June 5, 2007

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Monticello Nuclear Generating Plant
Docket 50-263
License No. DPR-22

Response to Request for Additional Information for the License Amendment Request: Revision to the Allowable Values and Surveillance Intervals for the Low Pressure Coolant Injection Loop Select Logic Time Delay Relays (TAC No. MD4095)

References: 1) NMC letter to NRC, "License Amendment Request: Revision to the Allowable Values and Surveillance Intervals for the Low Pressure Coolant Injection Loop Select Logic Time Delay Relays," (L-MT-07-009), dated January 29, 2007.

2) NRC letter to NMC, "Monticello Nuclear Generating Plant - Request for Additional Information Re: Low Pressure Coolant Injection Select Logic Amendment (TAC No. MD4095)," dated April 17, 2007.

On January 29, 2007, the Nuclear Management Company, LLC (NMC) submitted a license amendment request (LAR) for the Monticello Nuclear Generating Plant (Reference 1) to revise the allowable value and surveillance interval specified for each of the following Low Pressure Coolant Injection (LPCI) loop select logic time delay relay functions of MNGP Technical Specification Table 3.3.5.1-1, "Emergency Core Cooling System (ECCS) Instrumentation:"

2.k. Reactor Steam Dome Pressure - Time Delay Relay (Break Detection)

2.l. Recirculation Pump Differential Pressure - Time Delay Relay (Break Detection)

2.m. Recirculation Riser Differential Pressure - Time Delay Relay (Break Detection)

The NMC requested to extend the surveillance interval for these LPCI loop select logic time delay relays from quarterly to 24-months and to revise the associated allowable values accordingly since the logic was not designed to be tested on-line. In Reference 2 the U.S. Nuclear Regulatory Commission requested additional information on the LPCI loop select logic and ECCS analysis to complete their review.

Enclosure 1 provides the requested additional information. Enclosure 2 provides a draft copy of the revised TS Bases pages for the LPCI loop select time delay relay functions revised following LAR approval. Enclosure 3 provides a copy of an Agastat data sheet for the ETR series relays.

This letter makes no new commitments or changes to any existing commitments.

In accordance with 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated Minnesota Official.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on June 5, 2007.

Timothy J. O'Connor
Site Vice President, Monticello Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosures (3)

cc: Administrator, Region III, USNRC
Project Manager, Monticello, USNRC
Resident Inspector, Monticello, USNRC
Minnesota Department of Commerce

ENCLOSURE 1

Background

On January 29, 2007, the Nuclear Management Company, LLC (NMC) submitted a license amendment request (LAR) for the Monticello Nuclear Generating Plant (MNGP) (Reference 1) to revise the allowable value and surveillance interval specified for each of the following Low Pressure Coolant Injection (LPCI) loop select logic time delay relay functions of MNGP Technical Specification (TS) Table 3.3.5.1-1, "Emergency Core Cooling System (ECCS) Instrumentation:"

2.k. Reactor Steam Dome Pressure - Time Delay Relay (Break Detection)

2.l. Recirculation Pump Differential Pressure - Time Delay Relay (Break Detection)

2.m. Recirculation Riser Differential Pressure - Time Delay Relay (Break Detection)

The NMC requested to extend the surveillance interval for these LPCI loop select logic time delay relays from quarterly to a 24-month interval and to revise the associated allowable values accordingly.

In Section 3 of Reference 1, NMC requested issuance of this license amendment by June 25, 2007, established from the scheduled surveillance performance window during the 2007 refueling outage (RFO). The surveillance was actually performed April 9, 2007. This sets the end of the quarterly (92 day) surveillance interval as July 10, 2007.(1)

In Reference 2 the U.S. Nuclear Regulatory Commission (NRC) requested additional information pertaining to the LPCI loop select logic and the ECCS analysis. The requests for additional information are shown in bold type and the NMC responses are provided immediately thereafter in standard type.

NRC Request for Additional Information

(1) The second paragraph of Section 5.3 of Enclosure 1, in part, states: "The LPCI [Low Pressure Coolant Injection] loop select time delay relays have very specific functions which do not specifically relate to accident timing parameters, Analytical Limits are not readily apparent." In addition, the second paragraph of Section 5.2 states: "In MODES 1, 2, and 3, operation of the LPCI loop select logic functions is required to ensure that no single failure can prevent successfully selecting the unbroken recirculation loop for LPCI injection." Since LPCI mode of the Residual Heat Removal system is one of the Emergency Core Cooling Systems, please provide the analyzed value of the time available to achieve successful LPCI injection so that the Nuclear Regulatory Commission (NRC) staff can determine that adequate margin is available in the setting of the time delay relays with or without loss of offsite power.

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1. The duration of the quarterly surveillance interval applying Surveillance Requirement 3.0.2 is 115 days (92 + 23), resulting in a required performance date of August 2, 2007.

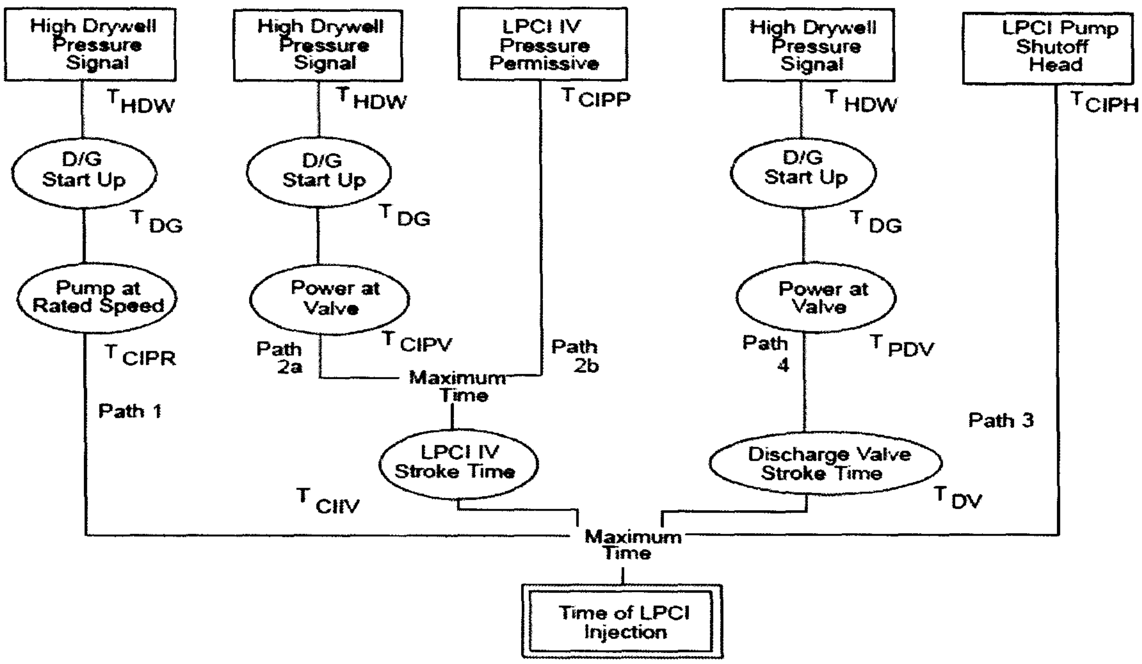
The LPCI loop select logic functions specified in TS Table 3.3.5.1-1 are only necessary in the event of a recirculation line break Loss of Coolant Accident (LOCA), i.e., proper functioning of this logic is assumed for mitigation. The GE ECCS performance evaluation (References 3 and 4) considered breaks ranging from the maximum recirculation suction line break down to a 0.05 square-foot (ft^2) break. For the Design basis Accident (DBA) LOCA analysis the bounding break location was assumed to be in the recirculation system suction piping. LOCA analysis results indicate that the limiting large break and single failure combination for the MNGP is the maximum recirculation suction line break with battery failure for nominal assumptions and with LPCI injection valve failure for 10 CFR 50 Appendix K assumptions. The most limiting small recirculation line break is the 0.07 ft^2 recirculation line suction break for nominal assumptions and the 0.08 ft^2 recirculation line suction break for Appendix K assumptions. For the four other evaluated non-recirculation line break LOCA events (feedwater, core spray, and a main steam line break (both in and outside containment) the ECCS performance was evaluated. For these non-recirculation loop LOCA events, success of the loop select logic to properly pick the unbroken recirculation loop is not required and the cases were non-limiting.

