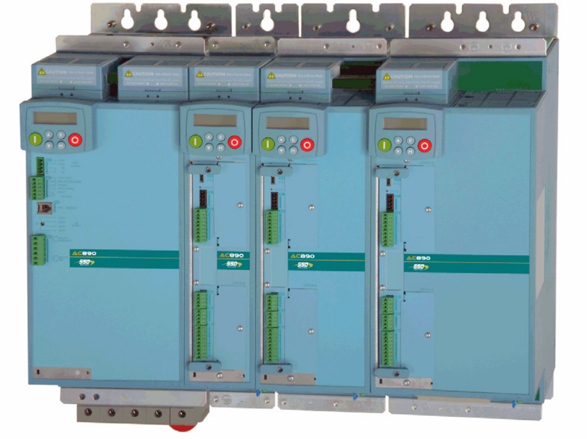
890 Engineering Reference

Product Manual : Frames B, C & D

HA468445U002 Issue 4

Compatible with Version 2.3 Software onwards



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HA468445U002
890

Parker

Chapter 1

Safety

Please read these important Safety notes before installing and operating this equipment.

Caution	WARNING
CAUTION notes in the manual warn of danger to equipment.	**WARNING** notes in the manual warn of danger to personnel.

Safety Information

Requirements

IMPORTANT Please read this information BEFORE installing the equipment.

Intended Users

This manual is to be made available to all persons who are required to install, configure or service equipment described herein, or any other associated operation.

The information given is intended to highlight safety issues, and to enable the user to obtain maximum benefit from the equipment.

Complete the following table for future reference detailing how the unit is to be installed and used.

INSTALLATION DETAILS			
Model Number ***(see product label)***		**Where installed** ***(for your own information)***	
Unit used as a: ***(refer to Certification)***	❑ Component ❑ Relevant Apparatus	**Unit fitted:**	❑ Wall-mounted ❑ Enclosure

Application Area

The equipment described is intended for industrial motor speed control utilising AC induction or AC synchronous machines.

Personnel

Installation, operation and maintenance of the equipment should be carried out by qualified personnel. A qualified person is someone who is technically competent and familiar with all safety information and established safety practices; with the installation process, operation and maintenance of this equipment; and with all the hazards involved.

Safety Information

Product Warnings

Caution Risk of electric shock	**Caution** Refer to documentation	**Earth/Ground** Protective Conductor Terminal

Hazards

DANGER! - Ignoring the following may result in injury

1. This equipment can endanger life by exposure to rotating machinery and high voltages.

2. The equipment must be permanently earthed due to the high earth leakage current, and the drive motor must be connected to an appropriate safety earth.

3. Ensure all incoming supplies are isolated before working on the equipment. Be aware that there may be more than one supply connection to the drive.

4. There may still be dangerous voltages present at power terminals (motor output, supply input phases, DC bus and the brake, where fitted) when the motor is at standstill or is stopped.

5. For measurements use only a meter to IEC 61010 (CAT III or higher). Always begin using the highest range.
   CAT I and CAT II meters must not be used on this product.

6. Allow at least 5 minutes for the drive's capacitors to discharge to safe voltage levels (<50V). Use the specified meter capable of measuring up to 1000V dc & ac rms to confirm that less than 50V is present between all power terminals and between power terminals and earth.

7. Unless otherwise stated, this product must NOT be dismantled. In the event of a fault the drive must be returned. Refer to "Routine Maintenance and Repair".

1

Safety Information

WARNING! - Ignoring the following may result in injury or damage to equipment

SAFETY

Where there is conflict between EMC and Safety requirements, personnel safety shall always take precedence.

- Never perform high voltage resistance checks on the wiring without first disconnecting the drive from the circuit being tested.
- Whilst ensuring ventilation is sufficient, provide guarding and /or additional safety systems to prevent injury or damage to equipment.
- When replacing a drive in an application and before returning to use, it is essential that all user defined parameters for the product's operation are correctly installed.
- All control and signal terminals are SELV, i.e. protected by double insulation. Ensure all external wiring is rated for the highest system voltage.
- Thermal sensors contained within the motor must have at least basic insulation.
- All exposed metalwork in the Inverter is protected by basic insulation and bonded to a safety earth.
- RCDs are not recommended for use with this product but, where their use is mandatory, only Type B RCDs should be used.

EMC

- In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.
- This equipment contains electrostatic discharge (ESD) sensitive parts. Observe static control precautions when handling, installing and servicing this product.
- This is a product of the restricted sales distribution class according to IEC 61800-3. It is designated as "professional equipment" as defined in EN61000-3-2. Permission of the supply authority shall be obtained before connection to the low voltage supply.

Safety Information

CAUTION!

APPLICATION RISK

- The specifications, processes and circuitry described herein are for guidance only and may need to be adapted to the user's specific application. We can not guarantee the suitability of the equipment described in this Manual for individual applications.

RISK ASSESSMENT

Under fault conditions, power loss or unintended operating conditions, the drive may not operate as intended. In particular:

- Stored energy might not discharge to safe levels as quickly as suggested, and can still be present even though the drive appears to be switched off
- The motor's direction of rotation might not be controlled
- The motor speed might not be controlled
- The motor might be energised

A drive is a component within a drive system that may influence its operation or effects under a fault condition. Consideration must be given to:

- Stored energy
- Supply disconnects
- Sequencing logic
- Unintended operation

Chapter 2

Getting Started

A few things you should do when you first receive the unit.

About this Manual

IMPORTANT **Motors used must be suitable for Inverter duty.**

Note ***Do not attempt to control motors whose rated current is less than 25% of the drive rated current. Poor motor control problems may occur if you do.***

This manual is intended for use by the installer, user and programmer of the 890 drive. It assumes a reasonable level of understanding in these three disciplines.

Note ***Please read all Safety information before proceeding with the installation and operation of this unit.***

It is important that you pass this manual on to any new user of this unit.

How the Manual is Organised

This Engineering Reference manual is organised into chapters, indicated by the numbering on the edge of each page.

Information for all 890 units is included (890CS Common Bus Supply, 890CD Common Bus Drive, 890SD Standalone Drive).

The manual is more detailed than the relevant QuickStart manual, and so is of use to the unfamiliar as well as the high-end user.

Initial Steps

Use the manual to help you plan the following:

Installation

Know your requirements:

- certification requirements, CE/UL/CUL conformance
- conformance with local installation requirements
- supply and cabling requirements

Operation

Know your operator:

- how is it to be operated, local and/or remote?
- what level of user is going to operate the unit?
- decide on the best menu level for the Keypad (where supplied)

Programming (using the 890 DSE Configuration Tool)

Know your application:

- create/install the most appropriate Application
- enter a password to guard against illicit or accidental changes
- customise the keypad to the application

Equipment Inspection

- ♦ Check for signs of transit damage
- ♦ Check the product code on the rating label conforms to your requirement.

If the unit is not being installed immediately, store the unit in a well-ventilated place away from high temperatures, humidity, dust, or metal particles.

Storage and Shipping Temperatures			
Storage Temperature :	-25°C to +55°C	Shipping Temperature :	-25°C to +70°C

Refer to Appendix E: “Technical Specifications” to check the rating label/product code.
Refer to Chapter 11: “Routine Maintenance and Repair” for information on returning damaged goods.

Packaging and Lifting Details

Caution

The packaging is combustible. Igniting it may lead to the generation of lethal toxic fumes.

- ♦ Save the packaging in case of return. Improper packaging can result in transit damage.
- ♦ Use a safe and suitable lifting procedure when moving the unit. Never lift the unit by its terminal connections.
- ♦ Prepare a clear, flat surface to receive the drive before attempting to move it. Do not damage any terminal connections when putting the unit down.

Chapter 3

Product Overview

An introduction to the 890 range of products, and a quick look at the Keypads and available plug-in Options.

Product Range

The 890 range is designed to control standard 3-phase ac induction motors and brushless servo motors. There are three main types of 890:

890CS Common Bus Supply

The Common Bus Supply connects to AC and provides DC to the Common Bus Drive (s) via busbars.

890CD Common Bus Drive

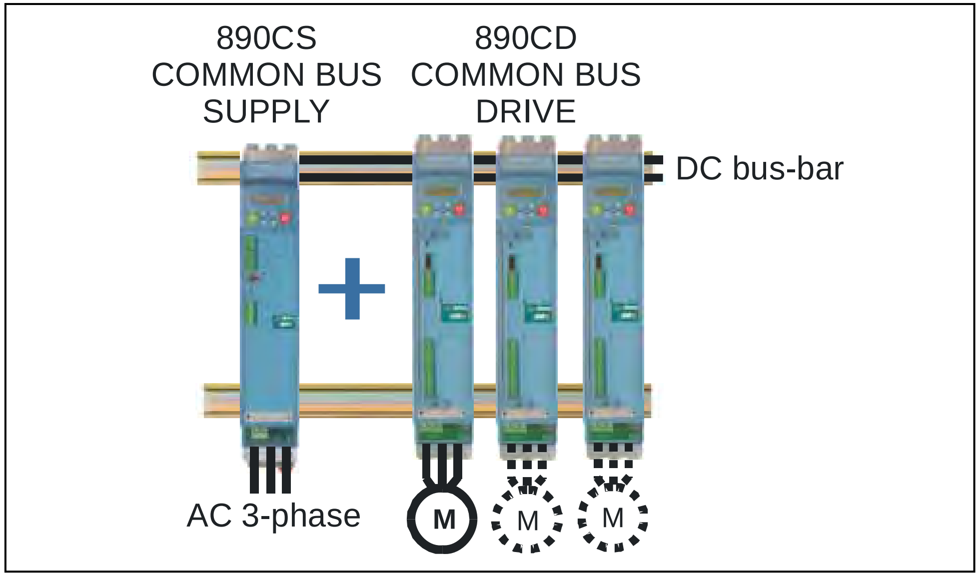
The Common Bus Drive (s) receives DC from the Common Bus Supply. It provides control for the motor.

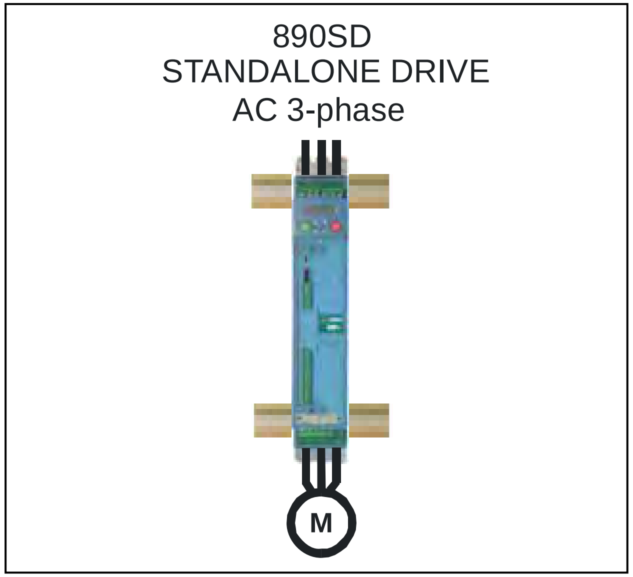
The figure shows a Frame B Common Bus Supply linked to three Frame B Common Bus Drives.

890SD Standalone Drive

The Standalone Drive is AC supplied and provides control for the motor.

The figure shows a Frame B Standalone Drive.





Note ***All kW ratings are at 400VAC, all HP ratings are at 460VAC.***

The units are available in the following frame sizes:

890CS Common Bus Supply

	FRAME B 32A AC (Frame B1) nominal full load input current 54A AC (Frame B2) nominal full load input current		FRAME D 108A AC (Frame D1) nominal full load input current 162A AC (Frame D2) nominal full load input current

890CD Common Bus Drive

	FRAME B 0.55 – 7.5kW 0.75 – 10 HP 16A AC maximum = 100% full load output current		FRAME C 5.5 – 15kW 7.5 – 20 HP 30A AC maximum = 100% full load output current		FRAME D 18.5 – 30 kW 25 – 40 HP 59A AC maximum = 100% full load output current

890CS/890CD Selection

The required rating for the 890CS input stage can be calculated by adding up the sum of the motor currents attached to the associated output stages. Refer to Appendix E: " Electrical Ratings: : 890CS - Calculation"

890SD Standalone Drive

	FRAME B 0.55 – 7.5kW 0.75 – 10 HP 16A AC maximum = 100% full load output current		FRAME C 11 – 15kW 15 – 20 HP 30A AC maximum = 100% full load output current		FRAME D 18.5 – 30 kW 25 – 40 HP 59A AC maximum = 100% full load output current

Functional Diagrams

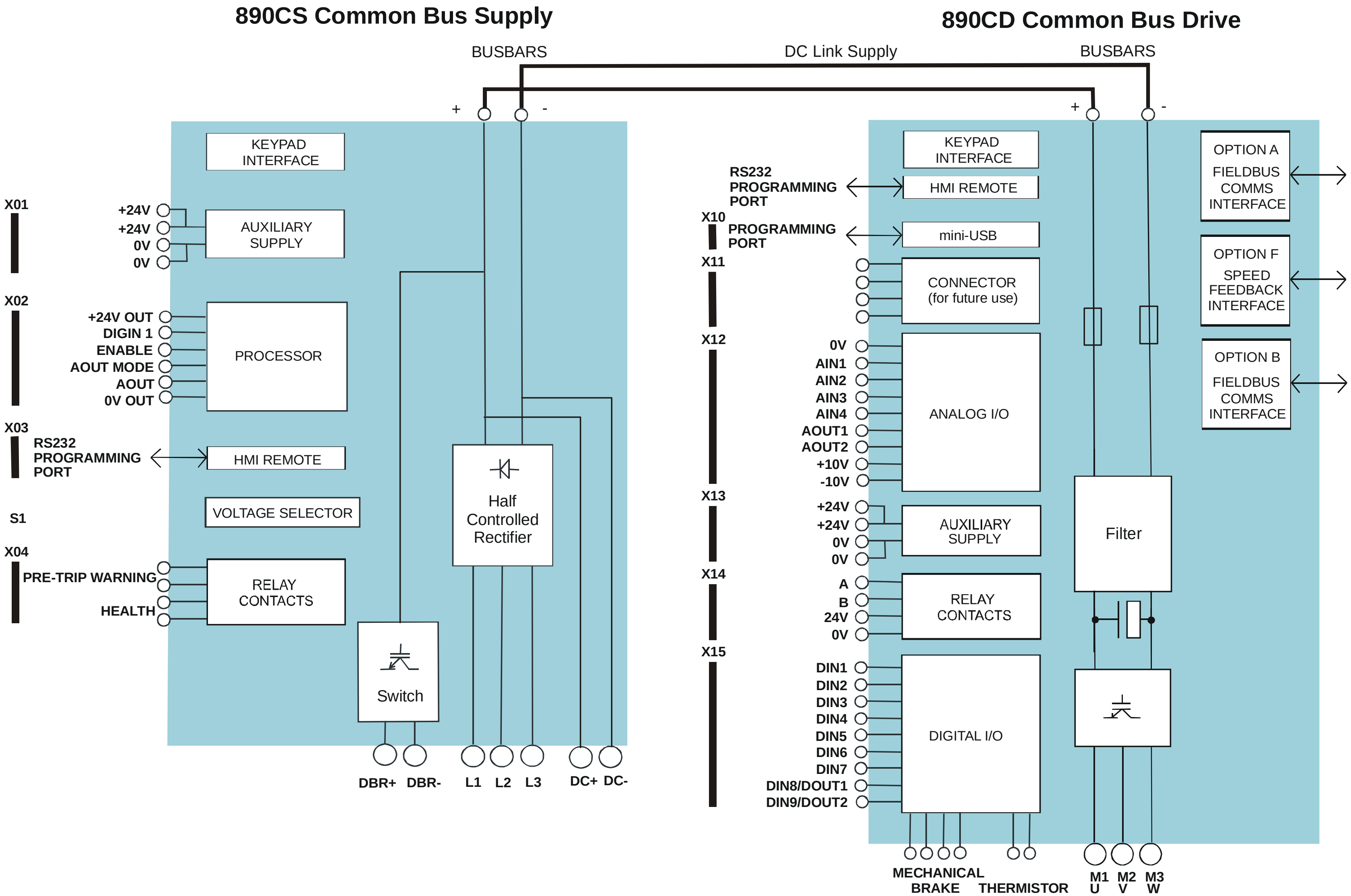


Figure 3.1 Functional Block Diagram of 890CS Common Bus Supply & 890CD Common Bus Drive

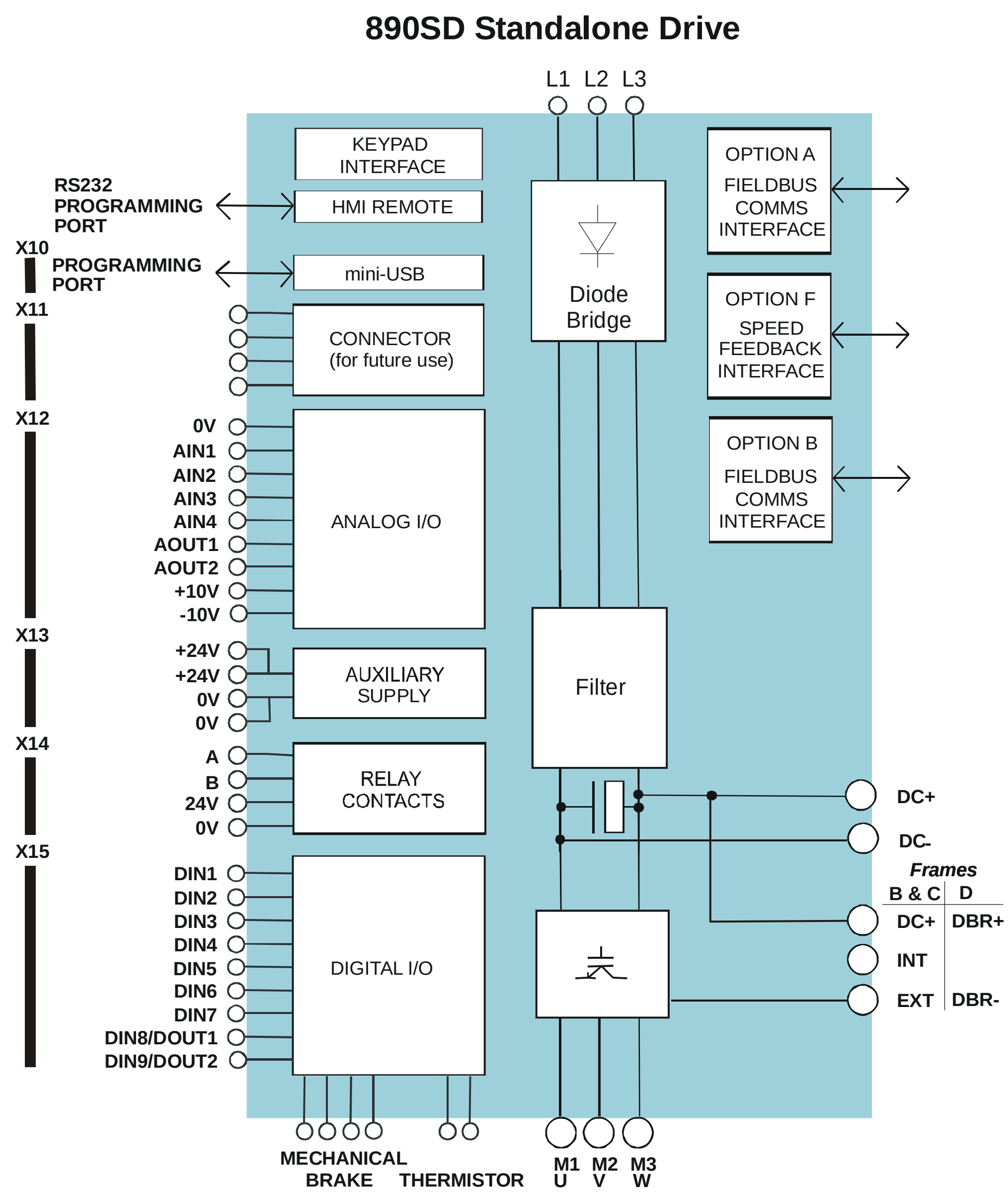


Figure 3.2 Functional Block Diagram of 890SD Standalone Drive

Keypads

The 890 is fitted with the 6511 Keypad.

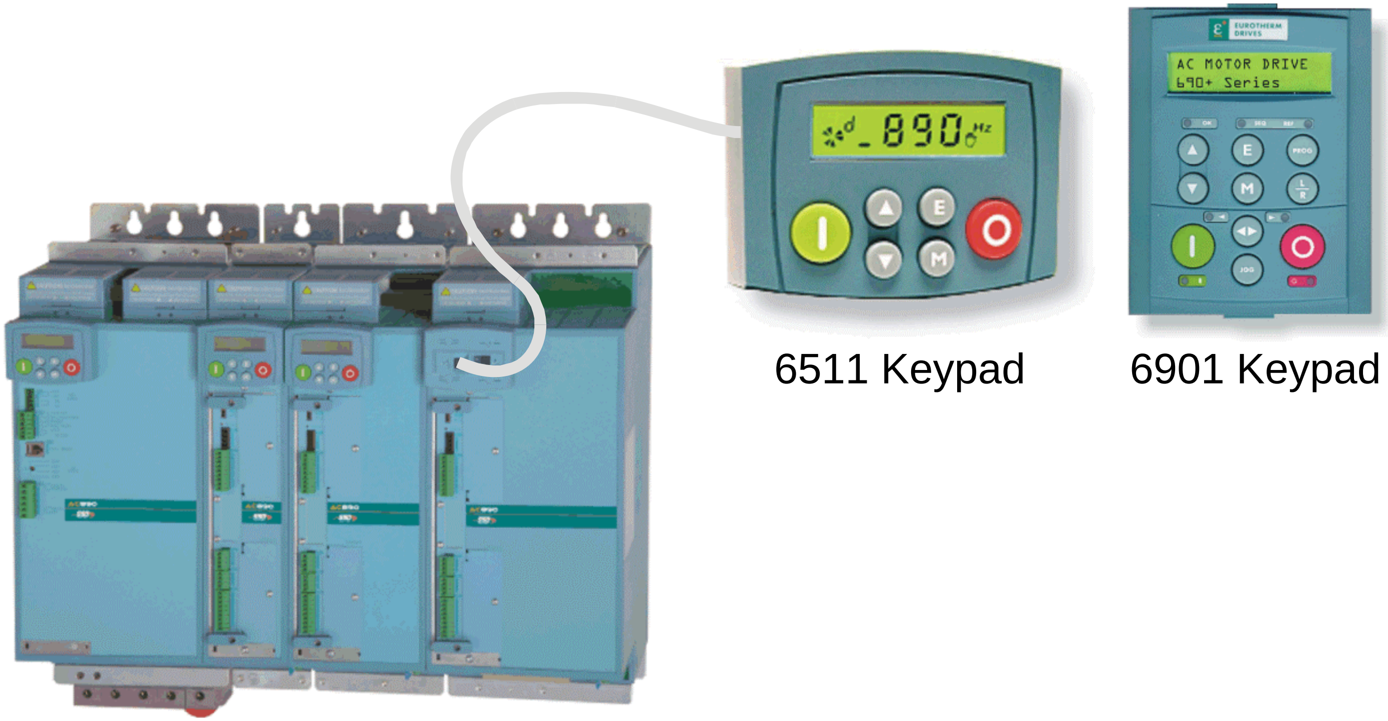
It provides Local control of the 890. For example, you can start and stop the motor and check on diagnostic information. The keypad can also be used to change parameters values on the 890CD and 890SD units.

The 6511 keypad fits to the front of the 890.

You can also remote-mount the 6511 keypad up to 3 metres away.

Another option is to remote-mount a 6901 keypad (as used on our larger 690+ drives). The 6901 keypad provides plain language programming on its larger display, and it also has the ability to upload, store and download parameters.

For remote-mounting, you'll need the correct Remote Mounting Kit. Refer to Chapter 8: "The Keypad".



6511 Keypad

6901 Keypad

Option Cards

The 890CD Common Bus Drive and 890SD Standalone Drive can be fitted with a range of Option Cards. They are plugged into the removable Control Board.

- Feedback Board : Resolver type, Encoder type
- Fieldbus Comms - all major protocols

These are easily fitted to the plug-in Control Board.

For full details of the options available refer to Appendix A.

Control Board Access

You can access this board from the front of the unit.

- It contains a Processor that provides a range of analog and digital inputs/outputs, together with their reference supplies.
- It has connections for the range of Option Cards.
- There is a mini USB port for connection to a PC. Use Parker SSD Drives' DSE 890 (Drive Systems Explorer) Configuration Tool to graphically program and configure the drive.

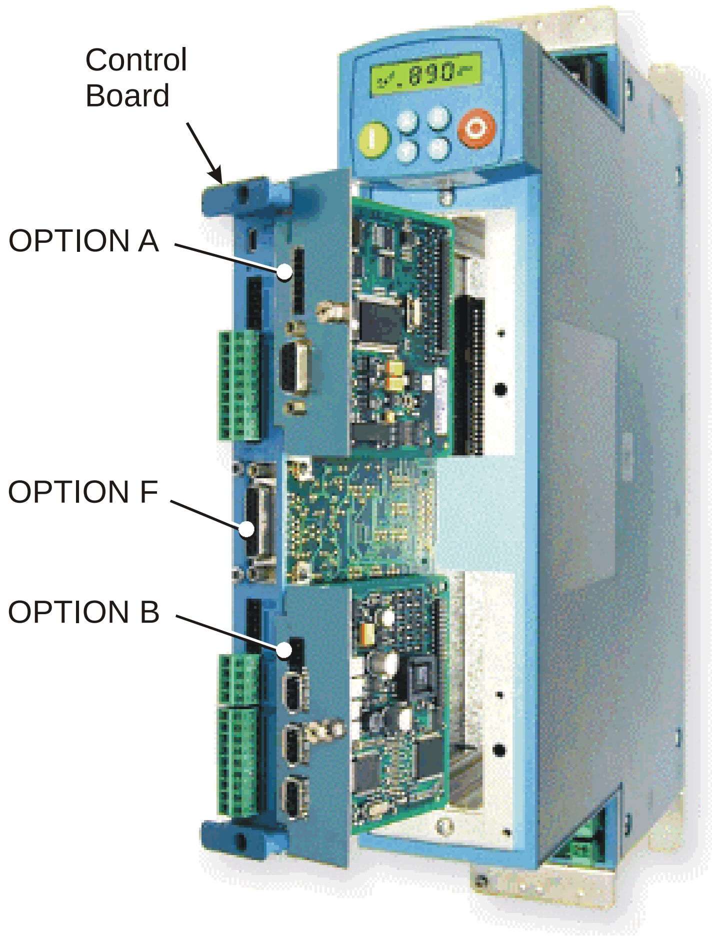


Figure 3.3 Diagram showing Option Cards fitted to the Control Board

Chapter 4

890CS & 890CD Common Bus Units

This chapter describes the mechanical and electrical installation of the Common Bus Units (890CS Common Bus Supply and 890CD Common Bus Drive). It discusses configuring your system, and how to turn the motor for the first time.

Follow the Steps for a successful installation.

Step 1: Mechanical Installation

Install the 890 units and associated equipment into the cubicle. The diagram shows a typical layout using Star Point earthing for EMC compliance. Refer to Appendix C for further information.

KEY

- **A** Analog Clean Earth
- **B** Back plate
- **C** Cubicle
- **E** Dirty Earth
- **F** Filter (optional)
- **G** Star Point Earth/Ground
- **M** Metal Work Earth
- **P** Fuse or circuit breaker
- **R** AC Line Reactor (mandatory)
- **S** Signal/Control Screen Earth
- **T** 24V Power Supply

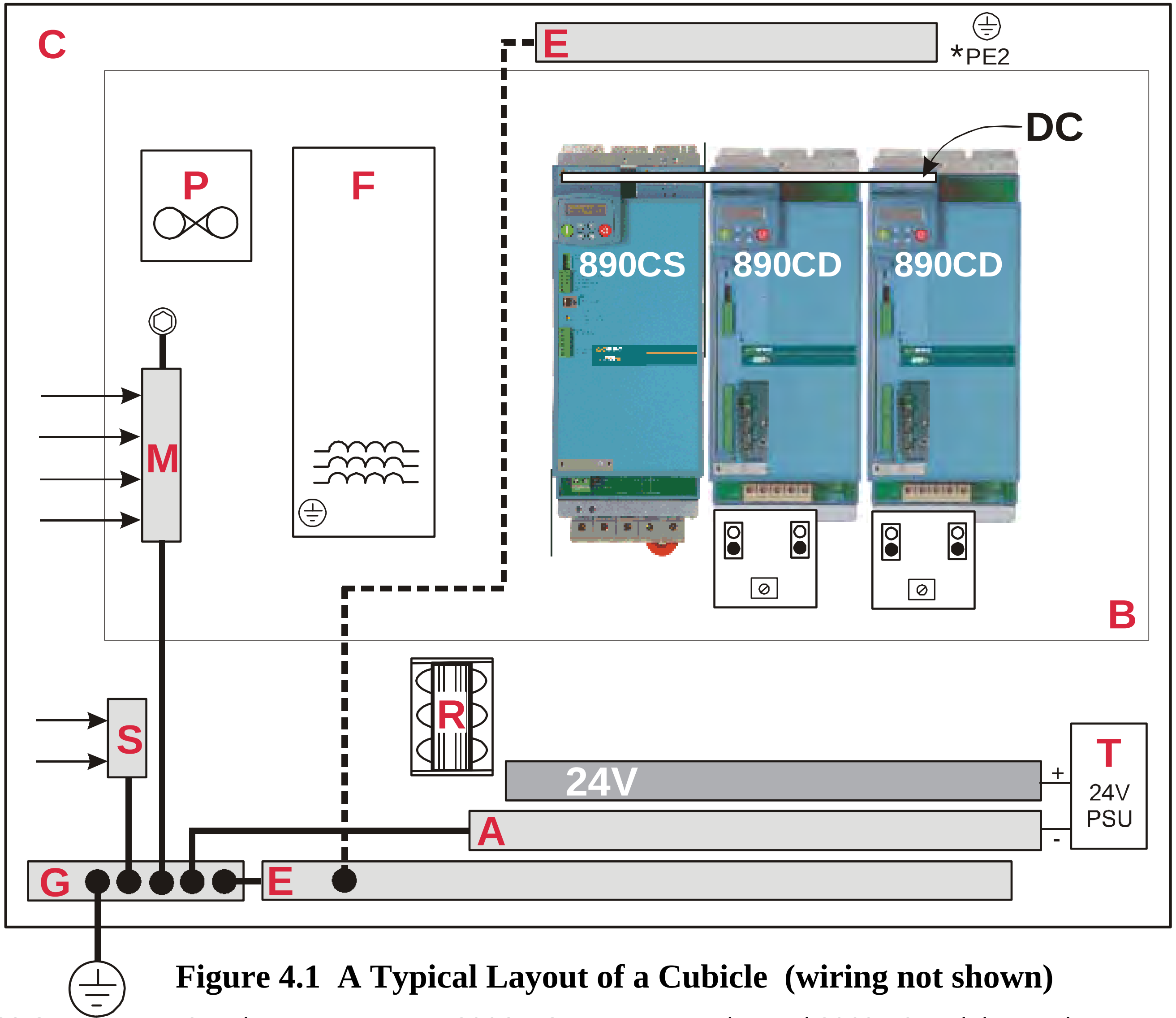


Figure 4.1 A Typical Layout of a Cubicle (wiring not shown)

Main Points

- These are modular, cubicle-mounted units. They are not suitable for wall-mounting.
- Mount the Modules side-by-side vertically on a solid, flat, normally cool, non-flammable, vertical surface.
- The 890CS Common Bus Supply is normally mounted to the left of the 890CD Common Bus Drive(s).
- The units can be DIN rail or panel mounted.
- Fit the 890 Installation kit to the bottom of the drive.
- Adequate ventilation must be provided.
- Avoid excessive vibration.
- The earth points (D, E, G, M & S) are shown separated - it may be possible to use one large star point without EMC problems, this will depend upon your application.

Note ***Refer to Appendix C for information about EMC compliance.***

Sizing the Enclosure

The enclosure must comply with the European safety standards VDE 0160 (1994)/EN50178 (1998) and will require a tool for opening.

The size of the enclosure will depend on many factors:

- Physical size and number of units
- Ventilation clearances
- Power output, affected by derating due to altitude and ambient temperature

4

Enclosure/Environmental Information

The information here will help you to specify the enclosure to house the 890(s).

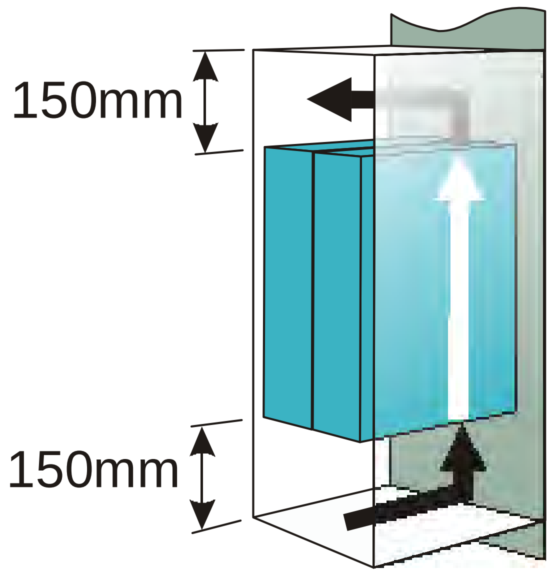
890 Operating Conditions		
Operating Temperature	0°C to 45°C (32°F to 113°F)	
Product Enclosure Rating	IP20 - UL (c-UL) Open Type (North America/Canada) Type 1 Suitable for cubicle mount only	
Cubicle Installation	The 890 must be installed to EN60204 Standard in the cubicle. For USA, the cubicle shall meet the requirements of UL50.	
Cubicle Rating	Cubicle to provide the following attenuation to radiated emissions:	
	EMC Enclosure Standard	*Attenuation to RF in spectrum 30-1000MHz*
	EN61800-3 2nd Environment	NONE
	EN61800-3 1st Environment Restricted Distribution EN61000-6-3:2001	10db
	EN61800-3 1st Environment Unrestricted Distribution EN61000-6-4:2001	20db

890 Operating Conditions	
Humidity	Maximum 85% relative humidity at 40°C (104°F) non-condensing
Atmosphere	Non flammable, non corrosive and dust free
Climatic Conditions	Class 3k3, as defined by EN50178 (1998)
Vibration	The product has been tested to the following specification: Test Fc of EN60068-2-6 10Hz<=f<=57Hz sinusoidal 0.075mm amplitude 57Hz<=f<=150Hz sinusoidal 1g 10 sweep cycles per axis on each of three mutually perpendicular axis
Safety	
Pollution Degree	Pollution Degree II (non-conductive pollution, except for temporary condensation)
Europe	When fitted inside an enclosure, this product conforms with the Low Voltage Directive 73/23/EEC with amendment 93/68/EEC, Article 13 and Annex III using EN50178 (1998) to show compliance.
North America/ Canada	Complies with the requirements of UL508C as an open-type drive.

Cooling

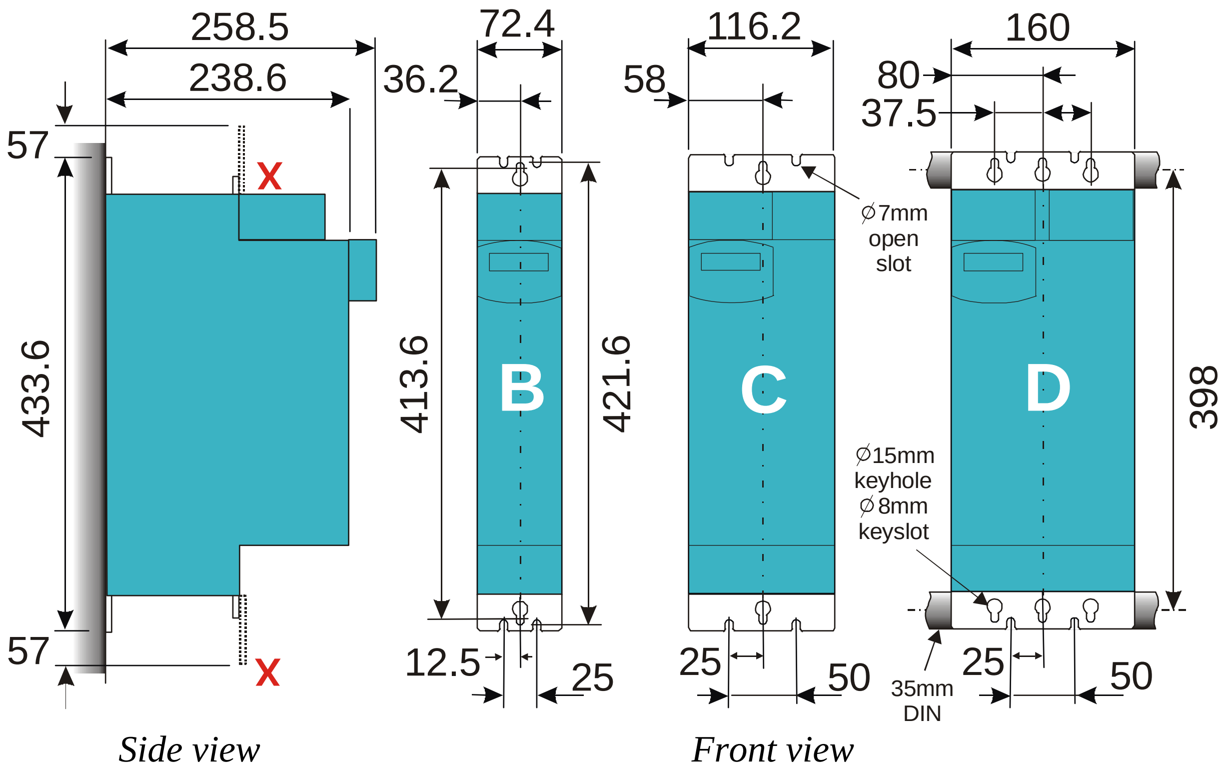
Units are designed for mounting side-by-side as shown. A minimum of 150mm (6") free-air space must be allowed at the top and bottom of each unit.

The 890 gives off heat in normal operation. The mounting surface for the unit should be normally cool. Allow a free flow of air through the top and bottom ventilation slots and heatsink. Remember that any other equipment may have its own clearance requirements. If you mount 890s above and below each other, the minimum top and bottom clearances should be added to produce an overall clearance value.



Mounting Dimensions

Mount the unit using the keyholes and slots, or fix to a DIN rail (35mm DIN).



The 890CS Common Bus Supply is normally mounted to the left of the 890CD Common Bus Drive(s). However, for 890CS Frame D, mount the 890CS between the 890CD units to share the load evenly if the total current draw on the DC busbar will exceed 140A. Connect to the left and right busbar terminals separately.
The busbar is rated for operation at 140A. Do not exceed 140A.

Dimensions are in millimetres. **X** *: Power Bracket - 890 Installation Kit*

890CS Weight	Frame B	3.5kg/7.5lbs			Frame D	8.7kg/19.2lbs
890CD Weight	Frame B	5kg/11.0lbs	Frame C	6.6kg/14.5lbs	Frame D	12.1kg/26.7lbs

The 890 Installation Kit is supplied with your unit. The kit provides several options for earth/ground connections. It also includes the brackets for DIN rail mounting the unit. Refer to the instructions in the kit and use the appropriate parts.

Cables are considered to be electrically sensitive, clean or noisy. Plan your cable routes to segregate these cables for EMC compliance. Refer to Appendix C: "Certification".

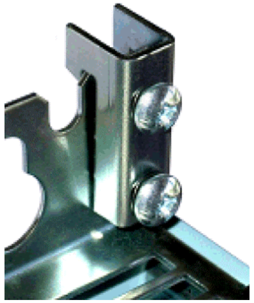
Panel Mount Fixings

Support the unit at the top and bottom with fixings to secure the unit to the panel. Mark and drill the fixing holes into the panel. Refer to the fixing centres given on the previous page. Insert the fixings into the top hole(s) and hang the unit. Insert the bottom fixing(s) and tighten to the required torque.

DIN Rail Mounting

The unit can be DIN rail mounted (35mm DIN).

Convert the unit to accept to DIN rail mounting:



1. Secure the DIN clips from the 890 Installation Kit into the threaded inserts at the top of the unit using the fixings supplied.
2. Hang the unit on the top DIN rail. Fix the DIN clips onto the bottom of the unit and clip onto the DIN rail.
3. Tighten both the top and bottom clips when the unit is in position on the rail.

Shield Bonding Clips

Fit the shield bonding clips to the Control Bracket/Power Bracket. Select slots providing a loose fit. This will then allow the clips to be tightened by hand.

Note ***Do not squeeze the clip sides to produce a fit as this will crimp the sides to the clip's moving soleplate.***

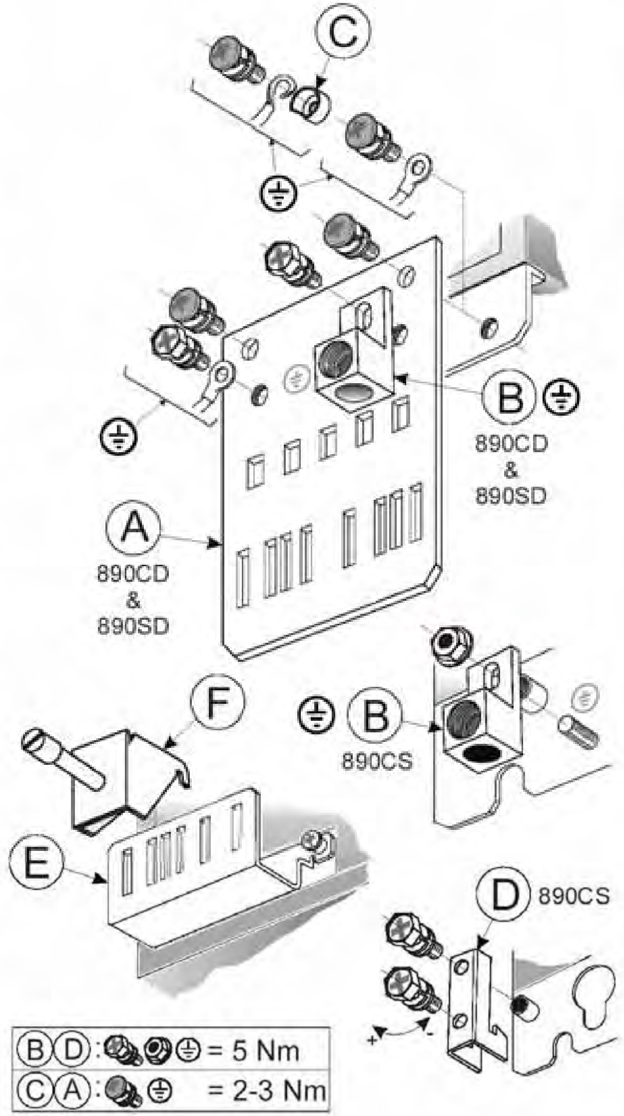
890 Installation Kit

The fitting instructions for the kit are reproduced below.

890 Installation Kit

Item	Description	SSD Part Number	Qty
	890CS : Common Bus Supply		
B	Ground Terminal M6 small	CI465312	1
	Ground Terminal M6 large	CI470521U001	1
C	Cup Washer M5	FX463522	2
D	DIN Clip	BA465900	4
E	Control Bracket	BA465887	1
	Screw Assembly M4 x 10mm	FY385649	2
	Screw Assembly M5 x 12mm	FY468470U012	8
	Nut Assembly	FZ463232	1
	Busbar Insulation 15mm	BC465938U015	2
	Busbar Insulation 200mm	BC465938U200	1
F	Shield Bonding Clip 8mm ∅	CI465892U008	1
	Screwdriver	JA465841	1
	Allen Wrench	JA465842	1
	890CD : Common Bus Drive		
A	Power Bracket	BA465888	1
B	Ground Terminal M6	CI465312	1
C	Cup Washer M5	FX463522	2
D	DIN Clip	BA465900	4
E	Control Bracket	BA465887	1
	Screw Assembly M4 x 10mm	FY385649	4
	Screw Assembly M5 x 12mm	FY468470U012	10
	Busbar Insulation 200mm	BC465938U200	1
F	Shield Bonding Clip 8mm ∅	CI465892U008	1
	Terminal Wiring Label	GA469181	1
	890SD : Standalone Drive		
A	Power Bracket	BA465888	2
B	Ground Terminal M6	CI465312	2
C	Cup Washer M5	FX463522	2
D	DIN Clip	BA465900	4
E	Control Bracket	BA465887	1
	Screw Assembly M4 x 10mm	FY385649	4
	Screw Assembly M5 x 12mm	FY468470U012	10
F	Shield Bonding Clip 8mm ∅	CI465892U008	1
	Screwdriver	JA465841	1
	Terminal Wiring Label	GA469181	1

HA468432U001 Issue 5



F : Shield Bonding Clips
For larger sizes contact SSD Drives.
Part Numbers:
CI465892U014 - 14mm ∅
CI465892U020 - 20mm ∅

Step 2: Connecting Power

In this section we are going to connect the 3-phase supply to the 890CS Common Bus Supply, and connect the 890CD Common Bus Drive(s) via the DC link.

We'll also connect the mandatory AC line reactor, the motor, and the (optional) brake resistor.

WARNING

During commissioning, remove the fuses (or trip the circuit breaker) on your 3-phase supply.
Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

Solid-State Short-Circuit Protection

These devices are provided with Solid-State Short-Circuit (output) Protection. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection requirements must be in accordance with the latest edition of the National Electrical Code NEC/NFPA-70 and any additional local codes.

Refer to the 890 Installation Kit for earth/ground fixing details. Fit the appropriate parts.

Each unit must be **permanently earthed** according to EN 50178.

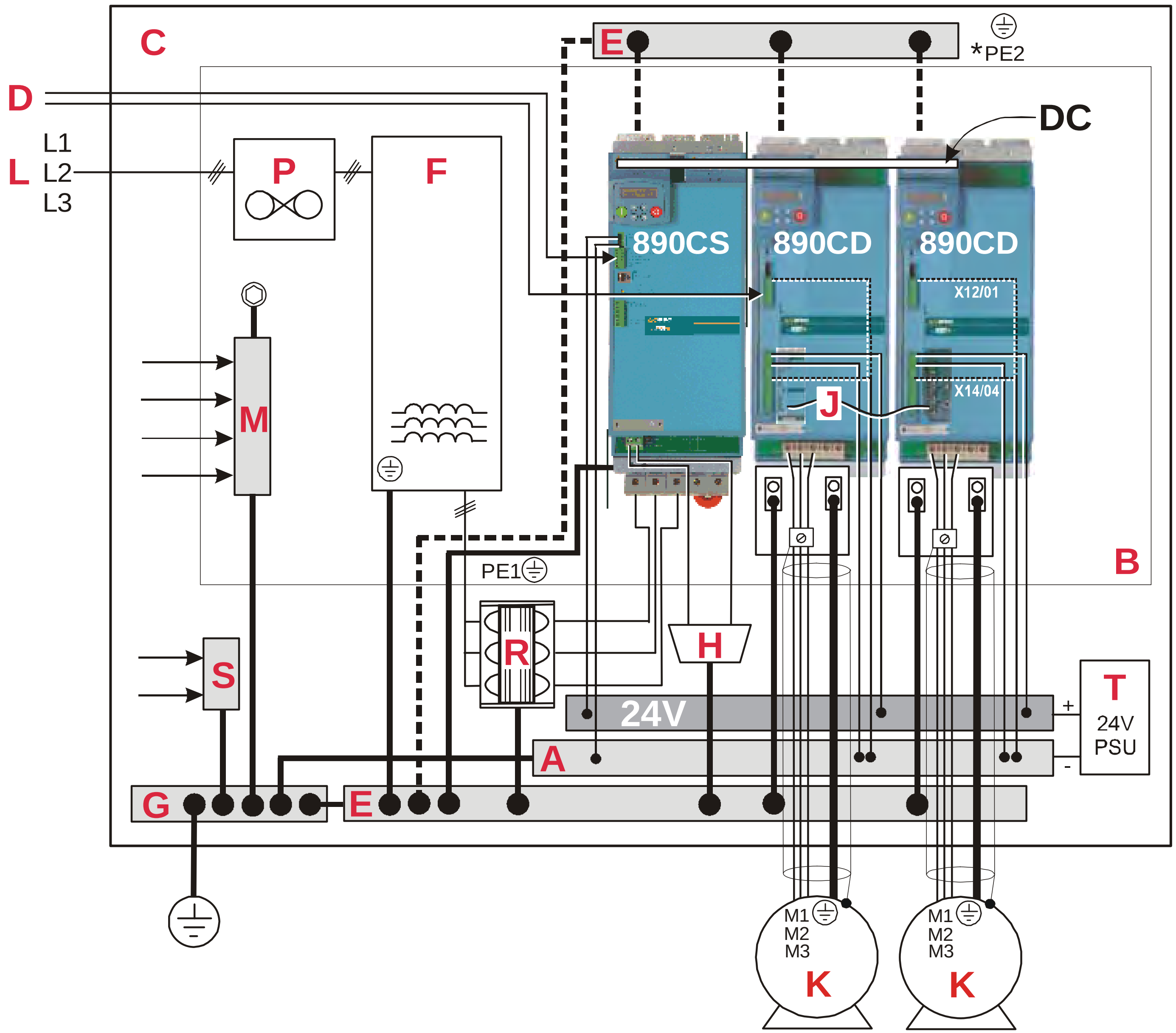
For permanent earthing:

A cross-section conductor of at least $10mm^2$ is required. This can be achieved either by using a single conductor (PE) or by laying a second conductor though separate terminals (PE2 where provided) and electrically in parallel.

Caution

The 890CS Common Bus Supply is factory-fitted with a safety bung to terminals DC+ and DC- which maintains the IP20 rating. Leave this bung connected unless the terminals are to be used.

Wiring Diagram



Key to Wiring Diagram

A	Analog Clean Earth	This must be insulated from the back panel. Analog reference X12/01 or digital reference X14/04 must be connected to this busbar, avoiding earth loops.
B	Back-plate	Earth the backplate to the star point (G).
C	Cubicle	The 890 must be mounted inside a cubicle complying with the European safety standards VDE 0160 (1994)/EN50178 (1998).
D	Control Wiring	Control terminals are SELV (Safe Extra Low Voltage), i.e. double-insulated from power circuits. 0.08mm^2 (28AWG) to 2.5mm^2 (12AWG).
E	Dirty Earth	This must be insulated from the back panel. It is used for all power earths.
F	Filter (optional)	Refer to Chapter 6: "Associated Equipment" for the specified filter. This may help to achieve EMC compliance. Refer to Appendix C.
G	Star Point Earth/Ground	The star point connects all earth busbars. Connect the star point to the incoming safety earth (PE). Note the possible requirement for PE2 connections to each drive, refer to page 4-9.
H	Brake Resistor (DC+, EXT: frames B & C) (DBR+, DBR-: frame D)	External brake resistors are available for the 890CS unit. Refer to Chapter 6: "Associated Equipment". Ensure wiring is rated for highest system voltage.

Key to Wiring Diagram

J	FireWire™ Connection	A very fast external bus (IEEE 1394a) to connect up to 63 units. You will need the FireWire Option Card for each Common Bus Drive, refer to Appendix A.
K	Motor (M1, M2, M3)	The motor used must be suitable for Inverter duty. Ensure wiring is rated for highest system voltage. Refer to Appendix E.
L	3∅ Power Supply Cable (L1, L2, L3)	Ensure wiring is rated for highest system voltage. Refer to Appendix E.
M	Metal Work Earth	Use the back panel for this earth. It provides earthing points for all parts of the cubicle including doors and panels. Connect cubicle to earth/ground via cubicle PE terminal.
P	Fuse or Type B RCD	Fuse rating - refer to Appendix E. We don't recommend the use of circuit breakers (e.g. RCD, ELCB, GFCI), but if their use is mandatory, use only a Type B RCD.
R	Line Reactor (mandatory)	**A 3% line reactor MUST be fitted to the 890CS unit.** Refer to Chapter 6: "Associated Equipment".
S	Signal/Control Screen Earth	This must be insulated from the back panel. Connect any signal/control screened cables which **do not** go directly to the drives.
T	24V Power Supply (mandatory on 890CS)	A 24Vdc power supply. Can also suppy the 890CD unit to allow for configuration and commissioning of the system without the DC supply being present.

Power Connections - 890CS Common Bus Supply

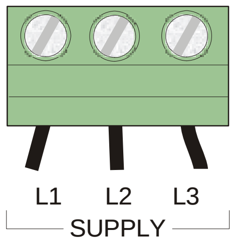
The frame B and frame D 890CS units are each available in two power ratings:

Frame B1 : 32A AC rms Input Current	Frame D1 : 108A AC rms Input Current
Frame B2 : 54A AC rms Input Current	Frame D2 : 162A AC rms Input Current

See the product rating label on the side of the unit to check the power rating. "0032" = 32A etc.

Power Connections - 890CS Common Bus Supply

SUPPLY



Connect 3-phase supply in any order.

Maximum wire sizes:
Frame B1: 10mm^2 / 8AWG, 2.5-3Nm / 1.8-2.2lbf
Frame B2: 16mm^2 / 4AWG, 2.5-3Nm / 1.8-2.2lbf
Frame D1: 50mm^2 / 1/0AWG, 15-20Nm / 11-14.8lbf
Frame D2: 95mm^2 / 4/0AWG, 15-20Nm / 11-14.8lbf

EARTH/GROUND

Fix earth connections to ⏚.

Maximum wire sizes:
Frame B1: 10mm^2 / 8AWG
Frame B2: 16mm^2 / 4AWG
Frame D1: 50mm^2 / 1/0AWG
Frame D2: 95mm^2 / 4/0AWG

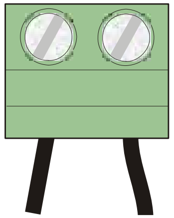
Refer to the 890 Installation Kit for earth/ground fixing details.

Each unit must be **permanently earthed** according to EN 50178.

For permanent earthing: one conductor, PE1, of >10mm^2 cross-section is required; or two individual incoming protective earth conductors, PE1 & PE2, of <10mm^2 cross-section. Each earth conductor must be suitable for the fault current according to EN 60204.

Power Connections - 890CS Common Bus Supply

DC+ / DC- Bottom Terminals - 890CS Option



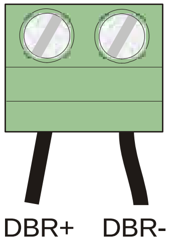
Use these terminals to wire the DC Bus if not using the SSD_Rail busbar. Use correctly rated wire - refer to Appendix E.
Uses include connection to the 890 Common Bus Adaptor unit, or for connection to a 690+ AC Drive for example.

Maximum wire sizes:
Frame B1: 10mm^2 / 8AWG, 2.5-3Nm / 1.8-2.2lbf
Frame B2: 16mm^2 / 4AWG, 2.5-3Nm / 1.8-2.2lbf
Frame D1: 50mm^2 / 1/0AWG, 15-20Nm / 11-14.8lbf
Frame D2: 95mm^2 / 4/0AWG, 15-20Nm / 11-14.8lbf

Power Connections - 890CS Common Bus Supply

EXTERNAL BRAKE RESISTOR - Option

You can connect an external brake resistor between terminals DBR+ and DBR-.



***DO NOT** apply external voltage sources (mains supply or otherwise) to the braking terminals.*

Maximum wire size:
$16mm^2$ / 6AWG 1.2Nm / 0.9lbf

During deceleration, or with an overhauling load, the motor acts as a generator. Energy flows back from the motor into the dc link capacitors within the drive. This causes the dc link voltage to rise. If the dc link voltage exceeds 810V for the 400V build (or 890V for the 500V build) then the drive will trip to protect the capacitors and the drive power devices. The amount of energy that can be absorbed in the capacitors is relatively small; typically more than 20% braking torque will cause the drive to trip on overvoltage. Dynamic braking increases the braking capability of the drive by dissipating the excess energy in a high power resistor connected across the dc link, see above.

When the dc link voltage rises above that specified for each Frame size the brake unit switches the external resistor network across the dc link. The brake unit switches off again when the dc link voltage falls below the threshold level. The amount of energy produced by the motor during regeneration depends upon the DECEL TIME parameter (refer to the REFERENCE RAMP and DYNAMIC BRAKING function blocks) and the inertia of the load.

Refer to Chapter 6:"Associated Equipment" for brake resistor selection.

Power Connections - 890CD Common Bus Drive

Power Connections - 890CD Common Bus Drive

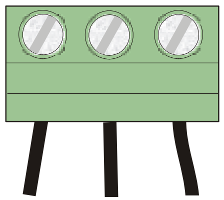
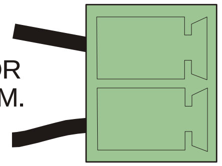
EARTH/GROUND	
Fix Drive earth connections to ⏚.	Fix the earth from the Motor to the base of the drive.
Maximum wire sizes: Frame B: 6mm^2 / 10AWG Frame C: 10mm^2 / 8AWG Frame D: 16mm^2 / 4AWG	Maximum wire sizes: Frame B: 4mm^2 / 12AWG Frame C: 10mm^2 / 8AWG Frame D: 16mm^2 / 4AWG

Refer to the 890 Installation Kit for earth/ground fixing details.

Each unit must be **permanently earthed** according to EN 50178.

For permanent earthing: one conductor, PE1, of >10mm^2 cross-section is required; or two individual incoming protective earth conductors, PE1 & PE2, of <10mm^2 cross-section. Each earth conductor must be suitable for the fault current according to EN 60204.

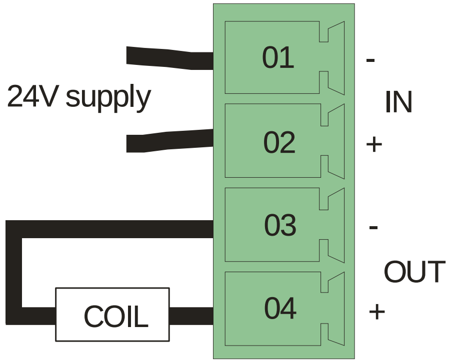
Power Connections - 890CD Common Bus Drive

MOTOR	MOTOR THERMISTOR
	
M1 (U), M2 (V), M3 (W). Connect to the motor in any order. Maximum wire sizes: Frame B: 10mm^2 / 8AWG, 0.5-0.9Nm / 0.4-0.7lbf Frame C: 10mm^2 / 8AWG, 1.2Nm / 0.9lbf Frame D: 10mm^2 / 8AWG, 2-4Nm / 1.5-3lbf	Detects over-temperature in motors fitted with an internal thermistor. **Link these terminals for motors not fitted with an internal thermistor (or set SETUP::TRIPS::I/O TRIPS::INVERT THERMIST to True).** Maximum wire size: 0.22 Nm/0.16lbf The connections have no polarity. Thermistor PTC `Type A' is supported as defined in IEC 34-11 Part 2: *Rising temperature trip resistance: 1650 to 4000Ω* *Falling temperature trip reset resistance: 750 to 1650Ω*

4

Power Connections - 890CD Common Bus Drive

Mechanical Brake (24V) - Option



Connect the 24V DC brake supply to terminals 1 and 2, and connect the brake terminals to 3 and 4. The brake coil is energized when the drive runs. The terminals are rated for 2A DC at 24V DC.

SSD-Rail Common DC Busbar Connections

WARNING

During commissioning, remove the fuses (or trip the circuit breaker) on your 3-phase supply.
Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

Caution

All 890 units connected to the DC bus must be rated for the same 3∅ operating voltage.

The 890CD Common Bus Drives in a system are supplied DC by an 890CS Common Bus Supply. The busbar connects DC+ to DC+ and DC- to DC- between each 890 unit in the system.

The following items are available from Parker SSD Drives:

- Busbar : Part No. BH465850 - 1m length, 10mm x 3mm copper
- Busbar Insulator : Part No. BC465938U200 - 200mm length

Busbar Installation

1. Correctly position and secure all units on to the panel or DIN rail.
2. Open the top covers by inserting a large flat blade screw driver into the slot at the front and prising open.
3. Cut the busbar and busbar insulator to length. **For your safety and EMC compliance:**
   - **Busbar:** cut this to length so that both ends of the bar are fully inserted into a terminal –the busbar must not protrude beyond the edge of the terminal clamp if the busbar is a terminating piece.
   - **Insulator:** Fit this to all busbar external of the unit. It should butt-up to the sides of each unit. Press it firmly down onto the busbar for complete protection.

Fit all busbar/insulation and tighten all Allen screws (2.0 Nm).
Close all Busbar Terminal Covers. They snap shut.

Step 3: Control Connections

WARNING

During commissioning, remove the fuses (or trip the circuit breaker) on your 3-phase supply. Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

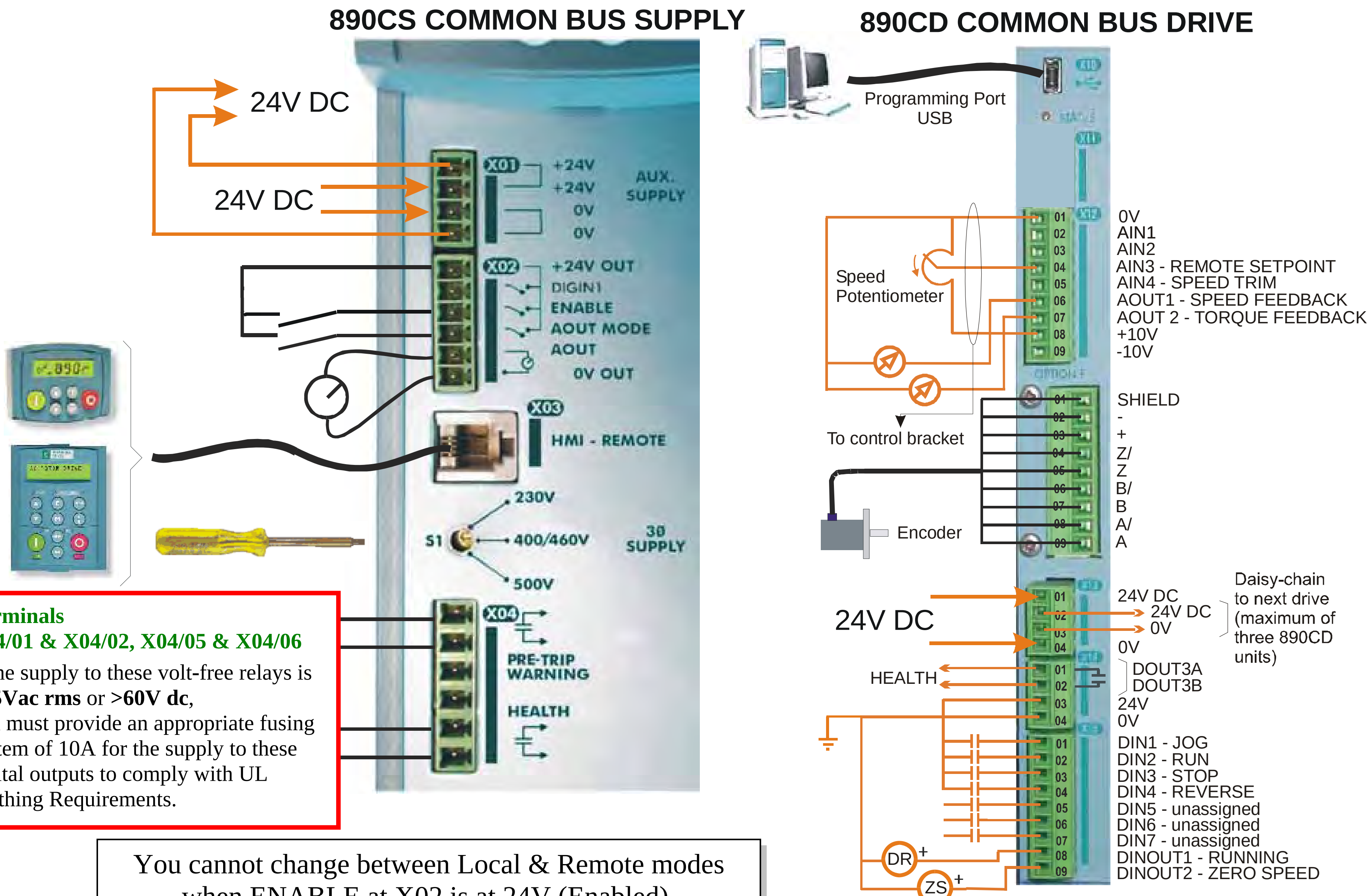
Main Points

- The 890 is a system product and is designed for Remote mode operation using the analog & digital inputs/outputs and/or FireWire™ connection. The use of the keypad (Local mode) is for configuration purposes.

  Connecting 890CD Common Bus Drives using the FireWire™ Option Cards is recommended for applications requiring high levels of accuracy. Otherwise, use I/O to transfer data from master to slave units.

- The control terminals will accept a single wire of size 1.5mm^2/16AWG. For two wires per terminal, use smaller gauge wire such as 0.5mm^2/22AWG.
- Use screened control cables to comply with EMC requirements. All screens must be terminated at the base of the product using the Control Bracket and (optional) Shield Bonding Clips from the 890 Installation Kit.
- The control board 0V at X14/04 must be connected to protective (clean) earth outside of the product to meet EMC and safety requirements.

Control Connection Diagram



Terminals
X04/01 & X04/02, X04/05 & X04/06
If the supply to these volt-free relays is **>25Vac rms** or **>60V dc**, you must provide an appropriate fusing system of 10A for the supply to these digital outputs to comply with UL Earthing Requirements.

You cannot change between Local & Remote modes when ENABLE at X02 is at 24V (Enabled).

890CD Minimum Control Connections

Minimum Connections

- Connect X14/04 to a clean, external earth

Speed Reference

- Connect a 10kΩ potentiometer at terminal X12:

  X12/01 : Low (CCW)
  X12/04 : Wiper
  X12/08 : High (CW)

- Connect the shield to earth/ground at the control bracket.

OR

- External 2-wire speed reference between:

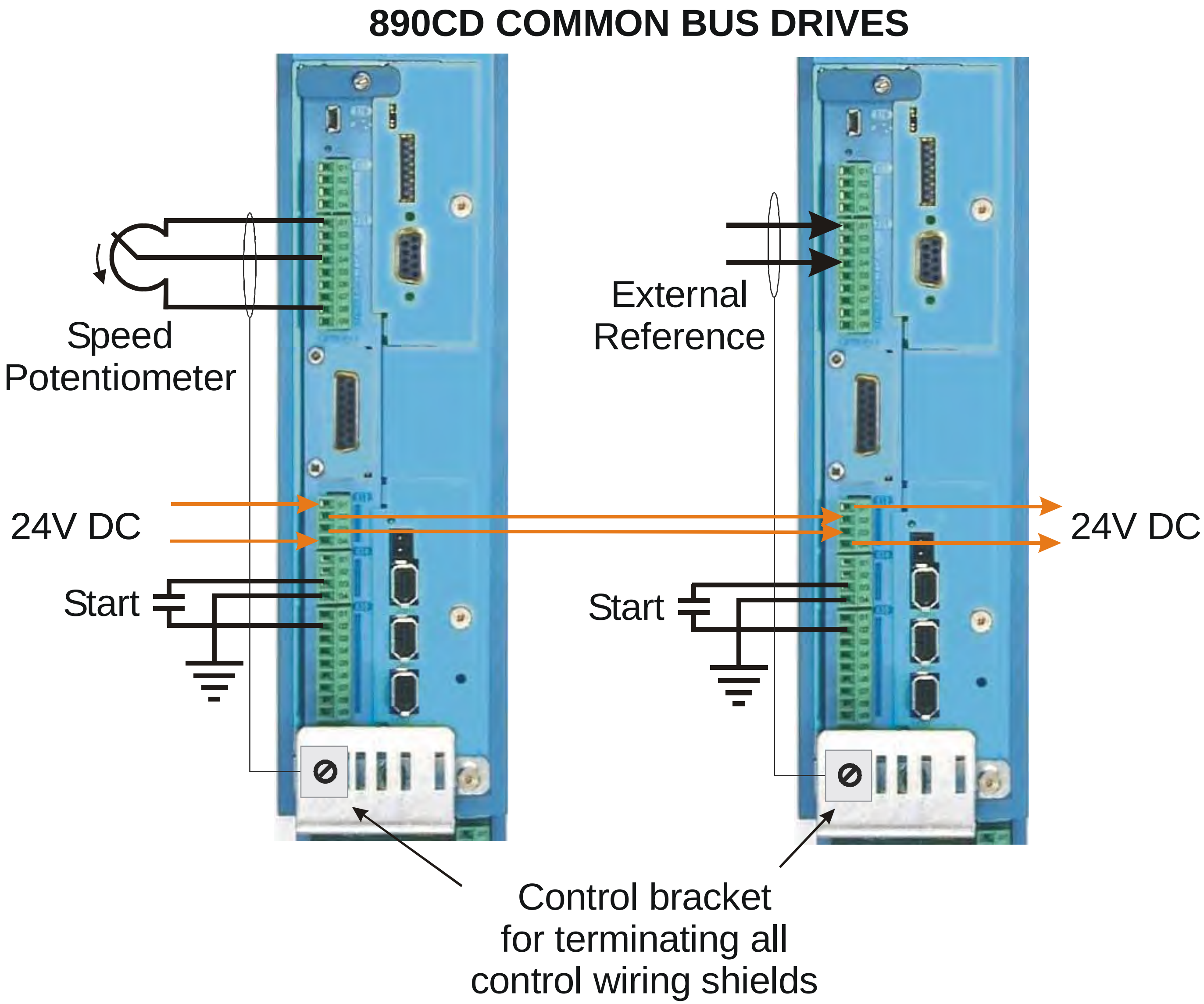
  X12/01 : negative
  X12/04 : positive

- Connect the shield to earth/ground at the control bracket.

Sequencing

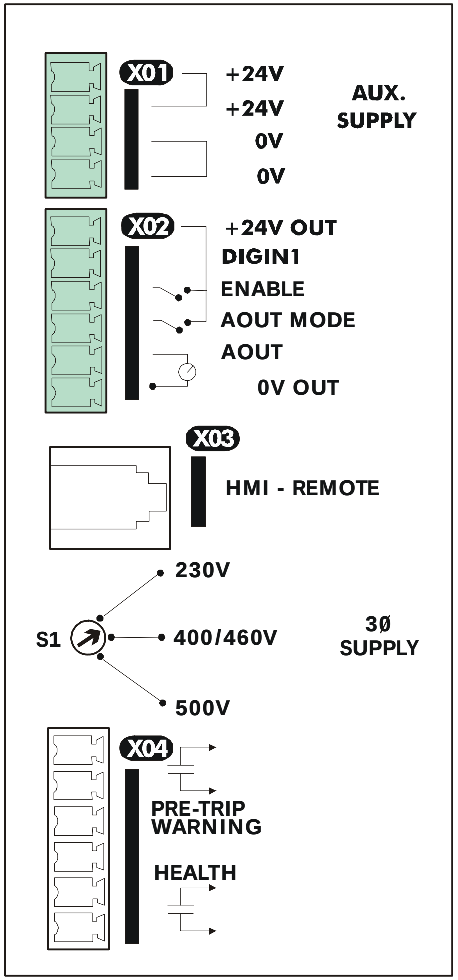
- RUN (maintained contact)

  X14/03 : 24V
  X15/02 : RUN



Control Connections - 890CS Common Bus Supply

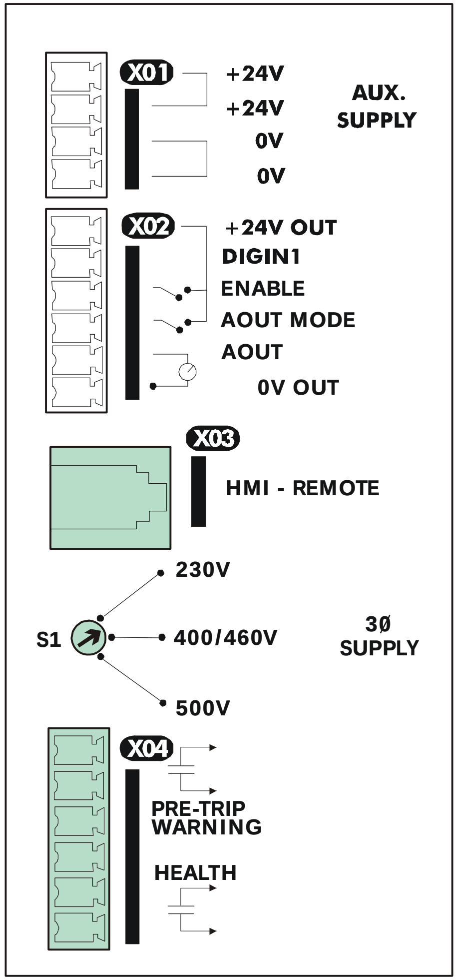
The table below shows the factory defaults.



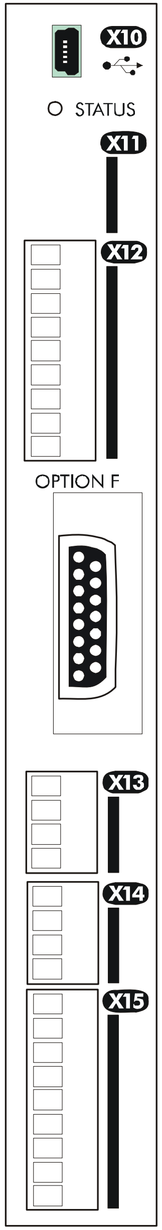
		Name	Range	Description
X01	01	+24V AUX SUPPLY	24V (±10%) 2A	You must supply 24V DC to power the unit. Use a source separate to your 3∅ supply. Use the second set of terminals to daisy-chain to the next drive. Connect three 890CD units only using this method. The unit is protected against reversal of this supply. See Note.
	02			
	03	0V AUX SUPPLY	0V (24V)	
	04			
X02	01	+24V OUT	24V	A 24V DC supply for the digital I/O of X02.
	02	DIGIN1	-	Future use
	03	ENABLE	0-24V	24V = 890CS Common Bus Supply powers-up to supply DC to connected units.
	05	AOUT MODE	0-24V	0V = Power (kW) , 24V = Current (A). Selects the units for meter connected to AOUT.
	05	AOUT	0-10V	Mode set by AOUT MODE. Meter connection: 0 to 5V is equivalent to 0 to 100%.
	06	0V OUT	0V	0V reference for AOUT

Note ***X01: This Control Supply is necessary at all times to operate the 890CS Common Bus Supply. DO NOT use this 24V for the terminals at X02, only use the 24V supply provided at X02/01.***

890CS & 890CD Common Bus Units



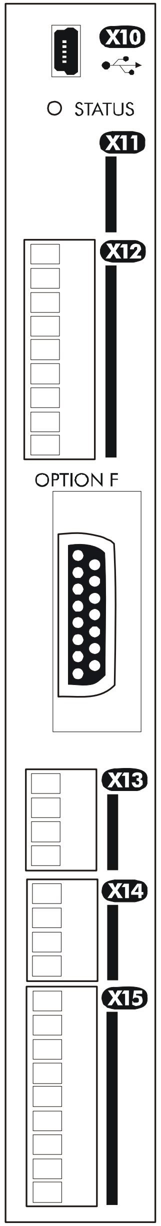
		Name	Range	Description
X03		HMI-REMOTE	-	Keypad port for a remote-mounted Keypad. Refer to Chapter 8: "Remote Mounting the Keypad".
S1		3∅ SUPPLY SELECTION	230V, 400/460V, 500V	Power-down the unit and turn the (10-position) switch "arrow" to point to the correct voltage. The keypad displays the selected voltage when powering-up, and this can checked when configuring using only the 24V DC Control Supply.
X04	01 02	PRE-TRIP WARNING	24V DC 100V AC 240V AC	Internal, volt-free contacts. Closed = Healthy: PRE-TRIP WARNING - indicates overload or overtemperature of the Common Bus Supply. It may trip soon unless your system removes the overload condition (by shedding load or powering down on this signal). Refer to Chapter 10: "Trips and Fault Finding".
	03	*not used*		
	04	*not used*		
	05 06	HEALTH		HEALTH - indicates the health status of the Common Bus Supply. Refer to Chapter 10: "Trips and Fault Finding".



Control Connections - 890CD Common Bus Drive

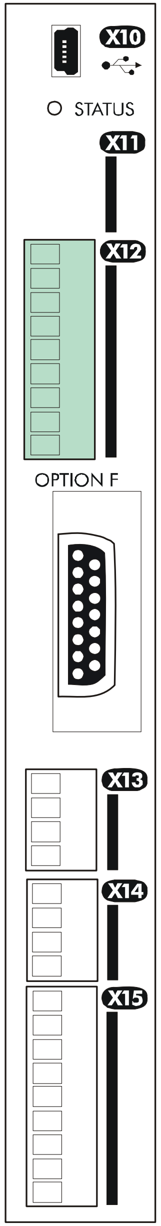
The table below shows the factory defaults.

Mini USB Port			
	Name	**Range**	**Description**
X10	USB		This Mini USB port provides a serial communications link to a host computer running the DSE 890 Configuration Tool. Use an approved USB lead: A to mini-B.



