

Start-up Guide Axpert-CSS

400V System, 50Hp (37kW) ~ 844Hp (630kW)



NOTICE

1. Read this guide thoroughly before using the Axpert-CSS, and store in a safe place for reference.
2. Make sure that this guide is delivered to the final user.

The **Axpert-CSS** is a range of Combination Soft Starter panels offered by **AMTECH DRIVES**.

We also offer the module unit as an individual product, named as “Axpert-Opti torque” Soft Starter. This is only the core unit without the panel.

A brief introduction of Axpert-CSS model is given for reference.

Axpert-CSS

This is the highest value product for applications where "across-the-line" motor starting capabilities are not required.

An AC-1 "Run-Rated" Bypass contactor is provided standard. Once the Axpert-Opti torque Soft Starter gets the motor “up-to-speed” the motor is switched over to the bypass contactor and runs “across-the-line.”

An AC-3 "fully-rated" Bypass contactor is provided as adder in place of AC-1 rated contactor to start the motor “across-the-line” in case of soft starter faulty. In normal operation it is work same as AC-1 rated contactor.

The Axpert-Opti torque still monitors full operation of the AC motor and provides complete diagnostic protection.

The Axpert-CSS (Combination Soft Starter) Start-Up Guide is not meant to replace the complete Instruction Manual of Axpert-Opti torque soft starter. This is a supplementary document intended to provide concise instructions covering the most common installation and configuration options.

WARNING: Only qualified personnel should plan or implement the installation, start-up, operation and maintenance of this equipment. Personnel must read the entire Axpert-Opti torque INSTRUCTION MANUAL before attempting to install, operate or troubleshoot the Axpert-CSS.

There are nine key elements to the basic installation and start up of Soft Starter. In this Start-Up Guide we will cover the following steps. For more information, please refer to the Axpert-Opti torque Instruction Manual IMAOT-01.

Nine Key Elements to a Successful Installation

1. Physically install the unit with consideration for ambient temperature and proper cooling, adequate room around the Soft Starter panel for airflow and mounting properly to protect the enclosure from the specific environment.
2. Check that the unit is of the correct voltage and current rating to suit the application.
3. Connect the AC input voltage, AC motor and control wiring using proper sized cables and wires with appropriate grounding and shielding for proper operation. Make sure that the requirements of the local electrical codes are adhered to for proper installation.
4. Power up the Soft Starter and familiarize yourself with the operation of the keypad, such as navigating through the parameters and how to change parameters.

IMPORTANT NOTE! Whenever undertaking the start-up of Soft Starter, especially if anyone has been operating the Soft Starter prior to the start-up, it is advisable to set all of the parameter values to their factory default values. By knowing that all of the parameters are at the default values, this can save a lot of troubleshooting later on through mis-operation by having a parameter set to a value not needed by the application. An incorrectly programmed parameter can look like a defective Soft Starter. Setting parameter B311 to “333” will reset all user parameters to default.