The LPCI loop select logic first determines if both reactor recirculation pumps are running. The Recirculation Pump Differential Pressure (Function 2.l) time delay relays provide a short time delay (nominal trip setpoint (NTSP) of 0.5 seconds) to allow for proper determination of the running recirculation pumps. If either recirculation pump is not running (that is the unit is in Single Loop Operation (SLO)) the logic sends trip signals to both recirculation pumps, and further logic operation is delayed until the reactor pressure vessel (RPV) pressure decreases to approximately 900 psig. If both recirculation pumps are running, or after RPV pressure drops to 900 psig if in SLO, the Reactor Steam Dome Pressure (Function 2.k) time delay relays provide a delay (NTSP of 2.0 seconds) to allow full differential pressure to develop between the recirculation loops. Following this time delay, the logic selects the correct recirculation loop for injection. The Recirculation Riser Differential Pressure (Function 2.m) time delay relays provide a short delay (NTSP of 0.5 seconds) to allow for proper determination of the unbroken loop.

Updated Safety Analysis Report (USAR) Section 14.7.2.3.3 discusses ECCS equipment performance. USAR Figure 14.7-12, presented below, depicts schematically the LPCI System initiation logic. The maximum of the time required to complete each of several parallel event sequences determines the LPCI injection time. The time required to complete each path is a combination of initiation signal and equipment parameter times. The times at which initiation signals occur depend on the vessel blowdown and break flow rates which are functions of break location and size. ECCS equipment parameters used in the

MNGP ECCS performance licensing analysis are listed in the USAR.[2] The path nomenclature of Figure 14.7-12 was applied below to describe the parallel operations that occur.

Figure 14.7-12 LPCI Initiation Logic



Blocks indicate initiation signals.

Elipses indicate equipment parameters.

Effect of Loss of Offsite Power

As described in USAR Section 14.7.2.2.5, the primary effect of the assumption that offsite power becomes unavailable coincident with the LOCA is an increase in the time delay for injection by the low pressure ECCS. This occurs because the ECCS must wait for the emergency power supplied by the diesel generators. The ECCS LOCA analysis was therefore performed assuming a loss of offsite power and the results bound the LOCA with offsite power case.

2. During the RFO the remaining GE 11 fuel was discharged. The entire core is now GE 14 fuel. The ECCS-LOCA analysis discussion herein applies only to this fuel type.

The unavailability of offsite power causes a trip of the reactor recirculation pumps at the beginning of the event. This causes both pumps to begin coasting down. A time constant of 5 seconds is assumed for the non-broken loop. For the broken recirculation loop, the pump coastdown time is immaterial because flow coastdown is dominated by the break flow dynamics. The feedwater pumps are assumed to trip at the beginning of the event and linearly coastdown to zero within 5 seconds. Since the Reactor Protection System (RPS) is fail safe, the unavailability of offsite power initiates a scram at the beginning of the event.

For a LOCA with offsite power available the LPCI pumps would start and once the LPCI injection valve pressure permissive was met and their discharge pressure overcame vessel pressure would be able to inject.[3] This time depends on the vessel blowdown and break flow rates which are functions of break location and size. In parallel with this sequence, once the LPCI loop select logic was completed, the selected recirculation loop discharge valve would close and the LPCI injection valves would open allowing injection. Times for a LOCA analysis without the loss of offsite power are not available since the analysis is always performed for the bounding cases assuming a loss of offsite power. If offsite power were available LPCI injection would occur sooner within the bounding time frames discussed.

LPCI Initiation Discussion

No separate path is identified for the LPCI loop select logic time delay relays since they perform their functions in parallel within some of the paths (primarily Paths 2a and 4) described below. The LPCI loop select logic is initiated by the same signals that initiate the Diesel Generator start sequence. Diesel Generator (DG) startup is assumed to take 15 seconds in the analysis. Since the divisional LPCI loop select logic is powered from the 125 Vdc electrical system, it does not rely on AC power from the respective division's DG in order to complete its function.

1. LPCI pumps at rated speed (Path 1). For this to occur, the DG must be started and powering the emergency busses. Low Pressure Coolant Injection pumps are loaded on the emergency busses and achieve rated flow.

   The ECCS-LOCA evaluation uses 34.3 seconds as the maximum time from initiating signal to LPCI pump at rated speed and capable of rated flow.

2. LPCI injection valves open (Path 2). Two conditions must be satisfied:

   - Power must be established at the valves (Path 2a). DG started and powering the emergency busses.

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3. This discussion does not consider the type of single failure that might occur (and affect on makeup systems), mode of plant operation, i.e., two or single loop operation, etc.

- Reactor pressure vessel (PRV) pressure decrease to less than the LPCI injection valve pressure permissive 350 psig (Path 2b).

Then the LPCI injection valves must have time to stroke open. LPCI injection in the ECCS-LOCA analysis begins after the LPCI injection valve receives power and is open.[4]

For the limiting large break LOCA, (the maximum recirculation suction line break with battery failure and nominal assumptions) the RPV depressurizes rapidly and the LPCI injection will occur following Paths 2a and 4. DG startup is assumed to take 15 seconds in the LOCA analysis with the LPCI loop select logic proceeding in parallel with the DG startup. The large break LOCA analysis indicates that RPV pressure falls below 900 psig within approximately 4 seconds into the limiting large break event. (If the unit was operating in SLO, Functions 2.k and 2.m cannot occur until the RPV pressure decreases to approximately 900 psig.) This leaves a remaining period of approximately 11 seconds for the LPCI loop select time delay relays to perform their function within the time for the DGs to start and provide AC power to the injection valves (Path 2a).[5] Therefore, as long as the total time delay due to the LPCI loop select time delays relays is less than 11 seconds, the timing of the LPCI injection assumed for a large break event in the LOCA analysis will not be affected. For this event, injection occurs at approximately 54 seconds.

For the limiting small recirculation line break LOCA, (the 0.08 ft^2 recirculation line break case with battery failure and Appendix K assumptions) the RPV depressurizes much more slowly and the LPCI injection occurs following Paths 2b or 3. (Note that the injection time for these events depends on the rate of depressurization which depends on the break size and location of the break being evaluated. Depending on the break size, LPCI injection may be further delayed until the RPV pressure reduces to below the LPCI pump shutoff head, Path 3.) For this limiting Appendix K small break in the latest ECCS-LOCA analysis, LPCI injection occurs at greater than approximately 450 seconds into the event and hence a much longer time is available for the LPCI loop select time delay relays to perform their function.

3. RPV pressure decrease to below LPCI pump shutoff head (Path 3). Coolant cannot be pumped into the PRV until the pressure difference between reactor and suppression chamber (torus) (source of ECCS coolant) is less than the pump shutoff head.

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4. Rated LPCI flow to the RPV was assumed to occur when the LPCI injection valve was greater than 50 percent open. This was assumed to occur at 35 seconds in the analysis.
5. A review of the pressure response for the limiting LOCA, the maximum recirculation suction line break, indicated that the LPCI injection valve pressure permissive is not reached until approximately 17 seconds into the blowdown.

