

96 x 96

SPECIFICATIONS

DISPLAY

3 Row of 4 Digits

7 Segment LED Display 0.49 inch Height Digit Integrated with parameter Units

WIRING INPUT

3Ø-4 wire, 3Ø-3 wire, 2Ø-3 wire and 1Ø-2 wire (R/Y/B Programmable)

RATED INPUT VOLTAGE

11 to 300VAC (L-N); 19 to 519VAC (L-L) Installation Category III (600V)

FREQUENCY RANGE

45-65 Hz

RATED INPUT CURRENT

Nominal 5AAC (Min-14mA, Max-6A)

BURDEN

0.5VA@5Aperphase

CT PRIMARY

1A/5A to 10,000A (Programmable for any value)

Note: 1A to 10,000 Aif CT secondary is 1 else 5Ato 10.000A

CT SECONDARY

1Aor5A(programmable)

PT PRIMARY

100V to 500kV (Programmable for any value)

PT SECONDARY

100 to 500V (Programmable for any value)

DISPLAY UPDATE TIME

1 sec. for all parameters

DISPLAY SCROLLING

Auto/Manual/Default

POWER CONSUMPTION

Less than 8VA

ENVIRONMENTAL CONDITIONS

- Indoor use
- Altitude of up to 2000 meters
- Pollution degree II

Temperature: Operating: -10°C to 55°C

Storage :-20°C to 75°C

Humidity : Up to 85% non-condensing

MOUNTING: Panel mounting

WEIGHT

MFM376-230V AC: 260gms MFM376-C/MFM376-C-CE: 230gms

OUTPUT

Pulse Output: Voltage range: External 24V DC max.

Current capacity: 100 mA max

Pulse Width: 100ms ± 5ms.

ORDER CODE INFORMATION					
Product	Supply	Certification			
Product	Зирріу	C€	CULUS		
MFM376-230VAC	240V AC, ±20%, 50/60Hz	_	_		
MFM376-C	40V - 270V DC, 85V - 270V AC,50/60Hz	_	_		
MFM376-C-CE	40V - 270V DC, 85V - 270V AC,50/60Hz	•	_		

Installation Category III

ACCURACY	
Measurement	Accuracy
Voltage V _{⊾N}	±0.5% of Full scale
Voltage V _{L-L}	±0.5% of Full scale
Current	±0.5% of Full scale
Frequency	±0.1% For L-N Voltage >20V, For L-L Voltage >35V
Active Power	1%
Apparent power	1%
Reactive Power	1%
Power Factor	±0.01
Active Energy	Class 1
Reactive Energy	Class 1
Apparent Energy	Class 1

RESOLUTIO	N:		
PT Ratio x CT Ratio	kWh / kVAh / kVArh	Pulse	INT
<40	0.01K	0.01K	0.001K
<400	0.1K	0.1K	0.01K
<4000	1K	1K	0.1K
<40000	0.01M	0.01M	1K
<400000	0.1M	0.1M	0.01M
≥4000000	1M	1M	0.1M

Note: a) For voltage, current and power resolution is automatically adjusted

- b) For power factor resolution is 0.001
- c) Blinks indicating accumulation of energy, if load is connected on any one phase of 3 Phase.

A SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument

If the equipment is not used in a manner specified by the manufacturer it might impair the protection provided by the equipment.

- Do not use the equipment if there is any mechanical
- Ensure that the equipment is supplied with correct

! CAUTION :

- 1. Read complete instructions prior to installation and operation of the unit.
- 2. Risk of electric shock.
- 3. The equipment in its installed state must not come in close proximity to any heating sources, oils, steam, caustic vapors or other unwanted process by products.

WIRING GUIDELINES

/ WARNING:

- 1. To prevent the risk of electric shock, power supply to the equipment must be kept OFF while doing the wiring arrangement.
- 2. Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
- 3. Use lugged terminals.
- 4. To reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections.
- 5. Layout of connecting cables shall be away from any internal EMI source.
- 6. Cable used for connection to power source, must have a cross section of 0.5mm² to 2.5mm² (20 to 14AWG; 75°C(min)). These wires shall have current carrying capacity of 6A.
- 7. Copper cable should be used (Stranded or Single core cable).
- 8. Before attempting work on device, ensure absence of voltages using appropriate voltage detection device.

