100mm Diameter Glycerine Filled Pressure Gauge

Application

For the measurement of fluid liquids that are not:- highly viscous, high temperature (over 60°C), likely to solidify/crystallize or corrosive to copper or tin alloys.

Also suitable for non-oxidising gases (such as oxygen or acetylene) up to 25 bar maximum.

Glycerine filled gauges are particularly suited to applications where oscillating/surging pressures or vibration are present. The damping effect of the glycerine will steady the pointer making it easier to take a reading against the scale.

Description

Nominal Size
100mm

Accuracy
+/- 1.6% FSD

Scales
PSI Outer (Black) & BAR Inner (Red) - Pressure
"HG Outer (Black) & BAR Inner (Red) - Vacuum
"HG+PSI Outer (Black) & BAR Inner (Red) - Compound

Ranges
-30/0"HG Vacuum to 0/10000 PSI Pressure
-30"HG/+15 PSI to -30"HG/+160 PSI Compound

Mounting Options
Bottom - Direct Mounting (standard)
Bottom - Surface Mounting Rear 3 Hole Flange

Centre Back - Direct Mounting (standard)
Centre Back - Panel Mounting Rear Bracket
Centre Back - Panel Mounting Front 3 Hole Flange

Operating Temperature
Ambient: -20/+60°C
Medium: +60°C maximum

Temperature Effect
Variation in indication caused by temperature
± 0.04 x (t2 – t1)% of the span
t1 is the reference ambient temperature in °C
t2 is the ambient temperature in °C

Ingress Protection
IP 65 as per EN 60529

Case & Crimped Bezel
304 Stainless Steel

Window
Polycarbonate - Crystal clear

Pressure Element
CU Alloy - Sealed Bourdon tube
C-Type <100 BAR
Coiled Type >100 BAR

Joints
Soldered with tin/silver alloy

Movement
High Precision Brass

Process Connection & Block
Brass - 3/8" BSP (parallel) male (standard)
Brass - 1/2" BSP (parallel) male (standard)
Brass - 22mm Hexagon block

Pointer
Aluminium - Black

Dial
Aluminium - White

Filling
FDA Approved food grade glycerine

Special Options
Other scales/ranges
Customer logo on dial
Other process connections
Rubber gauge cover

Sondex UK PHE - Design & Datalist

Att : Mike West — Item :1 V10A34

QuotationNo : 754 — Ref : 168 — 23 March 2015

PHE-Type S47-IG10-146-TMTL86-LIQUII		Hot side	Cold side
Flowrate	(kg/s)	23.88	23.88
Inlet temperature	(°C)	24.00	18.00
Outlet temperature	(°C)	19.00	23.00
Pressure drop	(kPa)	50.78	50.77
Heat exchanged	(kW)	500	
Thermodynamic properties:		**Water**	**Water**
Density	(kg/m³)	997.38	997.60
Specific heat	(kJ/kg*K)	4.19	4.19
Thermal conductivity	(W/m*K)	0.60	0.60
Mean viscosity	(mPa*s)	0.97	0.99
Wall viscosity	(mPa*s)	0.99	0.97
Fouling factors	(m²*K/kW)		
Dimensioning factor	(%)		
Inlet branch		F1	F3
Outlet branch		F4	F2

Design of Frame / Plates:		
Plate arrangement (passes*channel)		1 × 73 + 0 × 0
Plate arrangement (passes*channel)		1 × 72 + 0 × 0
Number of plates		146
Effective heat surface	(m²)	74.04
Overall K-value Duty/Clean	(W/m²*K)	6754 / 6754
Plate material		0.4 mm AISI 304
Gasket material / Max. temp.	(°C)	NITRIL HT SONDER LOCK (S) / 140
Max. design temperature	(°C)	100.00
Max. Working/test pressure	(MPa)	1,00 / ACC. to PED 97/23/EC Art 3.3
Max. Differential pressure	(MPa)	1.00
Frame type / Paint Specification		IG No 4 / Category C2L BLUE RAL 5010
Connections HOT side	(F1->F4)	DN 100 Flange rubberlined PN16 HT
Connections COLD side	(F3->F2)	DN 100 Flange rubberlined PN16 HT
Liquid volume	(dm³)	167
Frame length	(mm)	1034 Max. No. of Plates 155
Net weight	(kg)	716

PRICE EACH	**GBP**	3623	**Approval**
TERMS OF DELIVERY			Ex works Freight and Packing extra @ GBP
TERMS OF PAYMENT			30 Days
DELIVERY TIME			
VALIDITY OF QUOTATION			30 Days
DESIGNED BY			Peter Cole

Skid Base (2000x800)		92
Accesories:	**GBP**	92

Sondex UK LTD **Swallowfield Way** **Hayes, UB3 1AW**

Tlf : +44 208 573 6276 **Fax : +45 75538968/75505019**

Product Data Sheet
00813-0100-4029, Rev DA
November 2010

Rosemount 2110 Compact Vibrating Fork Liquid Level Switch

- *Function virtually unaffected by flow, turbulence, bubbles, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *No need for calibration and requires minimum installation procedures*
- *Polarity insensitive and short circuit protection*
- *Industry standard plug/socket connection*
- *No moving parts or crevices means virtually no maintenance*
- *Electronic, self-checking, and condition monitoring - Heartbeat LED gives status and health information*
- *Magnetic test point makes functional test easy*
- *Compact design, small in size and weight*
- *"Fast Drip" Fork Design gives quicker response time especially with viscous liquids*
- *Hygienic connections*

DIBt

Contents

Reliable Performance...In Challenging Applications

Threaded Process Connection **Tri-Clamp Process Connection**

Compact And Lightweight

‘Fast Drip’ Forks

MEASUREMENT PRINCIPLE

The Rosemount 2110 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

When the 2110 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- Stainless steel housing and plug/socket connection for the fast fit, high volume user
- Compact and lightweight design for side or top mounting
- The industry standard DIN 43650 plug/socket is used for a fast connection. The polarity insensitivity and short circuit protection make electrical hook-up safe and easy
- The 2110 is designed for operation in temperatures from –40 to 302 °F (–40 to 150 °C)
- The ‘heartbeat’ LED gives status and health information on the 2110
- ‘Fast Drip’ fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Fit and Forget

- Once installed, the 2110 is ready to go.
  It needs no calibration and requires minimum installation
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational
- Functional testing of the instrument and system is easy with a magnetic test point
- You can install, and forget it

Superior Performance

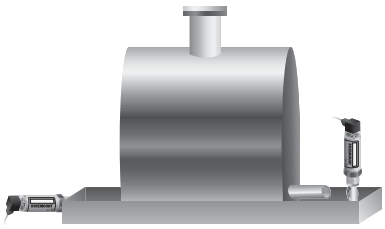
- Functionality is virtually unaffected by flow, turbulence, bubbles, foam, or vibration
- The ‘Fast Drip’ design allows the liquid to be quickly drawn away from the fork tip, making the 2110 quicker and more responsive in high density or viscous liquid applications
- With a user-selectable time delay feature, the risk of false switching is minimized in turbulent or splashing applications

APPLICATIONS

- Overfill protection
- High and low level alarms
- Leak detection
- Run dry or pump protection
- Pump control or limit detection
- Hygienic applications

Overfill Protection

High And Low Level Alarm



Leak Detection

Pump Protection

Rosemount 2110
Compact Vibrating Fork Liquid Level Switch

2110 Level Switch

Rosemount 2110 capabilities include:

- Rugged stainless steel body and fork, the ideal choice for OEM applications
- Compact design, small and lightweight, perfect for small tank or pipe installations
- Short fork or semi-extended lengths
- Direct load switching or PNP/PLC electronics
- Safe area only

Additional Information

TABLE 1. 2110 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2110	Compact Vibrating Fork Liquid Level Switch	
Electronic Type		
Standard		**Standard**
0	Direct load switching with plug connection (2 wire) 21 to 264 Vac 50/60Hz, 21 to 264 Vdc	★
1	PNP/PLC low voltage switching with plug connection 18 to 60 Vdc	★
Process Connection Size / Type		
Standard		**Standard**
0A	3/4-in. BSPT (R) thread	★
1A	1-in. BSPT (R) thread	★
0D	3/4-in. NPT thread	★
2R	2-in. (51 mm) Tri-clamp	★
1B	1-in. BSPP (G) thread	★
1L	1-in. BSPP (G) Semi-extended 4.6 in. (116 mm)	★
Product Certificates		
Standard		**Standard**
NA	No hazardous locations certifications (safe area use only)	★
U1	DIBt/WHG Overfill protection	★
OPTIONS		
Calibration Data Certificate		
Standard		**Standard**
Q4	Certificate of functional test	★
Tag Plate		
Standard		**Standard**
ST	Tag plate SST engraved plate (maximum 16 digits)	★
WT	Tag plate laminated paper (maximum 40 digits)	★
Typical Model Number: 2110 0 2R NA		

TABLE 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss for 1-in. BSPP model. Material: 316 SST fitting. Fluorocarbon (FPM/FKM) O-ring	★
02100-1020-0001	Hygienic mounting kit for 2-in. (51 mm) Tri-clamp model. Includes vessel fitting, clamp ring, and seal. Material: 316 SST and NBR Nitrile	★
02100-1030-0001	Telescopic test magnet	★

Specifications

PHYSICAL

Product
Rosemount 2110 Compact Liquid Level Switch

Measuring principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Process Material
316L Stainless Steel (1.4404)
For Tri-Clamp connection, hand polished to better than 0.8 μm. Gasket material for 1 in. BSPP (G1) is Non-asbestos BS7531 Grade X carbon fiber with rubber binder.

Housing Materials
Body: 304 SST with polyester label
LED window:
Flame retardant Polyamide (Pa12) UL94 V2
Plug: Polyamide glass reinforced
Plug seals: Nitrile butadiene rubber

Mounting
- $^{3}/_{4}$-in. BSPT (R) or NPT
- 1-in. BSPT (R) or BSPP (G) thread, or
- Hygienic 2-in. (51 mm) Tri-clamp fitting

Dimensional Drawings
See “Dimensional Drawing” on page 7

Ingress of Protection Rating
IP66/67 to EN60529

PERFORMANCE

Hysteresis (water)
±0.039-in. (± 1 mm) nominal.

Switching Point (water)
0.5 in. (13 mm) from fork tip if mounted vertically.
0.5 in. (13 mm) from the fork edge if mounted horizontally.
The switch point varies with different liquid densities.

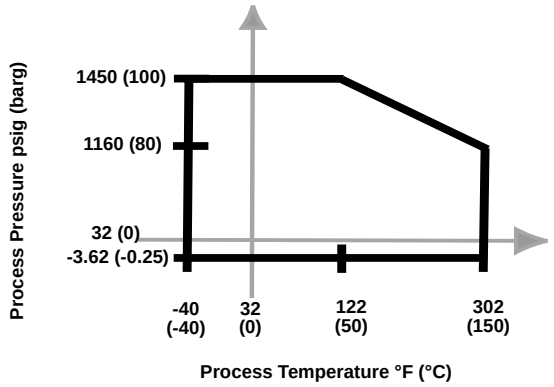
FUNCTIONAL

Maximum Operating Pressure
(The final rating depends on the process connection)

Threaded Connection
See Figure 1

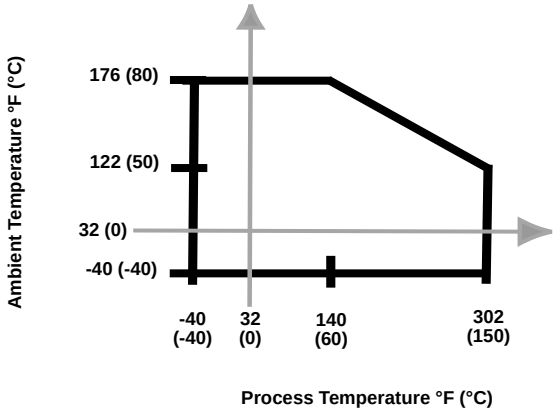
Hygienic Connection
435 psig (30 barg)

Figure 1. Process Pressure



Temperature
See Figure 2 for the maximum and minimum operating temperatures.

Figure 2. Temperature



Liquid Density
Minimum 37.5 lb/ft^3 (600 kg/m^3)

Liquid Viscosity Range
0.2 to 10000 cP (centiPoise)

Solids Content and Coating
Maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm).

For coating product, avoid ‘bridging’ of forks.

Switching Delay
1 second dry-to-wet or wet-to-dry

CIP (Clean In Place) Cleaning
Withstands steam cleaning routines up to 302 °F (150 °C)

Electrical

Switching Mode
User selectable (Dry=on or Wet=on) by selecting plug wiring

Cable Connection
Via 4-way plug provided (DIN43650).

Max. conductor size is 15AWG.

4-position orientation (90/180/270/360 deg).

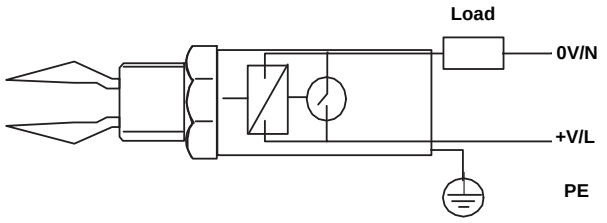
Conductor Size
Maximum 0.06 in.^{2} (1,5 mm^2)

Cable Gland
PG9 provided. Cable diameter 0.24 to 0.31 in. (6 to 8 mm)

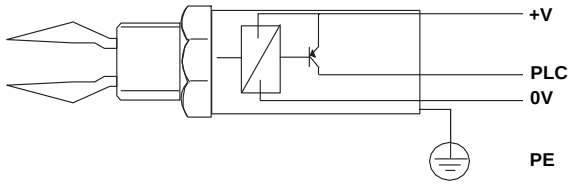
Protection
Polarity insensitive. Over-current, short circuit, and load-missing protection. Surge protection to IEC61326.

Grounding
The 2110 should always be grounded either through the terminals or using the external ground connection provided.

Direct Load Switching (Electronics Type Code 0)	
Operating Voltage	21 to 264 Vac (50 to 60 Hz)/dc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Minimum switched load	20 mA continuous
Voltage drop	6.5 V @ 24 Vdc / 5 V @ 240 Vac
Current draw (load off)	<3.0 mA continuous



PNP Switching (Electronics Type Code 1)	
Operating Voltage	18 to 60 Vdc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Voltage drop	<3 V
Supply Current	3 mA nominal
Output current (load off)	<0.5 mA



Product Certifications

L.V. Directive
EN61010-1 Pollution degree 2,
Category II (264V max),
Pollution degree 2, Category III (150 V maximum)

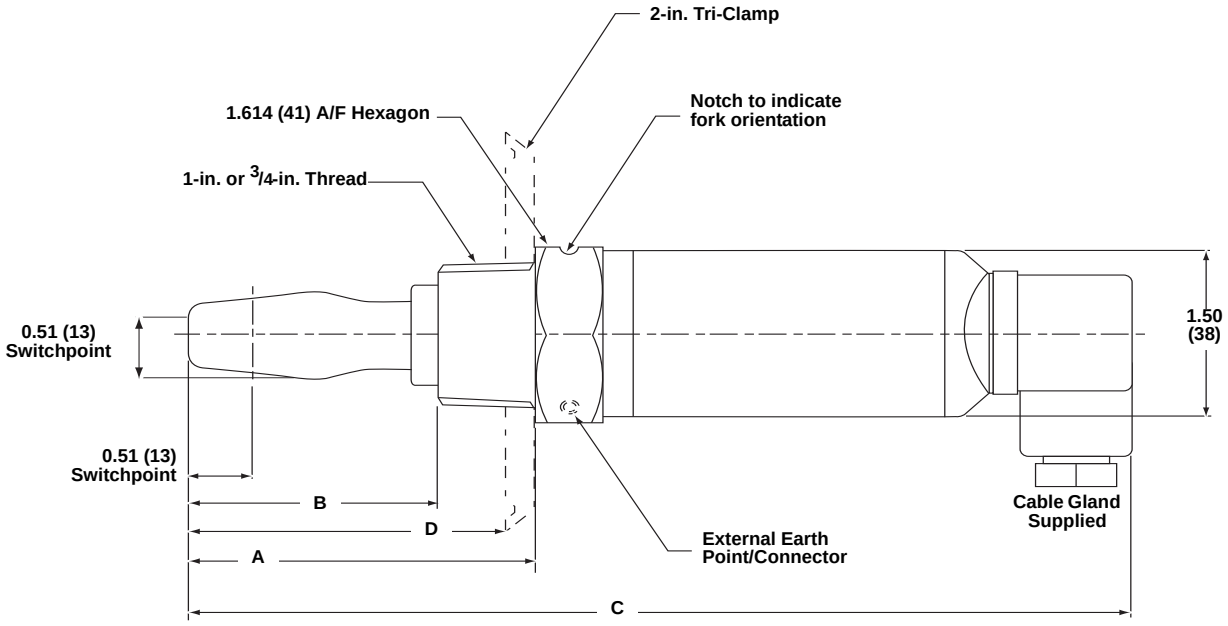
Electro Magnetic Compatibility (EMC) Directive
EN61326

Overfill Protection
If required, select Product Certificates code U1 for DIBt/WHG overfill protection.

The approval number is Z-65.11-236.

Canadian Registration Number (CRN)
The CRN is 0F04227.2C for model numbers with a NPT threaded process connection selected.

Dimensional Drawing



Process Connections	A	B	C	D
3/4-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
3/4-in. NPT	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPP (G)	3.07 (78)	2.36 (60)	7.91 (201)	N/A
2-in. (51 mm) Tri-Clamp	2.72 (69)	1.97 (50)	7.40 (188)	2.52 (64)
1-in. Semi-extended	4.57 (116)	3.86 (98)	9.41 (239)	N/A

Rosemount 2110

Product Data Sheet
00813-0100-4029, Rev DA
November 2010

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

Emerson Process Management
Rosemount Measurement
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Chanhassen, MN 55317 USA
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Fax +1 952 949 7001
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00813-0100-4029 Rev DA 11/10

EMERSON™
Process Management

pCO5+ Controllo elettronico programmabile / Electronic programmable control

pGDE*

LEGGE E CONSERVA QUESTE ISTRUZIONI
READ AND SAVE THESE INSTRUCTIONS
NO POWER & SIGNAL CABLES TOGETHER
READ CAREFULLY IN THE TEXT!

ITA DESCRIZIONE

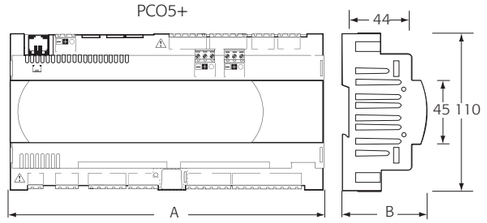
pCO5+ è un controllo elettronico programmabile a microprocessore sviluppato da CAREL per offrire molteplici applicazioni nel settore del condizionamento dell'aria, della refrigerazione e in generale del settore HVAC/R. Può essere collegato in rete pLAN a tutti i controlli della famiglia pCO sistema ed ai terminali della gamma pGD. Il programma applicativo, creato nell'ambiente di sviluppo 1Tool, è caricato sul controllo tramite il programma pCO Manager, disponibile sul sito http://ksa.carel.com. Vedere il man. cod. +0300020IT, scaricabile dal sito www.carel.com.

ENG DESCRIPTION

pCO5+ is a programmable microprocessor electronic controller developed by CAREL to offer numerous applications in the air conditioning and refrigeration industry and in the general HVAC/R sector. It can be connected over the pLAN to all controllers in the pCO system family and to terminals in the pGD line. The application, created in the 1Tool development environment, is loaded on the controllers through the pCOManager program, available at http://ksa.carel.com. See manual code +0300020EN, that can be downloaded from www.carel.com.

ITA DIMENSIONI (mm)

ENG DIMENSIONS (mm)



	Small	Medium	Buit-in driver	Large	Extralarge
A	227,5	315	315	315	315
B	60	60	60	60	60
B - con porta USB e/o terminale integrato *B - with USB port and/or built-in terminal*	70	70	70	70	70
B - con modulo ULTRACAP *B - with ULTRACAP module*	-	-	75	-	-

ITA MODELLI (vedere listino per codici di acquisto ordinabili)

Codice	Descrizione	Classific.
P+5*********	Memoria 9MB (7MB programma applicativo +2MB Bios)+4MB storici	Memoria
P+3*********	Memoria 5MB (3MB programma applicativo +2MB Bios) +2MB storici (♦)	
P+5*****0****	Uscite digitali tutte a relè	Tipo di uscita digitale
P+5*****1...6****	1...6 uscite SSR a 24 V	
P+5*****A...F****	1...6 uscite SSR a 230 V	
P+5****0*****	Standard	Connettività
P+5****A*****	BMS2 non optois. - FieldBus2 non optois.	
P+5****B*****	BMS2 optois. / FieldBus2 non optoisolata	
P+5****C*****	BMS2 optoisolata / FieldBus2 optoisolata	
P+5***0******	No porta USB	Porta USB
P+5***A******	Porta USB	
P+5******0***	Senza driver valvola	Driver valvola
P+5******1***	1 driver valvola CAREL	
P+5******2***	2 driver valvola CAREL	
P+5*******0**	Senza terminale	Terminale integrato
P+5*******E**	Con terminale	
P+5********S*	Small	Taglia
P+5********M*	Medium	
P+5********L*	Large	
P+5********Z*	Extralarge	
P+5*********0/1	Singolo - multiplo	Imballo

(♦)I modelli previsti sono P+3**B00*0(0,E)(S,M,L,Z)0

Codice	Descrizione
PGDE000*	Terminale utente PGDE
PGDT04000F***	Termin. utente pGD Touch 4,3"
PGDT0700F***	Term. utente pGD Touch 7"
PCO5OWUC20	Modulo ultracap per pCO5+ built-in driver
S90CONN00*	Cavo telefonico

WARNING: separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel wiring) and signal cables in the same conduits.

Disposal of the product: the appliance (or the product) must be disposed of separately in accordance with the local waste disposal legislation in force.

ENG MODELS (see the list price for purchase codes, that can be ordered)

Code	Description	Classific.
*P+5*********	*9MB (7MB application program +2MB Bios) +4MB memory log file*	*Memory*
*P+3*********	*5MB (3MB application program +2MB Bios) +2MB memory log file (♦)*	
*P+5*****0****	*Digital outputs all relay*	*Digital output type*
*P+5*****1...6****	*1 to 6 SSR outputs, 24V*	
*P+5*****A...F****	*1 to 6 SSR outputs, 230V*	
*P+5****0*****	*Standard*	*Connectivity*
*P+5****A*****	*BMS2 not optois. - FieldBus2 not optois.*	
*P+5****B*****	*BMS2 optois. / FieldBus2 not optoisolated*	
*P+5****C*****	*BMS2 optoisolated / FieldBus2 optoisolated*	
*P+5***0******	*No USB port*	*USB Port*
*P+5***A******	*USB port*	
*P+5******0***	*without valve driver*	*Driver valve*
*P+5******1***	*1 CAREL drive valve*	
*P+5******2***	*2 CAREL drive valve*	
*P+5*******0**	*Without terminal*	*Integrated terminal*
*P+5*******E**	*With terminal*	
*P+5********S*	*Small*	*Size*
*P+5********M*	*Medium*	
*P+5********L*	*Large*	
*P+5********Z*	*Extralarge*	
*P+5*********0/1*	*Single - multiple*	*Packaging*

*(♦)The models provided are P+3**B00*0(0,E)(S,M,L,Z)0.*

Code	Description
*PGDE000**	*User terminal PGDE*
*PGDT04000F****	*User terminal pGD Touch 4.3"*
*PGDT0700F****	*User terminal pGD Touch 7"*
PCO5OWUC20	*Ultracap module for pCO5+ built-in driver*
*S90CONN00**	*Telephone cable*

ITA

Caratteristiche tecniche

Contenitore plastico

Montaggio	agganciabile su guida DIN secondo DIN 43880 CEI EN 50022
Materiale	tecnopolimero
Autoestinguenza	V2 (secondo UL94) e 850 °C (secondo IEC 60695)
Temperatura per la prova con la sfera	125 °C
Resistenza alle correnti striscianti	≥ 250 V
Colore	Bianco RAL 9016
Terminale integrato	Tipo PGD1 (132x64 pixel) con tastiera retroilluminata

Altre caratteristiche

Condizioni di funzionamento	P+(3,5)*******0**(no terminale integrato): -40T70 °C, 90% UR non conden. (*)
(*) con modulo Ultracap montato: -40T60°C	P+(3,5)*******E**(con terminale integrato): -20T60 °C, 90% UR non conden. (*)
Condizioni di immagazzinamento	P+(3, 5)*******0**(no terminale integrato): -40T70 °C, 90% UR non condens.
	P+(3, 5)*******E**(con terminale integr.): -30T70 °C, 90% UR non condens.
Grado di protezione	Mod. con porta USB e/o con modulo Ultracap: IP20 nel solo frontalino
	Mod. senza porta USB e senza modulo Ultracap: IP40 nel solo frontalino
Situaz. di inquinam. del dispos. di comando	2
Classe secondo la protezione contro le scosse elettriche	da integrare su apparecchiature di Classe I e/o II nelle versioni senza driver valvola, classe I nelle versioni con driver valvola
PTI dei materiali per isolamento	PCB: PTI 250 V; materiale di isolamento: PTI 175
Periodo delle sollec. elettr. delle parti isolanti	lungo
Tipo azioni	1C; 1Y per le versioni a SSR
Tipo di disconnessione o microinterruzione	microinterruzione
Categoria di resistenza al calore e al fuoco	Categoria D (UL94-V2)
Caratter. di invecchiamento (ore funzionam.)	80.000
N.ro di cicli di manovra operazioni automatiche	100.000 (EN 60730-1); 30.000 (UL 60730)
Tensione impulsiva nominale	2500 V

Caratteristiche elettriche:

Alimentazione

Small, Medium, Large, Extralarge: utilizzare un trasformatore dedicato di sicurezza in classe 2 da 50 VA.
Built-in driver: utilizzare un trasformatore dedicato di sicurezza in classe II da 100 VA.

	Vac	P (Vac)	Vdc	P (Vdc)
Small	24 Vac (+10/-15%), 50/60 Hz, fusibile esterno da 2,5 A T	45 VA	28...36 Vdc (-20/+10%) fusibile esterno da 2,5 A T	30 W
Medium				
Large				
Extralarge				
Built-in driver		90 VA	Non ammesso	

⚠ Attenz.: per la versione "pCO5+ built-in driver" sono obbligatori l'alimentazione in alternata e il collegamento del secondario del trasformatore a terra (G0 a terra).

Morsettiera	con connettori maschio/femmina estraibili
Sezione cavi	min 0.5 mm² - max 2.5 mm²
Orologio con batteria	di serie, precisione 100 ppm
Buzzer	abilitabile da software, solo con terminale integrato
Batteria	Di tipo "bottone" al litio cod. CR2430 tensione 3 Vdc (dimen. 24x3 mm)
Classe e struttura del software	Classe A
Categ. di immunità ai surge (CEI EN 61000-4-5)	Categoria III
Dispositivo non destinato ad essere tenuto in mano quando alimentato	

Ingressi / Uscite

Ingressi/uscite universali:

Ingressi analogici, Lmax = 30 m, numero massimo	Small	Medium/Built-in driver/Extralar.	Large
sonde NTC CAREL (-50T90°C; R/T 10 kΩ ±1% a 25°C), NTC HT (0T150°C), PTC (600Ω...2200Ω), PT500 (-100T300°C), PT1000 (-100T400°C)	5	8	10
sonde PT100 (-100T400°C)	2	3 (2 su U1...U5, 1 su U6...U8)	4 (2 su U1...U5, 1 su U6...U8, 1 su U9...U10)
segnali 0...1 Vdc/0...10 Vdc (*) da sonde alimentate dal controllo	max tot 5	5 max tot 8: 6	max tot 10: 6
segnali 0...1 Vdc/0...10 Vdc (*) alimentati esternamente		5 max tot 8: 8	max tot 10: 10
ingressi 0...20 mA /4...20 mA (*) da sonde alimentate dal controllo	max tot 4	4 max tot 7: 6: (max 4 su U1...U5, 3 su U6...U8)	max tot 9: 6: (max 4 su U1...U5, 3 su U6...U8, 2 su U9...U10)
ingressi 0...20 mA /4...20 mA (*) alimentati esternamente		4 max tot 7: 7: (max 4 su U1...U5, 3 su U6...U8)	max tot 9: 9: (max 4 su U1...U5, 3 su U6...U8, 2 su U9...U10)
segnali 0...5 V (*) da sonde raziomet. alim. dal controllo	5	6	6
Precisione ingressi: ± 0,3 % f.s.			
Costante di tempo per ogni ingresso: 0,5 s			
Classificazione dei circuiti di misura (CEI EN 61010-1): categoria I			

Ingressi digitali non optois., Lmax = 30 m, n.ro max	Small	Medium/Built-in driver/Extralar.	Large
contatti puliti	5	8	10
ingressi digitali veloci: tipo: contatto pulito, corrente max: 10 mA, freq. max: 2kHz e risoluzione: ±1 Hz	2	4: (max 2 su U1...U5, max 2 su U6...U8)	6: (max 2 su U1...U5, max 2 su U6...U8, 2 su U9...U10)

⚠ Attenzione:
- prevedere per le sonde attive (0...1 V, 0...10 V, 0...20 mA, 4...20 mA) alimentate esternamente, per evitare di danneggiare irreparabilmente il controllo, adeguate misure di protezione di corrente, che deve essere mantenuta < 100 mA; le sonde raziometriche possono essere alimentate solo dal controllo;
- all'accensione, gli ingressi/uscite universali rimangono cortocircuitati a GND per circa 500ms fino al termine della fase di configurazione.

Uscite analogiche non optois. (n.ro max), Lmax = 30 m,	Small	Medium/Built-in driver/Extralar.	Large
0...10 Vdc (*) (corrente massima 2 mA)	5	8	10
PWM (uscita 0/3.3 Vdc, corrente max 2 mA, frequenza: 2kHz asincrono, 100 Hz asincrono)	5	8	10

Alimentazione sonde e terminali

+VDC	per l'alimentazione di eventuali sonde attive è possibile utilizzare i 24/21 Vdc ± 10% (*) (P+5*/P+3*) disponibili al morsetto +VDC (J2). La corrente max erogabile è di 150 mA protetta contro i cortocircuiti.
+5VREF	per l'alimentazione delle sonde raziometriche 0...5 V utilizzare i 5 Vdc (*) (± 5%) disponibili al morsetto +5VREF (J24). La corrente massima erogabile è di 60 mA.
Vterm	P+3**********: 21 Vdc ± 10% (*); P+5**********: 24 Vdc ± 10% (*). Da impiegarsi per alimentare un terminale esterno in alternativa a quello connesso a J10, Pmax = 1,5 W

⚠ Attenz.: se la lunghezza supera i 10 m prevedere un cavo schermato con schermo connesso a terra. In ogni caso la lunghezza massima consentita è 30 m.

Note per ingressi digitali:
- separare quanto più possibile i cavi delle sonde e degli ingressi digitali dai cavi dei carichi induttivi e di potenza per evitare possibili disturbi elettromagnetici. Non inserire mai nelle stesse canaline (comprese quelle dei quadri elettrici) cavi di potenza e cavi di segnale;
- in caso di ingressi in tensione continua (24 Vdc) è indifferente collegare il + o il - al morsetto comune;
- la portata del contatto esterno degli ingressi digitali deve essere almeno pari a 5 mA.

Ingressi digitali - Uscite analogiche

Ingressi digitali (IDi... IDH...)			
Tipo	Optoisolati		
Lmax	30 m		
Numero massimo		nr. ingr. optoisol. a 24 Vac o 24 Vdc	nr. ingr. optois. a 24 Vac o 230 Vac (50 Hz)
	Small	8	Nessuno
	Medium/Built-in driver/ Extralarge	12	2
	Large	14	4
Tempo minimo di rilevazione impulso agli ingressi digitali	Normalm. aperto (aperto-chiuso-aperto)	200 ms	
	Normalm. chiuso (chiuso-aperto-chiuso)	400 ms	
Alimentazione degli ingressi	Esterna	IDH...: 230 Vac (+10/-15%) 50/60 Hz	
		IDi...: 24 Vac (+10/-15%) 50/60 Hz o 28...36 Vdc (-20/+10%)	
Classific. dei circuiti di misura (CEI EN 61010-1)	Categoria I: 24 Vac/Vdc (J5, J7, J20); Categoria III: 230 Vac (J8, J19)		
Corrente assorbita ingressi digitali in tensione a 24 Vac/Vdc		5 mA	
Corrente assorbita ingressi digitali in tensione a 230 Vac		5 mA	

Uscite analogiche (Y...)

Tipo	0...10 V optoisolate su Y1, Y2, Y3, Y4, Y5, Y6 / a taglio di fase (PWM) optoisolate su Y3, Y4 (configurabili via softw.)		
Lmax	30 m		
Numero max	Small/Medium/Built-in driver/Extralarge	4	Y1...Y4 a 0...10 V
	Large	6	Y1...Y6 a 0...10 V
Alimentazione	esterna	24 Vac (+10/-15%) o 28...36 Vdc (+10/-20%) su VG(+), VG0(-) (*)	
Precisione	Y1...Y6	± 2% fondo scala	
Risoluzione	8 bit		
Tempo di assestam.	Y1...Y6	Da 1 s (slew rate 10 V/s) a 20 s (slew rate 0,5 V/s) selezionabile via SW	
Carico massimo	1 kΩ (10 mA)		

⚠ **Avvertenze:**
- per lunghezze > 10 m si prescrive un cavo schermato con schermo connesso a terra;
- ad un'uscita analogica optoisolata di tipo 0...10 Vdc si possono collegare in parallelo altre uscite dello stesso tipo, oppure una tensione esterna. La tensione risultante sarà quella maggiore. Non è garantito il corretto funzionamento nel caso si colleghino attuatori con ingresso in tensione;
- alimentare le uscite analogiche VG-VG0 con la stessa tensione presente su G-G0: connettere G a VG e G0 a VG0. Questo è valido sia per alimentazioni in alternata sia in continua; nel caso di uscite a taglio di fase (PWM) si fa notare che il sincronismo (zero crossing) è prelevato da G/G0 e solo con alimentazione 24 Vac e non Vdc.

Uscite digitali NO..., NC...

Tipo: Nr. max	Relè. Corrente minima di contatto: 50 mA. 8: SMALL; 13: MEDIUM/ BUILT-IN DRIVER; 18: LARGE; 29: EXTRALARGE
Distanza isolamento	Le uscite relè hanno caratteristiche diverse a seconda del modello del controllo. Le uscite sono suddivisibili in gruppi. I relè appartenenti ad uno stesso gruppo hanno tra loro iun isolamento di funzionamento e quindi devono essere sottoposti alla stessa tensione. Tra gruppo e gruppo vi è isolamento rinforzato quindi i relè possono essere sottoposti a tensioni diverse. In ogni caso tra ogni morsetto delle uscite digitali e il resto del controllo esiste il doppio isolamento.

Per quanto riguarda l'isolamento tra gruppi di relè, il tipo di relè e la potenza commutabile vedere il manuale cod. +0300020IT. Per le caratteristiche delle uscite SSR vedere il manuale cod. +0300020IT.
Modello con driver per valvola di espansione elettronica: vedere il manuale cod. +0300020IT.
(*) classe 2.

ENG

Technical characteristics

Plastic case

Installation	Fitted on DIN rail as per DIN 43880 and IEC EN 50022
Material	Technopolymers
Self-extinguishing	V2 (according to UL94) and 850 °C (according to IEC 60695)
Temperature for the ball pressure test	125 °C
Creeping current resistance	≥ 250 V
Colour	White RAL 9016
Built-in terminal	Type PGD1 (132x64 pixel) with backlit keyboard

Other specifications

Operating conditions	P+(3,5)*******0**(no Built-in terminal): -40T70°C, 90% UR no-condensing (*)
(*) with Ultracap module installed: -40T60°C	P+(3,5)*******E**(with Built-in terminal): -20T60 °C, 90% UR no-condensing
Storage conditions	P+(3, 5)*******0**(no Built-in terminal): -40T70 °C, 90% UR no-condensing
	P+(3, 5)*******E**(with Built-in terminal): -30T70 °C, 90% UR no-condensing
Protection index	Models with USB port and/or with Ultracap module: IP20 in the front panel only
	Models without USB port and without Ultracap module: IP40 in the front panel only
Control pollution situation	2
Class according to protection against electrical shocks	to be integrated into Class I and/or II appliances in the versions without valve driver, Class I in versions with valve driver
PTI of the insulating materials	PCB: PTI250; insulation material: PTI 175
Period of electrical stress on the insulat. parts	Long
Type of actions	1C; 1Y for SSR versions
Type of disconnection or microswitching	Micro-switching
Category of resistance to heat and fire	Category D (UL94-V2)
Aging characteristics (operational hours)	80.000
Number of automatic operating cycles	100.000 (EN 60730-1); 30.000 (UL 60730)
Rated impulse voltage	2500 V

Electrical characteristics

Power supply

Small, Medium, Large, Extralarge: use a dedicated safety transformer rated in Class 2 from 50 VA.
Built-in driver: use a dedicated safety transformer rated in Class II type 100 VA.

