SIEMENS

English

ADVANCED OPERATOR PANEL (AOP)

Operating Instructions Issue 07/05

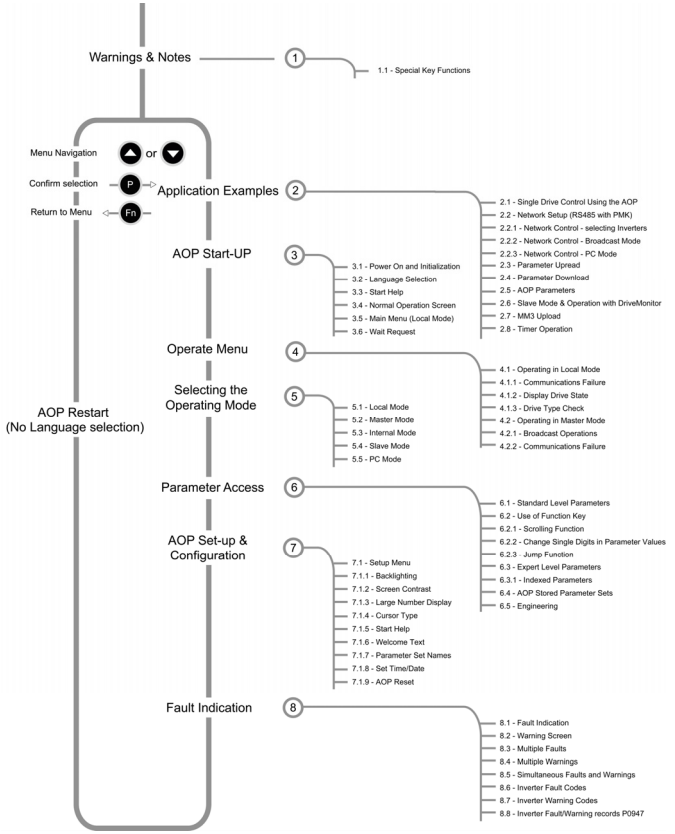


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AOP Menu Structure

The diagram below gives an overview of the menu structure of the AOP.



Introduction

The Advanced Operator Panel (AOP) has been designed to enhance the interface and communications capability of the MICROMASTER 4th generation frequency inverters.

For details on the operation of the AOP see the following Sections:

Section 2 -	Application Examples
Section 3, 4 & 5 -	AOP First Start-up and Mode Selection
Section 6 -	Parameter Access and Controlling the inverter with the AOP
Section 7 -	AOP Set-up and Configuration
Section 8 -	Fault Indication

1 Warnings and Notes

Warnings

- The AOP will not START or STOP an attached inverter until it has been set as the command source. (P0700 = 4 or 5)
- If the AOP has been set as the I/O control (P0700= 4 or 5); to prevent unexpected drive operation, the USS timeout parameter (P2014) should be set to 5000. (The removal of the AOP from the inverter in this mode will then cause a trip in 5 seconds).
- The AOP can be fitted to and removed from the inverter whilst power is applied.
- The AOP will set the USS PZD (P2012) length to 4 when connected to an inverter.
- The AOP uses the USS PZD status word to monitor and control connected inverters. Parameter P2016 and P2019 should not be changed from their default values when an AOP is used either as the master or as a cloning device and the command source is USS, as unexpected behavior may occur.
- When the inverter has been set so that AOP has control (P700 = 4 or 5) the drive control buttons Start, Stop, Jog and Reverse can control the drive at all times.

Notes

- **Parameter edit – Bit field indicator** — When editing a bit field type parameter the AOP increments the displayed value as a binary number. For a full description of the binary values please see the inverter user guide.

- **Inhibit** — When the AOP displays 'Inhibit' this indicates that the inverter is in an inhibit mode of operation as reported on the USS message. This will be cleared when the drive has had a valid start/stop command from the AOP. On First power-up send an OFF1 command to the inverter before trying to run the inverter; this must also be done when the inverter is under Automatic Timer Control.

- **Memory Limitation**
  The AOP supports five European Languages; English, German, French, Spanish and Italian. ***Due to internal memory limitations the user should delete one of these languages in order to upread the specified ten parameter sets that can be held on the AOP.***

- **To Delete a Language**
  Select "Language" from the top level menu, highlight the language you want to delete then press "Fn" and "↑". ***Please note that once a Language has been deleted it cannot be restored.***

- **Support of drive inverters MICROMASTER 420 and 440**
  This AOP (6SE6400-0AP00-0AA**1)** supports all versions of MICROMASTER 420 and 440 inverters holding parameter information for the newest version of drive available at the time of AOP manufacture. However for parameters that are present on newer versions but not present on the older versions of firmware the AOP will display "not accessible"

1.1 Special Key Functions

Function	Keypad Strokes
Main Menu	Fn and P simultaneously, at any time, will display the main menu.
Help	Fn and ▼ simultaneously, at any time will display the relevant help screens.
Delete Parameter Set	Fn and ▲ when uploading a parameter set is used to delete a stored parameter set.
Software Version	Fn and ▲ when viewing a stored parameter set to see the software version.
Top Level Menu	Fn and P to go to top level menu

 Is used throughout the manual to indicate a keypad special function.

2 Applications Examples

2.1 Single drive control using the AOP

To configure a single inverter with the AOP as the control source, the following procedure should be performed to change the required parameters.

1. Fit the AOP to the inverter.
2. Using ▲ and ▼ select the required Language for the display.
3. Press P to confirm the language selection.
4. Press P to bypass the Start Help.
5. Using ▲ and ▼ select Parameters.
6. Press P to confirm selection.
7. Select All Parameters.
8. Press P to confirm selection.
9. Using ▲ and ▼ select P0010
10. Press P to edit the parameter value.
11. Set P0010 access level to 1
12. Press P to confirm selection.
13. Using ▲ and ▼ select P0700.

14. Press P to edit the parameter value.
15. Set P0700 = 4 (AOP).
16. Press P to confirm selection.
17. Using ▲ and ▼ select P1000.
18. Set P1000 = 1 (MOP Setpoint).
19. Using ▲ and ▼ select P0010
20. Press P to edit the parameter value.
21. Set P0010 access level to 0
22. Press P to confirm selection.
23. Press Fn to return to r0000.
24. Press P to display the standard screen.
25. Press I to start the inverter/motor.
26. Using ▲ the output will increase
27. Using ▼ the output will decrease
28. Press 0 to stop the inverter/motor.

