S • Drive

ADVANCED SCOOTER CONTROL SYSTEMS

PG DRIVES TECHNOLOGY

THE S-DRIVE FAMILY

The S-Drive scooter controller family is the most advanced and cost-effective controller available to date, offering major enhancements in performance and function. It is suitable for the entire range of mobility scooters and similar electric vehicles. The S-Drive combines the proven reliability of PG Drives Technology design with all of the safety features expected from such a respected mobility electronics manufacturer.

The S-Drive is available with 45A, 70A, 90A, 120A and 140A power outputs, and employs the very latest in motor control algorithms. The on-board diagnostic system can store and display status information not only for the S-Drive itself, but also for the other electrical components on the scooter. The electronics of the S-Drive are sealed against water ingress to IPX5, and when the optional connector sealing system is fitted the cable connections are protected to IPX4. This allows the S-Drive to operate safely and reliably in the harshest environmental conditions.

S • Drive

140A
120A

90A
70A
45A

- Advanced drive algorithm
- Choice of power ratings
- Freewheel speed limit
- Electronics sealed to IPX5
- Connections sealed to IPX4 with optional cover
- Extremely compact with very small footprint
- Industry standard connectors across the entire range
- Programmable diagnostic output
- System log - provides a record of all trip conditions
- Hours run timer function
- SP1 or PC Programming
- TÜV approved
- Designed to ISO7176/14 and EN12184
- Documentation for international approvals

S • Drive

ADVANCED DRIVE CONTROL

The S-Drive utilises an advanced motor control algorithm to provide exceptional drive performance. Smooth, precise speed control is assured on all surfaces and gradients, and roll-back when starting on inclines has been virtually eliminated. A soft-stop feature ensures that the scooter stops smoothly under any circumstances, and the freewheel speed is limited to a programmable value. A slow/fast input and an input for an optional speed limiting potentiometer allows the selection of a drive profile to suit the location. All of these characteristics and features combine to ensure that the S-Drive provides a very safe and comfortable driving experience.

EASY INSTALLATION

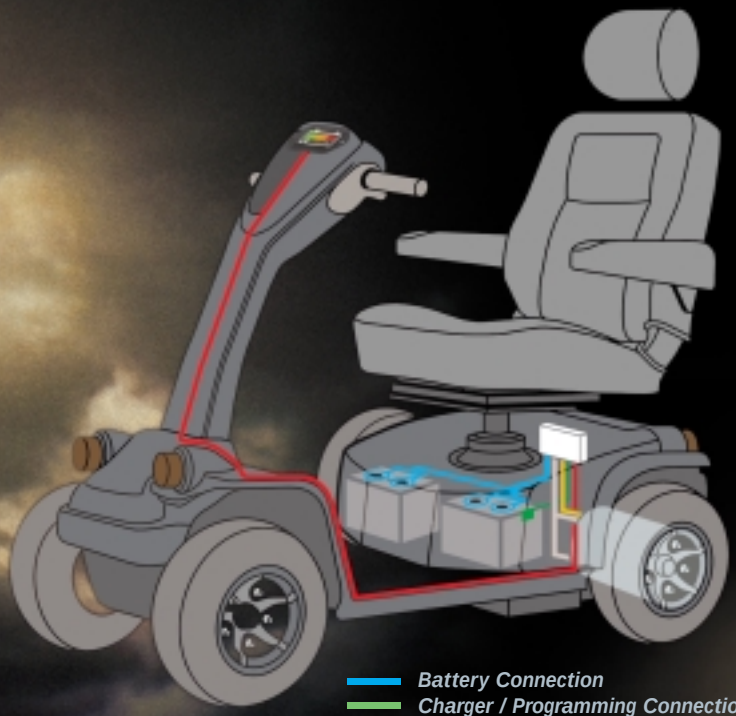
Much consideration has been given to the ease of installation, which is a primary factor in the S-Drive's design. Its small size and environmentally sealed packaging means that it can be easily installed on scooters and similar electric vehicles without worry of contamination from water or other electrically conductive deposits. The signal connectors used on all S-Drive models are low cost, universally available Molex® Mini-Fit, Jr™ types. By using the same connector family across the product range, customer inventory requirements are greatly reduced.
To further aid ease of installation the new S120 and S140 have the same mounting pitch as PGDT's existing high power scooter controllers.
The S45, S70 and S90 uses 6.35mm/0.25" spade terminals for the power connections, which are also readily available in all regions. To meet the higher power requirements of the S120 and S140 in the most cost-effective way, custom PGDT battery and motor connectors are used for these products. Despite their specialist nature, these connectors will also be easily obtainable from warehouses in the US, Europe and Hong Kong.

