SilverDust D2-IGF Datasheet

Servo controller/driver for QuickSilver's NEMA 11, 17 and 23 frame, high torque, direct drive servomotors. This SilverDust features a simple, compact design to save cabinet space and cost.

QCI-D2-IGF

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System Overview

Point-to-Point Moves
- Relative or Absolute
- Velocity or Time Based
- S-Curve

Advanced Motion Profile Moves
- Profile Move Commands
- Register Based
  - Position/Accel/Decel/Vel
  - Modify On-the-Fly

Multi-Axis Linear Interpolation
- XYZ Coords Contained in Text File
- 1000+ Points Stored In NV Memory

Built-In Voltage Clamp
- Regenerative Braking Resistor

Input/Output
- 7 TTL Digital I/O
  - Use for QCI-BO-B52 24V I/O
- 4 Analog Inputs (Joystick)
- Analog Output Option
- Programmable Limit Switch (PLS)
  - Dynamically Sets Output Dependent on Motor Position
- Secondary Encoder In

Program and Data Storage
- 32K Non-Volatile Memory:
- 2000-3000 Program Lines
- User Data Examples
  - CAM Tables
  - Motion Profiles
  - Lookup Tables

Electronic Slip Clutch/Brake
- Variable Torque
- Wind/Unwind Applications

Anti-Hunt™
- Optionally use Open Loop While Holding
- No Servo Dither While At Rest

Electronic Gearing/Camming
- Follow Encoder (A/B Quadrature) or Step and Direction
- Dynamic Gear Ratios
  - Integer Ratios 32767:1 to 1:32767
  - Decimal Ratios to 7 Places
- Electronic Cam
  - Import Tables From Text File
  - Over 2500 Points
  - Multiple Tables

Communications
- RS-485/RS-232 @ 230K Baud
- ASCII,Binary,Modbus®,DMX512
- Host Control While Servo in Motion

Programming Language
- Easy, Menu Driven Interface
- Command Parameter Prompts
- No Syntax Errors
- User Namable I/O and Registers

Advance PVIA™ Servo Loop
- 100:1 Inertial Mismatch
- Direct Drive Oversized Inertial Loads
  - Flywheels/Belt Drives
  - Typically Without Gearheads
- More Stable Than PID

Digital 4 Quadrant Vector Drive
- DSP Driven for Reduced Noise

Multi-Task/Multi-Thread

Compatible with QCI Motor/Encoders
- NEMA 11 Frame
  - 4000 Counts/Rev Encoder
  - Up To 9 oz-in (continuous)
- NEMA 17 Frame
  - 8000 Counts/Rev Encoder
  - Up To 43 oz-in (continuous)
  - IP50 or IP65
- NEMA 23 Frame
  - 8000 Counts/Rev Encoder
  - Up To 300 oz-in (continuous)
  - IP50 or IP65

Electrical Specifications

Input Power

Voltage
+12 VDC to +48 VDC, regulated. The controller must be initialized for the actual operating voltage using Initialization Wizard.

Over-Voltage Protection
Voltages exceeding +55 VDC will permanently damage the controller/driver electronics. The controller includes an onboard clamp circuit.

Reverse Polarity Protection
Reverse polarity protection is provided. Note, however, if the power supply is not floating, connecting the V+ input to Ground will cause this potential to be present at the communications and I/O lines, which may damage these lines or that to which they are connected.

Input Current
4 Amps maximum for any input voltage, +12 VDC to +48 VDC.

Output Power

Output/Driver Current
3.5 Amps continuous per phase *; 4.5 Amps peak per phase *.

* With Adequate Heat Sinking / air flow.

Maximum Output Power
150 Watts continuous power with adequate heat dissipation.

Encoder Interface
Quadrature differential signals from motor encoder.

External (secondary) encoder can be used for dual loop operation or for encoder following (Quadrature).

Inputs & Outputs

Standard I/O
IO1-IO7

Digital Inputs
0 to +3.3 VDC. LVTTL level compatible.
Effective internal 200K ohm impedance to +3.3 V.

Digital Output Voltage
0 / +3.3 VDC.

Digital Output Current
Sinking or Sourcing
I/O 1, 4, 5, 7 outputs 4 mA MAX
I/O 2 and 3 outputs 2 mA MAX
I/O 6 outputs 8 mA MAX

I/O Over-Voltage Protection
An over-voltage limiter protects each standard I/O line up to 30 volts. Applying voltages
greater than 30 volts will permanently damage the digital I/O.

