



TELEDYNE TEST SERVICES
Everywhereyoulook™

Valve Diagnostic Testing and Maintenance

Seventh Annual QUIKLOOK Users Group Meeting

August 14 & 15, 2013



Presented by: Mike Richard



TELEDYNE TEST SERVICES

Everywhereyoulook™

Valve Diagnostic Testing and Maintenance

MIDAS

Implementation of LTU 93-03

Manager Computer Interaction

Michael Richard



Technical Discussion

How does your plant/utility use Limit torque Technical Update 93-03 in determining MOV torque capability? Does your plant take credit for a lower current associated with elevated temperatures? If yes, is the current loss based on 25°C or 40°C? What temperature is the torque de-rate based on, i.e. 25°C or 40°C? Does your plant analyze motor capability at nominal temperature and/or maximum temperature?

Limitorque 93-03

Limitorque Corporation

Automated Valve Actuators and Jacks for Industry
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LIMITORQUE TECHNICAL UPDATE - 93-03

SUBJECT: Reliance 3-Phase Limitorque Corporation Actuator Motors
 (Starting Torque @ Elevated Temperature)

REFERENCE: Potential 10CFR21 Condition Dated May 13, 1993 (Attached)

Issued September, 1993

The purpose of this update is to provide guidance in addressing the referenced document.

- 550/575 Volt 3-Phase** - The tabulated data presented in the referenced document is applicable to 550/575 volt, 3-Phase Reliance motors.
- Motor Applicability** - The tabulated data presented in the referenced document is applicable to all Reliance 3-phase motors. The motor start torque, no-load speed, and frame size must match that given in the tabulation, e.g.:
 Existing Reliance 230/460, 3-phase, 60 Hz, 100 #, 1800 RPM, 210 Frame motor design curve unavailable. From the tabulation, percent current loss is 17.8 percent, and percent torque loss is 13.1 percent when subjected to a 155°C increase in temperature.

- Deration Start Temperature** - The torque reduction is to be applied at temperatures >40°C (104°F). The tabulation details percent loss over a 155°C change in temperature (i.e., from 25° C to 180° C). The percent torque loss per °C for a 10# , 1800 RPM, 56 Frame motor is:

$$\frac{27.7\%}{155^{\circ}\text{C}} = 0.179\% / ^{\circ}\text{C}$$

The percent torque loss for this motor operating in 100°C ambient is:
 (0.179%) (100°C - 40°C) = 10.7%

- Temperature Rise With Motor Energized** - Reliance 3-phase motors are designed with thermal characteristics that result in ≤75°C temperature rise in:
 - 15 minutes @ full load running torque.

Limitorque Corporation

Technical Update 93-03

- 10 seconds @ locked rotor.

A typical valve stroke time of 30 seconds will increase the motor temperature as follows:

$$\begin{matrix} \text{Temperature} & & \text{Temperature} \\ \text{rise rate during} & & \text{rise rate} \\ \text{running} & & \text{during starting} \\ \downarrow & & \downarrow \\ (.5 \text{ Min}) & \frac{75^{\circ}\text{C}}{15 \text{ Min.}} & + 0.1 \text{ Sec} & \frac{(75^{\circ}\text{C})}{(10 \text{ Sec})} = 3.25^{\circ}\text{C} \\ \text{Time for} & & \text{Time for} & \\ \text{full load} & & \text{starting} & \\ \text{stroke} & & \text{motor} & \end{matrix} \quad \text{Rise in one stroke}$$

The above example is simplistic and is given only to show that the motor temperature rise associated with stroking the valve is insignificant. However, applications that allow the motor to draw locked rotor current until the system or valve stabilizes must be addressed. A 5 second duration at locked rotor current will result in a temperature increase of ≤ 37.5°C. It should be noted that continual diagnostic testing will increase motor temperature and decrease output torque and thrust.

- Motor Speed at Elevated Temperature** - Elevated temperature will reduce the motor full load speed. The speed reduction is minimal (≈2% or 3%) from 25°C to 180°C.
- Limitorque Corporation Sizing Equation** - The standard sizing equation requires the use of a 0.9 application factor. If the motor terminal voltage is less than 90 percent, this factor may be revised to 1.0. As before, there is no reduced voltage factor down to 90% voltage but below 90% voltage the square of the percent voltage available to rated motor voltage must be applied.
- Misprint in Referenced Document** - The 2# , 1800 RPM, 56 Frame motor of the tabulation is a 48 frame motor.

Additional Motor Data:

Start/RPM/Frame	% Current Loss	% Torque Loss
1# / 900 / 48	30% / 155°C	19% / 155°C
2# / 900 / 48	30% / 155°C	19% / 155°C
175# / 3600 / 256	16.7% / 155°C	9.9% / 155°C
150# / 1800 / 256	15% / 155°C	12% / 155°C

P. McQuillan
 P. McQuillan
 Nuclear/ Special Projects Manager

Limitorque 93-03

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May 13, 1993

U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Document Control Desk

Re: Potential 10 CFR 21 Condition
Subject: Reliance 3Ø
L. C. Actuator Motors
(Starting Torque at Elevated Temperature)

Limitorque Corporation has completed an evaluation of the subject motors. The results of this evaluation should be utilized to determine actuator operability at motor temperatures of 25° C through 180° C. The motor starting torque decreases with increasing temperature thereby decreasing actuator output torque. This condition could potentially be reportable depending on the operating practice of the licensee. Therefore, pursuant to the requirement of 10 CFR Part 21, herein provided is notification of a potential defect in Limitorque Corporation supplied motor actuators or motors supplied as spare parts.