	Vac	P (Vac)	Vdc	P (Vdc)
Small	24 Vac (+10/-15%), 50/60 Hz, external fuse from 2.5 A T	45 VA	28...36 (-20/+10%) Vdc external fuse type 2.5 A T	30 W
Medium				
Large				
Extralarge				
Built-in driver		90 VA	Not allowed	

⚠ *Attenz.: the pCO5+ with built-in driver must be powered with alternating current and the secondary winding of the power supply transformer (G0) must be earthed.*

Terminal block	with male/female plug-in connectors,
Cable section	min 0.5 mm² - max 2.5 mm²
Clock with battery	standard, precision 100 ppm
Buzzer	enabled by software, only with built-in terminal
Battery	Lithium "button" type code CR2430 voltage 3 Vdc (dimensions 24x3 mm)
Software class and structure	Class A
Surge protection category (CEI EN 61000-4-5)	Category III
Device not meant to be held in the hand when receiving power	

Inputs / Outputs

Universal inputs/outputs:

Analogue inputs, Lmax = 30m, maxim. number	Small	Medium/Built-in driver/Extralar.	Large
Probes: NTC CAREL (-50T90°C; R/T 10 kΩ ±1% a 25°C), NTC HT (0T150°C), PTC (600Ω...2200Ω), PT500 (-100T300°C), PT1000 (-100T400°C)	5	8	10
PT100 probes (-100T400°C)	2	3 (2 su U1...U5, 1 su U6...U8)	4 (2 su U1...U5, 1 su U6...U8, 1 su U9...U10)
signals 0...1 Vdc/0...10 Vdc (*) from probes pow. by control	max tot 5: 5	max tot 8: 6	max tot 10: 6
signals 0...1 Vdc/0...10 Vdc (*) powered externally	max tot 5: 5	max tot 8: 8	max tot 10: 10
inputs 0...20 mA /4...20 mA (*) from probes powered by the control	max tot 4: 4	max tot 7: 6: (max 4 su U1...U5, 3 su U6...U8)	max tot 9: 6: (max 4 su U1...U5, 3 su U6...U8, 2 su U9...U10)
inputs 0...20 mA /4...20 mA (*) powered externally	max tot 4: 4	max tot 7: 7: (max 4 su U1...U5, 3 su U6...U8)	max tot 9: 9: (max 4 su U1...U5, 3 su U6...U8, 2 su U9...U10)
signals 0...5 V (*) from raziom. probes pow. by control	5	6	6
Input precision: ± 0,3 % f.s.			
Time constant for each input: 0,5 s			
Classification of measuring circuits (CEI EN 61010-1): category I			

Digital inputs not opt.-isolated , Lmax = 30 m, max. num.	Small	Medium/Built-in driver/Extralar.	Large
free contacts	5	8	10
fast digital inputs: type: free contact, max current: 10 mA, max freq.: 2kHz and resolution: ±1 Hz	2	4: (max 2 su U1...U5, max 2 su U6...U8)	6: (max 2 su U1...U5, max 2 su U6...U8, 2 su U9...U10)

⚠ *Attention:*
- *provide adequate current protection measures for externally powered active probes (0 to 1 V, 0 to 10 V, 0 to 20 mA, 4 to 20 mA), to prevent irreparable damage to the controller, which must be maintained at < 100 mA; the raziometric probes can be powered only by the controller;*
- *at power on, universal inputs/outputs are short circuited to GND for about 500ms up to the end of the configuration.*

Anal. outputs not opt.-isolated (max. nu.), Lmax = 30 m	Small	Medium/Built-in driver/Extralar.	Large
0...10 Vdc (*) (max current 2 mA)	5	8	10
PWM (output 0/3.3 Vdc, max. current 2 mA, frequency: 2kHz asynchronous, 100 Hz asynchronous)	5	8	10

Probe and terminal power supply

+VDC	for supplying any active probes, the 24/21 Vdc ± 10% (*) (P+5*/P+3*) can be used, available to the +VDC (J2) terminal. The maximum deliverable current is 150 mA protected against short-circuits.
+5VREF	for supplying the 0 to 5 V raziometric probes, use the 5 Vdc (*) (± 5%) available to the +5VREF(J24) terminal. The maximum deliverable current is 60 mA.
Vterm	P+3**********: 21 Vdc ± 10% (*); P+5**********: 24 Vdc ± 10% (*) To be used to power an external terminal as an alternative to the one connected to J10, Pmax = 1.5 W

⚠ *Attent.: if the length exceeds 10m, provide a shielded cabled with the shield earthed. In any case, the maximum length permitted is 30 m.*

Note for digital inputs:
- *separate the probe and digital input cables as much as possible from inductive loads and power cables, to avoid any electromagnetic disturbances. Never lay power cables and signal cables in the same cable conduits (including those for electrical panels;*
- *In the event of continuous voltage inputs (24 Vdc) it makes no difference whether the + or - is connected to the common terminal;*
- *the capacity of the external contact of the digital inputs must be at least equal to 5 mA;*

Digital inputs - Analogue outputs

Digital inputs (IDi... IDH...)

Type	Optically-isolated		
Lmax	30 m		
Maximum number		no. opt.-isolated inputs at 24 Vac or 24 Vdc	no. opt.-isolated inputs at 24 Vac or 230 Vac (50 Hz)
	Small	8	None
	Medium/Built-in driver/ Extralarge	12	2
	Large	14	4
Minimum digital input pulse detection time	Normally open (open-closed-open)	200 ms	
	Normally closed (closed-open-closed)	400 ms	
Input power supply	Esterna	IDH...: 230 Vac (+10/-15%) 50/60 Hz	
		IDi...: 24 Vac (+10/-15%) 50/60 Hz o 28...36 Vdc (-20/+10%)	
Classification of measuring circuits (CEI EN 61010-1):	Category I: 24 Vac/Vdc (J5, J7, J20); Category III: 230 Vac (J8, J19)		
Absorbed current digital inputs at 24 Vac/Vdc			5 mA
Absorbed current digital inputs at 230 Vac			5 mA

Analogue outputs (Y...)

Type	0...10 V optically-isolated on Y1, Y2, Y3, Y4, Y5, Y6 / at cut-off (PWM) opt.-isolated on Y3, Y4 (configurable by softw.)		
Lmax	30 m		
Max number	Small/Medium/Built-in driver/Extralarge	4	Y1...Y4 a 0...10 V
	Large	6	Y1...Y6 a 0...10 V
Power supply	external	24 Vac (+10/-15%) o 28...36 Vdc (+10/-20%) su VG(+), VG0(-) (*)	
Precision	Y1...Y6	± 2% full scale	
Resolution	8 bit		
Settling time	Y1...Y6	From 1 s (slew rate 10 V/s) a 20 s (slew rate 0,5 V/s) selectable by SW	
Maximum Load	1 kΩ (10 mA)		

⚠ *Warnings:*
- *lengths > 10 m require a shielded cable with the shield earthed;*
- *other inputs of the same type or an external voltage can be connected in parallel to an optically-isolated analogue output type 0 to 10 Vdc. The resulting voltage is the higher one. Proper operation is not guaranteed if actuators with inputs under power are connected;*
- *supply analogue VG-VG0 outputs with the same voltage present on G-G0; connect G to VG and G0 to VG0. This is valid for both alternating and continuous current; in the event of cut-off outputs (PWM) please note that synchronization (zero crossing) is taken from G/G0 and only with 24Vac and not Vdc.*

Digital outputs NO..., NC...

Type: Nr. max	Minimum relay contact current: 50 mA. 8: SMALL; 13: MEDIUM/ BUILT-IN DRIVER; 18: LARGE; 29: EXTRALARGE
Insulation distance	The relay outputs have different characteristics according to the controller model. The outputs can be divided into groups. The relays belonging to the same group have an operational insulation between them and thus must be subjected to the same voltage. Between one group and the other there is reinforced insulation, therefore the relays can be subjected to different voltages. In any case, between every terminal of the digital outputs and the rest of the controller there is double insulation.

As for the insulation between groups of relays, the type of relay and switchable power see manual code +0300020EN. For the characterstics of the SSR outputs, see manual code +0300020EN.

Model with driver for electronic expansion valve: see manual code +0300020EN.
(*) class 2.

MORSETTI DI COLLEGAMENTO

1	Connettore per l'alimentazione [G(+), G0(-)]
2	+Vterm: alimentazione per terminale aggiuntivo +5 VREF alimentazione per sonde raziometriche
3	Ingressi/uscite universali
4	+VDC: alimentazione per sonde attive
5	Tasto impostazione indiriz. pLAN, display secondario, LED
6	VG: aliment. a tensione A (*) per uscita analogica optois. VG0: aliment. per uscita analogica optoisolata a 0 Vac/Vdc
7	Uscite analogiche
8	ID: ingressi digitali a tensione A (*)
9	ID..: ingressi digitali a tensione A (*) IDH..: ingressi digitali a tensione B (**)
10	Connettore telefonico pLAN per terminale/ download programma applicativo
11	Connettore estraibile pLAN
12, 13, 14:	Riservato
15	Uscite digitali a relè
16	Connettore BMS2
17	Connettore FieldBus2
18	Microinterruttori selezione FieldBus/ BMS
19	Connettore FieldBus2
20	Connettore valvola elettronica A
21	Connettore valvola elettronica B
22	Connettore per modulo Ultracap esterno
23	Ingressi analogici e digitali driver esterno
24	LED segnalazione stato valvola
(*)	Tensione A: 24 Vac o 28...36 Vdc
(**)	Tensione B: 230 Vac - 50/60 Hz

Struttura

A	Tasto selezione indirizzo pLAN
B	Display indirizzo pLAN (*)
C	LED presenza alimentazione
D	LED sovraccarico
E	Microinterruttori FieldBus/BMS su porta J26 (*)
F	Porta USB Host (master) (*)
G	Porta USB Device (slave) (*)
H	Display principale

(*) presente nei modelli P+5..., non nei modelli P+3...

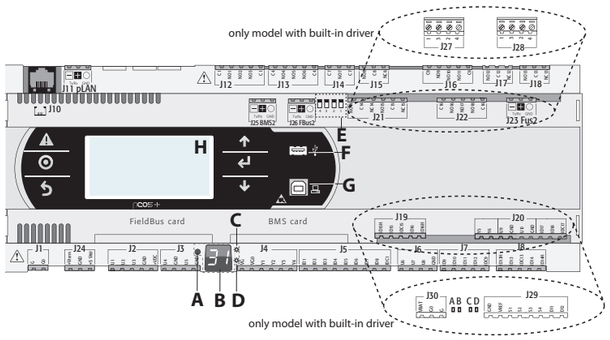
CONNECTION TERMINALS

1	Power supply connectors [G(+), G0(-)]
2	+Vterm: additional terminal power supply +5 VREF power supply for raziometric probes
3	Universal inputs/outputs
4	+VDC: power supply for active probes
5	pLAN address setup key, secondary display, LED
6	VG: power supply at voltage A (*) for optoisolat. analog.output VG0: power supply for optoisolat. analogue output at 0 Vac/Vdc
7	Analog outputs
8	ID: digital inputs at voltage A (*)
9	ID..: digital inputs at voltage A (*) IDH..: digital inputs at voltage B (**)
10	pLAN telephone connector for terminal/download application programme
11	pLAN removable connector
12, 13, 14:	Reserved
15	Relay digital outputs
16	BMS2 connector
17	FieldBus2 connector
18	FieldBus/BMS selector micro-switch
19	FieldBus2 connector
20	Electronic Valve A connector
21	Electronic Valve B connector
22	Connector for external Ultracap module
23	External driver analogue and digital inputs
24	Valve status signal LED
(*)	Voltage A: 24 Vac or 28 to 36 Vdc
(*)	Voltage B: 230 Vac - 50/60 Hz

Structure

A	pLAN address selection key
B	pLAN (*) address display
C	Power supply presence LED
D	Overcharge LED
E	FieldBus/BMS on port J26 micro-switch (*)
F	USB Host (master) Port (*)
G	USB Slave (device) port (*)
H	Main Display

(*) available in P+5... models, not available in P+3... models

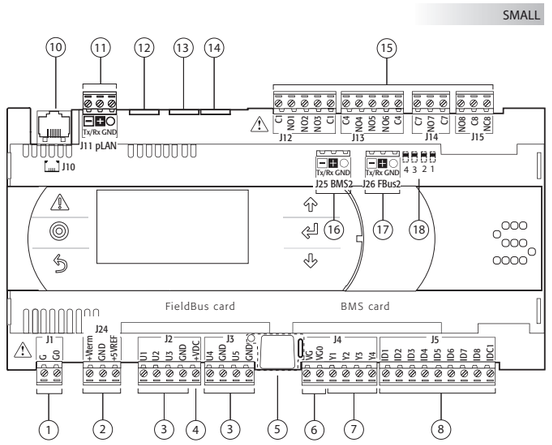


TASTIERA (BUILT-IN e PGDE)

Tasto	Descriz.	Retro-illum.	Funzioni
⚠	Alarm	Bianco/ Rosso	• Premuto insieme a UP fornendo alimentazione permette di cambiare l'indirizzo del controllo; • premuto insieme a Enter permette di accedere alle maschere gestite da BIOS
◎	Prg	Bianco/ Giallo	-
↩	Esc	Bianco	Ritorno livello superiore
↑	UP	Bianco	• Premuto insieme a DOWN e ENTER permette di cambiare l'indirizzo del terminale (solo per terminali PGDE); • aumento valore
↵	Enter	Bianco	Conferma valore
↓	DOWN	Bianco	• Premuto insieme a UP e ENTER permette di cambiare l'indirizzo del terminale (solo per terminali PGDE); • Diminuzione valore
○	Sele-zione indirizzo pLAN	-	• Pressione breve: visualizza-zione indirizzo pLAN • Pressione lunga (> 5s): procedura di modifica indirizzo pLAN

KEYBOARD (BUILT-IN and PGDE)

Key	*Descriz.*	*Backlight*	*Functions*
⚠	*Alarm*	*White/ Red*	*• Pressed together with UP and supplying power allows the controller address to be changed; • pressed together with Enter accesses the BIOS page*
◎	*Prg*	*White/ Yellow*	-
↩	*Esc*	*White*	*return high level*
↑	*UP*	*White*	*• Pressed together with DOWN and ENTER allows the terminal address to be changed (only for PGDE terminal); • increase value*
↵	*Enter*	*White*	*confirm value*
↓	*DOWN*	*White*	*• Pressed together with UP and ENTER allows the terminal address to be changed (only for PGDE terminal); • decrease value*
○	*pLAN address selec-tion*	-	*• short press: shows pLAN address; • long press (> 5s): proce-dure for modifying the pLAN address*

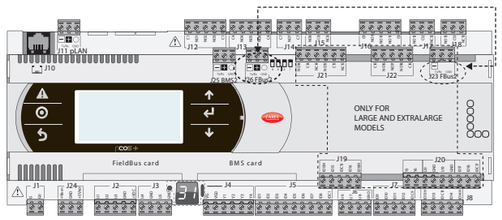


PORTE SERIALI

Rispetto al pCO3, i controlli pCO5+ (e pCO5) possiedono una seconda porta seriale BMS sul connettore J25 (BMS2) e una seconda porta FieldBus sul connettore J26 (FBus2). Nelle schede pCO5+ versione Large e Extralarge è ancora presente il connettore J23 e riporta la scritta FBus2 come per il connettore J26. Dal punto di vista della gestione da applicativo 1Tool si tratta infatti della stessa linea seriale e si devono usare indirizzi diversi per i dispositivi connessi ai 2 connettori, mentre dal punto di vista elettrico le porte sono indipendenti (un guasto elettrico nella porta J26 non influenza la porta J23). Vedere la tab. caratteristiche tecniche.

SERIAL PORTS

In comparison to the pCO3, the pCO5+ (and pCO5) controllers have a second BMS serial port on the J25 connector (BMS2) and a second FieldBus port on the J26 connector (FBus2). In the pCO5+ cards, version Large and Extralarge, the J23 is also present and is labeled FBus2 as for connector J26. From the point of view of the 1Tool application management, it is, in fact, the same serial line and different addresses must be used for the devices connected to the 2 connectors, while from the electrical point of view, the ports are independent (an electrical failure on port J26 does not effect J23). See the technical characterist. table.



Porte seriali

Seriale	Tipo/connettori	Caratteristiche
ZERO	pLAN/J10, J11	Integrata su scheda base RS485 pLAN Non optoisolata Connettori: Jack telefonico 6 vie + Estraibili 3 vie p. 5,08 Lunghezza massima: 500 m Numero massimo dispositivi collegabili: 32
UNO	BMS 1 Serial Card	Non integrata su scheda base
DUE	FieldBus 1 Serial Card	Non integrata su scheda base
TRE	BMS 2/ J25	Integrata su scheda base RS485 Slave Seriale optoisolata/non optoisolata(*) Connettore estraibile 3 vie p. 5,08 Lunghezza massima: 1000 m
QUATTRO	FieldBus 2 / J26 (e J23 su versione Large e Extralarge)	Integrata su scheda base RS485 Master/Slave (**) J23: non optoisolata, J26: optoisolata/non optoisolata Connettore estraibile 3 vie p. 5,08

Nota: utilizzare cavo schermato AWG 20-22 a coppie twistate per i +/-; (*) disponibili i 2 modelli; (**) J26 configurabile

Serial Ports

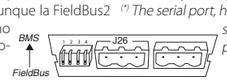
Serial	*Type/connectors*	*Specifications*
ZERO	*pLAN/J10, J11*	*Integrated on main board RS485 pLAN Not optically-isolated Connectors: 6-way telephone jack + 3-way removable p. 5.08 Max length: 500 m Maximum number of connected devices: 32*
ONE	*BMS 1 Serial Card*	*Not integrated on main board*
TWO	*FieldBus 1 Serial Card*	*Not integrated on main board*
THREE	*BMS 2/ J25*	*Integrated on base card RS485 Slave Serial opt.isolated/not opto-isolated(*) 3-way removable connector 5.08 Maximum length: 1000 m*
FOUR	*FieldBus 2 / J26 (and J23 on Large and Extralarge version)*	*Integrated on base card RS485 Master/Slave (**) J23: not optically-isolated , J26: opt.-isolated/not opt.-isolated 3-way removable connector 5.08*

Note: use twisted pair shielded cable AWG 20-22 for the +/-; (*) available in 2 models; (**) J26 configurable

CONFIGURAZIONE PORTA J26

Rispetto al pCO5, i controlli pCO5+ sono dotati di 4 microinterruttori per configurare la porta seriale J26 (figura):
- microinterruttori tutti "IN BASSO": porta J26 impostata con hardware FieldBus;
- microinterruttori tutti "IN ALTO": porta J26 impostata con hardware BMS(*);

La configurazione di fabbrica è: porta FieldBus.
(*) La porta seriale rimane comunque la FieldBus2 a livello software all'interno dell'ambiente di programmazione 1Tool.



PORT J26 CONFIGURATION

In comparison to pCO5, the pCO5+ controllers are equipped with 4 micro-switches to configure the serial port J26 (figure):
- *all micro-switches "DOWN": port J26 set with FieldBus hardware;*
- *all micro-switches "UP": port J26 set with BMS(*) hardware;*

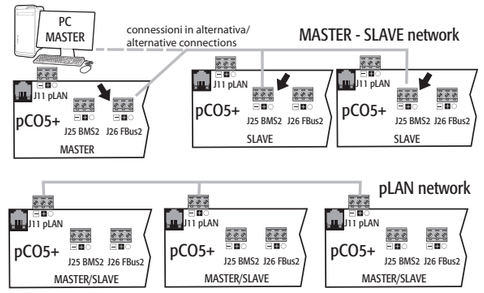
The factory setting is; FieldBus port.
(*) The serial port, however, remains FieldBus2 at the software level inside the 1Tool programming environment.

CONNESSIONE IN RETE TRA CONTROLLI

Nel pCO5+ ci sono tre tipi di seriali: pLAN, FieldBus, BMS. La porta seriale Fieldbus RS485 ha hardware di tipo Master, mentre la porta seriale BMS RS485 ha hardware di tipo Slave. I protocolli da utilizzare sulla porta Fieldbus RS485 sono, per natura stessa della porta, di tipo Master (Carel Master o Modbus RTU Master), anche se possono essere utilizzati in casi particolari quelli di tipo Slave (Carel Slave o Modbus RTU Slave), con i dovuti accorgimenti. Analogamente sulla porta BMS RS485, i protocolli da utilizzare sono di tipo Slave, anche se con i dovuti accorgimenti è possibile avere protocolli di tipo Master.
Nota: la rete pLAN è multi-master: ogni controllo può essere contemporaneamente Master o Slave.

NETWORK CONNECTION BETWEEN CONTROLLERS

In the pCO5+ there are three types of serials: pLAN, FieldBus and BMS. The RS485 Fieldbus port has Master type hardware while the RS485 BMS port has Slave type hardware. The protocols to be used on the RS485 Fieldbus port are, due to the nature of the port itself, Master type (Carel Master or Modbus RTU Master), even if Slave type (Carel Slave or Modbus RTU Slave) can be used in certain cases with the appropriate expedients. Similarly, on the RS485 BMS port, the protocols to be used are Slave type, even if with the appropriate expedients, Master-type protocols are possible.
***Note:** the pLAN network is multi-master: each controller can be Master or Slave at the same time.*



ETICHETTAT. INGRESSI / USCITE

I controlli pCO5+ si differenziano per la taglia e sono provvisti di ingressi e uscite e alimentazione alle sonde attive adatte per le varie applicazioni. Le caratteristiche che dipendono dalla taglia sono:
- numero massimo e natura degli ingressi/uscite;
- presenza o meno del display integrato;
- presenza del driver integrato per valvola di espansione.

Etich.	Tipo di segnale
U...	Ingressi/uscite universali, configurabili via software come: Ingressi analogici: - sensori NTC , PTC, PT500, PT1000 - sensori PT100 - segnali 0...1 Vdc o 0...10 Vdc - segnali 0/4...20 mA - segnali 0...5 V per sonde raziometriche Ingressi digitali (non optoisolati): - contatti puliti (non optoisolati) - ingressi digitali veloci Uscite analogiche (non optoisolate): - segnali 0...10 Vdc - segnali PWM
Y...	Uscite analogiche 0...10 Vdc, uscite PWM
ID...	Ingresso digitale a 24 Vac o 28...36 Vdc
ID...H	Ingresso digitale a 230 Vac
NO...	Uscita a relè, contatto normalmente aperto
NC....	Uscita a relè, contatto normalmente chiuso
C...	Uscita a relè, comune
Tx/Rx, GND	Porta seriale

INPUTS/ OUTPUTS LABEL

The pCO5+ controllers are differentiated by their size and are equipped with inputs and outputs and active probe power supplies that are suitable for the various applications. The size-related characteristics are:
- *max. number and nature of the inputs/outputs;*
- *whether or not it has an integrated display;*
- *presence of the integrated driver for the expansion valve*

Label	Signal type
U...	Universal inputs/outputs, configur. via software such as: Analogue inputs: - sensors NTC , PTC, PT500, PT1000 - sensors PT100 - signals 0 to 1 Vdc or 0 to 10 Vdc - signals 0/4 to 20 mA -signals 0 to 5 V for raziometric probes Digital inputs (not opto-isolated): - free contacts (not opto-isolated) - fast digital inputs Analogue outputs (not opto-isolated): - signals 0 to 10 Vdc -signals PWM
Y...	Analogue outputs 0 to 10 Vdc, PWM outputs
ID...	Digital inputs to 24 Vac or 28 to 36 Vdc
ID...H	Digital inputs to 230 Vac
NO...	Relay outputs, contact normally open
NC....	Relay outputs, contact normally closed
C....	Relay outputs, common
Tx/Rx, GND	Serial port

COLLEGAMENTO TERMINALE

Il controllo e il terminale sono connessi in rete pLAN.

1: controllo pCO singolo

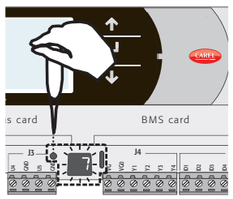
Nel collegamento del controllo al terminale occorre tener presente i seguenti vincoli:
- la lunghezza totale della rete pLAN non deve superare i 500 m. Quindi se il terminale è stato remotato la lunghezza del cavo del terminale entra nel computo totale della lunghezza;
- il cavo telefonico non schermato si può utilizzare per una lunghezza massima di 50 m. Oltre questa lunghezza utilizzare un cavo schermato tripolare;
- oltre i 200 m l'alimentazione del terminale deve essere fornita separatamente;
- è possibile collegare al massimo 3 terminali allo stesso controllo pCO. I terminali devono essere dello stesso tipo (es. tutti PGD1). 1 terminale è alimentato dal controllo, gli altri due sono alimentati esternamente;
- tranne PGD0/ PGD1/PGDE gli altri terminali vanno alimentati con alimentazione separata.

2: Controllo pCO in rete pLAN

Nel caso di terminale connesso ad un controllo pCO, a sua volta collegato in rete pLAN ad altri controlli, il terminale è alimentato direttamente dal controllo. Prestare attenzione per evitare che una doppia alimentazione raggiunga il terminale. A questo scopo impostare i ponticelli J14 e J15 della scheda TCONN6J000, tramite i quali è possibile interrompere il passaggio della corrente di alimentazione.

Impostazione indirizzo pLAN

Procedura:
1. premere per 5 s il tasto A. L'indirizzo pLAN inizierà a lampeggiare;
2. premere ripetutamente o tenere premuto il tasto fino a raggiungere l'indirizzo desiderato (es. 7); estrarre il cacciavite;
3. attendere finché l'indirizzo comincia a lampeggiare velocemente. In questa fase l'indirizzo è memorizzato ma non ancora attivo per il programma applicativo;
4. togliere alimentazione al controllo;
5. ridare alimentazione al controllo. Ora l'indirizzo è attivato.



Impostazione dell'indirizzo del terminale e connessione controllo-terminale

Dopo aver impostato l'indirizzo del controllo (vedere paragrafo precedente), per stabilire la connessione controllo-terminale occorre impostare l'indirizzo del terminale. Seguire la procedura descritta nel manuale d'uso cod. +03000020IT.

CONNECTING THE TERMINAL

CONNECTING THE TERMINAL

The controller and terminal are connect in the pLAN network

1: pCO single controller

In connecting the controller to the terminal, the following requirements must be applied:
- *the total length of the pLAN network must not exceed 500m. Therefore, if the terminal is remote, the length of the cable from the terminal is part of the total length computation;*
- *unshielded telephone cable can be used for a max. length of 50m. If this length is exceeded, us a tri-polar shielded cable;*
- *over 200 m, power supply must be provided separately to the terminal;*
- *a max. of 3 terminals can be connected to the same pCO controller The terminals must be of the same type (e.g., type PGD1). 1 terminal is supplied by the controller, the other two are externally powered.*
- *except for PGD1/PGD1/PGDE, the other terminals are powered separately.*

2: pCO controller in pLAN network

In the case of a terminal connected to a pCO controller which is then connected to other controllers in the pLAN network, the terminal is supplied directly by the controller. Pay close attention to prevent the terminal from receiving a double power supply. For this purpose, set jumpers J14 and J15 on the TCONN6J000 card, through which the passage of the power supply can be interrupted

pLAN address setup

Procedure:
1. *press key A for 5 seconds. The pLAN address will start to flash;*
2. *press the key repeatedly or hold it down until the desired address is reached (e.g., 7); remove the screwdriver;*
3. *wait until the address starts to flash quickly. In this phase the address is saved but it is not yet active in the program;*
4. *remove power from the controller;*
5. *return power to the controller; The address is now active*

Setting the terminal address and controller-terminal connection

After having set the controller address (see the previous paragraph), in order to establish the controller-terminal connection, the terminal address must be set. Follow the procedure described in user manual code +03000020EN.

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pGD touch PGDT10000FR10-PGDT13000FR10: Terminale utente pGD Touch 10" / 13" - *User terminal pGD Touch 10" / 13"*

CAREL

Installazione e montaggio / *Assembly and installation*

Dimensioni e forature / *Dimensions and drilling template* (in mm/inc.)

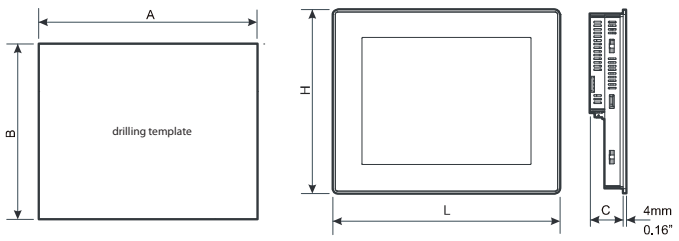


Fig.1

Model	A	B	C	H	L
pGD 10	276 (10.86")	221 (8.7")	56 (2.2")	232 (9.13")	287 (11.30")
pGD 13	326 (12.83")	256 (10.07")	56 (2.2")	267 (10.51")	337 (13.22")

Tab. 1

Fissaggio supporti / *Fixing bracket*

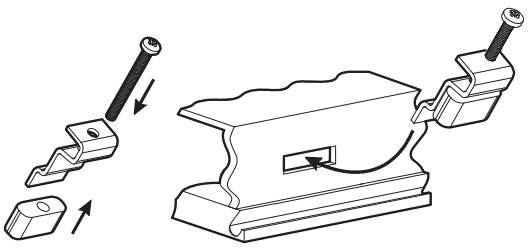


Fig.2

Nota: avvitare ogni vite di fissaggio fino a quando l'angolo della cornice poggerà sul pannello. / *Screw each fixing screw until the bezel corner gets in contact with the panel.*

Applicazione guarnizione / *Applying the gasket*

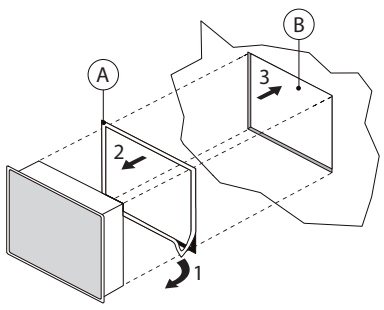


Fig.3

Legenda:

A. Guarnizione / *Gasket*
B. Foratura per il montaggio / *Installation cut-out*

Tab. 3

Collegamento elettrico / *Power supply connection*

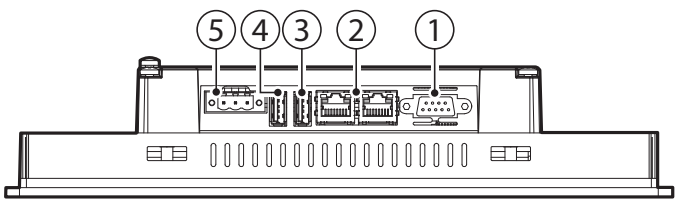


Fig.4

Legenda:

1. Porta seriale / Serial Port
2. 2x porta Ethernet / 2x Ethernet Port
3. porta USB (versione 2.0 - 1.1) / USB port (version 2.0 - 1.1)
4. porta USB (versione 2.0 solo alta velocità)
   USB port (version 2.0 High speed only)
5. Alimentazione / Power Supply

Tab. 2

WARNING: separate as much as possible the probe and digital input signal cables from the cables carrying inductive loads and power cables to avoid possible electromagnetic disturbance. Never run power cables (including the electrical panel wiring) and signal cables in the same conduits.

IMPORTANT WARNINGS

The CAREL product is a state-of-the-art product, whose operation is specified in the technical documentation supplied with the product or can be downloaded, even prior to purchase, from the website www.carel.com. - The client (builder, developer or installer of the final equipment) assumes every responsibility and risk relating to the phase of configuration the product in order to reach the expected results in relation to the specific final installation and/or equipment. The lack of such phase of study, which is requested/indicated in the user manual, can cause the final product to malfunction of which CAREL can not be held responsible. The final client must use the product only in the manner described in the documentation related to the product itself. The liability of CAREL in relation to its own product is regulated by CAREL's general contract conditions edited on the website www.carel.com and/or by specific agreements with clients.

Descrizione

I terminali grafici pGD Touch da 10 e 13 pollici appartengono alla famiglia di terminali touch screen pensata per rendere semplice e intuitivo interfacciamento dell'utente con i controlli della famiglia pCO Sistema.
La tecnologia elettronica utilizzata e il nuovo display a 65'000 colori permettono di gestire immagini ad alta risoluzione e funzionalità avanzate per ottenere un elevato standard estetico. Il pannello touch screen, inoltre, facilita l'interazione uomo-macchina rendendo, di fatto, più facile la navigazione tra le varie schermate.

Codici modelli

Codice	Dimensione display	Risoluzione
PGDT10000FR10	10.4 pollici	800x600 (SVGA)
PGDT13000FR10	13.3 pollici	1280x800 (WXGA)

Codici accessori

Codice	Descrizione
PGTA00TRF0	Alimentatore 230 VAC – 24 VDC per guida DIN
PGTA00CNV0	Cavo adattatore DB9 per RS485 lunghezza 2 m

Avvertenze per l'installazione

Evitare il montaggio delle schede in ambienti che presentino le seguenti caratteristiche:

- umidità relativa maggiore di quanto indicato nelle specifiche tecniche;
- forti vibrazioni o urti;
- esposizione ad atmosfere aggressive ed inquinanti (es.: gas solforici e ammoniacali, nebbie saline, fumi) con conseguente corrosione e/o ossidazione;
- elevate interferenze magnetiche e/o radiofrequenze (evitare quindi l'installazione delle macchine vicino ad antenne trasmittenti);
- esposizione all'irraggiamento solare diretto e agli agenti atmosferici in genere;
- ampie e rapide fluttuazioni della temperatura ambiente;
- ambienti ove sono presenti esplosivi o miscele di gas infiammabili;
- evitare di avvicinarsi con le dita ai componenti elettronici montati sulle schede per evitare scariche elettrostatiche (estremamente dannose) dall'operatore verso i componenti stessi.

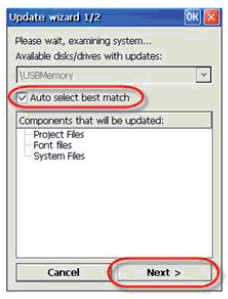
Avvertenze generali

1. **I terminale pGDTouch 10" e 13" possono essere alimentati solo in corrente continua.**
2. Una tensione di alimentazione elettrica diversa da quella prescritta può danneggiare seriamente il sistema;
3. Utilizzare capicorda adatti per i morsetti in uso. Allentare ogni vite ed inserirvi i capicorda, quindi serrare le viti. Ad operazione ultimata tirare leggermente i cavi per verificarne il corretto serraggio;
4. L'uso a temperature particolarmente basse può causare una visibile diminuzione della velocità di risposta del display. Questo è da ritenersi normale e non è indice di malfunzionamento.

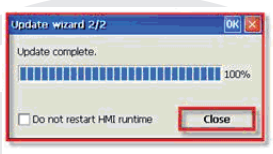
Aggiornamento Runtime

Copiare il pacchetto di aggiornamento contenente il Runtime in una chiave USB e successivamente collegare la chiave USB al pGDTouch.
Tenere premuto il dito sullo schermo del terminale pGD Touch per alcuni secondi fino a che il menu di scelta rapida sarà visualizzato.

Selezionare "Update…" per avviare la procedura di aggiornamento Runtime. L'utility per l'aggiornamento del Runtime si avvierà ed apparirà la seguente finestra.



Selezionare "Auto select best match" e premere next, in questo modo verrà avviata la procedura di aggiornamento.



Attendere che la procedura sia terminata e premere "Close".

Description

The pGD Touch 10 and 13 inch graphic terminals are part of the family of touchscreen terminals designed to simplify user interface with the pCO sistema. family controllers
The electronic technology used and the new 65,000 colour display means high resolution images and advanced functions are available for a superior appearance. The touchscreen panel makes interaction between the user and the unit much easier by simplifying navigation between the various screens.

Model codes

Code	Display size	Resolution
PGDT10000FR10	10.4 inches	800x600 (SVGA)
PGDT13000FR10	13.3 inches	1280x800 (WXGA)

Accessory codes

Code	Description
PGTA00TRF0	230 VAC – 24 VDC power supply for DIN rail
PGTA00CNV0	DB9 adapter cable for RS485, 2 m long

Installation warnings

Do not install the boards in environments with the following characteristics:

- relative humidity greater than the value specified in the technical specifications;
- strong vibrations or knocks;
- exposure to aggressive and polluting atmospheres (e.g.: sulphur and ammonia fumes, saline mist, smoke) so as to avoid corrosion and/or oxidation;
- strong magnetic and/or radio frequency interference (therefore avoid installing the units near transmitting antennae);
- exposure to direct sunlight or the elements in general;
- large and rapid fluctuations in the room temperature;
- environments where explosives or mixes of flammable gases are present;
- avoid touching or nearly touching the electronic components fitted on the boards to avoid electrostatic discharges (extremely damaging) from the operator to the components.

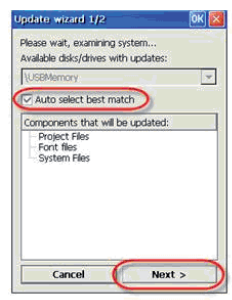
General warnings

1. **The pGD Touch 10" and 13"' terminals are for DC power supply only.**
2. Power supplies other than those specified may seriously damage the system;
3. Use cable ends suitable for the corresponding terminals. Loosen each screw and insert the cable ends, then tighten the screws. When finished, slightly tug the cables to check they are sufficiently tight;
4. Operation at low temperatures may cause a visible decline in the response speed of the display. This should be considered normal and does not indicate a malfunction.

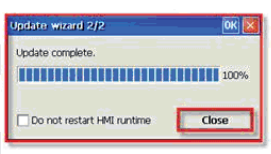
Runtime update

Copy the update package containing the Runtime to a USB pendrive and then plug the pendrive into the pGDTouch.
Touch and hold the pGD Touch terminal screen for a few seconds until the shortcut menu is displayed.

Select "Update…" to start the Runtime update procedure. The Runtime update utility will start and the following window will be displayed.



Select "Auto select best match" and then press next to start the update procedure.



Wait for the procedure to end and press "Close".

Alimentazione / *Power supply*

⚠ Alimentatore a bassissima tensione di sicurezza/sorgente di potenza limitata / *Extra low voltage power supply / Limited power source.*

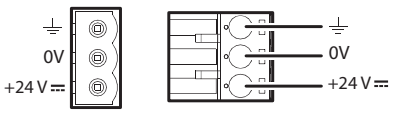


Fig.5

⚠ Non aprire l'involucro dei pannelli quando sono alimentati / *Don't open the panel rear cover when the power supply is applied.*

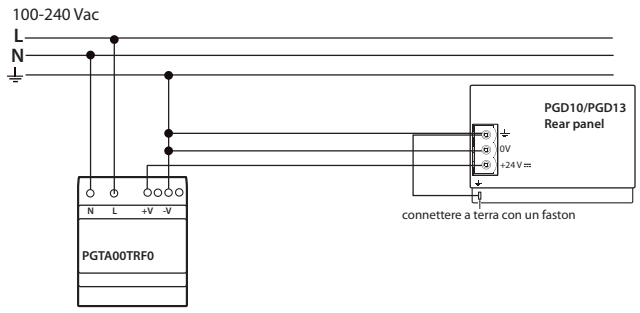


Fig.6

Verificare che l'alimentatore sia in grado di erogare la potenza necessaria per il corretto funzionamento dell'apparecchiatura. E' possibile ordinare l'alimentatore 230Vac/24Vdc - codice PGTA00TRF0. / *Ensure that the power supply has enough power capacity for the operation of the devices. The 230 Vac/24Vdc power supply - code PGTA00TRF0 can be ordered.*

Collegamenti seriali / *Serial conncetions*

PLC PORT: Com 1 - PC/PRINTER PORT: Com2

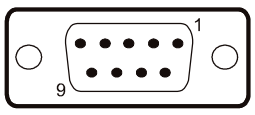


Fig. 7

Pin	Description
1	GND
2	-
3	TX/CHA-
4	RX/CHB-
5	-
6	+5 V output
7	CTS/CHB+
8	RTS/CHA+
9	-

Per effettuare il collegamento con gli strumenti Carel in RS485 utilizzare l'apposito cavo adattatore PGTA00CNV0. / *To make the RS485 connection to Carel instruments use the special adapter cable code PGTA00CNV0.*

Caratteristiche PGTA00CNV0	*PGTA00CNV0 Technical specifications*
lunghezza: 2 m	*lenght*: 2 m
Il cavo è dotato di connettore DB9 maschio e resistenze interne di polarizzazione linea	*The cable is fitted with a DB9 male connector and internal resistance for line polarisation*
terminazioni: Db9 maschio e fili sguainati con occhiello per collegamento a terra della calza	*terminations: DB9 male and stripped wires with eyelet for earthing the shield*

Per il collegamento al pCO seguire i colori indicati in figura:
To connect the pCO follow the colours indicated in the figure:

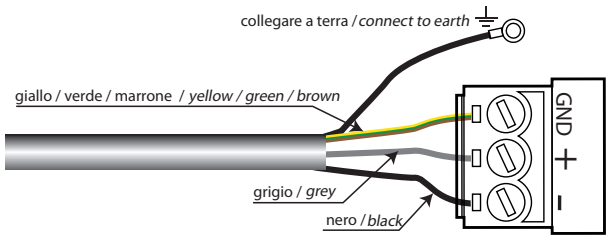


Fig. 8

Regole per lo smaltimento / *Guidelines for disposal*

- Non smaltire il prodotto come rifiuto solido urbano ma smaltirlo negli appositi centri di raccolta.
- Il prodotto contiene una batteria ed è quindi necessario rimuoverla separandola dal resto del prodotto seguendo le istruzioni riportate di seguito prima di procedere al suo smaltimento.
- Un uso improprio o uno smaltimento non corretto potrebbe avere effetti negativi sulla salute umana e sull'ambiente.
- Per lo smaltimento vanno utilizzati i sistemi di raccolta pubblici o privati previsti dalle leggi locali.
- In caso di smaltimento abusivo dei rifiuti elettrici ed elettronici sono previste sanzioni stabilite dalle vigenti normative locali in materia di smaltimento.

