

DC MOTOR DRIVE 400i



SPRINT ELECTRIC

Please read this information before installing or using the product.

Install, use and maintain this product following the procedures provided.

The manual(s) cannot provide all details, variations and contingencies required for your installation, operation and maintenance of this product or the apparatus with this product installed. For further help or information, refer to your local Supplier sales office.

Application area

The equipment described is intended for industrial (non-consumer) motor speed control.

Intended users

To safely enable the user to obtain maximum benefit from the equipment:

- Ensure this information is available to all persons required to install, configure or service the described equipment or any other associated operation.
- Always store the manual in a conveniently accessible area for quick reference.
- Make it available for the next user/owner of the product.

This product is of the restricted sales distribution class according to IEC 61800-3 and has a "professional equipment" designation as defined in EN 61000-3-2.

Safety

Ensure all users and operators understand the included WARNINGS, CAUTIONS and NOTES, which alert the user to safety issues. COMPLY WITH WARNINGS AND CAUTIONS AT ALL TIMES. Each of these carries a special meaning and should be read carefully:



WARNING!

A WARNING is given when non-compliance with the warning may result in personal injury and/or equipment damage.



CAUTION!

A CAUTION is given when non-compliance with the caution may result in permanent equipment damage.

NOTE A note provides specific information to make important instructions clear.

Symbols

 Attention	 Electrostatic Discharge (ESD)	 Electric Shock Hazard
See the instructions for use. Specific warnings not found on the label.	This equipment contains ESD sensitive parts. Observe static control precautions when handling, installing and servicing this product.	Disconnect the mains supply before working on the unit. Do not touch presets, switches and jumpers! Always use the correct insulated adjustment tools.



WARNING!

Only qualified personnel must install, operate and maintain this equipment.

A qualified person is someone technically competent and familiar with all safety information, established safety practices, installation, operation, maintenance and the hazards involved with this equipment and any associated machinery.

Hazards

This equipment can endanger life through rotating machinery and high voltages.



WARNING!

PERSONAL INJURY AND/OR ELECTRICAL SHOCK HAZARD

- Always isolate all power supplies from the equipment before starting any work.
- Never perform high voltage resistance checks on the wiring without first disconnecting the product from the circuit under test.
- Use guarding and additional safety systems to prevent injury and electric shock.
- Metal parts may reach 90°C during operation.



CAUTION!

EQUIPMENT DAMAGE HAZARD

- We thoroughly test our products. However, before installation and start-up, inspect all equipment for transit damage, loose parts, packing materials, etc.
- Installation must observe the required environmental conditions for safe and reliable operation.
- In a domestic environment, this product may cause radio interference, requiring adequate measures to be taken. Obtain the permission of the supply authority before connecting to the low voltage supply.

General risks

Installation

- Ensure mechanically secure fixings are in use as recommended.
- Ensure cooling airflow around the product is as recommended.
- Ensure cables/wire terminations are as recommended and are torqued correctly.
- Ensure the product rating is correct - do not exceed the rating.

Application risk

Electromechanical safety is the responsibility of the user. The integration of this product into other apparatus or systems is not the manufacturer's or distributor of the product's responsibility. It is the user's responsibility to ensure the compliance of the installation with any regulations in force.

Health and safety at work

Electrical devices can constitute a safety hazard. Thorough personnel training is an aid to SAFETY and productivity. SAFETY awareness not only reduces the risk of accidents and injuries in your plant but also has a direct impact on improving product quality and costs. If you have any doubts about the SAFETY of your system or process, consult an expert immediately. Do not proceed without doing so. If in doubt, refer to the Supplier.

Weight

Consideration should be given to the weight of our heavier products when handling.

Risk assessment

Under fault conditions or conditions not intended: the motor speed may be incorrect; the motor speed may be excessive; the direction of rotation may be incorrect; the motor may be energised.

In all situations, the user should provide sufficient guarding and/or additional redundant monitoring and safety systems to prevent risk of injury.

NOTE: During a power loss event, the product will commence a sequenced shut-down procedure. Therefore, the system designer must provide suitable protection for this case.

Maintenance

Only qualified personnel should maintain and effect repair using only the recommended spares, alternatively return the equipment to the factory for repair. The use of unapproved parts may create a hazard and risk of injury.



WARNING!

PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD

When replacing a product, all user-defined parameters that define the product's operation must be installed correctly before returning to use. Failure to do so may create a hazard and risk of injury.

