

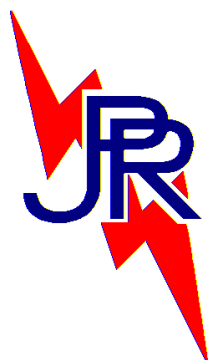
# QUEENSLAND URBAN UTILITIES

SP333  
SEWAGE PUMP STATION UPGRADE  
ASHBURN ROAD,  
EBBWVALE

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## ELECTRICAL CONTROL PANEL OPERATION AND MAINTENANCE MANUAL

Developed by:



J & P RICHARDSON INDUSTRIES  
CAMPBELL AVENUE  
WACOL QLD 4076

ABN 23 001 952 325  
ACN 001 952 325

Ph. (07) 3271 2911  
Fax. (07) 3271 3623

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  - 1.1 Operating Instructions
- 2 Pumps
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- 8 Service & Maintenance

# **1 INTRODUCTION**

These operating instructions cover the sewage pump station, Ashburn Road, Ebbwvale, SP333 electrical equipment supplied by J & P Richardson Industries Pty Ltd in 2012.

## **1.1 Operating Instructions**

Normal operation of the pumping station is in the automatic mode with control by means of a Master Programmable Logic Controller (PLC), which receives level signals from the Level Measurement System in the wet well/Electronic Level Relays.

Manual operation control of the station is available by means of selector switches on the motor control switchboard.

## 2 PUMPS

**SUPPLIER:** Weir Minerals Australia Ltd  
L4 14 Mt Gravatt-Capalaba Rd  
Upper Mt Gravatt, QLD, 4122

Ph: (07) 3347 1400  
Fax: (07) 3347 1499

**MODEL:** HIDROSTAL F04K-S03R + FE030X4-XSEK1 + NC1B4E-20

**kW RATING:** 22kW

**MOTOR SPEED:** 1482rpm

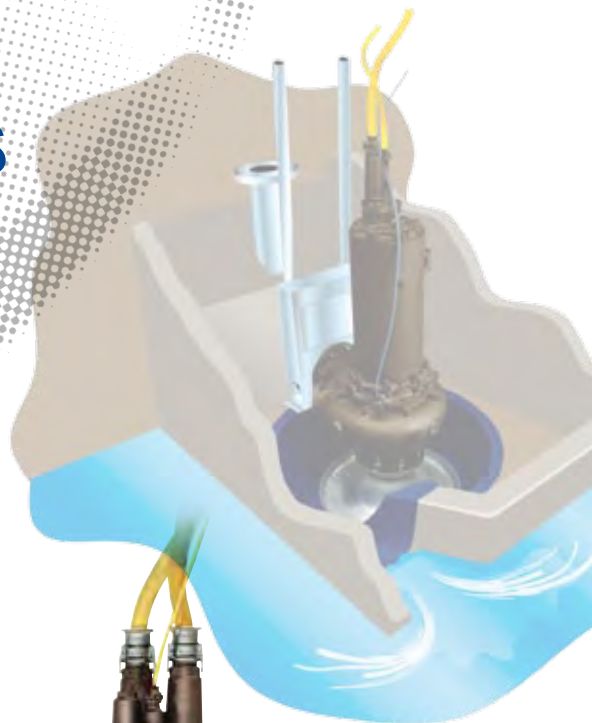
**FULL LOAD CURRENT:** 43A

**VOLTAGE:** 400V





# Submersible and Immersible Pumps *for sewage & sludges*



A range of quality pumps featuring the unique Hidrostat Screw Centrifugal Impeller. Models are available for fully, partially submerged or dry installation and designed for:

- SOLIDS HANDLING
- VISCOUS PUMPING
- DELICATE HANDLING

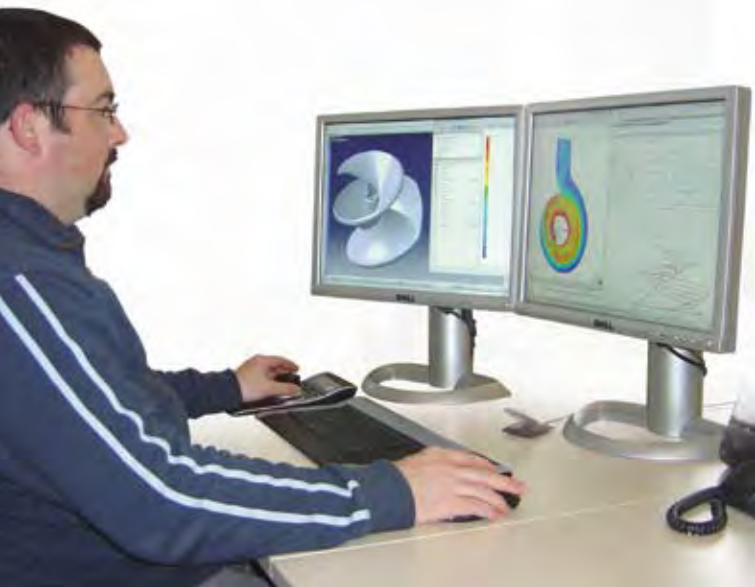


# HIDROSTAL PUMPS...



**This brochure provides an overview of Hidrostal's range of submersible and immersible pumps. The pumps are deployed in many industries worldwide in an extensive range of applications. Based on Hidrostal's unique screw centrifugal impeller technology the pumps also incorporate many other features exclusive to Hidrostal products.**

**Detailed product selection and installation advice can be obtained from Hidrostal's Engineers, or approved agents and distributors.**



## DESIGN PHILOSOPHY

Hidrostal's principles are to combine innovation with proven pump design, produce value for money products and to minimise life cycle costs (LCC).

Key design objectives are:

- Provide a range of solutions for many diverse applications
- Provide full flexibility by cross-generation compatibility. Sub-assemblies such as hydraulic ends, bearing frames and motors can be replaced by units of later technology.
- Flexibility to upgrade pump specifications to meet changing requirements.

## LIFE CYCLE COSTING (LCC)

The Water & Waste Industry acknowledges that initial purchase price of a typical pump system represents only some 5% of a total 15-year LCC, which includes operation and maintenance costs.

Hidrostal asserts that unseen significant costs can potentially be incurred due to lost efficiency, unscheduled maintenance caused by full or partial blocking and not being 'fit for purpose'.

All Hidrostal pumps have exceptional solids handling capability and operating efficiency provided by the unique screw centrifugal impeller. The capability to handle sewage sludges up to 8% DSC and unscreened sewage without blockages makes Hidrostal pumps truly 'fit for purpose'.

Hidrostal equipment is easy to maintain. No special tools are required for dismantling, repair and re-assembly. Routine adjustments such as running clearances are simple.

## INNOVATION

From the time Hidrostal designed the screw centrifugal impeller, innovation has been a key company culture.

Hidrostal submersible/immersible pumps include:

- Screw centrifugal impeller in all pumps
- Immersible motor with dry running or submerged capability. Oil cooling precludes issues with using pumped liquid as coolant.
- Cable entry assemblies seal motor avoiding leakage from inside or outside the cable.
- Variable pump output using fixed speed motor by prerotating liquids pre-pumping (see the Prerostal section on back page of brochure).
- Two speed submersible/immersible motors
- Externally adjustable high chrome liners resist wear and maintain optimum pump efficiency.
- Optional flywheel in motor enclosure reduces effects of pipeline surges which can lead to pipeline damage.



*A typical flywheel installation, pumping raw sewage. 4 x Immersible pumps with 175KW motors and a duty of 300l/s at 35m head per pump.*

**The correct selection of pump for the design of the pump station is critical to Life Cycle Costing [LCC]. Hidrostal's Engineers, and their approved agents and distributors, can provide detailed information on selection and installation.**

# UNIQUE & DEPENDABLE

## THE SCREW CENTRIFUGAL IMPELLER

The heart of all Hidrostal pumps.

Extremely versatile in its applications, the impeller provides efficient handling of a range of liquids, often highly abrasive or corrosive in nature. It is ideal for:

- Solids Handling
- Pumping Viscous Sludges
- Handling Delicate or Low Shear Products

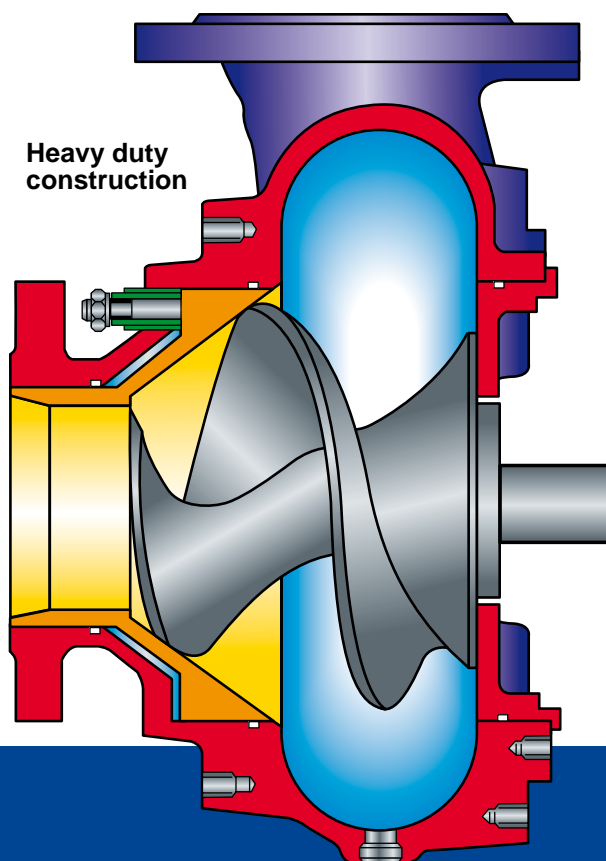
Unique to all Hidrostal pumps is the ability to handle the above in combination.

Many applications too arduous for other types of centrifugal pumps can usually be handled by the Hidrostal screw centrifugal impeller. The impeller comprises a single spiral vane, with large open passages, which makes a long slow turn from the axial inlet to the radial outlet. The design provides optimum hydraulic performance giving:

- High efficiencies
- Steep and stable hydraulic curve
- Non-overloading power curve
- Low NPSH
- Non-clog pumping

### Typical applications:

- Industrial effluents
- Raw unscreened sewage
- Viscous sludges
- Return activated sludges
- Drainage/Stormwater
- Process Waste



## PUMP CONSTRUCTION

The standard materials of construction are grey cast iron with a nodular iron impeller. The pump shaft is stainless steel. Alternative materials are available for increased wear and corrosion resistance.

## MATERIALS

Code	Pump casing	Impeller	Liner/suction cover	Motor casing cover
1	CI	NI	CI	CI
2	CI	NI	HH	CI
3	CI	CM	HH	CI
4	CI	HH	HH	CI
5	SS	SS	SS	SS or CI
6	DS	DS	DS	DS or CI

CI = Cast Iron

HH = Hidro Hard

SS = 316 St. Steel

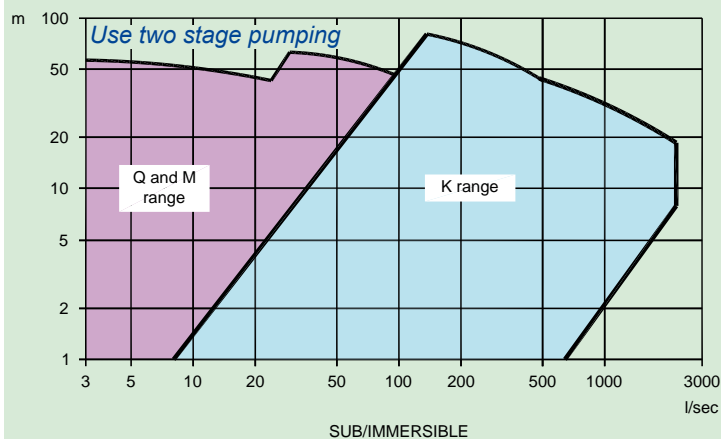
NI = Nodular Iron

CM = Cr. Mo Steel

DS = Duplex St. Steel

The above combinations are standard build, but components can be interchanged and other materials are available to suit specific applications.

## PERFORMANCE



## TWO STAGE PUMPING

### First stage:

Submersible/immersible/end suction

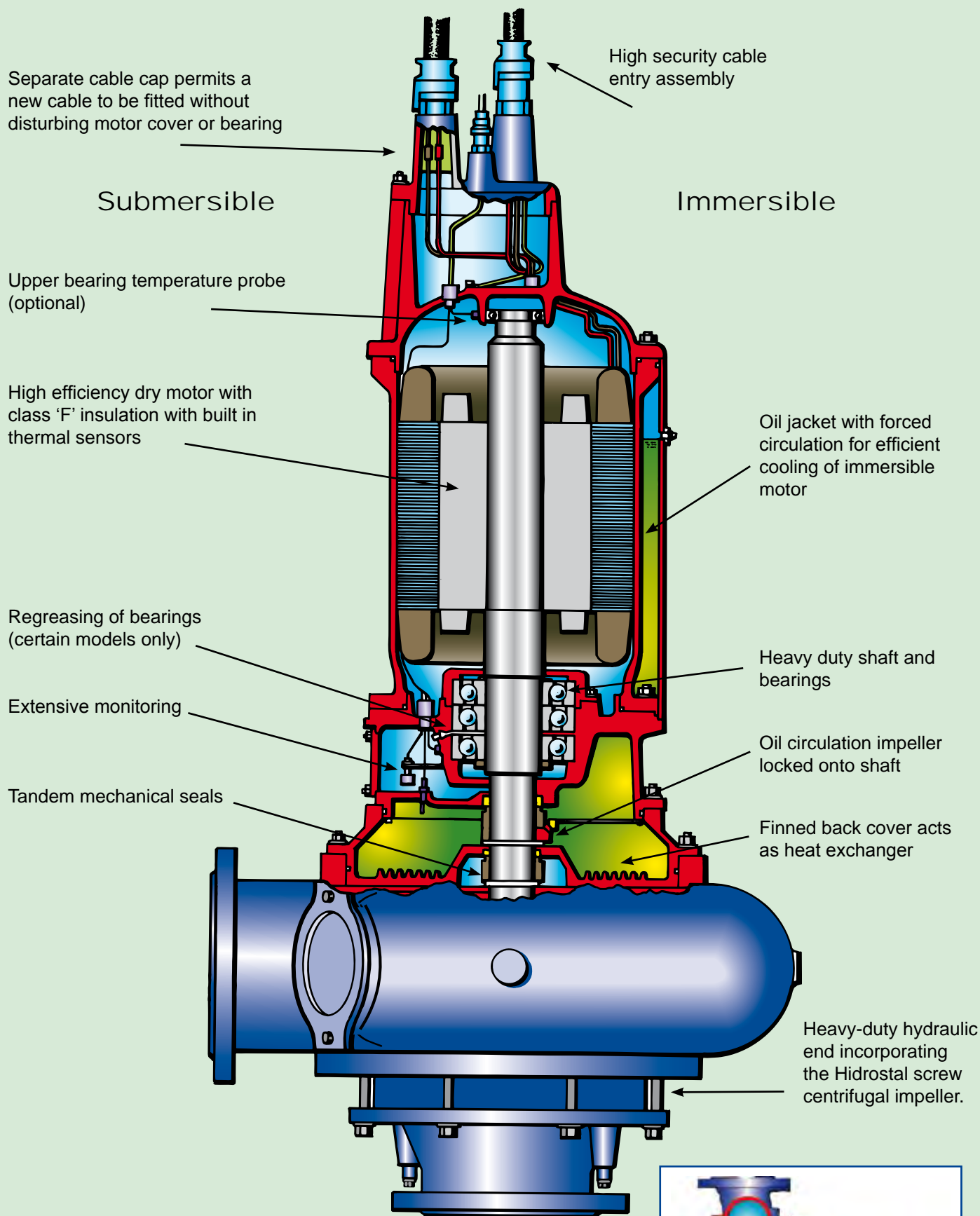
### Second stage:

Immersible/end suction, horizontally or vertically mounted.

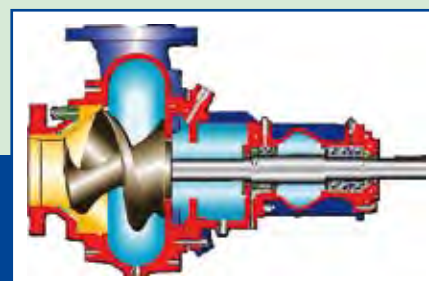
**[Consult Hidrostal for specific proposals]**



# SUBMERSIBLE / IMMERSIBLE



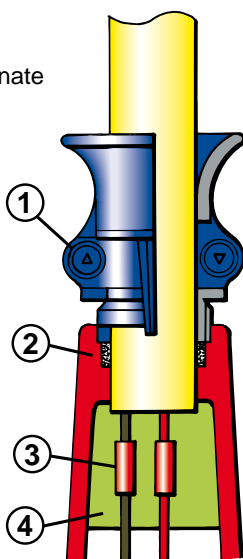
Also available with end-suction pumps for above ground pumping  
[see separate brochure]



# DESIGN FEATURES

## MOTOR CABLE ENTRY

- ① Cable mechanically clamped to eliminate strain on sealing elements.
- ② Outside of cable is sealed by a compressed grommet.
- ③ Each cable conductor is isolated from the motor by copper dams which prevent moisture leaking through the interior of the cable in the event of cable damage.
- ④ Poured epoxy totally encapsulates each individual conductor and copper dam preventing moisture from entering the motor via the outside or inside of the cable.



*Motors are shipped with free end of cable fitted with a waterproof sleeve.*

## COOLING

All immersible motors are efficiently cooled by oil, contained within a jacket, circulated around the motor, by an impeller locked to the motor shaft.

The oil transfers the heat to the pumped liquid, through a finned back cover between the pump and the motor.

The Hidrostat cooling method has advantages over other systems which circulate the pumped liquid through internal cooling channels which often become coated with sludge and slime, reducing the heat transfer and effectively derating the motor.

## TANDEM MECHANICAL SEALS

Both seals run in an oil bath which lubricates the pump side seal faces in the event of dry running. The pump side seal has faces of tungsten carbide running against silicon carbide, effective for abrasive applications. For heavy-duty applications the pumpside seal springs are totally enclosed in a rubber boot or metal body depending on application. Motor side seals are of the open spring type with carbon/ceramic faces.

## REGREASING OF BEARINGS

The lower bearing carries the axial thrust, the weight of the rotating unit and substantial radial loads. To fulfil its L10 design life, periodic regreasing is necessary on certain models. This is easily done by removing a watertight cover which exposes a greasing nipple.

The upper bearing carries a lighter load and does not require regreasing between major overhauls.

## INVERTERS & SOFT STARTS

All Hidrostat motors can operate with inverters and soft starts, provided quality electrical elements of approved specification are used.

## EXPLOSION PROOF MOTORS

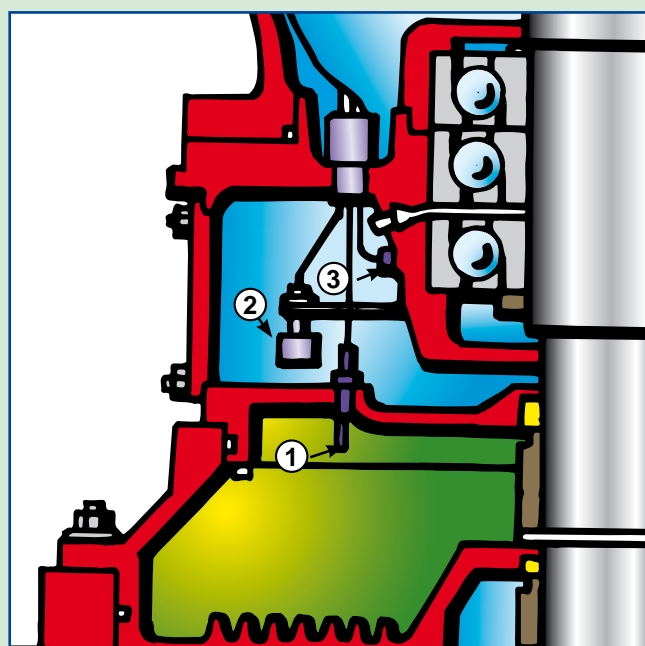
All 50hz motors are approved by ATEX for explosion proof application to 112G EExd11BT4 bzw and 112GEZxd[ib]11BT4.

## TWO SPEED MOTORS

Dual wound, two speed, submersible and immersible motors are available to suit individual applications.

## MONITORING MOTOR TEMPERATURE

Klixon type temperature sensors are built into the motor winding. Thermistors are available as an option.



### ① MOISTURE PROBE

Monitors the condition of the pump side seal by detecting water ingress in the cooling/seal chamber oil.

An alarm is triggered when a significant amount of water has entered, indicating that the pump side seal should be replaced.

### ② FLOAT SWITCH

Detects any water or oil passing through the motor side seal which could cause failure of the lower bearing. This feature is standard on larger motors and an option on smaller versions.

### ③ BEARING TEMPERATURES

Most Hidrostat motors have an option of monitoring bearing temperature and on large motors thrust bearing temperature sensors are provided as standard.

# SUBMERSIBLES

**Pumps are heavy-duty construction designed to operate at depths of 30 metres, greater depths are possible with special designs.**



## GUIDE RAIL MOUNTED

For permanent installation and ease of maintenance, a guide rail mounting arrangement is available. Twin guide rails ensure the pump is guided to the discharge elbow and correctly locates in position to give a leak free connection.



## FREE-STANDING OR PORTABLE UNITS

For applications where a permanent guide rail system is inappropriate, or a temporary arrangement is required, all Hidrostat submersible (and immersible) pumps can be used as free-standing or portable units.



## AIR OR HYDRAULICALLY DRIVEN OPTIONS

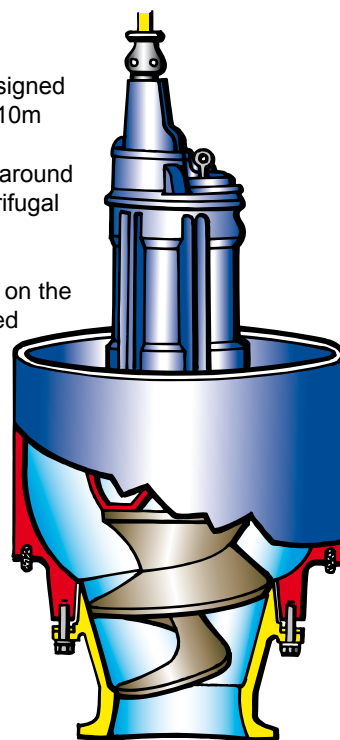
For applications where the use of electric submersible pumps is restricted by a lack of an electrical supply or a Zone '0' environment. Hidrostat can provide air or hydraulically driven portable or permanently installed units.

## AXIAL FLOW TUBE MOUNTED

Hidrostat 'A' type pumps are designed for low head applications up to 10m and flows from 30 to 1,100l/s.

The axial pump range is based around Hidrostat's classical screw centrifugal impeller and standard range of submersible motors.

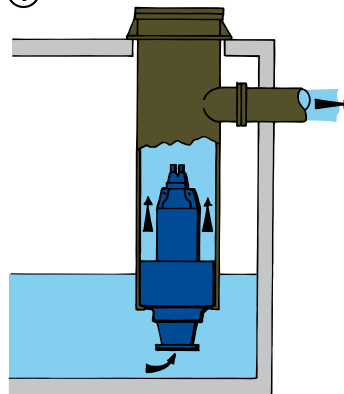
The difference is that the volute on the low pressure versions is replaced with a casing having an axial discharge enabling the pumps to be installed in a tube or concrete chamber.



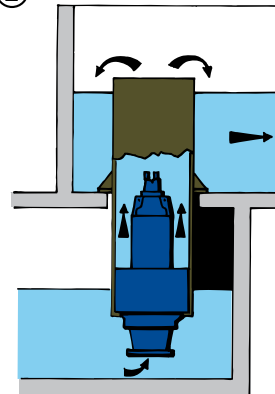
## TYPICAL APPLICATIONS

- Screened Sewage
- Stormwater
- Returned activated sludge
- Effluents
- Drainage water
- Oily water

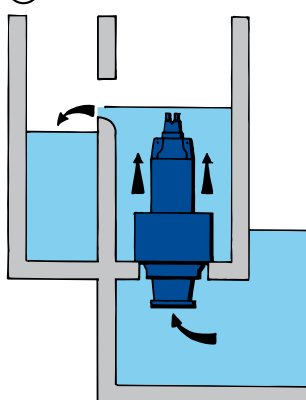
①



②



③



- ① Pump mounted in steel tube with pipeline discharge.
- ② Pump mounted in steel tube. Top of tube acts as weir.
- ③ Pump mounted in concrete chamber with weir discharge.

*The above mountings are the most common but many other arrangements are possible.*





# IMMERSIBLES

**Hidrostal immersible pumps are a versatile, innovative development of the established submersible range. Capable of continuous operation in a dry installation, the immersibles may be operated, with equal efficiency, when fully or partially submerged.**



The pumps are particularly suited for dry pit applications where the combination of the Screw Centrifugal Impeller and immersible motor can be considered the state-of-the art technology. Leakage of the pumped product is eliminated by tandem seals running in an oil bath, avoiding a situation commonly experienced with soft-packed glands.

Hidrostal immersible waste water / sewage pump stations have frequently been mistaken for clean water stations, due to the lack of odour and the cleanliness of the buildings.

Immersible pumps are particularly suitable for installation where quiet running, clean surroundings, reliable and long trouble-free operation is required.



*The pumps may be installed vertically or horizontally.*

## ADVANTAGES OF DRY PIT INSTALLATION

- Quiet running
- Cool exterior
- No leakage of product
- Compact, simple installation
- No exposed rotating shafts or couplings
- Pump easily opened for inspection
- Vertical or horizontal installation
- Clean odour-free waste water pump stations



## ADVANTAGES OF WET PIT INSTALLATION

- Immersible pumps can be installed in the same manner as submersible pumps
- Liquid level can be drawn down to pump casing without risk of overheating the motor.
- Shallower sumps compared with conventional submersible pump installations.
- Full motor rating maintained when pumping sludge



# OTHER APPLICATIONS

## PREROSTAL™ AUTOMATIC FLOW MATCHING SYSTEM

A unique system, incorporating a Hidrostral immersible pump, which automatically adjusts its output to match varying inflows, using a fixed speed motor. The system also has the capability of automatically skimming and pumping floating materials, oil and greases, eliminating maintenance and reducing odour.

Standard, guide rail-mounted immersible pumps are positioned in such a way that they draw liquid from a specially designed basin having a tangential inlet. The geometry of the basin causes the liquid to rotate at the pump inlet at a rate determined by the sump level. Since output relates to the speed of the liquid rotation the pump automatically varies its delivery.



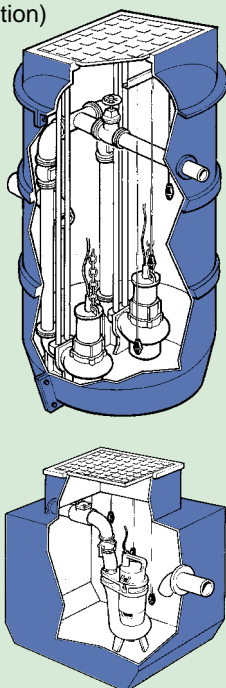
The Prerostal™ system is ideal for:

- Unscreened sewage (inlet pump station)
- Activated sludge return
- Industrial effluents
- Skimming of floating material

## PACKAGED PUMP STATIONS

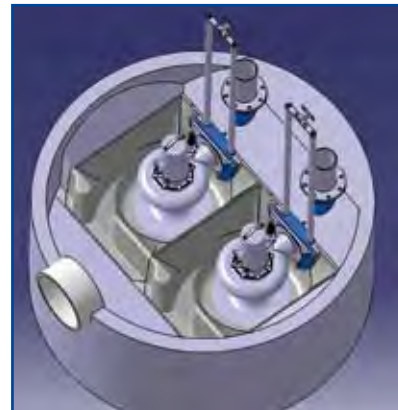
A range of fully self-contained pump stations available with single or twin Hidrostral submersible pumps, complete with pipework, valves and level controls. External valve chambers can be supplied as an option.

The pumps are installed in strong corrosion resistant chambers, suitable for burial underground and fitted with access covers. Special versions are available for mounting in dry areas such as cellars or basements.



## PREROCLEAN SELF CLEANING SUMP

The PreroClean is a simplified version of the Prerostal, designed to eliminate sump maintenance and reduce odour. It combines the Hidrostral screw centrifugal impeller pump with a special basin arrangement to make the sump self cleaning. With the special sump geometry installed, the pump behaves exactly like a normal submersible pump until the sump level approaches stop level. At this point the sump geometry induces a strong rotating flow which entrains all floating materials including oils and greases and pumps them into the discharge system. The result is that on every pump cycle all the solids and floating material [fat, oil, etc.] is pumped out of the sump to the screen and because there is no build up of solids or fats in the sump, the pump does not block and is kept clean. The PreroClean is ideal for duties within effluent and industrial treatment processes.



## VO<sub>2</sub> VENTURI AERATORS

VO<sub>2</sub> Venturi Aerators are driven by Hidrostral submersible pumps, and are available as freestanding, guide rail-mounted, or floating units, (can also be supplied externally mounted if required) providing an efficient and economic solution for the:

- Provision of oxygen for the biological treatment of polluted effluents
- Rejuvenation of oxygen depleted water
- Enhancement of chemical reactions
- Powerful mixing of tank or lagoon contents



Guide rail-mounted



Floating



### 3 VALVES

**SUPPLIER:** Pentair Water & Environmental Systems  
88 Frederick Street  
Northgate, QLD, 4013

Ph: (07) 3266 2255  
Fax: (07) 3260 5221

**MODEL:** 150dia. D.F. R.S. ECCENTRIC PLUG VALVE

**SUPPLIER:** VALVECO INDUSTRIES  
88 Sherwood Road  
Toowong Qld 4066

Ph: (07) 3859 6860  
Fax: (07) 3859 6869

**MODEL:** 300dia. D.F. VALMATIC CAM-CENTRIC PLUG VALVE  
250dia. D.F. VALMATIC CAM-CENTRIC PLUG VALVE  
250dia. D.F. VALMATIC SWING FLEX CHECK VALVE

## Ballcentric Valves - Figure 580 & 583

Sizes 80 - 600mm

**tyco**

*Flow Control*

KEYSTONE

### Features

- The resilient plug provides tight shut-off without sealing lubricants.
- The plug valve utilises a corrosion resistant welded nickel seat.
- One piece cast iron plug provides superior strength and no deflection.
- Corrosion resistant permanently lubricated stem bearings top and bottom.
- Bolted one piece Cast Iron top housing for high strength and easy maintenance.
- Top and bottom grit excluders to prevent the ingress of contaminants into the bearings.
- Flanged end connections available as standard.
- Full round port offers less flow resistance.
- Eccentric plug action eliminates plug drag on the seat while cycling. As the plug moves off the seat, plug-seat contact ceases at about 5° open through the fully open position preventing wear and deformation of the resilient plug sealing surface.

Eccentric style, round ported plug valves.

- F580 - valve sizes 80 to 100mm.
- F583 - valve sizes 150 to 600mm.



### General applications

Keystone Ballcentric valves control the flow of materials such as pulp and paper stock, industrial slurries and sludges, raw sewage, raw, activated and digested sludge, industrial and municipal effluents, sewage gas.

Typical applications include use on digesters, industrial slurry transfer lines, power plant ash handling systems, clarifiers, sludge collector systems, activated sludge reactors.

### Technical data

#### Size range:

Figure 580 80-100mm - 100% port area  
Figure 583 150-600mm - 80% port area

#### Pressure:

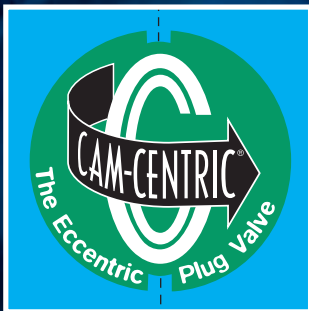
Vacuum to 1200kPa (80-300mm)  
Vacuum to 1034kPa (350-600mm)

#### Temperature:

Minus 18°C to 100°C

#### End connections:

AS 2129 C, D as standard  
(Consult Factory for other drillings)

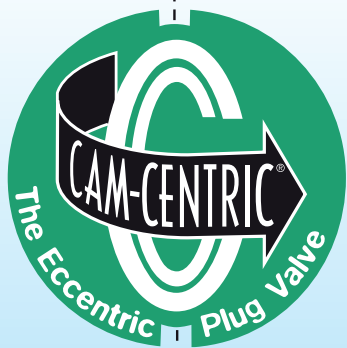


## CAM-CENTRIC Plug Valves

Committed People  Innovative Solutions

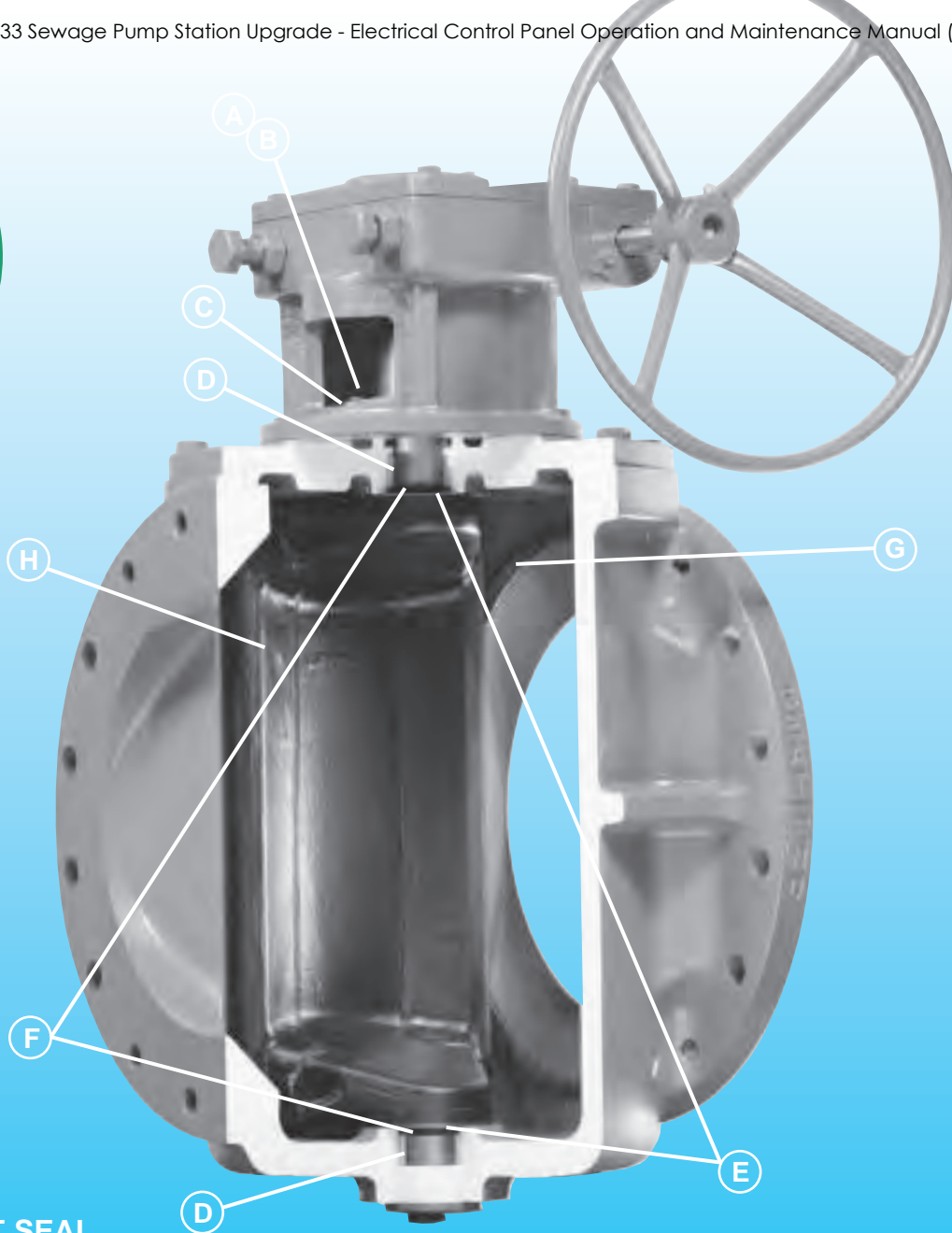
[www.hmagroup.com.au](http://www.hmagroup.com.au)





TRADITIONAL  
FEATURES

ADVANCED  
TECHNOLOGY



### VAL-MATIC® SHAFT SEAL SYSTEM WITH EXCLUSIVE POP™ SHIMS (PACKING OVERLOAD PROTECTION)

- A. ADJUSTABLE PACKING FOLLOWER**  
Meets recommended requirements for adjustment of Vee type packing.
- B. VEE TYPE PACKING**  
Field adjustable and replaceable without removal of actuator.
- C. REMOVABLE POP™ SHIMS**  
Packing Overload Protection Shims protect packing by preventing overloading by field personnel. (Patent applied for)

### VAL-MATIC® BEARING PACKAGE

- D. RADIAL BEARINGS**  
Heavy Duty, Stainless Steel, Permanently Lubricated.
- E. THRUST BEARING**  
Lower: Stainless Steel  
Upper: Teflon®

### VAL-MATIC® GRIT-GUARD™ BEARING AND PACKING PROTECTOR

- F. A VAL-MATIC® EXCLUSIVE**  
The Grit-Guard™ shaft seal extends packing and bearing life by minimizing contact with line media.

### VAL-MATIC® SEATING SYSTEM

*Performance Enhanced  
Technology*

- G. SEAT**  
Welded overlay of 99% pure nickel applied directly to the body using a state-of-the art robotic welding system for a consistent, high quality weld. (2 1/2" and larger)
- H. PLUG**  
Resilient facing formulated by Val-Matic® and leading industry rubber experts to assure a tight seal and long life.

Teflon is a registered trademark of DuPont.

Technical papers discussing the technical enhancements of the Val-Matic® seating and shaft seal systems is available. Please contact Val-Matic® for complimentary copies.

Q-Pulse Id: TMS580

Active: 16/12/2013

Copyright 1998 Val-Matic Valve & Fitting Corp.

# WHY AN ECCENTRIC PLUG VALVE?

Installed in thousands of applications the world over, the eccentric plug valve has proven itself as the valve of choice in wastewater and water applications. Unlike a multi-turn gate valve, the eccentric plug valve is a 1/4 turn valve allowing cost effective, low torque actuation for shut-off and throttling service. And while the gate valve leaves its operating stem exposed to the flow, the plug valve shaft and gear are both removed from the flow and protected from the media. Slurries and sewage are easily handled without clogging and with minimal headloss due to the valves linear flow path. The valve's eccentric action rotates the plug in and out of the seat without scraping or binding. The combination of the eccentric action and heavy duty nickel seat assures long life with minimal maintenance.

## WHY CAM-CENTRIC?

### TRADITIONAL FEATURES...

of the Cam-Centric include the features engineers and operators have come to expect in a plug valve. Adjustable and replaceable Vee-Type packing is standard as are stainless steel, permanently lubricated radial bearings and a welded nickel seat. Val-Matic has been able to enhance the performance of these features through

### ...ADVANCED TECHNOLOGY

By incorporating the latest in design, material and manufacturing technologies, Val-Matic has significantly improved upon these time proven features.

### SHAFT SEAL SYSTEM

Vee-Type packing leaks for two reasons. It's worn, or the gland follower has been over tightened destroying the packing's sealing capabilities. Val-Matic has enhanced the traditional design of Vee-Type packing systems to reduce wear and prevent over tightening of the follower.

Wear is reduced by the Grit-Guard™ seal which prevents grit, the prime cause of wear, from reaching the

bearings and packing. The seals are supplied standard in both the upper and lower journals. (Figure 1 & 2)

To prevent the packing from being over tightened, the shaft seal incorporates POP™ (Packing Overload Protection) Shims. Adjustment is easily accomplished by removing shims as necessary by utilizing the pull tab feature. (Figure 1) Any minimal maintenance required to the Cam-Centric shaft seal can be done without removal of the actuator. This includes removal/ replacement of the packing as well as removal of shims. The shaft seal fully complies with ANSI/AWWA C504.

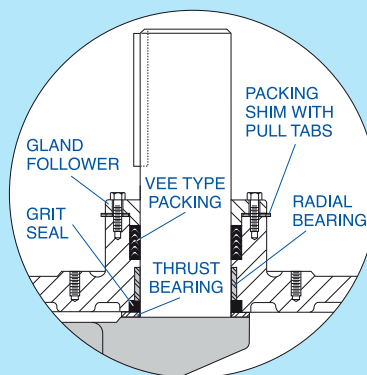


Figure 1: Upper Bearing Journal

### CAM-CENTRIC BEARING PACKAGE

The Cam-Centric bearing package consists of T316 stainless steel, permanently lubricated Radial Bearings in both the upper and lower journals. Thrust bearing of Teflon (upper journal) and T316 Stainless Steel (lower journal) are also provided. Like the packing, the bearings are protected from grit related wear by the Grit-Guard™ grit seal. (Figure 1 & 2)

### CAM-CENTRIC SEATING SYSTEM

The Cam-Centric utilizes a resilient faced plug formulated by Val-Matic



in conjunction with leading industry rubber experts to assure a tight seal and long life. Its mating surface, the nickel seat is applied directly to a machined surface on the valve body using a state-of-the-art robotic welding system for a consistent, high quality weld.

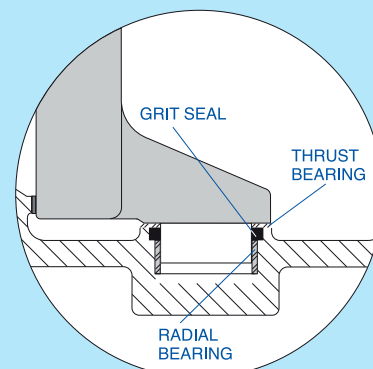


Figure 2: Lower Bearing Journal

### PROOF OF DESIGN TESTING

The Cam-Centric has been subjected to rigorous testing per the requirements of ANSI/AWWA C504. All valve and actuation tests were third party witnessed and were successfully completed. Copies of the test reports are available from Val-Matic.

### INCREASED PORT AREA FOR INCREASED FLOW

Cam-Centric® plug valves are designed to provide low headloss to maximize flow and reduce operating costs. 100% port areas are standard on valves 4" and smaller, optional on valves 6" and larger. Standard port areas for 6" and larger valves are larger than traditional rectangular ported valves.

