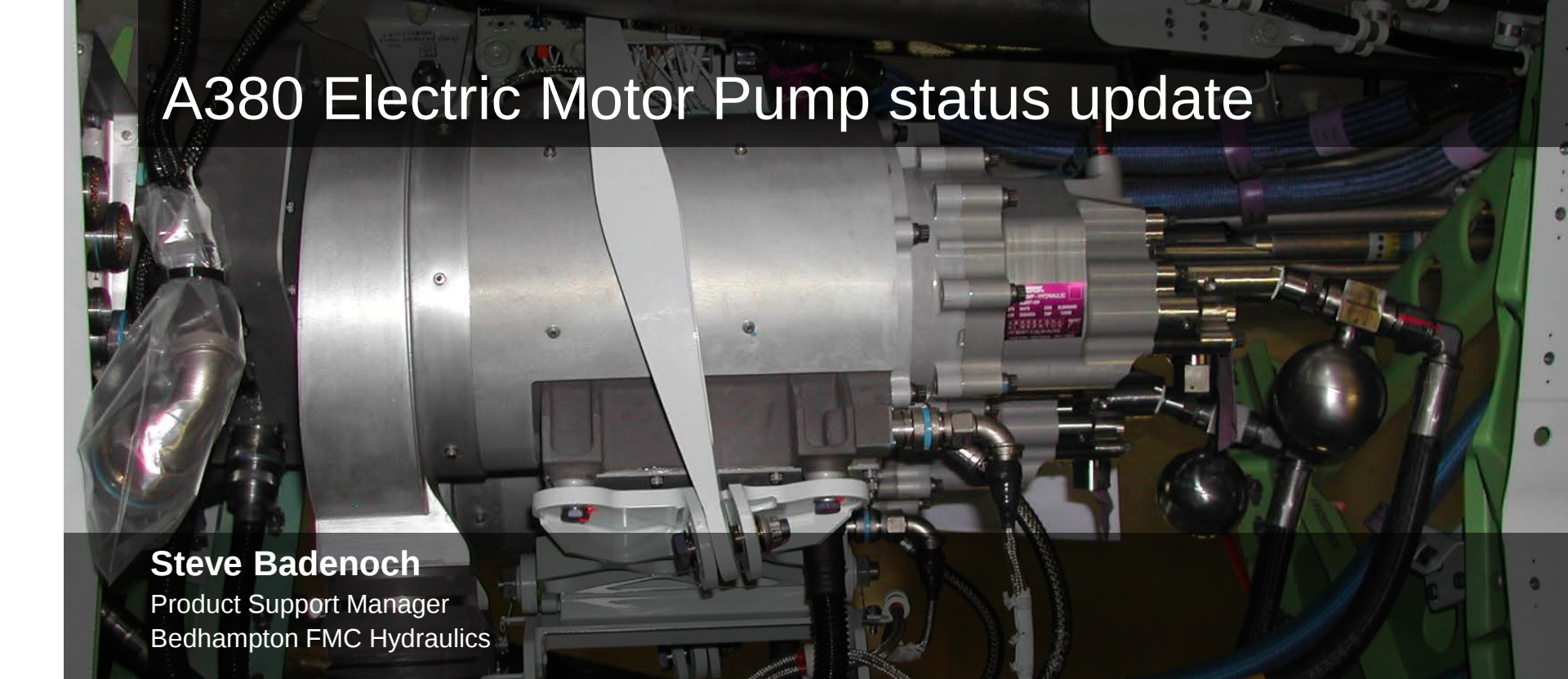


A380 Electric Motor Pump status update



Steve Badenoch

Product Support Manager
Bedhampton FMC Hydraulics



Powering Business Worldwide

Agenda

Equipment Description & Key Features

Reliability

In Service Returns

Product Improved Speed Sensor

New Model Code

Questions

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Equipment Description & Key Features

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Product Improved Speed Sensor

