

OTHER SPRINT ELECTRIC PRODUCTS AVAILABLE

Series 300

½ HP module with integral speed setting potentiometer, also available in totally enclosed cubicle.

Series 400

A family of drives based on the same footprint, rated, at 4A, 8A and 12A. All these products incorporate the Sprint Electric Control Module.

800

1200

FW20 & FW30

Field current controller giving automatic control into the field weakened, constant horsepower range.

DPM35

A range of digital panel meters allowing full calibration easily by the customer.

DPM45

From 180W to 50KW, utilising machines of GEC, MAWDSLEY and CREUSEN manufacture; IP22 to IP55.

DC Motors

Right Angle and Inline motor matched ROSSI gearboxes.

Gearboxes

Range of RADIO ENERGIE tachogenerators including REO444R, REO444N, AC14, RAC12.

Tachogenerators

SPRINT ELECTRIC LIMITED

UNIT C2

RUDFORD INDUSTRIAL ESTATE

FORD, ARUNDEL

WEST SUSSEX BN18 0BE

Tel: 0903 730000

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INSTRUCTION

MANUAL

for drive types

1600, 1600i, 3200i

Instruction Manual for SPRINT ELECTRIC
1600 and 3200 Series of DC Drive Modules.

INDEX

Current Limit	8.7, 8.8
Current Loop 4-20mA Input	8.14
Dimensions	3.1
Earthing	4.7
Feedback Calibration	8.9
Functions Available	2.2
Fusing	4.3
General Description	1.1, 2.1
High Inertia Loads	8.15
Hold Power Up	8.11
IR Comp	5.3 vi 8.6
Jumper Selection	8.13, 8.14
Low Voltage Rating	1.4
Min/Max Speed	8.1, 8.2, 5.3 iv
Motor Connection	5.2
Ramps	8.3, 8.4, 5.3 iv
Rating Table	1.3
Remote Stall Relay	8.10
Reversing	6.3
Speed Control	6.1
Stability	8.5
Start Up Procedure	5.3
Supply	4.7
Suppression	4.5
Switches Initial Settings	5.1
Tacho/AVF Selector	8.12
Terminal Description	7.1
Terminal Pads Description	7.2
Torque Control	6.2, 5.4
Torque/Speed Selector	8.13
Trouble Shooting Guide	9.3
Zero Speed Relay	8.10

HEALTH AND SAFETY AT WORK. ELECTRICAL DEVICES CAN CONSTITUTE A SAFETY HAZARD. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THE COMPLIANCE OF THE INSTALLATION WITH ANY ACTS OR BYELAWS IN FORCE. ONLY SKILLED PERSONNEL SHOULD INSTALL THIS EQUIPMENT AFTER READING THIS MANUAL.

General Description and Control Features available

- 1.1 The 1600 and 3200 Series drives constitute a family of contiguous products ranging from 16 amps to 48 amps, both isolated and non-isolated. All features and terminals are common to all drives; see Figs. 1, 2 and 3 for product identification.
- 1.2

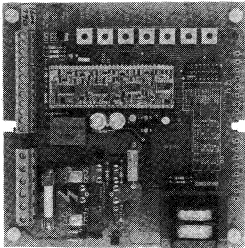


Fig. 1
1600 Series

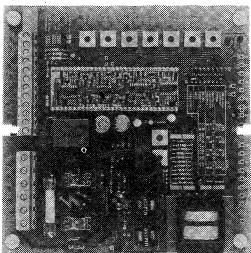


Fig. 2
1600i Series

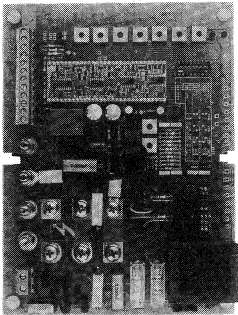


Fig. 3
3200 Series

1.3 SELECTION TABLE 1

TYPE	AC SUPPLY VOLTAGE	OUTPUT VOLTAGE	CURRENT	ISOLATION
1600	110/230	90/180	4/8/12/16 Amps	Non isolated
1600i	110/230	90/180	4/8/12/16 Amps	Isolated
3200i	230/415	180/320	8/16/32/48 Amps	Isolated

1.4 SELECTION TABLE 2 - LOW VOLTAGE

TYPE	AC SUPPLY VOLTAGE	OUTPUT VOLTAGE	CURRENT	ISOLATION
1600L V	30/60	24/48	4/8/12/16 Amps	Non isolated
1600iL V	30/60	24/48	4/8/12/16 Amps	Isolated
3200iL V	30/60	24/48	8/16/32/48 Amps	Isolated

All Sprint Electric drive products are available for low voltage applications as in above table.