INSTALLATION GUIDELINES

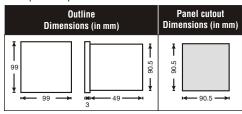
A CAUTION :

- 1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
- 2. Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
- 3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
- 4. Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short circuited to avoid risk of electrical shock and injury.
- 5. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
- 6. The equipment does not have a built-in-type fuse. Installation of external fuse of rating 275V AC / 0.5Amp for electrical circuitry / battery is highly recommended.

MECHANICAL INSTALLATION

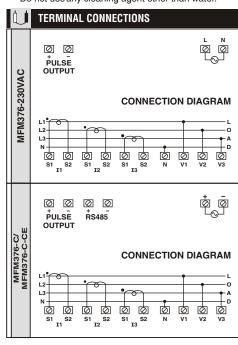
For installing the meter

- 1. Prepare the panel cutout with proper dimensions as shown below.
- 2. Push the meter into the panel cutout. Secure the meter in its place by fitting the clamp on the rear side. fit clamps on both sides in diagonally opposite location for optimum fitting.
- 3. For proper sealing, tighten the screws evenly with required torque.



MAINTENANCE

- 1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
- 2. Clean the equipment with a clean dry or damp cloth. Do not use any cleaning agent other than water.



FRONT PANEL DESCRIPTION



ONLINE PAGE DESCRIPTION

There are three dedicated keys labelled as △, ♡ and O. Use these 3 keys to read parameters. Simply press these keys to read the parameters. Units of corresponding parameters on display will glow automatically.

Use ♥ key to go back to previous page in sub page.

For MFM376-230VAC				
KEY PRESS	ONLINE PAGE DESCRIPTION			
_	1st screen	Displays three phase average line to neutral voltage, current and power factor.		
Press "△"	2nd screen	Displays three phase average line to line voltage, current and frequency.		
	3rd screen	Displays three phase current.		
	4th screen	Displays three phase line to neutral voltage.		
	5th screen	Displays three phase line to line voltage.		
Note: 1) For 3 phase 3 wire, only second, third and fifth screen will be available. 2) For 1 phase 2 Wire displays only voltage, Current and Power factor of selected phase in one screen.				
Press "PAGE"	1st Displays three phase active power.			
Press "△"	2nd screen	Displays three phase reactive power.		
3rd screen		Displays three phase apparent power.		
	4th screen	Displays three phase total active power, reactive power, apparent power.		
	For 1 pha	se 3 wire, only forth screen will be available. se 2 Wire displays only active, reactive and power of selected phase in one screen.		
Press "PAGE"	1st screen	Displays three phase power factor.		
Press "△"	2nd screen	Displays three phase phase angle.		
	3rd screen Displays active, reactive and apparent maximum power demand of three phase.			
	4th screen	Displays active and reactive minimum power demand of three phase.		
Note: 1) For 3 phase 3 wire only first, third and forth screen will be available.				

(In first screen only average power factor will available)

2) For 1 phase 2 wire only selected phase parameters will

be displayed.

KEY PRESS	ONLINE PAGE DESCRIPTION			
Press "PAGE"	1st screen	Displays three phase total active energy.		
Press "△"	2nd screen	Displays three phase total reactive energy.		
	3rd screen	Displays three phase total apparent energy.		
	4th screen	Displays Run hour.		
	5th screen	Displays Auxiliary Interrupts.		

