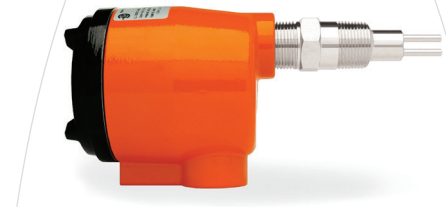
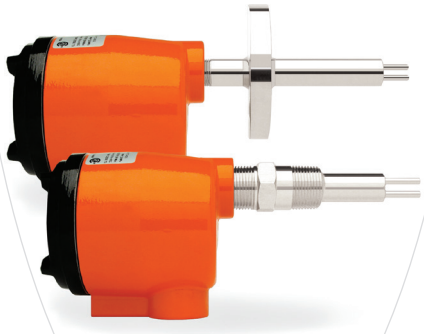
thermal

flow, level, interface

& temperature

switches & transmitters





CLASSIC® Series

Thermal

KAYDEN®

Helping the World Switch®

KAYDEN®

Helping the World Switch®

Table of Contents

Outline Dimensional Drawings

Helping the World Switch® - Kayden's Advanced Design

Patented Design

Kayden's patented designs provide the ultimate performance and features package for flow, level, interface and temperature sensing.

Kayden's thermal switches combine precision welded, highly accurate sensors, rugged enclosures and advanced digital electronics.

The **CLASSIC 800 Series** combines the failure resistance inherent in Thermal Dispersion technology with the performance and features usually reserved for much more expensive instruments.

Universal Power Input

- Some manufacturers require all options such as relay-energized mode to be specified at time of order but with the Kayden CLASSIC 800 series, by simply pushing a few buttons you can select your choice of operation modes.
- The universal power input capability of the Kayden CLASSIC 800 series provides flexibility for use in all power input situations.

Discrete & Analog Outputs

- Two SPDT fully sealed relay contacts rated @ 4 amps resistive 230 VAC or 30 VDC maximum, controlled by either thermal signal or temperature.
- Modbus RTU registers via RS-485
- 4-20 mA analog Thermal Signal output

Adjustable Time Deadband

- Four Adjustable Independent Relay Switch Point Timers

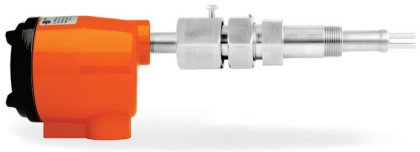
Advanced Diagnostics

- Kayden's CLASSIC 800 series uses an advanced microprocessor to perform continuous self-test diagnostics on the electronics and the sensor elements.
- Any open or shorted connection will result in a FAULT indication that also deactivates all relays and disables the heater circuitry.

- An internal watchdog circuit ensures that the microprocessor code is performing as expected and a secondary external watchdog circuit ensures that the microprocessor itself is functioning. In the event of a malfunction both circuits force the contacts open, illuminate the Fault LED and force the heater off. This prevents the possibility of a "run-away" heater or a high thermal offset.

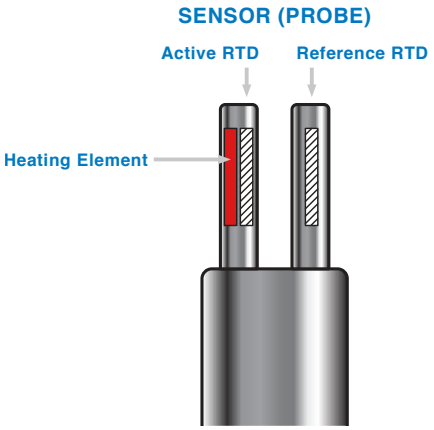
Intelligent User Controls

- The **Kayden CLASSIC 800** series Display Panel features very bright LED indicators for easy viewing even in direct sunlight.
- **An adjustable power-on Start-up Bypass Timer** is accessible from the Display Panel for low flow alarm pump protection applications. This makes it possible to disable a pump on low flow and have it automatically restart after a predetermined time in the event of a power interruption.



- **Four adjustable delay timers** allow the introduction of repeatable time delay into the (set point) relay trip function. For example, in a pump protection application this function will shut down the pump after the switch sensor has gone "dry" for the pre-set time (delay) limit.
- The Kayden RCM (Remote Communications and Monitoring) Software allows all the settings to be configured remotely and saved as a file, transmitted as an email attachment, and/or printed for future reference.
- The Kayden RCM Software includes the option of locking the CLASSIC 800 Series Display Panel to eliminate field adjustments or tampering.
- Modbus allows multiple Kayden units to be connected to the same communications bus (via RS-485) and monitored simultaneously.

Principle of Operation - Thermal Dispersion



Kayden thermal switches use proven thermal dispersion technology to create a very accurate, economical and rugged device for sensing flow, point level, liquids interface and temperature.

- The Reference RTD senses the temperature of the process.
- The Active RTD is heated by a constant power heating element.
- The Thermal Signal is calculated based on the temperature difference between the two RTDs, which is dependent on the thermal conductivity and velocity of the process media.

Typical Applications

Flow

Flow / No-Flow Monitoring & Verification

- Air, gases, water, hydrocarbon-based liquids, viscous fluids, liquids with particulates and/or suspended solids and slurries.
- Pump Protection
- Pipeline / Material storage
- Flare Gas Monitoring
- Relief Valve & Rupture Disk Flow Monitoring
- Purge Air Flow
- Eye Wash Stations
- Tanker Loading & Unloading
- Well Optimization

Interface

Interface (Level) Detection

- Separation Vessels, Oil / Pad / Water Knockout tanks

Level

Leak Detection

- Fast, Accurate and Repeatable at Low Flow Rates
- Drain Line Flow
- Lube / Seal Oil Systems

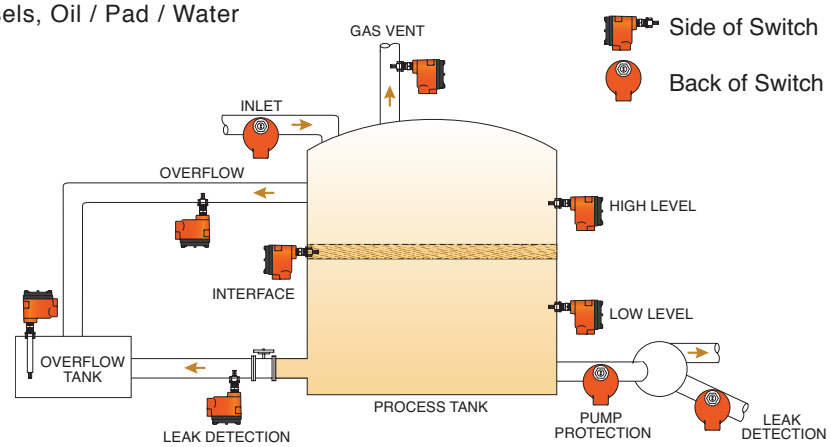
High / Low Level Detection

- Water, hydrocarbon-based liquids, viscous fluids, liquids with particulates and/or suspended solids and slurries.
- Tank Overflow Protection
- Process Tank Batching Control

Temperature

Process Temperature Monitoring

- Relays are configurable for process temperature



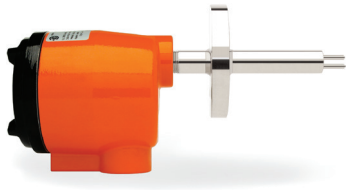
CLASSIC® 800 Models - Flameproof/Explosion-proof

Applications: Flow, Level, Interface & Temperature

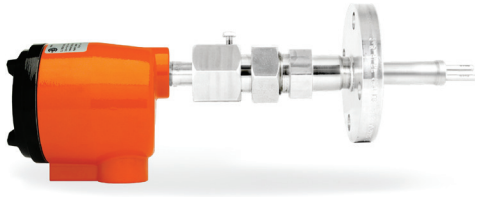
Every **CLASSIC 800** model is user configurable for **Flow, Level, Fluids Interface** and **Temperature** applications and suitable for use in Air, Gases, Water, Liquids and Slurries.

The **CLASSIC 800** has several unique features which make it the world's most advanced Thermal Flow/Level Switch including: temperature mode, 4-20 mA outputs, Modbus, digital temperature compensation, automated self-test diagnostics, and a simple intuitive user interface.

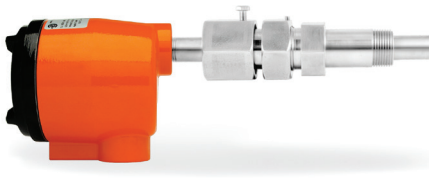
CLASSIC® 810



CLASSIC® 812

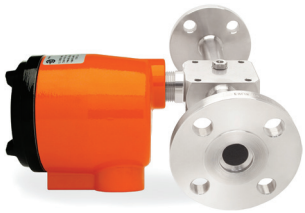


CLASSIC® 814



CLASSIC® 816

CLASSIC® 830



CLASSIC® 832

CLASSIC® 800 Electronics

The Display Panel of the CLASSIC 800 displays all process conditions and allows adjustment of all settings.

