OPERATION MANUAL

CMCP547 DIFFERENTIAL EXPANSION TRANSMITTER

CMCP547A DIFFERENTIAL EXPANSION MONITOR

REV. A

Model Description:

The **CMCP547** is a 4-20mA Differential Expansion Transmitter, typically used with an eddy-current probe/driver system, and an external readout/monitoring system, to indicate the relative differential expansion between a rotor and its' casing.

This unit can be also ordered as a stand alone Monitor by adding the suffix "**A**" to the basic model number, ie: **CMCP547A**. When ordered in this configuration, the unit includes an alarm module that provides independent set point alarms for both ALERT (A) and DANGER (D) levels in the up-scale direction. Each set point has a corresponding adjustment potentiometer and LED indicator on the alarm module front panel, and an output relay that can be jumper configured for either latching or non-latching operation. The alarm LED will turn "ON" and the corresponding relay will actuate whenever the differential expansion reading exceeds the corresponding set point for more than a preset (jumper selectable) delay time. The alarm module has a front panel accessible BNC connector and associated selector switch for reading the current position (CV) or alarm set points (A or D) with a standard digital volt-meter. Both monitors and transmitters mount on standard DIN rail.

Although the CMCP547 operates from a +24Vdc supply, it accepts input from most non-contact eddy-current probe/driver systems that operate from a -24Vdc supply. (-18Vdc probe/driver systems can also be made to work. Contact the factory for details). The output signal from the probe driver is processed to determine the differential expansion between case and rotor. The transmitter output is a standard 4-20mA current proportional to this measurement within a specified full scale range such as 0 to 1000 mils, and is suitable for direct connection to a PLC or DCS monitoring system. A BNC connector on the front of the unit provides buffered access to the probe driver voltage to assist in probe setup.

Power:

The CMCP547 requires externally supplied DC power. The power supply should have a nominal output of +24Vdc and be capable of supplying a minimum of 55mA for each CMCP547 in the system, or 90mA for each CMCP547A in the system. A linear-regulated, +24Vdc power-supply dedicated to the machine monitoring system is recommended.

The associated eddy probe/driver system will require an additional -24Vdc supply. This supply should be located next to the +24Vdc supply and have its common side tied to the common side of the +24Vdc supply used for the transmitters. It is recommended that the connection between the power-supply and the transmitters and probe-drivers be made using twisted-shielded instrument cable. The cable shield should float at the transmitter / driver, and be connected to common at the power-supply / system-common end only. The CMCP547 regulates dc power internally to prevent a fault on the output of one channel from affecting other channels. When power is first applied to the transmitter after connecting the transducer, there will be a delay of

approximately 30 seconds before the "OK" LED turns "ON".

Transducer:

The CMCP547 is factory configured for use with an eddy-current probe-driver system. The specific sensitivity in mV/mil is identified by a dash number immediately following the basic P.N. on the side label. Example: -01, indicates the transmitter expects the associated probe driver to have an output sensitivity of 10 mV/mil. Other sensitivities than indicated here are available.

Transducer Cable:

It is strongly recommended that the transmitter be mounted as close as practical to the associated probe driver. This will help to minimize interference from external noise sources. A twisted-shielded, properly installed cable from the probe driver to the transmitter is necessary to obtain reliable operation. The cable shield should be open at the probe driver, and connected to common (xdcr "-" terminal) at the monitor/transmitter input only. The cable should be routed as far away from other electrical circuits as possible, and routed through metal conduit where necessary to minimize noise pickup.

Transducer OK Circuit:

The CMCP547 incorporates a transducer "OK" circuit. This feature continuously monitors the probe-system output voltage. If this voltage exceeds preset "OK" limits, the 4-20 mA output current is reduced to less than 2 mA (typically 0 mA) to allow detection of the fault condition at the associated monitoring system. A green " OK" LED on the front of the unit (normally "ON" in an "OK" condition) turns "OFF" to provide a local indication of the fault condition. This circuit will effectively detect open, shorted, or reversed transducer connections. If a fault is detected and then subsequently removed, there will be a delay of approximately 30 seconds before the unit returns to the "OK" condition and the "OK" LED turns back "ON".

Full Scale Range:

The CMCP547 comes factory set calibrated to the full-scale range specified at the time of order.

Option:	**Range:**
-01	0 – 500 mils (+/- 250 mils)
-02	0 – 1000 mils (+/- 500 mils)

The factory calibrated range is listed on the side label as a dash number. If a range other than shown above is indicated, the unit has been modified or adjusted for a special range.

4-20 mA Output:

The output of the transmitter is 4-20 mA current which is proportional to the zero-to-full-scale range of the unit. IE: If the range is 0 – 1000 mils, then 4mA corresponds to 0.0 mils, 12mA corresponds to 500 mils, and 20mA corresponds to 1000 mils. This output will drive a maximum resistive load of 500 Ohms with respect to system common however, the recommended load is a precision 250 Ohm resistor. This will convert the 4-20mA current to 1-5Vdc at the control/monitor system input. A continuous short to ground (common) on the 4-20 output will not damage the output.