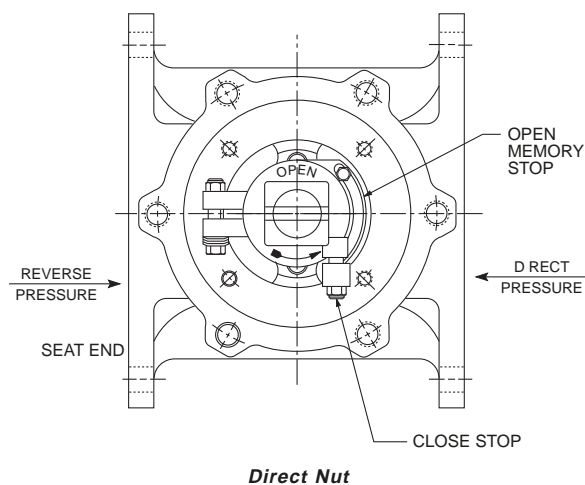
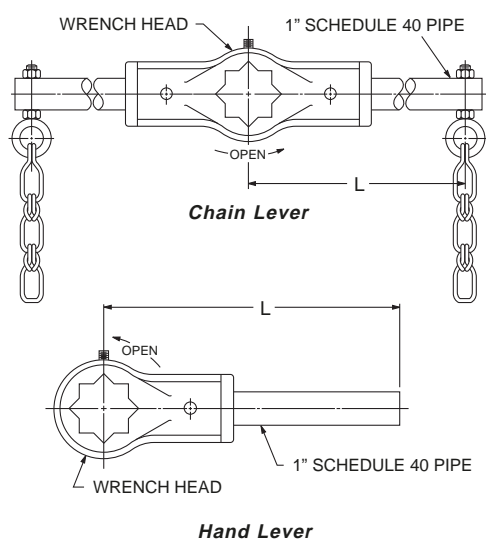
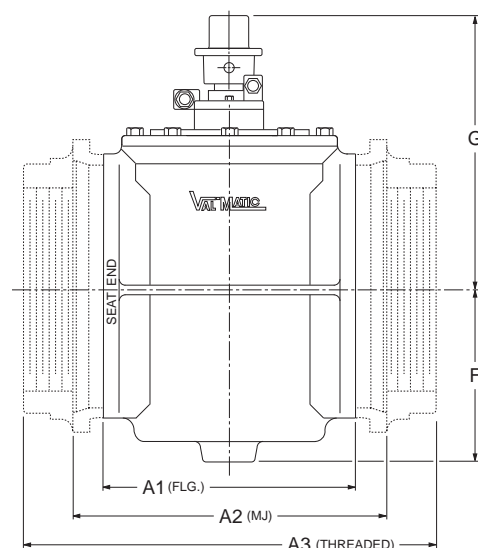
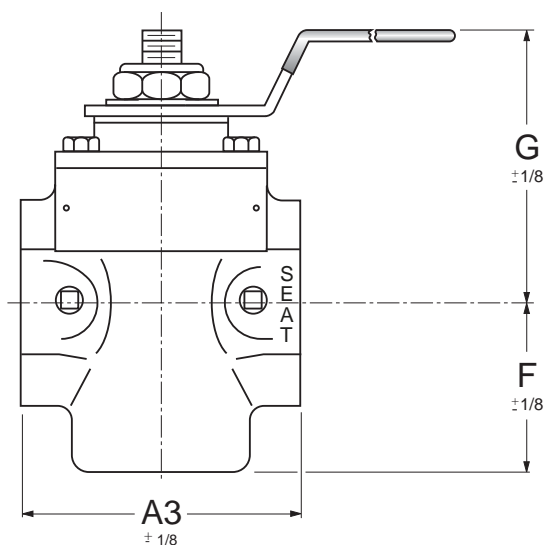
### A WORD ABOUT ANSI/AWWA COMPLIANCE

While most plug valve shaft seal and testing specifications refer to ANSI/AWWA C504, it should be remembered that C504 is a butterfly valve standard written for rubber seated butterfly valves for use in raw or potable water service. It was not written for plug valves, nor was it written for untreated wastewater to which plug valves are typically subjected. The reason the plug valve exists is because other valves, like the butterfly, are unable to handle solids bearing flow. For this reason, it is suggested that the specifier look at the requirements of ANSI/AWWA C504 as minimal requirements. Specify a valve that not only meets the requirements of C504 but exceeds them.

# INSTALLATION DIMENSIONS

## DIRECT NUT OPERATED

### FLANGED, MECHANICAL JOINT, THREADED END CONNECTIONS



VALVE SIZE	FLANGED MODEL NO.	MJ MODEL NO.	THREADED MODEL NO.	HANDLEVER MODEL NO.	CHAINLEVER MODEL NO.	ACTUATOR WP RATING PSI		DIMENSIONS (IN INCHES)					
						REVERSE	DIRECT	A1	A2	A3	F	G	L
1	-	-	5801RTL	Incl.	-	175	175	-	-	3.12	1.88	3.19	-
2	-	-	5802RTL	Incl.	-	175	175	-	-	5.25	2.88	4.25	-
2 1/2	5825RN	-	5825RTN	4L	3CH	175	175	7.50	-	8.75	4.50	9.62	16
3	5803RN	5903RN	5803RTN	4L	3CH	175	175	8.00	11.50	8.75	4.50	9.62	16
4	5804RN	5904RN	-	4L	4CH	175	175	9.00	14.25	-	5.56	10.93	22
6	5806RN	5906RN	-	8L	6CH	50*	100*	10.50	15.75	-	7.06	12.31	32
8	5808RN	5908RN	-	8L	8CH	50*	100*	11.50	17.25	-	8.75	13.88	44

## NOTES:

1. Flange drilling conforms to AS4087 Class 16.
2. Mechanical Joint (MJ) Ends conform to ANSI/AWWA C110/A21.10.
3. Threaded Ends conform to ANSI/ASME B1.20.1.

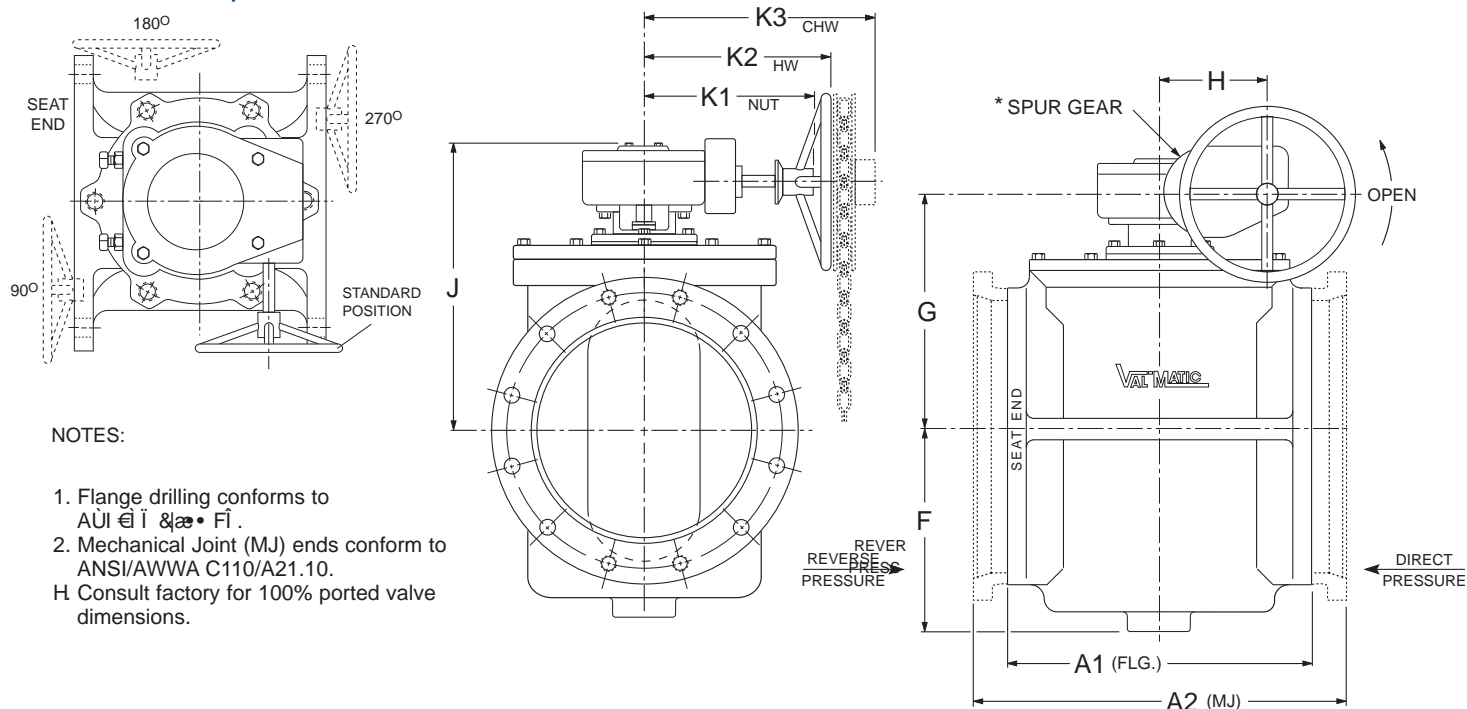
\* Worm gear actuators recommended for higher pressure ratings.

4. Hand levers (i.e. 3L) Chain levers (i.e. 3CH), and Chain (1CN) are ordered separately.
5. Consult factory for 100% ported valve dimensions.
6. Consult factory for 1/2", 3/4", 1-1/4" and 1-1/2" dimensions.

# INSTALLATION DIMENSIONS

## WORM GEAR ACTUATOR SELECTION

### FLANGED, MECHANICAL JOINT END CONNECTIONS



#### NOTES:

1. Flange drilling conforms to AUI 11 1/2 x 1/2 F1.
2. Mechanical Joint (MJ) ends conform to ANSI/AWWA C110/A21.10.
3. Consult factory for 100% ported valve dimensions.

Valve Size	Flanged Model No.	MJ End Model No.	Actuator $\Delta P$ Rating, PSI		Dimensions, In.								
			Reverse	Direct	A1	A2	F	G	H	J	K1	K2	K3
4	5804R/7A08	5904R/8A02	175	175	9.00	14.25	5.56	9.31	3.06	11.18	9.00	9.50	12.50
6	5806R/7A08	5906R/8A02	175	175	10.50	15.75	7.06	11.06	3.06	12.94	9.00	9.50	12.50
8	5808R/7A12	5908R/8A02	100	175	11.50	17.25	8.75	12.62	3.06	14.50	9.00	11.50	12.75
	5808R/7B16	5908R/8A02	175	175								9.38	13.00
10	5810R/7C12	5910R/8C02	100	175	13.00	18.75	10.44	16.25	4.75	19.00	7.88	13.12	13.12
	5810R/7D16	5910R/8D02	175	175								11.00	13.12
12	5812R/7C16	5912R/8C02	100	175	14.00	19.75	12.25	17.69	4.75	20.44	7.88	11.00	10.12
	5812R/7D24	5912R/8D02	175	175								16.75	14.88
14	5814R/7E18	5914R/8E02 *	50	100	17.00	24.50	13.00	19.31	5.62	22.00	13.00	15.25	18.62
	5814R/7F24	5914R/8E02 *	100	150				19.31	5.62	22.00		17.12	22.25
	5814R/7G12 *	5914R/8F02 *	150	150				21.25	9.69	23.31		14.00	17.38
16	5816R/7E24	5916R/8E02 *	50	100	17.75	24.75	14.50	20.62	5.62	23.31	13.00	17.12	22.25
	5816R/7F30	5916R/8E02 *	100	150				20.62	5.62	23.31		18.62	24.25
	5816R/7G14 *	5916R/8F02 *	150	150				22.56	9.69	24.62		14.62	18.00
18	5818R/7J30	5918R/8J02 *	50	100	21.50	28.50	16.25	22.25	5.62	24.94	14.50	18.62	24.25
	5818R/7K18 *	5918R/8J02 *	100	150				25.12	7.38	25.25		19.25	19.25
	5818R/7L24 *	5918R/8K02 *	150	150				25.12	7.38	25.25		19.25	21.88
20	5820R/7M18 *	5920R/8J02 *	50	100	23.50	30.50	17.50	26.25	7.38	26.25	14.50	19.00	18.88
	5820R/7N24 *	5920R/8J02 *	100	150								19.25	21.88
	5820R/7P30 *	5920R/8K02 *	150	150								21.88	23.62
24	5824R/7M24 *	5924R/8J02 *	50	100	30.00	37.00	20.25	29.00	7.38	29.00	14.50	19.25	21.88
	5824R/7N30 *	5924R/8J02 *	100	150					7.38			21.88	23.88
	5824R/7P36 *	5924R/8K02 *	150	150					11.50			23.25	24.62
30	5830R/7R24 *	5930R/8R02 *	50	100	37.50	45.50	24.00	31.00	4.06	35.12	14.44	16.12	21.25
	5830R/7S30 *	5930R/8R02 *	100	150									21.50
	5830R/7T36 *	5930R/8S02 *	150	150									21.50
36	5836R/7S30 *	5936R/8S02 *	50	100	52.00	60.00	29.00	31.00	4.06	35.12	14.44	16.12	21.50
	5836R/7V24 *	5936R/8S02 *	100	150				32.25	10.50	37.25			28.62
	5836R/7W30 *	5936R/8T02 *	150	150				32.25	10.50	37.25			28.88

\*Indicates actuators with spur gears.

# MATERIALS OF CONSTRUCTION

## PRESSURE/TEMPERATURE RATINGS

MATERIALS OF CONSTRUCTION	
COMPONENT	STANDARD
Body, Cover and Plug	Cast Iron ASTM A126 Class B
Seating Surfaces	*Welded Nickel Overlay Resilient Plug Facing
Coating	Internal & External Epoxy Coated
Fasteners	316 SS

NOTE: Val-Matic offers a variety of optional materials, coatings and linings. Please consult factory for available options.  
\*2-1/2" and larger.

MAXIMUM NON-SHOCK PRESSURE-TEMPERATURE RATING, PSIG		
TEMPERATURE °F / VALVE SIZE	1" - 12"	14" - 36"
100	175	150
150	175	150
200	150	135
Hydrostatic Test Pressure	263	225

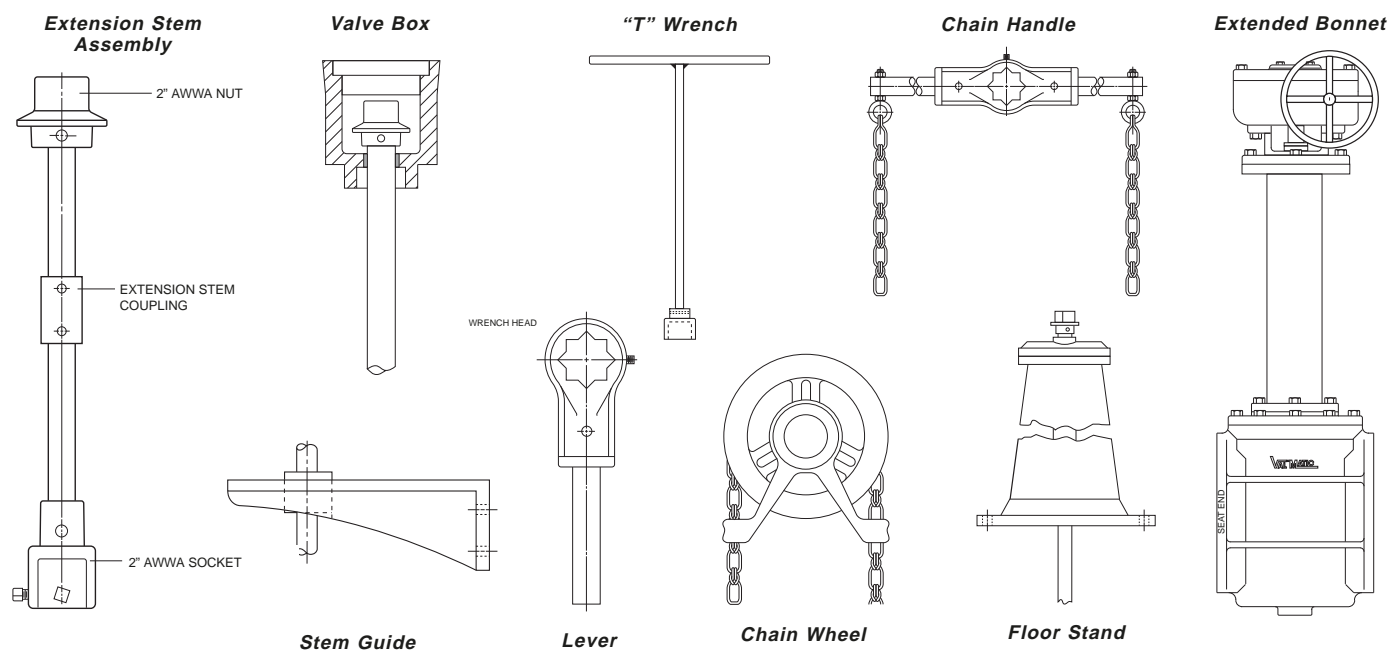
### NOTES:

1. Above ratings are valve ratings. Actuator ratings (shut-off differential pressure) are included under Valve Dimensions and Actuator Selection on page 9.
2. Gas service applications require a worm gear, cylinder or power actuator. Valve orders for gas service should specify the application.
3. Worm gear actuation is recommended for all buried service valves.

## ACCESSORIES

Space limitations and applications such as submerged service often require special accessories. In addition to those shown below, Val-Matic offers a wide range of

accessories to meet your application requirements. Please consult the factory for assistance.





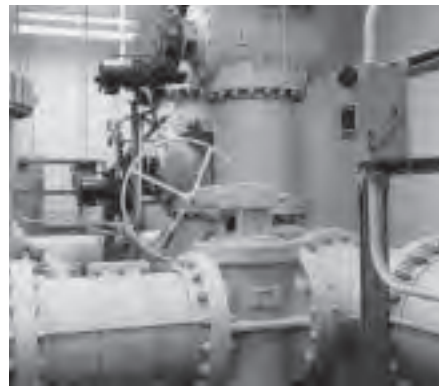
# APPLICATIONS/FEATURES



**18" Cam-Centric® plug valve with motor actuator.**



**14" Cam-Centric® plug valve with Val-Matic® Swing-Flex® Check Valve.**



**20" and 16" Cam-Centric® plug valves with worm gears and motor actuators.**



**18" motor actuated Cam-Centric® plug valve.**



**16" Cam-Centric® plug valve with extension stem and motor actuator.**



**16" Cam-Centric® plug valve. Cylinder actuated with hydraulic, manual override.**

## APPLICATIONS

Potable Water	<input checked="" type="checkbox"/>	Sludge	<input checked="" type="checkbox"/>
Raw Water	<input checked="" type="checkbox"/>	Primary Effluent	<input checked="" type="checkbox"/>
Secondary Wastewater Effluent	<input checked="" type="checkbox"/>	Salt Water, Sea Water, Brine, Brackish Water	<input checked="" type="checkbox"/>
Raw Sewage	<input checked="" type="checkbox"/>	Ozone Treatment	<input checked="" type="checkbox"/>
Screened Sewage	<input checked="" type="checkbox"/>	Irrigation	<input checked="" type="checkbox"/>
Abrasive Slurries	<input checked="" type="checkbox"/>	Buried Service	<input checked="" type="checkbox"/>
Air Service	<input checked="" type="checkbox"/>	Industrial Process Applications	<input checked="" type="checkbox"/>
Corrosive Service	<input checked="" type="checkbox"/>	Low Pressure Gas Service, Digester Gas	<input checked="" type="checkbox"/>
Vertical Flow Up	<input checked="" type="checkbox"/>	Throttling Service	<input checked="" type="checkbox"/>
Vertical Flow Down	<input checked="" type="checkbox"/>	Pump Check Service	<input checked="" type="checkbox"/>
Non-Abrasive Slurries	<input checked="" type="checkbox"/>	Modulating Service	<input checked="" type="checkbox"/>

## FEATURES

Vee Type Packing with Exclusive POP™ Shims	<input checked="" type="checkbox"/>	Gear, Hydraulic and Power Actuation	<input checked="" type="checkbox"/>
Integral Nickel Welded Seat	<input checked="" type="checkbox"/>	Port areas for valves 4" and smaller <input checked="" type="checkbox"/> 100%	<input checked="" type="checkbox"/>
Exclusive Stainless Steel/Teflon Bearing Package	<input checked="" type="checkbox"/>	Port areas for valves 6" - 16" <input checked="" type="checkbox"/> 85%	<input checked="" type="checkbox"/>
Grit-Guard™ Bearing and Packing Protector	<input checked="" type="checkbox"/>	Port areas for valves 18" - 24" <input checked="" type="checkbox"/> 80%	<input checked="" type="checkbox"/>



## NSW

### Wyong - Head Office

10 Hereford Street, Berkeley Vale NSW 2261  
PO Box 5010 Chittaway NSW 2261  
Tel: +61 (0)2 4389 6191  
Fax: + 61 (0)2 4389 6199  
Email: info@hmagroup.com.au

### Sydney

13 Sirius Road, Lane Cove NSW 2066  
Tel: +61 (0)2 9428 7300  
Fax: +61 (0)2 9428 7399  
Email: sydney@hmagroup.com.au

### Singleton

21 Magpie St, McDougall's Hill, NSW 2330  
Tel: +61 (0)2 6571 8200  
Email: singleton@hmagroup.com.au

## QLD

### Brisbane

3rd Floor, 49 Sherwood Road, Toowong QLD 4066  
Tel: +61 (0)7 3859 6800  
Fax: +61 (0)7 3859 6869  
Email: brisbane@hmagroup.com.au

### Mackay

22-30 Southgate Drive,  
Southgate Industrial Park, Paget QLD 4740  
Tel: +61 (0)7 4998 6900  
Fax: +61 (0)7 4998 6999  
Email: mackay@hmagroup.com.au

### Gladstone

9 Neil St, Gladstone QLD 4680  
Tel: +61 (0)7 4978 3128  
Email: gladstone@hmagroup.com.au

### Townsville

36 Rendle Street Aitkenvale QLD 4814  
Tel: +61 (0)7 4728 6300  
Email: townsville@hmagroup.com.au

## WA

### Perth

119 Dowd Street, Welshpool WA 6106  
Tel: +61 (0)8 6254 9500  
Fax: +61 (0)8 6254 9599  
Email: perth@hmagroup.com.au



## VIC

### Melbourne

1/72 Bayfield Road, Bayswater VIC 3153  
Tel: +61 (0)3 9720 5950  
Fax: +61 (0)3 9720 5942  
Email: melbourne@hmagroup.com.au

### Morwell

8 Jones Road, Morwell VIC 3840  
Tel: + 61 (0)3 5136 8400  
Fax: +61 (0)3 5136 8499  
Email: morwell@hmagroup.com.au

## SA

### Adelaide

PO Box 1280, North Haven SA 5018  
Tel: +61 (0)8 8341 8067  
Fax: +61 (0)8 8341 8067  
Mobile: +61 (0)437 460 032  
Email: adelaide@hmagroup.com.au

## NEW ZEALAND

### Hamilton

Unit 14, 9 Karewa Place, Pukete, Hamilton NZ 3200  
Tel: +64 (0)7 847 1880  
Fax: +64 (0)7 847 1883  
Email: hamilton@hmagroup.co.nz

### Wellington

Tel: +64 (0)7 847 1880  
Mobile: +64 272 612 744  
Email: wellington@hmagroup.co.nz

### Dunedin

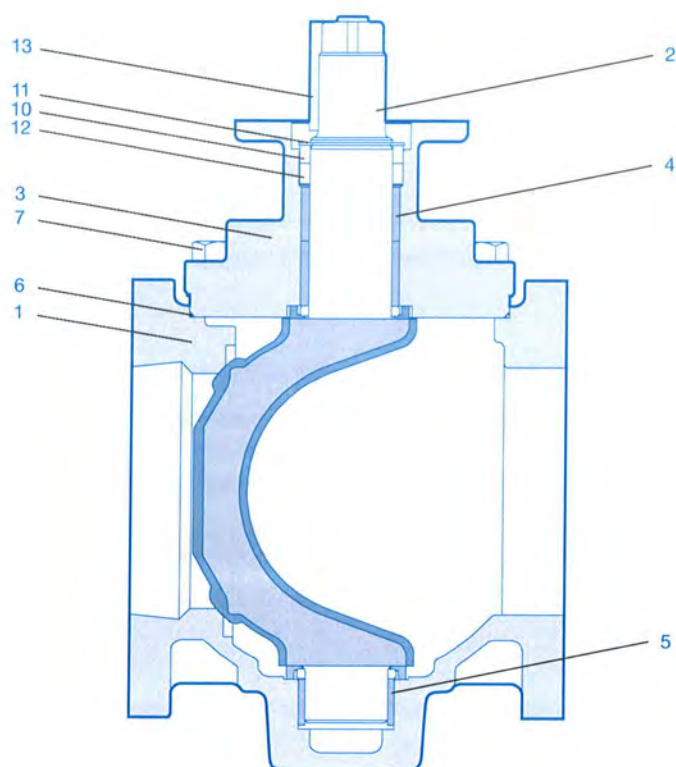
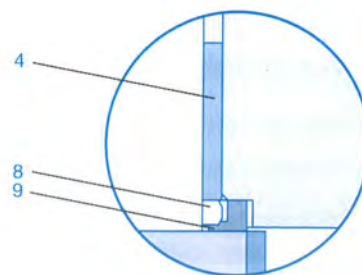
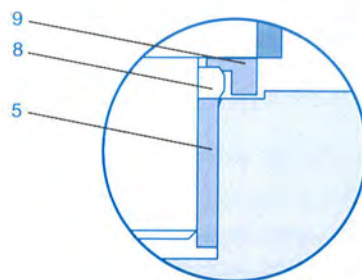
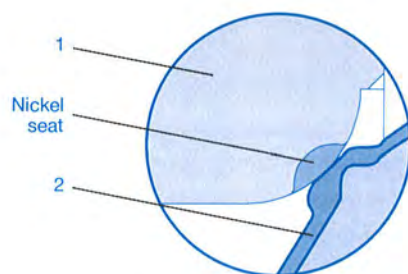
Mobile: +64 (0) 275 116 694  
Email: dunedin@hmagroup.co.nz

## Halley & Mellowes Australasia Group of Companies



**Ballcentric Valves - Figure 580 & 583**

Sizes 80 - 300mm

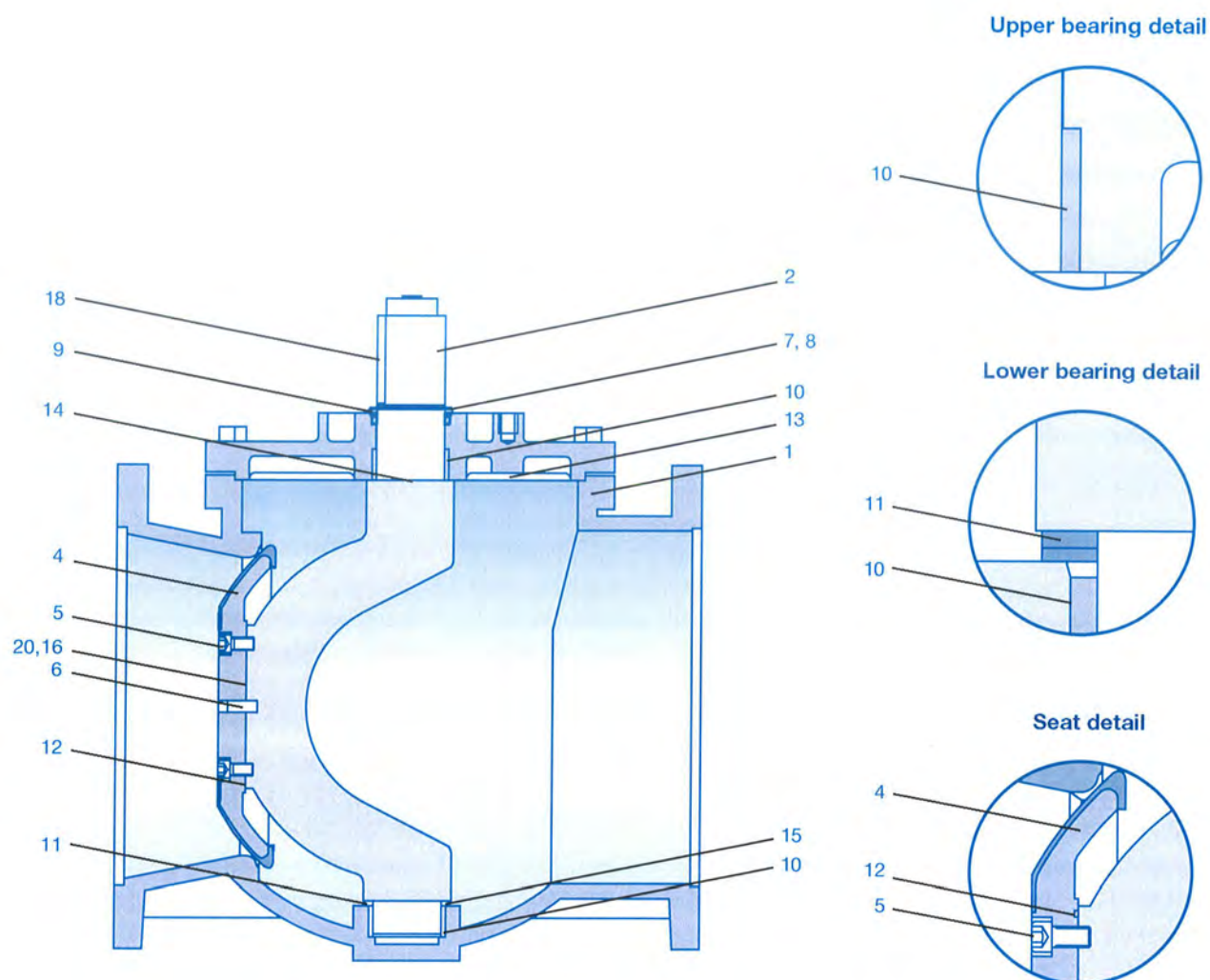
**Upper bearing detail****Lower bearing detail****Seat detail***Note: F580 valve illustrated***Parts list**

No.	Description	Standard material	Material specification
1	Body	Cast Iron	ASTM A-126 CL B
2	Plug/stem	Cast Iron (Buna-N Coated)	ASTM A-126 CL B
3	Top housing	Cast Iron	ASTM A-126 CL B
4	Bearing upper	304/316 Sintered Impreg with CHEMLUBE 209	Commercial
5	Bearing lower	304/316 Sintered Impreg with CHEMLUBE 209	Commercial
6	Cap O-ring	Buna-N	-
7	Fasteners	Cad Plated Steel	Commercial
8	Grit excluder	Buna-N	-
9	Spacer	Bronze	ASTM B-584
10	Bushing	Filled Polyester	Commercial
11	Retaining ring	Cad Plated Steel	Commercial
12	Packing	EPDM	Commercial
13	Key	Carbon Steel	Commercial



**Ballcentric Valves - Figure 583**

Sizes 350 - 600mm

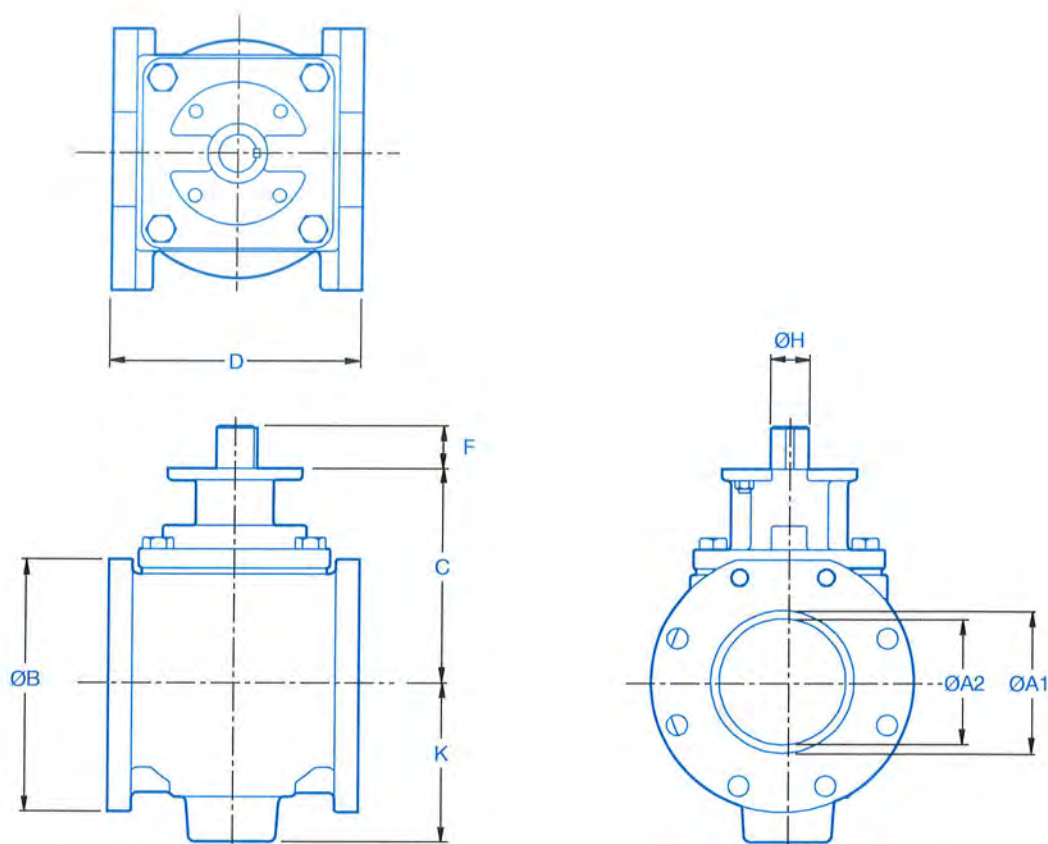
*Note: F583 valve illustrated***Parts list**

No.	Description	Standard material	Material specification
1	Body	Cast Iron (with nickel seat)	ASTM A-126 CL B
2	Plug/stem	Cast Iron	ASTM A-126 CL B
3	Cap	Cast Iron (Buna-N Coated)	ASTM A-126 CL B
4	Plug/disc	Cast Iron (coated)	ASTM A-126 CL B
5	Screw	304 S/S	ASTM A-276
6	Pin, dowel	304 S/S	ASTM A-276
7	Retaining ring	Carbon spring Steel	Commercial
8	Thrust race	Commercial	Zinc plated ASTM A366 HR
9	U-cup seal	Buna-N	Commercial
10	Bearing	304/316 Sintered Impreg with CHEMLUBE 209	Commercial
11	Packing	Buna-N	Commercial
12	O-ring	Buna-N	Commercial
13	Gasket, cap	Commercial gasket	-
14	Upper shim	PTFE	-
15	Lower shim	PTFE	-
16	Disc seat shim	Commercial gasket	-
17	Screw	Zinc plated steel	Commercial
18	Key	Carbon steel	Commercial
19	Plug (not shown)	-	-
20	Disc seat shim	Commercial gasket	-

# Ballcentric Valves - Figure 580 and 583

Sizes 80 - 300mm

**Note:** F580 valve illustrated



## Dimensions (mm)

Valve Size mm	Stem conn. code	ØA1 inlet	ØA2 outlet	ØB	C	D	F	K	Stem conn.		Top Plate Data			Mass (kg)	Kv (fully open)
									ØH (inches)	keyway (inches)	PCD	No holes	Dia.		
80	CAF	81	81	191	168	203	45	116	1½	¼ x ¼	127	4	14	21	493
100	CAF	114	103	229	193	229	68	151	1½	¼ x ¼	127	4	14	37	850
150	CAG	159	145	279	228	267	65	171	1½	¾ x ¾	127	4	14	54	1728
200	DAJ	210	187	343	293	292	76	238	1½	½ x ¾	165	4	22	105	2916
250	DAK	260	239	406	325	330	107	266	2¼	½ x ¾	165	4	22	145	4213
300	DAK	311	271	483	363	356	102	281	2¼	½ x ¾	165	4	22	193	6611

## Notes:

Kv = The flow rate of water in m<sup>3</sup>/hr that will pass through a valve with a pressure drop of 1 bar (100 kPa) @ 20°C.

Cv = 1.155 Kv.

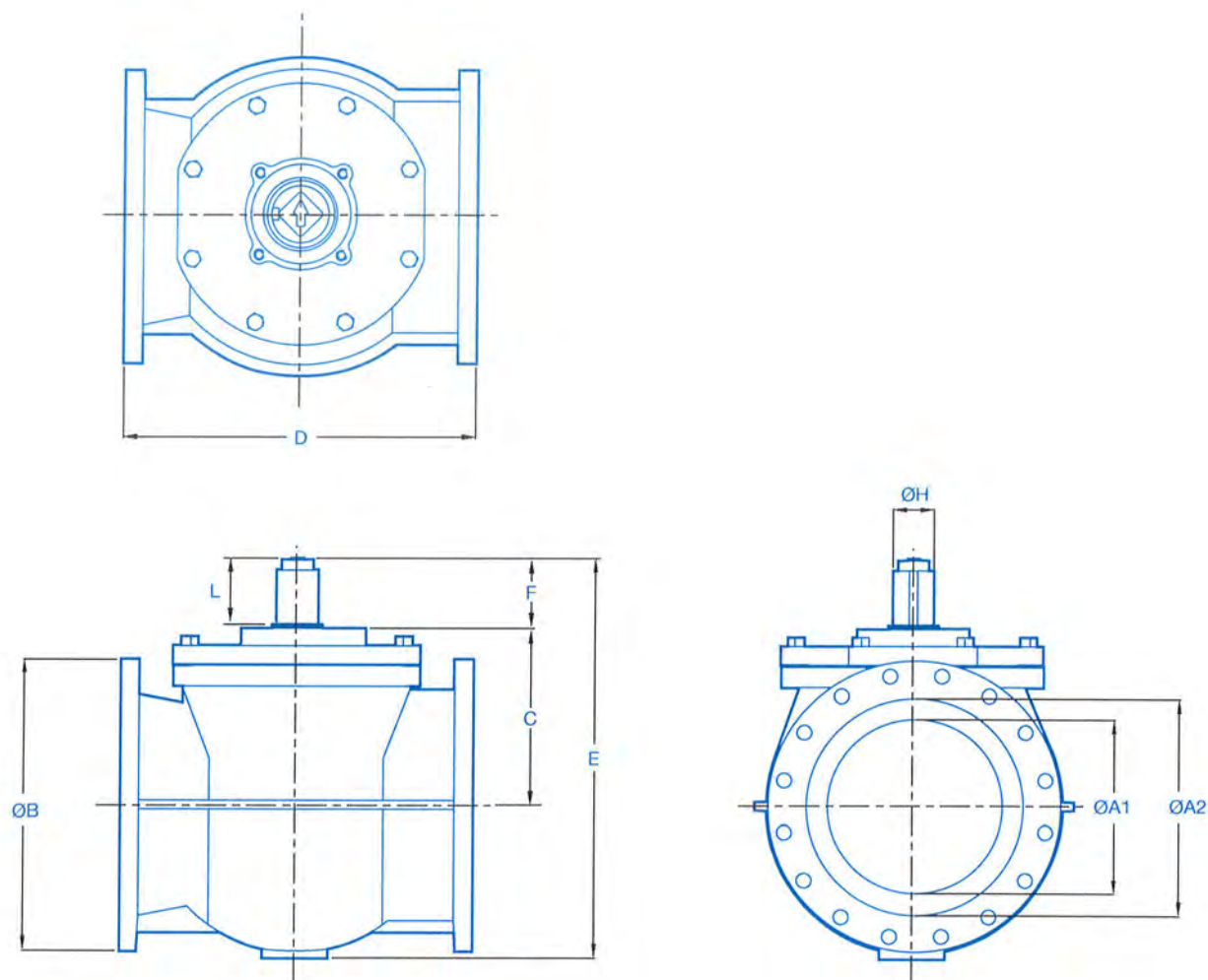
Dimensions are nominal ±1mm.



## Ballcentric Valves - Figure 583

Sizes 350 - 600mm

**Note:** F583 valve illustrated



### Dimensions (mm)

Valve Size mm	Stem conn. code	$\varnothing A1$ inlet	$\varnothing A2$ outlet	$\varnothing B$	C	D	E	F	L	Stem conn.		Top Plate Data			Mass (kg)	Kv (fully open)
										$\varnothing H$ (inches)	keyway (inches)	PCD	No holes	Dia.		
350	—	296	356	533	340	432	768	152	140	3 1/2	1/4 sq x 4 L	254	4	1/2 - 10 UNC	243	10434
400	—	369	413	597	384	533	868	154	143	3 1/2	1/4 sq x 4 1/2 L	254	4	1/2 - 10 UNC	404	12173
450	—	392	457	635	384	762	872	154	143	3 1/2	1/4 sq x 4 1/2 L	254	4	1/2 - 10 UNC	472	15652
500	—	437	511	699	414	914	1010	170	159	3 1/2	1/4 sq x 4 1/2 L	254	4	1/2 - 10 UNC	907	19130
600	—	437	616	813	414	1016	1041	170	159	3 1/2	1/4 sq x 4 1/2 L	254	4	1/2 - 10 UNC	968	21500

### Notes:

$K_v$  = The flow rate of water in m<sup>3</sup>/hr that will pass through a valve with a pressure drop of 1 bar (100 kPa) @ 20°C.

$C_v = 1.155 K_v$ .

Dimensions are nominal  $\pm 1$ mm.

**Ballcentric Valves - Figure 580 & 583**

Sizes 80 - 600mm

**Notes:**

1. The charted seating and unseating torques are the sum of all friction and resistance for opening and closing of the valve against the indicated pressure differential for normal service.
2. Normal Service: Clean liquid service at temperatures between minus 18°C to 100°C with no internal deposition or chemical attack. Operated a minimum of once per day.
3. The relationship between values are linear, therefore you can interpolate between nominated values.
4. The effect of dynamic torque is not considered in tabulation.
5. In sizing operators it is not necessary to include safety factors.

**Notes:**

To apply the as noted Application Factor Multipliers:

1. Find the base torque value by selecting the required valve size from the left hand column and read across to the intended line pressure column. Note the torque value. You can interpolate between line pressure values.
2. Find the zero pressure torque for the same valve on the same row and subtract this zero pressure torque from the value in step 1.
3. Multiply the zero pressure torque value by the expected Application Factors.
4. Add the difference between the zero pressure torque and the line pressure torque (value of step 2 plus value of step 3) to give the new torque value specific to the actual service conditions.

**Anticipated seating & unseating torque values - Nm (fully rated)**

Valve Size (mm)	Shut Off Pressure kPa/(bar)				
	Normal Service				
	0 (0)	300 (3)	600 (6)	1034 (10.3)	1200 (12)
80	61	67	77	88	98
100	102	116	150	197	218
150	245	273	302	390	422
200	435	507	601	832	911
250	694	800	946	1278	1360
300	911	1072	1235	1659	1904
350	1210	1659	2197	2720	-
400	1360	1895	2410	2992	-
450	1986	2342	2934	3808	-
500	2326	2753	3425	4216	-
600	2448	3045	3786	4760	-

For conditions that vary from those noted, then apply the following Application Factor Multipliers;

**Line Media -**

Dry service with abrasives, cement	x 3.3
Dry gas other than air	x 2.5
Dry air	x 1.7
Liquid media other than water	x 1.2
Lubricating oil	x 0.7

**Frequency -**

Operated less than once per day	x 1.1
---------------------------------	-------

**Condition -**

Corrosive seating surfaces or deposit buildup	x 1.5
Chemical attack: Consult factory	

**Example:**

A 150mm Figure 580 valve is to be used in a clean water application. The line pressure is 1000 kPa (10 bar) @ 80°C. The valve may only cycle twice per month.

1. Using the fully rated Torque Values Table  
Base Torque value for 150mm @ 1000 kPa (10 bar)  
= interpolating between values = 383Nm
2. Find torque value at zero kPa = 245Nm  
Subtract 383 - 245 = 138Nm
3. Multiply zero pressure torque value by Application Factors  
Application Factors  
Operated less than once per day = x 1.1  
245 x 1.1 = 270Nm
4. Add the difference between zero pressure and line pressure, as per step 2 to the value determined in step 3.  
138 + 270 = 408Nm

**The new torque value for this valve, specific to the actual service conditions is 408 Nm.**



## Ballcentric valves - Figure 580 & 583

Sizes 80 - 600mm

### Kv Values - Flowrate co-efficients

Valve Size mm	Angle of plug opening								Full Open
	10°	20°	30°	40°	50°	60°	70°	80°	
80	2	8	37	81	125	186	260	375	492
100	3	40	99	190	264	402	608	819	849
150	21	101	208	362	546	768	1067	1433	1727
200	23	161	371	628	910	1237	1639	2296	2916
250	40	196	458	870	1342	1880	2513	3698	4213
300	57	316	699	1249	1932	2810	3736	5376	6611
350	106	489	1128	1846	2838	4129	5217	7930	10434
400	133	554	1340	2176	3214	4900	6087	9252	12173
450	194	716	1721	2842	4210	6300	7826	11895	15652
500	218	892	2104	3425	5076	7700	9565	14539	19130
600	320	1620	3841	5130	8724	10782	12124	17240	21500

#### Notes:

Kv = The volume of water in m<sup>3</sup>/hr that will pass through a given valve opening at a pressure drop of 1 bar (100 kPa).

