Installation Instructions

DSM-4688DUS, DSM-4689DUS Digital Signal Monitors

Form DSM4600 II 11-12

altronic
HOERBIGER Engine Solutions

1.0 DESCRIPTION

1.1 The Altronic DSM-4600 series of digital monitors are electronic instruments designed to monitor the operating parameters of industrial equipment using industry standard pressure or temperature transducers. The DSM-4688DUS can monitor and alarm up to eight analog transducer inputs measuring (typically) pressures or temperatures as determined by the self-contained programming. The DSM-4689DUS additionally includes a run-time hourmeter and a tachometer which senses the operating RPM of an industrial engine via a connection to the ignition system. These monitors use a microcontroller to process the input signals and a nonvolatile memory to store the setup and setpoint values. An LCD displays the channel number and the numeric values in user specified engineering units. A front-mounted keypad serves as the user interface. The instrument can read pressure and temperature values in standard English or Metric units.

1.2 Each input is continuously compared against its individual user-settable high and low setpoint. When the input on a point has reached either its high or low setpoint value, a solid state Form C output switch turns on/off to the switch common, and the "ALARM" LCD indicator turns on. Additionally, the "HI" or "LO" indicator will display whenever any faulted point is displayed.

1.3 The DSM-4600 series of digital monitors are designed to be versatile and simple to use. Various temperature and pressure sensors and the desired engineering units can be selected via the keypad. Either automatic or manual scan functions can be selected. RS-485 serial communications allows data and alarm status to be communicated to other devices. An escape key is provided to permit the user to exit any setup function and return to the normal display mode. A programmable software filter is also provided which can be used to stabilize readings where the sensor signal is fluctuating. Calibration can be performed using the keypad. Factory default configurations, including factory calibration settings, can be recalled for easy setup.

1.4 The power requirement for the DSM-4600 series monitors is 12 to 30Vdc, 50mA max.

1.5 For proper operation, these installation instructions must be adhered to strictly.

WARNING: DEVIATION FROM THESE INSTRUCTIONS MAY LEAD TO IMPROPER OPERATION OF THE MONITORED MACHINE WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.

CAUTION: The DSM-4600 series of digital monitors are suitable for use in Class I, Group D, Division 1 and 2 hazardous locations when installed in accordance with these instructions.

The sensor leads connected to this device operate at a very low voltage and power levels and MUST NOT CONTACT any external voltage source. Damage to the system will result from connection between the sensor leads and the ignition system or any AC or DC power source.

2.0 TRANSDUCERS

2.1 The DSM-4600 monitors are designed to operate with industry standard, voltage or current amplified output transducers in the range of 0 to 5Vdc or 0 to 25mA. Three series of transducers are available from Altronic: pressure transducer 691201-x and temperature transducers 691202/203-300, 691212/213-450.

2.2 PRESSURE TRANSDUCER: The pressure transducer, Altronic P/N 691201-x, is packaged in a rugged sealed case with a 1/8"-27 NPT pressure port, a stainless steel media cavity, and a Packard Electric "Metri-Pack" connector. The ranges available are 0-100, 300, 500, 1000, 2000, and 5000 PSIS, all of which have an overload rating of 1.5 times full scale without damage. The three wires from the transducer are: +5 volt excitation, +0.5 to 4.5 volt output, and minus return. These three wires connect directly to the back of the DSM monitor using cable assembly P/N 693008-x.

2.3 TEMPERATURE TRANSDUCER: The temperature transducers, Altronic P/N 691202-300, 691203-300 with a temperature measurement range of +5 to 300°F and the 691212-450, 691213-450 with a temperature range of -40 to +450°F are packaged in a sealed, stainless steel housing with a 5/8"-18 UNF threaded body, and a Packard Electric "Metri-Pack" connector. During configuration (See section 10.4) the standard calibration for the

691202/203-300 sensor is selected as “dEG1” and the standard calibration for the 691212/213-450 is selected by choosing “dEG2”. The three wires from the transducer are: +5 volt excitation, temperature output voltage, and minus return. These wires connect directly to the back of the DSM using cable assembly P/N 693008-x.

3.0 MOUNTING

3.1 DSM-4600 DEVICE: Mount the DSM inside a control panel or to a suitable flat surface so that the display is at a convenient viewing height. A drilling template is provided.

NOTE: Avoid mounting the unit with the LCD display facing direct sunlight. The display temperature range is –40°F to +175°F (–40°C to +80°C).

3.2 PRESSURE TRANSDUCER: Mount the pressure transducer in the panel or in a manifold or tube off of the engine. Do not expose the pressure transducer to temperatures above 221°F. (105°C).

IMPORTANT: Pressure transducers will withstand overloads as high as 1.5 times rated pressure. If the overload rating is exceeded, failure may occur. Pressure fluctuations occur in most systems; pick the transducer with a rating high enough to prevent overload by peak pressures of pulsations. It is recommended that a pressure snubber be used which will reduce the peak pressure applied to the transducer. The life of the transducer will be extended with the use of a snubber or pulsation dampener.

3.3 TEMPERATURE TRANSDUCER: Mount the temperature transducer in a thermowell on the engine or machine. The actual sensor is located at the bottom of the transducer body; to ensure accuracy, the tip of the probe should be surrounded by the measured media.

IMPORTANT: Do not exceed the absolute maximum rating of the transducers, 350°F (176°C) for the 691202/203-300 or 450°F (232°C) for the 691212/213-450. Care should be taken to protect the wiring and connectors from contact with hot surfaces.

4.0 WIRING (see wiring diagrams)

4.1 POWER WIRING: Connect the power input wires, plus to terminal DC+ and minus to DC–; power requirement is 12 to 30 Vdc (10 watts max.). The DC– terminal is connected to panel ground which should be the same as engine ground. DO NOT ground this device directly to the ignition system common coil ground.

4.2 SENSOR WIRING: For each monitored point, select a transducer: either an Altronic pressure or temperature transducer listed above or one that outputs a signal in the range of 0 to 5Vdc or 0 to 25mA. Mount as described above. Use cable assembly 693008-x or similar to wire transducer to the monitor. An internal 5 volt sensor supply is available on the back of the monitor to power the transducers; see wiring diagrams. Take care not to damage the insulation when installing and take precautions against later damage from vibration, abrasion, or liquids in conduits. In addition, it is essential that the following practices be adhered to:

A. Never run sensor wires in the same conduit with ignition wiring or other high energy wiring such as AC line power.

B. Keep secondary wires to spark plugs and other high voltage wiring at least eight inches (200mm) away from sensor and sensor wiring.

4.3 OUTPUT SWITCH WIRING: An alarm or fault condition occurs when the measured value of a point reaches or violates either the high or low setpoint value of that point. This will cause the single Form C (N/O and N/C) solid state output switch to turn ON/OFF to the switch common terminal. The output switch is isolated from the DC– terminal and is rated 200V, 0.2 amp. The N/O

switch has a unique internal overload current protection circuit. If an overload occurs, the internal circuitry limits current to safe levels. When the overload is removed, the relay resumes its normal ON characteristics. These switches can be wired to an Altronic annunciator system or to pilot duty relays as shown in the wiring diagrams.

4.4 RS-485 COMMUNICATIONS WIRING: The DSM-4600 series monitors can communicate to other instruments, PC's or PLC's via the two serial RS-485 communication wires. Use a two-conductor shielded cable of fine gauge stranded wire and connect the wires to the terminals marked RS-485 "A" and RS-485 "B". Connect to the other communication device "A" to "A"(–) and "B" to "B"(+). Connect the shield wire to the master device only.

4.5 HAZARDOUS AREA OPERATION: The DSM-4600 series monitor is CSA-certified for CLASS I, DIVISION 2, GROUP D areas when mounted in a suitable enclosure. The device may be operated as CLASS I, DIVISION 1, GROUP D intrinsically safe, if the following conditions are met:

A. The monitor must be powered through a CSA-certified zener barrier rated 30 volts max., 120 ohms min. A suitable barrier is a Stahl part no. 9001/01-280-165-10; follow the installation instructions supplied with the barrier.

B. The switch outputs, if used, must be connected to the sensor inputs of an Altronic DA or DD annunciator system with the 690 series power supply. The DE annunciator system with the DIV 1 power supply may also be used.

C. The RS-485 communications, if used, must be connected through a CSA-certified zener barrier rated 30 volts max., 120 ohms min. A suitable barrier is a Stahl part no. 9001/01-280-165-10; follow the installation instructions supplied with the barrier.

The following requirements must also be met (see NFPA standard no. 493):

1. The intrinsically safe instrument wires within the panel enclosure must be kept at least two (2) inches away from other wiring. Run the thermocouple extension wires leaving the panel in a separate conduit from all other wiring and keep them separate throughout the installation.
2. Wiring to the sensors must have a grade of insulation capable of withstanding an AC voltage of 500 volts RMS.
3. Sensor wires must be run in separate conduits and junction boxes from high voltage wires such as ignition, fuel valve, and other high voltage wiring.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY AND/OR SUITABILITY FOR CLASS I, DIV. 2, GROUP D.

DO NOT DISCONNECT EQUIPMENT IN DIV. 2 ENVIRONMENT UNLESS POWER IS SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

4.6 TESTING SENSOR LEADS: If it becomes necessary to check transducer to terminal strip wiring with an ohmmeter or other checker, first unplug the transducer connectors at the monitor and at the transducer. This will prevent possible damage to sensitive low voltage detection circuitry in both the DSM monitor and the transducer.

5.0 NORMAL OPERATION

5.1 When the DSM-4600 series monitor is in the "normal" mode, it displays the channel number, numeric value and selected engineering units. The digit to the left of the colon indicates the displayed channel. The number to the right of the colon indicates the measured value associated with that particular channel. If a setpoint value is violated, the output switch changes state and the ALARM indicator is displayed. In addition, whenever the display of a faulted channel is selected, the appropriate LO or HI indicator is displayed.

5.2 The tachometer function in model DSM-4689 can be accessed at any time during normal operation by advancing the displayed channel manually to channel 9. Press the CHAN key until the display reads "9:xxxx" This readout is always in RPM.

5.3 The hourmeter function of model DSM-4689 can be accessed at any time during normal operation by advancing the displayed channel manually to channel 10. Press the CHAN key until the display reads "10:HOUr"; press ENTER and the run-time hours of the equipment will be displayed for 15 seconds.

The hours will be shown as a five digit number with no units designator “xxxxx”; leading zeroes will not be suppressed. When the 15-second time expires, the monitor will return to the normal scanning mode selected, either auto or manual, beginning with channel 1. Use the ▲ or ▼ (up or down arrow key) to set ahead or reset hours to zero. Press ENTER to accept and save the new value.

NOTE: Hours are accumulated only when the measured speed of channel 9 exceeds 100 RPM.

