NEMA-4X, IP65

APM765 Panel Meter

Description

The APM765 displays data collected from process current, DC voltage and temperature inputs. Several output options convert the display into a transmitter with proportional 4-20mA output or a serial communication interface. A relay output option adds limit alarm and pump control capabilities.

Process inputs can be scaled with or without applying an input for virtually any engineering units. Temperature inputs can be programmed to display in degrees Fahrenheit or Celsius.

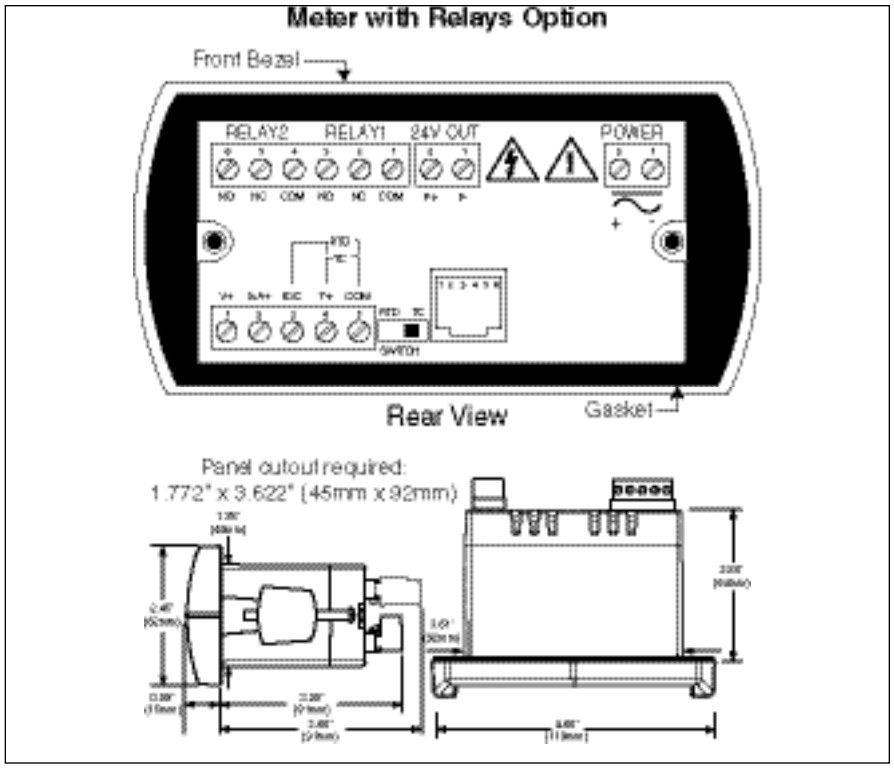
Inputs
4-20mA DC, ±20mA DC, ±10V DC,
Type J, K, T, E thermocouples,
100 ohm platinum RTDs

Outputs (optional)
4-20mA (sink/source)
Dual SPDT (Form C) 3A relays
RS-232, RS-422/485 serial communication

Power Requirements
Standard unit: 85-265V AC or 90-265V DC
Optional: 12-24V AC or 12-36V DC

Operating Temperature
0 to 65°C

Approvals
CE marked. UL, cUL listed.



Special Features

- Universal input (TC, RTD, mA, V DC)
- Sunlight-readable display (adjustable intensity)
- Push-button or PC programmable
- Dual relay option for limit alarms or pump control (with alternation)
- Isolated 4-20mA output options (sink/source)
- Single/dual 24V DC isolated power options
- Modbus RTU communication option
- Data acquisition and logging capabilities with MeterView software
- Universal power supply 90-265 VAC/VDC
- Shallow depth package (3.6" behind panel)

Easy Setup

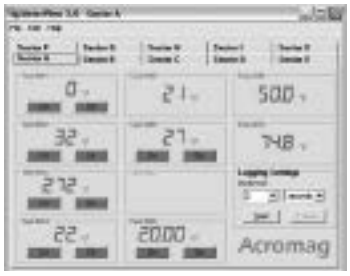
The APM765 is very easy to set up and program using the simple four-button configuration interface. There is only one switch on the entire meter – no jumpers – and never any need to open the case. The meter is also programmable using a PC and the MeterView software. A copy function quickly clones setups from other units.

