Technical Bulletin

NO. 9905

TOPIC: RECOMMENDED CALIBRATION VERIFICATION INTERVALS FOR DYNAMP HIGH CURRENT DC METERING SYSTEMS

File TEC9905b

RECOMMENDED CALIBRATION VERIFICATION INTERVALS FOR MODEL LKP & LKB METERING SYSTEMS

INTRODUCTION

Periodic calibration of the key instruments used in modern plants is a requirement of quality assurance programs such as ISO-9000. Users of DynAmp's high accuracy metering systems have requested a recommended interval schedule for calibration of high current measurement systems. The recommended calibration interval for these systems can vary based on the application and role of the specific metering system. The following recommendations are based on typical applications of DynAmp high current metering equipment. Further information regarding metering system errors is also provided.

RECOMMENDED CALIBRATION VERIFICATION INTERVALS

A. PERMANENTLY INSTALLED SYSTEM

- Typically 48 months or as required by plant specific programs. The metering system should be checked if there is an excessive difference between the measurement of the primary metering system and a secondary (back up) system. A verification should also be performed if any change in the difference between the primary metering system and secondary system is noted.

- Any time the accuracy or proper operation of a unit or units is in question.

B. PLANT CURRENT REFERENCE STANDARD (Permanently installed unit or group of units)

- Units used as reference standards should be verified on a 24-month cycle or as required by plant specific programs. These units should be returned to the DynAmp facility or verified on site by DynAmp Field Service personnel.

- Any time the accuracy or proper operation of a unit or units is in question.

C. PLANT CURRENT TRANSFER STANDARD (Portable unit or group of units)

- Units used as portable standards should be verified by comparison to a permanent plant reference standard before and after each use. System accuracy can be affected by mishandling.

- Any time the accuracy or proper operation of a unit or units is in question.

THE CASE FOR HIGH ACCURACY

High accuracy measurement of dc current is becoming increasingly important to the electrochemical industry as competition drives product prices down while costs continue to increase. Each plant has the need to continually improve the process economics to remain competitive. Decisions made on even small measurement errors can result in substantial losses given the economic scale of these facilities. In addition, most process changes and tighter control strategies result in incremental improvement. High accuracy metering is required to ensure control and to verify the improvements.

The need for high accuracy dc current measurement is sometimes questioned when a lower accuracy secondary or back-up metering system exists. Since electricity is a substantial portion of the cost of electrochemical products, most plants have implemented methods to cross check these instruments. In most cases, multiple independent methods of estimating the dc current operating level exist. These may be as basic as the scales used to weigh the shipped product or the utility power meter supplying the entire plant. Use of this type of data requires that a “constant” or conversion factor be used. Accurately quantifying this conversion factor to use back-up metering can be costly and time consuming. One technique involves experienced operators who simply develop an intuitive feel for the process operating rate. Other instrument-based systems such as those that use DCCTs, ACCTs or shunts are also used. The accuracy of each of these back-up metering techniques will vary based on linearity, repeatability, integration over time, mains voltage variations, temperature, initial calibration technique, loading, installation, and calibration adjustments after installation. Consequently, the conversion factor or “constant” would actually have to be continuously updated to maintain accuracy. Since this is not practical the system accuracy of most secondary or back-up metering systems ranges from ±1.0% to ±5.0% while the DynAmp high current metering systems provide up to ±0.1% class accuracy.

METERING SYSTEM ERRORS

The closed loop feedback technology used by DynAmp high current metering systems tolerates many changes while maintaining high accuracy. Therefore, most conditions that affect the DynAmp systems are temporary and do not impact calibration. Several operational conditions that may result in a temporary error are shown below. The system will return to accurate operation when the condition is corrected.

- Exceeding the full scale measurement range
- Reversed magnetic fields (unidirectional system)
- Mass of magnetic material (iron) near measurement head

If the system includes the optional Accuracy Diagnostics, most problems will be identified immediately. In addition, the instruction manual provided with the DynAmp system details periodic inspections that can be performed to detect any operational changes.