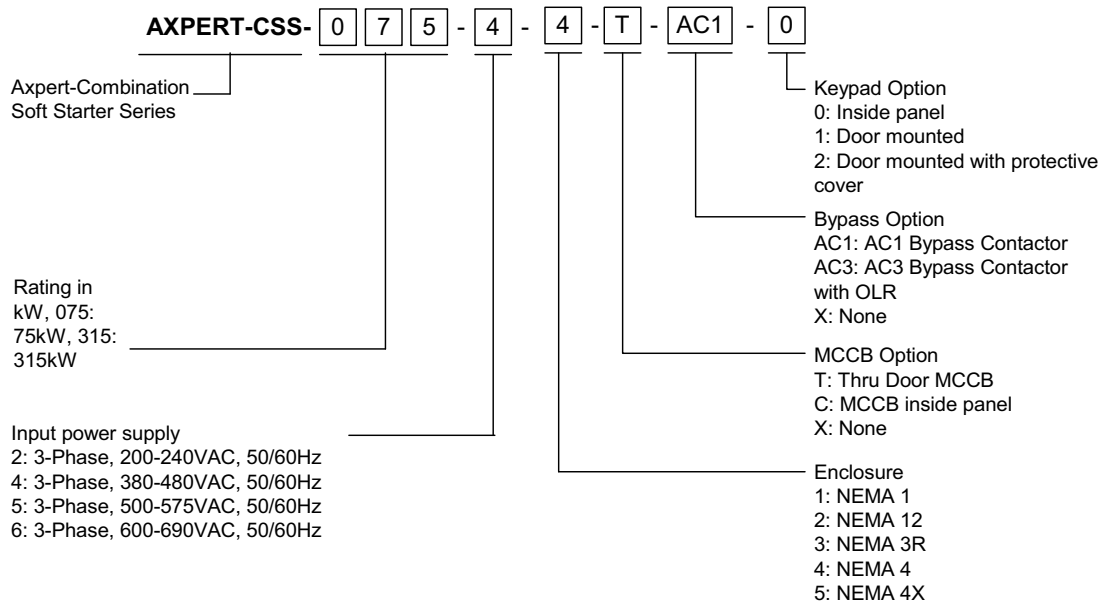
5. Review the parameters and determine which ones need to be changed to meet the requirements of your application. The motor parameters (B101 – B108) must be entered for precise protection of the AC motor used. The method for start/stop, Start Mode Selection, Stop Mode Selection and values for the ramp-up/ramp-down time according to start mode selection and stop mode selection, set different protection parameters like current limit, over current level etc. are all important parameters to be considered.
6. Start the motor and assure proper rotation and the expected load currents are displayed, (See Parameter M101 - Output Current in %, M102 – R Phase Current, M103 – Y Phase Current, M104 – B Phase Current). Find the read-only parameters that display information like a digital meter to show operational parameters such as input and output voltages, current of all phases and input frequency, power used and run time.

7. Review the Fault Codes and what they mean. Look at the Fault History parameters and how the Soft Starter will display the last ten faults and operational values that existed at the time of the fault.

8. Test all of the system operators, such as Pushbuttons, remote keypad, Selector Switches, to assure proper operation and control. Verify starting, stopping and correct motor operation.

9. Once the installation is complete and the system operates as desired, store the parameters into the Soft Starter's memory. (Set parameter B311 to a value of "111".) This will allow downloading the saved parameters in case of any accidental improper changes that could affect operation. It is advised to fully document all parameter value changes, jumper changes and control wiring to simplify troubleshooting or system duplication in the future. When working with technical support the first questions asked would be to let them know what parameters were changed, what the new values are and what control wires are connected to the terminal strips.

Details of Rating Nameplate and Type Display Method:



Installation

1. First, visually inspect the unit and ensure that the unit has not been damaged in transport. If any damage has occurred, do not energize the unit, and contact the supplier.
2. Be aware of the ambient temperature. Use the unit within the specified ambient temperature $\leq 50^{\circ}\text{C}$ ($\leq 122^{\circ}\text{F}$).
3. Connect the incoming AC power to the Circuit Breaker (CB-101) located in the top right side of the enclosure panel. The operator handle must be in the OFF position to the front door of the enclosure. Connect the ground wire at the assigned point marked by a symbol located on the door. Connect the motor cables to the output bus bars (U, V, W) located at the lower left side of the enclosure panel in models AMT-CSS-200, AMT-CSS-250 and AMT-CSS-315. In other models, connect the output cables directly to the output of the internal module.

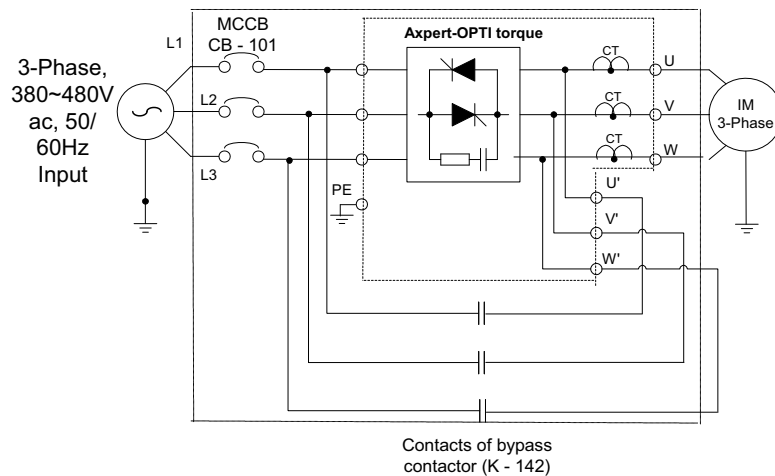


Fig 1 - Simplified Block Diagram of Axpert-CSS with AC-1 contactor

OPERATION

Note: Refer Electrical wiring diagram for better understanding of operation

Select the position of H-O-A selector switch. In hand mode, press the start pushbutton. Soft starter will provide control of the starting of the AC motor and accelerate it from zero to full speed. Upon reaching full speed, it will automatically switch power through the bypass contactor, and the soft starter will be bypassed. At run time run (green) pilot light lit. While running in bypass mode the soft starter continues to monitor the system, thus providing full diagnostic protection, such as over current and over voltage protection. To stop the soft starter press the stop pushbutton.