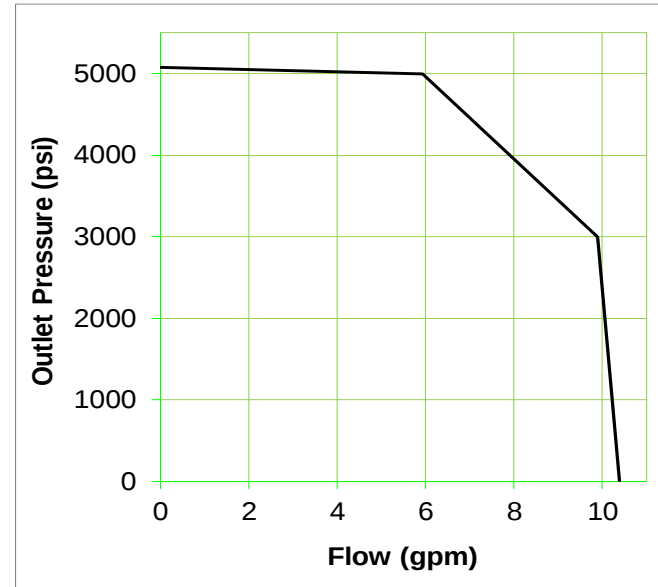
New Model Code

Questions

Electric Motor Pump Performance Characteristics

Equipment description

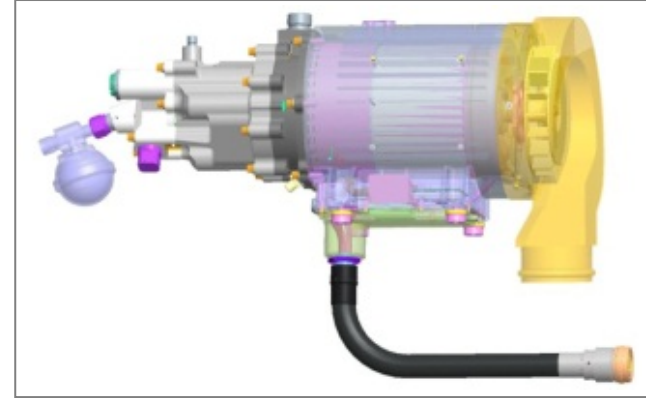
Model	MPEPV3-035-EA1K
Part Number	3022071-010
Component Maintenance Manual	29-21-19
Quantity per Aircraft	4
Speed	8000 Rpm
Delivery	38 l/min (10 gpm), maximum
Outlet Pressure @ Rated speed	345 (5000 psi) -0/+5 bars
Power Supply	115V AC / 400 Hz
Power Consumption @ full flow	75 Amp maximum
Pulsation Level	+/- 1%
Port Fittings	
• Inlet	Dash 12 per AS33514
• Outlet	Dash 8 per EN 6123
• Case Drain	Dash 4 per AS33514-4



