OVERVIEW
MV Controller

AuCom
MOTOR CONTROL SPECIALISTS

Contents

1. About This Manual

The examples and diagrams in this manual are included solely for illustrative purposes. The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.

WARNING
Indicates a hazard that may cause personal injury or death.

CAUTION
Indicates a hazard that may damage the equipment or installation.
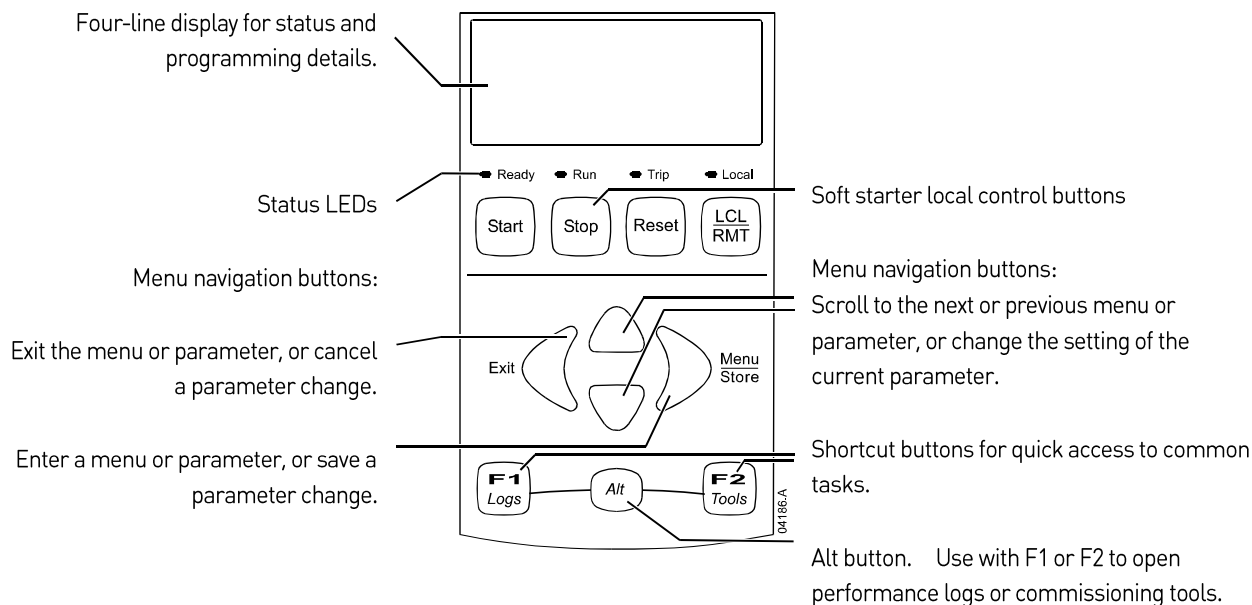
NOTE
Provides helpful information.

2. Controller

2.1 The Controller

Four-line display for status and programming details.

Status LEDs

Menu navigation buttons:

Exit the menu or parameter, or cancel a parameter change.

Enter a menu or parameter, or save a parameter change.

Soft starter local control buttons

Menu navigation buttons:
Scroll to the next or previous menu or parameter, or change the setting of the current parameter.

Shortcut buttons for quick access to common tasks.

Alt button.   Use with F1 or F2 to open performance logs or commissioning tools.

> **NOTE**
> When the Controller is powered up, the Ready LED flashes for 5 seconds as part of the initialisation routine.

2.2 Menu Shortcuts

The F1 and F2 buttons offer keyboard shortcuts to the Auto-Stop menu.   Use parameters 8B and 8C (*8B, 8C – F1 and F2 Button Action* on page 28) to select the shortcut target.

2.3 Displays

The controller displays a wide range of performance information about the soft starter.   The top half of the screen shows real-time information on current or motor power (as selected in parameter 8D). Use the ▲ and ▼ buttons to select the information shown on the bottom half of the screen.

- Starter status
- User programmable screen
- Motor temperature
- Current
- Motor power
- Voltage
- Last start information
- Date and time
- Performance graphs
- SCR conduction

Operating Feedback

> **NOTE**
> Screens shown here are with the default settings.

- **Starter Status**

The starter status screen shows details of the starter's operating status, including motor current, power and temperature.

```
              0A
Ready
M1 000%              000.0kW
```

- **Programmable screen**

The MVE's user-programmable screen can be configured to show the most important information for the particular application. Use parameters 8E to 8H to select which information to display.

```
              0A
Ready
00000 kWh           00000hrs
```

- **Motor Temperature**

The temperature screen shows which motor data set is in use, and the temperature of the motor as a percentage of total thermal capacity.

```
              0A
Primary Motor Set
 ➤ M1 000%          M2 000%
```

> **NOTE**
> M2 xxx% temperature is not applicable to this product.

- **Current monitoring screen**

The current screen shows real-time line current on each phase.

```
              0A
 Phase Currents (Gnd Crnt XX.XA)
000.0A      000.0A      000.0A
```

- **Motor Power**

The motor power screen shows motor power (kW, HP and kVA) and power factor.

```
              0A
000.0kW             0000HP
0000kVA             -.- - pf
```

- **Voltage**

The voltage screen shows real-time line voltage across each phase.

```
              0A
Line Voltages
00000       00000       00000
```

- **Last Start Information**

The last start information screen shows details of the most recent successful start:

- start duration (seconds)
- maximum start current drawn (as a percentage of motor full load current)
- calculated rise in motor temperature

```
              0A
Last start    000 s
000 % FLC           △ Temp 0%
```
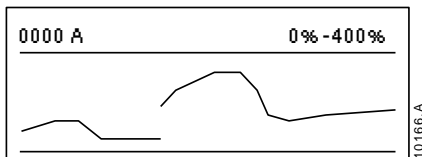
- **Date and Time**

The date/time screen shows the current system date and time (24 hour format).   For details on setting the date and time, refer to *Set Date and Time* on page 5.
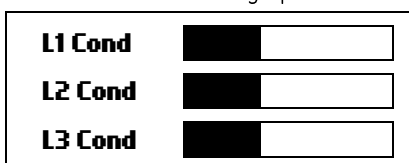
```
        0A
    DD MMM YYYY
      HH:MM:SS
```
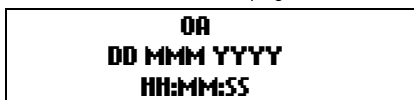
- **Performance Graph**

The performance graph provides a real-time display of operating performance.   Use parameters 8I~8L to select which information to display.

- **SCR Conduction Bargraph**

The SCR conduction bargraph shows the level of conduction on each phase.

2.4   Commissioning Menu (Tools)

The Commissioning Menu provides access to commissioning and testing tools.

Press **ALT** then **TOOLS** to open the Tools.

The Commissioning Menu is protected by the access code.

The default access code is 0000.

To navigate through the Commissioning Menu:

- to scroll to the next or previous item, press the ▲ or ▼ button.
- to open an item for viewing, press the ► button.
- to return to the previous level, press the ◄ button.
- to close the Commissioning Menu, press ◄ repeatedly.

2.5   Set Date and Time

To set the date and time:

1. Open the Commissioning Menu.
2. Scroll to the date/time screen.
3. Press the ► button to enter edit mode.
4. Press the ► and ◄ buttons to select which part of the date or time to edit.
5. Use the ▲ and ▼ buttons to change the value.
6. To save changes, press the ► button.   The MVE will confirm the changes.
   To cancel changes, press the ◄ button.

2.6   Simulation Tools

Software simulation functions let you test the soft starter's operation and control circuits without connecting the soft starter to mains voltage.

The simulation tools are accessed via the Commissioning Menu. The simulations are only available when the soft starter is in Ready state, control voltage is available and the controller is active.

> **NOTE**
> Access to the simulation tools is protected by the security access code.
> The default access code is 0000.

Run Simulation

To use the run simulation:

1. Open the Commissioning Menu.
2. Scroll to Run Simulation and press ►.

```
Run Simulation
Ready
Apply Start Signal
```

3. Press START or activate the start input.   The MVE simulates its pre-start checks and closes the main contactor relay. The Run LED flashes.

```
Run Simulation
Pre-Start Checks
STORE to Continue
```

> **NOTE**
> If mains voltage is connected, an error message is shown. Remove mains voltage and proceed to the next step.

```
Run Simulation
ATTENTION!
Remove Mains Volts
STORE to Continue
```

4. Press ►. The MVE simulates starting. The Run LED flashes.

```
Run Simulation
Starting X:XXs
STORE to Continue
```

5. Press ►. The MVE simulates running. The Run LED stays on without flashing and the bypass contactor relay closes.

```
Run Simulation
Running
Apply Stop Signal
```

6. Press STOP or activate the stop input.   The MVE simulates stopping. The Run LED flashes and the bypass contactor relay opens.

```
Run Simulation
Stopping X:XXs
STORE to Continue
```

7. Press ►. The Ready LED flashes and the main contactor relay opens.

```
Run Simulation
Stopped
STORE to Continue
```

8. Press ► to return to the commissioning menu.

> **NOTE**
> Run simulation can be exited at any stage by pressing the ◄.