	4th screen	Displays Run hour.	
	5th screen	Displays Auxiliary Interrupts.	
	For M	IFM376-C / MFM376-C-CE	
KEY Press		ONLINE PAGE DESCRIPTION	
_	1st screen	Displays three phase line to neutral voltage.	
Press "△"	2nd screen	Displays three phase line to line voltage.	
	3rd screen	Displays total percentage harmonics of line to neutral voltage of three phase.	
	4th screen	Displays total percentage harmonics of line to line voltage of three phase.	
	5th screen	Displays three phase instantaneous line to neutral voltage.	
	6th screen	Displays three phase instantaneous line to line voltage.	
	will be ava	se 3 wire, only second, forth and sixth screen ailable. se 2 Wire, only first, third and fifth screen of whase will be available.	
Press "PAGE"	1st screen	Displays three phase current.	
Press "△"	2nd screen	Displays total percentage harmonics of current of three phase	
	3rd screen	Displays active, reactive and apparent power of first phase.	
	4th screen	Displays active, reactive and apparent power of second phase.	
	5th screen	Displays active, reactive and apparent power of third phase.	
	6th screen	Displays total active, reactive and apparent power of three phase.	
	7th screen	Displays active, reactive and apparent maximum power demand of three phase	
	8th screen	Displays active and reactive minimum power demand of three phase.	
Note: 1) For 3 phase 3 wire, only first, second, sixth, seventh and eighth screen will be available. 2) For 1 phase 2 Wire, only first, second, third, seventh and eighth screen of selected phase will be available.			
Press "PAGE"	1st screen	Displays three phase instantaneous current.	
Press 2nd Dis		Displays three phase power factor.	
	3rd screen	Displays three phase phase angle.	
	411	Dianlava three phase systems !: t-	

Displays three phase average line to

neutral voltage, current and power factor.

KEY Press		ONLINE PAGE DESCRIPTION
Press "△"	5th screen	Displays three phase average line to line voltage, current and frequency.

Note: 1) For 3 phase 3 wire, only first screen, average power factor, fifth screen will be available.

2) For 1 phase 2 Wire, only first, second and third screen of selected phase will be available.

Press "PAGE"	1st screen	Displays three phase maximum demand of current.	
Press "△"	2nd screen	Displays import active energy.	
3rd screen		Displays export active energy.	
4th screen Displays total active energy.		Displays total active energy.	
5th screen		Displays import reactive energy.	
	6th screen	Displays export reactive energy.	
	7th screen	Displays total reactive energy.	
8th screen		Displays total apparent energy.	
9th screen		Displays Run Hour.	
10th screen		Displays Auxiliary interrupts.	

Note: 1) For 3 phase 3 wire, all screens will be available.

For 1 phase 2 wire, all screens of selected phase will be available.

SERIAL NUMBER DESCRIPTION

Press ♥ and ○ key for 10sec to display serial no for 5sec.

AUTOMATIC / MANUAL / DEFAULT MODE

Press key for 3sec to toggle between AUTOMATIC /

In **AUTOMATIC MODE**, only first screen of all pages will be scrolled.

In MANUAL MODE, the page will be change only after any key is pressed

In **DEFAULT MODE**,Total kWh page will be displayed if any key is not pressed for 36 seconds.

PHASE DETECTION

Press ⊜key for 3sec displays voltage sequence detection on last row and on last two rows for 3P4W and 3P3W only.

CT ERROR

Press \heartsuit key for 3sec displays current direction detection on last row. (Not applicable for 3 phase 3 wire)

RUN HOUR SELECTION

For Zero Run Hour Selection: Run Hour is ON Hour For Non zero Run Hour Selection: Parameter selectable between 1% to 10% will act as ON Hour.

CONFIGURATION

There are three dedicated keys with symbol \bigcirc , \bigcirc & \bigcirc . Use these 3 keys to enter into configuration menu **Note**: Setting should be done by professional after going through this user manual and having understood the application situation.

For the configuration setting mode:

- Use △ + key for 3 sec to enter and exit from configuration menu.
- Use \bigcirc key to shift parameter value in edit mode .

value in division of 100 which one want to set.

- Use key to increment the parameter and for roll over.
 (Only if parameter is in edit mode)
- Use O key to save the parameter value & go to next page.
- Press \(\) key and use \(\) key to go back to previous page.
 To set value of PT and CT Primary in "K", first set the

(i.e. If want to set 500k then set 5000) then press ⊜key for 3 sec. It will shift the value in K with 0.1 resolution i.e. 500.0 with "K" symbol.