Applications

- Process & temperature monitoring
- High & low alarms
- Latching or non-latching relays
- Pump alternation control
- Time delay & fail-safe relays
- Minimum & maximum readings

Data Logging

Software provides a convenient way to collect data generated by the APM765's serial output. Users can select the logging time interval and the engineering units for display on the computer screen. Data is written to a file that can be imported into spreadsheets or other applications.



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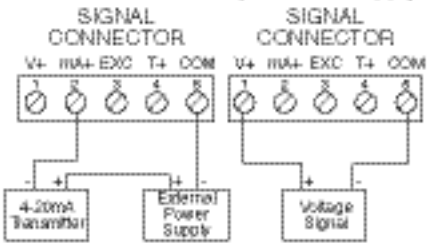
DC Process and Temperature Inputs

The APM765 is factory calibrated to accept 4-20 mA, ±10 VDC, Type J, K, T, E thermocouples and 100 ohm platinum RTDs. Process inputs can be scaled with or without applying an input for virtually any engineering units. Temperature inputs can be programmed to display in degrees Fahrenheit or Celsius and a type K thermocouple can display up to 2300°F.

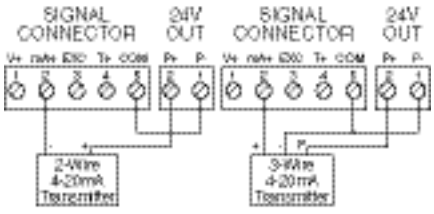
Current/Voltage Input

Setting up the meter to accept a current or voltage input is very easy. All setup steps are performed by pushbuttons or through software so there are no switches or jumpers to adjust.

Transmitter Powered by External Supply



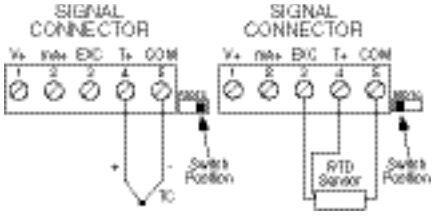
Transmitters Powered by Internal Supply (Optional)



Thermocouple/RTD Input

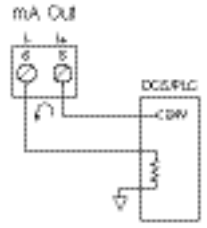
Setting up the APM765 to accept thermocouple or RTD input is simply a matter of setting a switch at the rear of the case and selecting the input type from the menu.

Meters accept J, K, T, or E type thermocouples as well as two, three, or four-wire 100 ohm platinum RTDs.

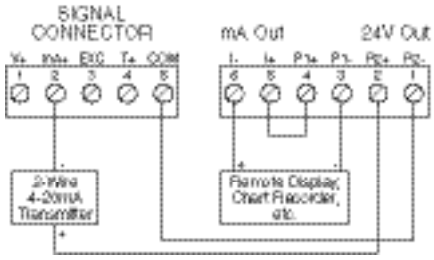


Isolated 4-20mA Output

Standard 4-20 mA Sinking Output (powered externally)



Sourced 4-20 mA Output and Input Signal Powered by Panel Meter (using dual 24V supplies)



Serial or Modbus Output

The APM765 can be used as a data acquisition device, with the added benefit of a digital display, by connecting an optional RS-232 or RS-422/485 serial communication adapter.

Acromag offers MeterView software for simple data acquisition and to program the meter.

Serial Communications

METER ADDRESS
Modbus protocol: 1 - 247 (default 247).

BAUD RATE
300 - 19,200 bps (default 2400).

TRANSMIT TIME DELAY
Programmable between 0 and 199mS or Transmitter always on for RS422 communication (default 10mS).

DATA
8 bit (1 start bit, 1 stop bit).

PARITY
None, even, or odd (default even).

BYTE-TO-BYTE TIMEOUT
0.01 - 2.54 seconds (default 0.01 seconds).

