

Fluid Flow Switch

Model Q-1

0.12 to 8.0 GPM

Detects and Signals Flow Change

- Superior Long Term Performance
- Continuous Adjustment While Operating
- 6 Interchangeable orifices plus 2:1 continuous switch adj. each orifice.
- Line Pressure to 300 psig
- Temperature 180°F Continuous
- Calibrated Independent of Line Pressure and Temperature
- Maintains Calibration Limits when Subjected to Reasonable Line Hydraulic Hammer or Surge Pulses
- SPDT 15 amp switching capacity model or Dry Circuit Computer/PLC Interface model
- Intrinsically Safe Relay Allows Model Q-1 to be used in Hazardous Areas. (see page 46)
- Maintenance and checkout is a snap for your present personnel using an uncomplicated standard test meter.

Non-Magnetic



Typical Working Fluids

- Alcohols
- Contaminated Ground Water
- Filtered Sewage Water
- Glycols
- Oils
- Pure Water
- Seawater
- Soap Solutions
- Tap Water

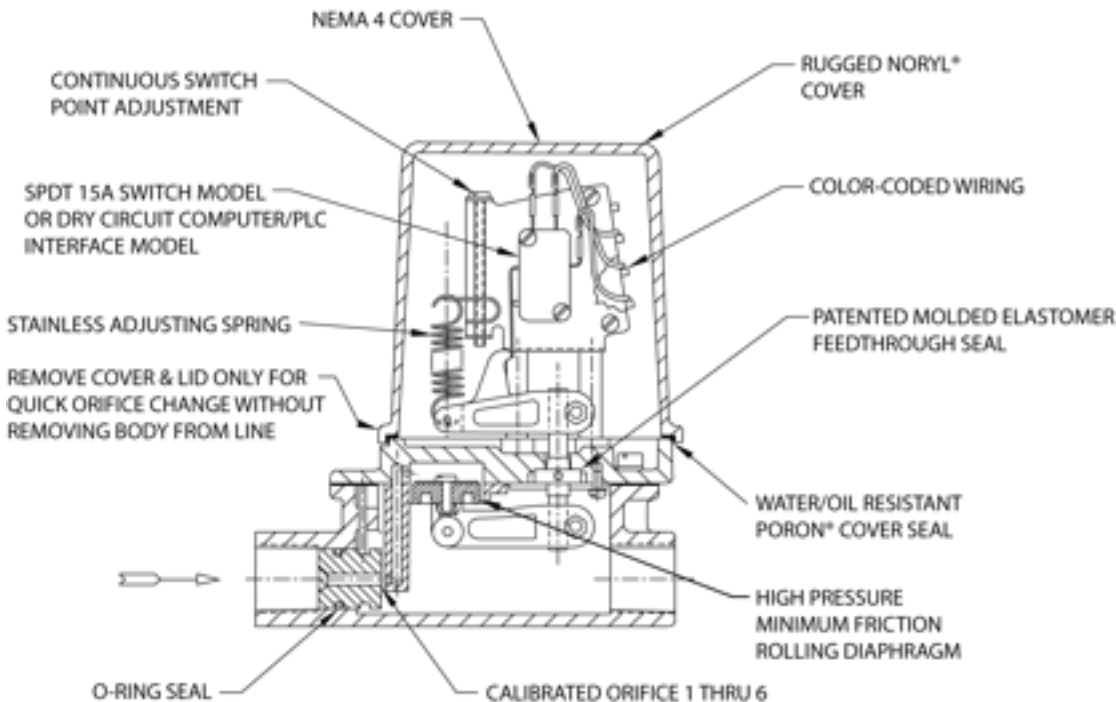
Typical Uses:

Monitoring flow of coolant water and fluids supplied to:

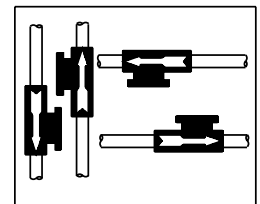
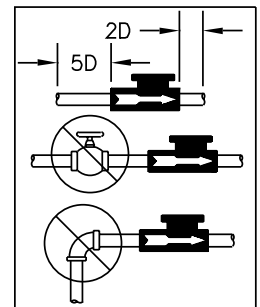
- Air Condition Systems
- Brakes and Clutches
- Computer Systems
- Diffusion Vacuum Pumps
- Diodes, SCRs, Triacs, etc.
- Electro Magnets
- High Power Transistors
- Marine and Stationary Engines
- Oil Supplied to Large Bearing and Gear Systems
- Plastic Molding Equipment
- RF and Radar Transmitter
- Spot welders
- Transformers
- Vacuum Systems

In Chemical Processing

- Fluid Blending Systems
- Heat Transfer Fluids
- Liquid Scrubbers
- Liquid Transfer
- Monitor Filter Clogging
- On/Off Control of Chemical Feed Pumps
- Starting Back-up Pumps
- Water Treatment



TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



Limited Warranty Page 7

541 Kinetic Drive, Oxnard, CA 93030
 Tel (805) 988-6800 Fax (805) 988-6804
 Email. harwil@harwil.com
 www.harwil.com

Specifications:

Flow Range - Water Calibrated @ 70°F

Model Q-1

Orifice #	Continuous Switch Point Adjustment Range GPM	Note
1	0.12 to 0.25	
2	0.25 to 0.50	
3	0.50 to 1.0	Maximum recommended flow rate for each orifice is 4x upper-end of adj. range.
4	1.0 to 2.0	
5	2.0 to 4.0	
6	4.0 to 8.0	

Hysteresis (% Flow Change to Activate/Deactivate Switch)

- ≈ 5% at upper end of flow range
- ≈ 25% at lower end of flow range

Differential pressure drops across unit (Normal Operating Conditions)

- ≈ 1.0 psig at lower end of flow range
- ≈ 5.0 psig at upper end of flow range

Working Line Pressure

300 psig max. @ 180°F Max
(Proof tested to 1200 psig @ 180°F)

Materials

Brass body Noryl®, stainless steel, and plastic hardware.
Working fluid “sees” red brass, 316 stainless steel, phosphor bronze, Noryl® (PPO), PVC, and EPDM elastomer seal.
(Hypalon® and Viton® elastomer seals are available on special order.)

Electrical Switch Characteristics

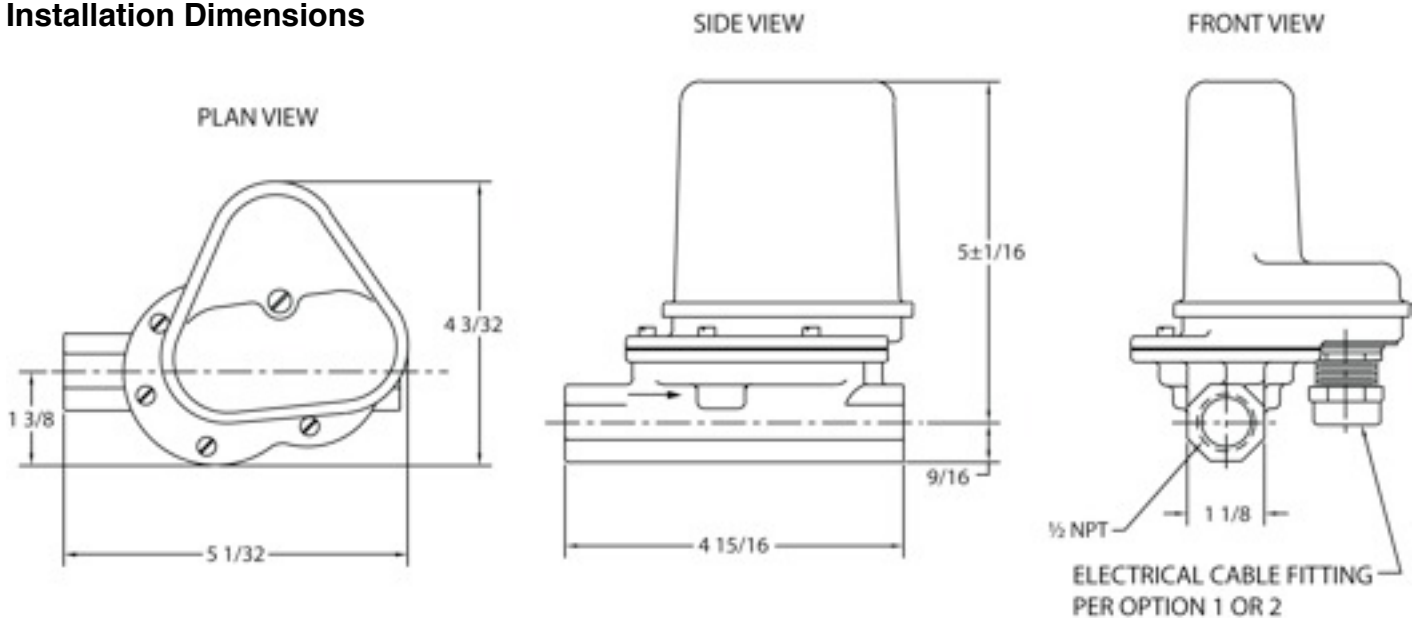
SPDT
15 amp, 1/2 hp @ 125 or 250 VAC
1/2 amp @ 125 VDC, 1/4 amp @ 250 VDC
5 amp @ 125 VAC (tungsten lamp load)
UL and CSA Listed
10,000,000 Operations Median

Model Q-1 can also be fitted with a SPDT Gold Cross Bar Switch for computer/PLC interface.

Maximum Continuous Temperature: 180°F (may be extended to 200°F for short periods.)

Weight: 3.5 lb.

Installation Dimensions



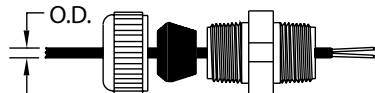
Input Power Cable Interface Options

Option No. 1

Sample Part #

Q - 1 / 3 / A

Basic Model # Orifice # Grommet Size



Grommet Size	Cable OD	Grommet Size	Cable OD
A	0.25"	B	0.37"
AA	0.30"	C	0.50"

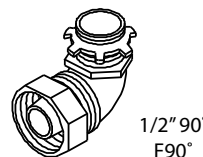
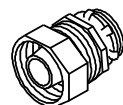
Option No. 2

Sample Part #

Q - 1 / 6 / F

Basic Model # Orifice # 1/2" Flexible Conduit Fitting

1/2" STRAIGHT F



- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.

