



# GENERAL MAINTENANCE OF MM7

Helps in reducing your maintenance cost and preventing unplanned outages

## DO YOU HAVE MM7 AND THE BELOW QUESTIONS?



Is it your goal to reduce your OPEX and unexpected breakdowns?



Do you wish to increase the performance of your MM7 by understanding its status?



Are you looking for replacement parts and optimized inventory?

The answer is, Plan your maintenance and choose it from Power Conversion's structured and comprehensive maintenance programs.

## AVAILABLE MAINTENANCE PROGRAM PACKAGES

### PERFORMANCE MAINTENANCE

Annual which includes,

- Visual inspection
- Performance checks
- Basic maintenance tasks

### EXTENDED PERFORMANCE MAINTENANCE

Every 3 years which includes,

- Visual inspection
- Performance checks
- Extended maintenance activities

### MAJOR MAINTENANCE

Every 5 years which includes,

- Advanced visual inspections & performance checks
- First systematic replacement of parts based on ageing.

### LIFECYCLE MAINTENANCE

Every 10 years which includes,

- Major maintenance extended by systematic lifecycle replacement of parts & components from cooling & power cubicles.



# OUR MAINTENANCE PROCESS

Tailored to the needs of your plant – step by step



## HOW DO WE DO IT?



1

Performing and recording preventive actions



2

Identifying safety critical and operational critical issues



3

Submitting reports with appropriate recommendations

Please refer the maintenance recommendations for MM7 STATCOM, DIRECT FEED & HIGH VOLTAGE BOOSTER from 125+ years old industry expert on the following pages

Step 1



- Drive inspection and health checks to assess the present condition of your drives.
- Air-/water cooling system maintenance.
- Process cabinets & controller equipment maintenance.

Step 2



- Operational & safety critical issues identified will be brought to your attention with resolution.
- Prioritized dispatch of the required parts to attend the issue on safety critical scenarios.

Step 3



- Comprehensive report with recommendations for improved safety and better performance of your critical power equipment.



# MAINTENANCE CONFIGURATIONS 1/2

MM7 STATCOM	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
Operation description								
Record drive document data with revision status and serial number		X				X		X
Event logs & history retrieval		X		X		X		X
<b>Control local converter (CLC)</b>								
Cleaning, visual check	X		X		X		X	
Safety check for transformer & breaker		X		X		X		X
Cabinet filter replacement			X		X		X	
Power supply measure		X		X		X		X
Replacement relay watch dog						X		X
Replacement battery CPU						X		X
Replacement of power supply/fans					X		X	
Test of spare boards						X		X
Cable head tightening	X				X		X	
<b>Cooling unit (CCU)</b>								
Filter cleaning + water analysis (external lab)		X		X		X		X
Functional check of : pumps, swap pumps system & safety devices : measure control (T°, P, Q Flow, Resistivity)		X		X		X		X
Expansion tank pressure control		X		X		X		X
Draining & refill								
Deionising cartridge replacement						X		X
Pump replacement if needed or inspection								X
Expansion tank replacement						X		X
Heat exchanger inspection		X		X		X		X
<b>Precharge system</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power components check (R)						X		X
Cable head tightening	X				X		X	
<b>MM7 Tower</b>								
Power components check (Transformer)						X		X
Electronic components check (PIBe+, HVM300, IPS401, optical fiber etc.)				X		X		X
Cable head tightening	X				X		X	
Current injection test						X		X

\* Mandatory during 1<sup>st</sup> maintenance, C – customer may perform



# MAINTENANCE CONFIGURATIONS 2/2

MM7 STATCOM	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
<b>Operation description</b>								
<b>MM7 Module (pile + capacitor DC )</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power supply measure	X		X		X		X	
Pulse test								
Power components check (R, IGBT) + electronic components check (GDR )				X		X		X
Power components check (capacitor)								X
Test optic fibre								X
Voltage injection test						X		X
<b>Harmonic filter</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power components check (LRC)						X		X
Cable head tightening	X				X		X	
<b>MM7 reactor</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Cable head tightening	X				X		X	
<b>System functional check</b>								
Insulation test		X		X		X		X
Restart record - signature		X		X		X		X

\* Mandatory during 1<sup>st</sup> maintenance, C – customer may perform





# MAINTENANCE CONFIGURATIONS 1/3

MM7 DIRRECT FEED	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
Record drive document data with revision status and serial number		X				X		X
Event logs & history retrieval		X		X		X		X
<b>Control local converter (CLC)</b>								
Cleaning, visual check	X		X		X		X	
Safety check for transformer & breaker		X		X		X		X
Cabinet filter replacement			X		X		X	
Power supply measure		X		X		X		X
Replacement relay watch dog						X		X
Replacement battery CPU						X		X
Replacement of power supply/fans					X		X	
Test of spare boards						X		X
Cable head tightening	X				X		X	
<b>Cooling unit (CCU)</b>								
Filter cleaning + water analysis (external lab)		X		X		X		X
Functional check of : pumps, swap pumps system & safety devices : measure control (T°, P, Q Flow, Resistivity)		X		X		X		X
Expansion tank pressure control		X		X		X		X
Draining & refill						X		X
Deionising cartridge replacement						X		X
Pump replacement if needed or inspection								X
Expansion tank replacement						X		X
Heat exchanger inspection		X		X		X		X
<b>Precharge system</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power components check (R)						X		X
Cable head tightening	X				X		X	
<b>MM7 Tower</b>								
Power components check (Transformer)						X		X
Electronic components check (PIBe+, HVM300, IPS401, optical fiber etc.)				X		X		X
Cable head tightening	X				X		X	
Current injection test						X		X

