

Knowledge Base Article

Product Group: Software

Product: CMSW5310 QuickCal Kit for CMMA864

Version: N/A

Abstract

This article outlines information about calibration procedures and firmware installation (QuickCAL) on the SKF CMMA864 On-line monitoring system.

Overview

1. QuickCAL Description and Procedures

1.1. Overview

This tool is designed for quick and easy downloading of new firmware and calibrating the CMMA864, both in house and in the field, and implements these two functions in a single software program for use by SKF operations department and field service personnel. The entire tool kit includes the software program, the CMMA864's firmware files, a firmware upgrade serial cable, and a calibration cable.

The program will be located on a PC or laptop's hard disk, along with the latest CMMA864 firmware. Whenever new firmware is created and ready for release, the tool (program and latest firmware) will be shipped out for installation onto the user's PC.

1.2. Calibration Overview

Calibration involves using a known, steady, and repeatable reference to compare and adjust system settings such that accurate and reliable measurements can be made. Most existing systems would, for example, use potentiometers or other forms of adjustable hardware to basically 'tune' a system. This tuning might be in the form of adjusting amplifier gains or setting corner frequencies, much like people would adjust a dial to tune in a radio station. And, when calibrating an instrument as an example, many people will take anywhere between 3 and 7 different measurements for comparison against the reference.

The CMMA864, like all monitoring modules, requires calibration. Unlike existing systems however, the CMMA864 will use the DSP as a reference source generator and adjust constants in firmware (rather than pots) to vary gain and attenuation levels. Calibration constants stored in firmware can thus be updated automatically for use during normal measurement cycles.

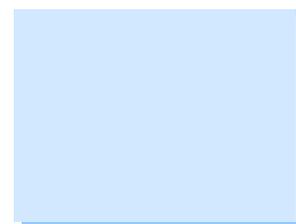
When using the 864 with a BC I/O Map, the reference source is the DC

proportional output from channel A, which connects to all four signal inputs.

When using an 864 configured with an AL I/O Map (i.e., dual-input DAQ PACs), the DC proportional output from channel A will connect to all four #1 signal inputs. Channel B DC proportional out will connect to all four #2 signal inputs.

Voltage levels, frequencies, etc., are all pre-programmed into the calibration routine that resides in firmware, and the process is fully controlled and automated, with a few stop-and-hold points where the user needs to double-check wiring, enter values, etc..

As with existing monitoring modules, the DC proportional outputs are available on the M800A backplane Wago connectors, and can thus be 'looped back' into the signal input pins of the Wago connector. Figure 1 below illustrates this loopback configuration for new installations (i.e., AL I/O Map is used).