Cv = 1.155 Kv

### Typical specifying sequence

<b>Example:</b>	<b>150</b>	<b>F583</b>	<b>218</b>	<b>AD</b>
	Valve size	Figure No.	Trim code	End connections
<b>Size Range:</b>	80 - 600mm			
<b>Figure No.:</b>	F580/583 - Ballcentric Plug Valve			
<b>Figure No</b>	<b>Trim code</b>	<b>Body material</b>	<b>Plug/Stem material</b>	<b>End connection</b>
F583	218	Cast Iron	Cast Iron (Buna-N Coated)	2129 D

### End connections available (depending on flange OD compatibility)

Standard flange drilling AS4087 CL16 (AS2129 D).

Other flange drillings available on request, please consult factory.

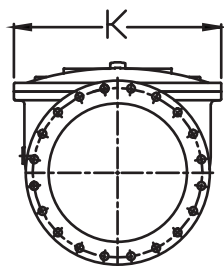
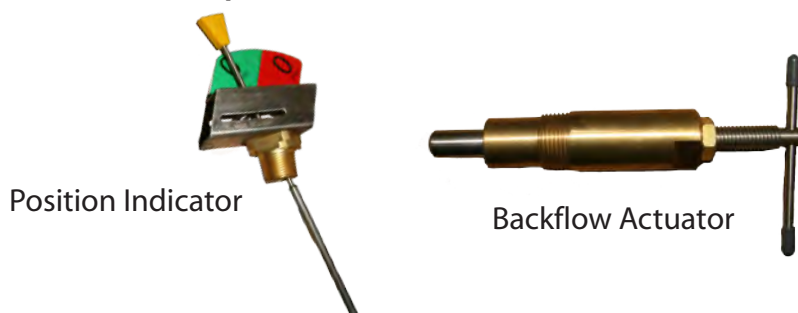




## Features:

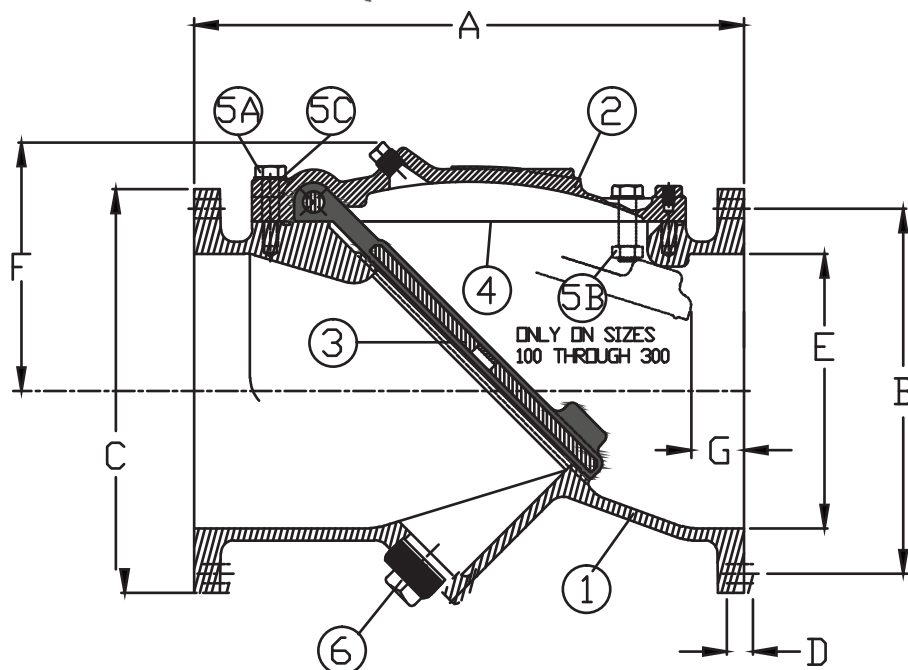
- 100% unrestricted flow area for improved flow characteristics and lower head loss
- One piece precision molded steel disc reinforced with nylon and backed by a 25 year warranty
- Memory-flex disc is the only moving part for long life and minimal maintenance
- Full sized top access port allows disc removal without removing valve from line
- Integral O-ring in disc assures positive seating at high and low pressures
- "Short Disc Stroke" combined with memory flex disc action reduces potentially destructive water hammer
- Backflow capabilities are available by means of an optional screw type backflow actuator
- Every Swing-Flex® Check Valve is 100% tested including a seat test to assure drop tight sealing and hydrostatic testing to assure the integrity of the casting

## Optional Accessories



## Technical Data

- Sizes: DN50-600 (2" - 24")
- Max. Working Pressure: 1600kPa
- Ductile Iron Body
- Fusion Bonded Epoxy Coated
- Buna-N Encapsulated Disc
- Flanges Drilled AS4087 Class 16
- 316 Stainless Steel Fasteners And Plugs
- **Lay Length To AS3578 & AS4794**



## HYDRO TEST PRESSURE:

1.5 TIMES COLD WORKING PRESSURE - CWP

SEE DRAWING NO. VM-502AU-M FOR STANDARD MATERIALS OF CONSTRUCTION.

DRAWING DEPICTS 375 mm SIZE TO SCALE

### AS4087 CLASS 16, Millimeters

VALVE SIZE	MODEL NO.	CWP BAR	A	B	C	D	E	F	G	K	BOLT SIZE	NO. OF BOLTS	WT. Kg
80	503AU	16	260	146	185	19	76	130	41	190	M16	4	20
100	504AU	16	330	178	215	19	102	146	54	210	M16	4	32
150	506AU	16	410	235	280	21	152	173	54	284	M16	8	57
200	508AU	16	540	292	335	22	203	213	73	406	M16	8	109
250	510AU	16	640	356	405	24	245	273	80	533	M20	8	190
300	512AU	16	700	406	455	30	305	317	88	610	M20	12	290
375	515AU	16	820	495	550	30	375	330	92	591	M24	12	330
450	518AU	16	970	584	640	32	457	388	80	718	M24	12	546
600	524AU	16	1220	756	813	48	610	489	127	914	M27	16	998

## **4 FLOWMETER**

**SUPPLIER:**

ABB Australia  
36 Archerfield Road  
Darra, QLD, 4076

Ph: (07) 3713 9111

Fax: (07) 3713 9297

**MODEL:**

250dia. WATERMASTER FLOWMETER

Data sheet DS/WM-EN Rev. L

# WaterMaster Electromagnetic flowmeter

The perfect fit for all water  
industry applications



## One solution for all your needs

- designed for use in all water and waste water applications, from sewage plants to distribution networks

## State-of-the-art memory technology

- revolutionary data storage enables transmitter interchange and commissioning without the need for re-configuration

## Versatile and simple configuration

- 'Through-the-Glass' (TTG) configuration eliminating the need to remove the cover
- smart key based functionality
- 'Easy Setup' function

## VeriMaster in situ verification software option

- enables the customer to perform in situ verification of the flowmeter system

## Unparalleled service ability

- fault-finding Help texts on the display
- minimized downtime with replaceable electronics cartridges

## MID and OIML R49 approved with R49 self-checking

- Type-approved to accuracy Class 1 and Class 2 for any pipe orientation and bidirectional flows
- Type P-approved continuous self-checking of the sensor and transmitter to ensure the highest accuracy and long term performance

## Innovative sensors for all applications

- optimized full-bore series for optimum turndown / low pressure drop, irrigation applications
- full-bore series for general-purpose water metering applications
- buriable sensors eliminating the need for costly chamber construction

## HART, PROFIBUS DP and MODBUS

- Access to all status information

## WaterMaster

### Electromagnetic flowmeter

## The Company

ABB is an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a world leader in process automation technology our worldwide presence, comprehensive service and application-oriented know-how make ABB a leading supplier of flow measurement products.

## Introduction

### Setting the standard for the Water Industry

The WaterMaster range, available in sizes 10 to 2400 mm ( $\frac{3}{8}$  to 96 in.), is designed specifically for use on the many diverse applications encountered in the Water and Waste-water industry. The modular design concept offers flexibility, cost-saving operation and reliability while providing a long service life and exceptionally low maintenance.

Integration into ABB asset management systems and use of the self-monitoring and diagnostic functions increase the plant availability and reduce downtimes.

### VeriMaster – the verification tool

An easy-to-use utility, available through the infra red service port, it uses the advanced self-calibration and diagnostic capability of WaterMaster, coupled with fingerprinting technology, to determine the accuracy status of the WaterMaster flowmeter to within  $\pm 1$  % of its original factory calibration. VeriMaster also supports printing of calibration verification records for regulatory compliance.



### Diagnostic functions

Using its diagnostic functions, the flowmeter monitors both its own operability and the process. Limit values for the diagnostic parameters can be set locally. When these limits are exceeded, an alarm is tripped. In the event of an error, diagnostic-dependent help text appears on the display and this considerably simplifies and accelerates the troubleshooting procedure.

In accordance with NAMUR NE107, alarms and warnings are classified with the status of 'Maintenance Required', 'Check Function', 'Failure' and 'Out of Specification'.

### Flow performance

Utilizing its advanced filtering methods, the WaterMaster improves accuracy even under difficult conditions by separating the noise from the measuring signal. WaterMaster has an operating flow range with  $\pm 0.4$  % accuracy as standard ( $\pm 0.2$  % optional) in both forward and reverse flow directions.

### Easy and quick commissioning

'Fit-and-Flow' data storage inside WaterMaster eliminates the need to match sensor and transmitter in the field. On initial installation, the self-configuration sequence automatically replicates into the transmitter all calibration factors, meter size and serial numbers, as well as customer site-specific settings, eliminating the potential for error.

### Intuitive, convenient navigation

The 'Easy Setup' function reliably guides unpracticed users through the menu step by step. The smart key based functionality makes handling a breeze – it's just like using a cell phone. During configuration, the permissible range of each parameter is indicated on the display and invalid entries are rejected.

### Universal transmitter – powerful and flexible

The backlit display can be rotated easily without the need for tools. The contrast is adjustable and the display fully-configurable. The character size, number of lines and display resolution (number of decimal points) can be set as required. In multiplex mode, several different display options can be pre-configured and invoked one after the other.

The smart modular design of the transmitter unit enables easy disassembly without the need to unscrew cables or unplug connectors. HART is used as the standard communications protocol. Optionally, the transmitter is available with PROFIBUS DP or MODBUS communication.

### Assured quality

WaterMaster is designed and manufactured in accordance with international quality procedures (ISO 9001) and all flowmeters are calibrated on nationally-traceable calibration rigs to provide the end-user with complete assurance of both quality and performance of the flowmeter.



## WaterMaster

### Electromagnetic flowmeter

### WaterMaster – always the first choice

WaterMaster sets the standard for the water industry. The specification, features and user benefits offered by this range are based on ABB's worldwide experience in this industry and they are all targeted specifically to the industry's requirements.

### Submersible and buriable

WaterMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life under the arduous conditions experienced in the Water and Waste Industry. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus ensuring suitability for installation in chambers and metering pits that are susceptible to flooding.

A unique feature of the WaterMaster sensors is that sizes DN40 to DN2400 (1½ to 96 in. NB) are buriable; installation simply involves excavating to the underground pipe, fitting the sensor, cabling back to the transmitter and then backfilling the hole.



*The WaterMaster family*

### Overview of the WaterMaster

A wide range of features and user benefits are built into WaterMaster as standard:

- bi-directional flow
- OIML-type continuous self-checking, with alarms, ensures both sensor and transmitter accuracy
- true electrode and coil impedance measurement
- comprehensive simulation mode
- universal switch-mode power supply (options are available for AC and DC supplies)
- comprehensive self-diagnostics compliant with NAMUR NE107
- programmable multiple-alarm capability
- bus options: HART (4 to 20 mA), PROFIBUS DP (RS485), MODBUS (RS485)
- 3 configurable pulse / frequency and alarm outputs
- advanced infrared service port supports remote HMI, HART, cyclic data out and parameter download
- VeriMaster in situ verification software available as option
- read-only switch and ultra-secure service password for total security





## WaterMaster

### Electromagnetic flowmeter

### OIML / MID approved

WaterMaster has been type tested and Internationally approved to the highest accuracy class 1 and 2 for cold and hot potable water meters – OIML R49-1 (Organisation Internationale de Métrologie Légale). For full details, OIML R49 is available to download from [www.oiml.org](http://www.oiml.org). Its requirements are very similar to other International standards, such as EN14154 and ISO4064.

WaterMaster has been assessed by type approval at the National Measurement Office (NMO) to OIML R49 and passed to the very highest accuracy designations for sizes DN40 to DN200 (1½ to 8 in. NB).

The approval is for:

- Class 1 and Class 2 accuracy (calibration option)
- Environmental class T50 for water temperatures of 0.1 to 50 °C (32.18 to 122 °F)
- Electromagnetic Environment E2 (10 V/m)
- Any pipe orientation
- 5 Diameters upstream pipe
- 0 Diameters downstream pipe
- Pressure Loss Class <0.25 bar (3.62 psi)
- Integral or remote transmitter (<200 m [ $<656$  ft.] cable)
- DN40 to DN200 (1½ to 8 in. NB), bi-directional flow

A major advance in WaterMaster is the self-checking capabilities that meet and exceed the R49 requirements and is the first electromagnetic flowmeter to be approved to OIML Type P permanent self checking during normal operation (not just at startup) and alarm indication for:

- transmitter and sensor status, with an accuracy alarm
- program ROM and RAM status
- double, independent storage of totalizer values, in both the sensor and transmitter non-volatile memories
- display test

The OIML R49-1 certificate of conformity is available from:

<http://www.abb.com/product/seitp330/b42ec2377d3293cdc12573de003db93b.aspx>

WaterMaster is also approved under the EU Measuring Instruments Directive (MID) 2004/22/EC, that covers putting into use water flowmeters for certain applications. MID WaterMaster is secured against tampering and is available as an option, along with fingerprinting for ABB VeriMaster in situ verification product, with certificate printout to  $\pm 1$  % accuracy.

WaterMaster certificates of EC type-examination of a measuring instrument are available from:

<http://www.abb.com/product/seitp330/b42ec2377d3293cdc12573de003db93b.aspx>

### Superior control through advanced sensor design

The innovative, patented octagonal sensor design improves flow profile and reduces up- and down-stream piping requirements for the most commonly used sizes of 40 to 200 mm (1½ to 8 in.). This optimized full bore meter provides very impressive results in the most difficult of installation requirements.

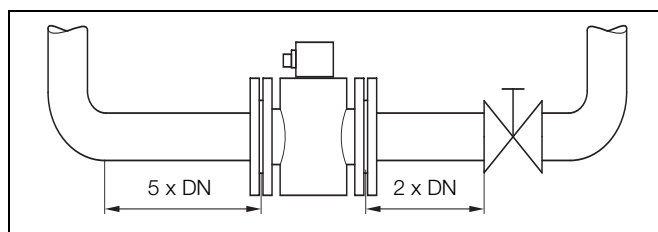
The content below is the extract from OIML R49 test requirements:

#### 6.8 Flow disturbance tests (R 49-1, 5.3.4)

##### 6.8.1 Object of tests

To verify that the meter complies with the requirements of 5.3.4 in R 49-1 for forward flow and where appropriate for reverse flow (see R 49-1, 3.2.5).

*Note 1: The effects on the error (of indication) of a water meter of the presence of specified, common types of disturbed flow upstream and downstream of the meter are measured.*



Recommended upstream / downstream conditions

*Note 2: Types 1 and 2 disturbance devices are used in the tests to create left-handed (sinistrorsal) and right-handed (dextrorsal), rotational velocity fields (swirl), respectively. The flow disturbance is of a type usually found downstream of two 90° bends directly connected at right angles. A type 3 disturbance device creates an asymmetric velocity profile usually found downstream of a protruding pipe joint, single bend, or a gate valve not fully opened.*



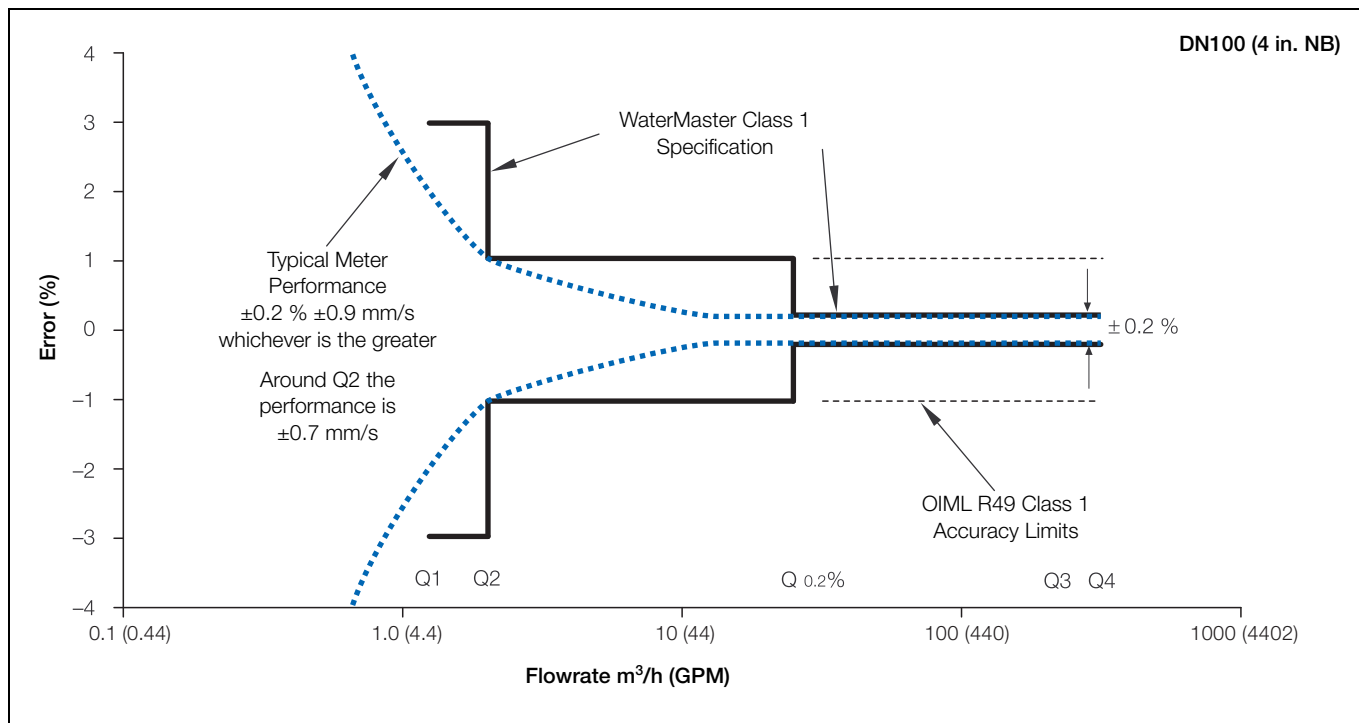
WaterMaster octagonal bore

The unique design of the reduced-bore sensor conditions the flow profile in the measuring section so that distortions in the flow profile, either upstream or downstream, are flattened. The result is excellent in situ flowmeter performance, even with very bad hydraulic installation conditions.

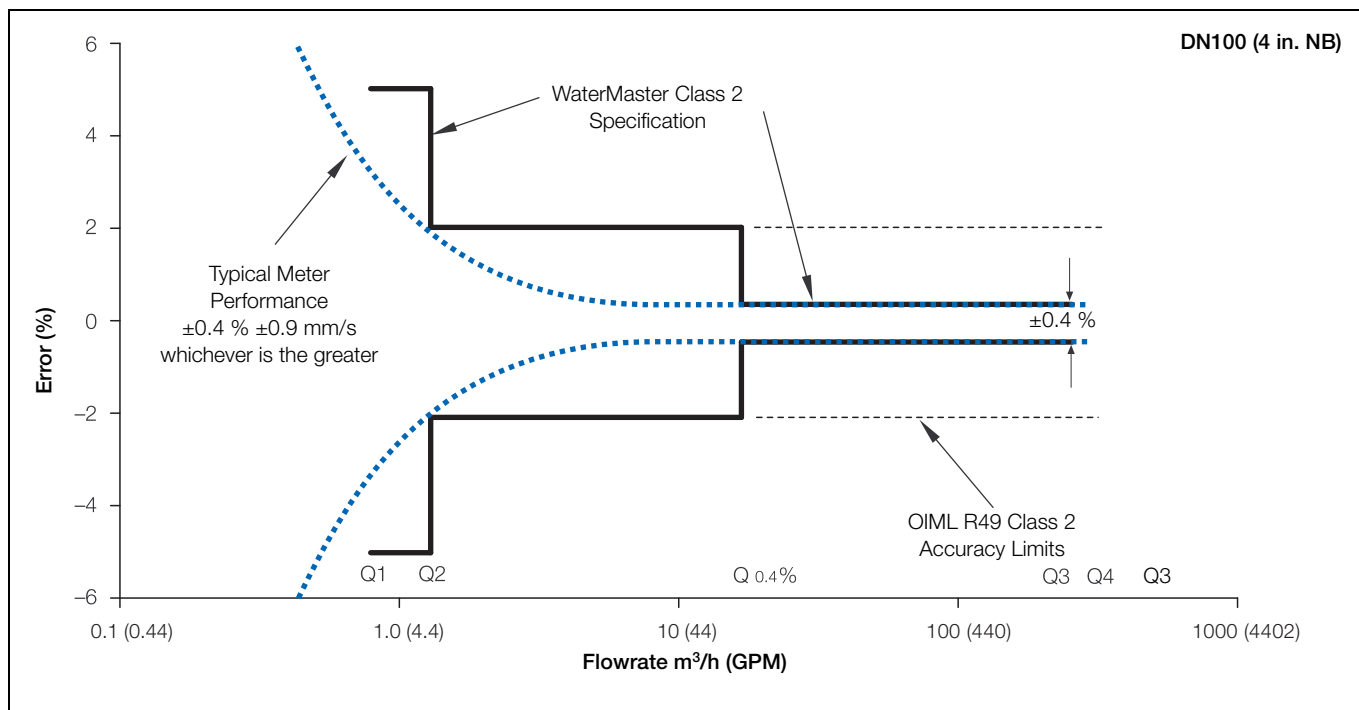
**WaterMaster**  
Electromagnetic flowmeter

## Specification

### WaterMaster specification to OIML R49 Class 1



### WaterMaster specification to OIML R49 Class 2



Although OIML R49 does not define the flow accuracy below Q1, WaterMaster continues to measure flow at lower flow rates down to a cutoff velocity of  $\pm 5 \text{ mm/s}$  ( $\pm 0.2 \text{ in./s}$ ). The accuracy between cutoff and Q1 is typically  $\pm 0.9 \text{ mm/s}$  ( $\pm 0.04 \text{ in./s}$ ).

### WaterMaster optimized full-bore meter / full-bore meter flow performance (m<sup>3</sup>/h)

DN	Q4 (m <sup>3</sup> /h)	Q3 (m <sup>3</sup> /h)	Standard Calibration 0.4 % Class 2			High Accuracy Calibration 0.2 % Class 1		
			Q <sub>0.4%</sub> (m <sup>3</sup> /h)	Q2 (m <sup>3</sup> /h)	Q1 (m <sup>3</sup> /h)	Q <sub>0.2%</sub> (m <sup>3</sup> /h)	Q2 (m <sup>3</sup> /h)	Q1 (m <sup>3</sup> /h)
10	3.1	2.5	0.167	0.02	0.006	0.31	0.02	0.012
15	7.9	6.3	0.42	0.04	0.016	0.8	0.05	0.03
20	12.5	10	0.67	0.063	0.025	1.3	0.08	0.05
25	20	16	1.1	0.13	0.05	2	0.13	0.08
32	31.25	25	1.67	0.13	0.08	3	0.20	0.13
40*	50	40	4.2	0.25	0.1	6	0.32	0.2
50*	79	63	4.2	0.4	0.16	8	0.5	0.32
65*	125	100	6.7	0.63	0.25	13	0.8	0.5
80*	200	160	11	1	0.4	16	1.3	0.8
100*	313	250	17	1.6	0.63	25	2	1.3
125*	500	400	27	2.5	1	40	3.2	2
150*	788	630	42	4	1.6	63	5	3.2
200*	1,250	1,000	67	6.3	2.5	100	8	5
250	2,000	1,600	107	10	4	160	13	8
300	3,125	2,500	167	16	6.3	250	20	13
350	5,000	4,000	267	25	10	400	32	20
400	5,000	4,000	267	25	10	400	32	20
450	7,875	6,300	420	39	16	630	50	32
500	7,875	6,300	420	39	16	630	50	32
600	12,500	10,000	667	63	25	1000	80	50
700	20,000	16,000	1067	100	40	1600	160	100
750 / 760	20,000	16,000	1067	100	40	1600	160	100
800	20,000	16,000	1067	100	40	1600	160	100
900	31,250	25,000	1667	156	63	2500	250	156
1000	31,250	25,000	1667	156	63	2500	250	156
1050	31,250	25,000	1667	156	63	2500	250	156
1100	31,250	25,000	1667	156	63	2500	250	156
1200	50,000	40,000	2667	250	100	4000	400	250
1350	78,750	63,000	4200	394	158	6300	630	394
1400	78,750	63,000	4200	394	158	6300	630	394
1500	78,750	63,000	4200	394	158	6300	630	394
1600	78,750	63,000	4200	394	158	6300	630	394
1650	78,750	63,000	4200	394	158	6300	630	394
1800	125,000	100,000	6667	625	250	10000	1000	625
1950	125,000	100,000	6667	625	250	10000	1000	625
2000	125,000	100,000	6667	625	250	10000	1000	625
2100	125,000	100,000	6667	625	250	10000	1000	625
2200	200,000	160,000	16000	1600	640	16000	1600	1000
2400	200,000	160,000	16000	1600	640	16000	1600	1000

\* OIML R49 Certificate of Conformance to Class 1 and Class 2, with OIML R49 and MID versions available.

**Note.** OIML R49–1 allow Class 1 for meters only with Q<sub>3</sub> ≥ 100 m<sup>3</sup>/h. Meters outside this range have been tested and conform to Class 1.



**WaterMaster**  
Electromagnetic flowmeter

**WaterMaster optimized full-bore meter / full-bore meter flow performance (GPM)**

NPS/NB (DN)	Q4 (GPM)	Q3 (GPM)	Standard Calibration 0.4 % Class 2			High Accuracy Calibration 0.2 % Class 1		
			Q0.4% (GPM)	Q2 (GPM)	Q1 (GPM)	Q0.2% (GPM)	Q2 (GPM)	Q1 (GPM)
3/8 (10)	13.8	11	0.73	0.06	0.035	1.38	0.09	0.053
1/2 (15)	34.7	27.7	1.85	0.14	0.09	3.48	0.22	0.14
3/4 (20)	55	44	2.94	0.22	0.14	5.5	0.35	0.22
1 (25)	88	70.4	4.7	0.35	0.22	8.8	0.57	0.35
1 1/4 (32)	137.6	110	7.3	0.57	0.35	13.2	0.88	0.57
1 1/2 (40)	220	176	18.5	0.89	0.56	26.4	1.41	0.88
2 (50)	347	277	18.5	1.41	0.88	34.7	2.22	1.39
2 1/2 (65)	550	440	29.4	2.24	1.40	55.0	3.52	2.20
3 (80)	881	704	47.0	3.58	2.24	70.4	5.64	3.52
4 (100)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
5 (125)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
6 (150)	3,467	2,774	185	14.1	8.81	277	22.2	13.9
8 (200)	5,504	4,403	294	22.4	14.0	440	35.2	22.0
10 (250)	8,806	7,045	470	35.8	22.4	704	56.4	35.2
12 (300)	13,759	11,007	734	55.9	34.9	1,101	88.1	55.0
14 (350)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
16 (400)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
18 (450)	34,673	27,738	1,849	141	88.1	2,774	222	139
20 (500)	34,673	27,738	1,849	141	88.1	2,774	222	139
24 (600)	55,036	44,029	2,935	224	140	4,403	352	220
27/28* (700)	88,057	70,446	7,045	451	282	7,045	704	440
30 (760)	88,057	70,446	7,045	451	282	7,045	704	440
32 (800)	88,057	70,446	7,045	451	282	7,045	704	440
36 (900)	137,590	110,072	11,007	704	440	11,007	1,100	688
39/40* (1000)	137,590	110,072	11,007	704	440	11,007	1,100	688
42 (1050)	137,590	110,072	11,007	704	440	11,007	1,100	688
48 (1200)	220,143	176,115	17,611	1,127	704	17,611	1,761	1,101
54 (1400)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
60 (1500)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
66 (1600)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
72 (1800)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
78 (2000)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
84 (2200)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403
96 (2400)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403

\*Size is dependent on flange specification

**WaterMaster**

## Electromagnetic flowmeter

**Specification – sensor****Functional specification****Pressure limitations**

As per flange rating – non approved  
PN16 for OIML R49, MID Approved

**Pressure equipment directive 97/23/EC**

This product is applicable in networks for the supply, distribution and discharge of water and associated equipment and is therefore exempt.

**Temperature limitations**

Ambient temperature  
Remote transmitter –20 to 70 °C (–4 to 158 °F)  
Integral transmitter –20 to 60 °C (–4 to 140 °F)  
Process temperature –6 to 70 °C (21 to 158 °F) – non approved  
0.1 to 50 °C (32.2 to 122 °F) – OIML R49 T50  
Approved

**IP rating**

IP68 (NEMA 6) to 10m (33 ft.) depth  
IP67 (NEMA 4X)

**Buriable (sensor only)**

FEV, FEF and FEW (DN700 to 2400 [27/28\* to 96 in. NB]  
to 5 m (16 ft.)

\*Size is dependent on flange specification

**Conductivity**

>5µS cm<sup>-1</sup>

**Transmitter mounting**

Integral or remote

**Electrical connections**

20 mm glands  
1/2 in. NPT  
20 mm armored glands

**Sensor cable**

ABB WaterMaster cable available in two forms –  
standard and armored  
Maximum length 200 m (660 ft.)

**Physical specification****Wetted parts****Electrode material**

Stainless steel 316 L / 316 Ti  
Super-austenitic steel  
Hastelloy® C-22 and Hastelloy C4  
(other electrode materials available on request)

**Potential equalizing rings**

Minimum of 1 recommended  
(for insulated bore upstream and downstream pipes)

**Lining material / potable water approvals**

			Potable Water Approvals				
Code	Size Range	Liner	WRAS	WRAS 60°C	ACS	NSF	AZ/ NZS 4020
FEW	DN10 – 32 ( <sup>3</sup> / <sub>8</sub> – 1 <sup>1</sup> / <sub>4</sub> in. NB)	PTFE	✓				
FEV	DN40 – 200 (1 <sup>1</sup> / <sub>2</sub> – 8 in. NB)	Poly-propylene	✓			NSF-61	✓
FEF	DN250 – 600 (10 – 24 in. NB)	Elastomer	✓		✓	NSF-61	✓
FEW	DN700 – 2400 (27/28* – 96 in. NB)	Elastomer	✓				
FEW	DN700 – 2400 (27/28* – 96 in. NB)	Hard rubber		✓		NSF approved material	

\*Size is dependent on flange specification

**Lining protection plates**

Not required

**Installation conditions (recommended)**

Upstream ≥ 5D  
Downstream ≥ 2D

**Pressure loss**

Negligible at Q3 All full bore meters  
<0.25 bar (<3.62 psi) at Q3 FEV (DN40 to 200 [1 <sup>1</sup>/<sub>2</sub> to 8 in. NB])

**Non-wetted parts****Flange material**

Carbon steel (DN20 to DN2400 [<sup>3</sup>/<sub>4</sub> to 96 in. NB])  
Stainless steel (DN10 to DN2400 [<sup>3</sup>/<sub>8</sub> to 96 in. NB])

**Housing material**

Carbon steel FEV (DN40 to 200 [1 <sup>1</sup>/<sub>2</sub> to 8 in. NB])  
FEW (DN700 to 2400 [18 to 96 in. NB])  
Plastic FEF (DN250 to 600 [10 to 24 in. NB])  
Aluminium FEW (DN10 to 400 [<sup>3</sup>/<sub>8</sub> to 16 in. NB])

**Terminal box material**

Polycarbonate, aluminium or stainless

**Cable gland material**

Plastic, brass or stainless steel

**Paint specification**

Paint coat ≥70 µm thick RAL 9002 (light grey)

## WaterMaster

### Electromagnetic flowmeter

## Specification – transmitter

### Functional specification

#### Power supply

Mains	85 to 265 V AC @ <7 VA
Low voltage	24 V AC +10 %/-30 % @ <7 VA
DC	24 V $\pm$ 30 % @ <0.4 A
Supply voltage fluctuations within the specified range have no effect on accuracy	

#### Digital Outputs (3)

- Rating 30 V @ 220 mA, open collector, galvanically isolated
- Maximum output frequency 5250 Hz
- 1 off dedicated to Alarm / Logic, programmable function
- 2 off configurable to either Pulse / Frequency or Alarm/Logic function

#### Current output – HART FEX100 variant

- 4 to 20 mA or 4 to 12/20 mA, galvanically isolated
- Maximum loop resistance 750  $\Omega$
- HART protocol Version 5.7 (HART registered)
- Signal levels compliant with NAMUR NE 43 (3.8 to 20.5 mA)
- Low alarm 3.6 mA, High alarm 21.8 mA

#### Additional accuracy

- $\pm 0.1$  % of reading
- Temperature coefficient: typically  $< \pm 20$  ppm/ $^{\circ}\text{C}$

#### RS485 Communications – PROFIBUS FEX100-DP variant

- Registered name: FEX100-DP
- RS485 (9.6kbps to 1.5Mbps), galvanically isolated
- DPV0, DPV1
- PA Profile 3.01
- Standard idents: 9700, 9740, 9741
- FEX100-DP specific ident: 3431
- 3 Concurrent MS2 master connections

#### RS485 Communications – MODBUS FEX100-MB variant

- MODBUS RTU protocol
- RS485 (9.6kbps to 115.2kbps), galvanically isolated

#### Electrical connections

- 20 mm glands  $\frac{1}{2}$  in. NPT, 20 mm armored glands

#### Temperature limitations

- Ambient temperature  $-20$  to  $60$   $^{\circ}\text{C}$  ( $-4$  to  $140$   $^{\circ}\text{F}$ )
- Temperature coefficient Typically  $< \pm 10$  ppm/ $^{\circ}\text{C}$  @ Vel  $\geq 0.5$  m/s

#### Environmental protection

- Humidity: 0 to 100 %
- Rating: IP67 (NEMA 4X) to 1m (3.3 ft.) depth

#### Tamper-proof security

- Write access prevented by internal switch combined with external security seals for MID applications

#### Languages

- English, French, German, Italian, Spanish, Polish

#### Infrared service port

- USB adapter (accessory), USB 1.1. and 2.0 compatible
- Driver software for Windows 2000, XP, 7 (32-bit) and Vista

#### Housing material

- Powder-coated aluminium with glass window

#### Paint specification

- Paint coat  $\geq 70$   $\mu\text{m}$  thick RAL 9002 (light grey)

#### Transmitter vibration testing

- Vibration level: 7 m/s<sup>2</sup>
- Frequency range: 20 to 150 Hz
- No. of sweeps in 3 orthogonal planes: 20
- Undetectable shift in transmitter span or zero performance

#### Hazardous approvals (HART variant only)

- FM & FMc Class 1 Div 2
- (FM listing NI / 1 / 2 / ABCD / T4, S / II, III / 2 / FG / T4, Ta=60C; Type 4X, IP67 – for transmitter and integral mounting Ta=70C, Type 6P, IP68 – for remote sensor type, IP67 on DN10 to 32 [ $\frac{3}{8}$  to  $1\frac{1}{4}$  in.NB])
- (FMc listing NI / 1 / 2 / ABCD / T4, DIP / II, III / 2 / FG / T4, Ta=60C; Type 4X, IP67 – for transmitter and integral mounting Ta=70C, Type 6P, IP68 – for remote sensor type, IP67 on DN10 to 32 [ $\frac{3}{8}$  to  $1\frac{1}{4}$  in.NB])
- FET, FEV, FEW and FEF DN700 to 2200 (27/28" to 84 in. NB) only
- \*Size is dependent on flange specification

#### Declaration of Conformance

- Copies of CE and PED certification will be available on request.
- WaterMaster has OIML R49 Certificate of Conformity to accuracy class 1 and 2 (FEV DN40 to 200 [ $1\frac{1}{2}$  to 8 in.NB]). Copies of accuracy certification are available on request.
- WaterMaster (FEV DN40 to 200 [ $1\frac{1}{2}$  to 8 in.NB]) has been type examined under directive MID 2004/22/EC, Annex MI-001. Copies of this certificate are available on request.

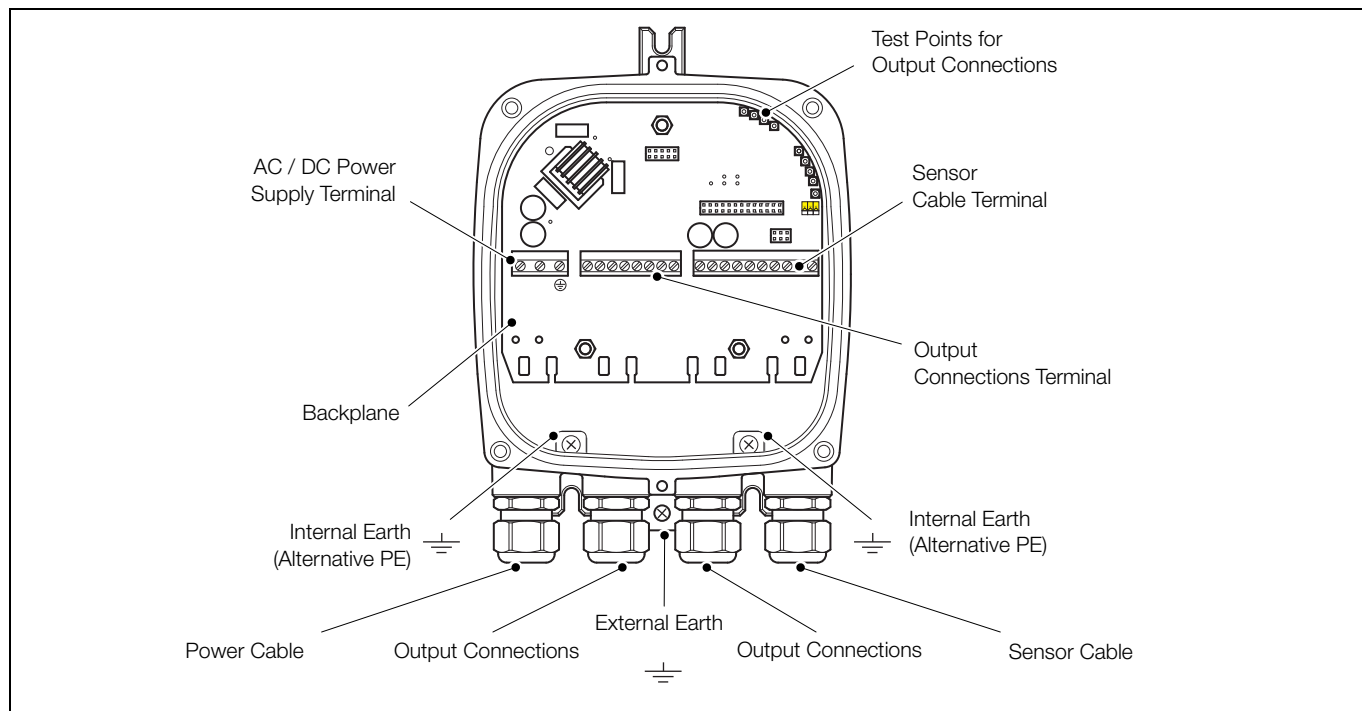
## WaterMaster

### Electromagnetic flowmeter

## Transmitter connections

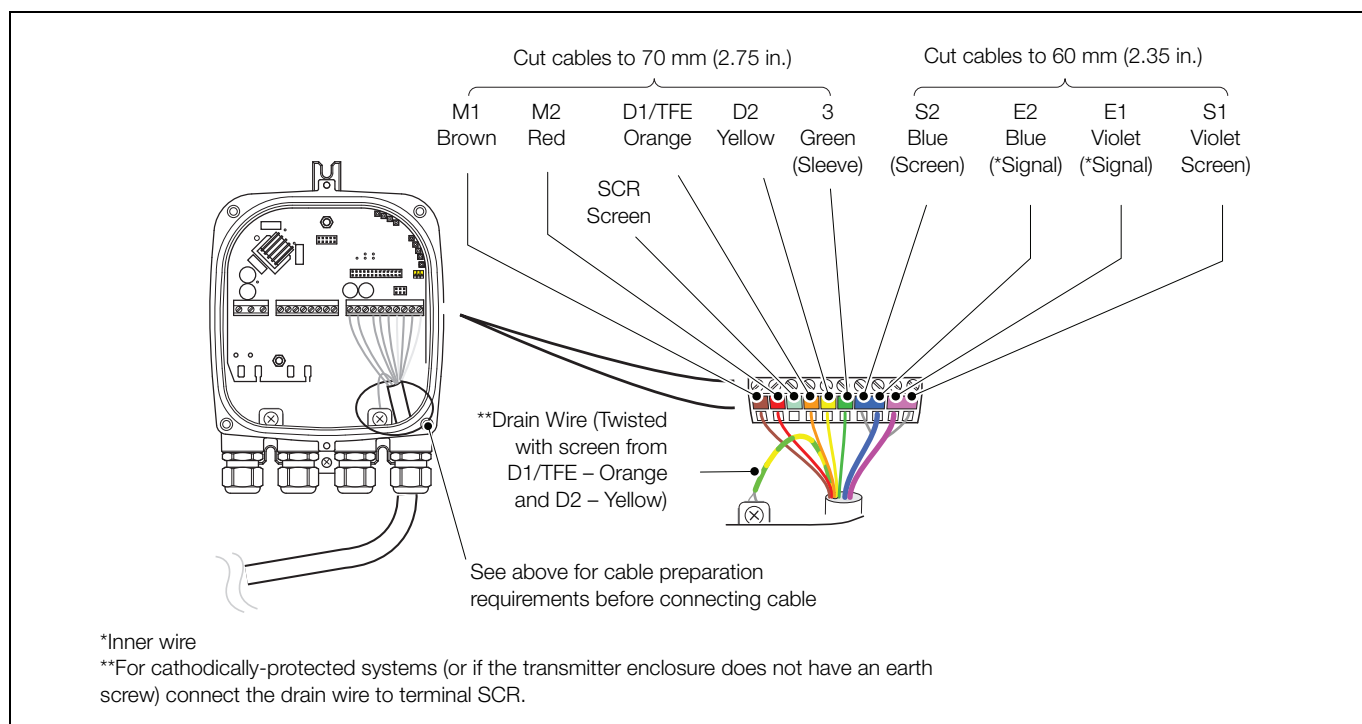
### Transmitter terminal connections overview

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and safety precautions – refer to the User Guide OI/FET100-EN.