Identification of Basic Component

The affected component is the Reliance 3Ø A.C. motor that provides input power to actuator types SMB/SB/SBD 000 through 5 and SMB 000 through 5/HBC 0 through 7 combinations.

Discovery Date

The discovery date of this potential defect was July 27, 1989.

Nature of the Defect

The electrical characteristics of the Reliance 3Ø A.C. Limitorque Corporation valve actuator motor are temperature dependent and locked rotor torque and locked rotor amperage will vary with motor temperature. Typically locked rotor torque and locked rotor amperage decrease as motor temperature increases. The attached tabulation details both parameters percentage changes in the temperature range of 25° C to 180° C. The percentage change is linear with respect to temperature for both parameters with baseline data at 25° C.

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Potential Part 21 Condition

The tabulation provides data that is relevant to standard Limitorque Corporation motor designs. The user must ensure that the motor performance curve number shown on the tabulation (e.g. M2735A) is applicable to the motor that is undergoing analysis. If this data is not available, the licensee may furnish the applicable motor identification numbers to Limitorque Corporation in order to make this determination.

The following guidance is offered:

1. Credit should be taken for the locked rotor amperage decrease which will result in a higher available motor terminal voltage.
2. Motor temperature rise due to prior motor energization and motor run time (valve stroke time) must be accounted for.
3. The tabulated data is expected to also predict 550/575 V 3Ø 15 minute duty motor performance. The starting torque rating, no load speed and frame size of the 550/575V motor must match the attached data to allow this analysis. The licensee is requested to provide the motor identification numbers to Limitorque Corporation to verify this assumption.
4. The tabulated data is based on analysis by Reliance Electric. Limitorque Corporation performed testing on two motor designs (quantity of 5 motors) which validated the analysis.

Equipment Affected

1. Same as the basic component identification.
2. Previously supplied technical data that may be used as the basis for operability justification. Where applicable this data should be revised to account for the applicable elevated temperature effects.

Licensee Corrective Action

Ensure operability justification considers the effect of motor performance at the applicable motor temperature.

Limitorque Corporation Corrective Action

Revise the selection procedure for safety related actuators, motors, and technical data packages to account for motor performance at the applicable motor temperature.

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 Potential Part 21 Condition

A copy of this notification has been sent to the Nuclear Regulatory Commission (NRC) under a separate cover letter.

Any questions or clarifications regarding the above notification may be directed to P. McQuillan, Nuclear/Special Projects Manager at (804)528-4400 Ext. 714.

Signed:


 I. E. Wilkinson
 Vice-President of Engineering

Attachment

cc: T. Mignogna
 Part 21 Notification File

Current/Torque Changes from 25 to 180 Centigrade

Start/RPM	Frame	Curve #	% Current Loss	% Torq Loss
2'#/1800	56	M2735A	27.8%	20.7%
5'#/1800	48	M2734	29.0%	18.6%
5'#/1800	56	M1658	21.8%	21.9%
7.5'#/1800	56	M2925	22.4%	5.7%
10'#/1800	56	M1468	26.9%	27.7%
15'#/1800	56	M1476	23.7%	23.1%
25'#/1800	56	M1480	23.1%	23.2%
40'#/1800	56	M1488	21.1%	23.4%
60'#/1800	56	M5204	20.8%	20.9%
60'#/1800	180	SK-59454	18.6%	18.2%
80'#/1800	210	SK-59423	16.1%	15.8%
100'#/1800	210	SK-59418A	17.0%	13.1%
200'#/1800	256	SK-34177	13.5%	9.0%
250'#/1800	256	SK-34193	11.8%	6.9%
300'#/1800	326	SK-34183	11.7%	5.8%
2'#/3600	48	413018-03	28.3%	16.0%
5'#/3600	48	M199	27.7%	18.5%
5'#/3600	56	M1454	24.7%	26.8%
7.5'#/3600	56	M1457	27.6%	16.7%
10'#/3600	56	M1458	23.5%	30.8%
15'#/3600	56	M1460	19.2%	21.4%
25'#/3600	56	M1463	16.2%	24.1%
40'#/3600	56	M4635	27.9%	15.9%
40'#/3600	180	SK-59450	16.2%	11.8%
60'#/3600	210	SK-59446	18.2%	16.5%
80'#/3600	210	SK-59448	18.0%	18.3%
100'#/3600	256	SK-34176	14.1%	9.8%
150'#/3600	256	SK-34184	13.9%	10.0%
200'#/3600	326	SK-34188	10.5%	3.4%
250'#/3600	326	SK-34173	9.3%	3.4%
300'#/3600	326	SK-34171	10.8%	2.9%
400'#/3600	365	SK-34800-	8.8%	-1.8%

Motor Torque Methodology in MIDAS

LIMITORQUE MOTOR PULLOUT TORQUE EQUATION (MPT)

$$\text{MPT} = \text{MST} * \text{OAR} * \text{PE} * \text{AF} * \left(\frac{V_{\text{mt}}}{V_{\text{rated}}} \right)^2 * \text{TRF}$$

Where:

MST = Motor Start Torque

OAR = Overall Actuator Ratio

PE = Gear Efficiency at Pullout

AF = Application Factor (Generally 0.9 Ref. SEL - 4)

V_{mt} = Terminal Voltage at Motor (see NOTE 1)

TRF = Torque Reduction Factor (based on elevated temperature)

V_{rated} = Motor Rated Voltage

NOTE 1: The $V_{\text{mt}} / V_{\text{rated}}$ term is only included when V_{mt} is less than 90% of V_{rated} and this equation is not valid if V_{mt} is less than 70% of V_{rated} .