Fluid Flow Switch

Model Q-4E

4 to 70 GPM

Detects and Signals Flow Change

- Superior Long Term Performance
- Line Pressure to 300 Psig
- Continuous Adjustment While Operating
- Temperature 180°F Continuous
- Four individual Drag Disk options plus continuous adjustment provides wide operating range
- For use in particle contaminated fluids
- SPDT 15 amp switching capacity model or Dry Circuit Computer/PLC Interface model
- Intrinsically Safe Relay Allows Model Q-4E to be used in Hazardous Areas (see page 46).
- Maintains Calibration Limits When Subjected to Reasonable Line Hydraulic Hammer or Surge Pulses
- Maintenance and checkout is a snap for your present personnel using an uncomplicated standard test meter.

Non-Magnetic



Typical Working Fluids

- Alcohols
- Glycols
- Hydrocarbons
- Oils
- Pure Water
- Sea Water
- Sewage
- Soap Solutions
- Tap Water
- Waste Water

Typical Uses:

Monitoring flow of coolant water and fluids supplied to:

- Air Condition Systems
- Brakes and Clutches
- Computer Systems
- Diffusion Vacuum Pumps
- Diodes, SCR's, Triacs, etc.
- Electro Magnets
- Fluids for Ceramic Cutting & Grinding Wheels
- Grinding and Polishing Fluids
- High Power Transistors
- Marine & Stationary Engines
- Plastic Molding Equipment
- Pressurized Oil for Floating Bearings & Ways
- Refrigeration Systems
- RF and Radar Transmitter
- Spot welders
- Transformers
- Vacuum Systems
- Water & Oil Based Cutting Fluids

In Chemical Processing

- Contaminated Groundwater
- Fire Sprinkler Flow Alarms
- Fluid Blending Systems
- Heat Transfer Fluids
- Liquid Scrubbers
- Liquid Transfer
- Monitor Filter Clogging
- On/Off Control of Chemical Feed Pumps
- Starting Back-up Pumps
- Water Treatment

CONTINUOUS SWITCH POINT ADJUSTMENT

SPDT 15A SWITCH MODEL OR DRY CIRCUIT COMPUTER/PLC INTERFACE MODEL

NEMA 4 COVER

RUGGED NORYL® COVER

H2O/OIL RESISTANT PORON® COVER SEAL

H2O/OIL RESISTANT ELECTRICAL CABLE STRAIN RELIEF OPTION 1 OR 2

O-RING SEAL

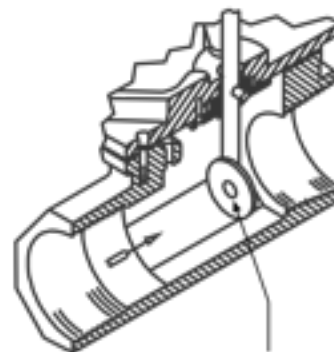
ORIFICE

DRAG DISK

REMOVE COVER AND LID ONLY FOR QUICK ORIFICE CHANGE W/OUT REMOVING BODY FROM LINE

STAINLESS ADJ. SPRING (NOT SHOWN)

PATENTED, MOLDED ELASTOMER FEEDTHRU SEAL

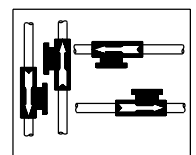
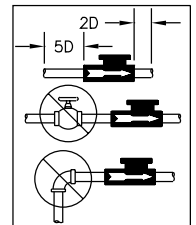


DRAG DISK

MODEL Q-4E/1
(USES ORIFICE & DRAG DISK)

MODELS Q-4E/2, 3 & 4
(USE DRAG DISK ONLY)

TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



Limited Warranty Page 7

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Specifications:

Flow Range - Water Calibrated @ 70°F

Model Q-4E

Model #	Continuous Switch Point Adjustment Range GPM	Note
Q-4E/1	4-8	Orifice/Drag Disk
Q-4E/2	6-20	Drag Disk Only
Q-4E/3	15-35	Drag Disk Only
Q-4E/4	25-70	Drag Disk Only

Hysteresis (% Flow Change to Activate/Deactivate Switch)

- ≈ 5% at upper end of flow range
- ≈ 25% at lower end of flow range

Differential pressure drops across unit (Normal Operating Conditions)

- ≈ 1.0 psig at lower end of flow range
- ≈ 5.0 psig at upper end of flow range

Working Line Pressure

300 psig max. @ 180°F Max
(Proof tested to 1200 psig @ 180°F)

Materials

Brass body, Noryl®, stainless steel, and plastic hardware. Working fluid “sees” red brass, 316 stainless steel, phosphor bronze and EPDM elastomer seal. (Hypalon® and Viton® Elastomer Seals are available on special order.)

Electrical Switch Characteristics

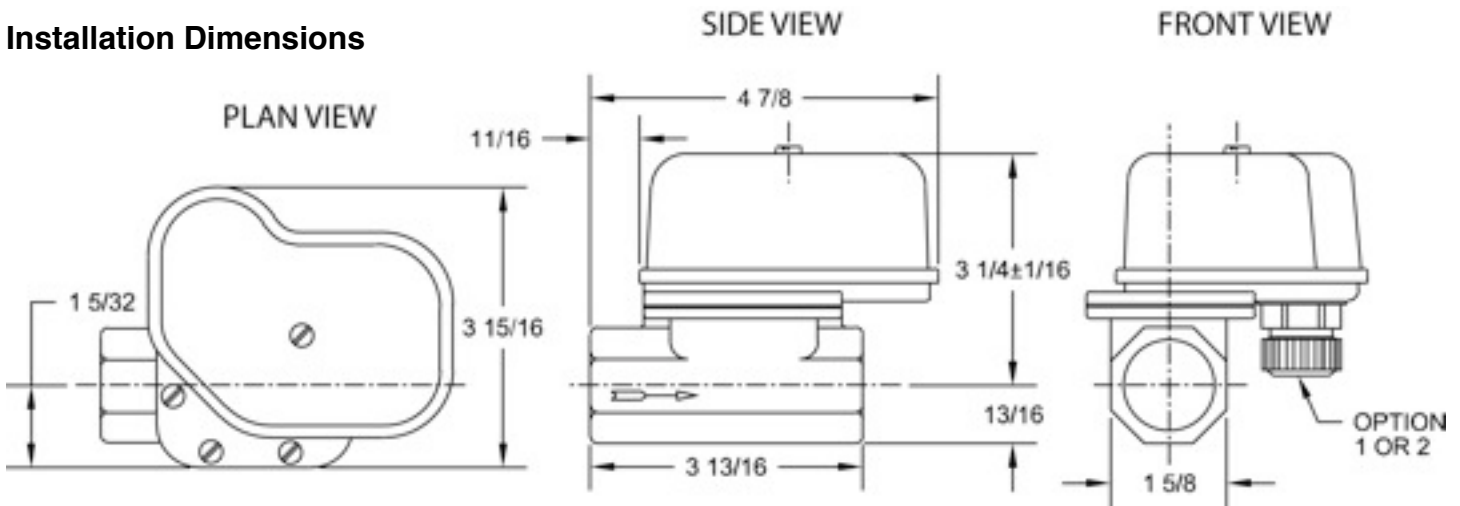
SPDT
15 amp, 1/2 hp @ 125 or 250 VAC
1/2 amp @ 125 VDC, 1/4 amp @ 250 VDC
5 amp @ 125 VAC (tungsten lamp load)
UL and CSA Listed
10,000,000 Operations Median

Model Q-4E can also be fitted with a SPDT Gold Cross Bar Switch for computer/PLC interface.

Maximum Continuous Temperature: 180°F (may be extended to 200°F for short periods.)

Weight: 5 lb.

Installation Dimensions



Input Power Cable Interface Options

Option No. 1

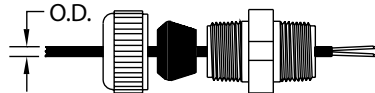
Basic Model #

Sample Part #

Grommet Size

Q - 4E / 1 / B

Orifice/Drag Disk #



Grommet Size	Cable OD	Grommet Size	Cable OD
A	0.25"	B	0.37"
AA	0.30"	C	0.50"

Option No. 2

Basic Model #

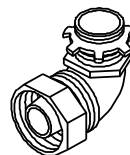
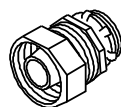
Sample Part #

1/2" Flexible Conduit Fitting

Q - 4E / 3 / F

Orifice/Drag Disk #

1/2" STRAIGHT F



1/2" 90° F90°

- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.

Fluid Flow Switch

Model Q-5

5 to 85,000+ GPM
for pipes 1" - 48"+

Detects and Signals Flow Change

- Superior Long Term Performance
- Line Pressure to 300 Psig
- Continuous Adjustment While Operating
- Temperature 180°F Continuous
- Multiple quick change targets plus continuous spring adjustment provide very wide operating range
- For use in highly particle contaminated fluids
- SPDT 15 amp switching capacity model or Dry Circuit Computer/PLC Interface model
- Intrinsically Safe Relay Allows Model Q-5 to be used in Hazardous Areas.
- Maintains Calibration Limits When Subjected to Reasonable Line Hydraulic Hammer or Surge Pulses
- Calibrated Independent of Line Pressure and Temperature



Typical Working Fluids

- Alcohols
- Glycols
- Pure Water
- Sea Water
- Sewage Water
- Slurries
- Soap Solutions
- Tap Water

Typical Uses

Water Treatment

- Contaminated Groundwater
- Irrigation Systems
- Municipal Water Supply Systems
- Sewage Treatment Plants