The LOCA analysis assumes that RPV pressure must decrease to below 300 psid (vessel to drywell) before LPCI injection can begin. For the limiting large break event, RPV depressurization is completed well within the time assumed for Path 2a. There is no set time delay for this path as the depressurization rate depends on the size and location of the break being evaluated. For the limiting small break in the latest ECCS-LOCA analysis, LPCI injection occurs at greater then approximately 450 seconds into the event.

4. <u>Close recirculation discharge valve in unbroken loop (Path 4)</u>. Closure directs LPCI flow upward through the jet pump drive lines into the jet pumps, preventing flow from being lost out the break. To close the recirculation loop discharge valve, power must be established at the valve (the DG must be started and powering the emergency busses).

   The timing conditions for this path are the same as Path 2a.

In the response to RAI Item 4, a table is provided which states the NTSP, the current Allowable Value (AV) and the proposed Allowable Value (AV), the calculated design and upper adjustment limits for each relay. From a review of this table versus the discussions above it is clear that small variations in the LPCI loop select logic time delays are insignificant considering the overall duration of the LPCI injection actuation scenarios.

(2) LPCI injection flow will only take place when the reactor pressure reduces to a value below the pump shut-off head. From the licensee's application, it is not clear as to how much time is available after the reactor steam dome pressure falls below the pump shut-off head and the LPCI flow has to be established. Please provide this information along with the basis of this information.

(Refer to the path timing specified in the response to RAI Item 1 for the following discussion.) The LOCA analysis assumes that LPCI injection occurs following the longest time delay of the logic paths discussed previously.

For the limiting large break LOCA event discussed previously, the RPV depressurization occurs rapidly and reactor pressure decreases to below the shut-off head of the LPCI pumps prior to Path 2a completing. Since the LPCI pump is at rated speed and capable of rated flow per the shorter time of Path 1, the analysis assumes that injection can occur as soon as Path 2a completes. (See Item 1 under the previous response.)

For the limiting small recirculation line break event discussed previously, the LOCA analysis indicates that LPCI injection is delayed until RPV pressure falls below the LPCI shut-off head (Path 3) at greater than 450 seconds into the event. The RPV depressurization rate is a function of the break size and the break location assumed in the analysis. The LOCA analysis assumes the LPCI injection valves start opening at 350 psig and that flow can begin at 300 psid (vessel to drywell). Since the LPCI pump is at rated speed and capable of rated flow per the shorter time of Path 1, the analysis assumes that injection can occur as soon as Path 3 completes.

(3) Please advise the NRC staff of the setpoint methodology and the method used for calculating the setpoint.

As indicated in Section 5.4 of the LAR (Reference 1), NMC applied the General Electric (GE) Instrument Setpoint Methodology (Reference 5), to determine the AV for the LPCI loop select time delay relays. While the method used to calculate the AV is similar to ISA-S67.04 (Reference 6), Method 2, in that the AV is derived from the AL, it is not equivalent since the GE Instrument Setpoint Methodology includes additional error terms not included in ISA Method 2. With the inclusion of these additional error terms, the resulting AV is more conservative from the perspective of protecting the AL. A summary description of the methodology was provided in response to a previous RAI (Question 1, within Enclosure 2) for the 24-month fuel cycle LAR (Reference 7). The NRC has previously reviewed and approved the GE Instrument Setpoint Methodology as documented in Reference 8.

In the GE Instrument Setpoint Methodology, the AV is established so that there is at least a 95 percent probability of providing the trip action before the process variable reaches the AL when the maximum allowable drift has occurred. The methodology used to determine the AV includes all known error terms (excluding drift) for a particular instrument application under trip conditions. The NTSP is established as the limiting value of the sensed process variable at which a trip action may be set to operate at time of calibration so there is at least a 95 percent probability of providing the trip action before the process variable reaches the AL.

The GE Instrument Setpoint Methodology includes an additional evaluation methodology called the Licensee Event Report (LER) Avoidance Test. The LER Avoidance Test can be performed to assure that there is sufficient margin between the AV and the NTSP to reasonably avoid violations of the AV. The LER Avoidance Test determines the error that may be present during surveillance testing and adjusts the NTSP to provide added margin to the AV if necessary. The following terms are considered in the LER Avoidance Test; Loop Accuracy under Normal (Calibration) Conditions, Loop Calibration Error, and Loop Drift.

Since it is advantageous to have LPCI injection occur as soon as practical, and since it was desired to retain the current plant setpoints, the following method was used in the setpoint calculation for the LPCI loop select logic time delay relays to develop more conservative AVs than would have been determined if the ALs had been established based on the time available in the ECCS-LOCA analysis.

The LER Avoidance Test method was used to determine the margin required between the NTSP and the AV. The AVs were then set based on maintaining the existing plant setpoints. Once the AVs were set, a calculated design limit was determined using the same method normally used to calculate the margin between the AL and the AV. Determining the design limit in this manner ensures that there is at least a 95 percent probability that the trip function will occur before the design limit is reached when all known errors are considered. As shown in the response to RAI Item 4 below, the sum of the calculated design limits of the three time delay relays is approximately five seconds and is well within the times determined in the ECCS-LOCA analysis.

(4) The second paragraph of Section 5.3 of Enclosure 1 states: "The total of all the nominal time delay settings is 3 seconds, and does not approach the 15 seconds available for completion. Totaling the upper adjustment limit for the three time delay relays involved in LPCI loop selection adds up to a total time of 9 seconds, and does not approach the 15 second requirement." Please explain how the total time delay setting can be 3 seconds when the proposed allowable value time setting for the three relays are 2.97, 0.75, and 0.75 seconds. Please clarify the statement as needed to avoid confusion.

In Section 4.0 of the LAR (Reference 1) the nominal time delay associated with each LPCI loop select time delay relay function was discussed. The table below provides the NTSP, the current AV and the proposed AV, the calculated design and upper adjustment limits for each relay.

Function and Title		NTSP	Current AV	Proposed AV	Calc. Design Limit	Relay Upper Adj. Limit
		(in seconds)				
2.k	Reactor Steam Dome Pressure - Time Delay Relay (Break Detection)	2.0	≤ 2.79	≤ 2.97	3.31	3.00
2.l	Recirculation Pump Differential Pressure - Time Delay Relay (Break Detection)	0.5	≤ 0.716	≤ 0.75	0.84	3.00
2.m	Recirculation Riser Differential Pressure - Time Delay Relay (Break Detection)	0.5	≤ 0.697	≤ 0.75	0.84	3.00
	Total	3.0	4.203	4.47	4.99	9.00

The sums of the time delay relays NTSP and AV are stated above. The intent of the LAR statement was to indicate the large margin available whether comparing the sum of the time delay relays NTSPs, AVs, or even upper adjustment limits, to the DG startup time of 15 seconds assumed in the ECCS performance analysis.

(5) The licensee's response to Item 1 of Generic Letter (GL) 91-04 stated that, since there was no requirement in the custom Technical Specification to test the time delay feature, calibration data from surveillance or maintenance records was not available for the LPCI loop select logic time delay relays to directly establish their drift characteristics. Please provide justification for the drift values used for ETR14D3A relays. Also, please provide the nominal trip setpoint values of the time delay relays.

The LPCI loop select logic time delay relays are Agastat model ETR14D3A (where "A" specifies a range of 0.15 to 3 seconds). Prior to adoption of the Improved Standard Technical Specifications on October 29, 2006, there were no TS surveillance requirements for the LPCI loop select logic instrumentation. The LPCI loop select logic instrumentation was not included in the MNGP custom TS. Functionality of the instrumentation was demonstrated once-per-cycle during shutdown condition ECCS testing.[6] Consequently, LPCI loop select logic instrumentation surveillance data was not available to directly establish the drift characteristics of the LPCI loop select Agastat[7] ETR14D3A relays.