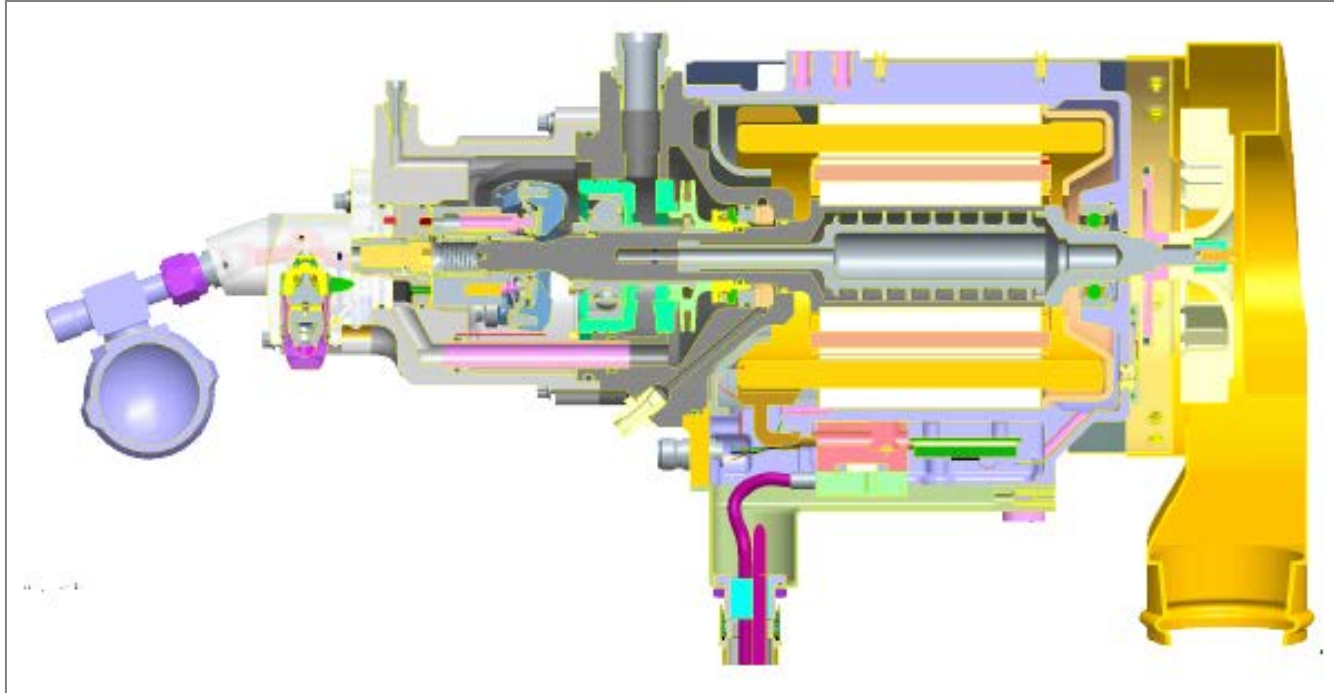
Electric Motor Pump

Ground use only

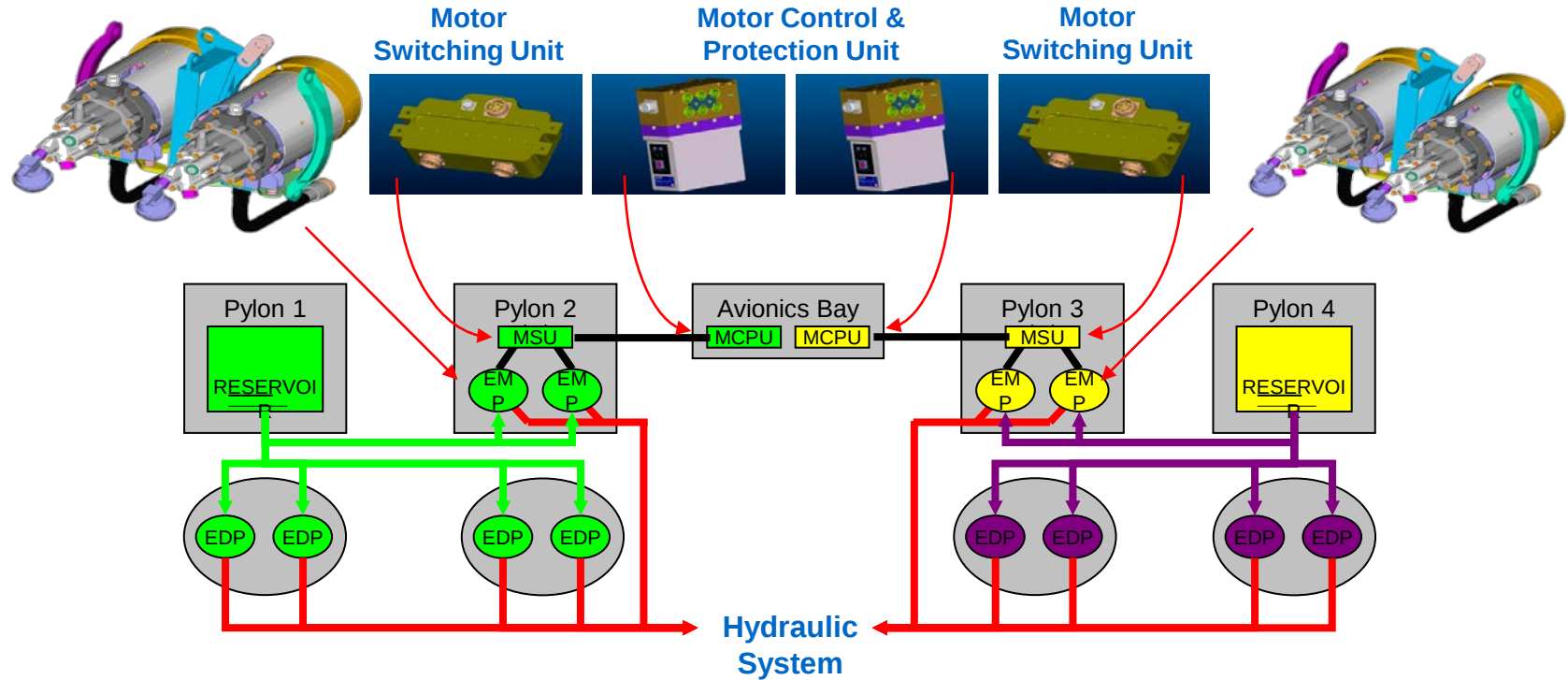
- Cargo door operation
- Landing gear steering
- Maintenance checks
- Switched off on engine start