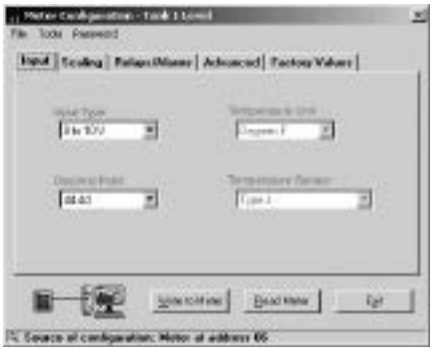
TURN AROUND DELAY
Less than 2mS (fixed).

MeterView Software

MeterView software enables PC programming of the APM765 and sets up data logger operation.

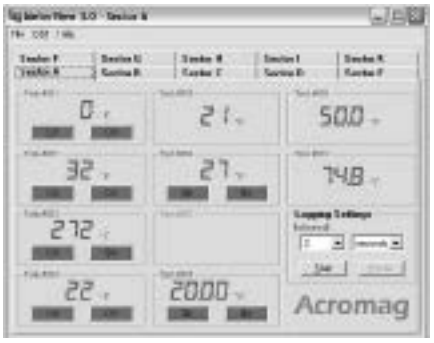
Remote Programming

MeterView software allows all setup parameters to be programmed from a PC and saved to a file for reporting or programming other meters.

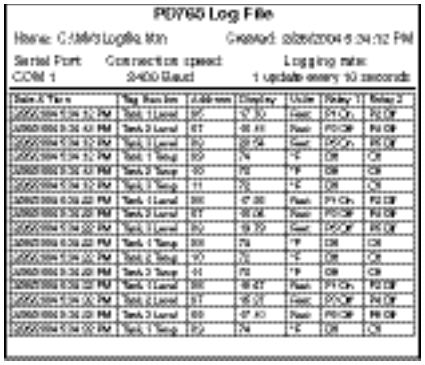


Data Acquisition

MeterView software provides a convenient way to collect the data generated from the serial output of up to 100 panel meters. The user can select the logging time interval and the engineering units that will be displayed on the computer screen. Data is written to a file that could then be imported into a spreadsheet or other application.



Sample File Generated by MeterView



APM Series®

Performance Specifications

Specifications apply to operation at 25°C.

General

DISPLAY
0.56"(14.2 mm) red LEDs. Four digits (-1999 to 9999).

DISPLAY INTENSITY
Eight user-selectable intensity levels.

FRONT PANEL
NEMA 4X, IP65. Panel gasket provided.

PROGRAMMING METHODS
Four front panel push buttons, PC and MeterView software, or cloning with Copy feature.

NOISE FILTER
Programmable between 2 - 199 (0 will disable filter).

DISPLAY UPDATE RATE
1.8-2.5/sec for TC input or 3.7-5/sec for process/RTD.

OVERRANGE AND UNDERRANGE
Display flashes 9999 (over) or -1999 (under).

MAX/MIN DISPLAY
Stored until reset by user or meter is turned off.

NON-VOLATILE MEMORY
All programmed settings are stored in nonvolatile memory for a minimum of ten years if power is lost.

POWER
AC: 85-265 VAC, 50/60 Hz, 20 VA.
DC: 90-265 VDC, 20 W.
Option: 12-36 VDC or 12-24 VAC.

REQUIRED FUSE
UL Recognized, 5A max, slow blow
(up to six meters may share one fuse).

NORMAL MODE REJECTION
64 dB at 50/60 Hz.

ISOLATION
Input or output to power line: 4kV.
Input or output to P1 or P2: 500V.
Input to output: 500V.
P1 to P2: 500V.

ENVIRONMENTAL
Operating range: 0 to 65°C (32 to 149°F).
Storage range: -40 to 85°C (-40 to 185°F).
Relative humidity: 0 to 90% non-condensing.

CONNECTIONS
Power & Signal: removable screw terminal blocks accept 12 to 26 AWG. Serial: RJ11 header, standard on all meters.

ENCLOSURE
1/8 DIN, high impact plastic, 94V-0, color; gray.

WEIGHT
8 oz (2.27 g) (no options).

WARRANTY
3 years parts and labor.