Note

- If the AOP is to be used as the normal control means for the inverter it is recommended that the user Set P2014.1 = 5000. To do this first set P0003 = 3. This setting will cause the drive to trip if communication with the control source, the AOP, is lost.
- If you have problems connecting to the inverters – set the Auto Baud to OFF and the default baud rate to the same as the inverter. See Section 2.5 on page 10.

2.2 Network Setup (RS 485 With Panel Mounting Kit)

There are two main modes of operation for the AOP when connected to a network of Micromaster 4th generation drive. These modes are both under the Master mode of operation on the AOP allowing a single drive to be accessed on the network with full control/parameter access or selecting B or broadcast mode all drives on the network can be set to start/stop at the same time.

The AOP has the capability to control up to 31 inverters connected as a network. A unique two-digit number identifies each inverter.

To set-up a network of inverters under the control of an AOP, the following procedure should be performed:

1. Connect the RS485 using the Standard Panel Mounting Kit (PMK).

Notes

- Panel Mounting Kit

  1. The correct wiring for the PMK and inverter is as follows:
     PIN3 = +24 V
     PIN4 = 0 V
     PIN 1 & 2 = 485 Comms
     On 420 PIN1 ⇒ PIN14 (420) PIN29 (440)
     PIN2 ⇒ PIN15 (420) PIN30 (440)
  2. The use of twisted twin cable or shielded cable is preferred.
  3. The inverter at the end of the network should have a 120Ω terminating resistor across the RS485 pins.
  4. A common earth plane should be used for all inverters and the PMK.

- For the early issue of the PMK Switch 1 of the DIP switch on board must be UP or ON for correct communication.

1. Configure the inverter for network use.
2. Each drive should be assigned a unique RS485 USS address in the range of 0 to 30.

   To do this set P003 = 2 and using P2011 assign a unique address to each inverter

3. Set the control over the USS on the communications port.
   Follow the process as in 2.1 above, in step 15 set P0700 = 5 (USS on Com link)

4. With the drives powered-up on the network, connect and power-up the AOP on the PMK.
5. At start-up of the AOP select MASTER mode.
6. Select Operate.
7. The AOP will now show all inverters on the network.
8. Select either a single inverter or broadcast mode of operation.
9. Press I to start the inverter/motor.
10. Press 0 to stop the inverter/motor.

Note

- If the AOP is to be used as the normal control means for the inverter it is recommended that the user Set P2014.0 = 5000. To do this first set P0003 = 3. This setting will cause the drive to trip if communication with the control source, the AOP, is lost.



Press the Fn and P keys at the same time to go to the top-level menu.

2.2.1 *Network control – selecting Inverters*

From the top-level menu select operate: Attached network of drives are then checked and for each connected drive an '**O**' should appear.

If there is a fault on a connected drive '**F**' should appear- use ▲ and ▼ to select the drive and clear the fault.

2.2.2 *Network control – Broadcast Mode*

From the top-level menu select operate: Attached network of drives are then checked and for each connected drive an '**O**' should appear.

Select 'B' and press P to enter Broadcast mode of operation, at any time Fn will leave this mode.

2.2.3 *Network control – PC Mode*

The AOP may be configured as an RS232 to RS485 converter. This will allow a PC running software such as DriveMonitor to connect to a network of drives, as described above.

To enter this mode select PC from the Mode menu followed by the desired baud rate of operation. The PC should be connected to the PMK using a Null Modem lead, as described in the PMK brochure.

2.3 Parameter Upread

Important Notes

- **Support of drive inverters MICROMASTER 440.**
  The AOP will normally only upload and download parameters up to and including level 3. When copying parameter sets between inverters the user must again **complete** the quick commissioning and the motor identification for the inverter to modify internal parameters (level 4). This is important for sensor less vector control. To do this set P1910 = 3.

  Alternatively the commissioning PC software "STARTER" may be used to perform upread/download completely in order to clone a MICROMASTER 440.

- **Memory Limitation**
  The delivered AOP supports five European Languages of English, German, French, Spanish and Italian. ***Due to internal memory limitations the user should delete one of these languages in order to upread the specified ten parameter sets that can be held on the AOP.***

- **To Delete a Language**
  To do this Select "Language" from the top level menu, highlight the language you want to delete then press "Fn" and "↑". ***Please note that once a Language has been removed it cannot be restored.***

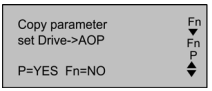
The upread facility allows a user to read the parameter set from an inverter to the AOP and store the parameter set within the AOP's internal memory. The AOP can read from a single inverter in local mode or from one specified inverter on a network of inverters in master mode.

The AOP can upread up to 10 parameter sets from the connected inverters, the number of sets will depend on the type of inverters that are connected to the AOP. For more details on available memory see P8562 in the relevant parameter list or Section 2.5 on page 10 of this manual. It should be noted that the timer settings also use AOP memory.

To upread a parameter set from an inverter to the AOP the following procedure must be performed:

1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until 'UPREAD' is highlighted.
2. Press the P key to confirm the selected option.

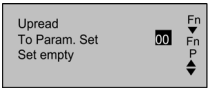
The user is then presented with the Upread menu.



3. Press the P key to confirm or Fn to cancel the process.

In Master mode the user would have to select a specific inverter from the networked inverters.

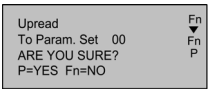
4. Using the ▲ and ▼ keys scroll through the parameter sets and select the desired parameter set into which the information will be written.



If the selected parameter set already contains a parameter set the user will be given the option to clear the existing parameter set.

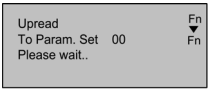
Pressing the Fn and ▲ keys simultaneously when uploading will delete the existing parameter set. When viewing stored parameter sets this same key combination will display the software version number of the uploaded parameter set.

The user will be presented with a confirmation screen.

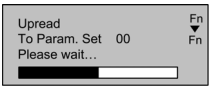


5. Press the P key to confirm or Fn to cancel the process.

The user will be presented with a 'wait' screen while communications with the specified inverter is established.