6.0 KEYPAD DESCRIPTION

6.1 The DSM-4600 series monitors contain an eight-key front keypad which is used to view or change the setpoint values and to configure and calibrate the pyrometer. The eight front panel keys are VIEW ALARMS, RESET, CHANNEL, ENTER, SETPTS, ESC, and ▲, ▼ (up and down arrow keys).

6.2 VIEW ALARMS: The VIEW ALARMS key allows the user to display channels which in the past have exceeded their setpoints, in the order they occurred since the last reset has been performed. This is helpful in determining which input is responsible for causing an alarm. Pressing VIEW ALARMS scrolls through the channels in the order in which the measured inputs have violated the setpoint values. The first channel that was violated will be displayed first along with the “ALARM” and either “HI” or “LO” LCD indicators. The LCD will display “ALARM, HI, X:1st” indicating high setpoint on channel X was first to cause an alarm. Any other channels that have had an alarm condition after the first one will be displayed in the order they occurred. Examples would be “ALARM, LO, 6:2nd”, “ALARM, HI, 1:3rd” and so on. Any channel that has not violated its setpoint value will not be displayed. After displaying all channels that have violated their setpoints, the display will show “donE” and revert back to the normal display. Reset will clear all faults. If no faults are logged, “CLEAr” will display.

NOTE: The “ALARM” and “HI” or “LO” indicators will stay on in this menu and do not necessarily indicate a fault condition is occurring.

6.3 RESET: The RESET key is used to clear any faults in the view alarms mode; it restarts the setpoint timer delay times and clears the output switch if set to latching mode. See section 9.3 for more information on reset.

6.4 CHANNEL: This key allows the user to increment the channel and corresponding measurement value on the LCD display in either auto or manual scan mode. After the last channel is displayed, the display will return to channel 1. The CHANNEL key also advances the display menu in the configuration mode. See section 10.6.

6.5 ENTER: The ENTER key is used in conjunction with the CHANNEL key to enter the setup mode and to save new data or a new configuration in nonvolatile memory. The setup will remain even through power-down.

6.6 SETPTS: The SETPTS (setpoints) key is used to view or change each setpoint value. When pressed, the message “StP” is displayed followed by the setpoint value for channel 1. Refer to section 9.0 for more information.

NOTE: The setpoints cannot be changed if the protection is set to “On”.

6.7 ESC: The ESC (escape) key can be used at any time during the setup or setpoint mode to return to the normal mode. When the ESC key is pressed in any configuration mode, any changed values are ignored (not stored in memory), the configuration returns to the previous values, and the display returns to the normal reading.

6.8 ▲▼: The up and down arrow keys are used to scroll through the selections in the setup mode and to increase or decrease values for setpoints, calibration, number of points, node numbers, trip delay times and the filter value.

7.0 DEFAULT FACTORY SETTINGS

7.1 The DSM-4600 monitors contain default settings that are available to the user anytime during the life of the instrument. Upon receipt, the monitor is set to this configuration. This default configuration will provide factory calibration for standard 0.5 to 4.5Vdc, 0 to 1000psi transducers on all channels. The default setting is used for factory testing and may be useful for troubleshooting. To restore the factory default settings, follow the flowchart to access the "dfLt" screen.

7.2 Listed below are the factory default settings stored in permanent memory.

UNITS:	Pressure in PSI
DISPLAY SCAN:	Manual
NUMBER OF POINTS:	8 channels DSM-4688; 9 channels DSM-4689
TRANSDUCERS:	1000 psi (Altronic 691201-1000) channels 1-8
TACHOMETER PPR:	6
PROTECTION STATUS:	Protection is OFF (Allows setpoints to be changed.)
NODE:	01, ASCII
OUTPUT SWITCH:	Shelf state, non-latching
LOW SETPOINTS :	Class B, time delay 5 seconds
HIGH SETPOINTS:	Class A
DISPLAY FILTER:	230 out of 255
SETPOINT VALUES:	90% of range for High, Low setpoints disabled
OVERSPEED SETPOINT:	2500 RPM, time delay 0 seconds (DSM-4689)
CHECKSUM:	Checksum disabled

WARNING: UNIT MUST BE PROPERLY CONFIGURED FOR EACH APPLICATION PRIOR TO USE.

8.0 INITIAL OPERATION

8.1 This section allows for quick setup and installation of the DSM-4600 series monitors. Mount and wire the device as described in sections 3.0 and 4.0. After initial power up, press and hold the ENTER key and press the CHANNEL key; the unit will be in the configuration mode. Press the CHANNEL key until the display reads the "tyPE". Press the ENTER key and the display will read "1: CHAn". Press ENTER and the previously selected transducer range will be displayed. Use the ▲ or ▼ (up or down arrow key) to view the transducer options. Press ENTER when the appropriate sensor type is displayed to load the data for that type. The display will now show the transducer voltage range "1:4.5-.5". Press ENTER to store your selection. The display reads "1:Unit psi", to select the desired engineering units, press the ▲ or ▼ (up or down arrow key) to scroll through the list and press ENTER to accept the desired choice. This procedure loads the factory calibration parameters for channel 1, and in most cases no additional calibration should be required. Repeat this process for all channels being used. To move between channels press the CHAN key when the display reads "x: CHAn". To return to the normal display mode, press the ESC key. The device is now ready to accurately read the programmed input transducers. For more detail refer to section 10.

9.0 SETPOINTS

9.1 There are eight individually-adjustable high and low setpoints for the DSM-4688DUS monitor and an added overspeed setpoint for channel 9 on the DSM-4689DUS. These can be set to any value within the range of the device. To view or change the setpoint values, press the SETPTS key one time, the display reads "1: CHAn". To view the first setpoint press the SETPTS key; the display reads "LO 1:xxxx" showing the low setpoint value for channel 1. Press SETPTS again to view the high setpoint, and so on; the low setpoints are listed first followed by the high. The number to the left of the colon represents

the setpoint channel being viewed. The number to the right of the colon is the numeric setpoint value for that point and the HI or LO display indicator shows if the setpoint is high or low. To adjust the displayed setpoint value, press the ▲ or ▼ (up/down arrow key) to increase or decrease the value until the desired trip-point for that switch is reached. Press ENTER to accept and save the new value. The setpoint value will change only if the ENTER key is pressed. Press the ESC key to return to the normal display mode with no setpoint value change.

NOTE: When in the setpoints mode, the previous setpoint values are monitored, and the new value is monitored only after the ENTER key is pressed. If no key is pressed for 15 seconds, the display will return to the normal mode and the configuration will revert back to the previous values. The activation of the output switch may be disabled for a particular channel by setting the low setpoint at its absolute minimum value and the high setpoint at its absolute maximum value. Setpoints are also disabled for any channels selected as unused by X:PtS (see section 10.6).

9.2 OUTPUT SWITCH: The output switch is a Form C (normally open and normally closed break before make) solid state switch rated 200V, 0.2 amp max. The output switch will make an electrical connection to switch common within one second (see note) if any channel's input value violates its setpoint value. For a setpoint to cause a fault, it must remain continuously faulted longer than the timer delay time set for that point. A hysteresis of 2% of the full scale value of the transducer is used on both high and low setpoints to prevent the output from rapidly turning on and off near a setpoint. The output switch, if set to non-latching, will clear when the measured values of all channels are 2% less than any high setpoint, or 2% greater than any low setpoint. For example, if a high setpoint on channel 3 is set to 80psi using a 100psi transducer, the output switch will trip when the monitored pressure on channel 3 reaches 80psi or greater and will not clear until the input is less than or equal to 78psi. If the output switch is set to LATCHING, the output switch will remain tripped until a reset is initiated.

NOTE: The output switch reaction time is tied to the filter value with one second being the standard reaction time. For other reaction times, see section 10.11.

9.3 RESET OPERATION: Reset can be initiated in one of four ways: by pressing the RESET key, by grounding the reset terminal on the back of the unit, by removing and reapplying power from the monitor or by sending a reset command via the RS-485 ASCII communications. A reset operation clears the setpoint timers, clears view alarms and places the output switch in the non-tripped condition. Reset can be held active by either grounding the reset terminal on the back of the unit or by depressing and holding the reset button in on the front keypad. When reset is kept active, the output switch will stay in the non-faulted condition and the display will flash "RESET" to remind the operator. A reset may be performed in the "normal" mode only.

10.0 CONFIGURATION

10.1 The following are the configuration headings of the monitor. From the normal display mode, press and hold the ENTER key and then press the CHANNEL key to enter the configuration mode. Once in the setup mode press the CHANNEL key to reach any of these configuration headings. After a selection has been made, press the ENTER key; the display will read "SAVE" or "SAVE/donE". It is at this time the new data is saved. The ESC (escape) key can be used at any time to abort the configuration mode and return to the normal reading. During configuration, the unit allows 15 seconds for first level and 60 seconds for other levels between keystrokes to change or save a new configuration. If the time lapses without a keystroke, the device will automatically return to the normal mode without making any changes. The new information is saved only if the ENTER key is pressed and the display reads "SAVE" or "SAVE/donE". A flowchart is provided that shows step-by-step progression through the configuration procedure.

10.2 "A:SCAn" AUTO SCAN: Allows the user to display automatically or manually the selected number of points. The scan starts with channel 1 and progresses in numerical order to the highest channel selected in configuration and then repeats the sequence. In manual scan the device continually displays the value of one channel at a time. The next channel and corresponding value is displayed with each press of the CHANNEL button. In auto scan the device will display the channel number and value for approximately two seconds before automatically switching to the next channel. For auto or manual scan, press ENTER and use the ▲ or ▼ (up/down arrow key) to select the desired mode "YES" or "no". Press ENTER and the display will read "SAVE/donE" indicating that your selection has been saved. See section 10.6.

10.3 "SPEEd": Allows the user to select the number of ignition firings per engine revolution required for the calculation of engine speed in RPM. Press ENTER to display "ppr" (Pulses Per Revolution). Press ENTER and the current value will be displayed. Use the ▲ or ▼ (up/down arrow key) to select the desired pulse number "xx.x" as shown below.

APPLICATION	PPR	
2-cycle engine, single capacitor	N	Where N equals the number of
2-cycle engine, dual capacitor	N/2	engine cylinders and "ppr" has
4-cycle engine, single capacitor	N/2	a range of 0.5 to 16.0.
4-cycle engine, dual capacitor	N/4	

NOTE: The DSM will read the correct value for the entered number of pulses per engine revolution; use the chart below to allow for 2 or 4 cycle and dual capacitor C.D. ignition systems. The maximum engine speed must be less than 2500 RPM.

10.4 "tyPE" TRANSDUCER TYPE: The instrument can use a variety of different transducers. Press enter to view the current transducer selection by channel. Display reads "1:CHAn" Press ENTER again to view the current transducer for channel 1. Use the ▲ or ▼ arrow keys to select the desired transducer type and press ENTER to accept and save the new transducer type. Select the full scale voltage range using the ▲ or ▼ arrow keys, press ENTER and then select the engineering units from the list, using the ▲ or ▼ arrow keys. Press ENTER to store the information for channel 1. The display will read "SAVE" indicating that your selection has been saved. Use the CHAN key to repeat this process for each channel being used. Use the ESC key to exit this mode when finished.