CONTROL ACROSS THE ENTIRE SCOOTER RANGE

The space available on any scooter is often at a premium. Therefore, to minimise the spatial requirements of the controller, the S120 and S140 battery and motor connectors are recessed on top of the unit, making efficient use of the available area and decreasing the total volume required for the controller and its associated wiring.

WATER RESISTANT SYSTEM

The S-Drive controller can be fitted with an optional water resistant sealing system, which protects the connectors against ingress of water to IPX4. This comprises of a cover and gasket, which is fitted to the front of the S-Drive. A slotted gasket is incorporated into the cover seals around the cabling, so that the cover can be fitted or removed without having to disconnect any of the wiring. Therefore, the cover can be removed at anytime to inspect the connections and then re-fitted without degrading the effectiveness of the water resistant seal.



Battery Connection
Charger / Programming Connection
Motor Connection
Brake Connection
TruCharge / Tiller Connection

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The S-Drive features a universal status output, which can be programmed to drive the familiar PGDT TruCharge displays, a single lamp or LED or an analogue meter. This output can also be programmed to provide diagnostic codes via a PGDT TruCharge display, or provide different formats of diagnostic flash code sequences that will already be familiar to the scooter market. This means that the S-Drive can be retrofitted onto existing designs without the need to modify the tiller panel.

The Trucharge module is plug and play to all versions of the S-drive minimising the wiring variants and allows you to use the same control panels across multiple vehicles.

PROGRAMMABLE DIAGNOSTIC OUTPUT ON-BOARD SYSTEM LOG

A powerful system log allows the S-Drive to record the number of occurrences of the last eight detected system problems. These can be viewed at any time when connected to a programming tool, and provide invaluable assistance when attempting to diagnose intermittent vehicle faults. A run timer is also included, so that the total number of hours that the motor has been driven is recorded. The system log and run timer are stored in permanent memory, so they will not be lost even if the S-Drive is disconnected from the battery supply. This data can only be cleared by certain versions of the programming tools.

POWERFUL PROGRAMMING

The S-Drive is fully programmable, offering manufacturers and dealers the maximum possible flexibility to configure the S-Drive to suit each application. The familiar SP1 allows convenient field programming and diagnostic support, but for a more powerful and user-friendly interface, a PC-based programming package is available.

Using the familiar Windows format the PC Programmer allows all parameters to be viewed, modified, saved as files and copied between S-Drives. Parameters can be modified off-line and saved creating new controller variants instantly and remotely. Whole sets of parameters can be transferred from programmer to controller, or vice-versa by a single command. The PC programmer uses one programming template for the entire S-Drive product range, minimising the time and effort required to program different controller types. A new feature in the S120 and S140 is that each alarm type has an associated frequency level or pitch, to aid diagnostics and helps to distinguish different alarm types on the scooter.

The PC Programmer provides manufacturers with the ability to quickly create customer specific settings, allowing a single S-Drive to be configured to suit each vehicle on the production line, thus eliminating the need to stock several variants of the same controller.