Protection Simulation

The protection simulation simulates activation of each protection mechanism to confirm that the soft starter and associated control circuits are responding correctly.

To use the protection simulation:

1. Open the Commissioning Menu.
2. Scroll to Protection Simulation and press ►.
3. Use the ▲ and ▼ buttons to select the protection you want to simulate.
4. Press and hold ► to simulate the selected protection.
5. The screen is displayed momentarily. The soft starter's response depends on the Protection Action setting (parameter group 16).

```
          0.0A
Tripped
Selected Protection
```

6. Use ▲ or ▼ to select another simulation, or press ◄ to exit.

> **NOTE**
> If the protection trips the soft starter, reset before simulating another protection.   If the protection action is set to 'Warn and Log', no reset is required.
>
> If the protection is set to 'Warn and Log', the warning message can be viewed only while the ► button is pressed.
>
> If the protection is set to 'Log only', nothing appears on the screen but an entry will appear in the log.

Output Signal Simulation

The output signal simulation simulates output signalling to confirm that outputs and associated control circuits are operating correctly.

> **NOTE**
> To test operation of the flags (motor temperature and low/high current), set an output relay to the appropriate function and monitor the relay's behaviour.

To use the output signal simulation:

1. Open the Commissioning Menu.
2. Scroll to Output Signalling Simulation and press ►.
3. Use the ▲ and ▼ buttons to select a function to simulate, then press ►.
4. Use the ▲ and ▼ buttons to turn the signal on and off.
   To confirm correct operation, monitor the state of the output.

```
          Prog Relay A
Off
On
```

5. Press ◄ to return to the simulation list.

Analog Output Simulation

The analog output simulation uses the ▲ and ▼ buttons to change the analog output current at terminals B10, B11 of the controller.

```
Analog Output
0%                    4 mA
```

Attach an external current measuring device to terminals B10, B11 of the controller.   Use the ▲ or ▼ button to adjust the percentage value in the lower left hand corner of the display.   The current measuring device should indicate the same level of current as shown at the lower right corner of the display.

2.7   Input/Output Status

Temperature Sensors State

This screen shows the state of the motor thermistors and RTD/PT100s.

```
Temp Sensors State
Thermistor: 0
RTDs A-->G:0000000
S = Shrt H=Hot C=Cld O=Opn
```

> **NOTE**
> The use of RTDs is not supported by this product and this screen will always indicate 0 (ie Open) for RTDs A->G.

Digital I/O State

This screen shows the current status of the digital inputs and outputs.

```
       Digital I/O State
Inputs:   1000000
Outputs: 0000000
```

The top line of the screen shows the start, stop, reset and programmable inputs A and B, then '00'. The screen shows input C23~C24 closed with all other inputs open.

The bottom line of the screen shows programmable output A, the fixed Run output, programmable outputs B and C, then '000'. The screen shows all outputs open.

Analog I/O State

This screen shows the current status of the Analog I/O

```
       Analog I/O State
Input: - - - - %
Output A: 04.0mA
```

> **NOTE**
> Input is not supported by this product and this screen will always indicate Input: - - - - %

2.8   Reset Thermal Models

The MVE's advanced thermal modelling software constantly monitors the motor's performance.   This allows the MVE to calculate the motor's temperature and ability to start successfully at any time.

The thermal model for the active motor can be reset if required.

1.   Open the Commissioning Menu.

2.   Scroll to Reset Thermal Models and press ▶.

3.   At the confirmation prompt press STORE to confirm or ◀ to cancel the action. You may have to enter your access code.

```
Reset Thermal Models
      M1 X%
      M2 X%
   Store to Reset
```

4.   Select Reset and press ▶.

Selecting Do Not Reset returns to previous screen.

```
Reset Thermal Models
     Do Not Reset
        Reset
```

When the thermal model has been reset, the screen will display a confirmation message then return to the previous screen.

⚠ CAUTION
Resetting the motor thermal model will compromise thermal model protection and may compromise motor life. Only reset the thermal model in an emergency.

2.9   Programming Menu

The Programming Menu lets you view and change programmable parameters that control how the MVE operates.

You can access the Programming Menu at any time, including while the soft starter is running.   Any changes to the start profile take effect immediately.

To open the Programming Menu, press the MENU button while viewing the monitoring screens.

To navigate through the Programming Menu:

- to scroll through parameter groups, press the ▲ or ▼ button.
- to open a submenu, press the ▶ button.
- to view the parameters in a group, press the ▶ button.
- to return to the previous level, press the ◀ button.
- to close the Programming Menu, press ◀ repeatedly.

Adjustment Lock

You can lock the Programming Menu to prevent users from altering parameter settings.   The adjustment lock can be turned on and off using parameter 15B.

To lock the programming menu:

1.   Open the Programming Menu.

2.   Open the Extended Menu.

3.   Select 'Advanced'.

4.   Enter the Access Code.

5.   Select parameter 15B *Adjustment Lock*

6.   Select and store 'Read Only'.

If a user attempts to change a parameter value when the adjustment lock is active, an error message is displayed:

```
Access Denied
Adj Lock is On
```

Altering Parameter Values

To change a parameter value:

- scroll to the appropriate parameter in the Programming Menu and press ► to enter edit mode.
- to alter the parameter setting, use the ▲ and ▼ buttons. Pressing ▲ or ▼ once will increase or decrease the value by one unit. If the button is held for longer than five seconds, the value will increase or decrease at a faster rate.
- to save changes, press STORE. The setting shown on the display will be saved and the controller will return to the parameter list.
- to cancel changes, press EXIT. The controller will ask for confirmation, then return to the parameter list without saving changes.

Load/Save Settings

The Load/Save Settings menu requires an access code and allows users to:

- Load the MVE's parameters with default values
- Load parameter settings from an internal file
- Save the current parameter settings to an internal file

In addition to the factory default values file, the MVE can store two user-defined parameter files. These files contain default values until a user file is saved.

To load or save settings:

1. Open the Programming Menu
2. Scroll to Load/Save Settings and press the ► button.
3. Scroll to the required function and press the ► button. Enter the access code when prompted.

```
 Load Defaults
 Load Backup
 Load User Set 1
```

4. At the confirmation prompt, select YES to confirm or NO to cancel and then STORE to load/save the selection.

   When the action has been completed, the screen will briefly display a confirmation message, then return to the Load/Save Settings screen

```
 Load Defaults
 No
 Yes
```

Access Code

Critical parameters (parameter group 15 and higher) are protected by a four-digit security access code, preventing unauthorised users from viewing or modifying parameter settings.

When a user attempts to enter a restricted parameter group, the controller prompts for an access code. The access code is requested once for the programming session, and authorisation continues until the user closes the menu.

To enter the access code, use the ◄ and ► buttons to select a digit, and the ▲ and ▼ buttons to change the value. When all four digits match your access code, press STORE. The controller will display an acknowledgement message before continuing.

```
 Enter Access Code
 0###
                STORE
 Access Allowed
 SUPERVISOR
```
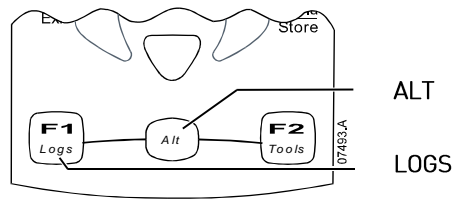
To change the access code, use parameter 15A.

2.10 Monitoring

Logs Menu

The Logs Menu provides information on events, trips and starter performance.

To open the Logs Menu, press **ALT** then **LOGS** while viewing the metering screens.

To navigate through the Logs Menu:

- to open a log, press the ► button.
- to scroll through the entries in each log, press the ▲ and ▼ buttons.
- to view details of a log entry, press the ► button.
- to return to the previous level, press the ◄ button.
- to close the Logs Menu, press ◄ repeatedly.

- **Trip Log**

The Trip Log stores details of the eight most recent trips, including the date and time the trip happened.   Trip 1 is the most recent and trip 8 is the oldest stored trip.

To open the Trip Log:

1. Press **ALT** then **LOGS** to open the Logs.
2. Scroll to Trip Log and press ►.
3. Use the ▲ and ▼ buttons to select a trip to view, and press ► to display details.
4. Use the ▲ and ▼ buttons to scroll through available details.