In Chemical Processing

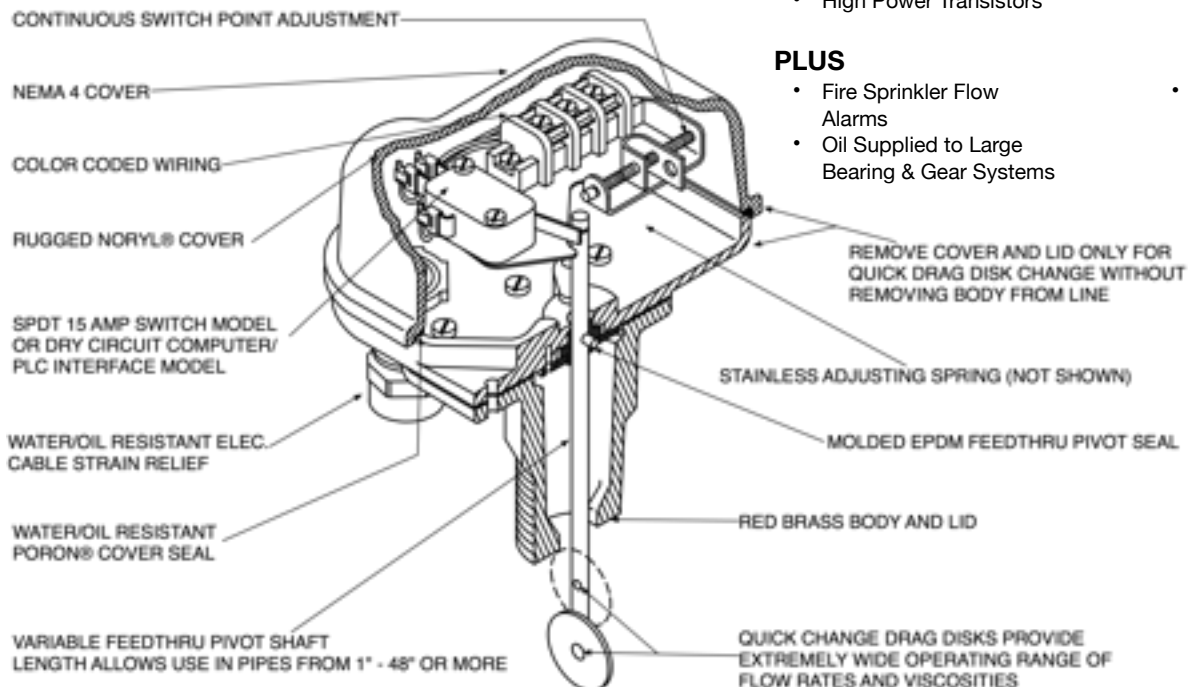
- Fluid Blending Systems
- Heat Transfer Fluids
- Liquid Scrubbers
- Liquid Transfer
- Monitor Filter Clogging
- Water Treatment

To Monitor Flow of Coolant Supplied to:

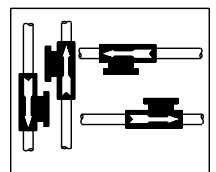
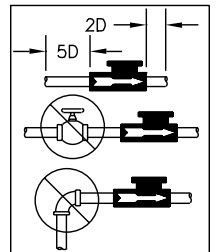
- Air Condition Systems
- Brakes & Clutches
- Computer Systems
- Diodes, SCR's, Triacs, etc.
- Electro Magnets
- High Power Transistors
- Plastic Molding Equipment
- RF and Radar Transmitter
- Spot welders
- Transformers
- Vacuum Diffusion Pumps

PLUS

- Fire Sprinkler Flow Alarms
- Oil Supplied to Large Bearing & Gear Systems
- Steam Boiler Feed Water



TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



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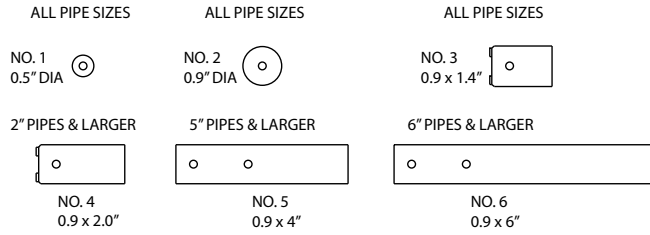
Model Selection Chart

Pipe Size NPT	Flow Limits Between Which Switch Point May Be Set GPM	Part Number			
		Model	Pivot Shaft No.	Target No.	Electric Cable 1 or 2
1	5-15	Q-5	2	2	---
	12-36	Q-5	2	1	---
1 1/2	7-21	Q-5	3	3	---
	10-30	Q-5	3	2	---
2	20-75	Q-5	3	1	---
	14-42	Q-5	3	4	---
2 1/2	20-60	Q-5	3	2	---
	50-150	Q-5	3	1	---
3	21-63	Q-5	3	4	---
	30-90	Q-5	3	2	---
3 1/2	70-210	Q-5	3	1	---
	27-81	Q-5	5	4	---
4	45-135	Q-5	5	2	---
	110-330	Q-5	5	1	---
4 1/2	36-108	Q-5	5	4	---
	60-180	Q-5	5	2	---
5	150-450	Q-5	5	1	---
	45-135	Q-5	5	4	---
5 1/2	75-225	Q-5	5	2	---
	200-600	Q-5	5	1	---
6	51-153	Q-5	5	5	---
	120-360	Q-5	5	2	---
6 1/2	300-900	Q-5	5	1	---
	65-195	Q-5	5	6	---
7	80-240	Q-5	5	5	---
	190-570	Q-5	5	2	---
7 1/2	450-1350	Q-5	5	1	---
	103-309	Q-5	5	6	---
8	126-378	Q-5	5	5	---
	300-900	Q-5	5	2	---
8 1/2	800-2400	Q-5	5	1	---
	172-516	Q-5	5	6	---
9	211-633	Q-5	5	5	---
	500-1500	Q-5	5	2	---
9 1/2	1200-3600	Q-5	5	1	---

LARGE PIPE SIZE INFORMATION AVAILABLE BY REQUEST.

Model Q-5

Target (Drag Disk/Strip) Number



Hysteresis (% Flow Change to Activate / Deactivate Switch)

≈ 10% at upper end of flow range
 ≈ 30% at lower end of flow range

Differential Pressure Drops Across Unit (Normal Operating Conditions)

1" - 3" Pipe, less than 1 psi
 4" - 48" Pipe, Negligible

Working Line Pressure

300 psig max. @ 180°F Max
 (Proof tested to 1200 psig @ room temperature)

Materials

Brass body, Noryl® cover, 316 stainless steel hardware.

Fluid "sees" red brass, phosphor, bronze, EPDM elastomer seal. (Other seal material available.)

Electrical Switch Characteristics

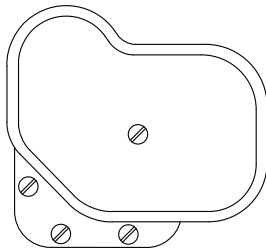
SPDT, 15 amp, 1/2 hp @ 125 or 250 VAC,
 1/2 amp @ 125 VDC, 1/4 amp @ 250 VDC,
 5 amp @ 125 VAC (tungsten lamp load)
 UL and CSA Listed
 10,000,000 Operations Median

Model Q-5 can also be fitted with a SPDT Gold Cross Bar Switch for computer/PLC interface.

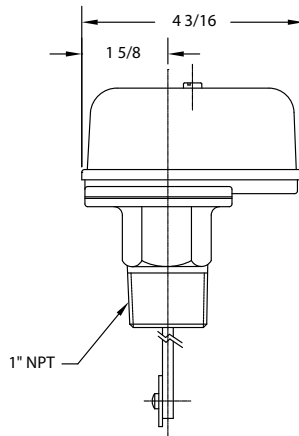
Weight: 3.5 lb.

Installation Dimensions

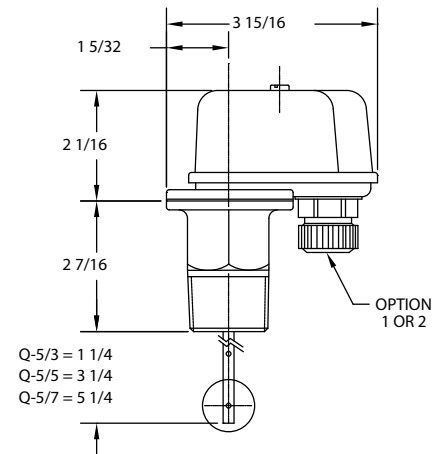
PLAN VIEW



SIDE VIEW



FRONT VIEW



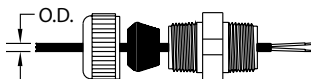
Input Power Cable Interface Options

Option No. 1

Basic Model # Sample Part #
 Grommet Size pg. 9

Q - 5 / 3 / 2 / B

Drag Disk Feedthru Shaft Length Drag Disk Size

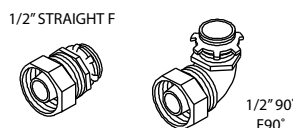


Option No. 2

Basic Model # Sample Part #
 1/2" Flexible Conduit Fitting

Q - 5 / 3 / 2 / F

Drag Disk Feedthru Shaft Length Drag Disk Size



See grommet size chart on page 9.

- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.

Fluid Flow Switch

Model Q-5SS

10 to 102,000+ GPM

for pipes 1"-48"+

316 STAINLESS STEEL - TEFLON® - VITON® - WETTED SURFACES



*Reliable,
Inexpensive*

For Use in Mildly Corrosive Chemicals

Generally accepted for use with 316 Stainless Steel
For instance, mildly corrosive fluids such as:

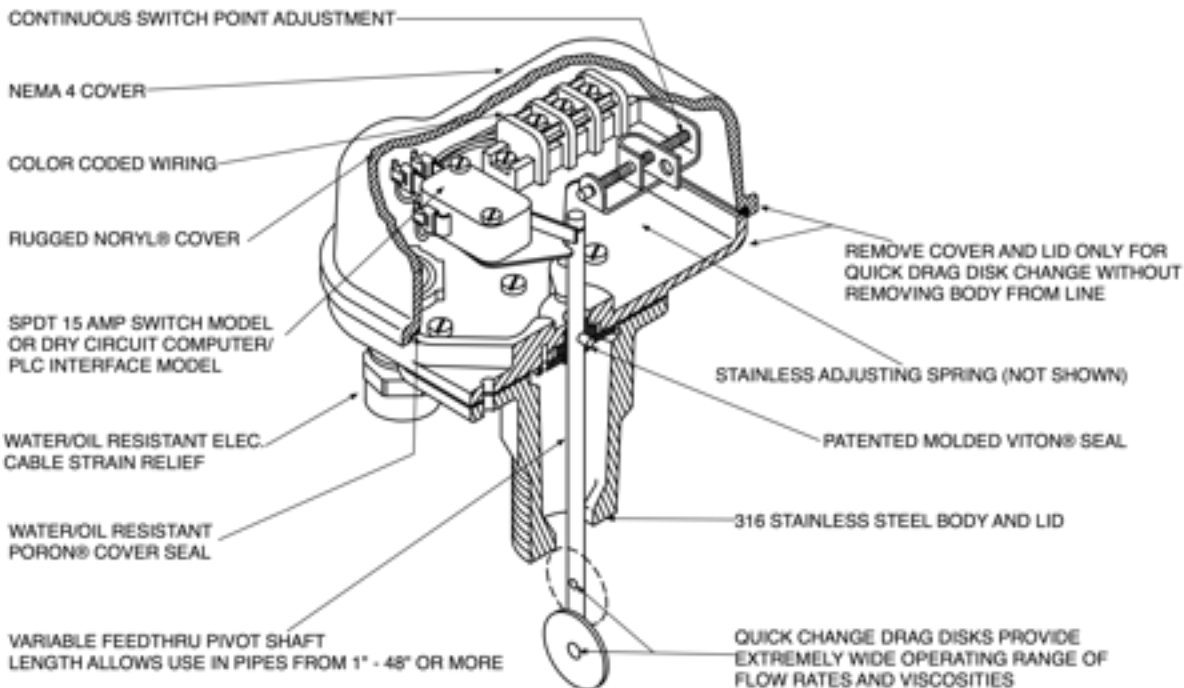
- Aluminum Sulfate
- Crude Oil
- Diluted Sulfuric Acid
- Ethyl Chloride
- Hydrochloric Acid
- Lactic Acid
- Magnesium Hydroxide
- Nickel Sulfate
- Nitric Acid
- Phenol
- Potassium Dichromate
- Zinc Sulfate

Plus

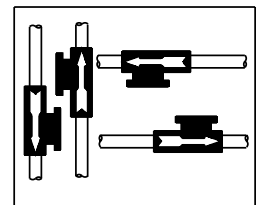
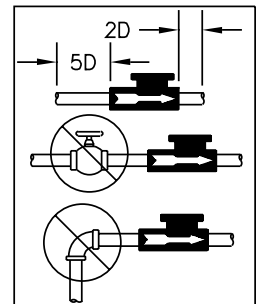
- Alcohols
- Filtered Sewage Water
- Gasoline
- Glycols
- Oils
- Pure Water
- Soap Solutions
- Tap Water

Special Features

- Wetted surfaces of 316 stainless steel, Teflon® and Viton®
- Responds to flow only, independent of pressure and temperature
- Continuously adjustable while operating
- Mount in any position
- Line pressure to 300 psig
- Temperature to 180°F continuous
- No damage or calibration change when subjected to reasonable hydraulic hammer or surge pulses
- Maintenance and checkout is a snap for your present personnel using an uncomplicated standard test meter
- Extensive Chemical Corrosive List On Page 49.



TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



Limited Warranty Page 7

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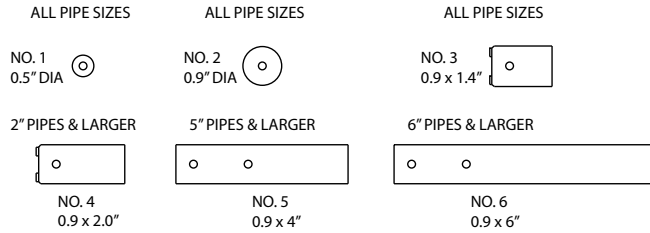
Model Selection Chart

Pipe Size NPT	Flow Limits Between Which Switch Point May Be Set GPM	Part Number			
		Model	Pivot Shaft No.	Target No.	Electric Cable 1 or 2
1	10-20	Q-5SS	2	2	---
	20-60	Q-5SS	2	1	---
1 1/2	14-42	Q-5SS	3	3	---
	20-60	Q-5SS	3	2	---
	30-90	Q-5SS	3	1	---
2	21-63	Q-5SS	3	4	---
	30-90	Q-5SS	3	2	---
	60-180	Q-5SS	3	1	---
2 1/2	36-108	Q-5SS	3	4	---
	90-150	Q-5SS	3	2	---
	90-270	Q-5SS	3	1	---
3	45-135	Q-5SS	5	4	---
	75-225	Q-5SS	5	2	---
	130-390	Q-5SS	5	1	---
3 1/2	56-168	Q-5SS	5	4	---
	85-285	Q-5SS	5	2	---
	180-540	Q-5SS	5	1	---
4	77-231	Q-5SS	5	4	---
	130-390	Q-5SS	5	2	---
	235-705	Q-5SS	5	1	---
5	84-252	Q-5SS	5	5	---
	200-600	Q-5SS	5	2	---
	350-1050	Q-5SS	5	1	---
6	103-309	Q-5SS	5	6	---
	125-375	Q-5SS	5	5	---
	300-900	Q-5SS	5	2	---
8	550-1650	Q-5SS	5	1	---
	189-567	Q-5SS	5	6	---
	232-696	Q-5SS	5	5	---
10	550-1650	Q-5SS	5	2	---
	950-2850	Q-5SS	5	1	---
	292-876	Q-5SS	5	6	---
10	358-1074	Q-5SS	5	5	---
	850-2550	Q-5SS	5	2	---
	1450-4350	Q-5SS	5	1	---

LARGE PIPE SIZE INFORMATION AVAILABLE BY REQUEST.

Model Q-5SS

Target (Drag Disk/Strip) Number



Hysteresis (% Flow Change to Activate / Deactivate Switch)

≈ 10% at upper end of flow range
 ≈ 30% at lower end of flow range

Differential Pressure Drops Across Unit (Normal Operating Conditions)

1" - 3" Pipe, less than 1 psi
 4" - 48" Pipe, Negligible

Working Line Pressure

300 psig max. @ 180°F Max
 (Proof tested to 1200 psig @ room temperature)

Materials

316 Stainless steel body, Noryl® cover, 316 stainless steel hardware.

Working fluid "sees" 316 stainless, Teflon® gasket and Viton® elastomer seal.

Electrical Switch Characteristics

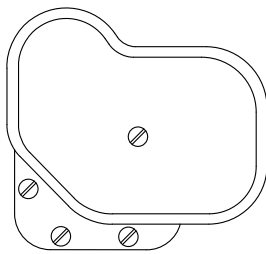
SPDT, 15 amp, 1/2 hp @ 125 or 250 VAC,
 1/2 amp @ 125 VDC, 1/4 amp @ 250 VDC,
 5 amp @ 125 VAC (tungsten lamp load)
 UL and CSA Listed
 10,000,000 Operations Median

Model Q-5SS can also be fitted with a SPDT Gold Cross Bar Switch for computer/PLC interface.

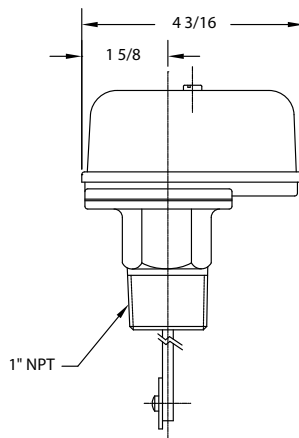
Weight: 3.5 lb.

Installation Dimensions

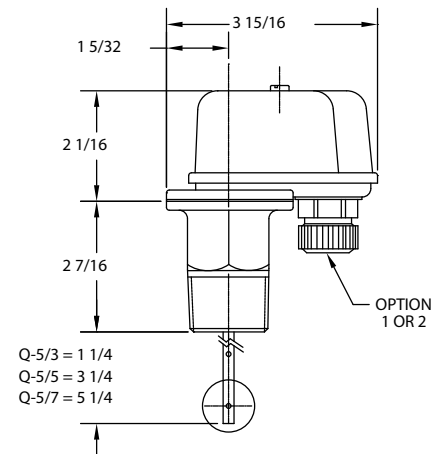
PLAN VIEW



SIDE VIEW



FRONT VIEW



Input Power Cable Interface Options

Option No. 1

Basic Model #

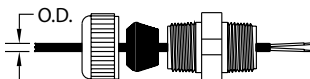
Sample Part #

Grommet Size pg. 9

Q - 5SS / 3 / 2 / B

Drag Disk Feedthru Shaft Length

Drag Disk Size



Option No. 2

Basic Model #

Sample Part #

1/2" Flexible Conduit Fitting

Q - 5SS / 3 / 2 / F

Drag Disk Feedthru Shaft Length

Drag Disk Size



See grommet size chart on page 9.

- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.

Fluid Flow Switch

Model QD-1

QD-4E, QD-5, QD-5SS

Model QD-1

0.12 to 8.0 GPM
For 1/2" Pipes



Model QD-4E

4 to 70 GPM
For 1" Pipes

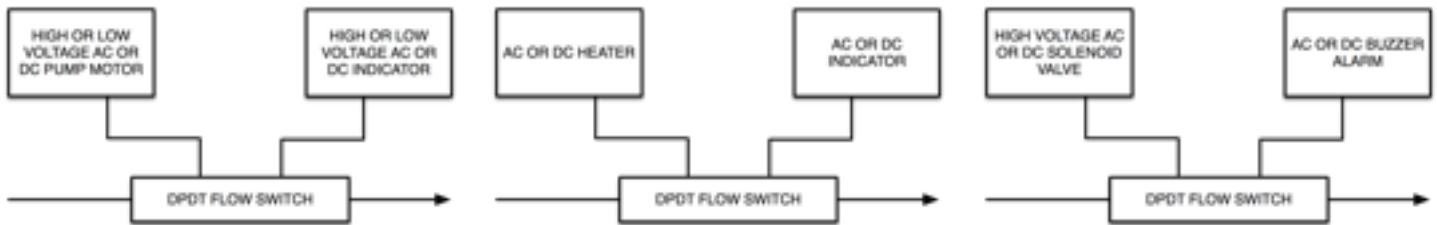


Models QD-5, QD-5SS

5-102,000 GPM & Up
For Pipes 1" - 48" & Up



**Supplied with Optional Feature -
Two SPDT Switches to Provide DPDT Action.**



Two Physically Ganged BUT Electronically Independent Switches Provide:

- Combination of two isolated AC or DC Circuits.
- Combination of two isolated High or Low Voltage Circuits.
- Combination of two isolated Power or Gold Cross Bar computer/PLC Dry Circuit.