Config page.	Function	Range or Selection	Factory Setting
	Password	0000 to 9998	1000
1	Change Password	No / Yes	No
1.1	New Password	0000 to 9998	10
2	Network Selection	3P4W / 3P3W / 1P2W-R/1P2W-Y / 1P2W-B	3P4W
3	CT Secondary	5 / 1	5
4	CT Primary	5 to 10,000	5
5	PT Secondary	100 to 500	350
6	PT primary	100 to 500k	350
7	Demand Interval Method	Sliding/Fixed	Slidin
8	Demand Interval Duration	1 to 30	15
9	Demand interval length	1 to 30	1
10	Pulse Weight	0.01 to 99.99	0.01
11	Pulse Duration	0.1 to 2.0	0.1
12	Run Hour Selection	0 to 10	0
*13	Slave Id	1 to 255	1
*14	Baud Rate	300, 600, 1200, 2400, 4800, 9600 and 19200 (bps)	9600
[*] 15	Parity	None, Odd, Even	None
[*] 16	Stop Bit	1 or 2	1
17	Factory Default	Yes / No	No
18	Reset Energy and Max Dmd	Yes / No	No
18.1	Password	0001 to 9999	100
18.01	Reset kWh	Yes / No	No
18.02	Rest kVArh	Yes / No	No
18.03	Reset kVah	Yes / No	No
18.04	Reset MAx	Yes / No	No
18.05	Reset Run Hour	Yes / No	No
18.06	Reset Interrupt	Yes / No	No

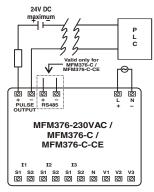
- For resetting energy parameter user will be promoted for password. If correct password is entered. User will be able to reset all energy parameters. This password will be value which will be greater than the configuration password by 1
- * Marked values are only valid for MFM376-C/MFM376-C-CE.

Doc. name: OP INST MFM376 SERIES OP506-V03(Page 2 of 4)

NETWORK SELECTION AND WIRING INPUT			
Network selection in configuration mode Wiring			
3P4W	3P4W, 2P3W, 1P2W		
3P3W	3P3W		
1P2W	1P2W-R, 1P2W-Y, 1P2W-B		

APPLICATION OF PULSE OUTPUT

PROCESS INTEGRATION

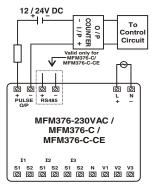


Pulse output from MFM376-230VAC / MFM376-C / MFM376-C-CE meter can be interfaced into a process through a PLC for on line control of energy content in the process.

If the PLC has a self excited digital input, external DC supply is not needed.

The kWh pulse is also used to derive average kWh information at the PLC.

ENERGY CONTROLLER



Pulse output from MFM376-230VAC / MFM376-C / MFM376-C-CE meter can be used as alarm generator or total energy controller by interfacing it with Presettable counter and control circuits (Contactors, Relay, Trip Circuit).

The counter is loaded with the maximum energy consumption. When count reaches setpoint it provides output to control circuit to take appropriate action.

Note: + and - is applicable only for MFM376-C/MFM376-C-CE

MODBUS REGISTER ADDRESSES LIST

30036

30038

30040

30042

30044

30046

30048

30050

30052

30054

30056

30058

30060

30062

30064

30066

30068

30070

30072

30074

30076

30078

30080

30082

30084

30086

30088

30090

30092

30094

30096

30098

30100

30102

0x24

0x26

0x28

0x2A

0x2C

0x2E

0x30

0x32

0x34

0x36

0x38

0x3A

0x3C

0x3E

0x40

0x42

0x44

0x46

0x48

0x4A

0x4C

0x4E

0x50

0x52

0x54

0x56

0x58

0x5A

0x5C

0x5E

0x60

0x62

0x64

0x66

kVA1

kVA2

kVA3

PF 1

PF 2

PF 3

Average PF

Frequency

Total KW

Total KVA

Total KVAR

MAX Active Power

MIN Active Power

MAX Reactive Power

MIN Reactive Power

MAX Apparent Power

MAX Instantaneous voltage V1N

MAX Instantaneous voltage V2N

MAX Instantaneous voltage V3N MAX Instantaneous voltage V12

MAX Instantaneous voltage V23

MAX Instantaneous voltage V31

MAX Instantaneous current I1

MAX Instantaneous current I2

MAX Instantaneous current I3

Import Active energy

Export Active energy Total Active energy

Import Reactive energy

Export Reactive energy

Total Reactive energy

Total Apparent energy

Total Harmonic Distortion(THD)