However, Agastat model ETR14D3B time delay relays (where "B" specifies a range of 0.55 to 15 seconds) are installed in the plant, used in a number of nuclear safety related applications, and were included in the custom TS. Since the TS functions associated with these ETR14D3B relays (see the table in the response to RAI Item 6) were in the custom TS, and hence were routinely calibrated, calibration data was available for this model of Agastat ETR time delay relays and could potentially be utilized.

The Agastat ETR series time delay relays are the nuclear qualified version of the Agastat TR time delay relays. As indicated on the data sheet provided in Enclosure 3, they are of an electromechanical design with a solid-state timing network and are available in eight timing ranges from Range A (0.15 to 3 seconds) to Range I (2 to 60 minutes). As further discussed in the response to RAI Item 6, there is no difference, other than a change in a resistor value to control the timing range, which would affect the performance of the various time ranges within the ETR series of time delay relays.

Since there are no significant differences between the ETR series of time delay relays, and the LPCI loop select time delay relays (Agastat model ETR14D3A) are located in the same environment within the Cable Spreading Room (as the Agastat model ETR14D3Bs), it was determined that the analyzed drift values for the ETR14D3B time delay relays could be applied to provide a conservative estimate

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6. Demonstration of the functionality of the LPCI loop select time delay relays prior to their inclusion in the TS as part of the ITS conversion was discussed in an RAI response (Reference 11) to the previous LAR. This LAR extended the quarterly surveillance interval to the 2007 RFO to allow surveillance performance when the plant was shutdown.
7. Attempts were made to retrieve drift information directly from the manufacturer, Tyco, Inc. but were unsuccessful.

of the drift that the ETR14D3As will experience. Also, as described in the response to RAI Item 6, several very conservative decisions were made to bias the drift analysis and determination of the setpoints to provide additional conservatism.

The NTSPs for the LPCI loop select time delay relays were provided in response to RAI Item 4.

(6) In the response to Item 1 of GL 91-04, the licensee has assumed that percentage drift for ETR14D3A (range 0.15 to 3.0 seconds) and that of ETR143B (range 0.55 to 15 seconds) are the same. The adjustable time delay ranges for these relays are significantly different. Please provide the basis of this assumption, including any available data to support this assumption. In addition, the 92-day drift data have been extrapolated for use in 30 month drift calculation. Please provide the basis with the reference used for extrapolating the 92-day drift data to 30-month drift calculation.

Agastat Testing and Qualification

The Agastat ETR series of time delay relays are nuclear qualified. They are of an electromechanical design with a solid-state timing network available in eight timing ranges. Reference 9 discusses the qualification test program performed by Agastat on representative samples from the EGP, EML and ETR families of control relays. Tested models included ETR14I3B (120 volts AC, 0.55 to 15 seconds) and ETR14D3B (125 volts DC, 0.55 to 15 seconds) as representative samples for the ETR series. The Tyco Electronics Product Specification (Reference 10) documents the characteristics of the ETR relays derived from the results of the generic test program.

Agastat ETR relays of all voltage ratings and timing ranges are supplied with Certificate of Compliance/Conformance that certifies that the purchased relays are identical, with respect to original material processing and design basis criteria, to those products tested and documented in qualification test report and product specification. There is no difference, other than a change in a resistor value to control the timing range, which would affect the performance of the various time ranges within the ETR series of time delay relays.

Determination of the Drift Uncertainty

The As-Found/As-Left (AFAL) analysis methodology[8] was used to statistically determine instrument drift based on the calibration data available for the Agastat ETR14D3B relays. The AFAL data includes several potential sources of

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8. The AFAL analysis methodology described in EPRI Report TR-103335-R1 (Reference 12) was provided to the NRC as Enclosure 4 to the 24-month fuel cycle LAR and subsequently proceduralized as Appendix III to the Engineering Standards Manual, "Drift Analysis (Instrumentation and Controls)" (ADAMS Accession Number ML0402040177) and is referenced in Section 5.4 of the LAR (Reference 1).

uncertainty over and above true instrument drift such as instrument accuracy, measurement and test equipment error, personnel-induced variations, and temperature and environmental effects. Since it is not possible to separate the other potential sources of uncertainty from the true instrument drift, the AFAL analysis methodology produces a conservative estimate of the drift that will be seen under in-plant conditions.

There is no significant difference between the various relays in the ETR series of time delay relays. Also, the LPCI loop select time delay relays are located in the same environment as the HPCI Steam Line Flow – High time delay relays and will be subjected to similar or better testing methods. Therefore, the analyzed drift values from the ETR14D3B time delay relays can provide a conservative estimate of the drift that the ETR14D3A time delay relays (used in the LPCI loop select logic application) will experience.

Spec. & Function	Specification Title	Drift Uncertainty		Extended Drift Uncertainty	
		Period	% S.P.	Period	% S.P.
3.3.5.1-1, 1.f	Core Spray Pump Start – Time Delay Relay	30-mth	± 5.5	Not Used	Not Used
3.3.5.1-1, 2.f	LPCI Pump Start – Time Delay Relay	30-mth	± 5.5	Not Used	Not Used
3.3.6.1-1, 3.a	HPCI Steam Line Flow – High (Time Delay Function)	92-day	± 9.9	30-mth	± 31.4

The past performance of the Agastat ETR14D3B time delay relays has shown that they do not exhibit a time dependency. However, for conservatism in accordance with the MNGP drift analysis guidance, the analyzed drift uncertainty from the HPCI Steam Line Flow – High time delay relays was treated as moderately time dependent and extrapolated to 30 months by multiplying the 92-day drift value by the square root of the ratio of the time periods. This resulted in a calculated 30-month drift of approximately ± 31.4 percent. Use of this drift uncertainty in determining the AVs provides a high probability that the AVs determined and applied to the LPCI loop select logic time delay relays will not be exceeded during routine calibrations.

This method for extrapolating the 92-day drift data for use as 30-month drift values is in accordance with the GE Instrument Setpoint Methodology. In accordance with that methodology, the errors inherent in the drift are assumed to be independent over any time interval, therefore, the resulting design drift allowance in the square root of the sum of the squares of the errors for the component time intervals. Since the drift of the Agastat ETR time delay relays do not exhibit a time dependency, this method resulted in a very conservative 30-month drift value. The drift determined in this way was used to determine the margin between the NTSP and the Allowable Value.

Determination of the As Found Tolerance

Since the above method results in a relatively large (approximately 31 percent) drift uncertainty value, a different method of extrapolating the drift was used to conservatively determine the As Found Tolerances that was applied for the LPCI loop select logic time delay relays.

To calculate the As Found Tolerance, the drift uncertainty from the HPCI Steam Line Flow – High time delay relays (Agastat model ETR14D3B) was treated as non-time dependent. The drift uncertainty for the extended (30-month) calibration interval was determined by increasing the tolerance interval to the 99 percent / 95 percent level. This resulted in a 30-month drift uncertainty of approximately ± 10.9 percent of setpoint.

The drift uncertainty determined in this way was used to determine the As Found Tolerances used in the periodic calibration surveillances. Use of this smaller HPCI Steam Line Flow – High time delay relay drift uncertainty in determining the As Found Tolerances results in more conservative As Found Tolerance than would have been determined using the larger (31.4 percent of setpoint) value. The use of this more conservative As Found Tolerance will assure that potential time delay relay performance problems are identified well before the Allowable Value is approached.

7.0 REFERENCES

1. NMC letter to NRC, "License Amendment Request: Revision to the Allowable Values and Surveillance Intervals for the Low Pressure Coolant Injection Loop Select Logic Time Delay Relays," (L-MT-07-009), dated January 29, 2007.