Analog Inputs
0 to +3.3 VDC input signal range.
10 bit ADC resolution (single).
11 bit ADC resolution (differential).
Analog inputs 1 to 4 are mapped to share digital I/O lines 4 to 7.
Each input has an effective internal 200K ohm impedance to +3.3 VDC.
Analog signals are read every servo cycle (120 µsec.) and the converted analog data is
processed through a 5 ms filter to reduce noise & transients.

Analog Output
Available on I/O 2, but requires Basic Breakout w/ Analog Out (QCI-BO-B1A). See technical
document QCI-TD048.

Communications

Hardware Interfaces
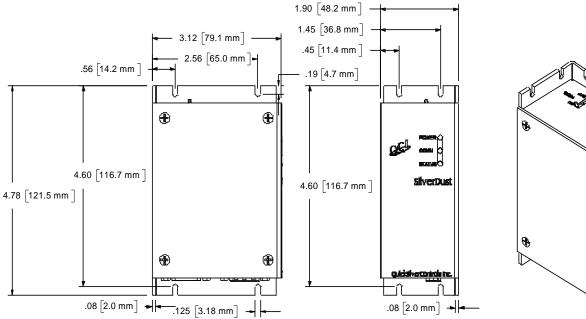RS-232, RS-232 multi-drop, RS-485 multi-drop (software selectable)

Protocols
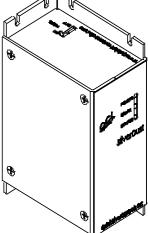8-bit ASCII, 9-bit binary, or Modbus® RTU.

Hardware Configuration Settings
Available Baud Rates: 2400, 4800, 9600, 19.2k, 28.8k, 57.6k, 115.2k or 230.4k
Data Bits: 8
Stop Bits: 1.5 or 2
Parity Bit: None

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Mechanical Specification

QCI-D2-IGF

Note: See our website for 2D drawings and 3D models.

Environmental Specifications

Operational Temperature
-10 C to +80 C

Storage Temperature
- 40 C to +85 C

Humidity
Continuous specification is 95% RH non-condensing.

Shock
Limitation is approximately 50g/11ms.

IP Rating
IP20 with cables attached.

Connector Data

Front **P**anel **(FP)**

- Status LEDs

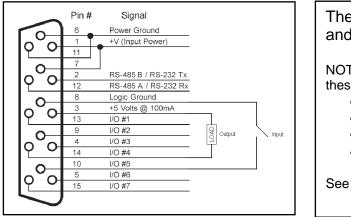**T**op **P**anel **(TP)**

- (TP1) Processor Switch

Bottom **P**anel **(BP)**

- (BP1) SMI Interface
- (BP2) Motor Interface

(TP1) Processor Switch

The Processor Switch turns on and off the power to the processor. The main power should be OFF before connecting or disconnecting the system. The Processor Switch does **<u>NOT</u>** disconnect main power.

(BP1) SilverLode Multi-function Interface (SMI) Port

Pin #	Signal
6	Power Ground
1	+V (Input Power)
11	
7	
2	RS-485 B / RS-232 Tx
12	RS-485 A / RS-232 Rx
8	Logic Ground
3	+5 Volts @ 100mA
13	I/O #1
9	I/O #2
4	I/O #3
14	I/O #4
10	I/O #5
5	I/O #6
15	I/O #7

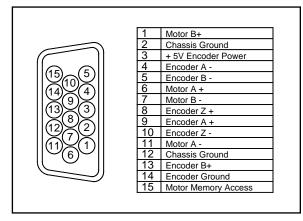These signals provide power, communications and 3.3v IO (digital and analog).

NOTE: QCI has many modules capable of breaking out these signals. For example:
- Basic Breakouts (QCI-BO-B, QCI-BO-B1)
- Basic Breakout w/ Analog Out (QCI-BO-B1A)
- Breakout w/ 24V IO -5in 2out (QCI-BO-B52)
- 24V Optical I/O Module (QCI-OPTMC-24)*
  *Requires QCI-EC-SMI cable

See technical documents on our website for details.

This port provides QuickSilver's basic Power, Communication, standard I/O for easy connectivity in large systems. The SMI port is standard on all our controllers which helps make new products backward compatible with older ones. See above sections for details on these signals.

(BP2) Motor Interface

1	Motor B+
2	Chassis Ground
3	+ 5V Encoder Power
4	Encoder A -
5	Encoder B -
6	Motor A +
7	Motor B -
8	Encoder Z +
9	Encoder A +
10	Encoder Z -
11	Motor A -
12	Chassis Ground
13	Encoder B+
14	Encoder Ground
15	Motor Memory Access

QCI recommends our QCI-C-D15P-D15S-nn (nn = length) cable to interface between the motor and the controller. Note: 01, 02, 04, and 10 foot cables are standard lengths.