FUTURE USE				
		Name	Range	Description
X11	01			
	02			
	03			
	04			

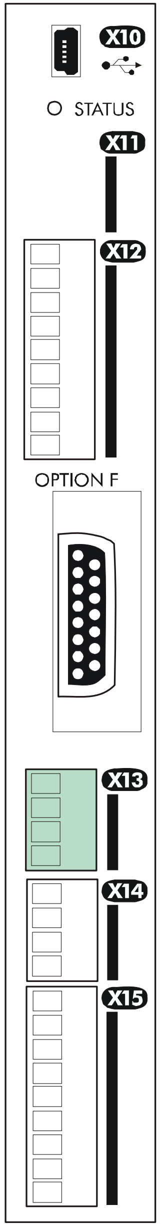
Note **Terminal X11 is for future use.**



ANALOG I/O				
		Name	**Range**	**Description**
X12	**01**	0V		0V reference for analog I/O
	02	AIN1	0-10V, ±10V	Analog Input 1 (default = diff I/P +)
	03	AIN2	0-10V, ±10V	Analog Input 2 (default = diff I/P -)
	04	AIN3	±10V, 0-10V, 0-20mA, 4-20mA	Analog Input 3 (default = remote setpoint I/P) -10V = 100.00% reverse, +10V = 100.00% forward (% maximum speed)
	05	AIN4	±10V, 0-10V, 0-20mA, 4-20mA	Analog Input 4 (default = speed trim I/P)
	06	AOUT1	±10V (10V = 100% speed)	Analog Output 1 (default = speed feedback O/P)
	07	AOUT2	±10V (10V = 200% torque)	Analog Output 2 (default = torque feedback O/P)
	08	+10V REF	+10V (output)	10V reference for analog i/o. Load 10mA maximum
	09	–10V REF	-10V (output)	10V reference for analog i/o. Load 10mA maximum

Note ***AIN1 and AIN2 are fitted with a link to ensure no noise pick-up when not in use. These terminals can be used as a differential ±10V input (which we call AIN5), but AIN1 and AIN2 must remain within ±10V relative to 0V. AIN5 has a direct input into the Speed Loop providing a fast speed or torque demand for servos.***

All analog inputs/outputs are configurable using the DSE 890 (Drive System Explorer) Configuration Tool supplied on disk. The table above shows the factory defaults. These analog connections require ±10V DC which is supplied at terminal X12/08 and X12/09 respectively. For further information refer to the DSE 890 Configuration Tool.



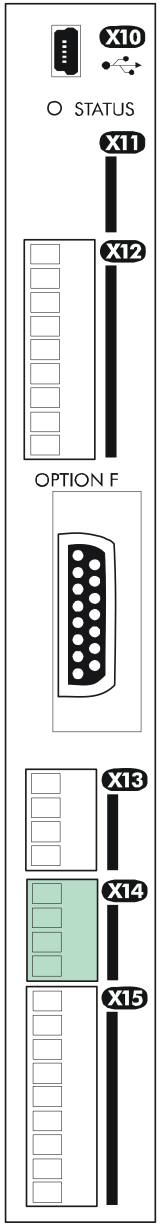
USER 24V DC INPUTS				
		Name	**Range**	**Description**
X13	**01**	24V INPUT	24V DC	User +24V (2A per unit)
	02	24V INPUT	24V DC	User +24V (2A per unit)
	03	0V INPUT	0V	0V (24V) input
	04	0V INPUT	0V	0V (24V) input

Note ***These connections are not necessary for normal operation of the drive.***

Connection can be made from the X01 terminal on the 890CS Common Bus Supply unit. This 24V DC control supply allows for configuration and commissioning of the system without the DC supply being present. The drive will operate with this supply but will not turn a motor.

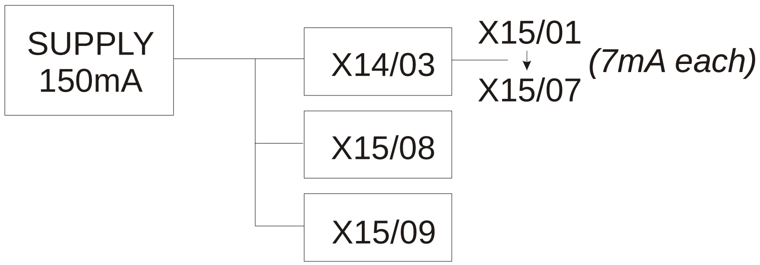
Connection is not required when the DC supply is present, but the connection can be safely left connected.

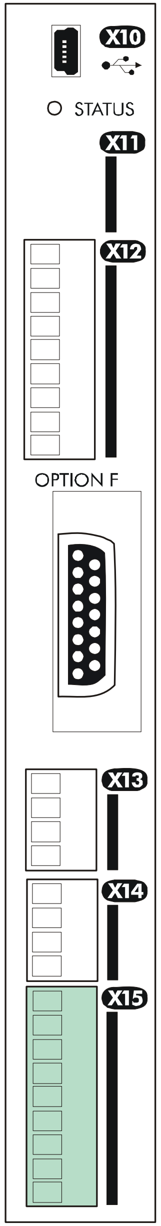
You can connect an 890CS unit to a maximum of three 890CD units when daisy-chaining 24V using these terminals (8A maximum). If you have more than three 890CDs, use a 24V rail and wire as shown in the Wiring Diagram on page 4-12.



RELAY CONTACTS				
		Name	**Range**	**Description**
X14	**01**	DOUT3A	0-24V DC	Relay Output: normally-open, volt-free, 24V DC 1A resistive load or use down to 1mA, 12V levels (DOUT3 closed = HEALTH)
	02	DOUT3B	0-24V DC	Relay Output: normally-open, volt-free, 24V DC 1A resistive load or use down to 1mA, 12V levels (DOUT3 closed = HEALTH)
	03	USER 24V	0-24V DC	24V DC Output, 150mA maximum load
	04	0V	0-24V DC	0V reference for USER 24V output

Note ***The maximum permissible sum of currents from X14/03, X15/08, X15/09 is 150mA. An Alert message will be displayed if exceeded.***



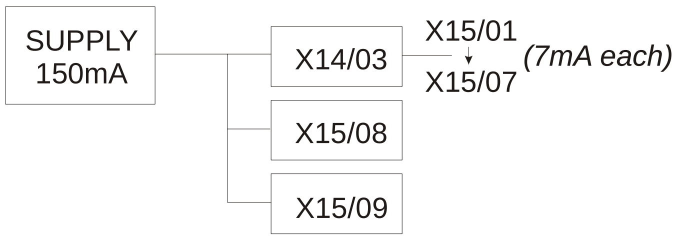


DIGITAL I/O

		Name	Range	Description
X15	01	DIN1	0-24V DC	Digital Input 1 (default = JOG)
	02	DIN2	0-24V DC	Digital Input 2 - (default = RUN)
	03	DIN3	0-24V DC	Digital Input 3 - (default = STOP)
	04	DIN4	0-24V DC	Digital Input 4 - (default = REVERSE)
	05	DIN5	0-24V DC	Digital Input 5 - (default = unassigned). Refer to I/O TRIPS::EXT TRIP MODE for special function.
	06	DIN6	0-24V DC	Digital Input 6 - (default = unassigned)
	07	DIN7	0-24V DC	Digital Input 7 - (default = unassigned)
	08	DIN8/DOUT1	0-24V DC	Digital Input/output 1 - (default = digital output: RUNNING)
	09	DIN9/DOUT2	0-24V DC	Digital Input/output 2 - (default = digital output: ZERO SPEED)

All digital inputs/outputs are configurable using the DSE 890 (Drive System Explorer) Configuration Tool supplied on disk. The table shows the factory defaults. The digital inputs require 24V DC which is supplied at terminal X14/03. For further information refer to the DSE 890 Configuration Tool.

Note ***The maximum permissible sum of currents from X14/03, X15/08, X15/09 is 150mA. The load on X15/08 & X15/09 connects from these pins to X14/04 (0V). An Alert message will be displayed if exceeded.***



Step 4: Checking the System

In this section we are going to apply the 24V DC Control Supply and check the I/O operation of the 890's by applying just a 24V DC Control Supply. If everything is okay, we'll be ready to receive DC at the 890CD Common Bus Drive via the DC link from the 890CS Common Bus Supply.

Pre-Operation Checks

Before Applying 24V DC:

If you have already wired the 3-phase supply to the 890CS Common Bus Supply, DISCONNECT IT NOW (remove the supply fuses, or trip the circuit breaker).

Check for damage to equipment.

Check for loose ends, clippings, drilling swarf etc. lodged in the drive and system.

Check all external wiring circuits of the system - power, control, motor and earth connections.

Ensure that other equipment will not be adversely affected by powering up.

Prepare to power-up the unit and system:

Fit the keypads to the front of the units, or connect remotely.

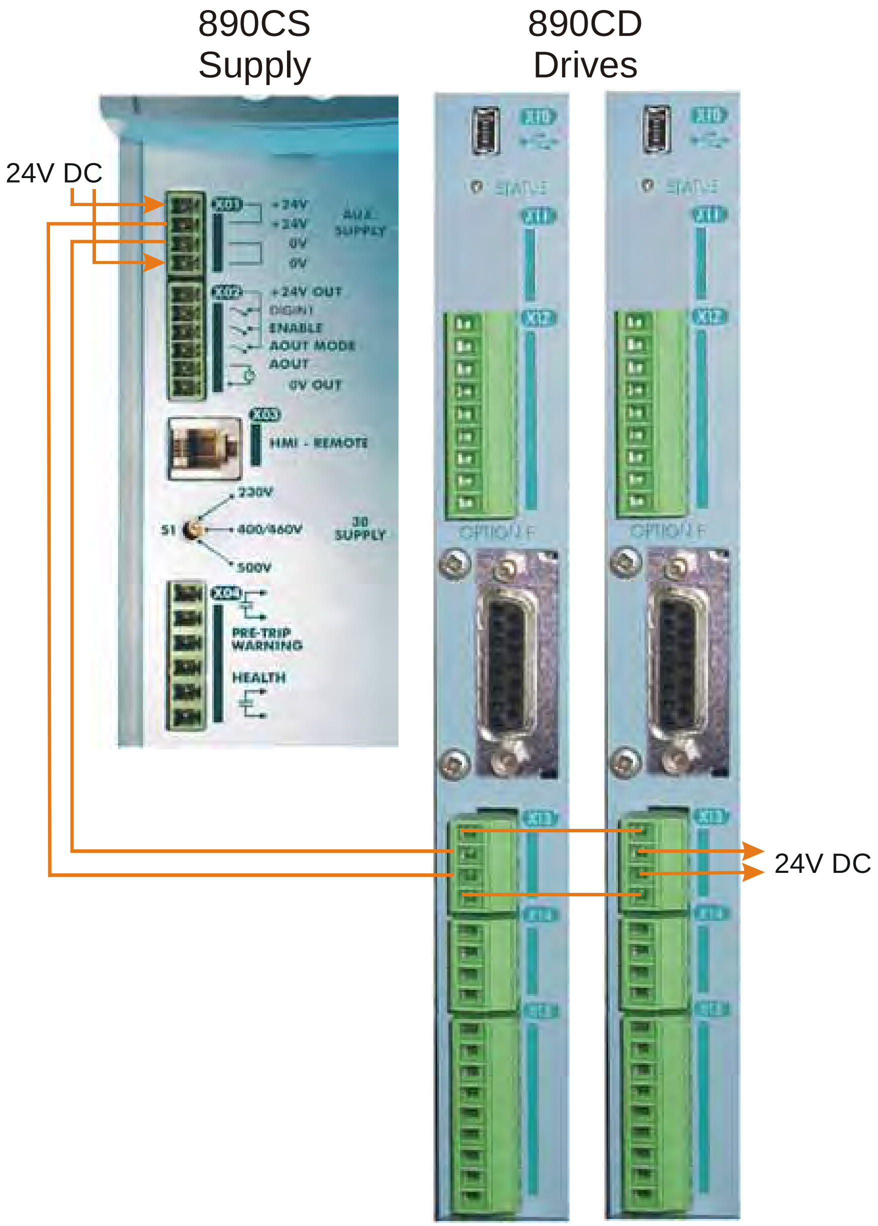
4.1: Power-up with 24V DC

You must provide an external 0V and +24V DC (±10%) control supply. Each unit, including the Common Bus Supply, can draw 2A, so for example: 3 units = 6A.

Connect 24V DC to terminal X01/01 or X02/02, and 0V (24V) to terminal X01/03 or X01/04 on the 890CS Common Bus Supply. The units are protected against reversal of this 24V DC supply.

Use the spare X01 terminals to daisy-chain the control supply to terminal X13 on the 890CD Common Bus Drive(s) in the system.

The diagram shows the control supply daisy-chained between the 890 Supply and Drive units.



IMPORTANT **This Control Supply will power the units for configuration purposes. It is not required by the 890CD Common Bus Drive when the DC link is present, but can be left connected. It is always required by the 890CS Common Bus Supply.**

Initial Power-Up Conditions

The unit will initialise in Remote Mode from factory conditions.

The Keypad will display the Input Current (%) on the 890CS Common Bus Supply, and the Remote Setpoint parameter (%) on the 890CD Common Bus Drive.

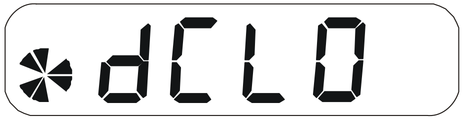
1. Apply the 24V DC.
2. Check that all keypads are active.

Note ***Because the unit is powering up without the 3-phase connection, the keypad will display a trip indicating that the supply is missing. The trip displays are shown below. Press the E key whenever this message appears to clear it from the screen.***

6511 Keypad

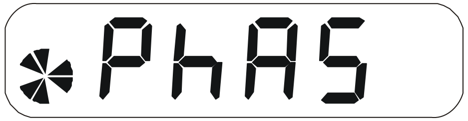
6901 Keypad

890CD :



*** TRIPPED ***
UNDERVOLTAGE

890CS :



*** TRIPPED ***
SUPPLY LOSS

If the unit is not powering-up with 24V DC: check your supply; check your connections at X01 and X13; check the keypad is fitted correctly. If you are still experiencing problems, please contact Parker SSD Drives.

4.2: Configure the 890CD Common Bus Drive

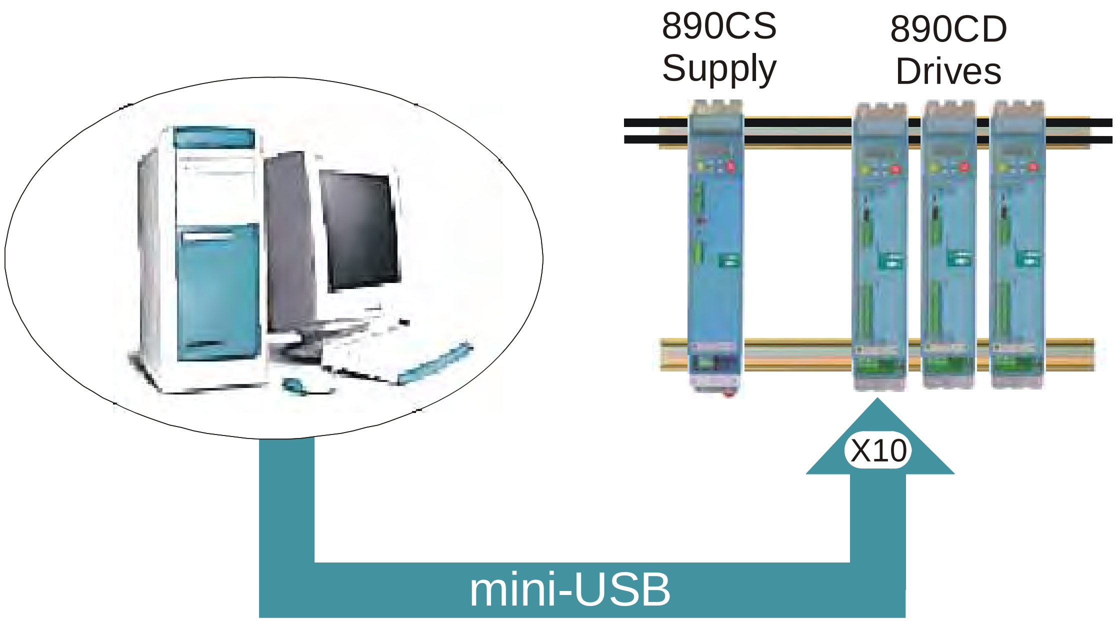
You must now configure each 890CD Common Bus Drive to your application. This is done using the DSE 890 Configuration Tool supplied on the CD, or the keypad.

Using the DSE 890 Configuration Tool

The DSE 890 (Drive System Explorer) Configuration Tool has a full Help system. Insert the DSE 890 disk into your PC and follow the on-screen instructions. Use the tool to set-up the I/O connectivity so that it meets the requirements for each 890CD Common Bus Drive. When connected, enter the set-up parameters as discussed on page 4-38.

Connecting to a PC

Connect the 890CD Common Bus Drive to your PC using an approved mini-USB lead. You can order this lead from Parker SSD Drives: part number CM471050 (3m long) or CM465778 (1m long).



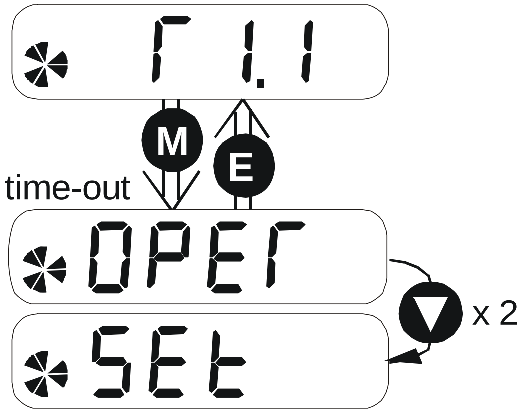
Using the Keypad

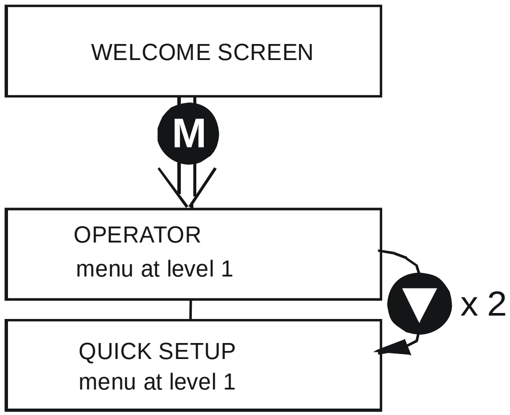
Note ***Use the DSE 890 Configuration Tool to configure the drive. The keypad is not intended for this purpose. However, the keypad does provide for local Start/Stop of the drive.***

Fit the keypad to the front of the unit, or connect remotely. The set-up parameters are stored in the SET menu on the 6511 keypad, and the QUICK SETUP menu on the 6901 keypad.


6511 Keypad


6901 Keypad





How to Edit a Parameter

Press  to enter the SET/QUICKSETUP menu.

Scroll through the parameters using the  and  keys.

Press  to select a parameter for editing.

Increment/decrement the parameter value using the  and  keys.

Press  to exit the parameter.

Set-up Parameters

The following is a list of the Set-up parameters you may need to check before starting the drive.

Note ***"PREF" is a parameter reference number used by the DSE 890 Configuration Tool.***

SET-UP PARAMETERS			
PREF	6511/6901 Display	Default	Brief Description
141.05	S 1 DRIVE MODE	0 : POSITION 1 : SPEED 2 : TORQUE	Select the working mode for the Position and Speed Loop
142.15	S 2 SPEED DEMAND	0	Sets the speed setpoint when the drive is in SPEED mode
142.06	S 3 I ATT	1.00	Sets the current attenuator (in units/s²).
31.01	S 4 VIEW LEVEL	0 : OPERATOR 1 : BASIC 2 : ADVANCED	Sets the level of menu to be displayed by the keypad

Step 5: Run the Motor

WARNING

Remove the fuses (or trip the circuit breaker) on your 3-phase supply.
Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

Main Points

1. You **MUST** perform the Voltage Check on the 890CS Common Bus Supply.
2. Complete all Pre-Operation Checks.
3. Ensure all the set-up parameter values for each 890CD Common Bus Drive have been entered. Refer to "4.2: Configure the 890CD Common Bus Drive", page 4-36.
4. Save your Application.
5. Follow one of the Start-up Routines: Local Mode or Remote Mode.

890CS Common Bus Supply - Voltage Check

IMPORTANT **You MUST check that the selected voltage of the unit is the same as the 3-phase supply voltage.**

The keypad will display the selected voltage of the unit.

If the voltage is incorrect: remove the 24V, select the required voltage at S1 on the front panel and apply 24V again. Re-check..

The correct voltage setting ensures that suitable voltage levels are used for Overvoltage, Undervoltage and Brake Level detection.

To display the Input Voltage Rating:

Press and hold E to display the software version.

Now press ▲ or ▼ to view the Input Voltage Rating.

Allow the display to time-out or press M to return to the previous screen.

The Welcome Screen displays the input voltage rating at power-up for a short time.

Otherwise, press E repeatedly until the Welcome Screen is displayed.

Allow the display to time-out or press M to return to the previous screen.

Pre-Operation Checks

Before Applying Power:

- Read the Safety section at the front of the Manual.
- Ensure that all local electric codes are met.
- Check for damage to equipment.
- Check for loose ends, clippings, drilling swarf etc. lodged in the drive and system.
- Check all external wiring circuits of the system - power, control, motor and earth connections.
- Ensure that unexpected rotation of the motor in either direction will not result in damage, bodily harm or injury. Disconnect the load from the motor shaft, if possible.
- Check the state of the Motor Thermistor and Brake Resistor connectors. Check external run contacts are open. Check external speed setpoints are all at zero.
- Ensure that nobody is working on another part of the system which will be affected by powering up.
- Ensure that other equipment will not be adversely affected by powering up.
- Check motor stator connections are correctly wired for Star or Delta as necessary for drive output voltage.
- Ensure that the SSD_Rail has been correctly installed and securely fastened.
- On the 890CS drive, set the line voltage on rotary switch S1.

4

Powering-up the Units

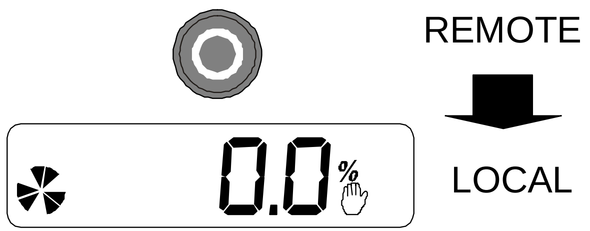
1. Apply the 3-phase supply to the 890CS Common Bus Supply.

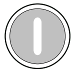
> **WARNING**
>
> The busbar system is **LIVE** when the 3-phase supply is provided to the 890CS unit, even prior to enabling the bus, and even though the the 890CD unit(s) will show no activity.

2. Select LOCAL mode operation on the 890CS Common Bus Supply:

Hold the Stop key down until the display spells LOC

Release the key to display the previous menu for example,Local Setpoint



3. Press the  key on the 890CS Common Bus Supply to supply DC to the 890CD Common Bus Drive(s) (the drive will not turn the motor).

   - The red LEDs on the top of each drive unit will light to show DC is present at the busbars.
   - The diagnostics on the 890CS keypad will indicate power is present - refer to Chapter 8: "The Keypad" - *6511 - Common Bus Supply*.

Initial Start-Up Routines

WARNING

Unpredictable motion, especially if motor parameters are incorrect.

Ensure no personnel are in the vicinity of the motor or any connected machinery.

Ensure that no machinery connected to the motor will be damaged by unpredictable motion.

Ensure that the emergency stop circuits function correctly before running the motor for the first time.

The Routines 1 & 2 below will run the drive using either the Keypad or the Control Terminals.

The 890CS Common Bus Supply must be supplying DC to the 890CD Common Bus Drive(s). This is indicated by the red LEDs displaying at the front of the busbar terminal boxes on the top of the units.

Routine 1: Local Mode

Note ***Refer to Chapter 8: "The Keypad" to familiarise yourself with the keypad and menu structure.***

Local control has a use for commissioning a drive. It is not the expected way to operate a system drive.

On the 890CD Common Bus Drive's keypad:

1. Select Local Mode (refer to Chapter 8: "The Keypad" for details).
2. The drive should be "healthy" now it is powered-up: no flashing trip messages displayed, and the 6901 keypad's HEALTH LED is lit (the RUN LED remains off). The keypad will display the Remote Setpoint parameter.
   If the drive has tripped, the keypad will be flashing a trip message, and the 6901 keypad's HEALTH LED will flash. Refer to Chapter 10: "Trips and Fault Finding" to investigate and remove the cause of the trip.

3. Press the Start key. The 6901 keypad's RUN LED will light and the motor will rotate slowly (the RUN LED will flash if the setpoint is at zero). The 6511 keypad will display a rotating symbol.

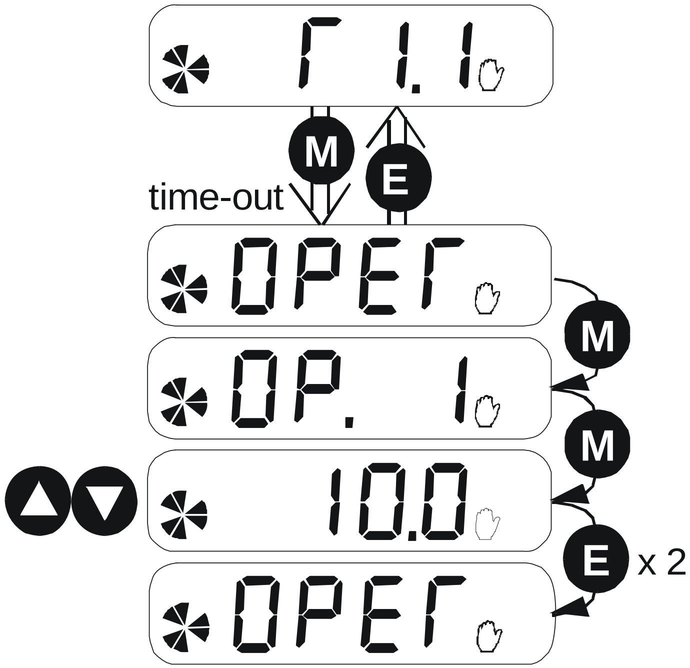
   *Reverse the motor's direction of rotation either by pressing the FORWARD/REVERSE key on the 6901 keypad, or by swapping two of the motor phases (**WARNING: Disconnect the mains supply first**).*

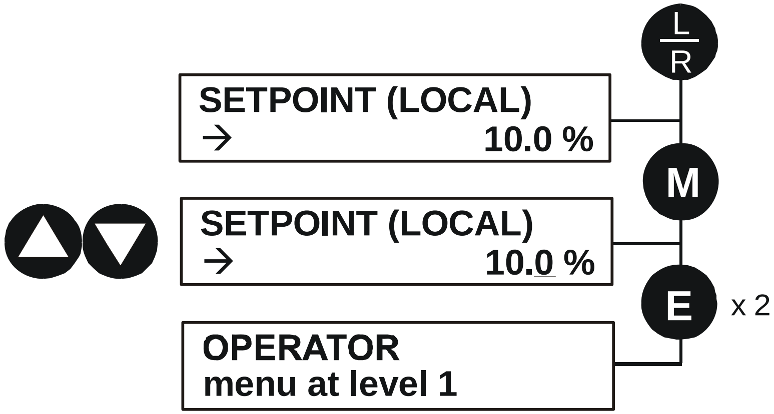
4. Control the value of the Local Setpoint parameter using the keys.

5. Press the Stop key.

6511 Keypad

6901 Keypad





Routine 2: Remote Mode

This routine assumes that the drive’s control terminals are wired as shown in "Control Connection Diagram" on page 4-23.

IMPORTANT **Ensure that the speed potentiometer is set to zero.**

On the 890CD Common Bus Drive:

1. The drive should be "healthy" now it is powered-up: no flashing trip messages displayed, and the 6901 keypad's HEALTH LED is lit (the RUN LED remains off).
   If the drive has tripped, the keypad will be flashing a trip message, and the 6901 keypad's HEALTH LED will flash. Refer to Chapter 10: “Trips and Fault Finding” to investigate and remove the cause of the trip.
2. Select Remote Mode - refer to Chapter 8: "The Keypad" for details, or power-down and power up the unit to re-initialise in Remote mode.
3. To Start in Remote Mode, close the "Run" switch on your control panel (applying 24V to DIN2, terminal X15/02 - RUN).
4. Turn the speed potentiometer up a little to apply a small speed setpoint (applying a variable voltage to AIN3, terminal X12/04 - REMOTE SETPOINT). The 6901 keypad's RUN LED will light and the motor will rotate slowly (the RUN LED will flash if the setpoint is at zero). The 6511 keypad will display a rotating symbol.
   *Reverse the motor’s direction of rotation either by pressing the FORWARD/REVERSE key on the 6901 keypad, or by swapping two of the motor phases (**WARNING: Disconnect the mains supply first**).*
5. To Stop in Remote Mode, open the "Run" switch on your control panel (removing 24V from DIN2, terminal X15/02 - RUN).

Chapter 5
890SD Standalone Drive

This chapter describes the mechanical and electrical installation of the 890SD Standalone Drive. It discusses configuring your system, and how to turn the motor for the first time.

Follow the steps for a successful installation.

Step 1: Mechanical Installation

Install the 890 units and associated equipment into the cubicle. The diagram shows a typical layout using Star Point earthing for EMC compliance. Refer to Appendix C for further information.

KEY

- **A** Analog Clean Earth
- **B** Back plate
- **C** Cubicle
- **E** Dirty Earth
- **F** Filter (optional)
- **G** Star Point Earth
- **P** Fuse or circuit breaker
- **R** AC Line Reactor (optional)
- **S** Signal/Control Screen Earth
- **T** 24V Power Supply (optional)

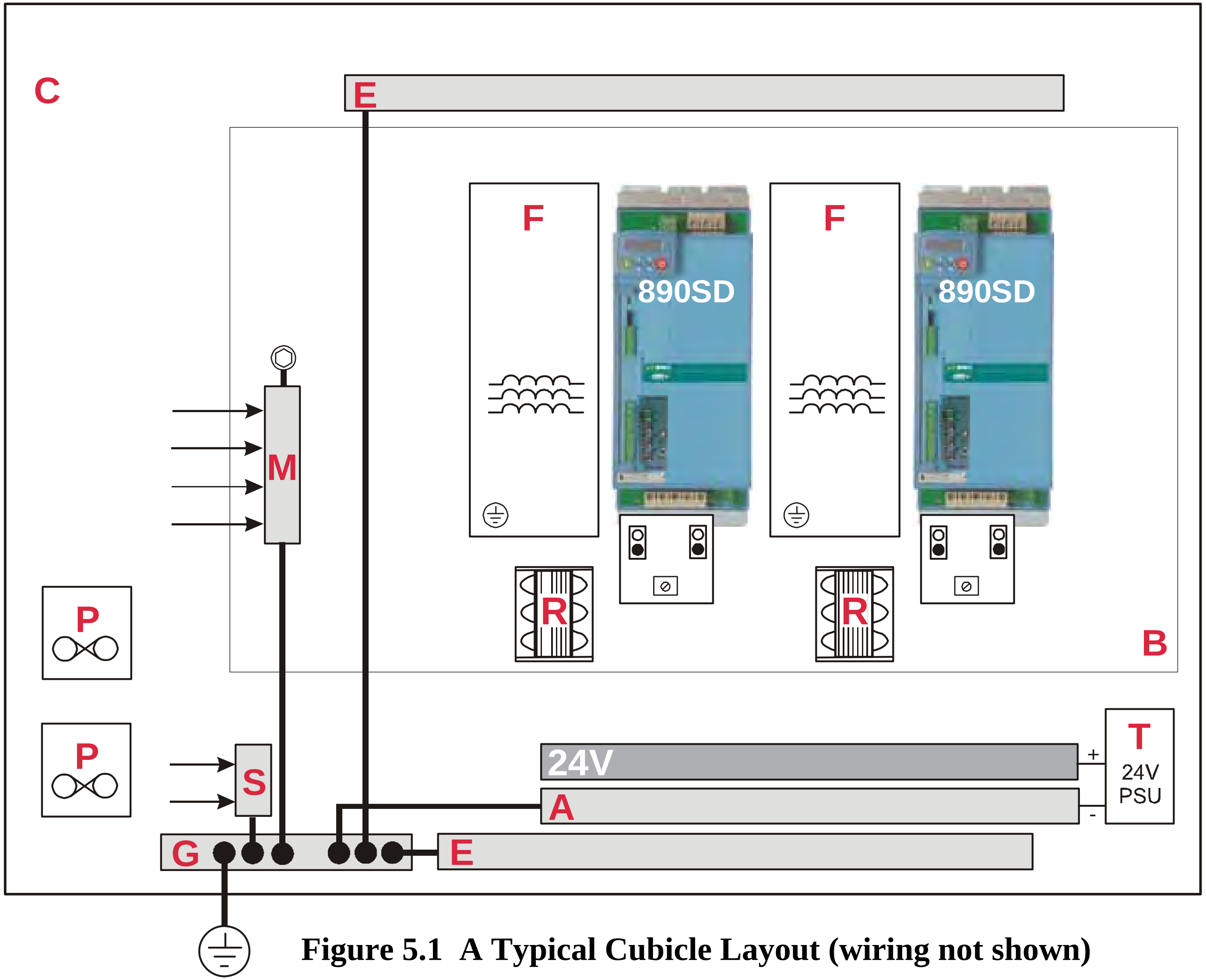


Figure 5.1 A Typical Cubicle Layout (wiring not shown)

Main Points

- This is a cubicle-mounted unit. It is not suitable for wall-mounting.
- Mount 890's side-by-side vertically on a solid, flat, normally cool, non-flammable, vertical surface.
- The unit(s) can be DIN rail or panel mounted.
- Fit the 890 Installation kit to the bottom of the drive.
- Adequate ventilation must be provided.
- Avoid excessive vibration.
- The earth points (D, E, G, M & S) are shown separated - it may be possible to use one large star point without EMC problems, this will depend upon your application.

Note ***Refer to Appendix C for information about EMC compliance.***

Sizing the Enclosure

The enclosure should comply with the European safety standards VDE 0160 (1994)/EN50178 (1998) and will require a tool for opening.

The size of the enclosure will depend on many factors:

- Physical size and number of units
- Ventilation clearances
- Power output, affected by derating due to altitude and ambient temperature

Enclosure/Environmental Information

The information here will help you to specify the enclosure to house the 890(s).

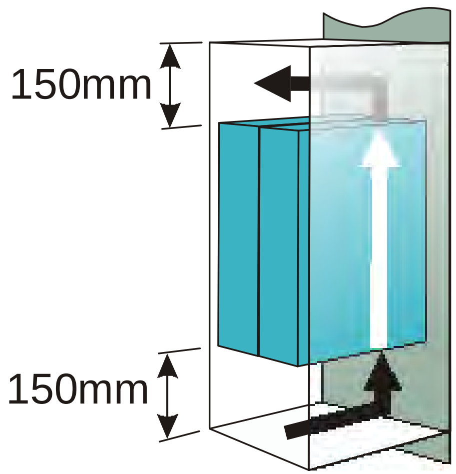
890 Operating Conditions		
Operating Temperature	0°C to 45°C (32°F to 113°F)	
Product Enclosure Rating	IP20 - UL (c-UL) Open Type (North America/Canada) Type 1 Suitable for cubicle mount only	
Cubicle Installation	The 890 must be installed to EN60204 Standard in the cubicle. For USA, the cubicle shall meet the requirements of UL50.	
Cubicle Rating	Cubicle to provide the following attenuation to radiated emissions:	
	EMC Enclosure Standard	*Attenuation to RF in spectrum 30-1000MHz*
	EN61800-3 2nd Environment	NONE
	EN61800-3 1st Environment Restricted Distribution EN61000-6-3:2001	10db
	EN61800-3 1st Environment Unrestricted Distribution EN61000-6-4:2001	20db

890 Operating Conditions	
Humidity	Maximum 85% relative humidity at 40°C (104°F) non-condensing
Atmosphere	Non flammable, non corrosive and dust free
Climatic Conditions	Class 3k3, as defined by EN50178 (1998)
Vibration	The product has been tested to the following specification: Test Fc of EN60068-2-6 10Hz<=f<=57Hz sinusoidal 0.075mm amplitude 57Hz<=f<=150Hz sinusoidal 1g 10 sweep cycles per axis on each of three mutually perpendicular axis
Safety	
Pollution Degree	Pollution Degree II (non-conductive pollution, except for temporary condensation)
Europe	When fitted inside an enclosure, this product conforms with the Low Voltage Directive 73/23/EEC with amendment 93/68/EEC, Article 13 and Annex III using EN50178 (1998) to show compliance.
North America/ Canada	Complies with the requirements of UL508C as an open-type drive.

Cooling

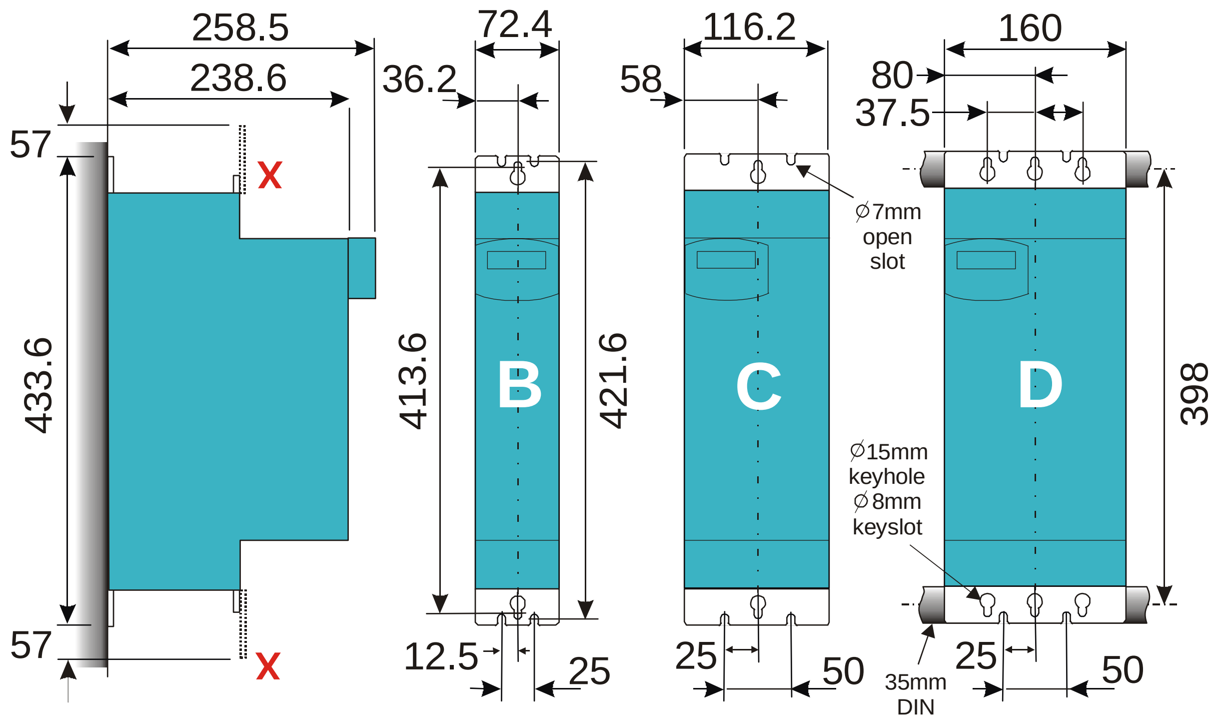
Units are designed for mounting side-by-side as shown. A minimum of 150mm (6") free-air space must be allowed at the top and bottom of each unit.

The 890 gives off heat in normal operation. The mounting surface for the unit should be normally cool. Allow a free flow of air through the top and bottom ventilation slots and heatsink. Remember that any other equipment may have its own clearance requirements. If you mount 890s above and below each other, the minimum top and bottom clearances should be added to produce an overall clearance value.



Mounting Dimensions

Mount the unit using the keyholes and slots, or fix to a DIN rail (35mm DIN).



Side view *Front view*

Dimensions are in millimetres. ***X*** *: Power Bracket - 890 Installation Kit*

890SD Weight Frame B 5kg/11.0lbs Frame C 6.6kg/14.5lbs Frame D 12.1kg/26.7lbs

The 890 Installation Kit is supplied with your unit. The kit provides several options for earth/ground connections. It also includes the brackets for DIN rail mounting the unit. Refer to the instructions in the kit and use the appropriate parts.

Cables are considered to be electrically sensitive, clean or noisy. Plan your cable routes to segregate these cables for EMC compliance. Refer to Appendix C: "Certification".

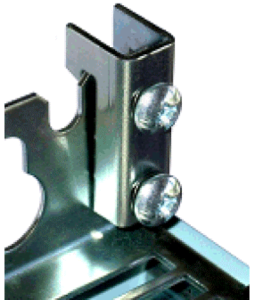
Panel Mount Fixings

Support the unit at the top and bottom with fixings to secure the unit to the panel. Mark and drill the fixing holes into the panel. Refer to the fixing centres given on the previous page. Insert the fixings into the top hole(s) and hang the unit. Insert the bottom fixing(s) and tighten to the required torque.

DIN Rail Mounting

The unit can be DIN rail mounted (35mm DIN).

Convert the unit to accept to DIN rail mounting:



1. Secure the DIN clips from the 890 Installation Kit into the threaded inserts at the top of the unit using the fixings supplied.
2. Hang the unit on the top DIN rail. Fix the DIN clips onto the bottom of the unit and clip onto the DIN rail.
3. Tighten both the top and bottom clips when the unit is in position on the rail.

Shield Bonding Clips

Fit the shield bonding clips to the Control Bracket/Power Bracket. Select slots providing a loose fit. This will then allow the clips to be tightened by hand.

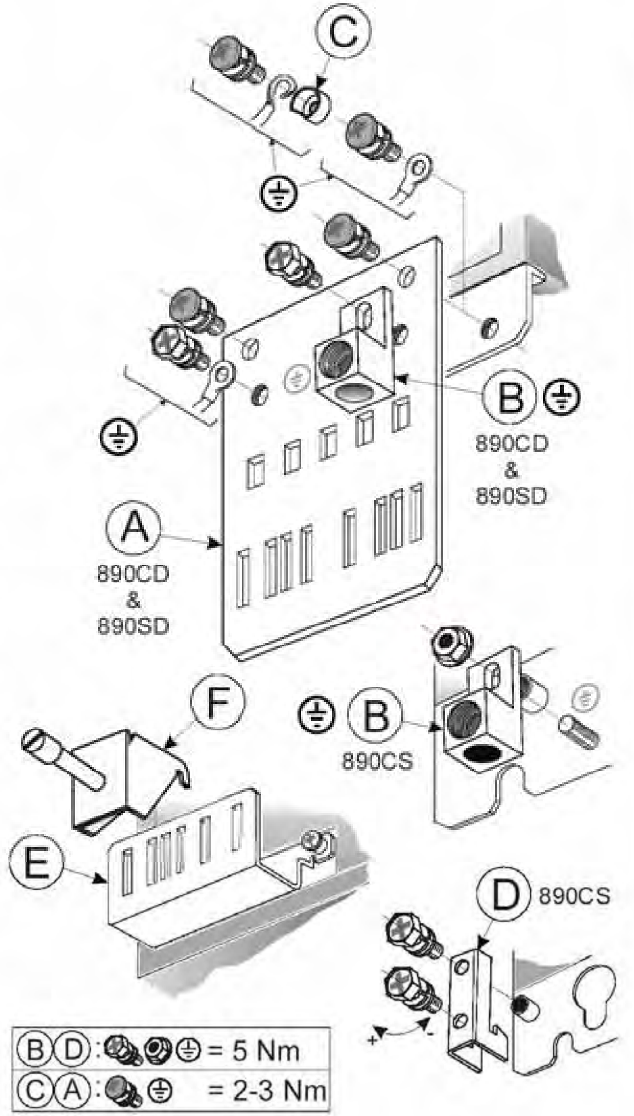
Note ***Do not squeeze the clip sides to produce a fit as this will crimp the sides to the clip's moving soleplate.***

890 Installation Kit

The fitting instructions for the kit are reproduced below.

890 Installation Kit

Item	Description	SSD Part Number	Qty
	890CS : Common Bus Supply		
B	Ground Terminal M6 small	CI465312	1
	Ground Terminal M6 large	CI470521U001	1
C	Cup Washer M5	FX463522	2
D	DIN Clip	BA465900	4
E	Control Bracket	BA465887	1
	Screw Assembly M4 x 10mm	FY385649	2
	Screw Assembly M5 x 12mm	FY468470U012	8
	Nut Assembly	FZ463232	1
	Busbar Insulation 15mm	BC465938U015	2
	Busbar Insulation 200mm	BC465938U200	1
F	Shield Bonding Clip 8mm ∅	CI465892U008	1
	Screwdriver	JA465841	1
	Allen Wrench	JA465842	1
	890CD : Common Bus Drive		
A	Power Bracket	BA465888	1
B	Ground Terminal M6	CI465312	1
C	Cup Washer M5	FX463522	2
D	DIN Clip	BA465900	4
E	Control Bracket	BA465887	1
	Screw Assembly M4 x 10mm	FY385649	4
	Screw Assembly M5 x 12mm	FY468470U012	10
	Busbar Insulation 200mm	BC465938U200	1
F	Shield Bonding Clip 8mm ∅	CI465892U008	1
	Terminal Wiring Label	GA469181	1
	890SD : Standalone Drive		
A	Power Bracket	BA465888	2
B	Ground Terminal M6	CI465312	2
C	Cup Washer M5	FX463522	2
D	DIN Clip	BA465900	4
E	Control Bracket	BA465887	1
	Screw Assembly M4 x 10mm	FY385649	4
	Screw Assembly M5 x 12mm	FY468470U012	10
F	Shield Bonding Clip 8mm ∅	CI465892U008	1
	Screwdriver	JA465841	1
	Terminal Wiring Label	GA469181	1



F : Shield Bonding Clips
For larger sizes contact SSD Drives.
Part Numbers:
CI465892U014 - 14mm ∅
CI465892U020 - 20mm ∅

HA468432U001 Issue 5

Step 2: Connecting Power

In this section we are going to connect the 3-phase supply to the 890SD Standalone Drive(s).

We'll also connect the motor and the (optional) brake resistor.

> **WARNING**
> During commissioning, remove the fuses (or trip the circuit breaker) on your 3-phase supply.
> Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

Solid-State Short-Circuit Protection

These devices are provided with Solid-State Short-Circuit (output) Protection. Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection requirements must be in accordance with the latest edition of the National Electrical Code NEC/NFPA-70 and any additional local codes.

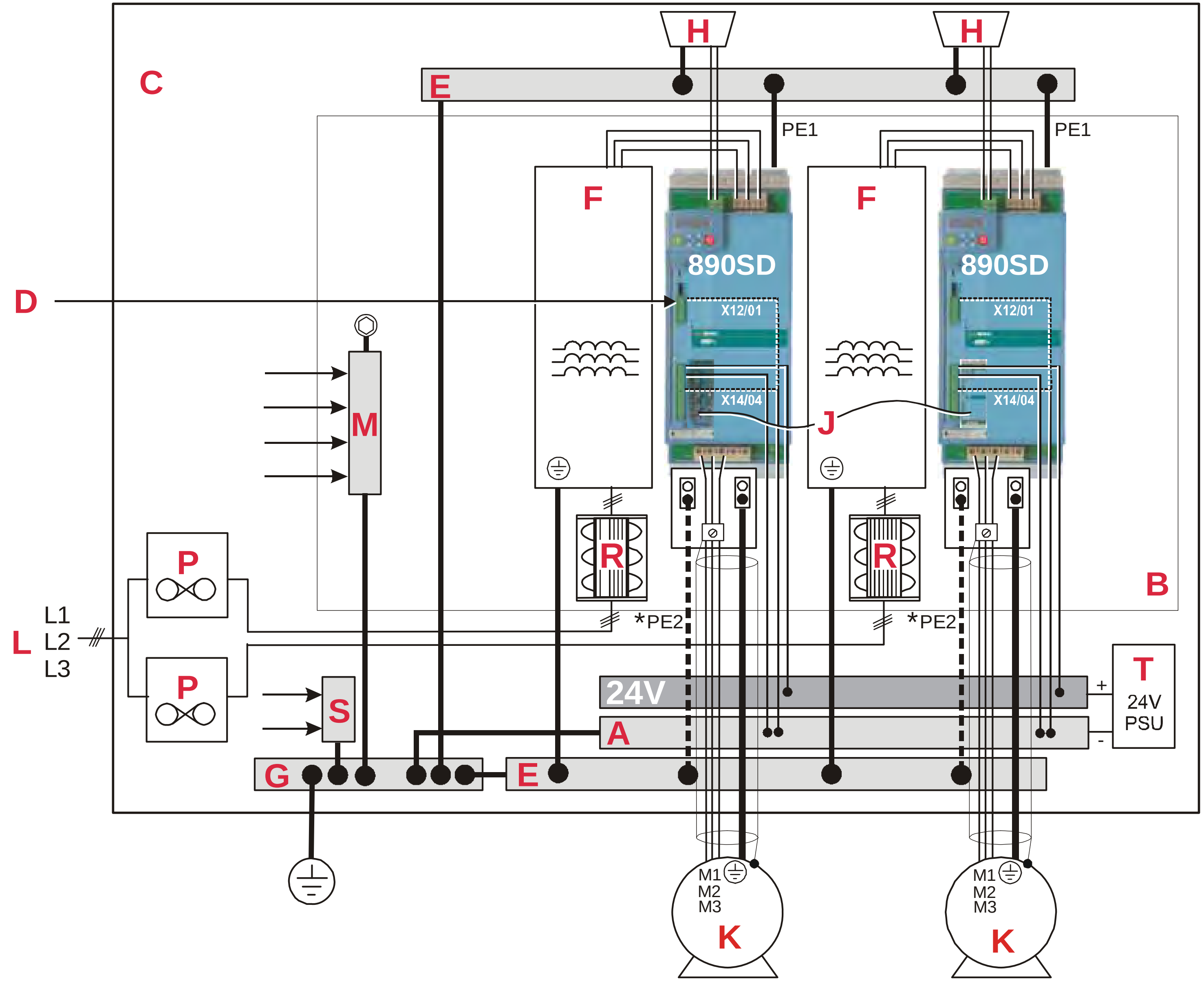
Refer to the 890 Installation Kit for earth/ground fixing details. Fit the appropriate parts.

Each unit must be **permanently earthed** according to EN 50178.

For permanent earthing:

A cross-section conductor of at least $10mm^2$ is required. This can be achieved either by using a single conductor (PE) or by laying a second conductor though separate terminals (PE2 where provided) and electrically in parallel.

Wiring Diagram



Key to Wiring Diagram

A	Analog Clean Earth	This must be insulated from the back panel. Analog reference X12/01 or digital reference X14/04 must be connected to this busbar, avoiding earth loops.
B	Back-plate	Earth the backplate to the star point (G).
C	Cubicle	The 890 must be mounted inside a cubicle complying with the European safety standards VDE 0160 (1994)/EN50178 (1998).
D	Control Wiring	Control terminals are SELV (Safe Extra Low Voltage), i.e. double-insulated from power circuits. 0.08mm^2 (28AWG) to 2.5mm^2 (12AWG).
E	Dirty Earth	This must be insulated from the back panel. It is used for all power earths.
F	Filter (optional)	Refer to Chapter 6: "Associated Equipment" for the specified filter. This may help to achieve EMC compliance. Refer to Appendix C.
G	Star Point Earth/Ground	The star point connects all earth busbars. Connect the star point to the incoming safety earth (PE). Note the possible requirement for PE2 connections to each drive, refer to page 4-9.
H	Brake Resistor (DC+, EXT: frames B & C) (DBR+, DBR-: frame D)	External brake resistors are available. Refer to Chapter 6: "Associated Equipment". Ensure wiring is rated for highest system voltage. (890SD Frame D units also have internal brake resistors.)

Key to Wiring Diagram

J	FireWire™ Connection	A very fast external bus (IEEE 1394a) to connect up to 63 units. You will need the FireWire Option Card for each Common Bus Drive, refer to Appendix A.
K	Motor (M1, M2, M3)	The motor used must be suitable for Inverter duty. Ensure wiring is rated for highest system voltage. Refer to Appendix E.
L	3∅ Power Supply Cable (L1, L2, L3)	Ensure wiring is rated for highest system voltage. Refer to Appendix E.
M	Metal Work Earth	Use the back panel for this earth. It provides earthing points for all parts of the cubicle including doors and panels. Connect cubicle to earth/ground via cubicle PE terminal.
P	Fuse or Type B RCD	Fuse rating - refer to Appendix E. We don't recommend the use of circuit breakers (e.g. RCD, ELCB, GFCI), but if their use is mandatory, use only a Type B RCD.
R	Line Reactor (optional)	An optional 3% line reactor can be fitted. This may help to achieve EMC compliance. Refer to Chapter 6: "Associated Equipment".
S	Signal/Control Screen Earth	This must be insulated from the back panel. Connect any signal/control screened cables which **do not** go directly to the drives.
T	24V Power Supply (optional)	A 24Vdc power supply. Can suppy the 890SD unit to allow for configuration and commissioning of the system without the AC supply being present.

Power Connections - 890SD Standalone Drive

Power Connections - 890SD Standalone Drive

EARTH/GROUND	
Fix Drive earth connections to ⏚. Maximum wire sizes: Frame B: 6mm^2 / 10AWG Frame C: 10mm^2 / 8AWG Frame D: 16mm^2 / 4AWG	Fix the earth from the Motor to the base of the drive. Maximum wire sizes: Frame B: 4mm^2 / 12AWG Frame C: 10mm^2 / 8AWG Frame D: 16mm^2 / 4AWG

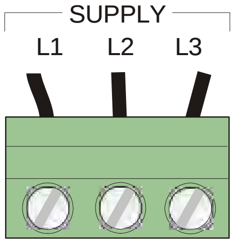
Refer to the 890 Installation Kit for earth/ground fixing details.

Each unit must be **permanently earthed** according to EN 50178.

For permanent earthing: one conductor, PE1, of >10mm^2 cross-section is required; or two individual incoming protective earth conductors, PE1 & PE2, of <10mm^2 cross-section. Each earth conductor must be suitable for the fault current according to EN 60204.

Power Connections - 890SD Standalone Drive

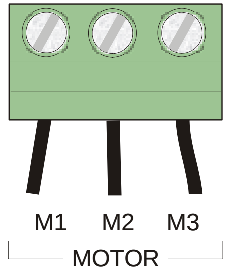
SUPPLY



L1, L2, L3
Connect 3-phase supply in any order.

Maximum wire sizes:
Frame B: $6mm^2$ / 10AWG, 0.5-0.9Nm / 0.4-0.7lbf
Frame C: $10mm^2$ / 8AWG, 1.2Nm / 0.9lbf
Frame D: $16mm^2$ / 4AWG, 2-4Nm / 1.5-3lbf

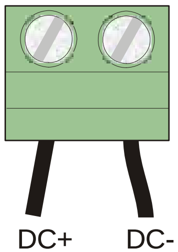
MOTOR



M1 (U), M2 (V), M3 (W).
Connect to the motor in any order.

Maximum wire sizes:
Frame B: $6mm^2$ / 10AWG, 0.5-0.9Nm / 0.4-0.7lbf
Frame C: $10mm^2$ / 8AWG, 1.2Nm / 0.9lbf
Frame D: $16mm^2$ / 4AWG, 2-4Nm / 1.5-3lbf

DC+ / DC- Bottom Terminals - Option



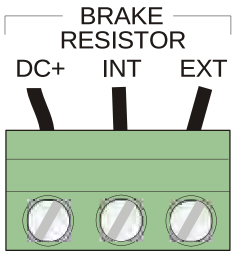
These terminals can be used for link monitoring and for link sharing between 890SD drives - ***caution****: refer to the Link Shairing Application note for limitations.*

Use correctly rated wire - refer to Appendix E.

Maximum wire sizes:
Frame B: $6mm^2$ / 10AWG, 0.5-0.9Nm / 0.4-0.7lbf
Frame C: $10mm^2$ / 8AWG, 1.2Nm / 0.9lbf
Frame D: $16mm^2$ / 4AWG, 2-4Nm / 1.5-3lbf

Power Connections - 890SD Standalone Drive

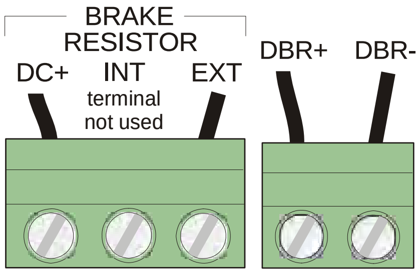
BRAKE RESISTOR - Frame B Option



You can connect an external brake resistor between terminals DC+ and EXT. The INT terminal is for future use only. Do not connect anything to this terminal.

Maximum wire size:
Frame B: 6mm^2 / 10AWG, 0.5-0.9Nm / 0.4-0.7lbf

BRAKE RESISTOR - Frame C & D Option



Frame C Frame D

Connect an external brake resistor between terminals DBR+ and DBR-.

Maximum wire size:
Frame C: 6mm^2 / 10AWG, 0.5-0.9Nm / 0.4-0.7lbf
Frame D: 10mm^2 / 8AWG, 1.2Nm / 0.9lbf

Power Connections - 890SD Standalone Drive

BRAKE RESISTOR - information

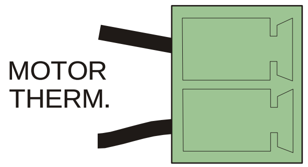
During deceleration, or with an overhauling load, the motor acts as a generator. Energy flows back from the motor into the dc link capacitors within the drive. This causes the dc link voltage to rise. If the dc link voltage exceeds 810V for the 400V build (or 890V for the 500V build) then the drive will trip to protect the capacitors and the drive power devices. The amount of energy that can be absorbed in the capacitors is relatively small; typically more than 20% braking torque will cause the drive to trip on overvoltage. Dynamic braking increases the braking capability of the drive by dissipating the excess energy in a high power resistor connected across the dc link, see above.

When the dc link voltage rises above that specified for each Frame size the brake unit switches the external resistor network across the dc link. The brake unit switches off again when the dc link voltage falls below the threshold level. The amount of energy produced by the motor during regeneration depends upon the DECEL TIME parameter (refer to the REFERENCE RAMP and DYNAMIC BRAKING function blocks) and the inertia of the load.

Refer to Chapter 6:"Associated Equipment" for brake resistor selection.

Power Connections - 890SD Standalone Drive

MOTOR THERMISTOR



Detects over-temperature in motors fitted with an internal thermistor

Link these terminals for motors not fitted with an internal thermistor (or set SETUP::TRIPS::I/O TRIPS::INVERT THERMIST to True).

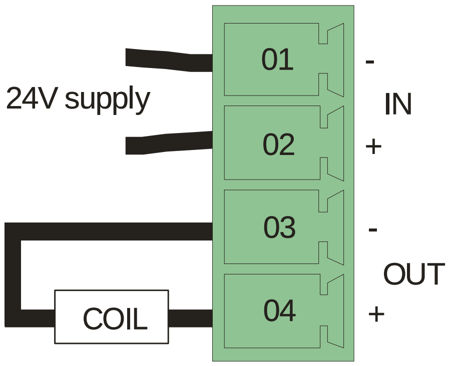
Maximum wire size:
0.22 Nm/0.16lbf

The connections have no polarity. Thermistor PTC `Type A' is supported as defined in IEC 34-11 Part 2:

Rising temperature trip resistance: 1650 to 4000Ω

Falling temperature trip reset resistance: 750 to 1650Ω

Mechanical Brake (24V) - Option



Connect the 24V DC brake supply to terminals 1 and 2, and connect the brake terminals to 3 and 4. The brake coil is energized when the drive runs. The terminals are rated for 2A DC at 24V DC.

Step 3: Control Connections

WARNING

During commissioning, remove the fuses (or trip the circuit breaker) on your 3-phase supply. Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

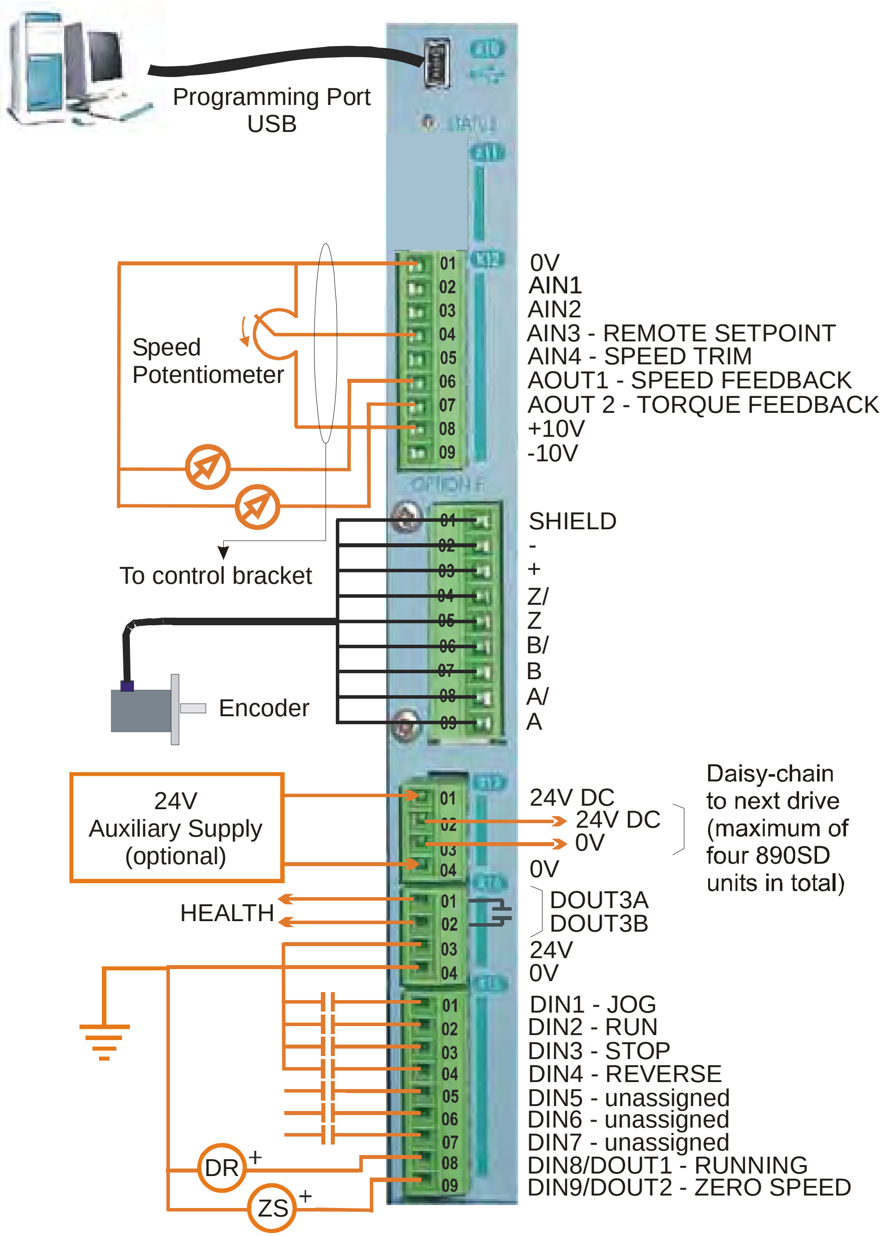
Main Points

- The 890 is a system product and is designed for Remote mode operation using the analog & digital inputs/outputs and/or FireWire™ connection. The use of the keypad (Local mode) is for configuration purposes.

  Connecting 890SD Standalone Drives using the FireWire™ Option Cards is recommended for applications requiring high levels of accuracy. Otherwise, use I/O to transfer data from master to slave units.

- The control terminals will accept a single wire of size 1.5mm²/16AWG. For two wires per terminal, use smaller gauge wire such as 0.5mm²/22AWG.
- Use screened control cables to comply with EMC requirements. All screens must be terminated at the base of the product using the Control Bracket and (optional) Shield Bonding Clips from the 890 Installation Kit.
- The control board 0V at X14/04 must be connected to protective (clean) earth outside of the product to meet EMC and safety requirements.

Control Connection Diagram



890SD Minimum Control Connections

Minimum Connections

Speed Reference

- Connect a 10kΩ potentiometer at terminal X12:

  X12/01 : Low (CCW)
  X12/04 : Wiper
  X12/08 : High (CW)

- Connect the shield to earth/ground at the control bracket.

OR

- External 2-wire speed reference between:

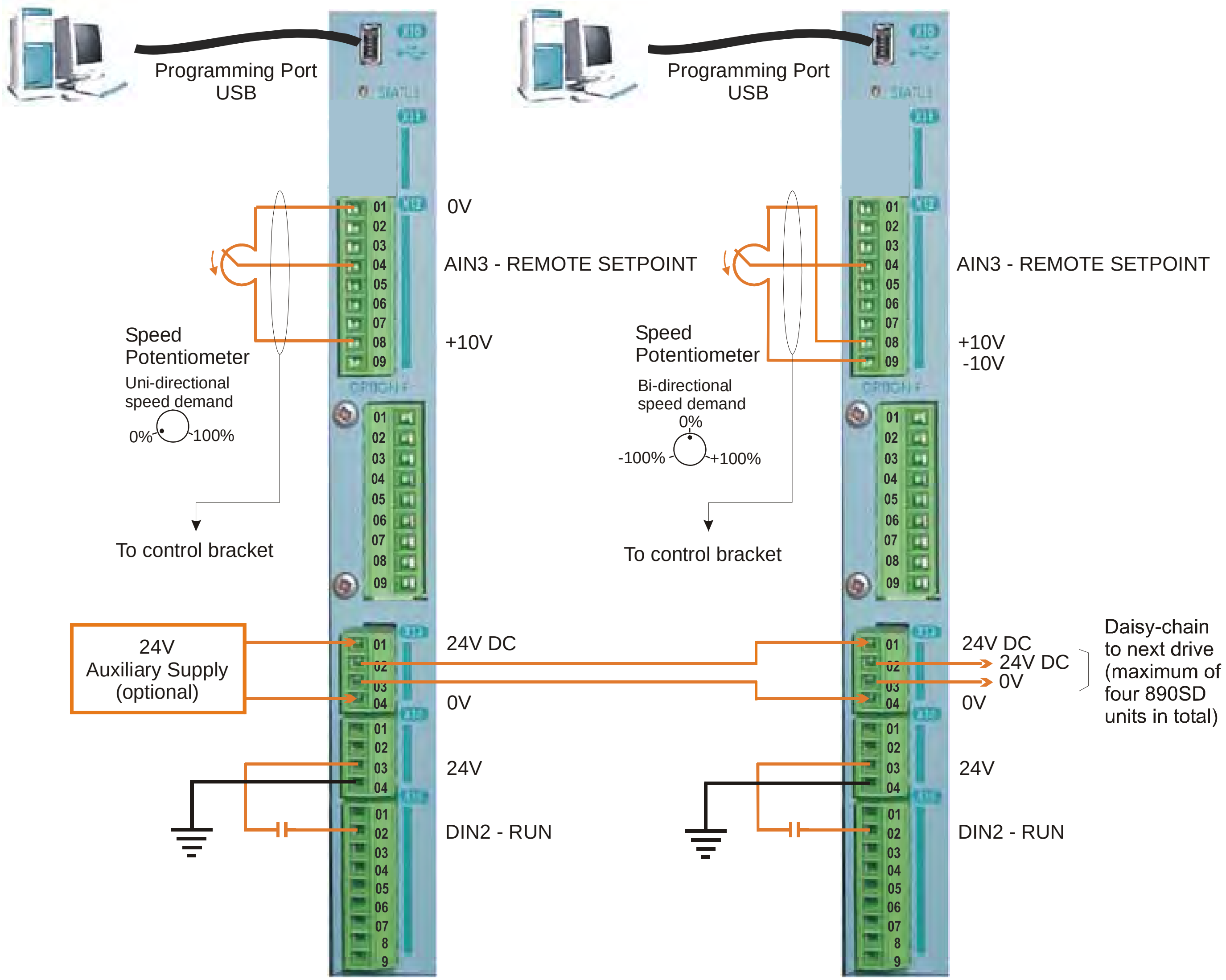
  X12/01 : negative
  X12/04 : positive

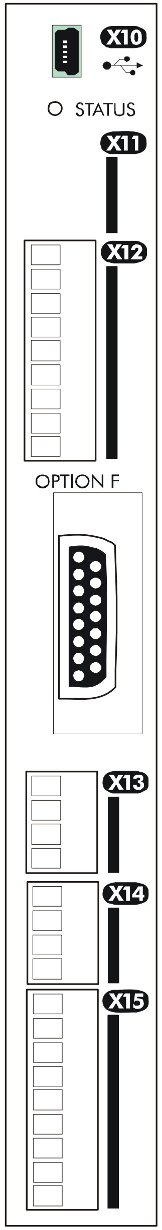
- Connect the shield to earth/ground at the control bracket.

Sequencing

- RUN (maintained contact)

  X14/03 : 24V
  X15/02 : RUN

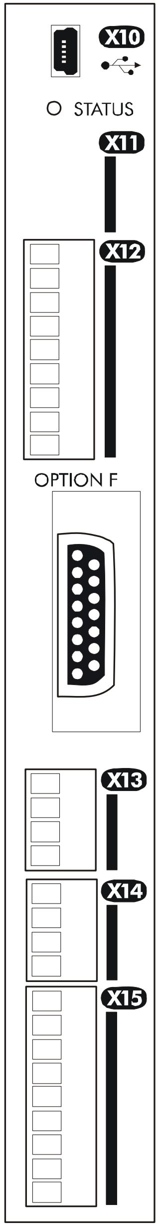




Control Connections - 890SD Standalone Drive

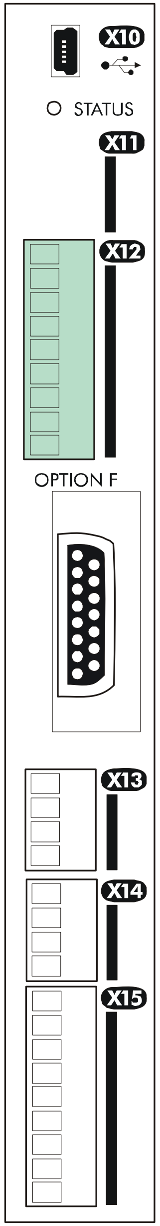
The table below shows the factory defaults. For further information refer to the DSE 890 Configuration Tool.

Mini USB Port			
	Name	**Range**	**Description**
X10	USB		This Mini USB port provides a serial communications link to a host computer running the DSE 890 Configuration Tool. Use an approved USB lead: A to mini-B.



FUTURE USE				
		Name	**Range**	**Description**
X11	**01**			
	02			
	03			
	04			

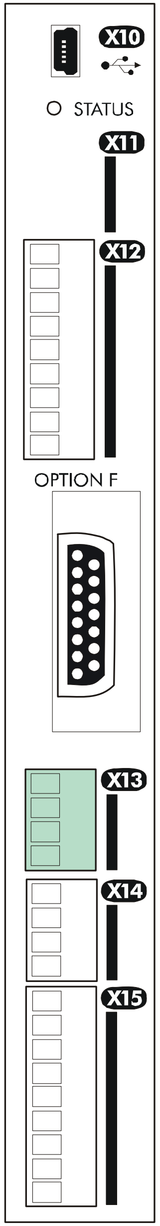
Note **Terminal X11 is for future use.**



ANALOG I/O				
		Name	**Range**	**Description**
X12	**01**	0V		0V reference for analog I/O
	02	AIN1	0-10V, ±10V	Analog Input 1 (default = diff I/P +)
	03	AIN2	0-10V, ±10V	Analog Input 2 (default = diff I/P -)
	04	AIN3	±10V, 0-10V, 0-20mA, 4-20mA	Analog Input 3 (default = remote setpoint I/P) -10V = 100.00% reverse, +10V = 100.00% forward (% maximum speed)
	05	AIN4	±10V, 0-10V, 0-20mA, 4-20mA	Analog Input 4 (default = speed trim I/P)
	06	AOUT1	±10V (10V = 100% speed)	Analog Output 1 (default = speed feedback O/P)
	07	AOUT2	±10V (10V = 200% torque)	Analog Output 2 (default = torque feedback O/P)
	08	+10V REF	+10V (output)	10V reference for analog i/o. Load 10mA maximum
	09	–10V REF	-10V (output)	10V reference for analog i/o. Load 10mA maximum

Note ***AIN1 and AIN2 are fitted with a link to ensure no noise pick-up when not in use. These terminals can be used as a differential ±10V input (which we call AIN5), but AIN1 and AIN2 must remain within ±10V relative to 0V. AIN5 has a direct input into the Speed Loop providing a fast speed or torque demand for servos.***

All analog inputs/outputs are configurable using the DSE 890 (Drive System Explorer) Configuration Tool supplied on disk. The table above shows the factory defaults. These analog connections require ±10V DC which is supplied at terminal X12/08 and X12/09 respectively. For further information refer to the DSE 890 Configuration Tool.



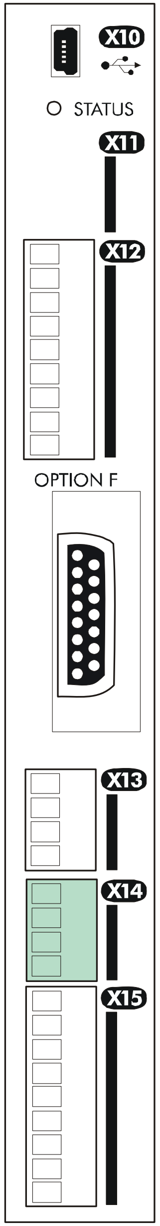
USER 24V DC INPUTS				
		Name	**Range**	**Description**
X13	**01**	24V INPUT	24V DC	User +24V (2A per unit)
	02	24V INPUT	24V DC	User +24V (2A per unit)
	03	0V INPUT	0V	0V (24V) input
	04	0V INPUT	0V	0V (24V) input

Note ***These connections are not necessary for normal operation of the drive.***

Connection can be made from a suitable, external 24V source. This 24V DC control supply allows for configuration and commissioning of the system without the AC supply being present. The drive will operate with this supply but will not turn a motor.

Connection is not required when the AC supply is present, but the connection can be safely left connected.

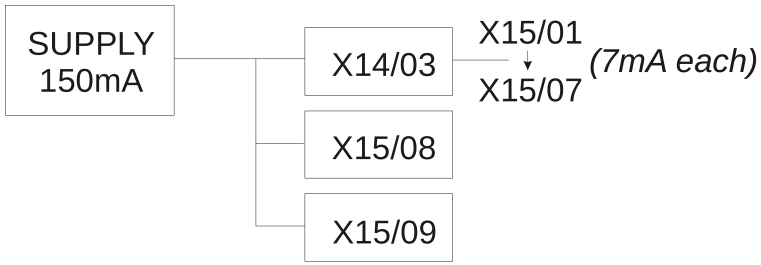
You can connect up to four 890SD units in total when daisy-chaining 24V using these terminals (8A maximum). If you have more than four 890SDs, use a 24V rail and wire as shown in the Wiring Diagram on page 4-11.

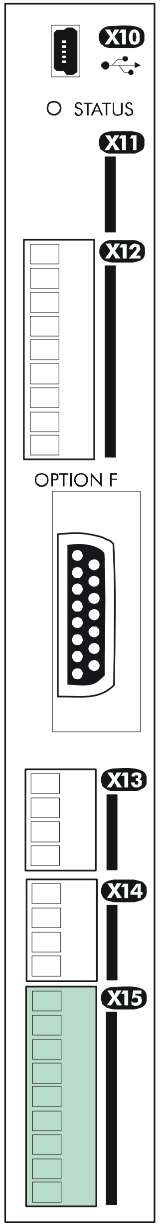


RELAY CONTACTS

		Name	Range	Description
X14	01	DOUT3A	0-24V DC	Relay Output: normally-open, volt-free, 24V DC 1A resistive load or use down to 1mA, 12V levels (DOUT3 closed = HEALTH)
	02	DOUT3B	0-24V DC	Relay Output: normally-open, volt-free, 24V DC 1A resistive load or use down to 1mA, 12V levels (DOUT3 closed = HEALTH)
	03	USER 24V	0-24V DC	24V DC Output, 150mA maximum load
	04	0V	0-24V DC	0V reference for USER 24V output

Note ***The maximum permissible sum of currents from X14/03, X15/08, X15/09 is 150mA. An Alert message will be displayed if exceeded.***



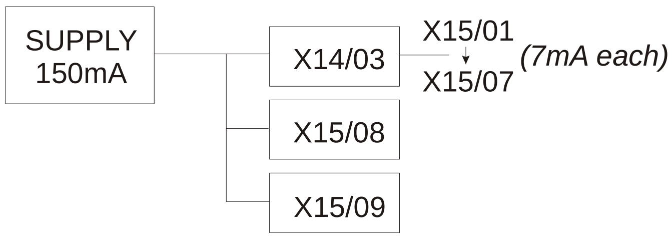


DIGITAL I/O

		Name	Range	Description
X15	01	DIN1	0-24V DC	Digital Input 1 (default = JOG)
	02	DIN2	0-24V DC	Digital Input 2 - (default = RUN)
	03	DIN3	0-24V DC	Digital Input 3 - (default = STOP)
	04	DIN4	0-24V DC	Digital Input 4 - (default = REVERSE)
	05	DIN5	0-24V DC	Digital Input 5 - (default = unassigned). Refer to I/O TRIPS::EXT TRIP MODE for special function.
	06	DIN6	0-24V DC	Digital Input 6 - (default = unassigned)
	07	DIN7	0-24V DC	Digital Input 7 - (default = unassigned)
	08	DIN8/DOUT1	0-24V DC	Digital Input/output 1 - (default = digital output: RUNNING)
	09	DIN9/DOUT2	0-24V DC	Digital Input/output 2 - (default = digital output: ZERO SPEED)

All digital inputs/outputs are configurable using the DSE 890 (Drive System Explorer) Configuration Tool supplied on disk. The table shows the factory defaults. The digital inputs require 24V DC which is supplied at terminal X14/03. For further information refer to the DSE 890 Configuration Tool.

Note ***The maximum permissible sum of currents from X14/03, X15/08, X15/09 is 150mA. The load on X15/08 & X15/09 connects from these pins to X14/04 (0V). An Alert message will be displayed if exceeded.***



Step 4: Checking the System

In this section we are going to apply the 24V DC Control Supply and check the I/O operation of the 890's by applying just a 24V DC Control Supply. If everything is okay, we'll be ready to apply the 3-phase supply to the drive(s).

Pre-Operation Checks

Before Applying 24V DC:

If you have already wired the 3-phase supply to the 890SD Standalone Drive, DISCONNECT IT NOW (remove the supply fuses, or trip the circuit breaker).

Check for damage to equipment.

Check for loose ends, clippings, drilling swarf etc. lodged in the drive and system.

Check all external wiring circuits of the system - power, control, motor and earth connections.

Ensure that other equipment will not be adversely affected by powering up.

Prepare to power-up the unit and system:

Fit the keypad(s) to the front of the unit(s), or connect remotely.