Process Inputs

INPUTS
Field selectable: ±20 mA DC and ±10 VDC

ACCURACY
±0.05% of calibrated span ±1 count, square root: 10-100% F.S.

LOW-FLOW CUTOFF
0 to 9999 (0 disables cutoff function).

DECIMAL POINT
Up to three decimal places: d.ddd, dd.dd, ddd.d,or dddd.

CALIBRATION
Internal or external signal or with PC.

CALIBRATION RANGE
User Programmable over entire range of meter.

INPUT IMPEDANCE
Voltage range: greater than 1M ohms.
Current range: 50-100 ohms.

INPUT OVERLOAD
Protected by automatically resettable fuse.

TEMPERATURE DRIFT
±50 PPM/°C.

TRANSMITTER SUPPLY
Isolated, one or two transmitter supplies (optional)
P1 (-1 option): 24 VDC ±10% @ 200mA max.
P1/P2 (-2 option)
P1: 24 VDC ±10% @ 200mA.
P2: 24 VDC ±10% @ 40mA.

Temperature Inputs

INPUTS
Factory calibrated, field selectable: type J, K, T, or E thermocouples and 100 ohm. platinum RTD (0.00385 or 0.00392 curve).

RESOLUTION
1°; type T, 1° or 0.1°.

ACCURACY

Type	Temperature Range	Accuracy
J	-58 to 1382°F (-50 to 750°C)	±2°F (±1°C)
K	-58 to 2300°F (-50 to 1260°C)	±2°F (±1°C)
T	-292 to 700°F (-180 to 371°C)	±2°F (±1°C)
E	-58 to 1578°F (-50 to 870°C)	±2°F (±1°C)
RTD	-328 to 1382°F (-200 to 750°C)	±1°F (±1°C)

COLD JUNCTION REFERENCE
Automatic.

TEMPERATURE DRIFT
±2°C maximum; 0 to 65°C ambient temperature.

OFFSET ADJUSTMENT
Programmable to ±19.9°. This allows the user to apply an offset value to the temperature being displayed.

INPUT IMPEDANCE
Greater than 100k ohms.

SENSOR BREAK
All relays and alarm status LEDs go to alarm state. Analog output may go to pre-programmed state. Display will flash.

Relays

RATING
2 SPDT (form C); rated 3 amps @ 30 VDC or 3 amps @ 250 VAC resistive load; 1/14 HP @ 125/250 VAC for inductive loads.

DEADBAND
0-100% of full scale, user selectable.

HIGH OR LOW ALARM
User may program any alarm for high or low.

RELAY OPERATION
1. Automatic (non-latching).
2. Latching.
3. Pump alternation control.

RELAY RESET
User selectable via front panel buttons or PC.
1. Automatic reset only (non-latching).
2. Automatic + manual reset any time (non-latching).
3. Manual reset only, at any time (latching).
4. Manual reset only after alarm condition has cleared (latching).

Automatic reset: Resets when input passes reset point.
Manual reset: Front panel ACK button.

TIME DELAY
0 to 199 seconds, on and off delays; programmable.

FAIL-SAFE OPERATION
Programmable, independent for each relay. Relay coils are energized in normal condition. In case of alarm or power failure, relays will go to de-energized state.

AUTO INITIALIZATION
When power is applied to the meter, relays will reflect the state of the input to the meter.

Isolated 4-20mA Output

OUTPUT RANGE
1.00 to 23.00mA typical. Scalable for 0.00 to 23.99mA. Factory calibrated for 4-20 mA.

ACCURACY
±0.1% F.S. ±0.004 mA.

TEMPERATURE DRIFT
50 PPM/°C from 0 to 65°C ambient.

Note: Analog output drift is separate from input drift.

OUTPUT LOOP RESISTANCE

Power Supply	Minimum	Maximum
24 VDC	10 ohms	700 ohms
35 VDC (external)	100 ohms	1200 ohms

OUTPUT MAXIMUM LOAD
R_{LOAD} (max) = (V_{SUPPLY} - 10V) / 0.020A

EXTERNAL POWER RANGE
10-35 VDC.

Ordering Information

Panel Meters

Please select models from the table below.