To close the log and return to the main display, press ◄ repeatedly.

- **Event Log**

The Event Log stores time-stamped details of the starter's 99 most recent events (actions, warnings and trips), including the date and time of the event.   Event 1 is the most recent and event 99 is the oldest stored event.

To open the Event Log:

1. Press **ALT** then **LOGS** to open the Logs.
2. Scroll to Event Log and press ►.
3. Use the ▲ and ▼ buttons to select an event to view, and press ► to display details.

To close the log and return to the main display, press ◄ repeatedly.

- **Starter Trip and Event Logger Software**

The Starter Trip and Event Logger Software allows you to download the trip and event logs from the soft starter, for separate analysis.

The software is compatible with all AuCom medium voltage soft starters using control software version 1.29 or later.

For further information, or to download the software, visit www.aucom.com.

- **Performance Counters**

The performance counters store statistics on the starter's operation:

- Hours run (lifetime and since counter last reset)
- Number of starts (lifetime and since counter last reset)
- Motor kWh (lifetime and since counter last reset)
- Number of times the thermal model has been reset

The resettable counters (hours run, starts and motor kWh) can only be reset if the *Adjustment Lock* (parameter 15B) is set to Read & Write.

To view the counters:
1. Open the Logs Menu.
2. Scroll to Counters and press ►.
3. Use the ▲ and ▼ buttons to scroll through the counters. Press ► to view details.
4. To reset a counter, press STORE (enter access code if required) then use the ▼ button to select Reset. Press STORE to confirm the action.

To close the counters and return to the main display, press the ◄ repeatedly.

2.11 Operation

⚠️ CAUTION
We recommend testing the soft starter's setup on a low voltage motor before beginning operation on a medium voltage motor. This allows the operator to test that the soft starter is correctly connected to the auxiliary equipment.

Start, Stop and Reset Commands

The soft starter can be controlled in three ways:
- using the buttons on the controller
- via remote inputs
- via a serial communication link

The LCL/RMT button controls whether the MVE will respond to local control (via the controller) or remote control (via the remote inputs).

The Local LED on the controller is on when the soft starter is in local control mode and off when the soft starter is in remote control mode.

Control via the fieldbus communication network is always enabled in local control mode, and can be enabled or disabled in remote control mode (parameter 6R *Comms in Remote*). Control via the serial communication network requires an optional communication module.

The STOP button on the controller is always enabled.

Using the Soft Starter to Control a Motor

To soft start the motor, press the START button on the controller or activate the Start remote input. The motor will start using the start mode selected in parameter 2A.

To stop the motor, press the STOP button on the controller or activate the Stop remote input. The motor will stop using the stop mode selected in parameter 2H.

To reset a trip on the soft starter, press the RESET button on the controller or activate the Reset remote input.

To stop the motor with a coast to stop, regardless of the setting of parameter 2H *Stop Mode*, press the local STOP and RESET buttons at the same time. The soft starter will remove power from the motor and open the main contactor, and the motor will coast to stop.

Operating States

• Start and Run States

The MVE soft starter has six operating states, and performs the following actions in each state:
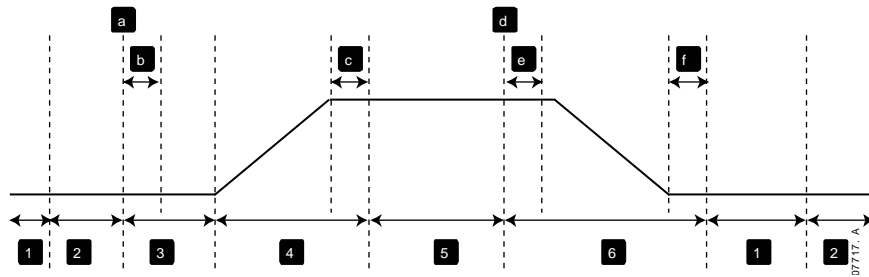
Starter State		Starter actions
1	Not ready	Control power is on. The starter may be in Restart Delay mode or waiting for the motor to cool down before allowing a start.
2	Ready	The starter is initialised and waiting for a start command.
3	Pre-start checks	A start command has been received (a). The main contactor closes (b) and the starter performs a series of internal and external checks.
4	Starting	The starter ramps the SCRs up to full conduction and closes the bypass contactor (c).
5	Running	The motor is running normally.
6	Stopping	A stop command has been received (d). The starter opens the bypass contactor (e), ramps the SCRs down to no conduction, then opens the main contactor (f).

• Trip States

The starter's response to a trip depends on the starter's state when the trip occurs.

▪ Trip while starting (bypass contactor not yet closed)

State	Function
Not ready	Perform system checks.
Ready	Wait for start command.
Start command received	Main contactor closes.
Pre-Start Checks	Perform connection checks.
Starting	Ramp up SCR firing angles.
Trip command	Turn SCRs off then open main contactor.
Tripped	Wait for reset command.
Reset command received	Trip cleared and starter returns to Not Ready state or Ready state.

▪ Trip while running (bypass contactor closed)

State	Starter action
Not ready	Perform system checks.
Ready	Wait for start command.
Start command received	Main contactor closes.
Pre-Start Checks	Perform connection checks.
Starting	Ramp up SCR firing angles.
Full conduction	SCRs at 100% conduction. Verify current is < 120% FLC then close bypass contactor.
Running	Normal motor run state (bypassed mode).
Trip command	Open bypass contactor. Turn SCRs off then open main contactor.
Tripped	Wait for reset command.
Reset command received	Trip cleared and starter returns to Not Ready or Ready state.

▪ Instantaneous Overcurrent Stage 2 trip

The main contactor opens immediately, regardless of the starter's state.

Motor Protection

- **Motor, System and Soft Starter Protection Mechanisms**
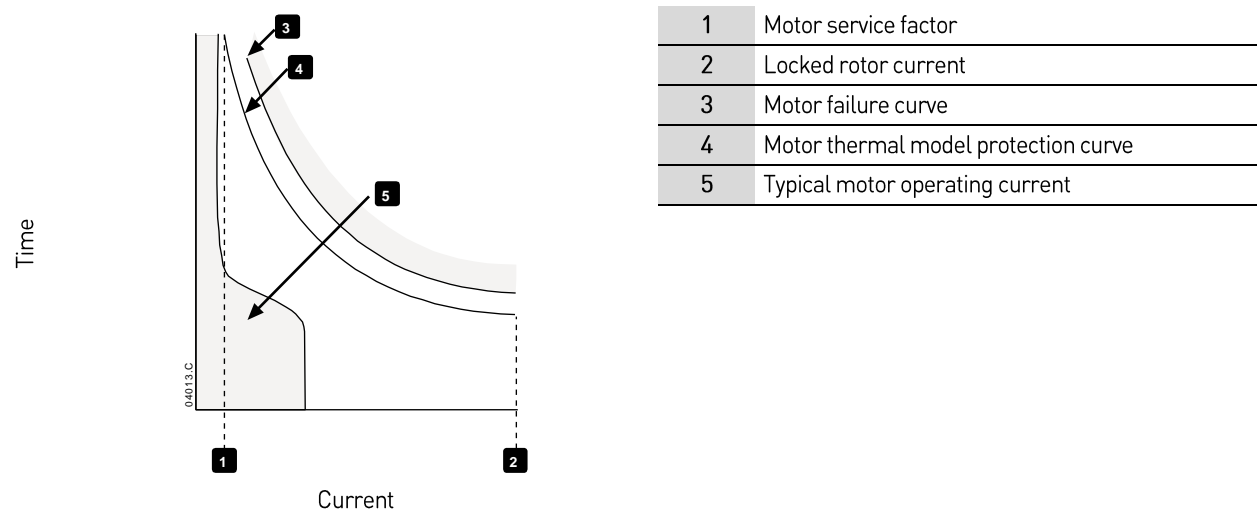
The MVE incorporates extensive protection features to ensure safe operation of the motor, system and soft starter.   Most protection features can be customised to suit the installation.   Use parameter group 4 Protection Settings to control the situation where the protections will activate and parameter group 16 Protection Action to select the soft starter's response.   The default response is to trip the soft starter.

- **Protection Coordination**

Check protection settings on the supply side of the starter to ensure correct coordination with the parameters of the soft starter.

When using fuse and main contactors, set the upstream circuit breaker protection parameters according to the ratings for fuse and contactor. The contactor must not open if the current is above its maximum breaking current value.   The fuse must act first or the upstream breakers instantaneous trip level must be less than the contactor's maximum breaking current level.