In auto mode, to start the soft starter, connect potential free contact between control terminal strip X-136 1 & X-136 2. When customer start / stop command enabled, soft starter will start and perform as per mentioned in above paragraph. Disable customer start / stop command to stop the soft starter.

Note:

- An AC1 is not a full motor starter and not having overloads or a higher current capacity should not be used to start the AC motor.

- If “across-the-line” operation is desired, the Axpert-CSS model comes with an AC3 fully rated bypass contactor that contains a full motor starter with external overloads to maintain motor protection.

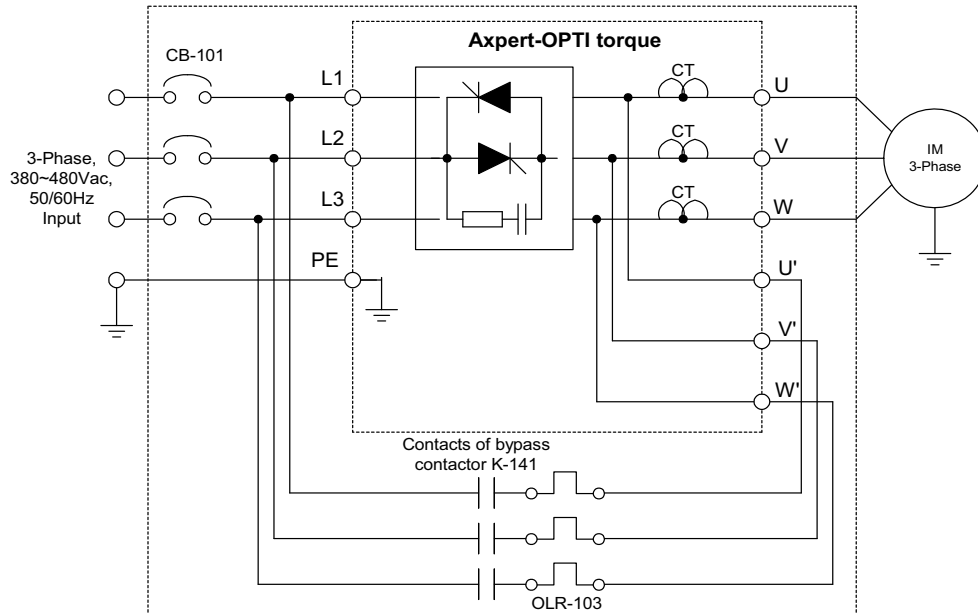


Fig 2 - Simplified block diagram of Axpert-CSS with AC-3 contactor adder

Operation of Axpert-CSS with AC-3 contactor adder

The default position of selector switch is “SS”, which sets the Axpert-CSS to operate the motor from the Soft Starter. It is not recommended to change the switch position to “XL” in normal condition as this will convert the operation to an “Across-the Line” Starter.

This Axpert-CSS model is designed with an AC3 Fully Rated Bypass Contactor that contains a full motor starter with external overloads to maintain motor protection.

When selector switch SS-135 is in “SS” position, and start command is given, the soft starter will provide control of the starting of the AC motor and accelerate it from zero to full speed. Upon reaching full speed, it will automatically switch power through the bypass contactor, and the Soft Starter will shut off. While running in Bypass Mode the Soft Starter continues to monitor the system, thus providing full diagnostic protection, such as over current and over voltage protection.

When selector switch SS-135 is in “XL” position and start command is given, the motor will start across-the-line and reach to the full speed. The overload relay will still provide the motor protection.

FRONT PANEL MOUNTING:



RUN PILOT LIGHT

If the system is “Healthy” with no faults, the RUN pilot light (PL-144) will light when the Start Pushbutton is pressed. The Green Light assures that the system is operational.