Electric Motor Pump Cross Section

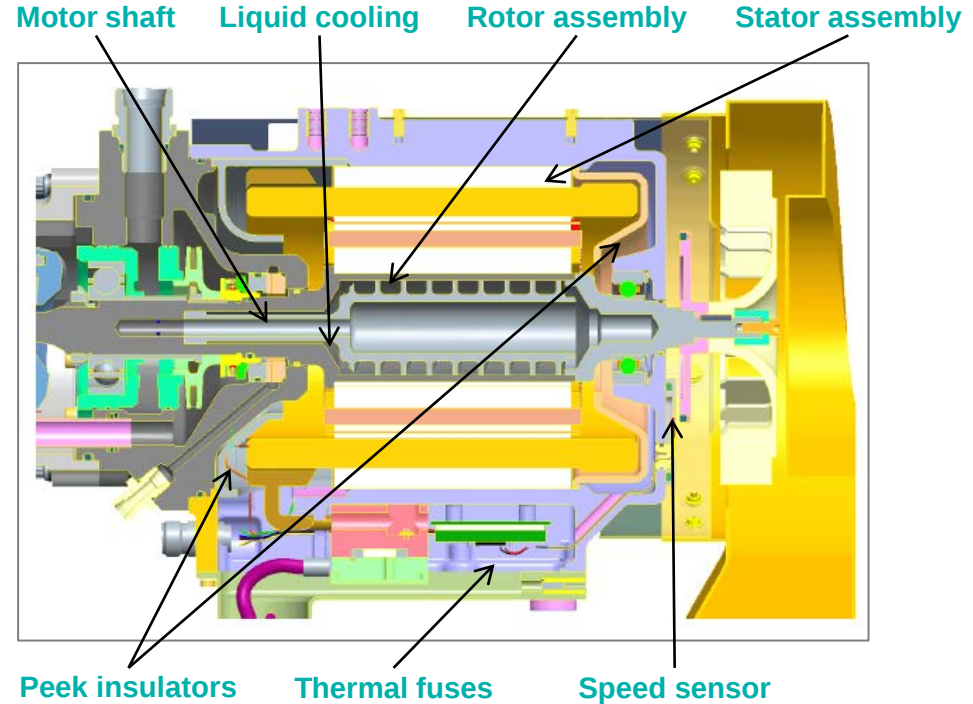


Electric Motor Pump & Auxiliary Equipment

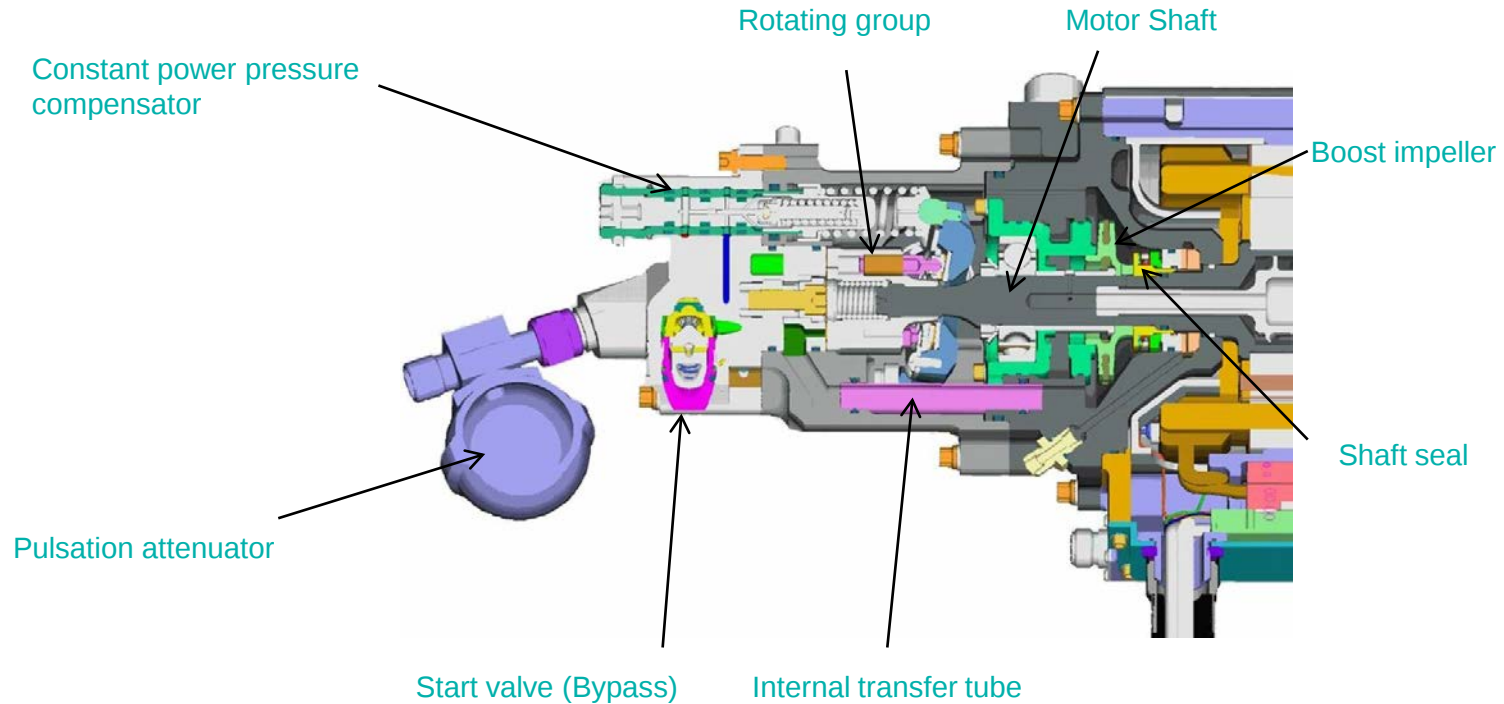


Electric Motor Pump – Key Features

- Electric motor key features
 - 115V AC / 400 Hz supply from ground cart or APU (not engines)
 - Compatible with standard ground carts
 - 75 Amps/260 Amps inrush
 - Air cooled stator
 - Rotor shaft liquid cooled
 - Dry design concept
 - Thermal switches
 - Thermal/current fuses
 - PEEK insulators for arcing
 - Magnet speed sensor