864 Calibration WAGO Configuration when using AL I/O Map

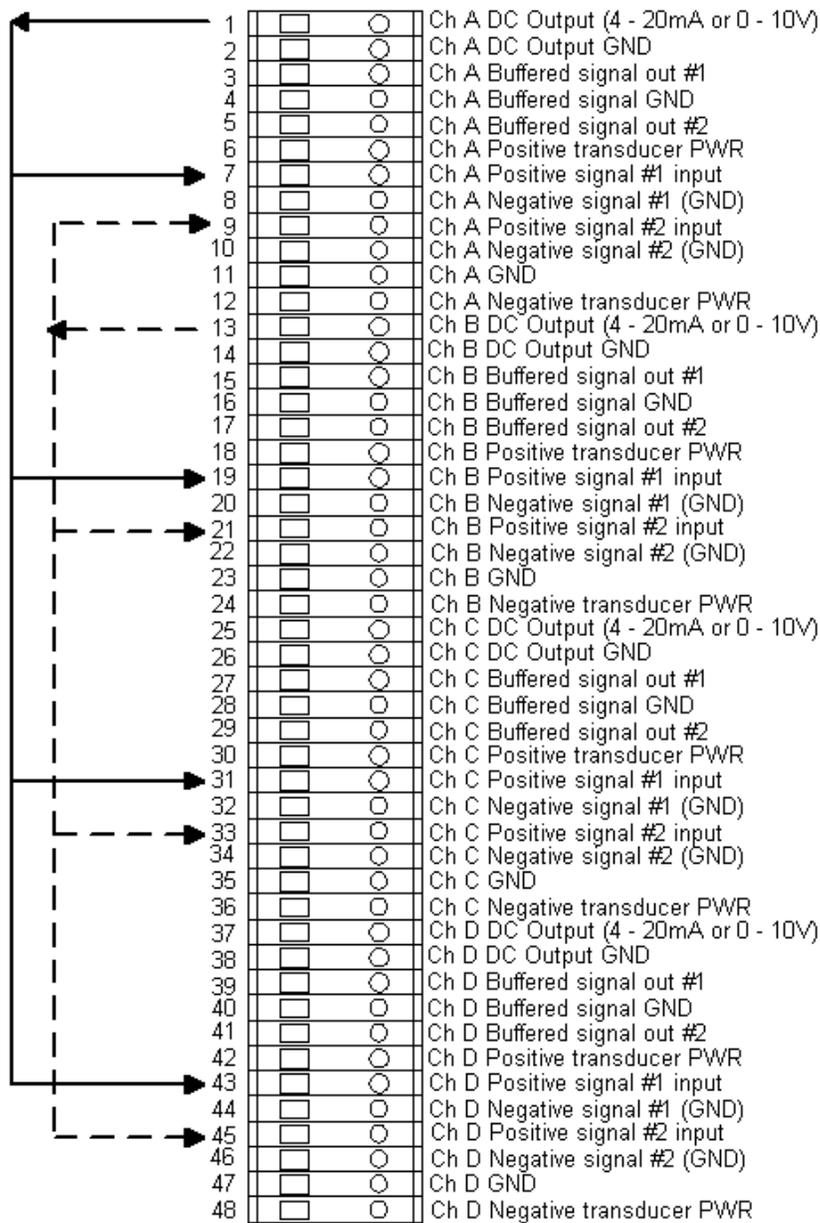


Figure 1. Drawing showing the loopback configuration for 864 calibration using AL I/O Map.

Note that the term 'DC Proportional Output' applies to normal operation; the CMM864 is perfectly capable of generating an AC signal on this output as well, which is what it does for calibration. Figure 2 below illustrates the loopback connection for existing installations.

Since the CMM864 can sample four input channels and produce four output signals simultaneously, calibration takes place on a per card basis, as opposed to a per channel basis.