Run Hour **Auxillary Interrupts**

MODE	MODDOS REGISTER ADDRESSES EIST						
Readal	Readable parameters for Communication valid only for MFM376-C / MFM376-C-CE : [Length (Register) : 2 ; Data Structure : Float]						
Address	Hex Address	Parameter		Address	Hex Address	Parameter	Τ
30000	0x00	Voltage V1N		30124	0x7C	THD of Voltage V1N	
30002	0x02	Voltage V2N	1	30126	0x7E	THD of Voltage V2N	
30004	0x04	Voltage V3N		30128	0x80	THD of Voltage V3N	_
30006	0x06	Average Voltage LN		30130	0x82	THD of Voltage V12	_
30008	0x08	Voltage V12		30132	0x84	THD of Voltage V23	_
30010	0x0A	Voltage V23		30134	0x86	THD of Voltage V31	_
30012	0x0C	Voltage V31		30136	0x88	THD of Current I1	_
30014	0x0E	Average Voltage LL		30138	0x8A	THD of Current I2	_
30016	0x10	Current I1		30140	0x8C	THD of Current I3	_
30018	0x12	Current I2		30684	0x2AC	Serial number of unit	_
30020	0x14	Current I3		00004	UNZAC	Serial Humber of unit	_
30022	0x16	Average Current		Readabl	e / writable pa	rameters for Communication valid only for M	IFI
30024	0x18	kW1		Address	Hex Address	Parameter	
30026	0x1A	kW2	1	Auditoss	IIOX Auditoss	Taramotor	
30028	0x1C	kW3	1	40000	0x00	Password	Λ
30030	0x1E	kVAr1	1	40001	0x01	N/W selection	١
30032	0x20	kVAr2					١
30034	0x22	kVAr3	1				١

Formula to	find address of	individual Harmonic	
Constant Parameter	Meaning	{143 + [(Harmonic r + 60 x Constant Pa	
0	Voltage V1N	For Example,	
1	Voltage V2N	To find the 14th Harmo	
2	Voltage V3N	of Voltage V31. Following formula car	
3	Voltage V12	1 ollowing formula cal	
4	Voltage VZO	Formula with the para {143 + [(Harmonic no	
5	Voltage V31	+ 60 x C P}	
6	Current I1	Eg. {143 + [(14-2) x 2	