Buffered Output:

The CMCP547 provides buffered access to probe driver output voltage via a BNC connector on the front of the unit. This output has the same sensitivity and units as the transducer itself, ie: the same mv/mil. However, the voltage at this output is the opposite polarity of the probe driver output, so a probe driver output voltage of -10.0 Vdc will read as +10.0 Vdc on a digital volt-meter at the buffered output. This output is also available on a screw terminal at the top of the unit.

ALARM MODULE:

Alert and Danger Alarm Set-Point Adjustment:

The Alert and Danger alarm set-points can be independently set in the field by turning the front panel selector switch to the associated position (A or D) and adjusting the associated front-panel potentiometer until the correct DC voltage is measured at the BNC connector located directly above the selector switch. Adjusting the set-point requires the use of a digital volt-meter, knowledge of the full scale range of the monitor, and the desired set-point as a percentage of the full scale range. The voltage measured at the BNC will vary between 0 Vdc and 5 Vdc, corresponding to 0 to Full-scale. IE: 2.5 Vdc represents 50% of full scale, 3.75 Vdc represents 75% of full scale. To calculate the required set point voltage, use the equation, 5(.xx) where .xx is the desired percentage expressed as a decimal fraction of the full scale range. IE. 5(.60) = 3.00 Vdc for a set-point of 60% of the full scale range. Turning the potentiometer clockwise increases the set point voltage.

Alert and Danger Alarm Delay Adjustment:

The Alert and Danger alarm delays can be independently set by internal jumper selection to .1, 1, 3, 6, or 10 seconds. The purpose of the delay is to reduce nuisance alarms caused by external electrical noise and/or transient vibration events. Both the Alert and Danger delay are factory set to the 3 second position.. To change the delay, open the unit and move the delay jumpers to the proper position (See: CMCP500 SERIES ALARM MODULE JUMPER LOCATIONS, at the back of this manual).

Latching/Non-Latching Alarms:

The Alert and Danger alarms are factory set for NON-LATCHING operation. This means that whenever the vibration level drops below the associated set-point for more than about 1 second, the associated relay will de-energize and the alarm LED will turn off. The alarms can also be set for LATCHING operation by installing shunts on jumpers E11 and E12 respectively on the Alarm module circuit board (See: CMCP500 SERIES ALARM MODULE JUMPER LOCATIONS, at the back of this manual). Latched alarms may be reset by closing the RESET (RST) and COMMON (COM) contacts at the top of the unit. This may be done with an external switch, dry contact relay, or by shorting the terminals together by hand. DO NOT APPLY VOLTAGE TO EITHER THE ARST@ or "COM" TERMINALS. If several monitors are mounted together, the "RST" terminals may be daisy-chained together and switched to "COM" (system common) as a group.

Alarm Relays:

The Alert Danger and OK relays are independent, single-pole-double throw relays. NO, ARM, and NC contacts are available via plugable screw-connector at the bottom of the monitor. Ok relay contacts are available on fixed screw terminals at the bottom front of the alarm module (See drawing: CMCP500 Series Relays And External Connections). Relay contacts are rated 5 Amps at 30 Vdc or 125 Vac, resistive load. This rating includes any inrush current that the load draws. For loads that are not purely resistive the contact switching capability will need to be considered carefully in terms of this inrush current. The entire subject of relay application is too large to address here, so the user is cautioned to use care in the application of the relays. The factory intended purpose of providing relay contacts is to operate relatively low power alarm annunciators, act as a dry or low dc voltage contact closure input to other systems, or act to actuate an appropriately sized slave relay for larger loads.

Opening The Case:

Opening the case is best done with a small flat-blade screwdriver. On transmitters (1" wide units) insert the tip of the screwdriver between the right-side cover (as viewed from the front of the unit) and the DIN rail mounting foot at the back of the unit and gently leverage the blade to begin separating the cover from the rest of the unit. Carefully work your way around to the front of the

unit to complete removal of the cover, exposing the circuit board components. On Monitors (1.6" wide units), you must first CAREFULLY separate the two halves of the unit at the center. The sides do not need to be removed. This is done by working the screwdriver around the middle of the unit in the same general manner described above. As the two halves start to become separated, you will see that they are still attached by a short ribbon cable inside. This cable can be carefully removed by pulling it away from the left hand side of the unit. The cable stays with the right hand side permanently. **CAUTION:** When re-installing this cable, make sure it is properly connected to the mating connector, and that the bend in the cable goes towards the front panel side of the unit. IF THE UNIT IS CLOSED WITH THE BEND TOWARDS THE BACK, THE RIBBON CABLE CAN BE DAMAGED.