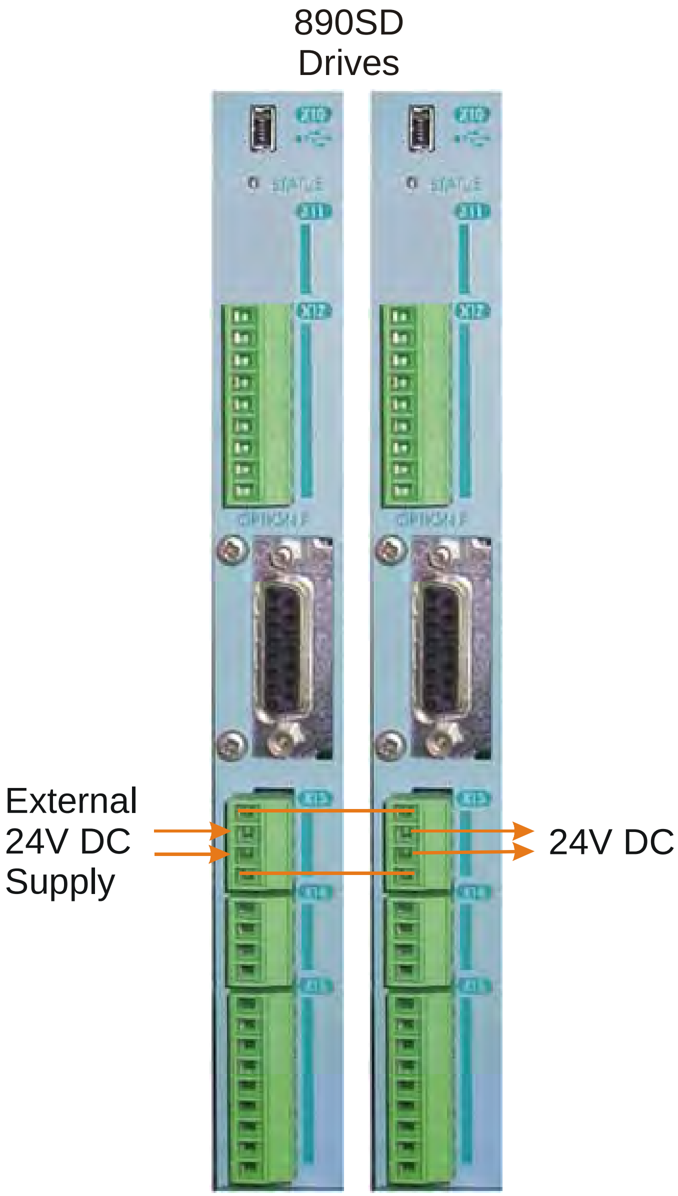
4.1: Power-up with 24V DC

You must provide an external 0V and +24V DC (±10%) control supply. Each unit can draw 2A, so for example: 3 units = 6A.

Connect 24V DC to terminal X13/01 or X13/02, and 0V (24V) to terminal X13/03 or X13/04. The units are protected against reversal of this 24V DC supply.

Use the spare X13 terminals to daisy-chain the control supply to other drives in the system.

The diagram shows the control supply daisy-chained between 890SD Standalone Drives.



IMPORTANT **This Control Supply will power the unit for configuration purposes. It is not required when the 3-phase supply is present, but can be left connected.**

890SD Standalone Drive

Initial Power-Up Conditions

The unit will initialise in Remote Mode from factory conditions.

The Keypad will display the Remote Setpoint parameter (%) on the 890SD Standalone Drive.

1. Apply the 24V DC.
2. Check that all keypads are active.

Note ***Because the unit is powering up without the 3-phase connection, the keypad will display a trip indicating that the supply is missing. The trip displays are shown below. Press the E key whenever this message appears to clear it from the screen.***

6511 Keypad

6901 Keypad

*** TRIPPED ***
UNDERVOLTAGE

If the unit is not powering-up with 24V DC: check your supply; check your connections at X01 and X13; check the keypad is fitted correctly. If you are still experiencing problems, please contact Parker SSD Drives.

4.2: Configure the 890SD Standalone Drive

You must now configure each 890SD Standalone Drive to your application. This is done using the DSE 890 Configuration Tool supplied on the CD, or the keypad.

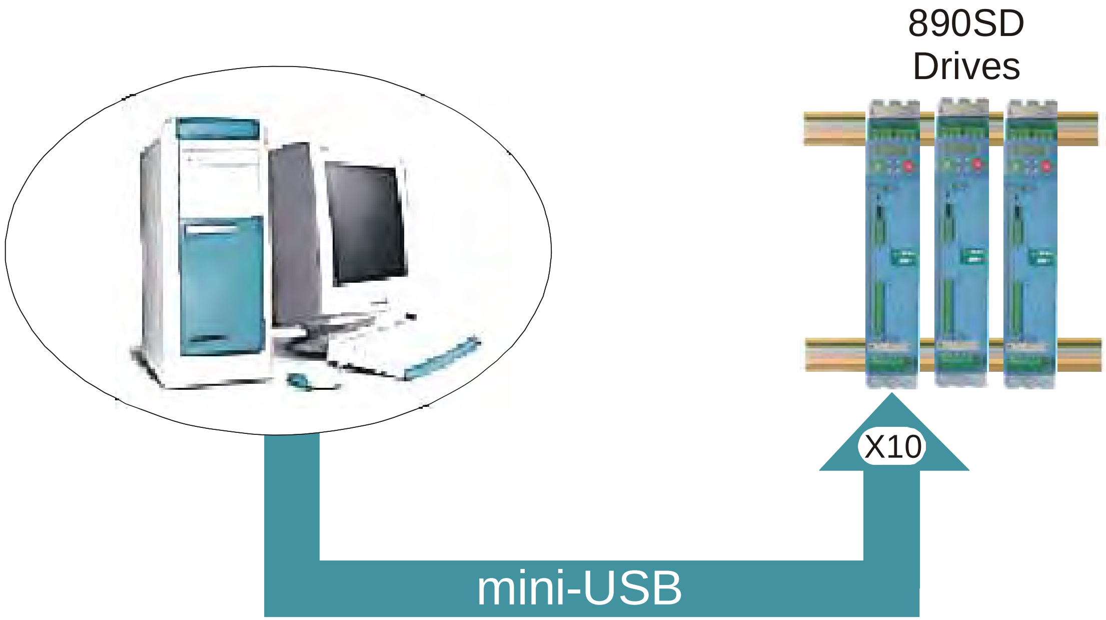
Using the DSE 890 Configuration Tool

The DSE 890 (Drive System Explorer) Configuration Tool has a full Help system. Insert the DSE 890 disk into your PC and follow the on-screen instructions. Use the tool to set-up the I/O connectivity so that it meets the requirements for each 890SD Standalone Drive. When connected, enter the set-up parameters as discussed on page 5-33.

5

Connecting to a PC

Connect the 890CD Common Bus Drive to your PC using an approved mini-USB lead. You can order this lead from Parker SSD Drives: part number CM471050 (3m long) or CM465778 (1m long).

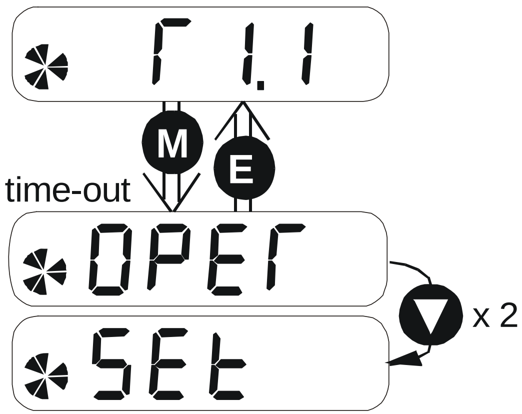


Using the Keypad

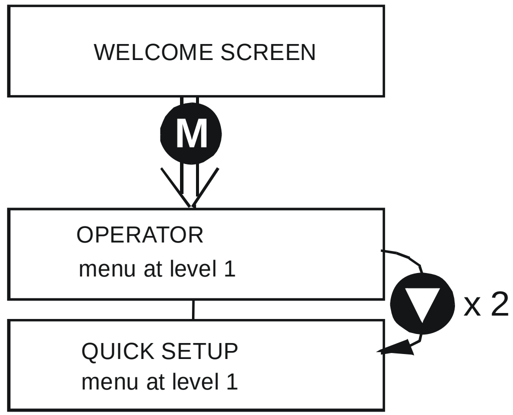
Note ***Use the DSE 890 Configuration Tool to configure the drive. The keypad is not intended for this purpose. However, the keypad does provide for local Start/Stop of the drive.***

Fit the keypad to the front of the unit, or connect remotely. The set-up parameters are stored in the SET menu on the 6511 keypad, and the QUICK SETUP menu on the 6901 keypad.

6511 Keypad



6901 Keypad



How to Edit a Parameter

Press  to enter the SET/QUICKSETUP menu.

Scroll through the parameters using the  and  keys.

Press  to select a parameter for editing.

Increment/decrement the parameter value using the  and  keys.

Press  to exit the parameter.

Set-up Parameters

The following is a list of the Set-up parameters you may need to check before starting the drive.

Note ***"PREF" is a parameter reference number used by the DSE 890 Configuration Tool.***

SET-UP PARAMETERS			
PREF	6511/6901 Display	Default	Brief Description
141.05	S 1 DRIVE MODE	0 : POSITION 1 : SPEED 2 : TORQUE	Select the working mode for the Position and Speed Loop
142.15	S 2 SPEED DEMAND	0	Sets the speed setpoint when the drive is in SPEED mode
142.06	S 3 I ATT	1.00	Sets the current attenuator (in units/s^2).
31.01	S 4 VIEW LEVEL	0 : OPERATOR 1 : BASIC 2 : ADVANCED	Sets the level of menu to be displayed by the keypad

Step 5: Run the Motor

WARNING
Remove the fuses (or trip the circuit breaker) on your 3-phase supply.
Make sure the power is OFF, and that it cannot be switched on accidentally whilst you are working.

Main Points

1. Complete all Pre-Operation Checks.
2. Ensure all the set-up parameter values for each 890SD Standalone Drive have been entered. Refer to "Set-up Parameters page 5-33.
3. Save your Application.
4. Follow one of the Start-up Routines: Local Mode or Remote Mode.

Pre-Operation Checks

Before Applying Power:

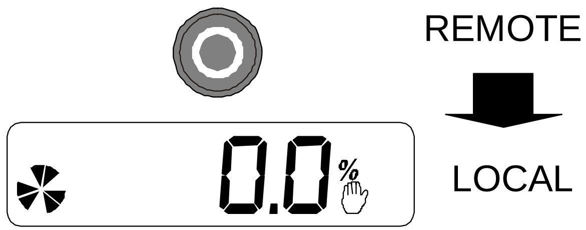
- Read the Safety section at the front of the Manual.
- Ensure that all local electric codes are met.
- Check for damage to equipment.
- Check for loose ends, clippings, drilling swarf etc. lodged in the drive and system.
- Check all external wiring circuits of the system - power, control, motor and earth connections.
- Ensure that unexpected rotation of the motor in either direction will not result in damage, bodily harm or injury. Disconnect the load from the motor shaft, if possible.
- Check the state of the Motor Thermistor and Brake Resistor connectors. Check external run contacts are open. Check external speed setpoints are all at zero.
- Ensure that nobody is working on another part of the system which will be affected by powering up.
- Ensure that other equipment will not be adversely affected by powering up.
- Check motor stator connections are correctly wired for Star or Delta as necessary for drive output voltage.

Powering-up the Unit

1. **Apply the 3-phase supply to the 890SD Standalone Drive.**
2. Select LOCAL mode operation:

Hold the Stop key down until
the display spells LOC

Release the key to display
the previous menu
for example,Local Setpoint



♦ The Keypad will display the Remote Setpoint parameter (%).

Initial Start-Up Routines

WARNING
Unpredictable motion, especially if motor parameters are incorrect.

Ensure no personnel are in the vicinity of the motor or any connected machinery.

Ensure that no machinery connected to the motor will be damaged by unpredictable motion.

Ensure that the emergency stop circuits function correctly before running the motor for the first time.

The Routines 1 & 2 below will run the drive using either the Keypad or the Control Terminals.

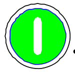
Routine 1: Local Mode

Note ***Refer to Chapter 8: "The Keypad" to familiarise yourself with the keypad and menu structure.***

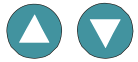
Local control has a use for commissioning a drive. It is not the expected way to operate a system drive.

On the 890SD Standalone Drive's keypad:

1. Select Local Mode (refer to Chapter 8: "The Keypad" for details).
2. The drive should be "healthy" now it is powered-up: no flashing trip messages displayed, and the 6901 keypad's HEALTH LED is lit (the RUN LED remains off). The keypad will display the Remote Setpoint parameter.
   If the drive has tripped, the keypad will be flashing a trip message, and the 6901 keypad's HEALTH LED will flash. Refer to Chapter 10: "Trips and Fault Finding" to investigate and remove the cause of the trip.

3. Press the Start key . The 6901 keypad's RUN LED will light and the motor will rotate slowly (the RUN LED will flash if the setpoint is at zero). The 6511 keypad will display a rotating symbol.

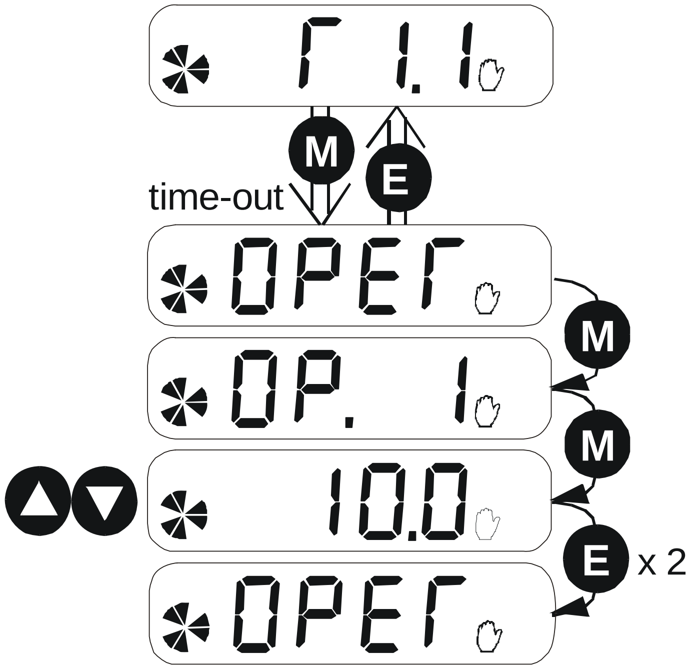
   *Reverse the motor's direction of rotation either by pressing the FORWARD/REVERSE key on the 6901 keypad, or by swapping two of the motor phases (**WARNING: Disconnect the mains supply first**).*

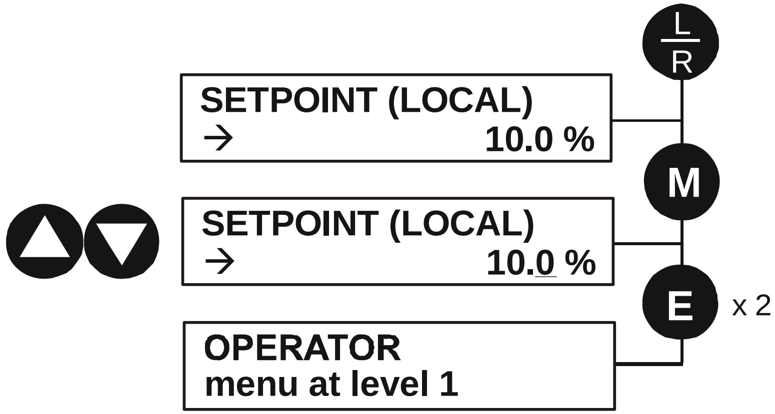
4. Control the value of the Local Setpoint parameter using the  keys.

5. Press the Stop key .

6511 Keypad

6901 Keypad





Routine 2: Remote Mode

This routine assumes that the drive’s control terminals are wired as shown in "Control Connection Diagram" on page 5-20.

IMPORTANT **Ensure that the speed potentiometer is set to zero.**

On the 890SD Standalone Drive:

1. The drive should be "healthy" now it is powered-up: no flashing trip messages displayed, and the 6901 keypad's HEALTH LED is lit (the RUN LED remains off).
   If the drive has tripped, the keypad will be flashing a trip message, and the 6901 keypad's HEALTH LED will flash. Refer to Chapter 10: “Trips and Fault Finding” to investigate and remove the cause of the trip.
2. Select Remote Mode - refer to Chapter 8: "The Keypad" for details, or power-down and power up the unit to re-initialise in Remote mode.
3. To Start in Remote Mode, close the "Run" switch on your control panel (applying 24V to DIN2, terminal X15/02 - RUN).
4. Turn the speed potentiometer up a little to apply a small speed setpoint (applying a variable voltage to AIN3, terminal X12/04 - REMOTE SETPOINT). The 6901 keypad's RUN LED will light and the motor will rotate slowly (the RUN LED will flash if the setpoint is at zero). The 6511 keypad will display a rotating symbol.
   *Reverse the motor’s direction of rotation either by pressing the FORWARD/REVERSE key on the 6901 keypad, or by swapping two of the motor phases (**WARNING: Disconnect the mains supply first**).*
5. To Stop in Remote Mode, open the "Run" switch on your control panel (removing 24V from DIN2, terminal X15/02 - RUN).

5

Chapter 6

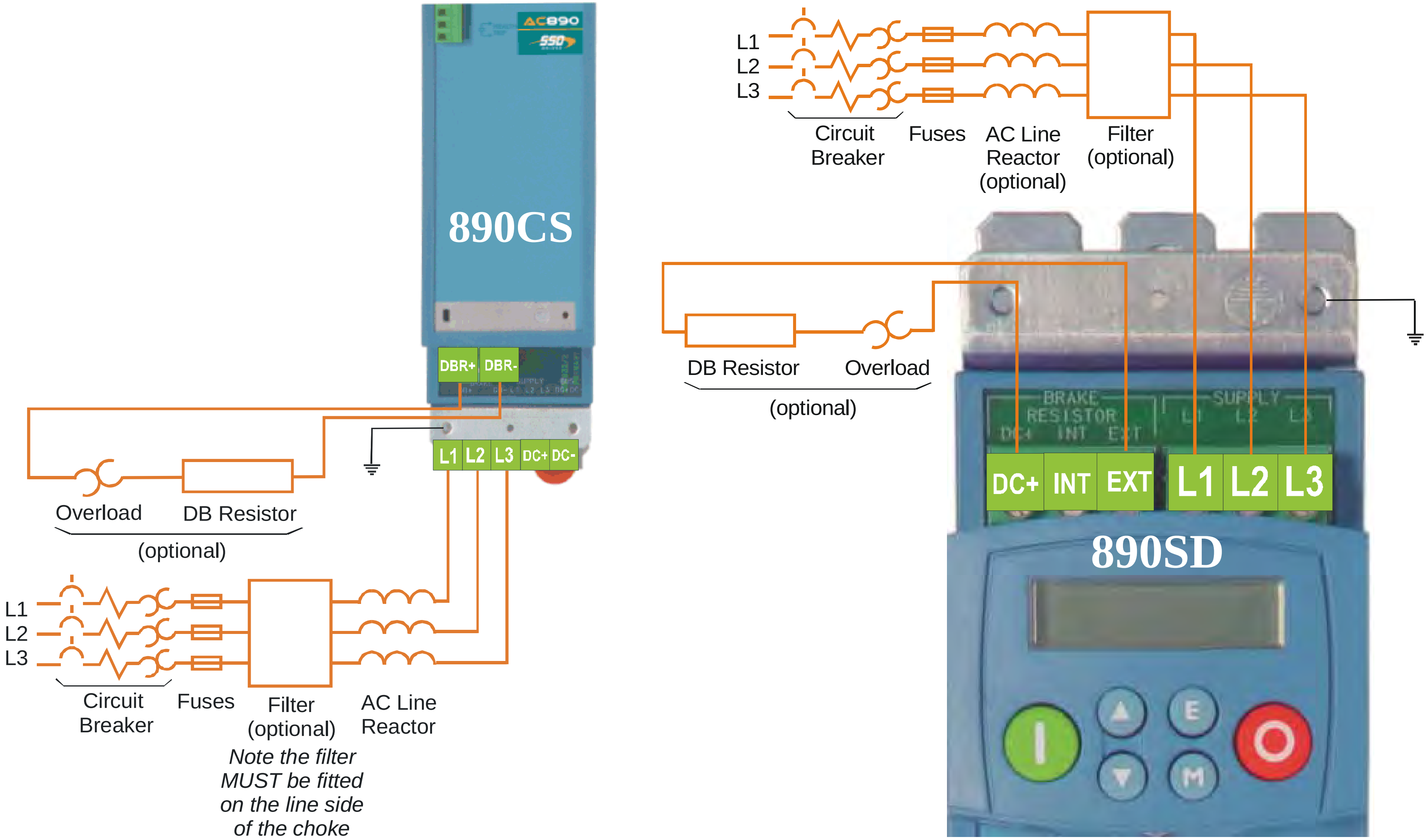
Associated Equipment

Details for all the ancilliary parts of a system that can be used with the 890.

IMPORTANT **An AC Line Reactor MUST be used with the 890CS Common Bus Supply unit.**

Main Points

Connect the associated equipment in the following order:



890CS : AC Line Reactors

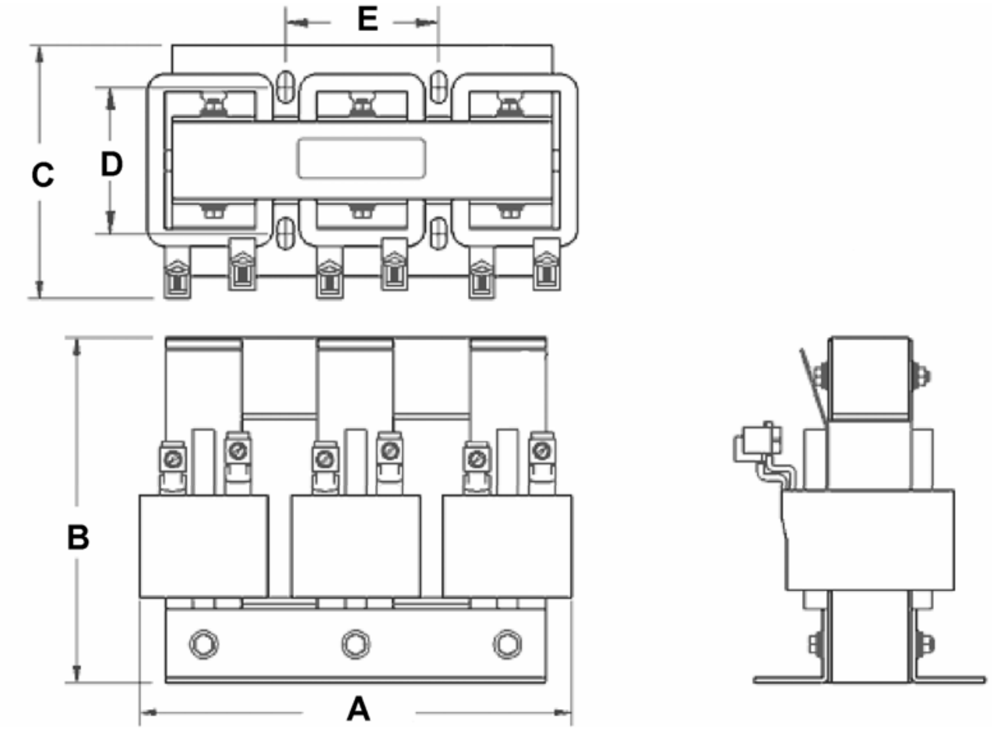
IMPORTANT **An AC Line Reactor MUST be used with the 890CS Common Bus Supply unit to achieve the design output rating, and to reduce the harmonic content of the supply current.**

The recommended external line reactor for each unit is listed below:

SSD Part Number	890CS Input Current	Supply Voltage	Reactor Value	Reactor Current
CO353014	32A	208-240V	400µH	35A
CO352901	32A	380-500V	800µH	35A
CO353016	54A	208-240V	250µH	55A
CO352903	54A	380-500V	500µH	55A
CO470654	108A	208-240V	150µH	100A
CO352905	108A	380-500V	300µH	100A
CO470058	162A	208-240V	75µH	160A
CO470057	162A	380-500V	150µH	160A

Associated Equipment

6



Typical View

SSD Part Number	Length	Height	Width	Fixing Centres		MTE	Weight
	A	B	C	D	E		kg/lbs
CO353014	183/7.2	147/5.8	102/4.0	66/2.60	76/3.00	RL03501	6.4/14
CO352901	183/7.2	147/5.8	102/4.0	70/2.75	76/3.00	RL03502	7.3/16
CO353016	229/9.0	185/7.3	135/5.3	80/3.16	76/3.00	RL05501	11/24
CO352903	229/9.0	178/7.0	135/5.3	80/3.16	76/3.00	RL05502	12/27
CO470654	279/11.0	216/8.5	178/7.0	88/3.46	92/3.62	RL10001	21/47
CO352905	279/11.0	216/8.5	170/6.7	93/3.66	92/3.62	RL10002	23/51
CO470058	274/10.8	216/8.5	172/6.8	80/3.16	92/3.62	RL16001	19/42
CO470057	279/11.0	216/8.5	178/7.0	88/3.47	92/3.62	RL16002	23/51
Dimensions are in mm/inches							

External Braking Resistors

We can supply suitable braking resistors, found on the following pages. Alternatively, you can use the calculation on page 6-8 to help you select alternative resistors.

IMPORTANT **We recommend using a thermal overload switch to protect the braking circuit. Refer to page 6-10.**

Main Points

- **The 890CS unit must be fitted with external braking resistors if braking is required**. The 890CS performs the braking for the 890CS/CD system. There is no internal braking. There are no parameters to set.
- **The 890SD unit must be fitted with external braking resistors if braking is required.** Use the DSE 890 Configuration Tool to set the following parameters in the 890SD unit:

  Set the INT DB RESISTOR parameter (PREF 31.75 in the DYNAMIC BRAKING function block) to FALSE. Also enter information about the external resistor being used in to this function block.

  Enable the "Brake Resistor" and "Brake Switch" trips in the TRIPS STATUS function block (DISABLE TRIPS parameter).

Wiring Details

WARNING

Do not apply external voltage sources (mains supply or otherwise) to any of the braking terminals: DBR+, DBR- (890CS) or DC+, INT or EXT (890SD). This can lead to overheating of the drive internal resistors, with extensive damage to the drive and installation, and risk to personnel.

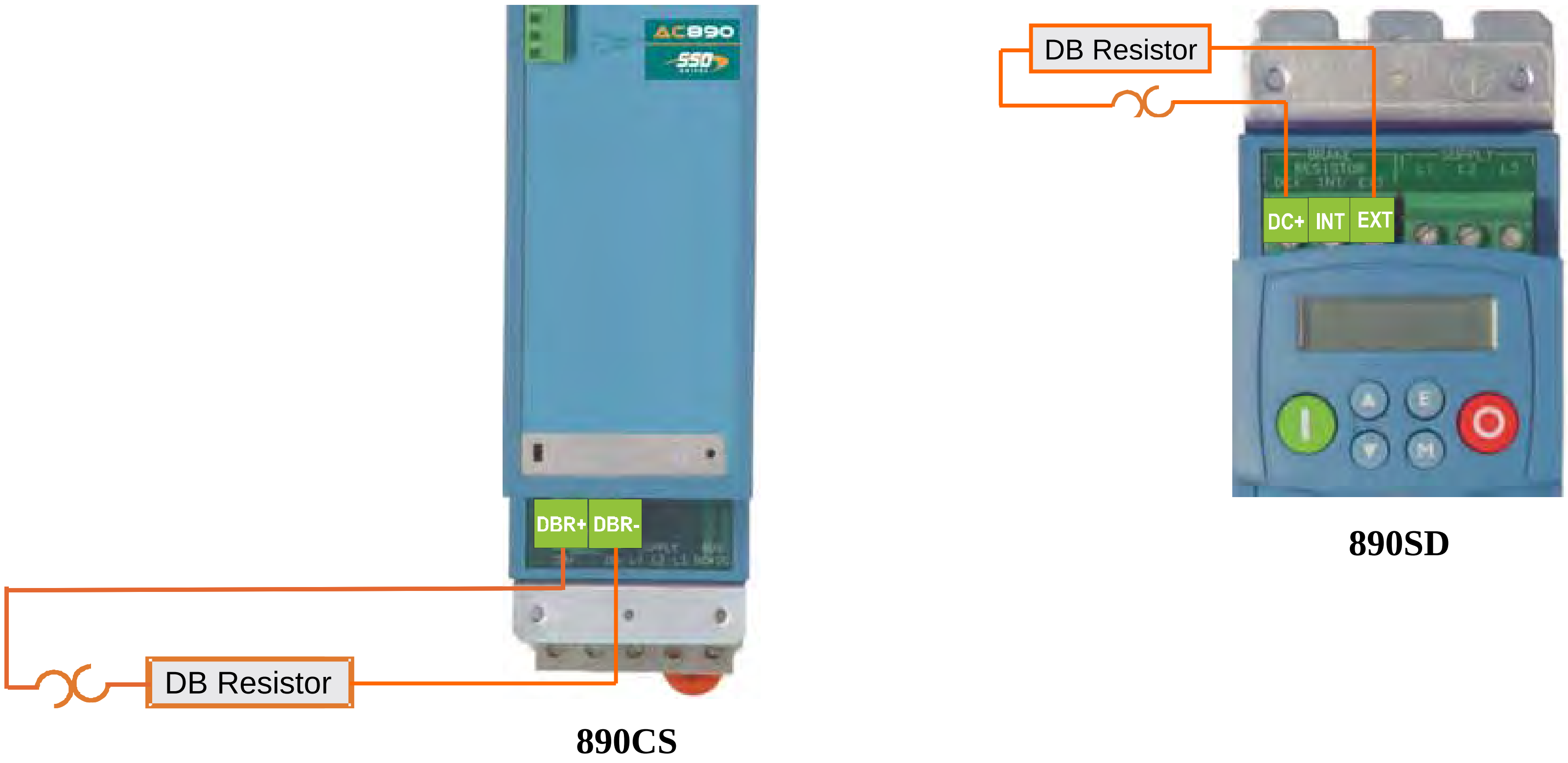


Figure 6.1 Braking Terminals on the 890CS and 890SD Units

IMPORTANT **890SD : The INT terminal is for future use. Do not use this terminal.**

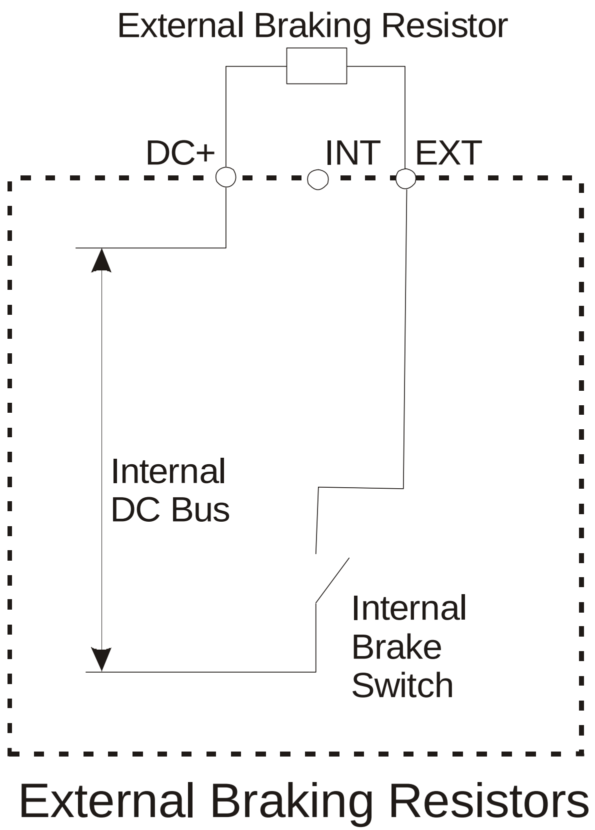


Figure 6.2 External Braking Resistor Wiring Details for the 890SD Standalone Drive

890CS Resistor Selection

Choose from the following tables listing recommended resistor kits.

890CS Dynamic Braking Resistor Kits - USA/Canada

These kits (complete with cover) are designed for stopping a motor at full load current from base speed with two times motor inertia, three times in rapid succession in accordance with NEMA ICS 3-302.62 Dynamic Braking Stop option.

Frame Size	Drive Amps (A)	Drive Rating (Hp)	Brake Level (V)	Peak Amps (A)	Minimum Ohms (Ω)	SSD Part Number	Dimensions L x W x H (inches)	Resistance (Ω)	Rated Amps (A)
208/230 Vac									
B	32	10	390	20	19.5	CZ353192	10 x 4 x 5	27	3.6
B	54	20	390	40	9.8	CZ353195	12 x 7 x 5	10	8.5
D	108	40	390	75	5.2	CZ353197	12 x 13 x 5	6	15
D	162	60	390	100	3.9	CZ353198	19 x 10 x 5	5	18
460 Vac									
B	32	25	770	20	38.5	CZ353181	10 x 7 x 5	54	3.6
B	54	45	770	40	19.3	CZ353184	12 x 10 x 5	22.5	7.2
D	108	90	770	75	10.3	CZ353186	19 x 10 x 5	12	13
D	162	135	770	100	7.7	CZ353188	27 x 10 x 5	9	18

890CS Dynamic Braking Resistors - Europe

These resistor sets (complete with cover) are designed for stopping the system at rated power. They are rated for 10 seconds in a 100 seconds duty cycle.

IMPORTANT **The continuous rating of the quoted resistor is not to be exceeded under repetitive loading conditions.**

Frame Size	Drive Amps (A)	Drive Rating (kW)	Brake Volts (V)	Peak Amps (A)	Minimum Ohms (Ω)	Cressall Part Number	Dimensions L x W x H (mm)	Resistance (Ω)	Rated Amps (A)	Rated Power (W)
208/230 Vac										
B	32	7.5	390	20	19.5	HP1-24R	505 x 138 x 135.5	24	8	1500
B	54	15	390	40	9.8	HP1-12R	505 x 138 x 135.5	12	11	1500
D	108	30	390	75	5.2	HP1-5R6	505 x 138 x 135.5	5.6	16	1500
D	162	45	390	100	3.9	HP2-4R7	505 x 138 x 135.5	4.7	25	3000
380/415 Vac										
B	32	15	770	20	38.5	HP1-47R	505 x 138 x 135.5	47	5.6	1500
B	54	30	770	40	19.3	HP1-24R	505 x 138 x 135.5	24	8	1500
D	108	60	770	75	10.3	HP2-12R	505 x 233 x 135.5	12	16	3000
D	162	90	770	100	7.7	HP3-8R2	505 x 327 x 135.5	8.2	23	4500
500 Vac										
B	32	18	830	20	41.5	HP1-47R	505 x 138 x 135.5	47	5.6	1500
B	54	37	830	40	20.8	HP1-24R	505 x 138 x 135.5	24	8	1500
D	108	75	830	75	11.1	HP2-12R	505 x 233 x 135.5	12	16	3000
D	162	110	830	100	8.3	HP3-10R	505 x 327 x 135.5	10	21	4500

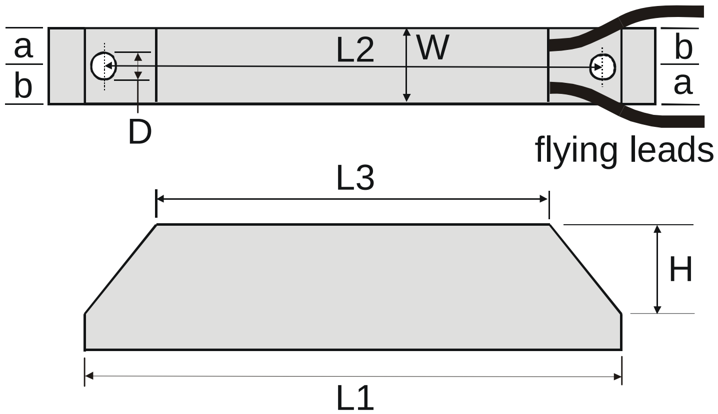
890SD Resistor Selection

These small, metal-clad resistors should be mounted on a heatsink (back panel) and covered to prevent injury from burning.

There are four resistor values available.

Each one can support "10 x Power Rating" for 5 seconds.

Refer to the following "Calculation".



IMPORTANT **The continuous rating quoted is not to be exceeded under repetitive loading.**

	Flying Lead Length	L1	L2	L3	a	b	D	W	H
500W	500	335	316	295	13	17	5.3	60	30
200W	500	165	146	125	13	17	5.3	60	30

Dimensions are in millimetres

SSD Part Number	Power Rating (W)	Resistance (Ω)	Current Rating (A)
CZ467717	200	100	1.4
CZ463068	200	56	1.9
CZ467716	500	56	3.0
CZ388396	500	36	3.7

Calculation

Brake resistor assemblies must be rated to absorb both peak braking power during deceleration and the average power over the complete cycle.

$$\text{Peak braking power } P_{pk} = \frac{0.0055 \times J \times (n_1^2 - n_2^2)}{t_b} \quad (W)$$

$$\text{Average braking power } P_{av} = \frac{P_{pk}}{t_c} \times t_b$$

- J - total inertia (kgm^2)
- n_1 - initial speed (rpm)
- n_2 - final speed (rpm)
- t_b - braking time (s)
- t_c - cycle time (s)

Obtain information on the peak power rating and the average power rating of the resistors from the resistor manufacturer. If this information is not available, a large safety margin must be incorporated to ensure that the resistors are not overloaded.

By connecting these resistors in series and in parallel the braking capacity can be selected for the application.

IMPORTANT **The minimum resistance of the combination and maximum dc link voltage must be as specified in Appendix E: "Technical Specifications" - Internal Dynamic Brake Switch.**

6

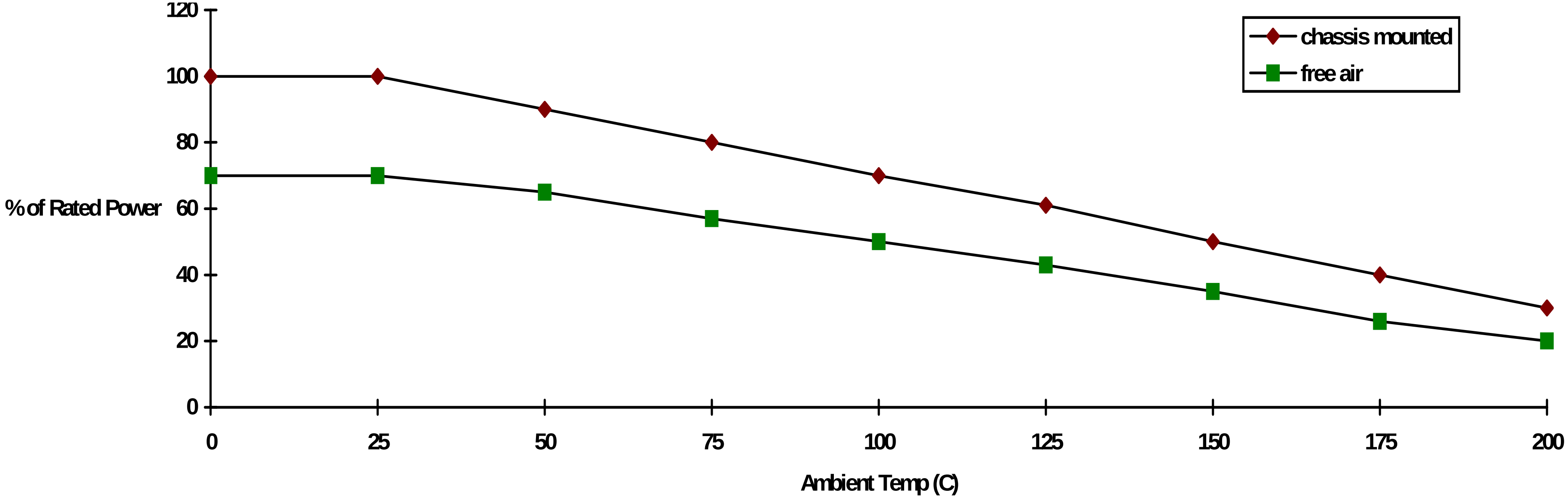


Figure 6.3 Braking Resistor Derating Graph (Metal Clad Resistors)

Dynamic Brake Resistor Overload Protection

We recommend that the braking resistor and wire are protected by a motor circuit protector rated at 110% of the continuous current rating of the resistor(s).

Route the braking wire through all three poles of the motor overload. An auxiliary contact can be used to annunciate an alarm if a trip should occur.

US Resistors

Resistor			Overload		
Part Number	**Value**	**Rating**	**Rating**	**Telemechanique / SquareD**	**SSD Part Number**
208-230Vac					
CZ353192	27R	3.6A	2.5 to 4 A	GV2-ME08	DB388419
CZ353195	10R	8.5A	6.0 to 10.0 A	GV2-ME14	DB388421
CZ353197	6R	15A	13.0 to 18.0A	GV2-ME20	DB388423
CZ353198	5R	18A	17.0 to 23.0A	GV2-ME21	DB388424
460-480Vac					
CZ353181	54R	3.6A	2.5 to 4 A	GV2-ME08	DB388419
CZ353184	22.5R	7.2A	6.0 to 10.0 A	GV2-ME14	DB388421
CZ353186	12R	13A	13.0 to 18.0A	GV2-ME20	DB388423
CZ353188	9R	18A	17.0 to 23.0A	GV2-ME21	DB388424
Auxiliary Contact Block (fitted to left hand side)				GV2-AN11	DB388426

European Resistors

Resistor			Overload		
Part Number	Value	Rating	Rating	Telemechanique / SquareD	Part Number
208-230Vac					
HP1-24R	24R	6A	4 to 6.3A	GV2-ME08	DB388420
HP1-12R	12R	8A	6 to 10A	GV2-ME14	DB388421
HP1-5R6	5.6R	16A	13 to 18A	GV2-ME20	DB388423
HP-4R7	4.7R	25A	20 to 25A	GV2-ME22	DB388425
400-500Vac					
HP1-45R	45R	6A	4 to 6.3A	GV2-ME10	DB388420
HP1-24R	24R	8A	6 to 10A	GV2-ME14	DB388421
HP2-12R	12R	16A	13 to 18A	GV2-ME20	DB388423
HP3-9R	9R	22A	17 to 23A	GV2-ME21	DB388424
Auxiliary Contact Block (fitted to left hand side)				GV2-AN11	DB388426

Note ***Intermediate overload circuit breakers are avialable if required:***

DB388422 - 6V2ME16 - 9 to 14A
DB388425 - 6V2ME22 - 20 to 25A

890CS Input Fuses

890CS Input Current Rating	Model Number	Bolted Fuses for USA			DIN Mounted Fuses for Europe		
		Fuse Rating	Reference Number	SSD Part Number	Fuse Rating	Reference Number	SSD Part Number
32A	890CS/…/032B	50A	A50QS50-4R	CS470408U050	40A	170M1563	CH570044
54A	890CS/…/054B	80A	A50QS80-4R	CS470408U080	80A	170M1566	CH570084
108A	890CS/…/108D	125A	A50QS125-4R	CS470408U125	125A	170M1568	CH571253
162A	890CS/…/162D	200A	A50QS200-4R	CS470408U200	200A	170M3815	CH580025

Circuit Breakers

We do not recommend the use of circuit breakers (e.g. RCD, ELCB, GFCI), but where their use is mandatory, they should:

- Operate correctly with dc and ac protective earth currents (i.e. type B RCDs as in Amendment 2 of IEC755).
- Have adjustable trip amplitude and time characteristics to prevent nuisance tripping on switch-on.

When the ac supply is switched on, a pulse of current flows to earth to charge the internal/external ac supply EMC filter's internal capacitors which are connected between phase and earth. This has been minimised in Parker SSD Drives' filters, but may still trip out any circuit breaker in the earth system. In addition, high frequency and dc components of earth leakage currents will flow under normal operating conditions. Under certain fault conditions larger dc protective earth currents may flow. The protective function of some circuit breakers cannot be guaranteed under such operating conditions.

WARNING

Circuit breakers used with VSDs and other similar equipment are not suitable for personnel protection. Use another means to provide personal safety. Refer to EN50178 (1997) / VDE0160 (1994) / EN60204-1 (1994)

Filters

The following recommended filters are available from Parker SSD Drives.

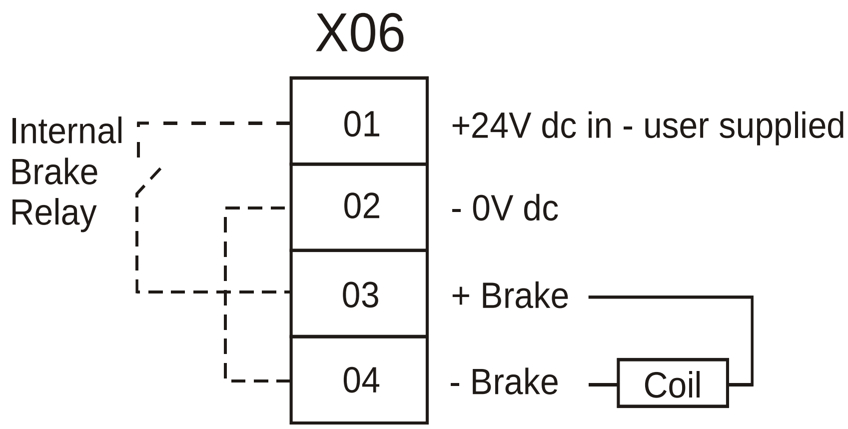
Product	Frame Size	Parker SSD Part Number
890CS	Frame B	CO469330
	Frame D	CO469331
890SD	Frame B,C & D	CO469334

Mechanical Brake

Brake motors provide a parking brake. The brake can be either mechanical where the user opens/closes the brake, or electro-mechanical where the braking is handled automatically by the drive.

The electro-mechanical parking brake is controlled by the output of terminal X06 on the 890CD.

- Connect a 24V dc supply to terminals X06/01 and X06/02 as shown.
- Connect the brake to terminals X06/03 and X06/04.



IMPORTANT **Engaging the brake when the motor is turning will increase its wear. This may lead to brake failure.**

Refer to Appendix D: "Programming" - MECH BRAKE to configure the drive for use with the brake.

To navigate to MECH BRAKE on the keypad:

SETUP::MOTOR CONTROL::MECH BRAKE

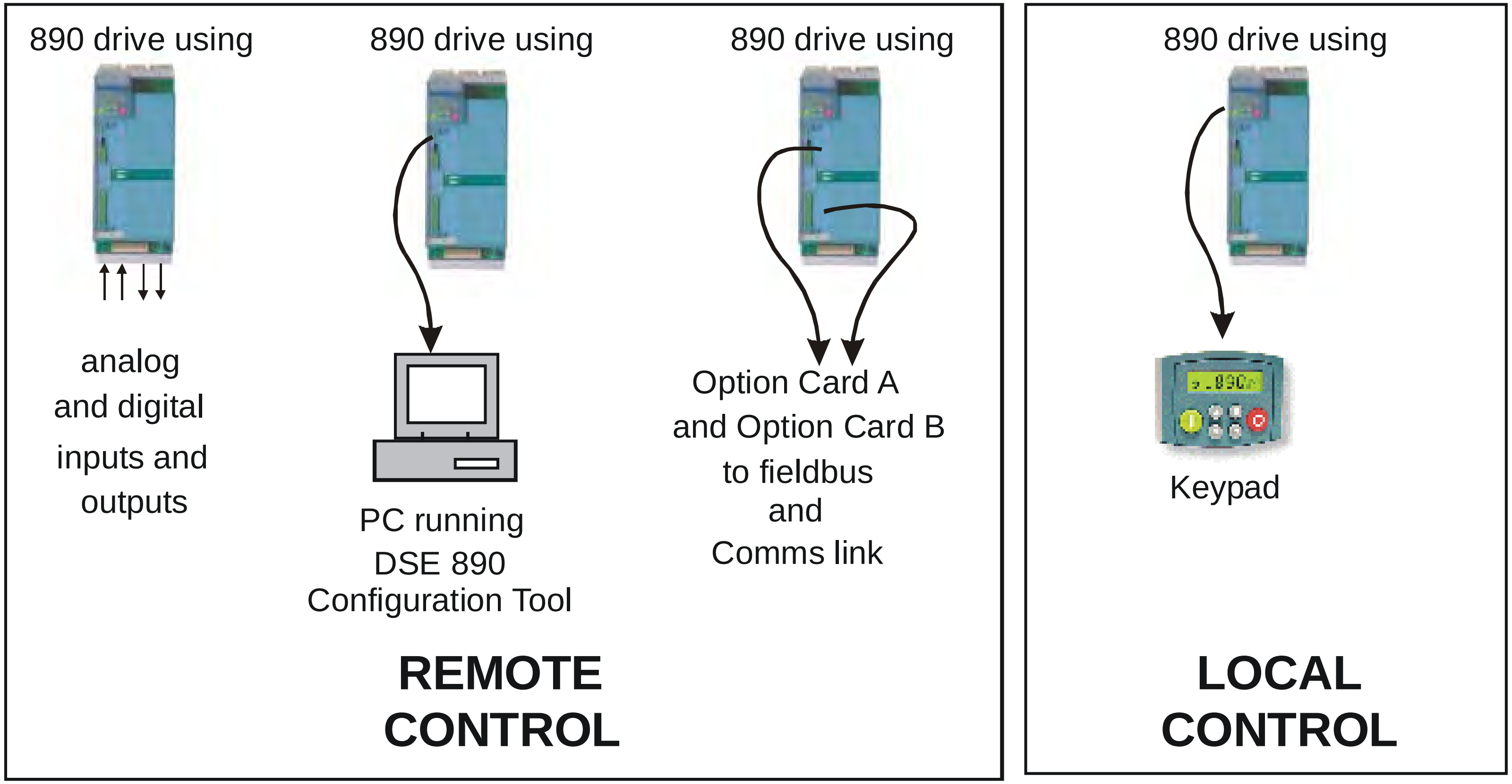
Chapter 7

Operating the Drive

Having turned the motor for the first time, now learn about the various ways you can start and stop the drive.

Control Philosophy

There are four ways to control the drive using Remote and Local control:



890CD Frame D illustrated

Figure 7.1 Remote and Local Control Modes

Start/Stop and Speed Control

There are two forms of control in operation at any time: *Start/Stop* and *Speed Control*. Each can be individually selected to be under either Local or Remote Control.

- **Local or Remote Start/Stop** decides how you will start and stop the drive.
- **Local or Remote Speed Control** determines how you will control the motor speed.

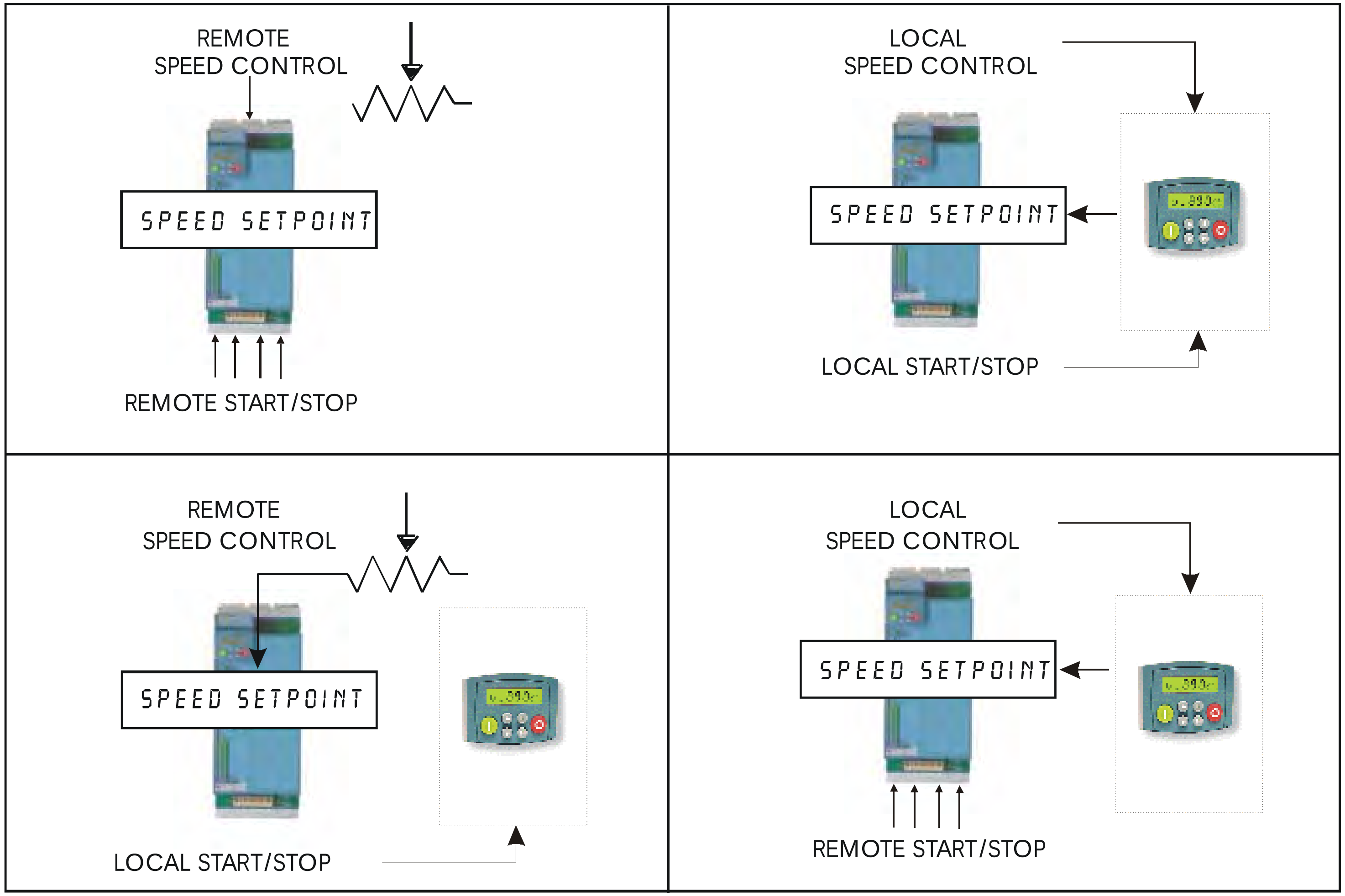
In each case, Local and Remote control are offered by using the following:

Local: The Keypad
Remote: Analog and digital inputs and outputs, RS232 Port or Technology Options

Note ***Refer to Appendex D: "Programming" - LOCAL CONTROL.***

Operating the Drive

Thus the drive can operate in one of four combinations of local and remote modes:



890CD Frame B illustrated

Figure 7.2 The Four Combinations of Local and Remote Control

Note ***Start/Stop is also known as "Sequencing".***
Speed Control is also known as "Reference Generation".

Chapter 8
The Keypad

In this chapter, learn about the control keys and keypad indications. The main menu maps are shown here, but for details of sub-menus refer to Chapter 9.

Introduction

The 890 units are factory fitted with the 6511 Keypad. It can be plugged into the front of the unit. To remove it, simply pull it away from the drive. To refit it, push it back into place.

You can also use a remote mounted 6901 Keypad.

Both the 6511 and 6901 Keypad can be mounted up to 3 metres away from the 890 using the optional panel mounting kit with connecting lead: refer to "Remote Mounting the Keypad", page 8-54.

6901

6511

The keypads display the following information:

890CS +		DIAG menu (5 important diagnostics)
890CS +		DIAGNOSTICS menu (5 important diagnostics)
890CD & 890SD +		OPER, DIAG, SET & SYS menus *(SET menu is equivalent to the QUICK SETUP menu of the 6901)*
890CD & 890SD +		OPERATOR, DIAGNOSTICS, QUICK SETUP, SETUP & SYSTEM menus *(SETUP menu lists all parameters available in the DSE 890 Configuration Tool)*

6511 Keypad

890CS Common Bus Supply

The 6511 Keypad (Man-Machine Interface, MMI) provides for local control (power-up/power-down), and also monitoring of the five diagnostics provided on the display.

To display the Software Version:

Press and hold E to display software version.

To display the Line Voltage Rating:

Press and hold E to display software version.

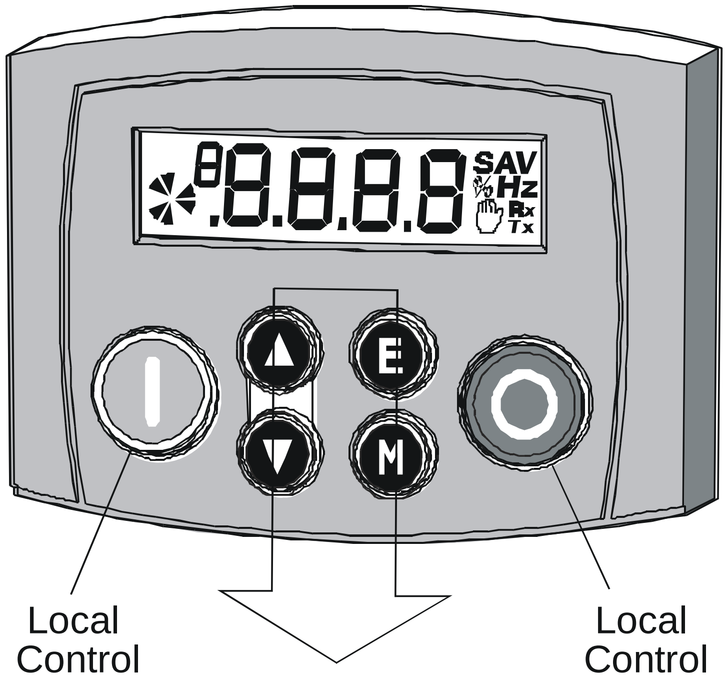
Press ▲ or ▼ to view.

To Start in Local Mode:

Press I

To Stop in Local Mode:

Press O

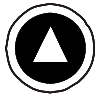
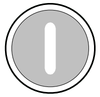
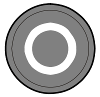


Initial Power-Up Conditions

The unit will always power-up in Remote mode.

The Keypad will display the DC Link Power 0.0% on the 890CS Common Bus Supply.

Control Key Definitions

Key	Operation	Description
	Escape	*Navigation* – Hold to display the Welcome screen *Trip Message* – Clear Trip or Error message from display
	Menu	Bypasses the time-out from the Welcome screen to display the Diagnostics menu.
	Increment	Move up through the Diagnostics menu
	Decrement	Move down through the Diagnostics menu
	Run	*Local Mode* – Run the unit (power-up the DC link)
	Stop	*Local Mode* – Stops the unit (power-down the DC link) *Navigation* – Press and hold to toggle between Local and Remote Mode (refer to page 8-8) *Trip Reset* – Resets trip condition allowing unit to resume operation

Example: To view the INPUT CURRENT diagnostic

1. The display will default to show the OUTPUT POWER (%) diagnostic 

.
2. Press the  key repeatedly to scroll to the INPUT CURRENT (A) diagnostic 

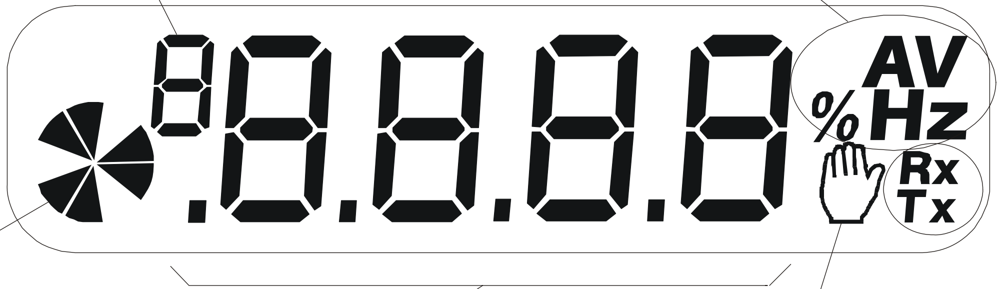
.
   Alternatively, press the  key just once to cycle round the list.

Display Indications

A when displaying an Alarm code
- a negative parameter value

Displays the units for the value:

V for voltage in Volts,
Hz for frequency in Hertz
A for current in Amps
% for percentage



Rrotating = DC link charged

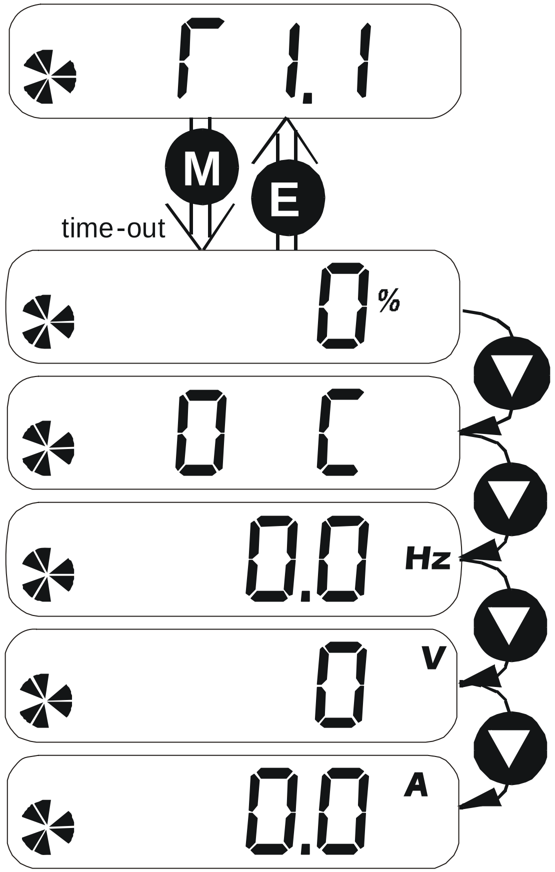
Indicates numbers or values,
trip information, error codes etc.
See "Status Indications" below.

Indicates the drive is in Local control.
Drive is in remote control when not visible.

The Menu System

The unit will initialise in Remote Mode from factory conditions.

The Keypad will display the Output Power (%). This is the first of five diagnostics.



Welcome Screen	Displays the software version of the unit

From the Welcome Screen, the display times-out (alternatively you can press the M *key) to show the first of 5 diagnostics:*

Output Power	As a percentage of nominal full power for the selected input voltage
Heatsink Temp	The heatsink temperature in Centrigrade
Supply Frequency	The real time frequency of the input supply in Hz
DC Link Volts	Vac (rms) x $\sqrt{2}$ = dc link Volts (when motor stopped)
Input Current	The real time input current in Amps

Drive Status Indications

The keypad can display the following status information:

Display	Status Indication and Meaning	Possible Cause
rdy	READY/HEALTHY No alarms present. Remote mode selected	
LOC	LOCAL Local Mode selected, healthy, no alarms present	Added or removed from the display letter-by-letter to indicate entering or leaving Local Mode
run	RUN Not possible to change between Local/Remote mode	The drive is running in Local mode or the Remote run signal is active

Alert Message Displays

A message will be displayed on the Keypad when either:

- A requested operation is not allowed
- The drive has tripped

Most messages are displayed for only a short period, or for as long as an illegal operation is tried, however, trip messages must be acknowledged by pressing the **E** key.

Experience will show how to avoid most messages. Refer to Chapter 10: “Trips and Fault Finding” for trip messages and reasons.

Selecting Local or Remote Mode

The unit can operate in one of two ways:

Remote Mode: Remote control using digital inputs

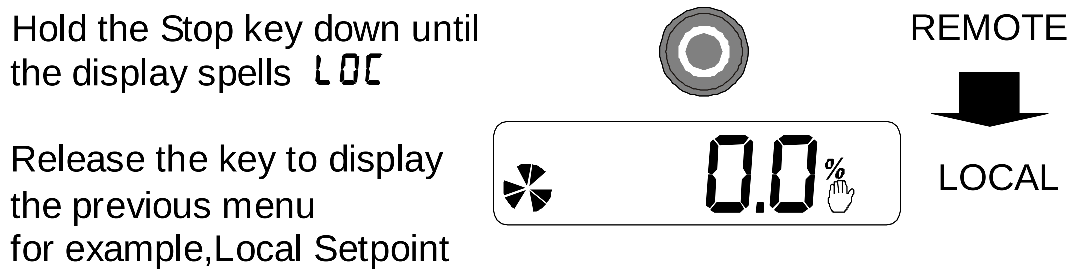
Local Mode: Local control using the Keypad

Local control keys are inactive when Remote mode is selected.

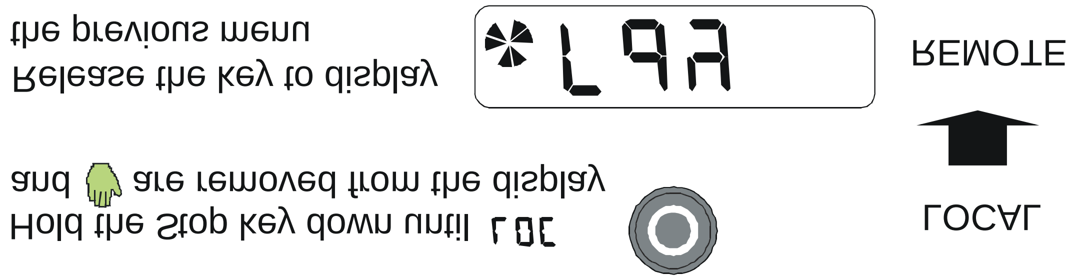
You can change between local and remote mode from any point on the MMI.

Note ***You can only change between Local and Remote Mode when the unit is "stopped" (when the DC link is powered-down).***

Remote to Local Mode:



Local to Remote Mode:

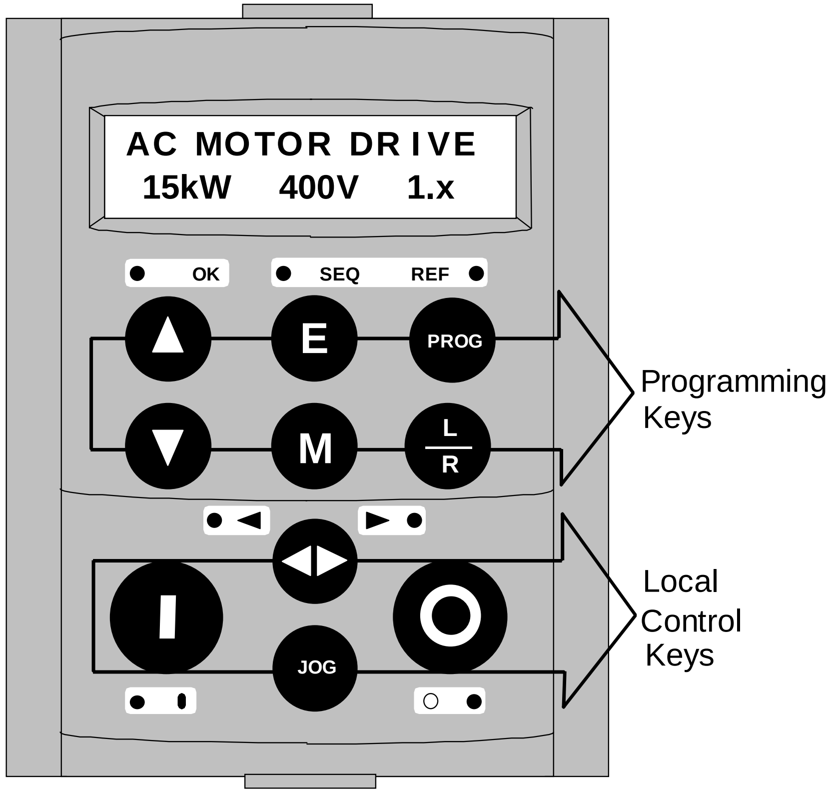


The ENABLE input (DIGIN2) must be inactive to effect this change.

6901 Keypad

890CS Common Bus Supply

The 6901 Keypad (Man-Machine Interface, MMI) provides for local control (power-up/power-down), and also monitoring of the five diagnostics provided on the display.



To display the Software Version & Voltage Rating:

Press and hold E to display software version.

Time-out or press M.

To Start in Local Mode:

Press I

To Stop in Local Mode:

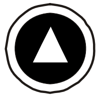
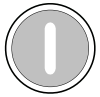
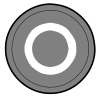
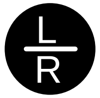
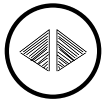
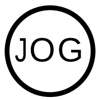
Press O

Initial Power-Up Conditions

The unit will always power-up in Remote mode.

The Keypad will display the DC Link Power 0.0% on the 890CS Common Bus Supply.

Control Key Definitions

Key	Operation	Description
	Escape	*Navigation* – Hold to display the Welcome screen *Trip Message* – Clear Trip or Error message from display
	Menu	Bypasses the time-out from the Welcome screen to display the Diagnostics menu
	Increment	Move up through the Diagnostics menu
	Decrement	Move down through the Diagnostics menu
	Run	*Local Mode* – Run the unit (power-up the DC link)
	Stop	*Local Mode* – Stops the unit (power-down the DC link) *Trip Reset* – Resets trip condition allowing unit to resume operation
	Local/Remote	Toggles between Remote and Local Mode
	Prog	*KEY INACTIVE*
	Forward/ Reverse	*KEY INACTIVE*
	Jog	*KEY INACTIVE*

Example: To view the INPUT CURRENT diagnostic

1. The display will default to show the OUTPUT POWER (%) diagnostic.

```
OUTPUT POWER
                  0 %
```

2. Press the  key repeatedly to scroll to the INPUT CURRENT (A) diagnostic.

```
INPUT CURRENT
                0.0 A
```

Alternatively, press the  key just once to cycle through the list.

LED Indications

There are seven LEDs that indicate the status of the drive. Each LED is considered to operate in three different ways:

OFF

FLASH

ON

The LEDs are labelled HEALTH, LOCAL (as SEQ and REF), RUN, STOP, FWD and REV. (FWD and REV are unused). Combinations of these LEDs have the following meanings:

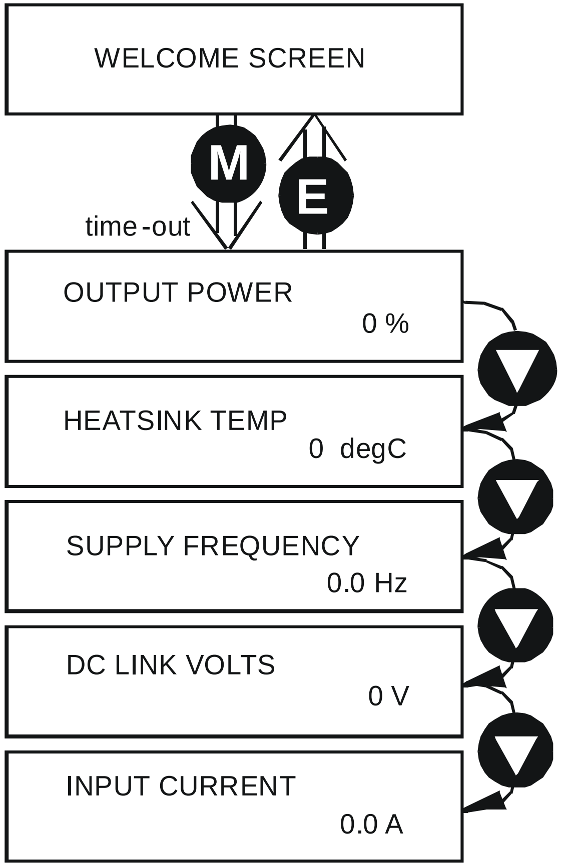
HEALTH	RUN	STOP	Drive State
			Tripped
			Stopped
			Running

LOCAL SEQ	LOCAL REF	Local / Remote Mode
		Start/Stop controlled from the terminals
		Start/Stop is controlled from the Keypad

The Menu System

The unit will initialise in Remote Mode from factory conditions.

The Keypad will display the Output Power (%). This is the first of five diagnostics.



Welcome Screen Displays the software version of the unit

From the Welcome Screen, the display times-out to show the first of 5 diagnostics:

Output Power	As a percentage of nominal full power for the selected input voltage
Heatsink Temp	The heatsink temperature in Centrigrade
Supply Frequency	The real time frequency of the input supply in Hz
DC Link Volts	Vac (rms) x $\sqrt{2}$ = dc link Volts (when motor stopped)
Input Current	The real time input current in Amps

Alert Message Displays

A message will be displayed on the Keypad when either:

- A requested operation is not allowed: *details the illegal operation, while the gives the reason or cause. See example*

  *** KEY INACTIVE ***
  REMOTE SEQ

  The top line bottom line opposite.

- The unit has tripped: *indicates a trip has occurred while the gives the reason for the trip. See opposite.*

  ***** TRIPPED *****
  HEATSINK TEMP

  The top line bottom line example

Most messages are displayed for only a short period, or for as long as an illegal operation is tried, however, trip messages must be acknowledged by pressing the **E** key.

8

Experience will show how to avoid most messages. When using the 6901 keypad, they are displayed in clear, concise language for easy interpretation. Refer to Chapter 10: “Trips and Fault Finding” for trip messages and reasons.

Selecting Local or Remote Mode

The unit can operate in one of two ways:

Remote Mode: Remote control using digital and analog inputs and outputs

Local Mode: Providing local control and monitoring of the drive using the Keypad

Local control keys are inactive when Remote Mode is selected.

You can change between local and remote mode from any point on the MMI.

Note ***You can only change between Local and Remote Mode when the unit is "stopped".***

To toggle between Modes:

Press 

Remote to Local Mode:

To toggle between Modes:

Press 

Local to Remote Mode:

Refer to "The L/R Key", page 8-34.

6511 Keypad

890CD Common Bus Drive/890SD Standalone Drive

The 6511 Keypad (Man-Machine Interface, MMI) provides for local control of the drive, monitoring, and complete access for application programming.

To display the Software Version:

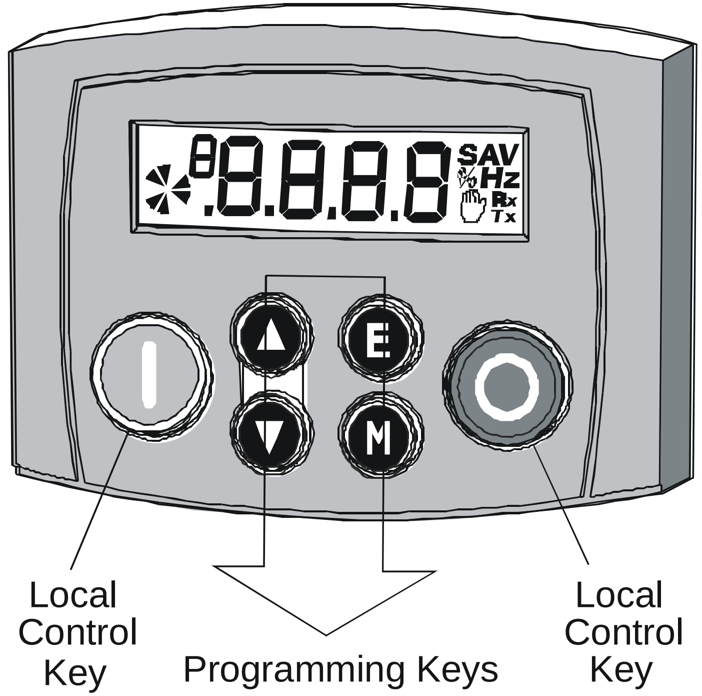
Press and hold E to display software version. Time-out or press M.

To Start in Local Mode:

Press

To Stop in Local Mode:

Press

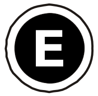
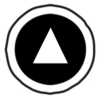
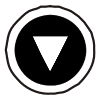
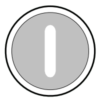
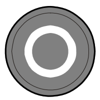


Initial Power-Up Conditions

The unit will always power-up in Remote mode.

The Keypad will display the Operator menu OP 1 (SETPOINT) on the 890CD Common Bus Drive and 890SD Standalone Drive.

Control Key Definitions

Key	Operation	Description
	Escape	*Navigation* - Moves upwards through the list of parameters. *Parameter* - Increments the value of the displayed parameter. *Command Acknowledge* - Confirms action when in a command menu.
	Menu	*Navigation* - Moves downwards through the list of parameters. *Parameter* - Decrements the value of the displayed parameter.
	Increment	*Navigation* - Displays the previous level's Menu. *Parameter* - Returns to the parameter list. *Trip Message* - Clear the Trip or Error message from the display.
	Decrement	*Navigation* - Displays the next Menu level, or the first parameter of the current Menu. *Parameter* - Allows a writable parameter to be modified (this is indicated by → appearing on the left of the bottom line).
	Run	*Control* - Runs the motor at a speed determined by the LOCAL SETPOINT or REMOTE SETPOINT parameter. *Trip Reset* - Resets any trips and then runs the motor as above. Only operates when the drive is in Local Start/Stop (Seq) Mode.
	Stop	*Control* - Toggles between Remote and Local Mode for both Start/Stop (Seq) and Speed Control (Ref). When toggling, the display automatically goes to the relevant SETPOINT screen, and the SETPOINT (LOCAL) screen will have the ▲ and ▼ keys enabled to alter the setpoint.

Display Indications

A when displaying an Alarm code

- a negative parameter value

Displays the units for the value:

V for voltage in Volts,
Hz for frequency in Hertz
S for seconds
A for current in Amps
% for percentage

Indicates the Control Mode

Indicates the drive is in Remote Comms mode

Represents a rotating shaft:
clockwise = drive running forward
anticlockwise - drive running in reverse

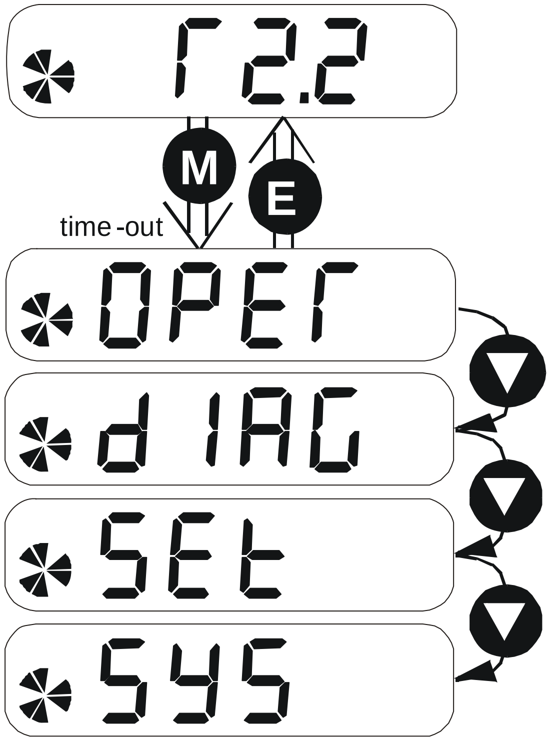
Indicates the drive is in Local control.
Drive is in remote control when not visible.