- The **Blue LED** on the Thermal Signal Bar Graph is a constant display of process condition (Flow/Level)
- Power, relay states, fault conditions, set points and delay timers all have dedicated LED indicators
- The push buttons replace internal dip switches, trim pots or slide switches and make set point, range, heater power and delay timer adjustments easier

CLASSIC 800 Display Panel

Display Panel Indicators

Relay 1	On steady when Relay 1 is energized
Relay 2	On steady when Relay 2 is energized
Fault	Indicates a self-test error or fault condition
Set Point 1	On steady when viewing Set Point 1
Set Point 2	On steady when viewing Set Point 2
Run Mode	Flashing when switch is operating
Bypass	Flashing when the Start-up Bypass Timer is active
Thermal Signal	Displays Thermal Signal

The Thermal Signal increases as

Flow	The flow rate increases
Level	The sensor is submerged
Interface	The sensor is submerged by the second liquid of greater thermal conductivity

Standard Features

- Microprocessor Based Electronics
- Intelligent User Interface
- Continuous self-test diagnostics of electronics and sensor
- Variable Heater Power
- Dual Independent Relays
- Relays configured to monitor flow by default (use Kayden RCM Software or Modbus to configure for temperature)
- Adjustable power-on Start-up Bypass Timer
- Independent Switch Point Timers (use Kayden RCM Software or Modbus to configure, default 0 seconds)
- Display Panel Lock-Out (use Kayden RCM Software or Modbus to configure)
- No mechanical jumpers or trim-pots
- Thermal delta, switch status and configuration can be read using Modbus

CLASSIC® 800 Specifications

Applications

- Flow, Level, Interface & Temperature

Process Connections

- 1/2”, 3/4”, 1”, 1-1/4”, 1-1/2” & 2” MNPT
- 3/4” FNPT & Flanged InLine
- Threaded (1” MNPT) & Flanged Retractable Packing Glands

Insertion ‘U’ Lengths

- **Imperial**
  1.2”, 2”, 3”, 4”, 6”, 9”, 12” & 18” standard
- **Metric**
  3, 5, 7.5, 10,15, 23, 30 & 45 cm standard
- **Custom Lengths**
  Available in 1/2” or 1 cm increments
  Min. 2.5” - Max. 120” (6.0 - 305 cm) model dependant

Wetted Materials

- 316/316L Stainless Steel - standard
- Titanium Gr. 2, Hastelloy C-276
- 316/316L Stainless Steel c/w Nickel Braze (830 & 832 InLine Models)

Enclosure Material

- Copper-free Aluminum
  (does not exceed 0.4% copper)
- Powder Coated Polyester TGIC
  (polyester triglycidyl isocyanurate)
- NEMA 4, 4X, 6P; IP65/67
- 1” FNPT Conduit Connection
- Buna O-Ring on Cover

Temperature Range – Continuous Service

- **Sensors**
  -55°C to +200°C (-58°F to +392°F)
  (Models 814 & 816: -55°C to +160°C [-58°F to +320°F])
- **Electronics**
  -55°C to +65°C (-67°F to +149°F)

Note: For temperatures above +65°C (+149°F) electronics must be remotely mounted. Refer to Electronics Location Considerations Page 10.

- **Storage**
  Product should be stored in a clean and dry environment between -30° and +60° C (-34.5° and 140° F)

Operating Pressure - Sensor

Threaded Style

- Maximum Working Pressure
  24 MPa (3500 psig) dependent on model and material of construction

Flanged Style

- Maximum Working Pressure
  per flange rating

Switch Point Range (Insertion Style - 1/2” to 2”MNPT, Flanged)

- **Water-based Liquids**
  0.01 to 3.0 ft./sec. (0.003 to 0.9 meters/sec.)
- **Hydrocarbon-based Liquids**
  0.01 to 5.0 ft./sec. (0.003 to 1.5 meters/sec.)
- **Gases**
  0.25 to 254 sfps (0.076 to 77 smps)
  Standard conditions: 21°C (70°F) at 14.7 psi (1 atm)

Switch Point Range (InLine Style)

- **Water-based Liquids**
  0.015 to 50 cc/sec.
- **Hydrocarbon-based Liquids**
  0.033 to 110 cc/sec.
- **Gases**
  0.6 to 20,000 cc/sec.
  Standard conditions: 21°C (70°F) at 14.7 psi (1 atm)

Accuracy

- **Flow Service**
  ±1% set point velocity over operating range of ±28°C (±50°F)
- **Level Service**
  ±0.25 inches (±0.64 cm)
- **Repeatability**
  ±0.5% Thermal Signal
- **Hysteresis (Dead Band)**
  ±1% Thermal Signal
- **Temperature**
  ±1° C or ±2% of full-scale range, whichever is greater.

Response Time

- Approximately 0.5 to 30 seconds

Remote Electronics Option

- Maximum recommended cable length - 200 feet (60 m)
- Cable type - 24 AWG minimum - twisted pairs

Heater Power

- Field adjustable to optimize performance

Input Power

- Universal Power standard 12-24 VDC and 115-230 VAC, 50-60 Hz
- Consumption Maximum 6.0 Watts
- DC input has reverse polarity protection
- AC & DC inputs have TVS diodes to protect against transient voltages (390 VAC, 39 VDC)
- Internal 1A self-resettable non-user-replaceable fuse

Outputs

- 4-20 mA current loop (with reverse voltage protection)
- Two (2) independent SPDT fully sealed relay contacts rated @ 4 amps resistive 230 VAC or 30 VDC Max.; individually adjustable

Start-Up Bypass Timer

- Adjustable: 0 to 100 seconds

Communications

- Modbus RTU via RS-485

Additional Features (Configure Using Kayden RCM Software or Modbus)

- Display Panel Lock-Out
- Set Points Configuration[1]
- Relay Actuation Delay Timer
  - Independently configurable for both On and Off, increasing or decreasing
  - Adjustable from 0 - 5000 seconds
- Start-up Bypass Timer[1]
  - Adjustable from 0 - 100 seconds
- Relay Mode Configuration[1]
  - Energized above or below set point
- Relay Temperature Switch Configuration
- Heater Power setting[1]
- Lower and Upper Range Values (LRV & URV) settings[1]
- Analog (4-20 mA) output configuration[1]
- View and Print Graphing (Trend) function
- Configuring settings; write to device, save to file and print
- Fault Event Log

Diagnostics

- Primary watchdog circuit monitors microprocessor parameter for anomalies
- Secondary watchdog circuit monitors microprocessor health
- Heater monitored for out-of-range conditions
- Fault Mode de-energizes relay(s) and halts power to the heater

Agency Approvals

- **CSA**
  Class I, Div. 1, Groups B, C and D; Ex d IIB + H2; AEx d IIB+H2 (Class I, Zone 1, Group IIB + H2,) T3; Enclosure Type 4 / IP55
- **Single Seal Approval**
  Per ANSI/ISA 12.27.01-2003
- **CRN** - Canadian Registration Number
  - CLASSIC 810: 0F22124.2C
  - CLASSIC 812:
    - 1” & 1-1/2”: 0F13787.2C
    - 2” to 10”: 0F13773.2C

  Note: Visit kayden.com for CRN specifics.

CRN
Canadian Registration Number

Factory Certifications

- Factory tested to NEMA 4, 4X, 6P; IP65/67. Contact Technical Support for reports.

Weights and Dimensions

- 810 Threaded 2” U length - 7 lbs (3.18 kg)
- Carton Size - 15” x 5” x 6” (38 cm x 13 cm x 15 cm)
- Other models/sizes - consult Kayden

Warranty

- One (1) Year from shipment date from factory (see Terms & Conditions on kayden.com for details)

Note: [1] Also configurable from Display Panel

Flow, Level, Interface & Temperature Switch & Transmitter

810	CODE	Sensor Type
	R	-55°C to +200°C (-58°F to +392°F) Continuous Service

CODE	Sensor Material
A	316/316L Stainless Steel
X	Titanium Gr. 2
T	Hastelloy C-276

CODE	Process Connection - MNPT
C	1/2"
D	3/4"
E	1"
F	1-1/4"
G	1-1/2"
H	2"

CODE	Insertion 'U' Lengths
0012	1.2" (3.0 cm)
0020	2" (5.0 cm)
0030	3" (7.5 cm)
0040	4" (10.1 cm)
0060	6" (15.2 cm)
0090	9" (23 cm)
0120	12" (30 cm)
0180	18" (46 cm)
IXXXX	Custom 'U' Lengths: Use 4 digits preceded by an 'I' (i.e. 3.5" 'U' = I0035) (Use 'M' for cm)

Custom 'U' Lengths
2.5" - 120" (6.0 cm - 305 cm)
Available in 1/2" (1.0 cm) increments.

CODE	Input Power
C	12-24 VDC and 115-230 VAC, 50 to 60 Hz

Electronics
Microprocessor Controlled with User Interface.
Two SPDT sealed relay contacts. Modbus via RS-485. 4-20 mA current loop.

CODE	Local Enclosure
1	Flameproof - Aluminum

CODE	Cover - For Local Enclosure
B	Blind Cover - Flameproof
G	Glass Lens Cover - Flameproof

CODE	Remote Electronics Enclosure & Cover
0A	Not Required
1G	Glass Lens Cover - Flameproof

CODE	Agency Approvals
1	$_{c}CSA_{us}$ (UL Standards)
3	$_{c}CSA_{us}$ (UL Standards) & CRN

CODE	Language
E	English

810	R	A	D	0020	C		1	G	0A	1	E

Model Number Legend
DOC#: ML-810-006

ML-810-006-[004]

812	CODE	Sensor Type
	R	-55°C to +200°C (-58°F to +392°F) Continuous Service

CODE	Sensor Material
A	316/316L Stainless Steel
X	Titanium Gr. 2
T	Hastelloy C-276

CODE	Process Connection - Flange Type
A	Raised Face
B	RTJ - Ring Type Joint

CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI
	1"		1-1/2"		2"		3"		4"		5"		6"		8"		10"
121	150	131	150	141	150	151	150	161	150	171	150	181	150	191	-	201	-
122	300	132	300	142	300	152	300	162	300	172	300	182	-	192	-	202	-
123	600	133	600	143	600	153	600	163	600	173	-	183	-	193	-	203	-
124	900	134	900	144	900	154	900	164	900	174	-	184	-	194	-	204	-

CODE	Flange Material		
A	316/316L Stainless Steel	X	Titanium Gr. 2
T	Hastelloy C-276		

CODE	Insertion 'U' Lengths 2.5" - 120" 6.4 cm - 305 cm in 1/2" 1.0 cm increments.
IXXXX	Custom 'U' Lengths: Use 4 digits preceded by an 'I' (i.e. 3.5" 'U' = I0035) ('M' = cm)

CODE	Input Power
C	12-24 VDC and 115-230 VAC, 50 to 60 Hz

Electronics
Microprocessor Controlled with User Interface.
Two SPDT fully sealed relay contacts. Modbus via RS-485. 4-20 mA current loop.