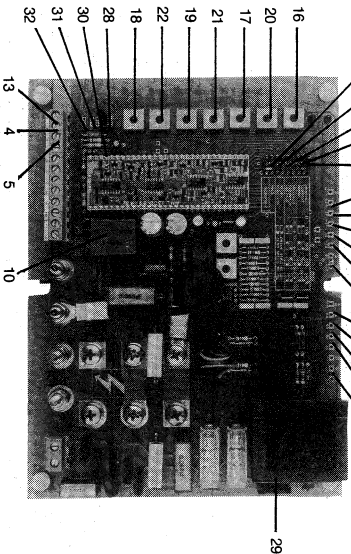
2.1 METHOD OF OPERATION

The units employ closed loop control of both armature current and feedback voltage to give precise control of the motor torque and speed. The motor and drive are protected by a stall timer which automatically removes power after 30 seconds if the required speed cannot be achieved. The drives will provide up to 150% of the preset maximum current for up to 30 seconds allowing high short-term torques during acceleration etc. Independent control of either the current or speed loops by external inputs allows torque or speed control applications with overspeed or overcurrent protection. The demand signal may be derived from a potentiometer, 0-10V signal or 4-20mA loop. The speed feedback signal may be derived from the ARMATURE VOLTAGE or a shaft mounted TACHOGENERATOR.

The electronic circuits are integrated onto a ceramic tile using laser trim and surface mount techniques. This gives superb accuracy and stability and is only made possible by the high production volumes of *SPRINT* ELECTRIC drives.

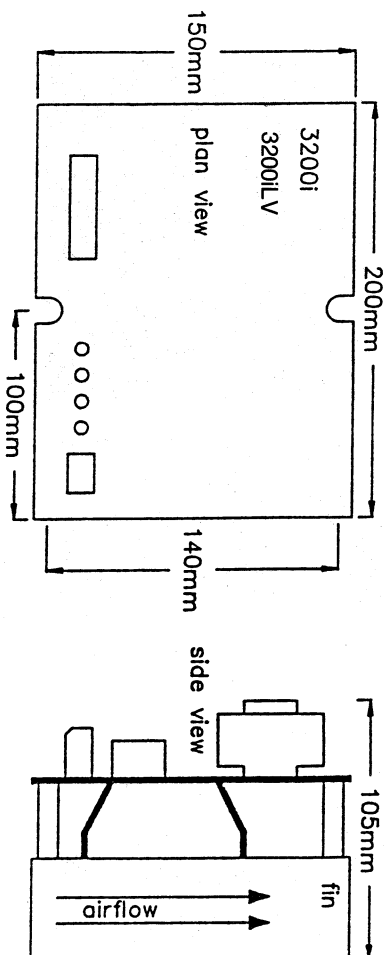
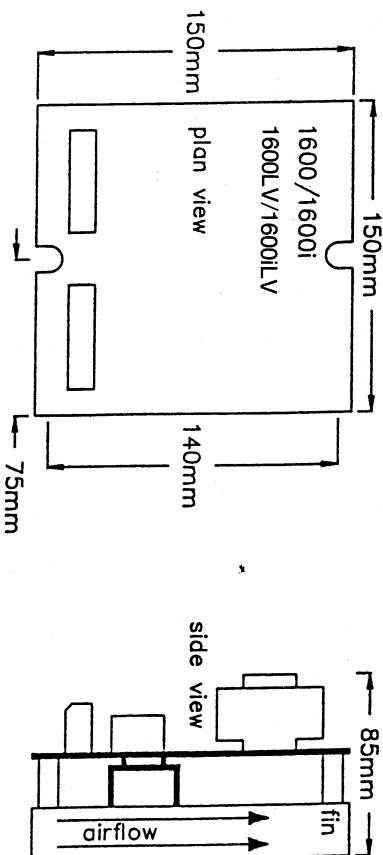
2.2 FUNCTIONS AVAILABLE

- | | |
|------------------------------|---|
| INPUTS AND OUTPUTS | |
| 1 +aux input | 6 speed output |
| 2 -aux input | 7 current output |
| 3 current input | 8 ramp output |
| 4 4-20mA input | 9 demand output |
| 5 0 to 10V input | 10 stall/zero relay |
| ADJUSTABLE PARAMETERS | 11 +24V unregulated output |
| 16 max speed | 12 +12V regulated output |
| 20 min speed | 13 +10V precision reference |
| 23 max current range | 14 -12V regulated output |
| 26 relay function | 15 -24V unregulated output |
| 28 torque mode | 18 max current |
| 31 4-20mA selector | 19 stability |
| | 22 IR comp |
| | 24 maximum feedback |
| | 25 tach/AVF feedback |
| | 27 power up hold |
| | 29 dual supply voltage |
| | 30 phase angle limit |
| | 32 50% stall threshold (high inertia loads) |



3.1 MECHANICAL DIMENSIONS

Two centre fixing slots are provided to mount the unit. Use one of these to connect the heatsink earth tag. Employ a star washer adjacent to heatsink for optimum earth continuity (see Fig. 4C). The fixing bolts should be 5mm by 35mm for 1600 series and 5mm by 50mm for the 3200 series.