- *Do not dispose of the product as municipal waste; it must be disposed of through specialist waste disposal centres.*
- *The product contains a battery that must be removed and separated from the rest of the product according to the instructions provided, before disposing of the product.*
- *Improper use or incorrect disposal of the product may negative effects on human health and on the environment.*
- *The public or private waste collection systems defined by local legislation must be used for disposal.*
- *In the event of illegal disposal of electrical and electronic waste, the penalties are specified by local waste disposal legislation.*

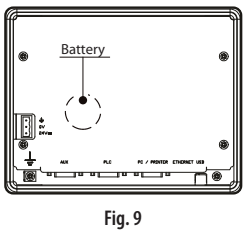


Fig. 9

Smaltimento del prodotto: l'apparecchiatura (o il prodotto) deve essere oggetto di raccolta separata in conformità alle vigenti normative locali in materia di smaltimento. / ***Disposal of the product:*** *the appliance (or the product) must be disposed of separately in accordance with the local waste disposal legislation in force.*

Caratteristiche tecniche

	pGD10"	pGD13"
Display		
Tipo	TFT	
Resoluzione	800x600, SVGA	1280x800, WXGA
Area display attiva	10.4" diagonal	13"3 diagonal
Colori	64 K	
Retro-illuminazione	LED	
Luminosità	300 Cd/m² typ.	
Regolazione luminosità	Si	
Requisiti di sistema		
Sistema operativo	Microsoft Windows CE 6.0	
Memoria utente	256 MB Flash	
RAM CPU | MIPS	256 MB DDR	
Interfaccia operativa		
Touchscreen	Analog resistive	
Indicatori LED utente	1 (dual core)	
Interfacce		
Porta Ethernet	2 10/100 Mbit with intergrated switch	
Porta USB	Host interface, (1 vers. 2.0, 1 vers. 2.0 e 1.1)	
Porta Seriale 1: Com1	RS232, RS485, RS422, configurabile via software	
Memory card	SD Card Slot	
Funzionalità		
Grafica vettoriale	Si, incluso supporto SVG 1.0	
Oggetti dinamici	Si. Visibilità, opacità, posizione, dimensione, rotazione per molti tipi di oggetti	
Font-TrueType	Si	
Multi-Protocollo	Sì, massimo 2 driver	
Storico e trend	Si. Limitato alla memoria della Flash memory	
Multi-lingue	Si, con impostazione della lingua run-timee limitato solo dalla memoria disponibile	
Recipes (ricette)	Si. Limitato alla memoria della Flash memory	
Allarmi	Si	
Lista eventi	Si	
Passwords	Si	
Hardware Real Time Clock	Si, con batteria di back-up	
Screen saver	Sì	
Buzzer	"Beep" alla pressione del touch (configurabile)	
Ratings		
Alimentazione	24 Vdc (18...30 Vdc)	
Corrente assorbita	0,95 A a 24 Vdc (max.)	1,15 A a 24 Vdc (max.)
Fusibile	Automatico	
Peso	appross. 2,1 kg	appross. 2,8 kg
Batteria	Ricaricabile a litio, non sostituibile dall'utente	
Condizioni ambientali		
Temperatura di lavoro	0...50 °C (installazione verticale)	
Temperatura di immagazzinamento	-20...70 °C	
Umidità i lavoro e immagazzinamento	5 – 85 % umidità relativa, non-condensante	
Grado di protezione	IP65 (front panel) - IP20 (rear)	
Dimensioni		
Pannello frontale LxH	287x232 mm	337x267 mm (13.22x10.51")
Foratura AxB	276x221 mm	326x256 mm (12.83x10.07")
Profondità D+T	56mm + 4mm	56+4 mm (2.20+0.16")

L'utilizzo di queste apparecchiature in ambienti residenziali, commerciali e dell'industria leggera è permesso solo nel caso in cui vengano prese le misure speciali per ottenere la conformità alla IEC61000-6-3.

CAREL si riserva la possibilità di apportare modifiche o cambiamenti ai propri prodotti senza alcun preavviso.

Technical Specification

	pGD10"	pGD13"
Display		
Type	TFT	
Resolution	800x600, SVGA	1280x800, WXGA
Active display area	10.4" diagonal	13"3 diagonal
Colours	64 K	
Backlight	LED	
Brightness	300 Cd/m² typ.	
Dimming	Yes	
System resources		
Operating System	Microsoft Windows CE 6.0	
User memory	256 MB Flash	
RAM CPU | MIPS	256 MB DDR	
Operator Interface		
Touchscreen	Analogue resistive	
User LED indicators	1 (dual core)	
Interfaces		
Ethernet port	2 10/100 Mbit with intergrated switch	
USB port	Host interface, (1 vers. 2.0, 1 vers. 2.0 e 1.1)	
Serial Port 1: Com1	RS232, RS485, RS422, software configurable	
Memory card	SD Card Slot	
Functions and features		
Vector graphics	Yes, includes SVG 1.0 support	
Object dynamics	Yes. Visibility, opacity, position size, rotation for object types.	
TrueType fonts	Yes	
Multiple driver commun.	Yes, max 2 drivers	
Data acquisition and trend presentation	Yes. Flash memory storage limited only by available memory	
Multilanguage	Yes, number of run-time languages limited by available memory	
Recipes	Yes. Flash memory storage limited by available mem.	
Alarms	Yes	
Event list	Yes	
Passwords	Yes	
Hardware Real Time Clock	Yes, with battery back-up	
Screen saver	Yes	
Buzzer	Yes, audible feedback for touchscreen	
Ratings		
Power supply voltage	24 Vdc (18 to 30 Vdc)	
Current consumption	0,95 A a 24 Vdc (max.)	1.15 A a 24 Vdc (max.)
Fuse	Automatic	
Weight	Approx 2.1 kg	Approx 2.8 kg
Battery	Rechargeable Lithium battery, not user-replaceable	
Environmental conditions		
Operating temperature	0...50 °C (vertical installation)	
Storage temperature	-20...70 °C	
Operating and storage humidity	5 – 85 % relative humidity, non-condensing	
Protection class	IP65 (front panel) - IP20 (rear)	
Dimensions		
Faceplate LxH	287x232 mm	337x267 mm (13.22x10.51")
Cutout AxB	276x221 mm	326x256 mm (12.83x10.07")
Depth D+T	56mm + 4mm	56+4 mm (2.20+0.16")

These devices may only be used in residential, commercial and light industrial environments if special measures are taken to ensure conformity to IEC61000-6-3.

CAREL reserves the right to modify the features of its products without prior notice.

Schema per collegamento a pCO⁵ / *Connection to pCO⁵*

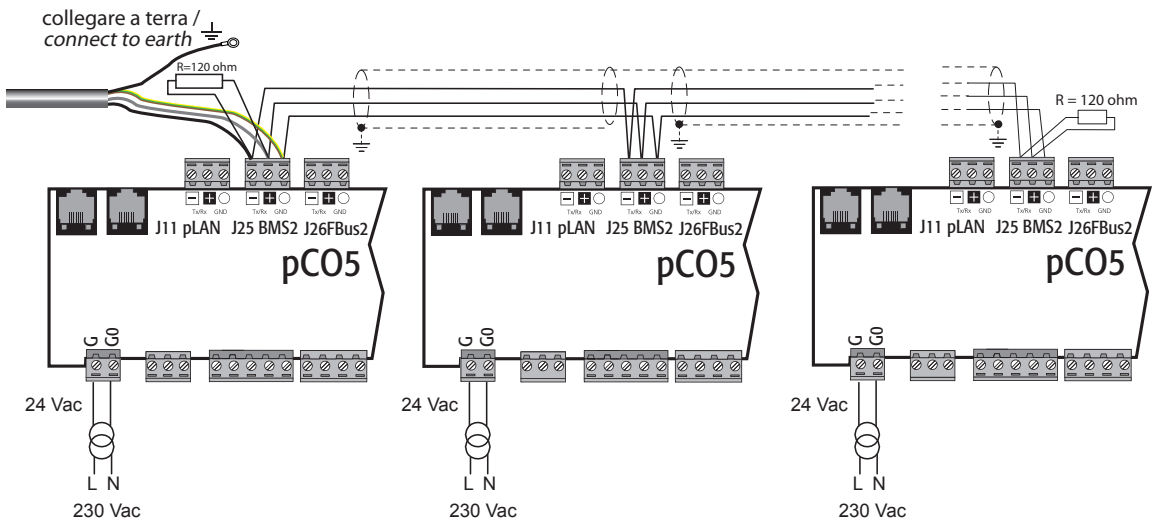


Fig. 10

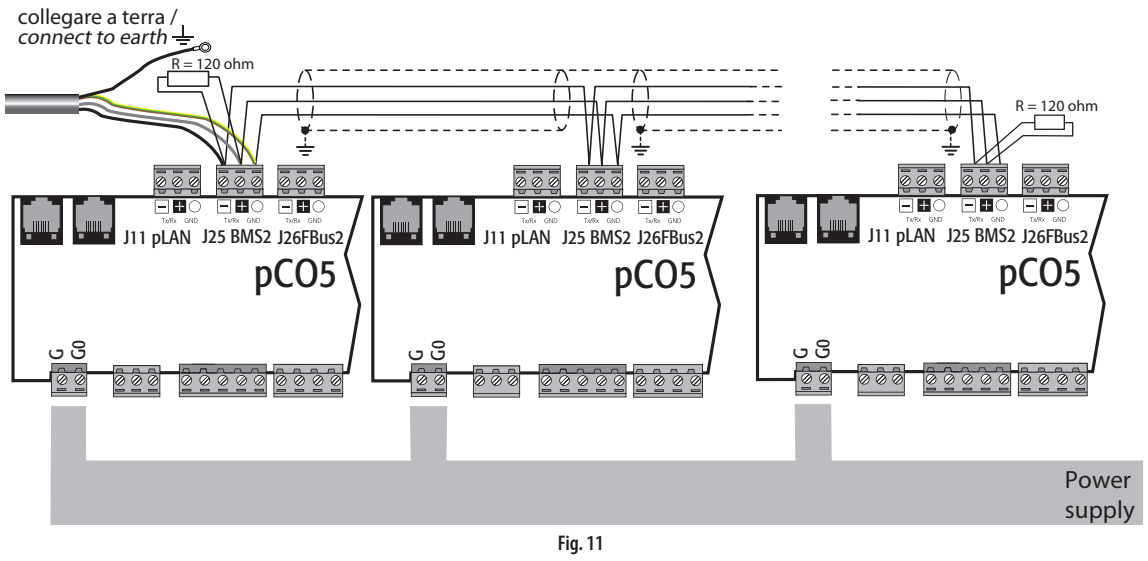


Fig. 11

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1 YEAR
WARRANTY

User's Guide

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FST-200 & FST-300 Series
Thermal Dispersion Flow Switches

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Offered in liquid and gas sensor types, the general purpose flow switch provides reliable low or no-flow detection of relatively clean, non-coating media with one 1A relay output. Liquid examples in clued water and acetic acid. Available in Polypropylene-PPS or PVDF, the short flow sensor is used in pipe or ducting from ½" to 1-1/2", and the long flow sensor is used in 2" and up. The flow switch set point may be adjusted from 0.,04 to 3 fps in liquids or 1 to 90 fps in gases as a low-flow alarm. The flow sensor is best applied in applications with relatively constant temperatures.

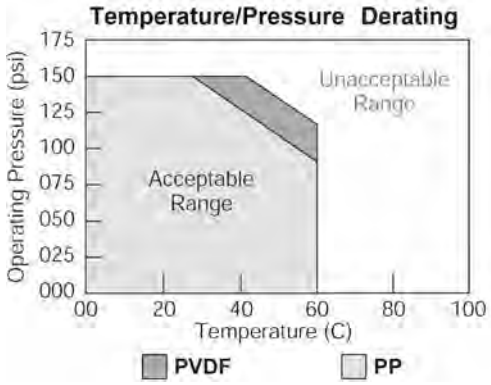
New Features

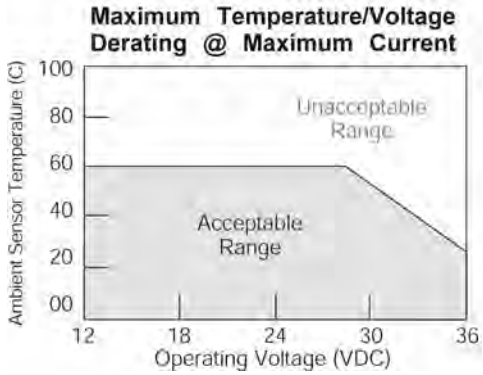
- Rugged Polypropylene-PPS or PVDF sensor for corrosive liquids and gasses.
- Adjustable set point with LED for flow or no-flow status indication.
- 60VA relay selectable NO or NC via power supply wiring polarity
- Solid State sensor is not damaged by over-ranging flow velocities.

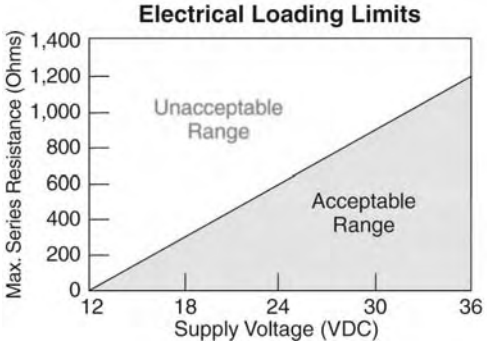
Table of Contents

SPECIFICATIONS **Step Two**

Set point range:	FST-200: .04 to 3 fps (.012 to .91 mps)
	FST-300: 1 to .90 fps (.3 to 27 mps)
Factory set point:	FST-200: .2 fps (.06 mps)
	FST-300: 10 fps (3 mps)
Repeatability:	±.5% of set point @ fixed temp.
Response time:	1-10 seconds
Set point adjust.:	Potentiometer
LED indication:	Flow Status
Viscosity range:	1-200 centipoise (FST-200 series only)
Supply Voltage:	14-36 VDC
Consumption:	70 mA maximum
Contact type:	(1) SPST relay
Contact rating:	60 VA, 1A max
Contact output:	Selectable NO/NC
Process temp.:	F:32° to 140°
	C: 0° to 60°
Electronics temp.	F: -40° to 140°
	C: -40° to 60°
Pressure:	150 psi (10 bar) @ 25°C., derated @ 1.667 psi (.113 bar) per °C. Above 25° C.
Sensor rating:	NEMA 4X (IP65)
Sensor Material:	FST-211/-221/-321/-323: PP-PPS
	FST-212/-222/-322/-324: PVDF
Cable jacket mat.:	FST-211/-221/-321/-323: PP
	FST-212/-222/-322/-324: PFA
Cable type:	4-conductor, #22 AWG (shielded)
Cable length:	10’ (3m)
Process mount:	3/4" NPT (3/4” G/Rp)
Mount. Gasket:	FKM (G version only)
Classification:	General purpose
CE compliance:	EN 61326 EMC
	EN 61010-1 safety



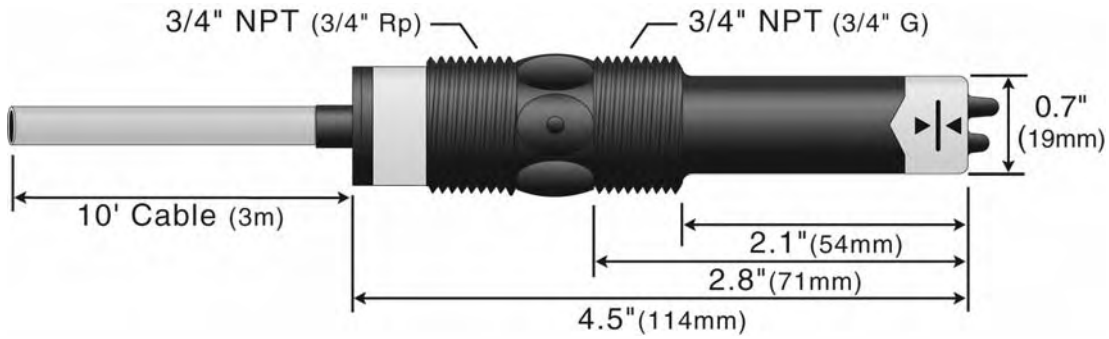




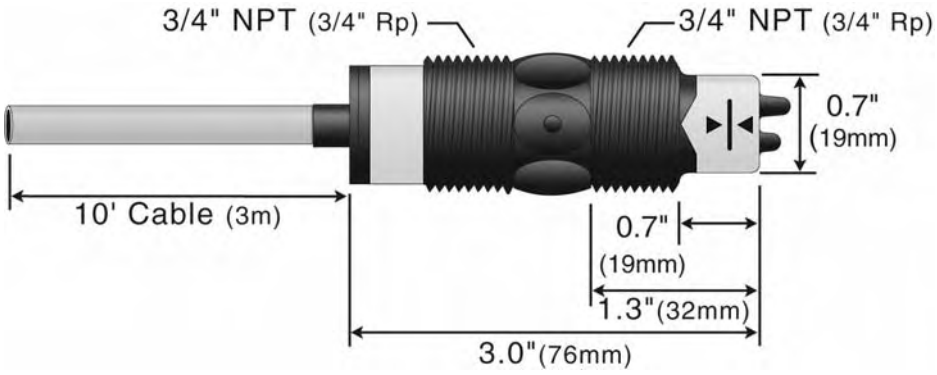
⚠ **Make a Fail-Safe System:** Design a fail-safe system that accommodates the possibility of switch and/or power failure. OMEGA ENGINEERING recommends the use of redundant backup systems and alarms in addition to the primary system. Adding a redundant alarm switch to the system is a cost effective means to prevent costly run-dry issues.

DIMENSIONS **Step Three**

Long Sensor (FST-221/-222/-323/-324)



Short Sensor (FST-211/-212/-321/-322)



Configurations (Liquid Flow Switches):

Part Number	Length	Material (body)	Material (cable)	Thread (inside x outside)
FST-211-SPST	Short (3”)	PP-PPS	Polypropylene	¾” NPT x ¾” NPT
FST-212-SPST	Short (3”)	PVDF	PFA	¾” NPT x ¾” NPT
FST-221-SPST	Long (4.5”)	PP-PPS	Polypropylene	¾” NPT x ¾” NPT
FST-222-SPST	Long (4.5”)	PVDF	PFA	¾” NPT x ¾” NPT

Configurations (Gas Flow Switches):

Part Number	Length	Material (body)	Material (cable)	Thread (inside x outside)
FST-321-SPST	Short (3”)	PP-PPS	Polypropylene	¾” NPT x ¾” NPT
FST-322-SPST	Short (3”)	PVDF	PFA	¾” NPT x ¾” NPT
FST-323-SPST	Long (4.5”)	PP-PPS	Polypropylene	¾” NPT x ¾” NPT
FST-324-SPST	Long (4.5”)	PVDF	PFA	¾” NPT x ¾” NPT

Note: *The above products ship with a standard 10’ cable length. Adding “ -25” to the end of the part number indicates that the product has a 25’ cable length (ex. FST-211-SPST-25). Adding “ -50” to the end of the part number indicates that the product has a 50’ cable length (ex. FST-321-SPST-50).*

About this Manual: PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on all models of Omega Engineering Thermal Dispersion Flow Switches: FST-200 and FST-300 series. Please refer to the part number located on the switch label to verify the exact model which you have purchased.

User's Responsibility for safety: Omega Engineering manufactures a wide range of flow switches and technologies, while each of these sensors is designed to operate in a wide variety of applications; it is the user's responsibility to select a sensor model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components. The failure to do so could result in property damage or serious injury.

Proper Installation and Handling: Because this is an eclectically operated device, only properly trained staff should install and/or repair this product. Use a proper sealant with all installations. ***Note:*** *Always install the 3/4" FKM gasket with all versions of Flow switches with metric threads. The G threaded version will not seal unless the gasket is properly installed.* Never over tighten the sensor within the fitting, beyond a maximum of 80 inch-pounds torque. Always check for leaks prior to system start-up.

Material Compatibility: The FST-200 and FST-300 series sensors are available in two different wetted materials. Models FST-211/-221/-321/-323 are made of Polypropylene (PP) with PPS tips. Models FST-212/-222/-322/-324 are made of Polyvinylidene Fluoride (PVDF). Make sure that the model you have selected is compatible with the application liquid. To determine the chemical compatibility between the sensor and its application liquids, refer to an industry reference such as the Compass Corrosion.

Wiring and Electrical: The supply voltage used to power the sensor should never exceed a maximum of 36 volts DC. Electrical wiring of the sensor should be performed in accordance with all applicable national, state, and local codes.

Flammable, Explosive and Hazardous Applications: DO NOT USE THE FST-200 or FST-300 SERIES GENERAL PURPOSE FLOW SWITCHES IN HAZAROUS LOCATIONS.

Warning

- *The rating for the relay is 60 VA, 1Amp max.*
- *Omega Engineering's Thermal Dispersion flow switches are not recommendable for use with electrically charged application liquids. For most reliable operation, the liquid being measured may need to be electrically grounded.*
- *The sensing tip of the sensor must always be submersed in the liquid and never exposed to air.*
- *The liquid temperature must remain constant and not change throughout the process.*

Technology: The Thermal Dispersion flow switches measure liquid or gas temperature to determine changes in flow velocity. As fluid flows across the sensing tips, the temperature is reduced proportionately as a function of the flow rate. When a temperature or velocity shift reaches the user defined set point, the switch changes state indicating the appropriate flow condition (flow of no-flow).

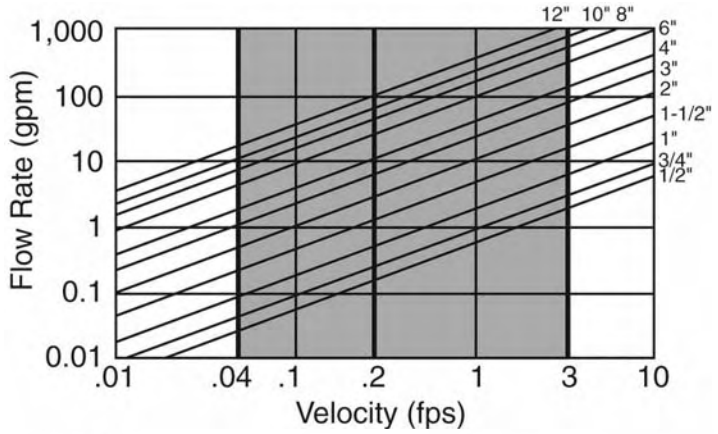
OMEGA ENGINEERING's sophisticated electronics convert the temperature shift into a signal which indicates whether a flow or no-flow condition occurs. Depending on how the sensor is wired, this signal may be wired for normally open or normally closed circuits.

OMEGA ENGINEERING's Thermal Dispersion flow switches have no moving parts to clog or foul, making them suitable for a verity of applications, including non-coating and non-scaling liquids. The FST-200 series directly measure mass flow and can operate over board range of liquids from 0.4 to 1.2 specific gravity and 1 to 300 cp.

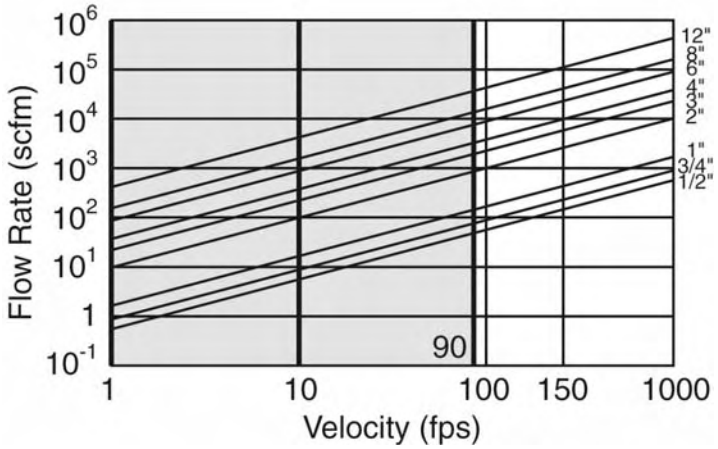
Initializing Sequence for FST-200 series: When the flow switch is powered up while submersed, the FST-200 series will immediately indicate flow before switching to its correct state. A time delay may be used to eliminate the initialization sequence. Omega Engineering's thermal dispersion relay controllers feature a 0 to 60 second time delay for your convenience.

Set Points: The FST-200 series liquid flow switch set point is factory calibrated to 0.2 fps and the FST-300 gas flow switch are set to 10 fps. To convert feet/sec to GPM, please refer to the chart below.

FST-200 Series
Flow Rate vs. Velocity
(gpm vs. fps)

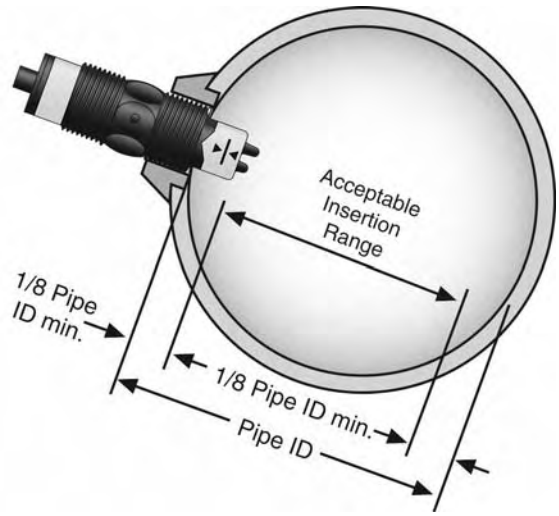


FST-300 Series
Flow Rate vs. Velocity
(scfm vs. fps)

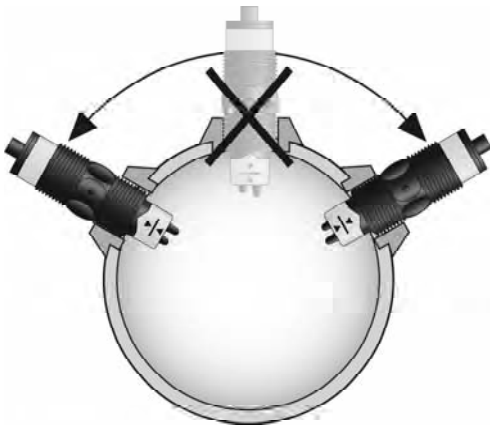


The FST-200 series flow switch must always be in contact with the liquid being measured. The FST-300 series flow switch must never be submersed in liquid. Both flow switches feature a 3/4" NPT threads which will allow it to be used with various types of fittings. Be sure to check the insertion depth of the flow switch in the fitting after it is installed. See the diagram to the right for the recommended insertion depth.

- The two tip of the sensor are to be perpendicular to the flow (as seen to the right). Never mount the tips with one in from t of the other.



When using any type of fitting, the orientation as well as the insertion depth of the flow switch in the pipe is critical. See the diagram to the right for the recommended orientation.



Warning

- The flow switch tips have a thin plastic wall which may be damaged if dropped or installed improperly.
- The FST-200 series flow switch is designed for use in liquid. For best results, avoid installing the FST-200 series where bubbles are present or where the tips of the switch may be out of the liquid.
- The FST-300 series flow switch is designed for us in gas applications. For best results, avoid installing the FST-300 series where it may be submersed in liquid.
- Always install the FKM gasket with all versions of the model FST-212/-222/-322/-324. The G threaded version will not seal unless the gasket is properly installed.
- The two temperature probes (tips) must always be perpendicular to the flow (see the flow at the same time).

Supply Voltage: The supply voltage to the Thermal Dispersion flow switch should never exceed a minimum output of 14 VDC or maximum output of 36 VDC.

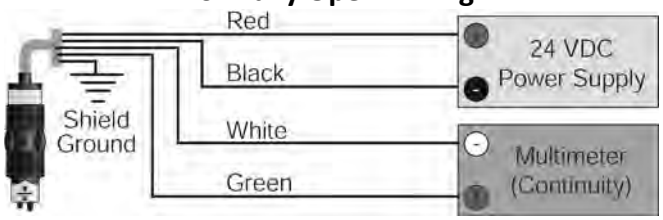
Required Cable Length: Determine the length of the cable required between the Thermal Dispersion flow switch and its point of termination. Allow enough slack to ensure the easy installation, removal and/or maintenance of the sensor. The cable length may be extended up to a maximum of 1000 ft, using a well-insulated 14 to 20 gauge shielded four conductor cable.

Wire Stripping: Using a 10 gauge wire stripper, carefully remove the outer layer of insulation from the last 1-1/4" of the sensor's cable. Unwrap and discard the exposed foil shield from around the signal wires, leaving the drain wire attached if desired. With a 20 gauge wire stripper, remove the last 1/4" of the colored insulation from the signal wires.

Signal Output (Relay Switching):

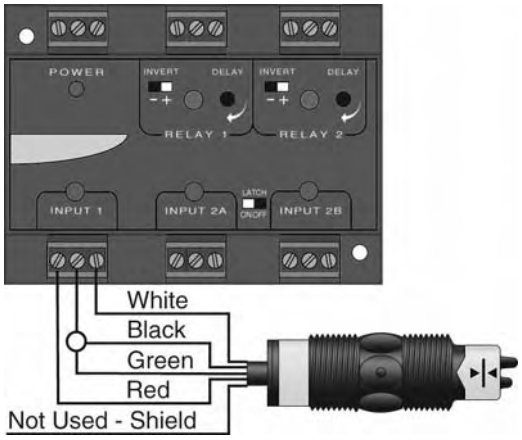
Allows the sensor to switch a small load on or off directly, using an internal relay rated below 60 VA. The NO/NC status is set by the polarity of the voltage feeding the red and black wires. The green wire is the common for the relay and the white wire is the NO or NC, depending on the polarity of red and black.

Normally Open Wiring:

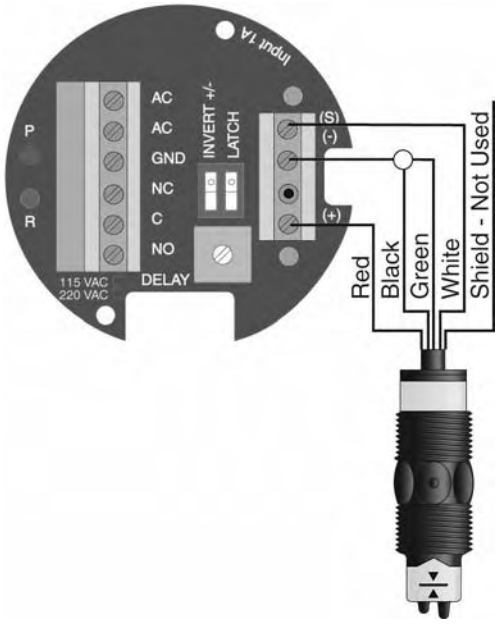


Wiring to an Omega Engineering Controller:

LVCN-131/-141 Series Controller



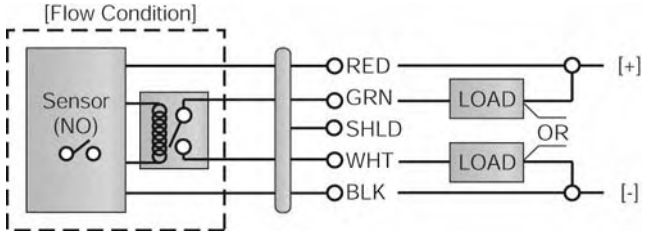
FLCN-100 Series Controller



Wiring the Relay Output: The Flow switch relay output can be wired as a dry contact to a VDC or VAC power source. The flow switch does require 14-36 VDC power to operate the sensor and switch the relay. All installations below identify a dry switch state as the normal position of the relay.

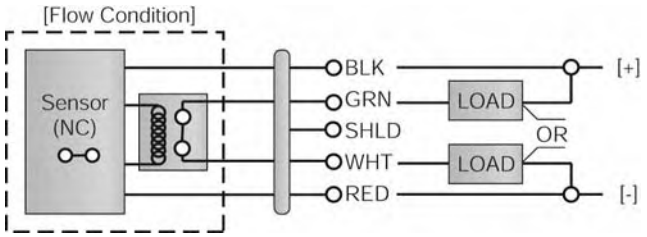
Switching a Normally Open DC Load (Open during Flow, Closed during No-Flow):

The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The LOAD can be attached to either the Green or White wires. Complete the circuit by connecting the Green to (+) VDC power or White to (-) VDC power (see illustration to the right).



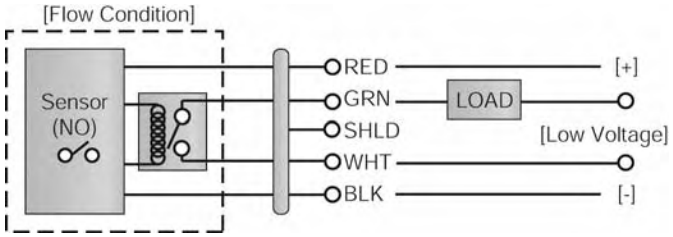
Switching a Normally Closed DC Load (Closed during Flow, Open during No-Flow):

The Black wire connects to positive (+) of the power supply and the Red wire connects to Negative (-). The Load can be attached to either the Green or White wires. Complete the circuit by connecting the Green to (+) VDC power or White to (-) VDC power (see illustration to the right).



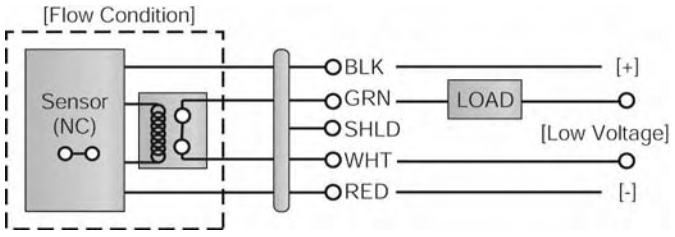
Switching a Normally Open AC Load (Open during Flow, Closed during No-Flow):

The Red wire connects to Positive (+) of the DC power supply and the Black wire connects to Negative (-). The LOAD can be attached to the Green wire and the Hot of the VAC power. Connect the white to the Neutral of the VAC power (see illustration to the right). Low voltage VAC is less than 36 VAC.



Switching a Normally Closed AC Load (Closed during Flow, Open during No-Flow):

The Black wire connects to Positive (+) of the DC power supply and the Red wire connects to Negative (-). The LOAD can be attached to the Green wire and the Hot of the VAC power. Connect the White to the Neutral of the VAC power (see illustration to the right). Low voltage VAC is less than 36 VAC.



For all Sensor Wiring diagrams above:

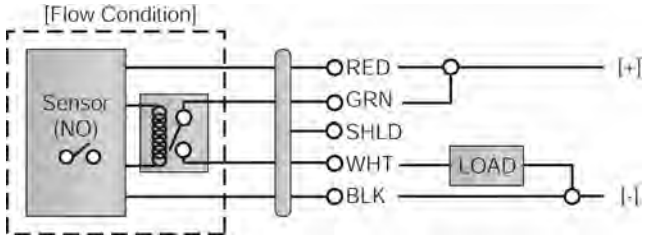
Sensor Power: Red and Black Wires (36 VDC Max.)

Relay Rating: Green and White Wires (60VA, 1A Max.)

Wiring as a P-Channel or N-Channel output: The Flow switch can be substituted for either a P-Channel (PNP, Sourcing) output or N-Channel (NPN, sinking) output.

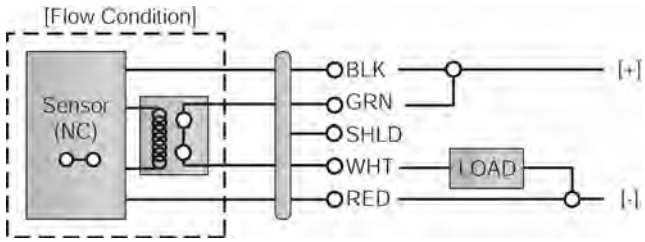
Normally Open DC Load as a P-Channel Output (Open during Flow, Closed during No-Flow):

To wire as a NO P-Channel output follow the directions below. The Red Wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The Green wire is jumping to the Red wire while the White wire is connected to the LOAD. Jumper the LOAD back to the Negative (-) to complete the circuit.



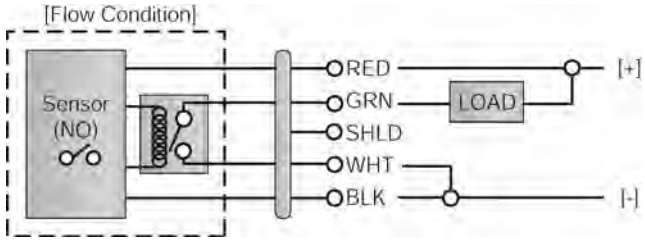
Normally Closed DC Load as a P-Channel Output (Closed during Flow, Open during No-Flow):

To wire as a NC P-Channel output, follow the directions below. The Black wire connects to Positive (+) of the power supply and the Red wire connects to Negative (-). The Green wire is jumping to the Black wire while the White wire is connected to the LOAD. Jumper the LOAD back to the Negative (-) to complete the circuit.



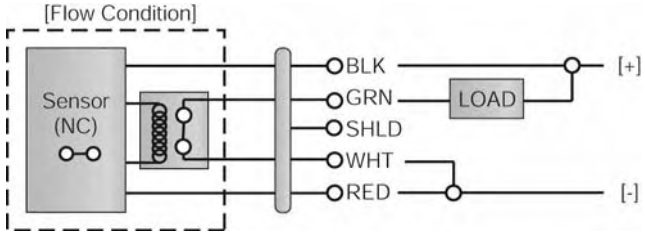
Normally Open DC Load as a N-Channel Output (Open during Flow, Closed during No-Flow):

To wire as a NO N-Channel output, follow the directions below. The Red wire connects to Positive (+) of the power supply and the Black wire connects to Negative (-). The white wire is jumping to the Black wire while the Green wire is connected to the LOAD. Jumper the LOAD back to the Positive (+) to complete the circuit.



Normally Closed DC Load as a N-Channel Output (Closed during Flow, Open during No-Flow):

To wire as a NC N-Channel output, follow the directions below. The Black wire connects to Positive (+) of the directions below. The Black Wire connects to Negative (-). The white wire is jumping to the Red wire while the White wire is connected to the LOAD. Jumper the LOAD back to Positive (+) to complete the circuit.



For all Sensor Wiring diagrams above:

Sensor Power: Red and Black Wires (36 VDC Max.)