\* Mandatory at 1<sup>st</sup> maintenance, C – customer may perform



# MAINTENANCE CONFIGURATIONS 2/3

MM7 DIRECT FEED	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
<b>Operation description</b>								
<b>HMMR DCC Tower</b>								
Power components check (capacitor etc.)								X
Electronic components check (PIBe+, HVM300, IPS401, optical fiber etc. )						X		X
Check and regrease earthing / isolating switch contact		X		X		X		X
Cable head tightening	X				X		X	
Injection test						X		X
<b>HMMR Diode Tower + 0V</b>								
Power components check (transformer)						X		X
Electronic components check (PIBe+, HVM300, IPS401, Optical fiber etc.)						X		X
Cable head tightening	X				X		X	
Injection test						X		X
<b>HMMR Diode Module (stack)</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power supply measure			X		X		X	
Pulse test								
Power components check (capacitor, resistor, diode) + Electronic components check (GDR)						X		X
Test optic fiber								X
Injection test						X		X
<b>MM7 Module (pile + capacitor DC )</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power supply measure	X		X		X		X	
Pulse test								
Power components check (resistor, IGBT) + electronic components check (GDR )				X		X		X
Power components check (capacitor)								X
Test optic fibre								X
Voltage injection test						X		X

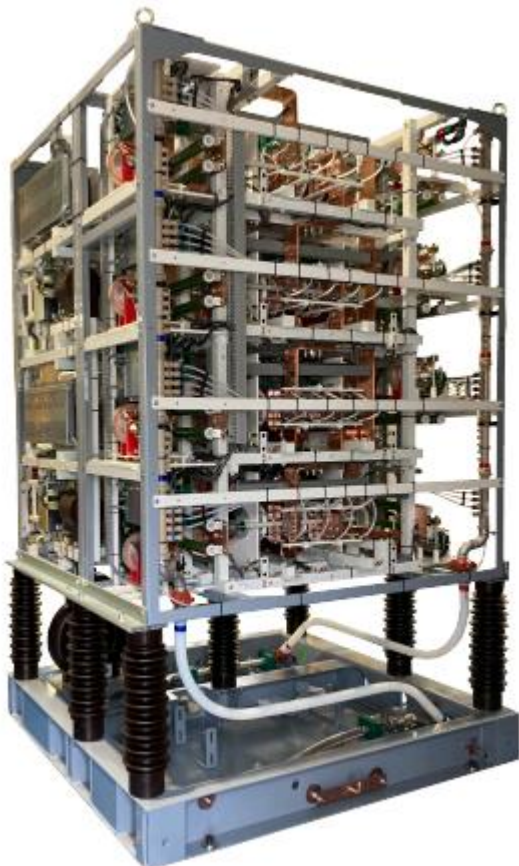
\* Mandatory during 1<sup>st</sup> maintenance, C – customer may perform



# MAINTENANCE CONFIGURATIONS 3/3

MM7 DIRECT FEED	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
<b>Operation description</b>								
<b>Harmonic filter</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power components check (LRC)						X		X
Cable head tightening	X				X		X	
<b>MM7 reactor</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Cable head tightening	X				X		X	
<b>System functional check</b>								
Insulation test		X		X		X		X
Restart record - signature		X		X		X		X

\* Mandatory during 1<sup>st</sup> maintenance, C – customer may perform





# MAINTENANCE CONFIGURATIONS 1/2

MM7 HIGH VOLTAGE BOOSTER	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
<b>Operation description</b>								
Record drive document data with revision status and serial number		X				X		X
Event logs & history retrieval		X		X		X		X
<b>Control local converter (CLC)</b>								
Cleaning, visual check	X		X		X		X	
Safety check for transformer & breaker		X		X		X		X
Cabinet filter replacement			X		X		X	
Power supply measure		X		X		X		X
Replacement relay watch dog						X		X
Replacement battery CPU						X		X
Replacement of power supply/fans					X		X	
Test of spare boards						X		X
Cable head tightening	X				X		X	
<b>Cooling unit (CCU)</b>								
Filter cleaning + water analysis (external lab)		X		X		X		X
Functional check of : pumps, swap pumps system & safety devices : measure control (T°, P, Q Flow, Resistivity)		X		X		X		X
Expansion tank pressure control		X		X		X		X
Draining & refill						X		X
Deionising cartridge replacement						X		X
Pump replacement if needed or inspection								X
Expansion tank replacement						X		X
Heat exchanger inspection		X		X		X		X
<b>Precharge system</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power components check (R)						X		X
Cable head tightening	X				X		X	
<b>MM7 Tower</b>								
Power components check (Transformer)						X		X
Electronic components check (PIBe+, HVM300, IPS401, optical fiber etc.)				X		X		X
Cable head tightening	X				X		X	
Current injection test						X		X