FAULT PILOT LIGHT

The Fault pilot light (PL-143) will be lit whenever the Soft Starter experiences a fault. The Red Pilot Light will go out when the fault is reset.



START PUSHBUTTON

The start pushbutton (PB-135B) is used to start the system. When the system is healthy and starts on pressing this button, the run pilot light lights up.



STOP PUSHBUTTON

The Stop Pushbutton (PB-135A) will stop the Soft Starter. Since it is a latching-type pushbutton, until it is reset by unlatching the pushbutton, the Soft Starter will not be permitted to start.

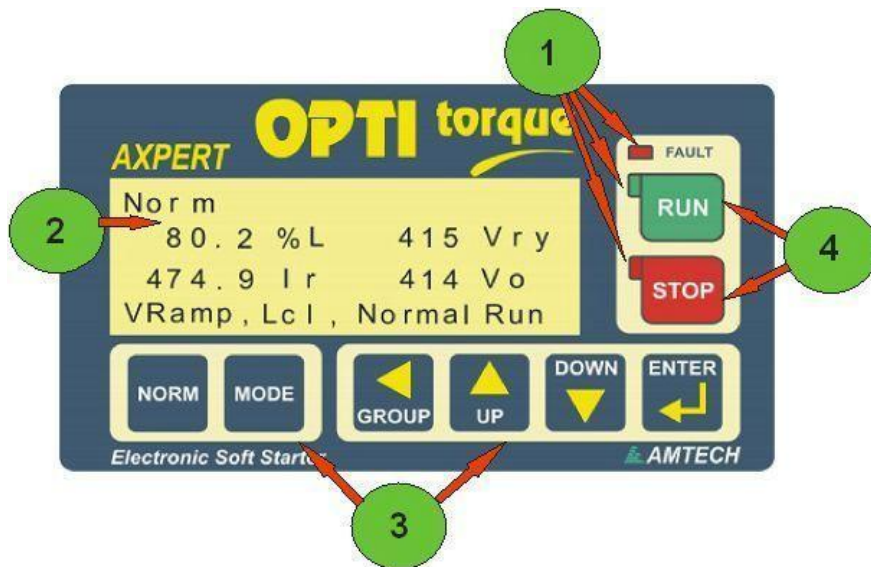


H-O-A SELECTOR SWITCH

The H-O-A selector switch (SS-133) is used to select the Hand mode or Auto mode of operation. In Hand mode, the unit can be operated from panel or terminals. In Auto mode, the unit will operate from the terminal.

PARAMETER NAVIGATION AND SETTING

The configuration of the Digital Operation Panel (LCD Keypad Module) is shown in the below figure.



- 1- Status Indicating LEDs (FAULT, RUN and STOP)
- 2- LCD Back-lit Display: 80 characters, 4 lines.
- 3- Navigation Keys (6 Keys).
- 4- Start and Stop keys for LOCAL mode.

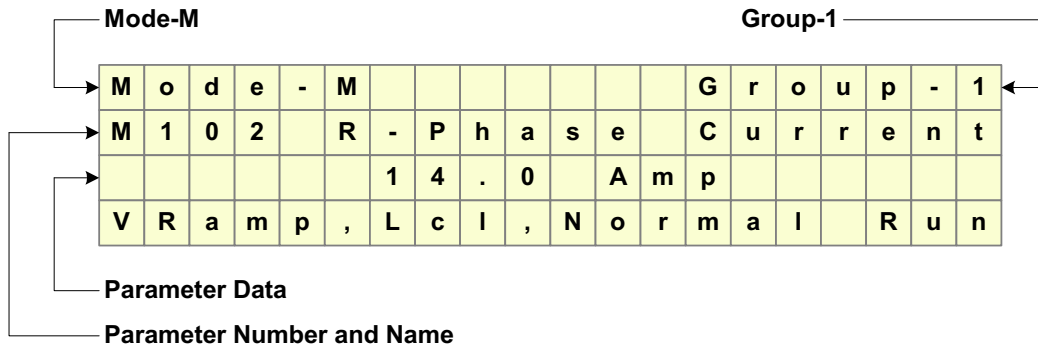
Pressing the NORM key will show the screen in the figure below.