NOTE: For transducer type "SPEC" (special), see Advanced Configuration, section 11.3.

10.5 "CAL" CALIBRATION: For calibration procedures, see Section 11.0.

10.6 "X:PtS" NUMBER OF POINTS: This allows the user to select the number of channels to be monitored, from 1 to 8 channels. Channels not selected will not display and will have no effect on the output switch.

NOTE: Channel 1 is always used and the rest of the channels used follow in numeric order from channel 1. On model DSM-4689DUS, channels 9 and 10 will be monitored regardless of the number of channels selected.

10.7 "CLASS": This allows the user to select the sensor CLASS to be associated with each setpoint of each channel. The sensor CLASS is described by the industry standard A, B, and C designators. The behavior of each is described below:

CLASS A - The setpoint is armed at all times.

CLASS B: The setpoint is disabled for an adjustable time delay in seconds after RESET.

CLASS C: The setpoint is disabled until an initially faulted condition clears or an adjustable time delay in minutes after RESET. See section 9.3.

Press ENTER, the display reads "1:CHAn". Press ENTER to select the sensor CLASS for channel 1 Lo setpoint. Display reads "Lo 1: b". Use the ▲ or ▼ (up/down arrow key) to select the desired CLASS A, B, or C. Press ENTER to store selection. If a sensor CLASS of B or C is selected, the display will read "Lo 1:xxx"; use the ▲ or ▼ (up/down arrow key) to select the desired time delay. Press ENTER to save value. The unit will now display the CLASS selection for the High setpoint of channel 1 "Hi 1: A". Repeat the same process for class and time delay (class B and C only). Repeat this process for all channels used.

NOTE: RPM (channel 9) has a high setpoint only and is CLASS B.

10.8 "nodE" RS-485 COMMUNICATIONS NODE NUMBER: For RS-485 serial communications each unit must be assigned a node or identification number so that a DSM device can be identified by the device communicating with it. Any unique number from 01 to 99 may be used. The communications protocol may be configured for either 'ASCII' or Modbus RTU. Consult section 12 for more details. Older units may not have the configuration for Modbus included. Consult the factory for information on upgrading the firmware for the Modbus configuration ability.

10.9 "P:On / P:OFF" PROTECTION STATUS: This feature allows the user an added layer of protection by preventing the setpoints from inadvertently being changed. When protection is ON, the user is able to view the setpoint values but is not able to change any of them. The hourmeter reset and preset are also locked out. If the ▲ or ▼ keys are pressed when protection is on with the display in the setpoints mode, the display will read "no" and return to the normal display mode.

10.10 "StAtE" OUTPUT SWITCH STATE: The options for the output switch are fail safe or shelf state, and latching or non-latching. Shelf-state is when the outputs are in the same condition with no faults as when unpowered; Fail-safe is when they are opposite. In non-latching mode, the output switch changes state when the setpoints come out of violation; in latching mode, a reset condition is required to clear.

10.11 "FILt" DISPLAY FILTER: The display filter can be used to stabilize the display reading of a changing input. Filtering is done in both hardware and software. The software filter is an adjustable filter; the rate of change is less for large values. The filter value is read-out in a number from 1 to 255, 1 being no filter value and 255 being maximum filter value. Below are some typical filter values and their effect on the display reading. Settling values are approximate times in seconds to reach 90% of new reading. Use the ▲ or ▼ arrow key to increase or decrease the filter value and press ENTER to save the new filter value.

FILTER VALUE	1	128	200	210	220	230	240	250	253	255
SETTLING, SEC.	1.0	1.5	2.5	3.0	3.5	4.0	5.5	14	28	81

NOTE: Channel 9, which monitors the RPM, uses a special active filter to allow an overspeed condition to be sensed in a maximum of 0.5 seconds.

11.0 CALIBRATION

11.1 The instrument is calibrated at the factory for the standard Altronic transducers and in most cases should not require additional calibration. However, calibration can be performed in the field many times over the life of the device. The calibration mode is used to calibrate the zero and span values. Calibration can be performed from the front keypad without disassembling the unit. To calibrate the instrument use the same transducer which will be used in operation on each channel. A dead weight tester or temperature standard is required to provide a calibration reference.

NOTE: During calibration, the unit allows 2 minutes between keystrokes to change or save a new calibration. If 2 minutes elapse without a keystroke, the device will automatically return to the normal mode with the previous values. The new calibration information is saved only if the ENTER key is pressed and the display reads "SAVE".

11.2 CALIBRATION PROCEDURE: To calibrate channel 1, press and hold the ENTER key and press the CHAN key, then press the CHAN key alone until the display reads "CAL" and press ENTER. The display will read "1:CHAn", press ENTER; the display will read "LO 1:CAL". Adjust the calibration standard for a low or minimum reading (0 psi) and press ENTER. Use the ▲ or ▼ arrow key to increase or decrease the display reading to match the setting of the calibration standard and press ENTER. The display will now read "HI 1:CAL". Adjust the calibration standard for a very high reading or full scale reading and press ENTER. Again use the ▲ or ▼ arrow key to increase or decrease the display reading to match the standard and press ENTER. The display will read "SAVE", and the new calibration values will be stored in permanent memory. Repeat this procedure for each channel being calibrated. Use the CHAN key to move between channels.

NOTE: Be sure that the units of the calibration standard match the units of the instrument before performing a calibration.

11.3 The DSM-4600 monitors have a feature that allows a slight adjustment of either the zero or span values individually. This type of calibration can be used to "tweak" the readout to match that of a known value without actually performing a formal calibration procedure.

NOTE: This type of adjustment will invalidate calibration settings from the procedures in section 11.2.

A. ZERO ADJUSTMENT ONLY: To make a small adjustment on the zero calibration value of a channel, enter the calibration mode by pressing and holding ENTER and press the CHAN key, then press the CHAN key alone until the display reads "CAL" and press ENTER. The display will read "x:CHAn", select the desired channel using the CHAN key and press ENTER; the display will read "LO x:CAL". With the standard at or near zero, press ENTER and use the ▲ or ▼ arrow key to increase or decrease the display reading to match the standard and press ENTER. The display will read "HI x:CAL"; press the CHAN key and the display will read "SAVE". The new zero calibration value will be stored in permanent memory. Use the ESC key to return to the normal reading.

B. SPAN ADJUSTMENT ONLY: To make a small adjustment on the span point of the pyrometer, enter the calibration mode by pressing and holding ENTER and press the CHAN key, then press the CHAN key alone until the display reads "CAL" and press ENTER. The display will read "x:CHAn",

select the desired channel using the CHAN key and press ENTER; the display will read “LO x:CAL”. Press the CHAN key and the display will read “HI x:CAL”. With the standard at or near the desired span value, press ENTER and use the ▲ or ▼ arrow key to increase or decrease the display reading to match the standard and press ENTER. The display will read “SAVE”. The new span calibration value will be stored in permanent memory. Use the ESC key to return to the normal reading.

11.4 ADVANCED CONFIGURATION: As previously mentioned, the DSM-4600 series monitors are designed to accept many different types of transducers as inputs. They can be configured to read any engineering units value from -999 to 9999 as long as the transducers’ output voltage is between 0 and 5 Vdc. If the desired engineering units indicator is not available on the display, the LCD indicator can be turned off and a traditional label used. To configure the unit for a non standard transducer, press and hold the ENTER key and then press the CHAN key. Press the CHAN key to move through the configuration headings until “tyPE” is displayed. See section 10.4. Proceed to the transducer selection menu and select “SPEC” (special). Press ENTER and the display will read “dPnt”. Use the ▲ or ▼ arrow keys to select the desired decimal point and press ENTER. The display will then read the previously configured lowest display value for that channel; use the ▲ or ▼ arrow keys to select the new lowest display value and press ENTER. Repeat as above for the highest display value and press ENTER. Use the ▲ or ▼ arrow keys to select the desired units and press ENTER. The display will read “SAVE”, and the new configuration will be stored in permanent memory. Repeat this for each channel that is using a special transducer. NOTE: Calibration may be required; see section 11.1. If it is desired to turn-off the units indicator when using a special transducer type, select “nonE” for units.

12.0 RS-485 COMMUNICATIONS

12.1 The DSM-4600 series monitor is part of a system that has been carefully designed to easily interface to popular computers, terminals, programmable controllers and future Altronic instruments. The data and status on any channel as well as the high and low setpoint values can be read remotely. The setpoints can also be adjusted remotely. The first alarm fault can be displayed and then cleared. A remote reset can also be performed.

The communications protocol may be either ASCII or Modbus RTU. Older units may not have the configuration for Modbus included. Consult the factory for information on upgrading the firmware for the Modbus configuration ability.

12.2 MASTER / SLAVE OPERATION: The DSM device RS-485 communication system is designed as a master/slave system; that is, each unit responds to its own unique address (node number) only after it is interrogated by the master (computer). One master and up to 32 slaves can communicate in the system. The units communicate with the master via a polling system. The master sends a command and only the polled slave responds. The slave modules can never initiate a communications sequence. A simple command/response protocol must be strictly observed.

12.3 NODE NUMBER: The node number is used in the system to identify the desired slave unit being polled. The node number can be any numeric value from 01 to 99 although only 32 devices can be served on a single communications port. This number range (01 to 99) is allowed so that if device grouping by function or application is desired it can be implemented using the first digit as the group or engine number and the second as the unit number. For example, 53 could be used to identify the number 3 slave unit mounted on engine number 5.

12.4 ASCII COMMUNICATION: All communication to and from the monitors is performed using ASCII characters. This allows the information to be processed with the “string” functions common to high level computer languages such as BASIC and C. For computers that support standard serial port interfaces, no special machine language software drivers are required. The use of the ASCII format also allows for the connection of these devices to an auto answer

modem for long distance operation without the need for a local supervisory computer. The ASCII characters also make system debugging easy using standard terminal emulation software.

12.5 HALF DUPLEX OPERATION: The RS-485 system employed uses two wires for communication and cannot send and receive data at the same time over the same two wires making it a half duplex system. When the master is in the transmit mode, the slave is in the receive mode and visa-versa.

12.6 ELECTRICAL OPERATING RANGE: RS-485 is a communications standard to satisfy the need for multi-dropped systems that can operate at high speeds over long distances. RS-485 uses a balanced differential pair of wires switching from 0 to 5 volts to communicate data. RS-485 drivers can handle common mode voltages from –7 to +12 volts without loss of data, making them an excellent choice for industrial environments.