NOTE 2: Actuators that fall in the following categories will require an additional allowance per Limitorque Technical Update 05-01.

- a) Unit with a 25 ft-lb, 3600 rpm motor in a 56 frame. (change exponent to 2.5)
- b) Unit with a 60 ft-lb, 1800 rpm motor in a 56 frame. (10% reduction)
- c) SMB-1 units with a 66:1 worm gear ratio. (10% reduction)

$$\text{TRF} = 1 - \left[\text{TL}\% \times \frac{T_2 - 40^\circ \text{C}}{180^\circ \text{C} - 25^\circ \text{C}} \right]$$

Where:

TL% = The percent torque loss from Limitorque Technical Update 93-03 for the appropriate motor, frame size, and RPM.

T_2 = The ambient temperature ($^\circ\text{C}$) assumed in calculating the available voltage.

Voltage Drop Analysis in MIDAS

The Motor Terminal Voltage for AC Motors will be determined by using the Voltage Divider Method as described below:

(a) Motor Terminal Voltage

$$V_{mt} = \frac{(Z_{motor}) \times (V_{mcc})}{\sqrt{(R_{motor} + R_{cable} + R_{tol})^2 + (X_{motor} + X_{cable})^2}}$$

Where:

- V_{mt} = Voltage at Motor Terminals
- V_{mcc} = Voltage at Motor Control Center Feeder Breaker
- Z_{motor} = Motor Impedance
- R_{motor} = Motor Resistance
- R_{cable} = Cable Resistance
- R_{tol} = Thermal Overload/Fuse Resistance + Tolerance
- X_{motor} = Motor Reactance
- X_{cable} = Cable Reactance

(b) Motor Impedance (Z_{motor})

$$Z_{motor} = \frac{V_{rated}}{\sqrt{3} \times LRA \times \left(1 - CL\% \frac{(T_{amb} - T_{rate})}{155^{\circ}C}\right)}$$

Where:

- LRA = Rated Motor Locked Rotor Amps
- V_{rated} = Rated Motor Voltage
- T_{amb} = Maximum Motor Ambient Operating Temperature (°C)
- T_{rate} = Motor Rated Operating Temperature (°C)
- CL% = % Current Loss from 25°C to 180°C

MIDAS Implementation

Motor Lookup Table

Motor Curve=M1463

MCL=%motor current loss=0.162%

MTL=%motor torque loss=0.241%

Motor Curve Lookup for 2S15-MOV8809A

Degraded Voltage is CALCULATED from MCC

AC/DC
 AC
 DC

Voltage
460

Torque	Manufacturer	Curve	Origin	Frame	FLA	LRA	CRT	HP	MCL	MTL	N	Derate
5	RELIANCE	M199	COMED	L48	1.25	10.4	0	0.65	0.277	0.185	2	1
5	RELIANCE	M1454	COMED	K56	1.9	12.3	0	0.66	0.247	0.268	2	1
7.5	RELIANCE	M1457	COMED	L56	1.625	9.75	0	1	0.276	0.167	2	1
10	RELIANCE	M1458	COMED	56	2.2	16	0	1.3	0.235	0.308	2	1
15	BALDOR	W03028-A-A	LIMITORQUE	56	3	27	16	1.9	0	0	2	1
15	RELIANCE	M1460	COMED	P56	3.18	26	0	1.9	0.192	0.214	2	1
25	RELIANCE	M1463	COMED	56	4.73	36	0	3.2	0.162	0.241	2.5	1
40	RELIANCE	SK59450	COMED	180/184	7.5	72.7	38	5.3	0.162	0.118	2	1
40	RELIANCE	M4635	COMED	56	7.9	61	0	5.3	0.279	0.159	2	1

AC Method
 Limitorque
 COMED

RPM
3600

25 RELIANCE M1463
Current Selection

OK Cancel

MIDAS Implementation

Motor Tab

MCL=0.162%

MTL=0.241%

Parameter	Dir	Value	Reference
Motor Torque Loss (%decimal)		0.241	1
Motor Current Loss (%decimal)		0.162000	1
Voltage at Motor or MCC		MCC	217
Voltage at MCC	(O)	444	N/A
Voltage at MCC	(C)	433	N/A
Voltage At Motor	(O)	414	217
Voltage At Motor	(C)	416	217
Motor Ambient Temperature (°C)	(O)	54	N/A
Motor Ambient Temperature (°C)	(C)	54	N/A
AC Voltage Drop Methodology		STD	N/A
Cable Resistance Calculated?		Yes	N/A
Cable #1 Size (AWG)		12	N/A
Cable #1 Length (ft)		100	N/A
Cable #1 Temperature (°C)		54	N/A
Cable #2 Size (AWG)		10	N/A
Cable #2 Length (ft)		90	N/A
Cable #2 Temperature (°C)		64	N/A