2. NRC letter to NMC, "Monticello Nuclear Generating Plant - Request for Additional Information Re: Low Pressure Coolant Injection Select Logic Amendment (TAC No. MD4095)," dated April 17, 2007.

3. General Electric report, NEDC-32514P, Revision 1, "Monticello Nuclear Generating Plant SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," dated October 1997.

4. GE-NE-J1103878-09-02P, "Monticello ECCS-LOCA Evaluation for GE14," August 2001.

5. GE Nuclear Energy, NEDC-31336-P-A, "General Electric Instrument Setpoint Methodology," dated September 1996.

6. Instrumentation, Systems, and Automation (ISA) Society ANSI/ISA-S67.04-2000, "Setpoints for Nuclear Safety-Related Instrumentation."

7. NMC letter to NRC, "Response to NRC Requests for Additional Information Regarding License Amendment Request Supporting 24-Month Fuel Cycles (TAC No. MC3692," (L-MT-05-005), dated March 3, 2005.

8. NRC letter to the Boiling Water Reactor Owners Group, "Revision to Safety Evaluation Report on NEDC-31366, Instrument Setpoint Methodology (NEDC-31336P)," dated November 6, 1995.

9. Tyco Electronics, "Qualification Test Report 501-529, Revision A," dated March 24, 2004.

10. Tyco Electronics, "Product Specification 108-2107."

11. NMC letter to NRC, "Response to Request for ECCS Surveillance Documentation to Confirm the Functionality of the LPCI Loop Select Time Delay Relays During Past Surveillance Testing," (L-MT-06-086), dated December 21, 2006.

12. EPRI Report TR-103335-R1, "Guidelines for Instrument Calibration Extension/Reduction Programs," dated March 1994.

ENCLOSURE 2

MONTICELLO NUCLEAR GENERATING PLANT

TECHNICAL SPECIFICATION BASES

(Draft revised pages provided for information.)

(2 pages follow)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.5.1.2, ~~and~~ SR 3.3.5.1.5 and SR 3.3.5.1.9

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the channel will perform the intended function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL FUNCTIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

The Frequency of 92 days for SR 3.3.5.1.2 is based on the reliability analyses of Reference 3. The Frequency of 12 months for SR 3.3.5.1.5 is based on the known reliability of the equipment and the multichannel redundancy available, and has been shown to be acceptable through operating experience. The Frequency of 24 months for SR 3.3.5.1.9 is based on the known reliability of the equipment and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

SR 3.3.5.1.3

Calibration of trip units provides a check of the actual trip setpoints. The channel must be declared inoperable if the trip setting is discovered to be less conservative than the Allowable Value specified in Table 3.3.5.1-1. If the trip setting is discovered to be less conservative than accounted for in the appropriate setpoint methodology, but is not beyond the Allowable Value, the channel performance is still within the requirements of the plant safety analyses. Under these conditions, the setpoint must be readjusted to be equal to or more conservative than the setting accounted for in the appropriate setpoint methodology.

The Frequency of 92 days is based on the reliability analysis of Reference 3.

SR 3.3.5.1.4, SR 3.3.5.1.6, and SR 3.3.5.1.7

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL

SURVEILLANCE REQUIREMENTS (continued)

CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology.

The Frequency of SR 3.3.5.1.4 is based upon the assumption of a 92 day calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.5.1.6 is based upon the assumption of a 12 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis. The Frequency of SR 3.3.5.1.7 is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

The SR 3.3.5.1.4 annotation in Table 3.3.5.1-1 for Functions 1.c, 1.d, 2.c, 2.d, 4.c, 4.d, 5.c, and 5.d has been modified by two Notes. The first Note requires evaluation of channel performance for the condition where the as-found setting for the channel is outside its as-found tolerance but conservative with respect to the Allowable Value. Evaluation of instrument performance will verify that the instrument will continue to behave in accordance with design basis assumptions. The purpose of the assessment is to ensure confidence in the instrument performance prior to returning the instrument to service. These channels will also be identified in the Corrective Action Program. In accordance with procedures, entry into the Corrective Action Program will require review and documentation of the condition of OPERABILITY. The second Note requires the setting for the instrument be returned to within the as-left tolerance of the nominal trip setpoint. This will ensure that sufficient margin to the Safety Limit and /or Analytical Limit is maintained. If the setting for the instrument cannot be returned to within the as-left tolerance of the nominal trip setpoint, then the instrument channel shall be declared inoperable. The second Note also requires that the nominal trip setpoint and the methodology for calculating the as-left and the as-found tolerances be in a document controlled under 10 CFR 50.59 (i.e., Technical Requirements Manual (Ref. 4)).

<u>SR 3.3.5.1.8</u>

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required initiation logic for a specific channel. The system functional testing performed in LCO 3.5.1, LCO 3.5.2, LCO 3.8.1, and LCO 3.8.2 overlaps this Surveillance to provide complete testing of the assumed safety function.

ENCLOSURE 3

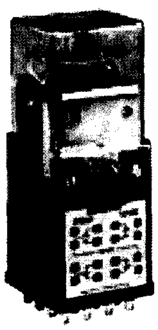
MONTICELLO NUCLEAR GENERATING PLANT

DATA SHEET FOR THE AGASTAT ETR SERIES TIME DELAY RELAYS

(Provided for Information)

(7 pages follows)

Nuclear Qualified Control Relays – Series EGP/EML/ETR



SEISMIC AND RADIATION TESTED

In order to satisfy the growing need for electrical control components suitable for class 1E service in nuclear power generating stations, AGASTAT® control relays have been tested for these applications. Series EGP, EML and ETR have demonstrated compliance with the requirements of IEEE Standards 323-1974 (Standard for qualifying Class 1E Equipment for Nuclear Power Generating Stations) and IEEE Standard 344-1975 (Seismic Qualification for Nuclear Power Generating Stations). Testing was also referenced to ANSI/IEEE C37.98 (formerly IEEE Standard 501-1978, Standard for Seismic Testing of Relays).

The design of Series EGP, EML and ETR control relays has evolved over 20 years of continual use in a wide range of industrial applications. Power Relay, Magnetic Latch and Timing Relay versions are available for use with a choice of coil voltages, as well as an internal fixed or adjustable potentiometer in the Series ETR time delay version.

TEST PROCEDURE

Test Procedure

AGASTAT® control relay Series EGP, EML and ETR were tested in accordance with the requirements of IEEE STD. 323-1974 (Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations), IEEE STD. 344-1975 (Seismic Qualification for Nuclear Power Generating Stations) and referenced to ANSI/IEEE C37.98 (formerly IEEE Standard 501-1978, Standard for Seismic Testing of Relays). The relays were tested according to parameters which, in practice, should encompass the majority of applications. Documented data applies to relays which were mounted on rigid test fixtures. The following descriptions of the tests performed are presented in their actual sequence.

Radiation Aging

Relays were subjected to a radiation dosage of 2.0×10^5 Rads, which is considered to exceed adverse plant operating requirements for such areas as auxiliary and control buildings.

Cycling with Load Aging

The radiated units were then subjected to 27,500 operations at accelerated rate, with one set of contacts loaded to 120VAC, 60Hz at 10 amps; or 125VDC at 1 amp, and the number of mechanical operations exceeding those experienced in actual service.

Temperature Aging

This test subjected the relays to a temperature of 100°C for 42 days, with performance measured before and after thermal stress.

Seismic Aging

Sufficient interactions were performed at levels less than the fragility levels of the devices in order to satisfy the seismic aging requirements of IEEE STD 323-1974 and IEEE STD 344-1975.

Seismic Qualification

Artificially aged relays were subjected to simulated seismic vibration, which verified the ability of the individual device to perform its required function before, during and/or following design basis earthquakes. Relays were tested in the non-operating, operating and transitional modes.