CODE	Local Enclosure
1	Flameproof - Aluminum

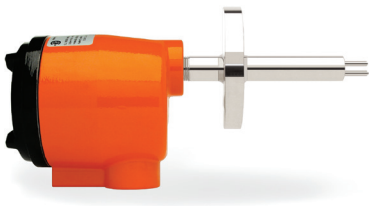
CODE	Cover - For Local Enclosure
B	Blind Cover - Flameproof
G	Glass Lens Cover - Flameproof

CODE	Remote Electronics Enclosure & Cover
0A	Not Required
1G	Glass Lens Cover - Flameproof

CODE	Agency Approvals
1	$_{c}$CSA$_{us}$ (UL Standards)
3	$_{c}$CSA$_{us}$ (UL Standards) & CRN

CODE	Language
E	English

812	R	A	A	131	A	I0035	C		1	G	0A	1	E



Flow, Level, Interface & Temperature Switch & Transmitter

Model Number Legend
DOC#: ML-812-006

ML-812-006-[004]

814	CODE	Sensor Type
	R	-55°C to +160°C [-58°F to +320°F] Continuous Service

CODE	Sensor Material
A	316/316L Stainless Steel
X	Titanium Gr. 2
T	Hastelloy C-276

CODE	Process Connection - Flange Type
A	Raised Face
B	RTJ - Ring Type Joint

CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI
	1-1/2"		2"		3"		4"		5"		6"		8"		10"
131	150	141	150	151	150	161	150	171	150	181	150	191	150	201	150

CODE	Flange Material	CODE	Flange Material
A	316/316L Stainless Steel	X	Titanium Gr. 2
T	Hastelloy C-276		

CODE	Retraction Assembly
T	Low Pressure; 316/316L Stainless Steel (MWP 50 psi)
J	Low Pressure c/w Retaining Chain; 316/316L Stainless Steel (MWP 125 psi)
X	Medium Pressure; 316/316L Stainless Steel (MWP 275 psi)

CODE	Insertion 'U' Lengths 2.5" - 120" 6.4 cm - 305 cm in 1/2" (1.0 cm increments.
IXXXX	Custom 'U' Lengths: Use 4 digits preceded by an 'I' (i.e. 3.5" 'U' = I0035) ('M' = cm)

CODE	Input Power
C	12-24 VDC and 115-230 VAC, 50 to 60 Hz

Electronics
Microprocessor Controlled with User Interface. Two SPDT fully sealed relay contacts. Modbus via RS-485. 4-20 mA current loop.

CODE	Local Enclosure
1	Flameproof - Aluminum

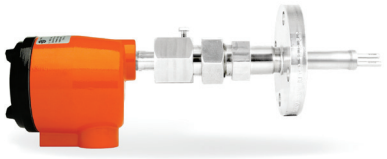
CODE	Cover - For Local Enclosure / Sensor Enclosure
B	Blind Cover - Flameproof
G	Glass Lens Cover - Flameproof

CODE	Remote Electronics Enclosure & Cover
0A	Not Required
1G	Glass Lens Cover - Flameproof

CODE	Agency Approvals
1	$_{c}$CSA$_{us}$ (UL Standards)

CODE	Language
E	English

814	R	A	A	131	A	T	I0035	C		1	G	0A	1	E	



Flow, Level, Interface & Temperature Switch & Transmitter

Model Number Legend
DOC#: ML-814-006

ML-814-006-[004]

***Sensor only.** The Packing Gland Assembly is available as standard in 316/316L Stainless Steel. For exotic alloys contact Kayden.

816	CODE	Sensor Type
	R	-55°C to +160°C [-58°F to +320°F] Continuous Service

CODE	Sensor Material
A	316/316L Stainless Steel
X	Titanium Gr. 2
T	Hastelloy C-276

CODE	Process Connection - MNPT
E	1"

CODE	Insertion 'U' Lengths
T	Low Pressure; 316/316L Stainless Steel (MWP 50 psi)
J	Low Pressure c/w Retaining Chain; 316/316L Stainless Steel (MWP 125 psi)
X	Medium Pressure; 316/316L Stainless Steel (MWP 500 psi)

CODE	Insertion 'U' Lengths
IXXXX	Custom 'U' Lengths: Use 4 digits preceded by an 'I' (i.e. 3.5" 'U' = I0035) (Use 'M' for cm)

CODE	Input Power
C	12-24 VDC and 115-230 VAC, 50 to 60 Hz

Electronics
Microprocessor Controlled with User Interface.
Two SPDT fully sealed relay contacts. Modbus via RS-485. 4-20 mA current loop.

CODE	Local Enclosure
1	Flameproof - Aluminum

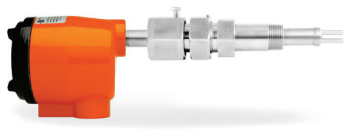
CODE	Cover - For Local Enclosure
B	Blind Cover - Flameproof
G	Glass Lens Cover - Flameproof

CODE	Remote Electronics Enclosure & Cover
0A	Not Required
1G	Glass Lens Cover - Flameproof

CODE	Agency Approvals
1	$_{c}$CSA$_{us}$ (UL Standards)

CODE	Language
E	English

816	R	A	E	T	I0035	C		1	G	0A	1	E	



Flow, Level, Interface & Temperature Switch & Transmitter

Model Number Legend
DOC#: ML-816-006

ML-816-006-[004]

***Sensor only.** The Packing Gland Assembly is available as standard in 316/316L Stainless Steel. For exotic alloys contact Kayden.

830	CODE	Sensor Type
	R	-55°C to +200°C (-58°F to +392°F) Continuous Service

CODE	Sensor Material
A3	316/316L Stainless Steel c/w Nickel Braze

CODE	Process Connection - FNPT
D	3/4"

CODE	Sensor Assembly Body Length
0035	3.5" (8.8 cm)

CODE	Bleed Port
A	Standard

CODE	Sensor Mounting Orientation
H	Horizontal Pipe
V	Vertical Pipe

CODE	Injection Tubes (3/4" MNPT x 1/4" FNPT)
0	Not Required
1	Type 1; .180" Bore; 316/316L Stainless Steel
2	Type 2; .086" Bore; 316/316L Stainless Steel

CODE	Mounting Bracket Kit
A	Not Required
B	90° Angle Bracket with hardware for wall/stand mounting

CODE	Power
C	12-24 VDC and 115-230 VAC, 50 to 60 Hz

Electronics
Microprocessor Controlled with User Interface. Two SPDT fully sealed relay contacts. Modbus via RS-485. 4-20 mA current loop.

CODE	Local Enclosure
1	Flameproof - Aluminum

CODE	Cover - For Local Enclosure / Sensor Enclosure
B	Blind Cover - Flameproof
G	Glass Lens Cover - Flameproof

CODE	Remote Electronics Enclosure & Cover
0A	Not Required
1G	Glass Lens Cover - Flameproof

CODE	Agency Approvals
1	$_{c}$CSA$_{us}$ (UL Standards)

CODE	Language
E	English

830	R	A3	D	0035	A	H	1	A	C		1	B	0A	1	E

Flow, Level & Temperature Switch & Transmitter

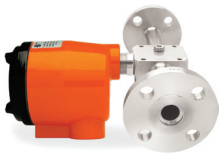
Model Number Legend
DOC#: ML-830-006

ML-830-006-[004]

832	CODE	Sensor Type
	R	-55°C to +200°C (-58°F to +392°F) Continuous Service

CODE	Sensor Material
A3	316/316L Stainless Steel c/w Nickel Braze

CODE	Process Connection - Flange Type
A	Raised Face
B	RTJ - Ring Type Joint



Flow, Level & Temperature
Switch & Transmitter

CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI	CODE	ANSI
	1"		1-1/2"		2"		3"		4"		5"		6"		8"		10"
121	150	131	150	141	150	151	150	161	150	171	150	181	150	191	150	201	150
122	300	132	300	142	300	152	300	162	300	172	300	182	300	192	300	202	300
123	600	133	600	143	600	153	600	163	600	173	600	183	600	193	600	203	600
124	900	134	900	144	900	154	900	164	900	174	900	184	900	194	900	204	900

CODE	Flange Material
A	316/316L Stainless Steel

CODE	Sensor Assembly Body Length (Flange Face to Flange Face)
IXXXX	Custom Body Lengths: Available in 1/2" (1.0 cm) increments. eg. 16.0" = 0160 ('M' = cm)
	7" - 72" (relative to flange size/rating)

CODE	Bleed Port
A	1/4" Threaded - Standard

CODE	Sensor Orientation
H	Horizontal
V	Vertical

CODE	Pipe Schedule
0	Schedule 40
1	Schedule 80 (Standard)

CODE	Input Power
C	12-24 VDC and 115-230 VAC, 50 to 60 Hz

Electronics
Microprocessor Controlled with User Interface. Two SPDT fully sealed relay contacts. Modbus via RS-485. 4-20 mA current loop.

CODE	Local Enclosure
1	Flameproof - Aluminum

CODE	Cover - For Local Enclosure / Sensor Enclosure
B	Blind Cover - Flameproof
G	Glass Lens Cover - Flameproof

CODE	Remote Electronics Enclosure & Cover
0A	Not Required
1G	Glass Lens Cover - Flameproof

CODE	Agency Approvals
1	$_{c}$CSA$_{us}$ (UL Standards)

CODE	Language
E	English

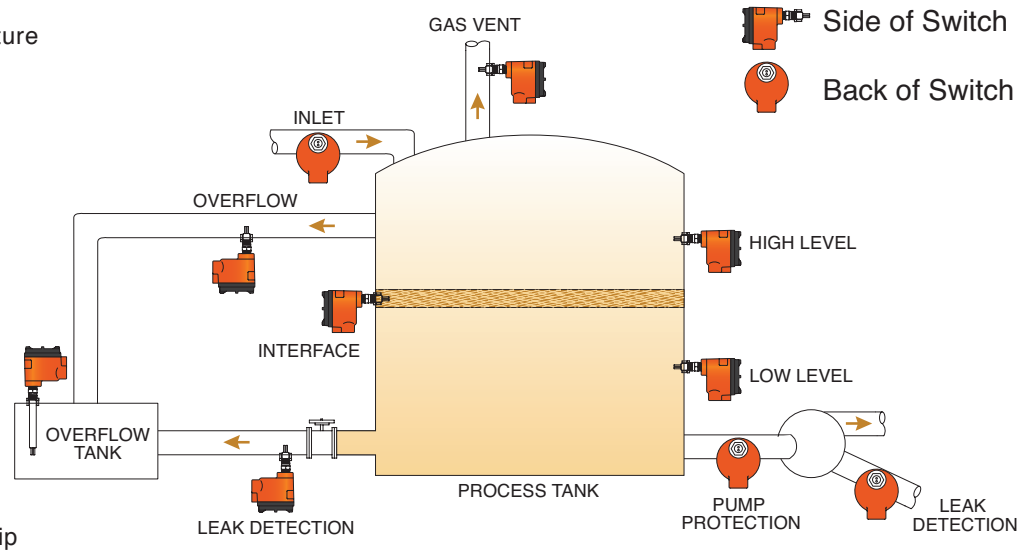
832	R	A3	A	131	A	I0060	A	H	0	C		1	G	0A	1	E	

Model Number Legend
DOC#: ML-832-006

ML-832-006-[004]

Application Principles - Flow, Level, Interface & Temperature

- ✔ Consistent process composition
- ✔ Consistent process temperature
- ✔ Clean or dirty process
- ✔ Liquids
- ✔ Dry air & gas
- ✔ Slurries
- ✔ Emulsion
- ✘ Aerated fluids
- ✘ Large temperature swings
- ✘ Wet or saturated air/gas
- ✘ Solids
- ✘ Sediment covering sensing tip



Application Considerations - Flow

Ideal Process Conditions

Liquids

- Consistent process composition & temperature
- Sufficient straight run flow profile (minimizes turbulence)
- Recommended minimum of 5 pipe diameters from any disturbance, preferably 15 pipe diameters.