If using circuit breakers only, set the soft starter's maximum instantaneous trip time < 150 ms. Always use a suitable external protection relay with a circuit breaker to ensure instantaneous overcurrent trip functionality.

Voltage must not be continuously maintained on the phase arms while the motor is off. Short circuit protective equipment must be installed in all cases.

- **Motor Overload Protection**

The MVE offers thermal model motor overload protection which monitors the performance of the motor and calculates its temperature in all states.   This protection is based on the motor information programmed in parameter groups 1 and 9, and the thermal model adjusts itself according to the motor's recent operating history (including temperature rise from previous operation).

1	Motor service factor
2	Locked rotor current
3	Motor failure curve
4	Motor thermal model protection curve
5	Typical motor operating current

- **Motor Thermal Model Protection Set-up**

To enable motor and starter protection using the motor thermal model, the soft starter must be programmed with accurate information on the motor's characteristics.

1. Set parameters 1B *Locked Rotor Time*, 1C *Locked Rotor Current* and 1D *Motor Service Factor* according to the motor datasheet.
2. Use instantaneous overcurrent protection (parameters 4E, 4F) to provide protection for locked rotor situations.   Refer to individual parameters for details.
3. Use instantaneous overcurrent protection stage 2 (parameters 4U, 4V) to trip circuit breaker or main contactor in the event of extreme overcurrent situations.

2.12 Standard Menu

The standard menu provides access to commonly used parameters, allowing the user to configure the MVE as required for the application.   For details of individual parameters, refer to *Parameter Descriptions* on page 18.

1		Motor Data-1
	1A	*Motor Full Load Current*
2		**Start/Stop Modes-1**
	2A	*Start Mode*
	2B	*Start Ramp Time*
	2C	*Initial Current*
	2D	*Current Limit*
	2H	*Stop Mode*
	2I	*Stop Time*
3		**Auto-Start/Stop**
	3C	*Auto-Stop Type*
	3D	*Auto-Stop Time*
4		**Protection**
	4A	*Excess Start Time*
	4C	*Undercurrent*
	4D	*Undercurrent Delay*
	4E	*Instantaneous Overcurrent*
	4F	*Instantaneous Overcurrent Delay*
	4G	*Phase Sequence*
6		**Inputs**
	6A	*Input A Function*
	6B	*Input A Name*
	6C	*Input A Trip*
	6D	*Input A Trip Delay*
	6E	*Input A Initial Delay*
	6F	*Input B Function*
	6G	*Input B Name*
	6H	*Input B Trip*
	6I	*Input B Trip Delay*
	6J	*Input B Initial Delay*
7		**Outputs**
	7A	*Relay A Function*
	7B	*Relay A On Delay*
	7C	*Relay A Off Delay*
	7D	*Relay B Function*
	7E	*Relay B On Delay*
	7F	*Relay B Off Delay*
	7G	*Relay C Function*
	7H	*Relay C On Delay*
	7I	*Relay C Off Delay*
	7M	*Low Current Flag*
	7N	*High Current Flag*
	7O	*Motor Temperature Flag*

8		Display
	8A	*Language*
	8B	*F1 Button Action*
	8C	*F2 Button Action*
	8D	*Display A or kW*
	8E	*User Screen - Top Left*
	8F	*User Screen - Top Right*
	8G	*User Screen - Bottom Left*
	8H	*User Screen - Bottom Right*

2.13 Extended Menu

The extended menu gives access to all of the MVE's programmable parameters.

1		Motor Data-1
	1A	*Motor Full Load Current*
	1B	*Locked Rotor Time*
	1C	*Locked Rotor Current*
	1D	*Motor Service Factor*
2		Start/Stop Modes-1
	2A	*Start Mode*
	2B	*Start Ramp Time*
	2C	*Initial Current*
	2D	*Current Limit*
	2E	*Reserved*
	2F	*Kickstart Time*
	2G	*Kickstart Level*
	2H	*Stop Mode*
	2I	*Stop Time*
3		Auto-Start/Stop
	3A	*Reserved*
	3B	*Reserved*
	3C	*Auto-Stop Type*
	3D	*Auto-Stop Time*
4		Protection
	4A	*Excess Start Time*
	4B	*Excess Start Time-2*
	4C	*Undercurrent*
	4D	*Undercurrent Delay*
	4E	*Instantaneous Overcurrent*
	4F	*Instantaneous Overcurrent Delay*
	4G	*Phase Sequence*
	4H	*Current Imbalance*
	4I	*Current Imbalance Delay*
	4J	*Frequency Check*
	4K	*Frequency Variation*
	4L	*Frequency Delay*
	4M	*Restart Delay*
	4N	*Motor Temperature Check*
	4O	*Ground Fault Level*

	4P	Ground Fault Delay
	4Q	Undervoltage
	4R	Undervoltage Delay
	4S	Overvoltage
	4T	Overvoltage Delay
	4U	Instantaneous Overcurrent S2
	4V	Instantaneous Overcurrent Delay S2
5		**Auto-Reset Trips (*Reserved*)**
	5A	Reserved
6		**Inputs**
	6A	Input A Function
	6B	Input A Name
	6C	Input A Trip
	6D	Input A Trip Delay
	6E	Input A Initial Delay
	6F	Input B Function
	6G	Input B Name
	6H	Input B Trip
	6I	Input B Trip Delay
	6J	Input B Initial Delay
	6K	Reserved
	6L	Reserved
	6M	Remote Reset Logic
	6N	Reserved
	6O	Reserved
	6P	Reserved
	6Q	Local/Remote
	6R	Comms in Remote
7		**Outputs**
	7A	Relay A Function
	7B	Relay A On Delay
	7C	Relay A Off Delay
	7D	Relay B Function
	7E	Relay B On Delay
	7F	Relay B Off Delay
	7G	Relay C Function
	7H	Relay C On Delay
	7I	Relay C Off Delay
	7J	Reserved
	7K	Reserved
	7L	Reserved
	7M	Low Current Flag
	7N	High Current Flag
	7O	Motor Temperature Flag
	7P	Analog Output A
	7Q	Analog A Scale
	7R	Analog A Maximum Adjustment
	7S	Analog A Minimum Adjustment

	7T	*Reserved*
	7U	*Reserved*
	7V	*Reserved*
	7W	*Reserved*
8		**Display**
	8A	*Language*
	8B	*F1 Button Action*
	8C	*F2 Button Action*
	8D	*Display A or kW*
	8E	*User Screen - Top Left*
	8F	*User Screen - Top Right*
	8G	*User Screen - Bottom Left*
	8H	*User Screen - Bottom Right*
	8I	*Graph Data*
	8J	*Graph Timebase*
	8K	*Graph Maximum Adjustment*
	8L	*Graph Minimum Adjustment*
	8M	*Mains Reference Voltage*
9		**Motor Data-2**
	9A	*Reserved*
	9B	*Motor FLC-2*
	9C	*Reserved*
	9D	*Reserved*
	9E	*Reserved*
10		**Start/Stop Modes-2**
	10A	*Start Mode-2*
	10B	*Start Ramp-2*
	10C	*Initial Current-2*
	10D	*Current Limit-2*
	10E	*Reserved*
	10F	*Kickstart Time-2*
	10G	*Kickstart Level-2*
	10H	*Stop Mode-2*
	10I	*Stop Time-2*
11		**RTD/PT100 (*Reserved*)**
	11A	*Reserved*
12		**Slip-Ring Motors**
	12A	*Motor Data-1 Ramp*
	12B	*Motor Data-2 Ramp*
	12C	*Changeover Time*
	12D	*Slip Ring Retard*
15		**Advanced**
	15A	*Access Code*
	15B	*Adjustment Lock*
	15C	*Emergency Run*
16		**Protection Action**
	16A	*Motor Overload*
	16B	*Excess Start Time*

16C	Undercurrent
16D	Instantaneous Overcurrent
16E	Current Imbalance
16F	Frequency
16G	Input A Trip
16H	Input B Trip
16I	Motor Thermistor
16J	Starter Communication
16K	Network Communication
16L	Reserved
16M	Battery/Clock
16N	Ground Fault
16O	Reserved
16P	Reserved
16Q	Reserved
16R	Reserved
16S	Reserved
16T	Reserved
16U	Reserved
16V	Undervoltage
16W	Overvoltage

2.14 Parameter Descriptions

1 Motor Data-1

The parameters in Motor Data-1 configure the soft starter to match the connected motor.   These parameters describe the motor's operating characteristics and allow the soft starter to model the motor's temperature.

1A – Motor FLC

Range:	5 - 1200 A	Default:	100 A

Description: Matches the starter to the connected motor's full load current.   Set to the full load current (FLC) rating shown on the motor nameplate.