Once communications have been successfully established and the upread is proceeding, the user is presented with a further 'wait' screen.



On completion of the upread process the user will be returned to the Main Menu.

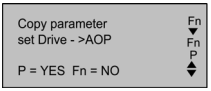
2.4 Parameter Download

The download facility allows a user to write a parameter set to an inverter connected in local mode and to a single specified inverter on a network of inverters in master mode.

In master mode a specific inverter must be designated as the recipient inverter. The download cannot be accomplished across all connected inverters simultaneously.

1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until 'DOWNLOAD' is highlighted.
2. Press the P key to confirm the selected option.

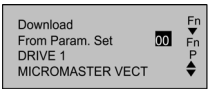
The user is then presented with the download menu.



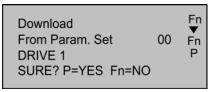
3. Press the P key to confirm or Fn to cancel the process.

In Master mode the user would have to select a specific inverter from the networked inverters.

4. Using the ▲ and ▼ keys scroll through the parameter sets of the AOP, from which the information is to be written.

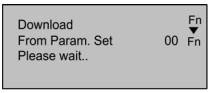


The user will be presented with a confirmation screen.

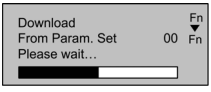


5. Press the P key to confirm or Fn to cancel the process.

The user will be presented with a 'wait' screen while communications with the specified inverter is established.



Once communications have been successfully established and the download is proceeding, the user is presented with a further 'wait' screen.



On completion of the download process the user will be returned to the Main Menu.

Note

- Should the AOP download fail the user should:

1. Parameter reset the Inverter (P0010 = 30, P0970 = 1).
2. Power cycle the Inverter.
3. Repeat the download.

2.5 AOP Parameters

To access the Advanced Operator Panel's internal parameter set, the following procedure must be performed:

1. Set mode to 'Internal' as described in Section 5 on page 21.
2. Select 'Parameters' as described in Section 6 on page 22.
3. Select the AOP Parameter Set.
4. View 'All' parameters.
5. Set P0003 = 3.

The AOP internal parameters that display useful information are as follows:

P0964	Software Version Information
P8552	Base slave address
P8553	Default baud rate
P8564	Enable Autobaud
P8560	Battery level
P8561	Enable Backlight
P8562	Free Memory
P8563	Enable Text Scrolling
P8564	RS232 Error count
P8565	RS485 Error count
P8566	Null USS Responses
P8567	USS Timeouts

2.6 Slave Mode and operation with DriveMonitor

The AOP may be connected to a PC running DriveMonitor.

Note

- The default baud rate for this mode of operation is 9600 bps, and the PZD length should be set to 4.

The following procedure should be used:

1. Upread parameter sets from inverters as required.
2. For each uploaded set the storage location and drive type.
3. Run DriveMonitor on the PC.
4. Select Drive type, Software version and Network address.

Note

- Storage location 0 is network address 0 etc.

5. Select on-line for the parameter set

6. Using a PMK or a DTK connect the AOP to the PC.

7. In Mode menu on the AOP select Slave.

Parameters other than read only are then available on the PC for viewing as required.

Note

- Macro parameters rely on the drive operation for correct update of all dependant parameters — these parameters should only be modified when connected to an inverter.

2.7 MM3 Upread

It is possible to use the AOP to upread a parameter set held on an MM3 inverter. To do this the user must use a PMK as an RS232 to RS485 converter to allow the AOP to communicate with the MM3. Once in this configuration the MM3 upread mode should be selected from the 'MODE' menu.

The AOP can upread up to 10 parameter sets from the connected inverters, the number of sets will depend on the type of inverters that are connected to the AOP. For more details on available memory see P8562 in the relevant parameter list or Section 2.5 on page 10 of this manual. It should be noted that the timer settings also use AOP memory.

This parameter set can then be transferred to a PC using DriveMonitor as described in the previous section.

2.8 Timer Operation

Notes

- Before using the Timer function as a control method, the user should set the Real Time Clock of the AOP as described in Section 7.1.8 on page 29.
- Setting a timing event for EVERY DAY will put a separate event with the same configuration settings in every day of the week. These must be cleared individually.
- When multiple events need to be cleared from the timer function it may be easier to reset the AOP as described in Section 7.1.9 on page 30.
- When in Master mode of operation and viewing the inverters connected a "T" is displayed in the top left corner of the display to indicated that the connected inverters are under timed remote control and may therefore start or stop unexpectedly.

The timer menu can be accessed from the top-level menu when in Local or Master (Network) mode of operation. The timer operates as a simple seven day, time of day on/off controller — much like a central heating controller but with the addition of a possible multi-inverter selection.

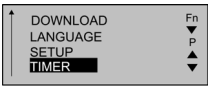
Keys and Symbols for Timer Operation

Key	Function
▼	To move down through the available choices of the highlighted field.
▲	To move up through the available choices of the highlighted field.
P	A short press will confirm the changed field and move the cursor to the next field.
P	A long press will move the cursor back to the previous field.
Fn	Cancels the current settings and returns the user to the Main Menu. **All changes will be discarded.**
Fn ▲	Cancels the entire timer event current display.
0 …31	Available USS inverter network settings 0 to 31 are selectable when the inverter at that address has been detected by the AOP in Master mode.
B	Allows the programmed timing event to be communicated to all connected drives.
|	This is the ON symbol, indicating that the currently viewed or programmed event is when the inverter will be switched on.
◌	This is the OFF symbol, indicating that the currently viewed or programmed event is when the inverter will be switched off.

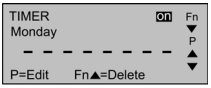
To set the timer to control the connected inverters the following procedure should be performed:

To Set a Timed Event

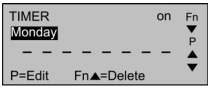
1. Using the ▲ and ▼ keys select TIMER from the Main Menu.



2. Press P to confirm selection.
3. The user is then presented with the TIMER screen.



4. If necessary use the ▲ and ▼ keys to select ON.
5. Press P to confirm the selection and move the cursor to the Day of the Week field.

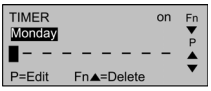


6. Using the ▲ and ▼ keys select to required Day of the Week.

Note

- If EVERYDAY is selected, the programmed events will be placed, by the AOP in every day of the week.