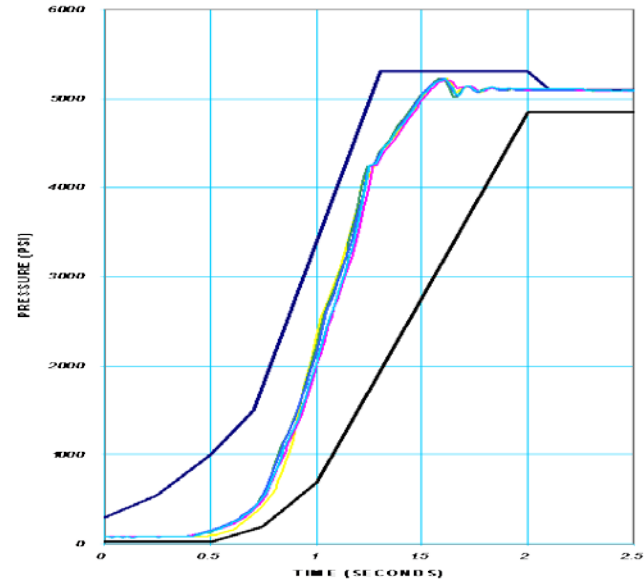
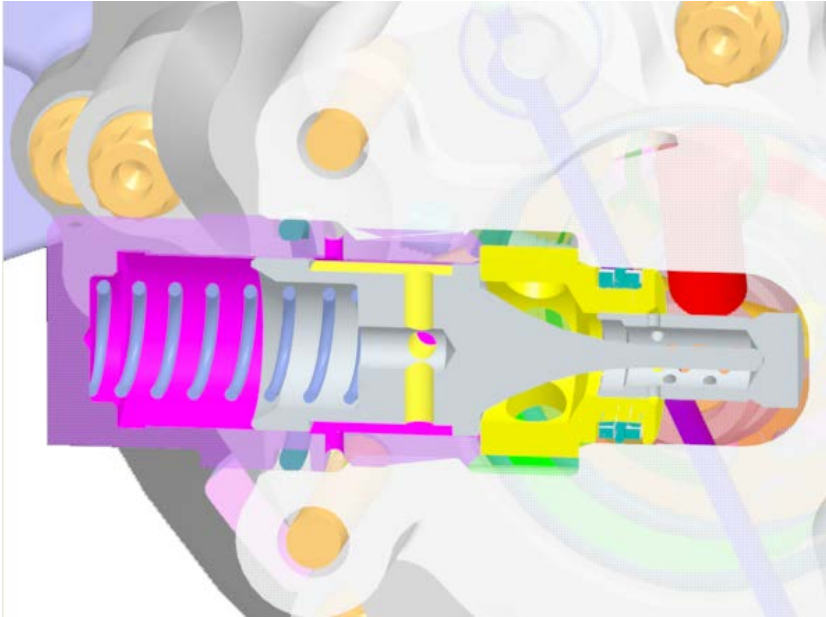