Performance, Physical and Electrical Specifications are the same as Standard Single Switch Units (Q-1, Q-4E, Q-5) with the following modifications:

- Nominal Differential Flow between the two Microswitch Actuation Points is -
Model QD-1 \approx 5% Model QD-4E \approx 5% Model QD-5 \approx 5%
- Electrical Connection is made directly to switch terminals with standard spade Quick-Connects supplied with each unit.

Reference Part Number:

- See page 8 for Q-1
- See Page 10 for Q-4E
- See Page 12 for Q-5
- See Page 14 for Q-5SS

- Add D to part # to designate DPDT Action Desired.

SAMPLE PART #:

QD-1 / 3 / A

QD-5 / 5 / 3 / F



Limited Warranty Page 7

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www.harwil.com

Miscellaneous Background Information

FLOW SWITCH MODEL Q-1:

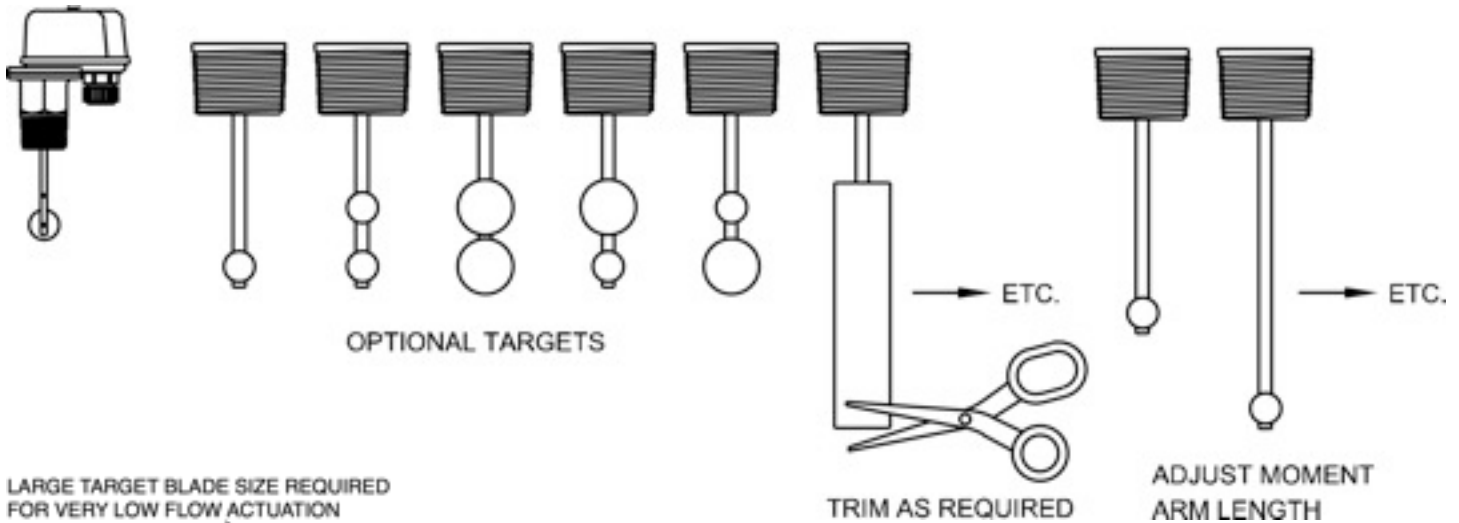
The dimensions of the 6 orifices listed in Model Q-1 are

Orifice No.	Orifice J.D. (inches)
1	0.073 (Drill No. 49)
2	0.094 (Drill No. 42)
3	0.150 (Drill No. 25)
4	0.196 (Drill No. 9)
5	0.277 (Letter J)
6	0.375 (3/8)

NOTE: Each orifice size provides a 2:1 flow range as listed under Model Q-1 Specifications. Model Q-1 can be provided with a blank orifice which the end user can drill as required to provide any desired 2:1 flow adjusting range. For example orifice No. 4 with a 0.196" I.D. hole has a normal 2:1 adjustable range 1.0 to 2.0 GPM. A blank orifice can be drilled approximately half way between orifice No. 4 and No. 5 that is drill "B" (0.238") to provide a flow range of 1.5 to 3.0 GPM. The end user can thus drill blank orifices as required to produce any 2:1 incremental sub division of the total operating range 0.12 to 8.0 GPM.

Models Q-5 / QD-5 / QD-5SS

These are supplied with target blades 0.9" wide for all lengths of blade. This allows blade and support shaft to be inserted into standard one inch NPT female fittings without removing fitting from main flow line.



LARGE TARGET BLADE SIZE REQUIRED FOR VERY LOW FLOW ACTUATION

LARGER TARGET BLADE COULDE BE DAMAGED WHEN SUBJECTED TO NORMAL FLOW.

IDEAL TARGET BLADE SIZE FOR NORMAL FLOW.

Flow Sensitivity vs Target Size vs Structural Load Limits

Target type flow switches present a classic turn down rate limit situation, that is, flow systems frequently require detection of flow at low to very low flow rate, E.G. 0.5 to 2.0 GPM in pipe size 1.0 inches to 6 inches and larger. This translated into very low ft/sec flow past the target blade which, in turn, may produce drag forces too small to operate the flow switch. This catch 22 situation is normally accommodated by limiting the high flow end, (i.e. turn down ratio, higher flow rate) may be available at greater complexity and increased cost.

- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.



Fluid Flow Switch

Model Q-8N (PPO)

8 to 1900 GPM & Up
for pipes 1" - 10" & Up

Noryl® Engineering Plastic (PPO) Polyphenylene Oxide

During normal operations flow switches increase efficiency, save time and money by the continuous monitoring of deviations from optimum flow rates. During emergency conditions flow switches signal system malfunctions such as line breakage, pump failure, incorrect valve opening or closing, pipe, valve or filter clogging, etc.

Typical Working Fluids

- For use in corrosive liquids such as mild acid and base solutions and related fluids.
- Extensive chemical list is available (see page 49).

For use in highly particle-contaminated liquids such as:

- Contaminated Groundwater
- Medium Slurries
- Rusty Coolant Water
- Sea Water
- Sewage
- Waste Water

Special Features

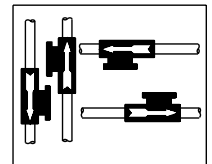
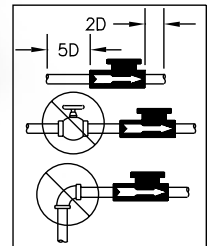
- Particle contamination resistance is provided by a single convolute elastomeric seal which is continually flushed by working fluid flow.
- Wetted surfaces of Noryl®, 316 Stainless Steel, EPDM Elastomeric Standard (Viton® Special Order.)
- Continuous adjustment while operating
- Responds to flow only, independent of line pressure, temperature, environment
- Temperature to 150°F continuous
- Line pressure to 50 psig operating - 100 psig non-operating
- SPDT 15 amp switching capacity model or Dry Computer/PLC Interface model
- Maintenance and checkout is a snap for your present personnel using an uncomplicated standard test meter.
- Maximum flow range flexibility is provided by three adjustment options:
 - Option 1 - Continuous adjustment while operating via FORCE/BALANCE spring
 - Option 2 - Step incremental adjustment via drag disk size change
 - Option 3 - Continuous adjustment via drag disk moment arm change

COMPONENT RECOGNIZED /c  (E85349)

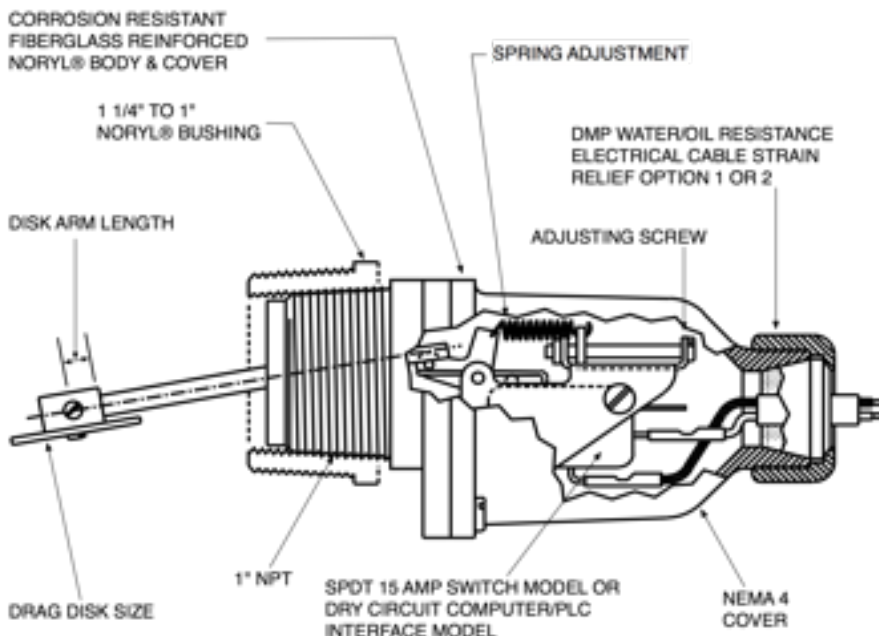
Reliable, Inexpensive



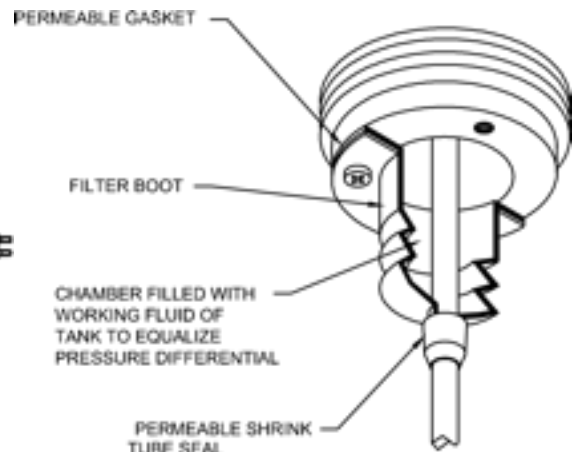
TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



Available with Optional Filter Boot For Use In Highly Particle Contaminated Liquids



Limited Warranty Page 7

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Flow Range Water Calibrated @ 70°F

Model Selection Chart

Pipe Size	Flow Limits Between Which Switch Point May Be Set GPM	Model Part Number (Power Cable Interface Option 1 or 2)
1	8-13	Q-8N /1 /2 /---
	18-28	Q-8N /1 /1 /---
1 1/2	15-30	Q-8N /2 /3 /---
	25-50	Q-8N /2 /1 /---
2	15-50	Q-8N /2 /3 /---
	50-105	Q-8N /2 /1 /---
2 1/2	40-80	Q-8N /2 /3 /---
	80-155	Q-8N /2 /1 /---
3	40-90	Q-8N /3 /3 /---
	90-180	Q-8N /3 /1 /---
4	75-155	Q-8N /3 /3 /---
	155-310	Q-8N /3 /1 /---
5	120-245	Q-8N /3 /3 /---
	245-480	Q-8N /3 /1 /---
6	180-350	Q-8N /3 /3 /---
	350-700	Q-8N /3 /1 /---
8	300-600	Q-8N /3 /3 /---
	600-1200	Q-8N /3 /1 /---
10	500-950	Q-8N /3 /3 /---
	950-1900	Q-8N /3 /1 /---

LARGE PIPE SIZE INFORMATION AVAILABLE BY REQUEST.