Cable gland / conduit entry (remote transmitter shown)

### Sensor cable terminal connections and recommended cable lengths



Sensor cable connections at transmitter terminal block – standard system

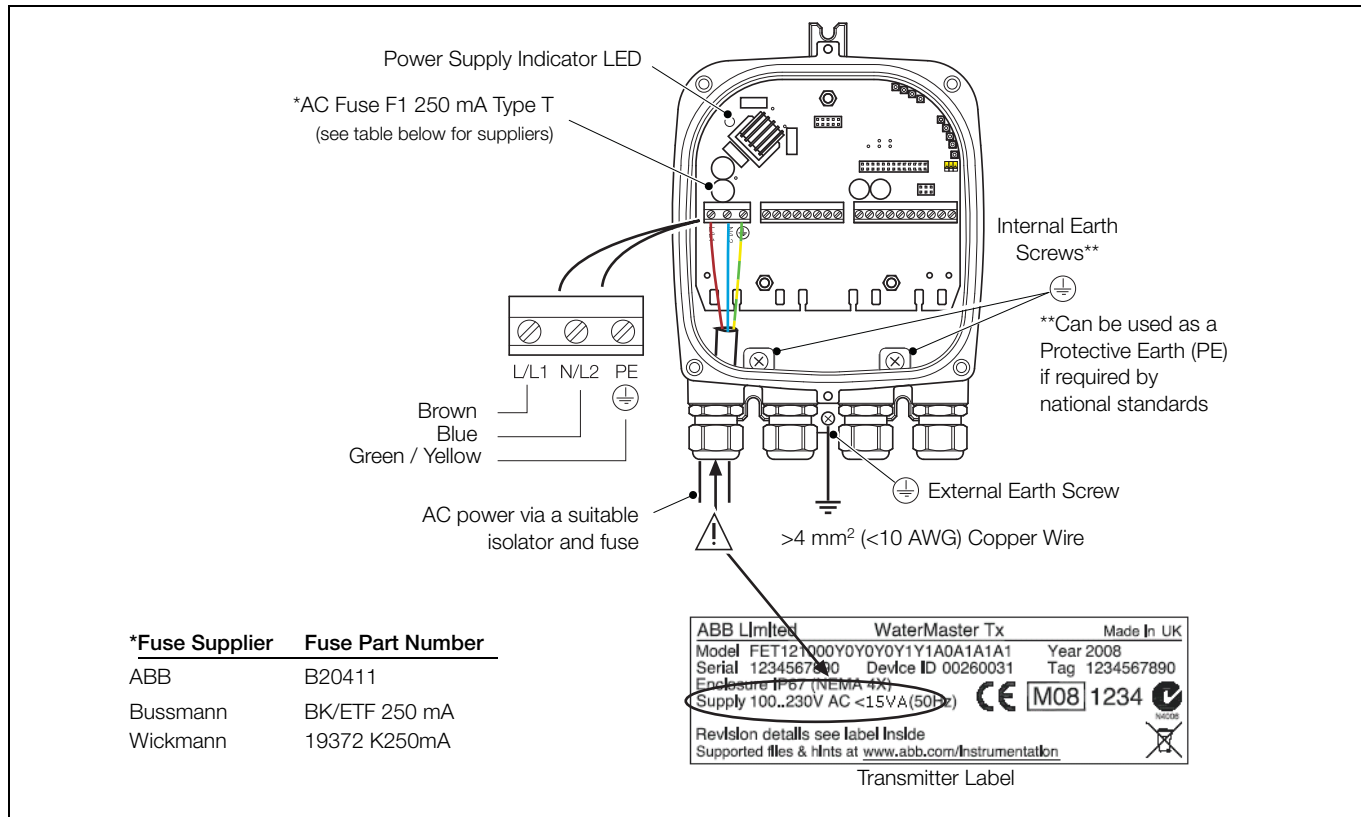


## WaterMaster

Electromagnetic flowmeter

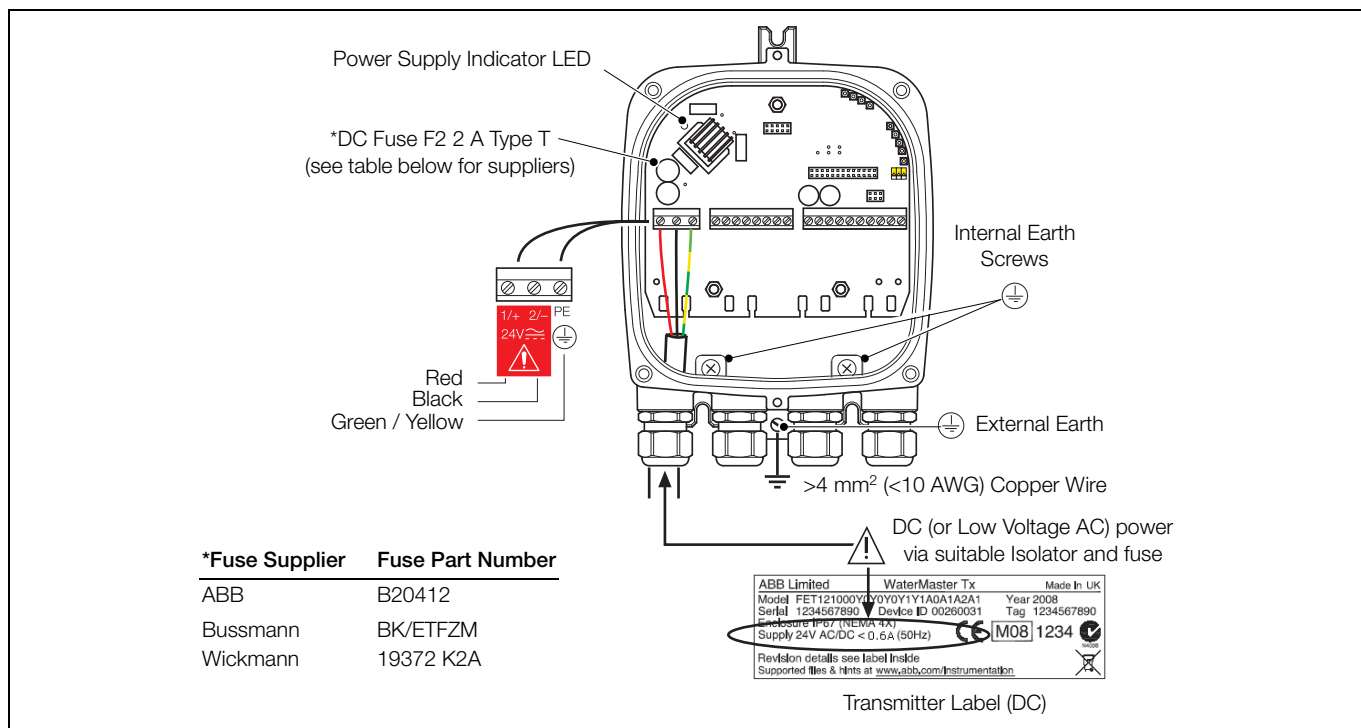
### Power supply connections

#### AC power supply



#### AC power supply connections

#### DC (and low voltage AC) power supply



#### DC (and low voltage AC) power supply connections

## WaterMaster

### Electromagnetic flowmeter

### Configuration DIP switches

Three configuration DIP switches are mounted on the transmitter backplane board.

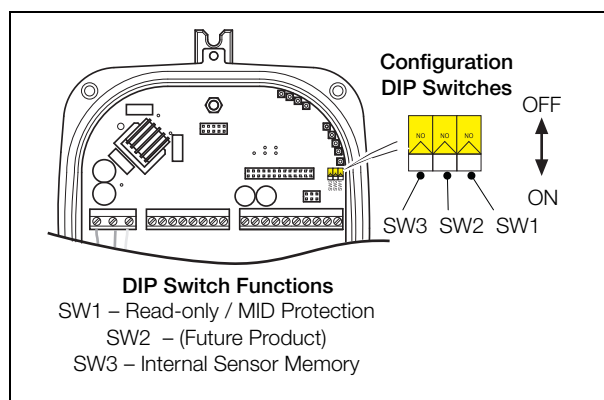
These are factory-set as follows:

- Remote transmitter – all OFF
- Integral transmitter – SW3 ON

For MID-compliant flowmeters the read-only / MID protection switch is set to 'ON' to ensure the meter is secure from tampering.

For HART software versions prior to 01.02.XX, this switch (set after commissioning) prevents login via the keypad or bus at any security level.

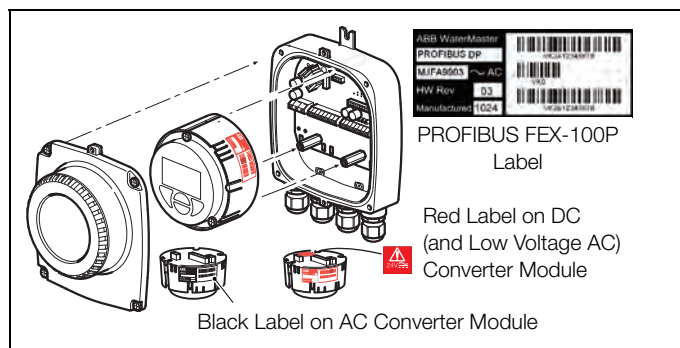
From HART software version 01.03.XX onwards and for all PROFIBUS software versions, on MID meters, all metrological-related parameters are locked and inaccessible at the Service level. Standard and Advanced user level parameters can still be modified via the HMI or bus.



Configuration DIP switches

### Converter module identification

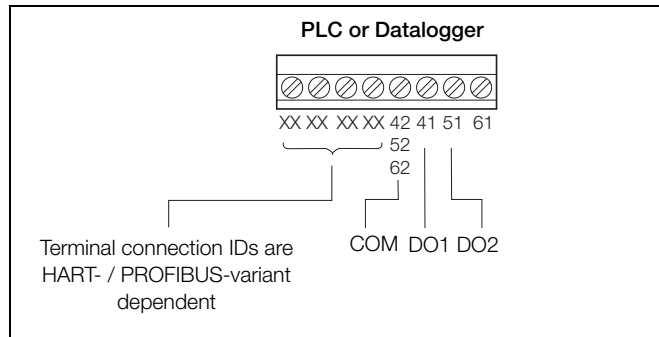
**Note.** The communications bus type is HART FEX100 if not specified on the converter module label. An example of the PROFIBUS FEX100-DP variant converter module label is shown below.



Converter module identification

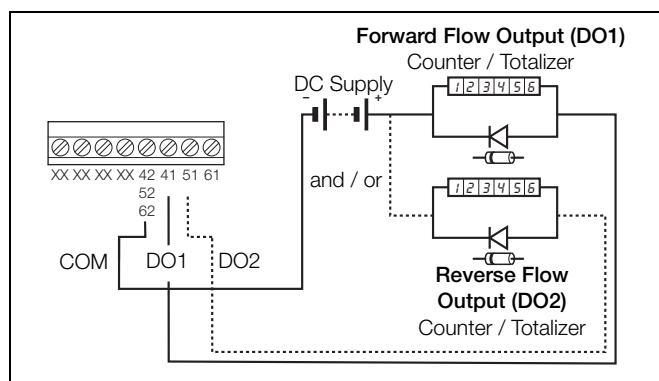
### Output connections

#### Frequency outputs

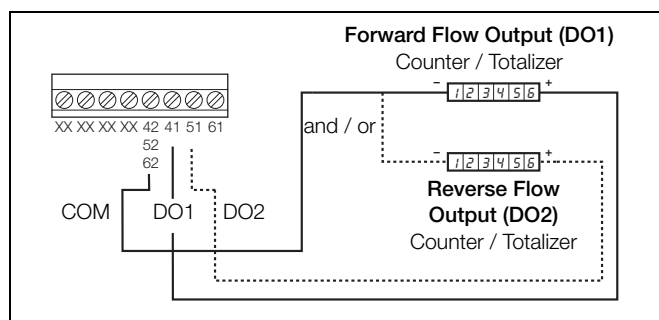


PLC / Datalogger connections

**Note.** Digital outputs DO1 and DO2 are polarity sensitive. The common (negative) connection for these outputs is designated 'COM'.



Electromechanical connections

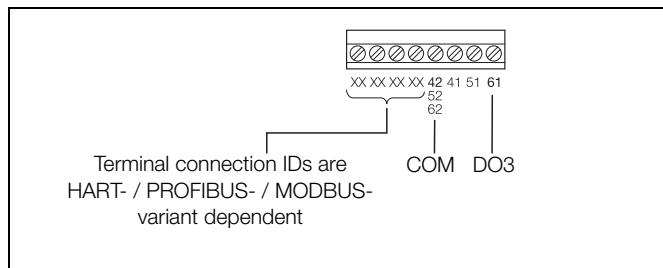


Telemetry / Electronic counters connections

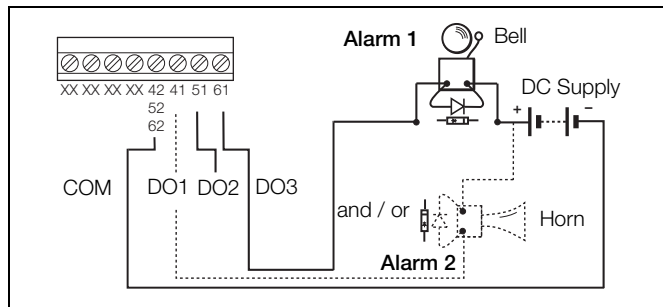
## WaterMaster

### Electromagnetic flowmeter

#### Alarm outputs



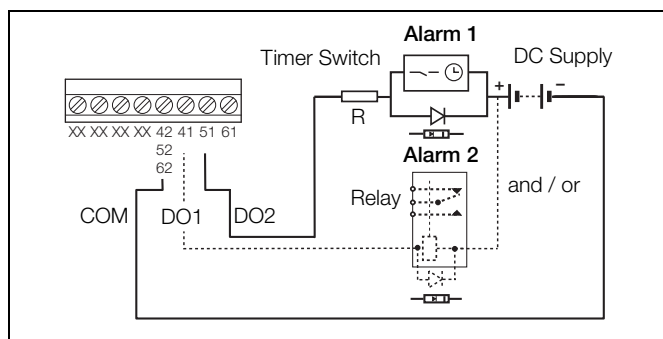
Alarm output connections



Alarm output connections

#### Note.

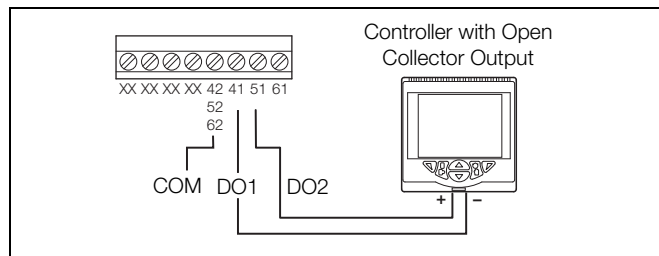
- Normal alarm / logic output is from DO3 (terminal 61). DO1 (41) and DO2 (51) can also be configured as alarms if required but are then NOT available as frequency / pulse outputs as shown in *Electromechanical connections* and *Telemetry / Electronic counters connections*, opposite.
- Bell and horn shown for example only. Any suitable alarm device may be used (for example, lamp, siren, buzzer etc.).



Relay and timers output connections

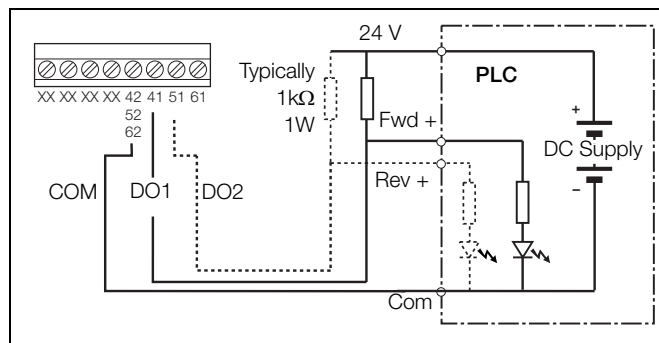
**Note.** Relay and timer switch shown for example only.

#### Contact input

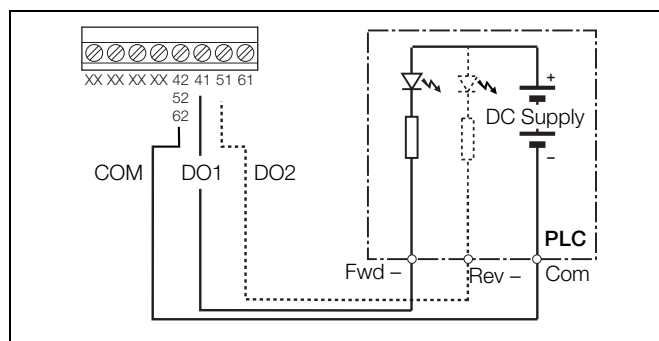


Open collector (or grounded contact) connections

#### PLC interface



PLC – common –ve connections



PLC – Common +ve connections

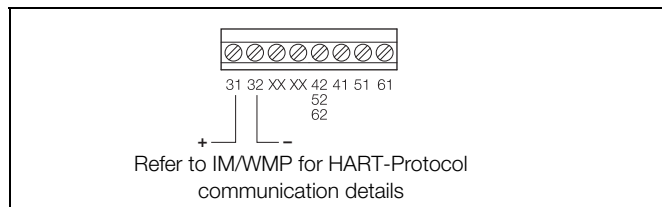
#### Note.

- WaterMaster digital outputs are NPN optocoupled transistors used as switches.
- Maximum allowed voltage at collector is 30 V DC
- Maximum allowed current across transistor is 220 mA.

## WaterMaster

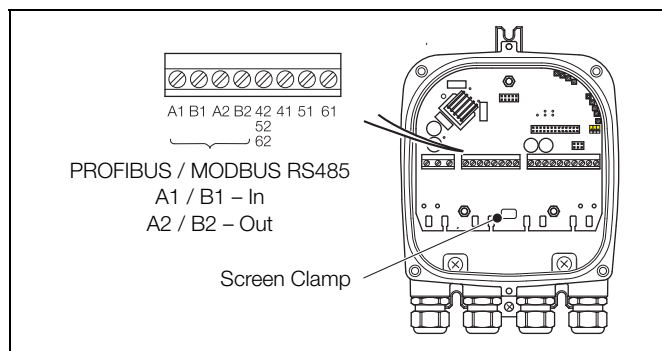
### Electromagnetic flowmeter

#### Current output (4 to 20 ma) – HART (FEX100) variant



Current output (4 to 20 mA) – HART (FEX100) variant

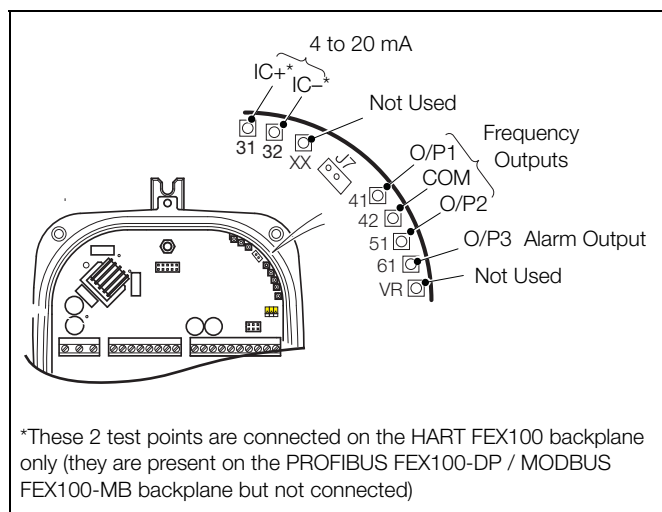
#### RS485 communications – PROFIBUS (FEX100-DP) and MODBUS (FEX100-MB) variants



WaterMaster RS485 backplane connections to PROFIBUS / MODBUS networks

#### Test point access

**Note.** A typical DVM probe can access (fit) the PCB's test holes.



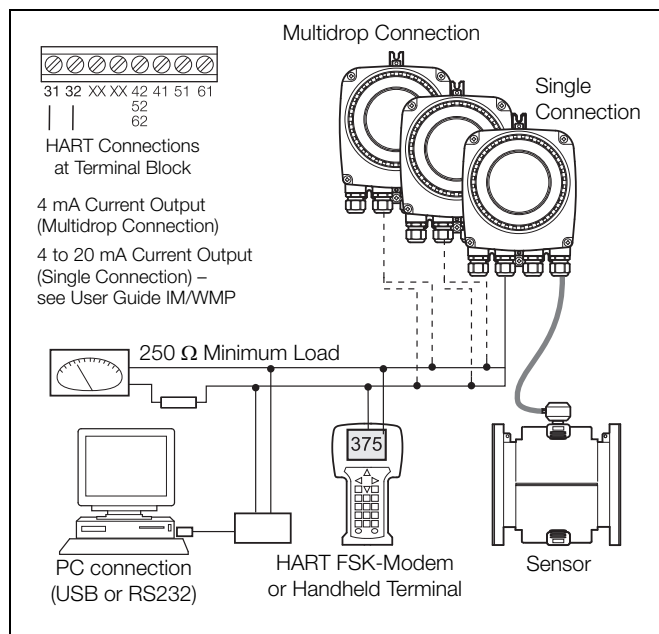
Transmitter PCB board test point access

## Digital communication

The transmitter has the following options for digital communication.

### HART protocol

The unit is registered with HART Communication Foundation.



HART-Protocol connection (remote installation shown)

HART protocol	
Configuration	Directly on the Device Software Asset Vision Basic (+ HART -DTM)
Transmission	Install a HART modem (FSK [Frequency Shift Keyed]-Modem) for HART-Communication when connecting to a PC. The HART-Modem converts the analog 4 to 20 mA signal into a digital output signal (Bell Standard 202) and connects to the PC using a USB (or RS232C) connector
Max. signal amplitude	1.2 mAss
Current output load	Min. 250Ω, max. = 560Ω
Cable	AWG 24 twisted
Max. cable length	1500 m (4921 ft.)
Baud rate	1.200 baud
Display	Log. 1: 1,200 Hz Log. 0: 2,200 Hz

## System integration

WaterMaster can be integrated into control systems and configuration devices using any Frame application, such as ABB AssetVision or similar third-party applications. ABB Device Type Managers (DTMs) for WaterMaster provide a unified structure for accessing device parameters, configuring and operating the devices and diagnosing problems. FDT (Field Device Tool) technology standardizes the communication and configuration interface between all field devices and host systems.



## WaterMaster

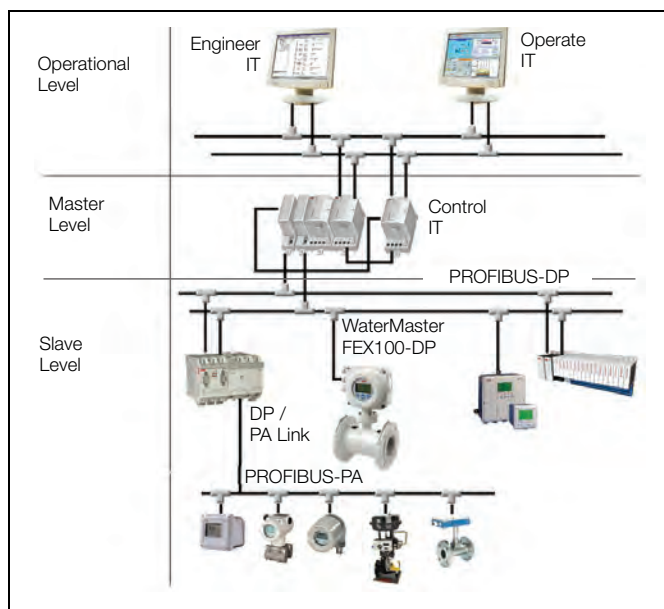
### Electromagnetic flowmeter

### PROFIBUS DP protocol

PROFIBUS is a manufacturer-independent, open Fieldbus standard for a wide range of applications in manufacturing, process and building automation. Manufacturer independence and openness are ensured by the international standard EN 50170.

PROFIBUS DP ID no.	0x3431
Alternative standard ID no.	0x9701 or 0x9741
Configuration	Directly on the device Software Asset Vision Basic (+PROFIBUS DP-DTM)
Transmission signal	Accuracy to IEC 61158-2
Cable	Shielded, twisted cable (accurate to IEC 61158-2, types A or B)

All devices are connected in a bus structure ('line') as shown in below. Up to 32 stations (master or slaves) can be linked to create one 'segment', although it is recommended not to install more than 16 devices on a single segment. Each end of a segment must be terminated by an active bus terminating resistor. Both bus terminators must always be powered to ensure fault-free operation, therefore it is strongly recommended that they are connected to a back-up power supply. The use of bus amplifiers (repeaters) and segment couplers can be used to extend the network.



Typical PROFIBUS network

### System integration

The GSD file for WaterMasters specifies the device-specific Ident No. 3431. It conforms to the PROFIBUS standard, providing a clear and comprehensive description of each instrument in a precisely defined format.

This enables the system configuration tool to use the information automatically when configuring a PROFIBUS bus system.

The ABB GSD file (Ident No. 3431) is divided into 2 sections:

#### ■ General specifications

Identification of the device, together with hardware and software versions, baud rates supported and the possible time intervals for monitoring times.

#### ■ DP slave-related specifications

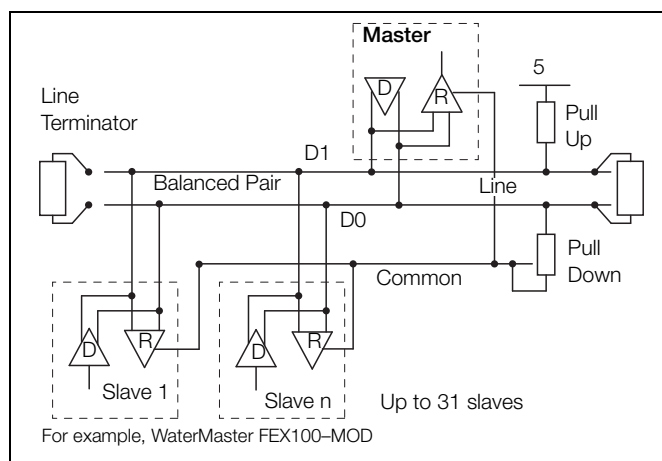
Information about the user parameter block for device-specific configuration and modules containing details of the input and output data that can be exchanged cyclically with a PROFIBUS master.

The WaterMaster GSD file (ABB\_3431.gsd) is available for download from the ABB website at: [www.abb.com/fieldbus](http://www.abb.com/fieldbus) (follow the link for PROFIBUS DP field devices).

### MODBUS protocol

MODBUS is an open standard that is owned and administered by an independent group of device manufacturers called the Modbus Organization ([www.modbus.org](http://www.modbus.org)).

Using the MODBUS protocol, devices from different manufacturers exchange information on the same communications bus without the need for special interface equipment. WaterMaster FEX100-MB follows the specification for Modbus Over Serial Line V1.02, using 2-wire TIA/EIA-485 (RS485) physical layer.



Typical MODBUS RS485 2-wire network Installation

## WaterMaster

### Electromagnetic flowmeter

### Cable Properties

The end-to-end length of the trunk cable must be limited. The maximum length depends on the Baud rate, the cable (gauge, capacitance or characteristic impedance), the number of loads on the daisy chain and the network configuration (2-wire or 4-wire).

For 9600 Baud rate and AWG26 (or wider) gauge, the maximum length is 1000 m (3280 ft.). Where 4-wire cabling is used as a 2-wire cabling system the maximum length must be divided by 2. The tap cables must be short, never more than 20 m (65.6 ft.). If a multi-port tap is used with  $n$  derivations, each one must have a maximum length of 40 m (131 ft.) divided by  $n$ .

The maximum serial data transmission line length for RS485 systems is 1200 m (3937 ft.). The lengths of cable that can be used are determined by the cable type, typically:

- Up to 6 m (19.7 ft.) – standard screened or twisted pair cable.
- Up to 300 m (984 ft.) – twin twisted pair with overall foil screen and an integral drain wire – for example, Belden 9502 or equivalent.
- Up to 1200 m (3937 ft.) – twin twisted pair with separate foil screens and integral drain wires – for example, Belden 9729 or equivalent.

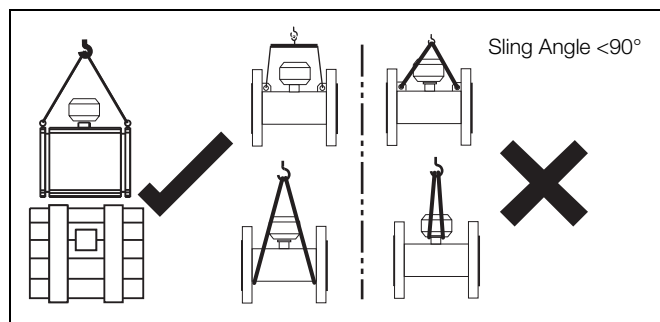
Category 5 cables may be used for RS485-MODBUS to a maximum length of 600 m (1968 ft.). For the balanced pairs used in an RS485-system, a characteristic impedance with value higher than 100Ω is preferred especially for 19200 and higher Baud rates.

### Installation requirements

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and Safety precautions refer to User Guide OI/FEF/FEV/FEW-EN.

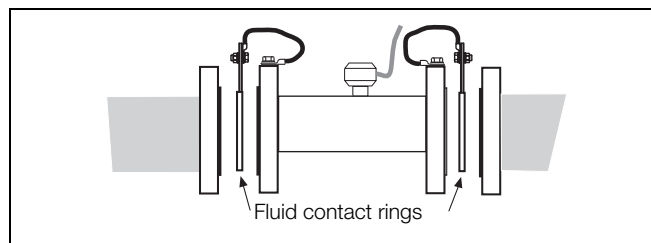
### Unpacking the flowmeter

Care must be taken when lifting the flowmeter to use the lifting hooks provided or sling under the body of the meter. Never lift using the terminal connection box of the sensor cable as this will cause damage and invalidate warranty.



### Grounding

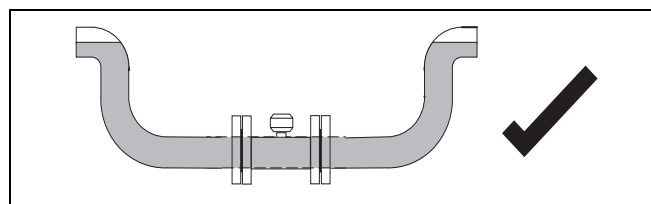
The flowmeter sensor must be connected to ground potential. For technical reasons, this potential should be identical to the potential of the metering fluid. For plastic or insulated lined pipelines, the fluid is grounded by installing a minimum of 1 earthing rings. When there are stray potentials present in the pipeline, an earthing ring is recommended on both ends of the meter sensor.



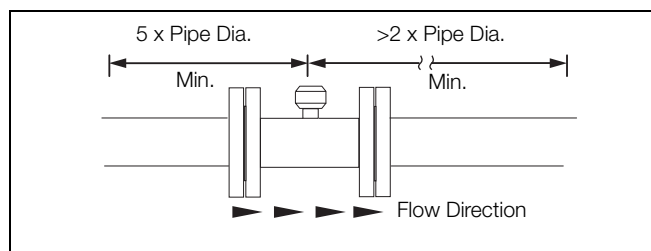
### Mounting

The installation conditions shown below must be observed to achieve the best operational results.

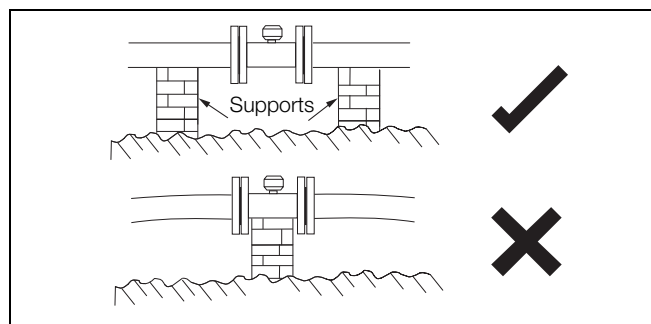
The sensor tube must always be completely full.



The flow direction must correspond to the identification plate. The device measures the flowrate in both directions. Forward flow is the factory setting.



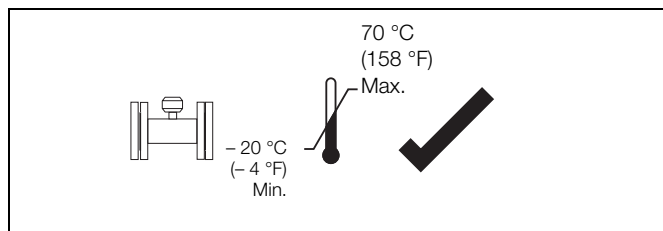
The devices must be installed without mechanical tension (torsion, bending). If required support the pipeline.



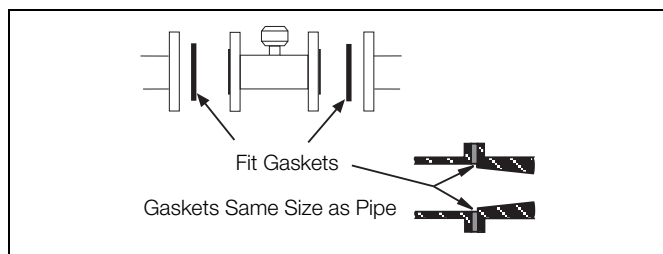
## WaterMaster

### Electromagnetic flowmeter

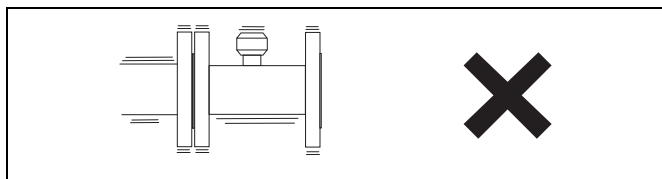
The flange seals must be made from a compatible material for the fluid and fluid temperatures if required.



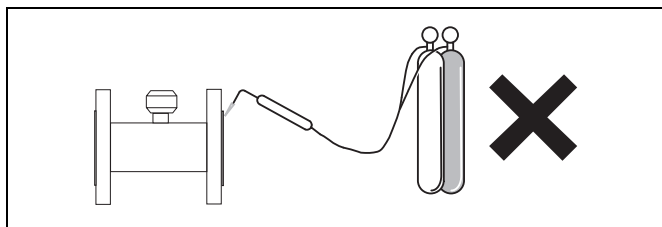
Seals must not extend into the flow area since possible turbulence could influence the device accuracy.



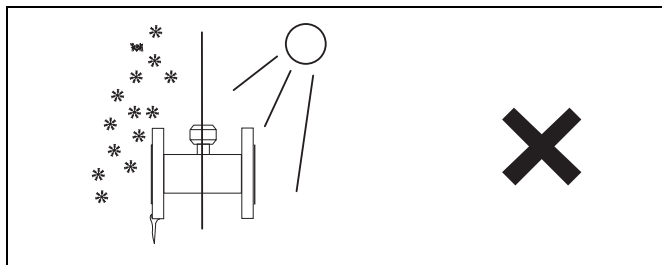
The pipeline may not exert any unallowable forces and torques on the device, such as vibration.



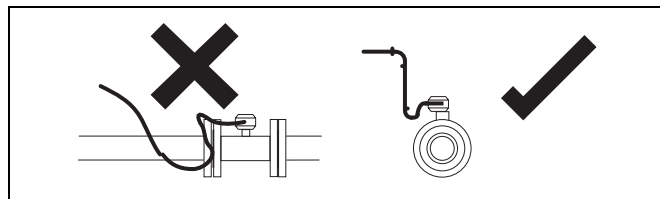
The flowmeter must not be submitted to any localized heat during installation; take care to remember this is a measuring instrument.



The flowmeter must not be exposed to direct sunlight or provide for appropriate sun protection where necessary.

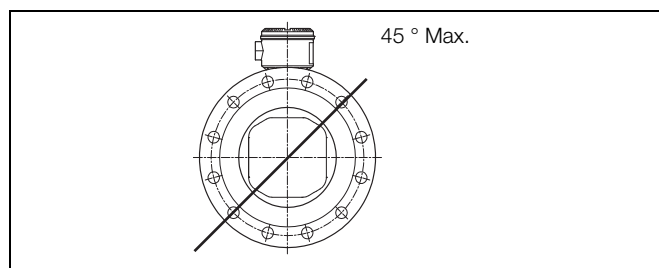


The cable to the flowmeter should be installed neatly or within a conduit, both loose or conduit should have a u shape below the terminal connection box height to allow any water run off to avoid any capillary action into the flowmeter sensor.



### Electrode axis

Electrode axis should be horizontal if at all possible or no more than 45° from horizontal.

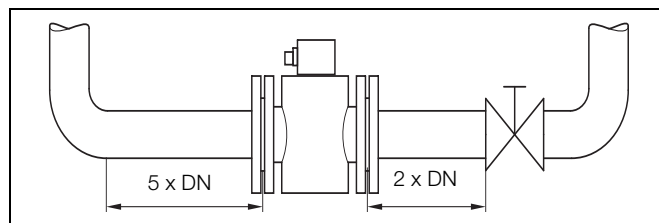


### Up and Down stream pipe sections

The metering principle is independent of the flow profile as long as standing eddies do not extend into the metering section, such as may occur after double elbows, in the event of tangential inflow or where half-open gate valves are located upstream of the flowmeter sensor. In such cases, best practice installation measures should be put in place to normalize the flow profile.

- Wherever possible do not install fittings (for example, manifolds, valves) directly in front of the flowmeter sensor.
- Butterfly valves should be installed so that the valve plate does not extend into the flowmeter sensor.
- Valves or other turn-off components should be installed in the Downstream pipe section.

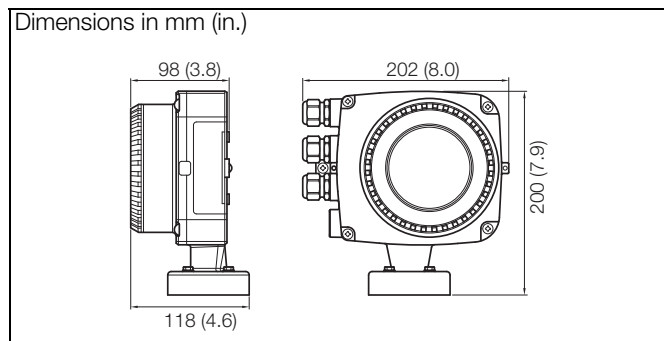
Experience has shown that, in most installations, straight upstream sections 3 x DN long and straight downstream sections 2 x DN long are normally sufficient. We would recommend conditions of 5 x DN straight upstream and 2 x DN straight downstream where possible.



