Technology Solutions

TEK-LCD 7801C

NEMA 4X Panel Mount Multi-Channel Controller

ACCESSORIES

Flow | Level | Temperature | Pressure | Valves | Analyzers | Accessories | TekValSys

Introduction

Tek-LCD 7801C NEMA 4X Panel Mount Multi-Channel Controller is easy to use and satisfies a wide variety of process display, alarm, and control applications. It accepts 4 to 20 mA inputs, flow meter pulse inputs, digital inputs, and Modbus inputs and displays them in numeric and bar graph format on a large, 5.7" color display. It can be equipped with multiple relays with user-definable actions, 4-20 mA outputs, digital outputs, Modbus RTU and ASCII, Modbus Enron, and Ethernet Modbus TCP/IP protocol communication capabilities. Additionally, the controller is equipped with up to 32 timers to control many processes or events.

Tek-LCD 7801C NEMA 4X Panel Mount Multi-Channel Controller takes full advantage of its color display by allowing the user to customize screen colors for bar graphs, alarm conditions, and input channels. All this functionality is easily programmed using the free software or via the front panel pushbuttons.

Fig 1: Tek-LCD 7801C NEMA 4X Panel Mount Multi-Channel Controller

Features

- Convenient display, control, and alarm of multiple 4-20 mA, pulse, and Modbus inputs.
- Numeric and bar graph color display (320 x 240 pixels) 5.7" (145mm).
- Sunlight readable display, white backlight.
- Isolated 24 VDC Transmitter Supplies 200mA/Analog Input; 1,600mA Max.
- 99 channels, 32 totalizers, 32 timers, and 99 Modbus inputs.
- 64 high and low alarms.
- Combine multiple alarms into logic AND and/or OR alarms.
- Simulation and manual control modes for testing setup.
- Modular design for inputs and outputs flexibility.
- Pulse, analog, and Modbus input flow rate or total or grand total capability.
- 50-point linearization, square root, and exponent for open channel flow.
- Round horizontal tank volume calculation is possible.
- Open channel flow math formulas for weirs and flumes.
- Multi-pump alternation control.
- On/off control with the random varying set point.
- Available with programmable displays, function keys, and digital inputs.
- RS-485 Serial Communication with Modbus RTU
- (20) screens with up to eight PVs each.
- Automatic or manual scanning.
- 3-Year Warranty.

Accessories

- **Light or Horn Accessories**

- **PDA-BUTTON Momentary Pushbutton**

- **7801C-SH Sun Hood**

- **7801C-2360 Control Stations**

- **Signal Splitter & Conditioner Accessories**

- **Split Core AC Current Transducer**

- **Panel Mount Buzzer and Light**

- **Snubber 0.01µF/470Ω Flexible Leads**

- **Low-Cost Signal Generator**

- **7801C-ENC NEMA 4X Plastic and NEMA 4 Steel Enclosures**

The 7801C-ENC enclosures provide a convenient way to mount the Tek-LCD 7801C to walls and other vertical structures. The enclosures are available in painted steel and plastic and come pre-cut with one cut-out to mount the Tek-LCD 7801C. The enclosures are available in various sizes, with the larger enclosures capable of housing other pieces of equipment, such as the 7801C-01 power supply.

*Note: The enclosure and Tek-LCD 7801C are ordered and packaged separately.