A Four Part Model # Completely Defines Each Unit

Basic Model #	Drag Disk Arm Length (See X)	Drag Disk Size	Input Power Cable Interface Option
Q-8N	1 or 2 or 3	1 or 2 or 3	1 or 2
	1=1.15"	1=0.5" dia.	SEE BELOW
	2=1.85"	2=0.83" dia.	
	3=3.31"	3=1.0" dia.	
Q-8N	/	/	/

Input Power Cable Interface Options

Option No. 1

Sample Part #

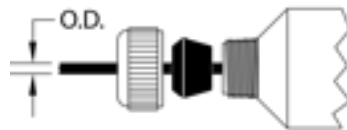
Basic Model # & Body Material

Grommet Size

Q - 8N / 1 / 1 / B

Drag Disk Arm Length

Drag Disk Size



Grommet Size	Cable OD	Grommet Size	Cable OD
A	0.25"	B	0.37"
AA	0.30"	C	0.50"

Option No. 2

Sample Part #

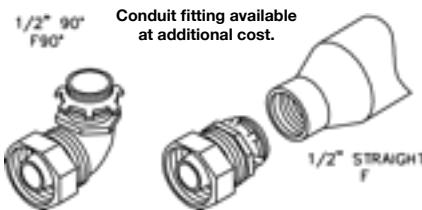
Basic Model # & Body Material

1/2" NPT Female Thread

Q - 8N / 1 / 1 / F

Drag Disk Arm Length

Drag Disk Size



Conduit fitting available at additional cost.

Model Q-8N

Hysteresis (% Flow Change to Activate/Deactivate Switch)

- ≈ 10% @ upper end of range
- ≈ 30% @ lower end of range

Differential pressure drops across unit

(Normal Operating Conditions)

- 1" - 3" pipe - less than 0.5 psi
- 4 - 10" pipe - negligible

Working Line Pressure

- 50 psig max. @ 180°F Max operating
- 100 psig @ 180°F Max non-operating

Wetted Surfaces

- Noryl® - (10% glass fibers)
- 316 Stainless Steel Standard
- EPDM Elastomer (Viton® Special Order)

Electrical Switch Characteristics

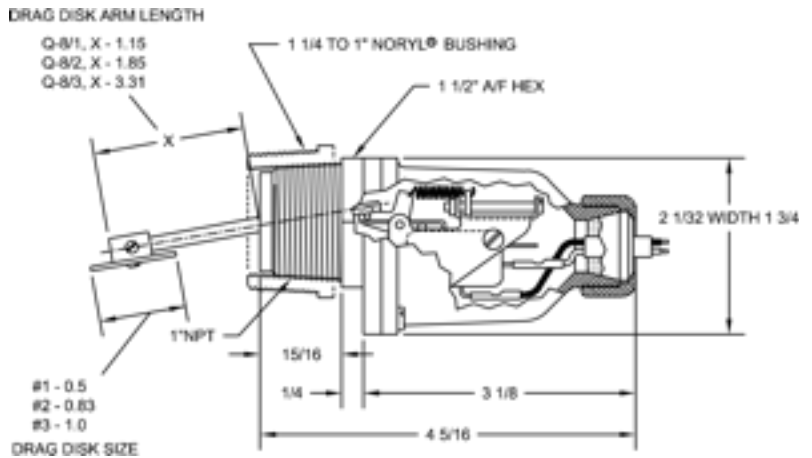
SPDT UL and CSA listed
 15 amp, 1/2 HP @ 125 or 250 VAC
 1/2 amp @ 125 VDC (Tungsten lamp load)
 10,000,000 operations median

Model Q-8N can also be fitted with a SPDT Gold Cross Bar Switch for computer/PLC interface.

Maximum Continuous Temperature: 180°F

Optional Filter Boot Available in EPDM, (Viton® Special Order)

Weight: 1/2 lb.



- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.

Fluid Flow Switch

Model Q-8CR

8 to 1900 GPM & Up
for pipes 1" - 10" & Up

Tycona Fortron® (PPS) Polyphenylene Sulfide

During normal operations flow switches increase efficiency, save time and money by the continuous monitoring of deviations from optimum flow rates. During emergency conditions flow switches signal system malfunctions such as line breakage, pump failure, incorrect valve opening or closing, pipe, valve or filter clogging, etc.

COMPONENT RECOGNIZED  /  (E85349)

For use in highly particle-contaminated liquids such as:

- Contaminated Groundwater
- Machine Cutting Oils
- Medium Slurries
- Rusty Coolant Water
- Sea Water
- Sewage
- Waste Water

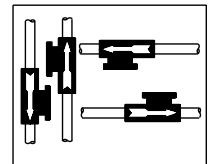
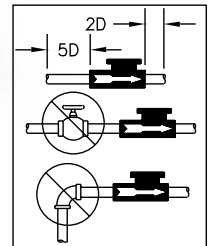
Special Features

- Particle contamination resistance is provided by a single convolute elastomeric seal which is continually flushed by working fluid flow.
- Wetted surfaces of Fortron® PPS, Hastelloy® C, (Titanium, Tantalum, Special Order) and Viton®.
- Continuous adjustment while operating
- Responds to flow only, independent of line pressure, temperature, environment
- Temperature to 200°F continuous
- Line pressure to 50 psig operating; 100 psig non-operating
- SPDT 15 amp switching capacity model or Dry Circuit
- Computer/PLC Interface model
- Fortron® (PPS) test strips available for chemical environment testing.
- Extensive Chemical Corrosive List Available.
- Maximum flow range flexibility is provided by three adjustment options:
 - Option 1 - Continuous adjustment while operating via FORCE/BALANCE spring
 - Option 2 - Step incremental adjustment via drag disk size change
 - Option 3 - Continuous adjustment via drag disk moment arm change

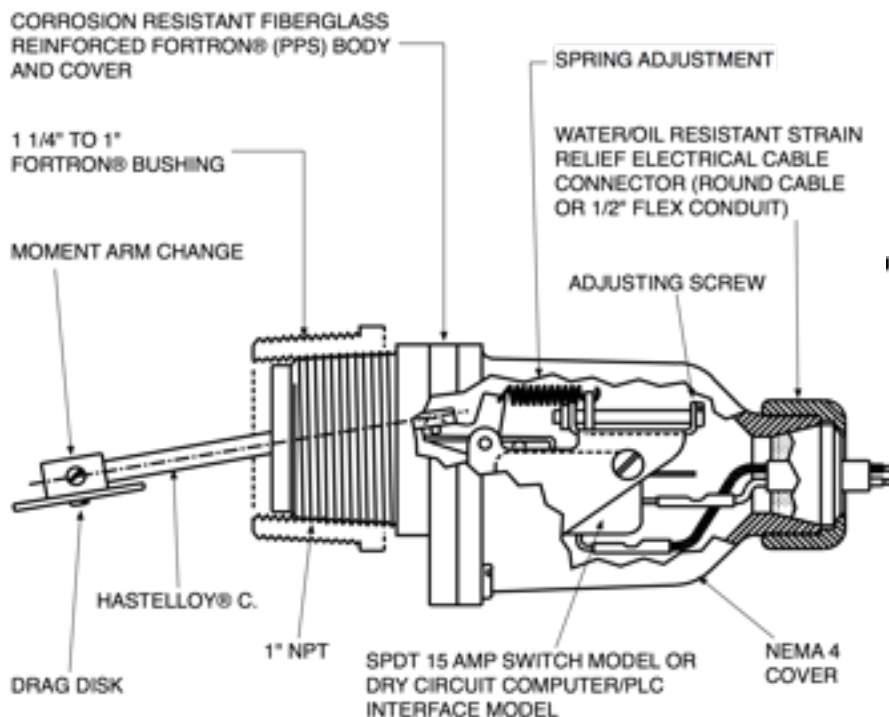
Reliable, Inexpensive



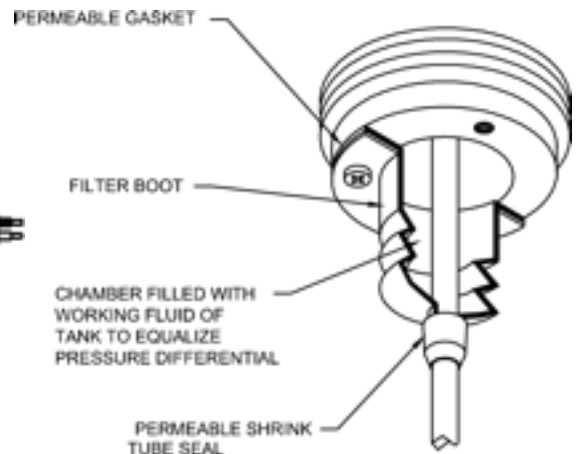
TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



Available with Optional Filter Boot For Use In Highly Particle Contaminated Liquids



Limited Warranty Page 7

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www.harwil.com

Flow Range Water Calibrated @ 70°F

Model Selection Chart

Pipe Size	Flow Limits Between Which Switch Point May Be Set GPM	Model Part Number (Power Cable Interface Option 1 or 2)
1	8-13	Q-8CR / 1 / 2 / ---
	18-28	Q-8CR / 1 / 1 / ---
1 1/2	15-30	Q-8CR / 2 / 3 / ---
	25-50	Q-8CR / 2 / 1 / ---
2	15-50	Q-8CR / 2 / 3 / ---
	50-105	Q-8CR / 2 / 1 / ---
2 1/2	40-80	Q-8CR / 2 / 3 / ---
	80-155	Q-8CR / 2 / 1 / ---
3	40-90	Q-8CR / 3 / 3 / ---
	90-180	Q-8CR / 3 / 1 / ---
4	75-155	Q-8CR / 3 / 3 / ---
	155-310	Q-8CR / 3 / 1 / ---
5	120-245	Q-8CR / 3 / 3 / ---
	245-480	Q-8CR / 3 / 1 / ---
6	180-350	Q-8CR / 3 / 3 / ---
	350-700	Q-8CR / 3 / 1 / ---
8	300-600	Q-8CR / 3 / 3 / ---
	600-1200	Q-8CR / 3 / 1 / ---
10	500-950	Q-8CR / 3 / 3 / ---
	950-1900	Q-8CR / 3 / 1 / ---

LARGE PIPE SIZE INFORMATION AVAILABLE BY REQUEST.