User Selectable four parameters

	N	o	r	m															
Norm 1 →		0	.	0	%	L					4	6	0	V	r	y			← Norm 3
Norm 2 →		0	.	0	I	r					0	0	V	o					← Norm 4
	V	R	a	m	p	,	L	c	I	,	S	t	o	p					
	↑			↑			↑												
	Start Mode			Start Select			Soft starter Status												

The above figure also indicates the selected start mode, start selection and Soft Starter status. The four user selectable parameters can be configured using parameters **A601** ~ **A604**.

When the MODE key is pressed, the last accessed parameter of the last accessed group of Mode-M will appear with its data. The figure below shows parameter **M102** of Mode-M and Group-1.

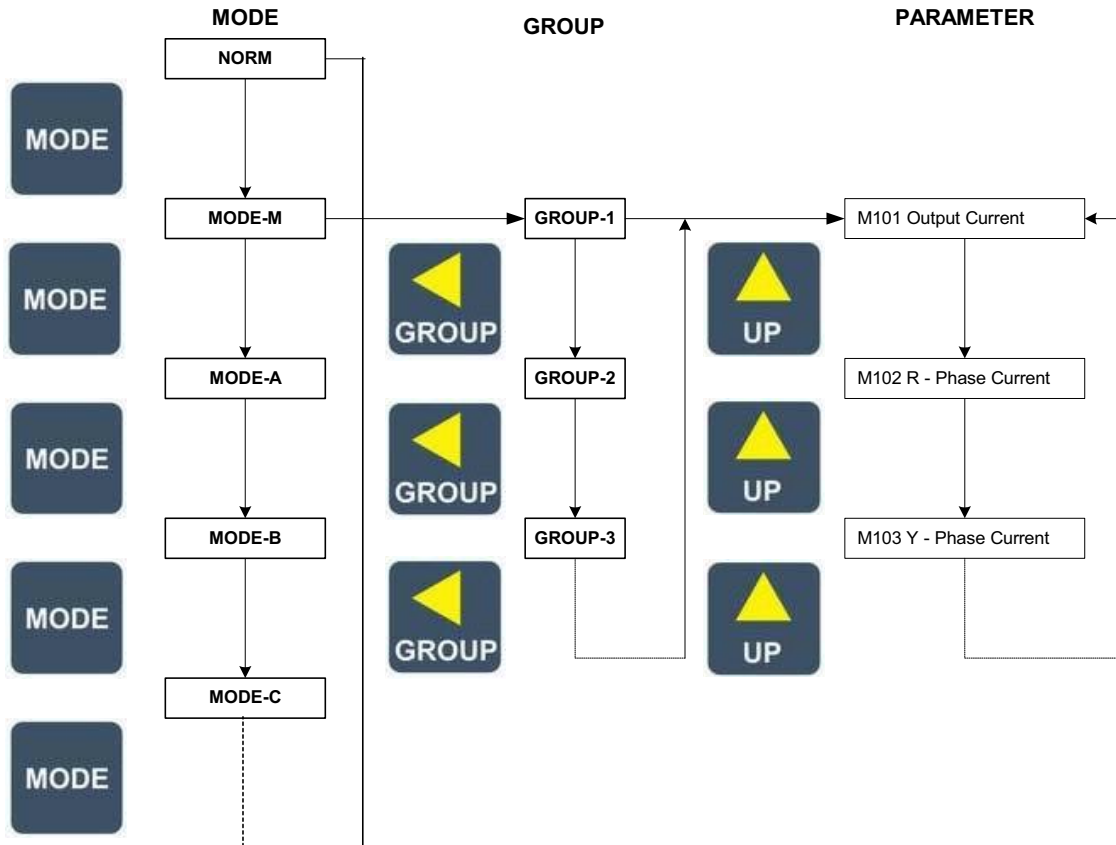


The first line of the display indicates the present Mode and Group. The second line indicates the parameter number and its function. The third line shows its value. The fourth line shows the present soft-starter status and is displayed except when there is an active fault, or displaying fault history or contact information.

Modes & Parameters

The parameters are grouped into Modes and Groups according to their functions.

The configuration of the parameters is as displayed in the figure below. Each press of the MODE key moves to the next Mode. Pressing it again after reaching to METER mode will return you to the Mode you started from. The GROUP key moves through the different Parameter Group within each Mode. The UP and DOWN keys change the parameters displayed within each Group.