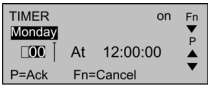
7. Press P to confirm the selection and move the cursor to the Event View field.



Note

- If no events are programmed into the AOP, the cursor will still move to this field.

8. Press P to move the cursor to the Inverter Address field.

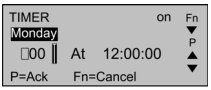


9. Using the ▲ and ▼ keys select the required inverter address.

Note

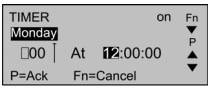
- The inverter addresses are a numerical value from 0 to 31 for individual inverters. These addresses should have been previously set as described in Section 2.2 Network Setup. If you wish to send the timed event to all connected inverters, then select "**B**" which is the broadcast mode.

10. Press P to confirm the selection and move the cursor to the ON/OFF field.



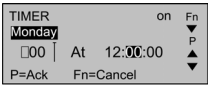
11. Using the ▲ and ▼ keys select either | for ON or ○ for OFF.

12. Press P to confirm the selection and move the cursor to the HOUR field.



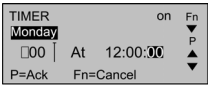
13. Using the ▲ and ▼ keys select the required HOUR.

14. Press P to confirm the selection and move the cursor to the MINUTE field.



15. Using the ▲ and ▼ keys select the required MINUTES.

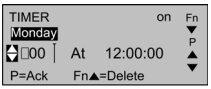
16. Press P to confirm the selection and move the cursor to the SECONDS field.



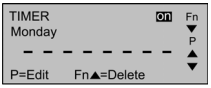
17. Using the ▲ and ▼ keys select the required MINUTES.

18. Press P to confirm the selection.

    The cursor will move to the Event View field.



19. Using the ▲ and ▼ keys select a blank event screen to set the required ON or OFF time for the inverter, depending upon what timing event was previously set.



20. To program a new event; perform steps 8 through 19 above.

    Ensure that a new blank event screen is selected, as any entry in a previous event will overwrite the previously entered data.

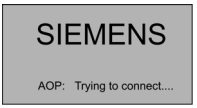
21. To **EXIT** from the TIMER screen and save the changes, two long presses of the P are required.

22. To **CANCEL/DELETE** an event, press the Fn and ▲ keys simultaneously.

3 AOP Start-Up

3.1 Power On and Initialization

On Power-up the AOP will display the welcome screen.

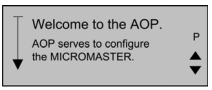


Once the AOP to inverter communications has been established the welcome screen is replaced by one of the following:

Language selection menu (only at first power-up or after a reset).

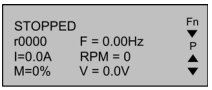


Start help page (start help is ON).



Normal operation display (start help is OFF).

Display type depends on the operating mode in use.



3.2 Language Selection

The AOP has the ability to display information in a number of languages.

Notes

- Prior to language selection the AOP has no control over the inverter.
- **Memory Limitation**
  The delivered AOP supports five European Languages of English, German, French, Spanish and Italian. ***Due to internal memory limitations the user should delete one of these languages in order to upread the specified ten parameter sets that can be held on the AOP.***
- **To Delete a Language**
  Select “Language” from the top level menu, highlight the language you want to delete then press “Fn” and “↑”. ***Please note that once a Language has been removed it cannot be restored.***

Language selection is performed with the AOP on-line and connected to the inverter. After powering-up and the AOPs internal self-test has been performed, the user will be prompted to select a language:

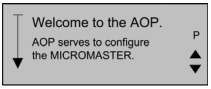


Use the ▲ and ▼ keys to select the required language.

Press the P key to confirm the language selection.

3.3 Start Help

If the Start Help function is set to ON the on-line help screens are displayed after the initial set-up routine is completed.



Use the ▲ and ▼ keys to scroll through the available screens.

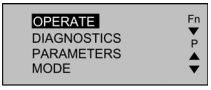
An arrow on the left-hand side of the screen will indicate if more information is available and the direction in which to navigate using the ▲ and ▼ keys.

Use the P key to return to the previous screen, or to move past the help screen onto the main menu.

Press Fn and P simultaneously, at any time, to return to the main menu.

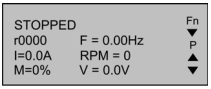
3.4 Normal Operation Screen

Once a language has been selected, the user is presented with the main menu screen.



The user then selects OPERATE

The screen now displays the current state of the inverter and motor.



An explanation of the information displayed on the screen is given in the following table:

Display	Description
RUNNING	Inverter is in a running state with pulses enabled.
STOPPED	Inverter stopped – pulses disabled.
FAULT	Inverter will not run; a fault as described by the AOP under Diagnostics is preventing operation.
WARNING	Inverter has detected a problem in normal operation and is informing the user of the condition of the inverter.
INHIBIT	A previously occurring fault or OFF condition is preventing the inverter operating. Sending an OFF1 command from the currently active command source clears this condition.
r0000	Indicates that a read-only parameter. r0000 is the normal operating display.
F= 0.00 Hz	Indicates the frequency at which the inverter/motor is running.
I= 0.0 A	Indicates the output current.
RPM= 0	Indicates the speed of the motor
M= 0%	Indicates the current torque of the motor.
V= 0.0 V	Indicates the output voltage.
Vdc= 0.0V	Indicates the dc link voltage.
Fn + ▼	Pressing these keys simultaneously will display the help pages.
P	Pressing P will select the parameter access screen.
▼▲	Use these keys to scroll through information on the display.
⬅➡	Indicates the direction of the running motor.



Pressing Fn and P simultaneously will display the main menu.

3.5 Main Menu (Local Mode)

Once the AOP has successfully initialized itself, the Start Help screen is displayed.

Press P and the Main Menu is displayed.

From here the user can select the mode of operation and the sub-menu's. If Local Mode is selected and then Operate, the user can change parameters on the directly connected inverter.

If the following parameters are changed:

P0700 = 4

P2014.1 = 5000

The user can then start and stop the inverter in Local Mode.

See Section 2 on page 4 for further details.