The packaging is inflammable and incorrect disposal may lead to the generation of lethal toxic fumes.

Repairs

Repair reports can only be given if the user makes sufficient and accurate defect reporting. Remember that the product without the required precautions can represent an electrical hazard and risk of injury, and that rotating machinery is a mechanical hazard.

Protective insulation

Isolated product



WARNING!

The drive and motor must be connected to an appropriate safety earth. Failure to do so presents an electrical shock hazard. Exposed metal work in this equipment is protected by basic insulation and bonding to a safety earth.

This product is classified as a component and must be used in a suitable enclosure.

1. This is achieved through basic insulation and protective earth grounding, or double-insulation to provide SELV Control Circuits.
2. This protection allows a safe connection to other low voltage equipment.
3. **Earth bonding is the responsibility of the installer.**

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1 Introduction

APPLICATION AREA: Industrial (non-consumer) "Motor speed control utilising DC Motors".

DRIVE MODEL	AC SUPPLY VOLTAGE	NOMINAL OUTPUT VOLTAGE	MAXIMUM CURRENT	PRODUCT DISSIPATION at full current	ISOLATION
400i/LV60	30/60	24/48	4 A	12 W	isolated
400i	110/240	90/180	4 A	12 W	isolated

This isolated DC motor drive is designed for panel mounting, with connections made using screw terminals

- All models are of open chassis construction for use in a suitable enclosure.
- The drives have isolated control electronics.
- Closed loop control of both armature current and feedback voltage for precise control of motor torque and speed.
- Motor and drive are protected by a stall timer to automatically remove power after 30 seconds if the required speed cannot be achieved.
- Up to 150% of the preset maximum current for up to 30 seconds allowing for high, short-term torques during acceleration etc.
- Independent control of either the current or speed loops by external inputs allow for torque or speed control applications with overspeed or overcurrent protection.
- Demand signal can be derived from a potentiometer, 0-10 V signal or 4-20 mA loop.
- Speed feed back signal selection: ARMATURE VOLTAGE, or shaft-mounted TACHOMETER.

Input and outputs	+aux input	speed output	rail outputs
	-aux input	current output	+12 V regulated output
	current input	ramp output	+10 V precision reference
	4-20 mA input	stall relay driver	-12 V regulated output
	0 to 10 V input	zero/stall relay	-24 V unregulated output
Adjustable parameters	Max speed	Up ramp	Max current
	Min speed	Down ramp	IR comp
			Stability
Switched functions	Max feedback	Torque control	Tacho feedback
			AV feedback
Jumper functions	Dual supply voltage	4-20 mA input	Phase angle limit
			50% stall threshold
Performance features	Dual loop control	Precision tacho rectifier	Compact design
	Relay driver outputs	International compatibility	Integral fusing

2 Installation



WARNING!

ELECTRIC SHOCK HAZARD

Disconnect the mains supply before working on the unit. **DO NOT TOUCH PRESETS, SWITCHES AND JUMPERS!** Always use the correct insulated adjustment tools.

2.1 Motor installation

- Foot-mounted motors must be level and secure.
- Ensure accurate alignment of the motor shaft and couplings.
- Do not hammer pulleys or couplings onto the motor shaft.
- Protect the motor from ingress of foreign matter during installation.

Earthing: Connect the motor to the system enclosure earth.

2.2 Drive Installation

Requirements during installation and operation:

- Optimise the heatsink airflow.
- Avoid vibration.
- Protect the drive from pollutants.
- Ambient operating temperature must be within -10°C and +40°C.

POWER CABLING: Use correctly rated cable: minimum 600 Vac, 2 x armature current

CONTROL SIGNALS: The 400i has isolated control terminals and as such may be connected to other systems. Avoid running signal cables close to power cables.

SUPPLY: Please ensure that the supply selection jumper on the drive matches the incoming supply. Failure to do this may result in permanent damage to the drive unit and will invalidate any warranty.

FUSING: The drive **MUST BE FUSED EXTERNALLY** with semiconductor fuses that **MUST** be rated at 1.75 x armature current, and have an A²s rating lower than the I²t value listed on page 14. **Any Warranty will be invalid if this fusing is incorrect.**

400i	Fuse	Holder	Clearing I ² t
8 A	CH0008A	CP102071	35 A ² s

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 100 Ω resistor in series with a 0.1 μF capacitor is usually adequate in these situations. Refer to page 5 for EMC guidelines.