Indicates numbers or values,
trip information, error codes etc.
See "Status Indications" below.

The Menu System

The unit will initialise in Remote Mode from factory conditions.

The Keypad will display the Operator Menu. Each menu contains parameters.



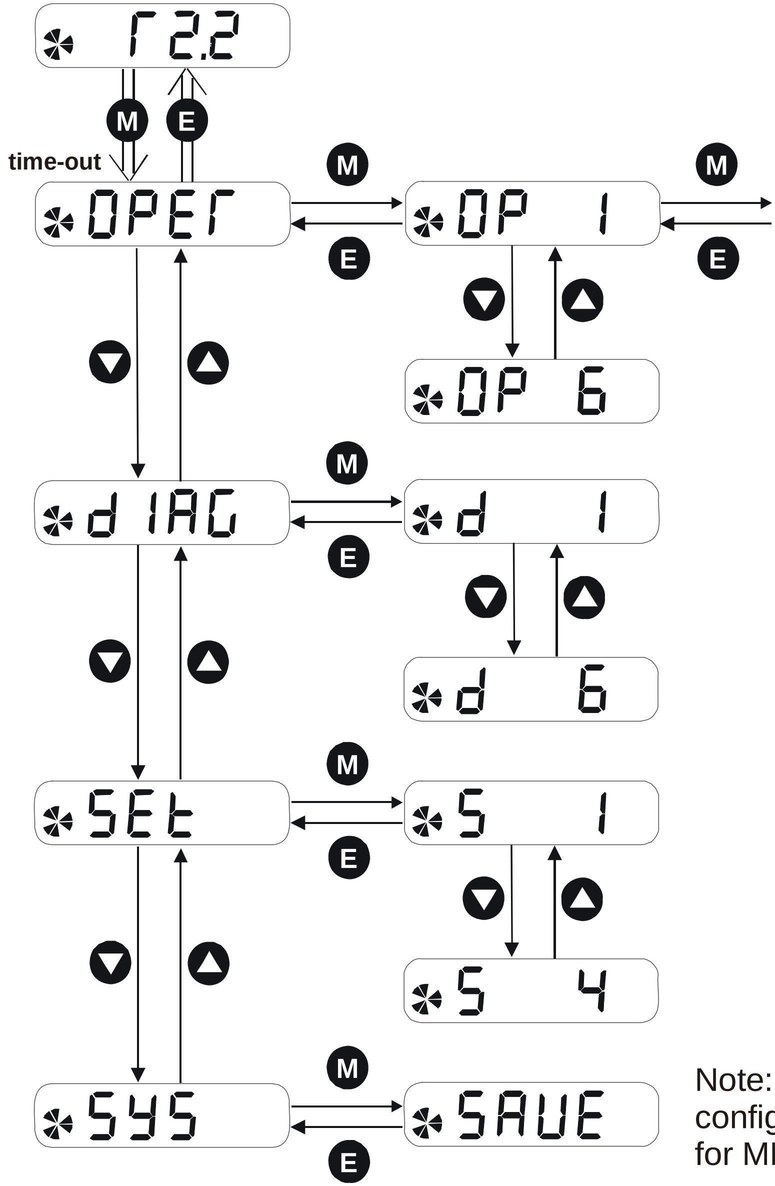
Welcome Screen Displays the software version of the unit

From the Welcome Screen, the display times-out (alternatively you can press the M *key) to show the first of 4 menus:*

Operator	A customised view of selected parameters.
Diagnostics	A view of important diagnostic parameters.
Setup	A quick-setup list of the most commonly used configuration parameters
System	Application "save".

The Menu System Map

The Menu System



Press M to view parameter value
Change value with ▲ ▼ keys
Press E to exit parameter

Note: this does not save the link configuration. It saves information for MMI parameters.

Drive Status Indications

The keypad can display the following status information:

Display	Status Indication and Meaning	Possible Cause
rdy	READY/HEALTHY No alarms present. Remote mode selected	
PASS	PASSWORD Current password must be entered before this parameter may be altered.	Enter password to change the parameter. Refer to page 8-48.
LOC	LOCAL Local Mode selected, healthy, no alarms present	Added or removed from the display letter-by-letter to indicate entering or leaving Local Mode
StOP	STOP Coast Stop or Prog Stop active	Run pressed while Coast Stop or Prog Stop lines are active, (low), on the sequencing block. Local Mode only.
rUn	RUN Not possible to change between Local/Remote mode	The drive is running in Local mode or the Remote run signal is active
EnbL	ENABLE Pressed RUN or JOG key in Local mode while Enable signal is low	The drive Enable signal is inactive, (low)

Alert Message Displays

A message will be displayed on the Keypad when either:

- A requested operation is not allowed
- The drive has tripped

Most messages are displayed for only a short period, or for as long as an illegal operation is tried, however, trip messages must be acknowledged by pressing the **E** key.

Experience will show how to avoid most messages. Refer to Chapter 10: “Trips and Fault Finding” for trip messages and reasons.

Selecting Local or Remote Mode

The unit can operate in one of two ways:

Remote Mode: Remote control using digital and analog inputs and outputs

Local Mode: Local control using the Keypad

Local control keys are inactive when Remote Mode is selected.

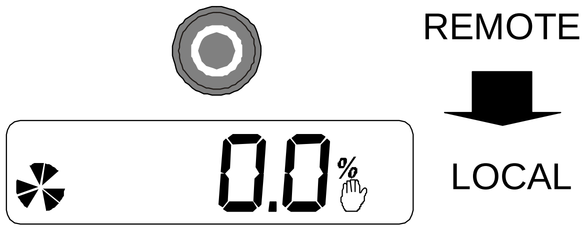
You must be at the top of the MMI, showing the software version, before you can change between local and remote modes.

Note ***You can only change between Local and Remote Mode when the unit is "stopped" and the Keypad is displaying the software version.***

Remote to Local Mode:

Hold the Stop key down until the display spells LOC

Release the key to display the previous menu for example,Local Setpoint



Local to Remote Mode:

Hold the Stop key down until LOC and are removed from the display

Release the key to display the previous menu

How To Change a Parameter Value

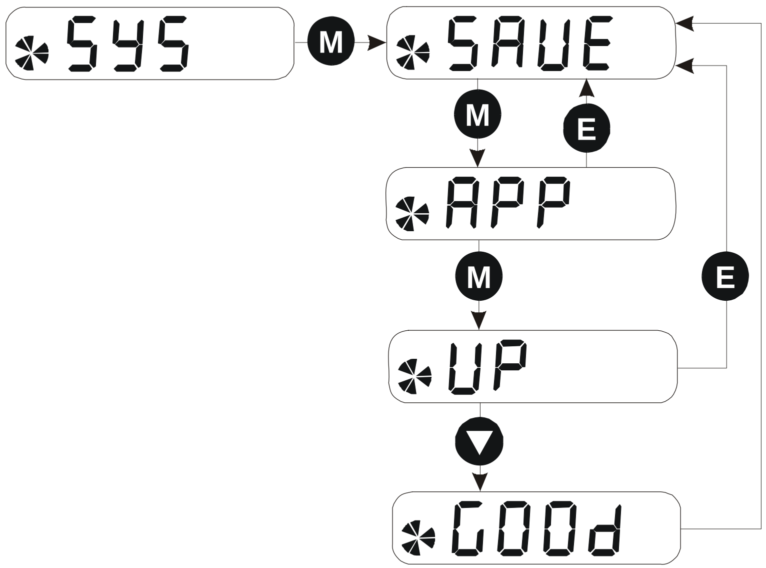
You can change the values of parameters stored in the OPEr and SEt menus. Refer to Chapter 9 for further information.

- View the parameter to be edited and press M to display the parameter’s value.
- Select the digit to be changed (pressing the M key moves the cursor from right to left).
- Use the ▲ ▼ keys to adjust the value. Hold the key momentarily to adjust the value marginally, or hold the key to make rapid changes; the rate of change varies with the time held.
- Press E to return to the parameter display.

How to Save the Application

The SAVE menu, available in all menu levels, is used to save any changes you make to the Keypad settings.

Press the UP key as instructed to save all parameters. Values are stored during power-down.



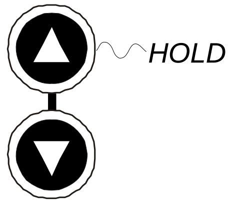
Special Menu Features

Resetting to Factory Defaults (2-button reset)

Power-up the drive whilst holding the keys as shown to return to factory default settings.
This loads default values for all pre-defined parameters.
Then press the E key.

Hold down the keys opposite:

Power-up the drive, continue to hold for at least 1 second



Selecting the Menu Level

For ease of operation the drive can display full or reduced menus.

Navigate to the S35 parameter (SET::S35) and press the M key. This toggles full or partial menu detail. Change the value of the parameter for a different viewing level:

0 = Operator mode (OPER menu and reduced SET menu (S35) only)

1 = Basic view (all menus)

2 = Advanced view (no effect on 6511 keypad)

Power-up Key Combinations

Resetting to Factory Defaults (2-button reset)

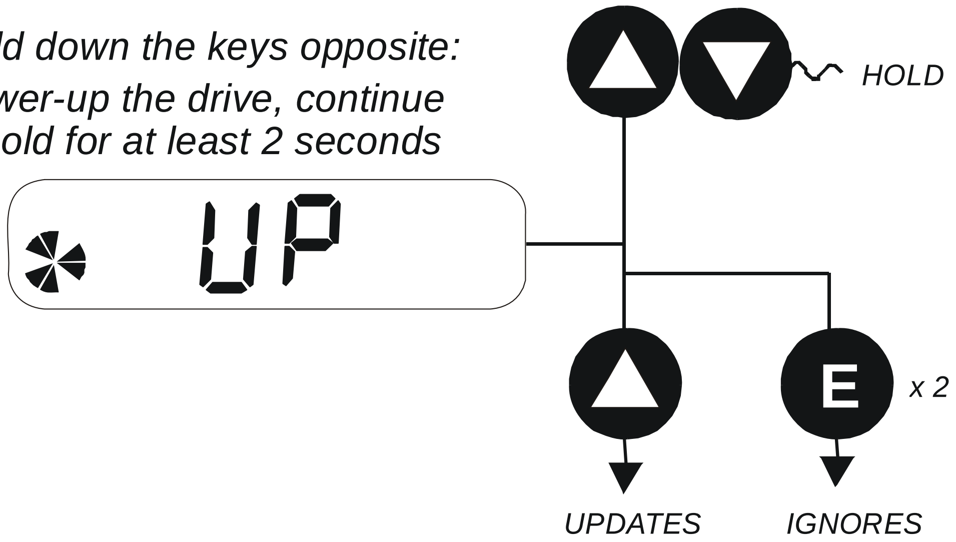
A special key combination restores to the drive the current product code default parameter values. This feature is only available at power-up as a security measure.

Note ***If the unit is operating on 24V dc only for configuration purposes, the unit will trip on UNDERVOLTAGE (DCLO) as to be expected. Press the "E" key to clear the trip message when it appears.***

6511 Keypad Combination

Hold down the keys opposite:

Power-up the drive, continue to hold for at least 2 seconds



On pressing "UP", the factory defaults for the pre-defined parameters will be restored. The keypad will display the "DATA" trip message. Press "E" to accept the default configuration.

If you decide not to update to factory defaults, press the "E" key twice to return to the main menus.

Changing the Product Code (3-button reset)

On rare occasions it may be necessary to change the default settings by changing the Product Code. The Product Code is detailed in Appendix E.

A special key combination is required to change the product code. This feature is only available at power-up as a security measure.

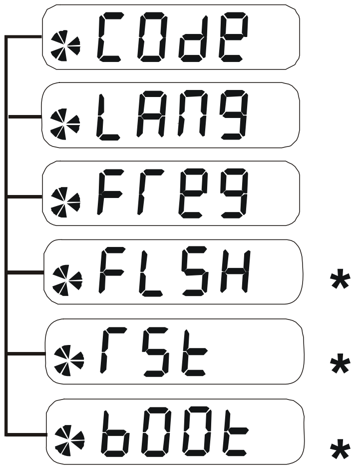
The 3-button reset will take you to the POWER BOARD menu in the expanded SYSTEM menu (highlighted in the diagrams below).

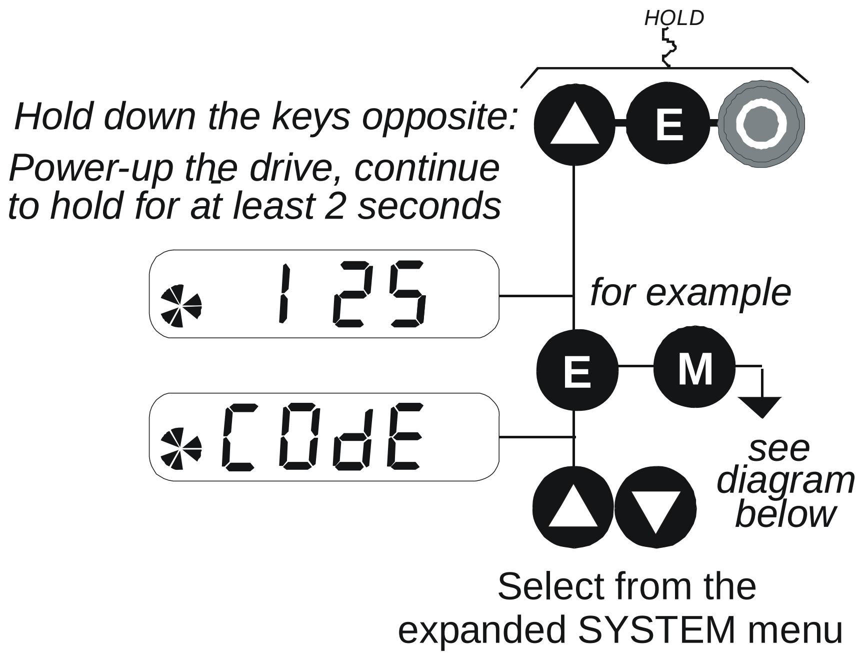
Note ***If the unit is operating on 24V dc only for configuration purposes, the unit will trip on UNDERVOLTAGE (DCLO) as to be expected. Press the "E" key to clear the trip message when it appears.***

6511 Keypad Combination

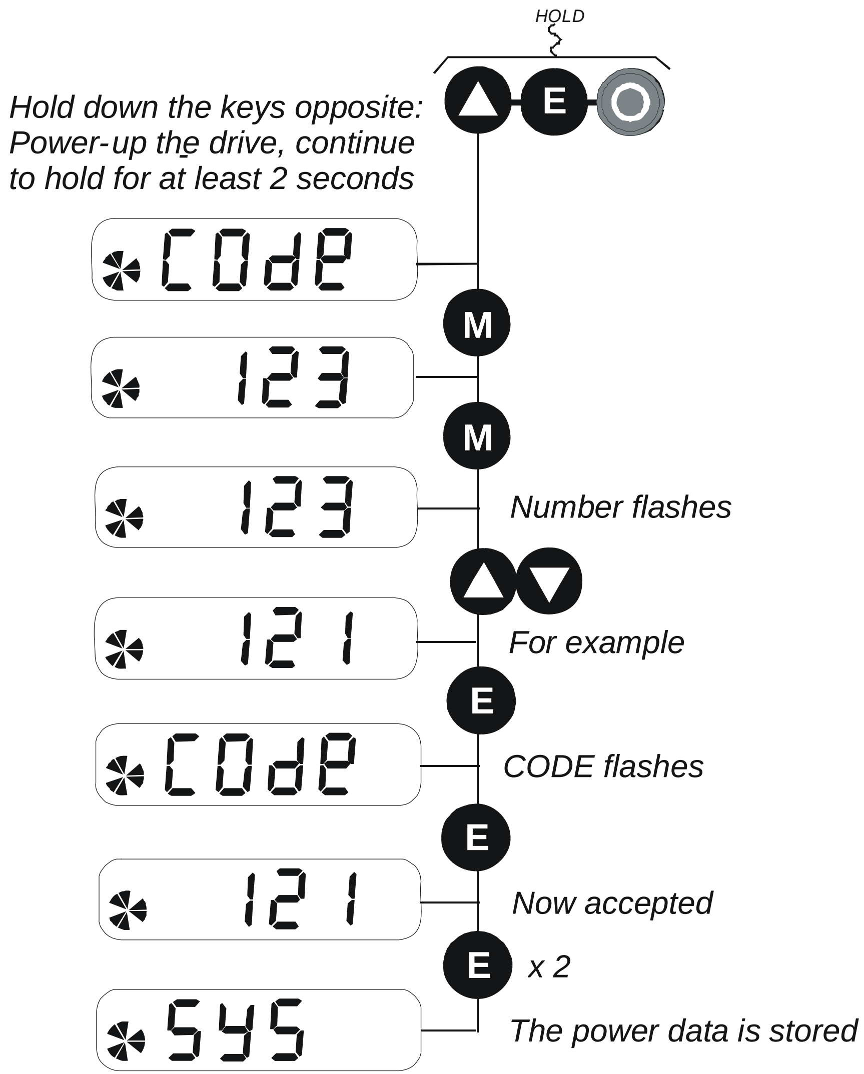
IMPORTANT **We recommend the menus marked * above are only used by Parker SSD Drives or suitably qualified personnel.**

Note ***The LANGUAGE menu currently contains selection for ENGLISH only.***





POWER BOARD (6511 keypad)



Size	Model No. Block 3	Rating	Code
CD/SD 230Vac Units:			
Frame B	0003B	0.75 HP/0.55kW	131
	0005B	1.5 HP/1.1kW	132
	0007B	2 HP/1.5kW	117
	0011B	3 HP/2.2kW	118
	0016B	5 HP/4.0kW	119
Frame C	0024C	7.5 HP/5.5kW	120
	0030C	10 HP/7.5kW	121
CD/SD 400-500 Vac Units:			
Size	**Model No. Block 3**	**Rating**	**Code**
Frame B	0002B	0.75 HP/0.55kW	133
	0003B	1.5 HP/1.1kW	134
	0004B	2 HP/1.5kW	135
	0006B	3 HP/2.2kW	122
	0010B	5 HP/4.0kW	123
	0012B	7.5 HP/5.5kW	136
	0016B	10 HP/7.5kW	124
	S016B 30% more peak	10HP/7.5kW	125
Frame C	0024C	15 HP/11kW	126
	0030C	20 HP/15kW	127
	S030C 30% more peak	20 HP/15kW	128
Frame D	0039D	25 HP/18.5kW	137
	0045D	30 HP/22kW	129
	0059D	40 HP/30kW	130

8

The diagram above shows a 3-button reset when there is power data stored in the drive. If the drive has no power data stored, then the "Power Data Corrupt" and "Language Defaults Loaded" alert messages will be displayed. Press the "E" key to remove the alert messages.

DEFAULT TO 60HZ

The setting of this parameter selects the drive operating frequency. It affects those parameters whose values are dependent upon the default base frequency of the drive. Settings will only be updated following a "restore macro" operation.

The default is 50Hz (6511 keypad = 0 , 6901 keypad = FALSE).

Refer to Appendix D: "Programming" - Frequency Dependent Defaults.

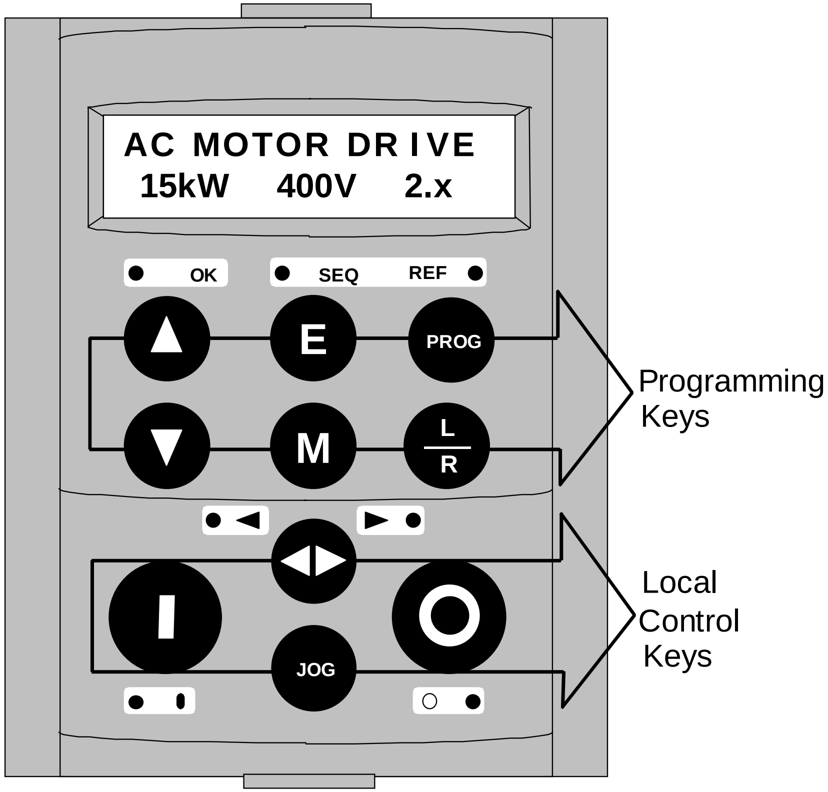
RESTORE DEFAULTS

Refer to "Resetting to Factory Defaults (2-button reset)", page 8-50.

6901 Keypad

890CD Common Bus Drive/890SD Standalone Drive

The 6901 Keypad (Man-Machine Interface, MMI) provides for local control of the drive, monitoring, and complete access for application programming.

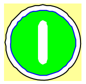


To display the Software Version:

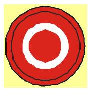
Press and hold  to display software version.

Time-out or press .

To Start in Local Mode:

Press 

To Stop in Local Mode:

Press 

Initial Power-Up Conditions

The Keypad will display the Operator menu on the 890CD Common Bus Drive and 890SD Standalone Drive.

Control Key Definitions

Keys for Programming the Drive

UP ▲	*Navigation* - Moves upwards through the list of parameters or menus *Parameter* - Increments the value of the displayed parameter. *Command Acknowledge* - Confirms action when in a command menu.
DOWN ▼	*Navigation* - Moves downwards through the list of parameters or menus *Parameter* - Decrements the value of the displayed parameter.
ESCAPE E	*Navigation* - Displays the previous level's Menu. *Parameter* - Returns to the parameter list. *Trip Message* - Clear the Trip or Error message from the display.
MENU M	*Navigation* - Displays the next Menu level, or the first parameter of the current Menu. *Parameter* - Allows a writable parameter to be modified (this is indicated by → appearing on the left of the bottom line). Hold to display the PREF.
PROG PROG	*Navigation* - Toggles between current locations within the Operator menu and any other menu.
LOCAL/ REMOTE L/R	*Control* - Toggles between Remote and Local Mode for both Start/Stop (Seq) and Speed Control (Ref). When toggling, the display automatically goes to the relevant SETPOINT screen, and the SETPOINT (LOCAL) screen will have the ▲ and ▼ keys enabled to alter the setpoint.

Keys for Operating the Drive Locally

FORWARD/ REVERSE	*Control* - Changes the direction of motor rotation. Only operates when the drive is in Local Speed Control mode.
JOG	*Control* - Runs the motor at a speed determined by the JOG SETPOINT parameter. When the key is released, the drive returns to "stopped". Only operates when the drive is "stopped" and in Local Start/Stop mode.
RUN	*Control* - Runs the motor at a speed determined by the LOCAL SETPOINT or REMOTE SETPOINT parameter. *Trip Reset* - Resets any trips and then runs the motor as above. Only operates when the drive is in Local Start/Stop (Seq) mode.
STOP/RESET	*Control* - Stops the motor. Only operates when the drive is in Local Sequence mode. *Trip Reset* - Resets any trips and clears displayed message if trip is no longer active.

The L/R Key

The **L/R** key (LOCAL/REMOTE) toggles between Remote and Local Mode. In doing so, the view of the SETPOINT parameter in the OPERATOR menu toggles between SETPOINT (LOCAL) and SETPOINT (REMOTE). The default is for the SETPOINT (REMOTE) parameter to be displayed.

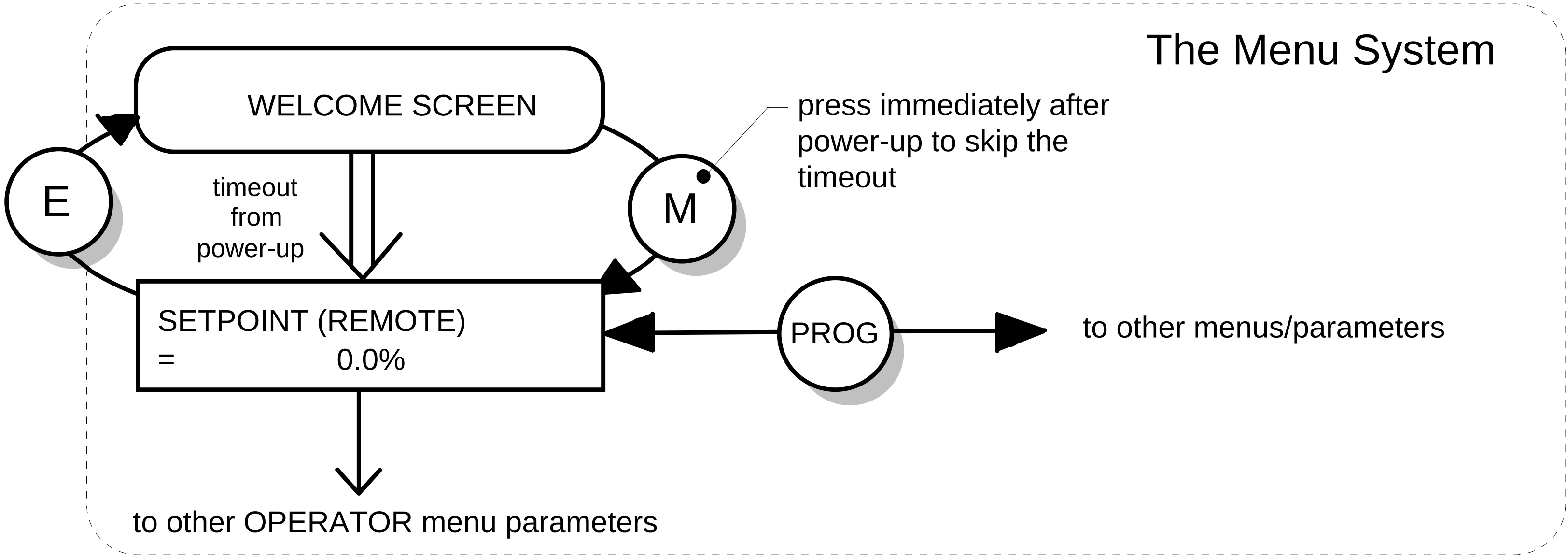
Note ***A different naming convention is applied in the OPERATOR menu for these parameters when displayed as the first parameter entry:***

- *REMOTE SETPOINT is displayed as SETPOINT (REMOTE)*
- *LOCAL SETPOINT is displayed as SETPOINT (LOCAL)*
- *COMMS SETPOINT is displayed as SETPOINT (COMMS)*
- *JOG SETPOINT is displayed as SETPOINT (JOG)*

Pressing the L/R key when in Remote mode takes you directly to the SETPOINT (LOCAL) parameter with the Edit mode enabled. Press the PROG key to return to the previous display.

The PROG Key

The **PROG** key toggles between the OPERATOR menu and any other menu, remembering and returning to previous positions in each menu. As you press the **PROG** key, the title of the menu you are about to enter is displayed, i.e. OPERATOR or for example DIAGNOSTICS. Releasing the key clears the display and releases you into that menu.



Holding the PROG key for approximately three seconds takes you to the SAVE CONFIG menu. Refer to "How to Save the Application", page 8-44.

LED Indications

There are seven LEDs that indicate the status of the drive. Each LED is considered to operate in three different ways:

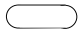
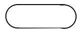
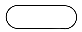
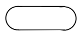
OFF

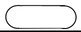
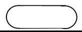
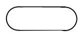
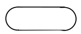
FLASH

ON

The LEDs are labelled HEALTH, LOCAL (as SEQ and REF), RUN, STOP, FWD and REV. Combinations of these LEDs have the following meanings:

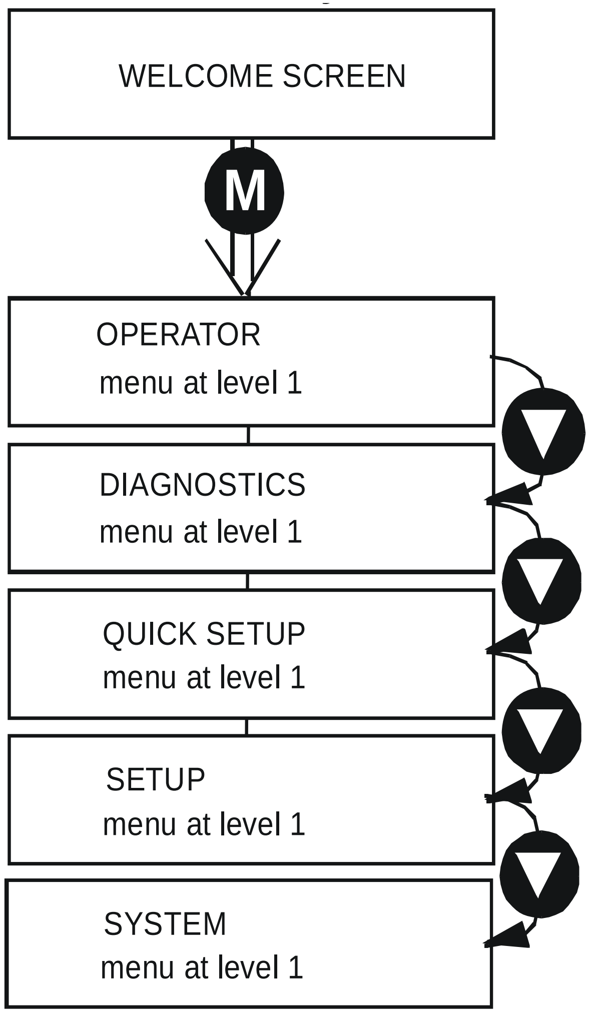
HEALTH	RUN	STOP	Drive State
FLASH	FLASH	FLASH	Re-Configuration
FLASH	OFF	ON	Tripped
ON	OFF	ON	Stopped
ON	OFF	FLASH	Stopping
ON	FLASH	OFF	Running with zero speed demand or enable false or contactor feedback false
ON	ON	OFF	Running
ON	ON	OFF	Running
ON	FLASH	FLASH	Autotuning
FLASH	FLASH	ON	Auto Restarting, waiting for trip cause to clear
FLASH	FLASH	OFF	Auto Restarting, timing

FWD	REV	Forward / Reverse State
		Requested direction and actual direction are forward
		Requested direction and actual direction are reverse
		Requested direction is forward but actual direction is reverse
		Requested direction is reverse but actual direction is forward

LOCAL SEQ	LOCAL REF	Local / Remote Mode
		Start/Stop (Seq) and Speed Control (Ref) are controlled from the terminals
		Start/Stop (Seq) is controlled using the RUN, STOP, JOG and FWD/REV keys. Speed Control (Ref) is controlled from the terminals
		Start/Stop (Seq) is controlled from the terminals Speed Control (Ref) is controlled using the up (▲) and down (▼) keys
		Start/Stop (Seq) and Speed Control (Ref) are controlled using the Keypad keys

The Menu System

The unit will initialise in Remote Mode from factory conditions. The Keypad will display the Operator Menu. Each menu contains parameters.



Welcome Screen Displays the software version of the unit

From the Welcome Screen, the display times-out (alternatively you can press the M key) to show the first of 4 menus:

Operator A customised view of selected parameters contained in the SETUP menu. Refer to Chapter 9.

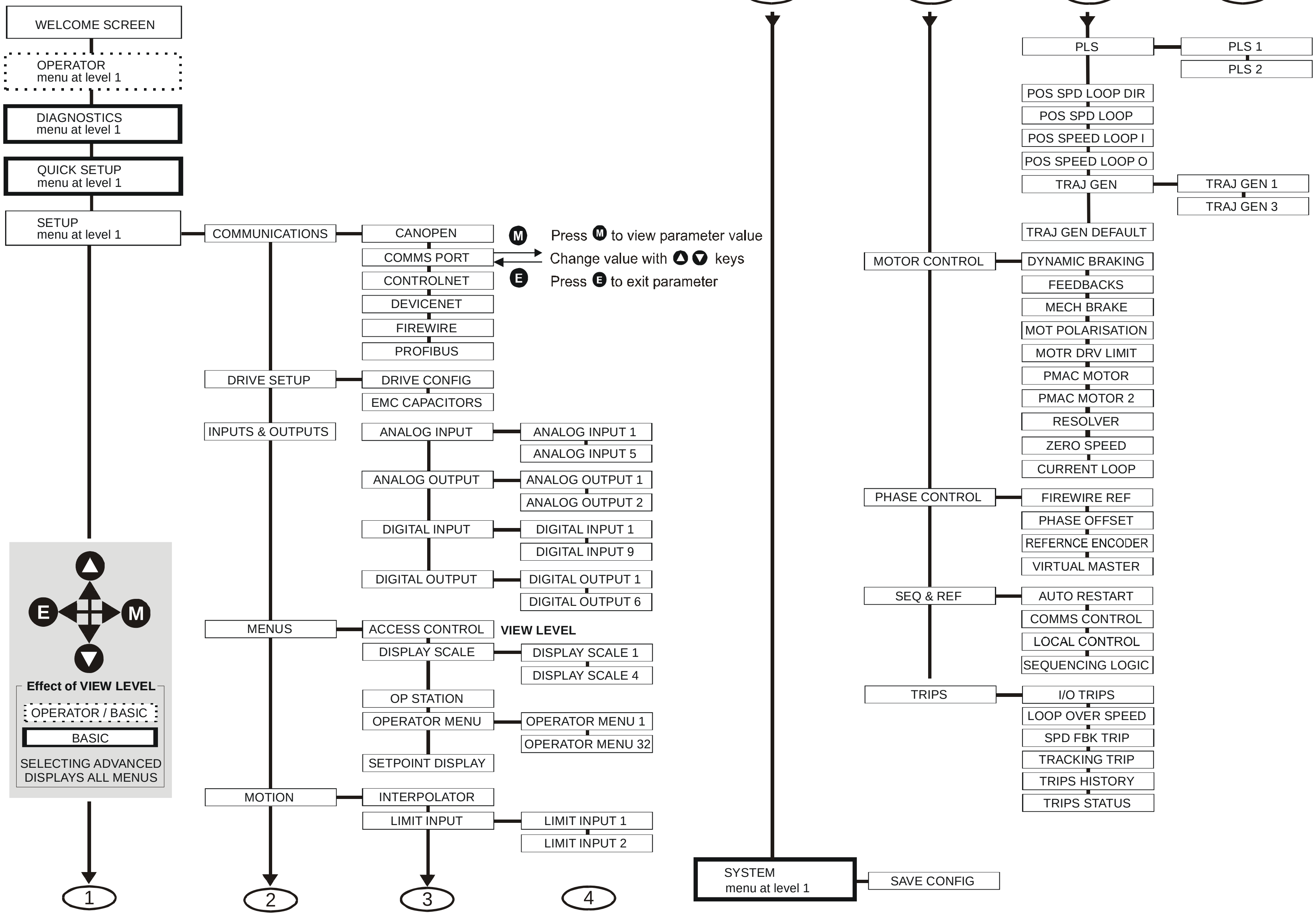
Diagnostics A view of important diagnostic parameters contained in the SETUP menu. Refer to Chapter 9.

Quick Setup A quick-setup list of the most commonly used configuration parameters. Refer to Chapter 9.

Setup Contains all the function blocks parameters for programming your application. Refer to Appendix D.

System Application "save" and macro selection.

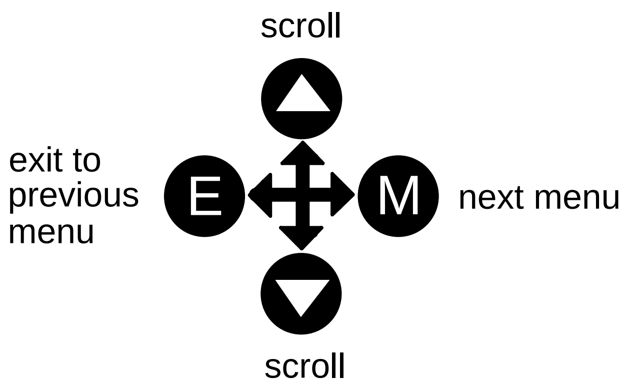
The Menu System Map



Navigating the Menu System

On power-up, the Keypad defaults into the OPERATOR menu, timing out from the Welcome screen. You can skip the timeout by pressing the M key immediately after power-up which will take you directly to the OPERATOR menu.

The menu system can be thought of as map which is navigated using the four keys shown opposite.



NAVIGATING THE MENU

Keys E *and* M *navigate through the menu levels.*
The up (▲) *and down* (▼) *keys scroll through the Menu and Parameter lists.*

Refer to “The Menu System Map” to see how the full menu is mapped.

HINT: Remember that because the Menu and Parameter lists are looped, the ▲ key can quickly move you to the last Menu or Parameter in the loop.

Alert Message Displays

A message will be displayed on the Keypad when either:

- A requested operation is not allowed:
  The top line details the illegal operation, while the bottom line gives the reason or cause. See example opposite.

* KEY INACTIVE *
REMOTE SEQ

- The drive has tripped:
  The top line indicates a trip has occurred while the bottom line gives the reason for the trip. See example opposite.

*** TRIPPED ***
HEATSINK TEMP

Most messages are displayed for only a short period, or for as long as an illegal operation is tried, however, trip messages must be acknowledged by pressing the **E** key.

Experience will show how to avoid most messages. They are displayed in clear, concise language for easy interpretation. Refer to Chapter 10: “Trips and Fault Finding” for trip messages and reasons.

Selecting Local or Remote Mode

The unit can operate in one of two ways:

Remote Mode: Remote control using digital and analog inputs and outputs

Local Mode: Providing local control and monitoring of the drive using the Keypad

Local control keys are inactive when Remote Mode is selected.

Note ***You can only change between Local and Remote Mode when the unit is "stopped".***

Remote to Local Mode:

To toggle between Modes:

Press 

Local to Remote Mode:

To toggle between Modes:

Press 

Refer to "The L/R Key", page 8-34.

How To Change a Parameter Value

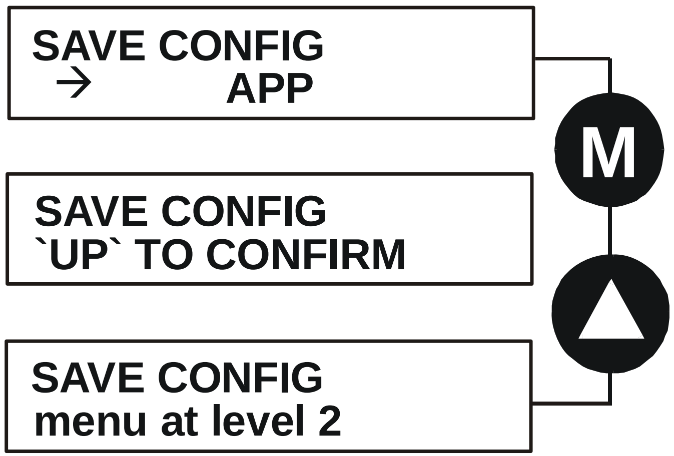
You can change the values of parameters stored in the OPERATOR, QUICK SETUP and SETUP menus. Refer to Chapter 9 for further information.

- View the parameter to be edited and press M to display the parameter's value.
- Select the digit to be changed (pressing the M key moves the cursor from right to left).
- Use the ▲ ▼ keys to adjust the value. Hold the key momentarily to adjust the value marginally, or hold the key to make rapid changes; the rate of change varies with the time held.
- Press E to return to the parameter display.

How to Save the Application

The SAVE menu, available in all menu levels, is used to save any changes you make to the Keypad settings.

Press the UP key as instructed to save all parameters. Values are stored during power-down.



Special Menu Features

Selecting the Menu Level

MMI Menu Map

1 QUICK SETUP

VIEW LEVEL

For ease of operation there are three `viewing levels' for the Keypad. The setting for the VIEW LEVEL parameter decides how much of the menu system will be displayed. The choice of menu for each has been designed around a type of user, hence we have the Operator, Basic and Advanced viewing levels.

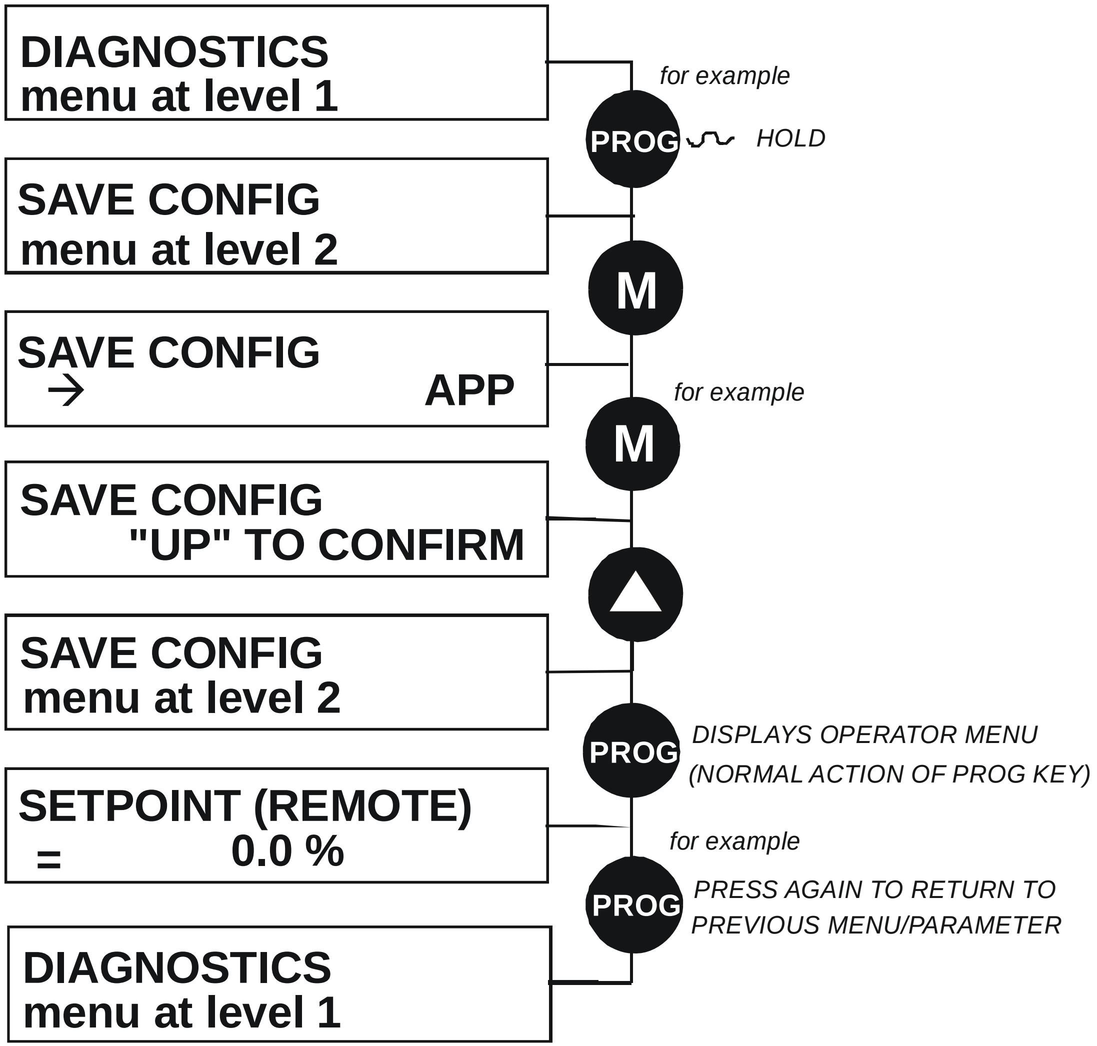
In the QUICK SETUP menu, press the key to quickly move to VIEW LEVEL, the last parameter in the menu.

Note ***The contents of the OPERATOR menu remains unchanged for all view levels.***

Refer to “The Menu System Map”, page 8-39 to see how VIEW LEVEL changes the menu.

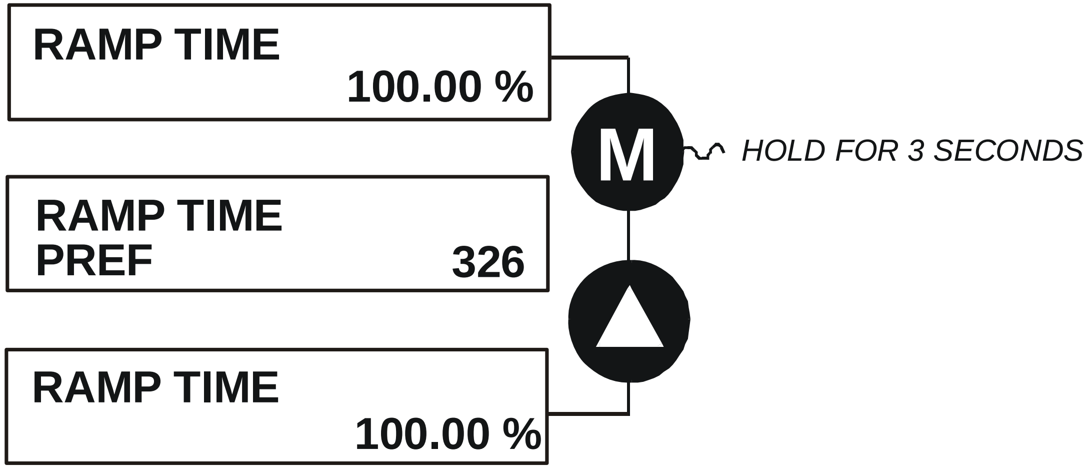
Quick Save Feature

From anywhere in the menu system, hold down the **PROG** key for approximately 3 seconds to move quickly to the SAVE CONFIG menu. You can save your application and return conveniently to your original display.

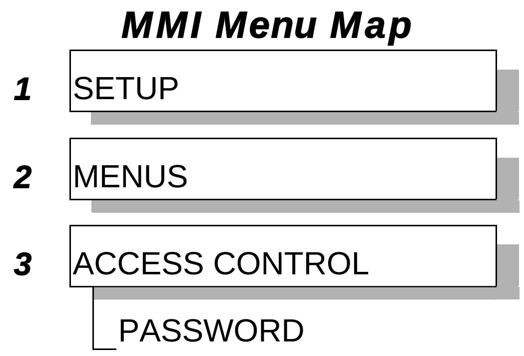


Quick Tag Information

With a parameter displayed, hold down the **M** key for approximately 3 seconds to display the parameter's tag number (a message may be displayed during this time).



Password Protection (6901 keypad)



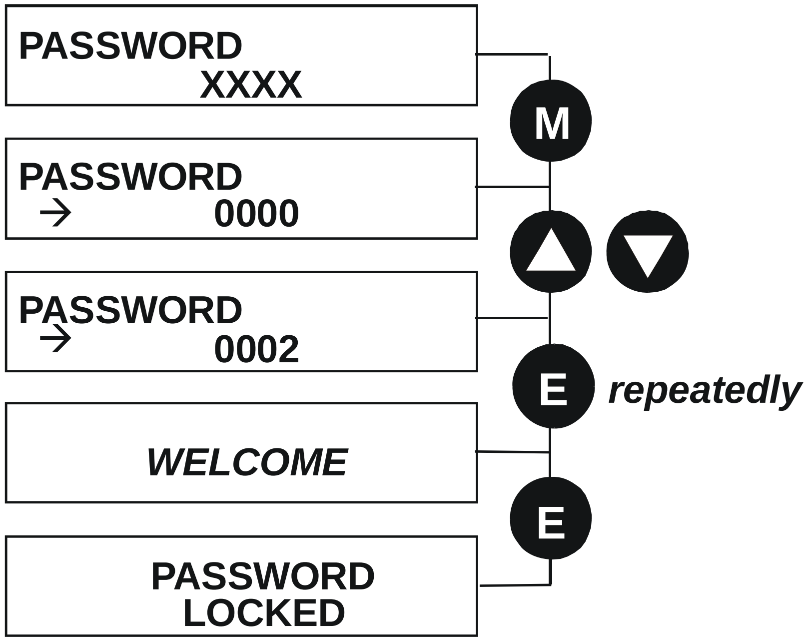
When activated, the password prevents unauthorised parameter modification by making all parameters “read-only”. If you attempt to modify a password protected parameter, you will be prompted for the password.

The password protection is activated/deactivated using the PASSWORD parameter.

To Activate Password Protection

By default the password feature is deactivated, i.e. 0000.

1. Enter a new password in the PASSWORD parameter (anything other than the default value of 0000), for example 0002.
2. Press the **E** key repeatedly until the Welcome screen is displayed. Pressing the **E** key again activates password protection.



Note ***Perform a SAVE CONFIG if you need the password to be saved on power-down.***

To De-activate Password Protection

If you try to change the value of a parameter with password protection activated, the PASSWORD screen is displayed for you to enter the current password. If you enter the password correctly password protection is temporarily de-activated.

To Re-activate Password Protection

Re-activate an existing password by pressing the **E** key repeatedly until the PASSWORD LOCKED screen is displayed.

To Remove Password Protection (default status)

Navigate to the PASSWORD parameter and enter the current password. Press the **E** key. Reset the password to 0000. Password protection is now removed.

You can check that password protection has been removed by repeatedly pressing the **E** key until the Welcome screen is displayed. Pressing the **E** key again will NOT display the PASSWORD LOCKED screen.

Note ***Perform a SAVE CONFIG if you need "no password" to be saved on power-down.***

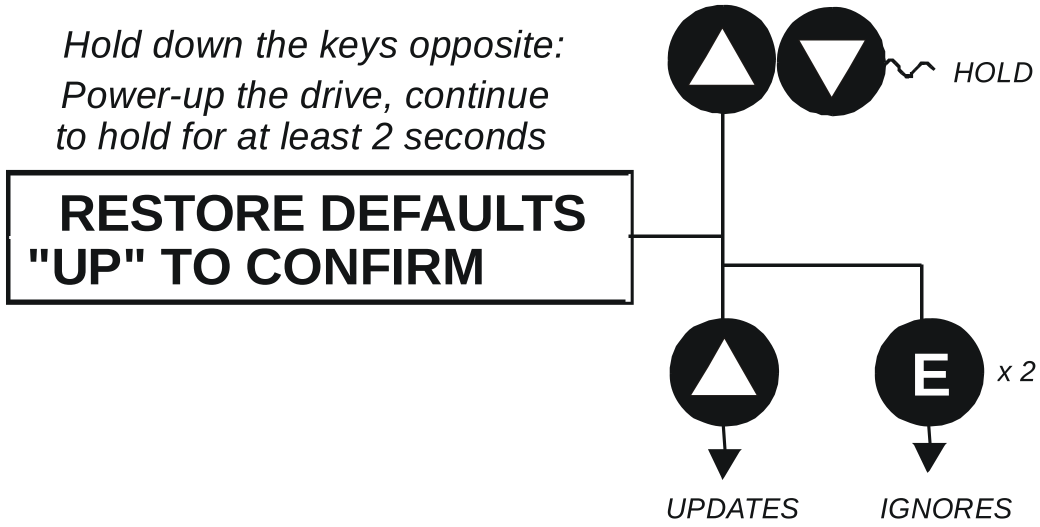
Power-up Key Combinations

Resetting to Factory Defaults (2-button reset)

A special key combination restores to the drive the current product code default parameter values. This feature is only available at power-up as a security measure.

Note ***If the unit is operating on 24V dc only for configuration purposes, the unit will trip on UNDERVOLTAGE (DCLO) as to be expected. Press the "E" key to clear the trip message when it appears.***

6901 Keypad Combination



On pressing "UP", the factory defaults will be restored. The keypad will display the RESTORE DEFAULTS menu. Press "E" to exit this menu.

If you decide not to update to factory defaults, press the "E" key twice to return to the menus at level 1.

Changing the Product Code (3-button reset)

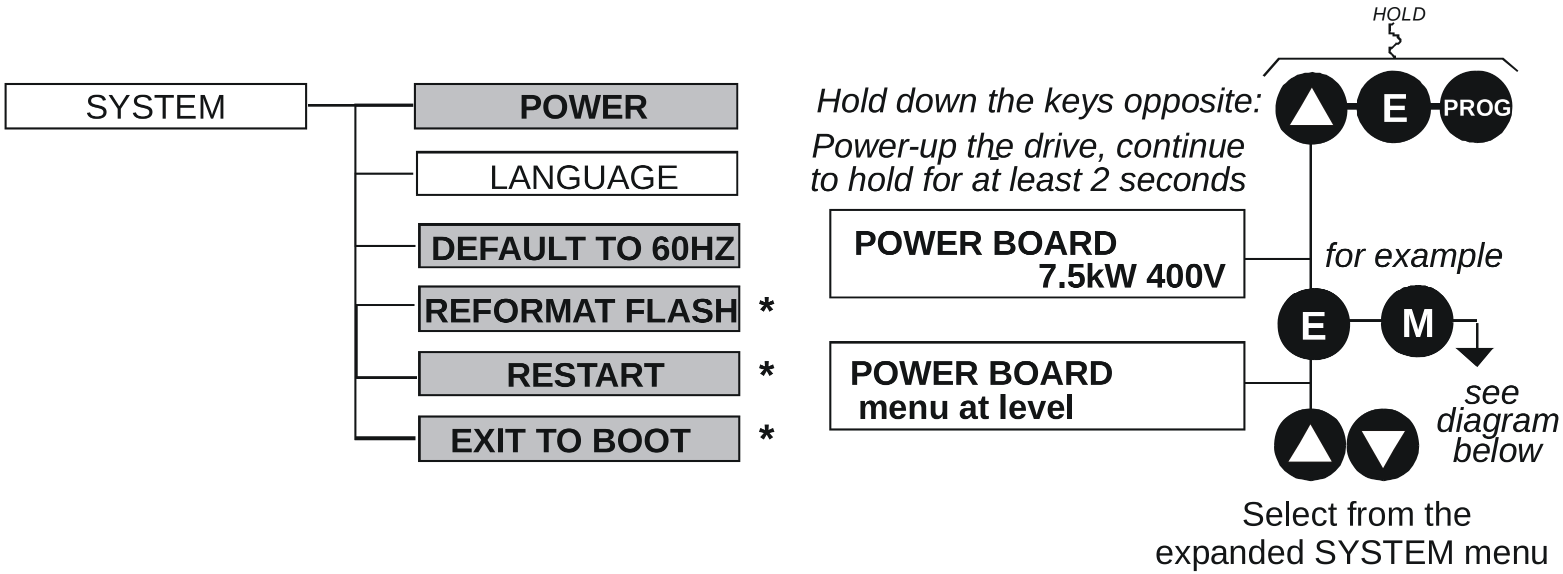
On rare occasions it may be necessary to change the default settings by changing the Product Code. The Product Code is detailed in Appendix E.

A special key combination is required to change the product code. This feature is only available at power-up as a security measure.

The 3-button reset will take you to the POWER BOARD menu in the expanded SYSTEM menu (highlighted in the diagrams below).

Note ***If the unit is operating on 24V dc only for configuration purposes, the unit will trip on UNDERVOLTAGE (DCLO) as to be expected. Press the "E" key to clear the trip message when it appears.***

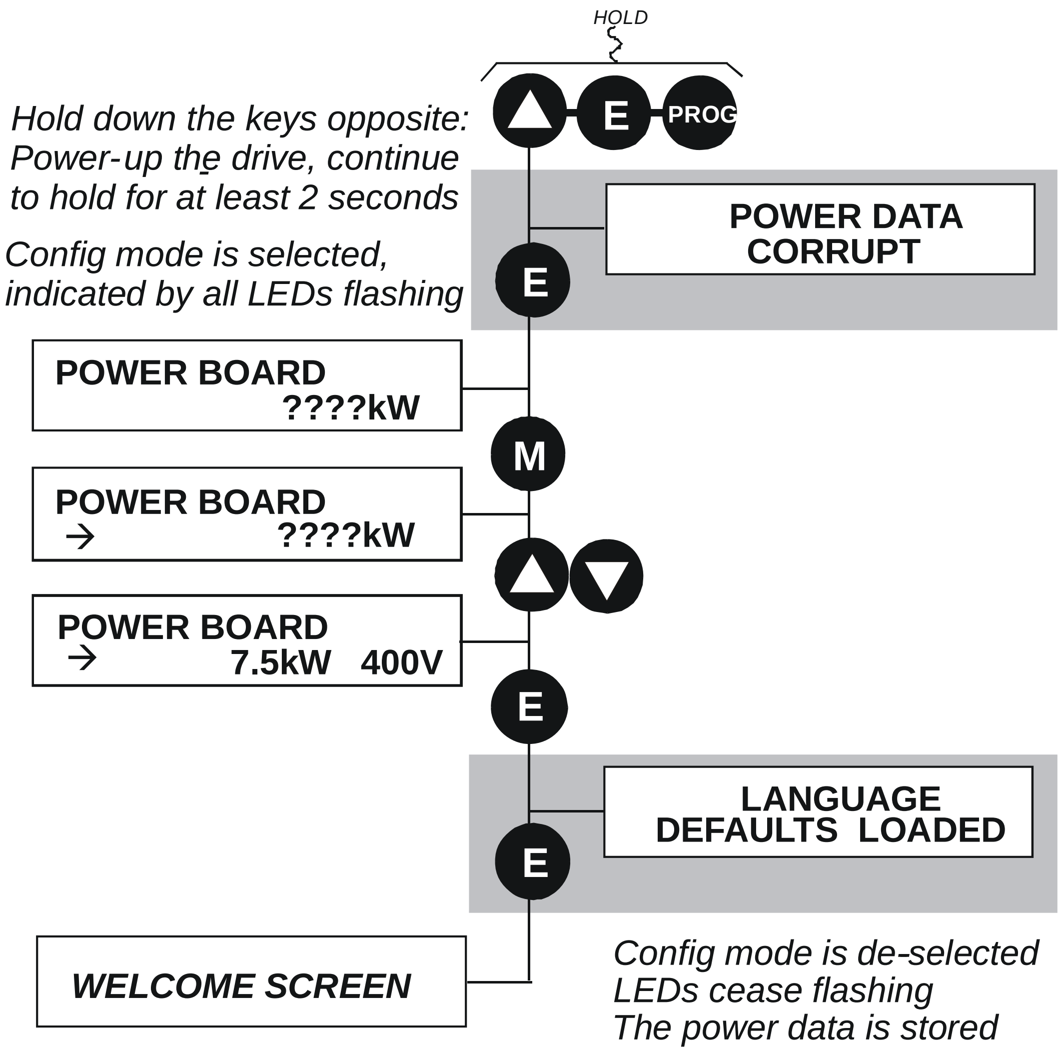
6901 Keypad Combination



IMPORTANT **We recommend the menus marked * above are only used by Parker SSD Drives or suitably qualified personnel.**

Note ***The LANGUAGE menu currently contains selection for ENGLISH only.***

POWER BOARD (6901 keypad)



The diagram above shows a 3-button reset when there is no power data stored in the drive. If the drive has power data stored, then the "Power Data Corrupt" and "Language Defaults Loaded" alert messages will not be displayed, also the display will show the current power board selection, instead of "????kW ???V".

DEFAULT TO 60HZ

The setting of this parameter selects the drive operating frequency. It affects those parameters whose values are dependent upon the default base frequency of the drive. Settings will only be updated following a "restore macro" operation.

The default is 50Hz (6511 keypad = 0 , 6901 keypad = FALSE).

Refer to Appendix D: "Programming" - Frequency Dependent Defaults.

RESTORE DEFAULTS

Refer to "Resetting to Factory Defaults (2-button reset)", page 8-50.

Remote Mounting the Keypad

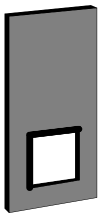
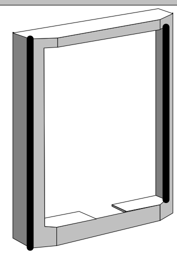
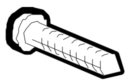
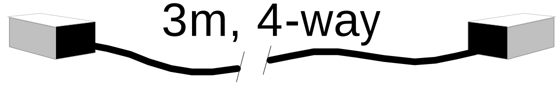
Fitting the Remote 6901 Keypad

The 6052 Mounting Kit is required to remote-mount a 6901 Keypad. An enclosure rating of IP54 is achieved for the remote Keypad when correctly mounted using the 6052 Mounting Kit.

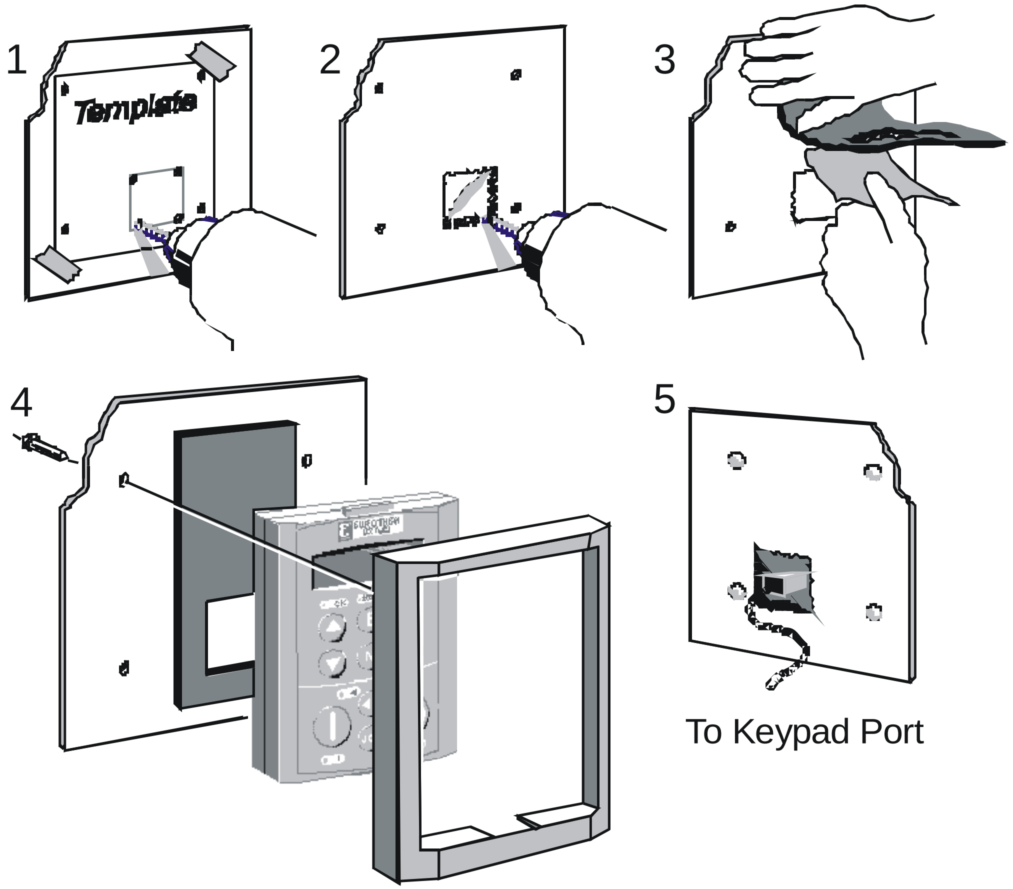
6052 Mounting Kit Parts for the Remote Keypad

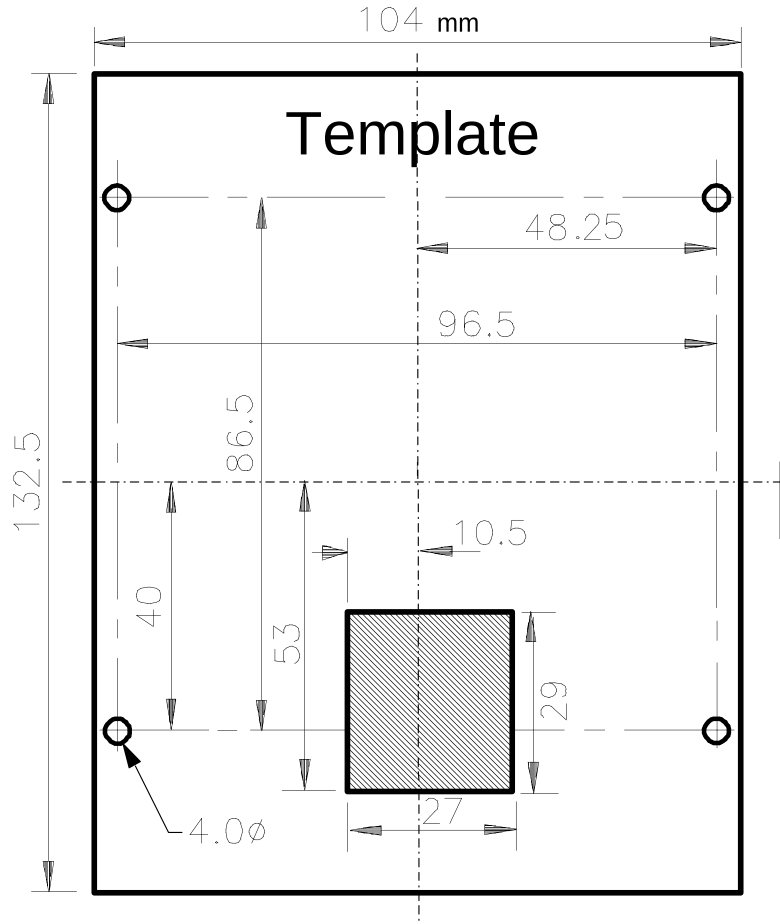
Tools Required

No. 2 Posidrive screwdriver.

6052 Mounting Kit			
1		1	
4	 No. 6 x 12mm	1	3m, 4-way 

Assembly Procedure

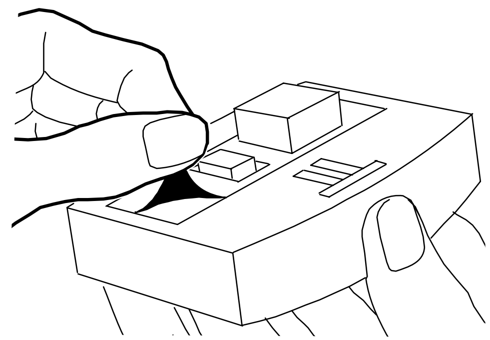




8

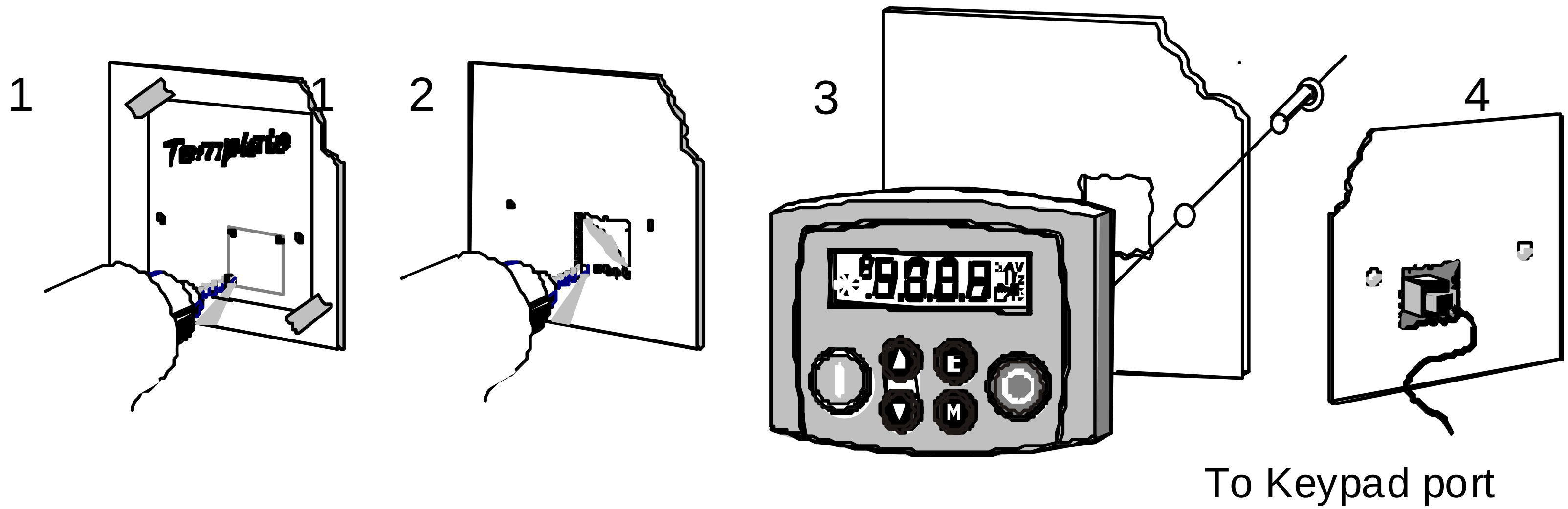
Figure 8.1 Mounting Dimensions for the Remote-Mounted 6901 Keypad

Fitting the Remote 6511 Keypad



You can remote-mount the keypad using a standard P3 lead, SSD Part Number CM057375U300, to connect the keypad to the drive.

Two self-tapping screws are provided with the keypad. Remove the protective film from the gasket. An enclosure rating of IP54 is achieved for the remote keypad when correctly mounted.



Assembly Procedure

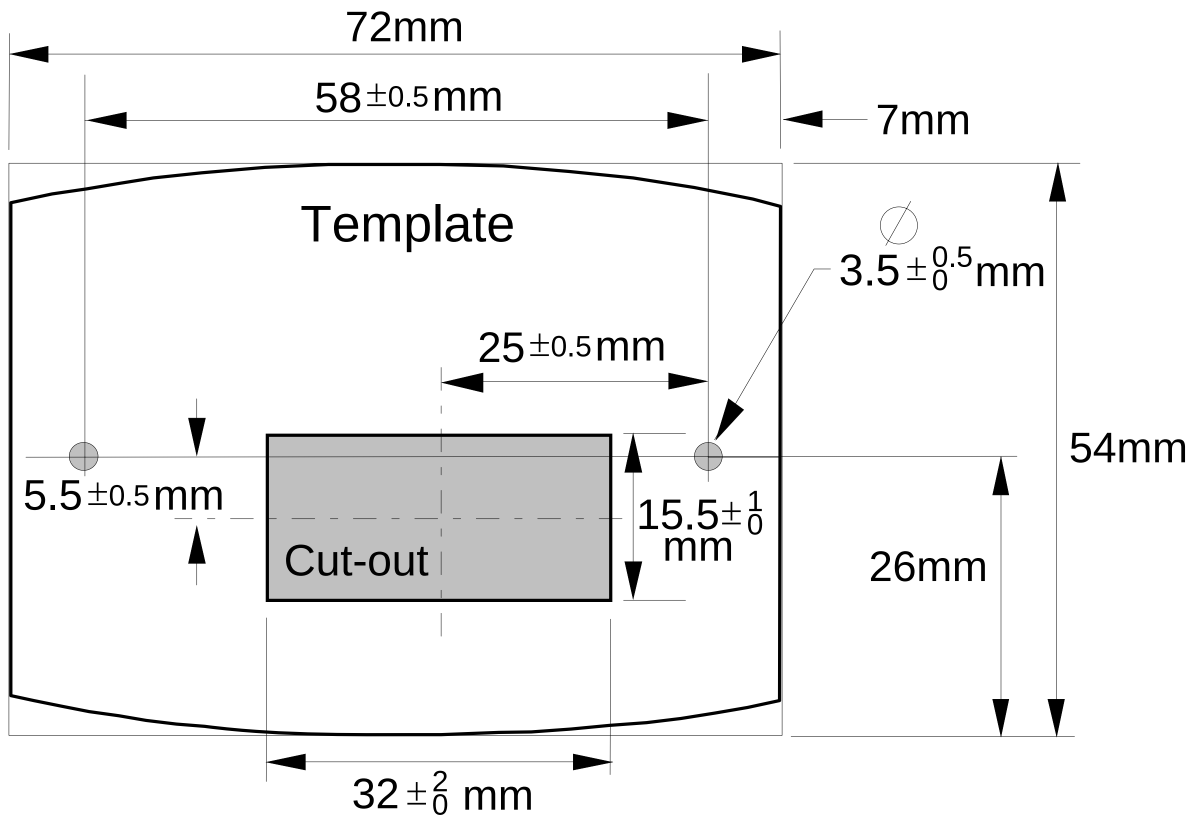


Figure 8.2 Mounting Dimensions for the Remote-Mounted 6511 Keypad

Chapter 9

Keypad Menus

This chapter details the Keypad menus available on the 6511 and 6901 Keypads when used on the 890CS Common Bus Supply and the 890CD Common Bus Drive & 890SD Standalone Drive.

The 6511 keypad displays a numbered menu, whilst the 6901 keypad displays information using concise text and allows access to more parameters.

890CS Common Bus Supply

The table below shows the parameters available using the 6511 Keypad. The full names as displayed by the 6901 Keypad and the DSE Configuration Tool are also provided. The list is shown in MMI order.

The DIAGNOSTIC Menu

DIAGNOSTIC MENU 890CS Common Bus Supply		
6511 Display	6901 Display	
0.0 %	OUTPUT POWER	As a percentage of nominal full power for the selected input voltage
0 C	HEATSINK TEMP	The heatsink temperature in Centrigrade
0.0 Hz	SUPPLY FREQUENCY	The real-time output frequency in Hertz
0 V	DC LINK VOLTS	Vac (rms) x $\sqrt{2}$ = dc link Volts (when motor stopped)
0.0 A	INPUT CURRENT	The input current in Amps

890 Common Bus/Standalone Drive

The table below shows the parameters available using the 6511 Keypad. The full names as displayed by the 6901 Keypad and the DSE Configuration Tool are also provided. The list is shown in MMI order.

