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Pressure and Level Transmitters - Duplication

S M Kumar
Process Design Consultant

During a recent P&ID review I noticed that separate PTs are provided for PAHH and PALL. I am used to seeing a single PT for both PAHH/PALL. I noticed separate LTs for LAHH and LALL. Are these not smart self-checking transmitters? Do we need such redundancy?. During any event, the demand is either high or low, that is mutually exclusive scenario.

I am told that independent PT and LT are the current trend called by SIL studies. Really?

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Prabuddha

Prabuddha Nandy
Projects & Process Engineer -Chemical Engineer

Single transmitter takes care, as you have correctly mentioned. Could the spare one be a backup, incase one fails since the 2 parameters being observed are very critical.

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Mukund

Mukund Chiplunkar
Experienced Process & Technical Safety Consultant at SOHO

Kumar, earlier we used to use switches to generate alarms. It is considered by instrument engineers to be less robust design. This is due to incidents of drifts in hardware switches and limited range over which a switch setting could be changed. As against that transmitter generating alarm is a software action and the loop is more reliable and trustworthy. In Middle East all engineering companies transmitters only to generate LL and HH alarms.
As regards separate instruments for LL and HH, most of the safety codes require dedicated instruments for shutdown related functions.

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S M

S M Kumar
Process Design Consultant

Thanks Mukund. Switches era is gone. Safety codes? Pls cite a few. Or they preferred practices of a few companies. So far I have heard only about 2 companies in the region asking for it. Otherwise, a number of opinions I got in private and other forums seem to suggest a single transmitter is OK. Have a look at thread in ADEPP Technical Safety http://lnkd.in/qkMN7V. There is another thread in Hazop group.

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Deepak Sundaram likes this

Mukund

Mukund Chiplunkar
Experienced Process & Technical Safety Consultant at SOHO

I investigated code references for separate HH and LL transmitters. Once Company Specification for Safety Instrumented Systems states the following:
QUOTE

Common transmitters used for High High (HH) and Low Low (LL) trips can be considered where possible provided that such configurations are taken into account during SIL assessment and verification. If it is concluded from SIL assessment and verification that separate transmitters for HH and LL trips are required, same shall be adapted in the design.
UNQUOTE
I am sure this is based on international code such as IEC. Will check with some of my colleagues still working in Middle East.

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Nurali

Nurali Panjwani
Independent Process Engineering Consultant

I recently came across this issue - It is a requirement mandated by BG standards. It requires separate transmitters for LL and HH trips unless it can be demonstrated that the failure of these trips leads to same consequences.

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Vinay

Vinay Singhal
Process Engineering Manager at McDermott International Inc.

Kumar, off late I been dealing with issue extensively. I would guess that the owner/operator your are dealing with here is Petronas, or, other Malaysian entities who follow Petronas standards. During a recent SIL review workshop with Petronas, this issue came up. Petronas logical explanation is: if both HH and LL has same SIL level assigned, then during transmitter or loop failure, they cannot ascertain "safe failure" mode of the transmitter. Usually, when we have a single transmitter doing both HH & LL trip functions, Instrumentation will assign "safe failure mode" to most stringent, i.e. the transmitter will default to most conservative executive action. However, if both, HH & LL have same SIL level, i.e. the implication of safe failure in terms of production loss and/or safety are adjudged to same severity, then will call for separate transmitters. Petronas also have a SIL assigning system, wherein cost of separate instrumentation loop is weighed against cost of errorenous reading (usually cost of production, including plant downtime and re-startup cost), accounting for number of such events expected during plant life. In this excercise, usually the cost of another instrumentation loop will come out to be lot cheaper than the downtime cost. Thus, we end up supplying separate loop for HH & LL. Another fall out of this standard is - most Malaysian FEED now take this requirement as pre-emptive, i.e. FEED end up showing separate loops for all HH & LL trips; and leave it to detailed engineering to do a SIL workshop and then see if any HH & LL can be combined. Particularly for HH & LL levels, Petronas insists upon high failure rates, based on their own operating experience and thus end up with separate transmitters. Hope, I have explained the issue thoroughly.

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Saravanan Kandan, Learn Syan Lee and 1 other like this


S M

S M Kumar
Process Design Consultant

Thanks Vinay for your detailed response. I started another thread in Hazop and ADEPP forums. As Hazop forum is a closed group, I am not giving you the link. I have given ADEPP link in my last posting. There the conclusion seems to be NOT required unless so proved in SIL studies. But for the client you cite, it is clear that it is required.

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Vinay

Vinay Singhal
Process Engineering Manager at McDermott International Inc.

I may add that the Client is worried about the Transmitter only, i.e. only transmitter is duplicated. So for reading level, same field instrument is used, but provided with 2 different transmitters to separatetly trigger HH and LL shutdown function. The 3rd level transmitter for level control and H/L pre-alarm is from a separate level tappings.
I will repeat myself: the root cause for giving separate transmitter was "safe failure" mode.
I been asked to explain whats the "safe failure" mode. Now-a-days, almost all transmitters are self diagnostic type. If a transmitter detects error (Instrumentation engineers can explain better) or loss of signal, it will default to "safe failure". Now if you have a common level transmitter to do both HH & LL shutdown function; during "safe failure", should it default to HH or LL action? You decide? So, if the implications of either HH & LL action thus triggered are same in terms of economic loss and/or safety, the client insists upon separate transmitters. Also note that this applies to loops with SIL1 and above rating. Yes, some loops may have a rating below SIL 1 or "no SIL" requirement; and separate transmitter case do not arise for such cases.

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Shyam Pillalamarri, Ron V. like this

Jaganathan

Jaganathan B

Asst. Manager (Process) at Larsen & Toubro Limited

Thanks for sharing. I too came across similar requiremment from client. Initially added two redundant transmitters with same function HH/LL trips with voting logic. Later it got changed to individual HH and LL trip function with same final control element ! Do you come across process time inputs to confirm SIL level, please share your view/experience, thanks again.

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VIMALESH

VIMALESH AGNIHOTRI

Senior Process Engineer at Engineers India Limited

Thanks to all for sharing such good experience..the middle east and Indian clients do not insist for such requirements..

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