Electric Motor Pump – Key Features



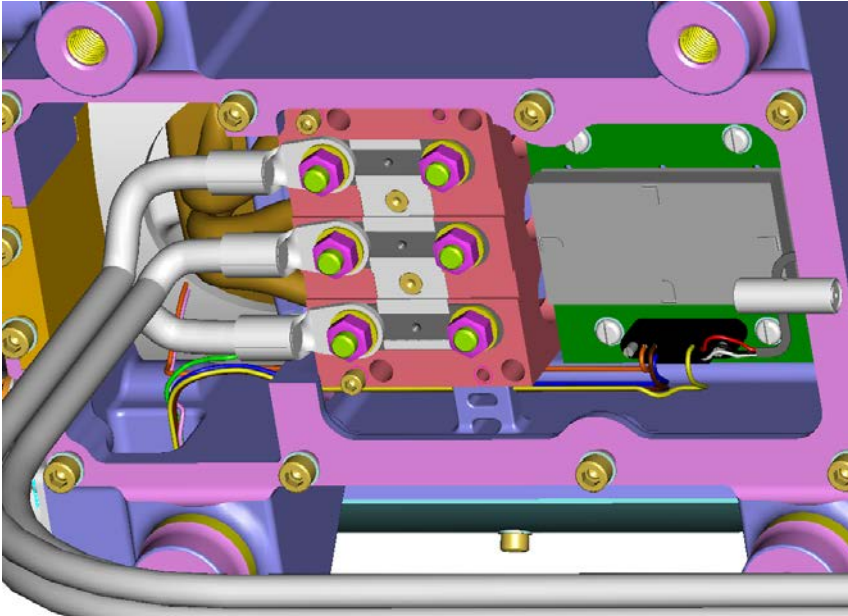
Electric Motor Pump – Start Valve

Start valve



Electric Motor Pump - Fuses

Thermal fuses – One per phase



Agenda

Equipment Description & Key Features

Reliability

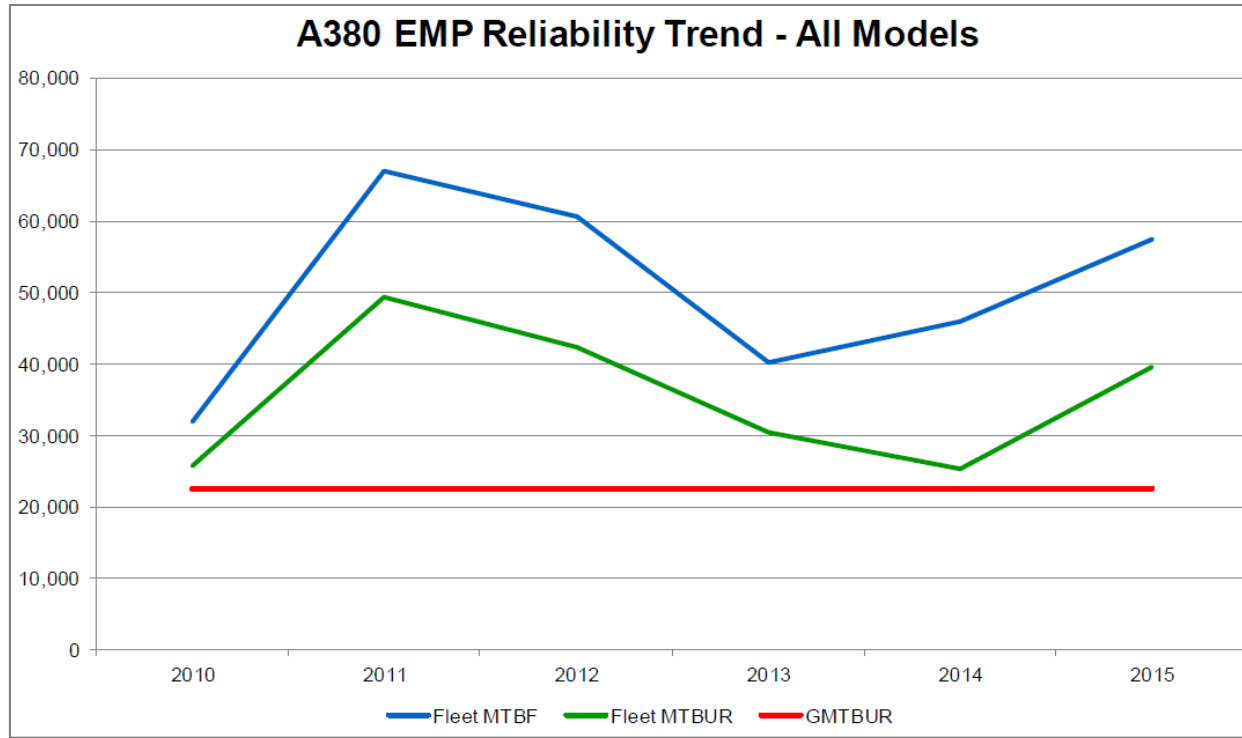
In Service Returns

Product Improved Speed Sensor

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Electric Motor Pump Reliability Trend