The following options are available to the user:

Options	Description
OPERATE	Displays the current status of the inverter/motor.
DIAGNOSTICS	Displays a recent fault history.
PARAMETERS	Allows the user to configure individual parameters or parameter groups for specific applications.
MODE	Allows the user to select the AOPs mode of operation as follows: LOCAL MASTER INTERNAL SLAVE PC Mode MM3 Upload
UPREAD	Allows the user to read a parameter set from the inverter into the AOP.
DOWNLOAD	Allows the user to write a parameter set to the inverter.
LANGUAGE	Allows the user to select a new language for the AOP display.
SETUP	Allows the user to personalize the configuration of the AOP.
TIMER	Allows the user to set a start and stop time for the inverters operation.

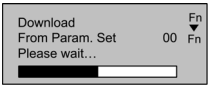


Press the Fn and P simultaneously, at any time will return the user to the main menu.

3.6 Wait Request

Some operations that the inverter is requested to perform may take some time to complete.

A screen (an example is shown below) is displayed to inform the user that the AOP is waiting for the inverter to complete a task.



4 Operate Menu

4.1 Operating in Local Mode

When the AOP is connected to an inverter, Local mode is automatically selected. The operating mode can be changed via the Main Menu as necessary according to the users requirements. For more information on how to set the parameters, see Section 6 below.

Function of Control Keys

Button	Function
0	Stops the motor running.
I	Starts the motor running.
jog	Move the motor at a preset frequency. When the key is released the motor stops.
	Reverses the direction of the motor.
P	Accesses the parameter settings.
Fn	1. A short press toggles the position of the cursor when editing parameters. 2. A long press returns the user to the previous screen.



Pressing Fn and P simultaneously, in any screen or sub-menu will return the user to the main menu.

4.1.1 Communications Failure

When communications between the AOP and the inverter fail a warning screen is displayed.

The user must press P to acknowledge the fault condition.

If a fault occurs again, the AOP will assume it is not connected to an inverter. The user is then returned to the Main Menu.

If the AOP has failed to establish initial communications with an inverter, any attempt to issue the “operate” command from the Main Menu will result in an error warning screen being displayed.

The user must press P to acknowledge the fault condition. The user is then returned to the Main Menu.

4.1.2 Display Drive State

The AOP has the ability to monitor the state of the inverter and motor to which it is connected.

The current activity of the inverter and motor will be displayed, including any fault conditions.

4.1.3 Drive Type Check

The AOP will check the type of inverter to which is connected. If the drive type is incompatible with the AOP, it will refuse to function and return the user to the Main Menu.

4.2 Operating in Master Mode

Selecting 'Operate' from the Main Menu with Master mode configured produces an operation screen display as shown below:

A slave inverter is selected by using the and keys.

Up to 30 inverters can be connected and controlled by one AOP.

A two-digit number on the left-hand side of the display identifies each inverter.

In the top left-hand on the screen an icon is displayed indicating the current status of the inverters operation. A list of all the icons is shown below.

To configure inverters for network operation, the following parameters should be set to the indicated values:

P0700 = 5

P2014.0 = 5000

P2011.0 = Unique number for each drive on the network.

For more information on setting inverter for network operation, see Section 2.2 above.

Button	Function
	Indicates the inverter is active and communicating.
	Indicates no active slave (icon is blank).
F	Indicates an inverter fault has been recorded and the inverter has tripped.
A	Indicates an inverter with active warnings.
	Indicates an inverter with communications problems.
ρ	Indicates a non-MM4 inverter (possibly MM3) - parameter upload only.

4.2.1 Broadcast Operations

Warning

Parameter P2011=31 cannot be selected using the AOP. If P2011=31 is selected using software such as DriveMonitor or STARTER, the inverter will enter Broadcast Mode and will not respond to any commands from the AOP. In Broadcast Mode the inverter will only respond to broadcast messages.

The purpose of the broadcast function is to allow all connected inverters to be controlled simultaneously.

With the broadcast function selected it is possible to perform the following functions on all connected inverters:

- Start
- Stop

The P key does not function in the broadcast mode since parameters cannot be edited on a global basis.

The ▲ and ▼ keys still function in broadcast mode. For example, it would be possible to change the speed of the motor simultaneously across all connected inverters.

4.2.2 Communications Failure

If at any time, communications fail between the AOP and a connected slave inverter, a 'Slave Error' warning screen is displayed. This screen will indicate which slave inverter is not working correctly.

The P key must be pressed to acknowledge the fault condition.

Should the fault condition occur again, then the user will be returned to the Main Menu and will not be allowed to enter the 'local' Operate mode.

5 Selecting the Operating Mode

The Mode Menu allows the user to select the required operating mode of the AOP. The modes supported by the AOP are listed below:

- LOCAL
- MASTER
- INTERNAL
- SLAVE
- PC mode
- MM3 Upload (see Section 5)

To exit a selected mode either follow the on screen instruction or select Mode from the top level menu and change to a different mode of operation.

A summary of the various modes and their limitations is contained in the table below.

When changing the mode of the AOP, the user is always presented with a confirmation screen.

Press P to confirm the selected mode.

Press Fn to return to the Main Menu.

LOCAL	MASTER	INTERNAL	SLAVE	PC Mode	MM3 Upload
Operate	Operate				
Diagnostics	Diagnostics	Diagnostics			
Parameters	Parameters	Parameters			
Mode	Mode	Mode	Mode	Mode	Mode
Upread	Upread				Upread
Download	Download				
Language	Language	Language			Language
Setup	Setup	Setup			Setup
Timer	Timer	Timer			
		Engineering			

The various modes are selected from the Main Menu using the following procedure:

1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until the required mode is highlighted.

2. Press the P key to confirm the selected option.

5.1 Local Mode

In Local mode the AOP is normally mounted directly onto the inverter. Once mounted it scans both the RS232 and the RS485 ports and establishes communication with the first port that answers the AOPs interrogation.

Communications, as previously stated, are performed through the RS232 and RS485 ports. Full operator control of the inverter is available with access to all normal inverter and AOP internal parameters.

This mode is designed to work with only one inverter and is the default setting of the AOP on initial power-up or after a reset has been performed.

5.2 Master Mode

In Master mode the AOP can control up to 31 inverters connected in a multi-drop arrangement.

Full operator control of each inverter is possible with access to all normal inverter and AOP internal parameters.