1B – Locked Rotor Time

Range:	0:01 - 2:00 (minutes:seconds)	Default:	10 seconds

Description: Sets the maximum length of time the motor can sustain locked rotor current from cold before reaching its maximum temperature.   Set according to the motor datasheet.

1C – Locked Rotor Current

Range:	400% - 1200% FLC	Default:	600%

Description: Sets the locked rotor current of the connected motor, as a percentage of full load current.   Set according to the motor datasheet.

1D – Motor Service Factor

Range:	100% - 130%	Default:	105%

Description: Sets the motor service factor used by the thermal model.   If the motor runs at full load current, it will reach 100%.   Set according to the motor datasheet.

2 Start/Stop Modes-1

2A – Start Mode

Options: Constant Current (default)

Description: Selects the soft start mode.

2B – Start Ramp Time

Range:	0:01 - 3.00 (minutes:seconds)	Default:	1 second

Description: Sets the ramp time for current ramp starting (from the initial current to the current limit).

2C – Initial Current

Range:	100% - 600% FLC	Default:	400%

Description: Sets the initial start current level for current ramp starting, as a percentage of motor full load current.   Set so that the motor begins to accelerate immediately after a start is initiated.
If current ramp starting is not required, set the initial current equal to the current limit.

2D – Current Limit

Range:	100% - 600% FLC	Default:	400%

Description: Sets the current limit for constant current and current ramp soft starting, as a percentage of motor full load current.

2E – Reserved

Description: This parameter is reserved for future use.

2F – Kickstart Time

Range:	0 – 2000 milliseconds	Default:	0000 milliseconds

Description: Sets the kickstart duration.   A setting of 0 disables kickstart.

2G – Kickstart Level

Range:	100% - 700% FLC	Default:	500%

Description: Sets the level of the kickstart current.

⚠️ **CAUTION**
Kickstart subjects the mechanical equipment to increased torque levels.   Ensure the motor, load and couplings can handle the additional torque before using this feature.

2H – Stop Mode

Options: Coast To Stop (default)
TVR Soft Stop

Description: Selects the stop mode.

2I – Stop Time

Range:	0:00 - 4:00 (minutes:seconds)	Default:	0 second

Description: Sets the time for soft stopping the motor using timed voltage ramp.
If a main contactor is installed, the contactor must remain closed until the end of the stop time.

3 Auto-Stop

The MVE can be programmed to stop automatically, after a specified delay or at a specified time of day.

⚠️ **WARNING**
This function should not be used in conjunction with remote two-wire control.
The soft starter will still accept start and stop commands from the remote inputs or serial communication network.
To disable local or remote control, use parameter 6Q.

3A, 3B – Reserved

Description: These parameters are reserved for future use.

3C – Auto-Stop Type

Options:	Off (default)	The soft starter will not auto-stop.
	Timer	The soft starter will auto-stop after a delay from the next start, as specified in parameter 3D.
	Clock	The soft starter will auto-stop at the time programmed in parameter 3D.

Description: Selects whether the soft starter will auto-stop after a specified delay, or at a time of day.

3D – Auto-Stop Time

Range:	00:01 - 24:00 (hours:minutes)	Default:	1 minute
Description:	Sets the time for the soft starter to auto-stop, in 24 hour clock format.		

4 Protection Settings

These parameters determine when the soft starter's protection mechanisms will activate.   The activation point for each protection mechanism can be set to suit the installation.

The soft starter responds to protection events by tripping, warning, or writing the event to the event log.   The response is determined by the Protection Action settings.   The default response is a trip.

⚠ CAUTION
The protection settings are vital for safe operation of the soft starter and motor.   Defeating the protection may compromise the installation and should only be done in the case of emergency.

4A – Excess Start Time

Excess start time is the maximum time the MVE will attempt to start the motor.   If the motor does not transition to Run mode within the programmed limit, the starter will trip.   Set for a period slightly longer than required for a normal healthy start. A setting of 0 disables excess start time protection.

Range:	0:00 - 4:00 (minutes:seconds)	Default:	20 seconds
Description:	Set as required.		

4B – Excess Start Time-2

Range:	0:00 - 4:00 (minutes:seconds)	Default:	20 seconds
Description:	Set as required.		

4C – Undercurrent

Range:	0% - 100%	Default:	20%
Description:	Sets the trip point for undercurrent protection, as a percentage of motor full load current. Set to a level between the motor's normal working range and the motor's magnetising (no load) current (typically 25% to 35% of full load current). A setting of 0% disables undercurrent protection.		

4D – Undercurrent   Delay

Range:	0:00 - 4:00 (minutes:seconds)	Default:	5 seconds
Description:	Slows the MVE's response to undercurrent, avoiding trips due to momentary fluctuations.		

4E, 4F – Instantaneous Overcurrent

The MVE can be configured to trip if the average current of all three phases exceeds a specified level while the motor is running. Refer to *4U, 4V – Instantaneous Overcurrent Stage 2* on page 22 for more information and examples.

Parameter 4E *Instantaneous Overcurrent*

Range:	80% - 600% FLC	Default:	400%
Description:	Sets the trip point for instantaneous overcurrent protection, as a percentage of motor full load current.		

Parameter 4F *Instantaneous Overcurrent Delay*

Range:	0:00 - 1:00 (minutes:seconds)	Default:	0 second
Description:	Slows the MVE's response to overcurrent, avoiding trips due to momentary overcurrent events.		

📄 NOTE
This protection is only active during run and must be coordinated with *Instantaneous Overcurrent Stage 2* (parameters 4U, 4V).

4G – Phase Sequence

Options: Any Sequence
Positive Only (default)
Negative Only

Description: Selects which phase sequences the soft starter will allow at a start.   During its pre-start checks, the starter examines the sequence of the phases at its input terminals and trips if the actual sequence does not match the selected option.

4H – Current Imbalance

Range:	10% - 50%	Default:	30%

Description: Sets the trip point for current imbalance protection.

4I – Current Imbalance Delay

Range:	0:00 - 4:00 (minutes:seconds)	Default:	5 seconds

Description: Slows the MVE's response to current imbalance, avoiding trips due to momentary fluctuations.

> **NOTE**
> The MVE will display a Current Imbalance trip only when phase loss at the supply terminals occurs during Run mode. When a phase loss occurs during other modes of operation, the MVE will trip on Motor Connection.

4J – Frequency Check

Options: Do Not Check
Start Only
Start/Run
Run Only (default)

Description: Determines when and if the starter will monitor for a frequency trip.

4K – Frequency Variation

Options: ± 2 Hz
± 5 Hz (default)
± 10 Hz
± 15 Hz

Description: Selects the soft starter's tolerance for frequency variation.

4L – Frequency Delay

Range:	0:01 - 4:00 (minutes:seconds)	Default:	5 seconds

Description: Slows the MVE's response to frequency disturbances, avoiding trips due to momentary fluctuations.

> **NOTE**
> If the mains frequency drops below 35 Hz or rises above 75 Hz, the starter will trip immediately, irrespective of the settings for Frequency Trip parameters.

4M – Restart Delay

Range:	00:01 - 60:00 (minutes:seconds)	Default:	30 minutes

Description: The MVE can be configured to force a delay between the end of a stop and the beginning of the next start. During the restart delay period, the display shows the time remaining before another start can be attempted.

4N – Motor Temperature Check

Options: Do Not Check (default)
Check

Description: Selects whether the MVE will verify the motor has sufficient thermal capacity for a successful start.   The soft starter compares the motor's calculated temperature with the temperature rise from the last motor start and only operates if the motor is cool enough to start successfully.

4O – Ground Fault Level

| Range: | 1 A - 40 A | Default: | 1 A |

Description: Sets the trip point for ground fault protection. Ground fault is a dynamic trip based on phase current measurements every half-cycle.

4P – Ground Fault Delay

| Range: | 0:01 - 4:00 (minutes:seconds) | Default: | 3 seconds |

Description: Slows the MVE's response to ground fault variation, avoiding trips due to momentary fluctuations.

> **NOTE**
> Ground fault accuracy is within ± 1 A of the set value.

4Q Undervoltage Level

| Range: | 100 – 18000 V | Default: | 100 V |

Description: Sets the trip point for undervoltage protection. Set as required.

4R Undervoltage Trip Delay

| Range: | 0:00 – 4:00 (minutes:seconds) | Default: | 5 seconds |

Description: Slows the MVE's response to undervoltage, avoiding trips due to momentary fluctuations.

4S Overvoltage Level

| Range: | 100 – 18000 V | Default: | 7200 V |

Description: Sets the trip point for overvoltage protection. Set as required.