12.7 COMMUNICATIONS PARAMETERS: The following must be set by the master to communicate with the slaves:

Baud Rate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	None

12.8 COMMUNICATIONS WIRING: The RS-485 wiring diagram illustrates the wiring required for multiple slave unit hookup. Note that every slave unit has a direct connection to the master. This allows any one slave unit to be removed from service without affecting the operation of the other units. Every unit must be programmed with a unique address or node number, but the addition of new units or nodes can be in any order. To minimize unwanted reflections on the transmission line, the bus should be arranged as a trunk line going from one module to the next. Random structures of the transmission line should be avoided. Special care must be taken with long busses (500 feet or more) to ensure error free operation. Long busses must be terminated with a 120 ohm resistor between the terminals marked RS-485 “A” and RS-485 “B” at the master only. The use of twisted pair shielded cable will enhance signal fidelity and is recommended. To prevent ground loops the shield should be connected to the shield terminal at the master only.

12.9 RX, TX INDICATORS: An RX and TX (receive and transmit) LED is visible on the back of the DSM-4600 unit to indicate when the unit is either receiving or transmitting data.

12.10 CONNECTING TO A PC: When connecting the DSM-4600 monitors to the RS-232 port on a PC, an RS-232 to RS-485 converter must be used for the communication interface. See wiring diagram for details.

12.11 LOADING: RS-485 uses a balanced differential pair of wires switching from 0 to 5 volts to communicate data. In situations where many units (32 max.) are connected together on a long run, voltage drop on the communications leads becomes a major problem. Voltage drops on the RS-485 minus lead appear as a common mode voltage to the receivers. While the receivers are rated to a maximum voltage difference of ±7 volts, –7V to +12V, a practical system should not have a voltage difference exceeding ±3 volts under normal conditions. The wire gauge used for the connections therefore limits the maximum number of units or the maximum length of wire between units in each application. The following formula can be used as a guideline to select the appropriate wire gauge.

For 18 AWG wire	No. of DSM units = (4000) / (ft of wire used)
For 20 AWG wire	No. of DSM units = (3600) / (ft of wire used)
For 22 AWG wire	No. of DSM units = (2400) / (ft of wire used)

NOTE: The maximum number of units connected together in a system is 32.

12.12 COMMAND STRUCTURE: The DSM units operate with a simple command/ response protocol to control all functions. A command must be transmitted to the unit by the master (computer or PLC) before the slave can respond with useful data. A slave unit can never initiate a communications sequence. A variety of commands exist to fully exploit the functionality of the individual units.

Communication of functions to the DSM is performed with two character ASCII command codes. The general format used for the commands is illustrated below using the READ DATA command from channel 3 of a DSM as an example. The hexadecimal values for the characters are shown only as a reference for those using low level (assembly language) decoding and will not appear on the communications terminal screen. All of the characters used in the communications protocol are standard ASCII characters and appear on the computer keyboard as shown with the exception of the "not acknowledge" (NAK) which is the industry standard "control U".

	header	**start**	**node**	**space**	**command**	**space**	**data**	**end**
ASCII	>	(	01		RD		03	)
HEX	3Eh	28h	30h 31h	20h	52h 44h	20h	30h 33h	29h

COMMAND HEADER ">" (3Eh): Each command must begin with the command header sometimes referred to as a prompt character. The ASCII character used is the ">" which means that a command message will be sent from the master to the slave.

START OF TEXT "(" (28h): The command header must be followed by the start of text indicator.

NODE NUMBER 01: 99: The node number or address of the device being contacted is next. A two digit number from 01 to 99 can be used.

SPACE (20h): Following the node number is an ASCII space character (not printable, value 20h) to act as a delimiter between the node number and the two character command word. For the balance of this document the space character will be shown normally without a specific description of each occurrence.

COMMAND WORD "RD" (52h, 44h): The command words are standard two letter (upper case) commands sent by the master for gathering specific information about the status of a slave. The commands are listed under STANDARD COMMANDS below.

SPACE (20h): Following the command word is another ASCII space character to act as a delimiter between the command word and the channel number.

CHANNEL NUMBER "03": This is the channel number in the slave unit that the information is requested from.

END OF TEXT ")" (29h): The end of text indicator says this is the end of the command.

STANDARD COMMANDS: The standard commands available are:

RD	for **R**ead **D**ata	>(01 RD 03)	Read the value of ch3 for the unit at node 01.
RL	for **R**ead **L**ow alarm value	>(02 RL 04)	Read the low setpoint of ch4 for the unit at node 02.
RH	for **R**ead **H**igh alarm value	>(15 RH 02)	Read the high set point of ch2 for the unit at node 15.
LS	for **L**o **S**etpoint adjustment	>(02 LS 04 sxxxx.)	Send new value for ch4 low setpoint for unit at node 02.
HS	for **H**i **S**etpoint adjustment	>(15 HS 02 sxxxx.)	Send new value for ch2 high setpoint for unit at node 15.
CA	for **C**lear **A**larms	>(11 CA)	Clear alarms of the device at node 11, timer not reset.
RR	for **R**emote **R**eset	>(01 RR)	Reset the unit and its timers at node 01.
FA	for **F**irst **A**larm value	>(01 FA)	Read the first alarm to fault for the unit at node 01.

NOTES: In the LS and HS setpoint adjustment commands, the variable data is of the form: sign (±) followed by the four most significant digits and a decimal point. Decimal point position must agree with the transducer programming, that is the decimal point position must be the same as that returned in a read response for that channel. It is recommended that the channels of the device always be read immediately prior to adjusting setpoints via the RS-485 link. Digits to the left of the most significant non-zero number must be filled with zero's for place holders (Ex: +0325.). A plus sign must be used for a setpoint value of zero (Ex: +0000.).

STANDARD RESPONSES: The standard responses to the commands above are:

<(01 4688 CH03 sxxxx. Psi OK OK)	Unit type 4688, node 01 channel 3, x value, Psi units, low setpoint status indicator, high setpoint status indicator.
<(02 CH04 sxxxx. DegF)	The low alarm value at node 01 of ch4 is x value, DegF units.
<(15 CH02 sxxx.x Psi)	The high alarm value at node 15 of ch2 is x value Psi units.
<(02 LS 04)	Made the low setpoint adjustment to ch4 at node 02.
<(15 HS 02)	Made the high setpoint adjustment to ch2 at node 15.
<(11 CA)	Cleared alarms at node 11.
<(01 RR)	Performed a remote reset at node 01.
<(01 CH07 HI)	Ch7's high setpoint was first to fault at node 01.

SETPOINT STATUS INDICATORS FOR THE READ RESPONSE: Setpoint status indicators consist of two ASCII characters. The first is the low setpoint indicator, the second is the high setpoint indicator. The valid status indicators are:

OK No faults detected on the requested channel

HI Channel measured value is above its setpoint value

LO Channel measured value is below its setpoint value

NA Channel disabled by X:PtS in the configuration menu, or are not used

TD Channel setpoint's timer has not timed out and the channel is not yet armed

VALID RESPONSE: A command/response sequence is not complete until a valid response is received. When a slave unit receives a valid command, it interprets the command, performs the desired function and then communicates the response to the master within the specified time. The master may not initiate a new command until the response from a previous command is completed.

A valid response can occur in three ways:

1) a normal response indicated by a "<" header and "( )" beginning and end of text
2) an error response indicated by a "§" NAK (not acknowledged)
3) a communications time-out error

Each command has an associated delay time before a response can be made from the slave unit. If the response does not occur within the time specified for the commands as given, a communications time-out error occurs. This error is usually caused by an improper command header or possibly an improper or non-existent node sent by the master. The commands and their associated maximum response delay times are listed below.

RD, RL, RH, FA, CD, CE commands	20 msec. max.
LS, HS, CA, RR commands	100 msec. max.

An NAK error response will be sent by the DSM-4600 series unit when it has received a command with an error in the message. All commands must be of the format above. The header, start-and-end of text characters, a valid node number and spaces must be sent and correct to receive an NAK; if not, no response will be sent.

NO ALARMS RESPONSE: If view alarms memory in the unit polled is clear, the response will be: <(01 CH ~~CL)

12.13 DSM-4689DUS: Special command notes. Channels 9 and 10 of the DSM-4689 are addressed via the RS-485 communications in much the same manner as any other channel. There are, however, the following exceptions:

1. Channel 9 (RPM) only recognizes the HS (High Setpoint) command, LS returns NAK. The format of the RPM is always "+xxxx." for example, "+1202. RPM". The decimal point position is not adjustable, and the sign must always be positive. An error in this format will return a NAK.
2. Channel 10 (Hours) always responds in the format "xxxxx. HOUR", there is no sign and five full digits to the left of the decimal point. Leading zero's are not suppressed. To change the hourmeter value, the HS command may be used. The new value must be sent in the same format, the command would be >(01 HS 10 03394.).

12.14 CHECKSUMS: Two additional commands are provided so that the user may enable or disable the communication checksum routines. When enabled, the messages include an error-checking checksum that is based upon an Exclusive-Or, Modulo 100 conversion sum of the characters in the message string between and including the start of text "(" character and the end of text ")" character. The checksum number is a decimal number that is appended to the message. The slave unit calculates the checksum of the message and compares the calculated value to the actual value it received from the master in the checksum field. If the two values are not equal, an error results and no response is sent.

CE	for **C**hecksum **E**nabled	>(01 CE)	checksum enabled for node 01
CD	for **C**hecksum **D**isabled	>(01 CD)	checksum disabled for node 01

To calculate the Exclusive-Or, Modulo 100 checksum, take the binary value of the 8 bit ASCII character "(" and XOR it with the next binary value of the ASCII character in the string. Take the result and XOR it with the next. Continue these calculations until the end of text ")" character and that is the checksum value. If the decimal number of any of the calculations are greater than 99, use Modulo 100 math. For example, for decimal 154, use 54.

The Exclusive-Or is a binary Boolean operator. The XOR truth table is as follows:

A	B	X
0	0	0
0	1	1
1	0	1
1	1	0

XOR EXAMPLE FOR "(" XORed WITH "0":

```
  00101000
  00110000
  00011000  =  24 (DECIMAL)
```

An example of the calculation of the checksum is below:
Command: >(01 RD 01)

ASCII CHAR	BINARY EQUIV	CHECKSUM (DECIMAL)
>	Not used	---
(	00101000	---
0	00110000	24
1	00110001	41
SPACE	00100000	9
R	01010010	91
D	01000100	31
SPACE	00100000	63
0	00110000	15
1	00110001	62
)	00101001	23

The checksum value will be sent at the end of the command, so the command will look like: >(01 RD 01)23

12.15 MODBUS PROTOCOL: The protocol for Modbus RTU has the following specifications:

Baud Rate: 9600
Data Bits: 8
Stop Bits: ONE
Parity: NO

The DSM-46XXDUS is limited to 12 Modbus registers per read. All the 30000 registers may also be read as 40000 registers which allows for some controllers to query properly. Modbus values would typically be read as 16 bit signed registers.