Current I2

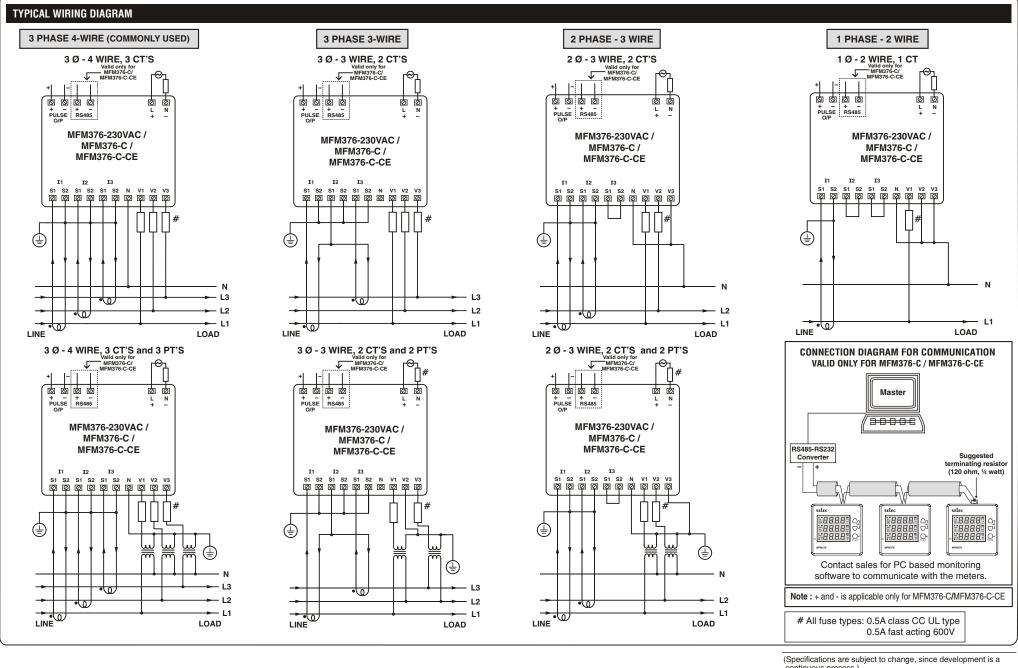
Current I3

{143 + [(Harmonic no-2) x 2] + 60 x Constant Parameter }
For Example, To find the 14th Harmonic address of Voltage V31. Following formula can be used:
Formula with the parameter: {143 + [(Harmonic no-2) x 2] + 60 x C P} Eg. {143 + [(14-2) x 2] + 60 x 5} = 467
So Check the 14th Harmonic of

Voltage V31 at 467 address.

Address	Hex Address 0x00 0x01	Password N/W selection	Range		Length (Register)	Data Structure Integer
40000			Min value : 0 Max value : 9998			
40001			Value : 0	Meaning : 3P-4W	1	Integer
			Value : 1	Meaning : 3P-3W	1	Integer
			Value : 2	Meaning : 1P2W-P1	1	Integer
			Value : 3	Meaning : 1P2W-P2	1	Integer
			Value : 4	Meaning : 1P2W-P3	1	Integer
40002	0x02	CT Secondary (A)	Min Value : 1	Max Value : 5	1	Integer
40003	0x03	CT primary (CT Secondary = 5) (A)	Min Value : 5	Max Value : 10000	1	Integer
		CT primary (CT Secondary = 1) (A)	Min Value : 1	Max Value : 10000		
40004	0x04	PT Secondary (V)	Min Value : 100	Max Value : 500	1	Integer
40005	0x05	PT primary (V)	Min Value : 100	Max Value : 500000	2	Integer
40007	0x07	Demand Interval Method	Value : 0x0000	Meaning : Sliding	1	Integer
			Value : 0x0001	Meaning : Fixed	1	Integer
40008	0x08	Demand Interval Length(min)	Min Value : 1	Max Value : 30	1	Integer
40009	0x09	Demand Interval Duration	Min Value : 1	Max Value : 30	1	Integer
40010	0x0A	Pulse Weight	Min Value : 0.01	Max Value : 99.99	1	Integer
40011	0x0B	Pulse Duration	Min Value : 0.1	Max Value : 2.0	1	Integer
40012	0x0C	Run Hour Selection	Min Value : 0	Max Value : 10	1	Integer
40013	0x0D	Slave ID	Min Value : 1	Max Value : 255	1	Integer
			Value	Meaning		
40014	0x0E	Baud rate	0x0000	300	1	Integer
			0x0001	600		
			0x0002	1200		
			0x0003	2400		
			0x0004	4800		
			0x0005	9600		
			0x0006	19200		
40015	0x0F	Parity	0x0000	None	1	Integer
			0x0001	Odd		
			0x0002	Even		
40016	0x10	Stop bit	0x0000	1	1	Integer
			0x0001	2		
40017	0x11	Factory Default	1	Set to factory setting range	1	Integer
40018	0x12	Reset kWh	1	Reset Total Active Energy	1	Integer
40019	0x13	Reset kVAh	1	Reset Total Apparent Energy	1	Integer
40020	0x14	Reset kVArh	1	Reset Total Reactive Energy	1	Integer
40021	0x15	Reset MAX Demand	1	Reset Maximum Demand	1	Integer
40022	0x16	Reset Run Hour	1	Reset Run Hour	1	Integer
40023	0x17	Reset Interrupts Count	1	Reset Auxillary Interrupt Count	1	Integer

Doc. name: OP INST MFM376 SERIES OP506-V03(Page 3 of 4)



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Doc. name: OP INST MFM376 SERIES OP506-V03(Page 4 of 4)