provers
- Specific configurations of valves and strainers
- Flexible hoses
- Articulated and swivel arms
- Hydraulic arms
- Integration into flow measurement skids

Above all, Daniel designs, builds, and maintains engineered proving solutions for all of today's flow measurement challenges.



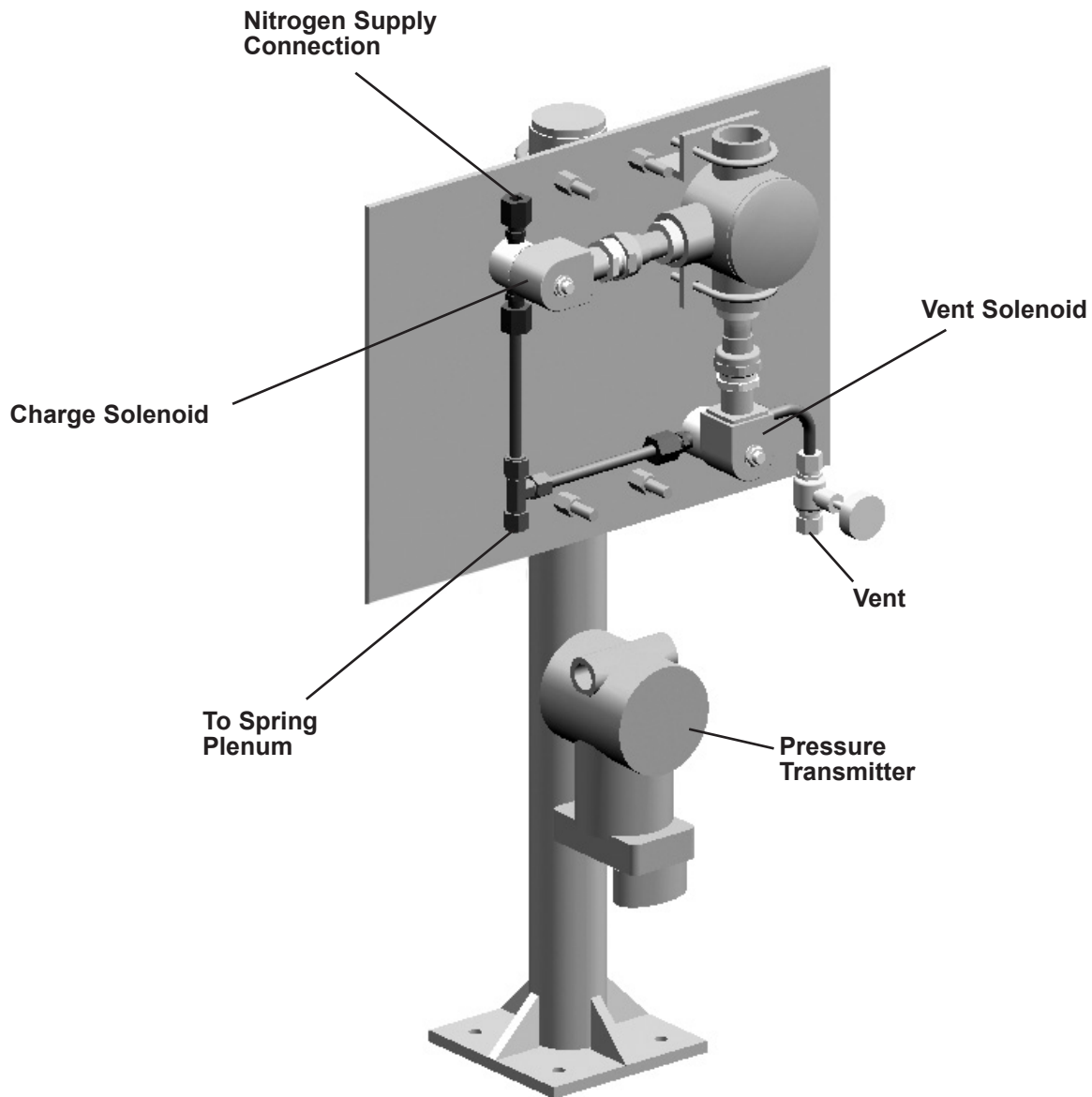
Vertical compact prover being raised into position

Compact Prover Cross Sectional View



Nitrogen Adjust Panel

As an option, Daniel Compact Prover may be equipped with an automatic plenum adjustment panel. The panel consists of charge and vent solenoid valves and a pressure transmitter. A typical panel is shown in the figure below. An operating computer with the adjustment routine pre-programmed, using an analog input (4-20mA) and two digital outputs, will be able to automatically adjust the spring plenum pressure before proving runs begin.



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