# Rugged Valves for Wind Turbine Pitch Control

D1FC / D3FC Series Direct Operated Proportional Electrohydraulic Control Valves with Position Feedback

Parker

ENGINEERING YOUR SUCCESS.

Proven from Parker:

# D1FC and D3FC Series Control Valves

## The ultimate solution for precise pitch control

Parker's advanced direct operated proportional DC valves are specially designed for high response, closed loop controls. The D1FC (nominal size NG06) and D3FC (nominal size NG10) combine a highly compact footprint with digital electronic control technology to provide rapid response and flow rates.

### Features that make a difference

**All fasteners are secured with thread locking material =** Long, reliable service in high vibration environments

**Factory Pre-set =** Valve-to-valve interchangability

**High level of dynamics combined with high flow rates =** Optimized process speed

**Progressive flow characteristics =** Precise pitch control profile

**Low Hysteresis =** Predictable control of blade position

**Optional: CANopen interface** offers serial communications that provide fast control and diagnostics

## The Power of Parker

Parker means solutions. As the global leaders in motion and control, you can rely on Parker to understand your challenges. We offer more products and services across the broadest range of applications in power than any other manufacturer. Plus our global network of manufacturing plants, 13,000 distributors and maintenance/repair outlets and 1500 Parker stores, deliver you what you want — when you need it.

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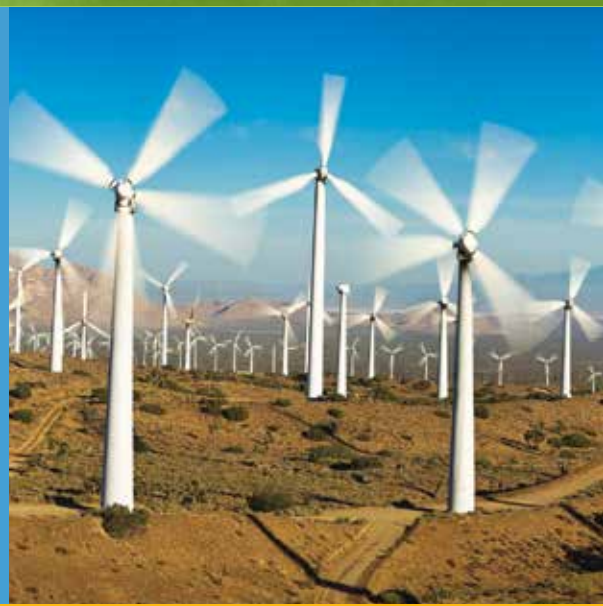