o   NEMA 4X Plastic Enclosure

7801-1909

7801-1939

7801-3939

7801-2909

7801-2919

7801-2929

Specifications

Note: All specifications apply to operation at 77°F (25°C)	
Display	Color; QVGA (320x240 px), 5.7" (145 mm) diagonally, white backlight; Bar Graph: Twenty divisions; Numerical: Up to 15 digits (±999,999,999,999,999); Feet & Inches Format: 99,999' 11.9"
Screen Bar Graph	Enable/disable: Channels, totals, timers; Bar Graph scale: 0 – 100%, independent of channel scale; Twenty Divisions: 5% each; Screen: Select to show bar graph or not
Color Selection	65 colors selection, customize bar graph, panel background, and text for normal and alarm conditions
Decimal Point	0 to 15 decimal places, user selectable
Engineering Units	User selectable units or custom units; Time, Distance, Volume, Pressure, Weight, Temperature, Current, Voltage, Percent, Amps, Volts, Counts, Logic, and Custom, Any unit/unit of time or other units
Units Conversion	Units' conversion is supported for channels, totals, timers, and any function using those parameters; Channel scaling must be in the intended base units (e.g. Gallons/min)
Display Update Rate	User selectable: 0.1 to 0.5 sec (10 updates/sec to 2 updates/sec)
Programming Method	Front panel buttons, external buttons
Number of Alarms	Up to 64 high or low, logic AND & OR Automatic (non-latching) or latching, On & Off time delays, can be assigned to one or more relays
Alarm Types	Single Source: One input; Multi-Source: Two or more inputs; Interval: Enter time interval and On Time; Day & Time: Select day of the week & time; Alarm OR: Any active input alarm triggers the OR alarm; Alarm AND: All alarms must be active to trigger the AND alarm
Internal Buzzer	60 dBA @ 24 inches (61 cm)
External Horn	Assign any relay to the Horn function to activate an external horn when alarm condition is detected
Live Channel Calibration	Live calibration of channels is independent of the input calibration used for scaling
Input & Output Cards	Max Number of I/O Cards: 7; Analog Inputs: 4/card; Pulse Inputs: 4/card; Analog Outputs: 5/card; Relays: 5/card
Number of Screens	Up to 20 screens with 1 to 8 PVs or items per screen
Function Keys	User programmable (See defaults below)
Number of Channels	F1 = Previous ← F2 = Next → F3 = Scan/Stop F4 = Ack
Password	Programmable password restricts modification of programmed settings. View and Setup menus are password protected, function keys and digital inputs are not protected.
Simulation Mode	Inputs, channels, totals, timers, and alarms can be simulated from the View menu or from a function key.
Manual Control	Analog outputs and relays can be controlled manually from the View menu or from a function key.
Non-Volatile Memory	Settings stored for a minimum of 10 years
Power Supply	Isolated 24 VDC @ 200 mA/input Max current: 1,600 mA (All inputs), (8) Analog Input @ 200 mA max, (28) Analog Input @ 20 mA max Available on AC or DC powered units
Operating Temperature	-40°F to 140°F (-40°C to 60°C)
Storage Temperature	-40°F to 140°F (-40°C to 60°C)
Relative Humidity	0 to 90% non-condensing
Internal Fan	Automatic temperature-controlled fan turns on if the inside temperature reaches 50°C and increases the speed as the temperature rises to 60°C
Internal Heater	Automatic temperature-controlled heater located behind the LCD turns on at 0°C, delivering the minimum power; If the temperature drops below -10°C, the heater delivers its maximum power
Connections	Removable screw terminal blocks Inputs/Outputs: 12 to 24 AWG wire; Digital I/O: 16 to 30 AWG; RS-485: 12 to 24 AWG wire RJ45 Ethernet connection; USB ports: Micro-USB (Device), cable included
Tightening Torque	Screw terminal connectors: 5 lb-in (0.56 Nm); Digital I/O terminals: 2.5 lb-in (0.28 Nm)
Enclosure	Enclosure Body: Thermoplastic Polyester, Color: Gray; Display Window: Clear Polycarbonate, GE LEXAN HP12W; Front Panel Keys: Silicone rubber
Mounting	Panel-mounting frame and twelve screws (provided) Cut-out: 10 ¼" x 10 ¼" ±1/16" (254mm x 254mm ±1.3 mm) (H x W); Panel thickness: 1/16" – 1/4" (1.8 mm to 8.9 mm); Clearance behind panel: 6" (150mm)
Dimensions	10 ¾" x 10 ¾" x 4 ¾" (276mm x 276mm x 124mm) (H x W x D)
Weight	7.4lb (3.4kg) approx.