Hostile Environment

Since the relays are intended for use in auxiliary and control buildings, and not in the reactor containment areas, a hostile environment test was performed in place of the Loss of Coolant Accident (LOCA) test. Relays were subjected to combination extreme temperature/humidity plus under/over voltage testing to prove their ability to function under adverse conditions even after having undergone all the previous aging simulation and seismic testing. The devices were operated at minimum and maximum voltage extremes: 85 and 120 percent of rated voltage for AC units, and 80 and 120 percent of rated voltage for DC units, with temperatures ranging from 40°F to 172°F at 95 percent relative humidity.

Baseline Performance

In addition to aging tests, a series of baseline tests were conducted before, and immediately after each aging sequence, in the following areas:

- Pull-in Voltage
- Drop-out Voltage
- Dielectric Strength at 1650V 60Hz
- Insulation Resistance
- Operate Time (milliseconds)
- Recycle Time (milliseconds)
- Time Delay (seconds) } Series ETR only
- Repeatability (percent) } Series ETR only
- Contact Bounce (milliseconds at 28VDC, 1 amp.)
- Contact Resistance (milliohms at 28VDC, 1 amp.)

Data was measured and recorded and used for comparison throughout the qualification test program in order to detect any degradation of performance.

The SRS shape (at 5 percent damping), is defined by four points:
- point A = 1.0 Hz and an acceleration equal to 25 percent of the Zero Period Acceleration (ZPA)
- point D = 4.0 Hz and 250 percent of the ZPA
- point E = 16.0 Hz and 250 percent of the ZPA
- point G = 33.0 Hz and a level equal to the ZPA

SPECIMEN 13, 15 & 16 (EGP SERIES)
RELAY STATE: NON-OPERATE MODE (DE-ENER.)
TEST RUN NO. 318, 319, (205-206), (198-199)
AXIS (H + V):
COMPOSITE OF FB/V-, SS/V, FB/V+ X .707
DUE TO 45° INCLINATION OF TEST MACHINE.

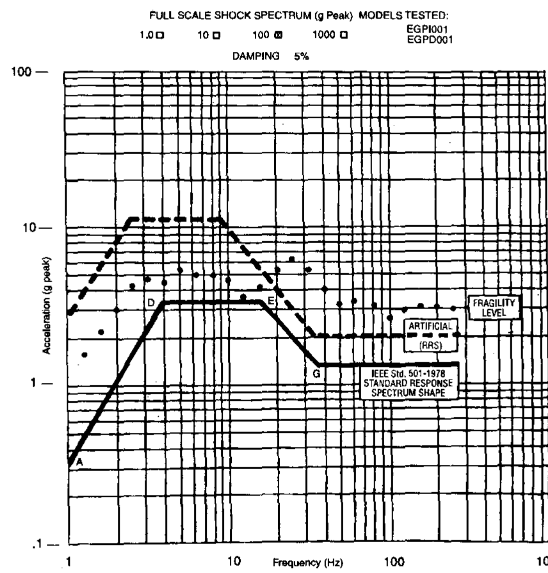


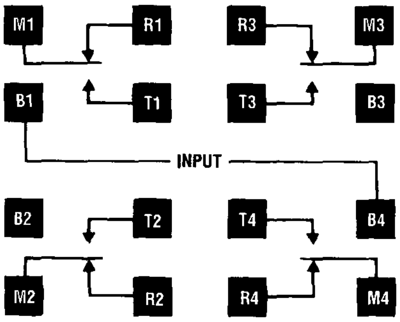
Figure 1. Model EGP, Response Sectrum, Non-Operate Mode

Additional Seismic Response Curves are available on request.

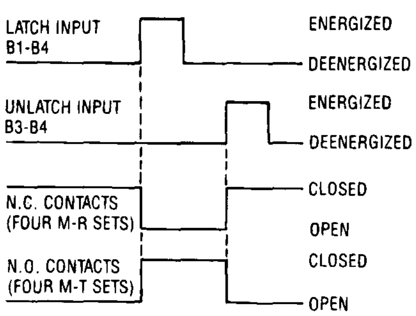
Relay State: Non-Operate Mode (De-ener.)
Test Run No. 318, 319, (205-206), (198-199)

OPERATION

Series EGP
Power Relay
Applying a continuous voltage to the coil (B1-B4) energizes the coil and instantaneously transfers the switch, breaking the normally closed contacts (M1-R1, M2-R2, M3-R3, M4-R4) and making the normally open contacts (M1-T1, M2-T2, M3-T3, M4-T4). The contacts remain in this transferred position until the coil is deenergized, at which time the switch instantaneously returns the contacts to their original position.



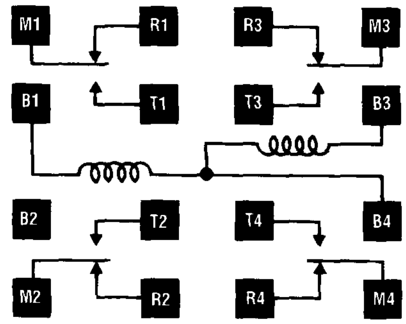
Series EML
Magnetic Latch
Application of a voltage to the latching input (B1-B4) will cause the relay to latch in (Make the N.O. Contacts, break the N.C. Contacts). When this voltage is removed, the relay will remain in this "Latched" condition. Application of a voltage to the un-latching input (B3-B4) will cause the relay to dropout (Break the N.O. Contacts, make the N.C. Contacts). When this voltage is removed, the relay will remain in this "Unlatched" condition.



Wiring Diagram (Wiring and Connections)
The ML relay has three terminals for the windings: latching winding between terminals B1 and B4, un-latching winding between terminals B3 and B4.

The ML Relay is not symmetrical due to its three coil connections

The relays are normally delivered polarized so that terminal B4 carries the negative voltage. To reverse the polarity, a deenergize/energize cycle should be carried out using a voltage 50% greater than the normal rating.



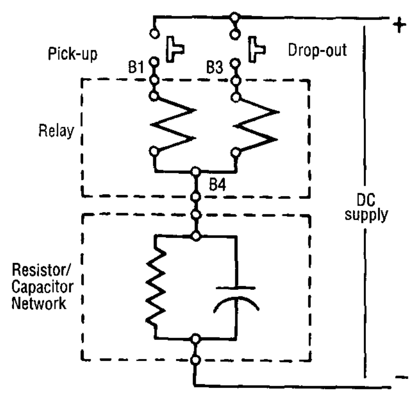
Continuous Duty Wiring
Since the double wound coil does not have a continuous duty rating, voltage pulses to the coils should not exceed a ratio of 40% on, to 60% off, with maximum power-on periods not to exceed 10 minutes.

If continuous energizing only is available, a resistor/capacitor network should be connected as shown below. In this case the shortest time between two operations must not be less than 5 seconds.

The relay will always assume the energized position in the event of both windings being energized simultaneously.

It is advisable not to put another load in parallel with the windings of the ML relay.