Air & Gas

- Consistent process composition and temperature, ideally clean and dry but not necessarily so long as process is consistent.
- Sufficient straight run flow profile (minimizes turbulence)
- Recommended minimum of 5 pipe diameters from any disturbance, preferably 15 pipe diameters.

Slurries

- Consistent process composition & temperature
- Sufficient straight run flow profile (minimizes turbulence)
- Recommended minimum of 5 pipe diameters from any disturbance, preferably 15 pipe diameters.

Emulsion

- Consistent process composition & temperature
- Sufficient straight run flow profile (minimizes turbulence)
- Recommended minimum of 5 pipe diameters from any disturbance, preferably 15 pipe diameters.

Undesirable Process Conditions

Liquids

- Inconsistent process composition or temperature
- Insufficient straight run
- Turbulence

Air & Gas

- Inconsistent process composition or temperature
- Wet or saturated air/gas

Slurries

- Inconsistent process composition or temperature
- Insufficient straight run
- Turbulence

Emulsion

- Inconsistent process composition & temperature
- Insufficient straight run
- Turbulence

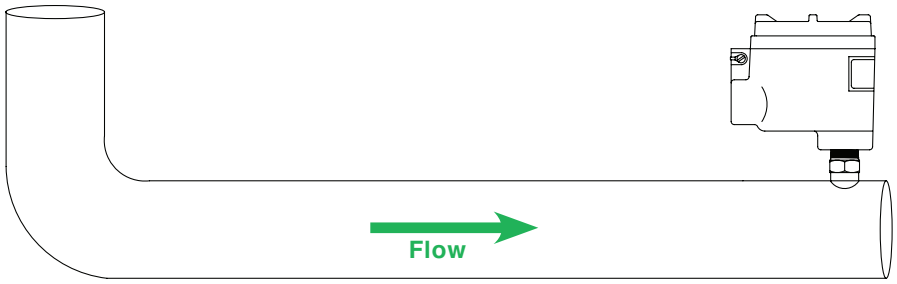
Solids

- Dry granulated processes are NOT good candidates for thermal switches

Mounting & Installation Diagrams for Flow

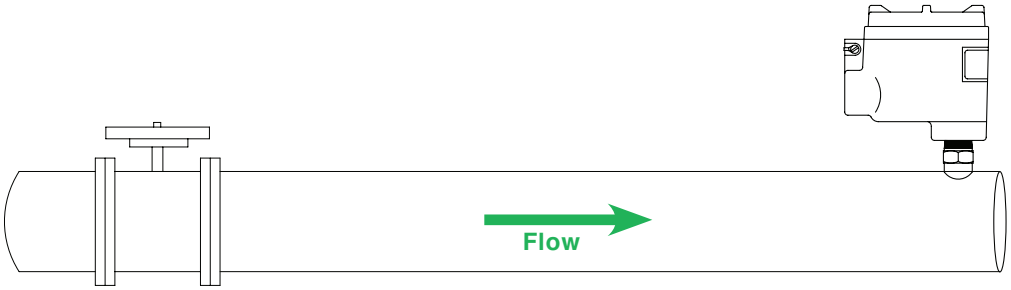
Bends, Elbows, etc.

Good installation practice requires sufficient downstream placement of bends, expansions or reductions.



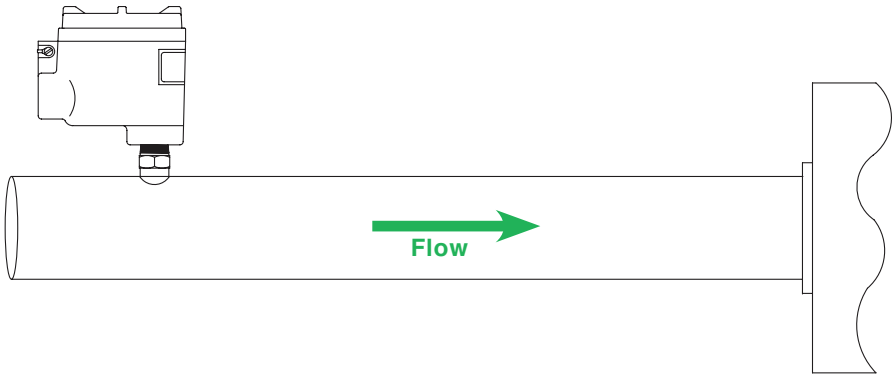
Valves, etc.

Good installation practice requires sufficient downstream placement from isolation and control valves - especially if valves are only partially opened.



Pumps, Fans & Compressors

Good installation practice requires sufficient downstream placement from pumps, fans and compressors. The preferred installation point for pump flow / no-flow detection is on the inlet side of the pump.



Note: **Flow profiles will tend to be smoother as the downstream distance** between the bend, elbow, valve, pump, fan or compressor and the switch **increases.**

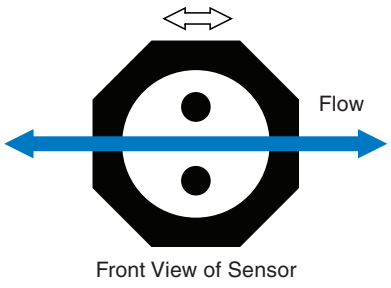
Guidelines for Flow Applications - Liquids, Slurries, Air, Gas

Mounting Considerations

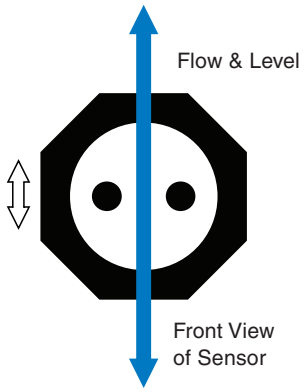
- Ensure the arrows on the sensor are oriented parallel to the process flow.
- Where possible mount the sensor in the point of least turbulent flow.
- Avoid locations where sediment may accumulate and eventually isolate the sensing tip from the process. Situating the sensing tip in the sediment may prevent the switch from being able to sense any changes in the process as the sediment will insulate the sensing tip.
- **Liquids & Slurries**: When mounted in a tee or section of pipe larger than the normal process pipe, position sensor in a vertical run of pipe with flow upward. This will prevent air or gas bubbles from becoming trapped around the sensing tip.
- Pumps, fans, valves, or pipe bends of 90° or more may cause turbulence or significant variance in the flow which may affect the repeatability of the switch. Care should be taken to minimize this possibility. Consult your local Representative or Kayden for assistance.
- **For pump flow/no-flow detecton the recommended installation point is on the inlet side of the pump.** The discharge side may have turbulence, reverse flow and an undeveloped flow profile. These factors may greatly reduce repeatability and accuracy.

Sensor Orientation

To optimize the sensor's performance and interpretation of the processes actions, ensure the sensor is positioned as outlined below:



Sensor Orientation for Horizontal Flow



Sensor Orientation for Vertical Flow

Guidelines for Flow Applications - Liquids, Slurries, Air, Gas

Horizontal Pipe - Side Mount - Ideal

Ensure sensing tip is fully inside the pipe wall as a minimum and to the center of the pipe as a maximum. Avoid locations where sediment may accumulate and isolate the sensing tip from the process.

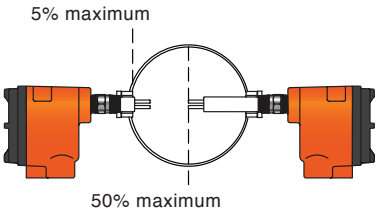
Horizontal Pipe - Top Mount

Ensure sensing tip is fully inside the pipe wall to a position where it will be constantly and fully exposed to the desired process in order for the flow or lack of flow to be recognized at any given time.

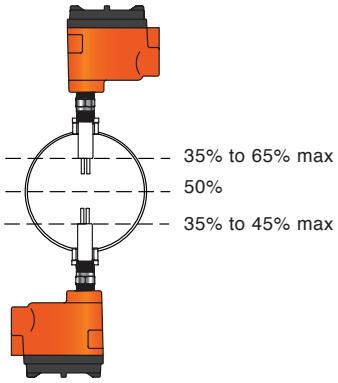
Horizontal Pipe - Bottom Mount

Ensure sensing tip is fully inside the pipe wall to a position where it will be constantly covered by the process in order for the flow or lack of flow to be recognized at any given time. Ensure the desired process covers the sensing tip – if the sensing tip is situated near the top of the pipe, the process must be filling the pipe to a level where the sensing tip is covered at all times. A wide selection of insertion 'U' lengths are available starting at 1.2".