N/A

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MIDAS Implementation

Voltage Drop Table

MCL=0.162%

AC Voltage Drop Calculation for 2SIS-MOV8809A

Print Exit

Voltage Drop Methodology **STD**

RELIANCE 25 ft-lbs , 3600 RPM , 460V, (M1463)

Cable Terms

Calculate Cable Resistance: 0.397 Cable Reactance: 0.015 TOL Resistance: 0.0138

Input

Voltage Divider Terminology (STD)

Power Factor: 0.850 Locked Rotor Amps: 36.00 **Current Loss: 0.162000**

	CLOSE SAFETY	OPEN SAFETY	
Ambient Temperature	54.0	54.0	(°C)
Voltage at MCC	433.0	444.0	(Volts)
Motor Impedance	7.487	7.487	(ohms)
Motor Resistance	6.4	6.4	(ohms)
Motor Reactance	3.886	3.886	(ohms)
Total Reactance	3.901	3.901	(ohms)
Total Resistance	6.811	6.811	(ohms)
Voltage at Motor	413	423.5	(Volts)
Voltage Ratio	0.8978	0.9207	

MIDAS Implementation

Voltage Drop Table
MCL=0
For
Conservatism

AC Voltage Drop Calculation for 2SIS-MOV8809A

Print Exit

Voltage Drop Methodology **STD**

RELIANCE 25 ft-lbs , 3600 RPM , 460V , (M1463)

Cable Terms

Calculate Input

Cable Resistance	Cable Reactance	TOL Resistance
0.397	0.015	0.0138

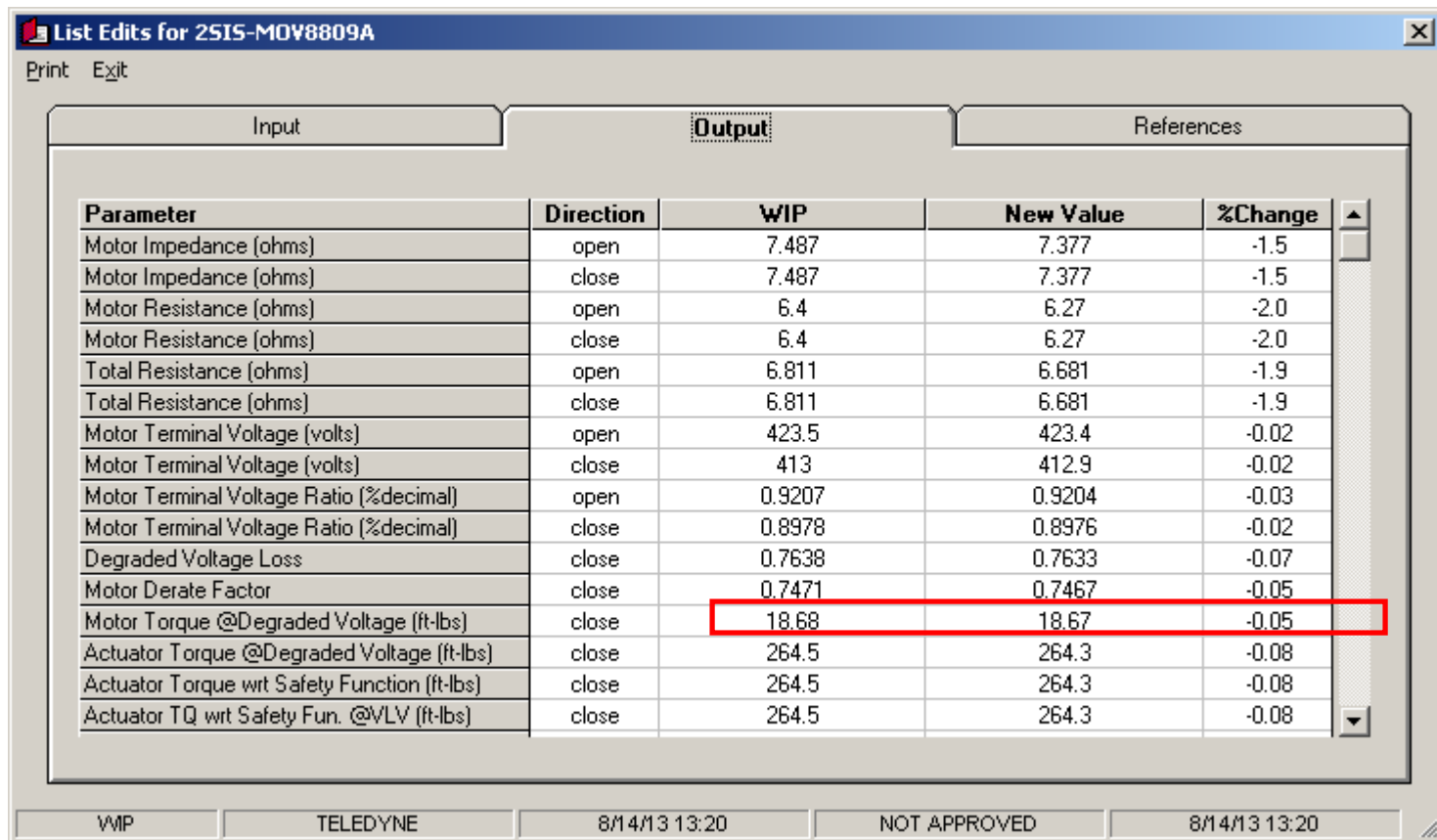
Voltage Divider Terminology (STD)