CAUTION!

EQUIPMENT DAMAGE HAZARD

Reversing systems: do not transpose the armature connections until the motor has stopped, otherwise damage will occur.



CAUTION!

EQUIPMENT DAMAGE HAZARD

For frequent stopping or jogging, it is not good practice to rely on switching the supply off and on to stop and start with the run contact permanently closed.

This may result in an uncontrolled current pulse for one half mains cycle under certain conditions, e.g. main contact bounce. This could lead to undesired motor movement or device damage.

In rapid start-stop systems, use a spare normally-open contact on the main supply contactor in series with T20 and any other RUN contacts.

2.2.1 Mechanical dimensions

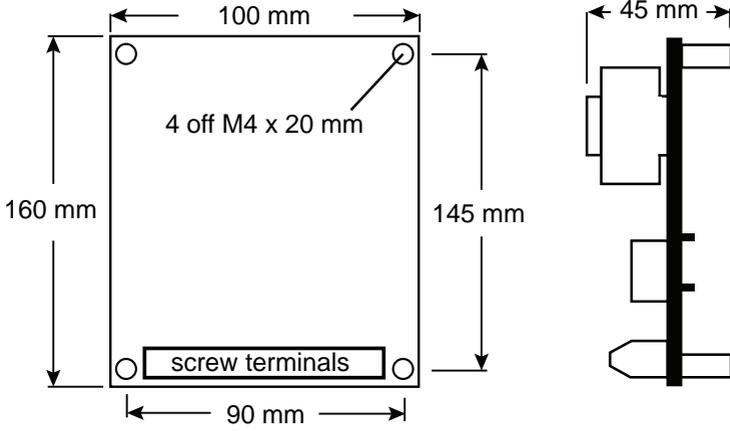


Figure 1 Mechanical dimensions

2.3 Guide for systems used in the EU

Special consideration must be given to installations in member states of the European Union regarding noise suppression and immunity. According to IEC 1800-3 (EN61800-3) the drive units are classified as complex components only for professional assemblers, with no CE marking for EMC.

The drive manufacturer is responsible for the provision of installation guidelines. The resulting EMC behaviour is the responsibility of the manufacturer of the system or installation. The units are subject to the LOW VOLTAGE DIRECTIVE 73/23/EEC and are CE marked accordingly.



Following the procedures outlined below will normally be required for the drive system to comply with the European regulations, some systems may require different measures. Installers must have a level of technical competence to correctly install. Although the drive unit itself is not subject to the EMC directive, considerable development work has been undertaken to ensure that the noise emissions and immunity are optimised.

- * EN61800-3 specifies two alternative operating environments. These are the Domestic (1st environment) and Industrial (2nd environment). There are no limits specified for conducted or radiated emissions in the industrial environment, hence it is usual for the AC supply filter to be omitted in Industrial systems.

Definition of an industrial environment: all establishments, other than those directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes.

2.4 Multiple drives

The arrangement shown below is for multiple drives with one filter, showing the star point earthing method.

The filter should be rated for the worst case total armature current load. The drive units are designed to function normally on unfiltered AC supplies shared with other thyristor DC drives. (Not AC drives).