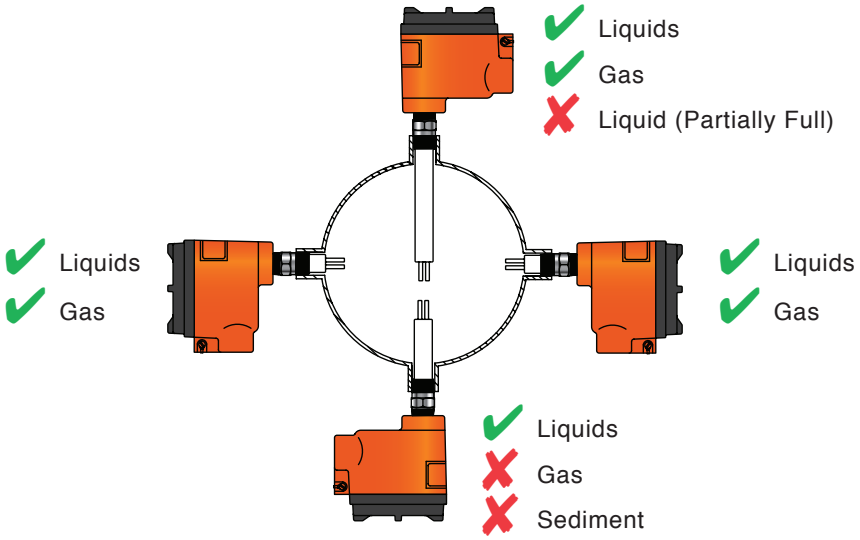
Avoid locations where sediment may accumulate and eventually isolate the sensing tip from the process.



Horizontal Pipe: Side Mount



Top/Bottom Mount



Sensor Positioning, Horizontal Pipe

Guidelines for Flow Applications - Liquids, Slurries, Air, Gas

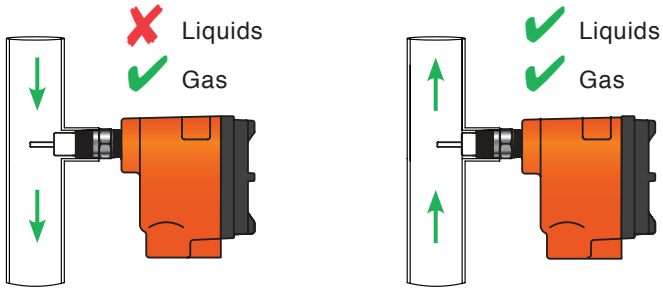
Vertical Pipe - Side Mount - Acceptable

Ensure sensing tip is fully inside the pipe wall as a minimum and to the center of the pipe as a maximum.

Note: When installing the switch in vertical piping, Kayden strongly recommends installing thermal switches at a point of UPWARD process flow to ensure continued total immersion of the sensing tip.

Vertical Pipe - Side Mount - Downward Flow

- Is only recommended for higher flow rates where the LINE IS KEPT FULL OF LIQUID OR SLURRY
- For installation in a vertical gravity flow, the switch must be distant enough from an open outlet that air cavitation does not affect the sensing tip and cause a false flow signal. A constriction at the outlet avoids this problem.
- A waterfall effect will occur in vertical pipe with low flow rates. Also, the process is likely to become substantially aerated. The switch will interpret the aeration as a substantially lower flow rate and possibly cause a false low flow alarm.



Sensor Positioning, Horizontal Pipe

Vertical Pipe - Side Mount - Top & Bottom Mount - Less Desirable

Positioning the sensor on a corner or elbow is not recommended as the process will be turbulent. The switch may interpret the turbulence as a constantly changing flow rate and fail to alarm as required.

Application Considerations - Level

Ideal Process Conditions

Liquids
- Consistent process composition & temperature
- Non-turbulent applications

Slurries
- Consistent process composition & temperature

Emulsion
- Consistent process composition & temperature

Undesirable Process Conditions

Liquids
- Inconsistent process composition
- Turbulence
- Large temperature swings

Slurries
- Inconsistent process composition
- Turbulence
- Large temperature swings

Emulsion
- Inconsistent process composition
- Turbulence
- Large temperature swings

Solids
- Dry granulated processes are NOT good candidates for thermal switches

Application Considerations - Interface

Ideal Process Conditions

Liquids
- Liquid to Liquid
- Consistent process composition & temperature
- Non-turbulent applications
- Large differential in thermal conductivities

Air or Gas to Liquid
- Consistent process composition & temperature
- Non-turbulent applications
- Dry gas

Emulsion
- Consistent process composition & temperature
- Large differential in thermal conductivities

Undesirable Process Conditions

Liquid to Liquid
- Inconsistent process composition or temperature
- High aeration
- High turbulence
- Small differential in thermal conductivities

Air or Gas to Liquid
- Inconsistent process composition or temperature
- High turbulence

Emulsion
- Inconsistent process composition or temperature
- High aeration
- High turbulence
- Small differential in thermal conductivities

Solids
- Dry granulated processes are NOT good candidates for thermal switches

Point Level & Fluids Interface

Mounting Considerations:

- Where possible mount the sensor in the point of least turbulence
- Agitators, bubblers, valves, or screens may affect the repeatability of the switch.

  Note: When possible, care should be taken to minimize this possibility. Consult your local Representative or Kayden for assistance.
- Ensure the arrows on the sensor are oriented parallel to the process surface
- Keep sensing tip clear of any mixing devices that may cause damage

Tanks and Vessels - **Side Mount (Ideal)**

Ensure sensing tip is fully inside the tank wall as a minimum.

Tanks and Vessels - **Top Mount**

Ensure sensing tip is fully inserted to the desired sensing point.

Application Considerations - Temperature

Ideal Process Conditions

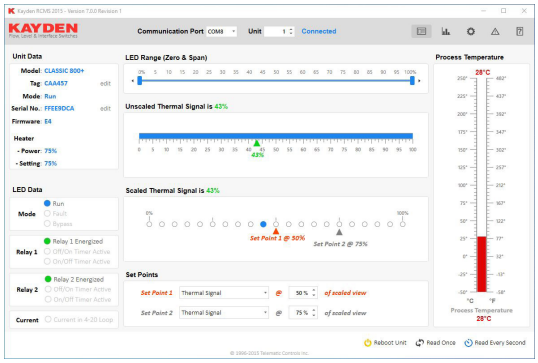
- Consistent Processes
- Process Temperature -55°C to +200°C

Undesirable Process Conditions

- Process Temperature < -55°C or > +200°C

Kayden RCM Software

Kayden RCM Software provides all the same features as the CLASSIC front panel User Interface, plus the additional features below:

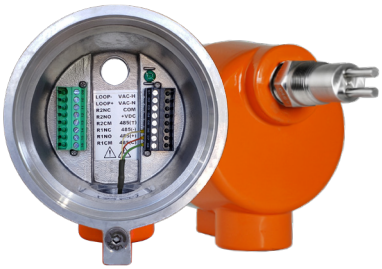


- Configure Relays to respond to temperature
- Configure Temperature Alarm Value (in Fahrenheit or Celsius)
- Configure Relay Delay Timers
- Configure the **Delay to Return Mode from Fault Mode** timer
- Save a Tag character string in the CLASSIC for identification
- Lock the front panel user interface to prevent accidental or undesired access

  Requires RS-485 adapter and communication cable

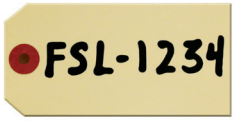
RS-485 Communication Adapters and Cable

Communication Adapter



PC Port	Adapter	Cable
D89	**Part Number: A15-321** Kayden SCA for computers with DB-9 RS-232. 	**A05-CC-0004** 4 feet **A05-CC-0008** 8 feet **A05-CC-0010** 10 feet Contact factory for custom lengths. 
USB	**Part Number: USB-RS485** Pigtail cable for direct connection with terminalblock for optional use. 	No cable required unless terminal block is used.

Equipment Tags



Stainless Steel Tags

Stainless Steel tags are attached with stainless steel wire to the switch. Please provide the exact information to be engraved.

Part Number: A20-0001

Lamacoid Tags

Lamacoid equipment tags are applied with double sided tape to any product. Please provide the exact information to be engraved.

Part Number: A20-0002

Paper Tags

Select paper tags when temporary labeling is required.

Part Number: A20-0003

Interconnecting Cables for Remote Electronics

Non-Armored Cable

Assembly includes heat shrink with crimp ferrules.
(Strain relief fittings are not included, however they are available as an option).

Construction

8 color coded conductors 20 AWG, shielded cable, PVC jacket.

Voltage Rating

30 volts RMS

Temperature Rating

-20°C to +80°C (-4°F to +176°F)

Part Number

A05-GP-xxxx (xxxx = length in feet)

Armored Cable

General Purpose (Non-hazardous) Cable & Connector Assembly

Assembly includes 2 general-purpose cable fittings.

Construction

8-strand concentric, Class B tinned copper, .020" PVC insulation, individual and overall foil shield, color & number coded, drain and Mylar separator, PVC inner jacket, aluminum interlock armor, PVC outer jacket.

Voltage Rating

300 volts

Temperature Rating

-40°C to +90°C (-40°F to +194°F); insulation rated @ 105°C (221°F)

Part Number

A06-GP-xxxx (xxxx = length in feet)

Flameproof Cable & Connector Assembly

Assembly includes 2 sealed explosion-proof cable fittings and sealing compound.

Construction: 8-strand concentric, Class B tinned copper, .020" PVC insulation, individual and overall foil shield, color & number coded, drain and Mylar separator, PVC inner jacket, aluminum interlock armor, PVC outer jacket.