Agenda

Equipment Description & Key Features

Reliability

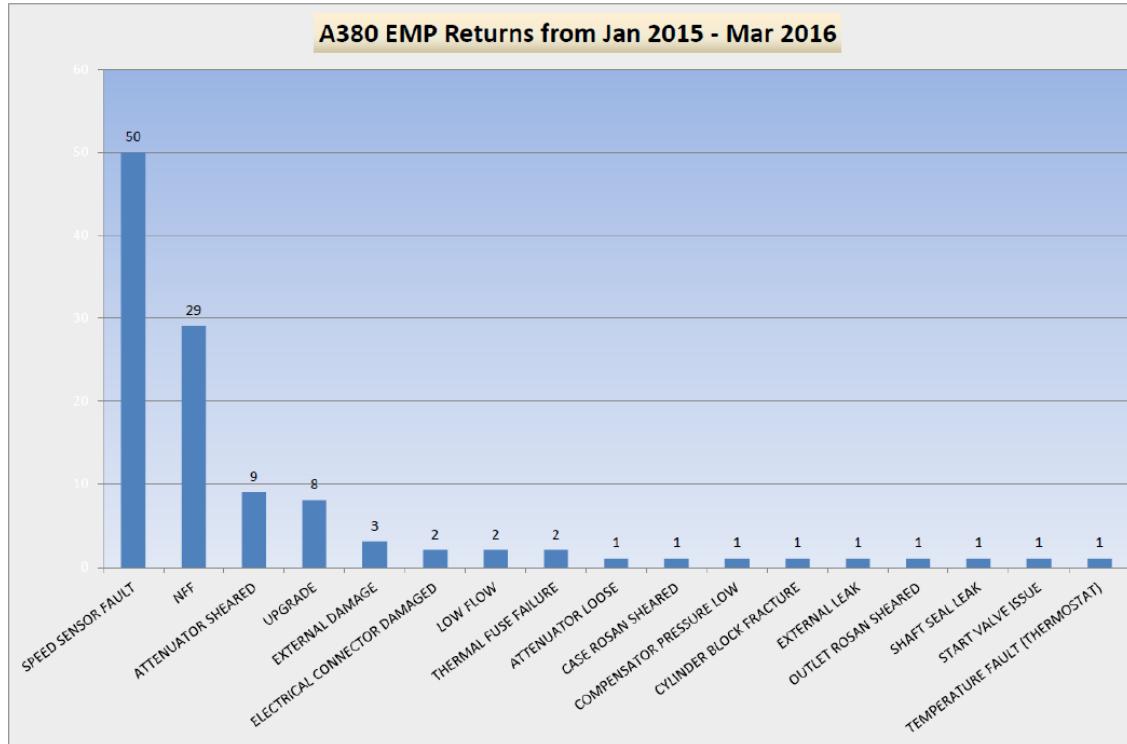
In Service Returns

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Questions

Electric Motor Pump In Service Returns



Agenda

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Questions

Electric Motor Pump Speed Sensor Technical Issues

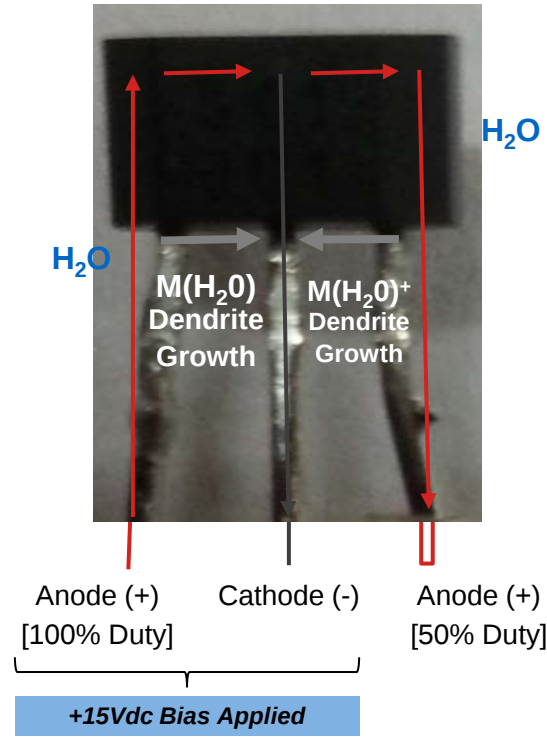
The speed sensor has experienced the following technical issues

- Potting compound ejecting from housing, exposing vulnerable areas of the sensor and its leads to ingress of moisture and contaminants
- Potting compound degradation exposing the speed sensor leads to moisture and contaminants
- Poor potting compound adhesion to PTFE wires, creating potential ingress path for moisture and contaminants
- When the issues are combined with the constant +15Vdc bias applied to the sensor, the following effects have been seen:
 - Dendritic growth between +15V and GND speed sensor leads
 - Dendritic growth between Signal and GND speed sensor leads causing short circuit conditions and intermittent faults
 - Corroded sensors causing open circuit conditions



Electric Motor Pump Root Cause - Electrochemical Migration

- Moisture and contaminants can be present in the immediate vicinity of the hall effect sensor leads due to failure of the potting compound
- A potential gradient of 4.54V/mm is constantly present on the power supply lead, and half the time on the signal lead
- The hall effect sensor leads suffer an electrolytic effect which produces mobile metal ions, the material which forms dendrites



Stage of ECM

ECM has not occurred

Early

Late
("Terminal")