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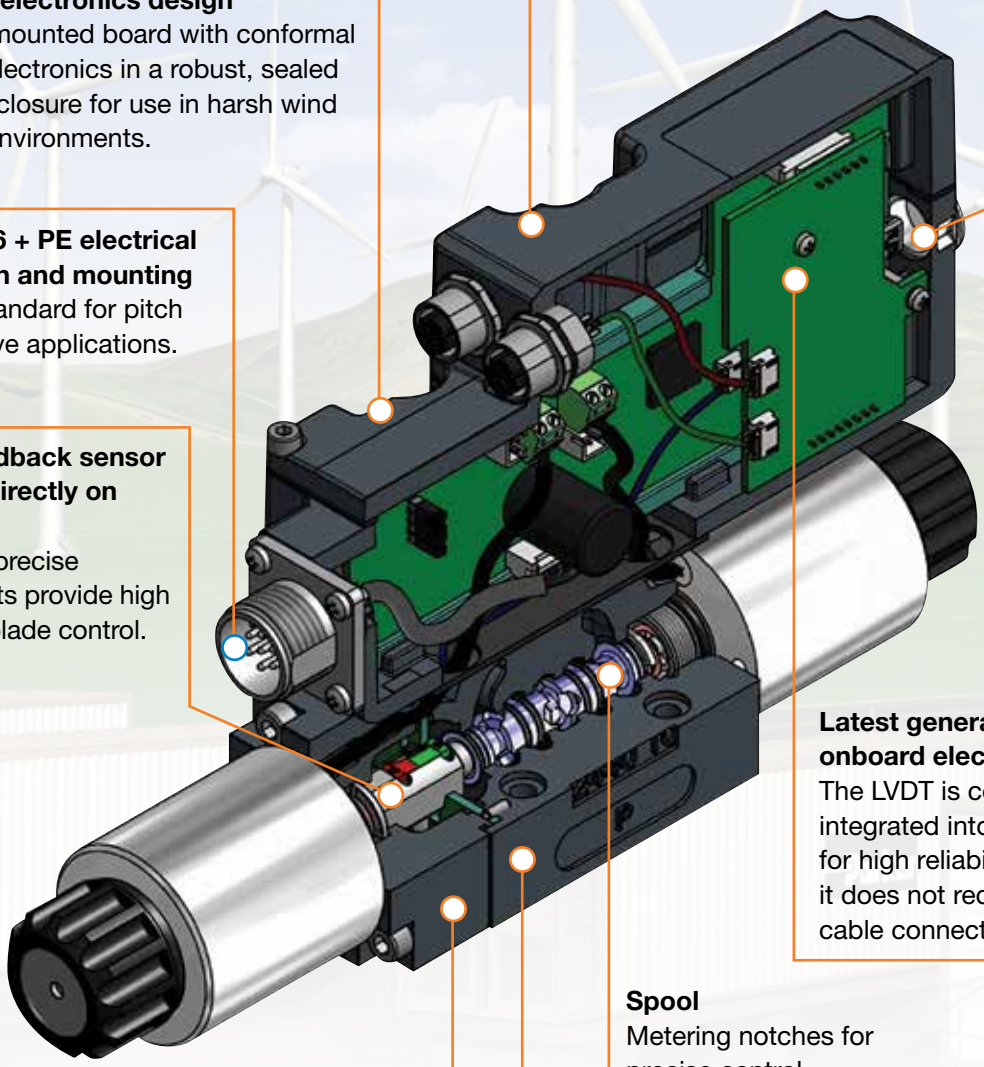
# Engineered for rugged precision: just plug and play

**Optional: CANopen**
Serial communication provides control and diagnostic capabilities.

**Parameterization connection**
Valve parameter is preset for optimal pitch control.

**Rugged electronics design**
Rubber mounted board with conformal coated electronics in a robust, sealed metal enclosure for use in harsh wind turbine environments.

**Common 6 + PE electrical connection and mounting**
Industry standard for pitch control valve applications.



**Position feedback sensor positioned directly on the spool**
Continuous, precise measurements provide high accuracy in blade control.

**Latest generation of digital onboard electronics**
The LVDT is completely integrated into the housing for high reliability and therefore it does not require an exposed cable connection.

**Spool**
Metering notches for precise control.

**Compact Integrated feedback system (no external wiring)**
Optimal protection from extreme wind turbine conditions, resulting in lower down times.

**5-chamber body**
Premium mechanical spool / body is designed for rapid response and high flow capacity.

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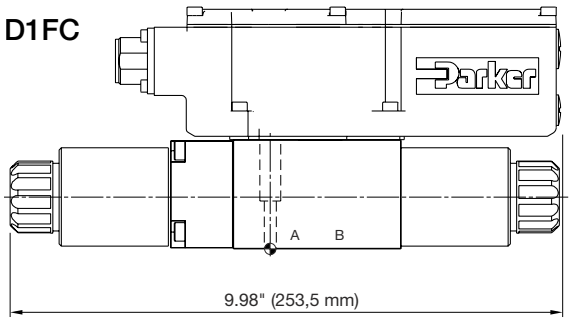
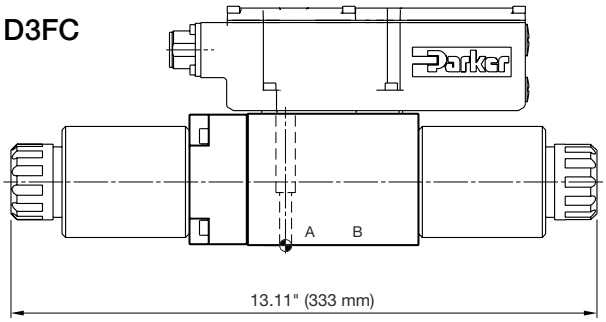
# D1FC & D3FC technical product specifications