Model No.	Power: 85-265V AC or 90-265V DC	Power: 12-36V DC or 12-24V AC	24V DC Supply	Dual 24V DC Supplies	Two Relays	4-20mA Output	Modbus Interface
APM765-6R0-00	•						•
APM765-6R0-10	•		•				•
APM765-6R2-00	•				•		•
APM765-6R2-10	•		•		•		•
APM765-6R3-00	•					•	•
APM765-6R3-10	•		•			•	•
APM765-6R3-20	•			•		•	•
APM765-7R0-00		•					•
APM765-7R2-00		•			•		•
APM765-7R3-00		•				•	•

Accessories

APMA2801
NEMA 4X plastic enclosure, holds one APM765 meter

APMA6845
Pipe-mount kit (2-inch pipe) for use with APMA2801.

APMA7232
RS-232 serial adapter, APMA7420 included

APMA7420
Standard modular cable, 7ft. (2.1m).

APMA7422
RS-422/485 serial adapter, APM7420 included

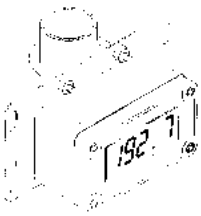
Field Enclosures

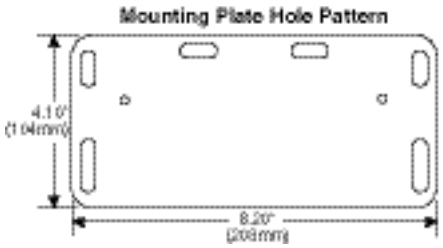
Low-Cost Plastic NEMA 4X Enclosure

The APMA2801 is a low-cost, compact, plastic NEMA 4X enclosure that will house one meter.

Pipe Mount Kit

The APMA6845 kit mounts a panel meter inside an APMA2801 NEMA 4X enclosure to a 2-inch pipe.