4T Overvoltage Trip Delay

| Range: | 0:00 – 4:00 (minutes:seconds) | Default: | 5 seconds |

Description: Slows the MVE's response to overvoltage, avoiding trips due to momentary fluctuations.

4U, 4V – Instantaneous Overcurrent Stage 2

The MVE has two instantaneous trip functions, stage 1 and 2. These protection functions are configured to be complementary.

Stage 1 must be configured to protect the motor against a locked rotor (shearpin) situation during run mode. Stage 1 should trigger at lower current/higher time values than Stage 2.

Stage 2 must be configured to protect the main switching device. When Stage 2 triggers, the starter opens the main switching device.

If the main switching element is a contactor (protected by a fuse), then this function must be coordinated with the fuse to ensure that the contactor does NOT open until the fuse ruptures.

If the main switching element is a breaker, then the delay must be minimised to provide the best possible protection to the SCR.

Parameter 4U *Instantaneous Overcurrent S2*

| Range: | 30 A – 4400 A | Default: | 4400 A |

Description: Sets the trip point for instantaneous overcurrent stage 2 protection in amperes. Set as required.

Parameter 4V *Instantaneous Overcurrent Delay S2*

| Range: | 10 – 1000 ms | Default: | 10 milliseconds |

Description: Sets the duration required for current to exceed the level set in parameter 4U before a trip occurs. Set as required.

> **NOTE**
> This protection is active during starting, running and stopping. It must be coordinated with *Instantaneous Overcurrent* (parameters 4E, 4F).

Example: Contactor and Fuse
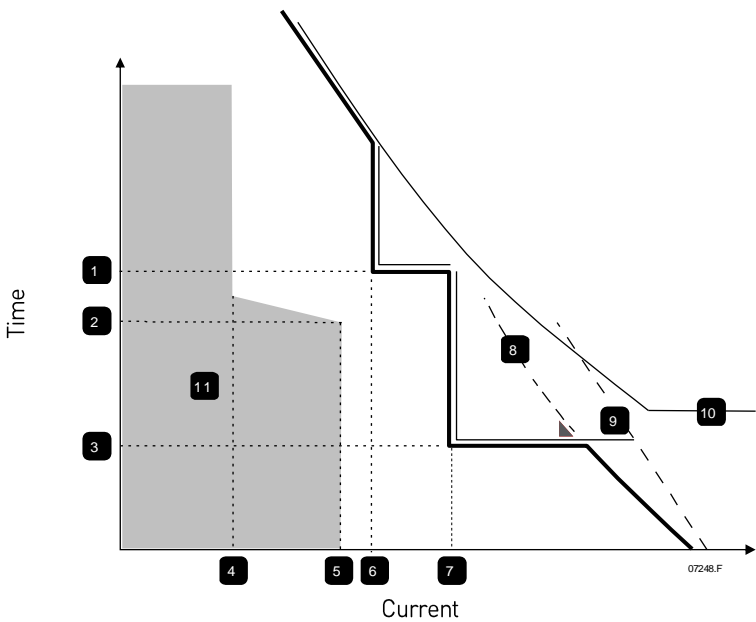
1	Instantaneous Overcurrent Delay - Stage 1 (4F)
2	Motor start time
3	Instantaneous Overcurrent Delay - Stage 2 (4V)
4	FLC
5	Motor start current
6	Instantaneous Overcurrent- Stage 1 (4E)
7	Instantaneous Overcurrent - Stage 2 (4U) to trip external upstream breaker
8	Fuse
9	SCR
10	Thermal model curve
11	Motor operation (shaded area of graph)

Example: Circuit Breaker
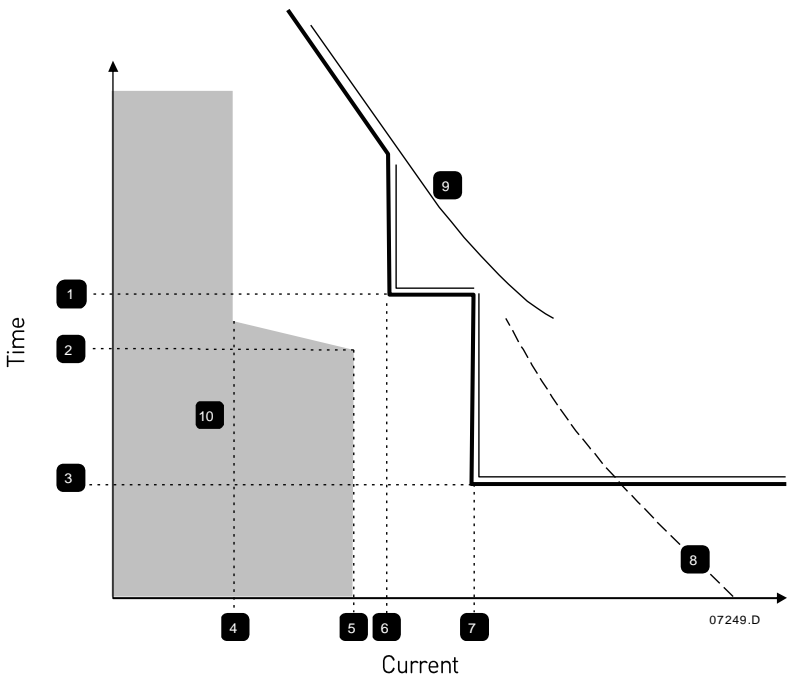
1	Instantaneous Overcurrent Delay - Stage 1 (4F)
2	Motor start time
3	Instantaneous Overcurrent Delay - Stage 2 (4V)
4	FLC
5	Motor start time
6	Instantaneous Overcurrent -Stage 1 (4E)
7	Instantaneous Overcurrent -Stage 2 (4U) to trip main breaker
8	SCR
9	Thermal model curve
10	Motor operation (shaded area of graph)

5 Auto-Reset Trips (Reserved)

This parameter group is reserved for future use.

6 Inputs

The MVE has two programmable inputs, which allow remote control of the soft starter.

6A – Input A Function

Options:	Motor Set Select	The MVE can be configured with two separate sets of motor data. To use the secondary motor data, parameter 6A must be set to 'Motor Set Select' and C53, C54 must be closed when a start command is given. The MVE checks which motor data to use at a start, and will use that motor data for the entire start/stop cycle.
	Input Trip (N/O) (default)	Input A can be used to trip the soft starter. When parameter 6A is set to Input Trip (N/O), a closed circuit across C53, C54 trips the soft starter. (Refer to parameters 6C, 6D, 6E)
	Input Trip (N/C)	When parameter 6A is set to Input Trip (N/C), an open circuit across C53, C54 trips the soft starter. (Refer to parameters 6C, 6D, 6E)
	Local/Remote Select	Input A can be used to select between local and remote control, instead of using the LCL/RMT button on the controller. When the input is open, the starter is in local mode and can be controlled via the controller. When the input is closed, the starter is in remote mode. The START and LCL/RMT buttons are disabled, and the soft starter will ignore any Local/Remote select command from the serial communications network. To use Input A to select between local and remote control, parameter 6Q must be set to 'LCL/RMT Anytime' or 'LCL/RMT When Off'.
	Emergency Run	In emergency run the soft starter continues to run until stopped, ignoring all trips and warnings (refer to parameter 15C for details). Closing the circuit across C53, C54 activates emergency run. Opening the circuit ends emergency run and the MVE stops the motor.
	Starter Disable	The MVE can be disabled via the control inputs. An open circuit across C53, C54 will disable the starter. The MVE will not respond to start commands. If running, the soft starter will allow the motor to coast to stop, ignoring the soft stop mode set in parameter 2H.

Description: Selects the function of Input A.

6B – Input A Name

Options:	Input Trip (default)	Controller
	Low Pressure	PLC
	High Pressure	Vibration
	Pump Fault	Field Trip
	Low Level	Interlock Trip
	High Level	Motor Temp
	No Flow	Motor Prot
	Starter Disable	Feeder Prot

Description: Selects a message for the controller to display when Input A is active.

6C – Input A Trip

Options:	Always Active (default)	A trip can occur at any time when the soft starter is receiving power.
	Operating Only	A trip can occur while the soft starter is running, stopping or starting.
	Run Only	A trip can only occur while the soft starter is running.

Description: Selects when an input trip can occur.

6D – Input A Trip Delay

Range:	0:00 - 4:00 (minutes:seconds)	**Default:**	0 second

Description: Sets a delay between the input activating and the soft starter tripping.

6E – Input A Initial Delay

Range:	00:00 - 30:00 (minutes:seconds)	**Default:**	0 second

Description: Sets a delay before an input trip can occur.   The initial delay is counted from the time a start signal is received.   The state of the input is ignored until the initial delay has elapsed.