Control of the inverters may be individual or by the broadcast method previously described. In the broadcast mode it is possible only to start and stop the motor directly simultaneously.

5.3 Internal Mode

In Internal mode the user has access to the AOP's own parameter sets, which are store within the AOP's hardware. No access is given, in this mode, to the parameter sets held within the inverter.

5.4 Slave Mode

In this mode the AOP is configured to communicate with a PC utilizing the AOP Desk Mounting Kit and communications software, such as, Starter or DriveMonitor. The AOP in this configuration acts as a slave to the PC, allowing the upread of parameter sets or the AOPs internal parameter set to be accessed as a USS address, numbered 1 to 10.

5.5 PC Mode

In PC mode the AOP is configured to act as an RS232/485 converter when used with a Panel Mount Kit, enabling an attached PC, with suitable software to control a network of inverters.

The only function that can be modified in this mode of operation is the communications baud rate.

See notes on Network Set-up for PMK configuration on page 5.

6 Parameter Access

6.1 Standard Level Parameters

The AOP has been designed to allow the editing of individual parameters within the inverter.

Access levels control the access to parameters. Each level allowing the user to use a more sophisticated control technique for the applications.

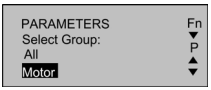
The access level is set through parameter P0003. The following values can be set using P0003:

P0003 = 0 User Defined List
P0003 = 1 Standard Parameters
P0003 = 2 Extended Parameters
P0003 = 3 Expert Parameters
P0003 = 4 Service Level

All parameters that are changed using the methods outlined below are changing the physical parameters on the inverter connected to the AOP.

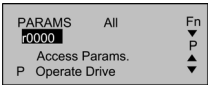
1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until 'PARAMETERS' is highlighted.
2. Press the P key to confirm the selected option.

The user is then presented with the parameter screen from which they can select the required parameter group.



3. Using the ▲ and ▼ keys scroll through the groups and select the desired parameter group.

Once a group is selected the user will be presented with the first parameter in ascending order of numerical value.



4. Using the ▲ and ▼ keys scroll through the parameters until the required parameter is highlighted.
5. Press the P key to confirm the selected parameter.
6. The user is now presented with parameter values.
   Using the ▲ and ▼ keys the value of the parameter can be changed.

Note

- The AOP will only accept values for the parameter within a pre-defined range. An out of range value will be rejected and the user requested to enter a correct value.

7. Press the P key to accept the new value of the parameter.

The user is then returned to the parameter screen, ready to select another parameter if required.

A long press of the Fn key will return the user to the previous screen. The parameter value that has been changed will be retained within the AOPs internal memory, but not sent to the inverter. Should power to the inverter or AOP be disconnected, all changes will be lost.

8. Once the value is confirmed and accepted by pressing the P key a short press of the Fn key will return the display to r0000.

Pressing the Fn and P keys simultaneously, at any time, will return the user return to the main menu.



Pressing the Fn and ▼ keys simultaneously, at any time will display the parameter help screens.

6.2 Use of Function Key

A short press of the Fn key will return the user to r0000.

A long press of the Fn key will return the user to the previous screen.

6.2.1 Scrolling Function

When the user is required to change a value of a parameter, the ▲ and ▼ keys on the AOP are used to increase and decrease the value respectively.

6.2.2 Changing single digits in Parameter values

For changing the parameter value rapidly, the single digits of the display can be changed by performing the following actions:

Ensure you are in the parameter value changing level:

1. Press Fn, which causes the right hand digit to blink.
2. Change the value of this digit by pressing ▲ or ▼.
3. Press Fn again causes the next digit to blink.
4. Perform steps 2 to 3 until the required value is displayed.
5. Press P to leave the parameter value changing level.

6.2.3 Jump Function

From any parameter (rXXXX or PXXXX) a short press of the Fn key will immediately jump to r0000.

Upon returning to r0000, pressing the Fn will return you to your starting point.

6.3 Expert Level Parameters

In Expert level parameters the number of available parameters increases significantly.

An important function of the Expert level parameters is to allow the expert user to access the indexed parameters.

A number of parameters contain indexes that group together closely related parameter type information.

The access level set on the inverter and not the AOP governs all access to the various levels of parameter sets.

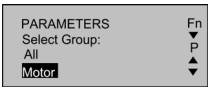
6.3.1 Indexed Parameters

In the Expert level the user can view and edit the individual characteristics of the two-dimensional array index.

The procedure for editing the indexed parameters is as follows:

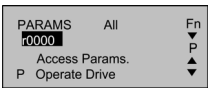
1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until 'PARAMETERS' is highlighted.
2. Press the P key to confirm the selected option.

The user is then presented with the parameter screen from which they can select the required parameter group.



3. Using the ▲ and ▼ keys scroll through the groups and select the desired parameter group.

Once a group is selected the user will be presented with the first parameter in ascending order of numerical value.



4. Using the ▲ and ▼ keys scroll through the parameters until the required parameter is highlighted.
5. Press the P key to confirm the selected parameter.
6. Press the P key again to access the parameter index.
7. Using the ▲ and ▼ keys scroll through the indexes until the required index is highlighted.
8. Press the P key to access the index value.
9. Using the ▲ and ▼ keys scroll through the values until the required value is highlighted.
10. Press the P key to confirm the change of value and return to the parameter selection screen.

Once the user has been returned to the parameter selection screen a new parameter can be selected.

To edit another parameter steps 4 to 10 should be repeated until all the necessary parameters have been configured.

6.4 AOP Stored Parameter Sets

The AOP contains a battery-backed storage facility capable of storing up to 10 parameter sets.

The standard AOP will be issued with three drive type parameter sets:

- MM420
- MM440

The parameter sets are identified numerically, from 00 to 09, a total 10 sets.

A parameter set can only be edited if the set contains parameter data. If the chosen parameter set does not contain parameter data the user will be asked to confirm if they wish the default parameter set to be copied to the new location.

On confirmation of this instruction, only the editable parameters will be copied to the new location - read only parameters will be called from the original location.

To edit the parameter sets the following procedure should be performed:

1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until 'MODE' is highlighted.
2. Press the P key to confirm the selected option.

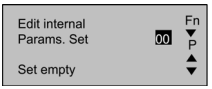
The user is then presented with the mode option screen.