A Four Part Model # Completely Defines Each Unit

Basic Model #	Drag Disk Arm Length (See X)	Drag Disk Size	Input Power Cable Interface Option
Q-8CR	1 or 2 or 3	1 or 2 or 3	1 or 2
	1=1.15"	1=0.5" dia.	SEE BELOW
	2=1.85"	2=0.83" dia.	
	3=3.31"	3=1.0" dia.	
Q-8CR	/	/	/

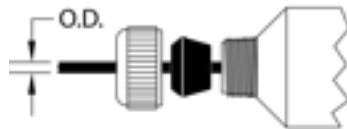
Input Power Cable Interface Options

Option No. 1 Sample Part #

Basic Model # & Body Material Grommet Size

Q - 8CR / 1 / 1 / B

Drag Disk Arm Length Drag Disk Size



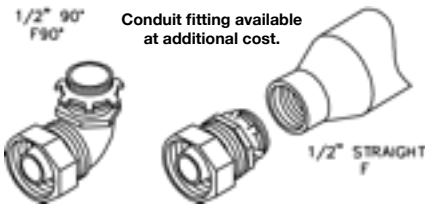
Grommet Size	Cable OD	Grommet Size	Cable OD
A	0.25"	B	0.37"
AA	0.30"	C	0.50"

Option No. 2 Sample Part #

Basic Model # & Body Material 1/2" NPT Female Thread

Q - 8CR / 1 / 1 / F

Drag Disk Arm Length Drag Disk Size



Conduit fitting available at additional cost.

- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.

Model Q-8CR

Hysteresis (% Flow Change to Activate/Deactivate Switch)

- ≈ 10% @ upper end of range
- ≈ 30% @ lower end of range

Differential pressure drops across unit (Normal Operating Conditions)

- 1" - 3" pipe - less than 0.5 psi
- 4" - 10" pipe - negligible

Working Line Pressure

- 50 psig max. @ 200°F Max operating
- 100 psig @ 200°F Max non-operating

Wetted Surfaces

- Fortron®, Hastelloy® C, and Viton®

Electrical Switch Characteristics

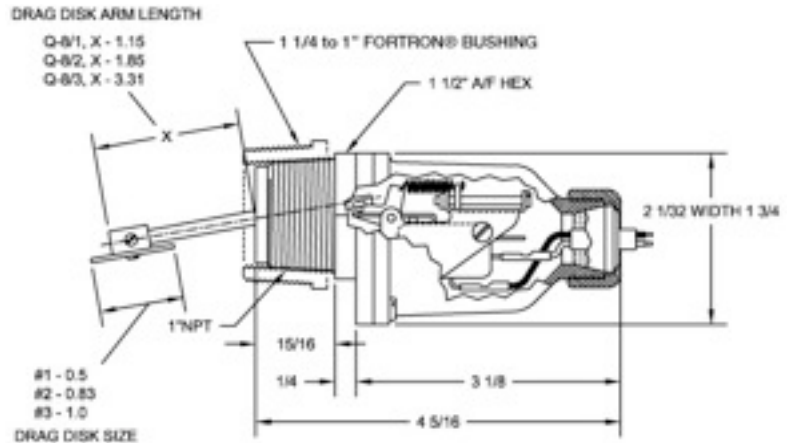
SPDT UL and CSA listed
 15 amp, 1/2 HP @ 125 or 250 VAC
 1/2 amp @ 125 VDC, 1/4 amp @ 250VDC
 5 amp @ 125 VDC (Tungsten lamp load)
 10,000,000 operations median

Model Q-8CR can also be fitted with a SPDT Gold Cross Bar Switch for computer/PLC interface.

Maximum Continuous Temperature: 200°F

Optional Filter Boot Available in EPDM, (Viton® Special Order)

Weight: 1/2 lb.



Fluid Flow Switch

Model Q-10N & Q-10VCR

Extremely Wide Operating Range:

- Down to 0.9 GPM in 1.0 inch pipes
- Up to 1025 GPM in 16 inch pipes

FLEXIBLE Design:

Model Q-10 is provided with three factory adjustable parameters which provide performance flexibility to meet a multitude of applications:

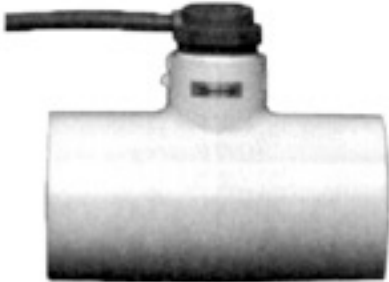
- Target Area
- Target Length
- Target Stiffness

Two Standard Models are Available

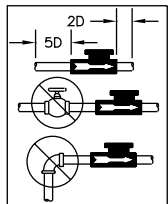
Model Q-10N for mild acids, bases

Model Q-10CR for concentrated acids, bases, ketones, esters, alcohols, phenols, etc.

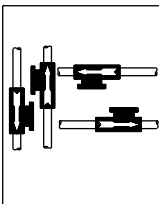
Extensive Chemical Corrosive List On Page 49.



TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



COMPONENT RECOGNIZED /c  (E85349)

Low Cost

Available with NO, NC or SPDT Reed Switch

Send Us Your Special Requirements

We Will Quote A Special Unit To Meet Those Requirements

- Designed for a broad spectrum of industrial fluids - pure water, tap water, sea water, cooling tower water, glycol solutions, acids, bases, hydrocarbons, ketones, lubricating oils, gasoline, JP-4, plating solutions.
- Responds to fluid flow only, independent of line pressure and temperature.
- Max flow may be five times normal flow.
- Positive stop eliminates fatigue effects of turbulence, vibration and flow surge on flow detecting element.
- Quick response.
- Small size and low profile provides easy mounting in crowded installations.
- Very low pressure drop - typically less than 1.0 psig at normal flow rate.
- Line pressure to 250 psig at room temperature.
- Temperature to 200°F continuous.
- Switches 5 VDC to 240 VAC.
- Switches resistive and light inductive loads.
- Switches Dry Circuit Computer/PLC inputs.
- Switch employs magnetic coupling.

Typical Uses

Monitoring flow of coolant water supplied to:

- RF and Radar transmitters
- High power transistors, SCR's etc.
- Computer systems
- Electromagnets
- Transformers
- Brakes and clutches
- Lasers
- Spot welders
- Vacuum systems
- Marine and stationary engines
- Emergency washdown showers
- Fire sprinkler flow alarms

In Chemical Processing

- Liquid transfer
- Water treatment
- Sewage systems (filtered)
- Fluid blending systems
- Monitoring pump output, valve position, systems flow status
- Liquid scrubbers
- Starting back-up pumps
- Monitor filter clogging
- Heat transfer fluids
- Contaminated groundwater

US PATENT NO. 5,021,619

Limited Warranty Page 7

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Flow Range Water Calibrated @ 70°F

Model Selection Chart

Pipe Size	Nominal ON/OFF Switch Point Range (GPM)	Model Number (N or VCR)	Target Blade Number	Switch Oper. Norm. Open or Norm Closed	Power Chord Length
1	1.3-0.9	Q-10 -- /	1 /	---	/ ---
	4-2	Q-10 -- /	2 /	---	/ ---
1 1/2	8-4	Q-10 -- /	3 /	---	/ ---
	17-14	Q-10 -- /	4 /	---	/ ---
2	10-7	Q-10 -- /	5 /	---	/ ---
	16-11	Q-10 -- /	6 /	---	/ ---
3	22-15	Q-10 -- /	7 /	---	/ ---
	36-25	Q-10 -- /	8 /	---	/ ---
4	39-27	Q-10 -- /	9 /	---	/ ---
	64-45	Q-10 -- /	10 /	---	/ ---
5	61-43	Q-10 -- /	11 /	---	/ ---
	100-70	Q-10 -- /	12 /	---	/ ---
6	88-62	Q-10 -- /	13 /	---	/ ---
	144-101	Q-10 -- /	14 /	---	/ ---
8	156-109	Q-10 -- /	15 /	---	/ ---
	256-179	Q-10 -- /	16 /	---	/ ---
10	244-171	Q-10 -- /	17 /	---	/ ---
	400-280	Q-10 -- /	18 /	---	/ ---
12	351-246	Q-10 -- /	19 /	---	/ ---
	576-403	Q-10 -- /	20 /	---	/ ---
16	625-438	Q-10 -- /	21 /	---	/ ---
	1025-718	Q-10 -- /	22 /	---	/ ---

CONSULT THE FACTORY FOR LARGER PIPE SIZES.

Model Q-10N & Q-10VCR

Reed Switch Electrical Characteristics:

SPNO Contact ratings:	
AC Voltage (Max switching)	300 VAC
DC Voltage (Max switching)	350 VDC
Current (max switching)	0.5 amp
Current (max carrying)	2.5 amp
Power (max) (VA, W)	50 watts
Contact resistance (max initial)	0.15 ohms
Insulation resistance	10 ¹⁰ ohms
Operating temperature	-40°F to 240°F (-40°C to 115°C)

SPNC or SPDT, 3 Watt, 100VAC/VDC optional

Computer/PLC Dry Circuit Operation

Inductive Loads

Switch contacts have been tested with small relay and J-C 30 amp motor contactor inductive drive coils at 120 VAC and 240 VAC to 500,000 operations without failure. (Volt Amp approximately 6VA. Steady State/Transient surge approximately 34 VA).