Relay Rating: Green and White Wires (60VA, 1A Max.)

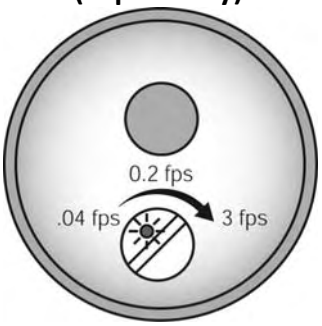
CALIBRATION **Step Eight**

Set Point: If the preset factory calibration is not adequate for your application, follow the calibration steps listed below.

Note: The switch's internal LED will be on when the switch detects no-flow and will off when the switch detects flow, regardless of the polarity of the Red and Black wires. Reversing the Red and Black wires will reverse the polarity of the relay switch, but not the internal LED.

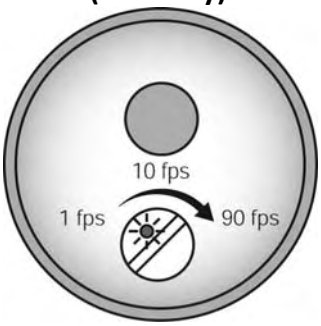
1. Install the fitting and flow switch as described in the Installation section of this manual. Turn the flow switch and controller power on and adjust the flow rate to the application setting. If the medium to be sensed is likely to be subject to any temperature variation, the flow switch should be set as the highest normal temperature likely to be encountered.
2. Locate the potentiometer knob at the top of the flow switch. The red LED is visible through the potentiometer. The adjustment is a single turn 270° potentiometer. The initial response time of the flow switch after adjustment is 1 to 10 seconds. Adjust the potentiometer in slow increments and wait for the response.
   a. LED is ON - If the LED is on, slowly adjust the potentiometer counter-clockwise, with a small flat head screwdriver until the LED turn off.
   b. LED is OFF - If the LED is off, slowly adjust the potentiometer clockwise. with a small flat head screwdriver until the light turns on.
3. Adjust the potentiometer back and forth where the LED is switching, eventually settling for where the LED is OFF (this is the low flow state for the switch).
   a. If the flow is increased, the LED will remain OFF indicating a flow condition
   b. If the flow is decrease, the LED will turn ON indicating a no-flow condition.
4. Verify that the new calibration is correct by lowering the system flow rate below the set point and check to see that the red LED turns on. Then increase the flow rate above the set point and verify that the red LED turns off accordingly.

FST-200 Series Flow Switch (Liquid Only)



Potentiometer Location

FST-300 Flow Switch (Gas Only)



MAINTENANCE **Step Nine**

General: The Flow switch requires no periodic maintenance except to clean off any deposits or scaling from the sensor tip as necessary. It is the responsibility of the user to determine the appropriate maintenance schedule, based on the specific characteristics of the application liquids.

Cleaning Procedure:

1. **Power:** Make sure that all power to the sensor, controller and/or power supply is completely disconnected.
2. **Sensor Removal:** ***Make sure that the flow is off and the pressure is down prior to removing the Flow switch.*** Carefully, remove the sensor from the installation. Replace the sensor with a 3/4" NPT plug to insure that the liquid does not leak out during this procedure. ***Do not re-install the Flow switch if the threads are damaged.***
3. **Cleaning the sensor:** Use a soft bristle brush and mild detergent, carefully wash the Thermal Dispersion flow switch. Do not use harsh abrasives such as steel wool or sandpaper, which might damage the surface sensor. Do not use incompatible solvents which may damage the surface sensor. Do not use incompatible solvents which may damage the sensor's PP/Ryton or PVDF plastic body.
4. **Sensor Installation:** Follow the appropriate steps of installation as outlined in the installation section of this manual.

Testing the Sensor (FST-200 Series Only):

1. **Immersing the switch:** Place the switch in a cup of water. Make sure the tips are submersed in the water.
2. **Power:** Turn on power to the switch with Red to (+) and Black to (-)**.** You can reverse the polarity if desired.
3. **No-Flow/Flow Test:** With the switch setting still in the cup, wait until the Red LED turns ON (no-flow condition).
    a. Swirl the switch in the cup and wait until the Red LED turn OFF (flow condition).
    b. Stop swirling the sensor and let it rest in the cup waiting for the Red LED to turn ON again (no-flow condition).
    c. Repeat the above two steps.
4. **Relay Test:** Connect a multimeter (set to read Ohms) to the White and Green Wires. Perform the above No-Flow/Flow test with the multimeter connect to observe the actuation of the relay.
    a. With Red to (+) and Black to (-), the multimeter will read a small resistance during no-flow (closed relay) and OL during a flow condition (open relay).
    b. Reverse Polarity [Red to (-) and Black to (+)] to see the multimeter read OL during a no-flow state (open relay) and a small resistance during a flow condition (closed relay).

The No-Flow/Flow test determines if the switch is capable of sensing the changes between no-flow and flow. The Relay test determines the ability of the relay to switch between a no-flow and flow condition. This is the basic test to determine functionality of the sensor.

Testing the Sensor (FST-300 Series Only):

1. **Creating a No-Flow Test Point:** The purpose of this step is to create a no-flow state for the sensor to be tested against. Since this is a low flow switch, even a buildings HVAC system can create a flow that the sensor can read.
    - **a.** Place the switch on a table and place an empty cup over the sensing tips.
    - **b.** The cup will act like a shield to protect the sensor from air flow.
2. **Power:** Turn on power to the switch with Red to (+) and Black to (-)**.** You can reverse the polarity if desired.
3. **No-Flow/Flow Test:** With the switch setting still under the cup, wait until the Red LED turns ON (no-flow condition).
    a. Remove the cup and move the sensor in air and observe when the Red LED turn OFF (flow condition).
    b. Place the sensor on the table and place the cup over the sensor and let it rest waiting for the Red LED to turn ON again (no-flow condition).
    - **c.** Repeat the above two steps.
4. **Relay Test:** Connect a multimeter (set to read Ohms) to the White and Green Wires. Perform the above No-Flow/Flow test with the multimeter connect to observe the actuation of the relay.
    a. With Red to (+) and Black to (-), the multimeter will read a small resistance during no-flow (closed relay) and OL during a flow condition (open relay).
    b. Reverse Polarity [Red to (-) and Black to (+)] to see the multimeter read OL during a no-flow state (open relay) and a small resistance during a flow condition (closed relay).

The No-Flow/Flow test determines if the switch is capable of sensing the changes between no-flow and flow. The Relay test determines the ability of the relay to switch between a no-flow and flow condition. This is the basic test to determine functionality of the sensor.

MADE IN USA

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

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- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

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- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

M-3948/0413

Product Data Sheet
00813-0100-4029, Rev DA
November 2010

Rosemount 2110 Compact Vibrating Fork Liquid Level Switch

- *Function virtually unaffected by flow, turbulence, bubbles, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *No need for calibration and requires minimum installation procedures*
- *Polarity insensitive and short circuit protection*
- *Industry standard plug/socket connection*
- *No moving parts or crevices means virtually no maintenance*
- *Electronic, self-checking, and condition monitoring - Heartbeat LED gives status and health information*
- *Magnetic test point makes functional test easy*
- *Compact design, small in size and weight*
- *"Fast Drip" Fork Design gives quicker response time especially with viscous liquids*
- *Hygienic connections*

DIBt

Contents

Reliable Performance...In Challenging Applications

Threaded Process Connection **Tri-Clamp Process Connection**

Compact And Lightweight

‘Fast Drip’ Forks

MEASUREMENT PRINCIPLE

The Rosemount 2110 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

When the 2110 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- Stainless steel housing and plug/socket connection for the fast fit, high volume user
- Compact and lightweight design for side or top mounting
- The industry standard DIN 43650 plug/socket is used for a fast connection. The polarity insensitivity and short circuit protection make electrical hook-up safe and easy
- The 2110 is designed for operation in temperatures from –40 to 302 °F (–40 to 150 °C)
- The ‘heartbeat’ LED gives status and health information on the 2110
- ‘Fast Drip’ fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Fit and Forget

- Once installed, the 2110 is ready to go.
  It needs no calibration and requires minimum installation
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational
- Functional testing of the instrument and system is easy with a magnetic test point
- You can install, and forget it

Superior Performance

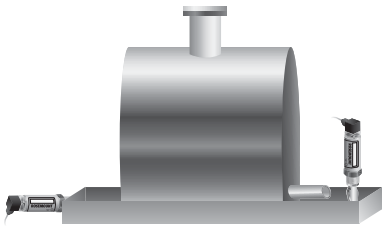
- Functionality is virtually unaffected by flow, turbulence, bubbles, foam, or vibration
- The ‘Fast Drip’ design allows the liquid to be quickly drawn away from the fork tip, making the 2110 quicker and more responsive in high density or viscous liquid applications
- With a user-selectable time delay feature, the risk of false switching is minimized in turbulent or splashing applications

APPLICATIONS

- Overfill protection
- High and low level alarms
- Leak detection
- Run dry or pump protection
- Pump control or limit detection
- Hygienic applications

Overfill Protection

High And Low Level Alarm



Leak Detection

Pump Protection

Rosemount 2110
Compact Vibrating Fork Liquid Level Switch

2110 Level Switch

Rosemount 2110 capabilities include:

- Rugged stainless steel body and fork, the ideal choice for OEM applications
- Compact design, small and lightweight, perfect for small tank or pipe installations
- Short fork or semi-extended lengths
- Direct load switching or PNP/PLC electronics
- Safe area only

Additional Information

TABLE 1. 2110 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2110	Compact Vibrating Fork Liquid Level Switch	
Electronic Type		
Standard		**Standard**
0	Direct load switching with plug connection (2 wire) 21 to 264 Vac 50/60Hz, 21 to 264 Vdc	★
1	PNP/PLC low voltage switching with plug connection 18 to 60 Vdc	★
Process Connection Size / Type		
Standard		**Standard**
0A	3/4-in. BSPT (R) thread	★
1A	1-in. BSPT (R) thread	★
0D	3/4-in. NPT thread	★
2R	2-in. (51 mm) Tri-clamp	★
1B	1-in. BSPP (G) thread	★
1L	1-in. BSPP (G) Semi-extended 4.6 in. (116 mm)	★
Product Certificates		
Standard		**Standard**
NA	No hazardous locations certifications (safe area use only)	★
U1	DIBt/WHG Overfill protection	★
OPTIONS		
Calibration Data Certificate		
Standard		**Standard**
Q4	Certificate of functional test	★
Tag Plate		
Standard		**Standard**
ST	Tag plate SST engraved plate (maximum 16 digits)	★
WT	Tag plate laminated paper (maximum 40 digits)	★
Typical Model Number: 2110 0 2R NA		

TABLE 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss for 1-in. BSPP model. Material: 316 SST fitting. Fluorocarbon (FPM/FKM) O-ring	★
02100-1020-0001	Hygienic mounting kit for 2-in. (51 mm) Tri-clamp model. Includes vessel fitting, clamp ring, and seal. Material: 316 SST and NBR Nitrile	★
02100-1030-0001	Telescopic test magnet	★

Specifications

PHYSICAL

Product
Rosemount 2110 Compact Liquid Level Switch

Measuring principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Process Material
316L Stainless Steel (1.4404)
For Tri-Clamp connection, hand polished to better than 0.8 μm. Gasket material for 1 in. BSPP (G1) is Non-asbestos BS7531 Grade X carbon fiber with rubber binder.

Housing Materials
Body: 304 SST with polyester label
LED window:
Flame retardant Polyamide (Pa12) UL94 V2
Plug: Polyamide glass reinforced
Plug seals: Nitrile butadiene rubber

Mounting
- $^{3}/_{4}$-in. BSPT (R) or NPT
- 1-in. BSPT (R) or BSPP (G) thread, or
- Hygienic 2-in. (51 mm) Tri-clamp fitting

Dimensional Drawings
See “Dimensional Drawing” on page 7

Ingress of Protection Rating
IP66/67 to EN60529

PERFORMANCE

Hysteresis (water)
±0.039-in. (± 1 mm) nominal.

Switching Point (water)
0.5 in. (13 mm) from fork tip if mounted vertically.
0.5 in. (13 mm) from the fork edge if mounted horizontally.
The switch point varies with different liquid densities.

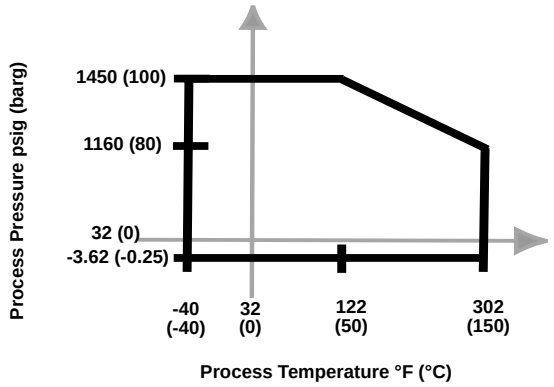
FUNCTIONAL

Maximum Operating Pressure
(The final rating depends on the process connection)

Threaded Connection
See Figure 1

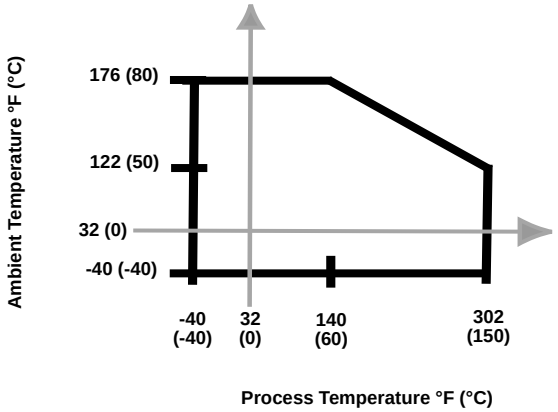
Hygienic Connection
435 psig (30 barg)

Figure 1. Process Pressure



Temperature
See Figure 2 for the maximum and minimum operating temperatures.

Figure 2. Temperature



Liquid Density
Minimum 37.5 lb/ft^3 (600 kg/m^3)

Liquid Viscosity Range
0.2 to 10000 cP (centiPoise)

Solids Content and Coating
Maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm).

For coating product, avoid ‘bridging’ of forks.

Switching Delay
1 second dry-to-wet or wet-to-dry

CIP (Clean In Place) Cleaning
Withstands steam cleaning routines up to 302 °F (150 °C)

Electrical

Switching Mode
User selectable (Dry=on or Wet=on) by selecting plug wiring

Cable Connection
Via 4-way plug provided (DIN43650).

Max. conductor size is 15AWG.

4-position orientation (90/180/270/360 deg).

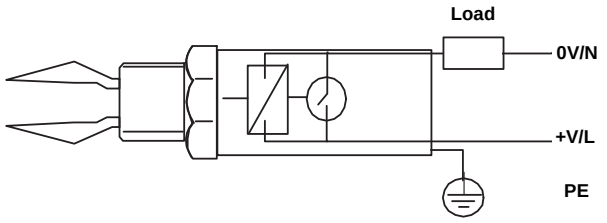
Conductor Size
Maximum 0.06 in.^{2} (1,5 mm^2)

Cable Gland
PG9 provided. Cable diameter 0.24 to 0.31 in. (6 to 8 mm)

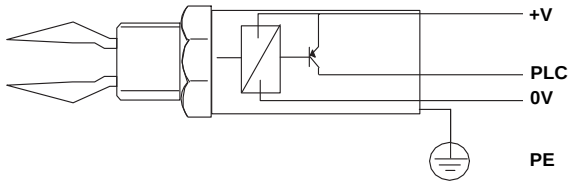
Protection
Polarity insensitive. Over-current, short circuit, and load-missing protection. Surge protection to IEC61326.

Grounding
The 2110 should always be grounded either through the terminals or using the external ground connection provided.

Direct Load Switching (Electronics Type Code 0)	
Operating Voltage	21 to 264 Vac (50 to 60 Hz)/dc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Minimum switched load	20 mA continuous
Voltage drop	6.5 V @ 24 Vdc / 5 V @ 240 Vac
Current draw (load off)	<3.0 mA continuous



PNP Switching (Electronics Type Code 1)	
Operating Voltage	18 to 60 Vdc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Voltage drop	<3 V
Supply Current	3 mA nominal
Output current (load off)	<0.5 mA



Product Certifications

L.V. Directive
EN61010-1 Pollution degree 2,
Category II (264V max),
Pollution degree 2, Category III (150 V maximum)

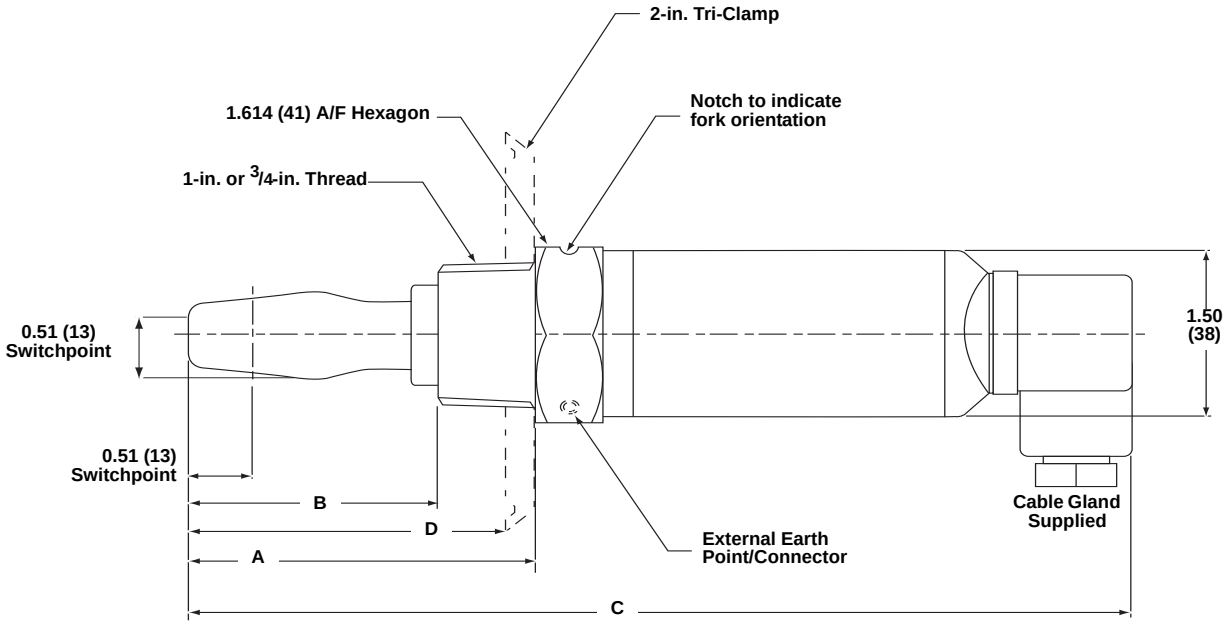
Electro Magnetic Compatibility (EMC) Directive
EN61326

Overfill Protection
If required, select Product Certificates code U1 for DIBt/WHG overfill protection.

The approval number is Z-65.11-236.

Canadian Registration Number (CRN)
The CRN is 0F04227.2C for model numbers with a NPT threaded process connection selected.

Dimensional Drawing



Process Connections	A	B	C	D
3/4-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
3/4-in. NPT	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPP (G)	3.07 (78)	2.36 (60)	7.91 (201)	N/A
2-in. (51 mm) Tri-Clamp	2.72 (69)	1.97 (50)	7.40 (188)	2.52 (64)
1-in. Semi-extended	4.57 (116)	3.86 (98)	9.41 (239)	N/A

Rosemount 2110

Product Data Sheet
00813-0100-4029, Rev DA
November 2010

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

Emerson Process Management
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00813-0100-4029 Rev DA 11/10

EMERSON™
Process Management

THERMAL DISPERSION FLOW SWITCHES FOR LIQUIDS

FST-200 Series

- High Reliability—No Moving Parts
- Very Low Flow Detection–Down to 0.04 FPS Liquids
- Use in ⅛ to 12" Pipe or Tubing
- SPST Relay Standard
- Excellent for Pump and Valve Monitoring of Critical Flows

OMEGA® FST-200 Series flow switches use thermal dispersion technology to create a very accurate and economical method of sensing flow. Monitor fluids from 0.4 to 1.2 specific gravity, 1 to 300 cp, and pulsating flow from 10 to 100 pulses per minute. The sensors incorporate two temperature probes, one of which is heated. The flow of liquid reduces the temperature of the heated probe, decreasing the temperature differential with the non-heated probe. OMEGA's LVCN Series of controllers can easily be interfaced to perform a variety of control functions.

SPECIFICATIONS

Range: 0.04 to 3 fps (liquids)
Accuracy: ±5% of setpoint at constant temperature and flowrate
Response Time: 10 sec after initial 30 sec warm up
Setpoint Drift With Fluid Temperature: 0.5% per °C
Voltage Input: 12 to 36 Vdc @ 70 mA
Contact Output Mode: Selectable, NO or NC states
Fluid Temperature: 0 to 60°C (32 to 140°F)
Maximum Fluid Pressure: PP or PVDF: 150 psi @ 25°C (77°F) derated @ 1.667 psi per °C above 25°C (77°F)
Wetted Materials: PP and PVDF
Cable Specifications: 3 m (10')
Maximum Cable Length: 305 m (1000')
Dimensions: 76.2 or 114.3 L x 26.7 mm diameter (3.0 or 4.5 x 1.05")

To Order

Model No.	Description	Material	Size	Use With Pipe Size
FST-211-SPST	Thermal dispersion flow switch	PP/ PVDF	3.0 x ¾ NPT	¾ to 1½"
FST-212-SPST	Thermal dispersion flow switch	PVDF	3.0 x ¾ NPT	¾ to 1½"
FST-221-SPST	Thermal dispersion flow switch	PP/ PVDF	4.5 x ¾ NPT	2 to 12"
FST-222-SPST	Thermal dispersion flow switch	PVDF	4.5 x ¾ NPT	2 to 12"

Flow Switch Fittings For Use with 76 mm (3") Sensor Only (Also For Pulsating Flow Applications)

Model No.	Wetted Material	Range (GPM)	Use With Pipe/Tube ID
FT-51	PP	0.05 to 1.53	⅛ to ½"
FT-52	PVDF	0.05 to 1.53	⅛ to ½"

Comes complete with operator's manual.
*Two extended cable lengths available: for 7.62 m (25') add suffix **"-25"** for PP/PVDF, or PVDF; for 15.24 m (50') add suffix **"-50"** for PP/PVDF or PVDF, for additional cost.*
***Note:** Sizes above ½" fit into ¾ NPT fitting adaptor.*
***Ordering Examples: FST-211-SPST,** flow switch, 3.0 x ¾ NPT size, plus **FT-51,** fitting.*
***FST-221-SPST**, flow switch, 4.5 x ¾ NPT.*

ABO valve

ABsOlute flow control

SERIES 900

// PN 6/10/16/Class 150
// DN 32 - 1600 (1“ ¼ - 64“)
// Industrial applications
// Water, chemicals, gas
// Oil & gas, air

CE

DVGW

Lloyd's Register

TÜV SÜD

INTERFLANGES BUTTERFLY VALVES

WWW.ABOVALVE.COM

GENERAL INFORMATION

GENERAL CHARACTERISTICS

- Concentric design
- Shut-off and regulating device
- Split shaft
- Pivot fixed by pin (or screw - option) allows demounting (demountable version)
- Long neck of the body according to Heating Systems Regulation standards
- Orange epoxy painting RAL 2002 - 80 µm
- Vacuum max 0,2 bar absolute
- Movement of disc ensured by four-squared endstem
- Certificate ATEX (Group II, Category 1/2 GD TX)
- Approved for demanding GAS applications by certificate DVGW

APPLICATIONS

Butterfly valves series 900 are suited for many applications where tight shut-off is required, such as:

- Industrial Processing
- Water and Wastewater
- Dry Bulk Conveying
- Light Slurry Handling
- Paper Mills
- Food and Beverage
- HVAC (Heating, Ventilating & Air Conditioning)
- Non-mining environments and explosive atmosphere consisting of dust and gas (zones 0, 1, 20 and 21)

STANDARDS

LEAK TEST:
- EN 12266-1, Rate A
- ISO 5208, Rate A
- API 598, TAB. 5

FACE TO FACE ACC.:
- EN 558, SERIES 20
- ISO 5752, SERIES 20
- API 609, TAB. 2

TOP FLANGE:
- EN ISO 5211

CONNECTION BETWEEN FLANGES:
- EN 1092-1
- DIN 2631
- ASME B16.5

WORKING STANDARD:
- EN 593 + A1

TYPE DESIGNATION

9 2 4 B

Version of body
B = wafer
T = lug
F = double flange

Material of disc
0 – Brass 2.0402
1 – Aluminium bronze 2.0966
2 – Stainless steel 1.4308 (CF8)*
3 – Ductile iron 0.7040 (GGG40)*
4 – Stainless steel 1.4408 (CF8M)*
5 – HASTELLOY
6 – Stainless steel 1.4539 (Uranus B6)
7 – Titanium
* Halar + Rilsan Coating optional

Material of seat
1 – NBR
2 – EPDM
3 – Carboxylic NBR
4 – VITON (FPM)
5 – Silicone Steam (MVQ)
6 – Silicone (VMQ)
7 – Epichlorohydrin
8 – HYPALON® (CSM)
9 - other variant

Series name
Series 900

Models

Wafer type B

Lug type T

Double flanged type F for DN 700 – DN 1600

PRODUCT QUALITY AND CONTROL

- ABO production facilities are certified in accordance to ISO 9001 quality system
- Test procedures are established according to: EN 12266-1, ISO 5208, API 598, ANSI/FCI 70-2
- Manufacture according to the requirements of the European Directive 97/23/CE – Equipment under pressure (Category III, modul B)
- All ABO valves pass pressure tests to 110% of rated pressure to ensure bubble tight shutoff
- All actuators are calibrated and cycle tested before shipment
- Material Traceability Rule – Certification is provided for all supplied valves as per customer's request
- Positive Material Identification – All materials are subjected to PMI testing in order to verify Material Traceability Certificate
- Certificates - Complete list of certificates can be found on www.abovalve.com

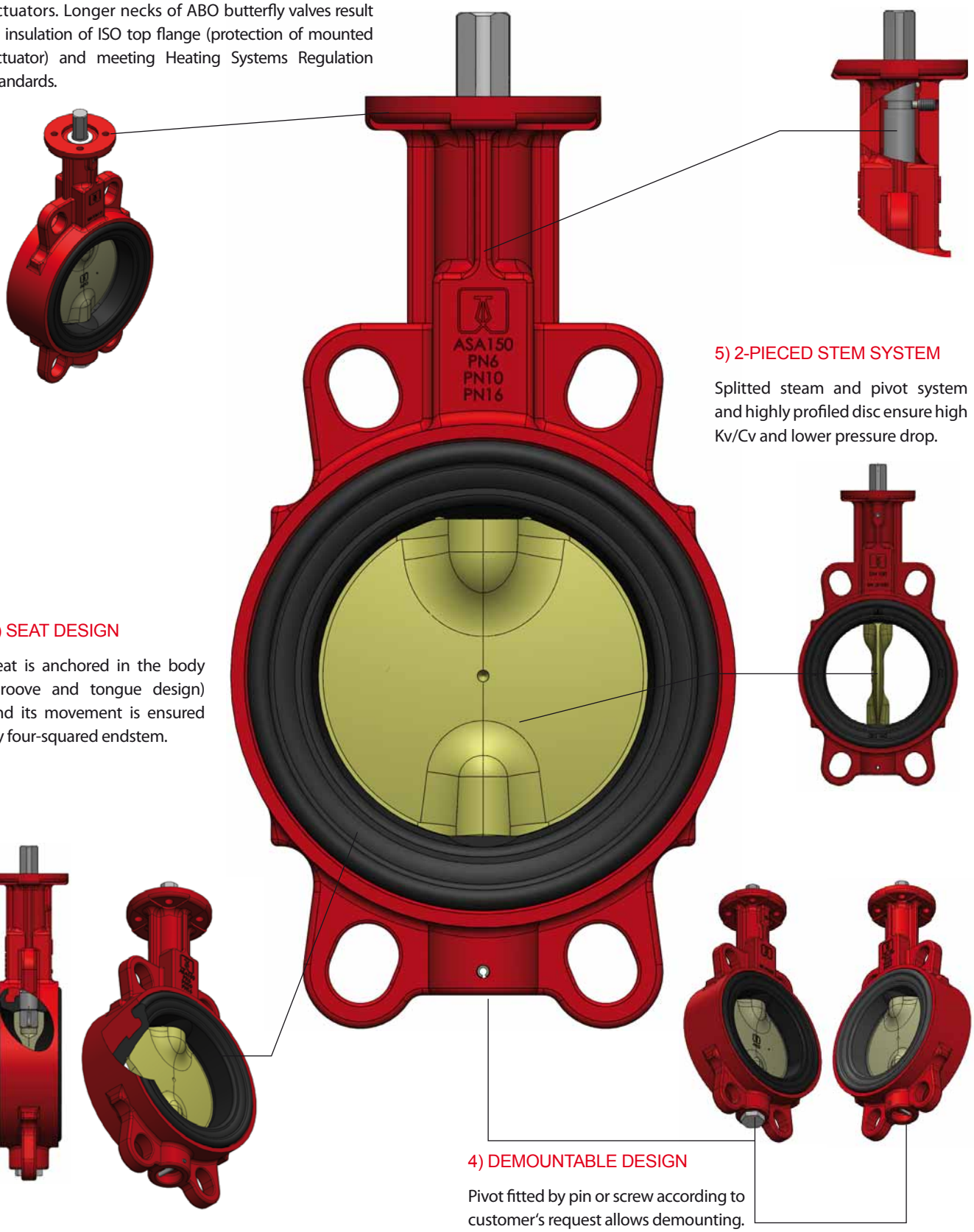
DESIGN BENEFITS

1) INTERNATIONAL STANDARD COMPATIBILITY

Top flange according to Standard ISO 5211 enables direct mounting of manual operators and power actuators. Longer necks of ABO butterfly valves result in insulation of ISO top flange (protection of mounted actuator) and meeting Heating Systems Regulation standards.

2) BLOW-OUT PROOF STEM SYSTEM

No up-movement of stem is ensured by securing pin in the body neck.



5) 2-PIECED STEM SYSTEM

Splitted steam and pivot system and highly profiled disc ensure high Kv/Cv and lower pressure drop.

3) SEAT DESIGN

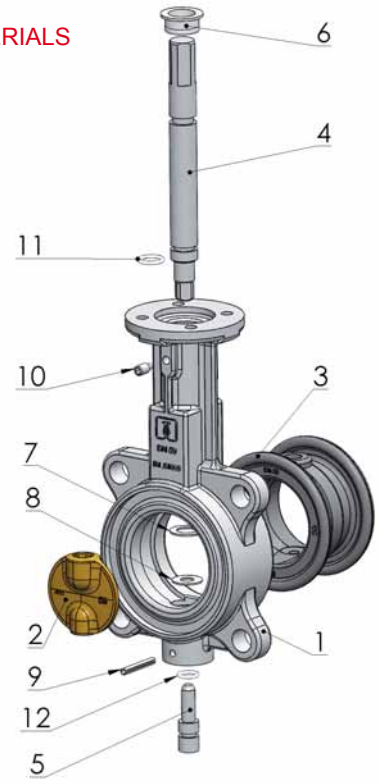
Seat is anchored in the body (groove and tongue design) and its movement is ensured by four-squared endstem.

4) DEMOUNTABLE DESIGN

Pivot fitted by pin or screw according to customer's request allows demounting.

MATERIALS & TECHNICAL INFORMATION

DRAWING & MATERIALS



Item	Name	Material
1	Body	Ductile iron 0.7040 (GGG40) epoxy coated Carbon steel 1.0446 (A216 WCB) Low carbon content steel 1.1156 (A352 LCC) Stainless steel 1.4408 (CF8M)
2	Disc	0 – Brass 2.0402 1 – Aluminium bronze 2.0966 2 – Stainless steel 1.4308 (CF8) 3 – Ductile iron 0.7040 (GGG40) 4 – Stainless steel 1.4408 (CF8M) 5 – HASTELLOY 6 – Stainless steel 1.4539 (Uranus B6) 7 – Titanium
3	Seat	1 - NBR - 10°C + 100°C 2 - EPDM - 25°C + 125°C 3 - Carboxylic NBR - 10°C + 100°C 4 - VITON (FPM) - 15°C + 150°C* 5 - Silicone Steam (MVQ) - 30°C + 140°C 6 - Silicone (VMQ) - 30°C + 150°C 7 - Epichlorohydrin - 30°C + 70°C 8 - HYPALON® (CSM) - 25°C + 120°C 9 - NBR 70-AG - 10°C + 60°C - NBR conduct - 10°C + 80°C
4	Shaft	Stainless steel 1.4021 (AISI 420)
5	Pivot	Stainless steel 1.4021 (AISI 420)
6	Bushing	Delrin (up to DN 300) Brass (from DN 350)
7	Distance ring	Stainless steel
8	Distance ring	Stainless steel
9	Pin	Stainless steel 1.4401 (AISI 316)
10	Retaining screw	Stainless steel
11	Shaft O-ring	NBR, EPDM, VITON is an option
12	Pivot O-ring	NBR, EPDM, VITON is an option

* Max. temperature for water services only up to 80 °C.

Execution in other material types can be provided upon request. Choice of the seat and disc materials for various media will be recommended upon specific enquiry. Max. temperatures for each material of seat are accepted only for a specific medium and short time exposure.

INSTALLATION BETWEEN FLANGES (DN 32-600)

Vers.	PN / DN	32/40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
B	PN 6											●	●	●	●	●
	PN10															
	PN16													●		
	Class 150											●	●	●	●	●
T	PN 6	●	●	●	●	●	●	●	●	●	●	●	●	X	X	X
	PN10													●	●	●
	PN16								●	●	●	●	●	●	●	●
	Class 150	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

INSTALLATION BETWEEN FLANGES (DN 700 – 1600)

Vers.	PN / DN	700	800	900	1000	1100	1200	1300	1400	1500	1600
F	PN 6	●	●	●	●	●	●	●	●	●	●
	PN 10										
	PN 16	●	●	●	●	●	●	●	●	●	●
	Class 150	●	●	●	●	●	●	●	●	●	●

	standard
●	*upon request*
X	*not suitable*

* For JIS 5K/10K, please consult with ABO.

WORKING CONDITIONS

- **Max working pressure** o DN 32 - 600: 16 bar
  o DN 700 - 1600: 10 bar (16 bar upon request)
- **Temperature range - max:** - 30°C + 150°C (- 22°F + 302°F), depends on material selection

When temperature of medium increases over + 120 °C, the max allowed pressure falls from 16 bar to 14,4 bar and from 10 bar to 9 bar

COATING

- Standard coating is orange epoxy painting RAL 2002 - 80 µm
- Based on customer's request, it is possible to modify the colour or provide higher degree of coating

ACTUATION & TORQUES

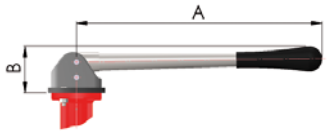
ACTUATION POSSIBILITIES

All ABO handles, manual gear operators, pneumatic and electric actuators can be mounted directly to ABO butterfly valves, thus eliminating brackets or couplings. This allows for simple installation in the field, minimizes possible misalignment and decreases overall height.

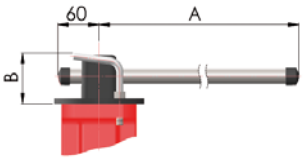
MANUAL ACTUATION: HANDLEVER

For manual actuation, ABO offers levers in carbon steel material with protective coating for excellent corrosion, abrasion and impact resistance. A lever in stainless steel material is an option. ISO top flange connection is F05 for sizes DN 50 and 65, and F07 for sizes DN 80-200, respectively. Handlever in regulating design optional.

DN 32 - 200



DN 250 - 300



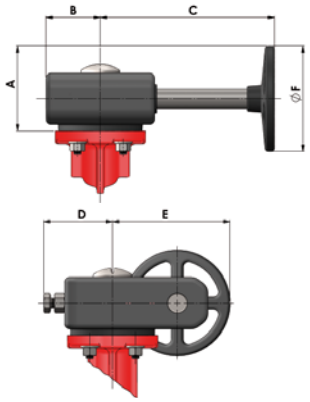
Type L (only up to 6 bar)

DN	32 - 100	125	150 - 200	250	300
A	270	270	362	450	750
B	75	80	90	135	135
Weight	1,24	1,26	1,4	2,2	3,1

Dimensions mentioned in mm, weight in kg.

MANUAL GEARBOX WITH HANDWHEEL

ABO gearbox series of manual actuators combines state of art production technology, with cast iron and pressed steel construction, to provide a smooth and trouble-free operation for heavy duty on-off and throttling service of ABO valves. The rugged, cast iron body seals is weatherproof to IP65. A self-locking gearing holds the valve in the desired position. Further features include a readily accessible handwheel, adjustable stopcrew for closed position, removable splined drive bush with indexing facility and a facility to lock handwheel with padlock and chain. Gearboxes, as well as handlevers, can be supplemented with contacts for signalization of endpoints.



DN	32 – 150	200	250-300	350	400	450	500	600
A	89	89/127**	155	213	263	275	275	350
B	51	51	66	83	83	99	99	126
C	152	152/185**	272	302	334	279	279	360
D	44	44	59	70	70	96	96	118
E	101	101/138,5**	177	242	292	314	314	423
F	125	125/200*	250	350	450	450	450	600
Weight	1,6	1,6	3,7	6,6	6,6	14,5	14,5	27,2
Wheel	SR5	SR5/SR8*	SR10	R14	R18	R18	R18	R24

Dimensions mentioned in mm, weight in kg. Valid for SE Series (DN 32 - 400), M Series (DN 450 - 600).
*Optional **Acc. to handwheel choice

ACTUATORS

- PNEUMATIC ACTUATORS - ABO pneumatic actuators Series 95 are rack and pinion, opposed-piston actuators available in two versions: single acting & double acting
- ELECTRIC ACTUATORS - ABO series 97 electric actuators are designated for quarter turn operating application. Electric actuators of 24V, 230V and 400V can be installed on ABO butterfly valves.

OPERATING TORQUES UPON WORKING PRESSURE (NM)*

DN	32/40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
PMA 6 bar	6	8	15	20	38	55	70	100	150	235	480	750	1180	1380	2050
PMA 10 bar	8	10	17	25	46	70	80	125	220	290	530	1200	1550	2050	2700
PMA 16 bar	10	12	20	30	55	85	100	150	290	380	580	1650	2100	2700	3750

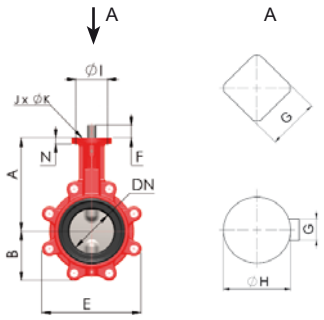
DN	700	800	900	1000	1200	1400	1600
PMA 10 bar	3500	4500	6000	8950	12600	18500	24400

The above mentioned torques are valid for valves with EPDM seat only, and under the condition that the working medium is liquid. While actuating the valve, the above mentioned figures should be multiplied by a coefficient of 1,2. Using a NBR seat, it is necessary to apply a coefficient of 1,8 for dimensions up to DN 300 and a coefficient of 1,32 for dimensions DN 350 and above. In case the medium is gaseous, or if it contains abrasive particles, it is necessary to apply a secondary coefficient of 1,35. If the working conditions are specific, it is recommended to discuss the selection of the actuator with the manufacturer.