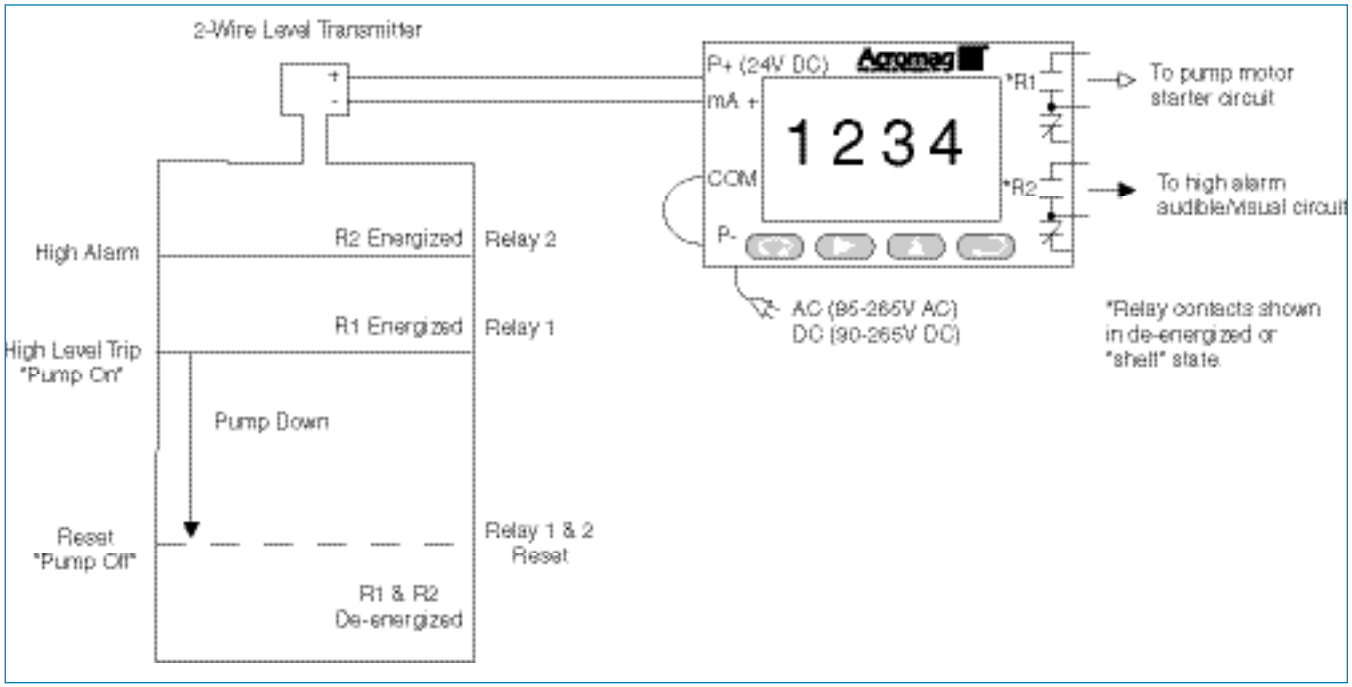


Application #1:
Pump down with high alarm

Problem: Need to excite a 2-wire, 4-20mA continuous level sensor, and provide two relay outputs. One relay for pump down and one relay for high alarm with automatic or manual reset.

Solution

Model APM765-6R2-10 panel meter



APM Configuration & Set-up Example

Input: 4-20mA

Dec. Point: As needed (d.ddd, dd.dd, ddd.d, or dddd)

Relay 1 Action: Automatic reset

Relay 1 Setpoint: As needed (e.g.; 16mA)

Relay 1 Reset: As needed (e.g.; 8mA)

Relay 2 Action: Auto-manual reset

Relay 2 Setpoint: As needed (e.g.; 18mA)

Relay 2 Reset: As needed or same as relay 1

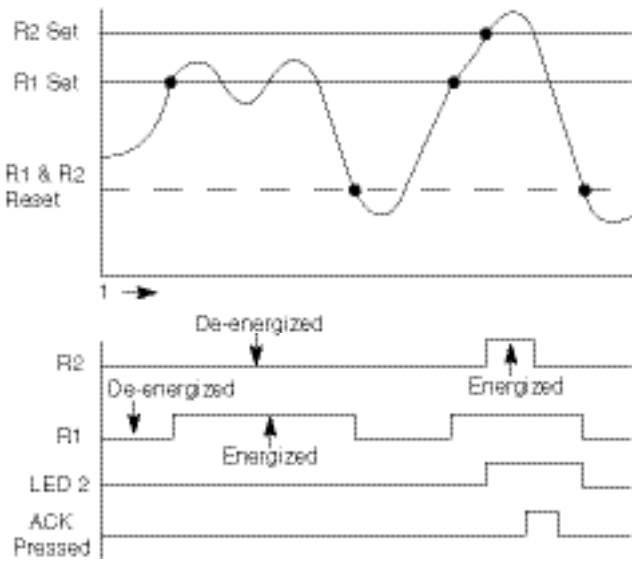
Failsafe Operation: None

Time Delay: None

Display Scale 1: 4mA = 0% (or as needed)

Display Scale 2: 20mA = 100% (or as needed)