Investigation
Result

No Fault Found

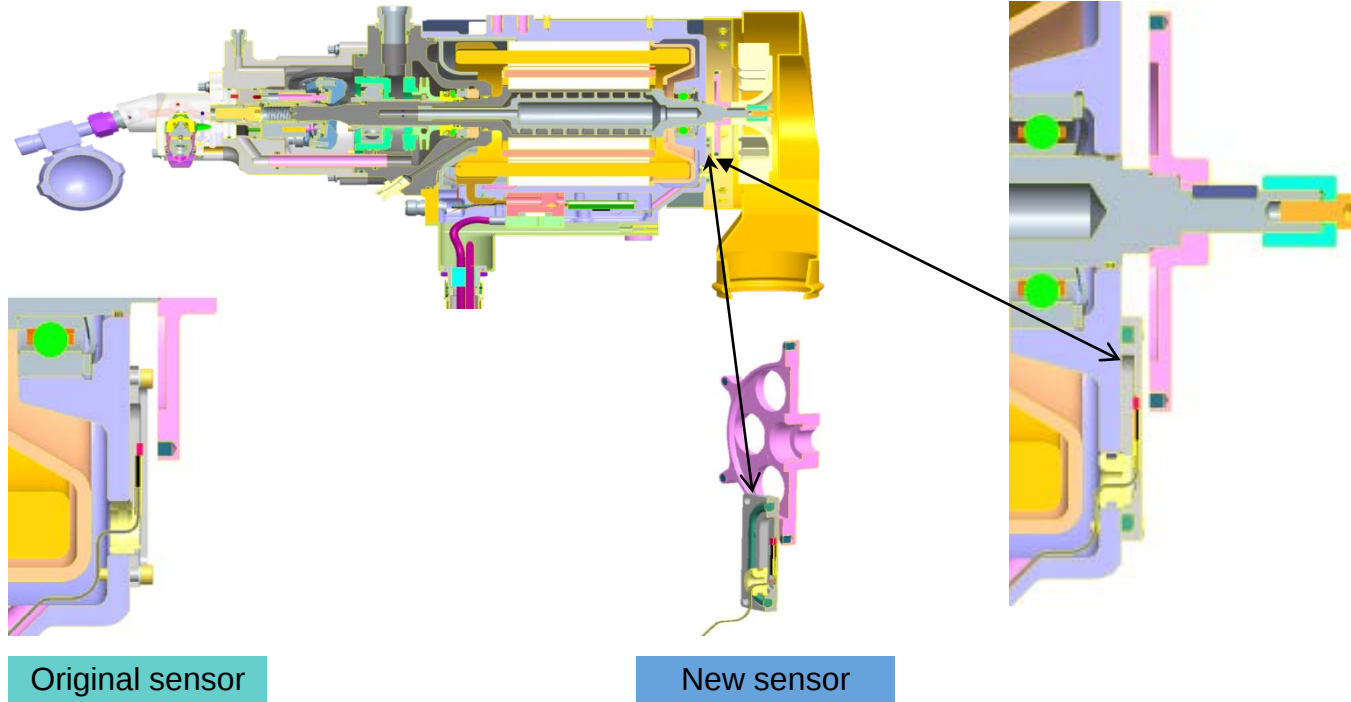
Intermittent
Failure

Corrosion Failure
Open Circuit

Electric Motor Pump Identified Improvements

- The overall speed sensor product improvement is a combination of improvements to the existing design focused on combatting electrochemical migration
- The scope of these improvements is limited to alterations to the speed sensor sub-assembly, allowing for ease of implementation and full electrical and mechanical interchangeability
- Improvements focusing on the following areas:
 - Revised potting compound with improved flexibility and co-efficient of thermal expansion closer to Aluminum Improved adhesion to housing surfaces can prevent it ejecting, which can expose vulnerable areas of the hall effect sensor to moisture and contaminants
 - Introducing additional face seal and o-ring to seal the completed sub-assembly to the body of the EMP motor sub-assembly
 - Re-designed housing to accommodate the above seals, decreasing magnet actuation distance and optimizing the magnetic circuit
 - Alteration of wire insulation material to ensure better potting compound adhesion which removes a potential ingress path for moisture and contaminant

Electric Motor Pump Speed Sensor Installation



Agenda

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Electric Motor Pump New Model Code

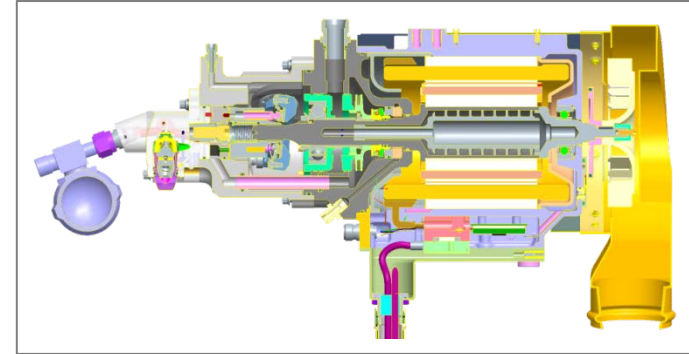
Service Bulletin 3022071-009-29-01 – Improved Speed Sensor released June 2015.

New Model Code – MPEV3-035-EA1K

New Part No - 3022071-010

New speed sensor subassembly – 3022071-293

All units returned for repair on attrition will be upgraded with new speed sensor free of charge if speed fault confirmed





Questions/Comments



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