Nominal Working Temperature/Pressure

Q-10N	Q-10VCR
180°F	180°F @ ambient pressure
250 Psig	200 Psig @ room temperature

Wetted Surfaces

Model Q-10N

G.E. NORYL® (PPO)
(10% glass fibers)
316 Stainless steel

Model Q-10VCR

Tycona Fortron® (PPS)
(40% glass fibers)
Hastelloy® C.

Option No. 1 - NORYL® (PPO)

Sample Part #

Basic Model # Target Blade # Power Chord Length

Q - 10N / 13 / NO / 4'

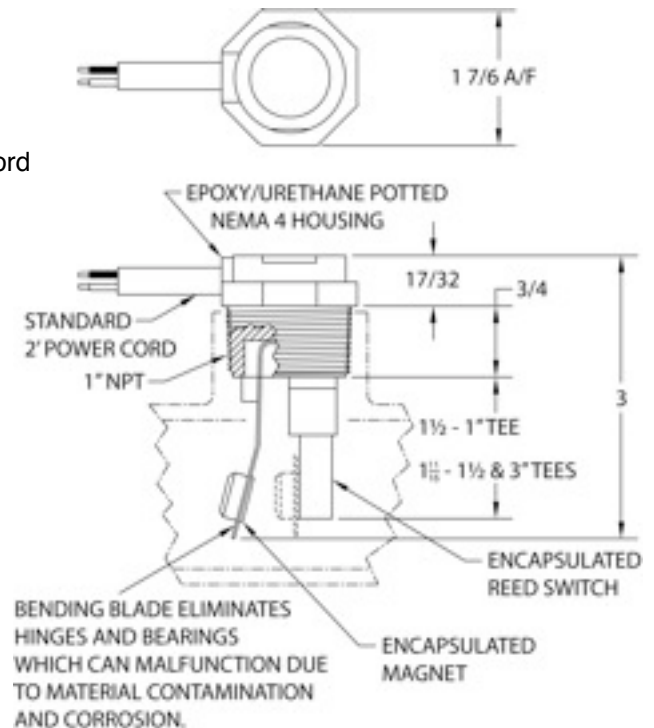
Body Material: NORYL® (PPO) Switch Operation NO, NC, or SPDT

Option No. 2 - Fortron® (PPS)

Plastic and Hast. C. metal surfaces

Q - 10VCR / 1 / NC / 2'

NOTE: Model Q-10 employs magnetic coupling between bending blade and switch body. Magnetic particles can accumulate on and around magnetic housing which may affect proper operation. Please conduct appropriate fluid magnetic particle evaluation and operational tests prior to and during installation and use.



- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.



Fluid Flow Switch

Model Q-12N & Q-12CR

VERY LOW COST

Miniature 1/2" NPT Unit
Available in SPDT, NO or NC Switch Operation

COMPONENT RECOGNIZED /c  (E85349)

True Flow Switch Performance Independent of Pressure and Temperature.

Flexible Design

- Target area
- Target Length
- Target stiffness

Which provide performance and flexibility to meet a multitude of pipe size and flow rate applications.

- Extremely Wide Operating Range:
- Down to 0.4 GPM in 3/4 inch pipes
- Up to 590 GPM in 8 inch pipes
- Many more switch points and pipe sizes available, consult factory for free analysis.

Send Us Your Special Requirements - We Will Quote A Special Unit To Meet Those Requirements



- Designed for a broad spectrum of industrial fluids - pure water, tap water, sea water, cooling tower water, glycol solutions, acids, bases, hydrocarbons, ketones, lubricating oils, gasoline, JP-4, plating solutions.
- Max flow may be five times normal flow.
- Positive stop essentially eliminates fatigue effects of turbulence, vibration and flow surge on flow detecting element.

- Very low pressure drop - typically less than 1.0 psig at normal flow rate.
- Line pressure to 200 psig.
- Temperature to 180°F continuous.
- Switches 5 VDC to 240 VAC.
- Power the driving coil of small ice cube relays as well as some 30 amp power relays.
- Provides dry circuit interface with computer and PLC modules.
- Small size and low profile provides easy mounting in crowded installations.

Typical Uses

- Brakes and clutches
- Computer systems
- Electromagnets
- Emergency wash down showers
- Fire sprinkler flow alarms
- High power transistors, SCR's etc.
- Lasers
- Marine and stationary engines

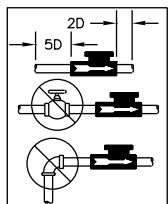
- Monitoring flow and temperature of coolant water supplied to:
 - RF and Radar transmitters
 - Sea water & Fresh water systems
 - Spot welders
 - Transformers
 - Vacuum systems

In Chemical Processing

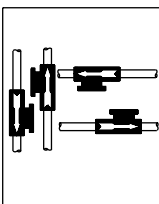
- Liquid transfer
- Starting back-up pumps
- Sewage systems
- Fluid blending systems
- Monitoring pump output, valve position, systems flow status

- Liquid scrubbers
- Water treatment
- Monitor filter clogging
- Heat transfer fluids

TURBULENT FLOW REDUCTION



MOUNT IN ANY POSITION



NOTE: Model Q-12N employs magnetic coupling between float arm and switch body. Magnetic particles can accumulate on and around magnetic housing which may affect proper operation. Please conduct appropriate fluid magnetic particle evaluation and operational tests prior to and during installation and use.



US PATENT NO. 5,021,619

Limited Warranty Page 7

541 Kinetic Drive, Oxnard, CA 93030
Tel (805) 988-6800 Fax (805) 988-6804
Email. harwil@harwil.com
www.harwil.com

Model Q-12N & Q-12CR

Pipe Size NPT	Nominal ON/OFF Switch Point Range (GPM)		Target Blade #
	Orifice		
	On	Off	
3/4	0.4 - 0.3	2 - 1	1
	0.8 - 0.5	2 - 1	2
1	0.7 - 0.4	3 - 2	3
	1.0 - 0.8	3 - 2	4
		4 - 3	5
		6 - 5	6
1 1/2		13 - 12	7
		16 - 15	8
		21 - 19	9
2		15 - 12	10
		23 - 18	11
		27 - 22	12
3		33 - 25	13
		57 - 45	14
		65 - 58	15
		82 - 78	16
4		56 - 43	17
		95 - 83	18
		120 - 108	19
		150 - 140	20
5		92 - 69	21
		150 - 130	22
		180 - 170	23
		230 - 220	24
6		135 - 95	25
		220 - 180	26
		260 - 220	27
		340 - 310	28
8		240 - 180	29
		390 - 320	30
		430 - 400	31
		590 - 570	32

CONSULT THE FACTORY FOR LARGER PIPES AND ADDITIONAL SWITCH POINTS.

Electrical Switch Characteristics

SPNO	
AC Voltage (Max switching)	300 VAC
DC Voltage (Max switching)	350 VDC
Current (max switching-DC)	0.5 amp
Current (max carrying-DC)	2.5 amp
Power (max resistance load)	50 watts
Contact resistance (max initial)	0.15 ohms
Insulation resistance	10 ¹⁰ ohms
Operating temperature	-40°F to 240°F (-40°C to 115°C)

SPNC or SPDT, 3 Watt, 100 VAC/VDC optional

Nominal Working Temperature/Pressure

Q-12N	Q-12CR
180°F	200°F @ ambient pressure
250 Psig	200 Psig @ room temperature

Inductive Loads

Switch contacts have been tested with small relays and 30 amp J-C relay inductive driving coils at 120/240 VAC to 500,000 operations without failure. Steady state driving coil Volt/Amp rating should be 8VA or less.

Dry Circuit Operation

Switch can interface with microprocessor based controllers and related computer circuits.

Wetted Surfaces

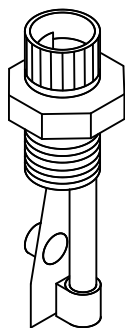
Model Q-12N	Model Q-12CR
G.E. NORYL® (PPO) GFN-1	Tycona Fortron® (PPS)
(10% glass fibers)	(40% glass fibers)
316 Stainless steel	Hastelloy®C
Epoxy	Epoxy

PPO - Polyphenylene Oxide

PPS - Polyphenylene Sulfide

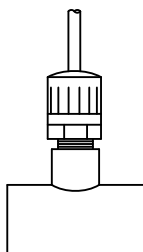
For performance in your working fluid see extensive corrosion resistance guide in the back of the catalog (see page 49).

Free parts samples are available for testing in your "exotic" unlisted fluids.



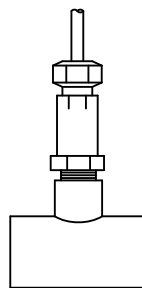
OPTION 1

Basic unit supplied with two 0.187 x 0.020 male spade terminals recessed in 1/2" NPT nipple section.



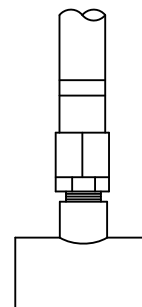
OPTION 2

Two conductor instrument cable potted in place. PVC tee optional.



OPTION 3

Basic unit with DMP tapered rubber grommet attachment for watertight seal and strain relief. PVC tee optional.



OPTION 4

Basic unit fitted with a 1/2" NPT female thread for mating with 1/2" plastic flexible conduit PVC tee optional.

Sample Part Number

basic model # & body material	pipe size (inches)	target blade #	switch operation	electrical connect opt.	tee size and material	orifice size
Q-12N / 3/4	3/4	2	NO	1	3/4x3/4x1/2 SST PVC	1/4" ORIFICE
noryl® (PPO) or fortion® (PPS)	3/4" to 8"	1 thru 32	N.O. or N.C.	option 1, 2, 3, or 4		1/4 or 1/2

- Installation drawing and a numbered parts list is supplied with each unit.
- Current Price Information is Listed on Separate Sheet.
- Special One Day Delivery Available.