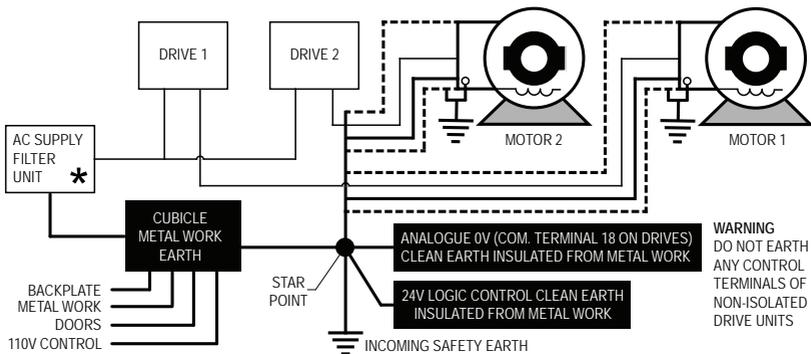


Figure 2 Star point connections for multiple drives

2.5 Requirements for EMC compliance

- Keep parallel runs of power and control cables at least 0.3 metres apart. Cross-overs must be at right angles.
- Keep sensitive components at least 0.3 metres from the drive and power supply cables.
- The AC connections from the filter to the drive must be less than 0.3 metres or, if longer, correctly screened.
- Do not run filtered and unfiltered AC supply cables together.
- Control signals must be filtered or suppressed, e.g. control relay coils and current carrying contacts. The drive module has built-in filters on signal outputs.
- The AC supply filter must have a good earth connection to the enclosure back plane. Take care with painted metal to ensure good conductivity.
- The AC input filter has earth leakage currents. Earth RCD devices may need to be set at 5% of rated current.
- The metal enclosure will be RF ground. The AC filter, drive earth and motor cable screen should connect directly to the metal cabinet for best performance.
- Linear control signal cables must be screened, with the screen earthed at the drive end only. Minimise the length of screen stripped back and connect it to an analogue earth point.
- (1) The motor cable must be screened or armoured with 360 degree screen terminations to earth at each end. The cable must have an internal earth cable and the screen must extend into the enclosure and motor terminal box to form a Faraday cage without gaps.
- (2) The internal earth cable must be earthed at each end. The incoming earth must be effective at RF.
WARNING! The earth safety must always take precedence.



WARNING!
ELECTRIC SHOCK HAZARD

AC supply filters must not be used on supplies that are unbalanced or float with respect to earth.

The drive and AC filter must only be used with a permanent earth connection. No plugs/sockets are allowed in the AC supply.

The AC supply filter contains high voltage capacitors and should not be touched for a period of at least 20 seconds after the removal of the AC supply.