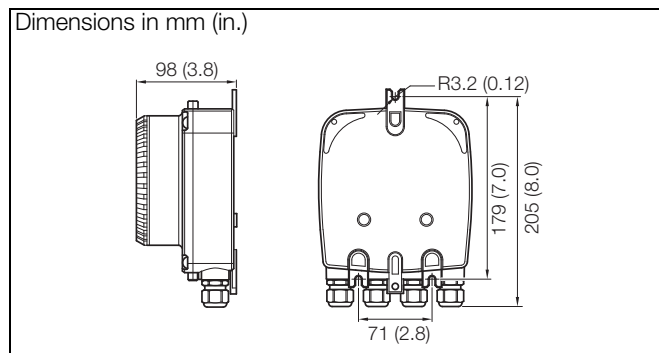
**WaterMaster**  
Electromagnetic flowmeter

## Transmitter dimensions

### Integral transmitter

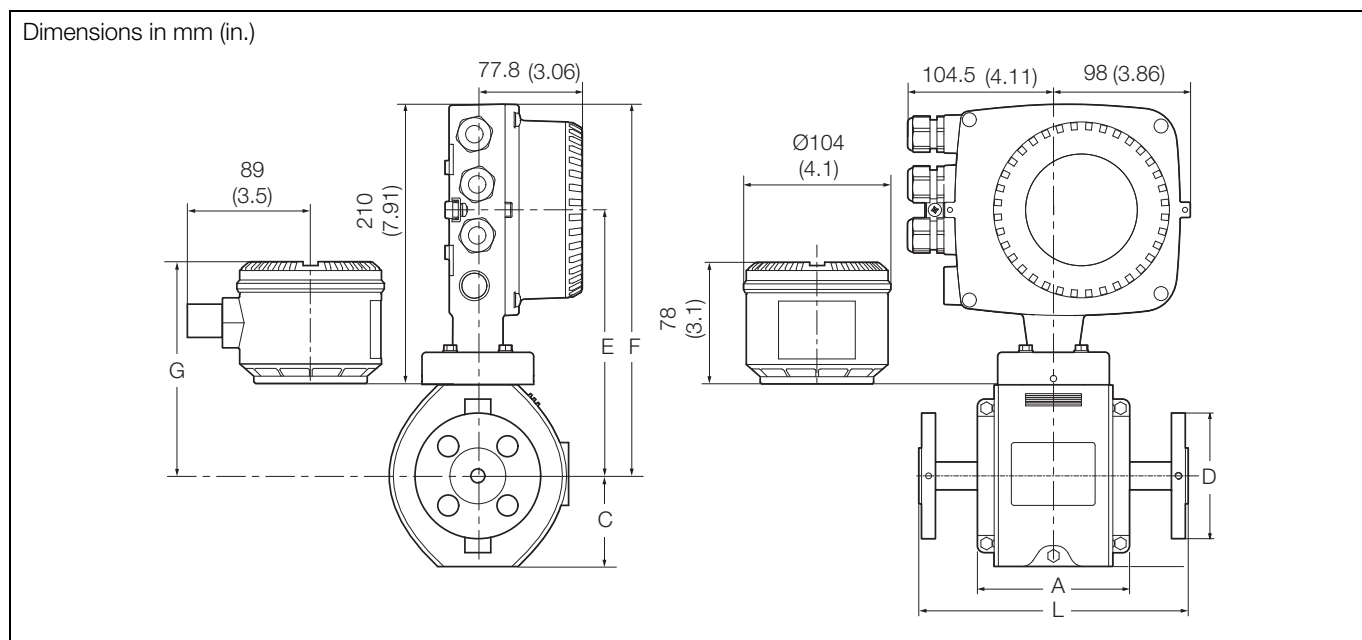


### Remote transmitter



## Sensor dimensions

### FEW – DN10 to 32 ( $\frac{3}{8}$ to 1 $\frac{1}{4}$ in. NB)



### DN10 to 32 ( $\frac{3}{8}$ to 1 $\frac{1}{4}$ in. NB) (FEW)

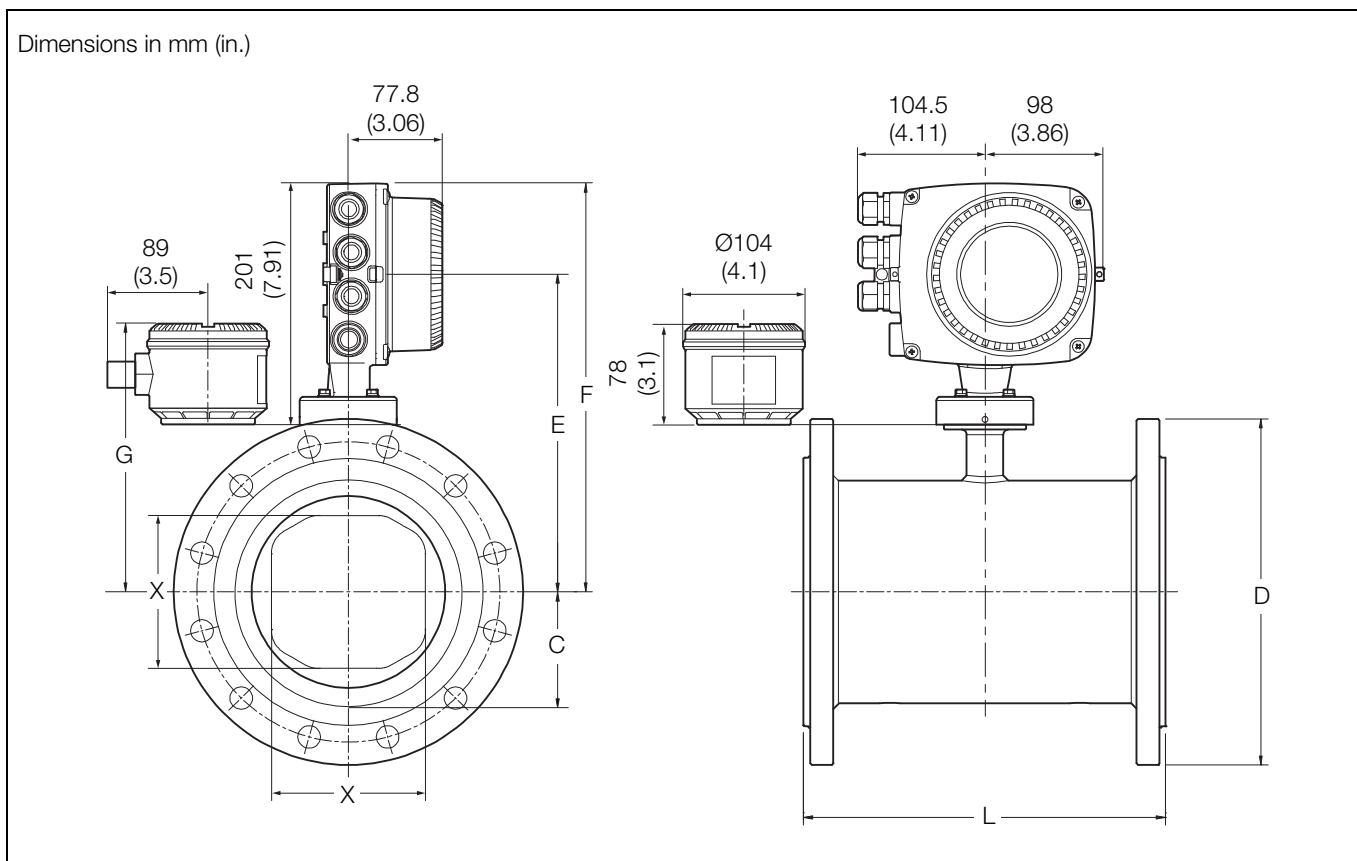
DN	Mating flange type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	A	Integral	Remote
DN10 ( $\frac{3}{8}$ in.)	PN40	90 (3.54)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)	6 (13.2)	4 (8.8)
	CL150	90 (3.54)								
	CL300	95 (3.74)								
DN15 ( $\frac{1}{2}$ in.)	PN40	95 (3.74)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)	8.5 (18.7)	6.5 (14.3)
	CL150	90 (3.54)								
	CL300	95 (3.74)								
DN20 ( $\frac{3}{4}$ in.)	PN40	105 (4.13)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)	8.5 (18.7)	6.5 (14.3)
	CL150	98 (3.86)								
	CL300	117 (4.61)								
DN25 (1 in.)	PN40	115 (4.53)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)	8.5 (18.7)	6.5 (14.3)
	CL150	108 (4.25)								
	CL300	124 (4.88)								
DN32 (1 $\frac{1}{4}$ in.)	PN40	140 (5.51)	200 (7.87)	350 (13.78)	92 (3.62)	275 (10.83)	230 (9.06)	113 (4.45)	8.5 (18.7)	6.5 (14.3)
	CL150	117 (4.61)								
	CL300	133 (5.24)								

### DN10 to 32 ( $\frac{3}{8}$ to 1 $\frac{1}{4}$ in. NB) (FEW) dimensions / weights



**WaterMaster**  
Electromagnetic flowmeter

**FEV – DN40 to 200 (1½ to 8 in. NB)**



DN40 to 200 (1½ to 8 in. NB) (FEV)

DN	Mating flange type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	X	Integral	Remote
DN40 (1½ in.)	EN1092-1 PN10, PN40	150 (5.91)	200 (7.87)	260 (10.24)	30.4 (1.20)	185 (7.28)	138 (5.43)	30 (1.18)	15 (33)	13 (29)
	ASME B16.5 CLASS 150	127 (5.00)								
	JIS 10K	140 (5.51)								
	AS2129 TABLE F	140 (5.51)								
	AS2129 TABLE C D E	135 (5.31)								
	AS4087 PN14	135 (5.31)								
DN50 (2 in.)	EN1092-1 PN10, PN16	165 (6.50)	200 (7.87)	270 (10.63)	38.3 (1.51)	195 (7.68)	146 (5.75)	38 (1.50)	16 (35)	14 (31)
	ASME B16.5 CLASS 150	152.4 (6.00)								
	JIS 10K	155 (6.10)								
	AS4087 PN21	165 (6.50)								
	AS2129 TABLE F	165 (6.50)								
	AS2129 TABLE C D E	150 (5.91)								
	AS4087 PN14, PN16	150 (5.91)								
DN65 (2½ in.)	AS4087 PN14, PN16	165 (6.50)	200 (7.87)	275 (10.83)	45.2 (1.78)	200 (7.87)	152 (5.98)	48 (1.89)	18 (40)	16 (35)
	AS2129 TABLE C D E	165 (6.50)								
	EN1092-1 PN10	185 (7.28)								
	EN1092-1 PN16	185 (7.28)								

DN40 to 200 (1½ to 8 in. NB) (FEV) dimensions / weights

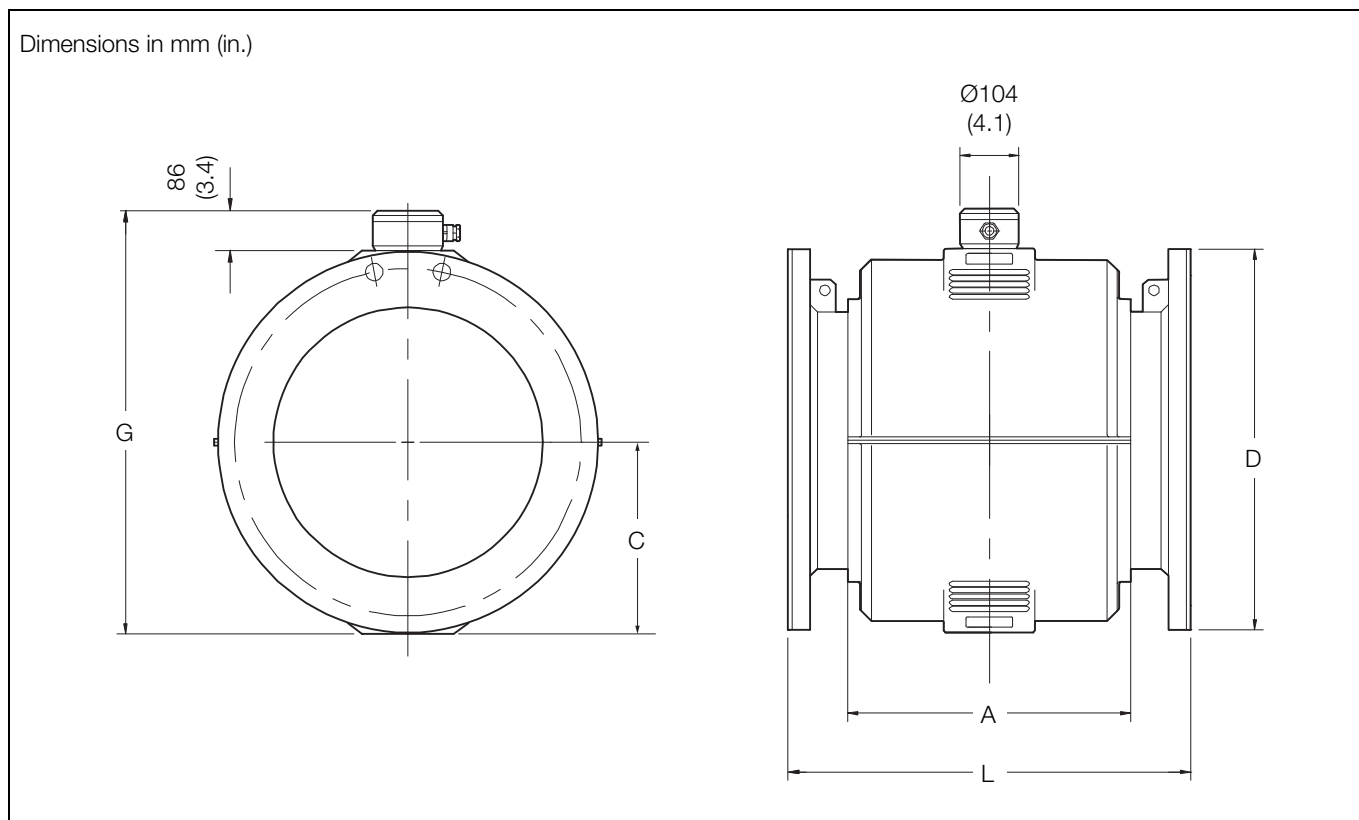
**WaterMaster**  
Electromagnetic flowmeter

DN	Mating flange type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	X	Integral	Remote
DN80 (3 in.)	EN1092-1 PN10, PN16	200 (7.87)	200 (7.87)	280 (11.02)	51.5 (2.03)	205 (8.07)	156 (6.14)	61 (2.40)	19 (42)	17 (37)
	ASME B16.5 CLASS 150	190 (7.48)								
	JIS 7.5K	211 (8.31)								
	JIS 10K	185 (7.28)								
	AS2129 TABLE C D E	185 (7.28)								
	AS4087 PN14, PN16	185 (7.28)								
	AS2129 TABLE F	205 (8.07)								
	AS4087 PN21	205 (8.07)								
DN100 (4 in.)	EN1092-1 PN10, PN16	220 (8.66)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	196.8 (7.75)	70 (2.76)	22 (49)	20 (44)
	ASME B16.5 CLASS 150	228.6 (9.00)								
	JIS 7.5K	238 (9.37)								
	JIS 10K	210 (8.27)								
	AS2129 TABLE C D	215 (8.46)								
	AS4087 PN14, PN16	215 (8.46)								
	AS2129 TABLE E	215 (8.46)								
	AS4087 PN21	230 (9.06)								
	AS2129 TABLE F	230 (9.06)								
DN125 (5 in.)	EN1092-1 PN10, PN16	250 (9.84)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	197 (7.76)	70 (2.76)	29 (64)	27 (60)
	ASME B16.5 CLASS 150	254 (10.00)								
	JIS 10K	250 (9.84)								
	AS2129 TABLE C D E	255 (10.04)								
	AS2129 TABLE F	280 (11.02)								
DN150 (6 in.)	EN1092 PN10, PN16	285 (11.22)	300 (11.81)	340 (13.39)	84.4 (3.32)	265 (10.43)	217 (8.54)	103 (4.06)	35 (77)	33 (73)
	ASME B16.5 CLASS 150	279 (10.98)								
	JIS 7.5k	290 (11.42)								
	JIS 10K	280 (11.02)								
	AS2129 TABLE C D	280 (11.02)								
	AS4087 PN14, PN16	280 (11.02)								
	AS2129 TABLE E	280 (11.02)								
	AS2129 TABLE F	305 (12.01)								
	AS4087 PN21	305 (12.01)								
DN200 (8 in.)	EN1092-1 PN10	340 (13.39)	350 (13.78)	365 (14.37)	109.8 (4.32)	290 (11.42)	243 (9.57)	150 (5.91)	52 (115)	50 (110)
	EN1092-1 PN16	340 (13.39)								
	ASME B16.5 CLASS 150	345 (13.58)								
	JIS 7.5K	342 (13.46)								
	JIS 10K	330 (12.99)								
	AS2129 TABLE C D	335 (13.19)								
	AS4087 PN14, PN 16	335 (13.19)								
	AS2129 TABLE E	335 (13.19)								
	AS2129 TABLE F	370 (14.57)								
	AS4087 PN21	370 (14.57)								

DN40 to 200 (1½ to 8 in. NB) (FEV) dimensions / weights (Continued)

**WaterMaster**  
Electromagnetic flowmeter

**FEF – DN250 to 600 (10 to 24 in. NB)**



DN250 to 600 (10 to 24 in. NB) (FEF)

DN	Mating flange type	Dimensions in mm (in.)					Approx. weight in kg (lb)
		D	L	C	G	A	
DN250 (10 in.)	ASME B16.5 CLASS 150	405 (15.94)	450 (17.72)	215 (8.46)	301 (11.85)	300 (11.81)	88 (194)
	ASME B16.5 CLASS 300	445 (17.52)	490 (19.29)				
	EN1092 -1 PN10	395 (15.55)	450 (17.72)				
	EN1092 – 1 PN16	405 (15.94)	450 (17.72)				
	EN1092 – 1 PN25	425 (16.73)	490 (19.29)				
	EN1092 – 1 PN40	450 (17.72)	490 (19.29)				
	JIS 5K	385 (15.16)	450 (17.72)				
	JIS 10K	400 (15.75)	450 (17.72)				
	AS4087 PN14, PN16	405 (15.94)	450 (17.72)				
	AS2129 TABLE C D		450 (17.72)				
	AS2129 TABLE E		450 (17.72)				
	AS4087 PN21	430 (16.93)	450 (17.72)				
	AS2129 TABLE F		450 (17.72)				

DN250 to 600 (10 to 24 in. NB) (FEF) dimensions / weights

**WaterMaster**  
Electromagnetic flowmeter

DN	Mating flange type	Dimensions in mm (in.)					Approx. weight in kg (lb)
		D	L	C	G	A	
DN300 (12 in.)	ASME B16.5 CLASS 150	485 (19.09)	500 (19.69)	231 (9.09)	317 (12.48)	352 (13.86)	128 (282)
	ASME B16.5 CLASS 300	520 (20.47)	540 (21.26)				
	EN1092 – 1 PN10	445 (17.52)	500 (19.69)				
	EN1092 – 1 PN16	460 (18.11)	500 (19.69)				
	EN1092 – 1 PN25	485 (19.09)	540 (21.26)				
	EN1092 – 1 PN40	515 (20.28)	540 (21.26)				
	JIS 5K	430 (16.93)	500 (19.69)				
	JIS 10K	445 (17.52)	500 (19.69)				
	AS4087 PN14, PN16	455 (17.91)	500 (19.69)				
	AS2129 TABLE C D	455 (17.91)	500 (19.69)				
	AS2129 TABLE E	455 (17.91)	500 (19.69)				
	AS4087 PN21	490 (19.29)	500 (19.69)				
	AS2129 TABLE F	490 (19.29)	500 (19.69)				
DN350 (14 in.)	ASME B16.5 CLASS 150	535 (21.06)	550 (21.65)	257.5 (10.14)	346 (13.62)	376 (14.80)	100 (220)
	ASME B16.5 CLASS 300	585 (23.03)	570 (22.44)				
	EN1092 – 1 PN10	505 (19.88)	550 (21.65)				
	EN1092 – 1 PN16	520 (20.47)	550 (21.65)				
	EN1092 – 1 PN25	555 (21.85)	570 (22.44)				
	EN1092 – 1 PN40	580 (22.83)	570 (22.44)				
	JIS 5K	480 (18.90)	550 (21.65)				
	JIS 7.5K	530 (20.87)	550 (21.65)				
	JIS 10K	490 (19.29)	550 (21.65)				
	AS4087 PN14, PN16	525 (20.67)	550 (21.65)				
	AS2129 TABLE C D E	525 (20.67)	550 (21.65)				
	AS4087 PN21	550 (21.65)	550 (21.65)				
	AS2129 TABLE F	550 (21.65)	550 (21.65)				
	AS4087 PN35	550 (21.65)	570 (22.44)				
	AS2129 TABLE H	550 (21.65)	570 (22.44)				
DN375 (15 in.)	AS4087 PN14, PN16	550 (21.65)	550 (21.65)	257.5 (10.14)	346 (13.62)	376 (14.80)	115 (253)
	AS2129 TABLE C	550 (21.65)	550 (21.65)				
	AS4087 PN35	580 (22.83)	570 (22.44)				
DN400 (16 in.)	ASME B16.5 CLASS 150	600 (23.62)	600 (23.62)	285 (11.22)	371 (14.61)	420 (16.54)	115 (253)
	ASME B16.5 CLASS 300	650 (25.59)	620 (24.41)				
	EN1092 – 1 PN10	565 (22.24)	600 (23.62)				
	EN1092 – 1 PN16	580 (22.83)	600 (23.62)				
	EN1092 – 1 PN25	620 (24.41)	620 (24.41)				
	EN1092 – 1 PN40	660 (25.98)	620 (24.41)				
	JIS 5K	540 (21.26)	600 (23.62)				
	JIS 7.5K	582 (22.91)	600 (23.62)				
	JIS 10K	560 (22.05)	600 (23.62)				
	AS4087 PN14, PN16	580 (22.83)	600 (23.62)				
	AS2129 TABLE C D E	580 (22.83)	600 (23.62)				
	AS4087 PN21	610 (24.02)	600 (23.62)				
	AS2129 TABLE F	610 (24.02)	600 (23.62)				
	AS4087 PN35	610 (24.02)	620 (24.41)				
	AS2129 TABLE H	610 (24.02)	620 (24.41)				

DN250 to 600 (10 to 24 in. NB) (FEF) dimensions / weights (Continued)



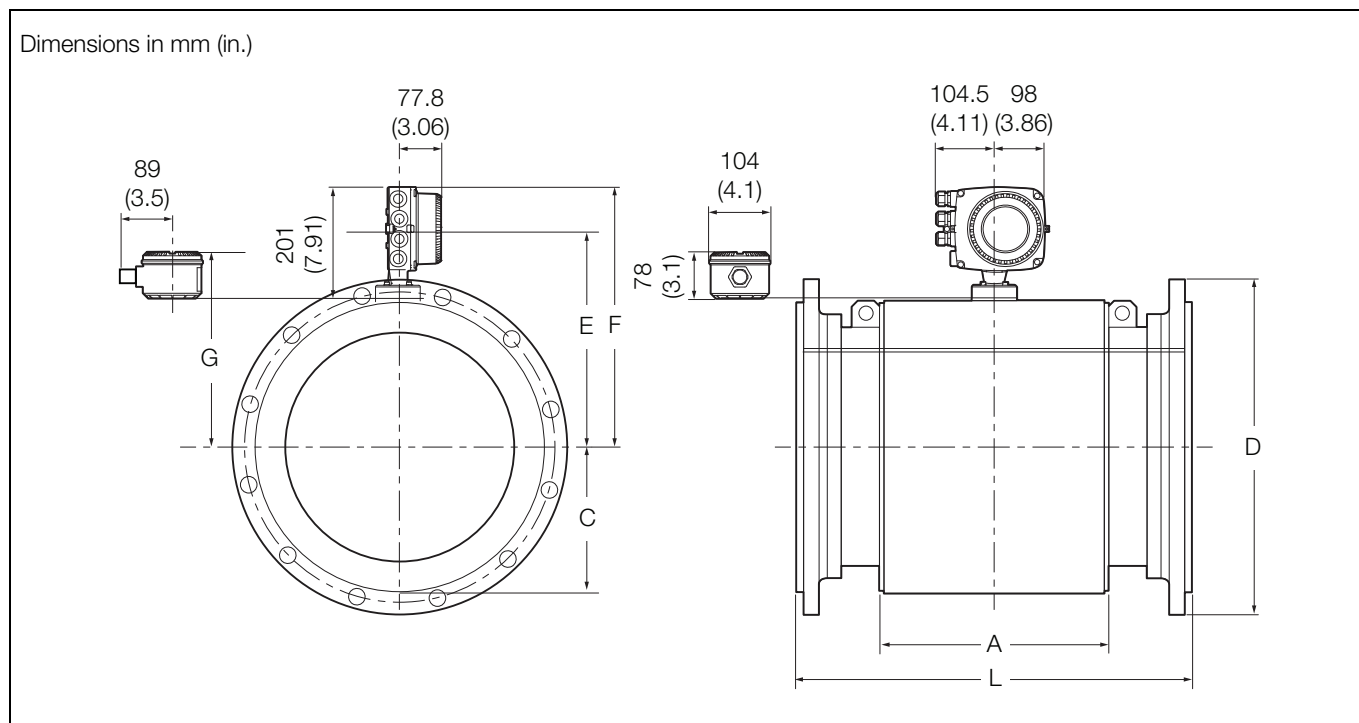
**WaterMaster**  
Electromagnetic flowmeter

DN	Mating flange type	Dimensions in mm (in.)					Approx. weight in kg (lb)
		D	L	C	G	A	
DN450 (18 in.)	ASME B16.5 CLASS 150	635 (25.00)	700 (27.56)	317.5 (12.50)	402 (15.83)	480 (18.90)	160 (352)
	ASME B16.5 CLASS 300	710 (27.95)					
	EN1092 – 1 PN10	615 (24.21)					
	EN1092 – 1 PN16	640 (25.20)					
	EN1092 – 1 PN25	670 (26.38)					
	EN1092 – 1 PN40	685 (26.97)					
	JIS 5K	605 (23.82)					
	JIS 7.5K	652 (25.67)					
	JIS 10K	620 (24.41)					
	AS4087 PN14, PN16	640 (25.20)					
	AS2129 TABLE C D	640 (25.20)					
	AS2129 TABLE E	640 (25.20)					
	AS4087 PN21	675 (26.57)					
	AS2129 TABLE F	675 (26.57)					
	AS4087 PN35	675 (26.57)					
	AS2129 TABLE H	675 (26.57)					
DN500 (20 in.)	ASME B16.5 CLASS 150	700 (27.56)	770 (30.31)	345 (13.58)	429 (16.89)	520 (20.47)	217 (455)
	ASME B16.5 CLASS 300	775 (30.51)					
	EN1092 – 1 PN10	670 (26.38)					
	EN1092 – 1 PN16	715 (28.15)					
	EN1092 – 1 PN25	730 (28.74)					
	EN1092 – 1 PN40	755 (29.72)					
	JIS 5K	655 (25.79)					
	JIS 7.5K	706 (27.80)					
	JIS 10K	675 (26.57)					
	AS4087 PN 14, PN16	705 (27.76)					
	AS2129 TABLE C D E	705 (27.76)					
	AS4087 PN21	735 (28.94)					
	AS2129 TABLE F	735 (28.94)					
	AS4087 PN35	735 (28.94)					
	AS2129 TABLE H	735 (28.94)					
DN600 (24 in.)	ASME B16.5 CLASS 150	815 (32.09)	920 (36.22)	387.5 (15.25)	472 (18.58)	610 (24.02)	315 (693)
	ASME B16.5 CLASS 300	915 (36.02)					
	EN1092 – 1 PN10	780 (30.71)					
	EN1092 – 1 PN16	840 (33.07)					
	EN1092 – 1 PN25	845 (33.27)					
	EN1092 – 1 PN40	890 (35.04)					
	JIS 5K	770 (30.31)					
	JIS 7.5K	810 (31.89)					
	JIS 10K	795 (31.30)					
	AS4087 PN14, PN16	825 (32.48)					
	AS2129 TABLE C D	825 (32.48)					
	AS2129 TABLE E	825 (32.48)					
	AS4087 PN21	850 (33.46)					
	AS2129 TABLE F	850 (33.46)					
	AS4087 PN35	850 (33.46)					
	AS2129 TABLE H	850 (33.46)					

DN250 to 600 (10 to 24 in. NB) (FEF) dimensions / weights (Continued)

**WaterMaster**  
Electromagnetic flowmeter

**FEW – DN700 to 2400 (28 to 96 in. NB)**



DN700 to 2400 (28 to 96 in. NB) (FEW)

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN700 (28 in.)	JIS 5K	875 (34.45)	910 (35.83)	604 (23.77)	403 (15.87)	528 (20.79)	530 (20.87)	444 (17.48)	216 (475)	214 (471)
	JIS 10K	905 (35.63)							282 (620)	280 (616)
	PN6	860 (33.86)							225 (495)	223 (491)
	PN10	895 (35.24)							303 (667)	301 (662)
	PN16	910 (35.83)							337 (741)	335 (737)
	AWWA C207 CLASS B	927 (36.50)							249 (548)	247 (543)
	AWWA C207 CLASS D	927 (36.50)							280 (616)	278 (612)
	AS4087 PN16	910 (35.83)							359 (790)	357 (785)
	AS2129 TABLE-D	910 (35.83)							263 (579)	261 (574)
	AS2129 TABLE-E	910 (35.83)							337 (741)	335 (737)
	PN25	960 (37.80)							471 (10.36)	469 (1032)
	PN40	995 (39.17)							586 (1289)	584 (1285)
	AWWA C207 CLASS E	927 (36.50)							472 (1038)	470 (1034)
	AWWA C207 CLASS F	1035 (40.75)							715 (1573)	713 (1569)
	AS4087 PN35	935							539 (1186)	537 (1181)
	ASME CL150 SERIES A	925 (36.42)							503 (1107)	501 (1102)
	ASME CL150 SERIES B	835 (32.87)							323 (711)	321 (706)
	ASME CL300 SERIES B	920 (36.22)							631 (1388)	629 (1384)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights

**WaterMaster**  
Electromagnetic flowmeter

DN	Mating flange type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	A	Integral	Remote
DN750 (30 in.)	JIS 5K	945 (37.20)	990 (38.98)	630 (24.79)	429 (16.89)	554 (21.81)	556 (21.89)	444 (17.48)	251 (552)	249 (548)
	JIS 10K	970 (38.19)							327 (719)	325 (715)
	AWWA C207 CLASS B	984 (38.74)							273 (601)	271 (596)
	AWWA C207 CLASS D	984 (38.74)							344 (757)	342 (752)
	AS4087 PN16	995 (39.17)							467 (1027)	465 (1023)
	AS2129 TABLE-D	995 (39.17)							340 (748)	338 (744)
	AS2129 TABLE-E	995 (39.17)							454 (999)	452 (994)
	AWWA C207 CLASS E	984 (38.74)							496 (1091)	494 (1087)
	AWWA C207 CLASS F	1092 (43.99)							790 (1738)	788 (1734)
	AS4087 PN35	1015 (39.96)							663 (1459)	661 (1454)
	ASME CL150 SERIES A	985 (38.78)							544 (1197)	542 (1192)
	ASME CL150 SERIES B	885 (34.84)							320 (704)	318 (700)
	ASME CL300 SERIES B	990 (38.98)							748 (1646)	746 (1641)
DN800 (32 in.)	JIS 5K	995 (39.17)	1040 (40.04)	654 (25.74)	453 (17.83)	578 (22.76)	580 (22.83)	542 (21.34)	280 (616)	278 (612)
	JIS 10K	1020 (40.16)							364 (801)	362 (796)
	PN6	975 (38.39)							294 (647)	292 (642)
	PN10	1015 (39.96)							406 (893)	404 (889)
	PN16	1025 (40.35)							469 (1032)	467 (1027)
	AWWA C207 CLASS B	1060 (41.73)							328 (722)	326 (717)
	AWWA C207 CLASS D	1060 (41.73)							408 (898)	406 (893)
	AS4087 PN16	1060 (41.73)							530 (1166)	528 (1162)
	AS2129 TABLE-D	1060 (41.73)							386 (849)	384 (845)
	AS2129 TABLE-E	1060 (41.73)							519 (1142)	517 (1137)
	PN25	1085 (42.72)							615 (1353)	613 (1349)
	PN40	1140 (44.88)							866 (1905)	864 (1901)
	AWWA C207 CLASS E	1060 (41.73)							634 (1395)	632 (1390)
	AWWA C207 CLASS F	1150 (45.28)							897 (1973)	895 (1969)
	AS4087 PN35	1060 (41.73)							751 (1652)	749 (1648)
	ASME CL150 SERIES A	1060 (41.73)							700 (1540)	698 (1536)
	ASME CL150 SERIES B	940 (37.01)							406 (893)	404 (889)
	ASME CL300 SERIES B	1055 (41.54)							933 (2053)	931 (2048)
DN900 (36 in.)	JIS 5K	1095 (43.11)	1170 (46.06)	705 (27.7)	504 (19.84)	629 (24.76)	631 (24.84)	570 (22.44)	369 (812)	367 (807)
	JIS 10K	1120 (44.09)							445 (979)	443 (975)
	PN6	1075 (42.32)							390 (858)	388 (854)
	PN10	1115 (43.90)							502 (1104)	500 (1100)
	PN16	1125 (44.29)							589 (1296)	587 (1291)
	AWWA C207 CLASS B	1168 (45.98)							417 (917)	415 (913)
	AWWA C207 CLASS D	1168 (45.98)							493 (1085)	491 (1080)
	AWWA C207 CLASS E	1168 (45.98)							827 (1819)	825 (1815)
	AWWA C207 CLASS F	1270 (50.00)							1150 (2530)	1148 (2526)
	AS4087 PN16	1175 (46.26)							706 (1553)	704 (1549)
	AS2129 TABLE-D	1175 (46.26)							514 (1131)	512 (1126)
	AS2129 TABLE-E	1175 (46.26)							694 (1527)	692 (1522)
	PN25	1185 (46.65)							819 (1802)	817 (1797)
	PN40	1250 (49.21)							1158 (2548)	1156 (2543)
	AS4087 PN35	1185 (46.65)							1044 (2297)	1042 (2292)
	ASME CL150 SERIES A	1170 (46.06)							961 (2114)	959 (2110)
	ASME CL150 SERIES B	1055 (41.54)							595 (1309)	593 (1305)
	ASME CL300 SERIES B	1170 (46.06)							1147 (2523)	1145 (2519)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights (Continued)

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN1000 (40 in.)	JIS 5K	1195 (47.05)	1300 (51.18)	755 (29.71)	554 (21.81)	679 (26.73)	681 (26.81)	624 (24.57)	441 (970)	439 (966)
	JIS 10K	1235 (48.62)							572 (1258)	570 (1254)
	PN6	1175 (46.26)							466 (1025)	464 (1021)
	PN10	1230 (48.43)							674 (1483)	672 (1478)
	PN16	1255 (49.41)							879 (1934)	877 (1929)
	AWWA C207 CLASS B	1289 (50.75)							503 (1107)	501 (1102)
	AWWA C207 CLASS D	1289 (50.75)							659 (1450)	657 (1445)
	AWWA C207 CLASS E	1289 (50.75)							1028 (2262)	1026 (2257)
	AWWA C207 CLASS F	1378 (54.25)							1367 (3007)	1365 (3003)
	AS4087 PN16	1255 (49.41)							831 (1828)	829 (1824)
	AS2129 TABLE-D	1255 (49.41)							610 (1342)	608 (1338)
	AS2129 TABLE-E	1255 (49.41)							833 (1833)	831 (1028)
	PN25	1320 (51.97)							1207 (2655)	1205 (2651)
	PN40	1360 (53.54)							1413 (3109)	1411 (3104)
	AS4087 PN35	1275 (50.20)							1244 (2737)	1242 (2732)
	ASME CL150 SERIES A	1290 (50.79)							1149 (2528)	1147 (2523)
	ASME CL300 SERIES A	1240 (48.82)							1349 (2968)	1347 (2963)
	ASME CL150 SERIES B	1175 (46.26)							738 (1624)	736 (1619)
	ASME CL300 SERIES B	1275 (50.20)							1487 (3271)	1485 (3267)
DN1050 (42 in.)	AWWA C207 CLASS B	1346 (52.99)	1365 (53.74)	808 (31.82)	608 (23.92)	733 (28.84)	735 (28.92)	624 (24.57)	564 (1241)	562 (1236)
	AWWA C207 CLASS D	1346 (52.99)							669 (1472)	667 (1467)
	AWWA C207 CLASS E	1346 (52.99)							1143 (2515)	1141 (2510)
	AWWA C207 CLASS F	1448 (57.01)							1568 (3450)	1566 (3445)
	ASME CL150 SERIES B	1225 (48.23)							809 (1780)	807 (1775)
	ASME CL150 SERIES A	1345 (52.95)							1289 (2836)	1287 (2831)
	ASME CL300 SERIES A	1290 (50.79)							1527 (3359)	1525 (3355)
DN1100 (44 in.)	ASME CL300 SERIES B	1335 (52.56)	1430 (56.30)	860 (33.85)	659 (25.94)	784 (30.87)	786 (30.94)	802 (31.57)	1704 (3749)	1702 (3744)
	JIS 5K	1305 (51.38)							510 (1122)	508 (1118)
	JIS 10K	1345 (52.95)							689 (1516)	687 (1511)
	AWWA C207 CLASS B	1403 (55.24)							615 (1353)	613 (1349)
	AWWA C207 CLASS D	1403 (55.24)							807 (1775)	805 (1771)
	AWWA C207 CLASS E	1404 (55.26)							1205 (2651)	1203 (2647)
	AWWA C207 CLASS F	1505 (59.25)							1719 (3782)	1717 (3777)
DN1200 (48 in.)	JIS 5K	1420 (55.91)	1560 (61.42)	860 (33.85)	659 (25.94)	784 (30.87)	786 (30.94)	802 (31.57)	651 (1432)	649 (1428)
	JIS 10K	1465 (57.68)							967 (2127)	965 (2123)
	PN6	1405 (55.31)							710 (1562)	708 (1558)
	PN10	1455 (57.28)							1107 (2435)	1105 (2431)
	PN16	1485 (58.46)							1363 (2999)	1361 (2994)
	AWWA C207 CLASS B	1511 (59.49)							772 (1698)	770 (1694)
	AWWA C207 CLASS D	1511 (59.49)							999 (2198)	997 (2193)
	AWWA C207 CLASS E	1511 (59.49)							1458 (3208)	1456 (3203)
	AWWA C207 CLASS F	1651 (65.00)							2400 (5280)	2398 (5276)
	AS4087 PN16	1490 (58.66)							1253 (2757)	1251 (2752)
	AS2129 TABLE-D	1490 (58.66)							1023 (2251)	1021 (2246)
	AS2129 TABLE-E	1490 (58.66)							1272 (2798)	1270 (2794)
	PN25	1530 (60.24)							1559 (3430)	1557 (3425)
	PN40	1575 (62.01)							2133 (4693)	2131 (4688)
	AS4087 PN35	1530 (60.24)							2115 (4653)	2113 (4649)
	ASME CL150 SERIES A	1510 (59.45)							1707 (3755)	1705 (3751)
	ASME CL300 SERIES A	1465 (57.68)							2163 (4759)	2161 (4754)
	ASME CL150 SERIES B	1390 (54.72)							1085 (2387)	1083 (2383)
	ASME CL300 SERIES B	1510 (59.45)							2352 (5174)	2350 (5170)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights (Continued)



		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN1350 (54 in.)	AWWA C207 CLASS B	1683 (66.26)	1755 (69.09)	955 (37.59)	754 (29.69)	879 (34.61)	881 (34.69)	902 (35.51)	981 (2158)	979 (2154)
	AWWA C207 CLASS D	1683 (66.26)							1213 (2669)	1211 (2664)
	AWWA C207 CLASS E	1683 (66.26)							1942 (4272)	1940 (4268)
DN1400 (56 in.)	PN6	1630 (64.17)	1820 (71.65)						1085 (2387)	1083 (2383)
	PN10	1675 (65.94)							1731 (3808)	1729 (3804)
	PN16	1685 (66.34)							1770 (3894)	1768 (3890)
	ASME CL150 SERIES B	1600 (62.99)							1593 (3505)	1591 (3500)
	PN25	1755 (69.09)							2368 (5210)	2366 (5205)
	PN40	1795 (70.67)							3086 (6789)	3084 (6785)
	ASME CL150 SERIES A	1745 (68.70)							2556 (5623)	2554 (5619)
	ASME CL300 SERIES A	1710 (67.32)							3376 (7427)	3374 (7423)
	ASME CL300 SERIES B	1765 (69.49)							3758 (8268)	3756 (8263)
DN1500 (60 in.)	JIS 5K	1730 (68.11)	1950 (76.77)	1065 (41.92)	864 (34.02)	989 (38.94)	991 (39.02)	910 (35.83)	1029 (2264)	1027 (2259)
	JIS 10K	1795 (70.67)							1504 (3309)	1502 (3304)
	ASME CL150 SERIES B	1725 (67.91)							2031 (4468)	2029 (4464)
	AWWA C207 CLASS B	1854 (72.99)							1229 (2704)	1227 (2699)
	AWWA C207 CLASS D	1854 (72.99)							1514 (3331)	1512 (3326)
	AWWA C207 CLASS E	1854 (72.99)							2544 (5597)	2542 (5592)
	ASME CL150 SERIES A	1855 (73.03)							3084 (6785)	3082 (6780)
	ASME CL300 SERIES A	1810 (71.26)							3875 (8525)	3873 (8521)
	ASME CL300 SERIES B	1880 (74.02)							4181 (9198)	4179 (9194)
DN1600 (64 in.)	PN6	1830 (72.05)	2080 (81.89)	1066 (41.96)	865 (34.06)	990 (38.98)	992 (39.06)	1000 (39.37)	1434 (3155)	1432 (3150)
	PN10	1915 (75.39)							2525 (5555)	2523 (5551)
	PN25	1975 (77.76)							3201 (7042)	3199 (7038)
	PN16	1930 (75.98)							2768 (6090)	2766 (6085)
	PN40	2025 (79.72)							4375 (9625)	4373 (9621)
DN1650 (66 in.)	AWWA C207 CLASS B	2032 (80.00)	2145 (84.45)	1116 (43.94)	915 (36.02)	1040 (40.94)	1042 (41.02)	1000 (39.37)	1504 (3309)	1502 (3304)
	AWWA C207 CLASS D	2032 (80.00)							2025 (4455)	2023 (4451)
DN1800 (72 in.)	PN6	2045 (80.51)	2340 (92.13)	1181 (46.50)	980 (38.58)	1105 (43.50)	1107 (43.48)	1100 (43.31)	1853 (4077)	1851 (4072)
	PN10	2115 (83.27)							3180 (6996)	3178 (6992)
	PN16	2130 (83.86)							3657 (8045)	3655 (8041)
	PN25	2195 (86.42)							4422 (9728)	4420 (9724)
	AWWA C207 CLASS B	2197 (86.50)							1773 (3901)	1771 (3896)
	AWWA C207 CLASS D	2197 (86.50)							2387 (5251)	2385 (5247)
DN1950 (78 in.)	AWWA C207 CLASS B	2362 (92.99)	2535 (99.80)	1291 (50.81)	1090 (42.91)	1215 (47.83)	1217 (47.91)	1180 (46.46)	2309 (5080)	2307 (5075)
	AWWA C207 CLASS D	2362 (92.99)							3037 (6681)	3035 (6677)
DN2000 (80 in.)	PN6	2265 (89.17)	2600 (102.36)						2581 (5678)	2579 (5674)
	PN10	2325 (91.54)							4254 (9359)	4252 (9354)
	PN16	2345 (92.32)							4556 (10023)	4554 (10019)
	PN25	2425 (95.47)							5896 (12971)	5894 (12967)
DN2100 (84 in.)	AWWA C207 CLASS B	2534 (99.76)	2730 (107.48)	1395 (54.91)	1194 (47.01)	1319 (51.93)	1321 (52.01)	1180 (46.46)	2641 (5810)	2639 (5806)
	AWWA C207 CLASS D	2534 (99.76)							3487 (7671)	3485 (7667)
DN2200 (88 in.)	PN6	2475 (97.44)	2860 (112.60)					1330 (52.36)	3363 (7399)	3361 (7394)
	PN10	2550 (100.39)							5795 (12749)	5793 (12745)
DN2400 (96 in.)	PN6	2685 (105.71)	3120 (122.83)	1495 (58.85)	1294 (50.94)	1419 (55.87)	1421 (55.94)	1450 (57.09)	4100 (9020)	4098 (9016)
	PN10	2760 (108.66)							6968 (15330)	6966 (15325)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights (Continued)

## WaterMaster

### Electromagnetic flowmeter

## Ordering information

### Electromagnetic flowmeter WaterMaster – FEW11, FEW12 and FEW18

Variant digit number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount (DN10 to DN32 Only)	FEW11																				
Flowmeter system – full bore, remote mount	FEW12		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Full bore sensor only – for use with WaterMaster transmitter / remote	FEW18																				
<b>Design</b>																					
Non-hazardous areas	1																				
Hazardous areas	5																				
<b>Bore diameter</b>																					
DN10 (3/8 in.)			010																		
DN15 (1/2 in.)			015																		
DN20 (3/4 in.)			020																		
DN25 (1 in.)			025																		
DN32 (1 1/4 in.)			032																		
<b>Liner material</b>																					
PTFE					A																
<b>Electrode design</b>																					
Standard					1																
Other					9																
<b>Measuring electrodes material</b>																					
Hastelloy® C-4 (2.4610)					D																
<b>Grounding accessories</b>																					
Not required																					
One potential equalizing ring (stainless steel)																					
Two potential equalizing rings (stainless steel)																					
Other																					
<b>Process connection type</b>																					
ASME B16.5 B class 150								A1													
ASME B16.5 B class 300								A3													
ISO / EN PN40								S4													
DIN PN40								D4													
Other								Z9													
<b>Process connection material</b>																					
Carbon steel flanges – DN20 to DN32 (3/4 to 1 1/4 in. NB)									B												
Stainless steel flange 1.4571 (316 Ti) – DN10 to DN15 (3/8 to 1/2 in. NB)									D												
Other									Z												
<b>Usage certifications</b>																					
Standard (without PED)																					
Other																					
<b>Calibration type</b>																					
Class 2 calibration – standard accuracy 0.4 %																					
Class 1 calibration – enhanced accuracy 0.2 %																					
Extended range, class 1 calibration – standard accuracy 0.4 %																					
Extended range, class 2 calibration – enhanced accuracy 0.2 %																					
<b>Temperature range installation / ambient temperature range</b>																					
Standard design/ –20 ... 60 °C (–4 ... 140 °F)																					
<b>Nameplate</b>																					
Adhesive																					
<b>Signal cable length and type</b>																					
Without signal cable																					
5 m (15 ft.) cable																					
10 m (30 ft.) cable																					
20 m (60 ft.) cable																					
30 m (100 ft.) cable																					
50 m (165 ft.) cable																					
80 m (260 ft.) cable																					
100 m (325 ft.) cable																					
150 m (490 ft.) cable																					
Special length or cable type																					
<b>Explosion protection certification</b>																					
General purpose (non-Ex design)																					
FM Class 1 Div. 2																					
FMc Class 1 Div. 2																					
Others																					

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# WaterMaster

## Electromagnetic flowmeter

Variant digit number		1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options						
Flowmeter system – full bore, integral mount (DN10 to DN32 Only)		FEW11		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X							
Flowmeter system – full bore, remote mount		FEW12																										
Full bore sensor only – for use with WaterMaster transmitter / remote		FEW18																										
Protection class transmitter / protection class sensor																		1 7										
IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable not fitted and potted to sensor IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable fitted and potted to sensor																												
Cable conduits*																		A B D F Y										
M20 x 1.5 (plastic) NPT 1/2 in. (blanked when cable not fitted) M20 SWA (armored) M20 SWA sensor, M20 x 1.5 (plastic) power / output Without																												
Power supply																								0 1 2 3 4				
Without 100... 230 V AC, 50 Hz 24 V AC or 24 V DC, 50 Hz 100... 230 V AC, 60 Hz 24 V AC or 24 V DC, 60 Hz																												
Input and output signal type																												
HART + 20 mA + pulse + contact output PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only) MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only) Without																		A G M Y										
Configuration type / diagnostics type																												
Not required Factory default/ standard																		0 1										
Options**																												
Accessories																												
Configuration lead																							AC					
Documentation language																												
German	M1	French	M4	Swedish	M7	Portuguese	MA																					
Italian	M2	English	M5 (default)	Finnish	M8	Danish	MF																					
Spanish	M3					Norwegen	MN																					
Verification type																												
Without fingerprint VeriMaster																							V0 V3					
Potable water approval																												
WRAS – cold water approval Without																							CWA CWY					
Power supply frequency (sensor FEW 18 only)																												
50 Hz	F5	60 Hz	F6																									
Number of testpoints (FEW 10 to 32 only)																												
1 Point 3 Points																							T1 T3					

\* For FM or FMC Approved versions, NPT only permitted.