Note ***Additional parameters are available using the 6901 Keypad and the DSE Configuration Tool. Refer to Appendix D for a full listing of all parameters.***

Keypad Menus

6511 Keypad	6901 Keypad/DSE
OPER	**|__OPERATOR**
OP 1	| |__SETPOINT
OP 2	| |__SPEED DEMAND
OP 3	| |__DRIVE FREQUENCY
OP 4	| |__MOTOR CURRENT A
OP 5	| |__TORQUE FEEDBACK
OP 6	| |__DC LINK VOLTS
DIAG	**|__DIAGNOSTICS**
D 1	| |__SPEED DEMAND
D 2	| |__REMOTE SETPOINT
D 3	| |__COMMS SETPOINT
D 4	| |__LOCAL SETPOINT
D 5	| |__JOG SETPOINT
D 6	| |__TOTL SPD DMD RPM
D 7	| |__TOTAL SPD DMD %
D 8	| |__SPEED FBK RPM
D 9	| |__SPEED FBK %
D 11	| |__SPEED ERROR
D 12	| |__DRIVE FREQUENCY
D 13	| |__DIRECT INPUT

9

Keypad Menus

```
6511 Keypad     6901 Keypad/DSE
D 14     |     |__TORQ DMD ISOLATE
D 15     |     |__ACTUAL POS LIM
D 16     |     |__ACTUAL NEG LIM
D 17     |     |__AUX TORQUE DMD
D 18     |     |__TORQUE DEMAND
D 19     |     |__TORQUE FEEDBACK
D 20     |     |__FIELD FEEDBACK
D 23     |     |__MOTOR CURRENT %
D 24     |     |__MOTOR CURRENT A
D 25     |     |__DC LINK VOLTS
D 26     |     |__TERMINAL VOLTS
D 31     |     |__BRAKING
D 32     |     |__DRIVE FREQUENCY
D 33     |     |__ACTIVE TRIPS
D 34     |     |__ACTIVE TRIPS+
D 35     |     |__FIRST TRIP
D 36     |     |__TRIP 1 (NEWEST)
D 37     |     |__TRIP 2
D 38     |     |__TRIP 3
D 39     |     |__TRIP 4
D 40     |     |__TRIP 5
D 41     |     |__TRIP 6
D 42     |     |__TRIP 7
D 43     |     |__TRIP 8
D 44     |     |__TRIP 9
D 45     |     |__TRIP 10 (OLDEST)
D 46     |     |__ANALOG INPUT 1
D 47     |     |__ANALOG INPUT 2
```

Keypad Menus

6511 Keypad	6901 Keypad/DSE
D 48	| |__ANALOG INPUT 3
D 49	| |__ANALOG INPUT 4
D 50	| |__ANALOG INPUT 5
D 51	| |__DIGITAL INPUT 1
D 52	| |__DIGITAL INPUT 2
D 53	| |__DIGITAL INPUT 3
D 54	| |__DIGITAL INPUT 4
D 55	| |__DIGITAL INPUT 5
D 56	| |__DIGITAL INPUT 6
D 57	| |__DIGITAL INPUT 7
D 58	| |__DIGITAL INPUT 8
D 59	| |__DIGITAL INPUT 9
D 60	| |__ANALOG OUTPUT 1
D 61	| |__ANALOG OUTPUT 2
D 62	| |__DIGITAL OUTPUT 1
D 63	| |__DIGITAL OUTPUT 2
D 64	| |__DIGITAL OUTPUT 3
SET	**|__QUICK SETUP**
S 1	| |__CONTROL MODE
S 2	| |__MAX SPEED
S 3	| |__RAMP ACCEL TIME
S 4	| |__RAMP DECEL TIME
S 5	| |__RUN STOP MODE
S 6	| |__JOG SETPOINT
S 7	| |__V/F SHAPE
S 8	| |__QUADRATIC TORQUE
S 9	| |__MOTOR CURRENT
S 10	| |__FIXED BOOST

9

Keypad Menus

```
6511 Keypad        6901 Keypad/DSE
    S 11          |        |__CURRENT LIMIT
    S 12          |        |__MOTOR BASE FREQ
    S 13          |        |__MOTOR VOLTAGE
    S 14          |        |__NAMEPLATE RPM
    S 15          |        |__MOTOR POLES
    S 16          |        |__MOTOR CONNECTION
    S 17          |        |__PULSE ENC VOLTS
    S 18          |        |__ENCODER LINES
    S 19          |        |__ENCODER INVERT
    S 20          |        |__AUTOTUNE ENABLE
    S 21          |        |__AUTOTUNE MODE
    S 22          |        |__MAG CURRENT
    S 23          |        |__STATOR RES
    S 24          |        |__LEAKAGE INDUC
    S 25          |        |__MUTUAL INDUC
    S 26          |        |__ROTOR TIME CONST
    S 27          |        |__SPEED PROP GAIN
    S 28          |        |__SPEED INT TIME
    S 29          |        |__AIN 1 TYPE
    S 30          |        |__AIN 2 TYPE
    S 31          |        |__AIN 3 TYPE
    S 32          |        |__AIN 4 TYPE
    S 33          |        |__DISABLE TRIPS
    S 34          |        |__DISABLE TRIPS+
    S 35          |        |__VIEW LEVEL
    SYS           |__SYSTEM
                  |        |__SAVE CONFIG
```

The OPERATOR Menu

OPERATOR MENU 890CD Common Bus Drive & 890SD Standalone Drive		
6511 Display	6901 Display	
OP 1	SETPOINT (xxxxxx)	***Range:*** *—.xx %*
(Fixed as PREF 101.10) Indicates target speed. This will be equal to either: LOCAL SETPOINT, REMOTE SETPOINT, JOG SETPOINT, COMMS SETPOINT or FIREWIRE SETPOINT.	*(Refer to the REFERENCE or REFERENCE JOG function blocks)*	
OP 2	SPEED DEMAND	***Range:*** *—.xx %*
(Default: PREF 101.16) Indicates actual speed demand. This is the input to the Drive.	*(Refer to the REFERENCE function block)*	
OP 3	DRIVE FREQUENCY	***Range:*** *—.xx Hz*
(Default: PREF 73.04) The Drive output frequency.	*(Refer to the REFERENCE function block)*	
OP 4	MOTOR CURRENT A	***Range:*** *—.xx A*
(Default: PREF 70.13) This diagnostic contains the level of rms line current being drawn from the Drive.	*(Refer to the REFERENCE function block)*	
OP 5	TORQUE FEEDBACK	***Range:*** *—.xx %*
(Default: PREF 70.10) Shows the estimated motor torque, as a percentage of rated motor torque.	*(Refer to the REFERENCE function block)*	
OP 6	DC LINK VOLTS	***Range:*** *—. V*
(Default: PREF 70.02) This shows the voltage on the dc link capacitors.	*(Refer to the REFERENCE function block)*	

The DIAGNOSTIC Menu

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
101.09	d 1	SPEED DEMAND	***Range:*** *—.xx %*
	Indicates actual speed demand. This is the input to the frequency controller.		
		(Refer to the REFERENCE function block)	
101.01	d 2	REMOTE SETPOINT	***Range:*** *—.xx %*
	This is the target reference that the drive will ramp to in remote reference mode (not including trim), direction is taken from REFERENCE::REMOTE REVERSE and the sign of REMOTE SETPOINT.		
		(Refer to the REFERENCE function block)	
101.14	d 3	COMMS SETPOINT	***Range:*** *—.xx %*
	This setpoint is the target reference that the drive will ramp to in Remote Reference Comms mode (not including trim). The direction is always positive, i.e. forward.		
		(Refer to the REFERENCE function block)	
101.12	d 4	LOCAL SETPOINT	***Range:*** *—.xx %*
	Indicates the Keypad setpoint. It is always a positive quantity; saved on power down. Direction is taken from LOCAL REVERSE.		
		(Refer to the REFERENCE function block)	
103.01	d 5	(JOG) SETPOINT	***Range:*** *—.xx %*
	The setpoint is the target reference that the drive will ramp to in Jog Reference mode.		
		(Refer to the REFERENCE JOG function block)	

DIAGNOSTIC MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511 Display	6901 Display	
78.17	d 6	TOTL SPD DMD RPM	***Range:*** *—.xx rpm*
	The final value of speed demand obtained after summing all sources in rpm. *(Refer to the SPEED LOOP function block)*		
78.18	d 7	TOTAL SPD DMD %	***Range:*** *—.xx %*
	The final value of speed demand obtained after summing all sources as a percentage of MAX SPEED CLAMP (REFERENCE function block). *(Refer to the SPEED LOOP function block)*		
70.04	d 8	SPEED FBK RPM	***Range:*** *—.xx rpm*
	The mechanical speed of the motor shaft in revolutions per minute. *(Refer to the FEEDBACKS function block)*		
70.06	d 9	SPEED FBK %	***Range:*** *—.xx %*
	Shows the mechanical speed of the motor shaft as a percentage of MAX SPEED CLAMP (REFERENCE function block). *(Refer to the FEEDBACKS function block)*		
78.19	d 11	SPEED ERROR	***Range:*** *—.xx %*
	The difference between the demanded speed and the actual speed. *(Refer to the SPEED LOOP function block)*		
73.04	d 12	DRIVE FREQUENCY	***Range:*** *—.xx Hz*
	Shows the drive output frequency in Hz. *(Refer to the PATTERN GEN function block)*		

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
78.21	d 13	DIRECT INPUT	***Range:*** *—.xx %*
	The value of the direct input, after scaling and clamping. *(Refer to the SPEED LOOP function block)*		
78.16	d 14	TORQ DMD ISOLATE	***Range****: FALSE / TRUE*
	Speed Control mode and Torque Control mode selection. Torque Control mode = TRUE. *(Refer to the SPEED LOOP function block)*		
83.05	d 15	ACTUAL POS LIM	***Range:*** *—.xx %*
	The final actual positive torque limit as a percentage of rated motor torque. *(Refer to the TORQUE LIMIT function block)*		
83.06	d 16	ACTUAL NEG LIM	***Range:*** *—.xx %*
	The final actual negative torque limit as a percentage of rated motor torque. *(Refer to the TORQUE LIMIT function block)*		
78.07	d 17	AUX TORQUE DMD	***Range:*** *—.xx %*
	The auxiliary motor torque as a percentage of rated motor torque as a percentage of rated motor torque. *(Refer to the SPEED LOOP function block)*		
78.20	d 18	TORQUE DEMAND	***Range:*** *—.xx %*
	The demanded motor torque as a percentage of rated motor torque. *(Refer to the SPEED LOOP function block)*		

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
70.10	d 19	TORQUE FEEDBACK	***Range:*** *—.xx %*
	The estimated motor torque, as a percentage of rated motor torque. *(Refer to the FEEDBACKS function block)*		
70.11	d 20	FIELD FEEDBACK	***Range:*** *—.xx %*
	A value of 100% indicates the motor is operating at rated magnetic flux (field). *(Refer to the FEEDBACKS function block)*		
70.12	d 23	MOTOR CURRENT %	***Range:*** *—.xx %*
	This diagnostic contains the level of rms line current being drawn from the drive and is seen as a % of the MOTOR CURRENT parameter setting in the MOTOR DATA function block. *(Refer to the FEEDBACKS function block)*		
70.13	d 24	MOTOR CURRENT A	***Range:*** *—.x A*
	This diagnostic contains the level of rms line current being drawn from the drive. *(Refer to the FEEDBACKS function block)*		
70.02	d 25	DC LINK VOLTS	***Range:*** *—. V*
	The internal dc voltage tested across the DC link capacitors. *(Refer to the FEEDBACKS function block)*		
70.03	d 26	TERMINAL VOLTS	***Range:*** *—. V*
	This shows the rms voltage, between phases, applied by the drive to the motor terminals. *(Refer to the FEEDBACKS function block)*		

9

DIAGNOSTIC MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511 Display	6901 Display	
99.06	d 31	BRAKING	***Range:*** *FALSE / TRUE*
	A read-only parameter indicating the state of the dynamic brake switch. *(Refer to the DYNAMIC BRAKING function block)*		
73.04	d 32	DRIVE FREQUENCY	***Range:*** *—.x Hz*
	The drive output frequency in Hertz. *(Refer to the PATTERN GEN function block)*		
97.05	d 33	ACTIVE TRIPS	***Range:*** *0000 to FFFF*
	Indicates which trips are currently active. These parameters are a coded representation of the trip status. *(Refer to the TRIPS STATUS function block)*		
97.06	d 34	ACTIVE TRIPS +	***Range:*** *0000 to FFFF*
	Indicates which trips are currently active. These parameters are a coded representation of the trip status. *(Refer to the TRIPS STATUS function block)*		
97.09	d 35	FIRST TRIP	***Range:*** *Enumerated - refer to block*
	From when a trip occurs until that trip is reset, this parameter indicates the trip source. When several trips have occurred, this parameter indicates the first one that was detected. *(Refer to the TRIPS STATUS function block)*		

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
96.01	d 36	TRIP 1 (NEWEST)	***Range:*** *Enumerated - refer to block*
	Records the most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.02	d 37	TRIP 2	***Range:*** *Enumerated - refer to block*
	Records the second most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.03	d 38	TRIP 3	***Range:*** *Enumerated - refer to block*
	Records the third most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.04	d 39	TRIP 4	***Range:*** *Enumerated - refer to block*
	Records the fourth most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.05	d 40	TRIP 5	***Range:*** *Enumerated - refer to block*
	Records the fifth most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		

9

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
96.06	d 41	TRIP 6	***Range:*** *Enumerated - refer to block*
	Records the sixth most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.07	d 42	TRIP 7	***Range:*** *Enumerated - refer to block*
	Records the seventh most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.08	d 43	TRIP 8	***Range:*** *Enumerated - refer to block*
	Records the eighth most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.09	d 44	TRIP 9	***Range:*** *Enumerated - refer to block*
	Records the ninth most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		
96.10	d 45	TRIP 10 (OLDEST)	***Range:*** *Enumerated - refer to block*
	Records the tenth most recent trip that caused the drive to stop. *(Refer to the TRIPS STATUS function block)*		

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
1.06	d 46	ANALOG INPUT 1	***Range:*** *—.xx %*
	(VALUE) The input reading.		
			(Refer to the ANALOG INPUT function block)
2.06	d 47	ANALOG INPUT 2	***Range:*** *—.xx %*
	(VALUE) The input reading.		
			(Refer to the ANALOG INPUT function block)
3.06	d 48	ANALOG INPUT 3	***Range:*** *—.xx %*
	(VALUE) The input reading.		
			(Refer to the ANALOG INPUT function block)
4.06	d 49	ANALOG INPUT 4	***Range:*** *—.xx %*
	(VALUE) The input reading.		
			(Refer to the ANALOG INPUT function block)
5.06	d 50	ANALOG INPUT 5	***Range:*** *—.xx %*
	(VALUE) The input reading (ANIN1 - ANIN2).		
			(Refer to the ANALOG INPUT function block)
8.02	d 51	DIGITAL INPUT 1	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)

9

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
9.02	d 52	DIGITAL INPUT 2	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
10.02	d 53	DIGITAL INPUT 3	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
11.02	d 54	DIGITAL INPUT 4	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
12.02	d 55	DIGITAL INPUT 5	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
13.02	d 56	DIGITAL INPUT 6	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
14.02	d 57	DIGITAL INPUT 7	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)

DIAGNOSTIC MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511 Display	6901 Display	
15.02	d 58	DIGITAL INPUT 8	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
16.02	d 59	DIGITAL INPUT 9	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE input.		
			(Refer to the DIGITAL INPUT function block)
6.01	d 60	ANALOG OUTPUT 1	***Range:*** *—.xx %*
	(VALUE) The demanded value to output.		
			(Refer to the ANALOG OUTPUT function block)
7.01	d 61	ANALOG OUTPUT 2	***Range:*** *—.xx %*
	(VALUE) The demanded value to output.		
			(Refer to the ANALOG OUTPUT function block)
17.01	d 62	DIGITAL OUTPUT 1	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE output demand.		
			(Refer to the DIGITAL OUTPUT function block)
18.01	d 63	DIGITAL OUTPUT 2	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE output demand.		
			(Refer to the DIGITAL OUTPUT function block)

DIAGNOSTIC MENU 890CD Common Bus Drive & 890SD Standalone Drive			
PREF	6511 Display	6901 Display	
19.01	d 64	DIGITAL OUTPUT 3	***Range:*** *FALSE / TRUE*
	(VALUE) The TRUE or FALSE output demand.		
			(Refer to the DIGITAL OUTPUT function block)

9

The QUICK SETUP Menu

Note ***For more information about these and additional parameters accessible using the DSE Configuration Tool. Refer to Appendix D or the DSE Configuration Tool on the CD supplied with your drive.***

The 890 menu system has been designed for use with the DSE Configuration Tool. Hence, the tool is the preferred method of programming, however it is possible to edit some parameters using the keypad.

The parameters most likely to require attention are contained in the QUICK SETUP menu at level 1.

Saving Your Modifications

When parameter values are modified the new settings must be saved. The drive will not retain new settings during power-down unless they have been saved. Refer to "Saving Your Application" if using the keypad.

Note ***The "Range" for a parameter value is given in the Configurable Parameters Table. Ranges for outputs are given as "—.xx %", for example, indicating an indeterminate integer for the value, to two decimal places.***

The Default values in the table below are correct for when the UK country code is selected and a 400V 2.2kW Frame B power board is fitted. Some parameters in the table are marked:

* Value dependent upon the Language field of the Product Code, e.g. UK

The values for these parameters may be different for your drive/application.

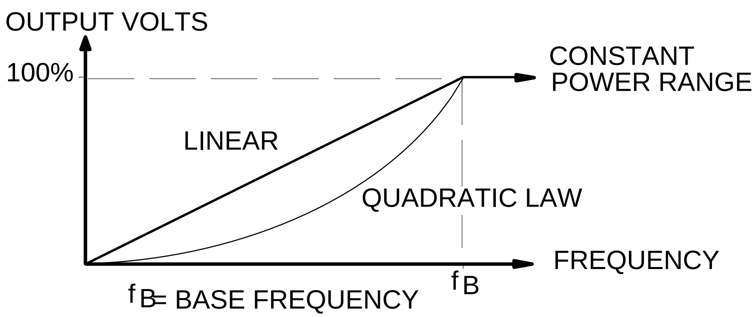
QUICK SETUP MENU 890CD Common Bus Drive & 890SD Standalone Drive				
PREF	6511/6901 Display	Description	Range	Default
27.01	S 1 CONTROL MODE	This parameter contains the main method of motor control used by the drive	0 : VOLTS / Hz 1 : SENSORLESS VEC 2 : CLOSED-LOOP VEC 3 : 4-Q REGEN	0
101.08	S 2 * MAX SPEED	The speed at which the 890 will run when maximum setpoint is applied. The default is Product Code dependent	0 to 32000 RPM	1500 RPM
100.02	S 3 RAMP ACCEL TIME	The time taken for the 890 output frequency to ramp up from zero to MAX SPEED	0.0 to 3000.0s	10.0s
100.03	S 4 RAMP DECEL TIME	The time taken for the 890 output frequency to ramp down from MAX SPEED to zero	0.0 to 3000.0s	10.0s

QUICK SETUP MENU
890CD Common Bus Drive & 890SD Standalone Drive

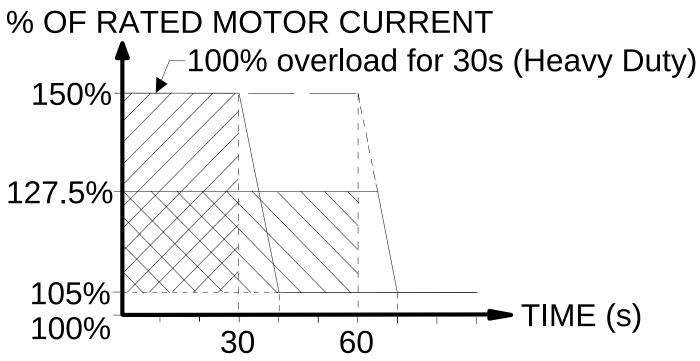
PREF	6511/6901 Display	Description	Range	Default
102.01	5 5 RUN STOP MODE	RUN RAMP : The motor speed is reduced to zero at a rate set by RAMP DECEL TIME (S4). A 2 second DC pulse is applied at end of ramp COAST : The motor is allowed to freewheel to a standstill DC INJECTION : On a stop command, the motor volts are rapidly reduced at constant frequency to deflux the motor. A low frequency braking current is then applied until the motor speed is almost zero. This is followed by a timed DC pulse to hold the motor shaft. STOP RAMP : The motor will decelerate at a rate set by STOP TIME (REFERENCE STOP function block).	0 : RUN RAMP 1 : COAST 2 : DC INJECTION 3 : STOP RAMP	0
103.01	5 6 JOG SETPOINT	Speed the 890 will run at if the Jog input is high, as a percentage of the MAX SPEED parameter	-100.00 to 100.00%	10.00%

QUICK SETUP MENU
890CD Common Bus Drive & 890SD Standalone Drive

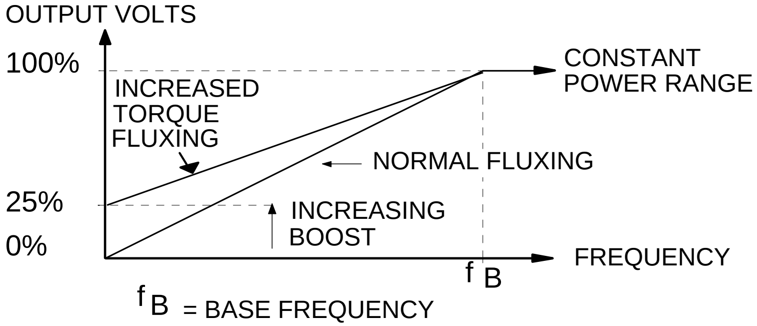
PREF	6511/6901 Display	Description	Range	Default
21.01	5 7 V/F SHAPE	LINEAR LAW: This gives a constant flux characteristic up to the BASE FREQUENCY FAN LAW: This gives a quadratic flux characteristic up to the BASE FREQUENCY. This matches the load requirement for fan and most pump applications USER DEFINED: This gives a user defined flux characteristic up to the BASE FREQUENCY	0 : LINEAR LAW 1 : FAN LAW 2 : USER DEFINED	0



QUICK SETUP MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511/6901 Display	Description	Range	Default
70.01	S 8 QUADRATIC TORQUE	 FALSE - CONSTANT: Inverse time allows 150% overload for 60s, then ramps back the current limit to 105% over a 10s period. At a lower load, the overload area remains the same, e.g. at 127.5% load for 120s - after 120s has expired, the output of the inverse time function is ramped back over a 10s period from 150% as before. TRUE - QUADRATIC: current limit is set to 110% motor current, inverse time delay is set to 30s	0=FALSE 1=TRUE **Note that 890 Frames B, C & D have no quadratic torque current rating.**	0
70.13	S 9 MOTOR CURRENT	This parameter contains the motor nameplate full-load line current	0.01 to 999.99A	product code dependent

QUICK SETUP MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511/6901 Display	Description	Range	Default
21.03	S 10 FIXED BOOST	Used to correctly flux the motor at low speeds. This allows the drive to produce greater starting torque for high friction loads. It increases the motor volts above the selected V/F characteristic at the lower end of the speed range  	0.00 to 25.00%	product code dependent
82.01	S 11 CURRENT LIMIT	This parameter sets the level of motor current, as a % of MOTOR CURRENT (S9) at which the drive begins to take current limit action.	0.00 to 300.00%	150.00%
27.03	S 12 MOTOR BASE FREQ	The output frequency at which maximum voltage is reached. The default is Product Code dependent	7.5 to 1000.0 Hz	50.0 Hz

QUICK SETUP MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511/6901 Display	Description	Range	Default
27.04	S 13 * MOTOR VOLTAGE	This parameter contains the motor nameplate voltage at base frequency	0.0 to 575.0V	product code dependent
27.07	S 14 * NAMEPLATE RPM	This parameter contains the motor nameplate full-load rated speed. This is the motor speed in rpm at base frequency minus full load slip	0.0 to 30000.0 RPM	product code dependent
27.09	S 15 MOTOR POLES	This parameter contains the number of motor poles, as supplied on the motor nameplate	0=2 pole 1=4 pole 2=6 pole 3=8 pole 4=10 pole 5=12 pole	1
27.08	S 16 * MOTOR CONNECTION	This parameter contains the motor nameplate connection.	0= DELTA 1= STAR	1
71.01	S 17 PULSE ENC VOLTS	The voltage output from the encoder feedback card.	10 to 20V	5.0
71.02	S 18 ENCODER LINES	The number of lines must be set to match the type of encoder being used. Incorrect setting of this parameter will result in an erroneous speed measurement.	250 to 32767	2048

QUICK SETUP MENU 890CD Common Bus Drive & 890SD Standalone Drive				
PREF	6511/6901 Display	Description	Range	Default
71.03	S 19 ENCODER INVERT	When TRUE, changes the sign of the measured speed and the direction of the position count.	0=FALSE 1=TRUE	0
80.01	S 20 AUTOTUNE ENABLE	Determines whether the Autotune sequence is operational or not. The Autotune sequence is operational when set to TRUE and the drive is run	0=FALSE 1=TRUE	0
80.02	S 21 AUTOTUNE MODE	Selects the Autotune operating mode.	0 : STATIONARY 1 : ROTATING 2 : SPD LOOP ROTATING 3 : SPD LOOP STATIONARY	
27.06	S 22 MAG CURRENT	This parameter contains the motor model no-load line current as determined by the Autotune, or taken from the motor nameplate	0.00 to 3276.70 A	product code dependent
27.14	S 23 STATOR RES	This parameter contains the motor model per-phase stator resistance as determined by Autotune.	0.0000 to 250.0000Ω	product code dependent
27.15	S 24 LEAKAGE INDUC	This parameter contains the motor model per-phase leakage inductance as determined by Autotune.	0.00 to 300.00mH	product code dependent

QUICK SETUP MENU 890CD Common Bus Drive & 890SD Standalone Drive				
PREF	6511/6901 Display	Description	Range	Default
27.16	S 25 MUTUAL INDUC	This parameter contains the motor model per-phase mutual inductance as determined by Autotune.	0.00 to 3000.00mH	product code dependent
27.17	S 26 ROTOR TIME CONST	This parameter contains the motor model rotor time constant as determined by Autotune.	10.00 to 3000.00ms	product code dependent
78.01	S 27 SPEED PROP GAIN	Sets the proportional gain of the loop. Speed error (mechanical rev/s) x proportional gain = torque percent.	0.0 to 3000.0	product code dependent
78.02	S 28 SPEED INT TIME	This is the integral time constant of the speed loop. A speed error which causes the proportional term to produce a torque demand T, will cause the integral term to also ramp up to a torque demand T after a time equal to “speed int time”.	1 to 15000ms	product code dependent
1.03	S 29 AIN 1 TYPE	Selects input range for Analog Input 1.	0 = -10..+10 V 1 = 0..+10 V	0
2.03	S 30 AIN 2 TYPE	Selects input range for Analog Input 2.	0 = -10..+10 V 1 = 0..+10 V	0

QUICK SETUP MENU
890CD Common Bus Drive & 890SD Standalone Drive

PREF	6511/6901 Display	Description	Range	Default
3.03	S 31 AIN 3 TYPE	Selects input range for Analog Input 3.	0 = -10..+10 V 1 = 0..+10 V 2 = 0..20 mA 3 = 4..20 mA	0
4.03	S 32 AIN 4 TYPE	Selects input range for Analog Input 4.	0 = -10..+10 V 1 = 0..+10 V 2 = 0..20 mA 3 = 4..20 mA	0
97.01	S 33 DISABLE TRIPS	Indicates which trips have been disabled. Not all trips may be disabled, the DISABLED TRIPS mask is ignored for trips that cannot be disabled. Refer to Chapter 10.	0000 to FFFF	0700
97.02	S 34 DISABLE TRIPS+	Indicates which trips have been disabled. Not all trips may be disabled, the DISABLED TRIPS mask is ignored for trips that cannot be disabled. Refer to Chapter 10.	0000 to FFFF	0840
31.01	S 35 VIEW LEVEL	Selects the menu to be displayed by the keypad.	0 : OPERATOR 1 : BASIC 2 : ADVANCED	1

For more information refer to Chapter 4/5: Set-up Parameters.

The SETUP Menu

This menu contains all the parameters available to you when using the DSE 890 Configuration Tool.

ADVANCED view level must be selected to view this menu. It is only available on the 6901 keypad when using the 890CD Common Bus Drive and 890SD Standalone Drive.

Note ***We recommend that you program the 890 using the DSE Configuration Tool.***

For details of the parameters in this menu, refer to Appendix D.

The SYSTEM Menu

SAVE CONFIG

The SAVE CONFIG menu saves your current settings.

To save an application press the **M** key when displaying the SAVE CONFIG menu. Press the ▲ key to confirm, as instructed.

Saving again will overwrite the previous information.

Saved information is stored during power-down and is restored at power-up.

This does not save the link configuration. It saves information for MMI parameters.

Chapter 10

Trips and Fault Finding

Your drive may trip in order to protect itself. To restart the drive, you will need to clear the trip(s). This chapter provides a list of trips, as displayed by the 6511 keypad and 6901 keypad.

Trips

What Happens when a Trip Occurs

When a trip occurs, the drive's power stage is immediately disabled causing the motor and load to coast to a stop. The trip is latched until action is taken to reset it. This ensures that trips due to transient conditions are captured and the drive is disabled, even when the original cause of the trip is no longer present

Drive Indications

If a trip condition is detected the unit displays and performs the following actions.

1. The programming block SEQ & REF::SEQUENCING LOGIC::TRIPPED signal is set to TRUE.
2. The FIRST TRIP parameter in the TRIPS STATUS function block displays the trip ID. Refer to Chapter 9: "Keypad Menus" - DISABLE TRIPS, DISABLE TRIPS + for a table of enumerated values..

Keypad Indications (when connected)

If a trip condition is detected the MMI displays and performs the following actions.

1. The trip source is displayed on the keypad.
2. 6901 keypad only: the HEALTH LED on the Keypad flashes indicating a trip condition has occurred and a trip message is displayed stating the cause of the trip.
3. The trip message(s) must be acknowledged by pressing the **STOP** key. The trip message may be cleared by pressing the **E** key. Refer to Chapter 8: "The Keypad" - Alert Message Displays.

Resetting a Trip Condition

Before a trip can be reset, the trip condition must be removed.

Note ***A Heatsink Over-temperature trip may not reset immediately. The unit needs to cool sufficiently.***

Local Mode

To reset a trip in Local Mode:		
Remove the trip condition		Press the Stop key to clear the trip. You can now press Run to restart the system..

Remote Mode

To reset a trip in Remote Mode:		
Remove the trip condition		Press the Stop key to clear the trip. You can now press Run to restart the system..
Remove the trip condition	-	Alternatively, remove and re-apply the 24V supply at X01, or toggle the ENABLE to 0V and then 24V to restart the system.

Trips Table

The following trips may occur to protect the drive.

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
DCHI	OVERVOLTAGE	The drive internal dc link voltage is too high	♦ The supply voltage is too high ♦ Trying to decelerate a large inertia load too quickly ♦ The brake resistor is open circuit
DCLO	UNDERVOLTAGE	The drive internal dc link voltage is too low	♦ The supply voltage is too low ♦ The supply has been lost ♦ A supply phase is missing

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
OC	OVERCURRENT	The motor current being drawn from the drive is too high	♦ Trying to accelerate a large inertia load too quickly ♦ Trying to decelerate a large inertia load too quickly ♦ Application of shock load to motor ♦ Short circuit between motor phases ♦ Short circuit between motor phase and earth ♦ Motor output cables too long or too many parallel motors connected to the drive ♦ Fixed or auto boost levels are set too high
HOT	HEATSINK	The drive heatsink temperature is too high	♦ The ambient air temperature is too high ♦ Poor ventilation or spacing between drives
ET	EXTERNAL TRIP	User trip caused via control terminals	♦ +24V not present on external trip (terminal X15/05) ♦ Check setting of EXT TRIP MODE parameter
IN 1	INPUT 1 BREAK	I/O TRIPS:: INPUT 1 BREAK has gone True	♦ Check configuration to determine source of signal
IN 2	INPUT 2 BREAK	I/O TRIPS:: INPUT 2 BREAK has gone True	♦ Check configuration to determine source of signal

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
STLL	MOTOR STALLED	The motor has stalled (not rotating)	♦ Motor loading too great ♦ Current limit level is set too low ♦ Fixed or auto boost levels are set too high
IT	INVERSE TIME		♦ The inverse time current limit is active: motor loading is too great; fixed or autoboost levels are too high (Full Load Current = 150% for 60 seconds)
DB R	BRAKE RESISTOR	External dynamic braking resistor has been overloaded	♦ Trying to decelerate a large inertia load too quickly or too often
DB S	BRAKE SWITCH	Internal dynamic braking switch has been overloaded	♦ Trying to decelerate a large inertia load too quickly or too often
DISP	OP STATION	Keypad has been disconnected from drive whilst drive is running in local control	♦ Keypad accidentally disconnected from drive
SCI	LOST COMMS	Can't refresh the COMMS COMMAND parameter	♦ COMMS TIMEOUT parameter set too short (refer to COMMS CONTROL menu at level 3)

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
CNTC	CONTACTOR FBK		♦ The CONTACTOR CLOSED input in the SEQUENCING LOGIC function block remained FALSE after a run command was issued
SPD	SPEED FEEDBACK		♦ SPEED ERROR > 50.00% for 10 seconds
AOT	AMBIENT TEMP		♦ The ambient temperature in the drive is too high
OT	MOTOR OVERTEMP	The motor temperature is too high	♦ Excessive load ♦ Motor voltage rating incorrect ♦ FIXED BOOST and/or AUTO BOOST set too high ♦ Prolonged operation of the motor at low speed without forced cooling ♦ Check setting of INVERT THERMIST parameter in I/O TRIPS menu at level 3. ♦ Break in motor thermistor connection

Trips and Fault Finding


6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
I HI	CURRENT LIMIT	V/Hz mode only: If the current exceeds 180% of induction stack rated current for a period of 1 second, the drive will trip. This is caused by shock loads	♦ Remove the cause of the shock load
A24SC	24V FAILURE	The 24V customer output has fallen below 17V	♦ 24V customer output is short circuited ♦ Excessive loading
LSPD	LOW SPEED OVER I	The motor is drawing too much current (>100%) at zero output frequency	♦ FIXED BOOST and/or AUTO BOOST set too high (refer to FLUXING menu at level 3)
PHAS	PHASE FAIL		♦ One or more input phases not present
ENC 1	FBK ENCODER FAIL		♦ Encoder fault - this trip is not functional in software version 1.x
SHRT	DESAT (OVER I)		♦ Instantaneous overcurrent. Refer to OVERCURRENT in this table

10

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
DCRP	VDC RIPPLE		♦ The dc link ripple voltage is too high. Check for a missing input phase.
DBSC	BRAKE SHORT CCT	Brake resistor overcurrent	♦ Check brake resistance is not less than minimum value allowed ♦ check wiring and brake resistor for earth faults
OSPD	OVERSPEED		♦ Speed feedback > 150% for 0.1 seconds
ANIN	ANALOG INPUT ERR		♦ 4-20mA analog input current > 22mA could damage the input circuit
DBCT	INT DB RESISTOR		♦ Braking mode set to INTERNAL (future use only). Set to EXTERNAL and connect an External Braking Resisitor if braking is required.
TRIP	UNKNOWN		♦ An unknown trip - refer to Parker SSD Drives
TR32	OTHER		♦ Refer to OTHER on page 10-16. One or more trips have occurred with a Value greater than 32. See the list.

Trips and Fault Finding

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
ATN1	MAX SPEED LOW		♦ During Autotune the motor is required to run at the nameplate speed o f the motor. If MAX SPEED RPM limits the speed to less than this value, an error will be reported. Increase the value of MAX SPEED RPM up to the nameplate rpm of the motor (as a minimum). It may be reduced, if required, after the Autotune is complete.
ATN2	MAINS VOLTS LOW		♦ The mains input voltage is not sufficient to carry out the Autotune. Re-try when the mains has recovered.
ATN 3	NOT AT SPEED		♦ The motor was unable to reach the required speed to carry out the Autotune. Possible reasons include: motor shaft not free to turn; the motor data is incorrect
ATN4	MAG CURRENT FAIL		♦ It was not possible to find a suitable value of magnetising current to achieve the required operating condition for the motor. Check the motor data is correct, especially nameplate rpm and motor volts. Also check that the motor is correctly rated for the drive.


6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
ATN5	NEGATIVE SLIP F		♦ Autotune has calculated a negative slip frequency, which is not valid. Nameplate rpm may have been set to a value higher than the base speed of the motor. Check nameplate rpm, base frequency, and pole pairs are correct.
ATN6	TR TOO LARGE		♦ The calculated value of rotor time constant is too large. Check the value of nameplate rpm.
ATN7	TR TOO SMALL		♦ The calculated value of rotor time constant is too small. Check the value of nameplate rpm.
ATN8	MAX RPM DATA ERR		♦ This error is reported when the MAX SPEED RPM is set to a value outside the range for which Autotune has gathered data. Autotune gathers data on the motor characteristics up to 30% beyond “max speed rpm”. If MAX SPEED RPM is later increased beyond this range, the drive had no data for this new operating area, and so will report an error. To run the motor beyond this point it is necessary to re-autotune with MAX SPEED RPM set to a higher value.
STAC	STACK TRIP		♦ The drive was unable to distinguish between an overcurrent/desat or overvoltage trip

Trips and Fault Finding

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
ATNA	LEAKGE L TIMEOUT		♦ The leakage inductance measurement requires a test current to be inserted into the motor. It has not been possible to achieve the required level of current. Check that the motor is wired correctly.
PLOS	POWER LOSS STOP		♦ Power Loss Stop sequence has ramped Speed Setpoint to zero or timed out
ATNC	MOTR TURNING ERR		♦ The motor must be stationary when starting the Autotune
ATND	MOTR STALLED ERR		♦ The motor must be able to rotate during Autotune
ATNE	AT TORQ LIM ERR		♦ The motor is in torque limit during Autotune
ECAL	ENCODR CAL ERROR	The drive has failed to set absolute position	♦ Check the encoder supports absolute position, and that the encoder is wired correctly.
GEAR	OUTPUT GBX ERROR		♦ A non-unity output gearbox is not supported if the encoder direction is reversed.
APP	APP HALTED		♦ The application has been halted by the DSE Configuration Tool

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
AERR	APP ERROR		♦ The application has ceased execution due to an error
FERR	FIRMWARE ERROR		♦ The firmware in the drive has stopped executing
TR53	TRACKING ERROR	The tracking error reached the maximum authorised value	♦ osition and speed loop is badly tuned ♦ Load inertia is incorrectly set ♦ Motor/drive is undersized
TR54	LOOP OVERSPEED	Motor speed is excessive	♦ Default velocity (in TRAJ GEN DEFAULT) is too low ♦ Position and speed loop is badly tuned ♦ Load inertia is incorrectly set
TR55	LIMIT SWITCH	Limit switch is reached	♦ After a HOME sequence a limit switch is encountered
TR56	SOFT. LIMIT	Software limit is reached	♦ After a HOME sequence the actual position reached the software limit

6511 Keypad Display	6901 Keypad Display	Description	Possible Reason for Trip
TR57	RESOLVER ERROR	See function block description	♦ Motor current is too high
TR58	I2T MOTOR TRIP	See function block description	♦ Motor is undersized

DISABLE TRIPS, DISABLE TRIPS+

The DISABLE TRIPS, ACTIVE TRIPS, WARNINGS, TRIGGERS 1 and TRIGGERS 2 parameters use a four digit hexadecimal number to identify individual trips. Each trip has a unique corresponding number as shown below.

Trip Name (MMI)	Value	Mask	User Disable	Auto-restart
NO TRIP	0	0x0000	N/A	N/A
OVERVOLTAGE	1	0x0001	No	Yes
UNDERVOLTAGE	2	0x0002	No	Yes
OVERCURRENT	3	0x0004	No	Yes
HEATSINK	4	0x0008	No	Yes
EXTERNAL TRIP	5	0x0010	No	Yes
INPUT 1 BREAK	6	0x0020	Yes	Yes
INPUT 2 BREAK	7	0x0040	Yes	Yes
MOTOR STALLED	8	0x0080	Yes	Yes
INVERSE TIME	9	0x0100	Yes	Yes
BRAKE RESISTOR	10	0x0200	Yes	Yes
BRAKE SWITCH	11	0x0400	Yes	Yes
OP STATION	12	0x0800	Yes	Yes
LOST COMMS	13	0x1000	Yes	Yes
CONTACTOR FBK	14	0x2000	Yes	Yes
SPEED FEEDBACK	15	0x4000	Yes	Yes
AMBIENT TEMP	16	0x8000	No	Yes
MOTOR OVERTEMP	17	0x0001	Yes	Yes
CURRENT LIMIT	18	0x0002	No	Yes
TRIP 19 (Reserved)	19	0x0004	No	No
24V FAILURE	20	0x0008	Yes	Yes
LOW SPEED OVER I	21	0x0010	No	Yes

10

Trip Name (MMI)	Value	Mask	User Disable	Auto-restart
PHASE FAIL	22	0x0020	Yes	Yes
ENCODER 1 FAULT	23	0x0040	Yes	Yes
DESAT (OVER I)	24	0x0080	No	Yes
VDC RIPPLE	25	0x0100	No	Yes
BRAKE SHORT CCT	26	0x0200	No	Yes
OVERSPEED	27	0x0400	Yes	Yes
ANALOG INPUT ERR	28	0x0800	Yes	Yes
INT DB RESISTOR	29	0x1000	No	No
TRIP 30 (Reserved)	30	0x2000	No	No
UNKNOWN	31	0x4000	No	Yes
OTHER	32	0x8000	No	Yes
MAX SPEED LOW	33	0x8000	N/A	N/A
MAINS VOLTS LOW	34	0x8000	N/A	N/A
NOT AT SPEED	35	0x8000	N/A	N/A
MAG CURRENT FAIL	36	0x8000	N/A	N/A
NEGATIVE SLIP F	37	0x8000	N/A	N/A
TR TOO LARGE	38	0x8000	N/A	N/A
TR TOO SMALL	39	0x8000	N/A	N/A
MAX RPM DATA ERR	40	0x8000	N/A	N/A
STACK TRIP	41	0x8000	N/A	N/A
LEAKGE L TIMEOUT	42	0x8000	N/A	N/A
POWER LOSS STOP	43	0x8000	N/A	N/A
MOTR TURNING ERR	44	0x8000	N/A	N/A
MOTR STALLED ERR	45	0x8000	N/A	N/A
AT TORQ LIM ERR	46	0x8000	N/A	N/A
FW ISR TIMEOUT	47	0x8000	N/A	N/A
ENCODR CAL ERROR	48	0x8000	N/A	N/A
OUTPUT GBX ERROR	49	0x8000	N/A	N/A

Trip Name (MMI)	Value	Mask	User Disable	Auto-restart
APP HALTED	50	0x8000	N/A	N/A
APP ERROR	51	0x8000	N/A	N/A
FIRMWARE ERROR	52	0x8000	N/A	N/A
TRACKING ERROR	53	0x8000	N/A	N/A
LOOP OVERSPEED	54	0x8000	N/A	N/A
LIMIT SWITCH	55	0x8000	N/A	N/A
SOFT. LIMIT	56	0x8000	N/A	N/A
RESOLVER ERROR	57	0x8000	N/A	N/A
I2T MOTOR TRIP	58	0x8000	N/A	N/A

The DISABLE TRIPS+, ACTIVE TRIPS+, WARNINGS+, TRIGGERS+ 1 and TRIGGERS+ 2 parameters use a four digit hexadecimal number to identify individual trips. Each trip has a unique corresponding number as shown.

Decimal number	Display
10	A
11	B
12	C
13	D
14	E
15	F

Hexadecimal Representation of Trips

When more than one trip is to be represented at the same time then the trip codes are simply added together to form the value displayed. Within each digit, values between 10 and 15 are displayed as letters A to F

For example referring to the tables above, if the ACTIVE TRIPS parameter is **02A8,** then this represents:

a "**2**" in digit 3

an "8" and a "2" in digit 2
(8+2 = 10, displayed as **A**)

an "**8**" in digit 1

This in turn represents the active trips BRAKE RESISTOR, MOTOR STALLED, INPUT 1 BREAK and HEATSINK TEMP, (an unlikely situation).

In the same way, the ACTIVE TRIPS + parameter displaying **02A8** would represent CURRENT LIMIT, DESAT (OVER I), TRIP 22 and 24V failure, (another unlikely situation).

Automatic Trip Reset (6901 keypad)

Using the Keypad, the drive can be configured to automatically attempt to reset a trip when an attempt is made to start driving the motor, or after a preset time once the trip condition has occurred. The following function blocks (MMI menus) are used to enable automatic trip resets.

Seq & Ref::Auto Restart (Auto-Reset)
Seq & Ref::Sequencing Logic

Setting Trip Conditions (6901 keypad)

The following function blocks (MMI menus) are used to set trip conditions:

Trips::I/O Trips
Trips::Trips Status

Viewing Trip Conditions (6901 keypad)

The following function blocks (MMI menus) can be viewed to investigate trip conditions:

Seq & Ref::Sequencing Logic
Trips::Trips History
Trips::Trips Status
Trips Status::Active Trips
Trips Status::Active Trips+
Trips Status::First Trip
Trips History::Trip 1 (NEWEST) to Trip 10 (OLDEST)

Viewing Trip Conditions (6511 keypad)

The following function blocks (MMI menus) can be viewed to investigate trip conditions:

Trips Status::Active Trips
Trips Status::Active Trips+
Trips Status::First Trip
Trips History::Trip 1 (NEWEST) to Trip 10 (OLDEST)

Alert Messages

A message will be displayed on the Keypad when either:

- A requested operation is not allowed
- The drive has tripped

The table below lists the messages and the reason for each message.

Alert Message IDs			
ID	**Message**		**Reason**
	6901 Keypad	**6511 Keypad**	
0			No Alert
1	RUNTIME ALERT XXXX YYYYYYYY	XXXX	Runtime alert
2	SAVING	SAVE	Saving to flash
3	LOADING	LOAD	Loading from flash.
4	LIMIT REACHED	HI	High or low limit reached while editing.
5	KEY INACTIVE RUN FORWARD TRUE	RUN	Can’t switch to remote mode.
6	KEY INACTIVE RUN REV TRUE	RUN	Can’t switch to remote mode.
7	KEY INACTIVE JOG TRUE	JOG	Can’t switch to remote mode.

Alert Message IDs			
ID	**Message**		**Reason**
	6901 Keypad	**6511 Keypad**	
8	KEY INACTIVE REMOTE SEQ	SEQ	Run, Jog and direction keys inactive.
9	KEY INACTIVE REMOTE REF	REF	Direction key inactive.
10	KEY INACTIVE DRIVE RUNNING	RUN	Local/Remote and Jog keys inactive.
11	KEY INACTIVE COAST STOP FALSE	STOP	Run and Jog keys over ridden.
12	KEY INACTIVE FAST STOP FALSE	STOP	Run and Jog keys over ridden.
13	KEY INACTIVE ENABLE FALSE	ENBL	Run and Jog keys over ridden.
14	CONFIG MODE FAILED	ERR1	Unable to enter configuration mode.
15	KEY INACTIVE READ ONLY	READ	Can’t edit read-only parameters
16	KEY INACTIVE PARAMETER LINKED	READ	Obsolete message

Alert Message IDs			
ID	Message		Reason
	6901 Keypad	6511 Keypad	
17	PASSWORD LOCKED	PASS	Incorrect password entered Password activated, (by pressing E key at the top of the MMI tree)
18	CHECKSUM FAIL DEFAULTS LOADED	ERR2	Error reading data on power-up.
19	SUCCESS	GOOD	
20	FAILED	FAIL	
21	NEW PCODE FAILED	FAIL	Failed to save new product code or country data.
22	DEFAULTS LOADED	DATA	Loaded default fixed parameters.
23	KEY INACTIVE NO FREE LINKS	ERR3	Obsolete message
24	KEY INACTIVE LOCKED	ERR4	Obsolete message
25	QUADRATIC TORQUE UP TO CONFIRM	ND	Validate change to quadratic torque mode.
26	CONSTANT TORQUE UP TO CONFIRM	HD	Validate change to constant torque mode.

Alert Message IDs			
ID	**Message**		**Reason**
	6901 Keypad	**6511 Keypad**	
27	USING BACKUP APPLICATION	ERR5	Failed to load most recently save application, using previous copy. This applies to: Fixed parameter file, (APP.CFG) Fixed motor data file, (MOTOR1.MOT) Fixed persistent data file, (APP.PST) Default frequency and language file, (COUNTRY.SYS) Drive ID file, (DRIVE_ID.SYS), now obsolete.
28	NEW PCODE SUCCESS	CODE	Saved new product code.
29	CONFIG MODE LOCKED	CONF	Exiting configuration mode.
30	FILE SYSTEM CORRUPT	FILE	The file store is corrupted. All saved files are lost.
31	USING BACKUP POWER DATA	CODE	At least one copy of the stack eeprom data has been corrupted.
32	POWER DATA CORRUPT	CODE	All copies of the stack eeprom data have been corrupted.

Alert Message IDs			
ID	Message		Reason
	6901 Keypad	6511 Keypad	
33	NEW POWER DATA DEFAULTS LOADED	CODE	Power board data on the control board does not match that on the stack eeprom.
34	LANGUAGE DEFAULTS LOADED	LANG	Default language and frequency settings lost.
35	USING BACKUP LANGUAGE	LANG	Obsolete message
36	APPLICATION NOT FOUND	DATA	Attempt to save fixed parameter set before it is valid.
37	AUTOTUNE IN PROGRESS	ATN	
38	OPERATOR	OPER	Alert displayed while changing to the operator menu on pressing the PROG key.
39	DIAGNOSTIC	DIAG	Alert displayed while changing to the diagnostic menu on pressing the PROG key.
40	QUICK SETUP	SET	Alert displayed while changing to the quick setup menu on pressing the PROG key.
41	SETUP	PAR	Alert displayed while changing to the setup menu on pressing the PROG key.
42	SYSTEM	SYS	Alert displayed while changing to the system menu on pressing the PROG key.

Alert Message IDs			
ID	**Message**		**Reason**
	6901 Keypad	**6511 Keypad**	
43	SUPER USER TRUE	SUPR	Reserved for Parker SSD Drives.
44	INCOMPATIBLE POWER BOARD	ERR6	Power board 500v and/or underlap signals incompatible with selected product code.
45	CALIBRATION CHECKSUM FAIL	CAL	The control board calibration data is invalid.
46	INCOMPATIBLE PCB	PCB	Software is not compatible with this version of control card PCB.
47	INCOMPATIBLE POWER BOARD TYPE	TYPE	Stack has been marked as a 650 or Baldor stack
48	INCOMPATIBLE EEPROM FLAGS	FLGS	Reserved flags in stack eeprom are not zero. See comms command ri.
49	INCOMPATIBLE POWER BOARD CODE	CODE	Product code not compatible with this version of software.

Fault Finding

Problem	Possible Cause	Remedy
Drive will not power-up	Fuse blown	Check supply details, replace with correct fuse.
		Check Product Code against Model No.
	Faulty cabling	Check all connections are correct and secure.
		Check cable continuity
Drive fuse keeps blowing	Faulty cabling or connections wrong	Check for problem and rectify before replacing with correct fuse
	Faulty drive	Contact Parker SSD Drives
Cannot obtain HEALTH state	Incorrect or no supply available	Check supply details
Motor will not run at switch-on	Motor jammed	Stop the drive and clear the jam
Motor runs and stops	Motor becomes jammed	Stop the drive and clear the jam
Motor won't rotate or runs in reverse	Encoder fault	Check encoder connections
	Open circuit speed reference potentiometer	Check terminal

Table 10-1 Fault Finding

Control Board STATUS LED Indications

Colour	LED Indication	Description
OFF/GREEN	FLASH Off 95 : Green 5	Initialization, checking for network
GREEN/OFF	FLASH Green 50 : Off 50	OK – application running, no network
GREEN/OFF	FLASH Green 95 : Off 5	OK – application running, network OK
RED/GREEN	ALTERNATING Red 95 : Green 5	Node halted
RED/GREEN	ALTERNATING Red 5 : Green 95	Duplicate address in network
RED/OFF	FLASH Red 50 : Off 50	No configuration
RED/GREEN	ALTERNATNG Red 50 : Green 50	Application error

Chapter 11

Routine Maintenance and Repair

Routine Maintenance

Periodically inspect the drive for build-up of dust or obstructions that may affect ventilation of the unit. Remove this using dry air.

Repair

There are no user-serviceable components.

IMPORTANT **MAKE NO ATTEMPT TO REPAIR THE UNIT - RETURN IT TO PARKER SSD DRIVES.**

Saving Your Application Data

In the event of a repair, application data will be saved whenever possible. However, we advise you to copy your application settings before returning the unit.

Returning the Unit to Parker SSD Drives

Please have the following information available:

- The model and serial number - see the unit's rating label
- Details of the fault

Contact your nearest Parker SSD Drives Service Centre to arrange return of the item.

You will be given a *Returned Material Authorisation.* Use this as a reference on all paperwork you return with the faulty item. Pack and despatch the item in the original packing materials; or at least an anti-static enclosure. Do not allow packaging chips to enter the unit.

Disposal

This product contains materials which are consignable waste under the Special Waste Regulations 1996 which complies with the EC Hazardous Waste Directive - Directive 91/689/EEC.

We recommend you dispose of the appropriate materials in accordance with the valid environmental control laws. The following table shows which materials can be recycled and which have to be disposed of in a special way.**{**xe "Disposal" \f **}**

Material	Recycle	Disposal
metal	yes	no
plastics material	yes	no
printed circuit board	no	yes

The printed circuit board should be disposed of in one of two ways:

1. High temperature incineration (minimum temperature 1200°C) by an incinerator authorised under parts A or B of the Environmental Protection Act
2. Disposal in an engineered land fill site that is licensed to take aluminium electrolytic capacitors. Do not dispose of in a land fill site set aside for domestic waste.

Packaging

During transport our products are protected by suitable packaging. This is entirely environmentally compatible and should be taken for central disposal as secondary raw material.

Appendix A
Options

This Chapter contains information about various options that can be fitted to the 890 range.

A

Option Cards

There are a range of Option Cards that may come factory-fitted to the 890CD and 890SD drives, or are available for customer fitting.

The options provide for fieldbus communications and speed feedback and are mounted on to the Control Board.

Refer to the Technical Manual suppled with each Option Card for detailed instructions.

Option Card A slot

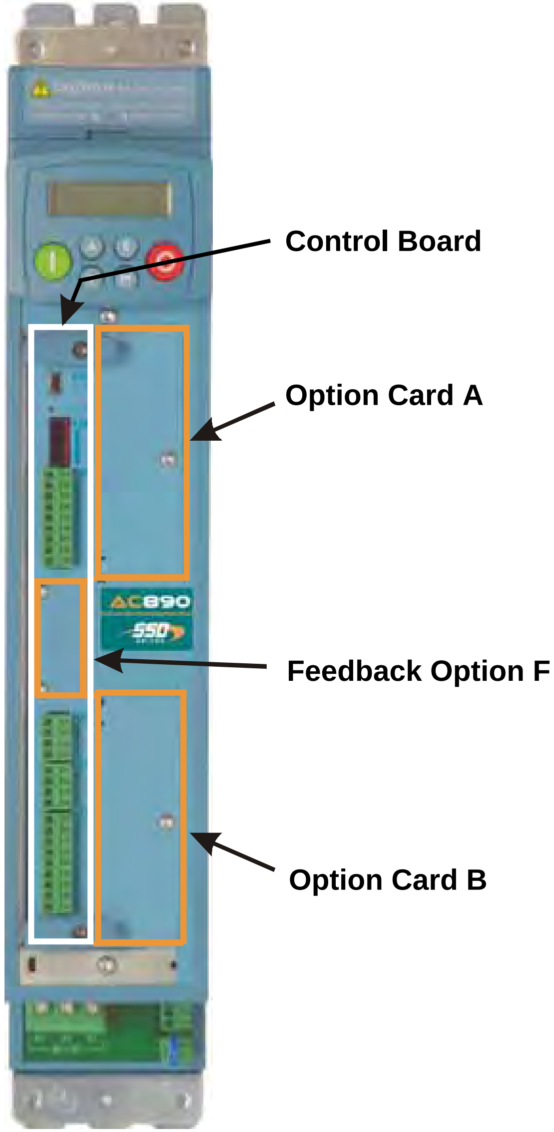
Fieldbus communications option cards for all major protocols

Option Card B slot

Fieldbus communications option cards for all major protocols (FireWire is currently fitted to this slot only)

Option Card F slot

Speed feedback option cards



Removing the Control Board

WARNING!

Disconnect all sources of power before attempting installation. Injury or death could result from unintended actuation of controlled equipment.

Caution

This option contains ESD (Electrostatic Discharge) sensitive parts. Observe static control precautions when handling, installing and servicing this option.

1. Undo the two screws securing Option A and Option B to the front of the drive. If options are not fitted, completely remove the blank covers for the Option A and Option B slots.
2. Undo the screws (A) located in the top and bottom handles of the control board. Gently pull on the handles to withdraw the board from the drive, supporting any attached option boards. Note that the boards are sliding in top and bottom slots.
3. Refer to the Option Card Technical Manual for fitting/wiring details.
4. Replace the control board (with attached options) into the drive.
5. Tighten the Option A and Option B screws; or importantly, fit the blank covers and secure with the screws.

Figure A-1 Control board with an Option Card correctly mounted

Appendix B
Sequencing Logic

The 890CD Common Bus Drive and 890SD Standalone Drive's reaction to commands is defined by a state machine. This determines which commands provide the demanded action, and in which sequence.

- Main sequencing states
- State outputs of the SEQUENCING LOGIC function block
- Transition of states
- State diagram
- External control of the drive

Principle State Machine

Main Sequencing States

The main sequencing state of the unit is indicated by an enumerated value given by the parameter SEQUENCER STATE under SEQUENCING LOGIC menu.

Enumerated Value	Main Seq State	Standard Name	Description
0	START DISABLED	Switch On Disabled	The Drive will not accept a switch on command
1	START ENABLED	Ready To Switch On	The Drive will accept a switch on command
2	SWITCHED ON	Switched On	The Drive’s stack is enabled
3	READY	Ready	Waiting for Contactor to be closed
4	ENABLED	Enabled	The Drive is enabled and operational
5	F-STOP ACTIVE	Fast-Stop Active	Fast stop is active
6	TRIP ACTIVE	Trip Active	The Drive is processing a trip event
7	TRIPPED	Tripped	The Drive is tripped awaiting trip reset

Table B-1 Enumerated Values for the SEQUENCING LOGIC Function Block

State Outputs of the SEQUENCING LOGIC Function Block

The following table shows the states of individual parameters for the SEQUENCING LOGIC function block required to produce the condition of the MAIN SEQ STATE parameter.

	START DISABLED	START ENABLED	SWITCHED ON	READY	ENABLED	F-STOP ACTIVE	TRIP ACTIVE	TRIPPED
Tripped	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
Running	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE
Jogging	FALSE	FALSE	FALSE	FALSE	Note 1	FALSE	FALSE	FALSE
Stopping	FALSE	FALSE	FALSE	FALSE	Note 2	TRUE	FALSE	FALSE
Output Contactor	Depends on previous state	Depends on previous state	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
Switch On Enable	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
Switched On	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
Ready	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
Healthy	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE Note 3

Table B-2 Parameter States for the MAIN SEQ STATE Parameter

B

Sequencing Logic

Note ***1. JOGGING is set TRUE once the jog cycle has started, and remains TRUE until the jog cycle has finished which is when either the stop delay has finished or another mode is demanded.***

2. STOPPING is set TRUE during the stopping cycles commanded by either RUNNING going low, JOGGING going low or if Fast Stop is active, i.e. SEQUENCING LOGIC is F-STOP ACTIVE.

3. Once Run and Jog are both FALSE, HEALTHY O/P will be set TRUE.

Transition of States

The transition matrix describes what causes the transition from one state to another, for example see number 4 below: the transition from “Ready To Switch On” to “Trip Active” is triggered by “TRIP” going TRUE. Note – where a state has more than one exit transition, the transition with the lowest number has priority.

Refer to the following table and state diagram.

	Current State	Next State	Cause (FALSE to TRUE)
1	Power Up	Switch On Disabled	Power-Up, Restore Configuration or exit from Configuration mode.
2	Switch On Disabled	Trip Active	Trip
3	Switch On Disabled	Ready To Switch On	RUN = FALSE, JOG = FALSE, NOT FAST STOP = TRUE and NOT COAST STOP = TRUE
4	Ready To Switch On	Trip Active	Trip
5	Ready To Switch On	Switch On Disabled	NOT COAST STOP = FALSE or NOT FAST STOP = FALSE
6	Ready To Switch On	Switched On	RUN = TRUE or JOG = TRUE

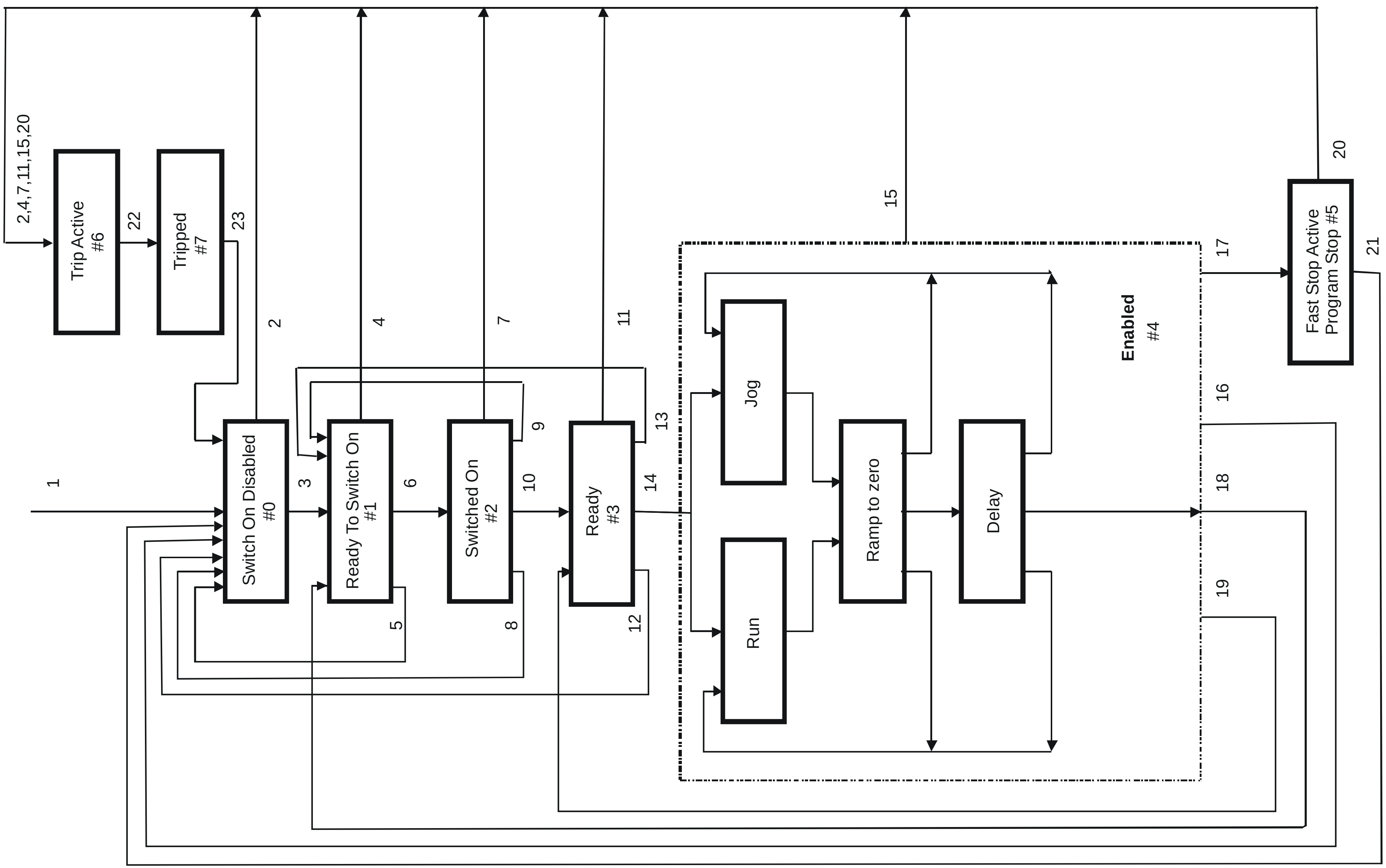
B

	Current State	Next State	Cause (FALSE to TRUE)
7	Switched On	Trip Active	Trip (includes CONTACTOR CLOSED = FALSE after 10 seconds)
8	Switched On	Switch On Disabled	NOT COAST STOP = FALSE or NOT FAST STOP = FALSE
9	Switched On	Ready To Switch On	RUN = FALSE and JOG = FALSE
10	Switched On	Ready	CONTACTOR CLOSED = TRUE and defluxed
11	Ready	Trip Active	Trip (includes CONTACTOR CLOSED = FALSE)
12	Ready	Switch On Disabled	NOT COAST STOP = FALSE or NOT FAST STOP = FALSE
13	Ready	Ready To Switch On	RUN = FALSE and JOG = FALSE
14	Ready	Enabled	ENABLE = TRUE
15	Enabled	Trip Active	Trip (includes CONTACTOR CLOSED = FALSE)
16	Enabled	Switch On Disabled	NOT COAST STOP = FALSE
17	Enabled	Fast Stop Active	NOT FAST STOP = FALSE
18	Enabled	Ready To Switch On	RUN = FALSE, JOG = FALSE and stopping complete
19	Enabled	Ready	ENABLE = FALSE

	Current State	Next State	Cause (FALSE to TRUE)
20	Fast Stop Active	Trip Active	Trip (includes CONTACTOR CLOSED = FALSE)
21	Fast Stop Active	Switch On Disabled	Fast Stop timer expired or FAST STOP MODE = Coast Stop OR Drive at zero setpoint
22	Trip Active	Tripped	Stack quenched
23	Tripped	Switch On Disabled	Trip = FALSE and TRIP RESET 0->1 transition

Table B-3 Transition Matrix

State Diagram



External Control of the Drive

Communications Command

When sequencing is in the Remote Comms mode, the sequencing of the Drive is controlled by writing to the COMMS COMMAND (PREF 95.05).

The COMMS COMMAND parameter is a 16-bit word based on standard fieldbus drive profiles. Some bits are not implemented in this release (see “Supported” column of the table below).

Bit	Name	Description	Supported	Required Value
0	Switch On	OFF1 Operational	√	
1	(Not) Disable Voltage	OFF2 Coast Stop	√	
2	(Not) Quick Stop	OFF3 Fast Stop	√	
3	Enable Operation		√	
4	Enable Ramp Output	=0 to set ramp output to zero		1
5	Enable Ramp	=0 to hold ramp		1
6	Enable Ramp Input	=0 to set ramp input to zero		1
7	Reset Fault	Reset on 0 to 1 transition	√	
8				0
9				0
10	Remote	=1 to control remotely		1
11				0
12				0
13				0
14				0
15				0

Switch On

Replaces the RUN FWD, RUN REV and NOT STOP parameters of the SEQUENCING LOGIC function block. When Set (=1) is the same as :

RUN FWD	=	TRUE
RUN REV	=	FALSE
NOT STOP	=	FALSE

When Cleared (= 0) is the same as :

RUN FWD	=	FALSE
RUN REV	=	FALSE
NOT STOP	=	FALSE

(Not) Disable Voltage

ANDed with the NOT COAST STOP parameter of the SEQUENCING LOGIC function block.
When both Set (=1) is the same as:

NOT COAST STOP	=	TRUE

When either or both Cleared (= 0) is the same as :

NOT COAST STOP	=	FALSE

(Not) Quick Stop

ANDed with the NOT FAST STOP parameter on the SEQUENCING LOGIC function block.
When both Set (=1) is the same as:

NOT FAST STOP	=	TRUE

When either or both Cleared (= 0) is the same as :

NOT FAST STOP	=	FALSE

Enable Operation

ANDed with the DRIVE ENABLE parameter on the SEQUENCING LOGIC function block.
When both Set (=1) is the same as:

DRIVE ENABLE	=	TRUE

When either or both Cleared (= 0) is the same as :

DRIVE ENABLE	=	FALSE

Enable Ramp Output, Enable Ramp, Enable Ramp Input

Not implemented. The state of these bits must be set (=1) to allow this feature to be added in the future.

Reset Fault

Replaces the REM TRIP RESET parameter on the SEQUENCING LOCIC function block. When Set (=1) is the same as:

REM TRIP RESET	=	TRUE

When Cleared (= 0) is the same as :

REM TRIP RESET	=	FALSE

Remote

Not implemented. It is intended to allow the PLC to toggle between local and remote. The state of this must be set (=1) to allow this feature to be added in the future.

Example Commands

047F hexadecimal to RUN

047E hexadecimal to STOP

B

Communications Status

The COMMS STATUS parameter (PREF 95.08) in the COMMS CONTROL function block monitors the sequencing of the Drive. It is a 16-bit word based on standard fieldbus drive profiles. Some bits are not implemented in the initial release and are set to 0 (see “Supported” column of the table below).

Bit	Name	Description	Supported
0	Ready To Switch On		√
1	Switched On	Ready for operation (refer control bit 0)	√
2	Operation Enabled	(refer control bit 3)	√
3	Fault	Tripped	√
4	(Not) Voltage Disabled	OFF 2 Command pending	√
5	(Not) Quick Stop	OFF 3 Command pending	√
6	Switch On Disable	Switch On Inhibited	√
7	Warning		
8	SP / PV in Range		
9	Remote	= 1 if Drive will accept Command Word	√
10	Setpoint Reached	= 1 if not ramping	√
11	Internal Limit Active	= 1 if current limit active or speed loop is in torque limit	√
12			
13			
14			
15			

Ready To Switch On

Same as the SWITCH ON ENABLE output parameter of the SEQUENCING LOGIC function block.

Switched On

Same as the SWITCHED ON output parameter of the SEQUENCING LOGIC function block.

Operation Enabled

Same as the RUNNING output parameter of the SEQUENCING LOGIC function block.

Fault

Same as the TRIPPED output parameter of the SEQUENCING LOGIC function block.

(Not) Voltage Disabled

If in Remote Comms mode, this is the same as Bit 1 of the COMMS COMMAND parameter. Otherwise it is the same as the NOT COAST STOP input parameter of the SEQUENCING LOGIC function block.

(Not) Quick Stop

If in Remote Comms mode, this is the same as Bit 2 of the COMMS COMMAND parameter. Otherwise it is the same as the NOT FAST STOP input parameter of the SEQUENCING LOGIC function block.

Switch On Disable

Set (=1) only when in START DISABLED state, refer to Table B-1.

Remote

This bit is set (= 1) if the Drive is in Remote mode **AND** the parameter REMOTE COMMS SEL of the COMMS CONTROL function block is Set (= 1).

Sequencing Logic

Setpoint Reached

This bit is set (=1) if the Reference Ramp is not ramping.

Internal Limit Active

This bit is set (=1) if, while in vector control mode, the speed limit has reached the torque limit; or, while in Volts/Hz mode, the open loop current limit is active.

Appendix C

Certification

This Chapter outlines the additional steps that may be required to achieve EMC conformance.

What is the EMC Directive? (89/336/EEC)

The EMC[1] Directive is one of a series of directives created to allow manufacturers to trade freely within the EEC territory. This is done by creating the CE mark CE, a "trade symbol" showing that requirements for safety and health are met. These requirements (called "essential requirements") are those apparatus has to meet to obtain the "presumption of conformity".

The aim of the EMC Directive 89/336/EEC is to ensure that any electric, or electronic, device will create no more then a limited amount of RF interference so that other apparatus are not affected from functioning correctly. Also to ensure that an electric, or electronic, device will withstand a certain amount of Electro Magnetic interference from other equipment.

History

Historically each European drives manufacture and importer interpreted the EMC directive and 'CE' marking requirements differently.

To provide a unified approach the European machines and drives manufactures, via their national trade associations have formed the 'European Committee of Manufacturers of Electrical Machines and Power Electronics', termed CEMEP. Recommendations were produced by this committee for the application of the European Council Directives to power drive systems. These are to be followed by all major European Drives manufacturers.

The "EMC Drive Product Specific Standard" EN 61800-3 was listed in the Official Journal of Europe on January 1st 1997. This standard takes precedence over the Generics Standards. Working to the product standard is a sensible approach to take to show EMC conformance. However many of our customers are tied to the Generic standards for the final application of our drives; we therefore continue to design, test and certify our drives to these standards.

C

[1] EMC stands for Electro Magnetic Compatibility, a term for the behaviour of an apparatus in terms of the Electro magnetic interference it generates and the immunity to an Electro magnetic field on its enclosure and cables

Who is Responsible?

Within a system the drive is considered to be a component. It remains the responsibility of the system manufacturer to verify that the goals as defined in the EMC directive (essential requirements) are being met. In practice this means that compliance to harmonised standards is sufficient to show compliance with the directive

All Parker SSD Drives' products are tested to ensure compliance with the harmonised standards. However it must be remembered that there is no guarantee that combinations of compliant components will result in a compliant system. This means that compliance to harmonised standards will have to be demonstrated for the system as a whole to ensure compliance with the directive

■ *Relevant Apparatus* - Parker SSD Drives Responsibility

Occasionally, say in a case where an existing fixed speed motor - such as a fan or pump - is converted to variable speed with an add-on drive module *(relevant apparatus*), it becomes the responsibility of Parker SSD Drives to apply the CE mark and issue an EC Declaration of Conformity for the EMC Directive. This declaration and the CE mark is included at the end of this chapter.

■ *Component* - Customer Responsibility

The majority of Parker SSD Drives' products are classed as *components* and therefore we cannot apply the CE mark or produce an EC Declaration of Conformity in respect of EMC. It is therefore the manufacturer/supplier/installer of the higher system/apparatus or machine who must conform to the EMC directive and CE mark.

Note ***When two or more EMC compliant components are combined to form the final machine/system, the resulting machine/system may no longer be compliant, (emissions tend to be additive, immunity is determined by the least immune component). Understand the EMC environment and applicable standards to keep additional compliance costs to a minimum.***

Current Standards

The following table sets out the current harmonised standards (Generic and Drive Specific) and shows how they have evolved from the earlier versions.

Number	Title	Issue /Amendment	Implementation Date	Superseded Standard & date of withdrawal
BSEN61800-3	Adjustable speed electrical power drive systems Part 3 EMC product standard including specific test methods	1997 incorporating Amendment No 1	01/07/2000	BSEN61800-3:1996 01/01/2002
BSEN6100-6-1	Electromagnetic compatibility (EMC) Part 6-1: Generic standards – Immunity for residential, commercial and light industrial environments	2001	01/04/2002	EN 50082-1:1997 01/07/2004
BSEN6100-6-2	Electromagnetic compatibility (EMC) Part 6-2: Generic standards – Immunity industrial environments	2001	01/04/2002	BSEN6100-6-2:1999 01/07/2004
BSEN6100-6-3	Electromagnetic compatibility (EMC) Part 6-3: Generic standards – Emission standard for residential, commercial and light industrial environments	2001	01/04/2002	EN50081-1:1992 01/07/2004
BSEN6100-6-4;	Electromagnetic compatibility (EMC) Part 6-4: Generic standards – Emission standard for industrial environments	2001	01/04/2002	EN50081-2:1993 01/07/2004

Definition of Working Environments

There are subtle differences in the environments defined in the standards. However, where there is any doubt as to the appropriate classification, we will be glad to advise on a case-by-case basis.

Standard	**Environment**	
	"Domestic"	**"Industrial"**
Drive Specific	Called 1st Environment Environment that includes Domestic premises. It also includes establishments directly connected without intermediate transformers to a low voltage (<1000V-rms) supply network that also supplies buildings used for domestic purposes.	Called 2nd Environment Environment that includes all establishments other than those directly connected to a low voltage (<1000V-rms) supply network that supplies buildings used for domestic purposes.
Generic standards	The environment encompassed by these standards is residential, commercial and light industrial locations, both indoor and outdoor. The following list, although not comprehensive gives an indication of the locations which are included ♦ Residential properties, e.g. houses, apartments etc.; ♦ Retail outlets, e.g. shops, supermarkets, etc.; ♦ Business premises e.g. offices, banks etc.;	Industrial environments are characterised by the existence of one or more of the following conditions: ♦ Industrial ,scientific and medical (ISM) apparatus is present ♦ Heavy inductive or capacitive loads are frequently switched ♦ Currents and associated magnetic field are high

C

General Installation EMC Considerations

Earthing Requirements

IMPORTANT **Protective earthing always takes precedence over EMC screening.**

Protective Earth (PE) Connections

Note ***In accordance with installations to EN60204, only one protective earth conductor is permitted at each protective earth terminal contacting point.***

Local wiring regulations tale precedence and may require the protective earth connection of the motor to be connected locally, i.e. not as specified in these instructions. This will not cause shielding problems because of the relatively high RF impedance of the local earth connection.

EMC Earth Connections

For compliance with EMC requirements, we recommend that the “0V/signal ground” be separately earthed. When a number of units are used in a system, these terminals should be connected together at a single, local earthing point.

Control and signal cables for the encoder, all analogue inputs, and communications require screening with the screen connected only at the VSD (Variable Speed Drive) end. However, if high frequency noise is still a problem, earth the screen at the non-VSD end via a 0.1μF capacitor.

Note ***Connect the screen (at the VSD end) to the VSD protective earth point ⏚, and not to the control board terminals.***

Cabling Requirements

Note ***Refer to Appendix E: "Technical Specifications" for additional Wire Sizes.***

Planning Cable Runs

- Use the shortest possible motor cable lengths.
- Use a single length of cable to a star junction point to feed multiple motors.
- Keep electrically noisy and sensitive cables apart.
- Keep electrically noisy and sensitive parallel cable runs to a minimum. Separate parallel cable runs by at least 0.25 metres. For runs longer than 10 metres, separation should be increased proportionally. For example if the parallel runs were 50m, then the separation would be (50/10) x 0.25m = 1.25m.
- Sensitive cables should cross noisy cables at 90°.
- Never run sensitive cables close or parallel to the motor, dc link and braking chopper circuit for any distance.
- Never run supply, dc link or motor cables in the same bundle as the signal/control and feedback cables, even if they are screened.
- Ensure EMC filter input and output cables are separately routed and do not couple across the filter.

Increasing Motor Cable Length

Because cable capacitance and hence conducted emissions increase with motor cable length, conformance to EMC limits is only guaranteed with the specified ac supply filter option up to a maximum cable length as specified in Appendix E: "Technical Specifications".

This maximum cable length can be improved using the specified external input or output filters.

Screened/armoured cable has significant capacitance between the conductors and screen, which increases linearly with cable length (typically 200pF/m but varies with cable type and current rating).

Certification

Long cable lengths may have the following undesirable effects:

- ♦ Tripping on `overcurrent' as the cable capacitance is charged and discharged at the switching frequency.
- ♦ Producing increased conducted emissions that degrade the performance of the EMC filter due to saturation.
- ♦ Causing RCDs (Residual Current Devices) to trip due to increased high frequency earth current.
- ♦ Producing increased heating inside the EMC ac supply filter from the increased conducted emissions.

These effects can be overcome by adding chokes or output filters at the output of the VSD.

Emissions

All VSDs potentially produce electrical emissions which are radiated into the environment and conducted back into the ac supply. The following information is provided to maximise the Electro Magnetic Compatibility (EMC) of VSDs and systems in their intended operating environment, by minimising their emissions.

The standards are concerned with two types of emission

- ♦ **Radiated** Those in the band 30MHZ – 1000MHz which radiate into the environment
- ♦ **Conducted** Those in the band 150kHz – 30MHz which are injected into the supply.

C

Radiated

The standards have common roots (CISPR 11 & CISPR14) so there is some commonality in the test levels applied in different environments.

Relationship Between Standards

<table>
<tr><th rowspan="2">Limits (interpreted for 10m measurement)</th><th colspan="3">Standards</th></tr>
<tr><th>Product Specific</th><th colspan="2">Generic</th></tr>
<tr><td></td><td>EN 61800-3</td><td>EN61000-6-3</td><td>EN61000-6-4</td></tr>
<tr><td>30 – 230MHZ 30dB(µV/m)
230 - 1000MHz 37dB(µV/m)</td><td>1st Environment
Table 10
Unrestricted Distribution</td><td>Equivalent</td><td>N/A</td></tr>
<tr><td>30 – 230MHZ 40dB(µV/m)
230 - 1000MHz 47dB(µV/m)</td><td>1st Environment
Table 10
Restricted Distribution</td><td>N/A</td><td>Equivalent</td></tr>
<tr><td>30 – 230MHZ 50dB(µV/m)
230 - 1000MHz 60dB(µV/m)</td><td>2nd Environment
Table 12</td><td colspan="2">These limits have no equivalent within the Generic Standards. They are taken from
CISPR 11 group 2 Class A</td></tr>
</table>

Reducing Radiated Emissions

To show compliance with the Adjustable Speed Electrical Power Drive Systems Standard BSEN61800-3, and the Generic Standards BSEN61000-6-3 & BSEN61000-6-4; radiated emission measurements are made between 30MHz and 1GHz in the far field at a distance of 10 to 30 metres. Limits lower than 30MHz or in close proximity are not specified.

Emissions from individual components tend to be additive. To reduce the emissions:

- The equipment must be mounted in a metal cubicle. The unit is installed for 1st environment operation when mounted inside a cubicle giving 10dB attenuation between 30 and 100MHz (typically the attenuation provided by a metal cabinet with no aperture of dimension greater than 0.15m), using the recommended ac supply filter and having met all cabling requirements. The cubicle should be as free of openings as is practical. Vent systems suitable for EMC applications are available from cubicle suppliers and should be used.

Note ***Radiated magnetic and electric fields inside the cubicle will be high and any components fitted inside must be sufficiently immune.***

- All cable entry and exits (power, control, and communication) should use screened cable

- Use of screened/armoured cable between VSD/cubicle and motor containing the motor protective earth (PE) connection is most important. If shielded cable is not available, lay unshielded motor cables in a metal conduit which will act as a shield. The conduit must be continuous with a direct electrical contact to the VSD and motor housing. If links are necessary, use **braid** with a minimum cross sectional area of $10mm^2$.

- Use 360° screen terminations.

- Earth screen at both ends connecting to the motor frame and cubicle.