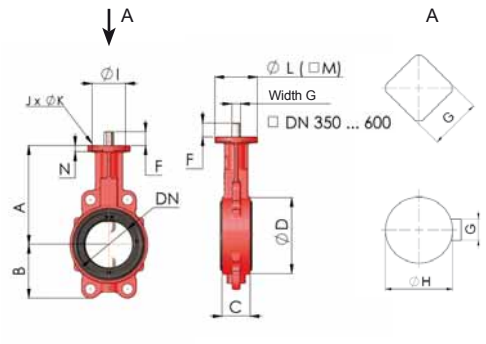
DIMENSIONS DN 32 - 1600 (1"¼ - 64")

DN 32 - 600 (1"¼ - 24") PN 6/10/16/Class 150

Lug type T



Wafer type B

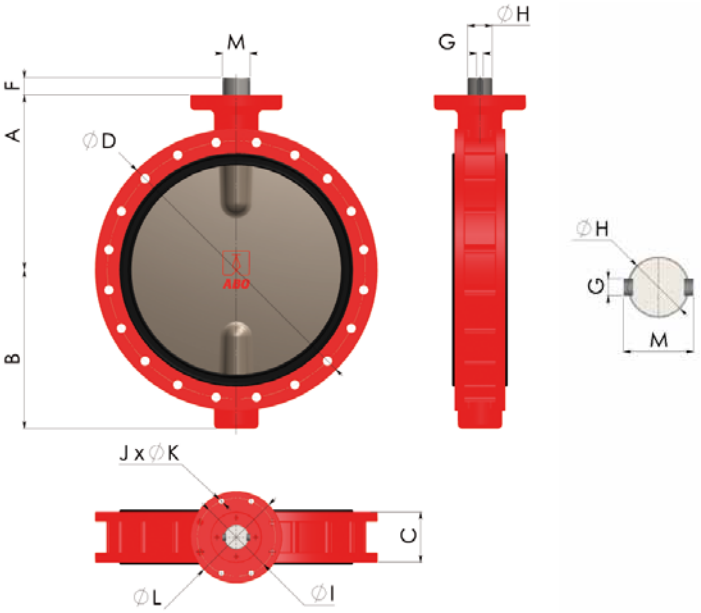


DN		mm	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
		inch	1"1/4	1"1/2	2"	2"1/2	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Version	B	A	136	136	146	153,5	163	172,5	192,5	205	234	270	310	325	365	375	482	562
	T																485	565
Valve dimensions		B	54	54	64	72	89	105	118	128	166	202	237	271	314	330	363	464
		C	33	33	43	46	46	52	56	56	60	68	78	78	102	114	127	154
		D	78	78	96	113	128	150	184	212	268	320	378	435	488	544	590	695
		E	110	110	115	129	174	204	234	255	319	396	465	509	590	610	682	810
Endshaft dimensions		F	25	25	25	25	25	25	25	25	25	30	30	36	36	80	80	80
		G	14						17			22	22	27	27	10	12	14
		H	-	-	-	-	-	-	-	-	-	-	-	-	-	Ø38	Ø42	Ø50
ISO TOP Flange		I	50/70		50				70			102	102	125	140	140	140	165
		J	4															
		K	7						9			10,5	10,5	14	18	18	18	23
Flange dimensions		L	-	-	70				-	-	-	-	-	-	-	175	175	210
		M	70	70	-	-	-	-	75	75	75	105	105	130	140	-	-	-
		N	8	8	8	8	8	8	9,5	9,5	14	17	17	17	21	22	25	25
Weight (kg)	Type B		1,9	1,9	2,7	3,2	3,7	4,7	6,7	8,4	13,3	22,0	29,3	46,4	69,8	83,0	112	216
	Type T		2,3	2,3	3,0	3,7	4,8	6,1	9,2	10,2	15,3	28,4	41,2	62	96,3	130	149	288
ISO Flange			F05/F07		F05				F07			F10		F12	F14			F16

DN 700 - 1600 (28" - 64") PN 10

DN	mm	700	800	900	1000	1200	1400	1600
	inch	28"	32"	36"	40"	48"	56"	64"
Version - F	A	629	666	720	800	940	1009	1150
Valve dimensions	B	537	601	656	720	844	1014	1045
	C	165	190	203	216	254	279	318
	D	940	1060	1168	1255	1485	1685	1930
Endshaft dimensions	F	95	95	130	130	150	150	180
	G	16	16	20	22	28	32	40
	H	55	55	75	85	105	120	140
	M	63	63	84	95	117	134	178
ISO TOP Flange	I	254	254	254	254	298	356	356
	J	8	8	8	8	8	8	8
	K	18	18	18	18	22	33	33
	L	300	300	300	300	350	415	415
Weight (kg)		350	580	700	850	1080	1922	2350
ISO Flange		F25	F25	F25	F25	F30	F35	F35

For version PN 16 / Class 150 upon request.



EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
INVESTMENT IN YOUR FUTURE

30. 9. 2014

Data subject to change.

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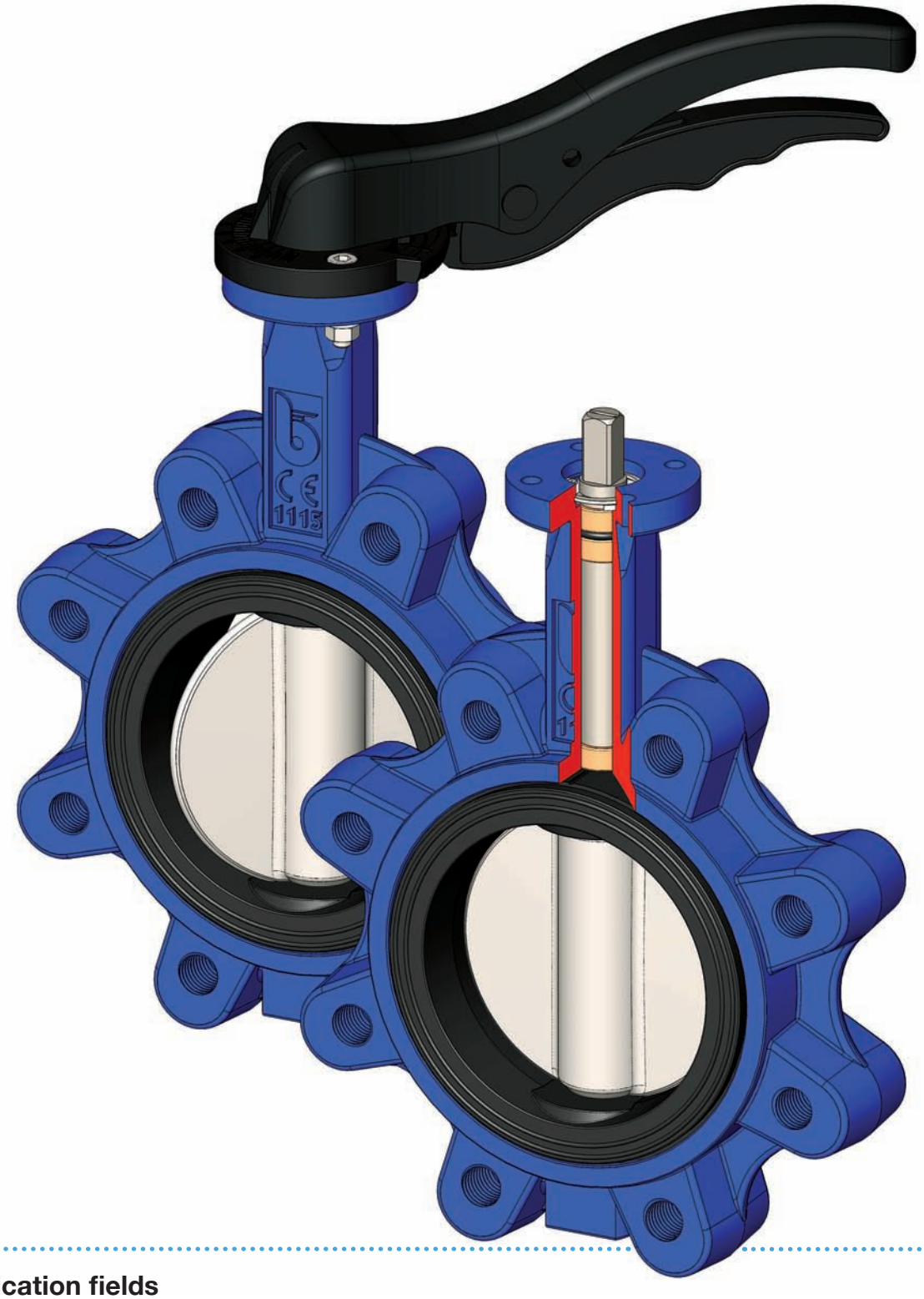
Serie L9

LUG butterfly valve



Application fields

WATER · CONDITIONING · GAS · HEATING · DRINKING WATER · INDUSTRY · FIRE FIGHTING

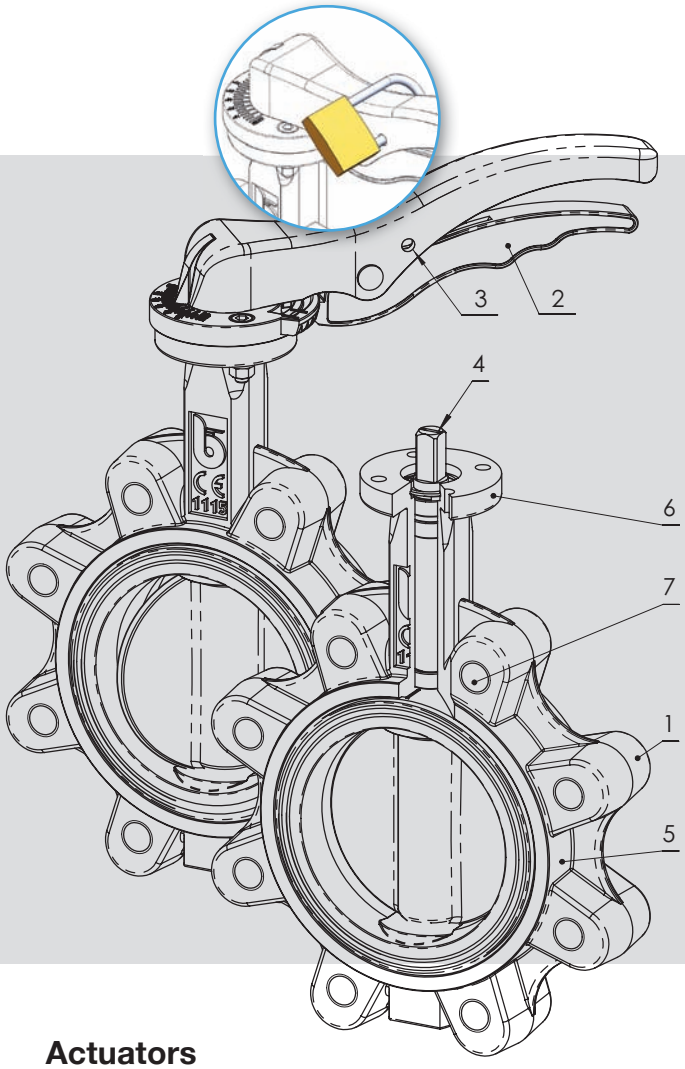
Serie L9

The shut-off LUG butterfly valves in Series L9, with a centred Disc and LUG type body, are made of ductile iron, manufactured in accordance with severe product norms and in conformity to EN ISO 9001.
These valves are suitable for heating and conditioning (HVAC), water treatment and water distribution, industrial applications, agricultural purposes, for compressed air, gas, oils and hydrocarbon.
(Please ensure the choice of the corresponding item)

YES: for in line and end of line installation with frequent actuation; the integrated support, in accordance with ISO 5211, allows easy mounting of a wide range of actuators and drives.
They are suitable for choking and regulating the flow.

NO: for steam.

1. Epoxy coating.
2. Lever suitable for intermediate regulation.
3. Lockable operation lever.
4. A notch machined at the top of the stem indicates the position of the disc and allows adjusting the command to the correct position, when the command/lever is removed.
5. Compact design.
6. Integrated ISO 5211 flange.
7. Threaded holes suitable for mounting between PN16 for DN25-300 flanges (on request PN 10) and for mounting between PN 10 for DN 350-600 flanges.



Accessories

- Extension for water main system connection
- Position indicator and padlocking for gear box
- Micro-switch for gear box
- Kit: micro-switches for ON/OFF position indicator

Actuators

- Double acting and single acting pneumatic actuators
  On request: micro-switches, position indicators
- Electric actuators
- Gear box
- Chain driven control

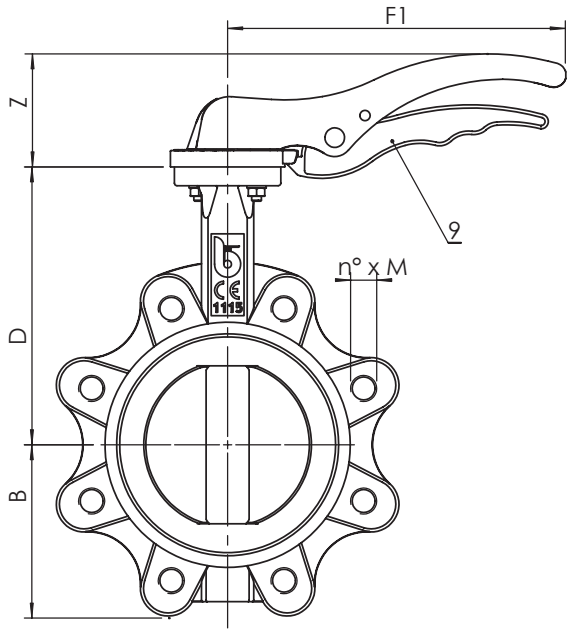
Refer to specifications on page 75

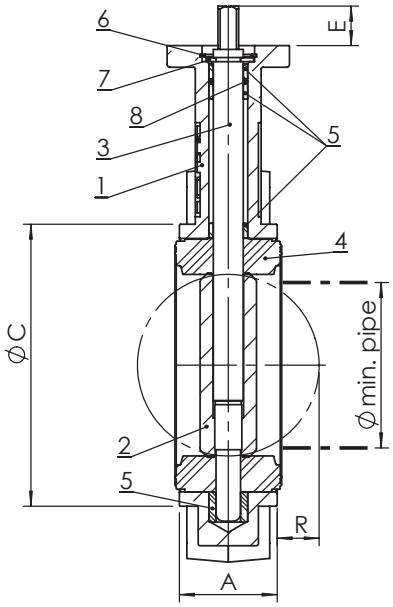
CE In conformity with directive 97/23/CE PED
In conformity with D.M. 174 (directive 97/83/CE)

Construction and testing norms (correspondences):

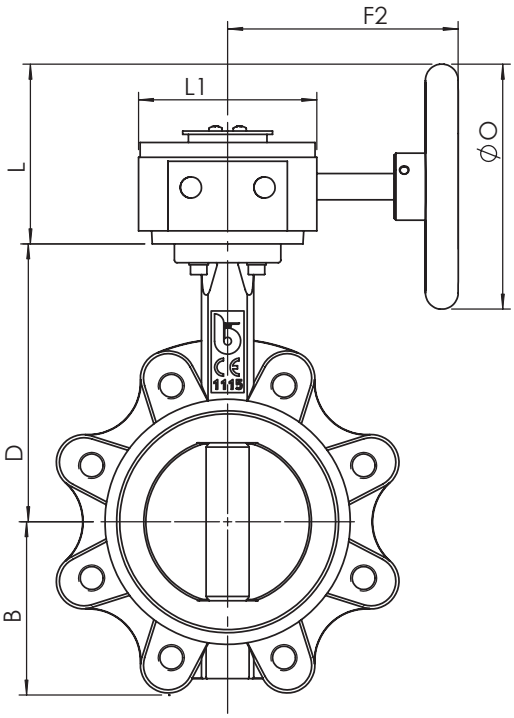
Face-to-face: EN558/1-20 (ISO 5752-20, DIN 3202K1)
Flanges: EN1092, ANSI B16.5 #150
Design: EN593, EN13445, ISO 5211, EN12570
Marking: EN19
Testing: 100% testing in accordance with EN 12266 cat. A (ISO 5208 cat. A)

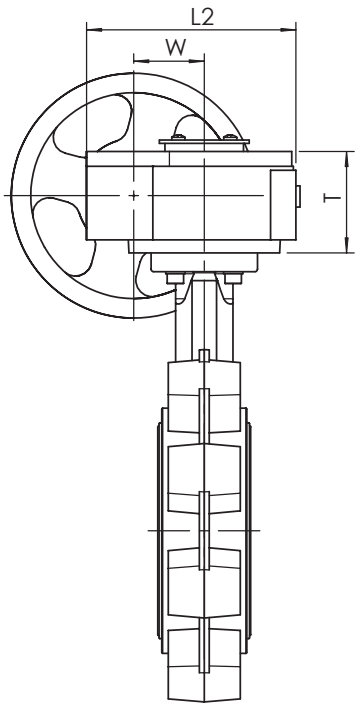
L9 DN25-250

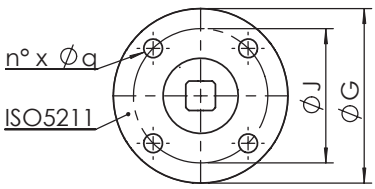


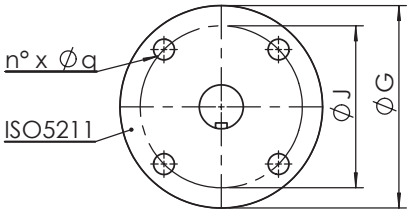


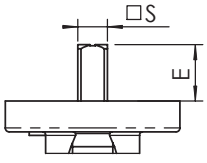
L9 DN300-600



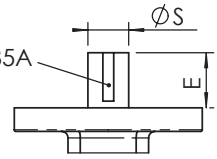








DN25-300



DN350-600

Materials

	Component	Material
1	Body	EN GJS 400 - 15
2	Disc	EN GJS 400 - 15 nickel plated / ASTM A351 gr. CF8-M / CuAl11Fe4 ASTM B148 C94500
3	Stem	AISI 420
4	Liner	EPDM / NBR / FKM (Viton®) / PTFE
5	Bushing	PTFE
6	Washer	Galvanized carbon steel
7	Cirlclip ISO3075	Spring steel
8	O-ring	FKM (Viton®)
9	Lever	DN25-150 aluminium / DN 200-250 EN GJS 400-15
10	Bolts	Galvanized carbon steel

Dimensions (mm)

DN	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
A	33	33	33	43	46	46	52	56	56	60	68	78	78	102	114	127	154
ØC	65	73	82	89	102	118	150	174	205	260	318	376	438	489	539	594	695
D	104	110	116	126	136	150	170	180	200	230	266	292	368	400	422	480	562
B	51	56	63	62	69	90	106	119	131	166	202	235	267	297	318	355	444
F1	192	192	170	170	170	206	206	285	285	400	530	-	-	-	-	-	-
Z	68	68	50	50	50	69	69	90	90	72	72	-	-	-	-	-	-
F2	130	130	130	130	130	130	130	130	130	235	226	226	216	216	216	256	285
L	102,5	102,5	102,5	102,5	102,5	102,5	102,5	102,5	102,5	190	190	190	183	183	183	311	386
T	65	65	65	65	65	65	65	65	65	78	80	80	80	80	80	125	136
L1	110	110	110	110	110	110	110	110	110	155	170	170	151	151	151	214	262
L2	130	130	130	130	130	130	130	130	130	176	200	195	188	188	188	275	324
W	45	45	45	45	45	45	45	45	45	63	81	81	80	80	80	168	293
O	150	150	150	150	150	150	150	150	150	300	300	300	285	285	285	285	385
R	-	1	5	5	9	17	26	34	50	71	91	112	128	144	163	182	219
D min pipe	-	12	27	31	45	65	90	110	146	194	241	291	324	379	428	475	573

Mounting between flanges [1]	EN 1092 PN16									EN 1092 PN10							
n x M	4 x M12	4 x M16	4 x M16	4 x M16	4 x M16	8 x M16	8 x M16	8 x M16	8 x M20	12 x M20	12 x M24	12 x M24	16 x M20	16 x M24	20 x M24	20 x M24	20 x M27
ISO 5211	F05	F05	F05	F05	F05	F05	F05	F07	F07	F10	F12	F12	F12	F14	F14	F14	F16
G	65	65	65	65	65	65	65	90	90	1 25	1 50	1 50	1 50	175	175	175	210
J	50	50	50	50	50	50	50	70	70	1 02	1 25	1 25	1 25	140	140	140	165
n x q	4 x 7	4 x 7	4 x 7	4 x 7	4 x 7	4 x 7	4 x 7	4 x 9	4 x 9	4 x 11	4 x 13	4 x 13	4 x 13	4 x 18	4 x 18	4 x 18	4 x 22
S	7	7	9	9	9	11	1 1	1 4	1 4	1 7	27	27	31,6	33,15	38	41,15	50,65
E	32	32	21	21	21	21	21	27	27	27	27	27	45	51,2	51,2	64,2	70,2

Weight (kg)

L9 with lever	2,6	2,6	2,3	3,2	4,1	5,4	6,7	9,6	10,8	21,1	32,7	41,2	-	-	-	-	-
L9 with gear box	6,2	6,2	6,1	7,0	7,9	9,2	10,5	12,9	14,1	28,4	42,0	50,5	79,3	122,6	254,8	228,3	308,6

1: *please refer to Instruction and Recommendations*

Operating torque (Nm)

DP bar																	
3	2,9	4,7	7,8	11,3	17	23	33	48	68	120	189	290	298	481	930	1250	2270
6	3,1	5,1	8,4	1 2	1 8	25	36	54	78	134	212	316	347	551	980	1350	2500
10	3,3	5,4	8,8	13	20	26	40	61	88	148	234	342	396	622	1200	1500	2700
16	3,4	5,7	9,2	13	21	28	44	68	99	162	257	367	-	-	-	-	-

N.B.: *In order to choose the right actuator, we recommend multiplying the operating torque figure by a safety coefficient, K=1.5*

Maximum pressure

Fluids *	Mounting	
	BETWEEN FLANGES	END OF LINE
Hazardous gases	16 bar DN25-200 10 bar DN250-350 NO DN400-600	10 bar DN25-100 NO DN125-600
Non-hazardous gases	16 bar DN25-300 10 bar DN350-500 6 bar DN600	10 bar DN25-300 6 bar DN350-500 4 bar DN600
Hazardous fluids	16 bar DN25-400 10 bar DN450-600	10 bar DN25-400 6 bar DN450-600
Non-hazardous fluids	16 bar DN25-400 10 bar DN450-600	10 bar DN25-400 6 bar DN450-600

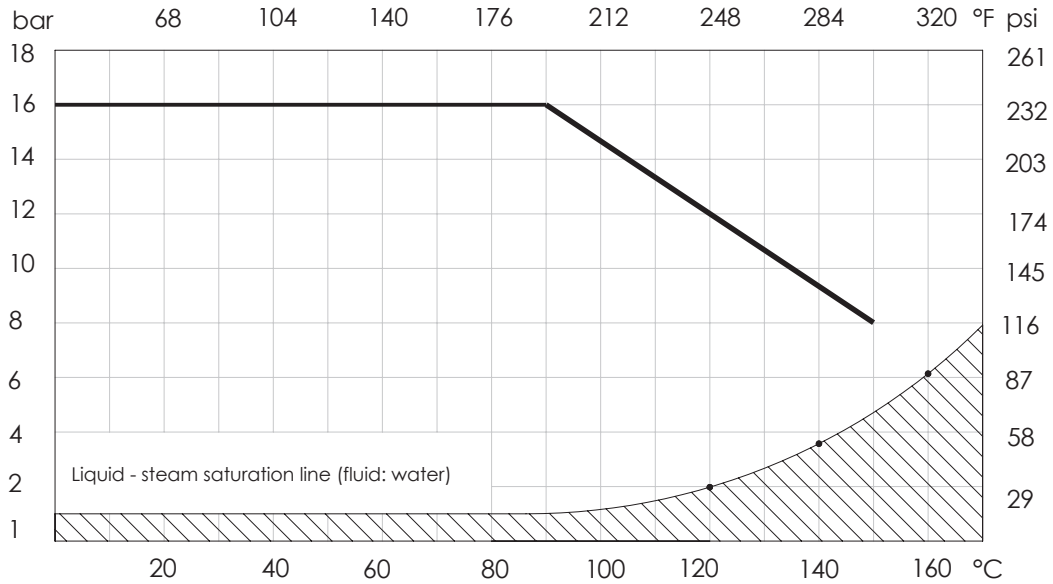
*: Hazardous gas, liquids (explosive, inflammable, toxic) in accordance with 97/23/CE PED and 67/548/EEC

Temperature

Temperature	min °C	Max°C	
		continuous	peak
EPDM	-10	120	130
NBR	-10	80	90
FKM (Viton®)	-10	150	170
PTFE	-10	120	120

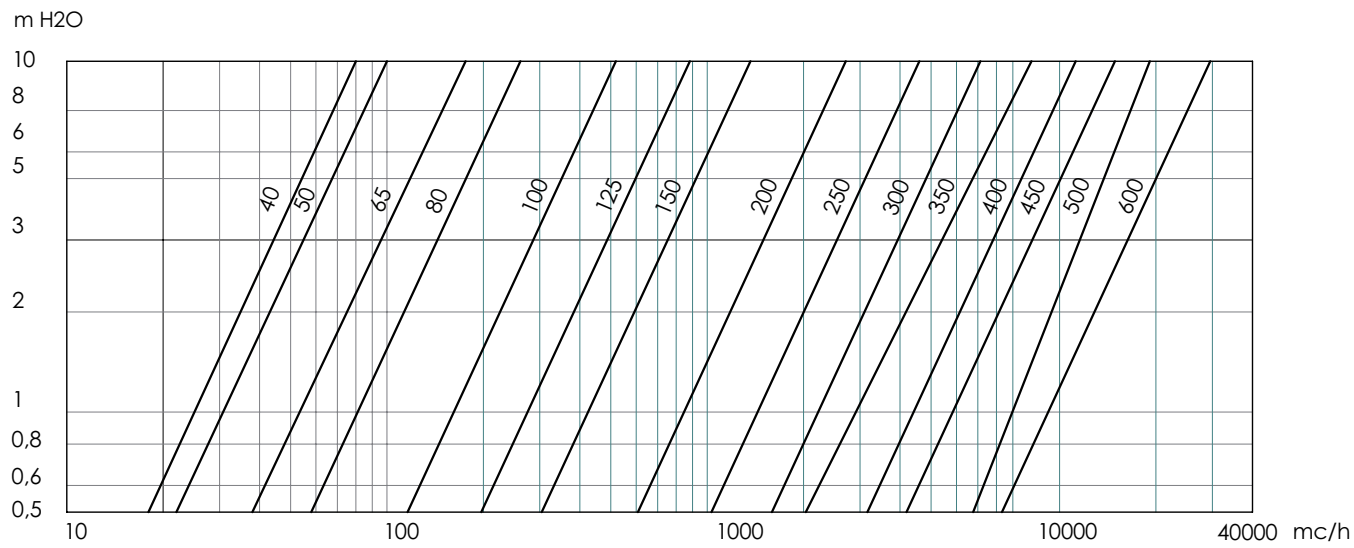
NB: *the maximum working pressure decreases while the temperature increases; please refer to "pressure/temperature" chart*

Pressure/temperature chart

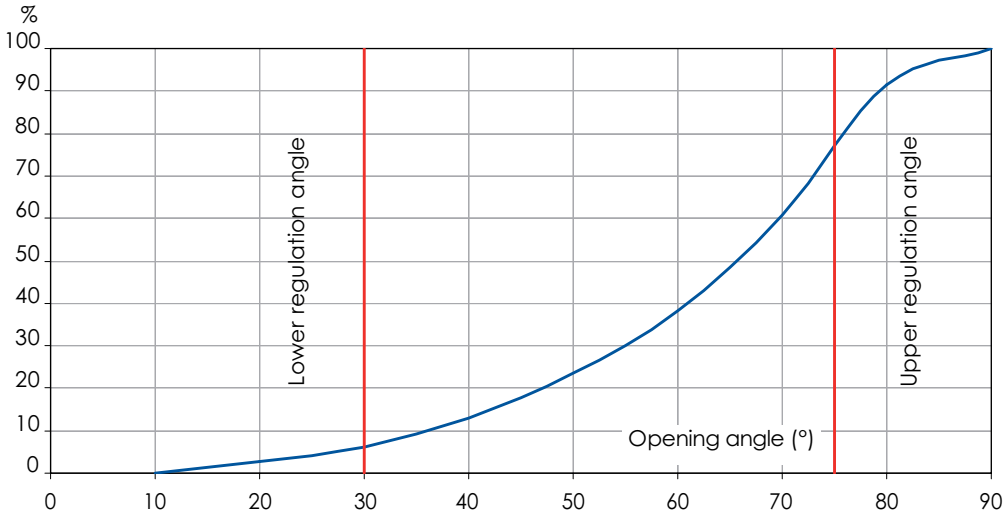


RANGE NOT SUITABLE FOR STEAM. DO NOT use when temperature and pressure are below the liquid-steam saturation line (hatched area)

Head loss **Fluid: water** (1m H2O = 0,098bar) - **Head loss with shutter completely open**



Flow rate / opening position chart **Flow percentage on the flow at full opening under the same loss of head.**



Kv - DN chart (mc/h per bar)

DN	mm	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
	ins	1" 1/2	2"	2" 1/2	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
OPENING ANGLE	10°	0,04	0,05	0,09	0,17	0,26	0,43	0,69	1,73	2,6	3,5	5,2	6,9	9,5	12	19
	20°	2,1	2,6	5,2	7,8	15	25	39	77	130	202	292	401	531	683	1055
	30°	4,8	6	10	16	31	53	82	162	276	427	617	849	1124	1445	2234
	40°	10	13	22	34	67	115	177	352	599	926	1376	1839	2437	3133	4840
	50°	19	23	39	60	120	205	316	628	1068	1650	2384	3279	4342	5609	8626
	60°	30	38	65	100	199	339	522	1038	1768	2730	3945	5425	7185	9238	14272
	70°	48	60	103	158	314	535	827	1643	2798	4322	6243	8585	11371	14620	22587
	80°	73	91	161	237	471	803	1241	2465	4196	6483	9364	12878	17057	21930	33882
	90°	79	99	169	261	518	883	1364	2708	4611	7124	10291	14152	18743	24099	37232

Versions

EPDM liner

0

EN GJL 250
N GJS400 nickel plated
PDM
-10 +120°C

L9.100

Body: EN GJS 400 -15
Disc: EN GJS400 nickel plated
Liner: EPDM
Temp: -10 +120°C

L9.120

Body: EN GJS 400 -15
Disc: AISI 316
Liner: EPDM
Temp: -10 +120°C

L9.170

Body: EN GJS 400 -15
Disc: Aluminium-bronze
Liner: EPDM
Temp: -10 +120°C

Coating: **RAL 5002** colour

NBR liner

01

EN GJS 400 -15
EN GJS400 nickel plated
NBR
: -10 +80°C

L9.121

Body: EN GJS 400 -15
Disc: AISI 316
Liner: NBR
Temp: -10 +80°C

L9.171

Body: EN GJS 400 -15
Disc: Aluminium-bronze
Liner: NBR
Temp: -10 +80°C

Coating: **RAL 5002** colour - GAS version (DN 25-350) with yellow lever

FKM or PTFE liner

2

EN GJS 400 -15
N GJS400 nickel plated
KM
-10 +150°C

L9.122

Body: EN GJS 400 -15
Disc: AISI 316
Liner: FKM
Temp: -10 +150°C

L9.172

Body: EN GJS 400 -15
Disc: Aluminium-bronze
Liner: FKM
Temp: -10 +150°C

L9.123

Body: EN GJS 400 -15
Disc: AISI 316
Liner: PTFE
Temp: -10 +120°C

L9.173

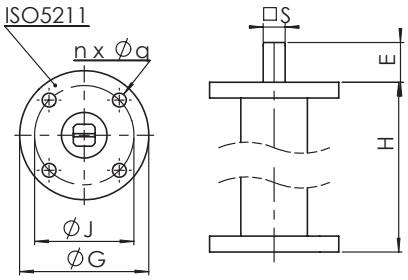
Body: EN GJS 400 -15
Disc: Aluminium-bronze
Liner: PTFE
Temp: -10 +120°C

Coating: **RAL 5002** colour

Special versions on request

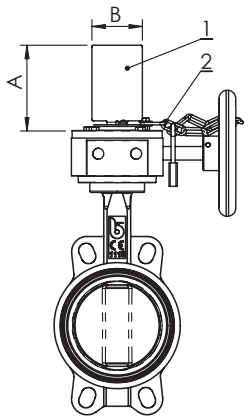
Accessories for series J9 - L9

Stem extension for water main system connection



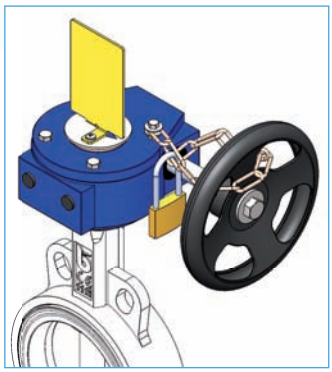
DN	40-100	125-150	200	250-300
H	250-500-800-1000			
ISO5211	F05	F07	F10	F12
G	65	90	125	150
J	50	70	102	125
n° x Ø q	4 x 7	4 x 9	4 x 11	4 x 13
E	20	26	26	26
S	11	14	17	27

Position indicator and padlocking for gear box

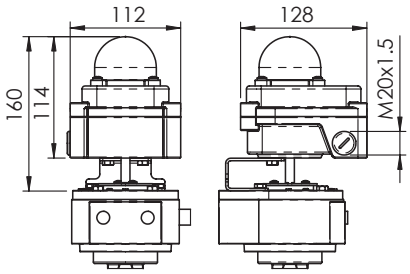


DN	25-150	200-400
A	100	120
B	60	80

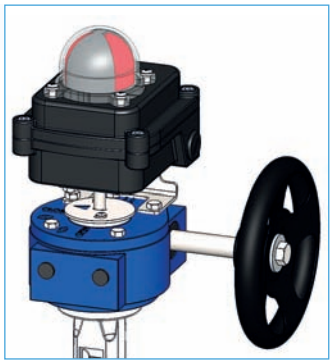
1) Position indicator
2) Chain for padlocking



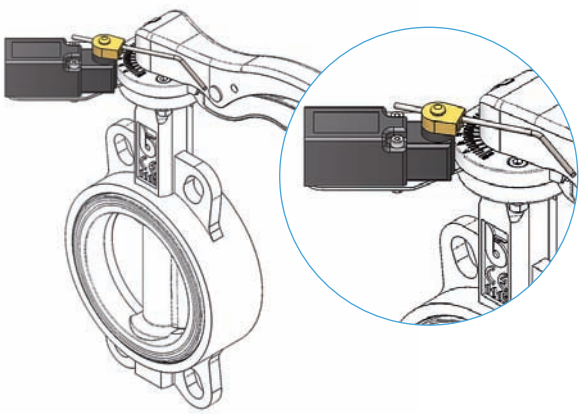
Limit switches box for gear box



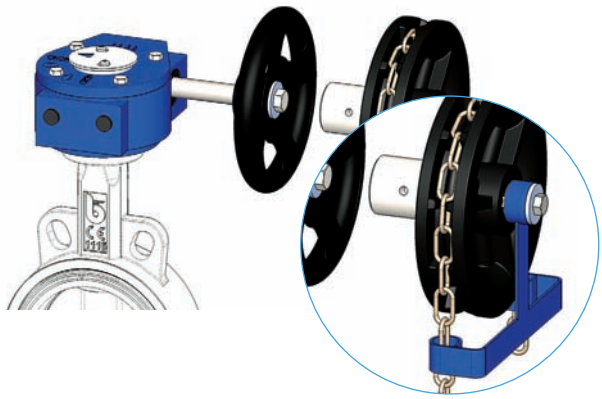
Mechanical switches per standard.
Available on request: proximity switches, ATEX explosion proof proximity switches.



Limit switches kit for ON-OFF indication



Chain driver kit



Instruction and Recommendations for series J9 - L9

The information provided here is delivered with each product, and contains "Instructions for use and maintenance"; it is also available on our website: www.brandoni.it (download section)

INSTALLATION AND TRANSPORT

- Keep in dry and closed place.
- While stored, the disc must be partially open (Fig. 1).
- Avoid knocks, take special care to protect lever, hand wheel, gear boxes/actuators.
- Do not use lever or hand wheel to lift the valve.

MAINTENANCE

The valve does not require maintenance.

RECOMMENDATIONS

Before carrying out maintenance or dismantling the valve, be sure that the pipes, valves and liquids have cooled down, that the pressure has decreased and that the lines and pipes have been drained in case of toxic, corrosive, inflammable or caustic liquids.
Temperatures above 50°C and below 0°C might cause damage to people.

INSTALLATION

- Handle with care.
- Do not weld the flanges to the piping after installing the valve.
- Water hammers might cause damage and ruptures. Inclination, twisting and misalignments of the piping may subject the valve to stress, once installed. It is recommended that elastic joints be used in order to reduce these effects as much as possible. The disc must be partially open (Fig. 1).

FIG. 1

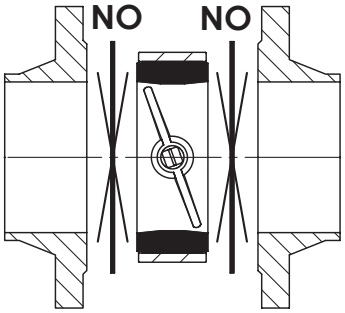


FIG. 2

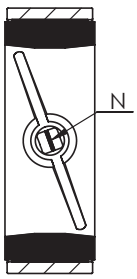
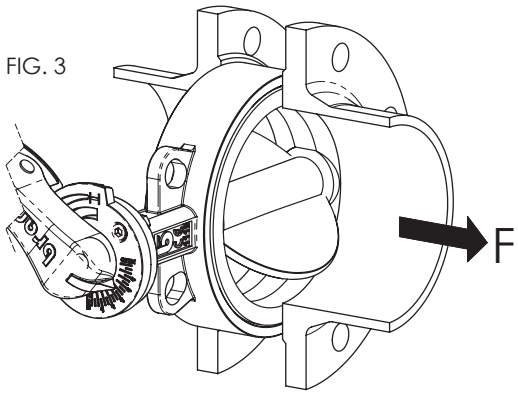


FIG. 3



The stem has a machined notch N (Fig. 2), which indicates the position of the disc; consider this indication, in order to mount the levers and actuators correctly.
The mounting can be made with the stem axis in a horizontal or vertical position. In case the fluid contains suspended solid particles (for example, sand, impurities, etc.) o solid particles that may leave deposits, it is recommend that the valve be installed with its axis horizontal, and in such a way that the bottom end of the disc opens in the direction of flow, F. (Fig. 3)
The item L9 allows the dismantling of the pipes downstream, for pressures below 6 bar. For end of line installation:
- SERIES J9 (all pressures), series L9 (pressure > 6 bar): counter flange MUST be installed
- SERIES L9 (pressure< 6 bar): it is recommended that a counter flange be installed.