\*\* Add codes for options.

# WaterMaster

## Electromagnetic flowmeter

### Electromagnetic flowmeter WaterMaster FEV11, FEV12 and FEV18

Variant digit number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	FEV11																				
Flowmeter system, optimized full bore, remote mount	FEV12		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Optimized full bore sensor only, for use with WaterMaster transmitter/remote	FEV18																				
<b>Design</b>																					
Non-hazardous areas	1																				
Hazardous areas	5																				
<b>Bore diameter</b>																					
DN40 (1½ in.)			040																		
DN50 (2 in.)			050																		
DN65 (2½ in.)			065																		
DN80 (3 in.)			080																		
DN100 (4 in.)			100																		
DN125 (5 in.)			125																		
DN150 (6 in.)			150																		
DN200 (8 in.)			200																		
<b>Liner material</b>																					
Polypropylene				V																	
<b>Electrode design</b>																					
Standard					1																
<b>Measuring electrodes material</b>																					
Stainless steel 316																					
Hastelloy® C-22																					
Super-austenitic steel																					
<b>Grounding accessories</b>																					
Standard																					
One potential equalizing ring (stainless steel)																					
Two potential equalizing rings (stainless steel)																					
<b>Process connection type</b>																					
Flanges ASME B16.5 class 150																					
Flanges AS 4087 PN21 (≥ DN50 [2 in. NB])																					
Flanges AS 4087 PN16 (≥ DN50 [2 in. NB])																					
Flanges AS 4087 PN14																					
Flanges AS 2129 Table F																					
Flanges AS 2129 Table E																					
Flanges AS 2129 Table D																					
Flanges AS 2129 Table C																					
Flanges JIS G5527 7.5K (≥ DN100 [4 in. NB])																					
Flanges JIS B2220 10K																					
ISO/EN PN10																					
ISO / EN PN16 (≥ DN50 [2 in. NB])																					
ISO / EN PN40 (DN40 [1½ in. NB] only) 16 bar rated																					
<b>Process connection material</b>																					
Carbon steel flanges																					
<b>Usage certifications</b>																					
Standard																					
<b>Calibration type</b>																					
Class 2 Calibration – standard accuracy 0.4 %																					
Class 1 Calibration – enhanced accuracy 0.2 %																					
Extended range, class 1 calibration – standard accuracy 0.4 %																					
Extended range, class 2 calibration – high accuracy 0.2 %																					

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# WaterMaster

## Electromagnetic flowmeter

Variant digit number		1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount		FEV11		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Flowmeter system, optimized full bore, remote mount		FEV12																				
Optimized full bore sensor only, for use with WaterMaster transmitter/remote		FEV18																				
Options**																						
Accessories																						
Configuration lead																						
Documentation language																						
German	M1	Swedish	M7																			
Italian	M2	Finnish	M8																			
Spanish	M3	Portuguese	MA																			
French	M4	Danish	MF																			
English	M5 (default)	Norwegian	MN																			
Other usage certifications																						
Measuring Instruments Directive (MID)																						
OIML R49 Calibration																						
Verification type																						
Without fingerprint																						
VeriMaster																						
Potable water approval																						
WRAS – cold water approval																						
NSF – 61 meter approval																						
Without																						
Power supply frequency (sensor FEV18 only)																						
50 Hz	F5	60 Hz	F6																			
Number of testpoints																						
1 Point																						
3 Points																						

\*\*Add codes for options.

## WaterMaster

### Electromagnetic flowmeter

**Electromagnetic flowmeter WaterMaster FEF12 and FEF18 (Sizes up to DN2400 [96 in. NB] still available on request)**

Variant digit number		1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
<b>Flowmeter system, full bore, remote mount</b>		FEF12																				
<b>Full bore sensor only, for use with WaterMaster transmitter / remote</b>		FEF18		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
<b>Design</b>																						
Non-hazardous areas		1																				
Hazardous areas (DN≥700 [27/28" in. NB])		5																				
*Size is dependent on flange specification																						
<b>Bore diameter</b>																						
DN250 (10 in.)				250																		
DN300 (12 in.)				300																		
DN350 (14 in.)				350																		
DN375 (15 in.)				375																		
DN400 (16 in.)				400																		
DN450 (18 in.)				450																		
DN500 (20 in.)				500																		
DN600 (24 in.)				600																		
Others				999																		
<b>Liner material</b>																						
Elastomer					K																	
<b>Electrode design</b>																						
Standard						1																
Others						9																
<b>Measuring electrodes material</b>																						
Stainless steel 316								S														
Hastelloy® C-22								C														
Super-austenitic steel (DN250 to 600 [10 to 24 in. NB])								U														
Others								Z														
<b>Grounding accessories</b>																						
Standard								1														
One potential equalizing ring (stainless steel)								3														
Two potential equalizing rings (stainless steel)								4														
Others								9														
<b>Process connection type</b>																						
Flanges ASME B16.5 class 150									A1													
Flanges ASME B16.5 class 300									A3													
Flanges AWWA C207 class B									C1													
Flanges AWWA C207 class D									C2													
Flanges AS 4087 PN21									E0													
Flanges AS 4087 PN16									E1													
Flanges AS 4087 PN14									E2													
Flanges AS 2129 Table F									E3													
Flanges AS 2129 Table E									E4													
Flanges AS 2129 Table D									E5													
Flanges AS 2129 Table C									E6													
Flanges AS 2129 Table H									E7													
Flanges AS 4087 PN35									E8													
Flanges JIS G5527 7.5K									J0													
Flanges JIS B2220 10K									J1													
Flanges JIS B2220 5K									J2													
Flanges ISO / EN PN6									S0													
Flanges ISO / EN PN10									S1													
Flanges ISO / EN PN16									S2													
Flanges ISO / EN PN25									S3													
Flanges ISO / EN PN40									S4													
Others									Z9													
<b>Process connection material</b>																						
Carbon steel flanges										B												
Others										Z												
<b>Usage certifications</b>																						
Standard												1										
<b>Calibration type</b>																						
Class 2 Calibration – standard accuracy 0.4 %																						
Class 1 Calibration – enhanced accuracy 0.2 %																						
Extended range, class 1 calibration – standard accuracy 0.4 %																						
Extended range, class 2 calibration – enhanced accuracy 0.2 %																						
<b>Temperature range installation / ambient temperature range</b>																						
Standard design / –20 ... 60 °C (–4 ... 140 °F)																						1

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**WaterMaster**  
 Electromagnetic flowmeter

Variant digit number		1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
<b>Flowmeter system, full bore, remote mount</b>		FEF12																				
<b>Full bore sensor only, for use with WaterMaster transmitter / remote</b>		FEF18		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
<b>Nameplate</b>																						
Adhesive																						A
<b>Signal cable length and type*</b>																						
Without signal cable																						0
5 m (15 ft.) cable																						1
10 m (30 ft.) cable																						2
20 m (60 ft.) cable																						3
30 m (100 ft.) cable																						4
50 m (165 ft.) cable																						5
80 m (260 ft.) cable																						6
100 m (325 ft.) cable																						7
150 m (490 ft.) cable																						8
Special Length > 150 m (> 490 ft.) (and / or armored cable)																						9
<b>Explosion protection certification</b>																						
General purpose (non-Ex design)																						A
FM Class 1 Div. 2 (DN≥700 [27/28* in. NB]) DN≤1600 [66 in. NB])																						G
FMc Class 1 Div. 2 (DN≥700 [27/28* in. NB]) DN≤1600 [66 in. NB])																						P
Others																						Z
<b>Protection class transmitter / protection class sensor</b>																						
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable not fitted and not potted																						2
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable fitted and potted																						3
<b>Cable conduits**</b>																						
M20 x 1.5 (plastic)																						A
NPT 1/2 in. (blanked when cable not fitted)																						B
M20 SWA (armored)																						D
M20 SWA sensor, M20 x 1.5 (plastic) power / output																						F
Without																						Y
<b>Power supply</b>																						
Without																						0
100... 230 V AC (50 Hz)																						1
24 V AC or 24 V DC (50 Hz)																						2
100... 230 V AC (60 Hz)																						3
24 V AC or 24 V DC (60 Hz)																						4
<b>Input and output signal type</b>																						
HART + 20 mA + pulse + contact output																						A
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)																						G
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)																						M
Without																						Y
<b>Configuration type / diagnostics type</b>																						
Without																						0
Factory defaults / standard diagnostics																						1
<b>Options***</b>																						
<b>Accessories</b>																						
Configuration lead																						AC
<b>Documentation language</b>																						
German	M1	French	M4	Swedish	M7	Portuguese	MA															
Italian	M2	English	M5 (default)	Finnish	M8	Danish	MF															
Spanish	M3					Norwegian	MN															
<b>Verification type</b>																						
Without fingerprint																						V0
VeriMaster																						V3
<b>Potable water approvals</b>																						
WRAS – cold water approval																						CWA
NSF-61 meter approval																						CWC
ACS																						CWF
Without																						CWY
<b>Power supply frequency (sensor FEF 18 only)</b>																						
50 Hz	F5	60 Hz	F6																			
<b>Number of testpoints</b>																						
1 Point																						T1
3 Points																						T3

\*Size is dependent on flange specification

\*\*The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered.

For FM or FMC Approved versions, NPT only permitted.

\*\*\*Add codes for options.

## WaterMaster

Electromagnetic flowmeter

### Electromagnetic flowmeter WaterMaster – FEW31, FEW32 and FEW38 (FEF still available on request)

Variant digit number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	FEW31																				
Flowmeter system – full bore, remote mount	FEW32		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Full bore sensor only – for use with WaterMaster transmitter/remote	FEW38																				
<b>Design</b>																					
Non-hazardous areas		1																			
Hazardous areas		5																			
<b>Bore diameter</b>																					
DN700 (28 in.)			700																		
DN750 (30 in.)			750																		
DN800 (32 in.)			800																		
DN900 (36 in.)			900																		
DN1000 (40 in.)			001																		
DN1050 (42 in.)			051																		
DN1100 (44 in.)			101																		
DN1200 (48 in.)			201																		
DN1350 (54 in.)			351																		
DN1400 (56 in.)			401																		
DN1500 (60 in.)			501																		
DN1600 (64 in.)			601																		
DN1650 (66 in.)			651																		
DN1800 (72 in.)			801																		
DN1950 (78 in.)			951																		
DN2000 (80 in.)			002																		
DN2100 (84 in.)			102																		
DN2200 (88 in.)			202																		
DN2400 (96 in.)			402																		
<b>Liner material</b>																					
Hard rubber				H																	
Elastomer				K																	
<b>Electrode design</b>																					
Standard					1																
Other					9																
<b>Measuring electrodes material</b>																					
Hastelloy® C-4 (2.4610)						D															
Stainless steel 316L						S															
Hastelloy C-22						C															
<b>Grounding accessories</b>																					
Not required						0															
Standard						1															
One potential equalizing ring (stainless steel)						3															
Two potential equalizing rings (stainless steel)						4															

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**WaterMaster**  
 Electromagnetic flowmeter

Variant digit number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
<b>Flowmeter system – full bore, integral mount</b>	FEW31																				
<b>Flowmeter system – full bore, remote mount</b>	FEW32		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
<b>Full bore sensor only – for use with WaterMaster transmitter/remote</b>	FEW38																				
<b>Process connection type</b>																					
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150 Flanges ANSI / ASME B16.5 / 16.47 series B Class 300 Flanges ANSI / ASME B16.5 / 16.47 series A Class 150 Flanges ANSI / ASME B16.5 / 16.47 series A Class 300 Flanges AWWA C207 Class B Flanges AWWA C207 Class D Flanges AWWA C207 Class E Flanges AWWA C207 Class F Flanges JIS 10K Flanges JIS 5K Flanges AS 4087 PN 16 Flanges AS 2129 Table E Flanges AS 2129 Table D Flanges AS 4087 PN 35 ISO 7005, DIN, EN 1092-1 PN6 ISO 7005, DIN, EN 1092-1 PN10 ISO 7005, DIN, EN 1092-1 PN16 ISO 7005, DIN, EN 1092-1 PN25 ISO 7005, DIN, EN 1092-1 PN40																					
A1 A3 B1 B3 C1 C2 C3 C4 J1 J2 E1 E4 E5 E8 S0 S1 S2 S3 S4																					
<b>Process connection material</b>																					
Carbon steel flanges																					
Stainless steel flange																					
B D																					
<b>Usage certifications</b>																					
Standard (without PED)																					
1																					
<b>Calibration type</b>																					
Class 2 calibration – standard accuracy 0.4 %																					
Class 1 calibration – enhanced accuracy 0.2 %																					
A B																					
<b>Temperature range installation / ambient temperature range</b>																					
Standard design/ –20 ... 60 °C (–4 ... 140 °F)																					
1																					
<b>Nameplate</b>																					
Adhesive																					
A																					
<b>Signal cable length and type</b>																					
Without signal cable																					
5 m (15 ft.) cable																					
10 m (30 ft.) cable																					
20 m (60 ft.) cable																					
30 m (100 ft.) cable																					
50 m (165 ft.) cable																					
80 m (260 ft.) cable																					
100 m (325 ft.) cable																					
150 m (490 ft.) cable																					
Special length or cable type																					
0 1 2 3 4 5 6 7 8 9																					
<b>Explosion protection certification*</b>																					
General purpose (non-Ex design)																					
A																					

Continued on next page...



\* FM approval in process. FEF product still available with full FM approval  
 \*\* The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered.  
 For FM or FMC Approved versions, NPT only permitted.  
 \*\*\* Add codes for options.

**WaterMaster**  
Electromagnetic flowmeter

**Electromagnetic flowmeter transmitter for WaterMaster FET10 and FET12**

Variant digit number		1 ... 5	6	7	8	9	10	11	12	13	14	15	Options
<b>Transmitter converter module</b>		FET10											
<b>Remote transmitter</b>		FET12		X	X	X	X	X	X	X	X	X	
<b>Design</b>													
Non-hazardous area			1										
Hazardous area			5										
<b>Temperature range installation / ambient temperature range</b>													
Standard design / -20 ... 60 °C (-4 ... 140 °F)				1									
<b>Nameplate</b>													
Adhesive					A								
<b>Signal cable length and type</b>													
Without signal cable						0							
<b>Explosion protection certification</b>													
Without (transmitter only)													
FM Class 1 Div. 2													
FMc Class 1 Div. 2													
Others													
<b>Protection class transmitter / protection class sensor</b>													
IP67 (NEMA 4X) / IP67 (NEMA 4X)								1					
<b>Cable conduits</b>													
M20 x 1.5 (plastic)													
NPT 1/2 in. (blanked when cable not fitted)													
M20 SWA (armored)													
M20 SWA sensor, M20 x 1.5 (plastic) power / output													
Without													
<b>Power supply</b>													
100... 230 V AC											1		
24 V AC or 24 V DC											2		
<b>Input and output signal type*</b>													
HART + 20 mA + pulse + contact output													
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)													
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)													
<b>Configuration type / diagnostics type</b>													
Factory defaults / standard diagnostics												1	
<b>Options**</b>													
<b>Accessories</b>													
Configuration lead				AC									
<b>Documentation language</b>													
German	M1			French	M4	Swedish	M7	Portuguese	MA				
Italian	M2			English	M5 (default)	Finnish	M8	Danish	MF				
Spanish	M3							Norwegian	MN				
<b>Other usage certifications</b>													
Measuring Instruments Directive (MID)				CM1									

\*The transmitter converter module Input and Output Signal Type must match the transmitter backplane output configuration (HART or PROFIBUS) – see O/FET100-EN.

\*\*Add codes for options.

## WaterMaster

Electromagnetic flowmeter

### Common accessories

Accessory	Item Number
WaterMaster AC Fuse F1 Type T 250 mA A/S TR5	B20411
WaterMaster DC Fuse F2 Type T 2 A A/S TR5	B20412
WaterMaster Infra Red Comms Pack	MJBX9932
WaterMaster Backplane PCB Board (STD)	WATX2505
WaterMaster Sensor PCB Board	WATX2506
WaterMaster Comms Cable	WEBC2500
Signal cable for remote WaterMaster transmitter 5 m (15 ft.) 10 m (30 ft.) 20 m (60 ft.) 30 m (100 ft.) 50 m (165 ft.) 80 m (260 ft.) 100 m (325 ft.) 150 m (490 ft.) 500 m (1650 ft.)	STT4500/05 STT4500/10 STT4500/20 STT4500/30 STT4500/50 STT4500/80 STT4500/100 STT4500/150 STT4500/500
Armored signal cable for remote WaterMaster transmitter 5 m (15 ft.) 10 m (30 ft.) 20 m (60 ft.) 30 m (100 ft.) 50 m (165 ft.) 80 m (260 ft.) 100 m (325 ft.) 150 m (490 ft.) 500 m (1650 ft.)	STT4501/05 STT4501/10 STT4501/20 STT4501/30 STT4501/50 STT4501/80 STT4501/100 STT4501/150 STT4501/500

## Contact us

### **ABB Limited**

#### **Process Automation**

Oldends Lane  
Stonehouse  
Gloucestershire GL10 3TA  
UK  
Tel: +44 1453 826 661  
Fax: +44 1453 829 671  
instrumentation@gb.abb.com

### **ABB Inc.**

#### **Process Automation**

125 E. County Line Road  
Warminster  
PA 18974  
USA  
Tel: +1 215 674 6000  
Fax: +1 215 674 7183

### **ABB Engineering (Shanghai) Ltd.**

No. 5, Lane 369, Chuangye Road  
201319, Shanghai,  
P.R. China  
Phone: +86 (0) 21 6105 6666  
Fax: +86 (0) 21 6105 6992  
Mail: china.instrumentation@cn.abb.com

**www.abb.com**

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DS/WM-EN Rev. L 05.2012

## **5 SUMP PUMP**

**SUPPLIER:** Grundfos Pumps Australia  
30 Blanck Street  
Ormeau, QLD, 4208

Ph: (07) 5540 6700  
Fax: (07) 5540 6710

**MODEL:** GRUNDFOS EF30.50EX06.2.50B SUMP PUMP



# DP, EF, SE1 and SEV ranges 0.6 – 2.6 kW



# Grundfos DP, EF, SE1 and SEV ranges

## Powerful pumps for drainage, effluent and raw sewage

Grundfos offers a full range of powerful wastewater pumps and pumping systems. This brochure presents the pumps in the 0.6 - 2.6 kW range.

Designed for handling drainage, effluent and sewage from private dwellings, farm areas, and small industry, these pumps represent the essence of the know-how that Grundfos has built up through more than 20 years in the wastewater business.

The Grundfos wastewater pumps offer unique user benefits, which make these pumps the natural choice for a variety of applications in small wastewater systems.

### ➤ Wide range of applications

State-of-the-art technology make the Grundfos pumps extremely efficient and highly dependable regardless of the application. These pumps are built to last even under the toughest working conditions.

### ➤ Less down time

The non-clogging design of the vortex impeller pumps and the solids handling capability of our channel impeller pumps guarantee maximum operating time and, consequently, less down time and reduced maintenance costs.

### ➤ Life long reliability

A newly developed cartridge shaft seal system, together with the polyurethane-sealed cable plug system, prevents liquid from penetrating into the motor.

### ➤ Easy to handle

The Grundfos pumps are easy to install and easy to dismantle for service or inspection. The pumps can be installed on an auto-coupling system, or they can be used as free-standing, portable pumps.





# Options

The Grundfos range of wastewater pumps can be permanently installed with a pipe connection or by means of an auto-coupling system. The auto-coupling system enables automatic connection or disconnection of the pump from outside the pumping pit.

Alternatively the pumps can be used as free-standing, portable pumps.

## Submerged installation on auto-coupling with guide rails

When the pump is installed on an auto-coupling system, where the base is fixed to the bottom of the pump pit, the pump is lowered into the pit on a dual guide rail system. The pump automatically connects to the base unit where the Grundfos SmartSeal, mounted on the pump discharge flange, provides a completely leak-proof connection between the pump and the base unit of the auto-coupling system. This optimises the efficiency of the entire pumping system and keeps the running cost at a minimum.



## Submerged installation, free standing

The pumps may alternatively be installed free standing connected either with a rigid discharge pipe or a flexible hose as required.



## Portable use

The Grundfos submersible wastewater pumps are fitted with a specially designed easy-lift handle. This makes the pumps suitable for portable use in a non-permanent installation or as a utility pump.



# Tough and reliable pumps...

The Grundfos range of small wastewater pumps is built for tough environments. Once installed these robust pumps will provide years of trouble-free operation with very little service required. State-of-the-art technology ensures high efficiency and low long-term operation costs.



## Watertight cable connection

Polyurethane filled, stainless steel cable plug connection, hermetically sealed, secure that no liquid will penetrate through the cable into the motor.



## Short rotor shaft

Compact construction with short rotor shaft and outside bearings, which ensure less stress on the bearings and, consequently, longer lifetime.



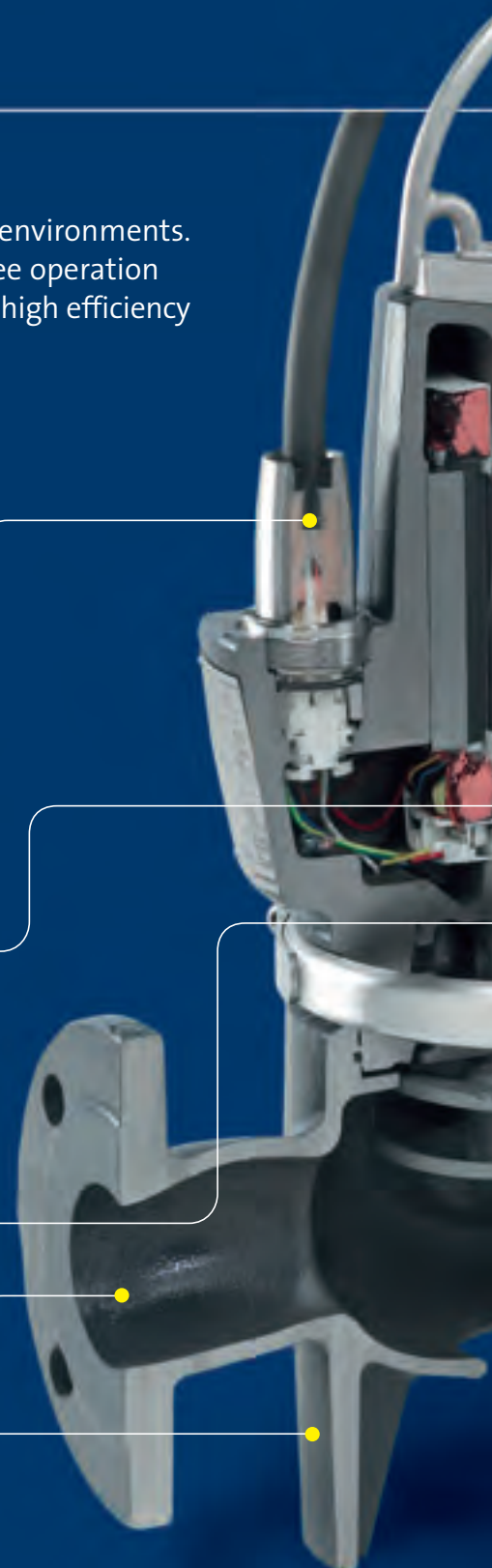
## Shaft seal

Cartridge shaft seal system provides longer operation time and less down-time. Easy to replace in the field without use of special tools.



## Hose connection or flange

Depending on model, the Grundfos wastewater pumps are fitted either with a 2" inside thread or a DN 65, PN 10 discharge flange. Legs on the pump housing provide optimum non-clogging suction.



## Grundfos DP range



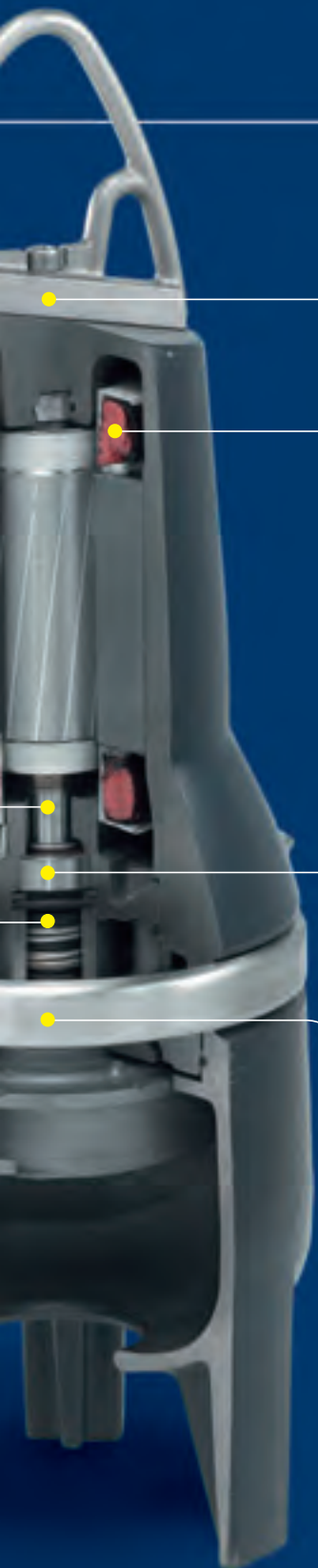
The DP range is fitted with a semi-open multi-vane impeller capable of handling solids up to 10 mm size. The heavy-duty suction strainer is easy to dismantle for cleaning.

## Grundfos EF range



The EF range is fitted with an open single-vane impeller capable of handling solids up to 30 mm size.

# – with many unique features



## Explosion proof motors

The motors can be provided in explosion proof versions: II 2 G EEx d IIB T4 according to EN 50014 (1997) + A1 & A2, and EN 50018 (2000) + A1, or an explosion proof Ex nC II T3 version according to IEC 60079-15.

## Specially designed lifting handle

Ensures correct lifting regardless of installation or motor positioning.



## Motor protection

Built-in thermal sensors in the motor windings provide failsafe protection against overheating. Ensures long lifetime.



## Heavy-duty ball bearings

Heavy-duty, maintenance-free ball bearings. Greased for life. Single row ball bearings in pumps with 0.6 kW to 1.5 kW motors. Pumps with 2.6 kW motors feature double row, angular contact ball bearings as lower bearing.



## Stainless steel clamp

Unique clamp system provides quick and easy dismantling of pump and motor unit. No tools required. Enables 180° rotation of the motor housing.



## Grundfos SE1 range



The SE1 range is fitted with a closed single-channel impeller capable of handling solids up to 50 mm size.

## Grundfos SEV range



The SEV range is fitted with Grundfos' unique SuperVortex impeller capable of handling solids up to 65 mm size.



# Type key and material specification

## Type key

<b>Example DP 10.50 .11 .EX .2 .1 .5 02 DP</b>	<b>10</b>	<b>.50</b>	<b>.11</b>	<b>.EX</b>	<b>.2</b>	<b>.1</b>	<b>.5</b>	<b>02</b>
Type range Grundfos DP range Grundfos EF range Grundfos SE range								
Material (standard, cast iron)								
Impeller type 1-channel impeller V-SuperVortex impeller []-Semiopen impeller								
Max. spherical impeller clearance [mm]								
Nominal discharge diameter [mm]								
Power Motor power output $P_2 / 100$ [W]								
Equipment (supplied with pump) []-Standard without equipment A-The pump is equipped with a control box CU 100								
Ex version []-Standard version of submersible wastewater pumps Ex-The pump is approved after the Ex standard indicated								
Number of poles 2-pole, 3000 min <sup>-1</sup> , 50 Hz								
Number of phases 1-Single-phase motor []-Three-phase motor								
Mains frequency 5-[50Hz]								
Voltage and starting method 02 230 V, direct-on-line starting 0B 400-415 V, direct-on-line starting 0C 230-240 V, direct-on-line starting								

## Material specification

Description	Material	DIN W. -Nr / EN standard	AISI / ASTM
O-rings	NBR		
Impeller	Cast iron	EN-GJS-500-7	
Pump housing	Cast iron	EN-GJL-250	
Stator housing	Cast iron	EN-JL-1030	
Nameplate	Stainless steel	1.4301	304
Strainer (only for the DP range)	Cast iron	EN-GJL-250	
Clamp	Stainless steel	1.4301	304
Seal ring	NBR		
Shaft seal	Primary seal (0.6 - 1.5 kW): SIC/SIC Secondary seal (0.6 - 1.5 kW): lip seal, NBR Primary seal (2.6 kW): SIC/SIC Secondary seal (2.6 kW): carbon/aluminium oxide Other components: NBR rubber, stainless steel		
Oil chamber	Cast iron		
Wear plate	Cast iron	EN-GJL-250	
Rotor / Shaft	Part at rotor: steel Shaft end at hydraulics: stainless steel	1.0533 1.4301	304
Cable	CR rubber, cable H07RN-F		
Outer plug part	Stainless steel	1.4308	CF-8
Screw	Stainless steel		
Lifting bracket	Stainless steel	1.4308	CF-8
Oil	Shell Ondina 917		
Paint (NCS S 8005-R80B, gloss 35)	Two component epoxy		

# Grundfos DP range

**The Grundfos DP pumps are designed for pumping drain water and groundwater from installations in or around private housing, farms, small industry, etc.**



The portable Grundfos DP pumps are also ideal for flood-relief applications and as utility pumps in farming, industry, etc.

The DP pumps are fitted with a suction strainer on which the pump stands. The suction strainer allows for the passage of solid particles of up to 10 mm size - the maximum free passage through the DP pumps. The strainer is easy to dismantle for cleaning or inspection of the pump hydraulics.

## Easy-adjustable impeller

The impeller of the DP range is of a semi-open multivane design. The impeller clearance can easily be adjusted simply by tightening or loosening the adjustment screws at the bottom of the suction cover.



## Installation

The Grundfos DP pumps with motors up to and including 1.5 kW are fitted with a 90°-angled discharge port with a 2" inside tread for mounting of a rigid or flexible discharge pipe. These models are for free-standing or portable use only.

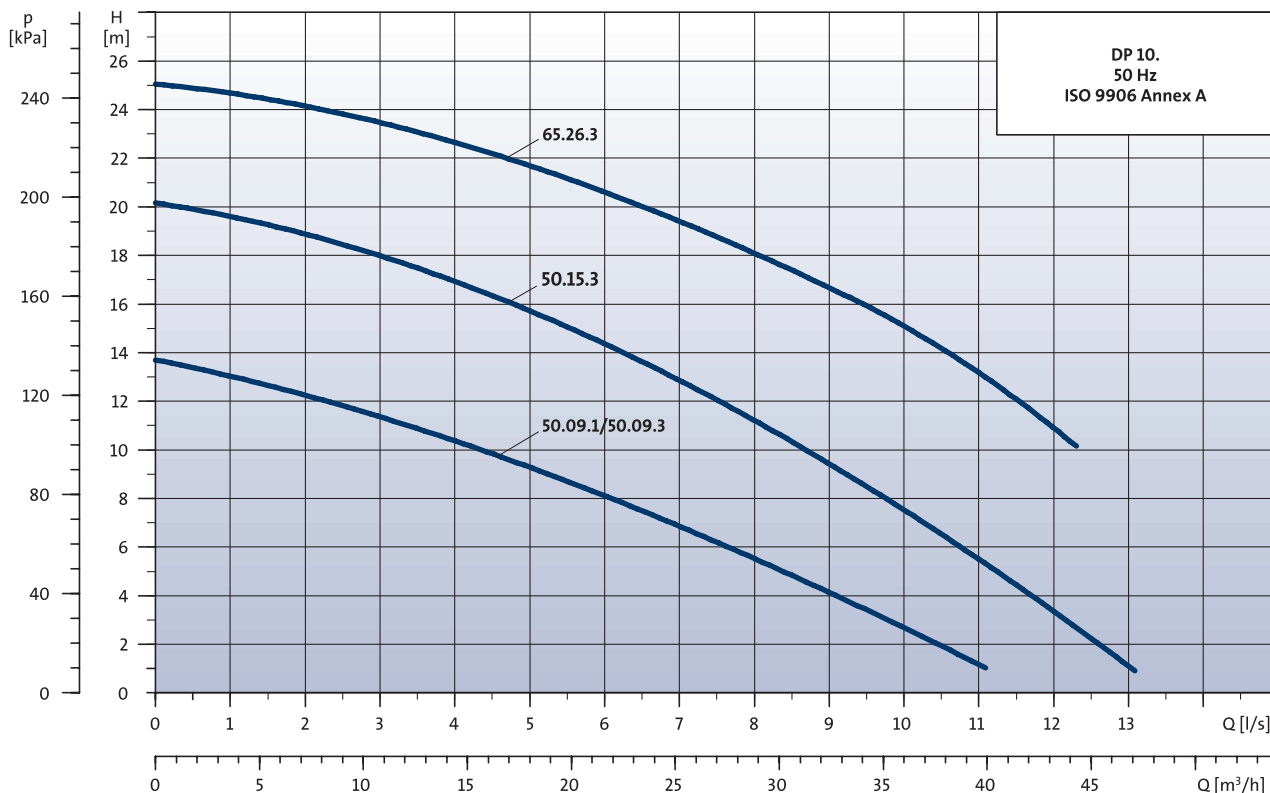


Grundfos DP pumps with 2.6 kW motors are fitted with a standard DN 65 flange. Flanged models can be mounted free standing or on an auto-coupling system.



# Grundfos DP range

## Performance overview



### Pumped liquids

The Grundfos DP pumps are suitable for pumping drainage and other liquids, with a pH value of 4 to 10, in permanent installations.

The Grundfos DP pumps are suitable for the following applications:

- Drainage and surface water
- Ground water
- Industrial process water without solids and fibres

### Liquid temperature

0°C to +40°C. For short periods, maximum one hour, up to +60°C is permissible (non-Ex versions only).

### Variants

The DP range comprises models for single-phase or three-phase voltage supply. See table on page 9. All types are designed for voltage tolerances of -10%/+6%.

The single-phase versions require a control box with built-in operating capacitor of 30 µF.

### Approvals

All 50 Hz DP pumps have been approved according to DIN EN 12050-2 for use in building services.

### Explosion-proof versions

For applications involving a risk of explosion, or where otherwise required, explosion-proof versions of the DP pumps are available. These models are provided with an II 2 G EEx d IIB T4 explosion-protection classification according to EN 50 014 (1997) + A1 & A2, and EN 50 018 (2000) + A1.

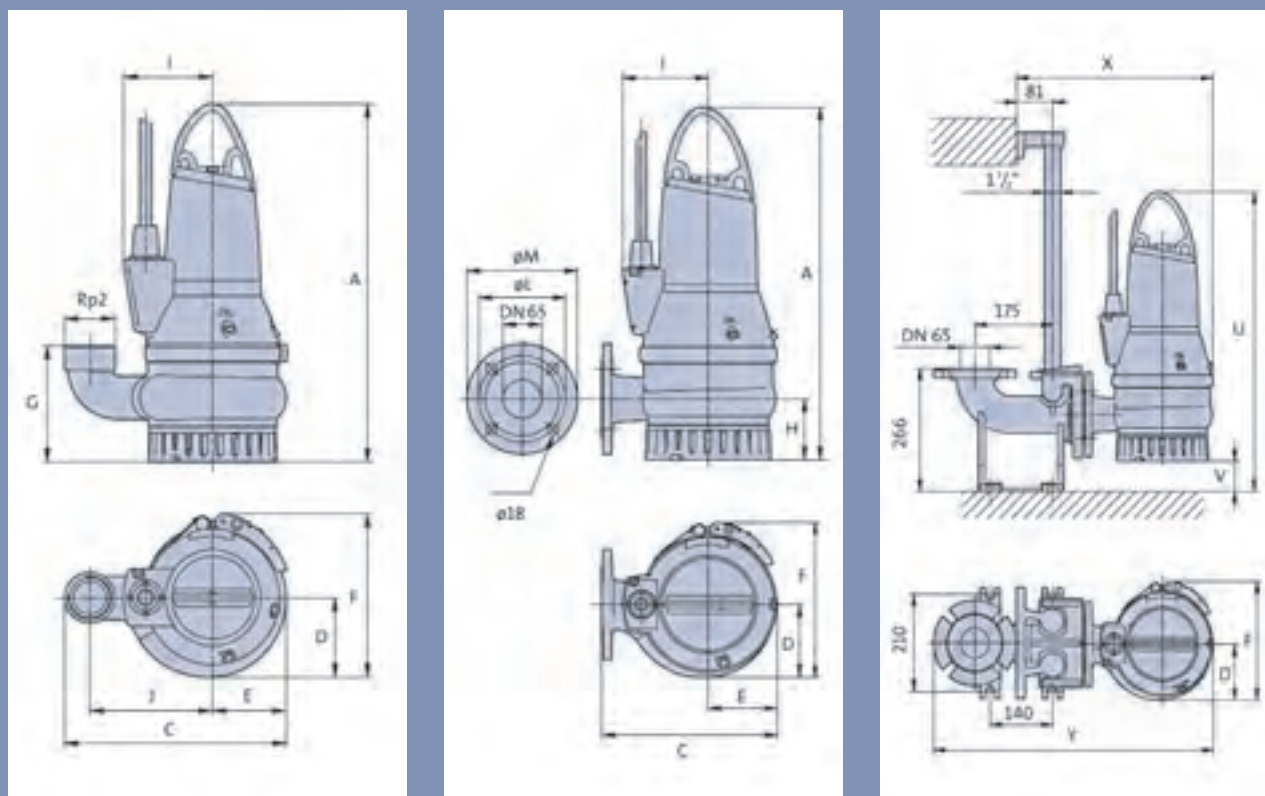
The DP pumps are also available with an Ex nC II T3 classification in accordance with IEC 60079-15:1987.

### Starts and stops

The Grundfos DP pumps are suitable for fully submerged continuous operation, or partly submerged intermittent S3-40%-10min. operation with a maximum of 20 starts per hour.

# Technical data

## Dimensions, free standing and on auto-coupling system



Motor size [kW]	A	C	D	E	F	G	H	I	J	øL	øM	U	V	X	Y
0.9 - 1.5	497	307	110	102	227	161	-	123	170	-	-	-	-	-	-
2.6	591	294	115	116	252	-	102	143	-	143	185	655	64	443	630

## Electrical data, pump type and product numbers

Pump type	Product number	P <sub>1</sub> [kW]	P <sub>2</sub> [kW]	n min <sup>-2</sup>	Voltage [V]	I <sub>h1</sub> [A]	I <sub>start</sub> [A]	Cos φ	Ex-classification	Weight [kg]
DP10.50.09.2.1.502	96104200	1.3	0.9	2870	1x230	6.1	38.0	0.96		39.0
DP10.50.09.2.50B	96104204	1.4	0.9	2870	3x400-415	2.8	21.0	0.76		39.0
DP10.50.09.A.2.1.502*	96104202	1.3	0.9	2870	1x230	6.1	38.0	0.96		39.0
DP10.50.09.A.2.50B*	96104206	1.4	0.9	2870	3x400-415	2.8	21.0	0.76		39.0
DP10.50.09.EX.2.1.502	96104201	1.3	0.9	2870	1x230	6.1	38.0	0.96	EEx d IIB T4	39.0
DP10.50.09.EX.2.50B	96104205	1.4	0.9	2870	3x400-415	2.8	21.0	0.76	EEx d IIB T4	39.0
DP10.50.09.EX.2.1.502	96104203	1.3	0.9	2870	1x230	6.1	38.0	0.96	Ex n IIB T4	39.0
DP10.50.09.EX.2.50B	96104207	1.4	0.9	2870	3x400-415	2.8	21.0	0.76	Ex n IIB T4	39.0
DP10.50.15.2.50B	96104208	2.2	1.5	2720	3x400-415	3.8	21.0	0.88		39.0
DP10.50.15.A.2.50B*	96104210	2.2	1.5	2720	3x400-415	3.8	21.0	0.88		39.0
DP10.50.15.EX.2.50B	96104209	2.2	1.5	2720	3x400-415	3.8	21.0	0.88	EEx d IIB T4	39.0
DP10.50.15.EX.2.50B	96104211	2.2	1.5	2720	3x400-415	3.8	21.0	0.88	Ex n IIB T4	39.0
DP10.65.26.2.50B	96106542	3.5	2.6	2870	3x400-415	5.8	33.0	0.87		61.0
DP10.65.26.A.2.50B*	96106544	3.5	2.6	2870	3x400-415	5.8	33.0	0.87		61.0
DP10.65.26.EX.2.50B	96106543	3.5	2.6	2870	3x400-415	5.8	33.0	0.87	EEx d IIB T4	61.0
DP10.65.26.EX.2.50B	96106545	3.5	2.6	2870	3x400-415	5.8	33.0	0.87	Ex n IIB T4	61.0

\*The pump is equipped with a CU 100 control box for automatic operation.



# Grundfos EF range

The Grundfos EF pumps are designed for pumping wastewater without toilet waste from private dwellings. These pumps are also suitable for pumping liquid manure from farms, and for a variety of industrial applications.



The EF pumps are designed for free-standing installation. The pumps are fitted with an integrated three-leg stand that keeps the suction inlet well clear of the pit bottom. The EF pumps are capable of handling solids of up to 30 mm size.



## Efficient channel impeller

The Grundfos EF pumps are fitted with an open single-vane impeller with excellent solids handling capabilities.

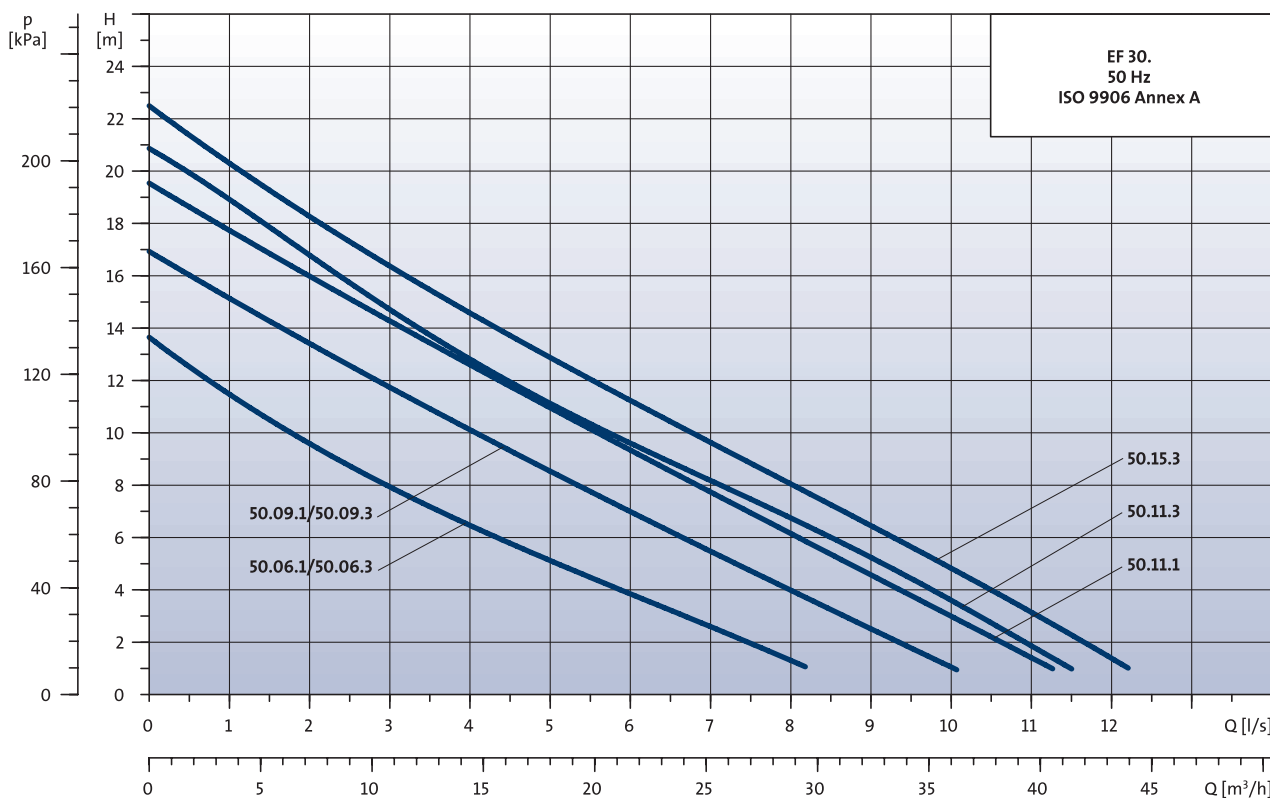
Impeller clearance can be adjusted by tightening or loosening the adjustment screws at the bottom of the suction cover. Adjustment can be carried out without dismantling the pump.