D1FC




D3FC




## General Specifications

| | D1FC | D3FC |
|---|---|---|
| Design | Direct Operated Proportional DC Valve with Position Feedback | |
| Actuation | Proportional Solenoid | |
| Size | NG06 / CETOP 03 / NFPA 03 | NG10 / CETOP 5 / NFPA D05 |
| Mounting Interface | Unrestricted | |
| Ambient Temperature Range | -4°F to 140°F (-20°C to +60°C) | |
| MTTF Value [Years] | 150 | |
| Vibration Resistance [g] | 10 Sinus 5…2000 Hz acc. IEC 68-2-6<br>30 Random noise 20 to 2000 Hz acc. IEC 68-2-36<br>15 Shock acc. IEC 68-2-27 | |

## Hydraulic Specifications

| | D1FC | D3FC |
|---|---|---|
| Max. operating pressure | Ports P, A, B 5,075 psi (350 bar); port T max. 508 psi (35 bar);<br>3,046 psi (210 bar) (external drain); port Y max. 508 psi (35 bar) | |
| Nominal flow at Δp = 73 psi (5 bar) per control edge | 2.6 gpm (10 l/min) / 5.3 gpm (20 l/min) / 7.9 gpm (30 l/min) | 9.3 gpm (35 l/min) / 14.5 gpm (55 l/min) / 19.8 gpm (75 l/min) |
| Step response at 100 % step | .02 sec (20 ms) | .04 sec (40 ms) |
| Hysteresis | < 0.1 % | |
| Leakage at 1450 psi (100 bar) | <.016 gal/min. (< 60 ml/min.) | <.026 gal/min. (< 100 ml/min.) |
| Repeatability [%] | <0.01 | |
| Filtration | ISO Class 4406 (1999) 18/16/13 | |

## Electrical Specifications

| | | D1FC | D3FC |
|---|---|---|---|
| Command | Code B | 0...+10 V P->A | |
| Command | Code E | 0...+20 mA P–>A | |
| Command | Code S | 12...+20 mA P–>A | |
| Electrical connection | | 6 + PE or 11 + PE acc. to EN 175201-804 | |
| Adjustment ranges | Min<br>Max<br>Ramp | 0...50 %<br>50...100 %<br>0...32.5 s | |
| Duty Factor [%] | | 100 | |
| Protection Class | | IP66/67 in accordance with EN 60529 with mating connectors Protection Class | |
| Current Consumption MAX [A] | | 2.0 | 3.5 |
| Communication Interface: Optional | | **CANopen** EN50325-4 | |

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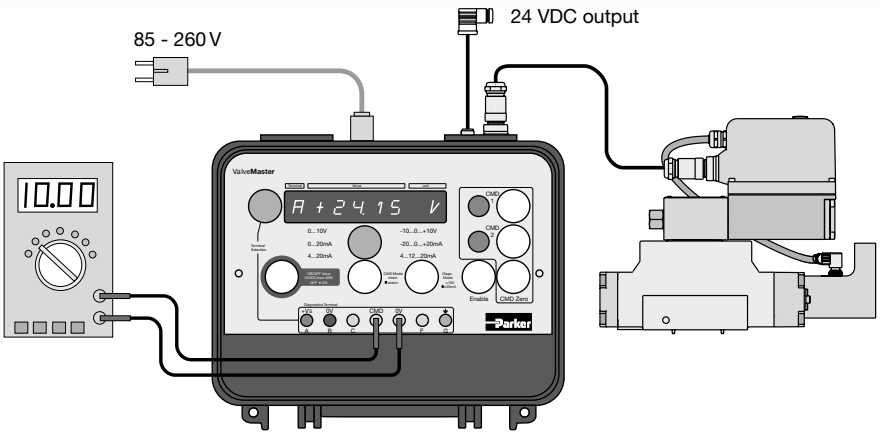
# EX00-M05 Series Valve Master Portable Proportional Valve Test Box

The Parker EX00-M05 Valve Master test unit is suitable for testing and commissioning all proportional and servo proportional valves with onboard electronics across the hydraulic industry. For easy on-site service, all necessary cables are securely located inside the rugged case. The Valve Master unit provides all common voltage and current imputs as well as measuring ports for quick diagnosis of the valves.

**Features:**

- Compatible with most common industry valves. EN 175201-804 (6-pin + PE)
- Built-in fuses
- Cable set included
- Lockable rugged box
- Additional 24V output is available for on/off valves

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HY14- 2563/US MK 10/16

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