Power Factor	Locked Rotor Amps	Current Loss
0.850	36.00	0.000000

	CLOSE SAFETY	OPEN SAFETY	
Ambient Temperature	54.0	54.0	(°C)
Voltage at MCC	433.0	444.0	(Volts)
Motor Impedance	7.377	7.377	(ohms)
Motor Resistance	6.27	6.27	(ohms)
Motor Reactance	3.886	3.886	(ohms)
Total Reactance	3.901	3.901	(ohms)
Total Resistance	6.681	6.681	(ohms)
Voltage at Motor	412.9	423.4	(Volts)
Voltage Ratio	0.8976	0.9204	

MIDAS Implementation

Degraded Motor Torque Difference for MCL=0



Print Exit

Parameter	Direction	WIP	New Value	%Change
Motor Impedance (ohms)	open	7.487	7.377	-1.5
Motor Impedance (ohms)	close	7.487	7.377	-1.5
Motor Resistance (ohms)	open	6.4	6.27	-2.0
Motor Resistance (ohms)	close	6.4	6.27	-2.0
Total Resistance (ohms)	open	6.811	6.681	-1.9
Total Resistance (ohms)	close	6.811	6.681	-1.9
Motor Terminal Voltage (volts)	open	423.5	423.4	-0.02
Motor Terminal Voltage (volts)	close	413	412.9	-0.02
Motor Terminal Voltage Ratio (%decimal)	open	0.9207	0.9204	-0.03
Motor Terminal Voltage Ratio (%decimal)	close	0.8978	0.8976	-0.02
Degraded Voltage Loss	close	0.7638	0.7633	-0.07
Motor Derate Factor	close	0.7471	0.7467	-0.05
Motor Torque @Degraded Voltage (ft-lbs)	close	18.68	18.67	-0.05
Actuator Torque @Degraded Voltage (ft-lbs)	close	264.5	264.3	-0.08
Actuator Torque wrt Safety Function (ft-lbs)	close	264.5	264.3	-0.08
Actuator TQ wrt Safety Fun. @VLV (ft-lbs)	close	264.5	264.3	-0.08

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MIDAS Implementation

MCL

Voltage Drop Report

Motor Impedance

$$\begin{aligned} \text{Open: } Z_{\text{motor},o} &= (V_{\text{rated}}) / [(3)^{1/2} * (LRA) * (1 - (MCL * (MxAmbTo - 40) / 155))] \\ &= (460) / [(3)^{1/2} * 36] * (1 - (0.162 * (54 - 40) / 155)) = \mathbf{7.487} \text{ ohms} \end{aligned}$$

$$\begin{aligned} \text{Close: } Z_{\text{motor},c} &= (V_{\text{rated}}) / [(3)^{1/2} * (LRA) * (1 - (MCL * (MxAmbTc - 40) / 155))] \\ &= (460) / [(3)^{1/2} * 36] * (1 - (0.162 * (54 - 40) / 155)) = \mathbf{7.487} \text{ ohms} \end{aligned}$$

Motor Reactance

$$\begin{aligned} X_{\text{motor}} &= (V_{\text{rated}} * \sin(\arccos(\text{PF}))) / [(3)^{1/2} * (LRA)] \\ &= (460 * \sin(\arccos(0.85))) / [(3)^{1/2} * 36] = \mathbf{3.886} \text{ ohms} \end{aligned}$$

Motor Resistance

$$\begin{aligned} \text{Open: } R_{\text{motor},o} &= [(Z_{\text{motor},o})^2 - (X_{\text{motor}})^2]^{1/2} \\ &= [(7.487)^2 - (3.886)^2]^{1/2} = \mathbf{6.4} \text{ ohms} \end{aligned}$$

$$\begin{aligned} \text{Close: } R_{\text{motor},c} &= [(Z_{\text{motor},c})^2 - (X_{\text{motor}})^2]^{1/2} \\ &= [(7.487)^2 - (3.886)^2]^{1/2} = \mathbf{6.4} \text{ ohms} \end{aligned}$$

Motor Terminal Voltage

$$\begin{aligned} \text{Open: } V_{\text{mt},o} &= (Z_{\text{motor},o} * V_{\text{mcc},o}) / [(R_{\text{motor},o} + R_{\text{cable}} + R_{\text{tol}})^2 + (X_{\text{motor}} + X_{\text{cable}})^2]^{1/2} \\ &= (7.487 * 444) / [(6.4 + 0.397 + 0.0138)^2 + (3.886 + 0.015)^2]^{1/2} \\ &= \mathbf{423.5} \text{ Vac} \end{aligned}$$

$$\begin{aligned} \text{Close: } V_{\text{mt},c} &= (Z_{\text{motor},c} * V_{\text{mcc},c}) / [(R_{\text{motor},c} + R_{\text{cable}} + R_{\text{tol}})^2 + (X_{\text{motor}} + X_{\text{cable}})^2]^{1/2} \\ &= (7.487 * 433) / [(6.4 + 0.397 + 0.0138)^2 + (3.886 + 0.015)^2]^{1/2} \\ &= \mathbf{413} \text{ Vac} \end{aligned}$$