Number of Totalizers	Up to 32 totalizers, 15 digits with comma separator
Totalizer Inputs	Calculates total based on selected rate channel, pulse input, digital input, or triggered event for non-rate channels; Total is stored in non-volatile memory if power is lost
Maximum Total	18 digits 999,999,999,999,999,999
Rate Channel Input	4-20 mA input, Pulse input, Modbus input
Rate & Total Decimal Point	Independent and user selectable from 0 to 15 places
Non-Resettable Total	Total can be setup to be non-resettable to prevent unintentional reset. This can be changed in the Setup Totals menu.
Total Units Conversion	Input: Rate channel; Total units can be different than rate units. Use the custom units to convert to any unit (e.g. Gallons to MGal: Factor = 0.000001)
Pulse Input K-Factor	K-Factor = pulses/units of measure; Calculates total directly from pulse input, Modbus input, channel, total, or Modbus output. Create rate channel by entering K-Factor, units and time base in sec, min, hr, or day; Decimals: 0 to 15.
Count Down	Total can be setup to count down from a predetermined value entered by the user
Roll-Over	Enter the value for total to roll-over to 0
Negative Total	Allow total value to count below 0 for bi-directional flow based on rate channel
Total Bar Graph	Bar graph can be scaled to represent the expected maximum total
Date Format	Month, day, year
Time Format	24 hour; 00: Midnight hh: mm: ss
Battery	3 V, P/N: CR2032 included
Display Date & Time	Displayed on the top line of Setup and View menus, including day of the week
Screens	Date & Time can be added to any screen
Channels	Date & Time can be the input to a channel; Display Format: yyyy/mm/dd hh: mm: ss
Analog Inputs	(4) Analog inputs/card; (4) Pulse inputs/card; (28) Analog inputs max; 28) Pulse inputs max; (5) Relays/card; (30) Relays max with (4) analog or (4) pulse inputs; no other I/O; 199 Modbus RTU;
Digital Inputs	5 Inputs, non-isolated, 30 VDC max • Low: 0 to 1.2 V • High: 2.8 to 30.0 V • Internal pull-up: 5 kΩ to 5 V • Max pulse frequency: 1 kHz @ 5 Vp-p • +5 V terminal: Internal pull-up 100 Ω Note: Pulse inputs can be used as digital inputs
Typical Input	4-20mA
Input Range	0-24mA
Analog Outputs	(5) Analog outputs/card; (35) Analog outputs max with no other I/O cards (Seven I/O slots)
Digital Outputs	4 Outputs • Low: 0 V (no load), 1.5 V max @ 10 mA sink (External pull-up) • High: 5.0 V (no load), 3.5 V @ 10 mA load • Maximum current: 30 mA Output impedance: 100 Ω • Output protection: 150 mA auto-resettable fuse • Max frequency: 5 Hz
Output	4 to 20mA
Output Loop Power	Powered by controller or externally by 12 to 32 VDC
Output Loop Resistance	Powered by controller: 10 to 600 Ω External 12 VDC: 10 to 200 Ω External 24 VDC: 10 to 600 Ω External 32 VDC: 10 to 1000 Ω
Accuracy	±0.03% of full scale ±1 count
4-20 mA Display Value	Up to six full digits recommended ±999,999
Temperature Drift	Better than: 20 ppm/°C from -40 to 60°C ambient
Filter	Window: 0.5, 1, 2, 4, 8 sec, IIR: 16, 32 sec; Glitch Filter: Discards a single sample caused by high frequency noise
Filter Bypass	0 to 100 % of full-scale Filter is ignored, if the signal change is greater than bypass value

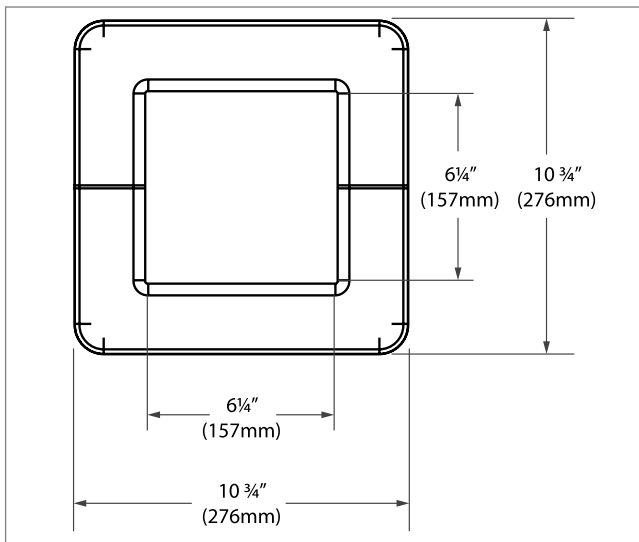|	
Channel Input Scale Function	Scale Linear 2-Point, Scale Multi-Point (up to 50 points) Scale Square Root, Scale Exponent (Open Channel Flow), Scale Factor Round Horizontal Tank (Volume); Units Conversion (mA Input Reading); Percent bar graph; Text (Percent)
Channel Input Live Calibration	Each channel can be calibrated using live calibration signal from a sensor or a calibrator
Input Protection	Each 4-20 mA input is protected by an auto-resettable fuse, 30 VDC max.; the fuse resets automatically after the fault condition is removed
Input Impedance	125 Ω typical, including auto-resettable fuse
HART Transparency	The controller does not interfere with existing HART communications; it displays the 4-20 mA primary variable, and it allows the HART communications to pass through without interruption. The controller is not affected if a HART communicator is connected to the loop. The controller does not display secondary HART variables.
Isolation	1500 V: Input-to-power line; 500 V: Input-to-input, input-to-output; All analog inputs and analog outputs are isolated from each other
Normal Mode Rejection	100 dB at 50/60Hz
Common Mode Rejection	90 dB at 50/60 Hz