6F, 6G, 6H, 6I, 6J – Input B Trip

Parameters 6F~6J configure the operation of Input B, in the same way as parameters 6A~6E configure Input A.   Refer to Input A for details.

- *6F Input B Function*   (**Default:** Input Trip (N/O))
- *6G Input B Name*   (**Default:** Input Trip)
- *6H Input B Trip*   (**Default:** Always Active)
- *6I Input B Trip Delay*   (**Default:** 0:00)
- *6J Input B Initial Delay*   (**Default:** 0:00)

6K, 6L – Reserved

These parameters are reserved for future use.

6M – Remote Reset Logic

Options: Normally Closed (default)
Normally Open

Description: Selects whether the MVE's remote reset input (terminals C41, C42) is normally open or normally closed.

6N, 6O, 6P – Reserved

These parameters are reserved for future use.

6Q – Local/Remote

Options:	LCL/RMT Anytime (default)	LCL/RMT selection is always enabled.
	LCL/RMT When Off	LCL/RMT selection is enabled when the starter is off.
	Local Control Only	The LCL/RMT button and all remote inputs are disabled.
	Remote Control Only	Local control buttons (START, RESET, LCL/RMT) are disabled.

Description: Selects when the LCL/RMT button can be used to switch between local and remote control, and enables or disables the local control buttons and remote control inputs.
The STOP button on the controller is always enabled.

⚠ **WARNING**
The STOP button on the controller is always enabled.   When using two-wire remote control, the soft starter will restart if the remote start/stop and reset inputs are still active.

6R – Comms in Remote

Options: Disable Control in RMT
Enable Control in RMT (default)

Description: Selects whether the starter will accept Start, Stop and Reset commands from the serial communication network when in Remote mode.   The Force Comms Trip and Local/Remote commands are always enabled.

7 Outputs

The MVE has three programmable outputs, which can be used to signal different operating conditions to associated equipment.

7A – Relay A Function

Options:	Off	Relay A is not used.
	Main Contactor (default)	The relay closes when the MVE receives a start command, and remains closed as long as the motor is receiving voltage.
	Run	The relay closes when the starter changes to run state.
	Trip	The relay closes when the starter trips (refer to parameter 16A to 16X).
	Warning	The relay closes when the starter issues a warning (refer to parameter 16A to 16X).
	Low Current Flag	The relay closes when the low current flag activates while the motor is running (refer to parameter 7M *Low Current Flag*).
	High Current Flag	The relay closes when the high current flag activates while the motor is running (refer to parameter 7N *High Current Flag*).
	Motor Temperature Flag	The relay closes when the motor temperature flag activates (refer to parameter 7O *Motor Temperature Flag*).
	Input A Trip	The relay closes when Input A activates to trip the soft starter.
	Input B Trip	The relay closes when Input B activates to trip the soft starter.
	Motor Overload	The relay closes when the starter trips on Motor Overload.
	Current Imbalance	The relay closes when the starter trips on Current Imbalance.
	Undercurrent	The relay closes when the starter trips on Undercurrent.
	Instantaneous overcurrent	The relay closes when the starter trips on Instantaneous Overcurrent.
	Frequency	The relay closes when the starter trips on Frequency.
	Ground Fault	The relay closes when the starter trips on Ground Fault.
	Heatsink Overtemperature	Not applicable to this product.
	Phase Loss	The relay closes when the starter trips on Phase Loss.
	Motor Thermistor	The relay closes when the starter trips on Motor Thermistor.
	Changeover Contactor	The relay closes when the high rotor resistance current ramp has reached full voltage, allowing use with a slip-ring motor.
	Undervoltage	The relay closes when the mains voltage drops below the level set in parameter 4Q.
	Ready	The relay closes when the starter transitions into Ready mode.

Description:	Selects the function of Relay A (normally open).

7B – Relay A On Delay

Range:	0:00 - 5:00 (minutes:seconds)	Default:	0 second

Description:	Sets the delay for closing Relay A.

7C – Relay A Off Delay

Range:	0:00 - 5:00 (minutes:seconds)	Default:	0 second

Description:	Sets the delay for re-opening Relay A.

7D~7I – Output Relays B and C

Parameters 7D~7I configure the operation of Relays B and C in the same way as parameters 7A~7C configure Relay A.   Refer to Relay A for details.

Relay B is a changeover relay.

- 7D *Relay B Function*   Default: Run
- 7E *Relay B On Delay*   Default: 0 second
- 7F *Relay B Off Delay*   Default: 0 second

Relay C is a changeover relay.

- 7G *Relay C Function*   **Default:**   Trip
- 7H *Relay C On Delay*   **Default:**   0 second
- 7I *Relay C Off Delay*   **Default:**   0 second

7J, 7L – Reserved

These parameters are reserved for future use.

7M – Low Current Flag

The MVE has low and high current flags to give early warning of abnormal operation.   The current flags can be configured to indicate an abnormal current level during operation, between the normal operating level and the undercurrent or instantaneous overcurrent trip levels.   The flags can signal the situation to external equipment via one of the programmable outputs.

The flags clear when the current returns within the normal operating range by 10% of the programmed flag value.

Range: 1% - 100% FLC   **Default:**   50%

Description: Sets the level at which the low current flag operates, as a percentage of motor full load current.

7N – High Current Flag

Range: 50% - 600% FLC   **Default:**   100%

Description: Sets the level at which the high current flag operates, as a percentage of motor full load current.

7O – Motor Temperature Flag

The MVE has a motor temperature flag to give early warning of abnormal operation.   The flag can indicate that the motor is operating above its normal operating temperature but lower than the overload limit. The flag can signal the situation to external equipment via one of the programmable outputs.

Range: 0% - 160%   **Default:**   80%

Description: Sets the level at which the motor temperature flag operates, as a percentage of the motor's thermal capacity.

7P, 7Q, 7R, 7S – Analog Output A

The MVE has an analog output, which can be connected to associated equipment to monitor motor performance.

<u>Parameter 7P</u> *Analog Output A*

Options:	Current (% FLC) (default)	Current as a percentage of motor full load current.
	Motor Temp (%)	Motor temperature as a percentage of the motor rated current (calculated by the soft starter's thermal model).
	Motor kW (%)	Motor kilowatts. 100% is motor FLC (parameter 1A) multiplied by mains voltage. Power factor is assumed to be 1.0.

$$\frac{\sqrt{3} \cdot V \cdot I_{FLC} \cdot pf}{1000}$$

| | Motor kVA (%) | Motor kilovolt amperes.   100% is motor FLC (parameter 1A) multiplied by mains voltage. |

$$\frac{\sqrt{3} \cdot V \cdot I_{FLC}}{1000}$$

| | Motor pf | Motor power factor, measured by the soft starter. |
| | Voltage (%Mains) | The average voltage measured on three phases as a percentage of the mains voltage. |

Description: Selects which information will be reported via Analog Output A.

<u>Parameter 7Q</u> *Analog A Scale*

Range: 0-20 mA
4-20 mA (default)

Description: Selects the range of the analog output.

<u>Parameter 7R</u> *Analog A Maximum Adjustment*

| Range: | 0% - 600% | | Default: | 100% |

Description: Calibrates the upper limit of the analog output to match the signal measured on an external current measuring device.

<u>Parameter 7S</u> *Analog A Minimum Adjustment*

| Range: | 0% - 600% | | Default: | 0% |

Description: Calibrates the lower limit of the analog output to match the signal measured on an external current measuring device.

7T~7W – Reserved

These parameters are reserved for future use.

8 Display

These parameters allow the controller to be tailored to individual users' requirements.

8A – Language

Options:	English (default)	Português
	Chinese	Français
	Español	Italiano
	Deutsch	Russian

Description: Selects which language the controller will use to display messages and feedback.

8B, 8C – F1 and F2 Button Action

Options: None
Setup Auto-Start/Stop

Description: Selects the function of the **F1** and **F2** buttons on the controller.

- 8B *F1 Button Action* **Default:** Setup Auto-Start/Stop

- 8C *F2 Button Action* **Default:** None

8D – Display A or kW

Options: Current (default)
Motor kW

Description: Selects whether the MVE will display current (amperes) or motor kilowatts on the main monitoring screen.

8E, 8F, 8G, 8H – User-Programmable Screen

Options:	Blank	Displays no data in the selected area, allowing long messages to be shown without overlapping.
	Starter State	The starter's operating state (starting, running, stopping or tripped). Only available for top left and bottom left positions on the screen.
	Motor Current	The average current measured on three phases.
	Motor pf	The motor's power factor, measured by the soft starter.
	Mains Frequency	The average frequency measured on three phases.
	Motor kW	The motor's running power in kilowatts.
	Motor HP	The motor's running power in horsepower.
	Motor Temp	The motor's temperature, calculated by the thermal model.
	kWh	The number of kilowatt hours the motor has run via the soft starter.
	Hours Run	The number of hours the motor has run via the soft starter.
	Analog Input	n/a
	Mains Voltage	The average voltage measured on three phases.