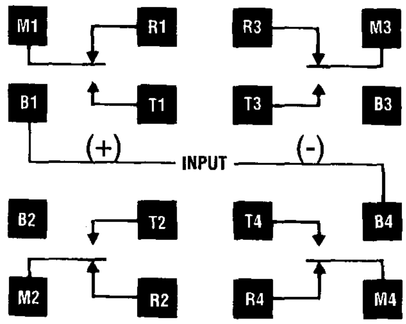
ML Series Relay for DC operation with a resistor/capacitor network

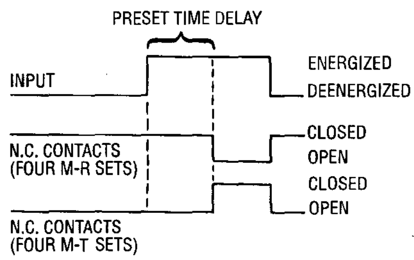


R-C Values

Nominal Voltage VDC	R OHMS ±5%	R Watts	C UF	C VDC
12	62	2	5000	15
24	240	2	2000	50
48	1000	2	500	100
125	6200	2	150	150

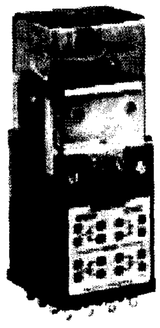
Series ETR
Time Delay Relay
(Delay on Energization)
Applying a continuous voltage to the input terminals (B1-B4) starts a time delay lasting for the preset time period. During this period the normally closed contacts (Four M-R sets) remain closed. At the end of the delay period, the normally closed contacts break and the normally open contacts (Four M-T sets) make. The contacts remain in this position until the relay is deenergized, at which time the contacts instantaneously return to their normal position. Deenergizing the relay, either during or after the delay period will recycle the unit within .075 second. It will then provide a full delay period upon reenergization, regardless of how often the voltage is interrupted before the unit has been permitted to "time-out" to its full delay setting.





AGASTAT

Nuclear Qualified Control Relays



SPECIFICATIONS

Contact Ratings – Series EGP/EML/ETR

Contact Capacity in Amperes (Resistive)

Contact Voltage	Min. 1,000,000 Operations
24 vdc	10.0 amps
125 vdc	1.0 amp
120 vac, 60 Hz	10.0 amps
240 vac, 60 Hz	7.5 amps

Contact Ratings, UL – Series EGP/EML Only
Contact ratings as listed under the Underwriters Laboratory Component Recognition Program.
(Two poles per load):
1/3 Horsepower, 120 vac
10 amps, General Purpose, 240 vac
120 vdc, 1.0 amp

Mechanical Life – Series EGP/EML/ETR
25,000 mechanical operations

Approximate Weight – Series EGP/EML/ETR
1 lb.

Transient Protection – Series ETR Only
A 1500 volt transient of less than 100 microseconds, or 1000 volts of less than 1 millisecond will not affect timing accuracy.

Timing Adjustment – Series ETR Only
Internal Fixed
Internal Potentiometer

Time Ranges – Series ETR Only

.15 to 3 Sec.	4 to 120 Sec.
.55 to 15 Sec.	10 to 300 Sec.
1 to 30 Sec.	2 to 60 Min.
2 to 60 Sec.	1 to 30 Min.

Repeat Accuracy – Series ETR Only
The repeat accuracy deviation (A_R) of a time-delay relay is a measure of the maximum deviation in the time-delay that will be experienced in five successive operations at any particular time setting of the relay and over the operating voltage and temperature range specified. Repeat accuracy is obtained from the following formula:

$$A_R = \pm 100 \frac{(T_1 - T_2)}{(T_1 + T_2)}$$

Where —
T_1 = Maximum Time Delay.
T_2 = Minimum Time Delay.

Replacement Schedule – Series EGP/EML/ETR
The qualified life of these relays is 25,000 electrical operations or 10 years from the date of manufacture, whichever occurs first.

The date of manufacture can be found in the first four (4) digits of the serial number on the nameplate

XX XX

First two digits indicate the year.

Second two digits indicate the week.

Example
In the date code "7814" below:
"78" indicates the year 1978;
"14" indicates the 14th week
(or April 3 through april 7).

Model	
Coil	125 VDC
Serial	78140028

Note
Tyco Electronics Corporation does not recommend the use of its products in the containment areas of Nuclear Power Generating Stations.

Nuclear Qualified Control Relays

OPERATING CHARACTERISTICS

Environmental Conditons (Qualified Life) — Series EGP/EML/ETR

Parameter	Min.	Normal	Max.
Temperature (°F)	40	70-104	156
Humidity (R.H. %)	10	40-60	95
Pressure	–	Atmospheric	—
Radiation (rads)	–	–	2.0 x 10^5 (Gamma)

Operating Conditions, Normal Environment – Series EGP/EML/ETR

Normal Operating Specifications	With DC Coils			With AC Coils	
	EGP	EML	ETR	EGP	ETR
Coil Operating Voltage, Nominal (rated)*	As Spec.	As Spec.	As Spec.	As Spec.	As Spec.
Pull-in (% of rated value)	80% Min.	85% Min.	80% Min.	85% Min.	85% Min.
Drop-out (% of rated value)	5-45%	85% Min.	5-45%	5-45%	5-50%
Continuous (% of rated value)	110% Max.	N/A	110% Max.	110% Max.	110% Max.
Power (Watts at rated value)					
Pull-in	6 Apprx.	15 Apprx.	6 Apprx.	6 Apprx.	6 Apprx.
Drop-out	N/A	13 Apprx.	N/A	N/A	N/A
Relay Operate Time	30 ms Max.	25 ms Max. With min. latch pulse of 30 ms.	N/A	35 ms Max.	N/A
Relay Release (Recycle) Time	25 ms Max.	20 ms Max. With min. latch pulse of 30 ms.	75 ms Max.	85 ms Max.	75 ms Max.
Contact Ratings, Continuous					
Resistive at 125 vdc	1.0 amp.	1.0 amp.	1.0 amp.	1.0 amp.	1.0 amp.
Resistive at 120 vac, 60 Hz	10.0 amp.	10.0 amp.	10.0 amp.	10.0 amp.	10.0 amp.
Insulation Resistance (In megohms at 500 vdc)	500 Min.	500 Min.	500 Min.	500 Min.	500 Min.
Dielectric (vrms, 60 Hz)					
Between Terminals and Ground	1,500	1,500	1,500	1,500	1,500
Between Non-connected Terminals	1,500	1,500	1,500	1,500	1,500
Repeat Accuracy	N/A	N/A	±5%	N/A	±5%

Operating Conditions, Abnormal Environment – Series EGP/EML

Adverse Operating Specifications	Normal	DB "A"	DB "B"	DB "C"	DB "D"
Temperature (°F)	70-104	40	120	145	156
Humidity (R.H. %)	40-60	10-95	10-95	10-95	10-95
Coil Operating Voltage (% of rated)*					
AC (Series EGP only)	85-110	85-110	85-110	85-110	85-110
DC (Series EGP only)	80-110	80-110	80-110	80-110	80-110
DC (Series EML only)	85-110	85-110	85-110	85-110	85-110
Relay Operate Time (ms)					
AC (Series EGP only)	35 Max.	35 Max.	35 Max.	35 Max.	35 Max.
DC (Series EGP, Series EML)	30 Max.	25 Max.	37 Max.	40 Max.	40 Max.