Note ***Some hazardous area installations may preclude direct earthing at both ends of the screen, in this case earth one end via a 1µF 50Vac capacitor, and the other as normal.***

- Keep unshielded cable as short as possible inside the cubicle.
- Always maintain the integrity of the shield. If the cable is interrupted to insert contactors etc., re-connect the screen using the shortest possible route. Some motor gland boxes and conduit glands are made of plastic, if this is the case, then braid must be connected between the screen and the chassis. In addition at the motor end, ensure that the screen is electrically connected to the motor frame since some terminal boxes are insulated from the frame by gasket/paint
- Keep the length of screen stripped-back as short as possible when making screen connections.

Conducted Emission

The various standards have common roots (CISPR 11 & CISPR14) so there is some commonality in the test levels applied in different standards and environments.

Relationship Between Standards

<table>
<tr><th colspan="3">Limits</th><th colspan="3">Standards</th></tr>
<tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">DB (µV)</th><th>Product Specific</th><th colspan="2">Generic</th></tr>
<tr><th>Quasi Peak</th><th>Average</th><th>EN 61800-3</th><th>EN61000-6-3</th><th>EN61000-6-4</th></tr>
<tr><td>0.15 - 0.5
0.5 - 5.0
5.0 - 30.0</td><td>79
73
73</td><td>66
60
60</td><td>1st Environment
Table 9
Restricted Distribution</td><td>N/A</td><td>Equivalent</td></tr>
<tr><td>0.15 - 0.5
decreasing with log of frequency to:
0.5 - 5.0
5.0 - 30.0</td><td>66

56
60</td><td>56

46
50</td><td>1st Environment
Table 9
Unrestricted Distribution</td><td>Equivalent</td><td>N/A</td></tr>
<tr><td>where I ≤100A
0.15 - 0.5
0.5 - 5.0
5.0 - 30.0
decreasing with log of frequency to:</td><td>100
86
90
70</td><td>90
76
80
60</td><td rowspan="2">2nd Environment
Table 11</td><td rowspan="2" colspan="2">These limits have no equivalent within the Generic Standards. They are taken from
CISPR 11 group 2 Class A</td></tr>
<tr><td>where I ≥100A
0.15 - 0.5
0.5 - 5.0
5.0 - 30.0</td><td>130
125
115</td><td>120
115
105</td></tr>
</table>

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Screening & Earthing

Note ***The installation requirements of local safety standards must be achieved regarding the safety of electrical equipment for machines.. Refer to Chapter 4/5 "Connecting Power".***

The VSD, external filter and associated equipment are mounted onto a conducting, metal mounting panel. Do not use cubicle constructions that use insulating mounting panels or undefined mounting structures. Cables between the VSD and motor must be screened or armoured and terminated at the VSD or locally on the back panel.

Star Point Earthing

A star-point earthing policy separates 'noisy' and 'clean' earths. Four separate earth busbars (three are insulated from the mounting panel) connect to a single earth point (star point) near the incoming safety earth from the main supply. Flexible, large cross-section cable is used to ensure a low HF impedance. Busbars are arranged so that connection to the single earth point is as short as possible.

1. **Clean Earth Busbar (insulated from the mounting panel)**

   Used as a reference point for all signal and control cabling. This may be further subdivided into an analog and a digital reference busbar, each separately connected to the star earthing point. The digital reference is also used for any 24V control.

2. **Dirty Earth Busbar (insulated from the mounting panel)**

   Used for all power earths, i.e. protective earth connection. It is also used as a reference for any 110 or 220V control used, and for the control transformer screen.

3. **Metal Work Earth Busbar**

   The back panel is used as this earth busbar, and should provide earthing points for all parts of the cubicle including panels and doors. This busbar is also used for power screened cables which terminate near to (10cm) or directly into a VSD - such as motor cables, braking choppers and their resistors, or between VSDs - refer to the appropriate product manual to identify these. Use U-clips to clamp the screened cables to the back panel to ensure optimum HF connection.

4. **Signal/Control Screen Earth Busbar (insulated from the mounting panel)**

   Used for signal/control screened cables which **do not** go directly to the VSD. Place this busbar as close as possible to the point of cable entry. 'U' clamp the screened cables to the busbar to ensure an optimum HF connection.

Sensitive Equipment

The proximity of the source and victim circuit has a large effect on radiated coupling. The electromagnetic fields produced by VSDs falls off rapidly with distance from the cabling/cubicle. Remember that the radiated fields from EMC compliant drive systems are measured at least 10m from the equipment, over the band 30-1000MHz. Any equipment placed closer than this will see larger magnitude fields, especially when very close to the drive.

Do not place magnetic/electric field sensitive equipment within 0.25 metres of the following parts of the VSD system:

- *Variable Speed Drive (VSD)*
- *EMC output filters*
- *Input or output chokes/transformers*
- *The cable between VSD and motor (even when screened/armoured)*
- *Connections to external braking chopper and resistor (even when screened/armoured)*
- *AC/DC brushed motors (due to commutation)*
- *DC link connections (even when screened/armoured)*
- *Relays and contactors (even when suppressed)*

From experience, the following equipment is particularly sensitive and requires careful installation:

- *Any transducers which produce low level analogue outputs (<1V) , e.g. load cells, strain gauges, thermocouples, piezoelectric transducers, anemometers, LVDTs*
- *Wide band width control inputs (>100Hz)*
- *AM radios (long and medium wave only)*
- *Video cameras and closed circuit TV*

- *Office personal computers*
- *Capacitive devices such as proximity sensors and level transducers*
- *Mains borne communication systems*
- *Equipment not suitable for operation in the intended EMC environment, i.e. with insufficient immunity to new EMC standards*

Single VSD - Multiple Motors

If connecting multiple motors to a single VSD, use a star junction point for motor cable connections. Use a metal box with entry and exit cable glands to maintain shield integrity.

European Directives and the CE Mark

The following information is supplied to provide a basic understanding of the EMC and low voltage directives CE marking requirements. The following literature is recommended for further information:

- *Recommendations for Application of Power Drive Systems (PDS), European Council Directives - CE Marking and Technical Standardisation* - (CEMEP)

Available from your local trade association or Parker SSD Drives office

The European machines and drives manufacturers via their national trade associations have formed the European Committee of Manufacturers of Electrical Machines and Power Electronics (CEMEP). Parker SSD Drives and other major European drives manufacturers are working to the CEMEP recommendations on CE marking. The CE mark shows that a product complies with the relevant EU directives, in our case the Low Voltage Directive and, in some instances, the EMC Directive.

CE Marking for Low Voltage Directive

When installed in accordance with this manual, the 890 product is CE marked by Parker SSD Drives in accordance with the low voltage directive (S.I. No. 3260 implements this LVD directive into UK law). Refer to page C-17 for the "EC Declaration of Conformity" (low voltage directive).

Legal Requirements for CE Marking

IMPORTANT: **Before installation, clearly understand who is responsible for conformance with the EMC directive. Misappropriation of the CE mark is a criminal offence.**

It is important that you have now defined who is responsible for conforming to the EMC directive, either:

■ Parker SSD Drives Responsibility

You intend to use the unit as *relevant apparatus*.

When the specified EMC filter is correctly fitted to the unit following EMC installation instructions, it complies with the relevant standards indicated in the following tables. The fitting of the filter is mandatory for the CE marking of this unit to apply.

The relevant declarations are to be found at the end of this chapter. The CE mark is displayed on the EC Declaration of Conformity (EMC Directive) provided at the end of this chapter.

■ Customer Responsibility

You intend to use the unit as a *component*, therefore you have a choice:

1. To fit the specified filter following EMC installation instructions, which may help you gain EMC compliance for the final machine/system.
2. Not to fit the specified filter, but use a combination of global or local filtering and screening methods, natural migration through distance, or the use of distributed parasitic elements of the existing installation.

Certificates

890 SYSTEM

EC DECLARATIONS OF CONFORMITY

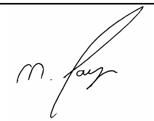
CE

Date CE marked first applied: October 2004

EMC Directive	Low Voltage Directive
In accordance with the EEC Directive 2004/108/EC We Parker SSD Drives, address as below, declare under our sole responsibility that the above Electronic Products when installed and operated with reference to the instructions in the Product Manual (provided with each piece of equipment) is in accordance with the relevant clauses from the following standards:- BSEN61800-3 (2004)	In accordance with the EEC Directive 2006/95/EC We Parker SSD Drives, address as below, declare under our sole responsibility that the above Electronic Products when installed and operated with reference to the instructions in the Product Manual (provided with each piece of equipment), is in accordance with the following standard :- EN50178 (1998)

MANUFACTURERS DECLARATIONS

EMC DECLARATION	MACHINERY DIRECTIVE
We Parker SSD Drives, address as below, declare under our sole responsibility that the above Electronic Products when installed and operated with reference to the instructions in the Product Manual (provided with each piece of equipment) is in accordance with the relevant clauses from the following standards:- BSEN61800-3 (2004)	The above Electronic Products are components to be incorporated into machinery and may not be operated alone. The complete machinery or installation using this equipment may only be put into service when the safety considerations of the Directive 89/392/EEC are fully adhered to. Particular reference should be made to EN60204-1 (Safety of Machinery - Electrical Equipment of Machines). All instructions, warnings and safety information of the Product Manual must be adhered to.



Dr Martin Payn (Conformance Officer)

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1 Radiated emission limit achieved when equipment installed in an EMC cubicle providing 10dBµV attenuation to signals in the range 30MHz to 100MHz
Conducted emission limits achieved when approved external EMC filter installed.

C

Certification

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Appendix D
Programming

This Appendix provides an introduction to programming the 890. It describes the 890 Function Blocks and the parameters they contain. We recommend that you program the 890 using the DSE Configuration Tool.

Programming with Block Diagrams

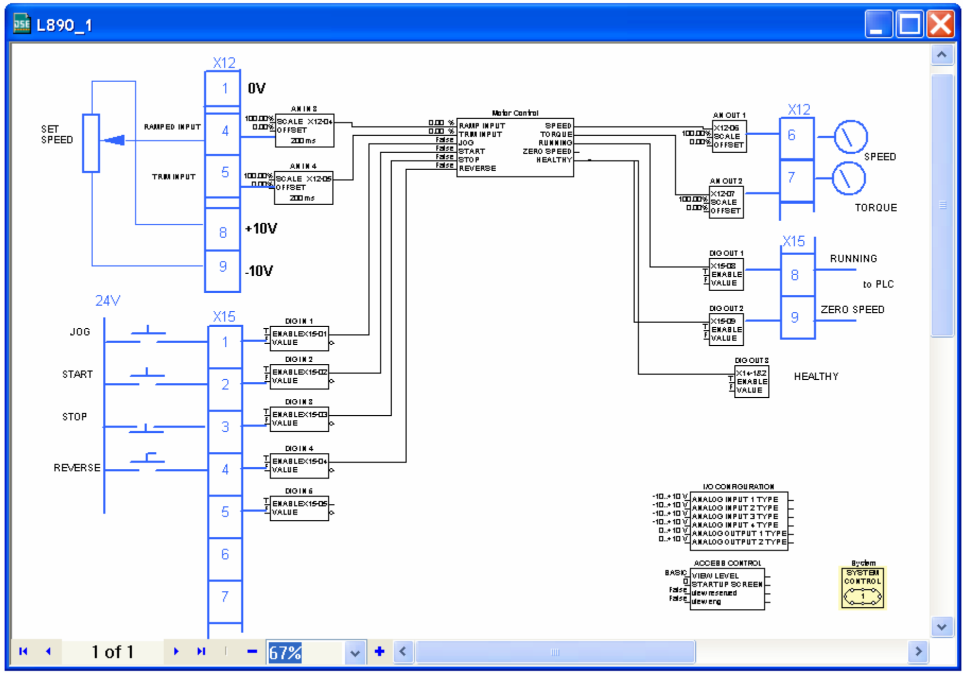
You can program the drive to your specific application. This programming simply involves changing parameter values. For instance, parameter ^{S}1 selects the main method of motor control used by the drive: Volts/Hz or Sensorless Vector.

Block diagram programming provides a visual method of planning the software to suit your application. The blocks described here are those blocks used by the Shipping Configuration(s) in the DSE 890 Configuration Tool. A typical block diagram as seen in the DSE 890 Configuration Tool is shown below.

The processes performed by the shipping configuration are represented as a block diagram, consisting of *function blocks* and *links:*

- Each function block contains the parameters required for setting-up a particular processing feature. Sometimes more than one instance of a function block is provided for a feature, i.e. for multiple digital inputs.

- Software links are used to connect the function blocks. Each link transfers the value of an output parameter to an input parameter of another (or the same) function block.



Each individual block is a processing feature, i.e. it takes the input parameter, processes the information, and makes the result available as one or more output parameters.

Modifying a Block Diagram

- ♦ Using the keypad you can modify the parameter values within a function block.
- ♦ Using the DSE Configuration Tool, you can modify the parameter values within a function block, and also make and break links within the shipping configuration. The Help in the DSE Configuration Tool explains this process.

Programming Rules

The following rules apply when programming:

- Function block output parameter values cannot be changed (because they are a result of the function block's processing)
- Function block input parameter values that receive their values from an internal link in the Block Diagram cannot be changed (as they will change back to the value they receive from the link when the Drive is running).

Saving Your Modifications

If parameter values have been modified, the new settings must be saved. The Drive will then retain the new settings during power-down. Refer to Chapter 8: "The Keypad" - Saving Your Application.

Function Block Descriptions

Note ***To view the SETUP Menu, ADVANCED view level must be selected - SETUP::VIEW LEVEL.***

Understanding the Function Block Description

The following function blocks show the parameter information necessary for programming the Drive.

The Default values in the pages below are correct for when the UK country code is selected and a 230V 2.2kW Frame B power board is fitted. Some parameters in the table are marked:

* Value dependent upon the Language field of the Product Code, e.g. UK

** Value dependent upon the overall "power-build", e.g. 230V, 2.2kW

The values for these parameters may be different for your drive/application. Refer to Appendix D: "Programming" - Product Related Default Values.

Parameter Descriptions Table: Sub-titles	
PREF	Unique identification normally used for communications
Default	The default value.
Range	The range for the parameter value. Ranges for outputs are given as "—.xx %", for example, indicating an indeterminate integer for the value, to two decimal places.
*	Parameters marked with "*" are set to a value depending upon the "operating frequency" of the drive. Refer to "Parameter Specification" - Frequency Dependent Defaults; and Chapter 8: "The Keypad" - Changing the Product Code (3-button reset).

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Function Blocks Alphabetically

The function block descriptions in this chapter are arranged alphabetically, however, they are also listed below by Category. ADVANCED view level must be selected to see all the function blocks listed

Page	Block	Page	Block	Page	Block
			Inputs & Outputs		
8	ANALOG INPUT	16	DIGITAL INPUT		
10	ANALOG OUTPUT	17	DIGITAL OUTPUT		
			Sequencing/Referencing		
11	AUTO RESTART	46	LOCAL CONTROL		
13	COMMS CONTROL	89	SEQUENCING LOGIC		
			Motor Control		
26	DYNAMIC BRAKING	51	MOT POLARISATION	86	RESOLVER
29	ENCODER	56	MOTR DRV LIMIT	110	ZERO SPEED
33	FEEDBACKS	64	PMAC MOTOR		
49	MECH BRAKE	68	PMAC MOTOR 2		
			Phase Control		
38	FIREWIRE REF	61	PHASE OFFSET	106	VIRTUAL MASTER
			Motion		
43	INTERPOLATOR	70	POS SPD LOOP DIR	84	POS SPEED LOOP OUT
44	LIMIT INPUT	73	POS SPEED LOOP	95	TRAJ GEN
62	PLS	80	POS SPEED LOOP IN	97	TRAJ GEN DEFAULT

ACCESS CONTROL

SETUP::MENUS::ACCESS CONTROL

This function block contains options associated with keypad password protection, view levels, setpoint display and initial Operator Menu selection.

Parameter Descriptions

VIEW LEVEL	*PREF: 31.01*	*Default: 1*	*Range: See below*

Sets the level of menu to be displayed by the keypad.

Enumerated Value : *View Level*

0 : OPERATOR
1 : BASIC
2 : ADVANCED

PASSWORD	*PREF: 31.02*	*Default: 0000*	*Range: 0x0000 to 0xFFFF*

Setting a non-zero value enables the password feature.

CONFIG NAME	*PREF: 31.05*	*Default:*	*Range: See below*

The maximum length is 16 characters. When not blank, the string is displayed as the top line of the Welcome screen.

STARTUP SCREEN	*PREF: 31.06*	*Default: 0*	*Range: See below*

Selects which of the Operator Menu parameters will be displayed after the Welcome screen.

Enumerated Value : *Startup Screen*

0 : selects REMOTE SETPOINT or LOCAL SETPOINT
1 : selects parameter defined by OPERATOR MENU 1
2 : selects parameter defined by OPERATOR MENU 2
: etc.
32 : selects parameter defined by OPERATOR MENU 32

ANALOG INPUT

SETUP::INPUTS & OUTPUTS::ANALOG INPUT

The analog input block converts the input voltage or current into a value expressed as a percentage of a configurable range.

Parameter Descriptions

TYPE	*PREF: 1.03, 2.03, 3.03, 4.03*	*Default: -10..+10V*	*Range: See below*

The input range and type.

- ANALOG INPUT 1 and ANALOG INPUT 2 are used for voltage measurement only.
- ANALOG INPUT 3 and ANALOG INPUT 4 support all types.
- ANALOG INPUT 5 is the differential of ANIN1 and ANIN2, see the Functional Description.

Enumerated Value : Type

0 : -10..+10 V
1 : 0..+10 V
2 : 0..20 mA
3 : 4..20 mA

BREAK ENABLE	*PREF: 3.04, 4.04*	*Default: FALSE*	*Range: FALSE / TRUE*

Only available on ANIN3 and ANIN4. For input types that support sensor break detection (see Functional Description below), this parameter may be used to disable sensor break detection. For input types that do not support break detection, this parameter is FALSE.

BREAK VALUE	*PREF: 3.05, 4.05*	*Default: -100.00 %*	*Range: -300.00 to 300.00 %*

Only available on ANIN3 and ANIN4. The value that will appear as the VALUE output when BREAK is TRUE.

VALUE	*PREF: 1.06, 2.06, 3.06, 4.06, 5.06*	*Default: —.xx %*	*Range: —.xx %*

The input reading. (PREF 5.06 is ANIN5, see the Functional Description).

Functional Description

The Drive has four analog inputs. There is an analog input function block for each:

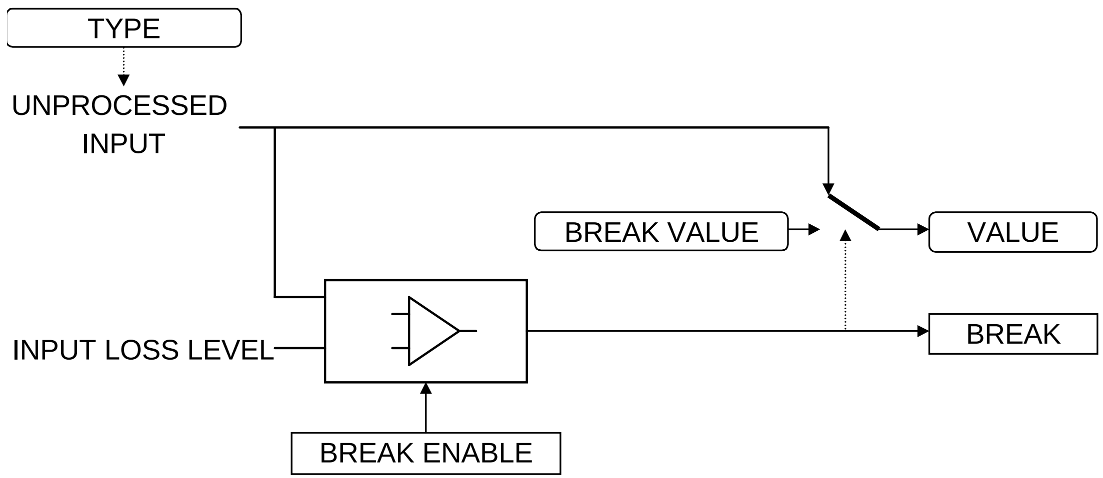
AIN1 is associated with the signal on terminal X12/02
AIN2 is associated with the signal on terminal X12/03
AIN3 is associated with the signal on terminal X12/04
AIN4 is associated with the signal on terminal X12/05

Analog input 5 is a special case: terminals AIN1 and AIN2 can be used as a differential ±10V input (which we call AIN5).

All analog inputs can be configured as a direct input into the Speed Loop providing a fast speed or torque demand for servos.

The input voltage is pre-processed and converted into a numeric value by the analog input electronics of the Drive. The analog input function blocks further process this reading so that a value of 0.00% represents an input equal to the low input range, while a value of 100.00% represents an input equal to the high input range.

The break detect facility may only be used in conjunction with the 4..20mA hardware range. An input break is defined as an input reading less than 0.45mA. When an input break has been detected, the VALUE output is forced to be the BREAK VALUE .



ANALOG OUTPUT

SETUP::INPUTS & OUTPUTS::ANALOG OUTPUT

The analog output blocks converts the demand percentage into a form suitable for driving the analog output electronics of the Drive.

Parameter Descriptions

VALUE *PREF: 6.01, 7.01,* *Default: —.xx %* *Range: -300.00 to 300.00 %*

The demanded value to output.

TYPE *PREF: 6.05, 7.05* *Default:0..+10V* *Range: See below*

The output hardware Voltage type. An incorrect selection will force the VALUE to be set to zero.

Enumerated Value : *Type*

0 : -10..+10 V
1 : 0..10 V

Functional Description

The Drive has two analog outputs. There is an ANALOG OUTPUT function block associated with each of these:

AOUT1 is associated with terminal X12/06
AOUT2 is associated with terminal X12/07

AUTO RESTART

SETUP::SEQ & REF::AUTO RESTART

Auto Restart provides the facility to automatically reset a choice of trip events and restart the Drive with a programmed number of attempts, after which, a manual or remote trip reset is required if the Drive is not successfully restarted. The number of attempted restarts are recorded. This count is cleared after a trip-free period of operation (5 minutes or 4 x ATTEMPT DELAY 1, whichever is the longer), or after a successful manual or remote trip reset, or by removing the Run signal, or by setting the ENABLE input to this block FALSE.

Parameter Descriptions

ENABLE	*PREF:* 93.01	*Default: FALSE*	*Range: FALSE / TRUE*

Enables operation of the auto restart feature. TRUE = enabled.

ATTEMPTS	*PREF: 93.02*	*Default: 5*	*Range: 1 to 10*

Determines the number of restarts that will be permitted before requiring an external fault reset.

INITIAL DELAY 1	*PREF: 93.03*	*Default: —.x s*	*Range: 0.0 to 600.0 s*

Determines the delay for the first restart attempt when the trip is included in TRIGGERS 1 .
The delay is measured from all error conditions clearing.

ATTEMPT DELAY 1	*PREF: 93.04*	*Default: —.x s*	*Range: 0.0 to 600.0 s*

Determines the delay between restart attempts for a trip included in TRIGGERS 1 . The delay is measured from all error conditions clearing.

TRIGGERS 1 and TRIGGERS 1+	*PREF:93.05, 93.06*	*Default: 0000*	*Range: 0x0000 to 0xFFFF*

Allows Auto Restart to be enabled for a selection of trip conditions. Refer to TRIPS STATUS, page D-101, for an explanation of the four-digit codes.

D

Parameter Descriptions

INITIAL DELAY 2 *PREF: 93.07* *Default: —.x s* *Range: 0.0 to 600.0 s*

Determines the delay for the first restart attempt when the trip is included in TRIGGERS 2
The delay is measured from all error conditions clearing.

ATTEMPT DELAY 2 *PREF: 93.08* *Default: —.x s* *Range: 0.0 to 600.0 s*

Determines the delay between restart attempts for a trip included in TRIGGERS 2 . The delay is measured from all error conditions clearing.

TRIGGERS 2 and TRIGGERS 2+ *PREF:* 93.09, 93.10 *Default: 0000* *Range:0x0000 to 0xFFFF*

Allows Auto Restart to be enabled for a selection of trip conditions.

If a trip is included in both TRIGGERS 1 and TRIGGERS 2, then the times associated with TRIGGERS 1 will take priority.

Refer to page D-105: “Hexadecimal Representation of Trips” for an explanation of the four-digit codes.

PENDING *PREF: 93.11* *Default: FALSE* *Range: FALSE / TRUE*

Indicates that an auto restart will occur after the programmed delay.

RESTARTING *PREF: 93.12* *Default: FALSE* *Range: FALSE / TRUE*

Indicates that an auto restart is occurring. TRUE for a single block diagram execution cycle.

ATTEMPTS LEFT *PREF: 93.13* *Default: 5* *Range: —.*

Indicates the number of attempts left before an external fault reset is required.

TIME LEFT *PREF: 93.14* *Default: —.x s* *Range: —.x s*

When in the Restarting state, this parameter indicates the time left before an auto restart attempt will be permitted. When non-zero, this value is unaffected by changes to ATTEMPT DELAY 1.

COMMS CONTROL

SETUP::SEQ & REF::COMMS CONTROL

This block switches between Remote Terminal and Remote Comms operating modes.

The Drive must be in Remote mode for selection to be made - REMOTE mode is enabled in the LOCAL CONTROL function block (REF MODES) and selected by the keypad. Refer to the outputs of the LOCAL CONTROL function block for the mode in use.

Parameter Descriptions

REMOTE COMMS SEL *PREF: 95.01* *Default: FALSE* *Range: FALSE / TRUE*

Selects the type of remote communications mode:

0 : FALSE, and in REMOTE mode then control is from the terminals.
1 : TRUE, and in REMOTE mode then control is from the communications.

FIREWIRE REF SEL *PREF: 95.10* *Default: FALSE* *Range:* FALSE / TRUE

This parameter selects Firewire Ref as the active reference.

REMOTE SEQ MODES *PREF: 95.02* *Default: 0* *Range: Enumerated - see below*

Selects the type of remote sequencing mode:

Enumerated Value : *Mode*

0 : TERMINALS/COMMS
1 : TERMINALS ONLY
2 : COMMS ONLY

REMOTE REF MODES *PREF: 95.03* *Default:0* *Range: See below*

Selects the type of remote reference mode:

Enumerated Value : *Mode*

0 : TERMINALS/COMMS
1 : TERMINALS ONLY
2 : COMMS ONLY

Parameter Descriptions

COMMS COMMAND	*PREF: 95.09*	*Default: 0000*	*Range:* 0x0000 to 0xFFFF

16-bit Command. Refer to Appendix B: "Sequencing Logic".

COMMS SEQ	*PREF: 95.06*	*Default: FALSE*	*Range: FALSE / TRUE*

Diagnostic indicating if operating in Remote Sequencing Comms Mode.
If FALSE (0), the Drive may be in Local Sequencing mode or Remote Sequencing Terminal mode.

COMMS REF	*PREF: 95.07*	*Default: FALSE*	*Range: FALSE / TRUE*

Diagnostic indicating if operating in Remote Reference Comms Mode.

If FALSE (0), the Drive may be in Local Reference mode or Remote Reference Terminal mode.

FIREWIRE REF	*PREF: 95.11*	*Default: FALSE*	*Range:* TRUE / FALSE

This diagnostic indicates if Firewire Ref is the active reference.

COMMS STATUS	*PREF: 95.08*	*Default: 0000*	*Range:* 0x0000 to 0xFFFF

Diagnostic showing the 16-bit Status word as seen by the communications.
Refer to Appendix B: "Sequencing Logic".

COMMS PORT

SETUP::COMMS::COMMS PORT

Designed for all Motor Control Modes.

This function block allows you to set the mode for the P3 Comms Port (keypad port).

Parameter Descriptions

MODE *PREF: 129.01* *Default: AUTOMATIC* *Range: Enumerated - see below*

This parameter

Enumerated Value : *Mode*

0 : AUTOMATIC (senses if either 6511 or 6901 operator station is present)
1 : 6511 OP STATION
2 : 6901 OP STATION
3 : TS8000 HMI

DIGITAL INPUT

SETUP::INPUTS & OUTPUTS::DIGITAL INPUT

The digital input block converts the physical input voltage to TRUE or FALSE control signals.

Parameter Descriptions

VALUE	*PREF: 8.02, 9.02, 10.02, 11.02, 12.02, 13.02, 14.02, 15.02, 16.02*	*Default: FALSE*	*Range: FALSE / TRUE*

The TRUE or FALSE input.

Functional Description

There is a DIGITAL INPUT function block associated with each of the following terminals:

The Control Board has nine configurable digital inputs:

DIN1 is associated with terminal X15/01
DIN2 is associated with terminal X15/02
DIN3 is associated with terminal X15/03
DIN4 is associated with terminal X15/04
DIN5 is associated with terminal X15/05
DIN6 is associated with terminal X15/06
DIN7 is associated with terminal X15/07
DIN8 is associated with terminal X15/08
DIN9 is associated with terminal X15/09

Terminals X1508 and X15/09 act as inputs by default. These terminals can also be set as outputs. Refer to DIGITAL OUTPUT, page D-17.

DIGITAL OUTPUT

SETUP::INPUTS & OUTPUTS::DIGITAL OUTPUT

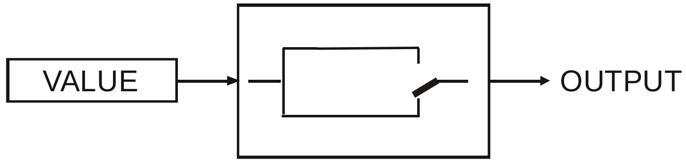
The digital output block converts a logic TRUE or FALSE demand to a physical output signal.

Parameter Descriptions

VALUE	*PREF: 17.01, 18.01, 19.01, 147.01, 148.01, 149.01*	*Default: FALSE*	*Range: FALSE / TRUE*

The TRUE or FALSE output demand.

Functional Description



There is a DIGITAL OUTPUT function block associated with each of the following terminals:

The Control Board has 2 configurable digital inputs/outputs. These share terminals X15/08 and X15/09. Also refer to COMMS PORT, page D-15.

DOUT1 is associated with terminal X15/08
DOUT2 is associated with terminal X15/09

The default status for DOUT1/2 is to act as inputs. Setting VALUE to TRUE will individually configure the block to be an output.

The Control Board has one digital output (volt-free relay contacts):

DIGITAL OUTPUT 3 is associated with the "HEALTH" outputs, DOUT3A & DOUT3B. These are terminals X14/01 and X14/02 respectively.

The Backpanel Board, fitted to Frames E and above, has three digital outputs (volt-free relay contacts):

DIGITAL OUTPUT 4, 5 and 6 are associated with DOUT4A & DOUT4B, DOUT5A & DOUT 5B, DOUT6A & DOUT6B. These are terminals X16/01 & X16/02, X16/03 & X16/04, and X16/05 & X16/06 respectively.

D

DRIVE CONFIG

SETUP::DRIVE SETUP::DRIVE CONFIG

This block contains general drive set-up parameters.

Parameter Descriptions

DRIVE NAME *PREF: 136.01* *Default: 890 DRIVE* *Range:*

Enter a user name for the drive.

CONTROL MODE *PREF: 136.02* *Default: 4* *Range: See below*

This parameter defines how the drive will control the motor. In firmware v2.x the value is set to PMAC and cannot be changed.

Enumerated Value : *CONTROL MODE*

0 : VOLTS / Hz
1 : SENSORLESS VEC
2 : CLOSED-LOOP VEC
3 : 4-Q REGEN
4 : PMAC Used to control Permanent-Magnet AC brushless motors.

Parameter Descriptions

FBK OPT. TYPE *PREF: 136.03* *Default: 2* *Range: See below*

Set this parameter to define the kind of feedback board fitted in Slot F on the drive.

Enumerated Value : *FBK OPT. TYPE*

0 : NONE	There is no board fitted in Slot F
1 : ENCODER	An encoder (ENDAT SinCos, RS485 or HTTL) board is fitted in slot F
2 : RESOLVER	A resolver board is fitted in Slot F
3 : TYPE 3	*Reserved for future use*
4 : TYPE 4	*Reserved for future use*
5 : TYPE 5	*Reserved for future use*
6 : TYPE 6	*Reserved for future use*
7 : TYPE 7	*Reserved for future use*

SLOT1 OPT. TYPE *PREF: 136.04* *Default: 0* *Range: See below*

Set this parameter to define the kind of option board fitted in Slot A on the drive.

Enumerated Value : *SLOT1 OPT. TYPE*

0 : NONE	There is no board fitted in Slot A
1 : RS485	RS485 serial communication board
2 : PROFIBUS	Profibus communication board
3 : LINK	LINK communication board
4 : DEVICE NET	DeviceNet communication board
5 : CAN OPEN	CANopen communication board
6 : LONWORKS	Lonworks communication board
7 : CONTROLNET	Control Net communication board
8 : MODBUS PLUS	Modbus Plus communication board
9 : ETHERNET	Ethernet communication board
10 : HTTL INC. ENC.	HTTL incremental encoder board

11 : RS485 INC. ENC.	RS485 incremental encoder board
12 : ENDAT SIN/COS	Endat SIN/SOC encoder board
13 : TYPE 13	Reserved for future use
14 : TYPE 14	Reserved for future use
15 : TYPE 15	Reserved for future use

SLOT2 OPT. TYPE *PREF: 136.05* *Default: 0* *Range: See below*

This parameter defines what kind of option board should be plugged in slot B.

Enumerated Value : *SLOT2 OPT. TYPE*

0 : NONE	No board
1 : RS485	RS485 serial communication board
2 : PROFIBUS	Profibus communication board
3 : LINK	LINK communication board
4 : DEVICE NET	Device Net communication board
5 : CAN OPEN	CAN Open communication board
6 : LONWORKS	Lonworks communication board
7 : CONTROLNET	Control Net communication board
8 : MODBUS PLUS	Modbus Plus communication board
9 : ETHERNET	Ethernet communication board
10 : HTTL INC. ENC.	HTTL incremental encoder board
11 : RS485 INC. ENC.	RS485 incremental encoder board
12 : ENDAT SIN/COS	Endat SIN/SOC encoder board
13 : TYPE 13	Reserved for future use
14 : TYPE 14	Reserved for future use
15 : TYPE 15	Reserved for future use

Parameter Descriptions

FBK FITTED	*PREF: 136.06*	*Default: 0*	*Range: See below*

This diagnostic defines what kind of feedback board is currently fitted in slot F.

Enumerated Value : *FBK FITTED*

0 : NONE	No board is present in slot F
1 : RESOLVER	A resolver board is fitted
2 : HTTL INC. ENC.	A HTTL incremental encoder board is fitted
3 : RS485 INC. ENC.	A RS485 incremental encoder board is fitted
4 : ENDAT SIN/COS	An Endat SIN/COS encoder board is fitted
5 : UNKNOWN	The board fitted is unknown by the firmware

FBK FAULT	*PREF: 136.07*	*Default: 0*	*Range: See below*

This diagnostic defines the slot F error status

Enumerated Value : *FBK FAULT*

0 : NONE	No error
1 : PARAMETER VALUE	The board has an error on an internal parameter
2 : TYPE MISMATCH	The defined type doesn’t match the the type of the fitted board
3 : SELFTEST	The board has a selftest error
4 : HARDWARE	There is a hardware error in the board
5 : MISSING	There is no board plugged in but one should be

FBK VERSION	*PREF: 136.08*	*Default: 0000*	*Range: 0000 to 9999*

When a board is plugged in slot F, this diagnostic gives the board version number

SLOT1 FITTED	*PREF: 136.09*	*Default: 0*	*Range: See below*

This diagnosticdefines what kind of option board is currently fitted in slot A.

Parameter Descriptions

Enumerated Value : *SLOT1 FITTED*

0 : NONE	No board is present in slot A
1 : FIREWIRE	A Firewire communication board is fitted
2 : PROFIBUS	A Profibus communication board si fitted
3 : CONTROL NET	A Control Net communication board si fitted
4 : CAN	A CAN bus communication board si fitted
5 : UNKNOWN	The board fitted is unknown by the firmware
6 : HTTL INC. ENC.	A HTTL incremental encoder board is fitted
7 : RS485 INC. ENC.	A RS485 incremental encoder board is fitted
8 : ENDAT SIN/COS	An Endat SIN/COS encoder board is fitted

SLOT1 FAULT *PREF: 136.10* *Default: 0* *Range: See below*

This diagnostic defines the slot A error status

Enumerated Value : *SLOT1 FAULT*

0 : NONE	No error
1 : PARAMETER VALUE	The board has an error on an internal parameter
2 : TYPE MISMATCH	The defined type doesn't match the the type of the fitted board
3 : SELFTEST	The board has a selftest error
4 : HARDWARE	There is a hardware error in the board
5 : MISSING	There is no board plugged in but one should be

SLOT1 VERSION *PREF: 136.11* *Default: 0000* *Range: 0000 to 9999*

When a board is plugged in slot A, this diagnostic gives the board version number

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SLOT2 FITTED *PREF: 136.12* *Default: 0* *Range: See below*

This diagnostic defines what kind of option board is currently fitted in slot B.

Parameter Descriptions

Enumerated Value : *SLOT1 FITTED*

0 : NONE	No board is present in slot B
1 : FIREWIRE	A Firewire communication board is fitted
2 : PROFIBUS	A Profibus communication board si fitted
3 : CONTROL NET	A Control Net communication board si fitted
4 : CAN	A CAN bus communication board si fitted
5 : UNKNOWN	The board fitted is unknown by the firmware
6 : HTTL INC. ENC.	A HTTL incremental encoder board is fitted
7 : RS485 INC. ENC.	A RS485 incremental encoder board is fitted
8 : ENDAT SIN/COS	An Endat SIN/COS encoder board is fitted

SLOT2 FAULT *PREF: 136.13* *Default: 0* *Range: See below*

This diagnostic defines the slot B error status

Enumerated Value : *SLOT2 FAULT*

0 : NONE	No error
1 : PARAMETER VALUE	The board has an error on an internal parameter
2 : TYPE MISMATCH	The defined type doesn't match the the type of the fitted board
3 : SELFTEST	The board has a selftest error
4 : HARDWARE	There is a hardware error in the board
5 : MISSING	There is no board plugged in but one should be

SLOT2 VERSION *PREF: 136.14* *Default: 0000* *Range: 0000 to 9999*

When a board is plugged in slot B, this diagnostic gives the board version number

PWM FREQ *PREF: 136.15* *Default: 0* *Range: See below*

This parameter defines the frequency of the PWM

Parameter Descriptions

Enumerated Value : *PWM FREQ*

0 : 4 KHz
1 : 8 KHz

Functional Description

This block is used the general parameters of the drive and what hardware should be plugged in the A, B and F slots. In order for the drive to run correctly these parameters must be correctly set.

DYNAMIC BRAKING

SETUP::MOTOR CONTROL::DYNAMIC BRAKING

Designed for all Motor Control Modes.

The dynamic braking function block controls the rate at which energy from a regenerating motor is dumped into a resistive load. This dumping prevents the dc link voltage reaching levels which would cause an Overvoltage trip.

Parameter Descriptions

ENABLE *PREF: 99.01* *Default: TRUE* *Range: FALSE / TRUE*

Enables operation of the dynamic braking block.

BRAKE RESISTANCE *PREF: 99.03* *Default: 100.00 Ohm* *Range:0.01 to 300.00 Ohm*

The value of the dynamic braking load resistance.

BRAKE POWER *PREF: 99.04* *Default: 0.1 kW* *Range: 0.1 to 510.0 kW*

The power that the load resistance may continually dissipate.

1SEC OVER RATING *PREF: 99.05* *Default: 25* *Range: 1 to 40*

Multiplier that may be applied to BRAKE POWER for power overloads lasting no more than 1 second.

INT DB RESISTOR *PREF: 99.07* *Default: TRUE* *Range: FALSE / TRUE*

For futrue use only. Set to FALSE if an external dynamic brake resistor is fitted.

BRAKING *PREF: 99.06* *Default: FALSE* *Range: FALSE / TRUE*

A read-only parameter indicating the state of the brake switch.

Functional Description

When enabled, the DYNAMIC BRAKING block monitors the internal dc link voltage every milli-second and sets the state of the brake switch accordingly.

The dynamic braking block provides a control signal that is used by the SLEW RATE LIMIT block. This causes the setpoint to be temporarily frozen whenever the dynamic brake is operating because the dc link voltage exceeds the internal comparison level. This allows the stop rate to be automatically tuned to the characteristics of the load, motor, Drive and brake resistor.

The DYNAMIC BRAKING block operates even when the motor output is not enabled. This allows the block to continually monitor the energy dumped into the braking resistor, and the energy dissipated across the brake switch. With this information the Drive is able to deduce the loading on the brake resistor. Optional trips may be enabled should the switch or resistor be loaded beyond its capabilities.

The "Brake Resistor" and "Brake Switch" trips are disabled by default. To enable these trips, refer to TRIPS STATUS, page D-101. When using dynamic braking, the brake resistor information must be entered and these two trips enabled.

Refer also to Chapter 7: “Operating the Drive” - Dynamic Braking.

EMC CAPACITORS

SETUP::DRIVE SETUP::EMC CAPACITORS

This block allows the user to disconnect the internal EMC "Y" capacitor (DC+ to earth and DC- to earth) from the drive earth on 890 Frames B, C & D.

Parameter Descriptions

EMC CAPACITORS *PREF: 125.01* *Default: 0* *Range: See below*

Electrically connects the internal EMC capacitors inside the product.

Enumerated Value : Internal EMC "Y " Capacitors

0 : CONNECTED	Y caps connected to earth
1 : NOT CONNECTED	Y caps disconnected from earth

Caution

Isolating the capacitors in this way will lower the input bridge's immunity to surges.
This will invalidate the EMC certification.

Reasons for Isolation

The drive's "Y" capacitors should be electrically isolated :

- when operating the drive on IT (non-earth referenced supplies)
- when operating the drive in a regenerative common dc link system (remove from all drives in the system)
- to prevent nuisance operation of earth leakage protection devices caused by earth leakage currents flowing in the supply

ENCODER

SETUP::MOTOR CONTROL::ENCODER

This block is used to set up the way that speed feedback is obtained via the feedback option card. Different encoder types may be selected including pulse encoder, sincos encoder and absolute single turn or multi turn. Different encoder types require different hardware options. If an encoder type is selected which does not match the hardware, an error will be flagged.

Parameter Descriptions

PULSE ENC VOLTS	*PREF: 71.01*	*Default: 10.0 V*	*Range: 10.0 to 20.0 V*

Set this approximately to the supply voltage required by the pulse encoder.

SINCOS ENC VOLTS	*PREF: 71.22*	*Default: 5.0 V*	*Range: See below*

Used to set the supply volts required by the sin/cos encoder.

Enumerated Value : SinCos Encoder Volts

0 : 5V
1 : 10V

ENCODER LINES	*PREF: 71.02*	*Default: 2048*	*Range: 250 to 32767*

The number of lines must be set to match the type of encoder being used. Incorrect setting of this parameter will result in an erroneous speed measurement and will cause the motor to become unstable.

ENCODER INVERT	*PREF: 71.03*	*Default: FALSE*	*Range: FALSE/TRUE*

Used to match the encoder direction to the motor direction. The encoder direction is set automatically by the Autotune when running in closed-loop vector mode. It should not be necessary to adjust this parameter. When TRUE, changes the sign of the measured speed and the direction of the position count.

Parameter Descriptions

ENCODER TYPE	*PREF: 71.04*	*Default: 3*	*Range: See below*

This parameter defines the type of encoder being used.

Enumerated Value : Type

0 : QUADRATURE	single-ended pulse encoder
1 : CLOCK/DIR	single-ended pulse encoder
2 : CLOCK	single-ended pulse encoder
3 : QUADRATURE DIFF	differential pulse encoder
4 : CLOCK/DIR DIFF	differential pulse encoder
5 : CLOCK DIFF	differential pulse encoder
6 : SINCOS INC	sin/cos encoder
7 : ABS ENDAT ST	single turn endat absolute encoder
8 : ABS ENDAT MT	multi-turn endat absolute encoder

Note that if an absolute endat encoder is used, the encoder MUST be wired exactly as specified. If not, it will fail to calibrate the absolute position and an error will result when the drive is started. Its status can be viewed via the parameter CALIBRATN STATUS.

ENCODER MECH O/S	*PREF: 71.06*	*Default: 0.0000 deg*	*Range: 0.0000 to 360.0000 deg*

(Encoder mechanical offset). When using an absolute encoder, the SHAFT POSITION diagnostic shows the absolute position of the motor shaft. The zero position can be adjusted by setting ENCODER MECH O/S. Rotate the motor shaft to the position which is required to be zero, and note the value of SHAFT POSITION. Enter this value into ENCODER MECH O/S to zero its position.

ENCODER FBK %	*PREF: 71.08*	*Default: —.xx %*	*Range: —.xx %*

This parameter shows the mechanical speed of the motor shaft, calculated from the encoder feedback, as a percentage of the user maximum speed setting (MAX SPEED in the REFERENCE function block).

Parameter Descriptions

SHAFT POSITION	*PREF: 71.09*	*Default: —.xx deg*	*Range: —.xx deg*

This diagnostic provides the motor shaft position (before the gear box).

LOAD POSITION	*PREF: 71.10*	*Default: —.xx deg*	*Range: —.xx deg*

This diagnostic provides the motor load position (after the gear box).

OUTPUT G'BOX IN	*PREF: 71.05*	*Default: 1*	*Range: -2000000000 to +2000000000*

See OUTPUT G'BOX OUT below.

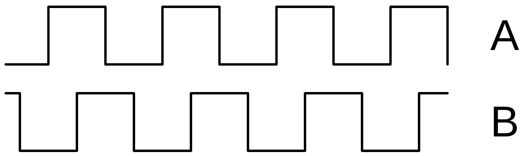
OUTPUT G'BOX OUT	*PREF: 71.26*	*Default: 1*	*Range: -2000000000 to +2000000000*

These two parameters define the gearbox ratio between the motor and the load. For example, if a 3:2 gearbox is fitted between the motor and the load such that the motor turns through 3 revolutions for every 2 revolutions of the load, then set OUTPUT G'BOX IN to 3, and set OUTPUT G'BOX OUT to 2. The software will then keep track of the load position.

If the power is removed and then reapplied, it is possible for the drive to keep track of the load position even if the shaft has moved since the power was removed. This is only possible if the encoder is an absolute multi-turn. Otherwise, the load position will be set equal to the motor position on power-up.

Functional Description

A quadrature encoder uses 2 input signals (A and B), phase shifted by a quarter of a cycle (90°). Direction is obtained by looking at the combined state of A and B.



Speed is calculated using the following function:

$$\text{SPEED HZ} = \frac{\text{Counts Per Second}}{\text{Lines x 4}}$$

where counts per second are the number of edges received from the encoder. There are 4 counts per line.

FEEDBACKS

SETUP::MOTOR CONTROL::FEEDBACKS

Designed for PMAC Control Mode.

The FEEDBACKS block allows you to view speed feedback and motor current related diagnostics.

Note that the following parameters are not implemented in this version : QUADRATIC TORQUE, OVERLOAD LEVEL, TERMINAL VOLTS, TORQUE FEEDBACK, FIELD FEEDBACK.

Parameter Descriptions

QUADRATIC TORQUE *PREF: 70.01* *Default: FALSE* *Range: FALSE/TRUE*

When TRUE, selects QUADRATIC allowing higher continuous ratings with less overload capability. Quadratic Torque operation is especially suited to fan or pump applications. When FALSE, selects CONSTANT duty.

OVERLOAD LEVEL *PREF: 70.20* *Default: HIGH* *Range: See below*

This reduces I*t limit for shaftless printing applications. However, with OVERLOAD LEVEL set to LOW, no pwm frequency reduction occurs during overload conditions.

Enumerated Value : Level

0 : LOW	130% for 60s : sets the I*t limit
1 : HIGH	150% for 60s : sets the I*t limit

DC LINK VOLTS *PREF: 70.02* *Default: —. V* *Range: —. V*

This shows the voltage across the dc link capacitors.

TERMINAL VOLTS *PREF: 70.03* *Default: —. V* *Range: —. V*

This shows the rms voltage, between phases, applied by the Drive to the motor terminals.

Parameter Descriptions

SPEED FBK RPM *PREF: 70.04* *Default: —.xx rpm* *Range: —.xx rpm*

This parameter changes according to the CONTROL MODE (MOTOR DATA function block):

- In CLOSED-LOOP VEC mode the parameter shows the mechanical speed of the motor shaft in revolutions per minute as calculated from the speed feedback device.
- In SENSORLESS VEC mode the parameter shows the calculated mechanical speed of the motor shaft in revolutions per minute.
- In VOLTS/Hz mode the parameter shows motor synchronous speed in rpm.

SPEED FBK REV/S *PREF: 70.05* *Default: —.xx rev/s* *Range: —.xx rev/s*

This parameter changes according to the CONTROL MODE (MOTOR DATA function block):

- In CLOSED-LOOP VEC mode the parameter shows the mechanical speed of the motor shaft in revolutions per second as calculated from the motor speed feedback.
- In SENSORLESS VEC mode the parameter shows the calculated mechanical speed of the motor shaft in revolutions per second.
- In VOLTS / Hz mode, the parameter shows the motor synchronous speed in revolutions per second.

SPEED FBK % *PREF: 70.06* *Default: —.xx %* *Range: —.xx %*

This parameter changes according to the CONTROL MODE (MOTOR DATA function block):

- In CLOSED-LOOP VEC mode the parameter shows the mechanical speed of the motor shaft as a percentage of the user maximum speed setting (MAX SPEED in the REFERENCE function block) as calculated from the motor speed feedback.
- In SENSORLESS VEC mode the parameter shows the calculated mechanical speed of the motor shaft as a percentage of the user maximum speed setting (MAX SPEED in the REFERENCE function block).
- In VOLTS / Hz mode, the parameter shows the electrical drive output frequency as a percentage of the user maximum speed setting (MAX SPEED in the REFERENCE function block).

Parameter Descriptions

TORQUE FEEDBACK	*PREF: 70.10*	*Default: —.xx %*	*Range: —.xx %*

Shows the estimated motor torque, as a percentage of rated motor torque.

FIELD FEEDBACK	*PREF: 70.11*	*Default: —.xx %*	*Range: —.xx %*

A value of 100% indicates the motor is operating at rated magnetic flux (field).

MOTOR CURRENT %	*PREF: 70.12*	*Default: —.xx %*	*Range: —.xx %*

This diagnostic contains the level of rms line current being drawn from the Drive and is seen as a % of the MOTOR CURRENT parameter setting in the MOTOR DATA function block.

MOTOR CURRENT A	*PREF: 70.13*	*Default: —.xx A*	*Range: —.xx A*

This diagnostic contains the level of rms line current in Amps being drawn from the Drive.

STACK RATING A	*PREF: 70.19*	*Default: —.x A*	*Range: —.x A*

This diagnostic indicates the stack rating in Amps. This reduces as a function of pwm switching frequency.

HEATSINK TEMP	*PREF: 70.17*	*Default: —. C*	*Range: —. C*

This diagnostic displays the power stack heatsink temperature in °Centigrade.

HEATSINK TEMP	*PREF: 70.18*	*Default: —. %*	*Range: —. %*

This diagnostic displays the power stack heatsink temperature as a percentage of the overtemperature trip level.

FIREWIRE

SETUP:: COMMS::FIREWIRE

The Firewire block parameterises Firewire communications, providing a series of diagnostics. There are no user settable parameters in this block.

Parameter Descriptions

OWN ID *PREF: 117.01* *Default: 99* *Range: —.*

FireWire network ID of the drive. This is the physical address, not the net address, as declared as part of the DSE Configuration. Note that this network ID can change after a Bus Reset.

IRM ID *PREF: 117.02* *Default: 99* *Range: —.*

FireWire network ID of the drive acting as the Isochronous Resource Manager. The IRM ID can change after a Bus Reset.

NUMBER OF NODES *PREF: 117.03* *Default: 0* *Range: —.*

Total number of Firewire Nodes connected to the network..

CYCLE TIMER *PREF: 117.04* *Default: 0* *Range: —.*

Timer which should be synchronised across the Firewire network.

BUS RESETS *PREF: 117.05* *Default: 0* *Range: —.*

Number of times the Firewire bus has reset.

BAD MESSAGES *PREF: 117.13* *Default: 0* *Range: —.*

Number of incoming Firewire messages that are received malformed. An incrementing value may indicate that the Firewire cabling needs attention.

MISSED TX ACKS *PREF: 117.14* *Default: 0* *Range: —.*

Number of outgoing Firewire messages that are not acknowledged. An incrementing value may indicate that the Firewire cabling needs attention.

MCAP ADVERTS *PREF: 117.06* *Default: 0* *Range: —.*

Count of Multicast Advertisements sent from this node.

Parameter Descriptions

MAX HOPS	*PREF: 117.07*	*Default: 0*	*Range: —.*

Maximum number of cable hops from this node to all other nodes.

OFFSET (40.69ns)	*PREF: 117.08*	*Default: 0*	*Range: —.*

Time delay between this node and the node hosting the Cycle Time Master.

FIREWIRE REF

SETUP:: PHASE CONTROL::FIREWIRE REF

Performance Level = ADVANCED : CLOSED-LOOP VEC Motor Control Mode only.

The FireWire option card (Option B) must be fitted to the drive.

This block processes Virtual Master commands received over Firewire communications, producing position, speed and acceleration references to be used by the control loops, when Firewire is selected as the reference source (Firewire Comms Sel is TRUE in Comms Control block).

Parameter Descriptions

CHANNEL	*PREF: 119.01*	*Default: 0*	*Range: 0 to 62*

This parameter sets the Firewire channel that the master reference is being received from.

RESET	*PREF: 119.02*	*Default: FALSE*	*Range: FALSE / TRUE*

This parameter resets the Outputs to zero. Note if this is set TRUE whilst the drive is running following the Firewire Reference, then the drive will decelerate to zero speed on the System Ramp.

INVERT	*PREF: 119.03*	*Default: FALSE*	*Range: FALSE / TRUE*

This parameter inverts the master reference. Note that this inversion does not take place locally in the drive, so the master and local diagnostics below will always be in the same direction.

GEAR RATIO A	*PREF: 119.04*	*Default: 1000000*	*Range: -2000000000 to 2000000000*

This parameter provides a Gear Ratio A/B (see GEAR RATIO B) inserted between master reference input and Firewire Ref outputs. Output = Gear ratio A / Gear Ratio B * Master Input.

GEAR RATIO B	*PREF: 119.05*	*Default: 1000000*	*Range: -2000000000 to 2000000000*

This parameter provides a Gear Ratio A/B (see GEAR RATIO A) inserted between master reference input and Firewire Ref outputs. Output = Gear ratio A / Gear Ratio B * Master Input.

Parameter Descriptions

POSITION OUTPUT	*PREF: 119.06*	*Default: —.xxxx deg*	*Range: —.xxxx deg*

This diagnostic shows the position demand in load mechanical degrees.

SPEED OUTPUT	*PREF: 119.07*	*Default: —.xx Hz*	*Range: —.xx Hz*

This diagnostic shows the speed demand in load mechanical Hz (rev/s).

ACCEL OUTPUT	*PREF: 119.08*	*Default: —.xx*	*Range: —.xx*

This diagnostic shows the acceleration demand in load mechanical Hz/s (rev/s^2).

MASTER POSITION	*PREF: 119.09*	*Default: —.xxxx deg*	*Range: —.xxxx deg*

This diagnostic shows the master aster position demand in mechanical degrees.

MASTER SPEED	*PREF: 119.10*	*Default: —.xxxx Hz*	*Range: —.xxxx Hz*

This diagnostic shows the master speed demand in mechanical Hz (rev/s).

MASTER ACCEL	*PREF: 119.11*	*Default: —.xxxx*	*Range: —.xxxx*

This diagnostic shows the master acceleration demand in mechanical Hz/s (rev/s^2).

READY	*PREF: 119.14*	*Default: FALSE*	*Range: FALSE / TRUE*

This diagnostic is TRUE when local drive is properly synchronised with the master, i.e. Status = READY.

Parameter Descriptions

STATUS *PREF: 119.13* *Default: 7* *Range: See below*

This diagnostic shows operating and error states

Enumerated Value : *Status*	
0 : READY	the Firewire Ref is operating normally
1 : REF RESET	the FireWire Ref RESET is set TRUE
2 : MASTER RESET	the Virtual Master is in Reset
3 : LOST SYNC	time stamp difference to large
4 : DUP MASTER	more than one Virtual Master with the same channel
5 : MISSING MASTER	no Virtual Master with selected channel
6 : NO FIREWIRE	no FireWire - either not fitted or no PHY power
7 : DISABLED	the FireWire CHANNEL is set to 0
8 : INTERNAL	same channel set for FIREWIRE REF & VIRTUAL MASTER

I/O TRIPS

SETUP::TRIPS::I/O TRIPS

This function block is designed to operate in conjunction with the Analog and Digital Input function blocks to trip the Drive on a loss of setpoint input or safety control input.

Parameter Descriptions

INVERT THERMIST	*PREF: 98.01*	*Default: FALSE*	*Range: FALSE / TRUE*

Inverts the sense of the motor thermistor input. The default FALSE is normally-closed/low impedance.

INVERT ENC TRIP	*PREF: 98.02*	*Default: FALSE*	*Range: FALSE / TRUE*

Inverts the sense of the encoder fail input on the encoder Technology Box.

EXT TRIP MODE	*PREF: 98.08*	*Default: DISABLED*	*Range: See below*

Determines the special function of digital input 5.

Enumerated Value : *External Trip Mode*

0 : TRIP - A low at digital input 5 will cause an external trip
1 : COAST - A low at digital input 5 will cause the motor to coast to stop. The drive will not trip.
2 : DISABLED - Digital input 5 does not have any special function.

INPUT 1 BREAK	*PREF: 98.03*	*Default: FALSE*	*Range: FALSE / TRUE*

A general purpose signal designed to be internally wired to the function block ANALOG INPUT 3, BREAK parameter. When this signal goes TRUE this causes an INPUT 1 BREAK trip to occur, (unless this trip is disabled within the TRIPS STATUS function block, see the DISABLE TRIPS parameter).

This parameter is not saved in the Drive's non-volatile memory and thus is reset to the default setting at power-up.

Parameter Descriptions

INPUT 2 BREAK *PREF: 98.04* *Default: FALSE* *Range: FALSE / TRUE*

A general purpose signal designed to be internally wired to the function block ANALOG INPUT 4, BREAK parameter. When this signal goes TRUE this causes an INPUT 2 BREAK trip to occur, (unless this trip is disabled within the TRIPS STATUS function block, see the DISABLE TRIPS parameter).

This parameter is not saved in the Drive's non-volatile memory and thus is reset to the default setting at power-up.

COMMS BREAK *PREF: 98.09* *Default: FALSE* *Range: FALSE / TRUE*

When TRUE, this signal causes a COMMS BREAK trip to occur.

THERMISTOR *PREF: 98.05* *Default: FALSE* *Range: FALSE / TRUE*

The current state of the motor thermistor trip input, modified by INVERT THERMIST input.

ENCODER *PREF: 98.06* *Default: FALSE* *Range: FALSE / TRUE*

The current state of the encoder feedback card (Option F) error trip input. TRUE is tripped.

EXTERNAL TRIP *PREF: 98.07* *Default: FALSE* *Range: FALSE / TRUE*

If external trip mode is set to Coast or Trip then this shows the state of the latched trip caused by external trip, (digital input 5). If the external trip mode is set to Disabled, this output will be FALSE.

Functional Description

The I/O TRIPS function block allows trips to be generated by signals on the input terminals of the Drive. Refer to Chapter 10 for a description of the trips supported by the Drive.

INTERPOLATOR

SETUP::MOTION::INTERPOLATOR

Designed for BRUSHLESS SERVO Motor Control Mode.

The interpolator function blocks controls the execution rate of the Trajectory Generator block.

Parameter Descriptions

PATTERN	*PREF: 140.01*	*Default: 0*	*Range: See below*

This parameter sets the interpolation rate of the Trajectory Generator compared to the Position and Speed loop.

Enumerated Value : *Pattern*

0 : TG Every 4 loop	The TG runs 4 times slower than the position and speed loop.
1 : TG Every 8 loop	The TG runs 8 times slower than the position and speed loop.
2 : TG Every 1 loop	The TG runs at the same rate than the position and speed loop.
3 : TG Every 2 loop	The TG runs 2 times slower than the position and speed loop.

LIMIT INPUT

SETUP::MOTION::LIMIT INPUT

Designed for BRUSHLESS SERVO Motor Control Mode.

The Limit Input block is designed to stop any ongoing motion when a given Boolean value (defined by INPUT) is crossing a certain level (defined by TYPE and STATE). This block also monitors the DIRECTION of the ongoing motion. When active, the ongoing motion may be stopped as defined by GUIDED.

Parameter Descriptions

DISABLE	*PREF: 144.01, 145.01*	*Default: FALSE*	*Range: FALSE / TRUE*

Set this parameter to TRUE to disable the block.

INPUT	*PREF: 144.02, 145.02*	*Default: False*	*Range: FALSE / TRUE*

Input to be monitored.

DIRECTION	*PREF: 144.03, 145.03*	*Default: 0*	*Range: See below*

This parameter sets the direction of ongoing motion. If the motion is in the same direction as DIRECTION then the block is active otherwise it does not monitor the INPUT.

Enumerated Value : Direction

0 : POSITIVE INPUT is check only if the ongoing motion moves in the POSITIVE direction.
1 : NEGATIVE INPUT is check only if the ongoing motion moves in the NEGATIVE direction.

TYPE	*PREF: 144.04, 145.04*	*Default: 0*	*Range: See below*

This parameter sets how the INPUT is monitored.

Enumerated Value : Type

0 : LEVEL TRIG. The block monitors the level of INPUT.
1 : EDGE TRIG. The block monitors rising or falling edge of INPUT.

Parameter Descriptions

STATE *PREF: 144.05, 145.05* *Default: 0* *Range: See below*

This parameter sets the level or edge that is monitored.

Enumerated Value : *State*

0 : LOW/FALLING	If TYPE = LEVEL TRIG. a low level on INPUT (i.e. INPUT = FALSE) will trigger the block, if TYPE = EDGE TRIG. a falling edge on INPUT will trigger.
1 : HIGH/RISING	If TYPE = LEVEL TRIG. a high level on INPUT (i.e. INPUT = TRUE) will trigger the block, if TYPE = EDGE TRIG. a rising edge on INPUT will trigger.

GUIDED *PREF: 144.06, 145.06* *Default: 0* *Range: See below*

This parameter sets how the drive reacts when the block is triggered.

Enumerated Value : *State*

0 : NONE	The drive will not stop. Only the ACTIVE output will be set.
1 : NORMAL STOP	The drive will decelerate with the current deceleration parameter.
2 : QUICK STOP	The drive will decelerate with the QUICK STOP RATE parameter (from TRAJ GEN DEFAULTS block).

ACTIVE *PREF: 144.07, 145.07* *Default: FALSE* *Range: FALSE / TRUE*

This is a diagnostic output indicating the current state of the block. If TRUE the block has triggered and the drive is stopping.

ENABLED *PREF: 144.08, 145.08* *Default: FALSE* *Range: FALSE / TRUE*

This is a diagnostic output indicating if the block is enabled.

VALUE *PREF: 144.09, 145.09* *Default: FALSE* *Range: FALSE / TRUE*

This is a diagnostic output indicating the current state of the INPUT.

LOCAL CONTROL

SETUP::SEQ & REF::LOCAL CONTROL

This block allows the available modes of Local and Remote operation to be customised. It also indicates the selected mode.

You can only switch between Local and Remote modes using the Keypad. Refer to Chapter 8: “The Keypad” - The L/R Key.

Parameter Descriptions

SEQ MODES *PREF: 94.01* *Default: 0* *Range: See below*

Allows the source of sequencing commands to be selected. Local is the Keypad, Remote is an external signal. The modes supported are:

Enumerated Value : *Seq Mode*

0 : LOCAL/REMOTE
1 : LOCAL ONLY
2 : REMOTE ONLY

REF MODES *PREF: 94.02* *Default: 0* *Range: See below*

Allows the source of the reference signal to be selected. Local is the Keypad, Remote is an external signal. The modes supported are:

Enumerated Value : *Ref Mode*

0 : LOCAL/REMOTE
1 : LOCAL ONLY
2 : REMOTE ONLY

Parameter Descriptions

POWER UP MODE *PREF: 94.03* *Default: 1* *Range: See below*

Allows the power-up operating mode of the Drive to be selected. Local is the Keypad, Remote is an external signal, Automatic is the same mode as at power-down. The modes supported are:

Enumerated Value : *Power Up Mode*

0 : LOCAL
1 : REMOTE
2 : AUTOMATIC

SEQ DIRECTION *PREF: 94.04* *Default: FALSE* *Range: FALSE / TRUE*

When TRUE, direction is a Sequencing command.

When FALSE, direction is a Reference command.

REMOTE SEQ *PREF: 94.05* *Default: TRUE* *Range: FALSE / TRUE*

This parameter indicates the present source of the sequencing commands.

REMOTE REF *PREF: 94.06* *Default: TRUE* *Range: FALSE / TRUE*

This parameter indicates the present source of the reference signal.

LOOP OVER SPEED

SETUP::TRIPS::LOOP OVER SPEED

Designed for BRUSHLESS SERVO Motor Control Mode.

The loop over speed operates by looking at speed feedback and comparing it against THRESHOLD.

If the feedback exceeds this threshold for a period greater than DELAY, then a trip is triggered. The trip is only active while the drive is operating in Brushless Servo.

Parameter Descriptions

INHIBIT *PREF: 132.01* *Default: FALSE* *Range: FALSE / TRUE*

Set this parameter to TRUE to disable the over speed trip.

THRESHOLD *PREF: 132.02* *Default: 110.00 %* *Range: 0.00 to 150.00 %*

Sets a threshold below which the trip will not operate. The value of THRESHOLD is a percentage of SPEED MAX (from POS SPEED LOOP I function block) and is compared to the value of SPEED ACTUAL (from the POS SPEED LOOP OUT function block).

DELAY *PREF: 132.03* *Default: 0.00 s* *Range: 0.00 to 10.00 s*

Sets the time the trip must be present for before a trip is triggered.

TRIPPED *PREF: 132.04* *Default: FALSE* *Range: FALSE / TRUE*

This is a diagnostic output indicating the current state of the loop over speed trip.

RESET *PREF: 132.05* *Default: FALSE* *Range: FALSE / TRUE*

Resets the loop overspeed trip if set to TRUE.

MECH BRAKE

SETUP::MOTOR CONTROL::MECH BRAKE

This block is used to control an electro-mechanical parking (holding) brake fitted to a brake motor.

IMPORTANT Engaging the brake when the motor is turning will increase its wear. This may lead to brake failure.

Parameter Descriptions

ENABLE	*PREF: 155.01*	*Default: FALSE*	*Range: FALSE / TRUE*

By default this parameter is set to FALSE which means that the drive's internal brake relay is opened at power-up and remains open, effectively disabling this block. (The brake would be permanently ON in this condition).

Set this parameter to TRUE to enable the MECH BRAKE block. The state of the brake is then determined by the METHOD parameter, and also the MANUAL STATE parameter if METHOD is set to MANUAL.

METHOD	*PREF: 155.02*	*Default: 0*	*Range: See below*

Select how to use the electro-mechanical brake:

Enumerated Value : *Method*

0 : AUTOMATIC	Braking is handled automatically by the drive.
1 : MANUAL	The user applies/releases the brake. Refer to MANUAL STATE.

T CLOSE	*PREF: 155.03*	*Default: 100*	*Range: 0 to 1500 ms*

When the motor speed reaches zero, the drive waits for time T CLOSE before applying the brake (METHOD = AUTOMATIC).

T OPEN	*PREF: 155.04*	*Default: 100*	*Range: 0 to 1500 ms*

When the motor starts, the drive waits for time T OPEN before releasing the brake (METHOD = AUTOMATIC).

Parameter Descriptions

MANUAL STATE *PREF: 155.05* *Default: FALSE* *Range: FALSE / TRUE*

When METHOD is set to MANUAL and ENABLE is set to TRUE, use this parameter to apply/release the brake (via a DIGITAL INPUT and switch for example).

FALSE :	the brake is ON
TRUE :	the brake is OFF

BRAKE RELEASED *PREF: 155.06* *Default: FALSE* *Range: FALSE / TRUE*

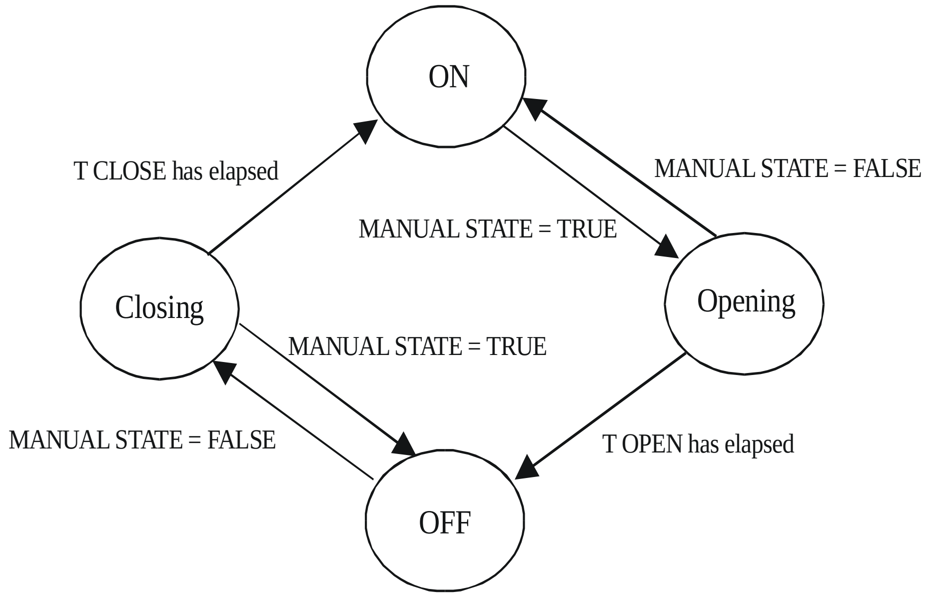
This output describes the state of the mechanical brake. If TRUE, the brake is OFF.

Functional Description

When the MECH BRAKE function block is enabled a state-machine is used to open or close the drive's internal brake relay.

This state-machine has 4 states :

CLOSING	relay is open, brake is closing
ON	relay is open, brake is on
OPENING	relay is closed, brake is opening
OFF	relay is closed, brake is off



The diagram opposite shows the state-machine transitions for when METHOD is set to AUTOMATIC or MANUAL.

D

MOT POLARISATION

SETUP::MOTOR CONTROL::MOT POLARISATION

Designed for MOTOR/ENCODER association in PMAC control mode

This function is used to set up and verify the relative position between the position sensor and the PMAC motor.

Parameter Descriptions

SWITCH ON START *PREF: 156.01* *Default: MANUAL* *Range: MANUAL*

Selects the method of starting the pole finding sequence. This parameter is automatically set to MANUAL (where the pole finding sequence is initiated by the POLAR START parameter).

POLARISATION *PREF: 156.02* *Default: DISABLE* *Range: DISABLE / ENABLE*

Set this parameter to ENABLE to enter the resolver calibration mode.

POLAR START *PREF: 156.03* *Default: FALSE* *Range: FALSE / TRUE*

Set this parameter to TRUE to start the calibration process.

TYPE *PREF: 156.04* *Default: 1:STANDARD* *Range: 1:STANDARD*

Selects the type of pole finding method. This parameter is automatically set to STANDARD.

Enumerated Value : Type

0 : 1:STANDARD Method used by 99% of applications (motor must be free to rotate).

1:MOTOR PHASE *PREF: 156.05* *Default: U PHASE* *Range: See below*

Selects the position to polarise the motor when the TYPE parameter is set to STANDARD.

Enumerated Value : Motor Phase

0 : U PHASE = 90°
1 : V PHASE = -150° (or 210°)

D

Parameter Descriptions

2 : W PHASE = - 30° (or 330°)

1:MOT CUR PCNT	*PREF: 156.06*	*Default: 50.00*	*Range: 0.00 to 100.00 %*

Sets the current level to apply (as a percentage of the permanent current of the motor) when the TYPE parameter is set to STANDARD.

1:MOT CUR RAMP	*PREF: 156.07*	*Default: 1.00*	*Range: 0.10 to 20.00 s*

Sets the ramp value in seconds to apply to the current setpoint when the TYPE parameter is set to STANDARD..

ELEC POS OFFSET	*PREF: 156.16*	*Default:0.0000°*	*Range: -180.0000° to 180.0000°*

An electrical position offset value that compensates for deviation from the theoretical value.

For example, if the value of the ELEC POS parameter is 100° and the theoretical value is 90° (MOTOR PHASE parameter set to U PHASE), you can apply a value of -10° to compensate for the deviation.

ELEC POS	*PREF: 156.17*	*Default:*	*Range: -180.0000° to 180.0000°*

This diagnostic displays the electrical position of the motor in degrees.

CURRENT	*PREF: 156.18*	*Default:*	*Range: —.0000 A*

This diagnostic shows the current value in Amps applied to the motor.

STATE	*PREF: 156.19*	*Default: 0*	*Range: See below*

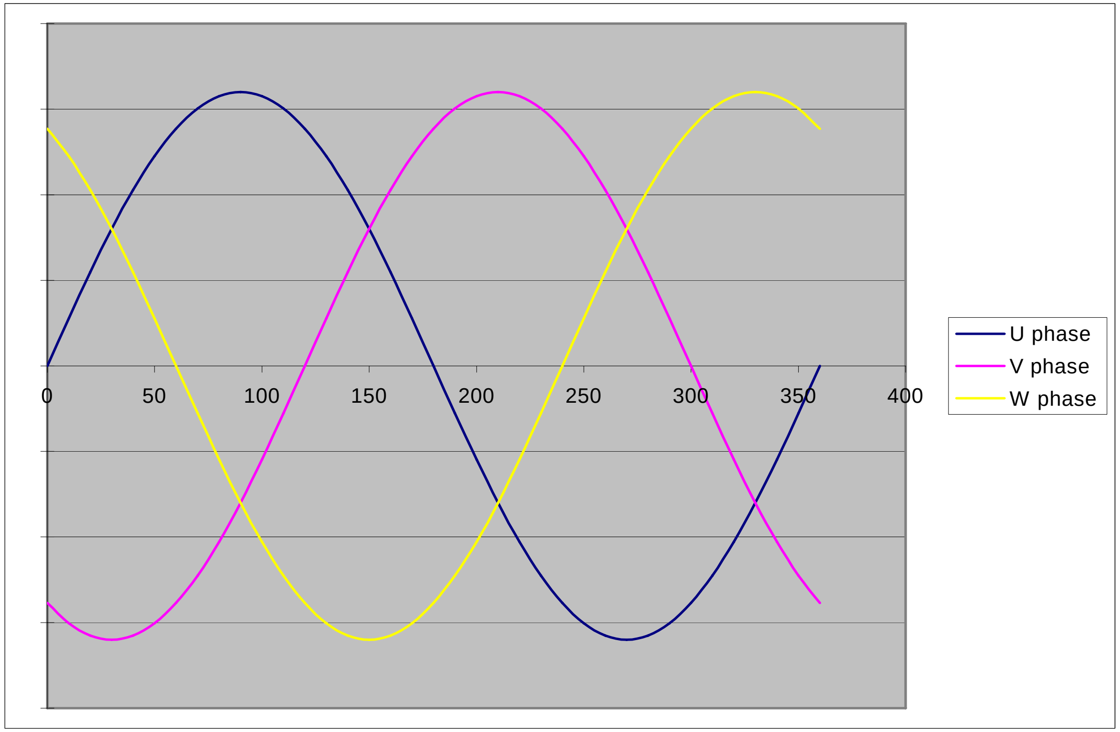
This diagnostic displays the state of the motor.

Enumerated Value : State

0 : NORMAL	normal mode
1 : POLARIZING	the motor is under polarisation

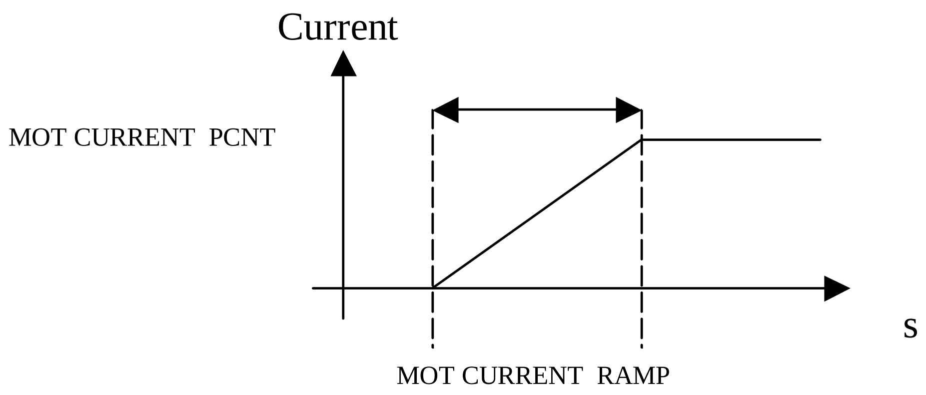
Functional Description

The convention in the 890 drive is given below :



The correct succession of motor phases is U (or M1), V (or M2), W (or M3) if the motor rotates in a clockwise direction looking to the motor shaft on the front side. U phase must ride through the 0 point in a positive way at a position of 0° (electrical position). The position must also increase in that direction.

To polarise the motor, a current setpoint is ramped to the motor in a special configuration. This will cause the rotor to lock to a specific position.



To start the STANDARD polarisation:

1. The motor must be stationary, with no load attached to the motor shaft. In this method, there will be a maximum movement of half an electrical turn of the motor shaft.
2. Choose a MOTOR PHASE: U, V or M.
3. Set the current level to apply in the MOT CURRENT PCNT parameter.
4. Set a ramp value for the current level in the MOT CURRENT RAMP parameter.
5. Set POLARISATION = ENABLE, POLAR START = FALSE.
6. Verify that ELEC POS OFFSET is set to 0.0.
7. Set POLAR START = TRUE.
8. Apply a torque to the motor and read the value of the ELEC POS parameter.
9. Stop the motor. Verify that the value of ELEC POS after polarisation matches the theoretical position for the chosen motor phase :
    - ♦ U or M1 :   90°
    - ♦ V or M2 :   210° (-150°)
    - ♦ W or M3 : 330° (-30°)

If not, apply a compensation using the ELEC POS OFFSET parameter. If necessary, repeat steps 6 and 7 until an error of only 1° to 5° is achieved.