BASIC PARAMETER PROGRAMMING (OPERATING FROM THE KEYPAD IN LOCAL)

Once you are familiar with the parameter navigation system, the next step is to set the basic parameters for your application. To view a specific parameter, first use the MODE key get to the desired mode; Mode's A, B, C contain the parameters that are programmable. Mode M contains the read-only parameters that provide system information such as output voltage and current, input voltage. Then use the GROUP key to reach the desired group within that mode. Use the UP or DOWN keys to reach the desired parameter.

During the initial start-up, you must program the key Soft Starter and motor parameters. First press the NORM key to display the "Normal" screen. Now press the MODE key three times to reach the Mode-B parameters. If Group-1 parameters are not displayed, press the GROUP key until you reach Group-1. Now use the UP or DOWN keys to reach the specific parameter. To change a parameter value, press the ENTER key and the digit flashing can be changed with the UP or DOWN key. Press the GROUP key to change the position of the flashing digit. When the new value has been entered, press the ENTER key again to load the new parameter value. The number will stop flashing. If you press the NORM key instead of the ENTER key, the old parameter value will remain.

MOTOR COMPANY	
HP 100	NEMA DESIGN B
RPM 1750	INS. CLASS B
VOLTS 460	S. F. 1.15
PHASE 3	FRAME 405T
Hz 60	
AMPS 114	

The figure to the left shows the information provided on a typical AC motor nameplate. There are several important motor values that will be used to program the soft-starter to provide accurate motor operation and protection. The motor HP will be programmed in kW. To change from HP to kW, multiply by 0.746. The 100HP shown would be $100 \times 0.746 = 74.6\text{kW}$.

Use the table below for the number of poles.

No Load Motor Speed (RPM)	Typical Rated Motor Speed (RPM)	Number of Poles
900	860	8
1200	1165	6
1800	1750	4
3600	3480	2

The Rated Motor Speed on the motor nameplate is an example and each motor may be slightly different since this is the speed the motor is expected to run at full load. Use the actual nameplate value shown on the motor for Rated Motor RPM. For the 1750RPM motor in the example nameplate above, Parameter **B105** Motor Rated RPM would be "1750" and **B107** Number of Motor Poles would be "4". **B103** Motor Rated Current would be "114". Now go to Step 1 and enter motor parameters B101 through B108.

1. Motor Parameters

In Mode-B, Group-1, select parameter **B101** and enter the rated input voltage. Now enter the following motor parameters; motor voltage **B102**, motor rated current **B103**, motor frequency **B104**, motor rated rpm **B105**, motor kW rating **B106** and the number of motor poles **B107**.

2. Selection of Start Control

The unit can be controlled from various places like Digital Operation Panel (Local), Terminal or from PC. Select appropriate start control in A101. Use Digital Operation Panel (Local) during the test operation.

A101: Start Control
=1: Local

=2: Terminal

=3: Serial

Note: - Must be set at "2" Terminal to operate properly

3. Adjusting the ramp time

The ramp time needs to be adjusted according to the applications and start/ stop mode. Do not program a long ramp time when using the V-Ramp or I-Ramp start modes.

4. Monitoring the Motor operation.

Press the NORM key to display the Normal screen which shows the Motor Current of R phase in Amp and percent load of the AC motor FLA (full load amp) rating, input Vry line voltage and output voltage. These are the default parameters on the Normal screen.

There are three ways to view operational parameters to monitor operating values such as input frequency (Hz), motor current of all three phases (I_r, I_y, I_b) (Amps), output voltage, input voltage (AC Volts), motor power factor (PF), output power (kW), and Soft Starter heat sink temperature in both °C and °F.

A. Press the NORM key and see four monitoring parameters in the Normal screen

B. Press the MODE key until you reach the METER Mode and eight monitoring parameters are displayed.

C. Press the MODE key until you reach the MODE-M Monitor Parameters. There are five groups of monitoring parameters including the Fault History of the last ten faults and contact information of Amtech Drives.

5. Key Parameters.

Listed here are the key parameters used to set up the soft-starter to meet the requirements of most applications. Typically, only a few of these parameters are changed from their default values. Please refer to the Amtech Axpert-Opti torque Soft starter Instruction Manual for the complete parameter listing and Fault Codes.

For monitoring,

M101 Output Current	Output Current in percentage of full load current of the AC motor.
M102 R-Phase Current	It displays the current of R-Phase in ampere.
M103 Y-Phase Current	It displays the current of Y-Phase in ampere.
M104 B-Phase Current	It displays the current of B-Phase in ampere.
M105 Output Voltage	It displays the Output Voltage.
M106 Input Voltage Vry	Input AC Voltage between L1 & L2
M107 Input Voltage Vy _b	Input AC Voltage between L2 & L3
M201 Heat sink Temperature	Temperature of the heat sink in °C.
M216 Heat sink Temperature	Temperature of the heat sink in °F.