All types of open chassis construction with rear heat fin.

The units will ideally be mounted on a vertical surface with a free passage of air through the heat fin. A free space should be allowed around the module. If the unit cannot be mounted in this way consult *SPRINT* ELECTRIC LTD.

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4.1 INSTALLATION AND COMMISSIONING

4.2 POWER CABLE

Use power cable minimum 600VAC and twice armature current.

4.3 FUSING

The 1600 and 1600i drive modules have on board fusing. The 3200 series requires either circuit breakers or HRC fuses rated at twice the armature current to be used in the AC supply. DO NOT FUSE THE ARMATURE CIRCUIT.

4.4 CONTROL SIGNALS

The control inputs on the 1600 are NOT ISOLATED unlike the 1600i and 3200i. Signal cables may be screened and the screen earthed at the drive end only. Avoid running signal cables close to power cables.

4.5 SUPPRESSION

The drives have excellent noise immunity. However, installations involving electrical welding or RF induction heating may require further filters on the line and armature terminals. Contactor coils and sparking contacts may also require suppression. A 100R in series with 0.1uF cap. is usually adequate in these situations.

4.6 MOTOR

Check motor is mounted correctly and free to rotate.

4.7 SUPPLY

Ensure that the supply selection jumper on the drive matches the incoming supply. Failure to do this may result in permanent damage of the drive unit. See Fig. 4A for 1600, Fig. 4B for 3200. Connect supply to L2/N and L₁, ensure module is earthed via fixing bolt on heat sink. See Fig. 4C.

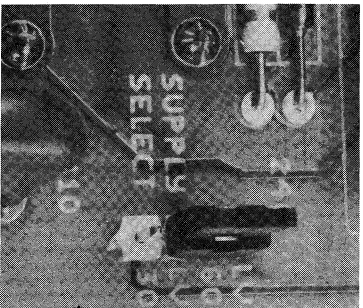


Fig. 4A

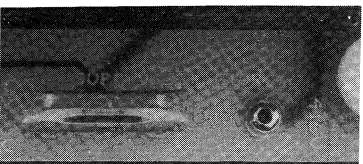


Fig. 4B

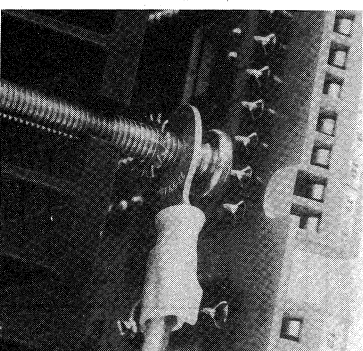


Fig. 4C

WARNING — MAKE SURE SUPPLY IS DISCONNECTED BEFORE WORKING ON UNIT. DO NOT TOUCH SWITCHES OR JUMPERS WITH POWER ON.

5.1 INITIAL SETTINGS

For user safety the drive units are shipped to run on the highest supply option, at nominal speed, in ARMATURE VOLTAGE feedback mode.

Factory settings

S1 & S2	Set to minimum current
S3 & S4	Set 180VDC for Line to Neutral drives
S5 & S6	Set 320VDC for Line to Line drives
S7	Set off
S8	Set on for Armature Voltage Feedback

To change this, select switches S1 to S8 as detailed in paragraph 8.8-8.12.

5.2 MOTOR CONNECTIONS

For shunt wound machines connect motor armature leads to A1 and A2, and field to F1 and F2. For permanent magnet machines connect only A1 and A2 - do not make any connection to F1 and F2. For reverse rotation transpose A1 & A2.

5.3 START UP PROCEDURE

- Set switches, potentiometers and jumpers as described in 8.1-8.15
- Power On, check ON LED is illuminated
- Close run contact and gradually increase the external setpoint, the motor will start to rotate
- Increase setpoint and drive will ramp up to full speed; adjust MAX SPEED if required; reduce setpoint, the drive will ramp down to zero speed, adjust MIN SPEED if required. Run motor up and down and adjust RAMPS to the required rate. For MIN, MAX SPEED and RAMP adjustment see Fig. 5C.