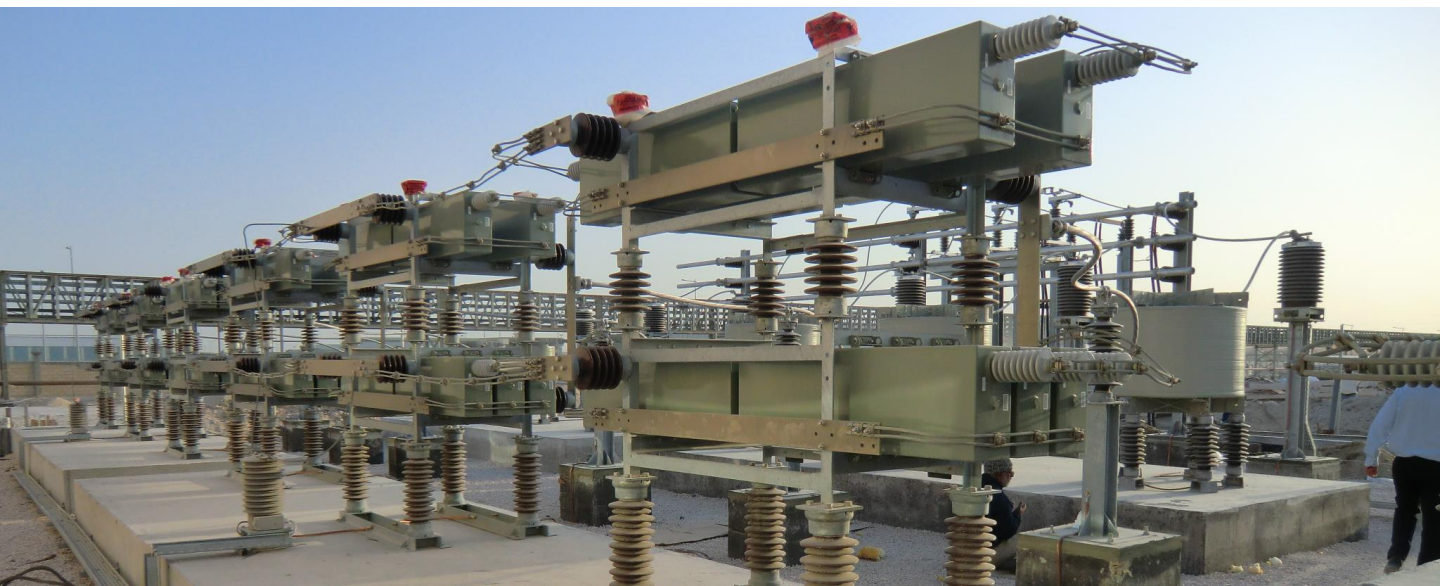
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# MAINTENANCE CONFIGURATIONS <sup>2/2</sup>

MM7 HIGH VOLTAGE BOOSTER	Initial*		Annual		5Y		10Y	
	C	GE	C	GE	C	GE	C	GE
<b>Operation description</b>								
<b>MM7 Module (pile + capacitor DC )</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power supply measure	X		X		X		X	
Pulse test								
Power components check (R, IGBT) + electronic components check (GDR )				X		X		X
Power components check (capacitor)								X
Test optic fibre								X
Voltage injection test						X		X
<b>Harmonic filter</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Power components check (LRC)						X		X
Cable head tightening	X				X		X	
<b>MM7 reactor</b>								
Visual check (leakage, heating, cable routing etc.)	X		X		X		X	
Cleaning if needed	X		X		X		X	
Cable head tightening	X				X		X	
<b>System functional check</b>								
Insulation test		X		X		X		X
Restart record - signature		X		X		X		X

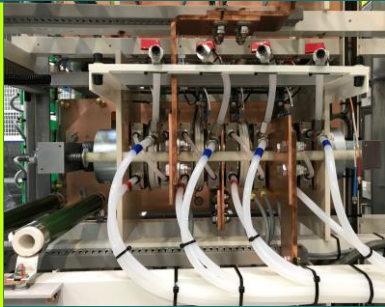
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# ADDITIONAL SUPPORT

We also recommend the following services for your benefits



## Critical spare parts

List of critical spares will be suggested

- To manage your unexpected breakdowns efficiently.
- To optimize your inventory for spare parts.



## Replacement parts\*

A form-fit-function replacement suggestion

- Based on the performance of existing components of MM7 drives and lifecycle status replacement parts will be suggested.



## Proactive performance enhancement packages\*\*

- To stick with state-of-the-art protection and safety technologies
- To enhance the efficiency, performance and life-span

\* Power Conversion offers a lifecycle management including 'last time buy' notifications to mitigate critical impacts and obsolescence risk.

\*\* Power Conversion offers various smaller upgrades as a part of our proactive maintenance.

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