Voltage Rating

300 volts

Temperature Rating

-40°C to +90°C (-40°F to +194°F); insulation rated @ 105°C (221°F)

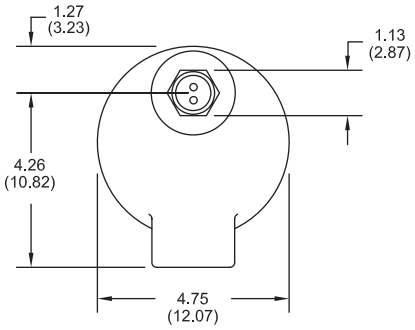
Part Number

A06-XP-xxxx (xxxx = length in feet)

CLASSIC® 810 & 812

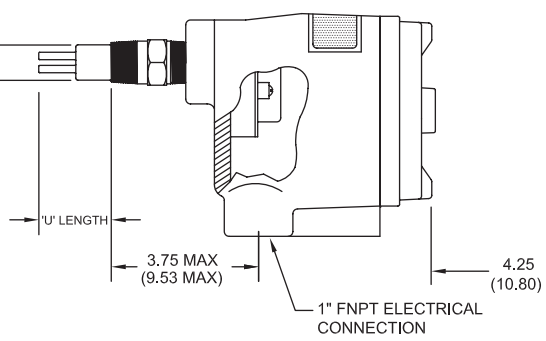
Inches (cm)

CLASSIC® 810 Threaded

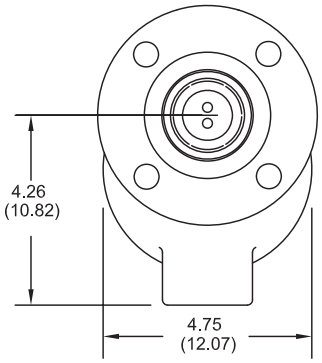


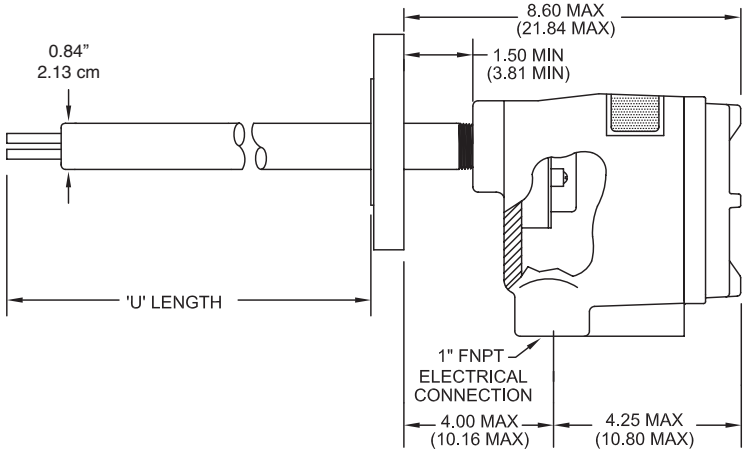
	Inches	cm
RAD to H	0.840	2.13
RAC	0.675	1.71

For dimensions on all process connections visit kayden.com



CLASSIC® 812 Flanged

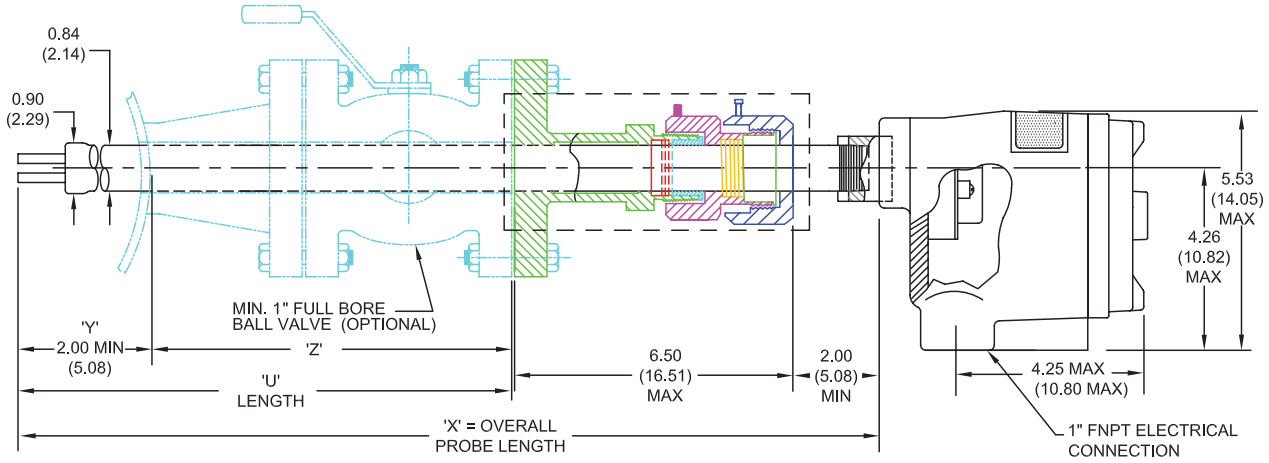




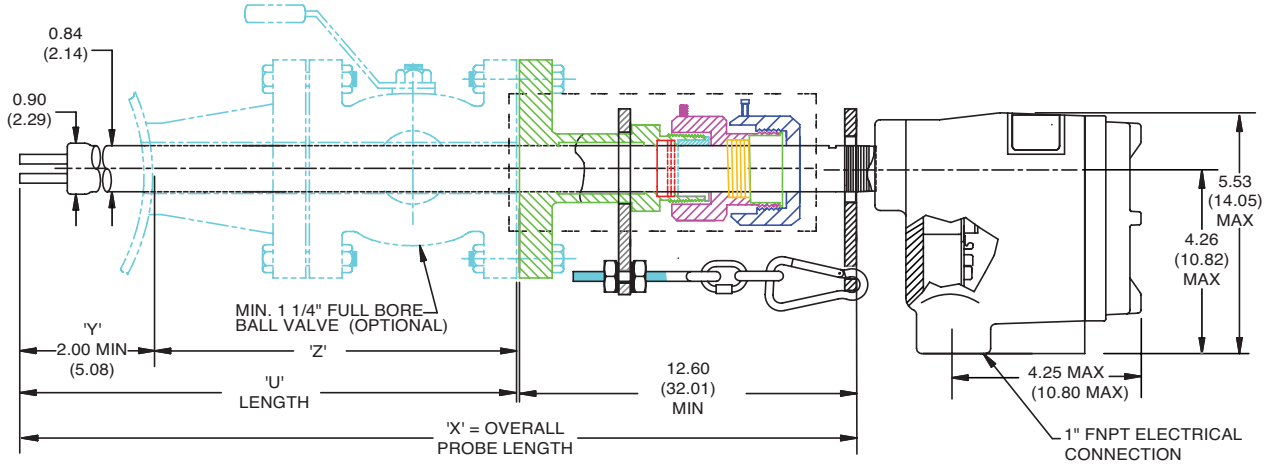
CLASSIC® 814

Inches (cm)

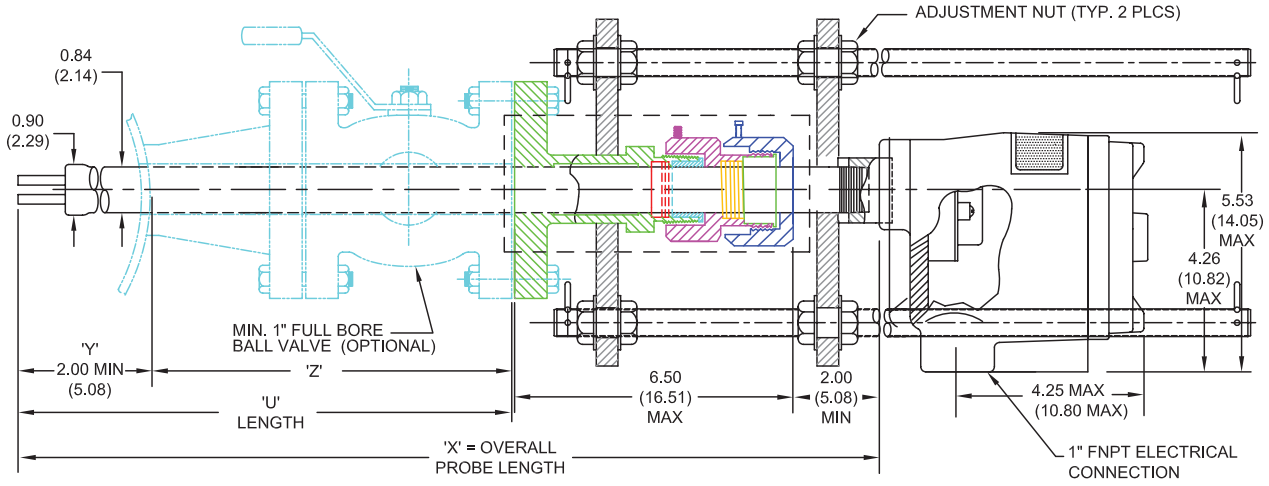
CLASSIC® 814 Retractable Packing Gland Flanged - to 50 psi



CLASSIC® 814 Retractable Packing Gland Flanged - 1" MNPT - c/w Retaining Chain - to 125 psi



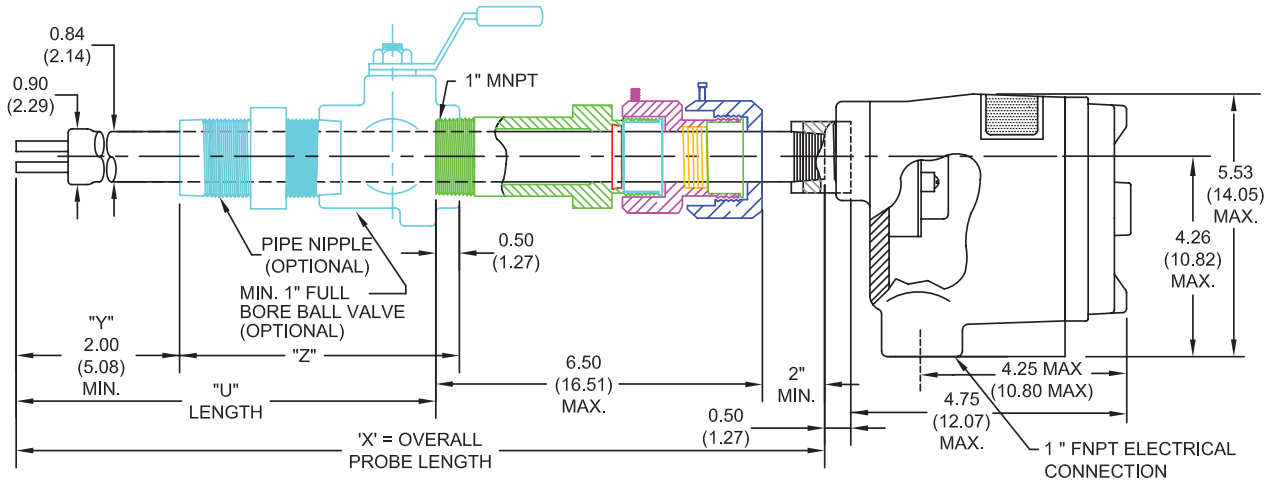
CLASSIC® 814 Retractable Packing Gland Flanged - to 275 psi