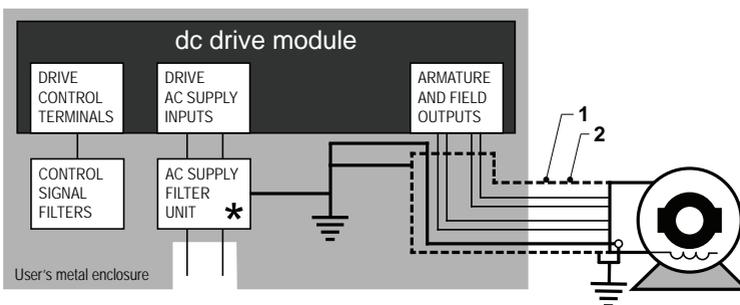


Figure 3 Connections for EMC compliance

2.6 Typical applications

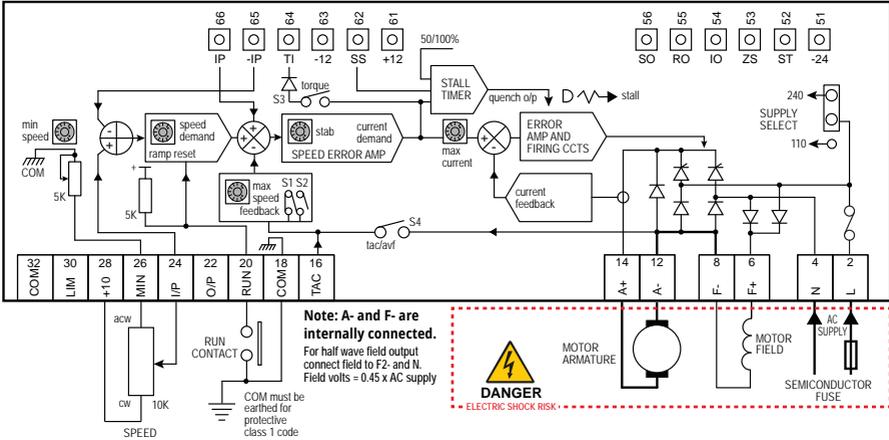


Figure 4 Basic connection

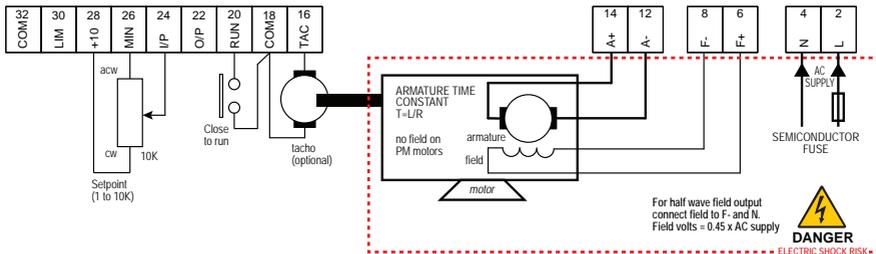


Figure 5 Basic connection with optional tacho

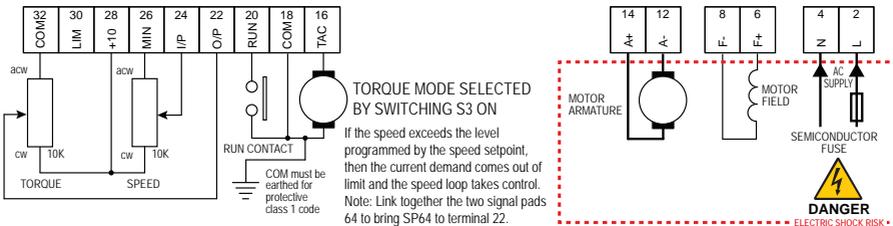


Figure 6 Torque control with overspeed limiting by separate setpoint

SPRINT ELECTRIC LTD. does not accept any liability whatsoever for the installation, fitness for purpose or application of its products. It is the user's responsibility to ensure that the unit is correctly used and installed.

Health and Safety at Work
Devices constitute a safety hazard. It is the responsibility of the user to ensure compliance with any Acts or By-Laws in force. **ONLY skilled persons should install this equipment.**



WARNING!

DANGEROUS POTENTIAL PRESENT

Control connections 16 to 32 and signal pads 51 to 66 are electrically isolated from the power terminals 2 to 14. DO NOT TOUCH THE BOARD!

Main terminals

32	Common
30	Open collector output, 100 mA 30 V - turns ON if the drive goes into a stall condition
28	+10 V precision reference, 10 mA maximum. Short circuit proof
26	Minimum end of setpoint potentiometer or 4-20 mA current loop input
24	0 to +10 V input for 0-100% speed
22	Output - may be linked to any one of the signal pads (located on the top edge) by connecting to an adjacent pad
20	Connect to COMMON to run 60 ms ON / 20 ms OFF (WARNING: Run is an electronic inhibit function. The field remains energised and all power terminals remain "live". RUN must not be relied upon during hazardous operations)
18	Common - connect to earth for protective Class 1
16	Tacho input 12-200 V full scale, + or - polarity
14	(A+) armature output
12	(A-) armature output (and T10)
10	(A-) armature output (and T12)
8	(F-) field output
6	(F+) field output
4	(N) AC supply input, according to supply select jumper
2	(L) AC supply input

Signal pads on top edge of board - link to Terminal 22 (see above)

66	Auxiliary speed input, 0 to +10 V for 0-100% direct speed
65	Auxiliary inverting speed input, 0 to -10 V for 0-100% ramped speed
64	Torque input, 0 to +10 V for 0-100% current
63	-12 V output 10 mA maximum - do not short
62	Stop/start input: close to -12 V to activate stall condition close to +12 V to release stall condition
61	+12 V output, 10 mA maximum - do not short
56	Speed output - typically 7.5 V full scale adjustment of maximum speed preset will alter the full scale reading from 4 V (anti-clockwise) to 9 V (clockwise) - 0 V to full scale represents 0-100%, impedance 1 k Ω
55	Setpoint ramp output, 0-10 V, impedance 1 k Ω
54	Current output, 0-5 V for 0-100% current, 1 k Ω impedance
53	Zero speed relay driver output, maximum 100 mA, switches to -24 V
52	Stall relay driver output, maximum 100 mA, switches to -24 V
51	-24 V relay supply, 25 mA - do not short

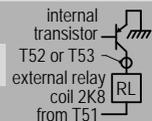


Figure 8 Terminal specifications

3 Commissioning

3.1 Initial settings - without power

The suggested Commissioning strategy is to start in the safest possible mode of operation and progressively exercise each element of the system until full functionality has been achieved.

For this reason, all drive units are shipped to run using:

- the highest supply option
 - a nominal speed
 - ARMATURE VOLTAGE feedback mode - **we recommend that initial commissioning is carried out in Armature Voltage feedback mode**
 - the lowest current range
1. **To avoid damage, ensure the drive's supply selection jumper matches the incoming ac supply: 240 Vac or 110 Vac, (60 Vac or 30 Vac for LV60 models).**
 2. Ensure switch S4 is set to ON, selecting AVF.