3. Using the ▲ and ▼ keys highlight 'INTERNAL'.
4. Press the P key to confirm the selected option.

The user is then presented with the Internal mode menu screen.

5. Using the ▲ and ▼ keys highlight 'PARAMETERS'.

The user is then presented with the internal edit menu for the AOP.



6. Using the ▲ and ▼ keys highlight required parameter set number.

The parameters can now be edited using the procedures outlined in Sections 6.1 and 6.3 above.

6.5 Engineering

When in Internal Mode of operation an additional menu item is available at the top-level.

This menu allows the user to view a USS message log of the last 1k bytes of messages between the AOP and the connected inverters.

7 AOP Set-up & Configuration

7.1 Setup Menu

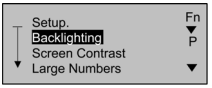
Using the Setup option from the Main Menu of the AOP, the following characteristics of the AOP can be personalized by the user:

- Backlighting
- Screen Contrast
- Large Numbers
- Cursor Type
- Start Help
- Welcome Text
- Parameter Set Names (Expert Level and above only)
- Set Time/Date (Service Level only)
- AOP Reset

To access the Setup menu the following procedure should be performed:

1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until 'SETUP' is highlighted.
2. Press the P key to confirm the selected option.

The user is then presented with the setup menu:



3. Using the ▲ and ▼ keys scroll through the list until the required option is highlighted.
4. Press the P key to confirm the selected option.

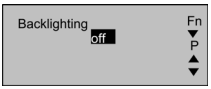
Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

7.1.1 Backlighting

To activate the backlighting option on the AOP, the following procedure should performed:

1. Using the ▲ and ▼ keys select the 'Backlighting' option from the Setup menu.
2. Press P to confirm the selection.

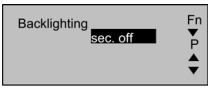
The user is then presented with the Backlighting screen.



3. Using the ▲ and ▼ keys select either the off or on state.
4. Press P to confirm the selected function.

The backlighting function can be set to switch off the backlighting after a specific period of time (in seconds) of inactivity.

5. Using the ▲ and ▼ keys select the timing function.



6. Press P to set the time delay screen.
7. Using the ▲ and ▼ keys set the required time.
8. Press P to confirm the action and return to the Setup menu.



Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

7.1.2 Screen Contrast

To change the screen contrast select the 'Screen Contrast' option from the Setup menu.

1. Using the ▲ and ▼ keys alter the level of contrast.
2. Press P to confirm the action and return to the Setup menu.

7.1.3 Large Number Display

The AOP is configured to allow the display in large character format of the inverter frequency. Depending upon the users requirements a user defined text string can also be displayed above the large display characters to assist in explaining the display output result.

7.1.4 Cursor Type

To change the type of cursor that the AOP uses, select the 'Cursor Type' option from the Setup Menu.

1. Using the ▲ and ▼ keys scroll through the cursor types until the required cursor is highlighted.
2. Press P to confirm the action and return to the Setup menu.

Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

7.1.5 Start Help

By default, the Start Help function is set to ON. To change this setting, select Start Help from the Setup menu.

1. Using the ▲ and ▼ keys select either the Off or On state.
2. Press P to confirm the action and return to the Setup menu.

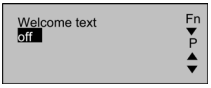
Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

7.1.6 Welcome Text

To edit the welcome text display on the AOP display on power-up the following procedure should be performed:

1. Using the ▲ and ▼ keys select the 'Welcome Text' option from the Setup menu.

The user is then presented with the welcome text screen:

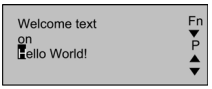


2. Use the ▲ and ▼ keys to select the ON or OFF state.

Pressing the Fn key will cancel this action and return to the Setup menu.

3. Press P to confirm the action.

The user will then be presented with a text screen with the first character highlighted by the cursor. The text string can contain a maximum of 20 characters.



1. Using the ▲ and ▼ keys scroll through the characters until the desired character is shown.
2. Press the P key to accept the character and move to the next character.
3. Repeat steps 1 and 2 until the desired text is entered.
4. Press and hold the P key to except the text string and return to the Setup menu

Pressing and holding down the Fn key will cancel the text entry, restore the original text string and return the user to the Setup menu.

Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

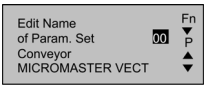
7.1.7 Parameter Set Names

This function allows the user to edit the parameter set names. All ten parameter sets can be edited. This option is not available in the standard access level.

To edit the parameter set names, the following procedure should be performed:

1. Using the ▲ and ▼ keys select the 'Parameter Set Names' option from the Setup menu.
2. Press the P key to confirm.

The user is then presented with the Parameter Set Names screen.



3. Using the ▲ and ▼ keys select the required parameter set.
4. Press the P key to confirm the parameter set.

The text string of the parameter set name is then edited using the same procedure as given in Section 8.1.5.

Pressing and holding down the Fn key will cancel the text entry, restore the original text string and return the user to the Setup menu.

Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

7.1.8 Set Time/Date

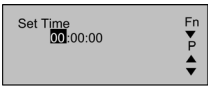
The set time and date option from the Setup menu allows the user to set the correct date and time of the AOPs simple watch function.

To set the correct time and date, the following procedure should be performed:

1. Using the ▲ and ▼ keys scroll through the option on the Setup menu until 'Set Time/Date' option is highlighted.

2. Press the P key to confirm the selection.

The user is then presented with the Set Time screen:



The first time element is highlighted.

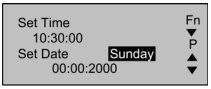
3. Using the ▲ and ▼ keys scroll through the digits until the desired hour is highlighted.

4. Press the P key to confirm the selection.

The cursor then automatically moves to the minutes field.

5. Repeat steps 3 and 4 until the minutes and seconds are set to the correct time.

The Day/Date screen is then displayed.



6. Complete steps 1 to 5 above to set the correct Day/Date.

7. Press and hold the P key to accept the Day/Date settings and return to the Setup menu.

7.1.9 AOP Reset

Warning

This function deletes all parameter sets and settings stored within the AOP

The AOP reset is accomplished by selecting the 'AOP Reset' option from the Setup menu.

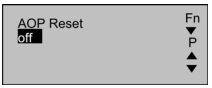
The normal default for this function is to clear all internal faults, message logs and the stored parameter sets.