REGISTERS	DSM-4688DUS	DSM-4689DUS
30001	CHANNEL 1	CHANNEL 1
30002	CHANNEL 2	CHANNEL 2
30003	CHANNEL 3	CHANNEL 3
30004	CHANNEL 4	CHANNEL 4
30005	CHANNEL 5	CHANNEL 5
30006	CHANNEL 6	CHANNEL 6
30007	CHANNEL 7	CHANNEL 7
30008	CHANNEL 8	CHANNEL 8
30009	0	SPEED
30010	0	HOURS
30011	FAULT STATUS	FAULT STATUS
30050	LOW SETPOINT CH01	LOW SETPOINT CH01
30051	HIGH SETPOINT CH01	HIGH SETPOINT CH01
30052	LOW SETPOINT CH02	LOW SETPOINT CH02
30053	HIGH SETPOINT CH02	HIGH SETPOINT CH02
30054	LOW SETPOINT CH03	LOW SETPOINT CH03
30055	HIGH SETPOINT CH03	HIGH SETPOINT CH03
30056	LOW SETPOINT CH04	LOW SETPOINT CH04

REGISTERS	DSM-4688DUS	DSM-4689DUS
30057	HIGH SETPOINT CH04	HIGH SETPOINT CH04
30058	LOW SETPOINT CH05	LOW SETPOINT CH05
30059	HIGH SETPOINT CH05	HIGH SETPOINT CH05
30060	LOW SETPOINT CH06	LOW SETPOINT CH06
30061	HIGH SETPOINT CH06	HIGH SETPOINT CH06
30062	LOW SETPOINT CH07	LOW SETPOINT CH07
30063	HIGH SETPOINT CH07	HIGH SETPOINT CH07
30064	LOW SETPOINT CH08	LOW SETPOINT CH08
30065	HIGH SETPOINT CH08	HIGH SETPOINT CH08
30066	0	HIGH RPM SETPOINT
30100	DECIMAL POINT CH 1	DECIMAL POINT CH 1
30101	DECIMAL POINT CH 2	DECIMAL POINT CH 2
30102	DECIMAL POINT CH 3	DECIMAL POINT CH 3
30103	DECIMAL POINT CH 4	DECIMAL POINT CH 4
30104	DECIMAL POINT CH 5	DECIMAL POINT CH 5
30105	DECIMAL POINT CH 6	DECIMAL POINT CH 6
30106	DECIMAL POINT CH 7	DECIMAL POINT CH 7
30107	DECIMAL POINT CH 8	DECIMAL POINT CH 8
30108	N/A	DECIMAL POINT SPEED
30109	N/A	DECIMAL POINT HOURS

The fault status (30011) contains information regarding which channel is faulted and whether the fault occurred for a high or a low condition. If the high byte is equal to 1, the fault that occurred is a high fault. If the value is zero, the fault is low.

The low byte contains the channel which caused the fault. A high fault on channel 4, e.g., would show the following:

Low byte: 00000100 (4)
High byte: 00000001 (1)

In this particular case, the value of the modus register would be 256 + 4 = 260.

Since the Modbus registers are signed integers, the operator would also need to know the decimal point associated with each channel.

For example, channel 6 shows up as 15.4 PSIG. The modbus register would contain “154” and 30105 (decimal point location for channel 6) would be one. This means the decimal point needs to get shifted over 1 digit to the left of the decimal point and ‘154.’ becomes ‘15.4’.

FIGURES SECTION:

MOUNTING DIMENSIONS AND SPECIFICATIONS

PRESSURE TRANSDUCER: P/N 691 201-X

TEMPERATURE TRANSDUCER: P/N 691 202-300 / 691 203-300

TEMPERATURE TRANSDUCER: P/N 691 212-450 / 691 213-450

DSM-4600 CONFIGURATION WORKSHEET

DSM-4600 FLOWCHART

GENERAL ELECTRICAL CONNECTIONS

WIRING DIAGRAM: VOLTAGE OUTPUT TRANSDUCERS

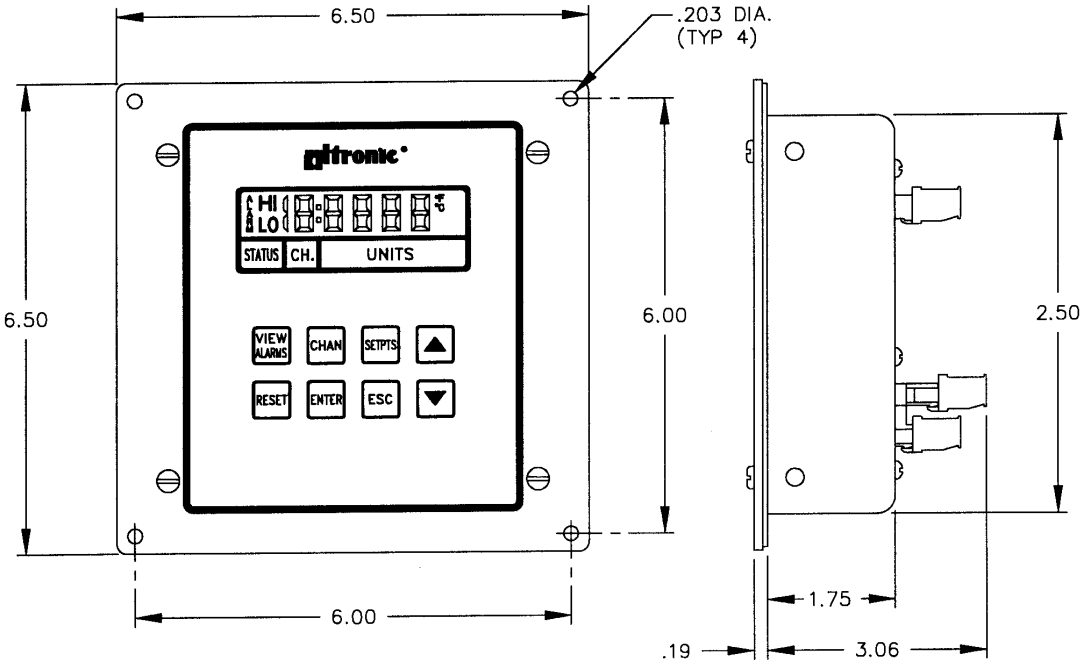
WIRING DIAGRAM: CURRENT OUTPUT TRANSDUCERS

WIRING DIAGRAM: ALTRONIC ANNUNCIATOR SYSTEMS

WIRING DIAGRAM: DC RELAYS

WIRING DIAGRAM: RS-485 COMMUNICATIONS

MOUNTING DIMENSIONS AND SPECIFICATIONS



SPECIFICATIONS:

POWER REQUIRED: DC POWERED 12–30 VDC, 10 WATTS MAX.

ANALOG INPUTS: 0 TO 5 VOLTS DC MAX. WITH RESPECT TO DC –.

PROGRAMMABLE ENGR. UNITS: Psi, Kpa, Hg, bar, °F, °C, RPM

DISPLAY: 0.5" 5–1/2 DIGIT LCD WITH DISPLAY INDICATORS.

DISPLAY UPDATE RATE: 1 SECOND NOMINAL.

DISPLAY SCAN RATE: 2.25 SECONDS PER CHANNEL (18 SECONDS FOR 8 CHANNELS NOMINAL).

RANGE: –999 TO +9999 CHANNELS 1 TO 8.
0 TO 2500 RPM, CHANNEL 9; 0 TO 99999 HOURS, CHANNEL 10.

OUTPUT SWITCH: ONE FORM C (N/O, N/C) SOLID STATE SWITCH
RATED 200 VDC, 0.2 AMP CONTINUOUS, OPTICALLY ISOLATED
FROM POWER SUPPLY. HYSTERESIS 2% FULL SCALE.

SWITCH RESPONSE TIME: TIED TO FILTER VALUE AND DISPLAY READING (WITH FILTER AT 1
MAX RESPONSE TIME IS APPROXIMATELY ONE SECOND).

AMBIENT TEMPERATURE RANGE: –40° TO 80°C (–40° TO 175°F).

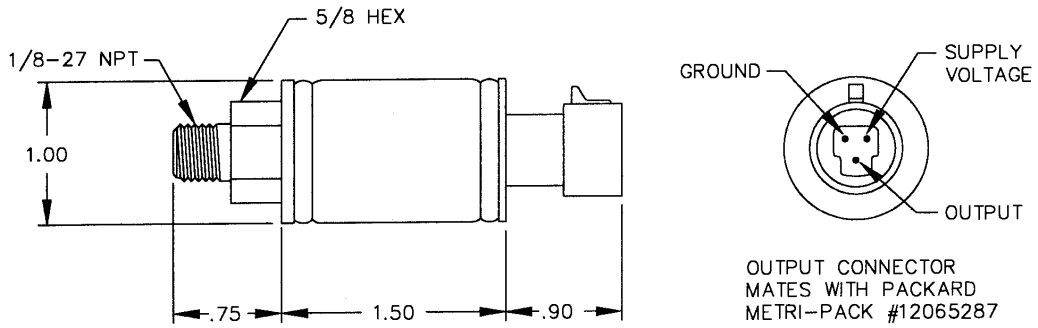
INSTRUMENT ACCURACY: ±0.5% ACROSS TEMPERATURE RANGE.

5 VOLT TRANSDUCER SUPPLY RATING: 200 ma. MAX.

RS–485 COMMUNICATIONS: 9600 BAUD, HALF DUPLEX.

HAZARDOUS AREA CLASSIFICATION: CLASS I, GROUP D, DIV. 2
CLASS I, GROUP D, DIV. 1 WHEN
POWERED FROM A CSA CERTIFIED ZENER
BARRIER RATED 30 VOLTS MAX., 120Ω MIN.

PRESSURE TRANSDUCER
P/N 691 201-X



SPECIFICATIONS:

EXCITATION VOLTAGE: +5VDC ±.25V 20mA MAX.

OUTPUT VOLTAGE: .50 TO 4.50V MIN. TO MAX. PRESSURE, RATIOMETRIC OUTPUT

NULL OFFSET: .50V

TRANSDUCER TYPE: SEALED GAUGE

MATERIAL IN CONTACT WITH MEDIA: 300 SERIES STAINLESS STEEL, NICKEL PLATED CARBON STEEL, BRAZE COMPOUND.

OVERLOAD: 1.5 X RATED RANGE WITHOUT DAMAGE
5 X RATED RANGE WITHOUT BURSTING

CASE MATERIAL: PLATED STEEL

ACCURACY: ±1% OF SPAN FROM BEST FIT STRAIGHT LINE INCLUDES EFFECTS OF NON-LINEARITY, HYSTERESIS AND REPEATABILITY.