Motor Terminal Voltage Ratio

$$\text{Open: } V_{\text{min},o} = (V_{\text{mt},o} / V_{\text{rated}}) = (423.5 / 460) = \mathbf{0.9207}$$

$$\text{Close: } V_{\text{min},c} = (V_{\text{mt},c} / V_{\text{rated}}) = (413 / 460) = \mathbf{0.8978}$$

MIDAS Implementation

Degraded Torque Report

AC Motor Torque Calculation

Limiterorque Method: Degraded Voltage Loss = 1 for Degraded Voltage \geq 90% of Rated Voltage.

$$\text{Close Degraded Voltage Loss} = \left(1 * 413 / 460 \right)^N = \mathbf{0.7638} \quad \text{Limiterorque Method}$$

$$\text{Open Degraded Voltage Loss} = \left(1 * 423.5 / 460 \right)^N = \mathbf{1} \quad \mathbf{N = 2.5}$$

$$\text{Temperature Loss} = 1 - \frac{\text{Torque Loss} * (\text{Ambient Temp} - 40)}{155}$$

NOTE: For (Ambient Temp - 40) < 0 Use Temperature Loss = 1 for conservatism.

$$\text{Close Temperature Loss} = 1 - \frac{0.241 * (54 - 40)}{155} = \mathbf{0.9782}$$

$$\text{Open Temperature Loss} = 1 - \frac{0.241 * (54 - 40)}{155} = \mathbf{0.9782}$$

MTL

Motor Derate Factor = Degraded Voltage Loss * Temperature Loss * LTU Derate Factor

$$\text{Close Motor Derate Factor} = 0.7638 * 0.9782 * 1 = \mathbf{0.7471}$$

$$\text{Open Motor Derate Factor} = 1 * 0.9782 * 1 = \mathbf{0.9782}$$

Motor Derated Torque = Motor Start Torque * Motor Derate Factor

$$\text{Close Motor Derated Torque} = 25 * 0.7471 * 1 = \mathbf{18.68 \text{ ft-lbs}}$$

$$\text{Open Motor Derated Torque} = 25 * 0.9782 * 1 = \mathbf{24.46 \text{ ft-lbs}}$$

MIDAS Implementation

Global Parameter Evaluator Tool

MIDAS Calculations for User Defined SQL

File Edits Tables References Tools Help

2S1S-MOV8809A
Valve Filter is Active

Global Parameter Evaluator
Export to Excel
Calculation List
Verify Software

NEW TEST

Parameter	value	Reference
Motor Torque Methodology Selection	LIMITORQUE	217
Motor Current Type	AC	217
Motor Curve	M1463	634
Motor Manufacturer	RELIANCE	217
Motor Start Torque Rating (ft-lbs)	25	217
Motor Stall Torque (ft-lbs)	30.61	N/A
Motor Rated Running Torque (ft-lbs)	0	N/A
Motor NEMA Frame Size	56	634
Motor Nameplate RPM	3600	217
Motor Rated Voltage (Volts)	460	217
Motor Stall Voltage (Volts)	460	N/A
Motor Power Factor (AC Motors)	0.85	N/A
Motor Locked Rotor Amps	36	634
Motor Full Load Amps	5.2	634
Motor Horse Power	3.2	634
Motor Duty	N/A	N/A
Motor Insulation Class	N/A	N/A

N/A

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MIDAS Implementation

Global Parameter Evaluator Setup - Input

The screenshot shows the 'Global Parameter Evaluator for Work in Progress Table' window. It features a menu bar with 'File', 'Table', and 'Sort'. The main interface includes several sections: 'Input Parameter' with a dropdown menu set to 'Motor Current Loss (%decimal)' and a label 'MOTOR_MCL'; 'Output Parameter' with a dropdown menu set to 'Motor Current Loss (%decimal)' and a label 'MTQ_DV_C'; 'SQL Statement' with a list of parameters and a 'Build SQL' button; 'New Input' with a text box containing '0.000000', radio buttons for 'Value' (selected) and ' [%]', and an 'Evaluate' button. At the bottom, there is a table header with columns: 'Valve ID', 'Old Input', 'Old Output', 'New Output', and '% Difference'.