Relay Operation Timing Diagrams



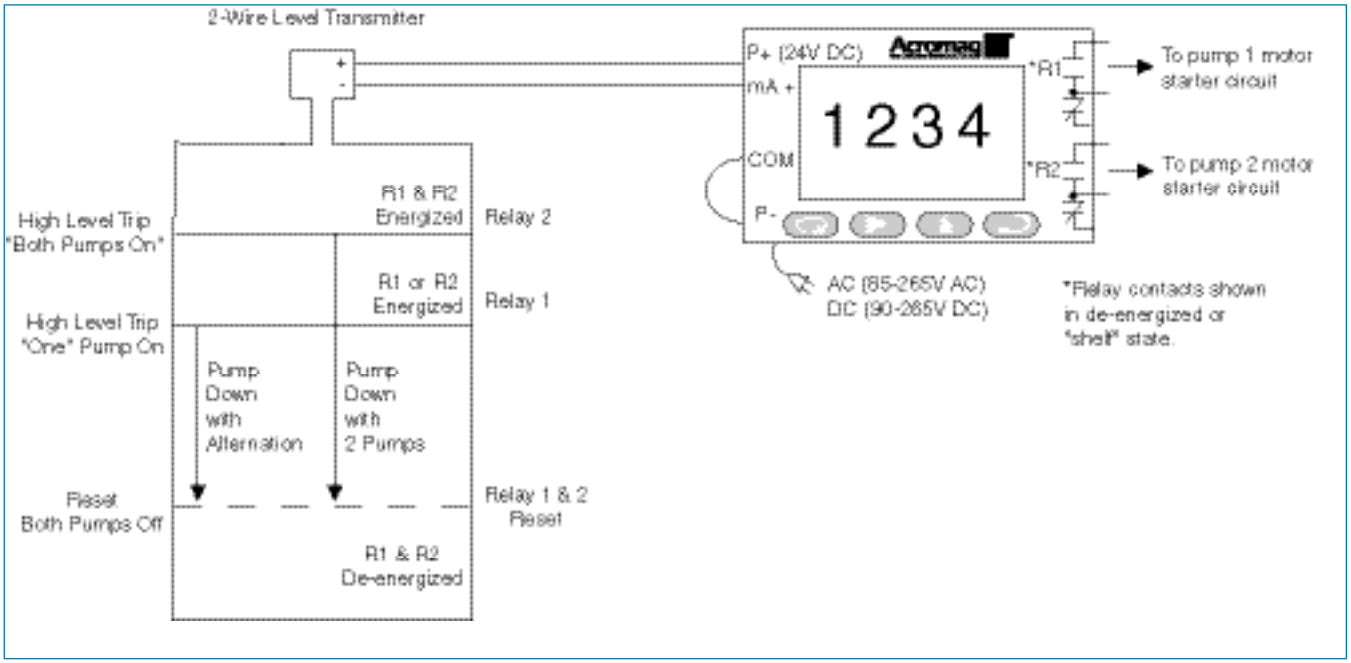
Application #2:
Pump down w/duplex pump control

Problem: Need to excite a 2-wire, 4-20mA continuous level sensor, and provide two relay outputs for duplex pump control with alternation. Both pumps must be turned on if one can't handle the duty.

Solution

Model APM765-6R2-10 panel meter

For extra high/low alarm relays with built-in silence circuit (manual reset and acknowledge), use additional APM765-6R2-00 and wire in series with 4-20mA loop.



APM Configuration & Set-up Example

Input: 4-20mA

Dec. Point: As needed (d.ddd, dd.dd, ddd.d, or dddd)

Relay 1 Action: Alternate

Relay 1 Setpoint: As needed (e.g.; 16mA)

Relay 1 Reset: As needed (e.g.; 8mA)

Relay 2 Action: Alternate

Relay 2 Setpoint: Above relay 1 (e.g.; 18mA)

Relay 2 Reset: Same as relay 1

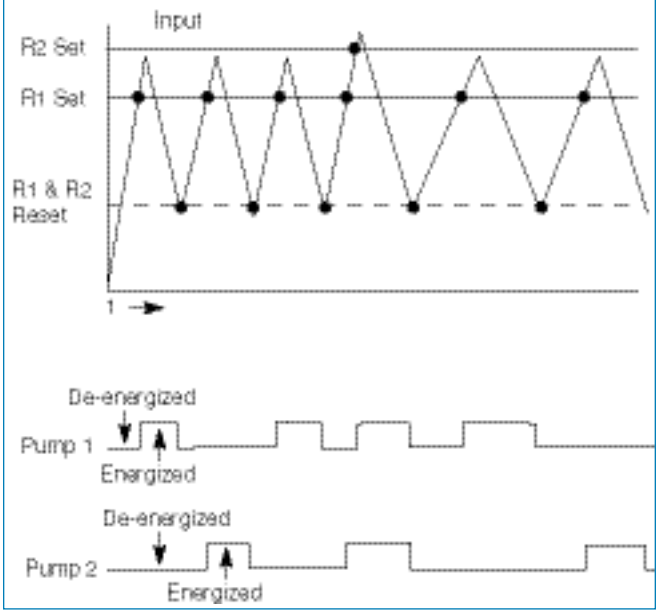
Failsafe Operation: None

Time Delay: None

Display Scale 1: 4mA = 0% (or as needed)