COMPENSATED TEMPERATURE RANGE: 0° TO 180°F (-18° TO 82°C)

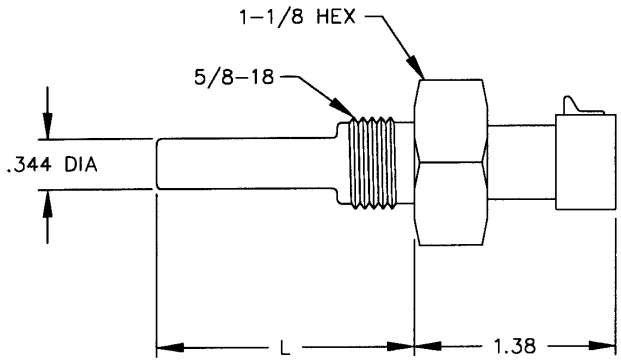
OPERATING AND STORAGE TEMPERATURE RANGE: -40° TO 221°F (-40 TO 105°C)

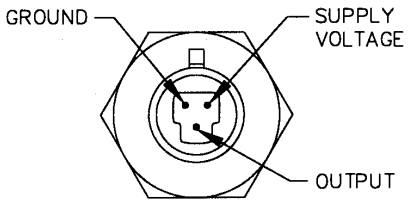
TOTAL ERROR: ±4% OF FULL SCALE INCLUDES THE EFFECTS OF TEMPERATURE, NON-LINEARITY, HYSTERESIS AND REPEATABILITY.

INSTALLATION: Use a 5/8" wrench to tighten transducer. Do not use the case to tighten transducer.

CAUTION: Avoid pressures in excess of full scale pressure or vacuum. Overpressure may cause calibration change or damage to the element. When selecting a pressure transducer range both static and dynamic overloads must be considered. Pressure fluctuations occur in most systems. These fluctuations can have very fast peak pressures, as in water hammer effects. An oscilloscope can be used to determine if high pressure transients exist in a system. Where pressure pulses are expected, select a transducer rating high enough to prevent overload by the peak pressures. Where high pressure transients are unavoidable, use either a higher range transducer or a pulsation dampener or snubber to reduce the peak pressure applied to the transducer.

TEMPERATURE TRANSDUCER
P/N 691 202-300 / 691 203-300





OUTPUT CONNECTOR
MATES WITH PACKARD
METRI-PACK #12065287

L	PART NO.
1.75	691 202-300
5.75	691 203-300

SPECIFICATIONS:

EXCITATION VOLTAGE: +5VDC TO 24VDC, .2mA MAX.

OUTPUT VOLTAGE: 10mV/°F

OUTPUT RANGE: .05 TO 3.0V (5 TO 300°F)

SENSOR TYPE: INTEGRATED CIRCUIT

CASE MATERIAL: 300 SERIES STAINLESS STEEL

ACCURACY: ±3°F OVER TEMPERATURE RANGE

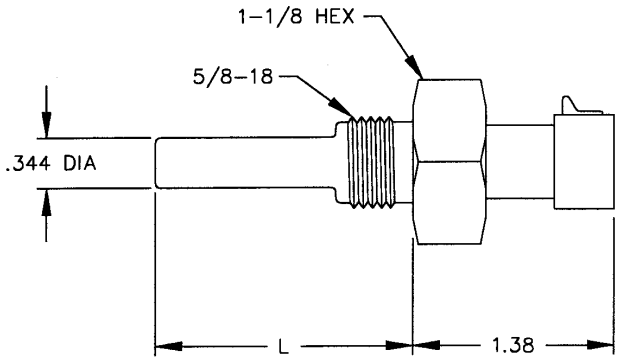
OPERATING TEMPERATURE: -40 TO 300°F (-40 TO 149°C)

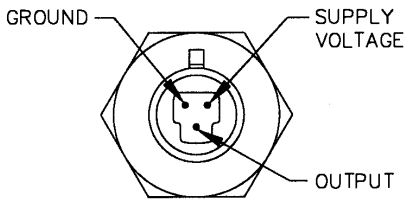
STORAGE TEMPERATURE: -75 TO 350°F (-59 TO 180°C)

INSTALLATION: Use a 1-1/8" wrench to tighten the tronsducer. Mount the temperature transducer in a thermowell on the engine or machine. The actual sensor is located at the bottom of the transducer, so to ensure accurate readings the tip of the probe should be surrounded by the media.

CAUTION: DO NOT exceed the absolute maximum temperature range of the transducer which is 350°F. DO NOT use for exhaust temperature monitoring, most exhaust temperatures exceed the maximum temperature rating.

TEMPERATURE TRANSDUCER
P/N 691212-450 / 691213-450





OUTPUT CONNECTOR
MATES WITH PACKARD
METRI-PACK #12065287

L	PART NO.
1.75	691212-450
5.75	691213-450

SPECIFICATIONS:

EXCITATION VOLTAGE: +5VDC ±0.1V, 5mA MAX.

NOMINAL OUTPUT VOLTAGE RANGE: 1.36 TO 3.40 (-40°F TO 450°F)

SENSOR TYPE: SILICON DIODE

CASE MATERIAL: 300 SERIES STAINLESS STEEL

ACCURACY: ±6°F OVER TEMPERATURE RANGE

OPERATING TEMPERATURE: -40 TO 450°F (-40 TO 232°C)

STORAGE TEMPERATURE: -40 TO 572°F (-40 TO 300°C)

INSTALLATION: Use a 1-1/8" wrench to tighten the transducer. Mount the temperature transducer in a thermowell on the engine or machine. The actual sensor is located at the bottom of the transducer, so to ensure accurate readings the tip of the probe should be surrounded by the media.

CAUTION: DO NOT exceed the absolute maximum temperature range of the transducer which is 572°F. DO NOT use for exhaust temperature monitoring, exhaust temperatures may exceed the maximum temperature rating.

DSM-4600 CONFIGURATION WORKSHEET

SERIAL#: _____ SIZE: _____

AUTO SCAN: _____ YES _____ NO

TRANSDUCER TYPE/UNIT:
1 _____ _____ 3 _____ _____ 5 _____ _____ 7 _____ _____
2 _____ _____ 4 _____ _____ 6 _____ _____ 8 _____ _____

X:PTS _____ POINTS MONITORED

SETPOINT PROTECTION: _____ ON _____ OFF

RS-485 COMMUNICATIONS NODE NUMBER: _____

COMMUNICATIONS TYPE: _____ ASCII _____ MODBUS

OUYTPUT SWITCH STATE: _____ SHELF _____ FAIL SAFE
_____ LATCHING _____ NON-LATCHING

CHANNEL 9: PPR _____ OVERSPEED _____ RPM

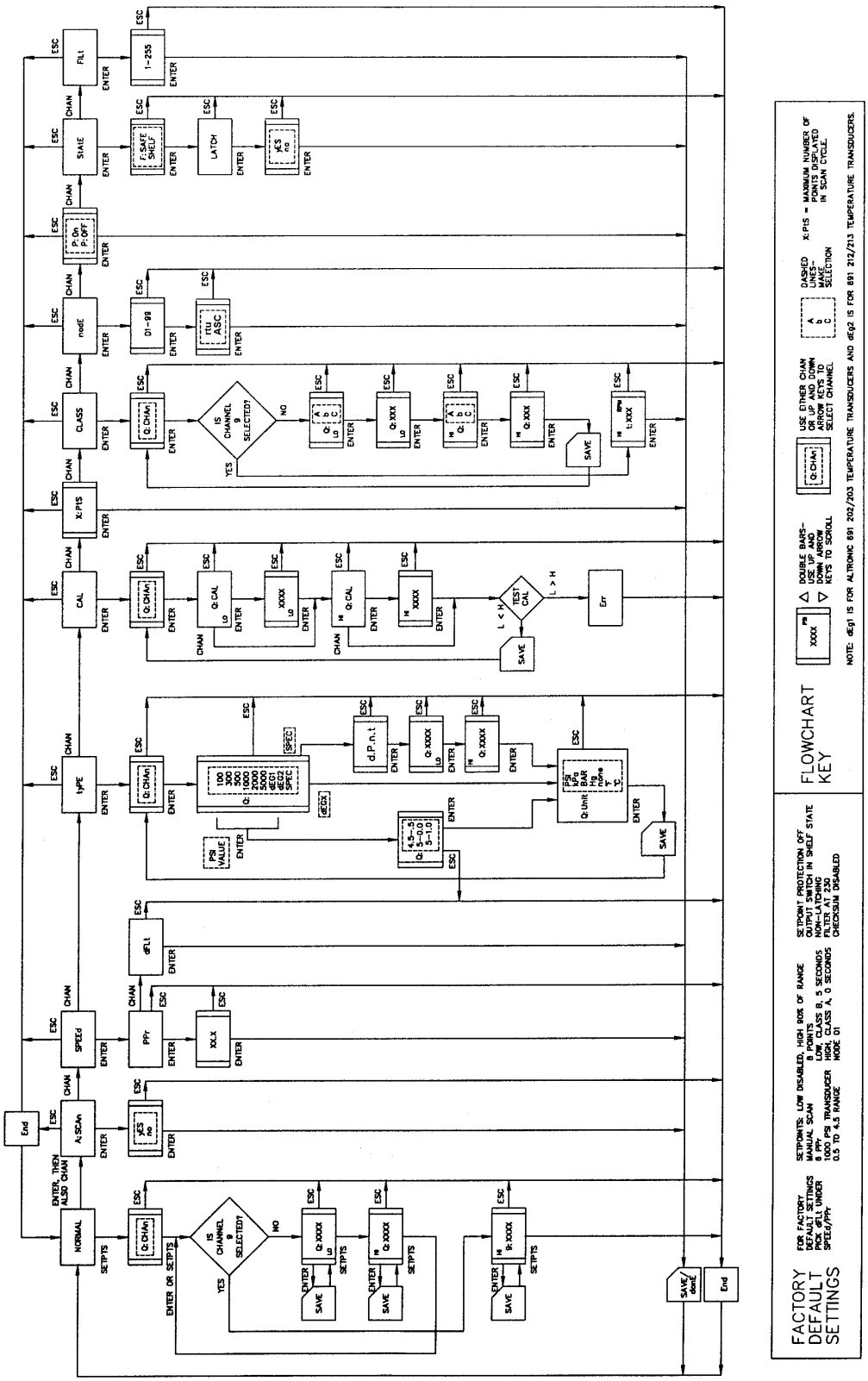
CHANNEL 10: PRESET _____ HOURS _____

FILTER: _____ (1 = MIN. FILTERING, 255 = MAX. FILTERING, DEFAULT = 230)