The Motor I/F Breakout (QCI-BO-M1) can be used to breakout these signals. See Technical Document QCI-TD057 "Motor I/F Breakout - QCI-BO-M1,QCI-BO-M2".
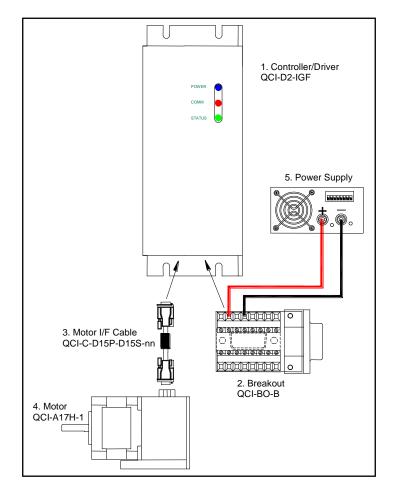
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Recommended Components

SilverDust IGF Start-Up Kit (QCI-SKB-D2-IGF)
For first time users, QCI recommends purchasing the QCI-SKB-D2-IGF Start-Up Kit which includes:

- SilverDust D2 (QCI-D2-IGF) & Datasheet (QCI-DS021)
- QuickControl Software CD (QCI-QC)
- User Manual & Command Reference (QCI-SLM)
- Basic Breakout (QCI-BO-B)
- Communication Cable (QCI-C-D9M9F-6)
- 4' DB15HD Motor I/F Cable (QCI-C-D15P-D15S-4)
- DIN Rail Bracket (QCI-DIN1)
- Start-Up Kit Setup Instructions (QCI-TD058)

With this Start-Up kit, a power supply, and a motor/encoder, you will have everything you need to get started. See technical document QCI-TD058 on our website for details.

1. Controller/Driver

SilverDust D2 IGF (QCI-D2-IGF). This is an closed open frame system without extended I/O. For users that do not need the extra I/O capabilities, this system is recommended for significant cost savings.

2. Basic Breakout (QCI-BO-B or QCI-BO-B52)

QCI recommends purchasing a breakout to simplify wiring power, communications and I/O. QuickSilver offers several breakouts (see our website), but the simplest is our Basic Breakout (QCI-BO-B). To convert the 7 TTL I/O to 5 24V isolated inputs and 2 open collector outputs, select the QCI-BO-B52.

3. Motor I/F Cable

For standard system, this D-sub type cable goes between the motor and the controller. The generic part number is QCI-C-D15P-D15S-nn. Replace the last two digits "nn" with length of cable in feet (i.e. –10 for 10 feet).

For IP65 system, a special IP65 cable goes in between the motor and the controller. The motors and cables are IP65, but not the controller/driver. The generic part number is QCI-C-D15P-T14S-nn. Replace the last two digits "nn" with length of cable in feet (i.e. –10 for 10 feet).

4. Motor

The SilverDust D2 is capable of driving any A 17 or 23 I-Grade motor/encoder. See the following datasheets for more information:

QCI-DS007: NEMA 17 I-Grade Motor/Encoder
QCI-DS008: NEMA 23 I-Grade Motor/Encoder

See QCI-DS017 for details on using QuickSilver's NEMA 11 frame motor with the IG.

5. Power Supply

Power supply selection is motor dependent, but the following will work with all the 17 and 23 frame motors.

S-210-48 (48V, 4.4A, 210 Watt)

Part Number

SilverDust™ IGF Controller/Drivers		
DRIVER	**CONTROLER**	**OPTIONS**
QCI-D2 - 3.5 Amp • For 23 Frame and Smaller • 3.5 Amps per Phase Continuous* • 4.5 Amp Peak • Input Power: 4A@12V-48V * Depending on heat sink (25C ambient).	**IGF** – SilverDust D2 IGF • 7 TTL Inputs or Outputs (use QCI-BO-B52 for 24V I/O) • 4 Analog Inputs (Joystick) • Analog Output Option (use QCI-BO-B1A) • RS-232 or RS-485 • ASCII, Binary, Modbus® • Voltage Clamp And Resistor • DB15HD (pin): SMI Port • DB15HD (socket): Motor I/F including motor power and encoder	**Blank** – Standard • DIN compatible **D** – DMX512
For an IGF		
QCI-D2	**IGF**	
This selection creates the part number: **QCI-D2-IGF**		

Contact Information

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