## Installation

The Grundfos EF pumps are fitted with a 90°-angled discharge port with a 2" inside tread for mounting of a rigid or flexible discharge pipe. The EF models are designed for free-standing installation or portable use only.



## Performance overview



### Pumped liquids

The Grundfos EF pumps are suitable for pumping effluent and other liquids with a pH value of 4 to 10. The EF pump range is able to handle liquids with solids up to 30 mm.

The Grundfos EF pumps are suitable for the following applications:

- Drainage and surface water with small impurities
- Wastewater with fibres, e.g. from laundries
- Wastewater, without discharge from toilets
- Wastewater from commercial buildings, without discharge from toilets

### Liquid temperature

0°C to +40°C. For short periods, maximum one hour, up to +60°C is permissible (non-Ex versions only).

### Variants

The EF range comprises models for single-phase or three-phase voltage supply, see page 12. All types are designed for voltage tolerances of -10%/+6%.

The single-phase versions require a control box with built-in operating capacitor of 30 µF.

### Approvals

All 50 Hz EF pumps have been approved according to DIN EN 12050-2 for use in building services.

### Explosion-proof versions

For applications involving a risk of explosion, or where otherwise required, explosion-proof versions of the EF pumps are available. These models are provided with an II 2 G EEx d IIB T4 explosion-protection classification according to EN 50 014 (1997) + A1 & A2, and EN 50 018 (2000) + A1.

The EF pumps are also available with an Ex nC II T3 classification in accordance with IEC 60079-15;1987.

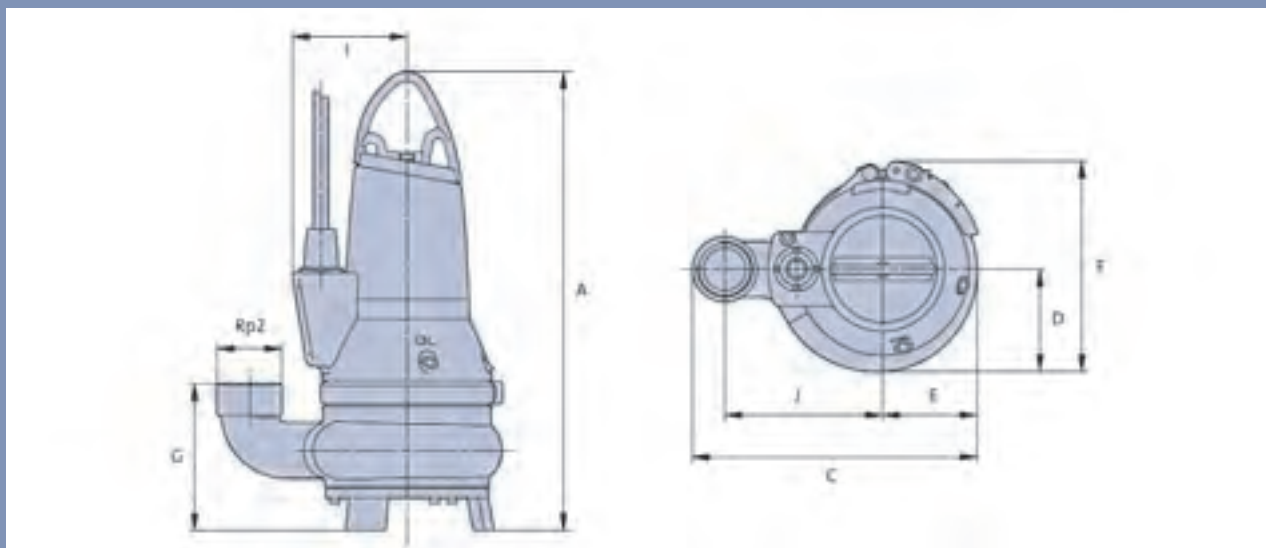
### Starts and stops

The Grundfos EF pumps are suitable for fully submerged continuous operation, or partly submerged intermittent S3-40%-10 min. operation with a maximum of 20 starts per hour.



# Grundfos EF range

## Dimensions, free standing



Motor size [kW]	A	C	D	E	F	G	I	J
0.6, 0.9, 1.1 and 1.5	497	307	110	102	227	161	123	170

## Electrical data, pump type and product numbers

Pump type	Product number	P <sub>1</sub> [kW]	P <sub>2</sub> [kW]	n min <sup>-2</sup>	Voltage [V]	I <sub>1/2</sub> [A]	I <sub>start</sub> [A]	Cos φ	Ex-classification	Weight [kg]
EF30.50.06.2.1.502	96106546	1.0	0.6	2920	1x230	4.8	38.0	0.90		38.0
EF30.50.06.2.50B	96106550	1.0	0.6	2920	3x400-415	2.3	21.0	0.65		38.0
EF30.50.06.A.2.1.502*	96106548	1.0	0.6	2920	1x230	4.8	38.0	0.90		38.0
EF30.50.06.A.2.50B*	96106552	1.0	0.6	2920	3x400-415	2.3	21.0	0.65		38.0
EF30.50.06.EX.2.1.502	96106547	1.0	0.6	2920	1x230	4.8	38.0	0.90	EEx d IIB T4	38.0
EF30.50.06.EX.2.50B	96106551	1.0	0.6	2920	3x400-415	2.3	21.0	0.65	EEx d IIB T4	38.0
EF30.50.06.EX.2.1.502	96106549	1.0	0.6	2920	1x230	4.8	38.0	0.90	Ex n IIB T4	38.0
EF30.50.06.EX.2.50B	96106553	1.0	0.6	2920	3x400-415	2.3	21.0	0.65	Ex n IIB T4	38.0
EF30.50.09.2.1.502	96115111	1.3	0.9	2870	1x230	6.1	38.0	0.96		38.0
EF30.50.09.2.50B	96115115	1.4	0.9	2870	3x400-415	2.8	21.0	0.76		38.0
EF30.50.09.A.2.1.502*	96115113	1.3	0.9	2870	1x230	6.1	38.0	0.96		38.0
EF30.50.09.A.2.50B*	96115117	1.4	0.9	2870	3x400-415	2.8	21.0	0.76		38.0
EF30.50.09.EX.2.1.502	96115112	1.3	0.9	2870	1x230	6.1	38.0	0.96	EEx d IIB T4	38.0
EF30.50.09.EX.2.50B	96115116	1.4	0.9	2870	3x400-415	2.8	21.0	0.76	EEx d IIB T4	38.0
EF30.50.09.EX.2.1.502	96115114	1.3	0.9	2870	1x230	6.1	38.0	0.96	Ex n IIB T4	38.0
EF30.50.09.EX.2.50B	96115118	1.4	0.9	2870	3x400-415	2.8	21.0	0.76	Ex n IIB T4	38.0
EF30.50.11.2.1.502	96106554	1.6	1.1	2830	1x230	7.4	38	0.97		38.0
EF30.50.11.2.50B	96106558	1.6	1.1	2830	3x400-415	3.1	21	0.81		38.0
EF30.50.11.A.2.1.502*	96106556	1.6	1.1	2830	1x230	7.4	38	0.97		38.0
EF30.50.11.A.2.50B*	96106560	1.6	1.1	2830	3x400-415	3.1	21	0.81		38.0
EF30.50.11.EX.2.1.502	96106555	1.6	1.1	2830	1x230	7.4	38	0.97	EEx d IIB T4	38.0
EF30.50.11.EX.2.50B	96106559	1.6	1.1	2830	3x400-415	3.1	21	0.81	EEx d IIB T4	38.0
EF30.50.11.EX.2.1.502	96106557	1.6	1.1	2830	1x230	7.4	38	0.97	Ex n IIB T4	38.0
EF30.50.11.EX.2.50B	96106561	1.6	1.1	2830	3x400-415	3.1	21	0.81	Ex n IIB T4	38.0
EF30.50.15.2.50B	96104196	2.2	1.5	2720	3x400-415	3.8	21	0.88		38.0
EF30.50.15.A.2.50B*	96104198	2.2	1.5	2720	3x400-415	3.8	21	0.88		38.0
EF30.50.15.EX.2.50B	96104197	2.2	1.5	2720	3x400-415	3.8	21	0.88	EEx d IIB T4	38.0
EF30.50.15.EX.2.50B	96104199	2.2	1.5	2720	3x400-415	3.8	21	0.88	Ex n IIB T4	38.0

\*The pump is equipped with a CU 100 control box for automatic operation.

# Grundfos SE1 range

**The Grundfos SE1 pumps are designed for pumping surface water, wastewater, and sludge, containing industrial wastewater.**



The Grundfos SE1 pumps are also ideal for installation in underground parking areas, car wash plants, and similar situations where a robust, dependable pump capable of dealing with large quantities of wastewater is required.

## **Self-cleaning channel impeller**

The Grundfos SE1 pumps are fitted with a closed single-channel impeller capable of handling moderate amounts of fibres and solids of up to 50 mm size.



The Grundfos channel impeller pumps provide high efficiency and excellent non-clogging capabilities. The channel impeller of the SE1 range has a free passage of 50 mm. Channel impeller pumps are ideal for heavy-duty operation and for pumping large quantities.

The impeller clearance can be adjusted by tightening or loosening the adjustment screws at the bottom of the suction cover. Adjustment can be carried out without dismantling the pump.

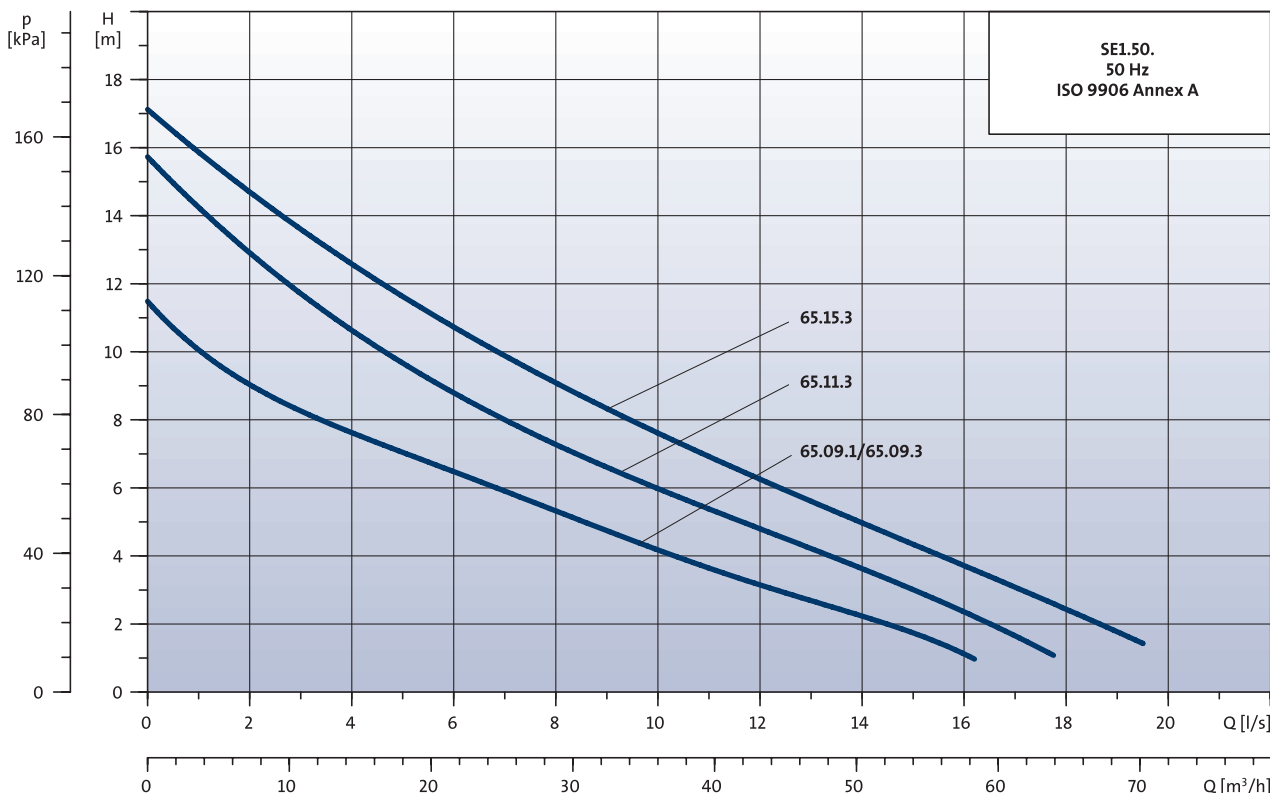
## **Installation**

The Grundfos SE1 pumps are fitted with a standard DN 65 discharge flange. The pumps can be installed free standing or on an auto-coupling guide-rail system in a pump pit.



# Grundfos SE1 range

## Performance overview



## Pumped liquids

The Grundfos SE1 pumps are suitable for pumping sewage and other liquids with a pH value of 4 to 10. The SE1 pump range is able to handle liquids with solids up to 50 mm.

The Grundfos SE1 pumps are suitable for the following applications:

- Large quantities of drainage and surface water
- Wastewater from private dwellings with discharge from toilets
- Wastewater from commercial buildings, without discharge from toilets
- Sludge containing industrial wastewater
- Industrial process water

## Liquid temperature

0°C to +40°C. For short periods, maximum one hour, up to +60°C is permissible (non-Ex versions only).

## Variants

The SE1 range comprises models for single-phase or three-phase voltage supply, see table on page 15. All types are designed for voltage tolerances of -10%/+6%.

The single-phase versions require a control box with built-in operating capacitor of 30 lF.

## Approvals

All 50 Hz SE1 pumps have been approved according to DINEN 12050-2 for use in building services.

## Explosion-proof versions

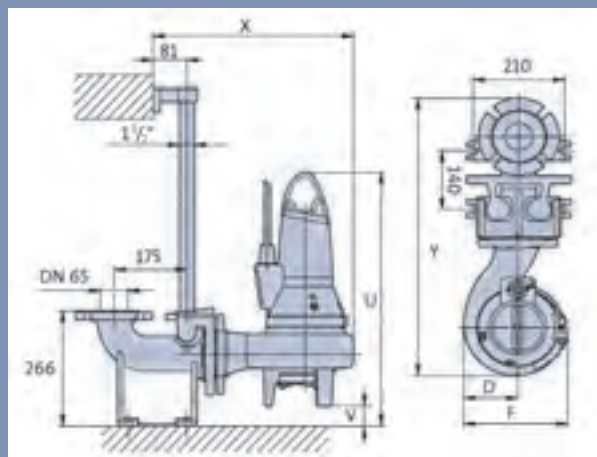
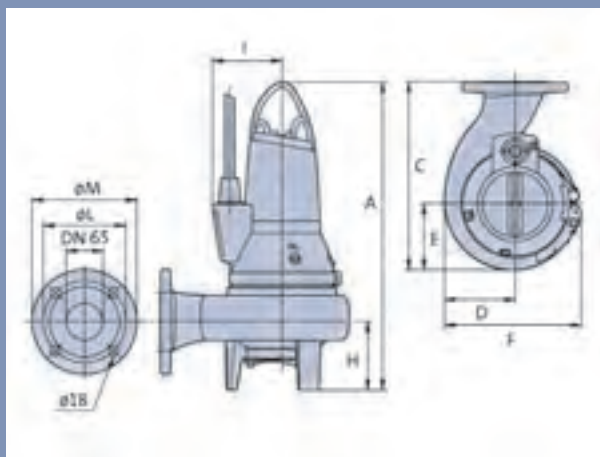
For applications involving a risk of explosion, or where otherwise required, explosion-proof versions of the SE1 pumps are available. These models are provided with an II 2 G EEx d IIB T4 explosion-protection classification according to EN 50 014 (1997) + A1 & A2, and EN 50 018 (2000) + A1.

The EF pumps are also available with an Ex nC II T3 classification in accordance with IEC 60079-15;1987

## Starts and stops

The Grundfos SE1 pumps are suitable for fully submerged continuous operation, or partly submerged intermittent S3-40%-10 min. operation with a maximum of 20 starts per hour.

## Dimensions, free standing and on auto-coupling system



Motor size [kW]	A	C	D	E	F	H	øL	øM
0.9, 1.1, and 1.5	544	333	126	118	242	121	143	185

Motor size [kW]	F	D	U	V	X	Y
0.9, 1.1 and 1.5	242	118	589	45	485	671

## Electrical data, pump type and product numbers

Pump type	Product number	P <sub>1</sub> [kW]	P <sub>2</sub> [kW]	n min <sup>-2</sup>	Voltage [V]	I <sub>1/1</sub> [A]	I <sub>start</sub> [A]	Cos φ	Ex-classification	Weight [kg]
SE1.50.65.09.2.1.502	96106562	1.3	0.9	2870	1x230	6.1	38	0.96		48
SE1.50.65.09.2.2.50C	96106567	1.4	0.9	2870	3x230-240	4.9	36	0.76		48
SE1.50.65.09.2.50B	96106566	1.4	0.9	2870	3x400-415	2.8	21	0.76		48
SE1.50.65.09.A.2.1.502*	96106564	1.3	0.9	2870	1x230	6.1	38	0.96		48
SE1.50.65.09.A.2.50C*	96106571	1.4	0.9	2870	3x230-240	4.9	36	0.76		48
SE1.50.65.09.A.2.50B*	96106570	1.4	0.9	2870	3x400-415	2.8	21	0.76		48
SE1.50.65.09.EX.2.1.502	96106563	1.3	0.9	2870	1x230	6.1	38	0.96	EEx d IIB T4	48
SE1.50.65.09.EX.2.50C	96106569	1.4	0.9	2870	3x230-240	4.9	36	0.76	EEx d IIB T4	48
SE1.50.65.09.EX.2.50B	96106568	1.4	0.9	2870	3x400-415	2.8	21	0.76	EEx d IIB T4	48
SE1.50.65.09.EX.2.1.502	96106565	1.3	0.9	2870	1x230	6.1	38	0.96	Ex n IIB T4	48
SE1.50.65.09.EX.2.50B	96106572	1.4	0.9	2870	3x400-415	2.8	21	0.76	Ex n IIB T4	48
SE1.50.65.11.2.1.502	96104125	1.6	1.1	2830	1x230	7.4	38	0.97		48
SE1.50.65.11.2.50C	96104130	1.6	1.1	2830	3x230-240	5.2	36	0.81		48
SE1.50.65.11.2.50B	96104129	1.6	1.1	2830	3x400-415	3.1	21	0.81		48
SE1.50.65.11.A.2.1.502*	96104127	1.6	1.1	2830	1x230	7.4	38	0.97		48
SE1.50.65.11.A.2.50C*	96104134	1.6	1.1	2830	3x230-240	5.2	36	0.81		48
SE1.50.65.11.A.2.50B*	96104133	1.6	1.1	2830	3x400-415	3.1	21	0.81		48
SE1.50.65.11.EX.2.1.502	96104126	1.6	1.1	2830	1x230	7.4	38	0.97	EEx d IIB T4	48
SE1.50.65.11.EX.2.50C	96104132	1.6	1.1	2830	3x230-240	5.2	36	0.81	EEx d IIB T4	48
SE1.50.65.11.EX.2.50B	96104131	1.6	1.1	2830	3x400-415	3.1	21	0.81	EEx d IIB T4	48
SE1.50.65.11.EX.2.1.502	96104128	1.6	1.1	2830	1x230	7.4	38	0.97	Ex n IIB T4	48
SE1.50.65.11.EX.2.50C	96104135	1.6	1.1	2830	3x400-415	3.0	21	0.81	Ex n IIB T4	48
SE1.50.65.15.2.50C	96104119	2.2	1.5	2720	3x230-240	6.6	36	0.88		48
SE1.50.65.15.2.50B	96104118	2.2	1.5	2720	3x400-415	3.8	21	0.88		48
SE1.50.65.15.A.2.50C*	96104123	2.2	1.5	2720	3x230-240	6.6	36	0.88		48
SE1.50.65.15.A.2.50B*	96104122	2.2	1.5	2720	3x400-415	3.8	21	0.88		48
SE1.50.65.15.EX.2.50C	96104121	2.2	1.5	2720	3x230-240	6.6	36	0.88	EEx d IIB T4	48
SE1.50.65.15.EX.2.50B	96104120	2.2	1.5	2720	3x400-415	3.8	21	0.88	EEx d IIB T4	48
SE1.50.65.15.EX.2.50B	96104124	2.2	1.5	2720	3x400-415	3.8	21	0.88	Ex n IIB T4	48

\*The pump is equipped with a CU 100 control box for automatic operation.



# Grundfos SEV range

The powerful Grundfos SEV pumps are designed for pumping wastewater with a high content of solids and fibres, including toilet waste, from pump pits in connection with private dwellings or other small building complexes.



## Highly efficient SuperVortex impeller

The SEV pumps are fitted with a patented Grundfos SuperVortex impeller, which is extremely efficient in handling solids and fibres. The SEV pumps have a free passage of 65 mm.



## No clogging or jamming

In a pump fitted with a Grundfos SuperVortex impeller, the flow takes place entirely outside the impeller.

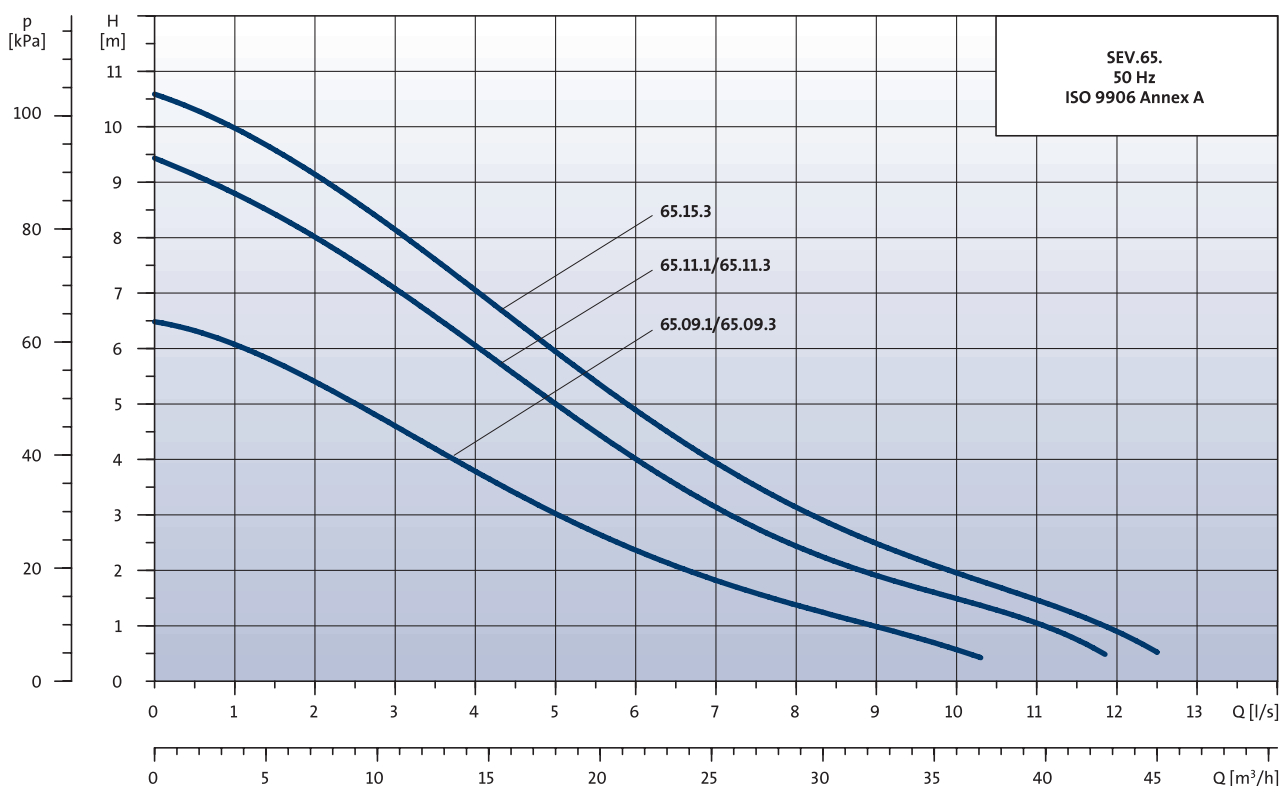
The design of the impeller ensures that long fibres pass freely through the pump without getting caught and without causing clogging or jamming. This means less downtime and overall higher pumping efficiency.

## Installation

The Grundfos SEV pumps are fitted with a standard DIN 65 discharge flange. The pumps can be installed free standing or on an auto-coupling guide-rail system in a pump pit.



## Performance overview



### Pumped liquids

The Grundfos SEV pumps are suitable for pumping sewage and other liquids with a pH value of 4 to 10. The SEV pump range is able to handle liquids with solids up to 65 mm.

The Grundfos SEV pumps are suitable for the following applications:

- Surface water containing abrasives
- Municipal sewage
- Sewage from commercial buildings
- Sludge and fibre-containing industrial wastewater

### Liquid temperature

0°C to +40°C. For short periods, maximum one hour, up to +60°C is permissible (non-Ex versions only).

### Variants

The SEV range comprises models for single-phase or three-phase voltage supply, see table on page 18. All types are designed for voltage tolerances of -10%/+6%.

The single-phase versions require a control box with built-in operating capacitor of 30 µF.

### Approvals

All 50 Hz SEV pumps have been approved according to DIN EN 12050-1 for use in building services.

### Explosion-proof versions

For applications involving a risk of explosion, or where otherwise required, explosion-proof versions of the SEV pumps are available. These models are provided with an II 2 G EEx d IIB T4 explosion-protection classification according to EN 50 014 (1997) + A1 & A2, and EN 50 018 (2000) + A1.

The EF pumps are also available with an Ex nC II T3 classification in accordance with IEC 60079-15:1987.

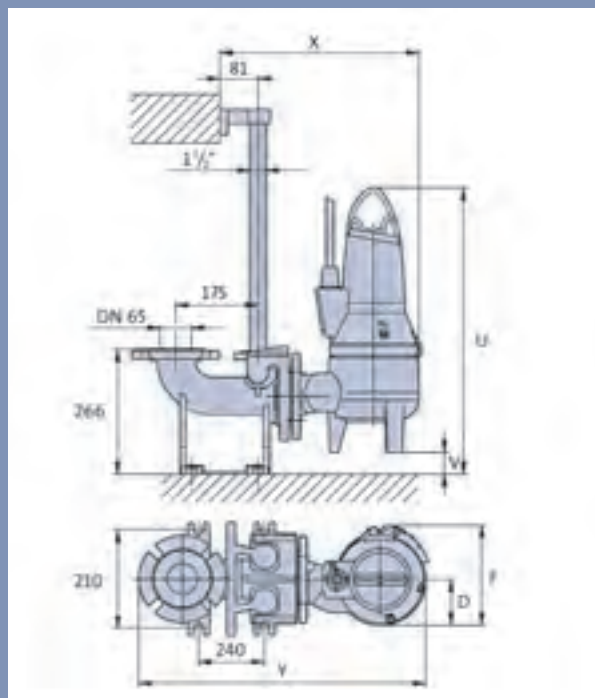
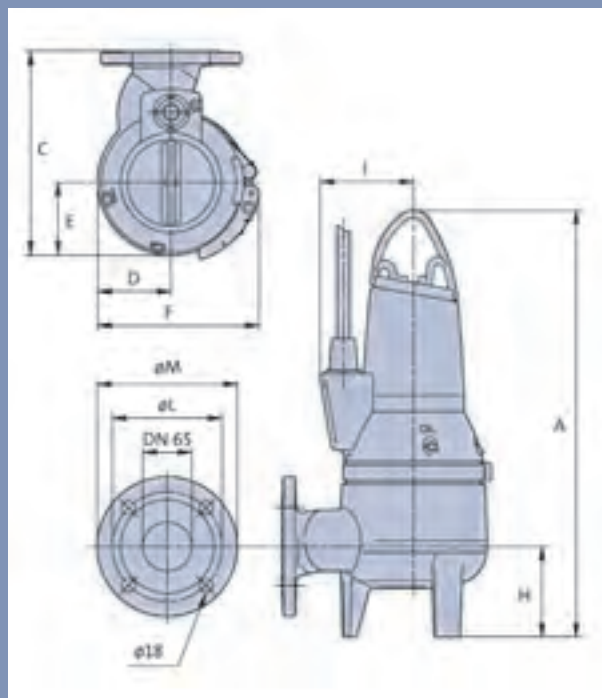
### Starts and stops

The Grundfos SEV pumps are suitable for fully submerged continuous operation, or partly submerged intermittent S3-40%-10 min. operation with a maximum of 20 starts per hour.



# Grundfos SEV range

## Dimensions, free standing and on auto-coupling system



Motor size [kW]	A	C	D	E	F	H	I	øL	øM
0.9, 1.1, and 1.5	544	333	126	118	242	121	123	143	185

Motor size [kW]	D	F	U	V	X	Y
0.9, 1.1 and 1.5	115	252	655	64	443	630

## Electrical data, pump type and product numbers

















Pump type	Product number	P <sub>1</sub> [kW]	P <sub>2</sub> [kW]	n min <sup>-2</sup>	Voltage [V]	I <sub>h1</sub> [A]	I <sub>start</sub> [A]	Cos φ	Ex-classification	Weight [kg]
SEV65.65.09.2.1.502	96115119	1.3	0.9	2870	1x230	6.1	38	0.96		41
SEV65.65.09.2.50B	96115123	1.4	0.9	2870	3x400-415	2.8	21	0.76		41
SEV65.65.09.A.2.1.502*	96115121	1.3	0.9	2870	1x230	6.1	38	0.96		41
SEV65.65.09.A.2.50B*	96115125	1.4	0.9	2870	3x400-415	2.8	21	0.76		41
SEV65.65.09.EX.2.1.502	96115120	1.3	0.9	2870	1x230	6.1	38	0.96	EEx d IIB T4	41
SEV65.65.09.EX.2.50B	96115124	1.4	0.9	2870	3x400-415	2.8	21	0.76	EEx d IIB T4	41
SEV65.65.09.EX.2.1.502	96115122	1.3	0.9	2870	1x230	6.1	38	0.96	Ex n IIB T4	41
SEV65.65.09.EX.2.50B	96115126	1.4	0.9	2870	3x400-415	2.8	21	0.76	Ex n IIB T4	41
SEV65.65.11.2.1.502	96106573	1.6	1.1	2830	1x230	7.4	38	0.97		41
SEV65.65.11.2.50B	96106577	1.6	1.1	2830	3x400-415	3.1	21	0.81		41
SEV65.65.11.A.2.1.502*	96106575	1.6	1.1	2830	1x230	7.4	38	0.97		41
SEV65.65.11.A.2.50B*	96106579	1.6	1.1	2830	3x400-415	3.1	21	0.81		41
SEV65.65.11.EX.2.1.502	96106574	1.6	1.1	2830	1x230	7.4	38	0.97	EEx d IIB T4	41
SEV65.65.11.EX.2.50B	96106578	1.6	1.1	2830	3x400-415	3.1	21	0.81	EEx d IIB T4	41
SEV65.65.11.EX.2.1.502	96106576	1.6	1.1	2830	1x230	7.4	38	0.97	Ex n IIB T4	41
SEV65.65.11.EX.2.50B	96106580	1.6	1.1	2830	3x400-415	3.1	21	0.81	Ex n IIB T4	41
SEV65.65.15.2.50B	96104192	2.2	1.5	2720	3x400-415	3.8	21	0.88		41
SEV65.65.15.A.2.50B*	96104194	2.2	1.5	2720	3x400-415	3.8	21	0.88		41
SEV65.65.15.EX.2.50B	96104193	2.2	1.5	2720	3x400-415	3.8	21	0.88	EEx d IIB T4	41
SEV65.65.15.EX.2.50B	96104195	2.2	1.5	2720	3x400-415	3.8	21	0.88	Ex n IIB T4	41

\*The pump is equipped with a CU 100 control box for automatic operation.

# Accessories

## Complete range of accessories

The following table shows the complete range of accessories for the Grundfos DP, EF, SE1, and SEV ranges.




No.	Picture	Description	Dimensions	Product number
1		90° elbow	R/Rp 2	96 00 19 80
			R/Rp 2½	96 00 19 81
2		Coupling half Storz coupling	Rp 2 for 2" hose	96 00 19 82
			Rp 2½ for 2" hose	96 00 19 83
3		10 m rubber hose incl. Storz couplings	2"	96 00 19 87
4		90° elbow	R/Rp 2	96 00 19 90
			R/Rp 2½	96 00 19 91
5		90° elbow with flange	DN 65, PN 10	96 00 36 16
			DN 80, PN 10	96 00 36 17
6		Hexagon nipple	R/Rp 2	96 00 19 93
			R/Rp 2½	96 00 19 94
7		Threaded flange	DN 50, Rp 2	96 00 44 51
			DN 65, Rp 2½	96 00 19 96
			DN 80, Rp 3	96 00 19 97
8		Bolts, nuts and gaskets	4 of each M16 x 65 mm, DN 50	96 00 44 52
			4 of each M16 x 65 mm, DN 65	96 00 19 98
			4 of each M16 x 65 mm, DN 80	96 00 19 99
9		Non-return valve Cast iron ball-type valve	Rp/Rp 2	96 00 20 02
10		Isolating valve Brass	R/Rp 2	96 00 20 05
			R/Rp 2½	96 00 20 06
11		Isolating valve Cast iron	Rp/Rp 2	96 48 99 76
12		Non-return valve Cast iron ball-type valve	DN 50	96 48 99 74
			DN 65	96 00 20 08
			DN 80	96 00 20 09
13		Isolating valve Cast iron	DN 50	96 48 99 75
			DN 65	96 00 20 10
			DN 80	96 00 20 11
14		Lifting chain with shackle, galvanized with certificates	10 m	96 49 74 64
			6 m	96 49 74 65
			3 m	96 49 74 66
15		Auto-coupling system complete – upper guiderail holder, nuts, bolts, gaskets, guide claw and base, cast iron	DN 65/DN 65 DN 80/DN 65	96 09 09 92 96 10 22 38
16		Hookup auto-coupling – base stand, counterpart, bolts, nuts and gaskets, cast iron	Rp/Rp 2	96 00 44 45

# Accessories




## Type Key for LC and LCD controllers

Example:			LC	107	230	1	12	30/150	DOL
Controller type	LC =	One-pump controller							
	LCD =	Two-pump controller							
Type of level sensors	107 =	Control of 1 or 2 pumps based on signals from bell shaped level pickups (pneumatic) Max. 11 kW shaft power DOL							
	108 =	Control of 1 or 2 pumps based on signals from float switches or electrodes Max. 11 kW shaft power DOL Max. 30 kW shaft power SD							
	110 =	Control of 1 or 2 pumps based on signals from electrodes Max. 11 kW shaft power DOL							
Voltage [V]									
Number of phases	1 =	1 phase							
	3 =	3 phase							
Maximum operating current per pump [A]									
Operating / starting capacitor [ $\mu$ F]									
[ ] = without capacitor									
30 = operating capacitor									
30/150 = 30 $\mu$ F operating and 150 $\mu$ F starting capacitor									
Starting methode	DOL =	Direct on-line starting							
	SD =	star-delta starting (only LC 108 and LCD 108)							

Note: Controllers with capacitor are for 12 A operating current.

No.	Picture	Description	Dimensions	Product number
17		LC 107 controller, pneumatic version with bell-shaped level-pickups and tube for 1 pump 1 x 230 V, direct-on-line-starting. With built-in operating capacitors	3.7 -12.0 A 30 $\mu$ F	96 12 55 95
		LC 107 controller, pneumatic version with bell-shaped level-pickups and tube for 1 pump 3 x 400 V, direct-on-line-starting	1 - 2.9 A	96 00 24 67
			1.6 - 5.0 A	96 00 24 68
			3.7 - 12.0 A	96 00 24 69
			12.0 - 23.0 A	96 00 24 70
18		LCD 107 controller, pneumatic version with bell-shaped level-pickups and tube for 2 pumps 1 x 230 V, direct-on-line-starting. With built-in operating capacitors	3.7 -12.0 A 30 $\mu$ F	96 12 55 96
		LCD 107 controller, pneumatic version with bell-shaped level-pickups and tube for 2 pumps 3 x 400 V, direct-on-line-starting	1 - 2.9 A	96 00 24 74
			1.6 - 5.0 A	96 00 24 75
			3.7 - 12.0 A	96 00 24 76
			12.0 - 23.0 A	96 00 24 77
19		LC 108 controller for level switches for 1 pump 1 x 230V, direct-on-line-starting. With built-in operating capacitors	3.7 -12.0 A 30 $\mu$ F	96 12 55 97
		LC 108 controller for level switches for 1 pump 3 x 230 V, direct-on-line-starting	1 - 2.9 A	•96 43 39 75
			1.6 - 5.0 A	•96 43 39 79
			3.7 - 12.0 A	•96 43 39 83
			12.0 - 23.0 A	•96 43 39 87
		LC 108 controller for level switches for 1 pump 3 x 400 V, direct-on-line-starting	1 - 2.9 A	•96 43 39 91
			1.6 - 5.0 A	•96 43 39 95
			3.7 - 12.0 A	•96 43 39 99
			12.0 - 23.0 A	•96 43 40 03


Product numbers marked with • are English versions. Other languages are available on request.

No.	Picture	Description	Dimensions	Product number
20		LCD 108 controller for level switches for 2 pumps 1 x 230V, direct-on-line-starting. With built-in operating capacitors	3.7 -12.0 A 30 µF	96 12 55 98
		LCD 108 controller for level switches for 2 pumps 3 x 230 V, direct-on-line-starting	1 - 2.9 A	•96 43 40 23
			1.6 - 5.0 A	•96 43 40 27
			3.7 - 12.0 A	•96 43 40 31
			12.0 - 23.0 A	•96 43 40 35
		LCD 108 controller for level switches for 2 pumps 3 x 400 V, direct-on-line-starting	1 - 2.9 A	•96 43 40 39
			1.6 - 5.0 A	•96 43 40 43
			3.7 - 12.0 A	•96 43 40 47
21		LC 110 controller for electrodes for 1 pump 1 x 230 V, direct-on-line-starting. With built-in operating capacitors	3.7 -12.0 A 30 µF	96 12 55 99
		LC 110 controller for electrodes for 1 pump 3 x 400 V, direct-on-line-starting	1 - 2.9 A	96 48 40 85
			1.6 - 5.0 A	96 48 40 86
			3.7 - 12.0 A	96 48 40 87
			12.0 - 23.0 A	96 48 40 88
22		LCD 110 controller for electrodes for 2 pumps 1 x 230 V, direct-on-line-starting. With built-in operating capacitors	3.7 -12.0 A 30 µF	96 12 56 00
		LCD 110 controller for electrodes for 2 pumps 3 x 400 V, direct-on-line-starting	1 - 2.9 A	96 48 40 93
			1.6 - 5.0 A	96 48 40 94
			3.7 - 12.0 A	96 48 40 95
			12.0 - 23.0 A	96 48 40 96

Product numbers marked with • are English versions. Other languages are available on request.






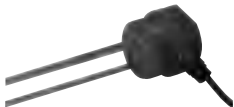
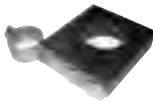


## Type Key for CU100 Control box

		Example:	CU	100	230	1	9	30/150	A
Type range									
Type designation									
Voltage [V]									
Number of phases	1	=	1 phase						
	3	=	3 phase						
Maximum amp. consumption for the pump [A]									
Operating / starting capacitor [µF]									
A = with float switch									
[] = without float switch									

Accessories				Product number
No.	Picture	Description	Dimensions	
23		CU 100 control box for one pump A model include float switch for automatic operation	CU 100.230.1.9.30/150	96 07 62 09
			CU 100.230.1.9.30/150.A	96 07 61 97
			CU 100.230.3.5.A	96 07 61 98
			CU 100.230.3.12.A	96 07 61 99
			CU 100.400.3.2,9.A	96 07 62 00
			CU 100.400.3.5.A	96 07 62 01



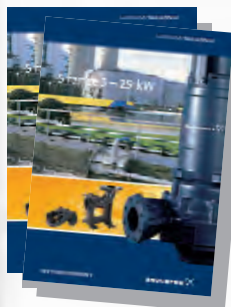
# Accessories

No.	Picture	Description	Dimensions	Product number
24		Float switch with 10 m cable	For LC 108 and LCD 108 controllers	96 00 33 32
		Float switch with 20 m cable		96 00 36 95
		Float switch for use in potentially explosive environments, with 10 m cable	For LC 108 and LCD 108 controllers connected to LC-Ex4	96 00 34 21
		Float switch for use in potentially explosive environments, with 20 m cable		96 00 35 36
25		Bracket for two float switches		96 00 33 38
26		Standard float switches with 10 m cable, counter weight and bracket	1 pump without alarm (2 switches)	62 50 00 13
			1 pump with alarm (3 switches)	62 50 00 14
			2 pumps without alarm (3 switches)	62 50 00 14
			2 pumps with alarm (4 switches)	62 50 00 15
27		Float switches for use in potentially explosive environments, with 10 m cable counter weight and bracket	1 pump without alarm (3 switches)	62 50 00 16
			1 pump with alarm (4 switches)	62 50 00 17
			2 pumps without alarm (4 switches)	62 50 00 17
28		LC-Ex4 intrinsically safe barrier, for use in potentially explosive environments, for float switch applications.  The LC-Ex4 can be mounted in ambient temperatures ranging from -25°C to +50°C. Safety class: II (1) G [Ex ia] II °C.		96 44 03 00
29		Electrodes for LC 110 and LCD 110	1 electrode with 10 m cable	96 07 62 89
			3 electrodes with 10 m cable	96 07 61 89
			4 electrodes with 10 m cable	91 71 34 37
30		Bracket for electrodes	For mounting on a 38 mm pipe	91 71 31 96
31		Signal lamp, 1 x 230 V	Outdoor mounting	62 50 00 20
32		Acoustic signal (horn), 1 x 230 V	Outdoor mounting	62 50 00 21
			Indoor mounting	62 50 00 22

# The Grundfos wastewater range

## S range 5 – 29 kW

Brochure covers the Grundfos range of submersible channel-impeller pumps from 5 kW up to 21 kW and Super-Vortex pumps up to 29 kW. All designed for handling unscreened raw sewage. Available in 50 Hz and 60 Hz versions.



## S range 15 – 155 kW

Brochure covers the Grundfos range of sewage pumps from 15 kW up to 155 kW for handling of raw sewage in heavy-duty applications. Available in 50 Hz and 60 Hz versions.



## S/SA ranges Up to 520 kW

Brochure covers the Grundfos range of super-heavy-duty channel pumps, axial flow pumps, and propeller pumps from 7.5 kW up to 520 kW.



