

Service guide

Pumps and ERDs

Tips and tricks for photos used in remote inspections



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1. General information

This guideline provides information on how to provide quality photos of individual parts and part groups during inspections of pumps and/or ERDs.

This recommendation is for guidance only.

2. Introduction

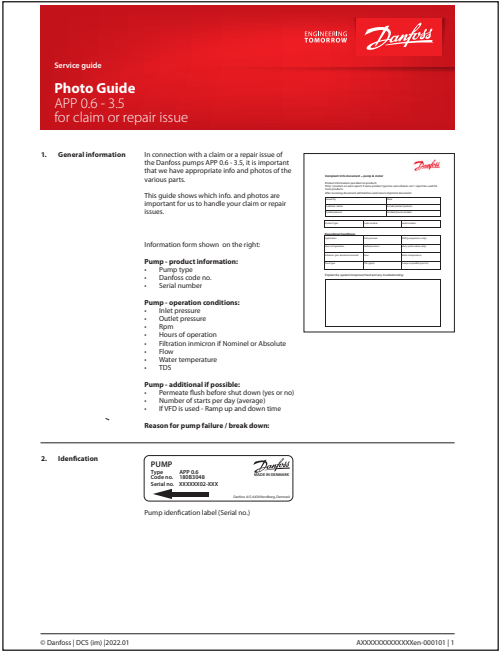
In order to provide guidance during pump and ERD inspections, good photographs of individual parts and part groups are required. The goal is for end users and/or customers to provide Danfoss High Pressure Pump service personnel with high quality photos, so that critical determinations can be made.

These include identification of the failure modes present, suggested root causes for the failure modes, and recommendations to limit future failures.

3. Photos

Photo guides are available for most APP pumps and iSaves, and can be sourced from your Danfoss High Pressure Pumps service person.

The guides show examples of the required photos of individual parts, as well as the specific surfaces of the parts that are needed to make determinations. Example of a guide is shown below:



Good/clear photos of parts and part groups are a must for proper guidance. It is most advantageous to take photos of parts ‘as is’ when the pump is disassembled, and also take photos of the same parts after cleaning.

Photos should be taken of ALL parts in the pump as outlined in the guides, regardless of whether they are damaged or not. It is very common for there to be primary and secondary failure modes present and these are not always apparent to customers and end users.

4. Tips

4.1 Lighting

Good lighting is extremely important when taking photos of component parts. It is recommended that photos be taken in natural/indirect light or under good indoor lighting. In general, it is normally better to take photos WITHOUT the camera flash, since using a flash can wash out important surface details. This can make many determinations difficult, if not impossible. Sometimes the use of a camera flash is needed, either due to extremely poor lighting or if there is a surface detail that cannot be captured by the photographer using natural light. There are also times when it is better to provide two photos, one with the camera flash and one without.

4.2 Part angling

A best practice used by Danfoss HPP technicians in the field is to examine the part at different angles relative to the camera and light source, in order to reveal more surface details. All part surfaces are reflective, especially black PEEK surfaces after wearing, so this method uses reflected light off the surface to reveal imperfections not normally be seen by a 'straight-on' photo. The example below highlights this technique.

4.3 Water/moisture

Parts should be completely dried with a rag or towel and free from lint. There should not be any standing water or moisture on the surface. Water will hide details and can make damaged parts appear good. This is especially true with the black PEEK part surfaces, such as piston shoes, barrel sleeves, retainer bearings, port plates, etc.

4.4 Files and file sharing

Minimum photo file size should be 1Mb to allow technicians adequate zoom capability. Smaller file sizes are not adequate and should not be sent.

E-mail is the preferred method for sending photos to Danfoss HPP technicians. File sharing sites, such as Dropbox, are also an acceptable means of sharing photos. Since mobile phones are most often used for taking photos, it can be convenient to text or use applications such as WhatsApp to send photos. This method is not recommended and should be used as a last resort. In addition to some file compression, these methods do not allow for proper Danfoss case creation or proper follow up methods.

5. Examples

The photos below were all taken of the same PEEK piston shoe face under different conditions related to the use of a camera flash and with different levels of moisture. Which one gives us the best detail?

Photos taken with camera flash



Photos taken without camera flash (natural light)



6. Perfect photo



The above photo was taken under natural light with a completely dry surface. The part angling technique was also used to bring out the highest level of surface details.

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