Examples:

In U phase (90°), if ELEC POS = 20° then ELEC POS OFFSET must be set to 70° to get a value of 90° for ELEC POS.

In U phase (90°), if ELEC POS = -160° then ELEC POS OFFSET must be set to –110° (+250°) to get a value of 90° for ELEC POS. 90° is equivalent to –270°, which explains the value of –110° : -270° = -160° + (-110°).

10. Verify the correct value of ELEC POS parameter and set POLARISATION = DISABLE, POLAR START = FALSE.

This function could also be used to verify the correct connection of the motor phase (correct succession of the 3 phases) by :

1. Polarise the motor on the U phase with a low current, typically 20 to 30%, and a ramp value of 1 second.
2. Change the phase to V, then W, etc. using the MOTOR PHASE parameter and apply torque to the motor:

   - ♦ If the motor is rotating in a clockwise direction, looking to the front shaft of the motor, then the motor phases are connected correctly. (With the encoder correctly wired, the encoder position will increment when the motor turns in a clockwise way looking to the front shaft of the motor)
   - ♦ If the motor is rotating in a counter clockwise direction, looking to the front shaft of the motor, two of the motor phases must be inverted, for example U and V phases.

MOTR DRV LIMIT

SETUP::MOTOR CONTROL::MOTR DRV LIMIT

Designed for BRUSHLESS SERVO Motor Control Mode.

The purpose of the Motor Drive Limitation is to automatically reduce the drive current limit in response to prolonged overload conditions. As the motor current exceeds the AIMING POINT level, the excess current is integrated. Motor current is allowed to flow at 200% of the permanent Drive current for a DELAY time. When this point is reached, the current limit is clamped to 100% of the permanent Drive current.

Under normal conditions, the drive current limit is set to the minimum value between :

- 200% of the permament Drive current (STACK CURRENT parameter of the FEEDBACKS Function Block)
- MAX CURRENT parameter of the PMAC MOTOR Function Block

If the Drive speed becomes lower than 2.5 Electrical Hz, the DELAY time is automatically reduced to 25% of its value.

There is also a motor protection based, on the rms current flowing in motor phases. This protection is named I2T and is based on two parameters of the PMAC MOTOR function block: PERM CURRENT and THERMAL TIME CST.

The level of motor load (I2T MOTOR LOAD) is given as percentage, and represents 100% if a current equal to the PERM CURRRENT flows in motor phases for a THERMAL TIME CST time.

Parameter Descriptions

AIMING POINT	*PREF: 84.01*	*Default: 105.00 %*	*Range: 50.00 to 150.00%*

Determines the level of the current limit (% of the permanent Drive current) to begin integer the current.

DELAY	*PREF: 84.02*	*Default: 4.0s*	*Range: 0.5 to 4.0s*

Determines the maximum allowed overload duration for having 200% of the permanent Drive current.

If the Drive speed becomes lower than 2.5 Electrical Hz , the DELAY time is automatically reduced to 25% of its value.

Parameter Descriptions

IT LIMITING *PREF: 84.05* *Default: FALSE* *Range: FALSE / TRUE*

This diagnostic indicates the state of the drive current protection :

- FALSE if an overload condition of 200% of the permanent Drive current could be supported for a DELAY duration.
- TRUE if an overload condition could not be supported by the drive.

IT TIME ALLOWED *PREF: 84.06* *Default: 4.0s* *Range: 0.0 to 4.0s*

This diagnostics indicates the remaining duration for having 200% of the permanent Drive current.

IT WARNING *PREF: 84.08* *Default: FALSE* *Range: FALSE / TRUE*

This diagnostic indicates if the integration of the drive current has raised 90% of the available delay time. When IT TIME ALLOWED value raised down under 10% of the DELAY time, the IT WARNING becomes TRUE.

The drive could supported an overload condition of 200% of the permanent Drive current for a DELAY duration.

I2T LIMIT MOTOR *PREF: 84.09* *Default: FALSE* *Range: FALSE / TRUE*

This diagnostic indicates the state of the motor current protection.

This protection is based on the THERMAL TIME CST and PERM CURRENT parameters of the PMAC MOTOR Function Block. The motor current is filtered with a first order low pass filter based on the THERMAL TIME CST. The output I2T MOTOR LOAD of this filter is a % of the motor thermal load. When this output exceeds 100%, the drive trips in MOTOR OVERTEMP trip.

I2T MOTOR LOAD *PREF: 84.10* *Default: 0.0%* *Range: 0.0 to 100.0%*

This diagnostic indicates the % of thermal motor load.

This value is the output of the filter based on the THERMAL TIME CST and PERM CURRENT parameters of the PMAC MOTOR Function Block. When this output exceeds 100%, the drive trips in MOTOR OVERTEMP trip.

D

Parameter Descriptions

I2T INHIBIT	*PREF: 84.11*	*Default: FALSE*	*Range: FALSE / TRUE*

This parameter allows you to enable/disable the I2T trip action. The drive continues to look for the motor load, but does not trip if the level is higher than 100%:

FALSE : I2T trip is enabled
TRUE : I2T trip is disabled.

MOTOR I2T TRIP	*PREF: 84.12*	*Default:*	*Range: FALSE / TRUE*

This diagnostic reports on the state of the I2T motor trip:

FALSE : the motor is running, the level of the motor load is lower than 100% (if the trip is active)
TRUE : the drive has tripped, the level of motor load is higher than 100%

OP STATION

SETUP::MENUS::OP STATION

This block allows the operation of the Keypad control keys to be customised.

Parameter Descriptions

ENABLED KEYS *PREF: 30.01* *Default: 00F0* *Range:* 0x0000 to 0xFFFF

The following keys on the Keypad can be enabled or disabled separately. The combination produces the parameter setting as in the table below.

Parameter Setting	RUN	L/R	JOG	DIR
0000	-	-	-	-
0010	-	-	-	ENABLED
0020	-	-	ENABLED	-
0030	-	-	ENABLED	ENABLED
0040	-	ENABLED	-	-
0050	-	ENABLED	-	ENABLED
0060	-	ENABLED	ENABLED	-
0070	-	ENABLED	ENABLED	ENABLED
0080	ENABLED	-	-	-
0090	ENABLED	-	-	ENABLED
00A0	ENABLED	-	ENABLED	-
00B0	ENABLED	-	ENABLED	ENABLED
00C0	ENABLED	ENABLED	-	-
00D0	ENABLED	ENABLED	-	ENABLED
00E0	ENABLED	ENABLED	ENABLED	-
00F0	ENABLED	ENABLED	ENABLED	ENABLED

Parameter Descriptions

OP VERSION	*PREF: 30.02*	*Default:0000*	*Range: 0x0000 to 0xFFFF*

Displays the software version of the Keypad. It is cleared to 0x0000 if no Keypad is connected.

OP DATABASE	*PREF: 30.03*	*Default: FALSE*	*Range: FALSE / TRUE*

Reserved for Parker SSD Drives.

PHASE OFFSET

SETUP::PHASE CONTROL::PHASE OFFSET

CLOSED-LOOP VEC Motor Control Mode only.

Provides an unramped position Offset of the Master reference position with respect to the Load position, or an unramped speed Offset to the Master reference speed.

Phase Output = Error + Offset + Offset Fine

Parameter Descriptions

OFFSET *PREF: 110.01* *Default: 0.0* *Range: -3000.0 to 3000.0*

A course offset added to the phase error allowing an absolute phase correction to be applied. The Offset is added to the phase at a maximum rate of ±32768 counts.

OFFSET FINE *PREF: 110.02* *Default: 0.0000* *Range: -1.0000 to 1.0000*

Additional correction added to OFFSET to allow fine control of position.

SPEED OFFSET *PREF: 110.04* *Default: 0.00 %* *Range: -300.00 to 300.00 %*

A speed offset added to the speed demand.

ACTIVE *PREF: 110.03* *Default: FALSE* *Range: FALSE / TRUE*

True while the offset count is being added.

PLS (Programmable Limit Switch)

SETUP::MOTION::PLS

Designed for BRUSHLESS SERVO Motor Control Mode.

The PLS block is designed to activate an output when a variable is in a predefined range.

Parameter Descriptions

ENABLE *PREF: 153.01, 154.01* *Default: FALSE* *Range: FALSE / TRUE*

Set this parameter to TRUE to enable the block.

SOURCE *PREF: 153.02, 154.02* *Default: 0* *Range: See below*

This parameter selects the variable that will be monitored.

Enumerated Value : State

0 : POS ACTUAL	The block will monitor the actual position.
1 : SPEED ACTUAL	The block will monitor the actual speed.
2 : TRACKING ERROR	The block will monitor the tracking error.
3 : POS TH	The block will monitor the theorytical position
4 : SPEED TH	The block will monitor the theorytical speed
5 : ACCEL TH	The block will monitor the theorytical acceleration

HIGH *PREF: 153.03, 154.03* *Default: 0* *Range: INT MIN to INT MAX*

This parameter sets the range’s upper limit.

LOW *PREF: 153.04, 154.04* *Default: 0* *Range: INT MIN to INT MAX*

This parameter sets the range’s lower limit. If LOW is larger than HIGH then the output will always be active.

Parameter Descriptions

INVERT	*PREF: 153.05, 154.05*	*Default: FALSE*	*Range: FALSE / TRUE*

This parameter inverts the active output state.

If set to FALSE the output is true when the variable is within the range, if set to TRUE the output is true when the variable is outside the range.

DESTINATION	*PREF: 153.06, 154.06*	*Default: 0*	*Range: See below*

This parameter sets which output is driven by the block.

Enumerated Value : *State*

0 : NONE	Only the ACTIVE output will be driven.
1 : DIG OUT 1	DIGITAL OUTPUT 1 will be driven along with the ACTIVE output.
2 : DIG OUT 2	DIGITAL OUTPUT 2 will be driven along with the ACTIVE output.
3 : DIG OUT 3	DIGITAL OUTPUT 3 will be driven along with the ACTIVE output.
4 : DIG OUT 4	DIGITAL OUTPUT 4 will be driven along with the ACTIVE output.
5 : DIG OUT 5	DIGITAL OUTPUT 5 will be driven along with the ACTIVE output.
6 : DIG OUT 6	DIGITAL OUTPUT 6 will be driven along with the ACTIVE output.

DEFAULT	*PREF: 153.07, 154.07*	*Default: FALSE*	*Range: FALSE / TRUE*

This parameter sets the ACTIVE output state when the block is disable.

ACTIVE	*PREF: 153.08, 154.08*	*Default: FALSE*	*Range: FALSE / TRUE*

This is a diagnostic output indicating the current state of the block.

PMAC MOTOR

SETUP::MOTOR CONTROL::PMAC MOTOR

Designed for BRUSHLESS SERVO Motor Control Mode.

The PMAC Motor block is designed to store all the parameters needed to run a PMAC Motor.

Parameter Descriptions

MANUFACTURER *PREF: 134.01* *Default: PARVEX* *Range:*

Enter the motor manufacturer's name.

MODEL *PREF: 134.02* *Default: HS620EV* *Range:*

Enter the motor name.

CONSTRUCTION *PREF: 134.03* *Default: 0* *Range: See below*

Select the motor's construction type.

Enumerated Value : *Construction*

0 : AXIS	Standard motor.
1 : SPINDLE	Spindle motor.
2 : TORQUE	Direct torque motor.

ATMOSPHERE *PREF: 134.04* *Default: 0* *Range: See below*

Selct the motor's atmospheric details.

Enumerated Value : *Atmosphere*

0 : STANDARD	Standard motor.
1 : EXPLOSIVE	Motor built for explosive atmosphere (Ex).

Parameter Descriptions

MAX VOLTAGE	*PREF: 134.05*	*Default: 400.00*	*Range: 200.00 to 640.00 V*

Set the motor's maximum ac input voltage (in Volts rms).

THERM PROTECTION	*PREF: 134.06*	*Default: FALSE*	*Range: FALSE / TRUE*

Motor's thermal protection feature.

MAX SPEED	*PREF: 134.07*	*Default: 4300*	*Range: 0 to INT MAX*

Set the motor's maximum mechanical speed (in rpm)

MAX CURRENT	*PREF: 134.08*	*Default: 10.60*	*Range: 0.00 to 1024.00 A*

Set the motor's maximum rms current .

PERM CURRENT	*PREF: 134.09*	*Default: 4.90*	*Range: 0.00 to 1024.00 A*

Set the motor's permanent rms current.

PERM TORQUE	*PREF: 134.10*	*Default: 6.40*	*Range: 0.00 to 10000.00 Nm*

Set the motor's permanent torque.

LOW SPEED VALUE	*PREF: 134.11*	*Default: 0*	*Range: 0 to INT MAX rpm*

Set the motor's low speed value (in rpm) below which the current must be reduced.

If this parameter is unknown, value must be set to 0 rpm.

POLES	*PREF: 134.12*	*Default: 10*	*Range: 0 to 400*

Set the number of motor poles, e.g. for a 4 pole motor enter "4".

BACK EMF	*PREF: 134.13*	*Default: 85.6*	*Range: 0.0 to 8192.0 V*

Set the motor's Back EMF phase to phase, rms value (in Volts/1000rpm).

Parameter Descriptions

R	*PREF: 134.14*	*Default: 3.63*	*Range: 0.00 to 50.00 Ω*

Set the motor's resistance, between phases at 25 °C.

L	*PREF: 134.17*	*Default: 24.299*	*Range: 0.000 to 1000.000 mH*

Set the motor's inductance at maximum current.

PHASE	*PREF: 134.18*	*Default: 0.00*	*Range: 0.00 to 90.000 degrees*

Set the motor's phase shift advance at permanent current. If this parameter is unknown, value must be set to 0/

MAX PHASE	*PREF: 134.19*	*Default: 0.00*	*Range: 0.00 to 90.000 degrees*

Set the motor's phase shift advance at maximum current. If this parameter is unknown, value must be set to 0/

MAX TORQUE	*PREF: 134.20*	*Default: 12.80*	*Range: 0.00 to 30000.000 Nm*

Set the motor's torque at maximum current.

KT	*PREF: 134.21*	*Default: 1.376*	*Range: 0.0000 to 100.0000 Nm/A*

Set the torque constant at 20°C. Ratio of the increase in torque to the motor phase current in Nm/A(rms).

IFMB	*PREF: 134.22*	*Default: 0.0*	*Range: -100.0000 to 100.0000A/Nm³*

Set the motor's parameters to compute current setpoint from torque setpoint.

$$[current] = [torque]/KT + [torque]^3 * IFMB$$

If IFMB is unknown, the value must be set to 0.

INERTIA	*PREF: 134.23*	*Default: 0.0010*	*Range: 0.0000 to 100.0000*

Set the motor's inertia. The units for this parameter are set by the INERTIA SCALE parameter.

Parameter Descriptions

INERTIA SCALE	*PREF: 134.24*	*Default: 0*	*Range: See below*

Set the motor’s inertia scale.

Enumerated Value : *Inertia Scale*

0 : Kg*m²
1 : Kg*cm²
2 : g*m²

STAND CURRENT	*PREF: 134.26*	*Default: 10.6*	*Range: 0.00 to 1024.00 A*

Set the motor’s standstill current. If this parameter is unknown, the value must be set to PERMANENT CURRENT.

THERMAL TIME CST	*PREF: 134.27*	*Default: 224.80*	*Range: 0.00 to 10000.00 s*

Set the motor’s copper time constant.

CUR LOOP BWDTH	*PREF: 134.28*	*Default: 600*	*Range: 100 to 1500 Hz*

This parameter defines the current loop bandwidth. The value will automatically generate the proportional gain of the PI corrector of the current loop. The proportional gain is calculated based on the "L" motor parameter.

Modifying the CUR LOOP BWDTH value could induce instability. Please contact our application engineer if you need to change it.

INTEGRAL FREQ	*PREF: 134.29*	*Default: 150*	*Range: 5 to 600 Hz*

This parameter defines the frequency of the Integral action of the PI corrector of the current loop.

Modifying this value could induce instability. Please contact our application engineer if you need to change it.

PMAC MOTOR 2

SETUP::MOTOR CONTROL::PMAC MOTOR 2

Designed for BRUSHLESS SERVO Motor Control Mode.

The PMAC Motor block is designed to store parameters needed for the thermal protection of the motor.

Parameter Descriptions

MPS1	*PREF: 135.01*	*Default: 230 V*	*Range:0 to 600 V*
MPS2	*PREF: 135.02*	*Default: 400 V*	*Range: 0 to 600 V*
MPS3	*PREF: 135.03*	*Default: 480 V*	*Range: 0 to 600 V*

These parameters define the waypoints on the motor's thermal protection curve. They represent AC input voltage (in Volts rms).

CURRENT AT MPS1	*PREF: 135.04*	*Default: 10.60 A*	*Range:0.00 to 1024.00 A*
CURRENT AT MPS2	*PREF: 135.05*	*Default: 10.60 A*	*Range:0.00 to 1024.00 A*
CURRENT AT MPS3	*PREF: 135.06*	*Default: 10.60 A*	*Range:0.00 to 1024.00 A*

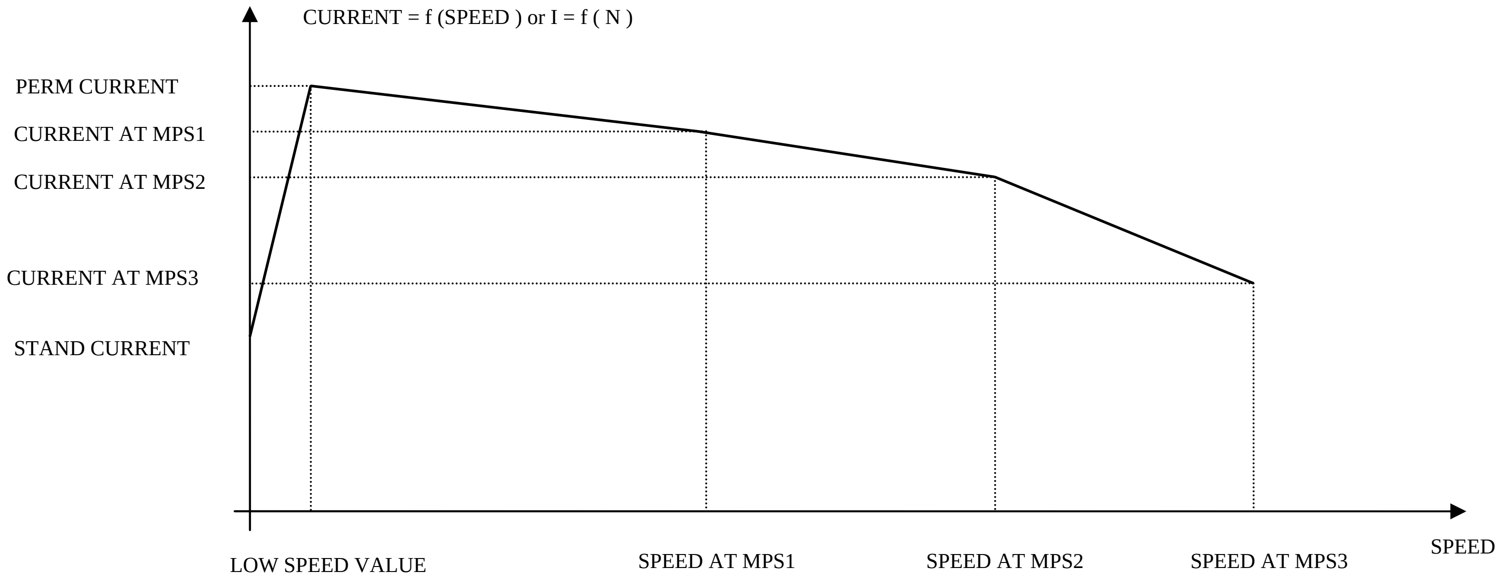
These parameters define the rms current at the speed defined below.

SPEED AT MPS1	*PREF: 135.07*	*Default: 2300*	*Range:0 to 2147483647 rpm*
SPEED AT MPS2	*PREF: 135.08*	*Default: 4000*	*Range: 0 to 2147483647 rpm*
SPEED AT MPS3	*PREF: 135.09*	*Default: 4800*	*Range: 0 to 2147483647 rpm*

These parameters define the speed on the waypoint.

Functional Description

This block defines the parameters needed to build the following curve. It is used to limit the motor's current, depending on the speed.



POS SPD LOOP DIR

SETUP::MOTION::POS SPD LOOP DIR

Designed for BRUSHLESS SERVO Motor Control Mode.

This block defines if and how the analog input/output may be linked to the position and speed loop.

Parameter Descriptions

SPD DMD SELECT *PREF: 157.01* *Default: 0* *Range: See below*

This parameter defines which Analog Input will be used to setup the SPEED DEMAND parameter. It may be used to allow direct connection between the analog input and the speed demand.

Enumerated Value : *SPD DMD SELECT*

0 : NONE	SPEED DEMAND is used normally.
1 : AN IN1	SPEED DEMAND is directly set by Analog Input1 value.
2 : AN IN2	SPEED DEMAND is directly set by Analog Input2 value.
3 : AN IN3	SPEED DEMAND is directly set by Analog Input3 value.
4 : AN IN4	SPEED DEMAND is directly set by Analog Input4 value.
5 : AN IN5	SPEED DEMAND is directly set by Analog Input5 value.

SPD DMD SCALE *PREF: 157.02* *Default: 655360* *Range: 0 to 2147483647*

Set the scaling factor used to convert the Analog Input (in %) in units/s:

100% = SPD DMD SCALE.

SPD DMD OFFSET *PREF: 157.03* *Default: 0.00 %* *Range: -100.00 to 100.00 %*

Add an offset to the Analog Input value before scaling it.

SPEED DEMAND = (ANALOG INPUT + SPD DMD OFFSET) / 100 * SPD DMD SCALE

D

Parameter Descriptions

SPD ACTUAL SELECT *PREF: 157.04* *Default: 0* *Range: See below*

This parameter defines which Analog Output will be used to output the SPEED ACTUAL parameter. It may be used to allow direct connection between the actual speed measurement and an analog output.

Enumerated Value : *SPD ACTUAL SELECT*

0 : NONE	SPEED ACTUAL is used normally.
1 : AN OUT1	Analog Output 1 is directly set by SPEED ACTUAL.
1 : AN OUT2	Analog Output 2 is directly set by SPEED ACTUAL.

SPD ACTUAL SCALE *PREF: 157.05* *Default: 655360* *Range: 0 to 2147483647*

Set the scaling factor used to convert SPEED ACTUAL to the Analog output (in %):

SPD ACTUAL SCALE = 100%.

SPD ACTUAL OFFSET *PREF: 157.06* *Default: 0.00 %* *Range: -100.00 to 100.00 %*

Add an offset to the Analog Output value after scaling the actual speed.

ANALOG OUTPUT= 100 * (SPEED ACTUAL / SPD ACTUAL SCALE) + SPD ACTUAL OFFSET

TORQUE DMD SELECT *PREF: 157.07* *Default: 0* *Range: See below*

This parameter defines which Analog Input will be used to setup the TORQUE DEMAND parameter. It may be used to allow direct connection between the analog input and the speed demand.

Enumerated Value : *TORQUE DMD SELECT*

0 : NONE	TORQUE DEMAND is used normally.
1 : AN IN1	TORQUE DEMAND is directly set by Analog Input1 value.
2 : AN IN2	TORQUE DEMAND is directly set by Analog Input2 value.
3 : AN IN3	TORQUE DEMAND is directly set by Analog Input3 value.
4 : AN IN4	TORQUE DEMAND is directly set by Analog Input4 value.
5 : AN IN5	TORQUE DEMAND is directly set by Analog Input5 value.

Parameter Descriptions

TORQUE DMD SCALE	*PREF: 157.08*	*Default: 1.00 Nm*	*Range: 0.0 to 32767.00 Nm*

Set the scaling factor used to convert the Analog Input (in %) in Nm:

100% = TORQUE DMD SCALE.

TORQUE DMD OFFSET	*PREF: 157.09*	*Default: 0.00 %*	*Range: -100.00 to 100.00 %*

Add an offset to the Analog Input value before scaling it.

TORQUE DEMAND = (ANALOG INPUT + TORQUE DMD OFFSET) / 100 * TORQUE DMD SCALE

Functional Description

This block is used when the SPEED DEMAND (when Drive Mode = SPEED) or the TORQUE DEMAND (when Drive Mode = TORQUE) must be set directly, and/or SPEED ACTUAL is output to an analog output without going through the Link application.

POS SPEED LOOP

SETUP::MOTION::POS SPEED LOOP

Designed for BRUSHLESS SERVO Motor Control Mode.

This block defines the basic parameters of the position and speed loop.

Parameter Descriptions

UNIT NAME	*PREF: 141.02*	*Default: INCREMENTS*	*Range:*

User-supplied unit name. Example : mm, degree, ...

UNIT/REV NUM.	*PREF: 141.03*	*Default: 65536*	*Range:0 to 2147483647*
UNIT/REV DENOM.	*PREF: 141.04*	*Default: 1*	*Range:1 to 2147483647*

These two parameters define the scaling factor (number of units per motor revolution).

$$[units] = \frac{UNITperREV\_NUMERATOR}{UNITperREV\_DENOMINATOR} * [revs]$$

DRIVE MODE	*PREF: 141.05*	*Default: 1*	*Range: See below*

This parameter defines the working mode of the Position and Speed loop.

Enumerated Value : Drive Mode

0 : POSITION	The drive operates as a positioner.
1 : SPEED	The drive operates as a speed drive, the position loop is disabled.
2 : TORQUE	The drive operates as a torque drive, both the position and the speed loop are disabled.
3 : INTERPOLATED	The drive operates as a positioner interpolating the position setpoint coming from the CANopen fieldbus (requires 8903/CB option board).

D

Parameter Descriptions

POS FBK SEL.	*PREF: 141.07*	*Default: 2*	*Range: See below*

This parameter defines the position feedback device.

Enumerated Value : *Pos Fbk Sel.*

0 : NONE	No feedback is selected. Actual position will always be 0.
1 : FBK RAW	Feedback is taken from the feedback slot position output, without filtering.
2 : FBK FILT.	Feedback is taken from the feedback slot filtered position output.
3 : OPT1 RAW	Feedback is taken from the option1 slot position output, without filtering.
4 : OPT1 FILT.	Feedback is taken from the option1 slot filtered position output.
5 : OPT2 RAW	Feedback is taken from the option2 slot position output, without filtering.
6 : OPT2 FILT.	Feedback is taken from the option2 slot filtered position output.

SPEED FBK SEL.	*PREF: 141.08*	*Default: 2*	*Range: See below*

This parameter defines the speed feedback device.

Enumerated Value : *Speed Fbk Sel.*

0 : NONE	No feedback is selected. Actual speed will always be 0.
1 : FBK RAW	Feedback is taken from the feedback slot speed output, without filtering.
2 : FBK FILT.	Feedback is taken from the feedback slot filtered speed output.
3 : OPT1 RAW	Feedback is taken from the option1 slot speed output, without filtering.
4 : OPT1 FILT.	Feedback is taken from the option1 slot filtered speed output.
5 : OPT2 RAW	Feedback is taken from the option2 slot speed output, without filtering.
6 : OPT2 FILT.	Feedback is taken from the option2 slot filtered speed output.

FP	*PREF: 141.09*	*Default: 800.00 Hz*	*Range: 1.00 to 800.00 Hz*

Set the frequency of the 2nd order delay filter on the position setpoint.

FV	*PREF: 141.10*	*Default: 800.00 Hz*	*Range: 1.00 to 800.00 Hz*

Set the frequency of the 2nd order delay filter on the speed feedforward.

Parameter Descriptions

FC	*PREF: 141.11*	*Default: 800.00 Hz*	*Range: 1.00 to 800.00 Hz*

Set the frequency of the 2^{nd} order low-pass filter on the output of the speed loop.

KP	*PREF: 141.12*	*Default: 33.00 s^{-1}*	*Range: 0.00 to 600.00 s^{-1}*

Set the position loop gain.

FIP	*PREF: 141.13*	*Default: 0.00 Hz*	*Range: 0.00 to 100.00 Hz*

Set the position loop integral frequency. If FIP = 0, then the integral part of the position loop is disabled.

IP DIS. VAL.	*PREF: 141.14*	*Default: 0*	*Range: 0 to 2147483647*

(IP DISABLE VALUE) Set the actual speed value over which the position loop integral term is automatically disabled (i.e. whilst the actual speed is greater than IP DIS. VAL, the integral term is frozen).

IP SAT.	*PREF: 141.15*	*Default: 0*	*Range: 0 to 2147483647*

Set the saturation (maximum) value of the position loop integral term.

KV	*PREF: 141.16*	*Default: 99.00 s^{-1}*	*Range: 0.00 to 2000.00 s^{-1}*

Set the speed loop gain.

FIV	*PREF: 141.17*	*Default: 3.15 Hz*	*Range: 0.00 to 100.00 Hz*

Set the speed loop integral frequency. If FIV = 0, then the integral part of the position loop is disabled.

SPEED THRESHOLD	*PREF: 141.18*	*Default: 0.10*	*Range: 0.01 to 1.00*

Speed threshold for static friction computation.

STATIC FRICTION	*PREF: 141.19*	*Default: 0.00 Nm*	*Range: 0.00 to 32767.00 Nm*

Used to compute the static friction.

$$static\_friction = FSTATIC * \frac{speed\_th}{speed\_threshold * speed\_\max}$$

D

Parameter Descriptions

GRAVITY	*PREF: 141.20*	*Default: 0.00 Nm*	*Range: -32768.00 to 32767.00 Nm*

Gravity force (in Nm) added to the torque setpoint computed by the speed loop. When there is a ‘vertical’ axis, the gravity is used so that the position and speed loop works with a static output near 0.

LOAD INERTIA	*PREF: 141.21*	*Default: 0.0000 kgm2*	*Range: 0.0000 to 32767.0000 kgm2*

Used to compute the torque setpoint from a given acceleration setpoint (kg*m²).

HIGH BAND	*PREF: 141.22*	*Default: FALSE*	*Range: FALSE / TRUE*

Must be set to TRUE if the speed loop is tuned with a bandwidth above the main resonance frequency.

If HIGH BAND = FALSE the total inertia (motor + load) is used to generate the static part of the torque setpoint (from the acceleration feedforward) and the dynamic part (from the speed loop output).
If HIGH BAND = TRUE the total inertia (motor + load) is used to generate the static part of the torque setpoint (from the acceleration feedforward) and only the motor inertia is used for the dynamic part (from the speed loop output).

REVERSE DIR.	*PREF: 141.23*	*Default: FALSE*	*Range: FALSE / TRUE*

Used to reverse the shaft movement.

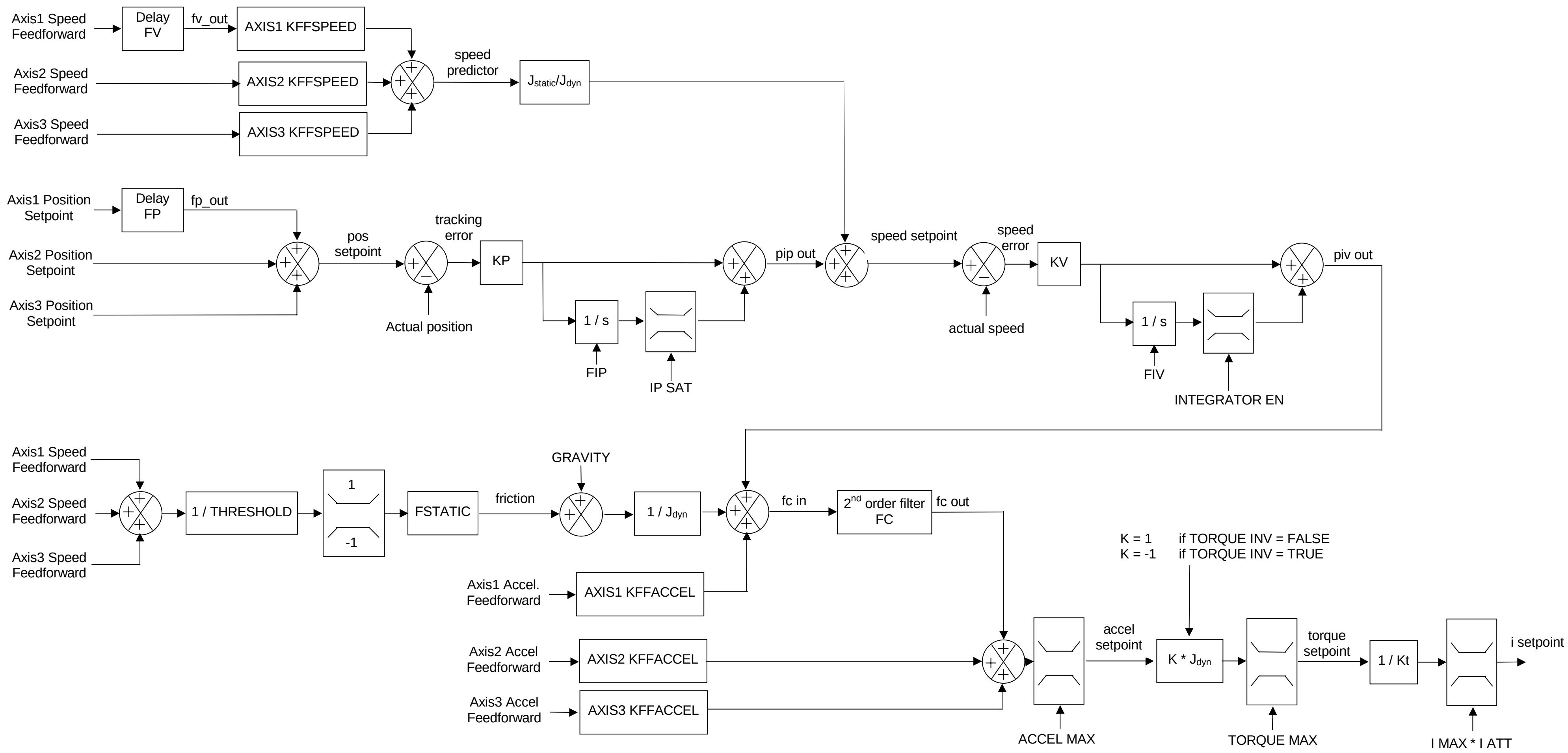
If REVERSE DIR. = FALSE : the drive is counting upward when the shaft goes clockwise
If REVERSE DIR. = TRUE : the drive is counting downward when the shaft goes clockwise

D

Functional Description

The Position and Speed loop generates a current setpoint to feed the current loop. This loop can be divided into 3 main sections :

1. Position loop : compares the position setpoint and the actual position, generates a tracking error (position error) that feed a PI.
2. Speed loop : takes the output of the position loop, adds the speed feedforwards then substracts the actual speed to generate the speed error. The speed error feeds a PI to computes an acceleration setpoint to which the acceleration feedforwards are added to compute the acceleration setpoint.
3. Current setpoint generator : the acceleration setpoint is then converted to a torque setpoint (given the load and motor inertias). The gravity and frictions are added to that torque setpoint that, with the motor's parameters, turns into a current setpoint.



The motor's and load's inertias are used as follow :

$J_{static} = J_{load} + J_{motor}$

$J_{dyn} = J_{load} + J_{motor}$ if HIGH BAND = FALSE

$J_{dyn} = J_{motor}$ if HIGH BAND = TRUE

D

Special configuration :

- DRIVE MODE = TORQUE
  i. The position loop is disabled (POS SETPOINT and POS TH are forced to POS ACTUAL, TRACKING ERROR = 0, integrator is reset)
  ii. The speed loop is disabled (all inputs are set to 0)
  iii. The torque demand is injected as the torque setpoint :
  TORQUE SETPOINT = TORQUE DEMAND (if REVERSE DIRECTION = FALSE)
  or TORQUE SETPOINT = -1.0 * TORQUE DEMAND (if REVERSE DIRECTION = TRUE)

- DRIVE MODE = SPEED
  i. The position loop is disabled (POS SETPOINT and POS TH are forced to POS ACTUAL, TRACKING ERROR = 0, integrator is reset)
  ii. The speed demand is injected as SPEED TH = SPEED DEMAND and Speed Predictor = FV OUT. The parameter ACCEL SPEED MODE (see POS SPEED LOOP IN) is used as a slew rate limitation.

D

POS SPEED LOOP IN

SETUP::MOTION::POS SPEED LOOP IN

Designed for BRUSHLESS SERVO Motor Control Mode.

This block defines extra parameters used by the Position and Speed Loop.

Parameter Descriptions

SPEED MAX	*PREF: 142.01*	*Default: 655360*	*Range: 0 to 2147483647*

Set the maximum speed allowed (in units/s).

This parameter is used to :

- Clamp the speed setpoint (output of the position loop)
- Clamp the SPEED DMD (speed setpoint when in SPEED mode)
- Clamp the velocity input of the application's Motion function blocks
- Monitor the LOOP OVER SPEED TRIP

ACCEL MAX	*PREF: 142.02*	*Default: 65536000*	*Range: 0 to 2147483647*

Set the maximum acceleration allowed (in units/s^2).

This parameter is used to :

- Clamp the acceleration setpoint (output of the speed loop)
- Clamp the accel/decel inputs of the application's Motion function blocks
- Act as the deceleration parameter when a motion is aborted as QUICK STOP

ACC. SPD. MODE	*PREF: 142.03*	*Default: 6553600*	*Range: 0 to 2147483647*

Set the SPEED DEMAND's slew-rate limitation when the drive is in SPEED mode (in units/s^2).

Parameter Descriptions

TORQUE MAX	*PREF: 142.04*	*Default: 1.00 Nm*	*Range: 0 to 32767.00 Nm*

Set the maximum value for the torque setpoint (in Nm).

I MAX	*PREF: 142.05*	*Default: 1.00 A*	*Range: 0.00 to 32767.00 A*

Set the maximum current setpoint allowed (in A). **This value is used only if I MAX POSITIVE and I MAX NEGATIVE are both different from 0.00.**

I ATT	*PREF: 142.06*	*Default: 1.00*	*Range: 0.00 to 1.00*

Set the current attenuator (in units/s^2). This parameter acts on I MAX (i.e. the current setpoint is clamped by I MAX * I ATT).

AXIS1 KFF SPEED	*PREF: 142.07*	*Default: 1.00*	*Range: 0.00 to 1.50*

Set the speed feed forward gain. 0.00 means there is no feedforward, 1.00 means there is a full feedforward.

AXIS1 KFF ACCEL	*PREF: 142.08*	*Default: 1.00*	*Range: 0.00 to 1.50*

Set the acceleration feed forward gain. 0.00 means there is no feedforward, 1.00 means there is a full feedforward.

AXIS2 KFF SPEED	*PREF: 142.09*	*Default: 0.00*	*Range: 0.00 to 1.50*

Set the speed feed forward gain. 0.00 means there is no feedforward, 1.00 means there is a full feedforward.

AXIS2 KFF ACCEL	*PREF: 142.10*	*Default: 0.00*	*Range: 0.00 to 1.50*

Set the acceleration feed forward gain. 0.00 means there is no feedforward, 1.00 means there is a full feedforward.

AXIS3 KFF SPEED	*PREF: 142.11*	*Default: 0.00*	*Range: 0.00 to 1.50*

Set the speed feed forward gain. 0.00 means there is no feedforward, 1.00 means there is a full feedforward.

AXIS3 KFF ACCEL	*PREF: 142.12*	*Default: 0.00*	*Range: 0.00 to 1.50*

Set the acceleration feed forward gain. 0.00 means there is no feedforward, 1.00 means there is a full feedforward.

Parameter Descriptions

SPEED DEMAND	*PREF: 142.15*	*Default: 0*	*Range: -2147483648 to 2147483647*

Set the speed setpoint when the drive is in SPEED mode. This value is clamped by SPEED MAX.

TORQUE DEMAND	*PREF: 142.16*	*Default:0.00 Nm*	*Range: -32768.00 to 32767.00 Nm*

Set the torque setpoint when the drive is in TORQUE mode.

I MAX POSITIVE	*PREF: 142.21*	*Default: 0.00 A*	*Range: 0.00 to 32767.00 A*

Set the maximum current setpoint allowed (in A) when the drive is running in the positive direction.

I MAX NEGATIVE	*PREF: 142.22*	*Default: 0.00 A*	*Range: 0.00 to 32767.00 A*

Set the maximum current setpoint allowed (in A) when the drive is running in the negative direction.

TEST ENABLE	*PREF: 142.23*	*Default: FALSE*	*Range: FALSE / TRUE*

If TRUE a test waveform generator is turned ON and its output exercises the drive depending of its DRIVE MODE.

TEST TYPE	*PREF: 142.24*	*Default: 0*	*Range: See below*

This parameter defines the type (shape) of the test waveform.

Enumerated Value : *Test type*

0 : SQUARE	The waveform is a square wave with a 50% duty cycle.
1 : SINUSOIDAL	The waveform is a sinusoide.
2 : TRIANGULAR	The wave form is a triangle.

TEST FREQUENCY	*PREF: 142.25*	*Default: 1.00 Hz*	*Range: 0.01 to 100.00 Hz*

Set the frequency of the test waveform.

TEST AMPLITUDE	*PREF: 142.26*	*Default: 0.01*	*Range: 0.00 to 1.00*

Set the amplitude of the test waveform output. The output range is – AMPLITUDE to + AMPLITUDE.

Parameter Descriptions

TEST OFFSET *PREF: 142.27* *Default: 0.00* *Range: 0.00 to 1.00*

Set the offset of the test waveform output that is added to the AMPLITUDE.
The amplitude and offset are expressed as a ratio of a maximum value that is depending of the DRIVE MODE :

POSITION :	TRIPS::TRACKING TRIP::THRESHOLD (PREF 131.02)
SPEED :	SPEED MAX (PREF 142.01)
POSITION :	TORQUE MAX (PREF 142.04)

POS SPEED LOOP OUT

SETUP::MOTION::POS SPEED LOOP OUT

Designed for BRUSHLESS SERVO Motor Control Mode.

This block gives feedbacks from the Position and Speed Loop.

Parameter Descriptions

POS ACTUAL *PREF: 143.01* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing drive's actual position (in units).

SPEED ACTUAL *PREF: 143.02* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing drive's actual speed (in units/s).

POS TH *PREF: 143.03* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing drive's theoretical position (in units).

SPEED TH *PREF: 143.04* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing drive's theoretical speed (in units/s).

ACCEL TH *PREF: 143.05* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing drive's theoretical acceleration (in units/s^2)

POS SETPOINT *PREF: 143.06* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing drive's position setpoint (in units).

TRACKING ERROR *PREF: 143.07* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing the difference between the position setpoint and the actual position :
Tracking error = pos setpoint – pos actual.

Parameter Descriptions

ACCEL SETPOINT *PREF: 143.15* *Default:* *Range: -2147483648 to 2147483647*

Diagnostic showing the Acceleration setpoint : sum of the filtered speed loop output (fc out) and acceleration feedforwards.

TORQUE SETPOINT *PREF: 143.17* *Default:* *Range: -32768.00 to 32767.00*

Diagnostic showing the Torque setpoint to be applied computed from the acceleration setpoint and the inertia as seen by the motor (in Nm). (The inertia seen by the motor depends of the HIGH BAND parameter).

I SETPOINT *PREF: 143.18* *Default:* *Range: -32768.00 to 32767.00*

Diagnostic showing the Current setpoint. This setpoint is computed from the torque setpoint and the motor parameters (in A). The current setpoint is clamped by the I MAX and I ATT parameters.

RESOLVER

SETUP::MOTOR CONTROL::RESOLVER

Designed for BRUSHLESS SERVO Motor Control Mode.

This block defines the parameters used to set up the resolver.

Parameter Descriptions

NAME	*PREF: 133.01*	*Default: PARVEX*	*Range:*

Set the resolver's name.

POLES	*PREF: 133.02*	*Default: 2*	*Range: 2 to 20*

Set the resolver's number of poles.

RATIO	*PREF: 133.03*	*Default: 0.5*	*Range:0.2 to 1.0*

Set the resolver's transformation ratio (at 8kHz, nominal carrier voltage).

SPEED MAX	*PREF: 133.04*	*Default: 10000*	*Range: 0 to 2147483647*

Set the resolver's maximum mechanical speed in RPM. If unknown, the value must be set to the motor maximum speed.

ACCURACY	*PREF: 133.05*	*Default: 20.00*	*Range: 0.00 to 60.00 minutes*

Set the resolver's peak to peak accuracy (in minutes). If unknown, use the default value.

CARRIER VOLTAGE	*PREF: 133.06*	*Default: 7.00*	*Range: 5.00 to 10.00V*

Set the resolver's nominal carrier rms voltage at 8kHz (in Volts). If unknown, use the default value.

CURRENT	*PREF: 133.07*	*Default: 0.046*	*Range: 0.000 to 1.000A*

Set the resolver's nominal carrier rms current at 8kz under nominal carrier voltage (in Amps). If unknown, use the default value.

INERTIA	*PREF: 133.08*	*Default: 24.00*	*Range: 10.00 to 32768.00Kg.cm2*

Parameter Descriptions

Set the resolver's rotor inertia (in kg*cm²). If unknown, use the default value.

POSITION SET UP	*PREF: 133.11*	*Default: 0.00*	*Range: -180.00 to 180.00 deg*

The electrical position offset value, in degrees. The value will adapt the resolver to the motor phasing (this parameter is automatically set up by using the MOT POLARISATION function block). The value could also be entered here if known.

RESOLVER POS OUT	*PREF: 133.15*	*Default:*	*Range: _.xxxx*

Mechanical position given by the resolver.

TRIP	*PREF: 133.16*	*Default: FALSE*	*Range: FALSE / TRUE*

This is a diagnostic output indicating a resolver trip:

TRIP = FALSE : resolver is OK

TRIP = TRUE : resolver is tripped

INIT DONE	*PREF: 133.17*	*Default: TRUE*	*Range: FALSE / TRUE*

This is a diagnostic output indicating the state of the resolver init sequence:

INIT DONE = FALSE : init on going

INIT DONE = TRUE : init done

REVERSE CNT DIR	*PREF: 133.18*	*Default: FALSE*	*Range: FALSE / TRUE*

Set the count direction for the resolver feedback.

REVERSE CNT DIR = FALSE : the position is increasing if the motor is running in a clockwise direction looking to the front shaft of the motor.

REVERSE CNT DIR = TRUE : the position is decreasing if the motor is running in a clockwise direction looking to the front shaft of the motor.

SPEED FILTER	*PREF: 133.19*	*Default: 100.00*	*Range: 10.00 to 1000.00 Hz*

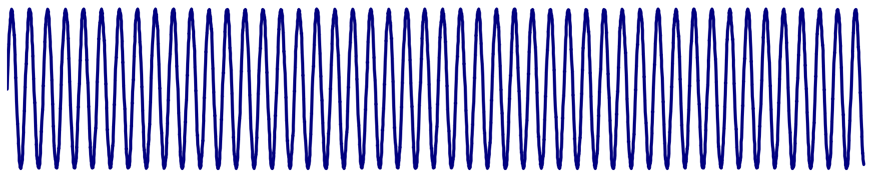
Set the low pass filter frequency in Hz on the resolver speed information.

Parameter Descriptions

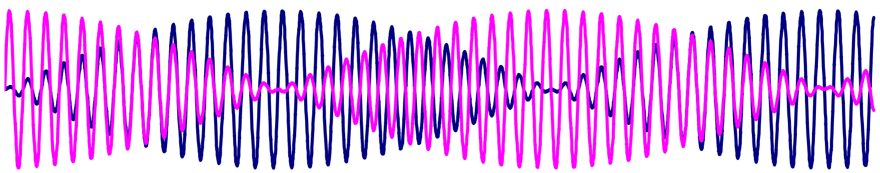
PHASE SHIFT *PREF: 133.20* *Default: 0.00* *Range: 0.00 to 180.00°*

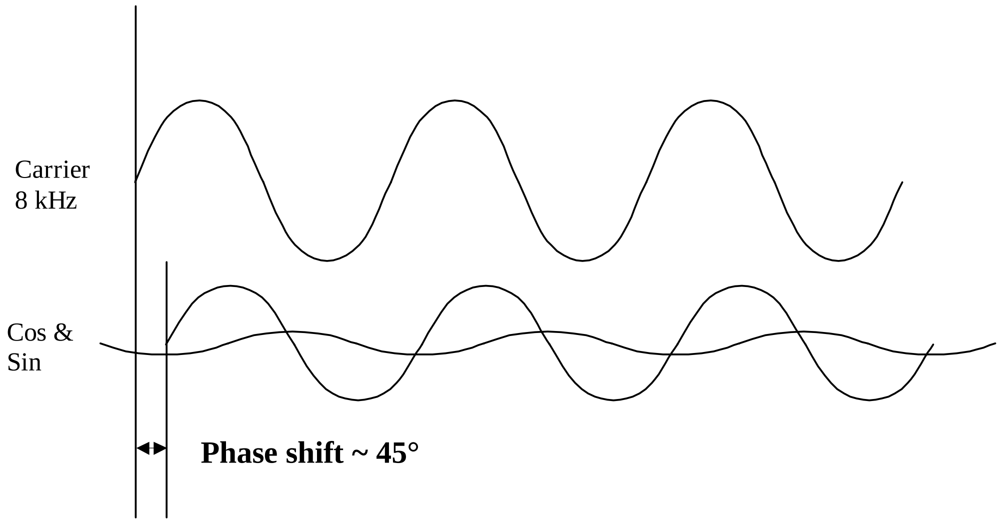
Set a phase shift in degrees between the carrier and the sin/cos signals coming from the resolver.

Carrier :



Sin/cos signals, motor in rotation :





If unknown, use the default value.

TRIP SELECTION *PREF: 133.21* *Default: 2* *Range: See below*

Select the trip detection based on hardware and/or software detection:

Enumerated Value : Trip Selection

0 : HARD AND SOFT	The trip is based on hardware and software detection.
1 : HARD	The trip is only based on hardware detection.
2 : SOFT	The trip is only based on software detection.

D

SEQUENCING LOGIC

SETUP::SEQ & REF::SEQUENCING LOGIC

This function block contains all the parameters relating to the sequencing (start and stop) of the Drive.

Before the Drive will respond to the RUN FORWARD, RUN REVERSE or JOG parameters (cause the Drive to run or jog), the parameters DRIVE ENABLE, NOT FAST STOP and NOT COAST STOP need to be set to TRUE. In addition, the Drive needs to be healthy (HEALTHY is TRUE). The Drive will only respond to RUN FORWARD, RUN REVERSE and JOG if the Drive is in the Remote Sequencing mode.

If RUN FORWARD and RUN REVERSE are TRUE, both are ignored and the Drive will stop.

Parameter Descriptions

RUN REVERSE *PREF: 92.02* *Default: FALSE* *Range: FALSE / TRUE*

Setting this parameter to TRUE causes the Drive to run in the reverse direction.

JOG *PREF: 92.04* *Default: FALSE* *Range: FALSE / TRUE*

Setting this parameter TRUE causes the Drive to run at the speed set by JOG SETPOINT (refer to the REFERENCE JOG function block). Once jogging, setting JOG to FALSE causes the Drive to ramp to zero.

NOT FAST STOP *PREF: 92.07* *Default: TRUE* *Range: FALSE / TRUE*

Whilst running or jogging, setting this parameter to FALSE causes the Drive to ramp to zero. The rate is set by FAST STOP RATE in the STOP function block. The action of setting NOT FAST STOP to TRUE is latched. The Drive cannot be restarted until fast stop is completed.

NOT COAST STOP *PREF: 92.08* *Default: TRUE* *Range: FALSE / TRUE*

Setting this parameter to FALSE disables the Drive operation and causes the motor to coast. The action of setting this parameter to TRUE is latched. The Drive can not be restarted until the coast stop is completed.
A detailed description of the sequencer states, as indicated by the SEQUENCER STATE parameter, is described in Appendix B.

Parameter Descriptions

REMOTE REVERSE *PREF: 92.09* *Default: FALSE* *Range: FALSE / TRUE*

For remote setpoints, setting this parameter TRUE inverts the demanded direction of motor rotation.

START DELAY *PREF: 92.25* *Default: 0.000 s* *Range: 0.000 to 30.000 s*

Delays the action of "ramping to setpoint" from the Run command. This can allow a period for motor flux to establish before the ramp to setpoint.

RUN FORWARD *PREF: 92.01* *Default: FALSE* *Range: FALSE / TRUE*

Setting this parameter to TRUE causes the Drive to run in the forward direction.

LATCHED RUN *PREF: 92.03* *Default: FALSE* *Range: FALSE / TRUE*

Setting this parameter TRUE will latch the RUN FORWARD or RUN REVERSE commands. Once latched, they can be reset to FALSE and the Drive will continue to run. Setting LATCHED RUN to FALSE causes the run commands to be unlatched.

CONTACTOR CLOSED *PREF: 92.05* *Default: TRUE* *Range: FALSE / TRUE*

Feedback used to indicate that the external contactor has been closed. It must be TRUE for the sequencer to proceed from the SWITCHED ON state to the READY STATE, refer to SEQUENCER STATE.

DRIVE ENABLE *PREF: 92.06* *Default: TRUE* *Range: FALSE / TRUE*

This provides a means of electronically inhibiting Drive operation. Whilst running, setting this parameter to FALSE disables the Drive operation and causes the motor to coast.

REM TRIP RESET *PREF: 92.10* *Default: FALSE* *Range: FALSE / TRUE*

On a transition to TRUE, this input clears latched trips.

TRIP RST BY RUN *PREF: 92.11* *Default: TRUE* *Range: FALSE / TRUE*

This allows the rising edge of run command to clear latched trips.

POWER UP START *PREF: 92.12* *Default: FALSE* *Range: FALSE / TRUE*

If TRUE, this allows the Drive to go directly to run mode on power-up if in remote and a run command is present. If FALSE, a low to high transition of the run command is required.

Parameter Descriptions

TRIPPED *PREF: 92.13* *Default:* *Range: FALSE / TRUE*

Indicates that there is a latched trip present.

RUNNING *PREF: 92.14* *Default:* *Range: FALSE / TRUE*

Indicates that that the Drive is in the enabled state.

JOGGING *PREF: 92.15* *Default:* *Range: FALSE / TRUE*

Indicates that the Drive is in the JOG mode.

STOPPING *PREF: 92.16* *Default:* *Range: FALSE / TRUE*

Indicates that the Drive is stopping.

OUTPUT CONTACTOR *PREF: 92.17* *Default:* *Range: FALSE / TRUE*

Output to be used to drive an external contactor in the motor output. This contactor is normally closed unless a Trip condition has occurred or the Drive goes into the re-configuration mode.

SWITCH ON ENABLE *PREF: 92.18* *Default:* *Range: FALSE / TRUE*

Sometimes referred to as READY TO SWITCH ON, this parameter indicates that the Drive will accept a run command.

SWITCHED ON *PREF: 92.19* *Default:* *Range: FALSE / TRUE*

Run accepted. Waiting for CONTACTOR CLOSED and any motor deflux delay to be completed

READY *PREF: 92.20* *Default:* *Range: FALSE / TRUE*

Indicates that the Drive's power stack is operable and the Drive will run if enabled.

SYSTEM RESET *PREF: 92.21* *Default:* *Range: FALSE / TRUE*

TRUE for a single block diagram execution cycle after the Drive enters either RUN or JOG mode.

Parameter Descriptions

SEQUENCER STATE *PREF: 92.22* *Default:* *Range: See below*

This parameter indicates the current sequencing state:

Enumerated Value : *State*

0 : START DISABLED
1 : START ENABLED
2 : SWITCHED ON
3 : READY
4 : ENABLED
5 : F-STOP ACTIVE
6 : TRIP ACTIVE
7 : TRIPPED

Refer to Appendix B : “Sequencing Logic States”.

REMOTE REV OUT *PREF: 92.23* *Default:* *Range: FALSE / TRUE*

This parameter indicates the current state of remote direction and RUN REVERSE. Note - this is the demanded direction, not the actual direction.

HEALTHY *PREF: 92.24* *Default:* *Range: FALSE / TRUE*

Set FALSE when the Drive trips, and set TRUE when the run command is removed.

FAN RUNNING *PREF: 92.26* *Default:* *Range: FALSE / TRUE*

This can be used to control the running of externally supplied fans. True when the drive is running, goes FALSE 60 seconds after the drive has stopped. Can be used to control externally supplied fans in large 890 drives.

SPEED FBK TRIP

SETUP::TRIPS::SPEED FBK TRIP

CLOSED-LOOP VEC Motor Control Mode only.

The speed feed back trip operates by looking at speed error and comparing it against THRESHOLD.

If the error exceeds this threshold for a period greater than DELAY, then a trip is triggered. The trip is only active while the drive is operating in Closed-Loop Vector Control and not in Autotune. When using the drive in torque control, this trip should be disabled to prevent nuisance tripping by setting INHIBIT to TRUE.

Torque control is defined as operating in torque or current limit, or if the TORQ DMD ISOLATE parameter in the SPEED LOOP function block is TRUE.

Parameter Descriptions

INHIBIT	*PREF: 115.01*	*Default: FALSE*	*Range: FALSE / TRUE*

Set this parameter to TRUE to disable the speed feedback trip.

THRESHOLD	*PREF: 115.02*	*Default: 150.00 %*	*Range: 0.00 to 300.00 %*

Sets a threshold below which the trip will not operate. The value of THRESHOLD is compared to the value of SPEED ERROR (from the SPEED LOOP function block).

DELAY	*PREF: 115.03*	*Default: 0.00 s*	*Range: 0.00 to 3.00 s*

Sets the time the trip must be present for before a trip is triggered.

TRIPPED	*PREF: 115.04*	*Default:*	*Range: FALSE / TRUE*

This is a diagnostic output indicating the current state of the speed feedback trip.

TRACKING TRIP

SETUP::TRIPS::TRACKING TRIP

Designed for BRUSHLESS SERVO Motor Control Mode.

The tracking trip operates by looking at tracking error feedback and comparing it against THRESHOLD.

If the feedback exceeds this threshold for a period greater than DELAY, then a trip is triggered. The trip is only active while the drive is operating in Brushless Servo.

Parameter Descriptions

INHIBIT	*PREF: 131.01*	*Default: FALSE*	*Range: FALSE / TRUE*

Set this parameter to TRUE to disable the over speed trip.

THRESHOLD	*PREF: 131.02*	*Default: 65536*	*Range: 0 to 2147483647*

Sets a threshold (in Units) below which the trip will not operate. The value of THRESHOLD is compared to the value of TRACKING ERROR (from the POS SPEEDLOOP OUT function block).

DELAY	*PREF: 131.03*	*Default: 0.00 s*	*Range: 0.00 to 10.00 s*

Sets the time the trip must be present for before a trip is triggered.

TRIPPED	*PREF: 131.04*	*Default:*	*Range: FALSE / TRUE*

This is a diagnostic output indicating the current state of the tracking trip.

TRAJ GEN

SETUP::MOTION::TRAJ GEN

Designed for BRUSHLESS SERVO Motor Control Mode.

This Trajectory Generator block defines the basic parameters of the position and speed loop.

Parameter Descriptions

TYPE *PREF: 137.01, 138.01, 139.01 Default: FALSE Range: FALSE / TRUE*

Set True to order the trajectory generator to behave like a 'master' path. In this mode the internals equations are changed to take into account that the 'master' move is not predictable.

POS. WINDOW *PREF: 137.02, 138.02, 139.02 Default: 65 Range: 0 to 2147483647*

The move is set to be finished (PDONE = TRUE) when the distance left is smaller than the position window (in units).

VEL. WINDOW *PREF: 137.03, 138.03, 139.03 Default: 650 Range: 0 to 2147483647*

The TG is set to be at the desired velocity (VDONE = TRUE) when the velocity output is within than the velocity window of the programmed velocity (in units/s).

MODULO ENABLE *PREF: 137.04, 138.04, 139.04 Default: FALSE Range: FALSE / TRUE*

If set to true, the TG position parameters wraps around MODULO UP and MODULO LOW.

MODULO UPPER *PREF: 137.05, 138.05, 139.05 Default: 0 Range: 0 to 536870911*

Upper value of position parameters when modulo is enabled (in units).

MODULO LOWER *PREF: 137.06, 138.06, 139.06 Default: 0 Range: -536870912 to 0*

Lower value of position parameters when modulo is enabled (in units).

Parameter Descriptions

MODULO PRESET	*PREF: 137.21, 138.21, 139.21*	*Default: 0*	*Range: -2147483648 to 2147483647*

This parameter is used to preset the MODULO COUNTER to a given value (on rising edge of MODULO DO PRESET).

MODULO DO PRESET	*PREF: 137.22, 138.22, 139.22*	*Default: FALSE*	*Range: FALSE / TRUE*

Used to preset the MODULO COUNTER output.

MODULO COUNTER	*PREF: 137.23, 138.23, 139.23*	*Default:*	*Range: -2147483648 to 2147483647*

This is a diagnostic output indicating the number of times the position has wrapped around the MODULO.

D

TRAJ GEN DEFAULT

SETUP::MOTION::TRAJ GEN DEFAULT

Designed for BRUSHLESS SERVO Motor Control Mode.

This block defines the default and override values for the Trajectory Generators. The default values are used if, when starting a new move, the corresponding parameter is set to 0. The override values act as gain on the velocity, acceleration and deceleration.

Parameter Descriptions

DEFAULT VELOCITY *PREF: 150.01* *Default: 1000000* *Range: 10 to 2147483647*

Used as the velocity value if the velocity parameter is set to 0 in the Motion block (in unit/s).

DEFAULT ACCEL *PREF: 150.02* *Default: 10000000* *Range: 10 to 2147483647*

Used as the acceleration value if the acceleration parameter is set to 0 in the Motion block (in units/s²).

DEFAULT DECEL *PREF: 150.03* *Default: 10000000* *Range: 10 to 2147483647*

Used as the deceleration value if the deceleration parameter is set to 0 in the Motion block (in units/s²).

DEFAULT JERK *PREF: 150.04* *Default: 0.0* *Range: 0.0 to 1.00*

Used as the jerk value if the jerk parameter is set to 0.0 in the Motion block.

VEL. OVERRIDE *PREF: 150.05* *Default: 1.00* *Range: 0.10 to 2.00*

Acts as a gain to the velocity parameter.

ACCEL. OVERRIDE *PREF: 150.06* *Default: 1.00* *Range: 0.10 to 2.00*

Acts as a gain to the acceleration parameter.

Parameter Descriptions

DECEL. OVERRIDE	*PREF: 150.07*	*Default: 1.00*	*Range: 0.01 to 2.00*

Acts as a gain to the deceleration parameter.

QUICK STOP RATE	*PREF: 150.08*	*Default: 10000000*	*Range: 10 to 2147483647*

Used as the deceleration value when the Quick Stop is active.

TRIPS HISTORY

SETUP::TRIPS::TRIPS HISTORY

This function block records the last ten trips that caused the Drive to stop.

To do this, it stores the value of the FIRST TRIP parameter, PREF 97:09, taken from the TRIPS STATUS function block.

Parameter Descriptions

TRIP 1 (NEWEST) *PREF: 96.01* *Default: 0* *Range: See below*

Records the most recent trip that caused the Drive to stop. The values that this (and the parameters below) may take are the same as PREF 97.09, FIRST TRIP, detailed in the TRIPS STATUS function block. Refer to page 131.

TRIP 2 *PREF: 96.02* *Default: 0* *Range: As above*

Records the second most recent trip that caused the Drive to stop.

TRIP 3 *PREF: 96.03* *Default: 0* *Range: As above*

Records the third most recent trip that caused the Drive to stop.

TRIP 4 *PREF: 96.04* *Default: 0* *Range: As above*

Records the fourth most recent trip that caused the Drive to stop.

TRIP 5 *PREF: 96.05* *Default: 0* *Range: As above*

Records the fifth most recent trip that caused the Drive to stop.

TRIP 6 *PREF: 96.06* *Default: 0* *Range: As above*

Records the sixth most recent trip that caused the Drive to stop.

TRIP 7 *PREF: 96.07* *Default: 0* *Range: As above*

Records the seventh most recent trip that caused the Drive to stop.

TRIP 8 *PREF: 96.08* *Default: 0* *Range: As above*

Records the eighth most recent trip that caused the Drive to stop.

Parameter Descriptions

TRIP 9 *PREF: 96.09* *Default: 0* *Range: As above*

Records the ninth most recent trip that caused the Drive to stop.

TRIP 10 (OLDEST) *PREF: 96.10* *Default: 0* *Range: As above*

Records the tenth most recent trip that caused the Drive to stop.

Functional Description

This function block provides a view of the ten most recent trips that caused the Drive to stop. Every time a new trip occurs this is entered as TRIP 1 (NEWEST and the other recorded trips are moved down. If more than ten trips have occurred since the Drive was configured then only the ten most recent trips will be available for inspection.

These parameters are preserved through a power failure.

TRIPS STATUS

SETUP::TRIPS::TRIPS STATUS

The Drive supports advanced and flexible trip logic to support monitoring of the Drive itself, the motor and the load. This function block provides a view into the current trip condition(s) and allows some trips to be disabled.

Parameter Descriptions

DISABLE TRIPS *PREF: 97.01* *Default: 0380* *Range: 0x0000 to 0xFFFF*

Use this parameter to disable trips. Not all trips may be disabled, the DISABLE TRIPS mask is ignored for trips that cannot be disabled. See below for which trips may be disabled and how this parameter is formed.

DISABLE TRIPS+ *PREF: 97.02* *Default: 0840* *Range: 0x0000 to 0xFFFF*

Use this parameter to disable trips. Not all trips may be disabled, the DISABLE TRIPS mask is ignored for trips that cannot be disabled. See below for which trips may be disabled and how this parameter is formed.

ACTIVE TRIPS *PREF: 97.05* *Default: 0000* *Range: 0x0000 to 0xFFFF*

Indicates which trips are currently active. These parameters are a coded representation of the trip status. See below for a description of how this parameter is formed.

ACTIVE TRIPS+ *PREF: 97.06* *Default: 0000* *Range: 0x0000 to 0xFFFF*

Indicates which trips are currently active. These parameters are a coded representation of the trip status. See below for a description of how this parameter is formed.

WARNINGS *PREF: 97.07* *Default: 0000* *Range: 0x0000 to 0xFFFF*

Indicates which conditions are likely to cause a trip. These parameters are a coded representation of the warning status. See below for a description of how this parameter is formed.

WARNINGS+ *PREF: 97.08* *Default: 0000* *Range: 0x0000 to 0xFFFF*

Indicates which conditions are likely to cause a trip. These parameters are a coded representation of the warning status. See below for a description of how this parameter is formed.

Parameter Descriptions

FIRST TRIP *PREF: 97.09* *Default: 0* *Range: see table below*

From when a trip occurs until that trip is reset, this parameter indicates the trip source. When several trips have occurred, this parameter indicates the first one that was detected.

Functional Description

The tables below shows the possible parameter values for FIRST TRIP, and the TRIPS HISTORY function block.

The ACTIVE TRIPS, WARNINGS, DISABLE TRIPS, TRIGGERS 1 and TRIGGERS 2 parameters use a four digit hexadecimal number to identify individual trips. Each trip has a unique corresponding number as shown below.

Trip Name (MMI)	Value	Mask	User Disable	Auto-restart
NO TRIP	0	0x0000	N/A	N/A
OVERVOLTAGE	1	0x0001	No	Yes
UNDERVOLTAGE	2	0x0002	No	Yes
OVERCURRENT	3	0x0004	No	Yes
HEATSINK	4	0x0008	No	Yes
EXTERNAL TRIP	5	0x0010	No	Yes
INPUT 1 BREAK	6	0x0020	Yes	Yes
INPUT 2 BREAK	7	0x0040	Yes	Yes
MOTOR STALLED	8	0x0080	Yes	Yes
INVERSE TIME	9	0x0100	Yes	Yes
BRAKE RESISTOR	10	0x0200	Yes	Yes
BRAKE SWITCH	11	0x0400	Yes	Yes
OP STATION	12	0x0800	Yes	Yes
LOST COMMS	13	0x1000	Yes	Yes
CONTACTOR FBK	14	0x2000	Yes	Yes
SPEED FEEDBACK	15	0x4000	Yes	Yes

Trip Name (MMI)	Value	Mask	User Disable	Auto-restart
AMBIENT TEMP	16	0x8000	No	Yes
MOTOR OVERTEMP	17	0x0001	Yes	Yes
CURRENT LIMIT	18	0x0002	No	Yes

Trip Name (MMI)	Value	Mask +	User Disable	Auto-restart
TRIP 19 (Reserved)	19	0x0004	No	No
24V FAILURE	20	0x0008	Yes	Yes
LOW SPEED OVER I	21	0x0010	No	Yes
PHASE FAIL	22	0x0020	No	Yes
ENCODER 1 FAULT	23	0x0040	Yes	Yes
DESAT (OVER I)	24	0x0080	No	Yes
VDC RIPPLE	25	0x0100	No	Yes
BRAKE SHORT CCT	26	0x0200	No	Yes
OVERSPEED	27	0x0400	Yes	Yes
ANALOG INPUT ERR	28	0x0800	No	Yes
INT DB RESISTOR	29	0x1000	No	Yes
TRIP 30 (Reserved)	30	0x2000	No	No
UNKNOWN	31	0x4000	No	Yes
OTHER	32	0x8000	No	Yes
MAX SPEED LOW	33	0x8000	N/A	N/A
MAINS VOLTS LOW	34	0x8000	N/A	N/A
NOT AT SPEED	35	0x8000	N/A	N/A
MAG CURRENT FAIL	36	0x8000	N/A	N/A
NEGATIVE SLIP F	37	0x8000	N/A	N/A
TR TOO LARGE	38	0x8000	N/A	N/A
TR TOO SMALL	39	0x8000	N/A	N/A
MAX RPM DATA ERR	40	0x8000	N/A	N/A

Trip Name (MMI)	Value	Mask +	User Disable	Auto-restart
STACK TRIP	41	0x8000	N/A	N/A
LEAKGE L TIMEOUT	42	0x8000	N/A	N/A
POWER LOSS STOP	43	0x8000	N/A	N/A
MOTR TURNING ERR	44	0x8000	N/A	N/A
MOTR STALLED ERR	45	0x8000	N/A	N/A
AT TORQ LIM ERR	46	0x8000	N/A	N/A
TRIP 47 (Reserved)	47	0x8000	N/A	N/A
ENCODR CAL ERROR	48	0x8000	N/A	N/A
OUTPUT GBX ERROR	49	0x8000	N/A	N/A
APP HALTED	50	0x8000	N/A	N/A
APP ERROR	51	0x8000	N/A	N/A
FIRMWARE ERROR	52	0x8000	N/A	N/A
TRACKING ERROR	53	0x8000	N/A	N/A
LOOP OVERSPEED	54	0x8000	N/A	N/A
LIMIT SWITCH	55	0x8000	N/A	N/A
SOFT LIMIT	56	0x8000	N/A	N/A
RESOLVER ERROR	57	0x8000	N/A	N/A
12T MOTOR TRIP	58	0x8000	N/A	N/A
SYNC TIMEOUT	59	0x8000	N/A	N/A

The ACTIVE TRIPS+, WARNINGS+, DISABLE TRIPS+, TRIGGERS+ 1 and TRIGGERS+ 2 parameters use a four digit hexadecimal number to identify individual trips. Each trip has a unique corresponding number as shown opposite.

Decimal number	Display
10	A
11	B
12	C
13	D
14	E
15	F

Hexadecimal Representation of Trips

When more than one trip is to be represented at the same time then the trip codes are simply added together to form the value displayed. Within each digit, values between 10 and 15 are displayed as letters A to F

For example referring to the tables above, if the ACTIVE TRIPS parameter is **02A8,** then this represents:

a “**2**” in digit 3

an “8” and a “2” in digit 2
(8+2 = 10, displayed as **A**)

an “**8**” in digit 1

This in turn represents the active trips BRAKE RESISTOR, MOTOR STALLED, INPUT 1 BREAK and HEATSINK TEMP, (an unlikely situation).

In the same way, the ACTIVE TRIPS + parameter displaying **02A8** would represent CURRENT LIMIT, DESAT (OVER I), TRIP 22 and 24V failure, (another unlikely situation).

The hexadecimal value is used over comms, however, pressing the M key whilst displaying the hexadecimal trip value will show the list of all trips and their current values

VIRTUAL MASTER

SETUP::PHASE CONTROL::VIRTUAL MASTER

This block transmits a regular update of speed, position and acceleration to all other drives listening on the selected channel. The output is profiled by the ACCELERATION, DECELERATION and JERK 1-4 parameters.

An example acceleration graph for a velocity 60 %/s maximum, acceleration of 20 $\%/s^2$ and a jerk of 10 $\%/s^3$ is shown below.

Parameter Descriptions

CHANNEL *PREF: 118.17* *Default: 0* *Range: 0 to 64*

This parameter sets the Firewire channel that the Virtual Master broadcasts references on.

SOURCE *PREF: 118.20* *Default: 0* *Range: See below*

This selects the source of the speed, position, and acceleration data that is transmitted.

Enumerated Value : *Source*

0 : SRAMP	This selects the s ramp function, which takes the INPUT parameter (speed) and processes it to get speed, position, and acceleration.
1 : FEEDBACK ENCODR	The speed, position, and acceleration of the feedback encoder are selected and broadcast.
2 : REFERNCE ENCODR	The speed, position, and acceleration of the reference encoder are selected and broadcast.

INPUT *PREF: 118.01* *Default: 0.00 %* *Range: -100.00 to 100.00 %*

Ramp input.

ACCELERATION *PREF: 118.02* *Default: 10.00 $/s^2$* *Range: 0.00 to 100.00 $/s^2$*

Sets the acceleration rate in units of percent per second^2, i.e. if the full speed of the machine is 1.25m/s then the acceleration will be: 1.25 x 75.00% = 0.9375m/s^2

DECELERATION *PREF: 118.03* *Default: 10.00 $/s^2$* *Range: 0.00 to 100.00 $/s^2$*

This functions in the same way as ACCELERATION above.

Parameter Descriptions

JERK 1 to JERK 4	*PREF: 118.04, 118.05, 118.06, 118.07*	*Default: 10.00 /s²*	*Range: 0.00 to 100.00 /s³*

Rate of change of acceleration for the relevant segment of the curve, i.e. JERK 1 is for segment 1, etc.

CONTINUOUS	*PREF: 118.08*	*Default: FALSE*	*Range: FALSE / TRUE*

When TRUE, it forces a smooth transition if the speed point is changed when ramping. The curve is controlled by the ACCELERATION and JERK 1 to JERK 4 parameters. When FALSE, there is an immediate transition from the old curve to the new curve.

HOLD	*PREF: 118.09*	*Default: FALSE*	*Range: FALSE / TRUE*

When TRUE, the output of the ramp is held at its last value.

SYMMETRIC JERK	*PREF: 118.10*	*Default: FALSE*	*Range: FALSE / TRUE*

When TRUE, JERK 1 is used for all segments of the curve. JERK 2, JERK 3 and JERK 4 are ignored.

RESET	*PREF: 118.11*	*Default: FALSE*	*Range: FALSE / TRUE*

If TRUE, the output is made equal to the input.

OFFSET	*PREF: 118.12*	*Default: 0.0000 deg*	*Range: 0.0000 to 360.0000 deg*

This input provides an additional offset to be applied to the Position Output

MAX SPEED	*PREF: 118.18*	*Default: 1500.0 RPM*	*Range: 100.0 to 6000.0 RPM*

This parameter specifies the maximum speed of the Virtual Master

POSITION OUTPUT	*PREF: 118.14*	*Default:*	*Range: —.xxxx deg*

Master position output.

SPEED OUTPUT	*PREF: 118.13*	*Default:*	*Range: —.xx Hz*

Master speed output.

ACCEL OUTPUT	*PREF: 118.15*	*Default:*	*Range: —.xx*

Master acceleration output in /s^2.

RAMPING	*PREF: 118.16*	*Default:*	*Range: FALSE / TRUE*

This is set TRUE when ramping.

Parameter Descriptions

STATUS	*PREF: 118.19*	*Default: 5*	*Range: See below*

Operating status of the Virtual Master.

Enumerated Value : *Status*

0 : READY	operating correctly
1 : RESET	RESET input is FALSE
2 : DUPLICATE	another VIRTUAL MASTER has the same CHANNEL number
3 : INITIALISING	FireWire is present but state not yet known
4 : NO FIREWIRE	No FireWire Option fitted or no FireWire power supplied
5 : DISABLED	CHANNEL set to zero
6 : INTERNAL	same channel set for FIREWIRE REF & VIRTUAL MASTER

SPEED FILT TIME	*PREF: 118.22*	*Default: 5.0 ms*	*Range: 0.0 to 100.0 ms*

Filter time constant real master speed.

ACCEL FILT TIME	*PREF: 118.23*	*Default: 5.0 ms*	*Range: 0.0 to 100.0 ms*

Fitler time constant for real master acceleration.