Display Scale 2: 20mA = 100% (or as needed)

Relay Operation Timing Diagrams

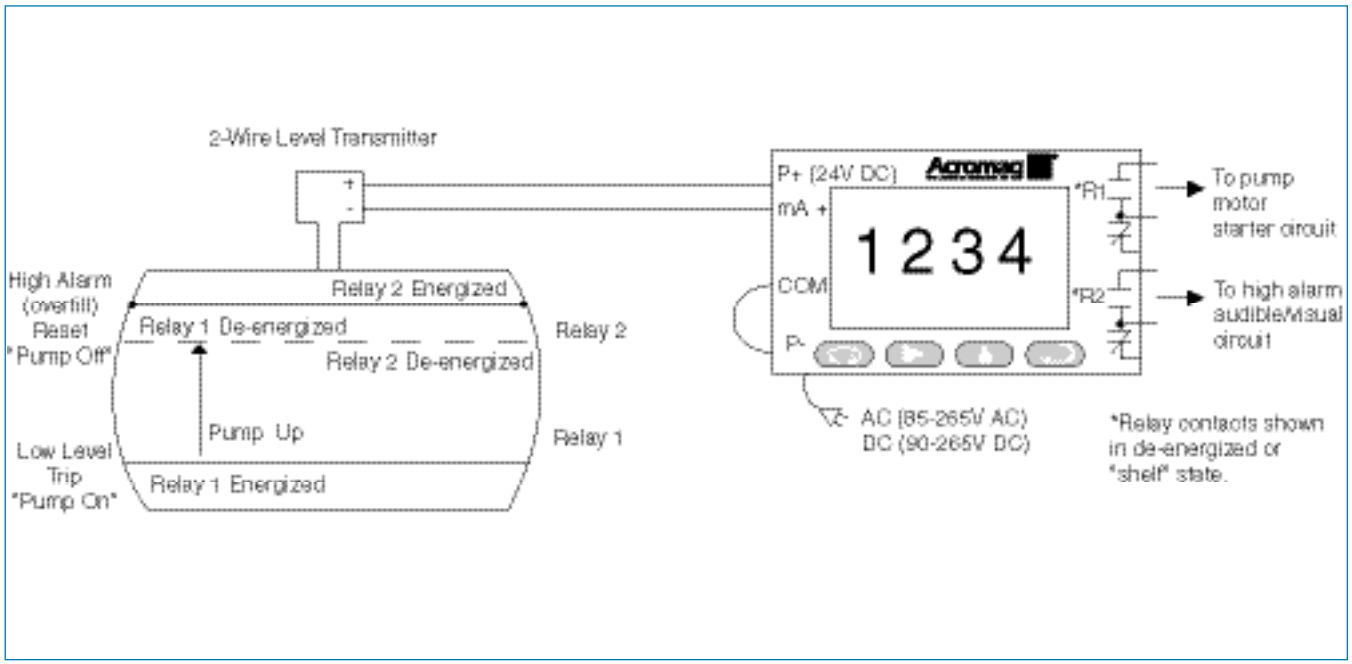


Application #3:
Pump Up with overfill alarm

Problem: Need to excite a 2-wire, 4-20mA continuous level sensor, and provide two relay outputs. One relay is for pump control (filling) and the other relay is for high alarm (overfill) with automatic or manual reset.

Solution

Model APM765-6R2-10 panel meter



APM Configuration & Set-up Example

Input: 4-20mA

Dec. Point: As needed (d.ddd, dd.dd, ddd.d, or dddd)

Relay 1 Action: Automatic

Relay 1 Setpoint: As needed (e.g.; 6mA)

Relay 1 Reset: As needed (e.g.; 16mA)

Relay 2 Action: Auto manual

Relay 2 Setpoint: As needed (e.g.; 18mA)

Relay 2 Reset: As needed (e.g.; 16mA)

Failsafe Operation: None

Time Delay: None

Display Scale 1: 4mA = 0% (or as needed)

Display Scale 2: 20mA = 100% (or as needed)

Relay Operation Timing Diagrams