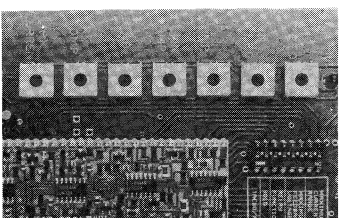


Fig. 5C

For detailed descriptions of potentiometer adjustment See 8.1-8.7

5.4 TORQUE SYSTEMS

- Adjust STAB to improve response if necessary; clockwise rotation gives faster response. Excessive rotation in either direction may lead to instability of the drive.
- Speed droop may occur where armature voltage feedback is used. This is compensated for by clockwise rotation of IR COMP preset. Excessive rotation may lead to instability. No IR COMP is required for systems with tach feedback.

Set up in speed mode as described with maximum speed set to just over the expected maximum; move the wiper of external setpoint to Terminal 6 and select torque jumper; connect Terminal 3 to Terminal 1. This method provides overspeed limiting in the event of a web break.

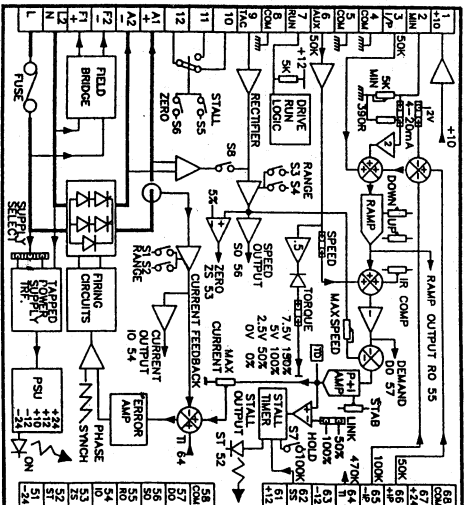
Diagram of the 12-pin connector for the 1000 Series Servo Motor. The pins are numbered 1 through 12. Pin 1 is +10V. Pin 2 is MIN. Pin 3 is I/P. Pin 4 is COM. Pin 5 is COM. Pin 6 is AUX. Pin 7 is RUN. Pin 8 is COM. Pin 9 is TACHO. Pin 10 is TACHO. Pin 11 is TACHO. Pin 12 is TACHO. Pins A1, A2, E1, F1, L1, L2, and N are also shown.

[illegible]

DRIVE TERMINALS ON
BOTTOM EDGE OF UNIT

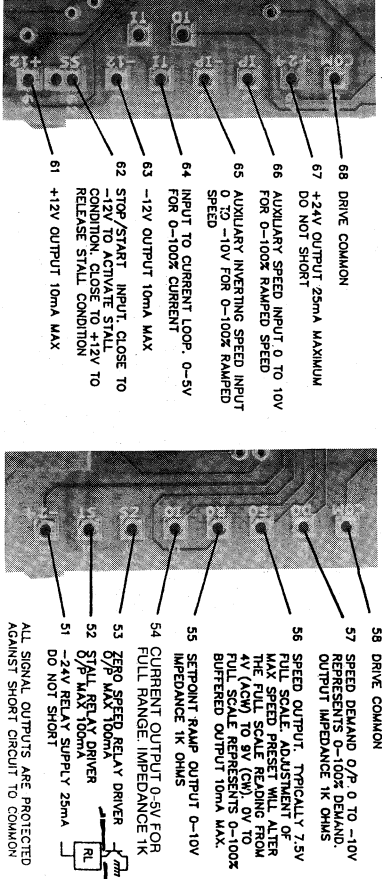
- ## 7.2 SIGNAL PADS ON TOP EDGE

	RELAY
	POT. SWITCH PRESETTABLE
	GAIN AMP
	INVERTING BUFFER
	JUMPER OR LINK
	SUMMING JUNCTION - FOR INVERSION



WARNING. 1600 UNITS ARE NON-ISOLATED DRIVES DO NOT CONNECT ANY TERMINAL TO EARTH OR OTHER LOW VOLTAGE. THE 1600i OR 3200i UNITS MUST BE USED IF ISOLATION IS REQUIRED.