FLT1–FLT10 Fault History Provides fault history for 10 faults and 4 values at time of each fault. The Fault History is located in Mode M Group 4.

The unit is shipped with some important parameters, which are required as per the logic requirement. There are some parameters (as indicated below) need to be set by the user based on the application requirement.

A101 Start Control	Terminal is selected for the start control.
A102 Maintained Start/Stop	The unit is programmed for maintained start.
A104 Start Mode Selection	The unit is shipped with the default V-Ramp Start, but can be changed as per the application requirement by the user.
A105 Stop Mode Selection	The unit is shipped with the default coast-to-stop mode, but can be changed as per the application requirement.
A106 V-Ramp Up Time1	Sets the ramp up time for V-Ramp Start and Jogging. Set this before starting as unit is shipped with the default ramp up time.
A107 V-Ramp Down Time1	Sets the ramp down time for V-Ramp Stop. Not applicable if the stop mode is coast-to-stop. Set as per the application requirement if other than coast-to-stop mode is selected.
B101 – B107 Motor Parameters	Key motor values that must be programmed at start-up.
B108 SS Connection Type	The unit is shipped with the default Inline type
B301 I-Limit Level	Sets the current limit as a % of motor rated current. Normally set to 350%.
B302 I-Limit Time	Sets the time limit for which the current limit can be active. Unit will trip if the total time of current limit operation exceeds the set time. Normally set to 10 seconds.
C101 PSI 1	The unit is shipped with option-6: Bypass contactor fault. This is used for feedback of bypass contactor. If the bypass contactor fails to operate, the unit will give fault.
C111 Prog. Relay 1	The unit is shipped with the default option-3: Run. This is used for the RUN indication on the panel.
C112 Prog. Relay 2	The unit is shipped with the default option-4: Top of ramp. This is used to operate the bypass contactor after the motor ramps to the full speed.
C113 Prog. Fault Relay	The unit is shipped with the default option-6: Fault. This is used for the fault indication.

Below are some important parameters, which need to be set as per the application requirement.

A301	I-Ramp Up Time	Sets the ramp up time for I-Ramp Start.
A302	Initial Current	Sets the initial current level for I-Ramp Start.
A401	T-Ramp Up Time	Sets the ramp up time for T-Ramp Start.
A402	Initial Torque	Sets the initial torque level for T-Ramp Start.
A403	Torque Limit	Sets the torque limit for T-Ramp Start.
A406	T-Ramp Down Time	Sets the ramp down time for T-Ramp Stop.
A407	End Torque	Sets the end torque level at stop as a % of motor nominal torque.
B307	I-Trip Level	This parameter sets the threshold of the instantaneous over current trip as % of motor rated current.
B309	Parameter Lock	Password to control parameter changes.
B310	Change Password	Allows selection of user selectable password.
B311	Default Value Load	Multiple functions; reset parameters to default, store user parameters, load user parameters from memory, clear fault history.
C201-202	Vout 1 – 2	Selects function of the two 0-10VDC Analog Outputs.
C203-204	Iout 1 – 2	Selects function of the two 4-20mA Analog Outputs.

6. Start-Up Parameter Check List.

Shown below is a list of the typical parameters used for general Soft Starter applications. Please write in the specific User's settings that make your installation unique. This information will be invaluable in the future for Soft Starter duplication, troubleshooting or replacement.

Parameters		Default	User's Values
B101	Rated Input Voltage	460V	_____ VAC
B102	Motor Voltage	460V	_____ VAC
B103	Motor Current	M301	_____ Amps
B104	Motor Frequency	50Hz	_____ Hz
B105	Motor Speed	1500RPM	_____ RPM
B106	Motor Output	M302	_____ kW
B107	Motor Poles	4	_____
B108	SS Connection Type	1: Inline	_____



Start and Stop Control Method			
Parameters		Default	User's Values
A101	Start Control	Local	_____
A102	Maintained Start/Stop	Maintained	_____
A104	Start Mode Selection	V-Ramp Start	_____
A105	Stop Mode Selection	Coast to Stop	_____

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