Valve ID	Old Input	Old Output	New Output	% Difference
----------	-----------	------------	------------	--------------

MIDAS Implementation

Global Parameter Evaluator Setup - Output

The screenshot shows the 'Global Parameter Evaluator for Work in Progress Table' window. It features a menu bar with 'File', 'Table', and 'Sort'. The main interface includes several dropdown menus and a list of parameters. The 'Input Parameter' is set to 'Motor Current Loss (%decimal)' with the value 'MOTOR_MCL'. The 'Output Parameter' is set to 'Motor Torque @Degraded Voltage (ft-lbs) (C)' with the value 'MTQ_DV_C'. The 'SQL Statement' dropdown is open, showing a list of parameters including 'Motor Torque @Degraded Voltage (ft-lbs) (C)', 'Instantaneous Actuator Torque DCM (ft-lbs) (O)', 'Instantaneous Actuator Torque DCM (ft-lbs) (C)', 'Functional Actuator Capability DCM (ft-lbs) (O)', 'Functional Actuator Capability DCM (ft-lbs) (C)', 'Actuator Torque @Degraded Voltage (ft-lbs) (O)', 'Actuator Torque @Degraded Voltage (ft-lbs) (C)', and 'Actuator TQ @Degraded Voltage >09 (ft-lbs)'. A 'Build SQL' button is located below the SQL Statement dropdown. To the right of the SQL Statement dropdown, there is a small window with 'AND' and 'NT>0' visible. At the bottom of the window, there is a table with the following columns: 'Valve ID', 'Old Input', 'Old Output', 'New Output', and '% Difference'.

Valve ID	Old Input	Old Output	New Output	% Difference
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Global Parameter Evaluator Setup - Criteria

The screenshot shows a software interface for building SQL statements. The main window is titled "Build SQL Statement for Work in Progress Table". It is divided into two main sections: "Parameters" and "Criteria".

Parameters Section:

- Sub-sections: Special, Outputs, Test Data, Controls, Valve, Actuator, **Motor**, System.
- Parameter List (with "Voltage at Motor or MCC" selected):
 - Motor Locked Rotor Amps
 - Motor Full Load Amps
 - Motor Horse Power
 - Motor Duty
 - Motor Insulation Class
 - Motor Rotor Material
 - Motor Serial Number
 - Motor Torque Loss (%decimal)
 - Motor Current Loss (%decimal)
 - Manual Motor Exponent
 - Manual Voltage Ratio Multiplier
 - manual Motor Start Torque Multiplier
 - Voltage at Motor or MCC**
 - Voltage at MCC (D)
 - Voltage at MCC (C)
 - Voltage At Motor (D)
 - Voltage At Motor (C)

Criteria Section (highlighted with a red box):

- Criteria 1: "Motor Current Type" with a dropdown menu set to "Any Part of Field" and a text field containing "AC".
- Criteria 2: "Voltage at Motor or MCC" with a dropdown menu set to "Any Part of Field" and a text field containing "MCC".
- Below these are several empty criteria slots, each with a "Clear" button.

Logic and Controls:

- Radio buttons for logic: Match all Criteria (AND), Match Any Criteria (OR).
- "Clear All" button.
- "OK" button.
- Dropdown menu for "All Plants".
- "Cancel" button.

Instructions at the bottom of the Parameters list: "Drag Parameters into an available Criteria or Double-Click on parameter for next available Criteria".

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Global Parameter Evaluator Setup - Value

The screenshot shows a software window titled "Global Parameter Evaluator for Work in Progress Table". The interface includes a menu bar with "File", "Table", and "Sort". Below the menu bar, there are two dropdown menus: "Input Parameter" set to "Motor Current Loss (%decimal)" and "Output Parameter" set to "Motor Torque @Degraded Voltage (ft-lbs) (C)". The "SQL Statement" field contains the query: "WHERE (InputData.MOTOR_VOLT_TYPE Like '%AC%') AND (InputData.MOTOR_DV_LOC Like '%MCC%') AND (PLANT>0)". A "Build SQL" button is located below the SQL field. A red box highlights the "New Input" section, which includes a text box with "0.000000" and two radio buttons: "Value" (selected) and "[%]". An "Evaluate" button is positioned to the right of the radio buttons. At the bottom of the window, a table header is visible with columns: "Valve ID", "Old Input", "Old Output", "New Output", and "% Difference".

Valve ID	Old Input	Old Output	New Output	% Difference
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Global Parameter Evaluator - Results

Global Parameter Evaluator for Work in Progress Table

File Table Sort

Input Parameter: Motor Current Loss (%decimal) MOTOR_MCL

Output Parameter: Motor Torque @Degraded Voltage (ft-lbs) (C) MTQ_DV_C

SQL Statement: WHERE (InputData.MOTOR_VOLT_TYPE Like '%AC%') AND (InputData.MOTOR_DV_LOC Like '%MCC%') AND (PLANT>0)

Build SQL

New Input: 0.000000 Value [%] Reset Valves Listed = 21

Valve ID	Old Input	Old Output	New Output	% Difference
COMED-03	0.231	21.42	21.34	-0.37
2SIS-MOV8809A	0.162	18.68	18.67	-0.05
EPRI-BF-02	0.231	22.99	22.98	-0.04
EPRI-BF-06	0.231	22.99	22.98	-0.04
EPRI-BF-01	0.231	22.99	22.98	-0.04
EPRI-BF-03	0.231	22.99	22.98	-0.04
EPRI-BF-07	0.231	22.99	22.98	-0.04
EPRI-BF-08	0.231	22.99	22.98	-0.04

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Global Parameter Evaluator - Report



Global Parameter Evaluator for Work in Progress Table

Input: Motor Current Loss (%decimal) = 0.000000

Output: Motor Torque @Degraded Voltage (ft-lbs) (C)