864 Calibration WAGO Configuration when using BC I/O Map

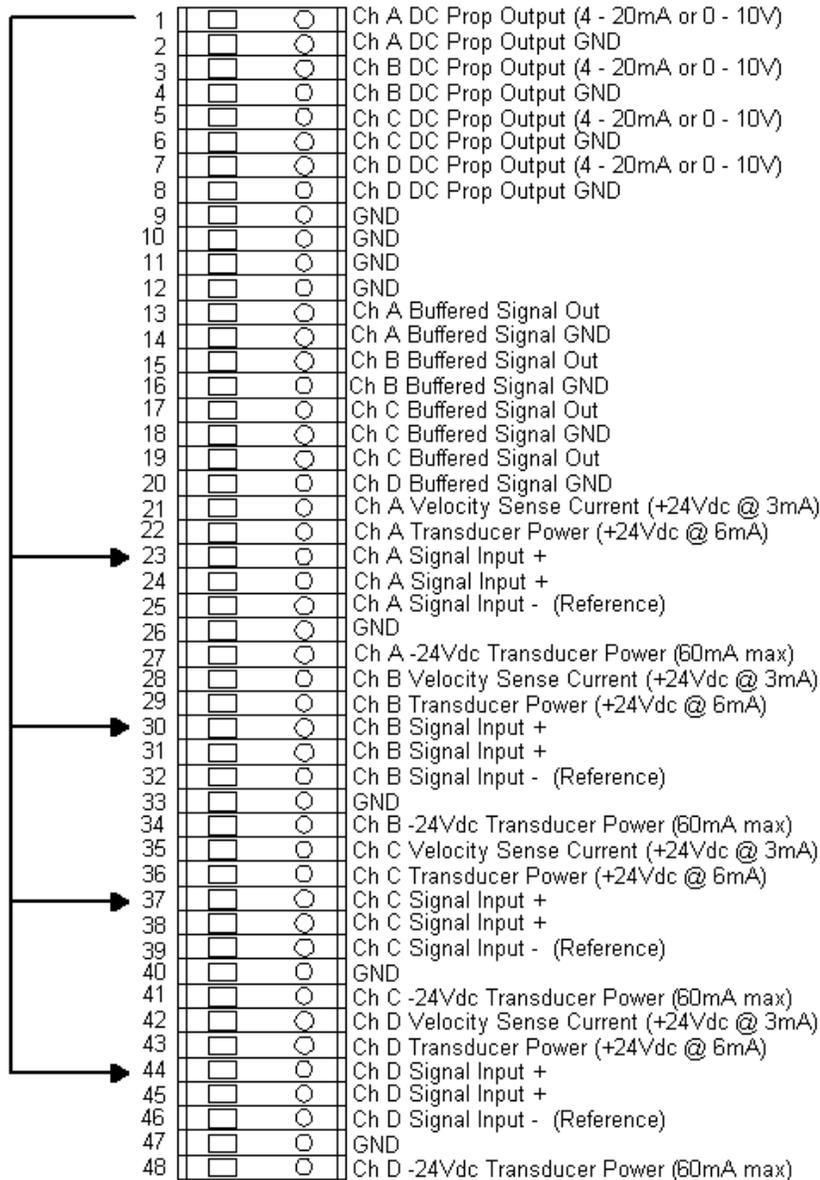


Figure 2. Drawing showing the loopback configuration for 864 calibration using AL I/O Map.

1.3. Installing and Upgrading Firmware

1.3.1. Downloading New Code

The CMMA864 has two major firmware sections; one for the microcontroller, and one for the DSP. The microcontroller has built-in flash memory which houses its own firmware, and is accessible through a Motorola-standard interface called the Background Debug Mode (BDM) port.

The DSP code is stored and run in SRAM during normal operation. Non-volatile storage of DSP firmware is accomplished by using a block of flash memory on the microcontroller. During power-up, the microcontroller will download the DSP firmware from its flash memory to the DSP, which in turn will transfer its code to SRAM.

The process for downloading new code to the CMMA864 is simple, and is done using a PC and two special cables which connect the PC to the BDM port (Service Port #1) and the serial port (Service Port #3) of the microcontroller. The download takes place while the CMMA864 is in an M800A rack and powered. The card does not have to be removed from the rack while installing the cables, however the user can remove the card, connect the cable, and then re-insert the card if desired.

In either case, connecting the BDM cable automatically stops the microcontroller, and will remain stopped until the BDM cable is removed and the reset button is pushed. Also, connecting the serial cable will automatically transfer CMMA864 communication from the M800A controller to the serial cable, resulting in a module fail reading on the M815 display. This is normal.

1.3.2. Firmware Download Procedure

1. Connect the BDM cable from the parallel port of the PC to Service Port #1. The service ports can be accessed after removing the front panel LED or Bargraph display. (See Figure 5). Also, Please note that the red wire on the BDM cable represents the pin 1 connection.
2. The second step is to connect the Serial cable from serial port #2 (COMM2) on the PC to Service Port #3. (Again, the red wire on the serial cable represents the pin 1 connection.)
3. Once the cables are connected, start the program, and push the 'Download Firmware' button. The program will automatically download the new firmware from the PC to the CMMA864.
4. Disconnect the cables from the CMMA864, press the reset button on the CMMA864, and re-install the front panel hardware. Figure 3 below illustrates a typical hardware setup between a PC and a CMMA864.