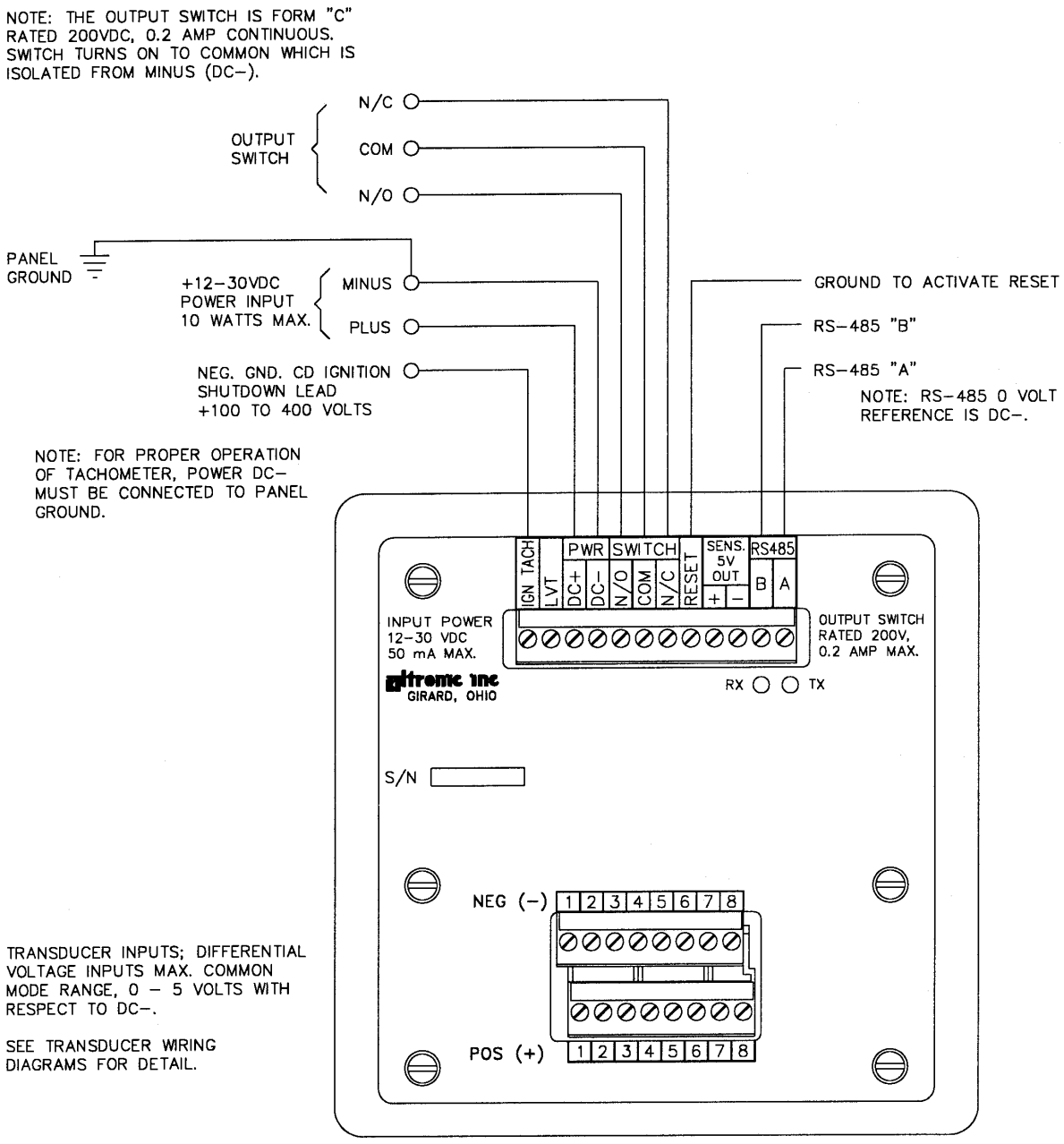
SETPOINTS:

	VALUE	CLASS	TIMER		VALUE	CLASS	TIMER
#1 LO				#1 HI			
#2 LO				#2 HI			
#3 LO				#3 HI			
#4 LO				#4 HI			
#5 LO				#5 HI			
#6 LO				#6 HI			
#7 LO				#7 HI			
#8 LO				#8 HI			