Supply selection		
Drive model	HIGH position	LOW position
400i	240 V	110 V
400i/LV60	60 V	30 V



Refer also to "Figure 9 User adjustments" on page 11 for the following switch selections:

3. Use switches S1 and S2 to select a range suitable for the armature voltage at full speed. For example, if the armature voltage is 90 V, then set S1:OFF and S2:ON for 50 to 100 V voltage feedback.
4. Switch S3 to off. (When on, this allows a Torque signal to be entered via signal pad 64 (TI) on the top edge of the board.)
5. For an initial start, adjust the following presets:



DOWN RAMP	Fully anti-clockwise
UP RAMP	Fully anti-clockwise
MIN SPEED	Fully anti-clockwise
MAX SPEED	Fully anti-clockwise
STABILITY	Mid-way
IR COMP	Fully anti-clockwise
MAX CURRENT	Set MAX CURRENT from your motor rating plate. Rotating clockwise gives 0-100% of the drive's 4 A current rating; 50% rotation will give a 2 A current limit.

6. If a tachogenerator is fitted, disconnect the tacho wire from terminal T16 and insulate.

3.2 Pre-operation motor check list

With no power applied, complete the following check list:

- Check for the correct insulation between all motor windings and earth (disconnect all drive cables before testing).
- Check inside the motor connection box for foreign objects, damaged terminals etc.
- Check that motor brushes are in good condition, correctly seated and free to move in brush boxes.
- Check for the correct action of brush springs.
- Check that motor vents are free of any obstruction or protective covers.

3.3 Operating the drive

1. Note the armature voltage rating given on the motor rating plate.
2. **Apply mains power to the unit.** The ON lamp will light. Apply mains power to the unit. The ON lamp will light. (Check the field energises if used, and +10 V precision reference is available on Terminal 28).
3. Close the RUN contact.
4. Gradually increase the external setpoint to start the motor rotating. If the direction is wrong, TURN OFF THE POWER, WAIT FOR THE MOTOR TO STOP TURNING and swap over the cables connected to the A+ and A- terminals.
5. **MAX SPEED:** Increase the external setpoint further to ramp up to full speed. Fine adjust using the MAX SPEED preset to achieve the armature voltage stated on the motor rating plate. Do not exceed the armature voltage rating.
6. Reduce the external setpoint to ramp the drive to zero. The motor will stop rotating.
7. **MIN SPEED:** Adjust MIN SPEED to provide a speed preset.
8. **RAMP UP/RAMP DOWN:** Run the motor up and down while adjusting the RAMP UP and RAMP DOWN potentiometers.
9. **STABILITY:** Adjust the STAB potentiometer to improve response. Clockwise rotation gives a faster response. (Excessive rotation in either direction may lead to instability, depending on load.)
10. **IR COMP:** Speed droop on heavy loads may occur where armature voltage feedback is used. Compensate for this by clockwise adjustment of the IR comp preset. Excessive rotation may lead to instability.

The drive is now commissioned for use in Armature Voltage feedback.



WARNING!

When power is applied to the drive,
ALWAYS use an insulated tool when adjusting the presets.

To implement the 50% THRESHOLD, link the two points marked STH. Drive quenches when lit if stall timer trips - the time depends upon the current demand:

STANDARD

150%	30 secs
125%	60 secs
115%	120 secs
100%	no trip

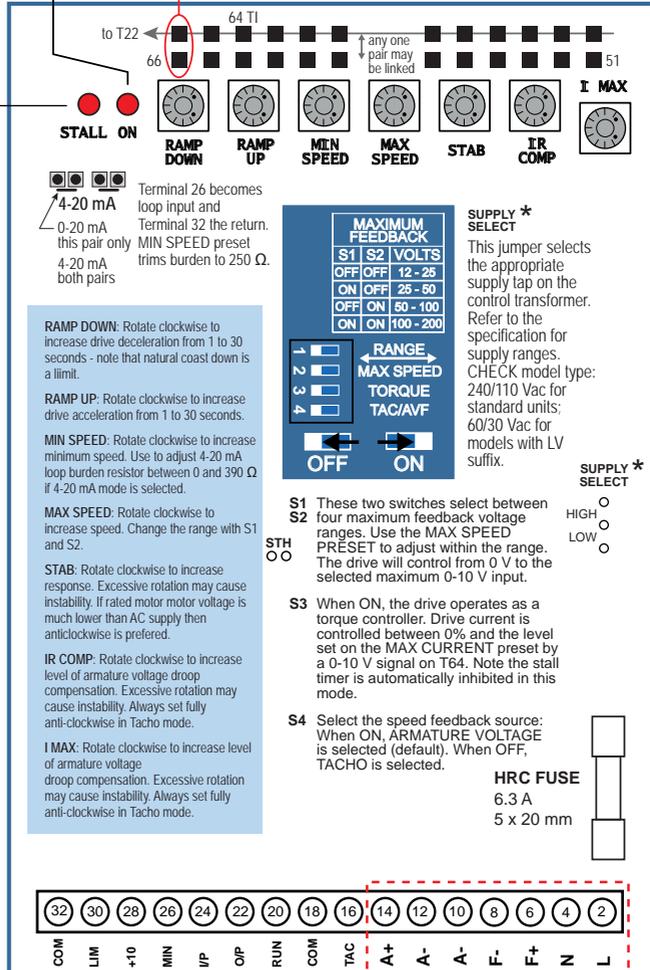
WITH 50% THRESHOLD

150%	15 secs
100%	30 secs
75%	60 secs
50%	no trip

AC power is applied when lit.

T22

Signal pads 51 to 66 - any one signal pad may be connected to T22 by linking the appropriate pads together



RAMP DOWN: Rotate clockwise to increase drive deceleration from 1 to 30 seconds - note that natural coast down is a limit.

RAMP UP: Rotate clockwise to increase drive acceleration from 1 to 30 seconds.

MIN SPEED: Rotate clockwise to increase minimum speed. Use to adjust 4-20 mA loop burden resistor between 0 and 390 Ω if 4-20 mA mode is selected.

MAX SPEED: Rotate clockwise to increase speed. Change the range with S1 and S2.

STAB: Rotate clockwise to increase response. Excessive rotation may cause instability. If rated motor voltage is much lower than AC supply then anticlockwise is preferred.

IR COMP: Rotate clockwise to increase level of armature voltage droop compensation. Excessive rotation may cause instability. Always set fully anticlockwise in Tacho mode.

I MAX: Rotate clockwise to increase level of armature voltage droop compensation. Excessive rotation may cause instability. Always set fully anticlockwise in Tacho mode.



DANGER!
ELECTRIC SHOCK HAZARD

Figure 9 User adjustments

4 Options

Consider the following changes to tune/improve the performance of the drive/system.

- **SPEED FEEDBACK SELECTION** If the system is to use **Tacho** feedback you can now adjust for the tachogenerator's output voltage, and hence the speed of the motor.

Run the drive in **Armature Voltage** feedback mode and check the polarity of the tacho using a voltmeter. The tacho feedback polarity must be negative with respect to COMMON, Terminal 24 for a Positive Speed Demand on Terminal 8.



WARNING! **PERSONAL INJURY HAZARD**

Terminals A+, A-, F+, F-, N & L are at high potential.
Do not touch the terminals or any connected conductor.

NOTE: IR COMP must NOT be used with Tacho feedback - set the potentiometer fully anti-clockwise.

- a. With the power off, connect the tachogenerator's output voltage to Terminal 16. Set the **Tach/Avf** switch S4 to OFF (left).

Calculate the output voltage from the tachogenerator:

For example, if quoted as "100 V per 1000 revs/min" then
feedback voltage = (motor speed/1000) x 100 V

Alternatively, it can be estimated as follows:

1. Whilst still in Avf mode and running at 100% speed, measure the tacho volts on the wire intended for connection to Terminal 16 - **WARNING: possible high voltage.** Note this voltage, **stop the motor and turn off the supply.**
 2. Set the **Tach/Avf** switch S4 to OFF (left) to disconnect Avf and then reconnect the tacho wire to Terminal 16.
- b. Reset switches S1 and S2 to a suitable range for the measured/calculated Tacho voltage.
 - c. Run the drive using a low to middle speed setpoint.
 - d. Adjust the **Max spd** preset to achieve the required shaft speed at maximum speed setpoint.
- **TORQUE CONTROL MODE:** Switch S3 allows a Torque signal to be entered when ON via signal pad 64 (TI) which is on the top edge of the board.