To initiate an AOP reset, the following procedure should be performed:

1. Using the ▲ and ▼ keys select the 'AOP Reset' option from the Setup menu.

2. Press P to confirm.

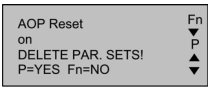
The user is then presented with the AOP reset screen:



3. Using the ▲ and ▼ keys select Off or On.

4. Press P to confirm.

The user is then presented with the parameter reset screen:



5. Press P to confirm the AOP reset and the deletion of the ***inverter parameter sets stored within the AOP's memory***.

   Or

   Press Fn to perform the AOP reset ***without deleting the inverter parameter sets stored within the AOP's memory.***

Caution

The AOP reset function will return all internally stored AOP specific data to its factory default settings, this includes such functions as the timer control settings etc.

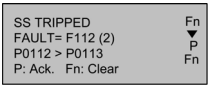
Pressing the Fn and ▼ keys simultaneously, at any time will display the relevant help screens to assist the user.

8 Fault Indication

8.1 Fault Screen

Should a fault occur on the connected inverter, or network of inverters, the AOP has been designed to give specific fault information.

A typical fault screen is shown below:



The user is given the following information:

- The identity of the inverter that has the fault condition
- The fault code (see Section 9.6)
- A plain text explanation of the fault condition

The user can then proceed as follows:

Press P to acknowledge the fault.

Or

Press Fn to clear the fault and perform a manual restart of the inverter. This is dependent on the fault condition and the cause of the fault should be investigated. To be able to clear the fault the AOP must have been set as the command source (P0700 =4 or 5)

Or

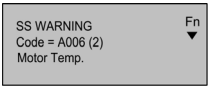
Pressing the Fn and ▲ keys simultaneously, will display warning specific help screen as an aid to diagnosing the problem.

Note

- The AOP can only clear the fault if P0700 has been set so that the AOP has control of the inverter.

8.2 Warning Screen

The AOP has been designed to display a warning screen should a condition arise within the connected inverter(s) that should be brought to the users attention.



The user is given the following information:

- The identity of the inverter that has the fault condition
- The warning code (see Section 9.7)
- A plain text explanation of the condition causing the warning message.

There is no requirement for the user to acknowledge the warning message. The message will be displayed for as long as the inverter is reporting the problem.

Pressing the Fn and ▲ keys simultaneously, will display warning specific help screen as an aid to diagnosing the problem.

8.3 Multiple Faults

Should more than one fault be reported by the connected inverter or networked inverters the AOP has been designed to show all the fault messages.

This is accomplished by the display cycling through all the fault messages until they have all be acknowledged or cleared.

For instructions on how to acknowledge the fault messages, see Section 9.1.

8.4 Multiple Warnings

Should more than one warning be reported by the connected inverter or networked inverters the AOP has been designed to show all the warning messages.

This is accomplished by the display cycling through all the warning messages until the condition causing the warning message ceases to exist.

8.5 Simultaneous Faults and Warnings

Should a fault condition and a warning condition be reported by the connected inverter or networked inverters the AOP has been designed to cycle through both the fault messages and the warning messages.

The AOP will first show a fault message then a warning message separated by a 2 second interval.

This cycle will continue until all fault and warning messages have been displayed. The cycle will repeat itself until all fault messages have been either acknowledge or clear and the conditions causing the warning messages have ceased to exist.

For instructions on how to acknowledge the fault messages, see Section 9.1.

8.6 Inverter Fault Codes

When a fault occurs on the inverter(s) to which the AOP is connected, a fault code is displayed with a description of the relevant fault.

For a complete list of fault codes, please refer to the appropriate Operating Instructions for the inverter.

8.7 Inverter Warning Codes

When a fault occurs on the inverter(s) to which the AOP is connected, a warning code is displayed with a description of the relevant warning.

For a complete list of warning codes, please refer to the appropriate Operating Instructions for the inverter.

8.8 Inverter Fault/Warning record P0947

The diagnostic menu allows the user access to the recent fault history of an inverter connected to the AOP. In master mode the inverter is identified by means of a two-digit USS slave address.

For a full explanation of this please see Inverter Fault/Warnings record P0947 in the Fault indication section.

Note

- The time display function of the AOP regarding fault history will only be available if the AOP was connected to the inverter at the time of the fault.

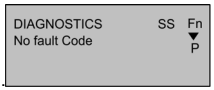
To access the diagnostic facilities of the AOP the following procedure should be performed:

1. From the Main Menu scroll through the list of options using the ▲ and ▼ keys until ‘DIAGNOSTICS’ is highlighted.

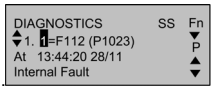
2. Press the P key to confirm the selected option.

The user is presented with one of the following screens:

If no fault history exists...



If a fault history exists...



3. If no fault history exists then press P or Fn to return to the Main Menu.

4. If a fault history exists use the ▲ and ▼ keys to scroll through the fault history.

5. Press the Fn and ▲ keys simultaneously to display the help screen which will contain details of the relevant corrective action.

6. Press and hold down the Fn key to return to the Main Menu.

NOTES

European Low Voltage Directive

The MICROMASTER product range complies with the requirements of the Low Voltage Directive 73/23/EEC as amended by Directive 98/68/EEC. The units are certified for compliance with the following standards:

EN 60146-1-1	Semiconductor inverters - General requirements and line commutated inverters
EN 60204-1	Safety of machinery - Electrical equipment of machine

European Machinery Directive

The MICROMASTER inverter series does not fall under the scope of the Machinery Directive. However, the products have been fully evaluated for compliance with the essential Health & Safety Requirements of the directive when used in a typical machine application. A Declaration of incorporation is available on request.

European EMC Directive

When installed according to the recommendations described in this guide, the MICROMASTER fulfils all requirements of the EMC Directive as defined by the EMC Product Standard for Power Drive Systems EN50082-2.

Underwriters Laboratories

MICROMASTER 4 listed accessory.
For use in a pollution degree 2 environment

ISO 9001

Siemens plc operates a quality management system, which complies with the requirements of ISO 9001.

To submit any suggestions for improvements, please visit the Siemens Standard Drives Web Site at http://www.siemens.de/micromaster

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