Verify maximum working pressure and limits of use under section "maximum pressure".
Place the valve between two flanges. While placing the valve, ensure there is sufficient space in order in order not to damage the rubber. Do not mount seals between valve and flanges (Fig. 1). Carefully clean the contact surface. Do not install the butterfly valve in direct contact with a rubber surface (for example, expansion joints); the best installation is when the rubber is in contact with metal (Fig. 4).
In order to achieve correct working, the internal diameter of the pipe must be greater than the value indicated in the chart. Do not weld the flanges to the tube if the valve has already been installed. It is recommended that the flanges listed in the chart be used. As far as possible, avoid flat flanges for welding (EN 1092 01 type); if these flanges are used, ensure perfect centring between the flange and valve, and be sure to weld exactly edgewise to the flange. Do not let protrusions or sharp edges on the piping cause damage to the rubber surface of the valve (Fig. 5).

FIG. 4

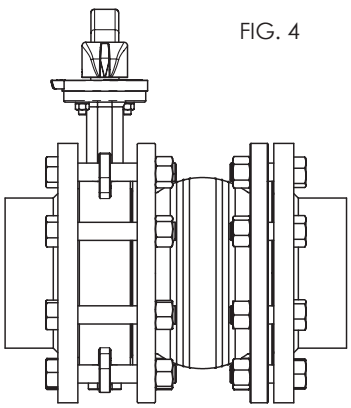
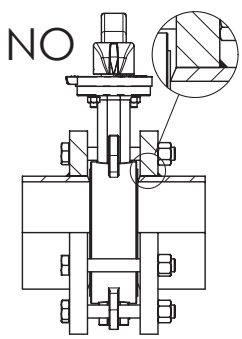
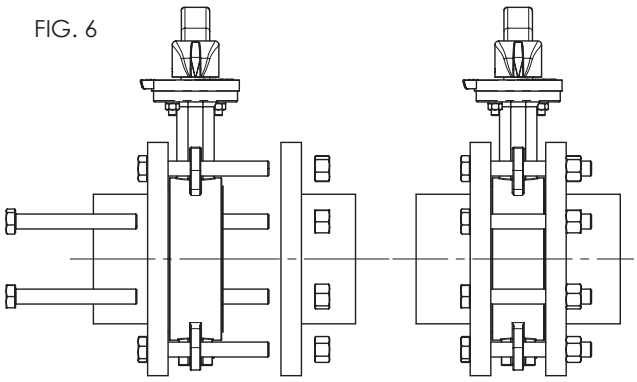


FIG. 5



Centre the valve on holes while using wafer type valves.
Tighten the bolts crosswise and progressively, in order to distribute the pressure equally before the body and flanges come into contact with each other. (Fig. 6)
With regard to the Lug version, check that the screws are the correct length, in order to allow complete compression of the lining rubber.
Turbulences of the fluid might increase erosion and reduce the life-cycle of the valve. Install the valve at a distance of at least 1 x DN upstream, and at a distance of 2-3 x DN downstream, away from fittings or bends.
In the open position, the valve is larger than the nominal Face to Face value.

FIG. 6



Check that no other components of the piping interfere or create damage or malfunction (Fig. 7A).
If they do, a spacer should be inserted for the valve to operate correctly (Fig. 7B).

FIG. 7A

NON OK

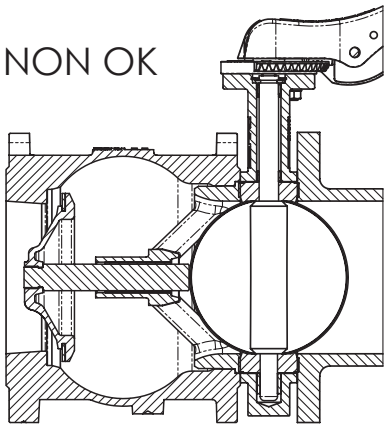
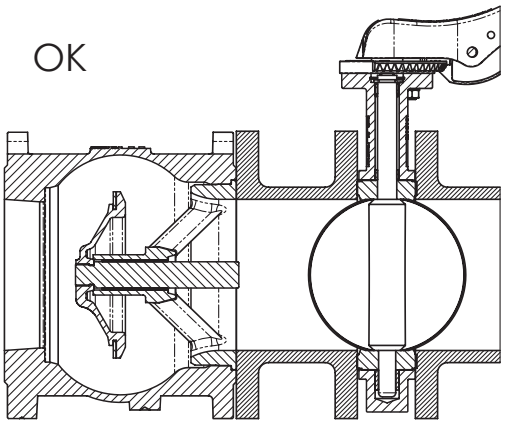


FIG. 7B

OK



FLANGES CHART

Norms	Type	
EN 1092-1 PN6/10/16	Type 11	weld neck
	Type 21	integral
	Type 02 + 35	loose plate with weld ring neck
	Type 02 + 36	loose plate with pressed collar
	Type 04 + 34	loose plate with weld neck collar
ANSI B16.1 #150* ANSI B16.5 #150*		flat face
		raised face
		lap joint

CHART MINIMUM DIAMETER OF PIPES

DN	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
Ø min. pipe	-	12	27	31	45	65	90	110	146	194	241	291	324	379	428	475	573

Customer	Date 2015-03-11
Contact	Project
Phone number	Project no.
Email	

Technical Data

NSCS 100-250/150/W46VCC4

Operating data

Pumpe type	Single head pump		Fluid		Water
No. of pumps / Reserve		1 / 0	Operating temperature t A	°C	4
Nominal flow	m³/h	189.2	pH-value at t A		7
Nominal head	m	20.4	Density at t A	kg/dm³	1
Static head	m	0	Kin. viscosity at t A	mm²/s	1.569
Inlet pressure	bar	0.098	Vapor pressure at t A	bar	0.0234
Environmental temperature	°C	20	Solids		0
Available system NPSH	m	0	Altitude	m	1000

Pump data

Make	Lowara			Nominal	m³/h	196	(196)
Speed		1/min	1765	Flow Max-	m³/h	249	
Number of stages			1	Min-	m³/h	29.6	
Max. casing pressure		bar	16	Nominal	m	21.9	
Max. working pressure		bar	2.9	Head at Qmax	m	15.9	
Head H(Q=0)		m	28	at Qmin	m	28.2	
Weight		kg		Shaft power	kW	14.2	(14.2)
	Max.	mm	259	Max. shaft power	kW	14.8	
Impeller R	designed	mm	245	Efficiency	%	82.14	
	Min.	mm	222	NPSH 3%	m	2.6	
Suction nozzle		DN125	PN10/16 EN1092-2 (NSC)	Discharge nozzle		DN100	PN10/16 EN1092-2 (NSC)

Pump Materials

Impeller	Cast iron, 0.6020
Casing	Cast iron, 0.6025
casing cover	Cast iron, 0.6025
Wear ring	stainless steel, 1.4301
Shaft	Stainless steel, 1.4057
Bearing frame	Cast iron, 0.6025

Shaft Seal

Mechanical Seal	
e-NSC, e-LNE - MG1S2	Burgmann
Rotating Assembly	B-Resin impregnated carbon
Fixed Assembly	Q1-Silicon carbide
Elastomers	E - EPDM
Springs	G-AISI 316
Other Components	G-AISI 316

Motor data

Manufacturer	WEG	Electric voltage	460 V
Specific design	IE3 motors - Cast Iron Frame - Premium Efficiency		
Type	W22 - 160 L - 15kW	Electric current	25 A
Rated power	15 kW	Degree of protection	IP55
Speed	1775 1/min	Insulation class	F
Frame size	160 L	Weight	145 kg
Shaft diameter	42 mm	Colour	RAL 5010

Coupling

Manufacturer	
Series	
Type	
Frame size	
Spacer length	
Weight	
Coupling protection	

Base plate

Description	
Weight	

Remarks:

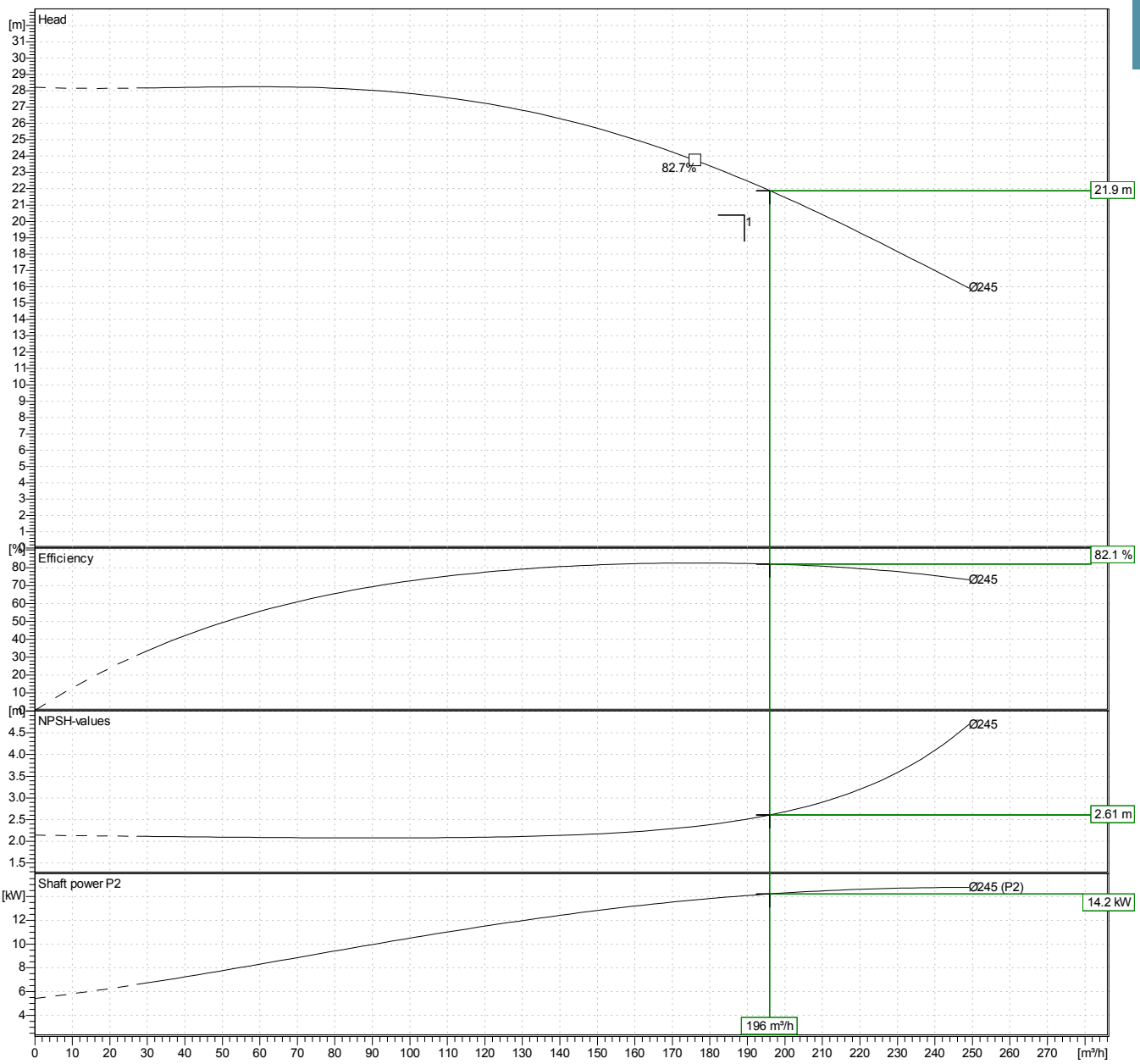
Customer Contact Phone number Email	Date 2015-03-11 Project Project no.

NSCS 100-250/150/W46VCC4

Hydraulic data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	189.2 m³/h	Flow	196 m³/h	Impeller R	245 mm
Head	20.4 m	Head	21.9 m	Frequency	60 Hz
Static head	0 m			Speed	1765 1/min

Power datas referced to:
Water [100%] ; 4°C; 1kg/dm³; 1.57mm²/s
Performance according to ISO 9906 - Annex A



Customer	Date 2015-03-11
Contact	Project
Phone number	Project no.
Email	

NSCS 100-250/150/W46VCC4

Dimensions mm/m³

a	140	m2	120
A	254	n1	400
AA	64	n2	315
AB	308	PM1	1/4"
AD	264	s1	19
B	254	s2	14.5
b	80	Trim	0
BB	298	Type	B
Bmax	431	Volumen	0.1985
DNd	100	w	348
DNs	125	x	140
E	3/8"		
f	240		
F	3/8"		
g1	26		
H	160		
h1	225		
h2	280		
h3	65		
HA	22		
Hmax	505		
L	912		
m1	160	Total weight	235 kg

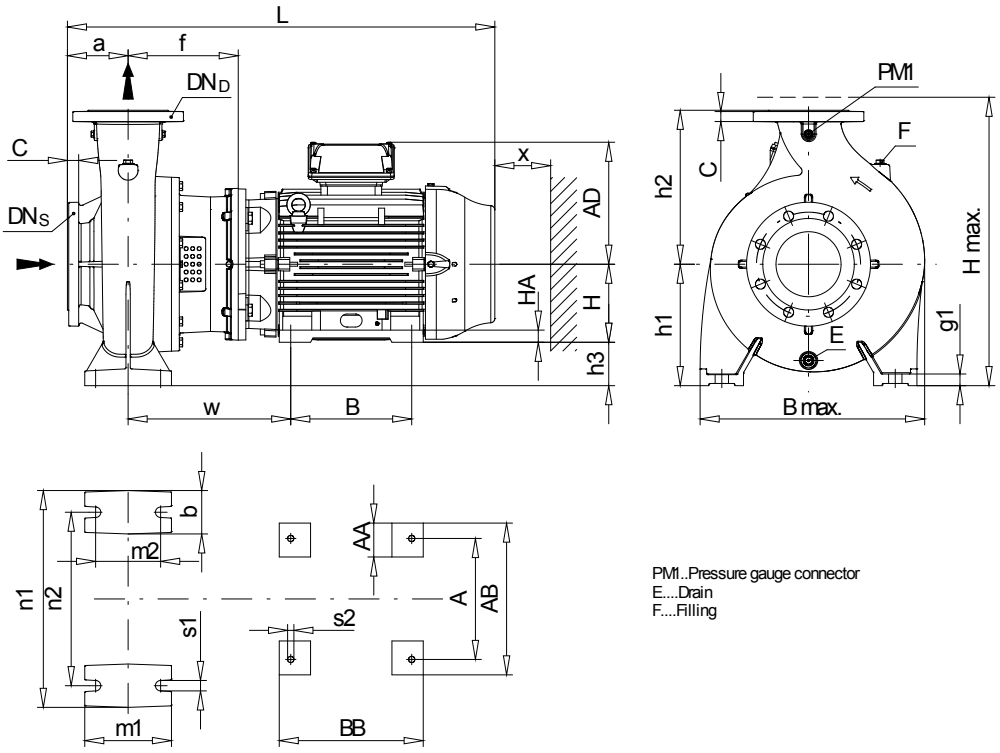
Connections mm

Suction nozzle	Discharge nozzle
DN125	DN100
PN10/16	PN10/16
EN1092-2 (NSC)	EN1092-2 (NSC)

C	26	C	24
D	255	D	230
d1	184	d1	157
K	210	K	180
L	19	L	19
z	8	z	8

Value C, D may vary from Standard

Drawing



PM1..Pressure gauge connector
E....Drain
F....Filling

Customer	Date 2015-03-11
Contact	Project
Phone number	Project no.
Email	

NSCS 100-160/40/W46VCC4

Operating data

Pumpe type	Single head pump		Fluid		Water
No. of pumps / Reserve		1 / 0	Operating temperature t A	°C	4
Nominal flow	m³/h	86	pH-value at t A		7
Nominal head	m	10.2	Density at t A	kg/dm³	1
Static head	m	0	Kin. viscosity at t A	mm²/s	1.569
Inlet pressure	bar	0.098	Vapor pressure at t A	bar	0.0234
Environmental temperature	°C	20	Solids		0
Available system NPSH	m	0	Altitude	m	1000

Pump data

Make	Lowara			Nominal	m³/h	84.6	(84.6)
Speed	1/min	1760	Flow	Max-	m³/h	187	
Number of stages		1		Min-	m³/h	28.5	
Max. casing pressure	bar	16		Nominal	m	9.9	
Max. working pressure	bar	1.1	Head	at Qmax	m	4.7	
Head H(Q=0)	m	10		at Qmin	m	10.2	
Weight	kg		Shaft power		kW	3.5	(3.5)
Max.	mm	190	Max. shaft power		kW	3.9	
Impeller R designed	mm	156	Efficiency		%	65.45	
Min.	mm	156	NPSH 3%		m	2	
Suction nozzle	DN125	PN10/16 EN1092-2 (NSC)	Discharge nozzle		DN100	PN10/16 EN1092-2 (NSC)	

Pump Materials

Impeller	Cast iron, 0.6020
Casing	Cast iron, 0.6025
casing cover	Cast iron, 0.6025
Wear ring	stainless steel, 1.4301
Shaft	Stainless steel, 1.4057
Bearing frame	Cast iron, 0.6025

Shaft Seal

Mechanical Seal	
e-NSC, e-LNE - MG1S2	Burgmann
Rotating Assembly	B-Resin impregnated carbon
Fixed Assembly	Q1-Silicon carbide
Elastomers	E - EPDM
Springs	G-AISI 316
Other Components	G-AISI 316

Motor data

Manufacturer	WEG	Electric voltage	460 V
Specific design	IE3 motors - Cast Iron Frame - Premium Efficiency		
Type	W22 - 112 M - 4kW	Electric current	7.1 A
Rated power	4 kW	Degree of protection	IP55
Speed	1755 1/min	Insulation class	F
Frame size	112 M	Weight	44 kg
Shaft diameter	28 mm	Colour	RAL 5010

Coupling

Manufacturer	
Series	
Type	
Frame size	
Spacer length	
Weight	
Coupling protection	

Base plate

Description	
Weight	

Remarks:

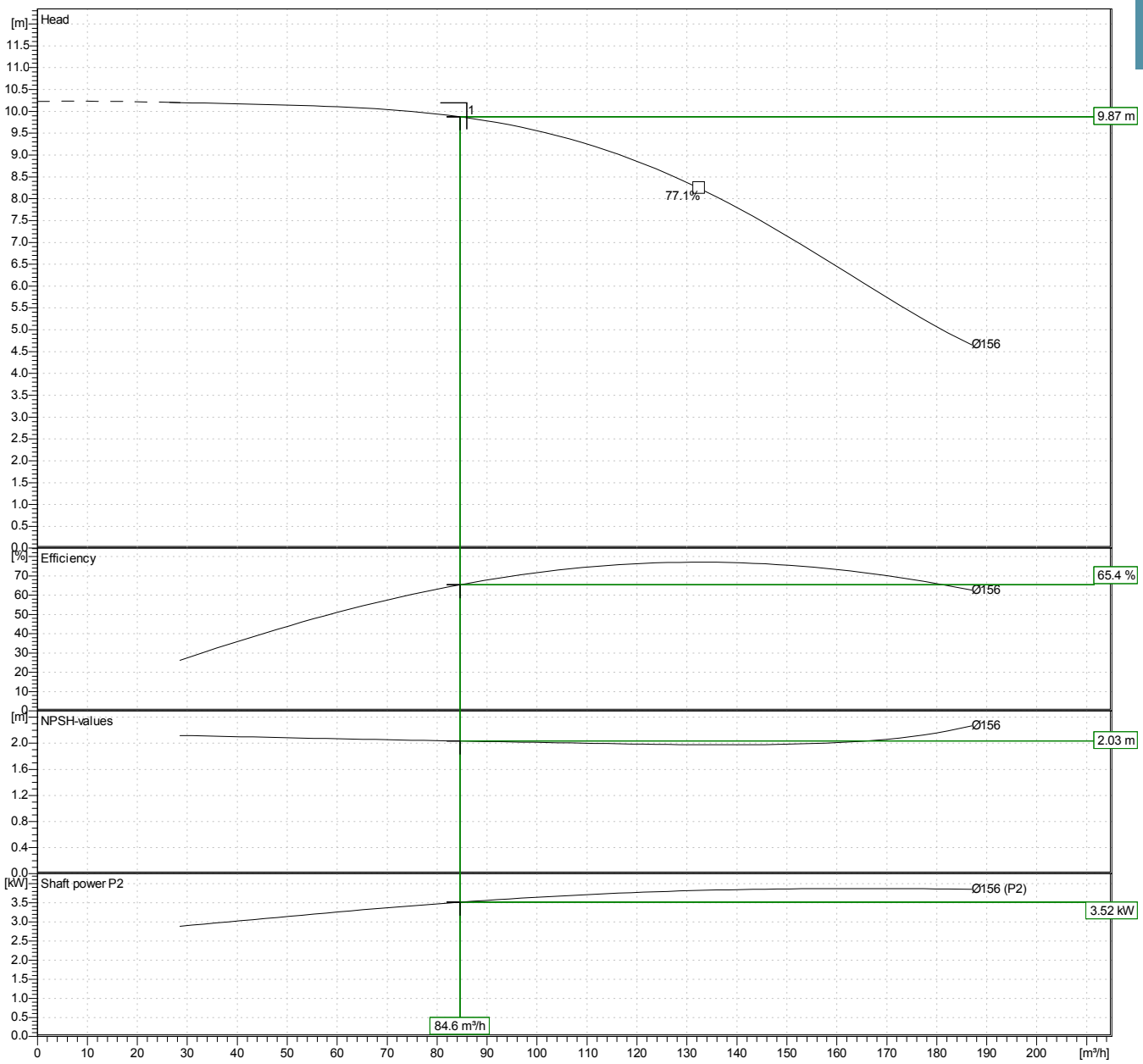
Customer Contact Phone number Email	Date 2015-03-11 Project Project no.

NSCS 100-160/40/W46VCC4

Hydraulic data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	86 m³/h	Flow	84.6 m³/h	Impeller R	156 mm
Head	10.2 m	Head	9.87 m	Frequency	60 Hz
Static head	0 m			Speed	1760 1/min

Power datas referced to:
Water [100%] ; 4°C; 1kg/dm³; 1.57mm²/s
Performance according to ISO 9906 - Annex A



Customer	Date 2015-03-11
Contact	Project
Phone number	Project no.
Email	

NSCS 100-160/40/W46VCC4

Dimensions mm/m³

a	125	Volumen	0.11938
AD	192	x	140
b	80		
Bmax	388		
DNd	100		
DNs	125		
E	3/8"		
f	183		
F	3/8"		
g1	26		
h1	200		
h2	280		
h3	88		
Hmax	480		
L	641		
m1	160		
m2	120		
n1	360		
n2	280		
PM1	1/4"		
s1	19		
Trim	0		
Type	A	Total weight	119 kg

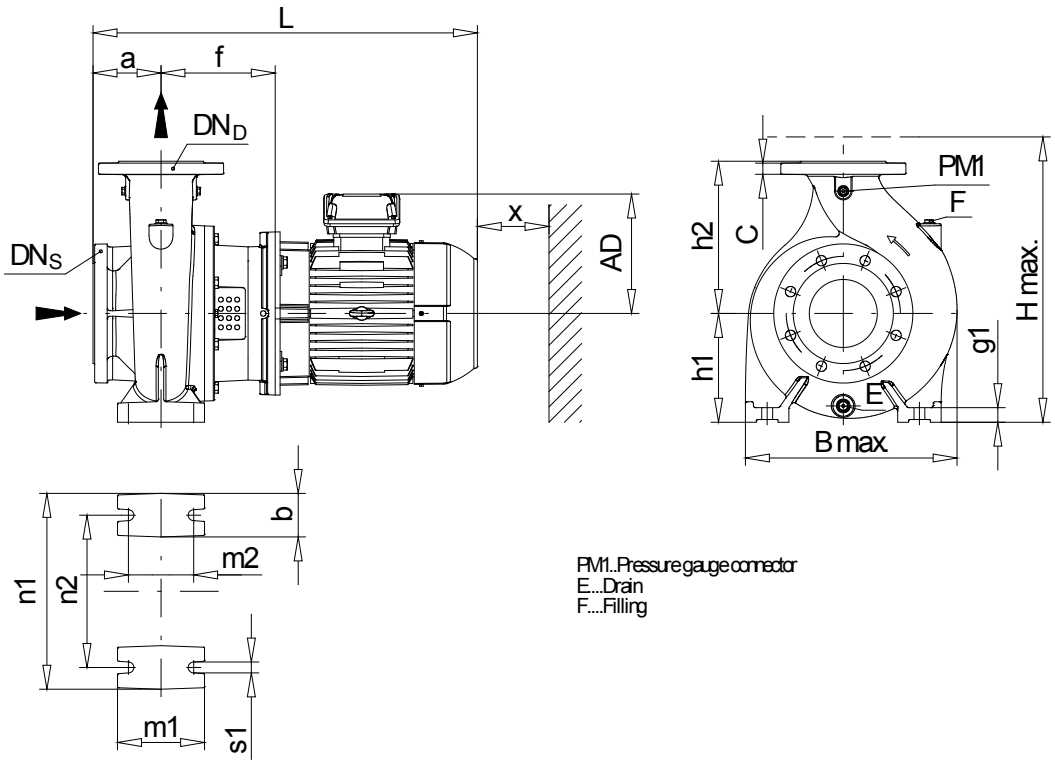
Connections mm

Suction nozzle	Discharge nozzle
DN125	DN100
PN10/16	PN10/16
EN1092-2 (NSC)	EN1092-2 (NSC)

C	26	C	24
D	255	D	230
d1	184	d1	157
K	210	K	180
L	19	L	19
z	8	z	8

Value C, D may vary from Standard

Drawing



PM1..Pressure gauge connector
E....Drain
F....Filling

Customer	Date 2015-08-27
Contact	Project
Phone number	Project no.
Email	

NSCS 100-160/40/W45VCC4

703740820

Technical Data

Operating data

Pumpe type		Single head pump	Fluid			Water, pure
No. of pumps	/ Reserve	1 / 0	Operating temperature t A		K	277
Nominal flow		m³/h 0	pH-value at t A			7
Nominal head		m 0	Density at t A		kg/m³	1000
Static head		m 0	Kin. viscosity at t A		mm²/s	1.569
Inlet pressure		kPa 9.8	Vapor pressure at t A		kPa	2.34
Environmental temperature		K 293	Solids			0
Available system NPSH		m 0	Altitude		m	1000

Pump data

Make	Lowara				Nominal	m³/h	( )
Speed		1/min 1450		Flow	Max-	m³/h 193	
Number of stages		1			Min-	m³/h 25	
Max. casing pressure		kPa 1600			Nominal	m	
Max. working pressure		kPa 105.9		Head	at Qmax	m 4.6	
Head H(Q=0)		m 11			at Qmin	m 10.7	
Weight		kg		Shaft power		kW	( )
	Max.	mm 190		Max. shaft power		kW 3.7	
Impeller R	designed	mm 190		Efficiency		%	
	Min.	mm 144		NPSH 3%		m	
Suction nozzle		DN125 PN10/16 EN1092-2 (NSC)		Discharge nozzle		DN100 PN10/16 EN1092-2 (NSC)	

Pump Materials

Impeller	Cast iron, 0.6020
Casing	Cast iron, 0.6025
casing cover	Cast iron, 0.6025
Wear ring	stainless steel, 1.4301
Shaft	Stainless steel, 1.4057
Bearing frame	Cast iron, 0.6025

Shaft Seal

Mechanical Seal	
e-NSC, e-LNE - MG1S2	Burgmann
Rotating Assembly	B-Resin impregnated carbon
Fixed Assembly	Q1-Silicon carbide
Elastomers	E - EPDM
Springs	G-AISI 316
Other Components	G-AISI 316

Motor data

Manufacturer	WEG	Electric voltage	400 V
Specific design	IE3 motors - Cast Iron Frame - Premium Efficiency		
Type	W22 - 112 M - 4kW	Electric current	8 A
Rated power	4 kW	Degree of protection	IP55
Speed	1450 1/min	Insulation class	F
Frame size	112 M	Weight	44 kg
Shaft diameter	28 mm	Colour	RAL 5010

Coupling

Manufacturer	
Series	
Type	
Frame size	
Spacer length	
Weight	
Coupling protection	

Base plate

Description	
Weight	

Remarks:

Customer Contact Phone number Email	Date 2015-08-27 Project Project no.

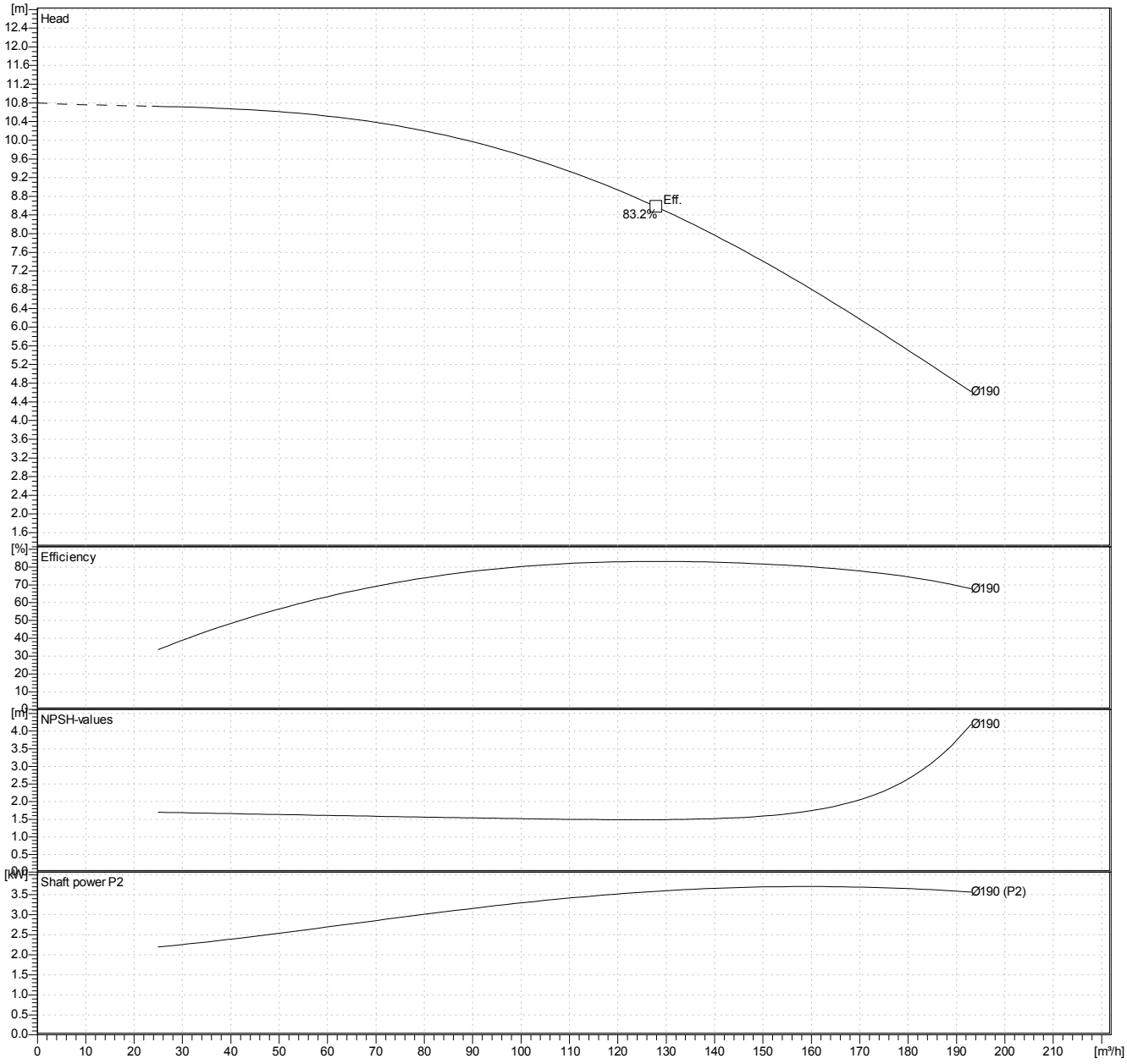
NSCS 100-160/40/W45VCC4

703740820

Hydraulic data

Operating Data Specification		Hydraulic data (duty point)		Impeller design	
Flow	0 m³/h	Flow		Impeller R	190 mm
Head	0 m	Head		Frequency	50 Hz
Static head	0 m			Speed	1450 1/min

Power datas referced to:
Water, pure [100%] ; 277K; 1000kg/m³; 1.57mm²/s
Performance according to ISO 9906 - Annex A



Customer	Date 2015-08-27
Contact	Project
Phone number	Project no.
Email	

NSCS 100-160/40/W45VCC4

703740820

Dimensions mm/l

a	125	Volumen	0.11938
AD	192	x	140
b	80		
Bmax	388		
DNd	100		
DNs	125		
E	3/8"		
f	183		
F	3/8"		
g1	26		
h1	200		
h2	280		
h3	88		
Hmax	480		
L	641		
m1	160		
m2	120		
n1	360		
n2	280		
PM1	1/4"		
s1	19		
Trim	0		
Type	A	Total weight	119 kg

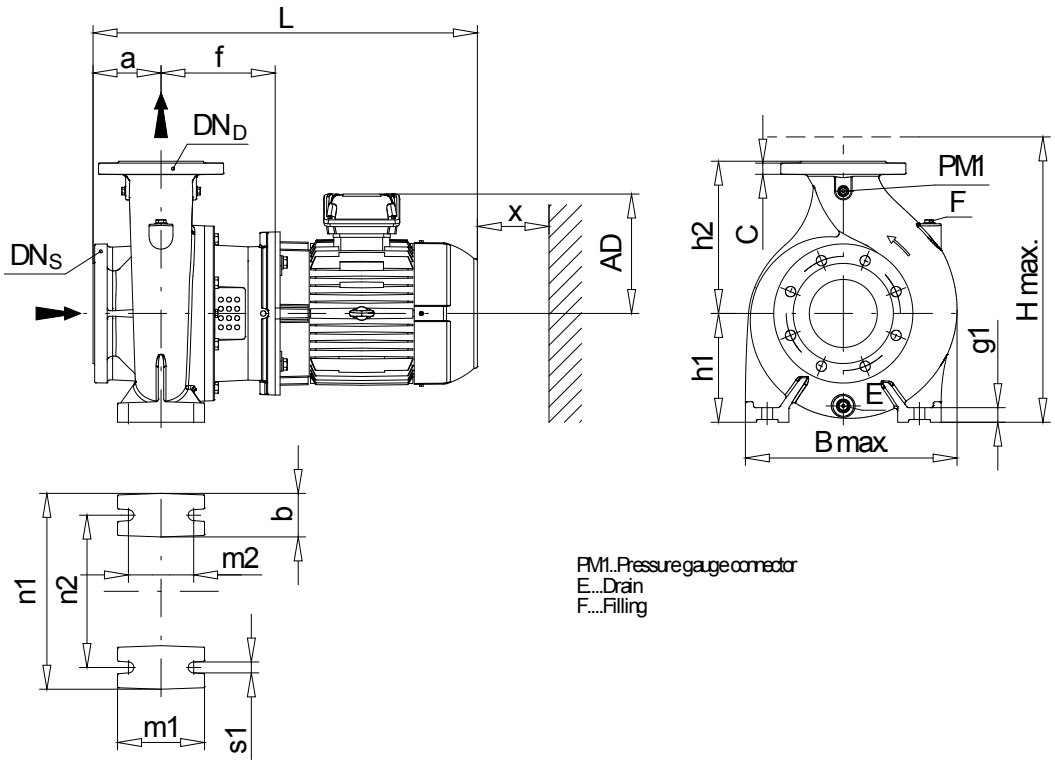
Connections mm

Suction nozzle	Discharge nozzle
DN125	DN100
PN10/16	PN10/16
EN1092-2 (NSC)	EN1092-2 (NSC)

C	26	C	24
D	255	D	230
d1	184	d1	157
K	210	K	180
L	19	L	19
z	8	z	8

Value C, D may vary from Standard

Drawing



PM1..Pressure gauge connector
E....Drain
F....Filling

SONDEX

S21/S22 + S36+S47 + S64
Plate Heat Exchanger

Recommended Applications:
The **S21/S22, S36+S47 and S64** range of **Sondex** plate heat exchangers is specially designed for the HVAC area, the geothermal-, marine- and heat recovery area as well as for the industrial- and chemical market.

Design Principle:
The **Sondex** plate range with lengths up to 1.9 m and up to extra "long" thermal pattern, will cover many duties up to 150 m^3/h in a single pass solution, which means that all connections are on the head side. This will ensure easy pipe- and service work, and by dismantling the exchanger for service, no pipes need to be removed.

The heat transfer is obtained, when the warm medium transfers energy through the thin, strong flow plates between the channels and delivers it to the cold opposing medium without mixing the two media. Countercurrent flow creates the optimum efficiency.

The plate- and inlet design allows an effective and easy CIP (Cleaning In Place) of all "flow" surfaces.

Flow Plates:
The corrugated "herringbone" pattern ensures turbulent flow in the whole effective area. Furthermore, this pattern brings "metallic" contact between the plates, and together with lock devices on the gaskets, the plate pack is easily assembled.

The plate pack is held firm and safely between the fixed head and movable follower of the frames.

Data Required for Correct Quotation:
Duty, flow rate, type of media, temperatures, working pressure, pressure losses and thermodynamic properties determine the choice of exchanger type, size of heat surface and plate pattern.

Technical Information

Frame:
Painted frame with the clamping bolts placed around the frame edge.
Standard colour by painted frame: Blue RAL 5010.
Available in other colours.

Working pressure:
The painted frames are designed for working pressure: 0.6/1.0/1.6/2.5 MPa

Intermediate Frames:
Intermediate frames and corner blocks for IS and FS frames in stainless steel.

Construction Standard:
According to PED 97/23/EC: A-D "Merkblätter"
According to ASME CODE: ASME VIII, DIV. 1

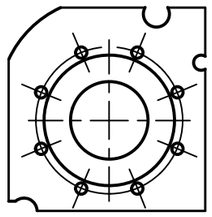
Connections:
DN100 flange Carbon steel, rubberlined or cladded, with AISI316 or titanium.

According to all known standards.
3" & 4"/DN80/100 dairy unions.
According to all known standards.

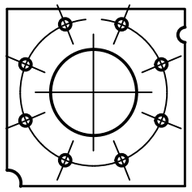
Plates:
Standard material
AISI 304, AISI 316 and titanium, 254 SMO.
Also 2 x 0.4 mm "Sonder Safe" plates.
Not standard: Hastelloy C 276 and other pressable materials.