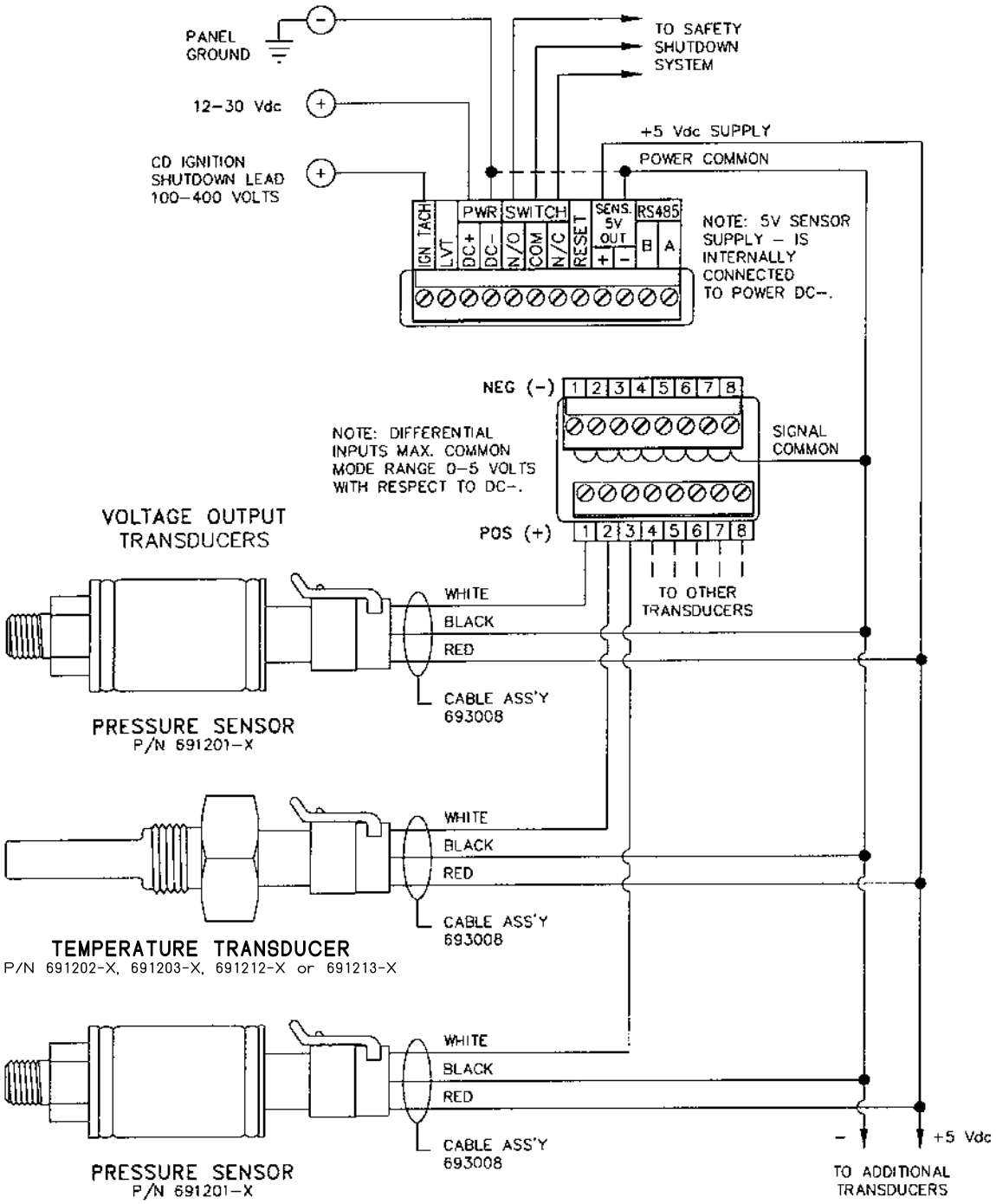
DSM-4600DUS - FLOWCHART



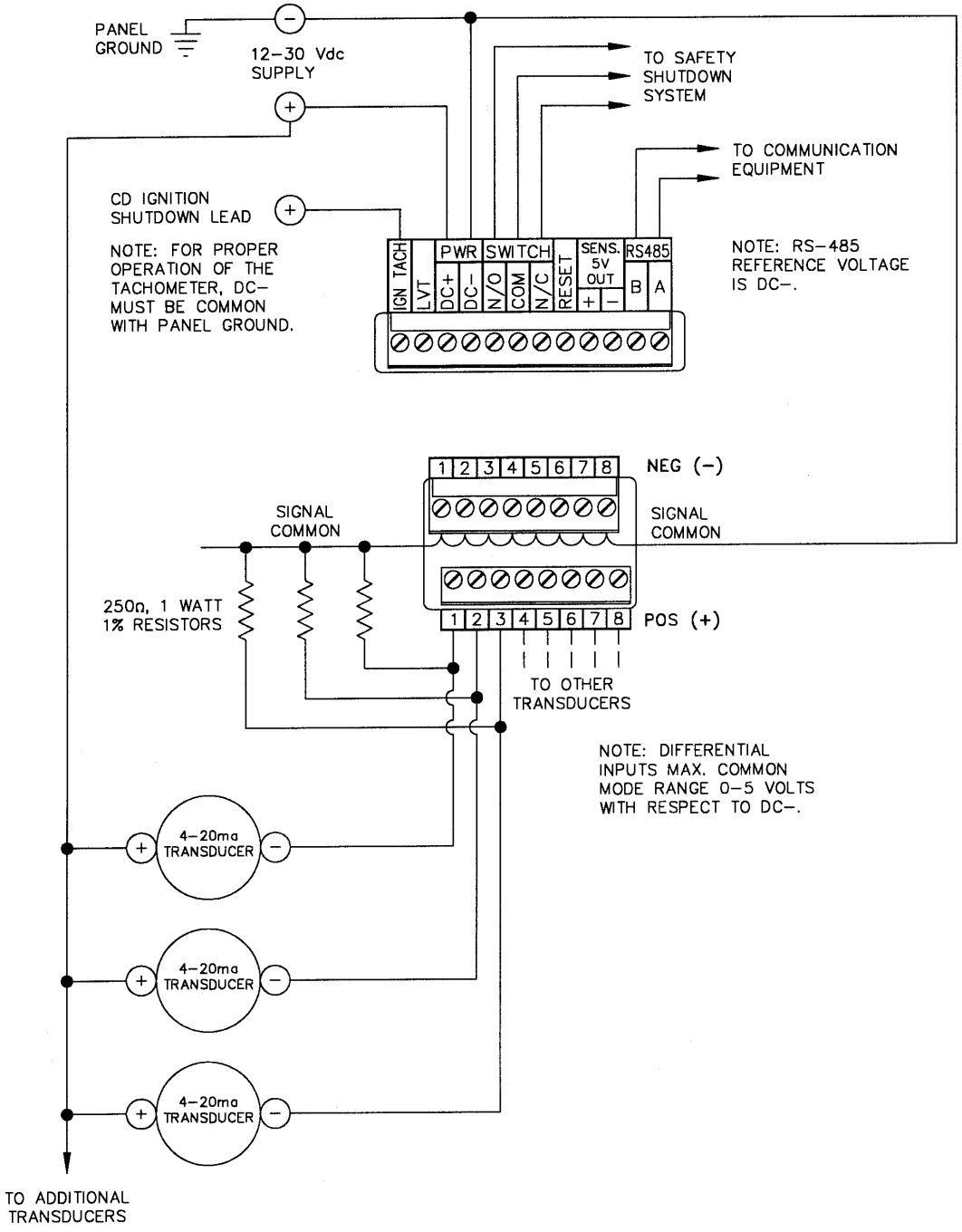
GENERAL ELECTRICAL CONNECTIONS



WIRING DIAGRAM VOLTAGE OUTPUT TRANSDUCERS



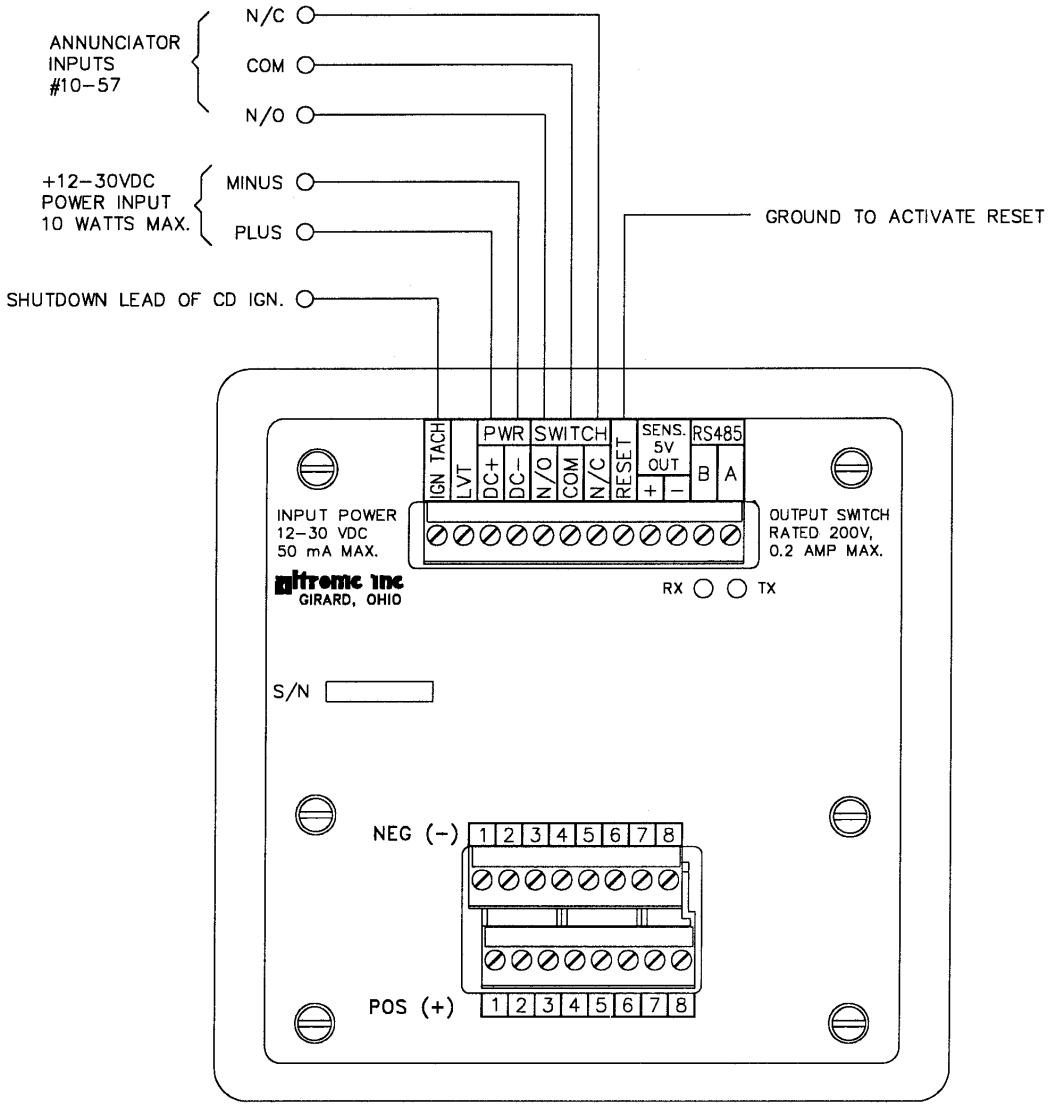
WIRING DIAGRAM CURRENT OUTPUT TRANSDUCERS



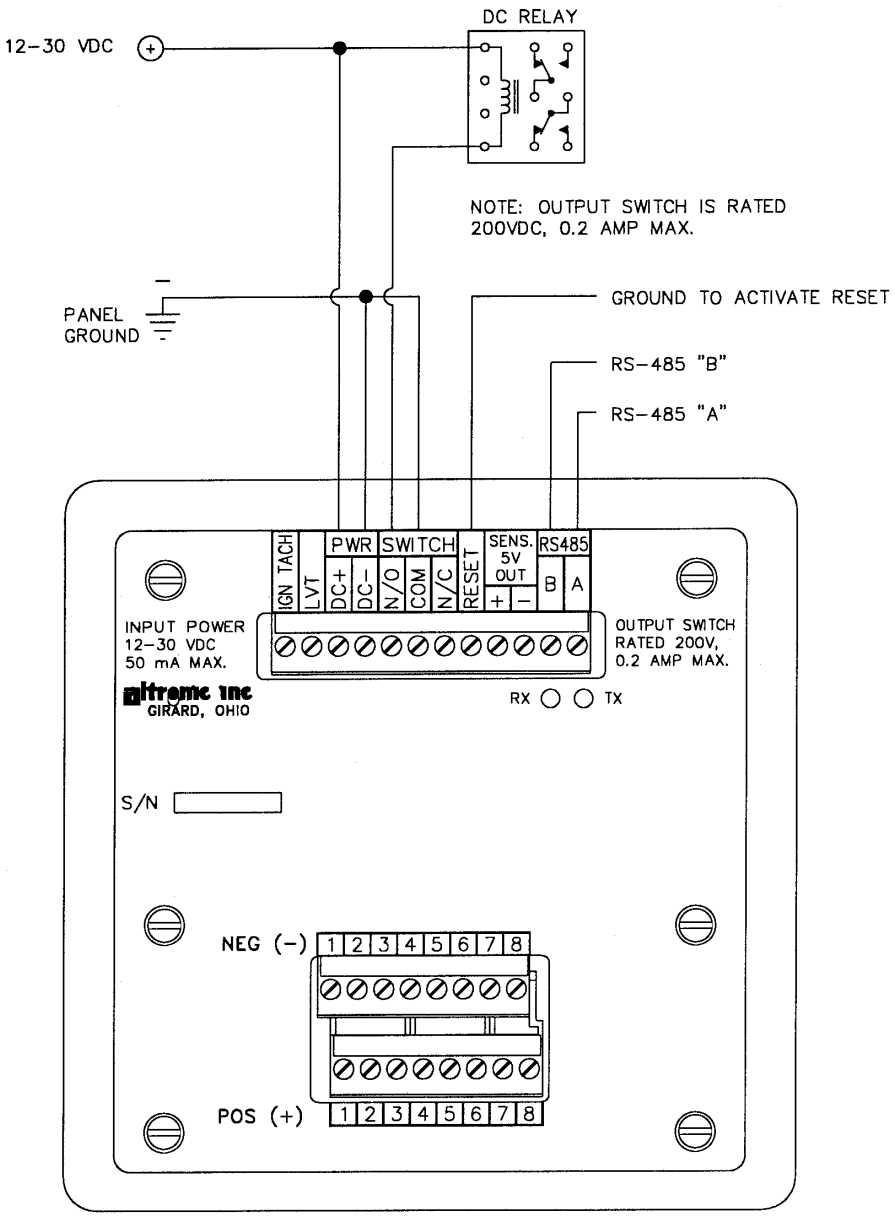
WIRING DIAGRAM
ALTRONIC ANNUNCIATOR SYSTEMS

NOTE: FOR INTRINSICALLY SAFE OPERATION THE FOLLOWING CONDITIONS MUST BE MET:

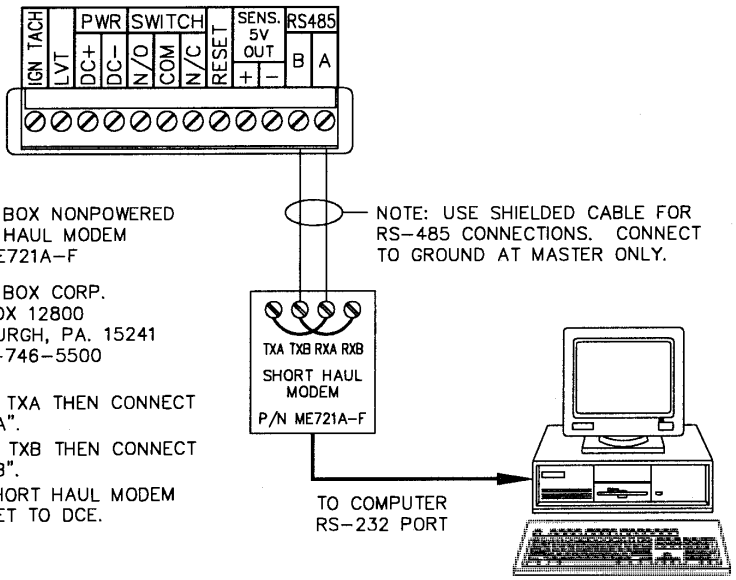
1. DC POWER MUST BE FROM A CSA CERTIFIED ZENER BARRIER RATED 30 VOLTS MAX., 120 OHMS MIN. FOLLOW THE INSTALLATION INSTRUCTIONS SUPPLIED WITH THE BARRIER.
2. THE SWITCH OUTPUTS, IF USED, MUST BE CONNECTED TO THE SENSOR INPUTS OF AN ALTRONIC DA OR DD ANNUNCIATOR SYSTEM WITH 690 SERIES POWER SUPPLY.
3. THE RS-485 COMMUNICATIONS, IF USED, MUST BE CONNECTED THROUGH A CSA-CERTIFIED BARRIER OR TO A CSA APPROVED COMMUNICATION DEVICE.
4. THE CD IGNITION SHUTDOWN LEAD, IF USED, MUST BE CONNECTED THROUGH A CSA-CERTIFIED BARRIER (ALTRONIC P/N 690107).



WIRING DIAGRAM – DC RELAY



RS–485 COMMUNICATIONS (PC HOOK–UP)



RS–485 COMMUNICATIONS (MULTIPLE SLAVE UNITS)