Dimensional Drawings
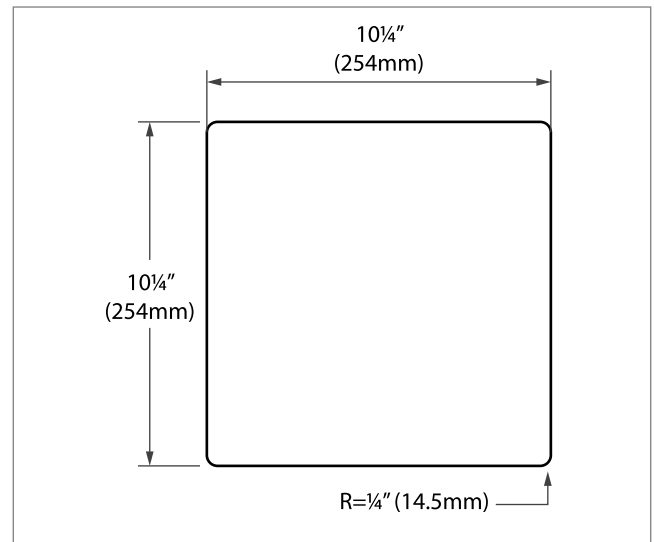

Fig 2: Front Panel Mount
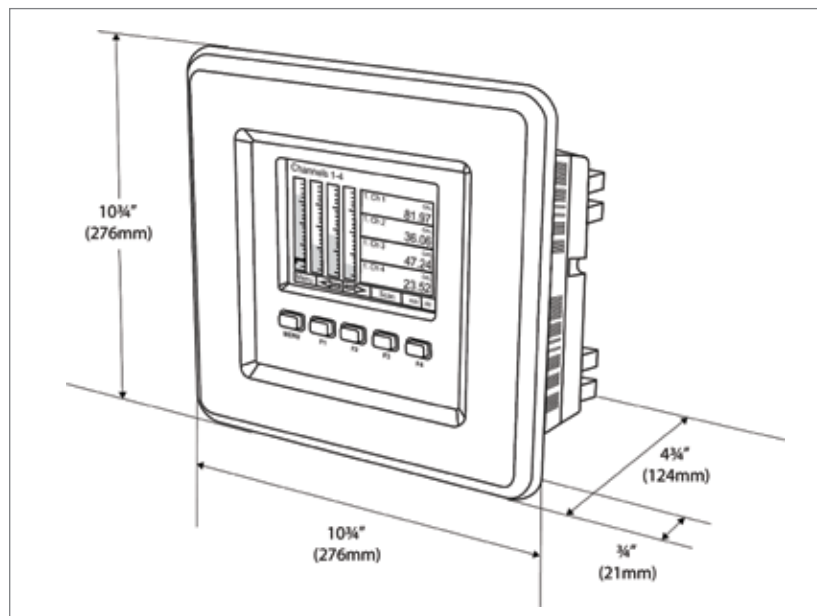

Fig 3: Panel Cut-out

Fig 4: Mounting Panel

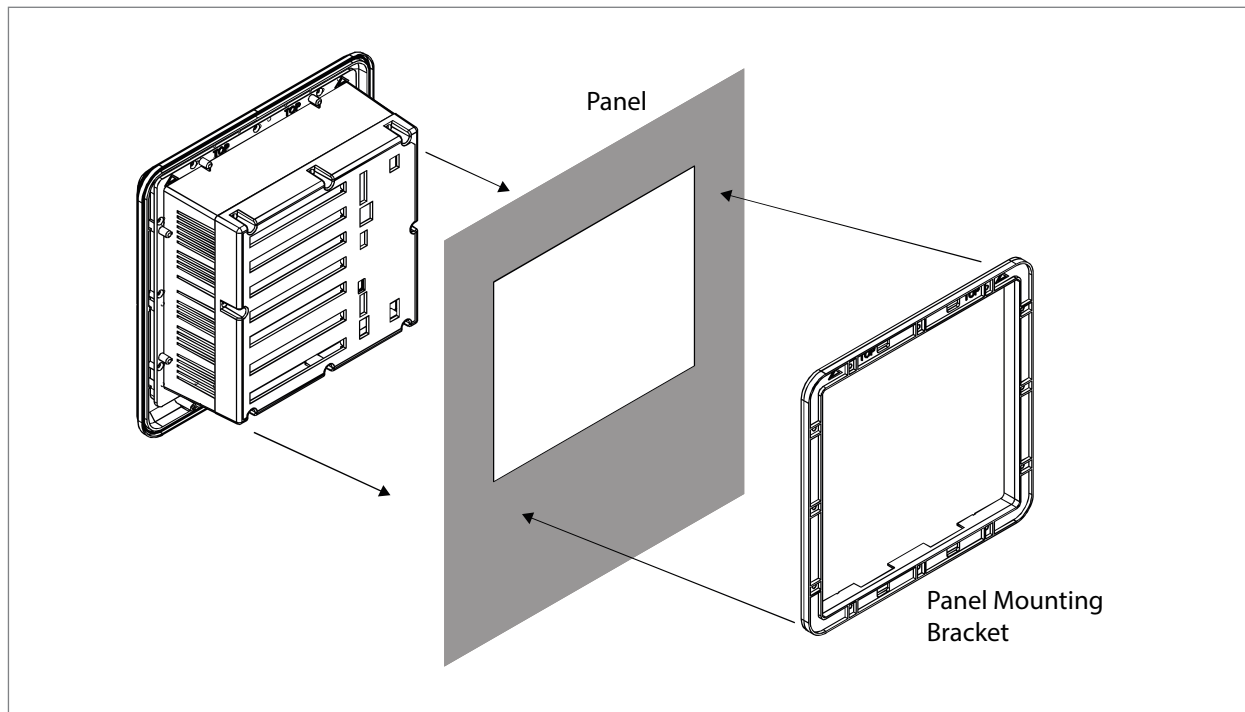# Installations

Panel Mounting

Fig 5: Panel Mount Installation

- Prepare panel cutout as per the dimensions provided.
- Locate the panel mounting bracket and screws.
- Inspect the controller to assure the gasket is securely in place.
- Insert controller in the panel cutout, the latches on the top and bottom should hold it in place.
- Insert the panel mounting bracket from the back of the panel, observe the orientation of the piece marked TOP.
- Install the 12 screws provided.

*Note:
1. Panel cutout: 10 ¼" x 10 ¼" ±1/16" (254mm x 254mm ±1.3mm)
2. Panel thickness: 1/16" to ¼" (1.8mm to 8.9 mm)
3. Clearance: Allow 6" (150mm) behind panel

General Purpose Panel-Mount Models				
Model	Pulse Inputs	4-20 mA Inputs	4-20 mA Outputs	Relays