Gaskets:
The gaskets are the unique "Sonder Lock" or "hang-on", non-glued type.
Standard material: Nitrile, EPDM and Viton.

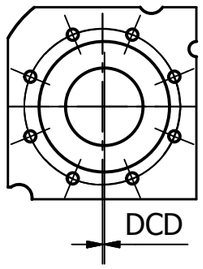
Extra Equipment:
Safety covers in stainless steel.
Insulating jacket.
Assembling spanner.
Foundation feet for frame.



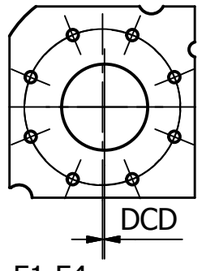
F1-F4 AND B1-B4
DN100 DIN2632/2633
CLADDED OR RUBBERLINED



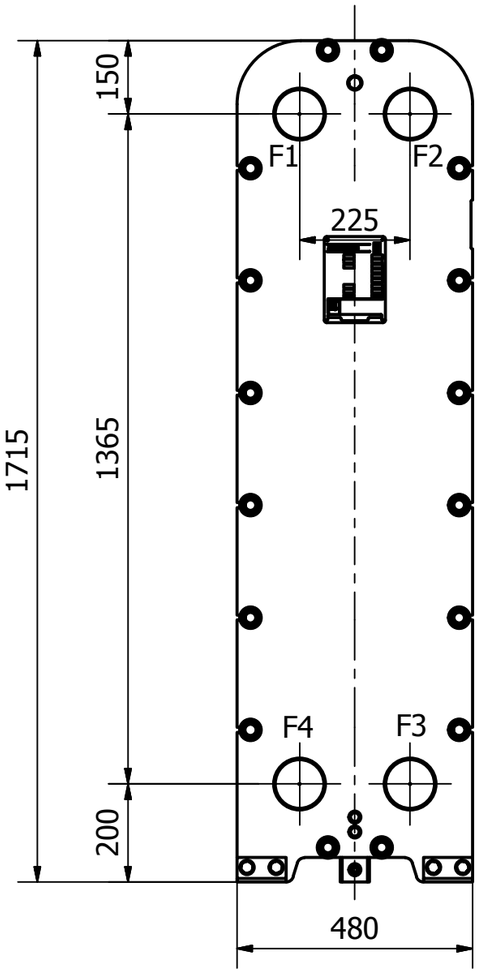
F1-F4
DN100 DIN2632/2633
UNCLADDED

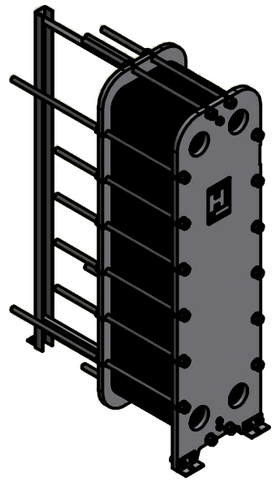


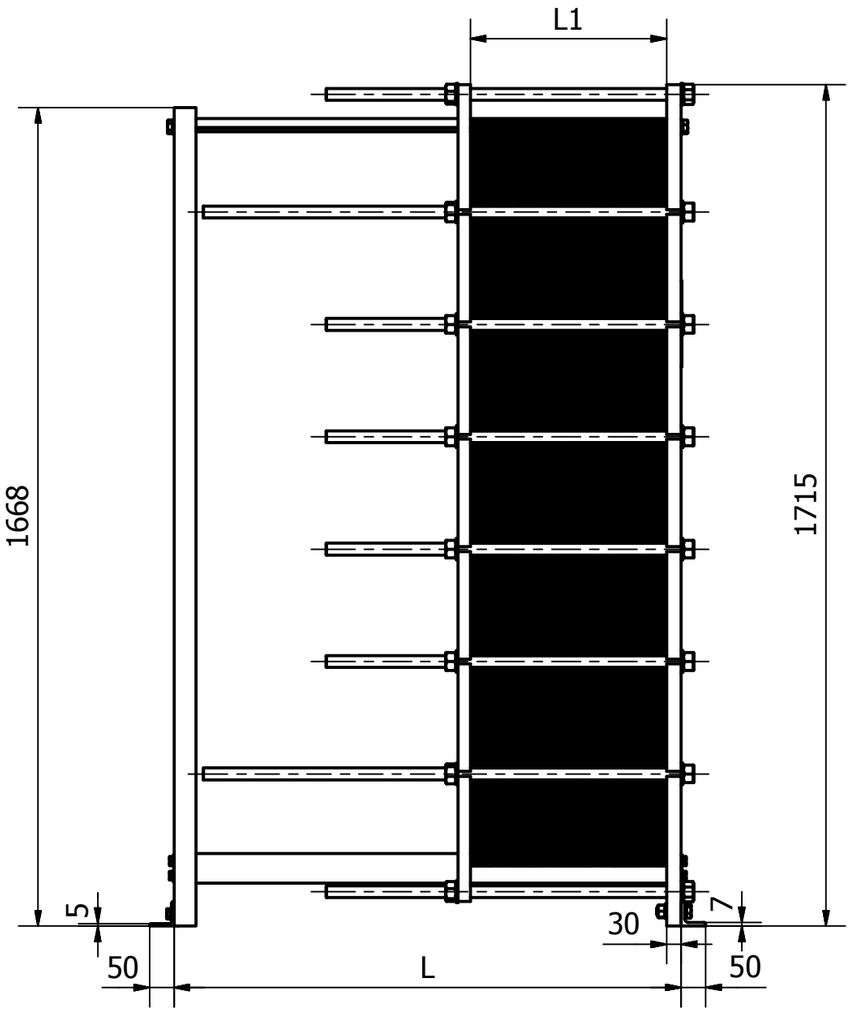
F1-F4 AND B1-B4
4 INCH ANSI CL150
DCD 2,5 MM
CLADDED OR RUBBERLINED

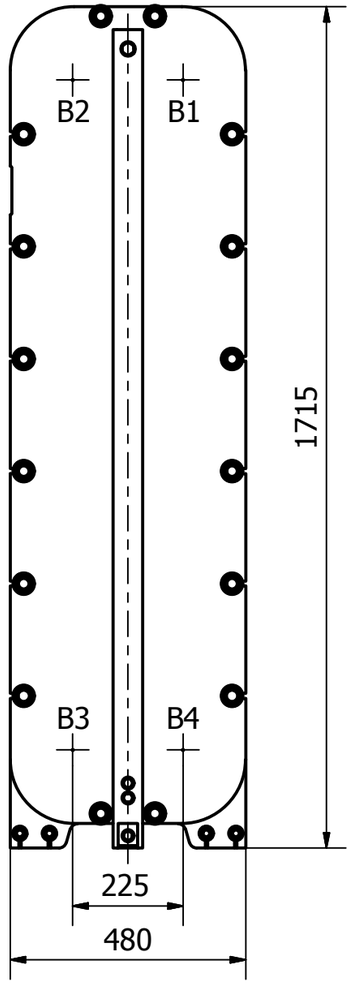


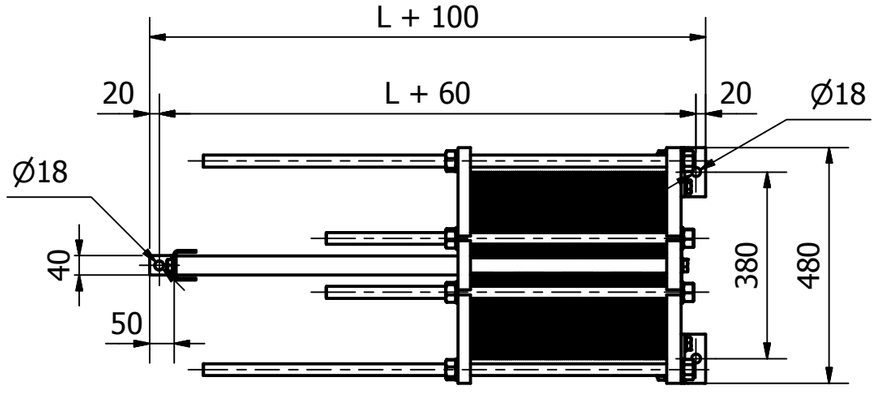
F1-F4
4 INCH ANSI CL150
DCD 2,5 MM
UNCLADDED





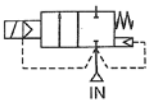






Dimensions without tolerance: ISO 2768-m	Designed by / Date: JKO 08-11-2010	Approved by / Date: JRD 16-07-2012	Rev. no.: 03	Revision Text: CHANGED HEAD-FOLL-COLUMN-CARR BAR	
ISO projektion	SONDEX Jernet 9 DK-6000 Kolding			Description: S47 IG PN10 DN100 DIM DRAWING LENGTH 400-1000 MM	
		Rev. date: 13-07-2012	Rev. by: LGK	Drawing no.: S47IGPN10DN100L400-1000	Sheet: 1 /1

Media: air – water – light oil - vacuum
Pressure range: 0 to 10 bar max
Media temperature: 90° C max
Ambient temperature: -20° to +60° C max
Media viscosity: 50 centistokes max
Mounting: coil upright
Opening / Closing Time: 50 mSec Max



NC

2/2 Brass

N/CLOSED
2 WAY ASSISTED LIFT

TYPE PU220 & AD

PRESSURE

Ø Port	Ø Orifice (mm)	Flow Rate Cv Ltr/ min	Coil Size	Pressure Rating (bar) Min	Max ΔP DC	Max ΔP AC	Max Working	Seals	Max Media Temp. °C	Part Number
3/8 BSP	13	35	22003	0	5	8.5	10	NBR FKM EPDM	90 120 120	PU22003 + voltage PU22003V + voltage PU22003E + voltage
1/2 BSP	13	35	22003	0	5	8.5	10	NBR FKM EPDM	90 120 120	PU22004A + voltage PU22004AV + voltage PU22004AE + voltage
3/4 BSP	20	72	22003	0	5	8.5	10	NBR FKM EPDM	90 120 120	PU22006A + voltage PU22006AV + voltage PU22006AE + voltage
1 BSP	25	183	22003	0	5	7	10	NBR FKM EPDM	90 120 120	PU22008A + voltage PU22008AV + voltage PU22008AE + voltage
11/4 BSP	35	400	WPA2	0	7	10	10	NBR FKM EPDM Silicone	90 120 120 120	AD35N + voltage AD35V + voltage AD35E + voltage AD35S + voltage
11/2 BSP	35	400	WPA2	0	7	10	10	NBR FKM EPDM Silicone	90 120 120 120	AD40N + voltage AD40V + voltage AD40E + voltage AD40S + voltage
2 BSP	51	580	WPA2	0	5	7	10	NBR FKM EPDM Silicone	90 120 120 120	AD50N + voltage AD50V + voltage AD50E + voltage AD50S + voltage

OPTIONS

Connector PG9 – DIN 43650 A
IP65 Coil
Explosion Proof Coil: EExmIIT4 ATEX IIG IP65 T 130°C (Optional T6 T 85°C)
NPT
HTA2 Coil 200°C N Rated (WPA2 size only)

ELECTRICAL DATA

Voltage (-10% + 10%) Continuous duty 100%		Coil Size	Power Inrush	Power Holding	Insulation class	Enclosure	Electrical connections
~	24 - 48 - 110 - 240 - 380 (50 or 60 Hz)	22003	23VA	17VA	H 180°C	*IP 65 with connector*	3 spades DIN 43650A DIN 40050 VDE 0110
=	12 - 24 - 48 - 110 (DC)		15 Watts				
~	24 - 110 - 230 (50 or 60 Hz)	WPA2	40VA	24.2VA	F 155°C		
=	12 - 24 (DC)		18 Watts				

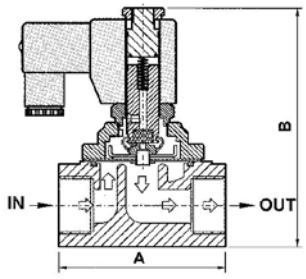
CONSTRUCTION

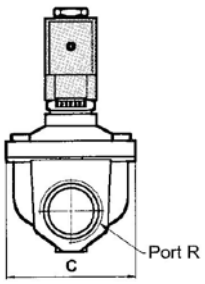
Body: Brass
Tube and internal parts: Stainless steel
Seals and gaskets: NBR (Optional EPDM or FKM)
Moulded coil: Resin

REPAIR KIT

Diaphragm seal	Valve part number + material
Coil	Coil size (22003 or WPA2) + voltage
Complete plunger + O' rings	KIT+ valve part number

OVERALL DIMENSIONS





Model	PU220 03	PU220 04A	PU220 06A	PU220 08A	AD35	AD40	AD50
Port R	3/8	½	¾	1	11/4	11/2	2
A	66.5	66.5	71.0	96.0	120	120	150
B	101.0	101.0	107.0	120.5	140	140	160
C	48.0	48.0	58.0	70.0	90	90	120
Kg	0.74	0.715	0.92	1.4	2.87	2.77	4.81

N/Open
Page 22

Dial Thermometer – Rigid Stem

Nominal Size
63mm • 100mm • 160mm • 250mm

Accuracy
± 1% FSD

Case Material
304 stainless steel.

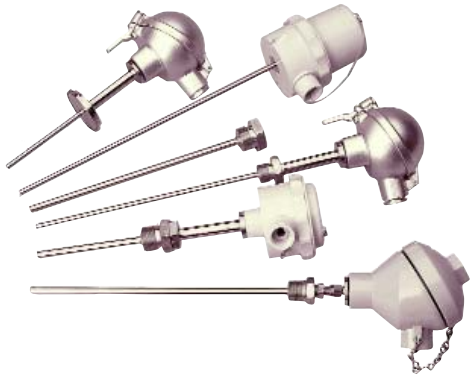
Stem Material
316 stainless steel.

Stem Length
From 100mm - 2 metres (depending on range)

Other Options
Dual Scale
Electrical Contacts, single or double
Max. indicating pointers
Glycerine Filled Heads
Anti-vibration Springs (Pyrometers)
Plastic Window
Various ranges available.
Various fittings available.
Non-toxic system available.
Bimetallic also available

TEMPERATURE PROBES & ACCESSORIES

- STANDARD OR CUSTOM PROBES
- RTD, TC OR THERMISTOR
- CHOICE OF TERMINATION STYLES
- TRANSMITTER OPTIONS
- FULL RANGE OF THERMOWELLS



INTRODUCTION

Status Instruments Ltd provide a complete range of sensors for temperature measurement. Our sensors include:

- PLATINIMUM RESISTANCE TEMPERATURE DETECTORS
- THERMOCOUPLES
- THERMISTORS

Our experience has enabled us to offer a comprehensive range of styles to provide the ideal sensor for every application and all manufactured under our ISO 9001 quality procedures. Complete sensor assemblies may be ordered by simply specifying the respective order code for each component required. Unless you specifically request that the components are to be supplied separately, we will assemble the components into a complete unit.

SENSOR SENSITIVITY

This may be defined as the change in sensor output relative to the temperature change it is detecting. Thermocouples produce a non-linear voltage output proportional to the temperature difference between the Hot or measuring junction and the Cold or reference junction, sensitivities vary typically from about (20 to 50) µV/°C. Pt100 Platinum resistance sensors change their resistance as a function of temperature. The most commonly used exhibit a 0.385 Ω/°C change. Thermistors provide a much higher change of resistance with temperature, but have restricted ranges and are very non-linear unless used over narrow temperature spans.

STANDARD TEMP. SENSORS (STS) SERIES

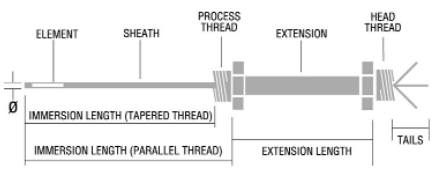
Temperature sensors can be supplied in a variety of styles and configurations, utilising thermocouple or thermistor elements as an alternative to Pt100 elements. If your exact requirements are not readily identified please contact our sales staff who will be pleased to discuss your application and provide a quotation.

(All dimensions in mm unless otherwise stated)

STS STYLE 1

Welded 316 ST/STEEL construction for screw fitting into process connections or STW series pockets (except style 2).

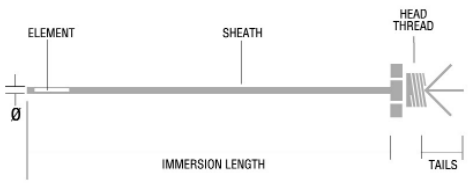
Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 75, 100, 150, 200, 250 immersion
Process Thread	½" BSP parallel
Extension	12.7 dia x 75 long
Head Thread	M24 x 1.5
Tails	3 wire 7/0.2Cu PTFE insulated, 150 long
Temp. Range	(-50 to 200) °C (at tip)



STS STYLE 2

All welded 316 ST/STEEL construction sensor for fitting into a compression gland.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 75, 100, 150, 200, 250 immersion
Head Thread	M24 x 1.5
Tails	3 wire 7/0.2 Cu PTFE insulated, 150 long
Temp. Range	(-50 to 200) °C (at tip).

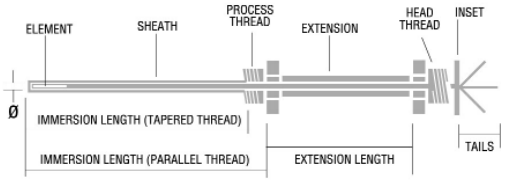


STATUS INSTRUMENTS

TEMPERATURE PROBES & ACCESSORIES

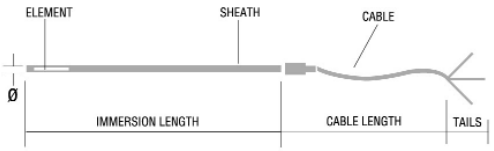
STS STYLE 3
All welded 316 ST/STEEL construction combined inset sensor and pocket. This sensor is designed to be used with a spring mounting kit fitted to the transmitter or terminal block to provide faster response times. The type of transmitter/terminal block and connecting head required must be specified when ordering.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	7.9 dia x 75, 100, 150, 200, 250 immersion
Process Thread	½" BSP parallel
Extension	12.7 dia x 75 long
Head Thread	M24 x 1.5
Tails	3 wire 7/0.2 Cu PTFE insulated, 150 long
Temp. Range	(-50 to 200) °C (at tip)



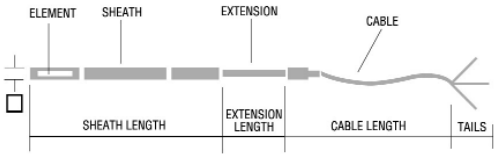
STS STYLE 4
Flying lead sensor with 316 ST/STEEL sheath for fitting into a compression gland.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 75, 100, 150, 200, 250 immersion
Cable	3 wire 7/0.2 Cu PTFE insulated, 1 m long
Temp. Range	(-50 to 200) °C (at tip)



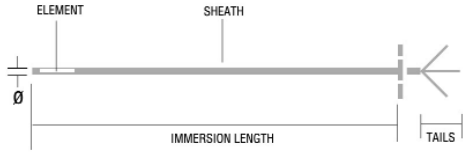
STS STYLE 5
Square aluminium block, strap-on-sensor with flying lead for clamping directly to pipes.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	¼ " square x 50 long
Extension	4.0 dia x 19 long
Cable	3 wire 7/0.2 Cu PTFE insulated, 1 m long
Temp Range	(-50 to 200) °C (at tip)



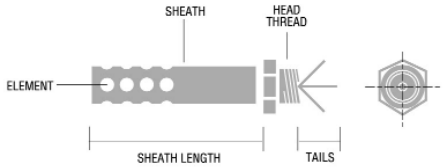
STS STYLE 6
316 ST/STEEL sensor suitable for energy management applications such as duct air and outside air temperature. This sensor can ONLY be used in conjunction with the SCH4 series connecting head.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 50, 150, 305 immersion
Flange	20.0 A/F Hex x 1.6 thick
Tails	3 wire 7/0.2Cu PTFE insulated, 75 long
Temp. Range	(-50 to 150) °C (at tip)



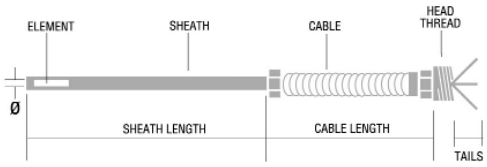
STS STYLE 7
All welded 316 ST/STEEL sensor with protective sheath suitable for energy management applications such as outside air temperature. This sensor can ONLY be used in conjunction with the SCH4 or DM500 (M16 entry) series connecting heads.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	12.7 dia x 50 long
Head Thread	M16 x 1.5
Tails	3 wire 7/0.2 Cu PTFE insulated, 75 long
Temp. Range	(-50 to 50) °C (at tip)



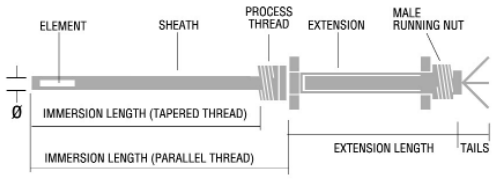
STS STYLE 8
Flying lead sensor with a 316 ST/STEEL sheath designed to be used as a direct replacement for mechanical thermometers in conjunction with the DM400 and DM500 series local indicators, see Instrument section.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	12.7 dia x 200 immersion length
Head Thread	M16 x 1.5
Cable	Flexible PVC sheath over cable 3 wire 7/0.2 Cu PTFE insulation, 1 m long
Temp. Range	(-50 to 200) °C (at tip)



STS STYLE 9
All welded 316 ST/STEEL sensor for screw fitting into process connections or STW series pockets. Designed to be used with the Status SCH4 connecting head or the DM400/500 local indicators it features a "running nut" head which enables the indicator to be orientated to the optimum viewing position.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 75,100,150,200,250 immersion
Process Thread	½" BSP parallel
Extension	9.5 dia x 75 long
Head Thread	M16 x 1.5
Tails	3 wire 7.0.2 Cu PTFE insulated, 150 long
Temp. Range	(-50 to 200) °C (at tip)

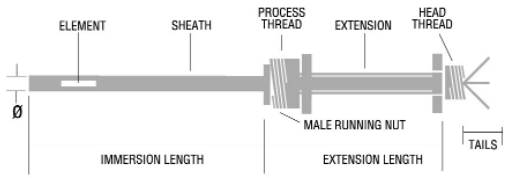


STATUS INSTRUMENTS

TEMPERATURE PROBES & ACCESSORIES

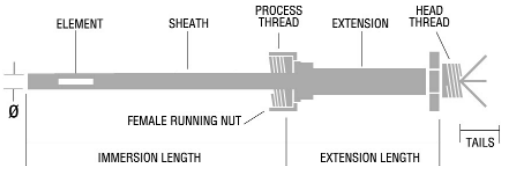
STS STYLE 10
All welded 316 ST/STEEL sensor for screw fitting into an internal thread hygienic type process connection.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 75,100,150,200,250 immersion
Process Thread	¾" BSP parallel male running nut
Extension	12.7 dia x 75 long
Head Thread	M24 x 1.5
Tails	3 wire 7.0.2 Cu PTFE insulated, 150 long
Temp. Range	(-50 to 200) °C (at tip)

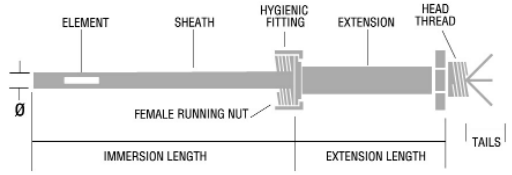


STS STYLE 11
All welded 316 ST/STEEL sensor for screw fitting into an external thread hygienic type process connection.

Element	Pt100 to BS.EN 60751 IEC751 Class B*
Sheath	6.0 dia x 75,100,150,200,250 immersion
Process Thread	¾" BSP parallel female running nut
Extension	12.7 dia x 75 long
Head Thread	M24 x 1.5
Tails	3 wire 7.0.2 Cu PTFE insulated, 150 long
Temp. Range	(-50 to 200) °C (at tip)



STS STYLE 12
All welded 316 ST/STEEL sensor for fitting to various hygienic process connections e.g. IDF, RJT, SMS patterns. Due to the wide variety of type and size of fittings, all sensors to this style are manufactured to customers specifications.



STW SERIES POCKETS/ THERMOWELLS

Some sensors can be fitted directly into the process by means of an integral process connection or by using an appropriate compression fitting. Other applications require a pocket or thermowell which is a permanent fitting into the process yet allows the sensor to be inserted or removed without interruption.

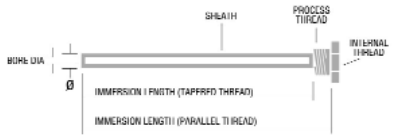
Pockets invariably increase the response time and obviously the thicker and heavier the pocket the more the response time will be increased. Some styles use spring loading which keeps the inset in permanent contact with the pocket. However, it is the radial clearance between the inset and pocket which has the greatest influence on response time.

For improved response the inset should be assembled into the pocket using thermally conductive grease. The following illustrations show the six most popular styles of pockets/thermowells.

NOTE: Pocket immersion lengths are relative to the probe lengths shown.

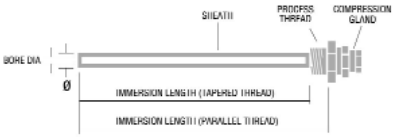
STW STYLE 1
All welded 316 ST/STEEL construction for screw fitting into process connection, suitable for STS sensors Style 1 and 9.

Sheath	7.9 dia x 71, 96, 146, 196, 246 immersion
Probe lengths	75, 100, 150, 200, 250
Process thread	3/4" BSP Parallel
Internal thread	1/2" BSP



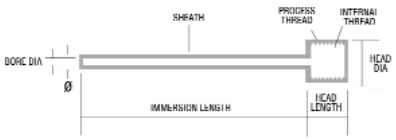
STW STYLE 2
All welded 316 ST/STEEL construction with brass compression gland, suitable for style 2, 4 & 6 sensors.

Sheath	7.9 dia x 23, 48, 98,148, 198 immersion
Probe lengths	75, 100, 150, 200, 250
Process thread	1/2" BSPT
Compression fitting	1/4" BSPT x 6.0 dia.



STW STYLE 3
All welded 316 ST/STEEL construction 'weld-in' pocket, suitable for Style 1,9 and Style 2, 4 & 6 sensors when used in conjunction with a compression gland.

Sheath	7.9 dia x 55, 80, 130, 180, 230 immersion
Probe lengths	75, 100, 150, 200, 250
Head	25.4 dia x 26 long typical
Internal Thread	1/2" BSP Parallel

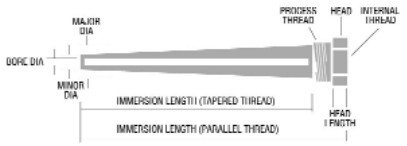


STATUS INSTRUMENTS

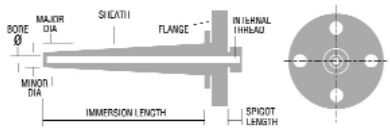
TEMPERATURE PROBES & ACCESSORIES

STW STYLE 4
Solid turned 316 ST/STEEL construction sensor for screw fitting into process connection, suitable for Style 1 sensors.

Parallel Sheath	13.4 dia x 57 & 82 immersion
Probe lengths	75 & 100
Tapered Sheath	13.4 to 19.0 dia x 132, 182, 232 immersion
Probe lengths	150, 200, 250
Process Thread	$^{3}/_{4}$" BSP Parallel
Internal Thread	$^{1}/_{2}$" BSP Parallel



STW STYLE 5
All welded 316 ST/STEEL construction for bolting to a flanged process connection. Due to the wide variety of, dimensional, material, pressure and pipe size requirements, all thermowells of this style are manufactured to customers specifications.



ORDER CODE

STS / STYLE / IMMERSION LENGTH

Styles	1 - 12	
Length	Styles 5, 6 & 7 only	- 050
	Not styles 5, 6 & 7	- 075
	Not styles 5 & 7	- 150
	Not styles 5, 6 & 7	- 200
	Not styles 5, 6 & 7	- 250
	Styles 6 & 12 only	- 305

EXAMPLE: STS2 / 075 - Style 2, 75 mm Immersion

*NOTE: Pt100 sensors are supplied as standard to Class B. They can be supplied to Class A or $^{1}/_{10}$ Class B on request. Sensors are also available with THERMOCOUPLE or THERMISTOR elements.

For special requirements please specify (where applicable) all details shown in diagrams, i.e. immersion length & diameter, extension length, element type, process thread, head thread, material & temperature range and in the case of hygienic sensors, the type and size of the fitting.

ORDER CODE

STS / STYLE / LENGTH

Styles	1 or 2	
Length		- 075
		- 100
		- 150

EXAMPLE: EXT1 /150 - Style 1, 150 mm long

For special requirements please specify, style, process thread, extension length, head thread and any other relevant details.

ORDER CODE

STW / STYLE / IMMERSION LENGTH

Styles	1 -6	
Immersion to suit std. sensor lengths		- 075
		- 100
		- 150
		- 200
		- 250
		- 305

Example: STW2/075 - Style 2 pocket to suit 75 mm standard probe.

Note: For Styles 5 & 6 or special requirements on other styles, please specify (where applicable) all details shown in diagrams.

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www.status.co.uk

STATUS INSTRUMENTS

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REV. 11-05-2009

brandoni S.p.A.
VALVOLE INDUSTRIALI

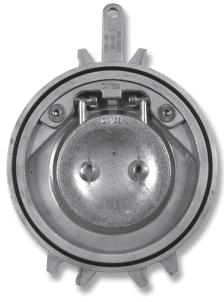
SINCERT
CERMET
REG. N. 067-A
UNI EN ISO 9001:2000

CE 1115

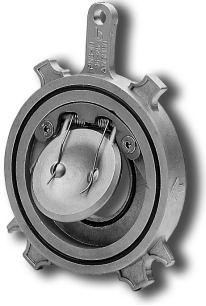
MANUALE D'USO E MANUTENZIONE
MAINTENANCE AND USE HANDBOOK

VALVOLE DI RITEGNO A CLAPET WAFER
WAFER CHECK VALVES

SERIE 06-M6 - *SERIES 06-M6*



Art. 06 senza molla - *without spring*



Art. M6 con molla - *with spring*

Conformi alla Direttiva Europea 97/23/CE (PED)
Complying with European Directive 97/23/CE

Per impianti idrici, condizionamento, riscaldamento, applicazioni industriali ed agricole, aria ompressa
For chemical, food and industrial applications

CONDIZIONI DI IMPIEGO
CONDITION OF USE

TEMPERATURA/*TEMPERATURE*	**min °C**	**max °C**
NBR	-10	100
VITON	-20	150
PTFE	-20	200

PRESSIONE/*PRESSURE*

Liquidi pericolosi - *Hazardous liquids* *	25 bar (DN32÷200) 16 bar (DN250÷300) 12 bar (DN350÷400)
Liquidi non pericolosi - *Non hazardous liquids* *	25 bar (DN32÷200) 16 bar (DN250÷400)
Gas non pericolosi - *Non hazardous gases* *	25 bar (DN32÷200) 16 bar (DN250÷400)

* Secondo/*according to*: 97/23/CE - 67/548/EEC

INSTALLAZIONE
INSTALLATION

-Maneggiare con cura.
-Montare nel senso corretto.
-Evitare colpi d'ariete che possono provocare danni irreparabili.
-In caso di utilizzo con fluidi a temperatura elevata prestare attenzione al rischio di ustioni al contatto.
-Non smontare o eseguire interventi di manutenzione con impianto in pressione.
-Utilizzare il foro "O" per l'imbragatura- sollevamento.

Montaggio: avvicinare le controflange lasciando un gioco G adeguato al montaggio della valvola. Posizionare un bullone in uno dei fori inferiori delle flange (1) in corrispondenza delle alette presenti sul lato della valvola e posizionare la valvola appoggiando sul bullone una delle alette (2). Montare i restante i bulloni e serrarli a croce.

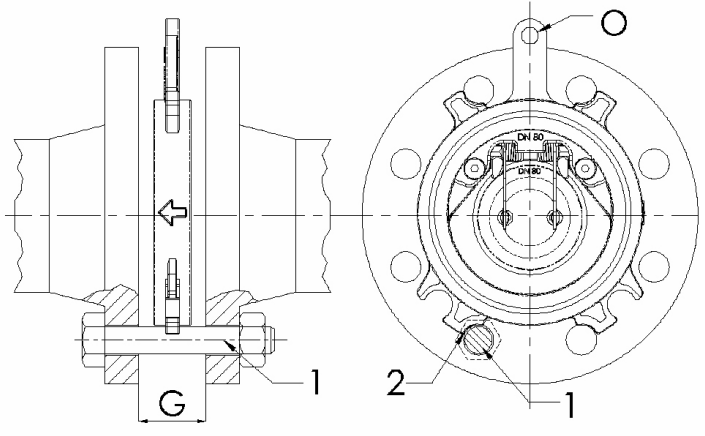
-Handle with care.
-Mount in the correct sense.
-Avoid pressure shock that can cause irreparable damages.
-Use hole "O" for the lifting.
-In case of use with hot fluids pay attention to the risk of scald.
-Do not dismantle or execute maintenance with pressure in the plant.

Mounting: draw near the flanges leaving a space G suitable for the mounting. Position a bolt in one of the inferior holes of the flange (1) corresponding to the tongue on the side of the valve and position the valve leaning one of the tongue the bolt.

STOCCAGGIO
STORING

Conservare in luogo asciutto
Keep in a dry and cold place

fig. 1



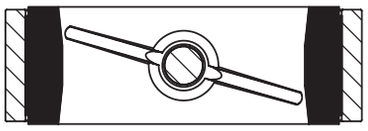


Fig. 1

Non è richiesta manutenzione (non effettuare interventi).
No maintenance required (do not service).
No requiere de ningún tipo de mantenimiento especial.

MANUTENZIONE
MAINTENANCE
MANTENIMIENTO

-Maneggiare con cura.
-Conservare in ambiente chiuso e asciutto.
-Durante lo stoccaggio il disco della valvola deve essere in posizione semiaperta (Fig 1).
-Evitare urti, specialmente sulle parti più deboli (manigliа, volantino, riduttori / attuatori).
-Non utilizzare le parti più deboli (manigliа, volantino) per sollevare la valvola.
-Handle with care. Keep in a dry place.
-During the storage the valve disc must be half open (Fig 1).
- Avoid, especially on the most softest parts (handles, wheels, reducers / actuators).
-Do not use the most softest parts (handle, wheel) to lift the valve.
- Manejar con cuidado.
- Mantener en lugar seco y fresco.
- Durante el almacenaje el disco debe de mantenerse en posición semidebierta. (Fig 1)
- Evitar golpes, especialmente sobre las parte más débiles (palanca, reductor, volante, actuador).
- No utilizar las partes más débiles (palanca, volante) para manipular- transportar la válvula.

STOCCAGGIO E TRASPORTO
STORING AND TRANSPORTING
ALMACENAJE Y TRANSPORTE

Evitare inclinazioni, torsioni e disallineamenti delle tubazioni che possono sollecitare la valvola una volta installata.
Non utilizzare le parti più deboli (manigliа, volantino) per sollevare la valvola
Il disco della valvola deve essere in posizione semiaperta (Fig. 1).
Piazzare la valvola tra due flange. Assicurarsi che, durante il posizionamento della valvola tra le flange, ci sia sufficiente spazio da non danneggiare la gomma. Non montare guarnizioni tra valvole e flangia (Fig. 2).
Evitare parti di tubi sporgenti e offlati poiché causano danni sulle superfici di gomma delle valvole (Fig. 3).
Non installare la valvola a farfalla a contatto diretto con una superficie in gomma (es. Giunti elastici); l'installazione ottimale richiede un contatto gomma su metallo (Fig. 4).
Non saldare le flange al tubo quando la valvola è già installata Raccoman- diamo di usare le flange del tipo a collarino (Fig 5A).
Quando si utilizzano flange piatte assicurarsi che siano saldate esattamente a filo della flangia (Fig. 5B).

INSTALLAZIONE
INSTALLATION
INSTALACIÓN

Prima di procedere a qualunque intervento di manutenzione o smontaggio: attendere il raffreddamento di tubazioni, valvola e fluido, scaricare la pressione e drenare linea e tubazioni in presenza di fluidi tossici, corrosivi, infiammabili o caustici.
Temperature oltre i 50°C e sotto gli 0° C possono a causare danni alle persone.
Before to proceed in any intervention of maintenance or disassembly: wait the cooling of the piping, the valve and the fluid, let the pressure escape and drain line and piping in the presence of poisonous, corrosive, inflammable and caustic fluids.
Temperature over 50°C and under 0° C can cause damages to people.
Antes de proceder a cualquier intervención de mantenimiento o desmon- taje: esperar el enfriamiento de la tubería, válvula y fluido, descargar la presión y drenar la linea de tubería con la presencia de fluidos tóxicos, corrosivos, inflamables o caústicos.
Temperaturas por encima de 50°C y por debajo de 0° C pueden causar daños personales.

AVVERTENZE
WARNING
ADVERTENCIA IMPORTANTE

CONDIZIONI DI IMPIEGO
CONDITION OF USE
CONDICIONES DE USO

TEMPERATURA *TEMPERATURE* TEMPERATURA	**min °C**	**max °C**
NBR	-10	80
EPDM	-10	120
VITON	-10	140
PTFE	-10	120

Pressione massima / *Maximum allowable pressure*		
Tipo fluido per / *Fluid type acc. to 97/23/CE - 67/548/EEC*	**Montaggio** / *Mounting*	
	tra flange / *between flange*	**fine linea** / *end of line*
G1 Gas pericolosi Hazardous gases	16 bar DN25-200 10 bar DN250-350 **NO DN400-1000**	10 bar DN25-100 **NO DN125-1000**
G2 Gas non pericolosi Non hazardous gases	16 bar DN25-300 10 bar DN350-500 6 bar DN600-800 5 bar DN900-1000	10 bar DN25-300 6 bar DN350-500 4 bar DN600-800 3 bar DN900-1000
L1 Liquidi pericolosi Hazardous liquids	16 bar DN25-400 10 bar DN450-1000	10 bar DN25-400 6 bar DN450-1000
L2 Liquidi non pericolosi Non hazardous liquids	16 bar DN25-400 10 bar DN450-1000	10 bar DN25-400 6 bar DN450-1000

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REV. 11-06-2009

brandoni S.p.A.
VALVOLE INDUSTRIALI

SINCERT CERMET REG. N. 007-A UNI EN ISO 9001:2000

MANUALE D'USO E MANUTENZIONE
MAINTENANCE AND USE HANDBOOK
INSTALACIÓN Y MANTENIMIENTO

CE 1115

VALVOLE A FARFALLA
BUTTERFLY VALVES
VÁLVULAS DE MARIPOSA

SERIE 09 - *SERIES 09* - SERIE 09

Art. J9 WFER Art. L9 LUG Art. F9

Conformi alla Direttiva Europea 97/23/CE (PED)
Complying with European Directive 97/23/CE
Conforme a 97/23/CE (PED)

Per impianti idrici, riscaldamento, condizionamento, antincendio e gas. Non adatta per vapore. In caso di utilizzi particolari richiedere al produttore la compatibilità con l'applicazione.
For water systems, heating, conditioning, fire prevention and gas. Not suitable for steam. For specific uses ask the manufacturer about product compatibility.
Para sistemas de agua, aire acondicionado, calefacción, anti-incendio y gas. Usos industriales, químicos y alimentación. Consultar listado de fluidos. No válido para vapores.