Operating Conditions, Abnormal Environment – Series ETR

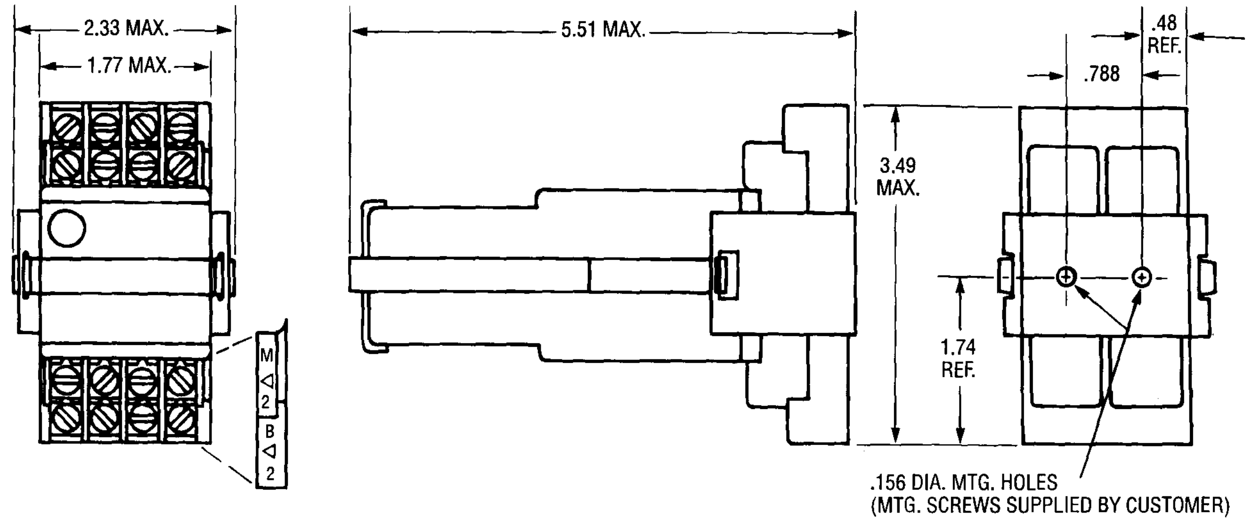
Adverse Operating Specifications	With DC Coils	With AC Coils
Coil Operating Voltage (rated)*	As Spec.	As Spec.
Pull-in (% of rated value)	80% Min.	85% Min.
Continuous (% of rated value)	110% Max.	110% Max.
Drop-out (% of rated value)	5-45%	5-50%
Power (Watts at rated value)	6 Apprx.	6 Apprx.
Relay Release (Recycle) Time	75 ms Max.	75 ms Max.
Contact Ratings, Continuous		
Resistive at 125 vdc	1.0 amp.	1.0 amp.
Resistive at 120 vac, 60 Hz	10.0 amp.	10.0 amp.
Repeat Accuracy	±10%	±10%

*All coils may be operated on intermittent duty cycles at voltages 10% above listed maximums
(Intermittent Duty = Maximum 50% duty cycle and 30 minutes "ON" time.)

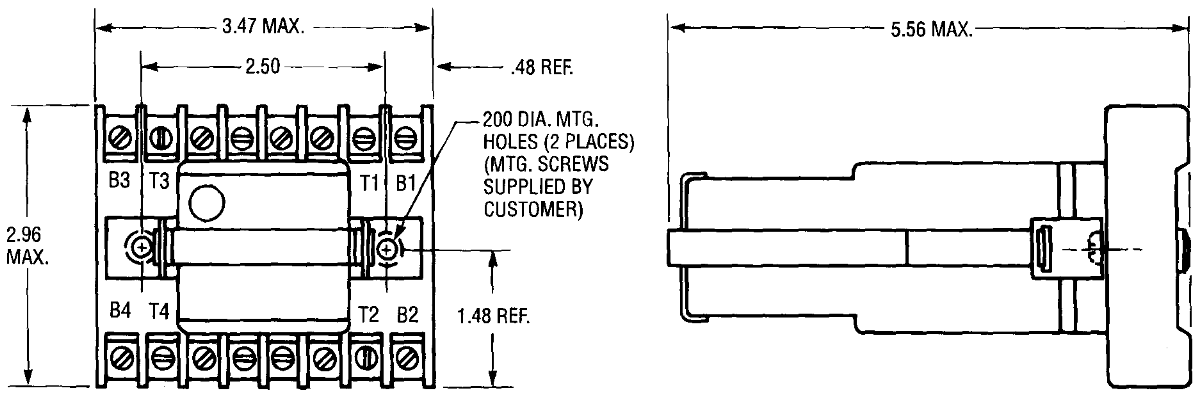
DIMENSIONS AND MOUNTING

SERIES EGP, EML AND ETR

All dimensions in inches



Qualification tested in the horizontal position, mounted in socket ECR0001-001 (captive clamp terminals) or in socket ECR0002-001 (screw terminals) with locking straps ECR0133.



Qualification tested in the horizontal position, mounted in socket ECR0095-001 (screw terminals) with locking strap ECR0155.

Series EGP, EML and ETR AGASTAT® control *relays must be mounted in the horizontal position*; performance specifications of these units are valid only when they are mounted as indicated in either of the above drawings.

Nuclear Qualified Control Relays

ORDERING INFORMATION

Catalog Number Code – Series EGP and EML

E	GP	A	004
Nuclear Safety Related	**AGASTAT® Control Relay Model**	**Coil Voltage**	**Configuration Code***
Code **E**	Code **GP** – Power Relay **ML** – Magnetic Latch	Code DC: **A** – 12 VDC **B** – 24 VDC **C** – 48 VDC **D** – 125 VDC **E** – 110 VDC **F** – 250 VDC (Series EGP Only) AC: **G** – 24 VAC 60 Hz (Series EGP Only) **H** – 48 VAC 60 Hz (Series EGP Only) **I** – 120 VAC 60 Hz (Series EGP Only) **J** – 220 VAC 60 Hz (Series EGP Only)	Code **004**

* **Configuration Code**
The Configuration Code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised.

E	TR14	B	1	A	**004
Nuclear Safety Related	**AGASTAT® Control Relay Model**	**Operating Voltage**	**Timing Adjustment**	**Time Range**	**Configuration Code**
Code **E**	Code **TR14** – Time Delay Relay (Delay on Pull-in)	Code DC: **B** – 24 VDC **D** – 125 VDC AC: **I** – 120 VAC 60Hz	Code **1** – Internal Fixed **3** – Internal Potentiometer	Code **A** – .15 to 3 sec. **B** – .55 to 15 sec. **C** – 1 to 30 sec. **D** – 2 to 60 sec. **E** – 4 to 120 sec. **G** – 10 to 300 sec. **I** – 2 to 60 min. **N** – 1 to 30 min.	Code **004**

* **Configuration Code**
The Configuration Code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised.

Relay Classifications Control Code Summary

CONFIGURATION CONTROL

Product	Code – 001	Code – 002	Code – 003	Code – 004
EGP	Contains all materials present in original qualification testing.	Nov. 1981 - Material change to coil wrapping tape and lead wire insulation to improve thermal life.	Dec. 1987 - Material change on leaf spring from nickel copper to beryllium copper.	Dec. 1995 - Material change on bobbin from Nylon Zytel 101 to Rynite FR530. Material change on base from Melamine Phenolic to Grilon PMV-5HV0.
EML	Contains all materials present in original qualification testing.	Nov. 1981 - Material change to coil wrapping tape and lead wire insulation to improve thermal life.	Dec. 1987 - Material change on leaf spring from nickel copper to beryllium copper.	Dec. 1995 - Material change on bobbin from Nylon Zytel 101 to Rynite FR530. Material change on base from Melamine Phenolic to Grilon PMV-5HV0.
ETR	Contains all materials present in original qualification testing.	Nov. 1981 - Material change to coil wrapping tape and lead wire insulation to improve thermal life.	Dec. 1987 - Material change on leaf spring from nickel copper to beryllium copper.	Dec. 1995 - Material change on bobbin from Nylon Zytel 101 to Rynite FR530. Material change on base from Melamine Phenolic to Grilon PMV-5HV0.
ECR0001	Contains all materials present in original qualification testing.	June 1989 - Material change from Noryl N-225 std. black to Noryl SE-I-701AA black.		
ECR0002	Contains all materials present in original qualification testing.	June 1989 - Material change from Noryl N-225 std. black to Noryl SE-I-701AA black.		
ECR0095	Contains all materials present in original qualification testing.			
ECR0133	Contains all materials present in original qualification testing.			
ECR0155	Contains all materials present in original qualification testing.			

Configuration Code: The Configuration code is a suffix to the Model Number which provides a means of identification. When a significant product change is introduced, the Configuration code and specification sheets will be revised. (001, 002, 003, 004, etc.).