TRUCHARGE DISPLAY

- **HIGH BATTERY VOLTAGE**
- **SOLENOID BRAKE TRIP**
- **POSSIBLE CONTROLLER FAULT**
- **THROTTLE FAULT**
- **INHIBIT ACTIVE**
- **NOT USED**
- **PARKING BRAKE OFF**
- **MOTOR WIRING FAULT**
- **MOTOR DISCONNECTED**
- **LOW BATTERY VOLTAGE**

The PGDT TruCharge display offers an accurate representation of the charge remaining in the batteries, unlike most simple voltmeter displays. The user is presented with a display comprising of 3 red, 4 yellow and 3 green LEDs, which provide an intuitive display thus inspiring confidence in the battery status. This display also provides diagnostic information to pinpoint simple problems, by flashing a number of LEDs as described above. It is available in two versions, either enclosed in a case for panel mounting, or as a bare board for inclusion behind tiller overlays.

PRODUCT CODES

S-Drive

S45	45A Maximum Current
S70	70A Maximum Current
S90	90A Maximum Current
S120	120A Maximum Current
S140	140A Maximum Current

Support Products

S Cover: S45/S70/S90	Water resistant sealing system
S Cover: S120/S140	Water resistant sealing system
Tiller Module 1	TruCharge display, encased
Tiller Module 2	TruCharge display, PCB
S Molex	Molex® Mini-Fit, Jr™ connector kit
D51070	S120/S140 battery connector kit
D51059	S120/S140 motor connector kit

Programming

SP1a	Dealer Programmer
PCPa	CD ROM and cable for Dealer PC Programming *
PCPb	CD ROM and cable for OEM Engineering PC Programming*

* Microsoft® Windows™ 95/98 or later, NT, XP

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PG DRIVES TECHNOLOGY INC

2532 East Cerritos Avenue
Anaheim
CA 92806-5627 USA
Tel: +1 714 712 7911
Fax: +1 714 978 9512

PG DRIVES TECHNOLOGY LTD

10 Airspeed Road
Christchurch
Dorset BH23 4HD UK
Tel +44 (0)1425 271444
Fax +44 (0)1425 272655

PG DRIVES TECHNOLOGY ASIA

(Taiwan)
Taiwan International Business Center
4F, 25, Sec. 1 Tunhua S. Rd.
Taipei, Taiwan ROC
Tel +886 (0)2 2579 1821
Fax +886 (0)2 2579 8381

PG DRIVES TECHNOLOGY ASIA

(Hong Kong)
Unit 3, Cambridge House
Taikoo Place, 979 King's Road
Island East, Hong Kong
Tel: +852 2293 2621
Fax +852 2293 2678

www.pgdt.com

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Specifications subject to change without notice.
For further information refer to the S-Drive Technical Manual SK76745.

SPECIFICATIONS

Supply Voltage:	24Vdc
Operating Voltage:	16Vdc to 28Vdc
Peak Voltage:	35Vdc
Reverse Battery Voltage:	40Vdc
Output Current:	45A, 70A, 90A, 120A, 140A
PWM Frequency:	20kHz ± 1%
Brake Voltage:	24Vdc
Brake Current:	1.25A max. continuous
Status Output:	Programmable 0-12V, 50mA sink or source
Reverse Alarm:	Programmable 24V, 50mA sink
Inhibit Input:	Programmable polarity
Battery Charging Current:	9A rms max.
Power Connections:	6.35mm (0.25) Faston Spade up to 90A
Motor Connections:	Custom high power connectors for S120 & S140
Battery Connections:	Custom high power connectors for S120 & S140
Brake Connections:	2-way Molex® Mini-Fit, Jr™
Charger Connection:	4-way Molex® Mini-Fit, Jr™
Tiller Connection:	14-way Molex® Mini-Fit, Jr™
Moisture Resistance:	Electronics to IPX5 Connections to IPX4 with terminal cover fitted
Operating Temperature:	-25˚C to +50˚C
Storage Temperature:	-40˚C to +65˚C
Safety:	Multiple hardware & software strategy Designed to ISO7176/14
EMC on sample scooter Susceptibility:	Tested at 30V/m to EN12184 and ANSI/RESNA requirements
Emissions:	To EN55022 Class B
ESD:	IEC801 part 2

DIMENSIONS

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SPIRENT Communications