Functional Description

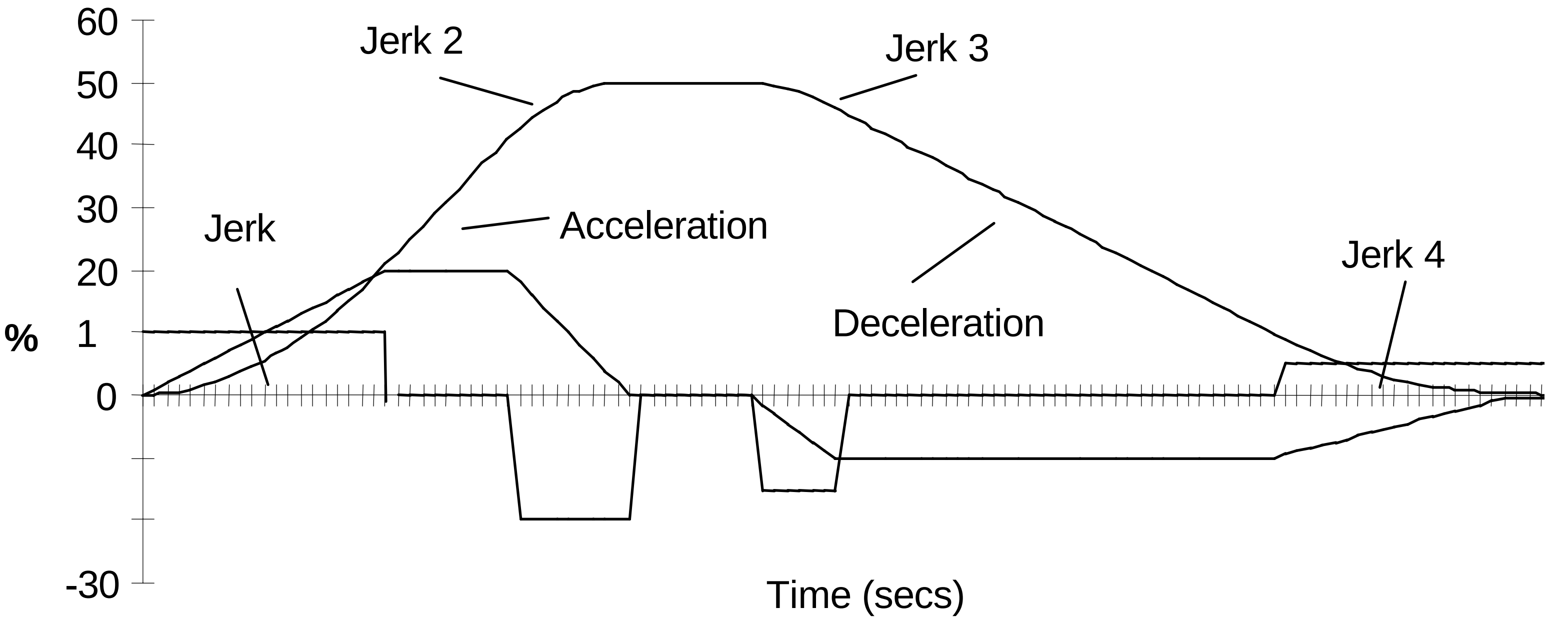
The time needed to stop or accelerate is:

As the speed is symmetrical, the average speed is V/2 therefore the stopping / acceleration distance can be calculated:

$$s=\frac{V}{2}\left(\frac{V}{A}+\frac{A}{J}\right) \text{ [Meters]} \qquad t=\frac{V}{A}+\frac{A}{J} \text{ [Seconds]}$$

__V__ is the maximum speed the drive must reach in % / sec.
__A__ is the maximum allowable acceleration in %/sec^2.
__J__ is the maximum allowable value for jerk, in %/sec^3

Note: These only hold true if Jerk = Jerk2 for acceleration or Jerk 3 = Jerk 4 for deceleration.



ZERO SPEED

SETUP::MOTOR CONTROL::ZERO SPEED

This function block detects when the motor speed is at or close to zero. HYSTERESIS and THRESHOLD are user-definable.

Parameter Descriptions

HYSTERISIS *PREF: 85.01* *Default: 0.10 %* *Range: 0.00 to 300.00 %*

Provides a hysteresis band about which the outputs are stable.

IF the hysteresis value is >= to the Threshold
THEN the level is set to 2 x the hysteresis value and the Off level is set to zero,
ELSE the On level = Threshold + Hysteresis and the Off level = Threshold - Hysteresis.

THRESHOLD *PREF: 85.02* *Default: 0.50 %* *Range: 0.00 to 300.00 %*

The nominal level below which the outputs are set.

AT ZERO SPD FBK *PREF: 85.03* *Default:* *Range: FALSE / TRUE*

Speed feedback. TRUE when at zero speed feedback, as defined by THRESHOLD and HYSTERESIS.

IF (abs(speed feedback)) > On Level at zero speed = FALSE
ELSE if (abs(speed feedback)) <= Off Level at zero speed = TRUE
ELSE at zero speed is unchanged

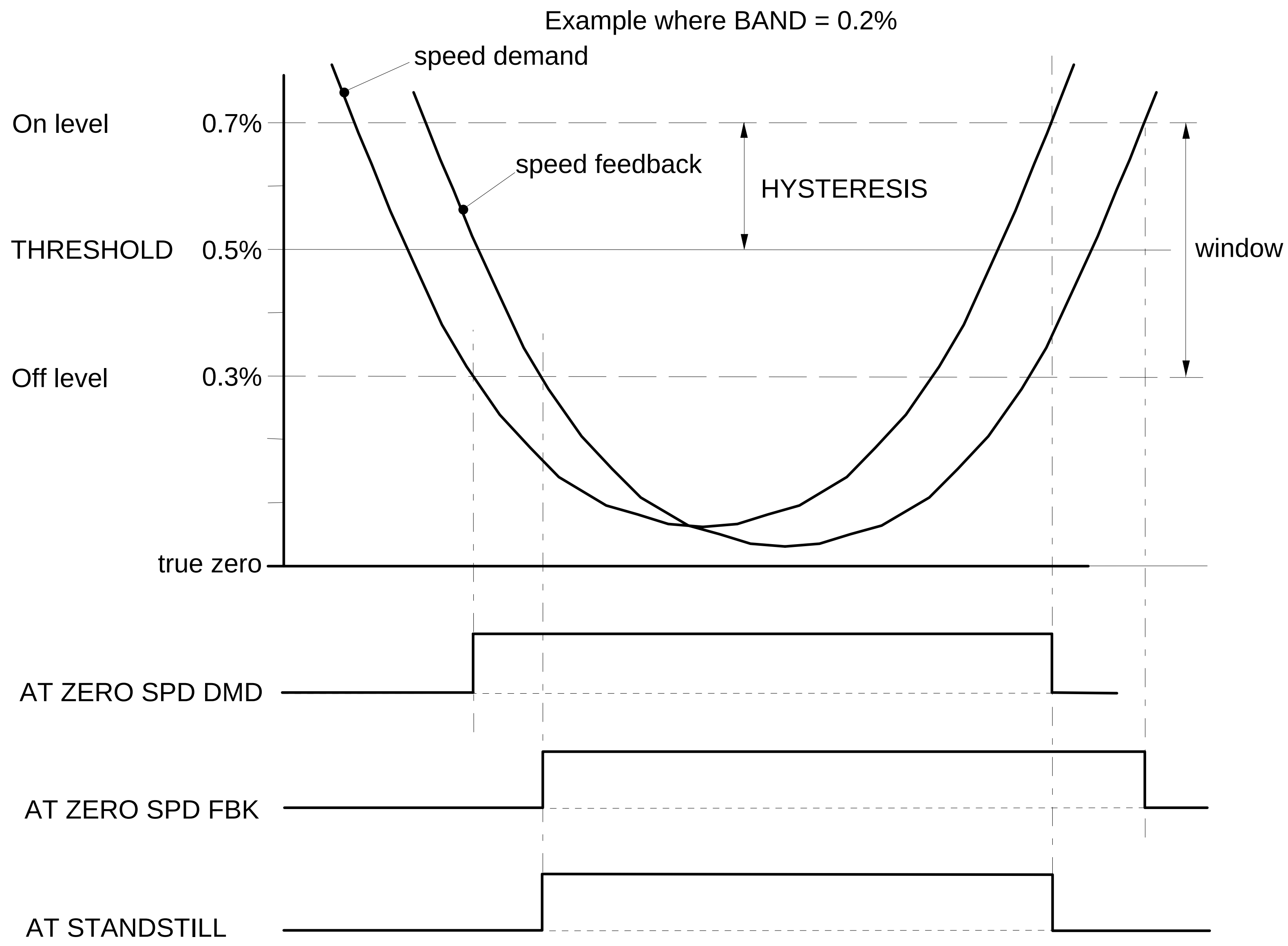
AT ZERO SPD DMD *PREF: 85.04* *Default:* *Range: FALSE / TRUE*

Speed demand. TRUE when at zero speed demand, as defined by THRESHOLD and HYSTERESIS.

AT STANDSTILL *PREF: 85.05* *Default:* *Range: FALSE / TRUE*

TRUE when both AT ZERO SPD FBK and AT ZERO SPD DMD are TRUE.

Functional Description



Parameter Specifications

The headings for the Parameter tables are described below.

PREF	A numeric identification of the parameter. It is used to identify the source and destinations of internal links.	
Name	The parameter name.	
Block	The menu page and function block under which the parameter is stored.	
Type	REAL	Floating point value
	INT	Integer value
	BOOL	A Boolean (bit) representing FALSE or TRUE
	ENUM	An enumerated value representing a selection
	STRING	An ASCII string
	WORD	16 Bit hexadecimal number
Range	This varies with parameter type:	
	REAL, INT	The upper and lower limits of the parameter
	BOOL	0 = FALSE, 1 = TRUE
	ENUM	A list of possible selections for that parameter
	STRING	Specified number of characters
	WORD	0000 to FFFF (hexadecimal), numbered lists show Bit numbers
	Note	***Decimal Places: "—" signifies an indeterminable number of units. An "x" signifies a decimal place, e.g. —.xx % could represent 100.00 %.***
Default	The default value of the parameter.	
ro\rw	Denotes a Read-Only (ro) or Read-Write (rw) parameter.	

Notes	You can record your application's settings here. Output parameters are not saved in non-volatile memory unless indicated. 1. This input parameter is not saved in non-volatile memory. 2. This input parameter can only be written to when the drive is stopped. 3. The default value is dependent on the power board. 4. The default value is dependent on the frequency board. 5. This parameter is not set from DSE on a partial install.

Parameter Table: PREF Number Order

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
1.03	TYPE	ANALOG INPUT 1	ENUM	0 : -10..+10 V 1 : 0..+10 V	-10..+10 V	rw	
1.06	VALUE	ANALOG INPUT 1	REAL	_.x	-100.0 %	ro	Output
2.03	TYPE	ANALOG INPUT 2	ENUM	0 : -10..+10 V 1 : 0..+10 V	-10..+10 V	rw	
2.06	VALUE	ANALOG INPUT 2	REAL	_.x	-100.0 %	ro	Output
3.03	TYPE	ANALOG INPUT 3	ENUM	0 : -10..+10 V 1 : 0..+10 V 2 : 0..20 mA 3 : 4..20 mA	-10..+10 V	rw	
3.04	BREAK ENABLE	ANALOG INPUT 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
3.05	BREAK VALUE	ANALOG INPUT 3	REAL	-300.00 to 300.00 %	0.00 %	rw	
3.06	VALUE	ANALOG INPUT 3	REAL	_.x	-100.0 %	ro	Output
3.07	BREAK	ANALOG INPUT 3	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
4.03	TYPE	ANALOG INPUT 4	ENUM	0 : -10..+10 V 1 : 0..+10 V 2 : 0..20 mA 3 : 4..20 mA	-10..+10 V	rw	
4.04	BREAK ENABLE	ANALOG INPUT 4	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
4.05	BREAK VALUE	ANALOG INPUT 4	REAL	-300.00 to 300.00 %	0.00 %	rw	
4.06	VALUE	ANALOG INPUT 4	REAL	_.x	-100.0 %	ro	Output
4.07	BREAK	ANALOG INPUT 4	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
5.06	VALUE	ANALOG INPUT 5	REAL	_.x	-100.0 %	ro	Output
6.01	VALUE	ANALOG OUTPUT 1	REAL	-300.00 to 300.00 %	0.00 %	rw	
6.05	TYPE	ANALOG OUTPUT 1	ENUM	0 : -10..+10 V 1 : 0..+10 V	0..+10 V	rw	
7.01	VALUE	ANALOG OUTPUT 2	REAL	-300.00 to 300.00 %	0.00 %	rw	
7.05	TYPE	ANALOG OUTPUT 2	ENUM	0 : -10..+10 V 1 : 0..+10 V	0..+10 V	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
8.02	VALUE	DIGITAL INPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
9.02	VALUE	DIGITAL INPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
10.02	VALUE	DIGITAL INPUT 3	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
11.02	VALUE	DIGITAL INPUT 4	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
12.02	VALUE	DIGITAL INPUT 5	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
13.02	VALUE	DIGITAL INPUT 6	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
14.02	VALUE	DIGITAL INPUT 7	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
15.02	VALUE	DIGITAL INPUT 8	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
16.02	VALUE	DIGITAL INPUT 9	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
17.01	VALUE	DIGITAL OUTPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
18.01	VALUE	DIGITAL OUTPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
19.01	VALUE	DIGITAL OUTPUT 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
30.01	ENABLED KEYS	OP STATION	WORD	0000 to FFFF	00F0	rw	
30.02	OP VERSION	OP STATION	WORD	0000 to FFFF	0000	ro	Output
30.03	OP DATABASE	OP STATION	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
31.01	VIEW LEVEL	ACCESS CONTROL	ENUM	0 : OPERATOR 1 : BASIC 2 : ADVANCED	BASIC	rw	
31.02	PASSWORD	ACCESS CONTROL	WORD	0000 to FFFF	0000	rw	
31.05	CONFIG NAME	ACCESS CONTROL	STRING	max length is 16 chars		rw	
31.06	STARTUP SCREEN	ACCESS CONTROL	INT	0 to 32	0	rw	
32.03	SCALING	SETPOINT DISPLAY	ENUM	0 : NONE 1 : DISPLAY SCALE 1	NONE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4			
32.05	IGNORE PASSWORD	SETPOINT DISPLAY	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
33.01	PARAMETER	OPERATOR MENU 1	PREF	00.00 to A0.01	0	rw	
33.03	SCALING	OPERATOR MENU 1	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
33.04	READ ONLY	OPERATOR MENU 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
33.05	IGNORE PASSWORD	OPERATOR MENU 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
34.01	PARAMETER	OPERATOR MENU 2	PREF	00.00 to A0.01	0	rw	
34.03	SCALING	OPERATOR MENU 2	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
34.04	READ ONLY	OPERATOR MENU 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
34.05	IGNORE PASSWORD	OPERATOR MENU 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
35.01	PARAMETER	OPERATOR MENU 3	PREF	00.00 to A0.01	0	rw	
35.03	SCALING	OPERATOR MENU 3	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
35.04	READ ONLY	OPERATOR MENU 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
35.05	IGNORE PASSWORD	OPERATOR MENU 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
36.01	PARAMETER	OPERATOR MENU 4	PREF	00.00 to A0.01	0	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
36.03	SCALING	OPERATOR MENU 4	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
36.04	READ ONLY	OPERATOR MENU 4	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
36.05	IGNORE PASSWORD	OPERATOR MENU 4	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
37.01	PARAMETER	OPERATOR MENU 5	PREF	00.00 to A0.01	0	rw	
37.03	SCALING	OPERATOR MENU 5	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
37.04	READ ONLY	OPERATOR MENU 5	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
37.05	IGNORE PASSWORD	OPERATOR MENU 5	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
38.01	PARAMETER	OPERATOR MENU 6	PREF	00.00 to A0.01	0	rw	
38.03	SCALING	OPERATOR MENU 6	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
38.04	READ ONLY	OPERATOR MENU 6	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
38.05	IGNORE PASSWORD	OPERATOR MENU 6	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
39.01	PARAMETER	OPERATOR MENU 7	PREF	00.00 to A0.01	0	rw	
39.03	SCALING	OPERATOR MENU 7	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
39.04	READ ONLY	OPERATOR MENU 7	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
39.05	IGNORE PASSWORD	OPERATOR MENU 7	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
40.01	PARAMETER	OPERATOR MENU 8	PREF	00.00 to A0.01	0	rw	
40.03	SCALING	OPERATOR MENU 8	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
40.04	READ ONLY	OPERATOR MENU 8	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
40.05	IGNORE PASSWORD	OPERATOR MENU 8	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
41.01	PARAMETER	OPERATOR MENU 9	PREF	00.00 to A0.01	0	rw	
41.03	SCALING	OPERATOR MENU 9	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
41.04	READ ONLY	OPERATOR MENU 9	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
41.05	IGNORE PASSWORD	OPERATOR MENU 9	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
42.01	PARAMETER	OPERATOR MENU 10	PREF	00.00 to A0.01	0	rw	
42.03	SCALING	OPERATOR MENU 10	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
42.04	READ ONLY	OPERATOR MENU 10	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
42.05	IGNORE PASSWORD	OPERATOR MENU 10	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
43.01	PARAMETER	OPERATOR MENU 11	PREF	00.00 to A0.01	0	rw	
43.03	SCALING	OPERATOR MENU 11	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3	NONE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				4 : DISPLAY SCALE 4			
43.04	READ ONLY	OPERATOR MENU 11	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
43.05	IGNORE PASSWORD	OPERATOR MENU 11	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
44.01	PARAMETER	OPERATOR MENU 12	PREF	00.00 to A0.01	0	rw	
44.03	SCALING	OPERATOR MENU 12	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
44.04	READ ONLY	OPERATOR MENU 12	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
44.05	IGNORE PASSWORD	OPERATOR MENU 12	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
45.01	PARAMETER	OPERATOR MENU 13	PREF	00.00 to A0.01	0	rw	
45.03	SCALING	OPERATOR MENU 13	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
45.04	READ ONLY	OPERATOR MENU 13	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
45.05	IGNORE PASSWORD	OPERATOR MENU 13	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
46.01	PARAMETER	OPERATOR MENU 14	PREF	00.00 to A0.01	0	rw	
46.03	SCALING	OPERATOR MENU 14	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
46.04	READ ONLY	OPERATOR MENU 14	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
46.05	IGNORE PASSWORD	OPERATOR MENU 14	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
47.01	PARAMETER	OPERATOR MENU 15	PREF	00.00 to A0.01	0	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
47.03	SCALING	OPERATOR MENU 15	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
47.04	READ ONLY	OPERATOR MENU 15	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
47.05	IGNORE PASSWORD	OPERATOR MENU 15	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
48.01	PARAMETER	OPERATOR MENU 16	PREF	00.00 to A0.01	0	rw	
48.03	SCALING	OPERATOR MENU 16	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
48.04	READ ONLY	OPERATOR MENU 16	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
48.05	IGNORE PASSWORD	OPERATOR MENU 16	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
49.01	PARAMETER	OPERATOR MENU 17	PREF	00.00 to A0.01	0	rw	
49.03	SCALING	OPERATOR MENU 17	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
49.04	READ ONLY	OPERATOR MENU 17	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
49.05	IGNORE PASSWORD	OPERATOR MENU 17	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
50.01	PARAMETER	OPERATOR MENU 18	PREF	00.00 to A0.01	0	rw	
50.03	SCALING	OPERATOR MENU 18	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
50.04	READ ONLY	OPERATOR MENU 18	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
50.05	IGNORE PASSWORD	OPERATOR MENU 18	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
51.01	PARAMETER	OPERATOR MENU 19	PREF	00.00 to A0.01	0	rw	
51.03	SCALING	OPERATOR MENU 19	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
51.04	READ ONLY	OPERATOR MENU 19	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
51.05	IGNORE PASSWORD	OPERATOR MENU 19	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
52.01	PARAMETER	OPERATOR MENU 20	PREF	00.00 to A0.01	0	rw	
52.03	SCALING	OPERATOR MENU 20	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
52.04	READ ONLY	OPERATOR MENU 20	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
52.05	IGNORE PASSWORD	OPERATOR MENU 20	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
53.01	PARAMETER	OPERATOR MENU 21	PREF	00.00 to A0.01	0	rw	
53.03	SCALING	OPERATOR MENU 21	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
53.04	READ ONLY	OPERATOR MENU 21	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
53.05	IGNORE PASSWORD	OPERATOR MENU 21	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
54.01	PARAMETER	OPERATOR MENU 22	PREF	00.00 to A0.01	0	rw	
54.03	SCALING	OPERATOR MENU 22	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3	NONE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				4 : DISPLAY SCALE 4			
54.04	READ ONLY	OPERATOR MENU 22	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
54.05	IGNORE PASSWORD	OPERATOR MENU 22	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
55.01	PARAMETER	OPERATOR MENU 23	PREF	00.00 to A0.01	0	rw	
55.03	SCALING	OPERATOR MENU 23	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
55.04	READ ONLY	OPERATOR MENU 23	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
55.05	IGNORE PASSWORD	OPERATOR MENU 23	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
56.01	PARAMETER	OPERATOR MENU 24	PREF	00.00 to A0.01	0	rw	
56.03	SCALING	OPERATOR MENU 24	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
56.04	READ ONLY	OPERATOR MENU 24	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
56.05	IGNORE PASSWORD	OPERATOR MENU 24	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
57.01	PARAMETER	OPERATOR MENU 25	PREF	00.00 to A0.01	0	rw	
57.03	SCALING	OPERATOR MENU 25	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
57.04	READ ONLY	OPERATOR MENU 25	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
57.05	IGNORE PASSWORD	OPERATOR MENU 25	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
58.01	PARAMETER	OPERATOR MENU 26	PREF	00.00 to A0.01	0	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
58.03	SCALING	OPERATOR MENU 26	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
58.04	READ ONLY	OPERATOR MENU 26	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
58.05	IGNORE PASSWORD	OPERATOR MENU 26	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
59.01	PARAMETER	OPERATOR MENU 27	PREF	00.00 to A0.01	0	rw	
59.03	SCALING	OPERATOR MENU 27	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
59.04	READ ONLY	OPERATOR MENU 27	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
59.05	IGNORE PASSWORD	OPERATOR MENU 27	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
60.01	PARAMETER	OPERATOR MENU 28	PREF	00.00 to A0.01	0	rw	
60.03	SCALING	OPERATOR MENU 28	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
60.04	READ ONLY	OPERATOR MENU 28	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
60.05	IGNORE PASSWORD	OPERATOR MENU 28	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
61.01	PARAMETER	OPERATOR MENU 29	PREF	00.00 to A0.01	0	rw	
61.03	SCALING	OPERATOR MENU 29	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
61.04	READ ONLY	OPERATOR MENU 29	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
61.05	IGNORE PASSWORD	OPERATOR MENU 29	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
62.01	PARAMETER	OPERATOR MENU 30	PREF	00.00 to A0.01	0	rw	
62.03	SCALING	OPERATOR MENU 30	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
62.04	READ ONLY	OPERATOR MENU 30	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
62.05	IGNORE PASSWORD	OPERATOR MENU 30	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
63.01	PARAMETER	OPERATOR MENU 31	PREF	00.00 to A0.01	0	rw	
63.03	SCALING	OPERATOR MENU 31	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
63.04	READ ONLY	OPERATOR MENU 31	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
63.05	IGNORE PASSWORD	OPERATOR MENU 31	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
64.01	PARAMETER	OPERATOR MENU 32	PREF	00.00 to A0.01	0	rw	
64.03	SCALING	OPERATOR MENU 32	ENUM	0 : NONE 1 : DISPLAY SCALE 1 2 : DISPLAY SCALE 2 3 : DISPLAY SCALE 3 4 : DISPLAY SCALE 4	NONE	rw	
64.04	READ ONLY	OPERATOR MENU 32	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
64.05	IGNORE PASSWORD	OPERATOR MENU 32	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
65.01	DECIMAL PLACE	DISPLAY SCALE 1	ENUM	0 : DEFAULT 1 : X.XXXX 2 : X.XXX 3 : X.XX 4 : X.X	DEFAULT	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				5 : X.			
65.02	FORMULA	DISPLAY SCALE 1	ENUM	0 : A/B * X + C 1 : A/B * (X+C) 2 : A/(B * X) + C 3 : A/(B * (X+C))	A/B * X + C	rw	
65.03	COEFFICIENT A	DISPLAY SCALE 1	REAL	-32768.0000 to 32767.0000	1.0000	rw	
65.04	COEFFICIENT B	DISPLAY SCALE 1	REAL	-32768.0000 to 32767.0000	1.0000	rw	
65.05	COEFFICIENT C	DISPLAY SCALE 1	REAL	-32768.0000 to 32767.0000	0.0000	rw	
65.06	HIGH LIMIT	DISPLAY SCALE 1	REAL	-32768.0000 to 32767.0000	0.0000	rw	
65.07	LOW LIMIT	DISPLAY SCALE 1	REAL	-32768.0000 to 32767.0000	0.0000	rw	
65.08	UNITS	DISPLAY SCALE 1	STRING	max length is 6 chars		rw	
66.01	DECIMAL PLACE	DISPLAY SCALE 2	ENUM	0 : DEFAULT 1 : X.XXXX 2 : X.XXX 3 : X.XX 4 : X.X 5 : X.	DEFAULT	rw	
66.02	FORMULA	DISPLAY SCALE 2	ENUM	0 : A/B * X + C 1 : A/B * (X+C) 2 : A/(B * X) + C 3 : A/(B * (X+C))	A/B * X + C	rw	
66.03	COEFFICIENT A	DISPLAY SCALE 2	REAL	-32768.0000 to 32767.0000	1.0000	rw	
66.04	COEFFICIENT B	DISPLAY SCALE 2	REAL	-32768.0000 to 32767.0000	1.0000	rw	
66.05	COEFFICIENT C	DISPLAY SCALE 2	REAL	-32768.0000 to 32767.0000	0.0000	rw	
66.06	HIGH LIMIT	DISPLAY SCALE 2	REAL	-32768.0000 to 32767.0000	0.0000	rw	
66.07	LOW LIMIT	DISPLAY SCALE 2	REAL	-32768.0000 to 32767.0000	0.0000	rw	
66.08	UNITS	DISPLAY SCALE 2	STRING	max length is 6 chars		rw	
67.01	DECIMAL PLACE	DISPLAY SCALE 3	ENUM	0 : DEFAULT 1 : X.XXXX 2 : X.XXX 3 : X.XX 4 : X.X 5 : X.	DEFAULT	rw	
67.02	FORMULA	DISPLAY SCALE 3	ENUM	0 : A/B * X + C 1 : A/B * (X+C) 2 : A/(B * X) + C	A/B * X + C	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				3 : A/(B * (X+C))			
67.03	COEFFICIENT A	DISPLAY SCALE 3	REAL	-32768.0000 to 32767.0000	1.0000	rw	
67.04	COEFFICIENT B	DISPLAY SCALE 3	REAL	-32768.0000 to 32767.0000	1.0000	rw	
67.05	COEFFICIENT C	DISPLAY SCALE 3	REAL	-32768.0000 to 32767.0000	0.0000	rw	
67.06	HIGH LIMIT	DISPLAY SCALE 3	REAL	-32768.0000 to 32767.0000	0.0000	rw	
67.07	LOW LIMIT	DISPLAY SCALE 3	REAL	-32768.0000 to 32767.0000	0.0000	rw	
67.08	UNITS	DISPLAY SCALE 3	STRING	max length is 6 chars		rw	
68.01	DECIMAL PLACE	DISPLAY SCALE 4	ENUM	0 : DEFAULT 1 : X.XXXX 2 : X.XXX 3 : X.XX 4 : X.X 5 : X.	DEFAULT	rw	
68.02	FORMULA	DISPLAY SCALE 4	ENUM	0 : A/B * X + C 1 : A/B * (X+C) 2 : A/(B * X) + C 3 : A/(B * (X+C))	A/B * X + C	rw	
68.03	COEFFICIENT A	DISPLAY SCALE 4	REAL	-32768.0000 to 32767.0000	1.0000	rw	
68.04	COEFFICIENT B	DISPLAY SCALE 4	REAL	-32768.0000 to 32767.0000	1.0000	rw	
68.05	COEFFICIENT C	DISPLAY SCALE 4	REAL	-32768.0000 to 32767.0000	0.0000	rw	
68.06	HIGH LIMIT	DISPLAY SCALE 4	REAL	-32768.0000 to 32767.0000	0.0000	rw	
68.07	LOW LIMIT	DISPLAY SCALE 4	REAL	-32768.0000 to 32767.0000	0.0000	rw	
68.08	UNITS	DISPLAY SCALE 4	STRING	max length is 6 chars		rw	
70.02	DC LINK VOLTS	FEEDBACKS	REAL	_.	0 V	ro	Output
70.04	SPEED FBK RPM	FEEDBACKS	REAL	_.xx	0.00 RPM	ro	Output
70.05	SPEED FBK REV/S	FEEDBACKS	REAL	_.xx	0.00 rev/s	ro	Output
70.06	SPEED FBK %	FEEDBACKS	REAL	_.xx	0.00 %	ro	Output
70.12	MOTOR CURRENT %	FEEDBACKS	REAL	_.xx	0.00 %	ro	Output
70.13	MOTOR CURRENT A	FEEDBACKS	REAL	_.x	0.0 A	ro	Output
70.17	HEATSINK TEMP	FEEDBACKS	REAL	_.	0 C	ro	Output
70.18	HEATSINK TEMP	FEEDBACKS	REAL	_.	0 %	ro	Output
70.19	STACK RATING A	FEEDBACKS	REAL	_.x	59.0 A	ro	Output
71.01	PULSE ENC VOLTS	ENCODER	REAL	10.0 to 20.0 V	10.0 V	rw	
71.02	ENCODER LINES	ENCODER	INT	250 to 262143	2048	rw	2
71.03	ENCODER INVERT	ENCODER	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	

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PREF	Name	Block	Type	Range	Default	ro\rw	Notes
71.04	ENCODER TYPE	ENCODER	ENUM	0 : QUADRATURE 1 : CLOCK/DIR 2 : CLOCK 3 : QUADRATURE DIFF 4 : CLOCK/DIR DIFF 5 : CLOCK DIFF 6 : SINCOS INC 7 : ABS ENDAT ST 8 : ABS ENDAT MT	QUADRATURE DIFF	rw	2
71.05	OUTPUT G'BOX IN	ENCODER	INT	-2000000000 to 2000000000	1	rw	2
71.06	ENCODER MECH O/S	ENCODER	REAL	0.0000 to 360.0000 deg	0.0000 deg	rw	2
71.08	ENCODER FBK %	ENCODER	REAL	_.xx	0.00 %	ro	Output
71.09	SHAFT POSITION	ENCODER	REAL	_.xx	0.00 deg	ro	Output
71.10	LOAD POSITION	ENCODER	REAL	_.xx	0.00 deg	ro	Output
71.22	SINCOS ENC VOLTS	ENCODER	ENUM	0 : 5V 1 : 10V	5V	rw	2
71.26	OUTPUT G'BOX OUT	ENCODER	INT	-2000000000 to 2000000000	1	rw	2
84.01	AIMING POINT	MOTR DRV LIMIT	REAL	50.00 to 105.00 %	105.00 %	rw	
84.02	DELAY	MOTR DRV LIMIT	REAL	0.5 to 4.0 s	4.0 s	rw	
84.03	DOWN TIME	MOTR DRV LIMIT	REAL	0.5 to 2.0 s	1.0 s	rw	
84.04	UP TIME	MOTR DRV LIMIT	REAL	0.5 to 2.0 s	1.0 s	rw	
84.05	IT LIMITING	MOTR DRV LIMIT	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
84.06	IT TIME ALLOWED	MOTR DRV LIMIT	REAL	_.xx	1.00 s	ro	Output
84.08	IT WARNING	MOTR DRV LIMIT	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
84.09	I2T LIMIT MOTOR	MOTR DRV LIMIT	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
84.10	I2T MOTOR LOAD	MOTR DRV LIMIT	REAL	_.x	0.0 %	ro	Output
84.11	I2T INHIBIT	MOTR DRV LIMIT	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
84.12	MOTOR I2T TRIP	MOTR DRV LIMIT	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
85.01	HYSTERISIS	ZERO SPEED	REAL	0.00 to 300.00 %	0.10 %	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
85.02	THRESHOLD	ZERO SPEED	REAL	0.00 to 300.00 %	0.50 %	rw	
85.03	AT ZERO SPD FBK	ZERO SPEED	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
85.04	AT ZERO SPD DMD	ZERO SPEED	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
85.05	AT STANDSTILL	ZERO SPEED	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
92.01	RUN FORWARD	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.02	RUN REVERSE	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.03	LATCHED RUN	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.04	JOG	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.05	CONTACTOR CLOSED	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
92.06	DRIVE ENABLE	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
92.07	NOT FAST STOP	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
92.08	NOT COAST STOP	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
92.09	REMOTE REVERSE	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.10	REM TRIP RESET	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.11	TRIP RST BY RUN	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
92.12	POWER UP START	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
92.13	TRIPPED	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
92.14	RUNNING	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.15	JOGGING	SEQUENCING LOGIC	BOOL	0 : FALSE	FALSE	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				1 : TRUE			
92.16	STOPPING	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.17	OUTPUT CONTACTOR	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.18	SWITCH ON ENABLE	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.19	SWITCHED ON	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.20	READY	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.21	SYSTEM RESET	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.22	SEQUENCER STATE	SEQUENCING LOGIC	ENUM	0 : START DISABLED 1 : START ENABLED 2 : SWITCHED ON 3 : READY 4 : ENABLED 5 : F-STOP ACTIVE 6 : TRIP ACTIVE 7 : TRIPPED	TRIPPED	ro	Output
92.23	REMOTE REV OUT	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
92.24	HEALTHY	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
92.25	START DELAY	SEQUENCING LOGIC	REAL	0.000 to 30.000 s	0.000 s	rw	
92.26	FAN RUNNING	SEQUENCING LOGIC	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
93.01	ENABLE	AUTO RESTART	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
93.02	ATTEMPTS	AUTO RESTART	INT	1 to 10	5	rw	
93.03	INITIAL DELAY 1	AUTO RESTART	REAL	0.0 to 600.0 s	10.0 s	rw	
93.04	ATTEMPT DELAY 1	AUTO RESTART	REAL	0.0 to 600.0 s	10.0 s	rw	
93.05	TRIGGERS 1	AUTO RESTART	WORD	0000 to FFFF	0000	rw	
93.06	TRIGGERS 1+	AUTO RESTART	WORD	0000 to FFFF	0000	rw	
93.07	INITIAL DELAY 2	AUTO RESTART	REAL	0.0 to 600.0 s	0.1 s	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
93.08	ATTEMPT DELAY 2	AUTO RESTART	REAL	0.0 to 600.0 s	0.1 s	rw	
93.09	TRIGGERS 2	AUTO RESTART	WORD	0000 to FFFF	0000	rw	
93.10	TRIGGERS 2+	AUTO RESTART	WORD	0000 to FFFF	0000	rw	
93.11	PENDING	AUTO RESTART	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
93.12	RESTARTING	AUTO RESTART	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
93.13	ATTEMPTS LEFT	AUTO RESTART	INT	_	5	ro	Output
93.14	TIME LEFT	AUTO RESTART	REAL	_.x	0.0 s	ro	Output
94.01	SEQ MODES	LOCAL CONTROL	ENUM	0 : LOCAL/REMOTE 1 : LOCAL ONLY 2 : REMOTE ONLY	LOCAL/REMOTE	rw	
94.02	REF MODES	LOCAL CONTROL	ENUM	0 : LOCAL/REMOTE 1 : LOCAL ONLY 2 : REMOTE ONLY	LOCAL/REMOTE	rw	
94.03	POWER UP MODE	LOCAL CONTROL	ENUM	0 : LOCAL 1 : REMOTE 2 : AUTOMATIC	REMOTE	rw	
94.04	SEQ DIRECTION	LOCAL CONTROL	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
94.05	REMOTE SEQ	LOCAL CONTROL	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
94.06	REMOTE REF	LOCAL CONTROL	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
95.01	REMOTE COMMS SEL	COMMS CONTROL	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
95.02	REMOTE SEQ MODES	COMMS CONTROL	ENUM	0 : TERMINALS/COMMS 1 : TERMINALS ONLY 2 : COMMS ONLY	TERMINALS/CO MMS	rw	
95.03	REMOTE REF MODES	COMMS CONTROL	ENUM	0 : TERMINALS/COMMS 1 : TERMINALS ONLY 2 : COMMS ONLY	TERMINALS/CO MMS	rw	
95.04	COMMS TIMEOUT	COMMS CONTROL	REAL	0.0 to 600.0 s	0.0 s	rw	
95.05	COMMS COMMAND	COMMS CONTROL	WORD	0000 to FFFF	0000	rw	1
95.06	COMMS SEQ	COMMS CONTROL	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
95.07	COMMS REF	COMMS CONTROL	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
95.08	COMMS STATUS	COMMS CONTROL	WORD	0000 to FFFF	0438	ro	Output
95.10	FIREWIRE REF SEL	COMMS CONTROL	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
95.11	FIREWIRE REF	COMMS CONTROL	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
96.01	TRIP 1 (NEWEST)	TRIPS HISTORY	ENUM	0 : NO TRIP 1 : OVERVOLTAGE 2 : UNDERVOLTAGE 3 : OVERCURRENT 4 : HEATSINK 5 : EXTERNAL TRIP 6 : INPUT 1 BREAK 7 : INPUT 2 BREAK 8 : MOTOR STALLED 9 : INVERSE TIME 10 : BRAKE RESISTOR 11 : BRAKE SWITCH 12 : OP STATION 13 : COMMS BREAK 14 : CONTACTOR FBK 15 : SPEED FEEDBACK 16 : AMBIENT TEMP 17 : MOTOR OVERTEMP 18 : CURRENT LIMIT 19 : TRIP 19 20 : 24V FAILURE 21 : LOW SPEED OVER I 22 : PHASE FAIL 23 : FBK ENCODER FAIL 24 : DESAT (OVER I) 25 : VDC RIPPLE 26 : BRAKE SHORT CCT 27 : OVERSPEED 28 : ANALOG INPUT ERR 29 : INT DB RESISTOR	NO TRIP	ro	Output

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PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				30 : TRIP 30 31 : UNKNOWN 32 : OTHER 33 : MAX SPEED LOW 34 : MAINS VOLTS LOW 35 : NOT AT SPEED 36 : MAG CURRENT FAIL 37 : NEGATIVE SLIP F 38 : TR TOO LARGE 39 : TR TOO SMALL 40 : MAX RPM DATA ERR 41 : STACK TRIP 42 : LEAKGE L TIMEOUT 43 : POWER LOSS STOP 44 : MOTR TURNING ERR 45 : MOTR STALLED ERR 46 : AT TORQ LIM ERR 47 : FW ISR TIMEOUT 48 : FBK ENCODER CAL 49 : OUTPUT GBX ERROR 50 : APP HALTED 51 : APP ERROR 52 : FIRMWARE ERROR 53 : TRACKING ERROR 54 : LOOP OVERSPEED 55 : LIMIT SWITCH 56 : SOFT. LIMIT 57 : RESOLVER ERROR 58 : I2T MOTOR TRIP 59 : SYNC TIMEOUT 60 : SAFE TORQUE OFF 61 : REF ENCODER CAL 62 : REF ENCODER FAIL			
96.02	TRIP 2	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.03	TRIP 3	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.04	TRIP 4	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.05	TRIP 5	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output

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PREF	Name	Block	Type	Range	Default	ro\rw	Notes
96.06	TRIP 6	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.07	TRIP 7	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.08	TRIP 8	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.09	TRIP 9	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
96.10	TRIP 10 (OLDEST)	TRIPS HISTORY	ENUM	Same as PREF 96.01	NO TRIP	ro	Output
97.01	DISABLE TRIPS	TRIPS STATUS	WORD	0000 to FFFF	0380	rw	
97.02	DISABLE TRIPS+	TRIPS STATUS	WORD	0000 to FFFF	0840	rw	
97.05	ACTIVE TRIPS	TRIPS STATUS	WORD	0000 to FFFF	0000	ro	Output
97.06	ACTIVE TRIPS+	TRIPS STATUS	WORD	0000 to FFFF	0000	ro	Output
97.07	WARNINGS	TRIPS STATUS	WORD	0000 to FFFF	0000	ro	Output
97.08	WARNINGS+	TRIPS STATUS	WORD	0000 to FFFF	0001	ro	Output
97.09	FIRST TRIP	TRIPS STATUS	ENUM	Same as PREF 96.01	STACK TRIP	ro	Output
98.01	INVERT THERMIST	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
98.02	INVERT ENC TRIP	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
98.03	INPUT 1 BREAK	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
98.04	INPUT 2 BREAK	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
98.05	THERMISTOR	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
98.06	ENCODER	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
98.07	EXTERNAL TRIP	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
98.08	EXT TRIP MODE	I/O TRIPS	ENUM	0 : TRIP 1 : COAST 2 : DISABLED	DISABLED	rw	
98.09	COMMS BREAK	I/O TRIPS	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
99.01	ENABLE	DYNAMIC BRAKING	BOOL	0 : FALSE 1 : TRUE	TRUE	rw	
99.03	BRAKE RESISTANCE	DYNAMIC BRAKING	REAL	0.01 to 300.00 Ohm	100.00 Ohm	rw	2
99.04	BRAKE POWER	DYNAMIC BRAKING	REAL	0.1 to 510.0 kW	0.1 kW	rw	2
99.05	1SEC OVER RATING	DYNAMIC BRAKING	REAL	1 to 40	25	rw	2

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PREF	Name	Block	Type	Range	Default	ro\rw	Notes
99.06	BRAKING	DYNAMIC BRAKING	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
99.07	INT DB RESISTOR	DYNAMIC BRAKING	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	3
110.01	OFFSET	PHASE OFFSET	REAL	-3000.0 to 3000.0	0.0	rw	
110.02	OFFSET FINE	PHASE OFFSET	REAL	-1.0000 to 1.0000	0.0000	rw	
110.03	ACTIVE	PHASE OFFSET	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
110.04	SPEED OFFSET	PHASE OFFSET	REAL	-300.00 to 300.00 %	0.00 %	rw	
115.01	INHIBIT	SPD FBK TRIP	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
115.02	THRESHOLD	SPD FBK TRIP	REAL	0.00 to 300.00 %	150.00 %	rw	
115.03	DELAY	SPD FBK TRIP	REAL	0.00 to 3.00 s	0.00 s	rw	
115.04	TRIPPED	SPD FBK TRIP	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
117.01	OWN ID	FIREWIRE	INT	_	99	ro	Output
117.02	IRM ID	FIREWIRE	INT	_	99	ro	Output
117.03	NUMBER OF NODES	FIREWIRE	INT	_	0	ro	Output
117.04	CYCLE TIMER	FIREWIRE	INT	_	0	ro	Output
117.05	BUS RESETS	FIREWIRE	INT	_	0	ro	Output
117.06	MCAP ADVERTS	FIREWIRE	INT	_	0	ro	Output
117.07	MAX HOPS	FIREWIRE	INT	_	0	ro	Output
117.08	OFFSET (40.69ns)	FIREWIRE	INT	_	0	ro	Output
117.13	BAD MESSAGES	FIREWIRE	INT	_	0	ro	Output
117.14	MISSED TX ACKS	FIREWIRE	INT	_	0	ro	Output
118.01	INPUT	VIRTUAL MASTER	REAL	-100.00 to 100.00 %	0.00 %	rw	
118.02	ACCELERATION	VIRTUAL MASTER	REAL	0.00 to 100.00 /s^2	10.00 /s^2	rw	
118.03	DECELERATION	VIRTUAL MASTER	REAL	0.00 to 100.00 /s^2	10.00 /s^2	rw	
118.04	JERK 1	VIRTUAL MASTER	REAL	0.00 to 100.00 /s^3	10.00 /s^3	rw	
118.05	JERK 2	VIRTUAL MASTER	REAL	0.00 to 100.00 /s^3	10.00 /s^3	rw	
118.06	JERK 3	VIRTUAL MASTER	REAL	0.00 to 100.00 /s^3	10.00 /s^3	rw	
118.07	JERK 4	VIRTUAL MASTER	REAL	0.00 to 100.00 /s^3	10.00 /s^3	rw	
118.08	CONTINUOUS	VIRTUAL MASTER	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
118.09	HOLD	VIRTUAL MASTER	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
118.10	SYMMETRIC JERK	VIRTUAL MASTER	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
118.11	RESET	VIRTUAL MASTER	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
118.12	OFFSET	VIRTUAL MASTER	REAL	0.0000 to 360.0000 deg	0.0000 deg	rw	
118.13	SPEED OUTPUT	VIRTUAL MASTER	REAL	_.xx	0.00 Hz	ro	Output
118.14	POSITION OUTPUT	VIRTUAL MASTER	REAL	_.xxxx	0.0000 deg	ro	Output
118.15	ACCEL OUTPUT	VIRTUAL MASTER	REAL	_.xx	0.00	ro	Output
118.16	RAMPING	VIRTUAL MASTER	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
118.17	CHANNEL	VIRTUAL MASTER	INT	0 to 64	0	rw	
118.18	MAX SPEED	VIRTUAL MASTER	REAL	100.0 to 6000.0 RPM	1500.0 RPM	rw	
118.19	STATUS	VIRTUAL MASTER	ENUM	0 : READY 1 : RESET 2 : DUPLICATE 3 : INITIALISING 4 : NO FIREWIRE 5 : DISABLED 6 : INTERNAL	DISABLED	ro	Output
118.20	SOURCE	VIRTUAL MASTER	ENUM	0 : S RAMP 1 : FEEDBACK ENCODR 2 : REFERNCE ENCODR	SRAMP	rw	2
118.22	SPEED FILT TIME	VIRTUAL MASTER	REAL	0.0 to 100.0 ms	5.0 ms	rw	
118.23	ACCEL FILT TIME	VIRTUAL MASTER	REAL	0.0 to 100.0 ms	5.0 ms	rw	
119.01	CHANNEL	FIREWIRE REF	INT	0 to 62	0	rw	
119.02	RESET	FIREWIRE REF	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
119.03	INVERT	FIREWIRE REF	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
119.04	GEAR RATIO A	FIREWIRE REF	INT	-2000000000 to 2000000000	1000000	rw	
119.05	GEAR RATIO B	FIREWIRE REF	INT	-2000000000 to 2000000000	1000000	rw	
119.06	POSITION OUTPUT	FIREWIRE REF	REAL	_.xxxx	0.0000 deg	ro	Output
119.07	SPEED OUTPUT	FIREWIRE REF	REAL	_.xx	0.00 Hz	ro	Output
119.08	ACCEL OUTPUT	FIREWIRE REF	REAL	_.xx	0.00	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
119.09	MASTER POSITION	FIREWIRE REF	REAL	_.xxxx	0.0000 deg	ro	Output
119.10	MASTER SPEED	FIREWIRE REF	REAL	_.xxxx	0.0000 Hz	ro	Output
119.11	MASTER ACCEL	FIREWIRE REF	REAL	_.xxxx	0.0000	ro	Output
119.12	TIME DIFFERENCE	FIREWIRE REF	REAL	_.xx	0.00 ms	ro	Output
119.13	STATUS	FIREWIRE REF	ENUM	0 : READY 1 : REF RESET 2 : MASTER RESET 3 : LOST SYNC 4 : DUP MASTER 5 : MISSING MASTER 6 : NO FIREWIRE 7 : DISABLED 8 : INTERNAL	NO FIREWIRE	ro	Output
119.14	READY	FIREWIRE REF	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
125.01	EMC CAPACITORS	EMC CAPACITORS	ENUM	0 : CONNECTED 1 : NOT CONNECTED	CONNECTED	rw	2
126.01	BAUDRATE	CANOPEN	ENUM	0 : 125K 1 : 250K 2 : 500K 3 : 1000K	1000K	ro	Output
126.02	ADDRESS	CANOPEN	INT	_	3	ro	Output
126.03	STATUS RUN	CANOPEN	ENUM	0 : STOPPED 1 : PRE-OPERATIONAL 2 : OPERATIONAL	STOPPED	ro	Output
126.04	STATUS ERROR	CANOPEN	ENUM	0 : NO ERROR 1 : WARNING LIMIT 2 : AUTOBAUD OR LSS 3 : CONTROL EVENT 4 : SYNC. ERROR 5 : BUS OFF	NO ERROR	ro	Output
126.05	HARDWARE	CANOPEN	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
126.06	BAUDRATE SOFT	CANOPEN	ENUM	0 : 125K 1 : 250K 2 : 500K 3 : 1000K	1000K	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
126.07	ADDRESS SOFT	CANOPEN	INT	1 to 127	1	rw	
127.01	BAUDRATE	PROFIBUS	ENUM	0 : 12 Mbits/sec 1 : 6 Mbits/sec 2 : 3 Mbits/sec 3 : 1.5 Mbits/sec 4 : 500 kbits/sec 5 : 187.5 kbits/sec 6 : 93.75 kbits/sec 7 : 45.45 kbits/sec 8 : 19.2 kbits/sec 9 : 9.6 kbits/sec 10 : UNKNOWN	UNKNOWN	ro	Output
127.02	ADDRESS	PROFIBUS	INT	_	0	ro	Output
127.03	STATUS	PROFIBUS	ENUM	0 : MISSING OR FAULT 1 : DISABLED 2 : BAUD SEARCH 3 : WAIT PARAM 4 : WAIT CONFIG 5 : DATA EXCHANGE 6 : DATA EXCH NO WD 7 : DATA EXCH ERROR 8 : DATA EX ER NO WD	MISSING OR FAULT	ro	Output
127.04	ADDRESS METHOD	PROFIBUS	ENUM	0 : SOFTWARE 1 : HARDWARE	HARDWARE	ro	Output
128.01	NODE ADDRESS	CONTROLNET	INT	_	0	ro	Output
128.02	ADDRESS METHOD	CONTROLNET	ENUM	0 : HARDWARE 1 : SOFTWARE	HARDWARE	ro	Output
128.03	NETWORK MODE	CONTROLNET	ENUM	0 : INVALID 1 : POWER UP 2 : CHECK FOR CABLE 3 : WAITING 2 ROGUE 4 : CHK 4 MODERATOR 5 : I'M ALIVE 6 : ATTACHED 7 : FORCED LISTEN 8 : DUPLICATE NODE	INVALID	ro	Output
128.04	CONNECTED	CONTROLNET	BOOL	0 : FALSE	FALSE	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				1 : TRUE			
128.05	SERIAL NUMBER	CONTROLNET	INT	_	0	ro	Output
128.06	FAULT	CONTROLNET	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
128.07	DIAGNOSTIC	CONTROLNET	WORD	0000 to FFFF	0000	ro	Output
128.08	FIXED PARAM SET	CONTROLNET	ENUM	0 : NONE	NONE	rw	2
128.09	CNET STATE	CONTROLNET	ENUM	0 : NONE 1 : FAULT 2 : INITIALISE 3 : VM CONFIGURE 4 : WAIT 2 ATTACH 5 : WAIT 2 CONNECT 6 : RUNNING	NONE	ro	Output
129.01	MODE	COMMS PORT	ENUM	0 : AUTOMATIC 1 : 6511 OP STATION 2 : 6901 OP STATION 3 : TS8000 HMI	AUTOMATIC	rw	
130.01	BAUDRATE(SWITCH)	DEVICENET	ENUM	0 : 125K 1 : 250K 2 : 500K 3 : 125K	125K	ro	Output
130.02	ADDRESS (SWITCH)	DEVICENET	INT	_	63	ro	Output
130.03	CONNECTION STATE	DEVICENET	ENUM	0 : NON_EXISTENT 1 : SELFTEST 2 : STANDBY 3 : OPERATIONAL 4 : RECOVER FAULT 5 : UNRECOVER FAULT	NON_EXISTENT	ro	Output
130.04	DEVICE STATUS	DEVICENET	ENUM	0 : NO ERROR 1 : OWNED 2 : CONFIGURED 3 : MINOR REC FAULT 4 : MINOR UNREC FLT 5 : MAJOR REC FAULT 6 : MAJOR UNREC FLT	NO ERROR	ro	Output
130.05	HARDWARE(SWITCH)	DEVICENET	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
130.06	BAUDRATE(SOFT)	DEVICENET	ENUM	0 : 125K 1 : 250K 2 : 500K	125K	rw	
130.07	ADDRESS (SOFT)	DEVICENET	INT	1 to 63	1	rw	
131.01	INHIBIT	TRACKING TRIP	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
131.02	THRESHOLD	TRACKING TRIP	INT	0 to 2147483647	65536	rw	
131.03	DELAY	TRACKING TRIP	REAL	0.00 to 10.00 s	0.00 s	rw	
131.04	TRIPPED	TRACKING TRIP	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
132.01	INHIBIT	LOOP OVER SPEED TRIP	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
132.02	THRESHOLD	LOOP OVER SPEED TRIP	REAL	0.00 to 150.00 %	110.00 %	rw	
132.03	DELAY	LOOP OVER SPEED TRIP	REAL	0.00 to 10.00 s	0.00 s	rw	
132.04	TRIPPED	LOOP OVER SPEED TRIP	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
133.01	NAME	RESOLVER	STRING	max length is 16 chars		rw	
133.02	POLES	RESOLVER	INT	2 to 20	2	rw	
133.03	RATIO	RESOLVER	REAL	0.20 to 1.00	0.50	rw	
133.04	SPEED MAX	RESOLVER	INT	0 to 2147483647	10000	rw	
133.05	ACCURACY	RESOLVER	REAL	0.00 to 60.00	20.00	rw	
133.06	CARRIER VOLTAGE	RESOLVER	REAL	5.00 to 10.00 V	7.00	rw	
133.07	CURRENT	RESOLVER	REAL	0.000 to 1.000 A	0.046	rw	
133.08	INERTIA	RESOLVER	REAL	10.00 to 32768.00Kg.cm2	24.00	rw	
133.11	POSITION SET UP	RESOLVER	REAL	-180.00 to 180.00 deg	0.00	rw	
133.15	RESOLVER POS OUT	RESOLVER	REAL	_.xxxx		ro	Output
133.16	TRIP	RESOLVER	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
133.17	INIT DONE	RESOLVER	BOOL	0 : FALSE 1 : TRUE	TRUE	ro	Output
133.18	REVERSE CNT DIR	RESOLVER	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
133.19	SPEED FILTER	RESOLVER	REAL	10.00 to 1000.00 Hz	100.00	rw	
133.20	PHASE SHIFT	RESOLVER	REAL	0.00 to 180.00 deg	0.00	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
133.21	TRIP SELECTION	RESOLVER	ENUM	0 : HARD AND SOFT 1 : HARD 2 : SOFT	2	rw	
134.01	MANUFACTURER	PMAC MOTOR	STRING	max length is 16 chars		rw	
134.02	MODEL	PMAC MOTOR	STRING	max length is 16 chars		rw	
134.03	CONSTRUCTION	PMAC MOTOR	ENUM	0 : Axe 1 : Spindle 2 : Torque	Axe	rw	
134.04	ATMOSPHERE	PMAC MOTOR	ENUM	0 : Standard 1 : Explosive	Standard	rw	
134.05	MAX VOLTAGE	PMAC MOTOR	REAL	200 to 640 V	400 V	rw	
134.06	THERM PROTECTION	PMAC MOTOR	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
134.07	MAX SPEED	PMAC MOTOR	INT	0 to 2147483647	4300	rw	
134.08	MAX CURRENT	PMAC MOTOR	REAL	0.00 to 1024.00 A	10.60 A	rw	
134.09	PERM CURRENT	PMAC MOTOR	REAL	0.00 to 1024.00 A	4.90 A	rw	
134.10	PERM TORQUE	PMAC MOTOR	REAL	0.00 to 10000.00 Nm	6.40 Nm	rw	
134.11	LOW SPEED VALUE	PMAC MOTOR	INT	0 to 2147483647	0	rw	
134.12	POLES	PMAC MOTOR	INT	0 to 400	10	rw	
134.13	BACK EMF	PMAC MOTOR	REAL	0.0 to 8192.0 VKRPM	85.6 VKRPM	rw	
134.14	R	PMAC MOTOR	REAL	0.00 to 50.00 Ohm	3.63 Ohm	rw	
134.17	L	PMAC MOTOR	REAL	0.00 to 1000.00 mH	24.30 mH	rw	
134.18	PHASE	PMAC MOTOR	REAL	0.00 to 90.00 deg	0.00 deg	rw	
134.19	MAX PHASE	PMAC MOTOR	REAL	0.00 to 90.00 deg	0.00 deg	rw	
134.20	MAX TORQUE	PMAC MOTOR	REAL	0.00 to 30000.00 Nm	12.80 Nm	rw	
134.21	KT	PMAC MOTOR	REAL	0.0000 to 100.0000 Nm/A	1.3760 Nm/A	rw	
134.22	IFMB	PMAC MOTOR	REAL	-100.0000 to 100.0000 A/Nm3	0.0000 A/Nm3	rw	
134.23	INERTIA	PMAC MOTOR	REAL	0.0000 to 100.0000	0.0010	rw	
134.24	INERTIA SCALE	PMAC MOTOR	ENUM	0 : kgm2 1 : kgcm2 2 : gm2	kgm2	rw	
134.26	STAND CURRENT	PMAC MOTOR	REAL	0.00 to 1024.00 A	10.60 A	rw	
134.27	THERMAL TIME CST	PMAC MOTOR	REAL	0.00 to 10000.00 s	224.80 s	rw	
134.28	CUR LOOP BWDTH	PMAC MOTOR	REAL	100 to 1500 Hz	600 Hz	rw	
134.29	INTEGRAL FREQ	PMAC MOTOR	REAL	5 to 600 Hz	150 Hz	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
135.01	MPS1	PMAC MOTOR 2	REAL	0 to 600 V	230 V	rw	
135.02	MPS2	PMAC MOTOR 2	REAL	0 to 600 V	400 V	rw	
135.03	MPS3	PMAC MOTOR 2	REAL	0 to 600 V	480 V	rw	
135.04	CURRENT AT MPS1	PMAC MOTOR 2	REAL	0.00 to 1024.00 A	10.60 A	rw	
135.05	CURRENT AT MPS2	PMAC MOTOR 2	REAL	0.00 to 1024.00 A	10.60 A	rw	
135.06	CURRENT AT MPS3	PMAC MOTOR 2	REAL	0.00 to 1024.00 A	10.60 A	rw	
135.07	SPEED AT MPS1	PMAC MOTOR 2	INT	0 to 2147483647	2300	rw	
135.08	SPEED AT MPS2	PMAC MOTOR 2	INT	0 to 2147483647	4000	rw	
135.09	SPEED AT MPS3	PMAC MOTOR 2	INT	0 to 2147483647	4800	rw	
136.01	DRIVE NAME	DRIVE CONFIG	STRING	max length is 14 chars	890 DRIVE	rw	
136.02	CONTROL MODE	DRIVE CONFIG	ENUM	0 : VOLTS / Hz 1 : SENSORLESS VEC 2 : CLOSED-LOOP VEC 3 : 4-Q REGEN 4 : PMAC	PMAC	ro	Output
136.03	FBK OPT. TYPE	DRIVE CONFIG	ENUM	0 : NONE 1 : ENCODER 2 : RESOLVER 3 : TYPE 3 4 : TYPE 4 5 : TYPE 5 6 : TYPE 6 7 : TYPE 7	RESOLVER	rw	
136.04	SLOT1 OPT. TYPE	DRIVE CONFIG	ENUM	0 : NONE 1 : RS485 2 : PROFIBUS 3 : LINK 4 : DEVICE NET 5 : CAN OPEN 6 : LONWORKS 7 : CONTROLNET 8 : MODBUS PLUS 9 : ETHERNET 10 : HTTL INC. ENC. 11 : RS485 INC. ENC. 12 : ENDAT SIN/COS 13 : TYPE 13	NONE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				14 : TYPE 14 15 : TYPE 15			
136.05	SLOT2 OPT. TYPE	DRIVE CONFIG	ENUM	0 : NONE 1 : RS485 2 : PROFIBUS 3 : LINK 4 : DEVICE NET 5 : CAN OPEN 6 : LONWORKS 7 : CONTROLNET 8 : MODBUS PLUS 9 : ETHERNET 10 : HTTL INC. ENC. 11 : RS485 INC. ENC. 12 : ENDAT SIN/COS 13 : TYPE 13 14 : TYPE 14 15 : TYPE 15	NONE	rw	
136.06	FBK FITTED	DRIVE CONFIG	ENUM	0 : NONE 1 : RESOLVER 2 : HTTL INC. ENC. 3 : RS485 INC. ENC. 4 : ENDAT SIN/COS 5 : UNKNOWN	NONE	ro	Output
136.07	FBK FAULT	DRIVE CONFIG	ENUM	0 : NONE 1 : PARAMETER VALUE 2 : TYPE MISMATCH 3 : SELFTEST 4 : HARDWARE 5 : MISSING	MISSING	ro	Output
136.08	FBK VERSION	DRIVE CONFIG	WORD	0000 to FFFF	0000	ro	Output
136.09	SLOT1 FITTED	DRIVE CONFIG	ENUM	0 : NONE 1 : FIREWIRE 2 : PROFIBUS 3 : CONTROL NET 4 : CAN 5 : UNKNOWN	NONE	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				6 : HTTL INC. ENC. 7 : RS485 INC. ENC. 8 : ENDAT SIN/COS			
136.10	SLOT1 FAULT	DRIVE CONFIG	ENUM	0 : NONE 1 : PARAMETER VALUE 2 : TYPE MISMATCH 3 : SELFTEST 4 : HARDWARE 5 : MISSING	NONE	ro	Output
136.11	SLOT1 VERSION	DRIVE CONFIG	WORD	0000 to FFFF	0000	ro	Output
136.12	SLOT2 FITTED	DRIVE CONFIG	ENUM	0 : NONE 1 : FIREWIRE 2 : PROFIBUS 3 : CONTROL NET 4 : CAN 5 : UNKNOWN 6 : HTTL INC. ENC. 7 : RS485 INC. ENC. 8 : ENDAT SIN/COS	NONE	ro	Output
136.13	SLOT2 FAULT	DRIVE CONFIG	ENUM	0 : NONE 1 : PARAMETER VALUE 2 : TYPE MISMATCH 3 : SELFTEST 4 : HARDWARE 5 : MISSING	NONE	ro	Output
136.14	SLOT2 VERSION	DRIVE CONFIG	WORD	0000 to FFFF	0000	ro	Output
136.15	PWM FREQ	DRIVE CONFIG	ENUM	0 : 4 KHz 1 : 8 KHz	4 KHz	rw	
137.01	TYPE	TRAJ GEN 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
137.02	POS. WINDOW	TRAJ GEN 1	INT	0 to 2147483647	65	rw	
137.03	VEL. WINDOW	TRAJ GEN 1	INT	0 to 2147483647	650	rw	
137.04	MODULO ENABLE	TRAJ GEN 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
137.05	MODULO UPPER	TRAJ GEN 1	INT	0 to 536870911	0	rw	
137.06	MODULO LOWER	TRAJ GEN 1	INT	-536870912 to 0	0	rw	
137.21	MODULO PRESET	TRAJ GEN 1	INT	-2147483648 to	0	rw	1

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PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				2147483647			
137.22	MODULO DO PRESET	TRAJ GEN 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
137.23	MODULO COUNTER	TRAJ GEN 1	INT	_	0	ro	Output
137.24	JERK	TRAJ GEN 1	REAL	0.00 to 1.00	0.00	rw	
138.01	TYPE	TRAJ GEN 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
138.02	POS. WINDOW	TRAJ GEN 2	INT	0 to 2147483647	65	rw	
138.03	VEL. WINDOW	TRAJ GEN 2	INT	0 to 2147483647	650	rw	
138.04	MODULO ENABLE	TRAJ GEN 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
138.05	MODULO UPPER	TRAJ GEN 2	INT	0 to 536870911	0	rw	
138.06	MODULO LOWER	TRAJ GEN 2	INT	-536870912 to 0	0	rw	
138.21	MODULO PRESET	TRAJ GEN 2	INT	-2147483648 to 2147483647	0	rw	1
138.22	MODULO DO PRESET	TRAJ GEN 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
138.23	MODULO COUNTER	TRAJ GEN 2	INT	_	0	ro	Output
138.24	JERK	TRAJ GEN 2	REAL	0.00 to 1.00	0.00	rw	
139.01	TYPE	TRAJ GEN 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
139.02	POS. WINDOW	TRAJ GEN 3	INT	0 to 2147483647	65	rw	
139.03	VEL. WINDOW	TRAJ GEN 3	INT	0 to 2147483647	650	rw	
139.04	MODULO ENABLE	TRAJ GEN 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
139.05	MODULO UPPER	TRAJ GEN 3	INT	0 to 536870911	0	rw	
139.06	MODULO LOWER	TRAJ GEN 3	INT	-536870912 to 0	0	rw	
139.21	MODULO PRESET	TRAJ GEN 3	INT	-2147483648 to 2147483647	0	rw	1
139.22	MODULO DO PRESET	TRAJ GEN 3	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
139.23	MODULO COUNTER	TRAJ GEN 3	INT	_	0	ro	Output
139.24	JERK	TRAJ GEN 3	REAL	0.00 to 1.00	0.00	rw	
140.01	PATTERN	INTERPOLATOR	ENUM	0 : TG every 4 loop 1 : TG every 8 loop 2 : TG every 1 loop	TG every 4 loop	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				3 : TG every 2 loop			
141.02	UNIT NAME	POS SPEED LOOP	STRING	max length is 14 chars	INCREMENTS	rw	
141.03	UNIT/REV NUM.	POS SPEED LOOP	INT	1 to 2147483647	65536	rw	2
141.04	UNIT/REV DENOM.	POS SPEED LOOP	INT	1 to 2147483647	1	rw	2
141.05	DRIVE MODE	POS SPEED LOOP	ENUM	0 : POSITION 1 : SPEED 2 : TORQUE 3 : INTERPOLATED	SPEED	rw	
141.07	POS FBK SEL.	POS SPEED LOOP	ENUM	0 : NONE 1 : FBK RAW 2 : FBK FILT. 3 : OPT1 RAW 4 : OPT1 FILT. 5 : OPT2 RAW 6 : OPT2 FILT.	FBK FILT.	rw	
141.08	SPEED FBK SEL.	POS SPEED LOOP	ENUM	0 : NONE 1 : FBK RAW 2 : FBK FILT. 3 : OPT1 RAW 4 : OPT1 FILT. 5 : OPT2 RAW 6 : OPT2 FILT.	FBK FILT.	rw	
141.09	FP	POS SPEED LOOP	REAL	1.00 to 800.00 Hz	800.00 Hz	rw	
141.10	FV	POS SPEED LOOP	REAL	1.00 to 800.00 Hz	800.00 Hz	rw	
141.11	FC	POS SPEED LOOP	REAL	1.00 to 800.00 Hz	800.00 Hz	rw	
141.12	KP	POS SPEED LOOP	REAL	0.00 to 600.00	33.00	rw	
141.13	FIP	POS SPEED LOOP	REAL	0.00 to 100.00 Hz	0.00 Hz	rw	
141.14	IP DIS. VAL.	POS SPEED LOOP	INT	0 to 2147483647	0	rw	
141.15	IP SAT.	POS SPEED LOOP	INT	0 to 2147483647	0	rw	
141.16	KV	POS SPEED LOOP	REAL	0.00 to 2000.00	99.00	rw	
141.17	FIV	POS SPEED LOOP	REAL	0.00 to 100.00 Hz	3.15 Hz	rw	
141.18	SPEED THRESHOLD	POS SPEED LOOP	REAL	0.01 to 1.00	0.10	rw	
141.19	STATIC FRICTION	POS SPEED LOOP	REAL	0.00 to 32767.00 Nm	0.00 Nm	rw	
141.20	GRAVITY	POS SPEED LOOP	REAL	-32768.00 to 32767.00 Nm	0.00 Nm	rw	
141.21	LOAD INERTIA	POS SPEED LOOP	REAL	0.0000 to 32767.0000 kgm2	0.0000 kgm2	rw	
141.22	HIGH BAND	POS SPEED LOOP	BOOL	0 : FALSE	FALSE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				1 : TRUE			
141.23	REVERSE DIR.	POS SPEED LOOP	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
142.01	SPEED MAX	POS SPEED LOOP IN	INT	0 to 2147483647	655360	rw	
142.02	ACCEL MAX	POS SPEED LOOP IN	INT	0 to 2147483647	65536000	rw	
142.03	ACC. SPD. MODE	POS SPEED LOOP IN	INT	0 to 2147483647	6553600	rw	
142.04	TORQUE MAX	POS SPEED LOOP IN	REAL	0.00 to 32767.00 Nm	1.00 Nm	rw	
142.05	I MAX	POS SPEED LOOP IN	REAL	0.00 to 32767.00 A	1.00 A	rw	
142.06	I ATT	POS SPEED LOOP IN	REAL	0.00 to 1.00	1.00	rw	
142.07	AXIS1 KFF SPEED	POS SPEED LOOP IN	REAL	0.00 to 1.50	1.00	rw	
142.08	AXIS1 KFF ACCEL	POS SPEED LOOP IN	REAL	0.00 to 1.50	1.00	rw	
142.09	AXIS2 KFF SPEED	POS SPEED LOOP IN	REAL	0.00 to 1.50	0.00	rw	
142.10	AXIS2 KFF ACCEL	POS SPEED LOOP IN	REAL	0.00 to 1.50	0.00	rw	
142.11	AXIS3 KFF SPEED	POS SPEED LOOP IN	REAL	0.00 to 1.50	0.00	rw	
142.12	AXIS3 KFF ACCEL	POS SPEED LOOP IN	REAL	0.00 to 1.50	0.00	rw	
142.15	SPEED DEMAND	POS SPEED LOOP IN	INT	-2147483648 to 2147483647	0	rw	1
142.16	TORQUE DEMAND	POS SPEED LOOP IN	REAL	-32768.00 to 32767.00 Nm	0.00 Nm	rw	1
142.21	I MAX POSITIVE	POS SPEED LOOP IN	REAL	0.00 to 32767.00 A	0.00 A	rw	
142.22	I MAX NEGATIVE	POS SPEED LOOP IN	REAL	0.00 to 32767.00 A	0.00 A	rw	
142.23	TEST ENABLE	POS SPEED LOOP IN	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
142.24	TEST TYPE	POS SPEED LOOP IN	ENUM	0 : SQUARE 1 : SINUSOIDAL 2 : TRIANGULAR	SQUARE	rw	1
142.25	TEST FREQUENCY	POS SPEED LOOP IN	REAL	0.01 to 100.00 Hz	1.00 Hz	rw	1
142.26	TEST AMPLITUDE	POS SPEED LOOP IN	REAL	0.00 to 1.00	0.01	rw	1
142.27	TEST OFFSET	POS SPEED LOOP IN	REAL	0.00 to 1.00	0.00	rw	1
143.01	POS ACTUAL	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.02	SPEED ACTUAL	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.03	POS TH	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.04	SPEED TH	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.05	ACCEL TH	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.06	POS SETPOINT	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.07	TRACKING ERROR	POS SPEED LOOP OUT	INT	_	0	ro	Output
143.15	ACCEL SETPOINT	POS SPEED LOOP OUT	INT	_	0	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
143.17	TORQUE SETPOINT	POS SPEED LOOP OUT	REAL	_.xx	0.00 Nm	ro	Output
143.18	I SETPOINT	POS SPEED LOOP OUT	REAL	_.xx	0.00 A	ro	Output
144.01	ENABLE	LIMIT INPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
144.02	INPUT	LIMIT INPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
144.03	DIRECTION	LIMIT INPUT 1	ENUM	0 : POSITIVE 1 : NEGATIVE	POSITIVE	rw	
144.04	TYPE	LIMIT INPUT 1	ENUM	0 : LEVEL TRIG. 1 : EDGE TRIG.	LEVEL TRIG.	rw	
144.05	STATE	LIMIT INPUT 1	ENUM	0 : LOW/FALLING 1 : HIGH/RISING	LOW/FALLING	rw	
144.06	METHOD	LIMIT INPUT 1	ENUM	0 : NO STOP 1 : NORMAL STOP 2 : QUICK STOP	NO STOP	rw	
144.07	ACTIVE	LIMIT INPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
144.08	ENABLED	LIMIT INPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
144.09	VALUE	LIMIT INPUT 1	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
145.01	ENABLE	LIMIT INPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
145.02	INPUT	LIMIT INPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
145.03	DIRECTION	LIMIT INPUT 2	ENUM	0 : POSITIVE 1 : NEGATIVE	POSITIVE	rw	
145.04	TYPE	LIMIT INPUT 2	ENUM	0 : LEVEL TRIG. 1 : EDGE TRIG.	LEVEL TRIG.	rw	
145.05	STATE	LIMIT INPUT 2	ENUM	0 : LOW/FALLING 1 : HIGH/RISING	LOW/FALLING	rw	
145.06	METHOD	LIMIT INPUT 2	ENUM	0 : NO STOP 1 : NORMAL STOP 2 : QUICK STOP	NO STOP	rw	
145.07	ACTIVE	LIMIT INPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
145.08	ENABLED	LIMIT INPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
145.09	VALUE	LIMIT INPUT 2	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
147.01	VALUE	DIGITAL OUTPUT 4	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
148.01	VALUE	DIGITAL OUTPUT 5	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
149.01	VALUE	DIGITAL OUTPUT 6	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
150.01	DEFAULT VELOCITY	TRAJ GEN DEFAULT	INT	10 to 2147483647	1000000	rw	
150.02	DEFAULT ACCEL	TRAJ GEN DEFAULT	INT	10 to 2147483647	10000000	rw	
150.03	DEFAULT DECEL	TRAJ GEN DEFAULT	INT	10 to 2147483647	10000000	rw	
150.04	DEFAULT JERK	TRAJ GEN DEFAULT	REAL	0.00 to 1.00	0.00	rw	
150.05	VEL. OVERRIDE	TRAJ GEN DEFAULT	REAL	0.10 to 2.00	1.00	rw	
150.06	ACCEL. OVERRIDE	TRAJ GEN DEFAULT	REAL	0.10 to 2.00	1.00	rw	
150.07	DECEL. OVERRIDE	TRAJ GEN DEFAULT	REAL	0.10 to 2.00	1.00	rw	
150.08	QUICK STOP RATE	TRAJ GEN DEFAULT	INT	10 to 2147483647	10000000	rw	
153.01	ENABLE	PLS 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
153.02	SOURCE	PLS 1	ENUM	0 : POS ACTUAL 1 : SPEED ACTUAL 2 : TRACKING ERROR 3 : POS TH 4 : SPEED TH 5 : ACCEL TH 6 : TG1 POS OUT 7 : TG2 POS OUT 8 : TG3 POS OUT 9 : FW POS OUT 10 : FW MASTER POS	POS ACTUAL	rw	
153.03	HIGH	PLS 1	INT	-2147483648 to 2147483647	0	rw	
153.04	LOW	PLS 1	INT	-2147483648 to 2147483647	0	rw	
153.05	INVERT	PLS 1	BOOL	0 : FALSE	FALSE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				1 : TRUE			
153.06	DESTINATION	PLS 1	ENUM	0 : NONE 1 : DIG OUT 1 2 : DIG OUT 2 3 : DIG OUT 3 4 : DIG OUT 4 5 : DIG OUT 5 6 : DIG OUT 6	NONE	rw	
153.07	DEFAULT	PLS 1	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
153.08	ACTIVE	PLS 1	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
154.01	ENABLE	PLS 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
154.02	SOURCE	PLS 2	ENUM	0 : POS ACTUAL 1 : SPEED ACTUAL 2 : TRACKING ERROR 3 : POS TH 4 : SPEED TH 5 : ACCEL TH 6 : TG1 POS OUT 7 : TG2 POS OUT 8 : TG3 POS OUT 9 : FW POS OUT 10 : FW MASTER POS	POS ACTUAL	rw	
154.03	HIGH	PLS 2	INT	-2147483648 to 2147483647	0	rw	
154.04	LOW	PLS 2	INT	-2147483648 to 2147483647	0	rw	
154.05	INVERT	PLS 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
154.06	DESTINATION	PLS 2	ENUM	0 : NONE 1 : DIG OUT 1 2 : DIG OUT 2 3 : DIG OUT 3 4 : DIG OUT 4 5 : DIG OUT 5	NONE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				6 : DIG OUT 6			
154.07	DEFAULT	PLS 2	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
154.08	ACTIVE	PLS 2	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
155.01	ENABLE	MECH BRAKE	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
155.02	METHOD	MECH BRAKE	ENUM	0 : AUTOMATIC 1 : MANUAL	AUTOMATIC	rw	
155.03	T CLOSE	MECH BRAKE	REAL	0 to 1500 ms	100 ms	rw	
155.04	T OPEN	MECH BRAKE	REAL	0 to 1500 ms	100 ms	rw	
155.05	MANUAL STATE	MECH BRAKE	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	
155.06	BRAKE RELEASED	MECH BRAKE	BOOL	0 : FALSE 1 : TRUE	FALSE	ro	Output
156.01	SWITCH ON START	MOT POLARISATION	ENUM	0 : MANUAL	MANUAL	rw	1
156.02	POLARISATION	MOT POLARISATION	ENUM	0 : DISABLE 1 : ENABLE	DISABLE	rw	1
156.03	POLAR START	MOT POLARISATION	BOOL	0 : FALSE 1 : TRUE	FALSE	rw	1
156.04	TYPE	MOT POLARISATION	ENUM	0 : 1:STANDARD	1:STANDARD	rw	1
156.05	1:MOTOR PHASE	MOT POLARISATION	ENUM	0 : U PHASE 1 : V PHASE 2 : W PHASE	U PHASE	rw	1
156.06	1:MOT CUR PCNT	MOT POLARISATION	REAL	0.00 to 100.00 %	50.00 %	rw	1
156.07	1:MOT CUR RAMP	MOT POLARISATION	REAL	0.00 to 20.00 s	1.00 s	rw	1
156.16	ELEC POS OFFSET	MOT POLARISATION	REAL	-180.0000 to 180.0000 deg	0.0000 deg	rw	1
156.17	ELEC POS	MOT POLARISATION	REAL	_.xxxx	0.0000 deg	ro	Output
156.18	CURRENT	MOT POLARISATION	REAL	_.xxxx	0.0000 A	ro	Output
156.19	STATE	MOT POLARISATION	ENUM	0 : NORMAL 1 : POLARIZING 2 : ENDED OK 3 : ENDED NOT OK	NORMAL	ro	Output
156.20	MAX ELEC POS	MOT POLARISATION	REAL	_.xxxx	0.0000 deg	ro	Output
157.01	SPD DMD SELECT	POS SPD LOOP DIR	ENUM	0 : NONE 1 : AN IN1	NONE	rw	

PREF	Name	Block	Type	Range	Default	ro\rw	Notes
				2 : AN IN2 3 : AN IN3 4 : AN IN4 5 : AN IN5			
157.02	SPD DMD SCALE	POS SPD LOOP DIR	INT	0 to 2147483647	655360	rw	
157.03	SPD DMD OFFSET	POS SPD LOOP DIR	REAL	-100.00 to 100.00 %	0.00 %	rw	
157.04	SPD ACTUAL SELECT	POS SPD LOOP DIR	ENUM	0 : NONE 1 : AN OUT1 2 : AN OUT2	NONE	rw	
157.05	SPD ACTUAL SCALE	POS SPD LOOP DIR	INT	0 to 2147483647	655360	rw	
157.06	SPD ACTUAL OFFSET	POS SPD LOOP DIR	REAL	-100.00 to 100.00 %	0.00 %	rw	
157.07	TOR DMD SELECT	POS SPD LOOP DIR	ENUM	0 : NONE 1 : AN IN1 2 : AN IN2 3 : AN IN3 4 : AN IN4 5 : AN IN5	NONE	rw	
157.08	TOR DMD SCALE	POS SPD LOOP DIR	REAL	0.00 to 32767.00 Nm	1.00 Nm	rw	
157.09	TOR DMD OFFSET	POS SPD LOOP DIR	REAL	-100.00 to 100.00 %	0.00 %	rw	