



## TELEDYNE INSTRUMENTS

*Advanced Pollution Instrumentation*

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## *Service Note*

95-024 Rev B  
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### **CALIBRATION OF THE M400 IN IZS**

Calibration, by definition, is the act of adjusting instrumentation to read correctly against a known standard. The act of calibration, by definition, must reference a standard at some point during the operation.

The idea of allowing a "SPAN" button during internal calibration (IZS) operations is something that some customers use. The difference between a M100 or M200 series and a M400 series is where the potential for mis-calibration occurs.

The permittube, used in M100 or M200, is referenced to some standard reference material. While the permittube itself is not as accurate as some sources of gas, once the value is known it will remain constant allowing for changes in pressure and temperature and the case of NO<sub>2</sub> humidity. Therefore, once the permittube's true value is known, its repeatability is acceptable for calibrating by some countries EPA. U.S. EPA does not allow calibration from a permittube (except in certain cases) in spite of the demonstrated repeatability.

At issue in the M400 is the idea of calibrating the bench from an IZS source. We need to be careful not to overreact and reduce the usefulness of the IZS system. As I see it, there are two issues involved in calibrating the M400 from an IZS source, as there are two immediately obvious ways to do this calibration.

First, an external calibrator (photometer) can be attached to an external IZS span valve and provide a source of O<sub>3</sub> which, in theory, is referenced to a standard. To eliminate the "SPAN" button from the "CAL-S" operation would prevent this method from being used, unless the "SPAN" button is made conditional (i.e., setting the IZS type to 0, 1, or 2 for NONE, valves only and IZS tower respectively. The allowing the "SPAN" to occur only when a 0 or 1 IZS type is selected), we risk losing the capability completely or leaving the situation as is.

Second, an internal tower is used to generate a source of O<sub>3</sub> gas. This method is based on calibrating the bench to a known standard (our transfer standard photometer or the customer's photometer) and then calibrating the IZS to the bench. As the bench is NOT a photometer, we are already treading thin ice with this method in my opinion.

To allow a customer to calibrate the bench off of the tower, then turn around and calibrate the tower off of the bench is to remove any requirement for a standard reference. I don't know how EPA feels about this, but strictly from a customer service point of view it creates problems: The case of a customer calling to complain that "the SPAN button doesn't come up" because the analyzer or IZS has a leak and has been spiraling downward as the customer cross calibrates the bench and IZS is just one example I can think of.

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My vote is to eliminate the "SPAN" button from the M400 when a tower is installed. Also to create a service note explaining this situation for those customers who have the current software to try to reduce the number of problems this can cause. Simply adding precautions to the manual is insufficient as it implies that the customer will read the manual.

As the market grows and we sell more equipment to people who have little or no experience with this type of instrumentation, the problem is only going to get worse. We will get more calls of the type where the customer, after a few seconds of silence says "if I wasn't supposed to calibrate on IZS then WHY does it let me?" The customer then feels stupid because this was never explained to him/her.