Description: Selects which information will be displayed on the programmable monitoring screen.

- 8E *User Screen - Top Left*   **Default:** Starter State
- 8F *User Screen - Top Right*   **Default:** Blank
- 8G *User Screen - Bottom Left*   **Default:** kWh
- 8H *User Screen - Bottom Right*   **Default:** Hours Run

8I, 8J, 8K, 8L – Performance Graphs

The MVE has a real-time performance graph to report the behaviour of critical operating parameters.

<u>Parameter 8I</u> *Graph Data*

Options:	Current (% FLC) (default)	Current as a percentage of motor full load current.
	Motor Temp (%)	Motor temperature as a percentage of the motor rated current (calculated by the soft starter's thermal model).
	Motor kW (%)	Motor kilowatts. 100% is motor FLC (parameter 1A) multiplied by mains voltage. Power factor is assumed to be 1.0.

$$\frac{\sqrt{3} \cdot V \cdot I_{FLC} \cdot pf}{1000}$$

| | Motor kVA (%) | Motor kilovolt amperes. 100% is motor FLC (parameter 1A) multiplied by mains voltage. |

$$\frac{\sqrt{3} \cdot V \cdot I_{FLC}}{1000}$$

| | Motor pf | Motor power factor, measured by the soft starter. |
| | Voltage (%Mains) | The average voltage measured on three phases as a percentage of the mains voltage. |

Description: Selects which information the graph will display.

<u>Parameter 8J</u> *Graph Timebase*

Options:	10 seconds (default)	10 minutes
	30 seconds	30 minutes
	1 minute	1 hour
	5 minutes	

Description: Sets the graph time scale. The graph will progressively replace the old data with new data.

<u>Parameter 8K</u> *Graph Maximum Adjustment*

Range:	0% – 600%	Default:	400%

Description: Adjusts the upper limit of the performance graph.

<u>Parameter 8L</u> *Graph Minimum Adjustment*

Range:	0% – 600%	Default:	0%

Description: Adjusts the lower limit of the performance graph.

8M – Mains Reference Voltage

Range:	100 – 14000 V	Default:	400 V

Description: Provides the reference voltage for the analog output and performance graphs.

9 Motor Data-2

The MVE can support two different starting and stopping motor data sets.

To select the secondary motor data set, a programmable input must be configured to parameter set selection (parameters 6A and 6F) and the input must be active when the soft starter receives a start signal.

NOTE
You can only choose which motor data set to use while the soft starter is stopped.

9A ~ 9E – Secondary Motor Settings

<u>Parameter 9A</u> *Reserved*

This parameter is reserved for future use.

<u>Parameter 9B</u> *Motor FLC-2*

Range:	5 - 1000 A	Default:	100 A

Description: Sets the secondary motor's full load current.

Parameter 9C *Reserved*

This parameter is reserved for future use.

Parameter 9D *Reserved*

This parameter is reserved for future use.

Parameter 9E *Reserved*

This parameter is reserved for future use.

10 Start/Stop-2

10A ~ 10I – Start/Stop-2

Refer to Start/Stop-1 (parameters 2A~2I) for details.

Parameter 10A *Start Mode-2*

Options:	Constant Current (default)		
Description:	Selects the soft start mode.		

Parameter 10B *Start Ramp-2*

Range:	0:01 - 3.00 (minutes:seconds)	Default:	1 second
Description:	Sets the ramp time for current ramp starting (from the initial current to the current limit).		

Parameter 10C *Initial Current-2*

Range:	100% - 600%	Default:	400%
Description:	Sets the initial start current level for current ramp starting, as a percentage of motor full load current. Set so that the motor begins to accelerate immediately after a start is initiated. If current ramp starting is not required, set the initial current equal to the current limit.		

Parameter 10D *Current Limit-2*

Range:	100% - 600% FLC	Default:	400%
Description:	Sets the current limit for constant current and current ramp soft starting, as a percentage of motor full load current.		

Parameter 10E *Reserved*

Description:	This parameter is reserved for future use.

Parameter 10F *Kickstart Time-2*

Range:	0 - 2000 (milliseconds)	Default:	0000 milliseconds
Description:	Sets the kickstart duration. A setting of 0 disables kickstart.		

Parameter 10G *Kickstart Level-2*

Range:	100% - 700% FLC	Default:	500%
Description:	Sets the level of the kickstart current.		

Parameter 10H *Stop Mode-2*

Options:	Coast To Stop (default) TVR Soft Stop		
Description:	Selects the stop mode.		

Parameter 10I *Stop Time-2*

Range:	0:00 - 4:00 (minutes:seconds)	Default:	0 second
Description:	Sets the stop time.		

11 RTD/PT100 (Reserved)

This parameter group is reserved for future use.

12 Slip-Ring Motors

These parameters allow the soft starter to be configured for use with a slip-ring motor.

12A – Motor 1 Ramp

Options:	Single Ramp (default)
	Dual Ramp
Description:	Selects whether to use a single or dual current ramp profile for soft starting. Set to single ramp for non-slip ring induction motors, or dual ramp for slip-ring induction motors.

12B – Motor 2 Ramp

Options:	Single Ramp (default)
	Dual Ramp
Description:	Selects whether to use a single or dual current ramp profile for soft starting. Set to single ramp for non-slip ring induction motors, or dual ramp for slip-ring induction motors.
	Parameter 12B selects the ramp configuration for the secondary motor.

12C – Changeover Time

Range:	100 - 500 (milliseconds)	Default:	150 milliseconds
Description:	Sets the delay between the rotor resistance relay closing and the low resistance current ramp starting. Set so that the contactor has enough time to close, but the motor does not slow down.		
	Parameter 12C only applies if parameter 12A or 12B is set to 'Dual Ramp', and an output relay is set to 'Changeover Contactor'.		

12D – Slip-Ring Retard

Range:	10% - 90%	Default:	50%
Description:	Sets the level of conduction after the rotor resistance contactor closes, as a percentage of full conduction. Set so that no current pulse occurs, but the motor retains enough speed to start correctly.		

15 Advanced

15A – Access Code

Range:	0000 - 9999	Default:	0000
Description:	Sets the access code to control access to restricted sections of the menus.		
	Use the ◄ and ► buttons to select which digit to alter and use the ▲ and ▼ buttons to change the value. After the last digit is set press STORE.		

📄 **NOTE**
In the event of a lost access code, contact your supplier for master access code that allows you to re-program a new access code.

15B – Adjustment Lock

Options:	Read & Write (default)	Allows users to alter parameter values in the Programming Menu.
	Read Only	Prevents users altering parameter values in the Programming Menu. Parameter values can still be viewed.
Description:	Selects whether the controller will allow parameters to be changed via the Programming Menu.	

15C – Emergency Run

Options: Disable (default)
                  Enable

Description: Selects whether the soft starter will permit emergency run operation.   In emergency run, the soft starter will start (if not already running) and continue to operate until emergency run ends, ignoring stop commands and trips.
                  Emergency run is controlled using a programmable input.

> ⚠ **CAUTION**
> Continued use of Emergency Run is not recommended. Emergency Run may compromise the starter life as all protections and trips are disabled.
>
> Using the starter in 'Emergency Run' mode will void the product warranty.

16 Protection Action

These parameters define how the soft starter will respond to different protection events.   The soft starter can trip, issue a warning, or ignore different protection events as required.   All protection events are written to the event log.   The default action for all protections is to trip the soft starter.

> ⚠ **CAUTION**
> Defeating the protection may compromise the starter and motor, and should only be done in the case of emergency.

16A~16W   –   Protection Actions

Options: Trip Starter (default)
                  Warn and Log
                  Log Only

Description: Selects the soft starter's response to each protection.
- 16A *Motor Overload*
- 16B *Excess Start Time*
- 16C *Undercurrent*
- 16D *Instantaneous Overcurrent*
- 16E *Current Imbalance*
- 16F *Frequency*
- 16G *Input A Trip*
- 16H *Input B Trip*
- 16I *Motor Thermistor*
- 16J *Starter Communication*
- 16K *Network Communication*
- 16L *Reserved*
- 16M *Battery/Clock*
- 16N *Ground Fault*
- 16O~16U *Reserved*
- 16V *Undervoltage*
- 16W *Overvoltage*

20 Restricted

These parameters are restricted for Factory use and are not available to the user.

**RIGHT FROM
THE START**

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