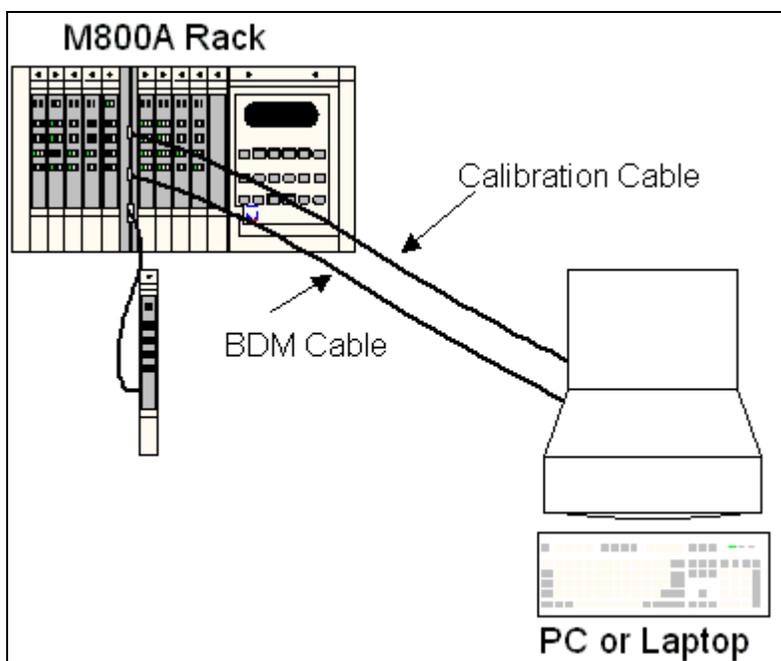


Figure 3. System configuration for both firmware upgrades and calibration.

In figure 3 above, the BDM cable is connected to the PC's parallel port, and the Calibration cable is connected to serial port #2 of the PC.

1.4. Calibration Procedure for Field Service

1. If a Wago connector (with sensor wiring) is already on the M800A backplane, remove it.
2. Make sure the DC proportional output jumpers on all four channels are set to the '0 - 10V' position. The jumper headers are silkscreen-labeled on the CMMA864 as 'Prop Out A', 'Prop Out B', 'Prop Out C', and 'Prop Out D'.
3. Connect the serial cable from serial port #2 of the PC to Service Port #3. (Please note that the red wire on the serial cable represents the pin 1 connection.)
4. Start the program and enter the board serial number and job number, if applicable.
5. Press the 'Calibrate CMMA864' button.

6. The program will prompt for the installation type. Check either 'New' or 'Existing', and then hit the 'Next >>' button. (If unsure about the installation type, look at the I/O map daughterboard installed on the CMMA864. If it reads 'AL I/O MAP', then use the 'New Installation' Wago configuration. If it reads 'BC I/O MAP', then use the 'Existing Installation' configuration.)

PLEASE NOTE THAT USING INCORRECT WAGO WIRING WILL DAMAGE THE CMMA864.

7. The program will then determine what DAQ PACs are installed. If AV DAQ PACs are installed, you will need to determine their jumper settings and enter them when prompted.
8. Confirm the DAQ PAC types by pressing the 'Next >>' button in the program.
9. The program will then retrieve the existing (if any) calibration coefficients and store them on the PC.
10. Start the calibration process by hitting the 'Start 864 Calibration' button.
11. The program will execute the process, and come back with some new calibration coefficient values that will also be stored on the PC.
12. The calibration process is now complete. The program creates a calibration report that can be read by pressing the 'VIEW REPORT' button, or printed by pressing the 'PRINT REPORT' button.

For further assistance, please contact the Technical Support Group by phone at 1-800-523-7514 option 8, or by email at tsg-americas@skf.com.