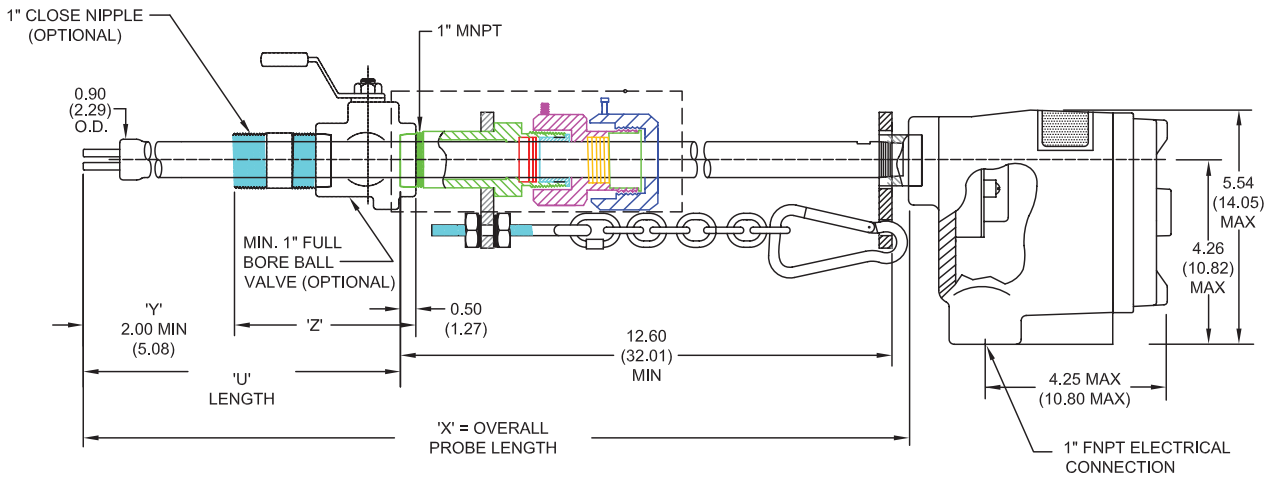
CLASSIC® 816

Inches (cm)

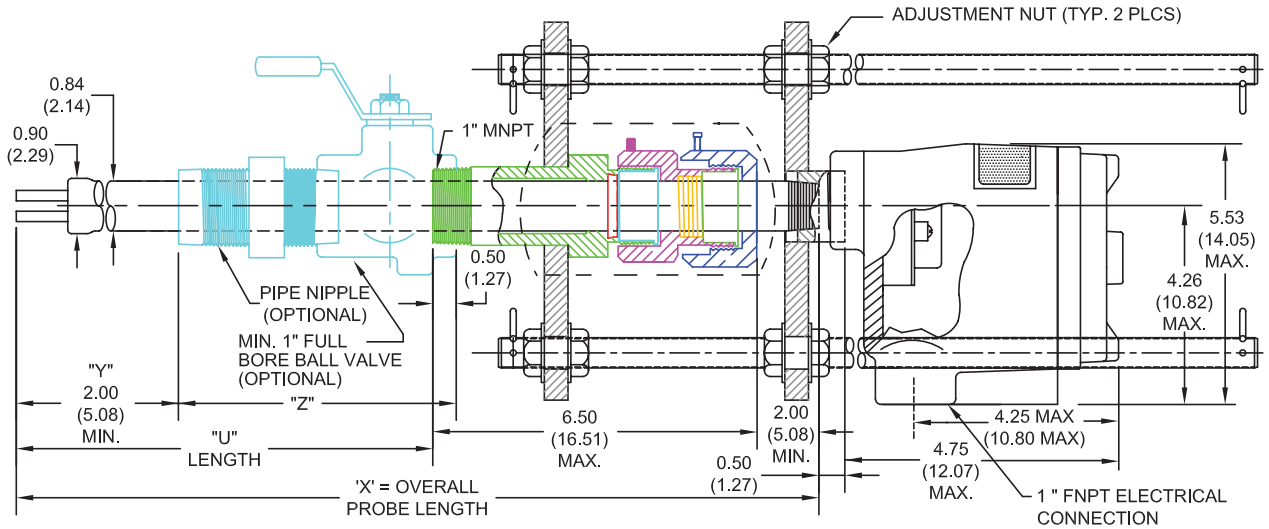
CLASSIC® 816 Retractable Packing Gland Threaded - 1” MNPT - to 50 psi



CLASSIC® 816 Retractable Packing Gland Threaded - 1” MNPT - c/w Retaining Chain - to 125 psi



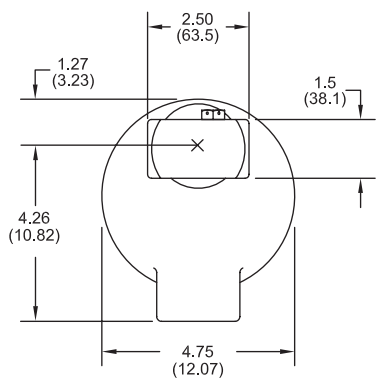
CLASSIC® 816 Retractable Packing Gland Threaded - 1” MNPT - to 500 psi

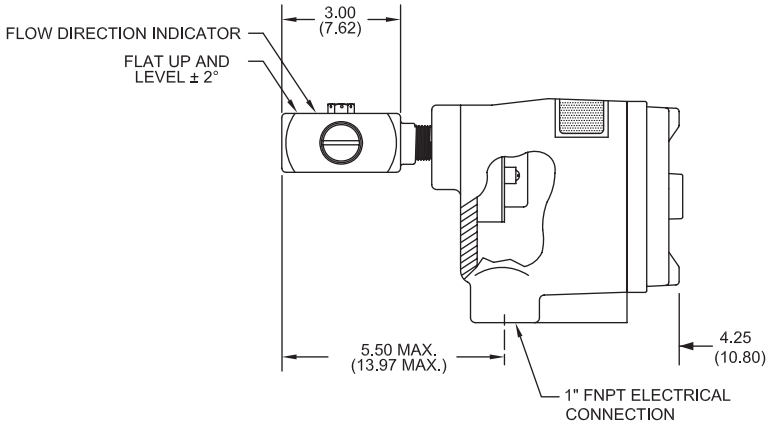


CLASSIC® 830

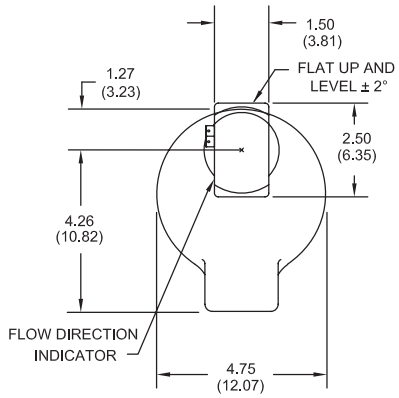
Inches (cm)

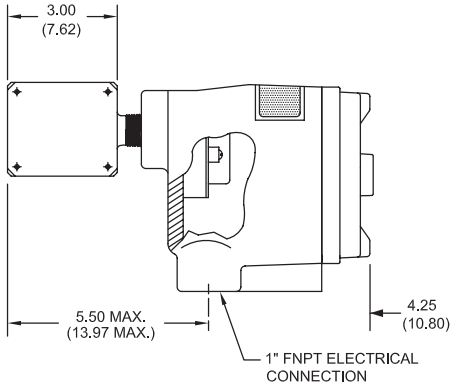
CLASSIC® 830 InLine Threaded - Horizontal



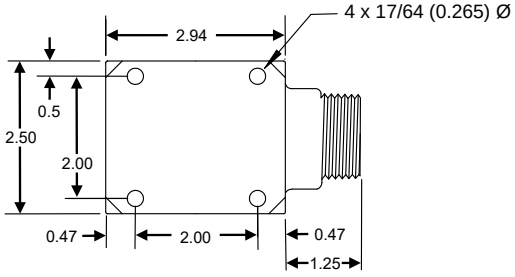


CLASSIC® 830 InLine Threaded - Vertical





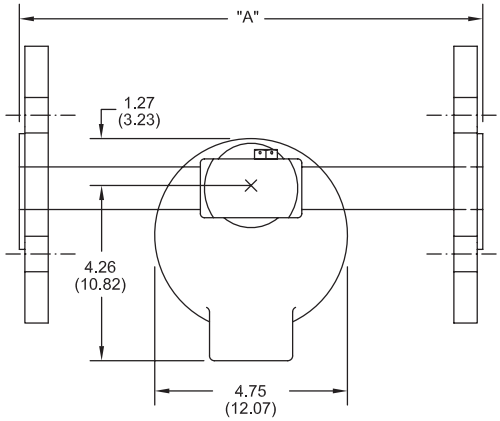
CLASSIC® 830 Detail - Mounting Holes

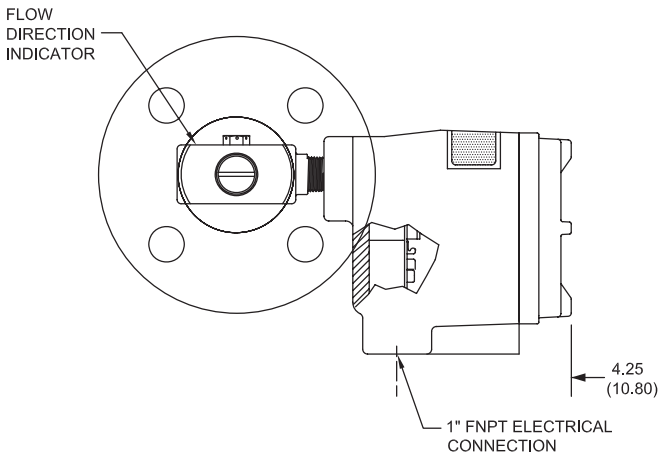


CLASSIC® 832

CLASSIC® 832 InLine Flanged - Horizontal

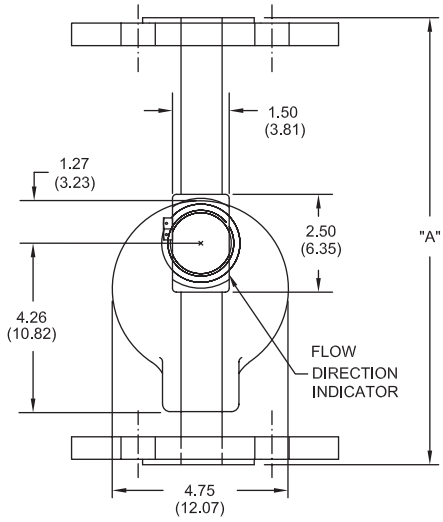
(as advised)