68 DRIVE COMMON



CUSTOMER PRESET POTENTIOMETERS

- 8.1 **MAX SPEED** 50-100% of maximum speed, turn clockwise to increase.
8.2 **MIN SPEED** 0-30% of maximum speed, turn clockwise to increase.
8.3 **UP RAMP** To adjust acceleration rate, turn clockwise to shorten ramp time between 1-30 secs.
8.4 **DOWN RAMP** To adjust deceleration rate, turn clockwise to shorten ramp time between 1-30 secs, this cannot be used to brake the load.
8.5 **STABILITY** Turn clockwise to improve response.
8.6 **IR COMP** Turn clockwise to increase IR Comp.
8.7 **MAX CURRENT** Used for fine adjustment of current in selected range, turn clockwise to increase. Make this adjustment after having set current range using switches S1 & S2 in 8.8

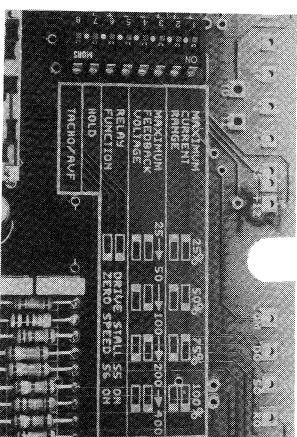
CUSTOMER SELECTABLE SWITCHES See Fig. 9.1

- 8.8 **MAX CURRENT RANGE** Set one of four ranges of current as follows: Drive rating label shows 100%
S1 OFF 25% S1 ON 50% S1 OFF 75% S1 ON 100%
S2 OFF 50% S2 ON 75% S2 ON 100%
Fine adjustment is then carried out using
Max Current Pot as in 8.7.
8.9 **MAX FEEDBACK VOLTAGE** Sets full scale feedback voltage
S3 OFF 25-50V; S3 ON 50-100V; S3 OFF 100-200V; S3 ON 200-400V.
S4 OFF S4 ON S4 ON
In tachogenerator feedback select the voltage that is generated when motor running at full speed. In armature voltage feedback select the voltage that appears on the motor rating plate.
S5 ON indicates drive stalled
S6 ON indicates zero speed
S7 ON will not allow the drive to power up into a run condition after a power cut
Select either tachogenerator or armature voltage feedback.
S8 ON AVF Close S/S 62 to +10V T1 to release
- 8.10 **RELAY FUNCTION**
8.11 **HOLD**
8.12 **TACHO/AVF**
8.13 **TORQUE/SPEED**
8.14 **4-20mA LINK**
8.15 **FOR HIGH INERTIA LOADS**

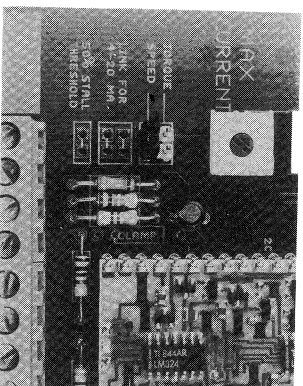
CUSTOMER SELECTABLE JUMPERS

- Selects either torque or speed control, in torque control reference is via Terminal 6. See Fig. 9.2.
Selects terminal 2 as loop input with Terminal 4 return, 5V compliance. See Fig. 9.2.
For high inertia loads link as shown in Fig. 9.2; this will allow 3 times the selected current of the drive, up to the maximum drive output.

9.1



9.2



9.3 TROUBLE SHOOTING GUIDE

PROBLEM	LIKELY CAUSES	REMEDY
Drive will not power up ON LED not illuminated	Line fuses blown Damaged transformer	POWER OFF, check circuits replace fuses with correct type Check supply select jumper
Fuses blow on power up	Short circuit load Damaged unit	Check load circuit Replace unit
Motor accelerates out of control with small setpoint and tach feedback.	Common grounded on 1600 non-isolated drive Tacho linkage Tacho faulty	Check for faulty earth circuit or grounded pot, screen. Check tacho coupling to motor Replace in emergency change to AVF (S8) and rescue feedback voltage (S3, S4) Remove tacho connection from terminal. Refer to set up procedure
Motor runs too fast or too slow	Incorrect speed scaling (S3, S4 MAX SPEED)	Refer to set up procedure
Stall lamp ON	Insufficient torque No field (Not applicable to Perm Magnet motors) No armature current Motor jammed S7 incorrectly set ON	Check field circuit Check armature circuit Disconnect motor, check load free to rotate. Turn S7 off
Stall light ON as soon as power applied	No run circuit No setpoint	Check run circuit T7 to T5 Check external setpoint T3
Motor still won't turn	Transposed armature connections	Swap armature connections
Motor rotates in wrong direction	Unstable drive Armature voltage rating of motor too low for AC supply	Relate STAB antilockwise Relate STAB antilockwise, insert choke in series with armature. New motor or supply.
Motor response 1) Large overshoots	High inertia low friction loads	rotate STAB pot clockwise, reduce ramp rates or current set too high
2) Speed related stability	Tacho couplings elastic or misaligned tacho eccentric load	Improve tacho coupling or re-align balance load