INSTALLAZIONE
INSTALLATION
INSTALACIÓN

Per le versioni Wafer centrare la valvola sugli occhielli. Serrare i bulloni a croce e progressivamente distribuendo uniformemente la pressione prima del contatto fra corpo e flangia (Fig. 6).
I colpi d'ariete possono causare danni e rotture. Raccomandiamo di evitarli o adottare giunti elastici per ridurne gli effetti.
Per la versione LUG, verificare che le viti d'installazione siano della giusta lunghezza, in modo da permettere la compressione completa della gomma manicotto "Liner".
La turbolenza del fluido può aumentare l'usura e ridurre la vita della valvola. Per ridurre il fenomeno si raccomanda di installare la valvola ad una distanza minima di almeno 1 volta il DN a monte e 2-3 DN a valle di raccordi e curve.
In posizione aperta la valvola presenta un ingombro maggiore dello scartamento nominale. Verificare che non vi siano interferenze con altri elementi della tubazione che possano provocare danni o malfunzionamenti (Fig. 7A). Nel caso installare un distanziale per consentire il corretto funzionamento (Fig. 7B).
Avoid inclinations, torques and non-alignments of the piping which could stress the valve once installed.
Do not use the softest parts (handle, wheel) to lift the valve.
The valve disc must be half open (Fig. 1).
Place the valve between two flanges. When placing valves between flanges, make sure that there is enough space not to damage rubber.
Do not install gaskets between valve and flanges. (Fig. 2).
Protruded sharp ends shall be strictly avoided as it causes damage on/off rubber seating surfaces of the butterfly valve (Fig. 3).
Do not install the butterfly valve on a rubber to rubber surface (e.g. expansion joints); the perfect installation shall be on rubber to metal surface (Fig. 4).
Do not place joints between flange and body - We recommend the use of flanges of the WELDING NECK type (Fig 5A).
When using flat flanges make sure the pipe is welded exactly edgewise with the flange (Fig. 5B).
Centre the valve by bolting the body locator first (Wafer type). Tighten bolts and nuts in progressive and crosswise with bolting pressure evenly distributed until the contact between valve body and flange faces (Fig. 6).
Pressure shocks can cause damages and breakage. We recommend to avoid them if possible or adopt expansion joints that could reduce pressure shocks' effects.
For the LUG type, please verify that the installation screws are of the right longness, in order to allow the complete compression of the liner rubber.
The fluid turbulence may increase the wear and reduce the valve endurance. In order to reduce the instance it is recommended to install the valve at a distance equal to at least 1 time the DN upstream and 2-3 DN downstream of fittings and bends.
In open position the valve shows a greater space occupied than the nominal face to face. You need to verify that there arenít interferences with other elements of the piping which could cause damages or malfunctions (Fig. 7A). In this case you need to set up a spacer to permit the right functioning (Fig. 7B).
Evitare inclinaciones, torsiones o disalinamientos de la tubería que puedan presionar a la valvula una vez instalada.
No utilizar las partes débiles (palanca, volante) para manipular-transporta la válvula.
El disco debe estar en posición semi-abierta (Fig. 1).
Situar la válvula entre dos bridas. Estar seguro que durante el posicionamiento de la válvula hay
suficiente espacio entre las bridas para evitar daños en el anillo. No instalar otros elementos o guarniciones entre válvula y bridas. (Fig. 2).
Los tubos pueden causar daños en la superficie del anillo (Fig. 3).
No instalar la válvula en contacto directo con una superficie de goma (por ejemplo: juntas de expansión). La instalación requiere un contacto metal-goma. (Fig. 4).
No soldar la brida al tubo si la válvula está ya instalada. Se recomienda usar bridas tipo WELDING NECK (Fig 5A).
Con bridas planas, asegurarse que la brida está soldada hasta el final de la misma (Fig. 5B).
Para la versión wafer centrar la válvula sobre las orejetas. Los bulones deben ser apretados en cruz distribuyendo uniformemente la presión después del contacto entre el cuerpo y las bridas (Fig. 6).
Los golpes de ariete pueden causar serios daños. Para evitarlos, se recomienda el uso de juntas de expansión para reducir los efectos del mismo.
Para la verión LUG, verificar que la tornillería utilizada tenga la largura justa, de modo que se permita la total compresión del anillo de cierre.
La turbolencia del fluido podría aumentar el desgaste y limitar la vida de la válvula. Para reducir el fenómeno se recomienda instalar la válvula a una distancia de una vez de DN, por lo menos, aguas arriba y de 2-3 DN aguas abajo de empalmes y curvas.
Al estar abierta la válvula ocupa un espacio mayor que el de la anchura nominal. Comprueben que no hayan interferencias con otros elementos de la tubería que pudieran provocar daños o funcionamientos defectuosos (Fig. 7A). En tal caso habrá que instalar un distanciador para permitir un fucinamiento correcto (Fig. 7B).

Fig. 2

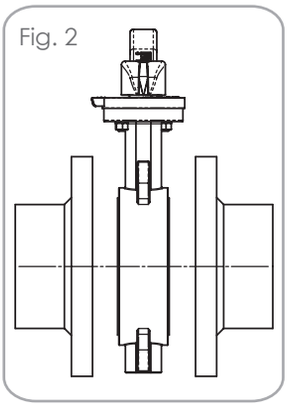


Fig. 4

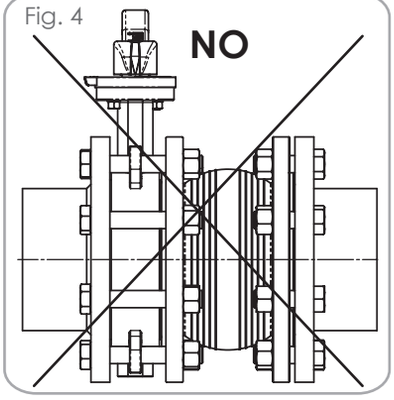


Fig. 3

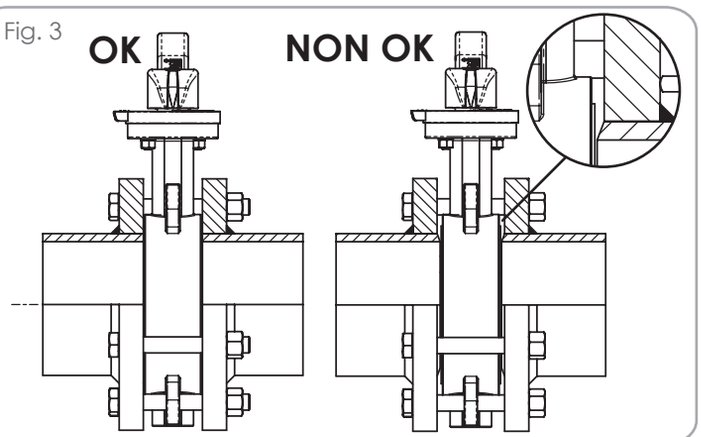


Fig. 5

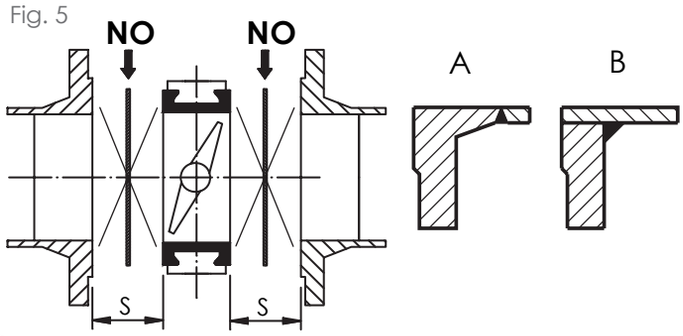


Fig. 6

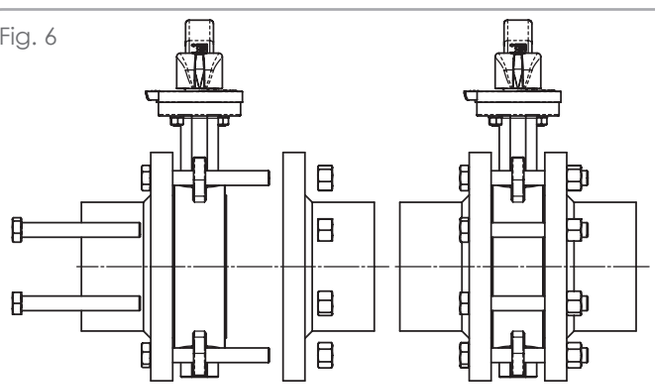
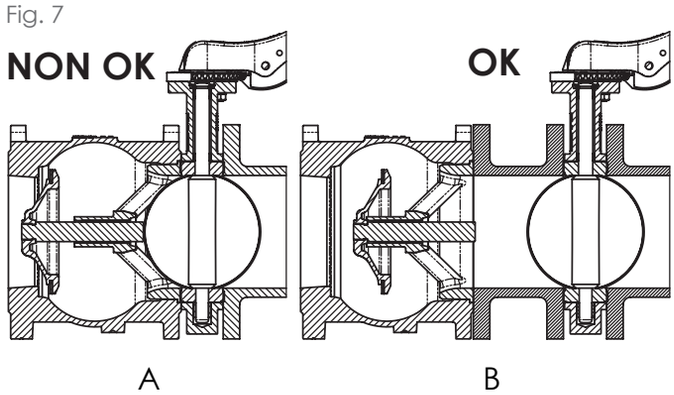


Fig. 7



LV 9912

Lugged Tapped Butterfly Valve - EPDM Liner

WRAS

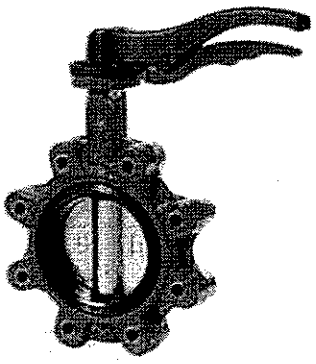
Epoxy Coated Ductile Iron Body, Stainless Steel 316 Disc, EPDM Liner, Locking Lever upto 12", Gearbox Operation Available for All Sizes, ISO 5211 Top Works for Direct Mount of Electric/Pneumatic Actuator, complies with 97/23/CE (PED) Directive CE 1115.

1½" to 12" to fit PN16, Other drillings available
14" to 24" to fit PN16 Flanges

* ALSO OFFER ANSI 150, SAME DIMENSION OF VALVE AS LISTED FOR PN16 *

Pressure/Temperature		
Pressure	1½" to 12"	PN16
	14" to 24"	PN10
Temperature	-10°C to 120°C	

Material List	
Body	Epoxy Coated Ductile Iron
Disc	Stainless Steel
Liner	EPDM
Shaft	Stainless Steel
Bushing	PTFE
Washer	Galvanized Carbon Steel
Circlip ISO 3075	Steel
O-Ring	Viton
Lever	Aluminium upto 6" Ductile Iron 8" and above
Bolts	Galvanized Carbon Steel

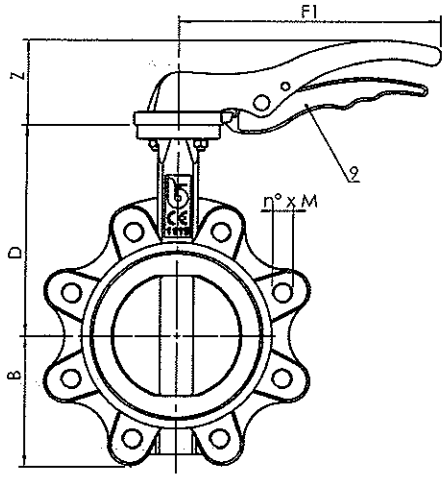


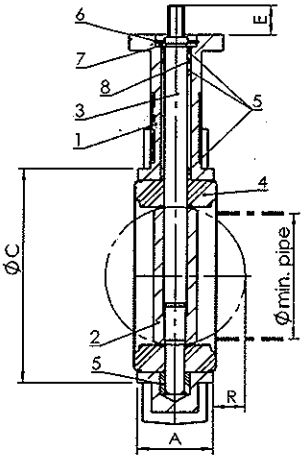
Operating Torque Figures

DP (Bar)	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
3	2.9	4.7	7.8	11.3	17	23	33	48	68	120	189	290	298	481	930	1250	2270
6	3.1	5.1	8.4	12	18	25	36	54	78	134	212	316	347	551	980	1350	2500
10	3.3	5.4	8.8	13	20	26	40	61	88	148	234	342	396	396	1200	1500	2700
16	3.4	5.7	9.2	13	21	28	44	68	99	162	257	367	-	-	-	-	-

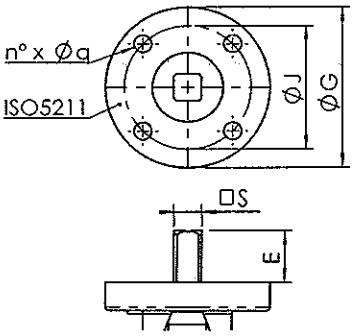
Continued on Page 2

1½" to 10" Lever Operated





Dimensions									
Size	A	ØC	D	B	F1	Z	R	Ø mm pipe	n° x M
1½"	33	82	116	63	170	50	5	27	4 x M16
2"	43	89	126	62	170	50	5	31	4 x M16
2½"	46	102	136	69	170	50	9	45	4 x M16
3"	46	118	150	90	206	69	17	65	8 x M16
4"	52	150	170	106	206	69	26	90	8 x M16
5"	56	174	180	119	285	90	34	110	8 x M16
6"	56	205	200	131	285	90	50	146	8 x M20
8"	60	260	230	166	400	72	71	194	12 x M20
10"	68	318	266	202	530	72	91	241	12 x M24



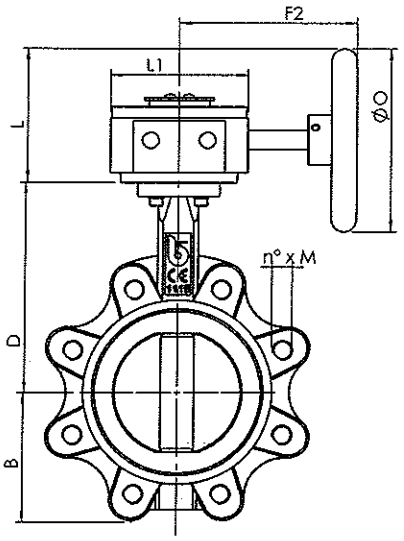
Dimensions						
Size	ISO	ØG	ØJ	n° x Øq	□S	E
1½"	F05	65	50	4 x 7	9	21
2"	F05	65	50	4 x 7	9	21
2½"	F05	65	50	4 x 7	9	21
3"	F05	65	50	4 x 7	11	21
4"	F05	65	50	4 x 7	11	21
5"	F07	90	70	4 x 9	14	27
6"	F07	90	70	4 x 9	14	27
8"	F10	125	102	4 x 11	17	27
10"	F12	150	125	4 x 13	27	27

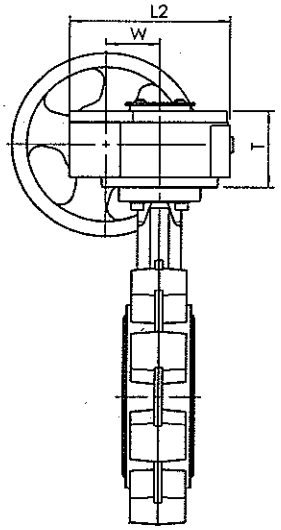
Continued on Page 3

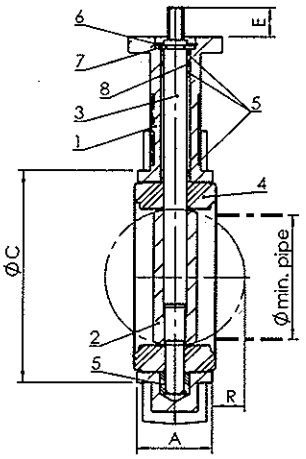
Lugged, Flanged Butterfly Valve - EPDM Liner

WRAS

1½" to 10" Gearbox Operated

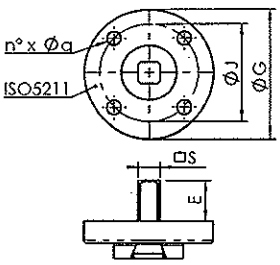






Dimensions

Size	A	ØC	D	B	F2	L	T	L1	L2	W	ØO	R	Ø min pipe	n° x M
1½"	33	82	116	63	130	102.5	65	110	130	45	150	5	27	4 x M16
2"	43	89	126	62	130	102.5	65	110	130	45	150	5	31	4 x M16
2½"	46	102	136	69	130	102.5	65	110	130	45	150	9	45	4 x M16
3"	46	118	150	90	130	102.5	65	110	130	45	150	17	65	8 x M16
4"	52	150	170	106	130	102.5	65	110	130	45	150	26	90	8 x M16
5"	56	174	180	119	130	102.5	65	110	130	45	150	34	110	8 x M16
6"	56	205	200	131	130	102.5	65	110	130	45	150	50	146	8 x M20
8"	60	260	230	166	235	190	78	155	176	63	300	71	194	12 x M20
10"	68	318	266	202	226	190	80	170	195	81	300	91	241	24 x M20

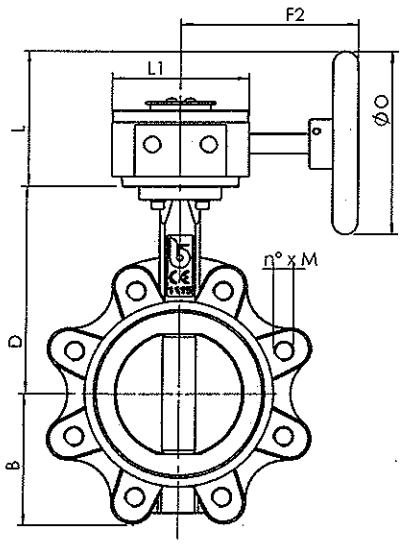


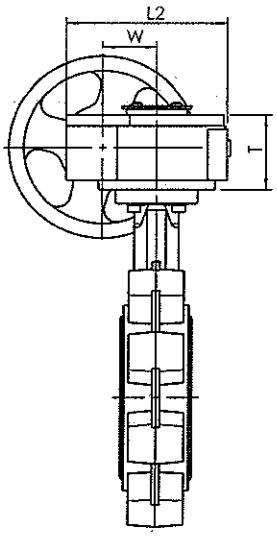
Dimensions

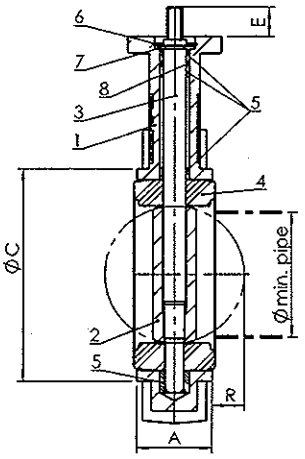
Size	ISO	ØG	ØJ	n° x Øa	□S	E
1½"	F05	65	50	4 x 7	9	21
2"	F05	65	50	4 x 7	9	21
2½"	F05	65	50	4 x 7	9	21
3"	F05	65	50	4 x 7	11	21
4"	F05	65	50	4 x 7	11	21
5"	F07	90	70	4 x 9	14	27
6"	F07	90	70	4 x 9	14	27
8"	F10	125	102	4 x 11	17	27
10"	F12	150	125	4 x 13	27	27

Continued on Page 4

12" to 24" Gearbox Operated

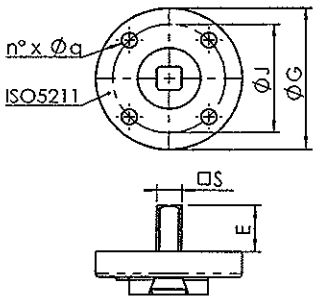




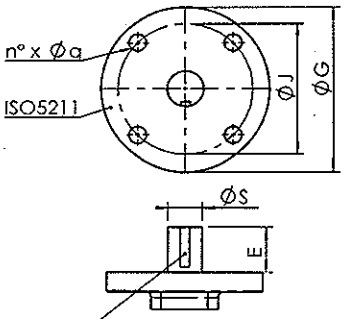


Dimensions

Size	A	ØC	D	B	F2	L	T	L1	L2	W	ØO	R	Ø min pipe	n° x M
12"	78	376	292	235	226	190	80	170	195	81	300	112	291	12 x M24
14"	78	406	335	257	226	183	80	151	188	80	285	128	324	16 x M24
16"	102	471	360	292	226	183	80	151	188	80	285	144	379	16 x M24
18"	114	539	422	318	216	183	80	151	188	80	285	163	428	20 x M24
20"	127	594	480	355	256	311	125	214	275	168	285	182	475	20 x M24
24"	154	695	562	444	285	386	136	262	324	293	385	219	573	20 x M27



DN25-300



DN350-600

Parallel key ISO R773 / DIN6885A

Dimensions

Size	ISO	ØG	Øi	n° x Øa	□S	E	ØS
12"	F12	150	125	4 x 13	27	27	
14"	F12	150	125	4 x 13		45	31.6
16"	F14	175	140	4 x 18		51.2	33.15
18"	F14	175	140	4 x 18		51.2	38
20"	F14	175	140	4 x 18		64.2	41.15
24"	F16	210	165	4 x 22		70.2	50.65

LV 9911

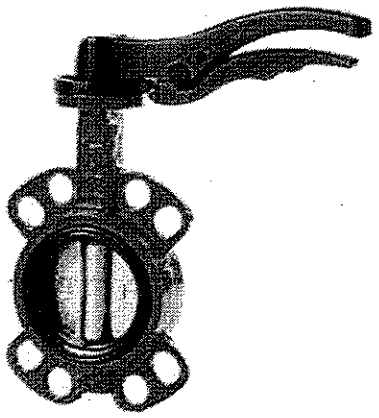
Lug Flanged Wafer Pattern Butterfly Valve - EPDM Liner

WRAS

Epoxy Coated Ductile Iron Body, Stainless Steel 316 Disc, EPDM Liner, Locking Lever upto 12", Gearbox Operation Available for All Sizes, ISO 5211 Top Works for Direct Mount of Electric/Pneumatic Actuator, complies with 97/23/CE (PED) Directive CE 1115.

1½" to 16" to fit PN6/10/16, ANSI 150, Table D & E Flanges
18 to 24" to fit PN16 Flanges

Pressure/Temperature		
Pressure	1½" to 12"	PN16
	14" to 24"	PN10
Temperature	-10°C to 120°C	



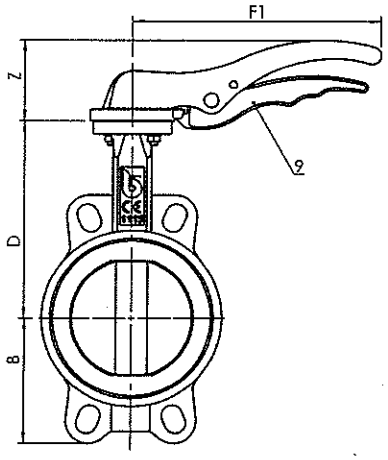
Material List	
Body	Epoxy Coated Ductile Iron
Disc	Stainless Steel
Liner	EPDM
Shaft	Stainless Steel
Bushing	PTFE
Washer	Galvanized Carbon Steel
Circlip ISO 3075	Steel
O-Ring	Viton
Lever	Aluminium upto 6" Ductile Iron 8" and above
Bolts	Galvanized Carbon Steel

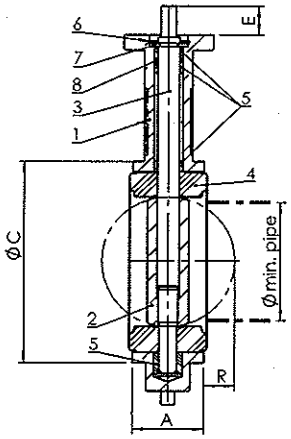
Operating Torque Figures

DP (Bar)	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
3	2.9	4.7	7.8	11.3	17	23	33	48	68	120	189	290	298	481	930	1250	2270
6	3.1	5.1	8.4	12	18	25	36	54	78	134	212	316	347	551	980	1350	2500
10	3.3	5.4	8.8	13	20	26	40	61	88	148	234	342	396	396	1200	1500	2700
16	3.4	5.7	9.2	13	21	28	44	68	99	162	257	367	-	-	-	-	-

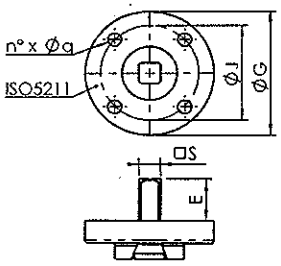
Continued on Page 2

1½″ to 10″ Lever Operated





Dimensions								
Size	A	ØC	D	B	F1	Z	R	Ø min pipe
1½″	33	82	116	63	170	50	5	27
2″	43	89	126	62	170	50	5	31
2½″	46	102	136	69	170	50	9	45
3″	46	118	150	90	206	69	17	65
4″	52	150	170	106	206	69	26	90
5″	56	174	180	119	285	90	34	110
6″	56	205	200	131	285	90	50	146
8″	60	260	230	166	400	72	71	194
10″	68	318	266	202	530	72	91	241



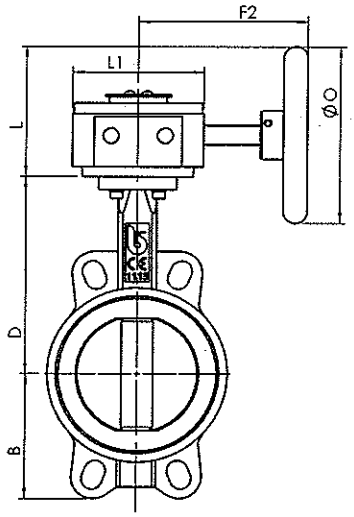
Dimensions						
Size	ISO	ØG	ØJ	n° x Ød	□S	E
1½″	F05	65	50	4 x 7	9	21
2″	F05	65	50	4 x 7	9	21
2½″	F05	65	50	4 x 7	9	21
3″	F05	65	50	4 x 7	11	21
4″	F05	65	50	4 x 7	11	21
5″	F07	90	70	4 x 9	14	27
6″	F07	90	70	4 x 9	14	27
8″	F10	125	102	4 x 11	17	27
10″	F12	150	125	4 x 13	27	27

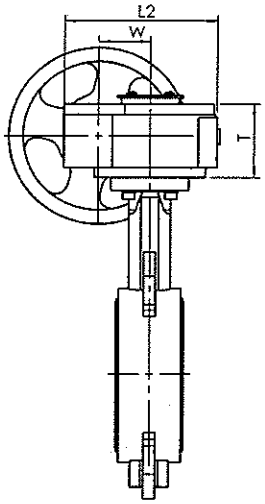
Continued on Page 3

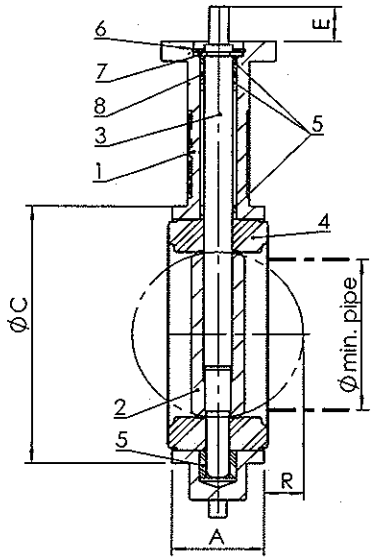
Double Flanged Wafer Pattern Butterfly Valve - EPDM Liner

WRAS

1½" to 10" Gearbox Operated

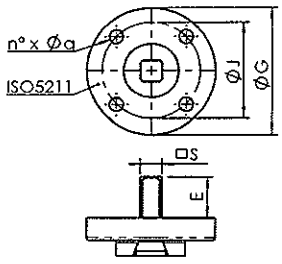






Dimensions

Size	A	ØC	D	B	F2	L	T	L1	L2	W	ØO	R	Ø min pipe
1½"	33	82	116	63	170	102.5	65	110	130	45	150	5	27
2"	43	89	126	62	170	102.5	65	110	130	45	150	5	31
2½"	46	102	136	69	170	102.5	65	110	130	45	150	9	45
3"	46	118	150	90	170	102.5	65	110	130	45	150	17	65
4"	52	150	170	106	170	102.5	65	110	130	45	150	26	90
5"	56	174	180	119	170	102.5	65	110	130	45	150	34	110
6"	56	205	200	131	170	102.5	65	110	130	45	150	50	146
8"	60	260	230	166	235	190	78	155	176	63	300	71	194
10"	68	318	266	202	226	190	80	170	195	81	300	91	241

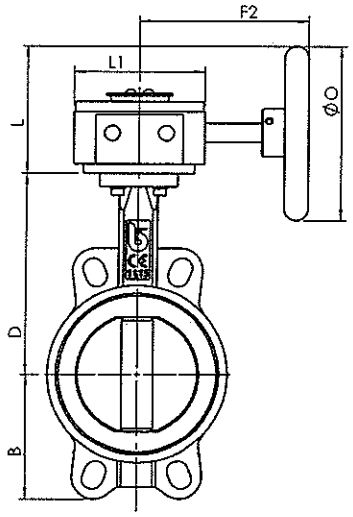


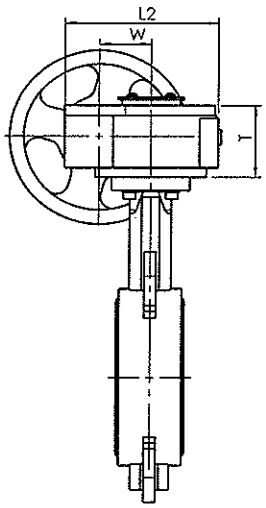
Dimensions

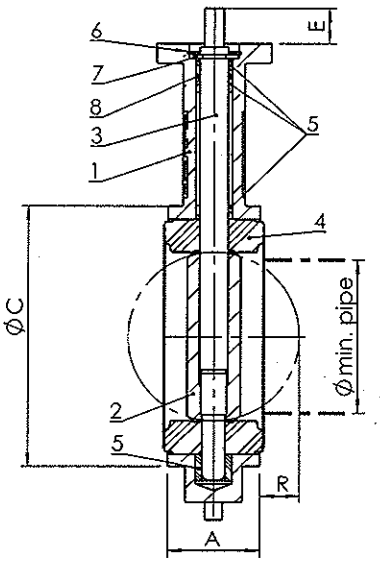
Size	ISO	ØG	Øj	n° x Øq	□S	E
1½"	F05	65	50	4 x 7	9	21
2"	F05	65	50	4 x 7	9	21
2½"	F05	65	50	4 x 7	9	21
3"	F05	65	50	4 x 7	11	21
4"	F05	65	50	4 x 7	11	21
5"	F07	90	70	4 x 9	14	27
6"	F07	90	70	4 x 9	14	27
8"	F10	125	102	4 x 11	17	27
10"	F12	150	125	4 x 13	27	27

Continued on Page 4

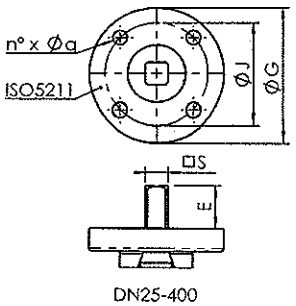
12" to 24" Gearbox Operated



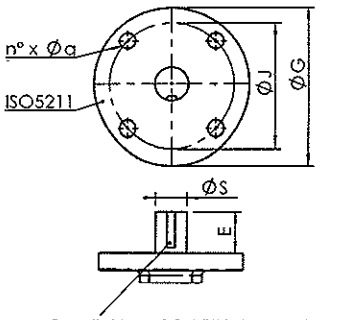




Dimensions													
Size	A	ØC	D	B	F2	L	T	L1	L2	W	ØO	R	Ø min pipe
12"	78	376	292	235	226	190	80	170	195	81	300	112	291
14"	78	406	335	257	226	190	80	170	195	81	300	128	324
16"	102	471	360	292	226	190	80	170	195	81	300	144	379
18"	114	539	422	318	216	183	80	151	188	80	285	163	428
20"	127	594	480	355	256	311	125	214	275	168	285	182	475
24"	154	695	562	444	285	386	136	262	324	293	385	219	573



DN25-400



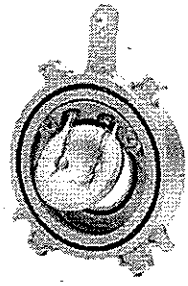
Parallel key ISO R773 / DIN6885A

DN450-600

Dimensions							
Size	ISO	ØG	Øj	n x Øq	□S	E	ØS
12"	F12	150	125	4 x 13	27	27	
14"	F12	150	125	4 x 13	27	27	
16"	F12	150	125	4 x 13	27	27	
18"	F14	175	140	4 x 18		51.2	38
20"	F14	175	140	4 x 18		64.2	41.15
24"	F16	210	165	4 x 22		70.2	50.65

Stainless Steel Spring Check Valve (Wafer Type)

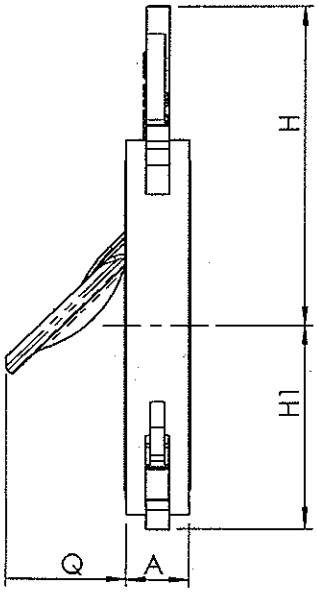
To fit PN6/10/16/25, ANSI 150 Flanges, Stainless Steel Body, Disc & Spring

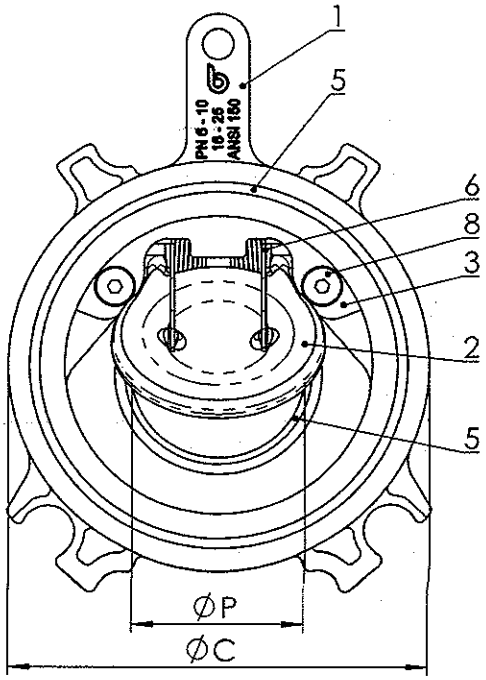


Pressure/Temperature Ratings		
Pressure	PN25	
Temperature	NBR	-20°C to 100°C
	Viton	-20°C to 150°C
	PTFE	-20°C to 200°C

Dimensions							
DN	P	A	C	H	H1	Q	Kg
32	20	16	77	83.5	45	18	0.43
40	26.5	16	86.5	88.75	49	21	0.54
50	33	18.5	99	98.5	53	30	0.82
65	43	18.5	118	107	63	44	1.25
80	53	22	134	115	73	56	1.83
100	75	23.5	154	131	92	70	2.42
125	96	29	184	138	119	80	3.1
150	118	34.5	208	137	149	96	5.3
200	164	36	264	169	167	125	8.5

Material List		
1.	Body	ASTM A351 gr. CF8M
2.	Disc	ASTM A351 gr. CF8M
3.	Plate	ASTM A351 gr. CF8M
5.	O-ring	NBR/Viton/PTFE
6.	Spring	AISI 302
8.	Screw	Stainless Steel A2

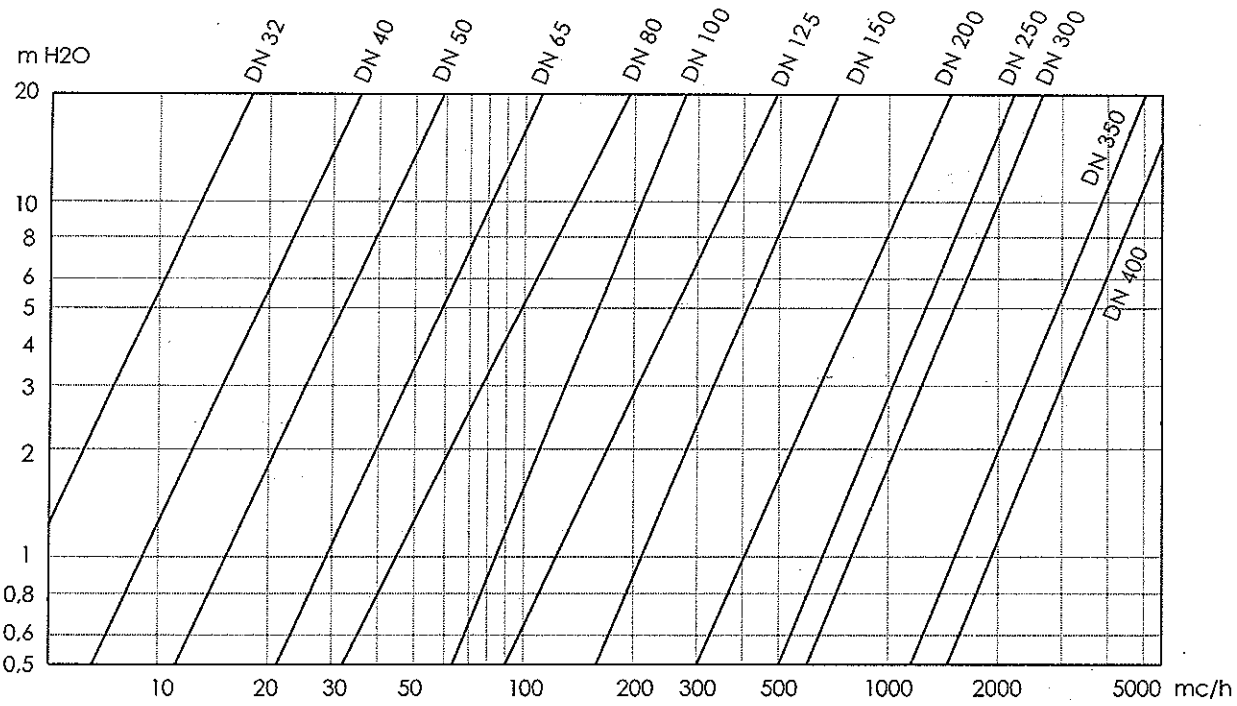




Stainless Steel Spring Check Valve (Wafer Type)

Head loss

Fluid: water (1m H2O = 0,098bar)



Kv									
DN	32	40	50	65	80	100	125	150	200
Kv	13	24	41	75	140	208	341	525	1093

Cracking Pressure (mmH2O)								(1m H2O = 0,098bar)	
DN	32	40	50	65	80	100	125	150	200
With Spring ↑	321	210	194	198	196	174	226	230	244
With Spring →	242	138	126	130	120	106	126	130	136
Without Spring ↑	80	73	70	70	76	68	100	100	110