7801C-GP	0	0	0	0
7801C-GP-4AI	0	4	0	0
7801C-GP-4AI-10RY	0	4	0	10
7801C-GP-4AI-5AO-10RY	0	4	5	10
7801C-GP-4AI-20RY	0	4	0	20
7801C-GP-4AI-5AO-20RY	0	4	5	20
7801C-GP-8AI	0	8	0	0
7801C-GP-8AI-10RY	0	8	0	10
7801C-GP-8AI-10AO-10RY	0	8	10	10
7801C-GP-8AI-20RY	0	8	0	20
7801C-GP-8AI-25RY	0	8	0	25
7801C-GP-12AI	0	12	0	0
7801C-GP-12AI-20RY	0	12	0	20
7801C-GP-12AI-10AO-10RY	0	12	10	10
7801C-GP-16AI	0	16	0	0
7801C-GP-16AI-15RY	0	16	0	15
7801C-GP-16AI-15AO	0	16	15	0
7801C-GP-20AI	0	20	0	0
7801C-GP-20AI-10RY	0	20	0	10
7801C-GP-20AI-10AO	0	20	10	0
7801C-GP-24AI	0	24	0	0
7801C-GP-24AI-5RY	0	24	0	5
7801C-GP-24AI-5AO	0	24	5	0
7801C-GP-28AI	0	28	0	0
7801C-GP-4PI	4	0	0	0
7801C-GP-4PI-5AO	4	0	5	0
7801C-GP-4PI-5AO-10RY	4	0	5	10
7801C-GP-4PI-4AI-5AO	4	4	5	0
7801C-GP-4PI-4AI-5AO-10R	4	4	5	10
7801C-GP-4PI-8AI-10AO-10RY	4	8	10	10
7801C-GP-8PI	8	0	0	0
7801C-GP-8PI-10AO	8	0	10	0
7801C-GP-8PI-10AO-10RY	8	0	10	10
7801C-GP-8PI-8AI-10AO-5RY	8	8	10	5