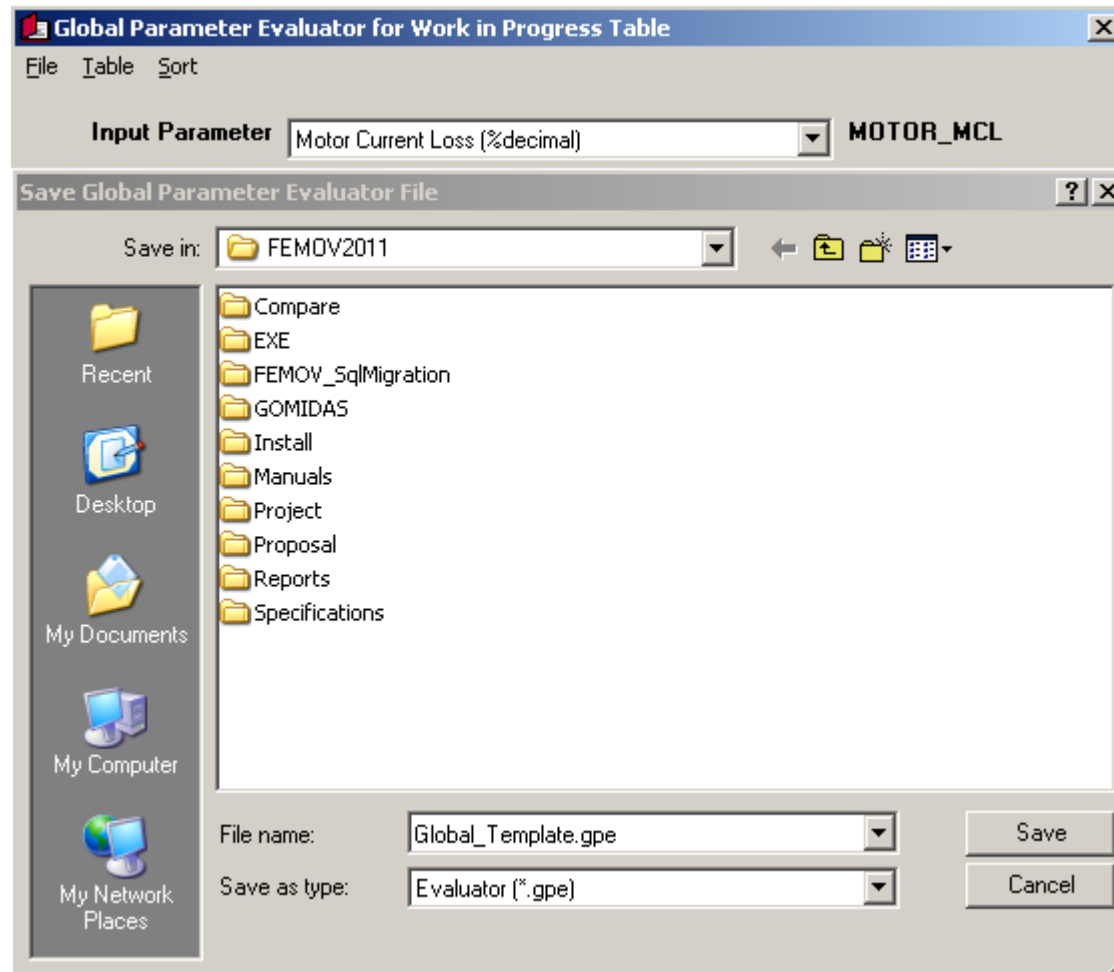
Sorted By: %Difference Ascending

SQL: WHERE (InputData.MOTOR_VOLT_TYPE Like '%AC%') AND (InputData.MOTOR_DV_LOC Like '%MCC%')

Valve Identification	Old Input	Old Output	New Output	Change %
COMED-03	0.231	21.42	21.34	-0.37
2SIS-MOV8809A	0.162	18.68	18.67	-0.05
EPRI-BF-02	0.231	22.99	22.98	-0.04
EPRI-BF-06	0.231	22.99	22.98	-0.04
EPRI-BF-01	0.231	22.99	22.98	-0.04
EPRI-BF-03	0.231	22.99	22.98	-0.04
EPRI-BF-07	0.231	22.99	22.98	-0.04
EPRI-BF-08	0.231	22.99	22.98	-0.04
EPRI-BF-04	0.231	22.99	22.98	-0.04
EPRI-BF-10	0.231	22.99	22.98	-0.04
EPRI-BF-09	0.231	22.99	22.98	-0.04
EPRI-BF-05	0.231	22.99	22.98	-0.04
HP31	0.269	8.94	8.94	0.00
2CCP-MOV150-1	0.29	4.97	4.97	0.00
COMED-02	0.269	10.07	10.07	0.00
2SIS-MOV8809-X	0.162	24.46	24.46	0.00
CF2A	0.29	4.11	4.11	0.00
COMED-01 COPY	0.208	37.55	37.55	0.00
COMED-01	0.208	37.55	37.55	0.00
HP31-M	0	0	0	h finite
RotorK-01	0	0	0	h finite

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Global Parameter Evaluator – Save Template



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Questions?