6 Specifications

Function	Specification					Comments
CONTROL ACTION	DUAL LOOP PROPORTIONAL + INTEGRAL					
FEEDBACK METHOD	ARMATURE VOLTS		TACHOMETER			SWITCH SELECTABLE
0-100% REGULATION	2% TYPICAL		0.1% TYPICAL			BEWARE MOTOR HEAT AT LOW SPEED
MAX TORQUE SPEED RANGE	20 : 1		100 : 1			
OVERLOAD	150% CONTINUOUS CURRENT FOR 30 SECONDS					
Customer Presets						
MAX SPEED	12 - 200 V FULL SCALE FEEDBACK					SWITCH SELECTABLE
MIN SPEED	0-30% OF MAX SPEED					NON-INTERACTIVE
UP/DOWN RAMPS	INDEPENDENTLY ADJUSTABLE 1-30 SECONDS					LINEAR RAMPS
STABILITY	VARIES SPEED LOOP GAIN					
IR COMPENSATION	0-30% OF ARMATURE VOLTAGE					DO NOT USE WITH TACHO
MAX CURRENT	LINEAR SETTING FROM 0-100%					150% OVERLOAD
Switch Selectable						
SPEED RANGE	FOUR RANGES OF FEEDBACK VOLTAGE					S1, S2
TORQUE MODE	0-10 V INPUT FOR 0-100% CURRENT, WITH AUTOMATIC OVERSPEED PROTECTION					S3
TACHO/AVF	SELECT TACHO OR ARMATURE VOLTAGE FEEDBACK					S4
Jumper Functions						
SUPPLY SELECT	DUAL SUPPLY VOLTAGE SELECTOR					JUMPER SELECTABLE
Link Functions						
4-20 mA	ALLOWS 4-20 mA LOOP SIGNAL INPUT					5 V COMPLIANCE
50% STALL LEVEL (STH link)	ALLOWS LARGE PEAK CURRENTS					150% PEAK
SUPPLY RANGES		LV30	LV60	110	240	OVER FULL TEMP RANGE WITH OUTPUTS LOADED
45 Hz to 65 Hz	MAX	36 V	72 V	130 V	264 V	
AUTO RANGING	MIN	27 V	54 V	100 V	200 V	
SIGNAL OUTPUTS	SPEED, CURRENT, RAMP					ALL BUFFERED
RELAY OUTPUTS	STALL, ZERO SPEED RELAY DRIVERS					FOR 24 Vdc
RAIL OUTPUTS	-24 V UNREGULATED 25 mA					+/- 20%
	+12 V, +10 V, -12 V REGULATED 10 mA					0.01%/DEG C 5%
FIELD OUTPUT	0.9 (0.45) x AC SUPPLY. 0.5 A MAXIMUM.					FULL (0.9) OR HALF WAVE (0.45)
IP RATING	IP00					
ALTITUDE	3000 METRES MAXIMUM FOR FULL RATING					DE-RATE 1%/100 m
HUMIDITY	85% R.H AT 40°C, NON-CONDENSING					
FORM FACTOR	TYPICAL 1.5 AT MAXIMUM OUTPUT					
TEMPERATURE	STORAGE AND OPERATING -10 TO + 50°C AMBIENT					
MAX I ² t FOR EXTERNAL FUSING (Amps ² Seconds)	50 I ² t					REFER TO SUPPLIER FOR SEMI-CONDUCTOR FUSES

Disposal

This product contains materials that are consignable waste under the Hazardous Waste Regulations 2005. Metal and plastic materials can be recycled, however, disposal of the printed circuit board requires compliance with all valid environmental control laws.



Products that must be recycled in accordance with the WEEE Regulations are marked with the symbol opposite. Contact us when recycling the product.



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We accept no liability whatsoever for the installation, fitness for purpose or application of this product.

It is the user's responsibility to ensure the unit is correctly used and installed.

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We reserve the right to modify or improve the product without notification.

The contents of this manual shall not become part of or modify any prior existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Sprint Electric. The warranty contained in the contract between the parties is the sole warranty of Sprint Electric. Any statements contained herein do not create new warranties or modify the existing warranty.

We will be under no liability for any defect arising from fair wear and tear, negligence, wilful damage, misuse, abnormal working conditions, failure to follow the manufacturer's instructions, unauthorised alteration or repair of hardware, unauthorised or accidental alteration of software or configuration, lost profits, commercial loss, economic loss, or loss arising from personal injury. We may, at our discretion, raise a charge for any faults repaired that fall outside the warranty cover.