Where,

G = General Purpose　　　　　AO = Analog Output
P = Panel-Mount　　　　　　　RY = Relay
AI = Analog Input　　　　　　　E = Ethernet
PI = Pulse Input

Model	Description
7801C-M1	Add-On Feature: NEMA 4X Panel Mount Multi-Channel Controller + Modbus Client/Snooper/Spoofer
7801C-C4AI	(4) Isolated 4-20 mA Inputs Card for NEMA 4X Panel Mount Multi-Channel Controller
7801C-C4PI	(4) Pulse Inputs Card for NEMA 4X Panel Mount Multi-Channel Controller
7801C-C5AO	(5) Isolated 4-20 mA Outputs Card for NEMA 4X Panel Mount Multi-Channel Controller
7801C-C5RY	(5) Relays Card for NEMA 4X Panel Mount Multi-Channel Controller
7801C-C4AI	(4) Isolated 4-20 mA Inputs Card for NEMA 4X Panel Mount Multi-Channel Controller
7801C-12	NEMA 4X Panel Mount Multi-Channel Controller Calibration and Certificate for up to 12 Inputs and Outputs
7801C-24	NEMA 4X Panel Mount Multi-Channel Controller Calibration and Certificate for up to 24 Inputs and Outputs
7801C-36	NEMA 4X Panel Mount Multi-Channel Controller Calibration and Certificate for up to 36 Inputs and Outputs
7801C-12-DATA	NEMA 4X Panel Mount Multi-Channel Controller Calibration and Certificate with data for up to 12 Inputs and Outputs
7801C-24-DATA	NEMA 4X Panel Mount Multi-Channel Controller Calibration and Certificate with data for up to 24 Inputs and Outputs
7801C-DATA	NEMA 4X Panel Mount Multi-Channel Controller Calibration and Certificate with data for up to 36 Inputs and Outputs
7801C	Custom Setup for NEMA 4X Panel Mount Multi-Channel Controller
7801C-1909	NEMA 4X Plastic Enclosure; Dimensions: 12"x 12" x 6" (300mm x 300mm x 150mm) (H x W x D)
7801C-1939	NEMA 4X Plastic Enclosure; Dimensions: 18" x 14" x 8" (450 mm x 350 mm x 200 mm) (H x W x D)
7801C-2909	NEMA 4 Steel Enclosure; Dimensions: 12" x 12" x 6" (300mm x 300mm x 150mm) (H x W x D)
7801C-2919	NEMA 4 Steel Enclosure; Dimensions: 14" x 12" x 8" (350mm x 300mm x 200mm) (H x W x D)
7801C-2929	NEMA 4 Steel Enclosure; Dimensions: 16" x 14" x 10" (400mm x 350mm x 250mm) (H x W x D)
7801C-3939	NEMA 4X Plastic Enclosure with Clear Cover; Dimensions: 17.7" x 13.8" x 7.9" (450 mm x 350 mm x 200 mm) (H x W x D)

Customer Service & Support

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Tek-Trol is a fully owned subsidiary of TEKMATION LLC. We offer our customers a comprehensive range of products and solutions for process, power and oil & gas industries. Tek-Trol provides process measurement and control products for Flow, Level, Temperature & Pressure measurement, Control valves & Analyzer systems. We are present in 15 locations globally and are known for our knowledge, innovative solutions, reliable products and global presence.

Flow | Level | Temperature | Pressure | Valves | Analyzers | Accessories | TekValSys