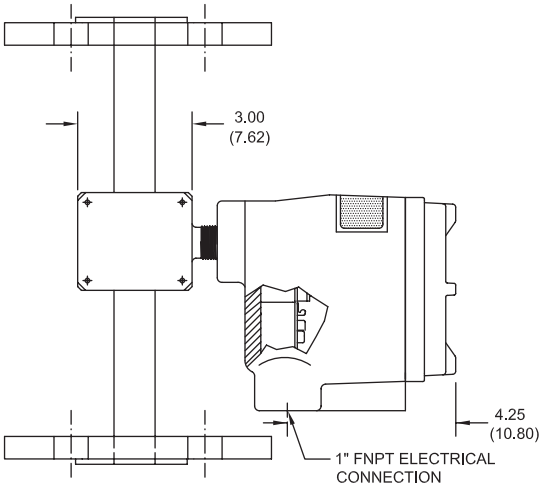




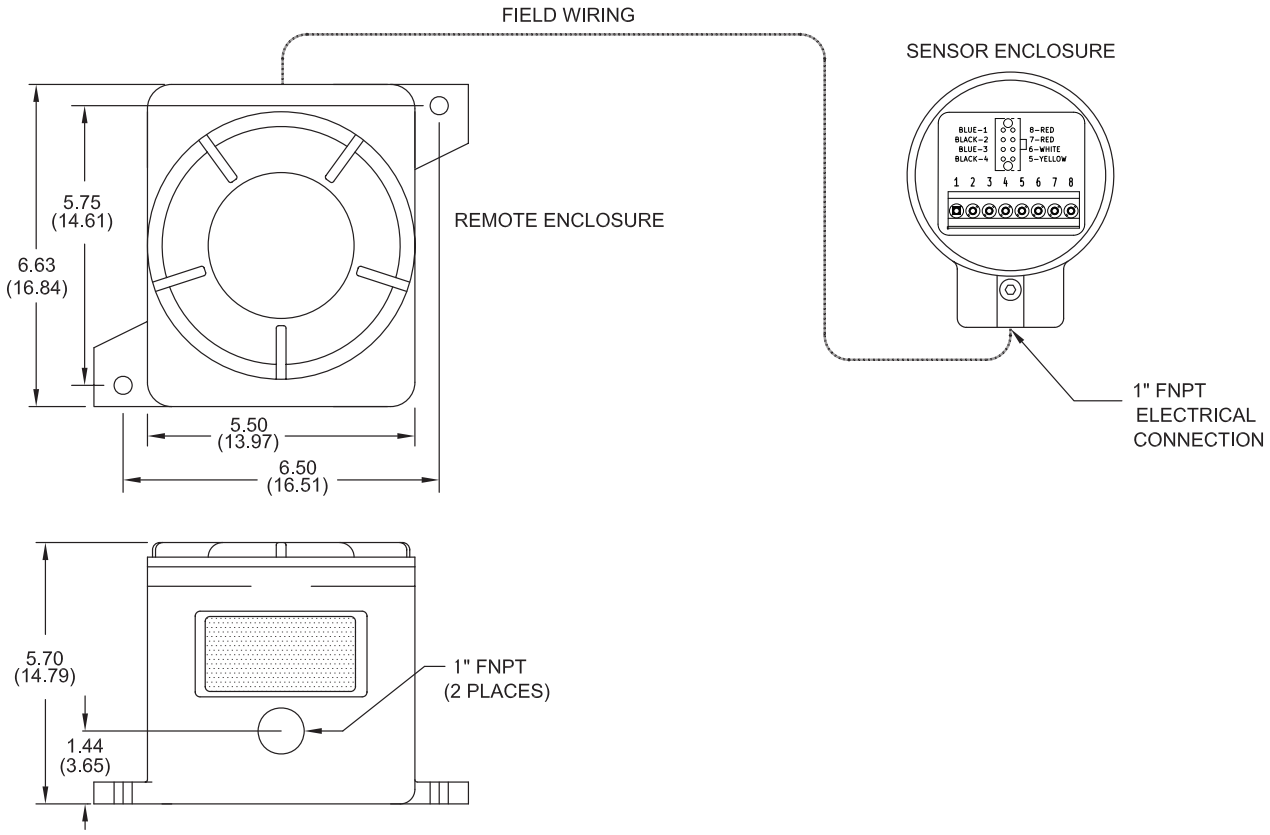
Inches (cm)

CLASSIC® 832 InLine Flanged - Vertical





Remote Electronics Enclosure - Flameproof (CSA)



Note: Suitable for one (1) Electronics Module.

Note: For detailed drawings of all products visit kayden.com

Notes

FEATURES	CLASSIC® 800 Series
Flow	✔
Level[1]	✔
Interface - Liquid / Slurry	✔
Temperature[2]	✔
Process Media	
Liquids	✔
Air & Gases	✔
Slurries	✔
Interface	✔
Features	
4-20 mA Analog Output	✔
Temperature Mode[2]	✔
Relay Contacts	Dual SPDT
Start-up Bypass Timer[3]	✔
Adjustable Set Point Deadbands	✔
Display Panel Lock-Out[4]	✔
Remote Communications[5]	✔
Input Power	
12-24 VDC; 115-230 VAC, 50-60 Hz	✔
Remote Mount Electronics	
CSA Approved (Class I, Div. 1) Enclosures	✔
Agency Approvals	
CSA Class I, Div. 1	✔ Groups B, C & D
Canadian Registration Number (CRN)[6]	✔

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Notes:

1. Point Level: physical location of the probe determines sensing point.
2. Requires Kayden RCMS and the Modbus communications (see note 5 below). Either relay may be configured to actuate on process temperature with the other relay functioning in a traditional Flow or Level application.
3. Adjustable from 0 - 100 seconds, the Start-up Bypass Timer is useful when restarting a pump.
4. The programming buttons on the Display Panel of the switch may be disabled using the Kayden RCMS and the Modbus communications.
5. Modbus RTU via RS-485; requires Kayden RCMS (included at no charge upon request), a Serial Communication Adapter (SCA) or USB Adapter and communications cable are available.
6. Visit kayden.com for CRN information per model and jurisdiction.

CLASSIC® 800 Features Overview

Series	CLASSIC® 800
Models & Applications	**810, 812, 814, 816, 830 & 832** Flow, Level, Interface & Temperature
Process Connections	**810:** 1/2" to 2" MNPT Threaded **812:** Flanged **814:** Flanged Retractable Packing Gland **816:** 1" MNPT Threaded Retractable Packing Gland **830:** 3/4" FNPT (InLine) 832: Flanged (InLine)
Insertion 'U' Lengths	1.2", 2", 3", 4", 6", 9", 12" & 18" Standard (most models) Custom lengths available to 240"
Sensor Material	316/316L Stainless Steel, Titanium Gr. 2, Hastelloy C-276 & Monel 400 **830 & 832:** 316/316L Stainless Steel c/w Nickel Braz
Remote Electronics Option	Explosion-proof - Standard
Input Power	Universal AC & DC
Power Consumption	Maximum: 6.0 watts (fully configured)
Communications	RS-485
Outputs	Two SPDT fully sealed relay contacts 4 amps resistive 230 VAC / 24 VDC Modbus RTU via RS-485. 4-20 mA current loop
Temperature Compensation	Yes
Operating Temperature - Sensor	Continuous Use: -45°C to +200°C (-50°F to +392°F) **814 & 816:** -45°C to +160°C (-50°F to +320°F)
Operating Temperature - Electronics	Continuous Use: -55°C to +65°C (-67°F to +167°F)
Operating Pressure - Sensor	Maximum Design Pressure: 24 MPa (3500 psig) Temperature derated. Visit kayden.com for pressure ratings per model.
Self-Test	Automated diagnostics performed on electronics & sensing elements
Agency Approvals	C US CRN Canadian Registration Number

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Ordering Information

Order Online

kayden.com Use our website to order your Kayden products. Please know that your local Authorized Distributor is supported whether you place orders online, via telephone, or email.

Contact Us

Telephone

+1 403 253-1423

E-Mail

info@kayden.com

Web

kayden.com

Hours Monday – Friday 8:00 a.m. – 5:00 p.m. MST

Mailing Address 3364–114th Avenue S.E., Calgary, Alberta, Canada T2Z 3V6

Contact a Local Distributor

Distributors

Visit kayden.com to find a local Distributor near you. Distributors provide local inventory, technical support & service.

60-Day 100% Satisfaction Guarantee

Standard Products

Standard Products are eligible for the 60-Day 100% Satisfaction Guarantee. If you purchased new Standard Products, you may return them to the place of purchase up to 60 days from the date of invoice for a refund or credit of the product purchase price provided the quantity of Products does not exceed twenty-five units (nominal restocking fee apply to only those quantities exceeding twenty-five units).

Custom Products

Custom Products are not eligible for this guarantee as they are manufactured specifically to the customers' individual and unique requirements. Ship returns prepaid. Please note the refund or credit will not include any charges for special documentation, special equipment, special service, special approvals, drawings, certificates, equipment tags, set points, flow curves, x-rays, dye penetration tests, opened software, shipping or insurance shown on your invoice.

View the Return Policy in detail at kayden.com.

Visit kayden.com to view the 60-Day 100% Satisfaction Guarantee in detail.

Warranty

One (1) Year from shipment date from factory (see Terms & Conditions of Sale).

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