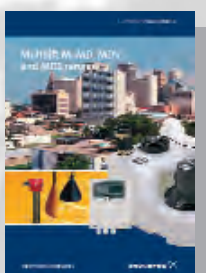
## DW range 0.7 – 20 kW

Brochure covers the Grundfos range of portable dewatering pumps (DW) from 0.8 kW to 20 kW for pumping raw water with abrasives.

**S range pumps 1.65 – 5.0 kW**  
The brochure covers the Grundfos range of heavy-duty submersible SuperVortex and channel-impeller pumps from 1.65 to 5.0 kW. All suitable for unscreened sewage.



**SEN range 1.0 – 21 kW**  
Brochure covers the Grundfos range of heavy-duty stainless steel pumps (SEN) for aggressive and corrosive environments.



## Multilift M, MD, MDV, and MD1 ranges

Brochure covers Grundfos lifting stations for individual as well as multi-user applications.



## LC/LCD Ranges – level controllers

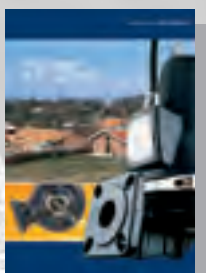
Brochure covers the Grundfos range of controls for the wastewater pumping systems.

## Prefabricated pumping stations

Brochure covers the Grundfos range of prefabricated pumping stations for collecting and removing drainwater, surface water, domestic and industrial wastewater and sewage.



**AMD, AMG, and AFG ranges**  
Brochure covers the new range of mixers and flowmakers for optimal control of liquids and solids throughout the wastewater treatment process.



## SEG range 0.9 – 4.0 kW

Brochure covers the Grundfos range of sewage grinder pumps (SEG) for pumping of wastewater with toilet discharge.



## SE1 and SEV ranges 1.1 – 11 kW

This brochure describes the innovative SEV/SE1 pump lines. Fitted with Super-Vortex or single-channel impellers, these pumps can meet approximately 80% of all wastewater pumping needs.

## SRP range 3.0 – 24 kW

Brochure covers the Grundfos range of SRP submersible recirculation pumps for wastewater treatment plants and flood control. Available in 50 Hz and 60 Hz versions.





## Business with an attitude

**Knowledge** The sharing of knowledge, experience and expertise across our global network will always lead our business forward.

**Innovation** Combining the best technology with fresh ways of thinking, we will continue to develop even better pumps, systems, services and standards.

**Solution** With a complete product range, capable of providing every conceivable water solution, we are the most complete player on the market.

## **6 TEST SHEETS**



Form No. F1323

## Pump Commissioning Test Sheet

Date: 11-4-13 Customer: July Job Number: I61162Pump Station: ASHBURN RD. kW: 22 Amps: 43

Duty: \_\_\_\_\_ Flow: \_\_\_\_\_ Head: \_\_\_\_\_ kWH/kL: \_\_\_\_\_

Test Description	Diameter of Well (m)	Centre of gauge to water level (m)	Reading of gauge (m)	Total Head in metres	Amps	Volts	Draw Down Test		Litres/Sec	kWH/1000	Insulation Testing		
							Metres drawn Down	Seconds Taken			R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading Earth Continuity
Pump No.1	50HZ			19	46	445			92		R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$
	45HZ			16	38	415			72		R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$
	40HZ			14	32	415			57		Earth Continuity 0.02 $\Omega$		
Pump No.2	50HZ			19	45	415			92		R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$
	45HZ			16	40	415			72		R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$
	40HZ			14	34	415			57		Earth Continuity 0.02 $\Omega$		
Pump No.3	Shut Off Head										R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$
	Duty Point										R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$
	Extra Point (if required)										R: $\frac{500}{\Omega}$ M $\Omega$	W: $\frac{500}{\Omega}$ M $\Omega$	Thermistor Reading $\Omega$

1. kW =  $(R \div t) \times (3600 \div c)$

R - Number of revs counted

t - Time taken in seconds

c - Meter constant

2. kWH/1000 =  $(kW \times 1000) \div (\text{Litres/Sec} \times 3600)$

3.  $V = \pi r^2 \times h$

V - Volume (metres cubed)

r - Radius of Well

h - Height

4. Litres/Sec =  $V \div \text{Sec. Taken}$


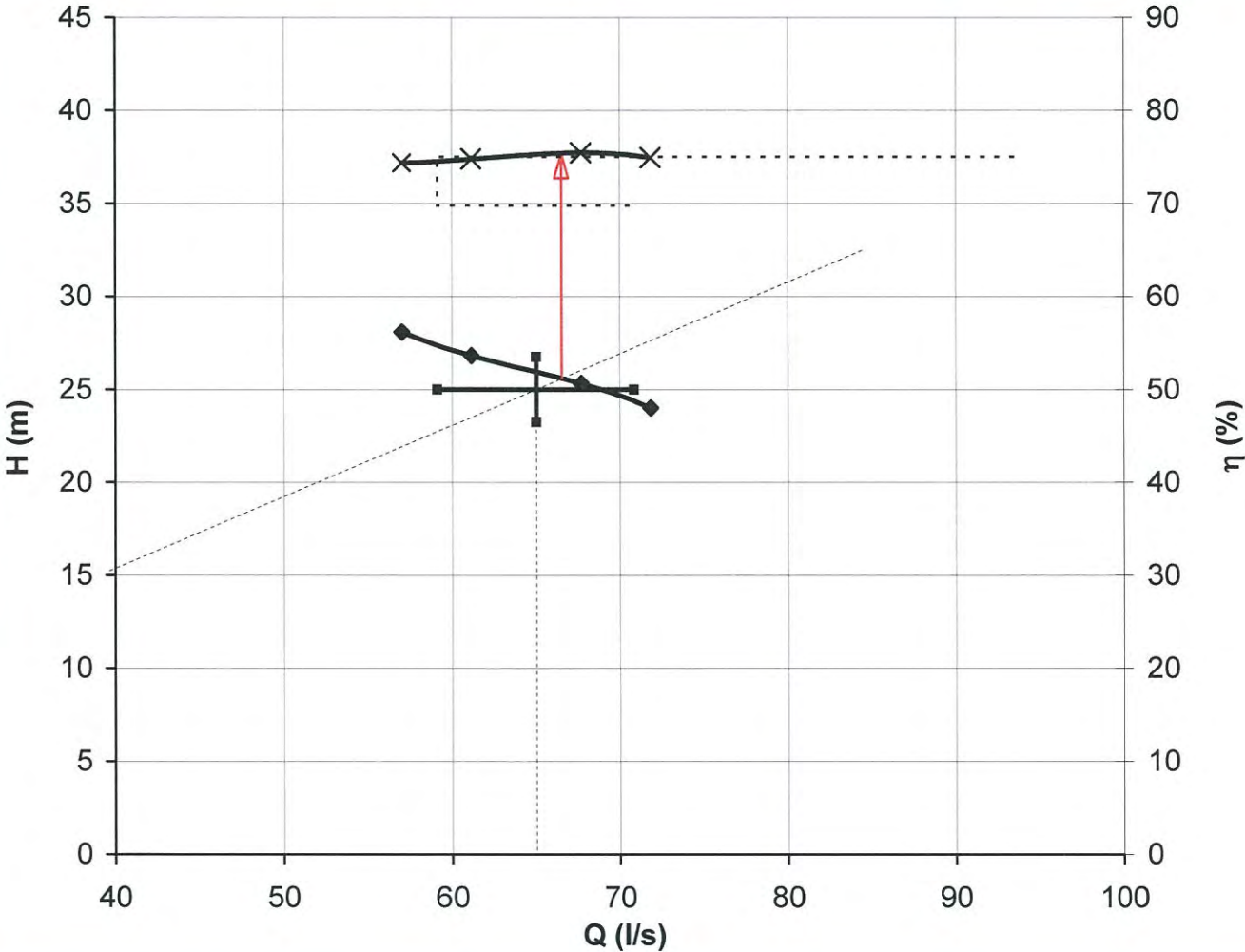
Person Testing: MARK DE RUYTERPerson Testing (Witness): PAUL FRANKTON



**Test in accordance with ISO 9906 Grade 2 Annex A**

Date: 27. Nov 12  
Test Engineer: andreas.sch



		<h1>Verification of Guarantee</h1>	
Test in accordance with ISO 9906 Grade 2 Annex A			
Client	Weir Minerals Australia Ltd	Date:	27. Nov 12
Pump Code:	F04K-S03R+FE030X4-XSEK1+NC1B4E-20	Order No.:	12008958
Fab. No.:	214580	Client Ref:	4500560095
Project		Item No.	
<b>Guarantee duty points at 1460 rpm</b>		<b>Tolerance Factors</b>	
Volumetric flow rate: $Q_G$ 65.0 l/s		$t_Q$ 9.0 %	
Pump total head: $H_G$ 25.0 m		$t_H$ 7.0 %	
Pump Efficiency $\eta_G$ 75.0 %		$t_\eta$ -7.0 %	
			
<b>Efficiency Line Intersection</b>			The pump efficiency is derived from the measured QH curve where it is intersected by a straight line passing through the guaranty point and the origin of the of the Q & H axis and where a vertical line from this intersection meets the Q $\eta$ curve.
Q	66.53	l/s	
H	25.59	m	
$\eta$	75.42	%	
<b>Test Result Report</b>			
	Max Allowable Deviations from GP	Actual Deviations from GP	Comments
$\Delta Q$	5.85	3.84	Intersects curve
$\Delta H$	1.75	0.93	Intersects curve
$\Delta \eta$	-5.25	0.42	Exceeds Requirements
<b>Test Result: Test Passed</b>			
Notes:	As at least one of the lines of the tolerance cross intersects with the tested pump QH curve and the efficiency is within tolerance, the guaranty has been verified.		


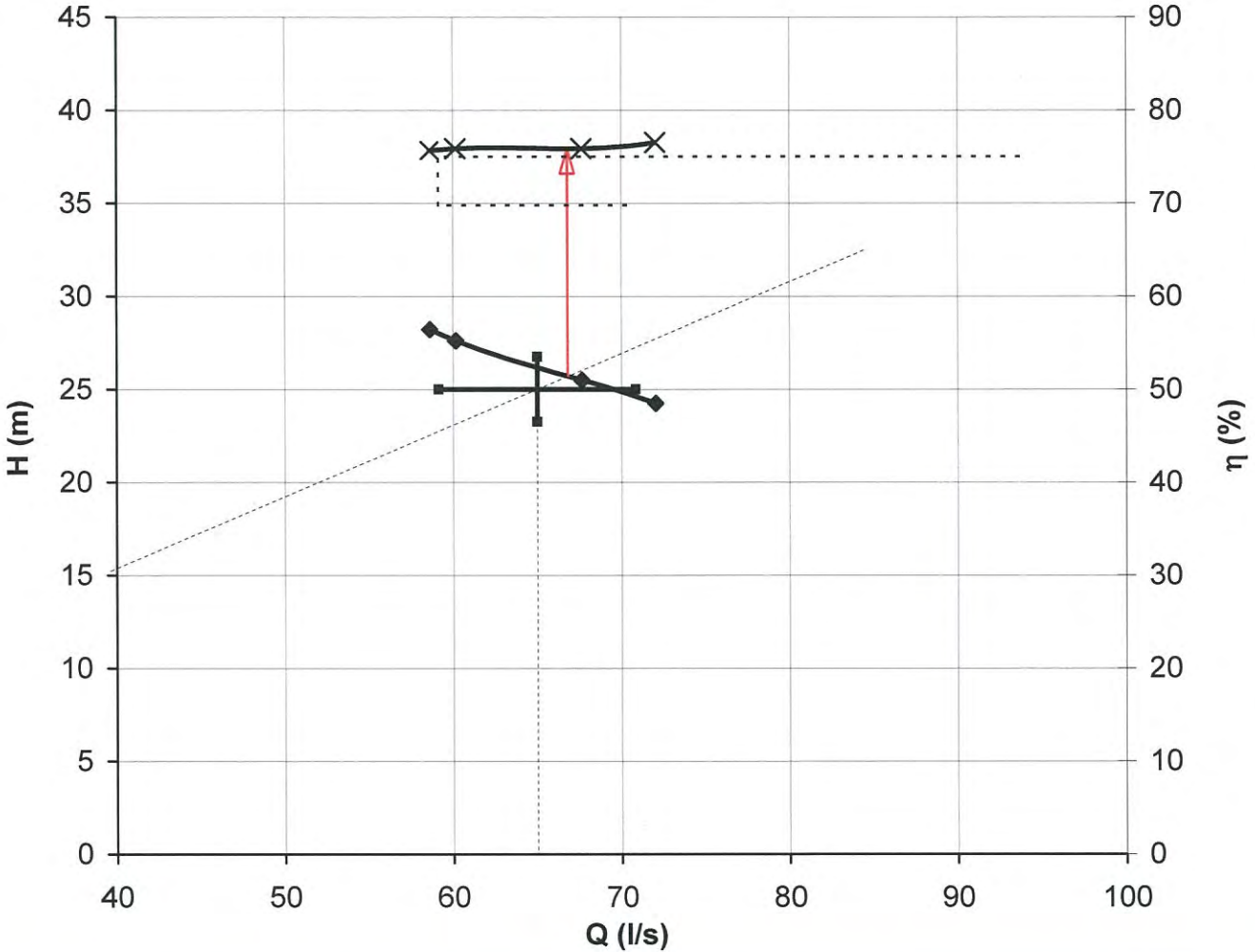


## Test in accordance with ISO 9906 Grade 2 Annex A

Date: 27. Nov 12  
Test Engineer: andreas.sch

[illegible]



		<h2 style="text-align: center;">Verification of Guarantee</h2>	
Test in accordance with ISO 9906 Grade 2 Annex A			
Client	Weir Minerals Australia Ltd		Date: 27. Nov 12
Pump Code:	F04K-S03R+FE030X4-XSEK1+NC1B4E-20		Order No.: 12008958
Fab. No.:	214581		Client Ref: 4500560095
Project			Item No.
<b>Guarantee duty points at 1460 rpm</b>			<b>Tolerance Factors</b>
Volumetric flow rate: $Q_G$ 65.0 l/s			$t_Q$ 9.0 %
Pump total head: $H_G$ 25.0 m			$t_H$ 7.0 %
Pump Efficiency $\eta_G$ 75.0 %			$t_\eta$ -7.0 %
			
<b>Efficiency Line Intersection</b>			The pump efficiency is derived from the measured QH curve where it is intersected by a straight line passing through the guaranty point and the origin of the of the Q & H axis and where a vertical line from this intersection meets the $\eta$ curve.
Q	66.81	l/s	
H	25.70	m	
$\eta$	75.86	%	
<b>Test Result Report</b>			
	Max Allowable Deviations from GP	Actual Deviations from GP	Comments
$\Delta Q$	5.85	4.47	Intersects curve
$\Delta H$	1.75	1.16	Intersects curve
$\Delta \eta$	-5.25	0.86	Exceeds Requirements
<b>Test Result: Test Passed</b>			
Notes:	As at least one of the lines of the tolerance cross intersects with the tested pump QH curve and the efficiency is within tolerance, the guaranty has been verified.		



**ZENTRIFUGALPUMPEN**  
CH – 8213 NEUNKIRCH SH Schweiz  
[www.hidrostal.ch](http://www.hidrostal.ch)

**Hidrostal AG**

Gigering 27CH-8213 Neunkirch

Telefon 052 / 687 06 87

Telefax 052 / 681 20 84

Web: [www.hidrostal.ch](http://www.hidrostal.ch)

## Hydrostatic Test – C E R T I F I C A T E

<b>Hidrostal Order No.:</b>	12008958
<b>Customer's Order No.:</b>	4500560095
<b>Customer:</b>	Weir Minerals Australia Ltd
<b>Pump-Type:</b>	F04K-S03R+FE030X4
<b>Serial-Number:</b>	214580 + 214581
<b>Test Pressure:</b>	6 bar
<b>Duration of Test:</b>	30 minutes

**WE HAVE PRESSURE TESTED THE ABOVE MENTIONED PUMP  
HYDRAULIC TO THE PRESSURE AND FOR THE DURATION AS  
INDICATED ABOVE. WE CONFIRM THAT THE HYDRAULIC WITHSTOOD  
THE PRESSURE FOR THE DURATION OF THE TEST PERIOD.**

**Date of Test :** 26.11.2012  
**Issued :** 26.11.2012  
**From :** M. Wüst





# Analytical Report



Accredited for compliance with ISO/IEC 17025  
NATA accredited Lab No 15304  
This Document Shall Not Be Reproduced, Except In Full



Ph: (07) 32871844  
Fax: (07) 32871344  
243a Burnside Rd, Stapylton  
QLD 4207  
Email: enquiries@coops.com.au

<b>Client Name:</b>	J & P Richardson Industries Pty Ltd
<b>Address:</b>	PO Box 124 Sumner Park QLD 4074
<b>Contact and Phone:</b>	Rob Miotti, Ph: (07) 3271 2911
<b>Project:</b>	Sewer Main (Bypass) Ashburn Road, Dinmore

SEWER MAIN	1200 Tested over 5 hour period	PASS	Y/N	20/03/2013	Yes	CHAINAGES OR LANDMARKS	As per on site location at Ashburn Road, Dinmore
------------	--------------------------------	------	-----	------------	-----	------------------------	--

TEST DESCRIPTION	Y/N	GAUGE USED	TESTING CRITERIA	AUTHORISED SIGNATORY NAME	AUTHORISED SIGNATORY SIGN-OFF	DATE	COMMENTS
SEWER MAIN (Bypass)	Yes	22606/2	Note 1	Penny Intaraphim		21/03/2013	WSA01-2004

Name of Field Technician/s : Darren Walker

NOTE 1: All tests are carried out to the requirements of Coops Drainage & Civil Testing Operating Procedures and to the local authority/council.

**End of Report**

## **7 “AS CONSTRUCTED” DRAWINGS**



## AS CONSTRUCTED DETAILS

I CERTIFY THAT THE 'AS CONSTRUCTED' DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

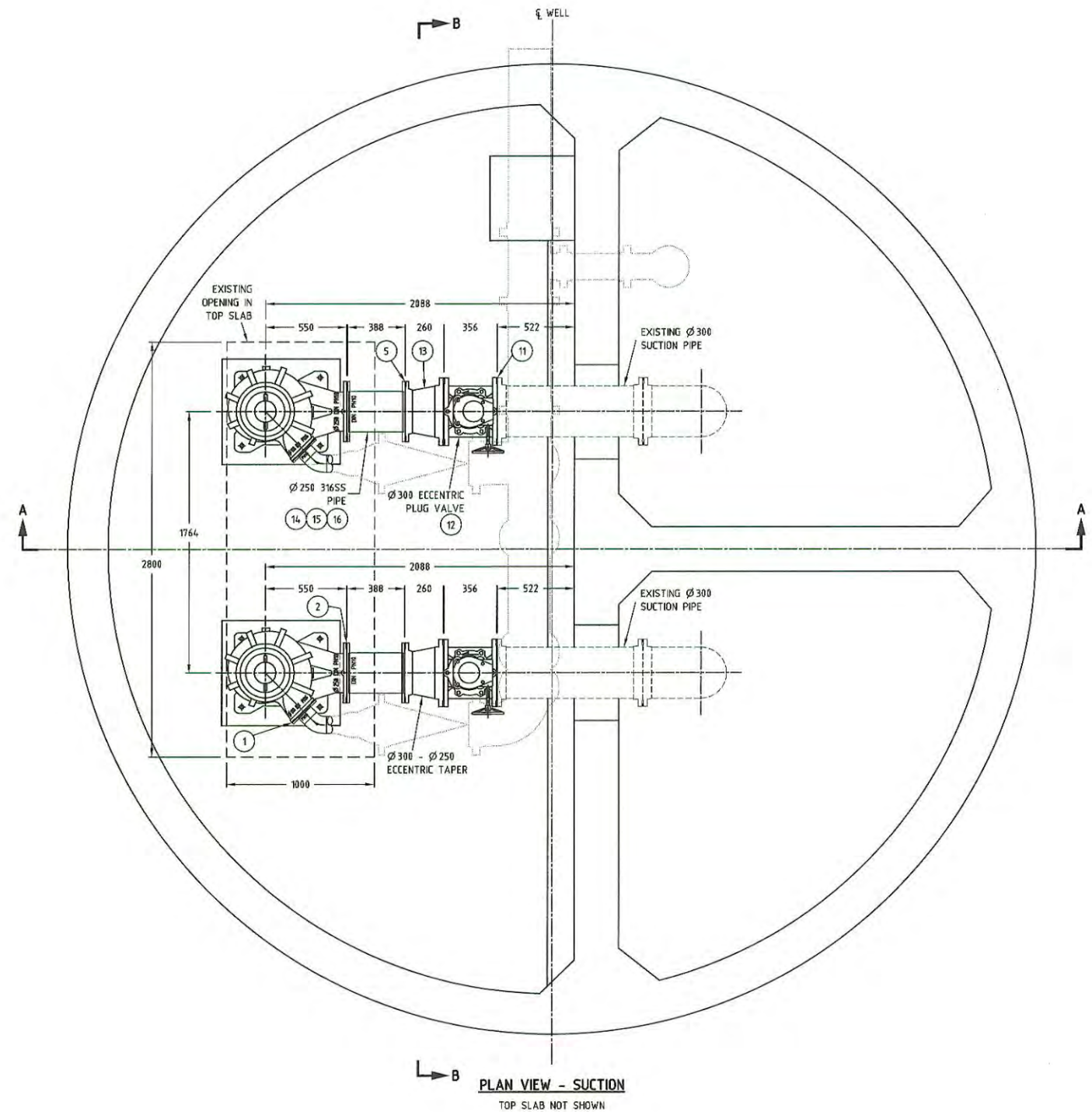
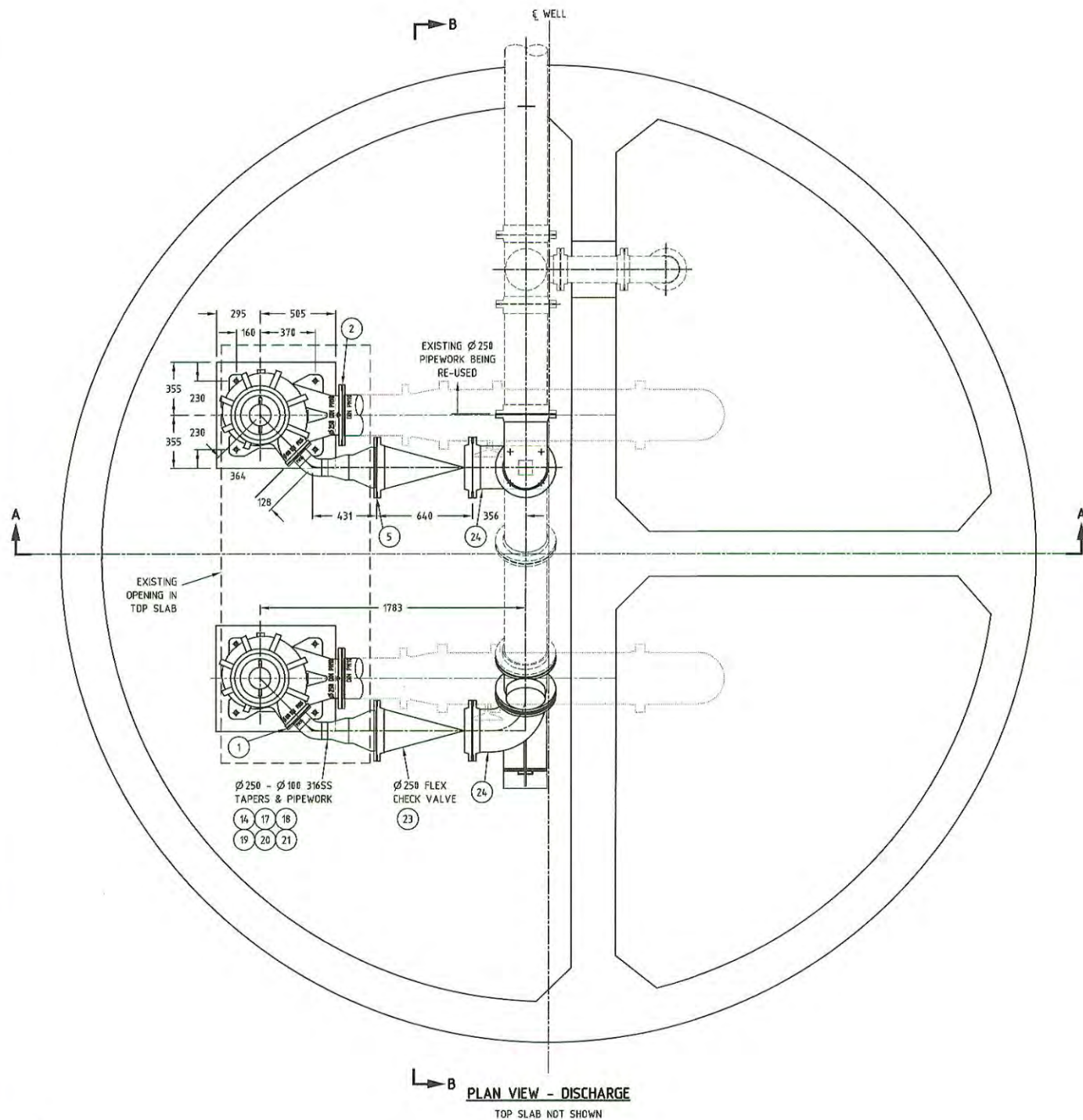
SIGNED: *[Signature]* DATE: 28/8/13

NAME of SIGNATORY: G SIDDON

RPEQ No. or LICENCE: 9321

COMPANY NAME: QUU

START DATE: FINISH DATE:



## NOTES:

1. PUMPS HIDROSTAL F04K-S03R + FE030X4-XSEK1 + NC1B4E-20
2. SITE MEASURED DIMENSIONS
3. EXISTING PIPEWORK SHOWN DOTTED

**J. & P. RICHARDSON**  
INDUSTRIES PTY LTD ELECTRICAL CONTRACTORS AND ENGINEERS  
A.B.N. 23 001 952 325 114 CAMPBELL AVE WACOL QLD 4076  
PH. (07) 3271 2911  
FAX. (07) 3271 3623  
EMAIL: jpr@jpr.com.au

Date: 3-12-12 Traced: P.H. Checked: P.H. JPR Drawing No.: P12-CB1162/X0 Rev.: E

SCALE 1:20 (A1 SHEET)  
SCALE OF METERS  
0.2 0.4 0.6 0.8 1.0

Sheet 01

				DRAFTED	P.HOUSTON				
E	24-7-13	AMMEND AS PER QUU REQUIREMENTS	P.C.	DRAFTING CHECK	P.HOUSTON	DESIGN	R.P.E.Q. No.	DATE	MANAGER ENGINEERING SERVICES
D	03-06-13	AS INSTALLED	P.C.	P.H.	CAD FILE	CB1162X0D.DWG			
No	DATE	AMENDMENT	DRN.	APD.	B.C.C. FILE No.	DESIGN CHECK	R.P.E.Q. No.	DATE	CLIENT DELEGATE



SITE  
SP333  
SEWAGE PUMP STATION  
UPGRADE  
ASHBURN ROAD, EBBWVALE

TITLE  
PIPEWORK LAYOUT

SHEET No. 1 OF 4

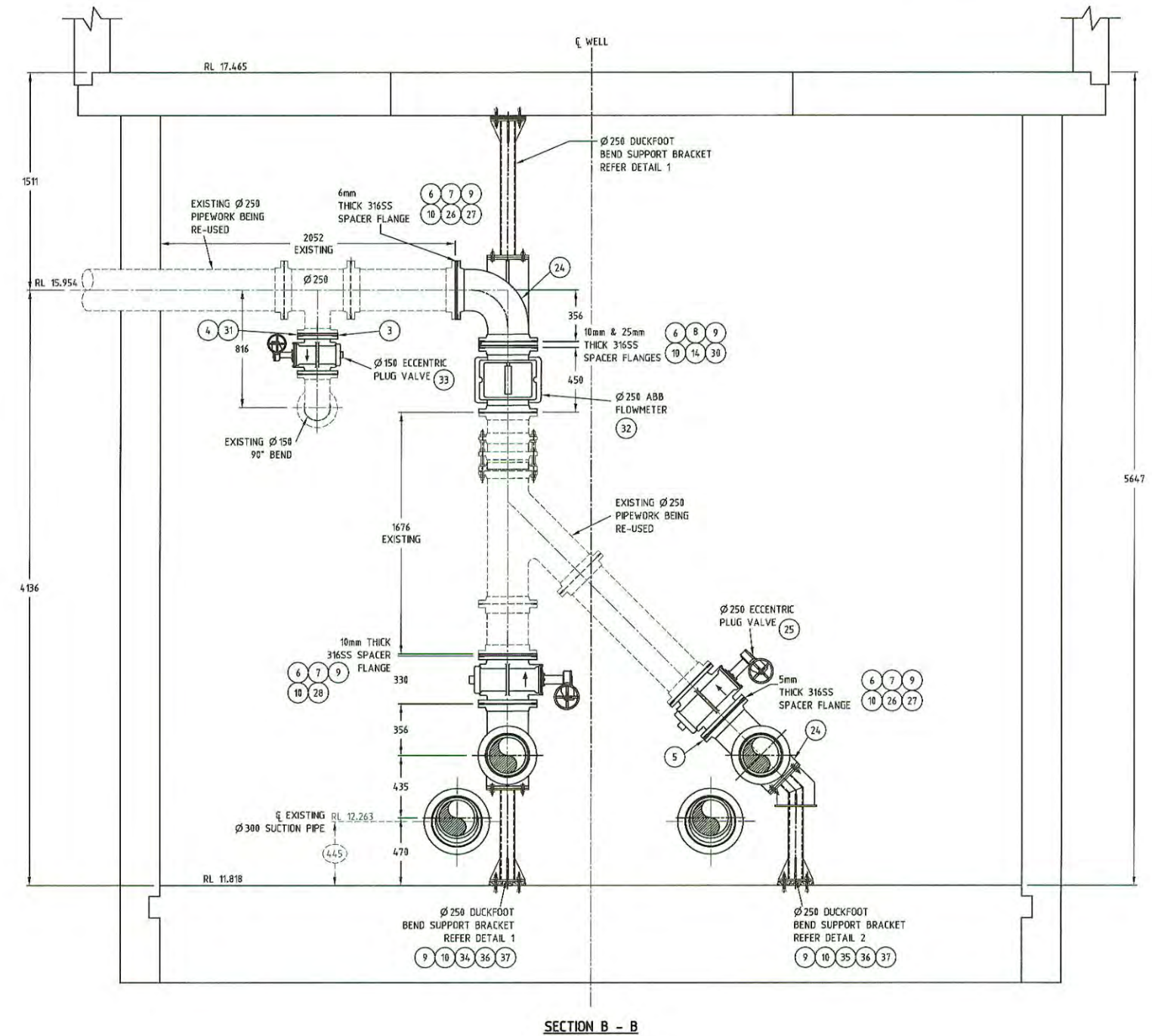
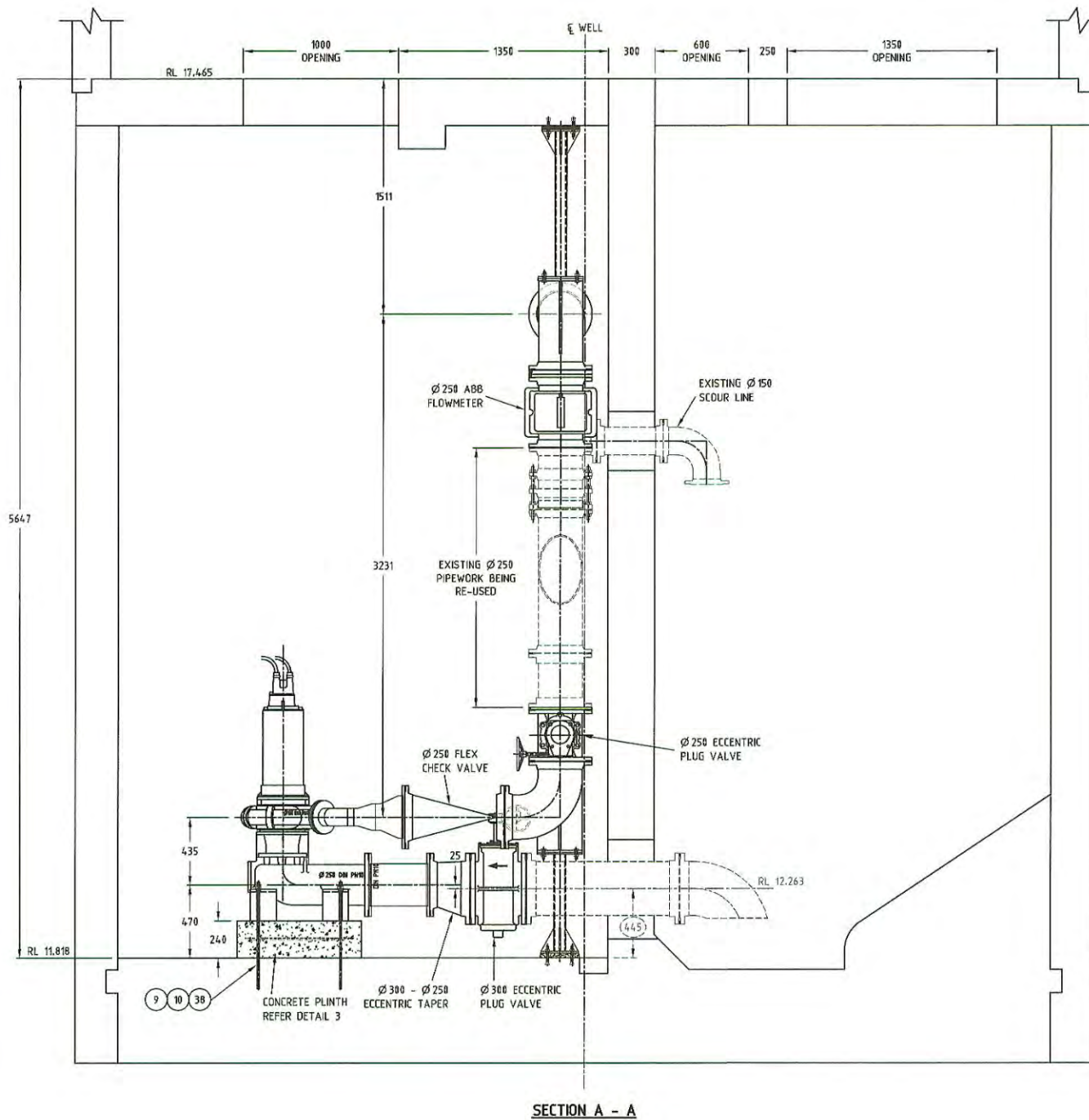
Queensland Urban Utilities DRAWING No.

486/5/7-0407-001

AMEND.

E





NOTES:

- NOTES:
1. PUMPS HIDROSTAL F04K-S03R + FE030X4-XSEK1 + NC1B4E-20
  2. O SITE MEASURED DIMENSIONS
  3. EXISTING PIPEWORK SHOWN DOTTED



SCALE 1:20  
(A1 SHEET)

				DRAFTED	P.HOUSTON				
E	24-7-19	AMMEND AS PER QUU REQUIREMENTS	P.C.		DRAFTING CHECK	P.HOUSTON	DESIGN	R.P.E.Q. No. DATE	MANAGER ENGINEERING SERVICES DATE
D	03-08-19	AS INSTALLED	P.C.	P.H.	CAD FILE	C61162X1D.DWG			
No	DATE	AMENDMENT	DRN.	APD.	B.C.C. FILE No.		DESIGN CHECK	R.P.E.Q. No. DATE	CLIENT DELEGATE DATE



SITE  
SP333  
SEWAGE PUMP STATION  
UPGRADE  
ASHBURN ROAD, EBBWVALE

TITLE  
PIPEWORK LAYOUT

SHEET No. 2 OF 4

Queensland Urban Utilities DRAWING No.

486/5/7-0407-002

AMEND.

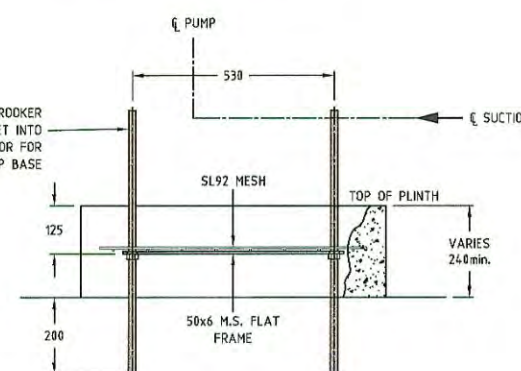
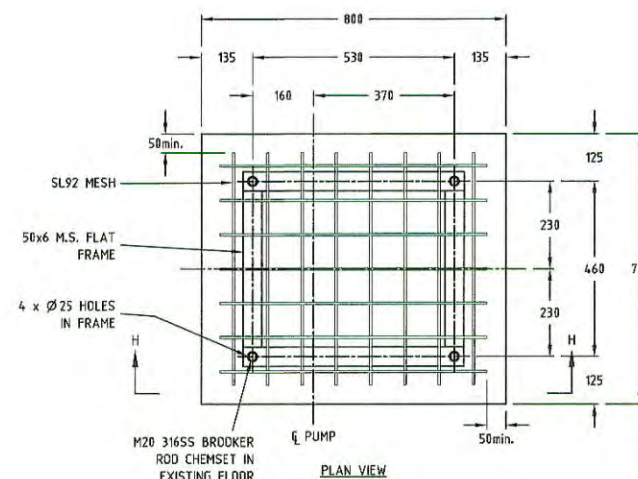


# AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

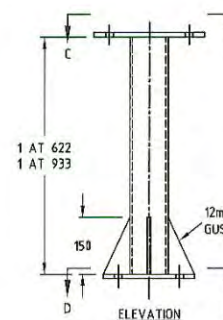
SIGNED: *[Signature]* DATE: 28/8/13  
 NAME of SIGNATORY: G. SIOON  
 RPEQ No. or LICENCE: 9321  
 COMPANY NAME: QUU  
 START DATE: FINISH DATE:

Item	Qty	Make & Number	Reg. No.
1	2	100dia. BNWG SET 316SS DIN PN16	
2	2	250dia. BNWG SET 316SS DIN PN10	
3	2	150dia. BNWG SET 316SS TC	
4	1	150dia. RUBBER GASKET	
5	10	250dia. BNWG SET 316SS TC	
6	8	250dia. RUBBER GASKET	
7	16	M 16 x 110 316SS BOLT	
8	8	M 16 x 150 316SS BOLT	
9	44	M 16 316SS NUT	
10	88	M 16 316SS FLAT WASHER	
11	4	300dia. BNWG SET 316SS TC	
12	2	300dia. DF VALMATIC CAM-CENTRIC PLUG VALVE	P0812
13	2	300dia. - 250dia. DF ECCENTRIC TAPER	
14	5	250dia. 316SS SOW FLANGE TABLE D	
15	2	250dia. 316SS SOW FLANGE DIN PN 10	
16	1.2m	250dia. 316SS SCHED.40 PIPE	
17	2	100dia. 316SS SOW FLANGE DIN PN16	
18	1m	100dia. 316SS SCHED.40 PIPE	
19	2	100dia. 316SS SCHED.40 BW 45deg. BEND	
20	2	150dia. - 100dia. 316SS SCHED.40 BW CONCENTRIC TAPER	
21	2	250dia. - 150dia. 316SS SCHED.40 BW CONCENTRIC TAPER	
22	2	250dia. 316SS SOW FLANGE TABLE D	
23	2	250dia. DF VALMATIC SWING FLEX CHECK VALVE	P0812
24	3	250dia. DF 90deg. DUCKFOOT BEND	
25	2	250dia. DF VALMATIC CAM-CENTRIC PLUG VALVE	P0812
26	2	250dia. 316SS SOW FLANGE TABLE D 5mm THICK	
27	2	250dia. 316SS SOW FLANGE TABLE D 6mm THICK	
28	1	250dia. 316SS SOW FLANGE TABLE D 10mm THICK	
29		SPARE	
30	1	250dia. 316SS SOW FLANGE TABLE D 25mm THICK	
31	1	150dia. 316SS SOW FLANGE TABLE D 10mm THICK	
32	1	250dia. ABB WATERMASTER FLOWMETER	P0813
33	1	150dia. DF ECCENTRIC PLUG VALVE	P0812
34	2	250dia. DUCKFOOT SUPPORT BRACKET TO DETAIL 1	
35	1	250dia. DUCKFOOT SUPPORT BRACKET TO DETAIL 2	
36	12	M 16 x 100 SS STUD ANCHORS	
37	12	M 16 x 60 316SS SET SCREWS	
38	8	M 16 x 1m 316SS BROOKER ROD	
39	8	M 16 316SS SPRING WASHERS	
40	1	GRUNDFOS EF30.50.EX 06.2.50B SUMP PUMP	
41		SPARE	
42		SPARE	
43		SPARE	
44		SPARE	
45		SPARE	
46		SPARE	
47		SPARE	
48		SPARE	
49		SPARE	
50		SPARE	

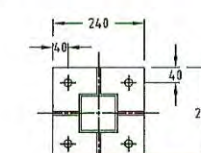
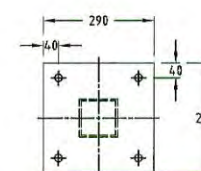


DETAIL 3 - CONCRETE PUMP PLINTH

SCALE 1:10



NOTE:  
ALL HOLES Ø20

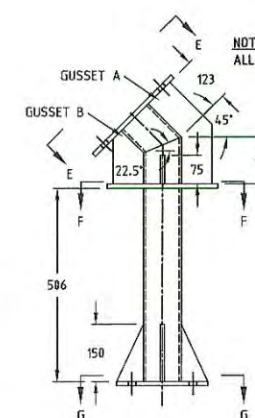


DETAIL 1

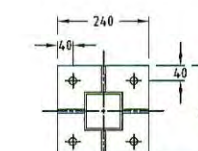
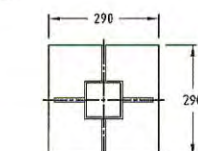
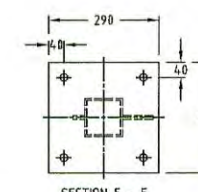
DUCKFOOT BEND SUPPORT BRACKET

SCALE 1:10 AT A1  
 MATERIAL: 12mm M.S. PLATE & 100x100x5 RHS  
 FINISH: HOT DIP GALV. AFTER FABRICATION  
 No. REQUIRED: 2

9 10 34 36 37



NOTE:  
ALL HOLES Ø20



DETAIL 2

DUCKFOOT BEND SUPPORT BRACKET

SCALE 1:10 AT A1  
 MATERIAL: 12mm M.S. PLATE & 100x100x5 RHS  
 FINISH: HOT DIP GALV. AFTER FABRICATION  
 No. REQUIRED: 1

9 10 35 36 37

## NOTES:

- PUMPS HIDROSTAL F04K-S03R + FE030X4-XSEK1 + NC1B4E-20
- SITE MEASURED DIMENSIONS
- EXISTING PIPEWORK SHOWN DOTTED

**J. & P. RICHARDSON**  
 INDUSTRIES PTY LTD ELECTRICAL CONTRACTORS AND ENGINEERS  
 A.B.N. 23 001 952 325 114 CAMPBELL AVE WACOL QLD 4076  
 PH. (07) 3271 2911 FAX. (07) 3271 3623  
 Email: jpr@jpr.com.au

SCALE 1:10 (A1 SHEET)  
 SCALE OF METERS

Sheet 03

				DRAFTED	P.HOUSTON																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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AS CONSTRUCTED DETAILS

I CERTIFY THAT THE "AS CONSTRUCTED" DETAILS SHOWN ON THIS PLAN ARE A TRUE AND ACCURATE RECORD OF THE WORKS.

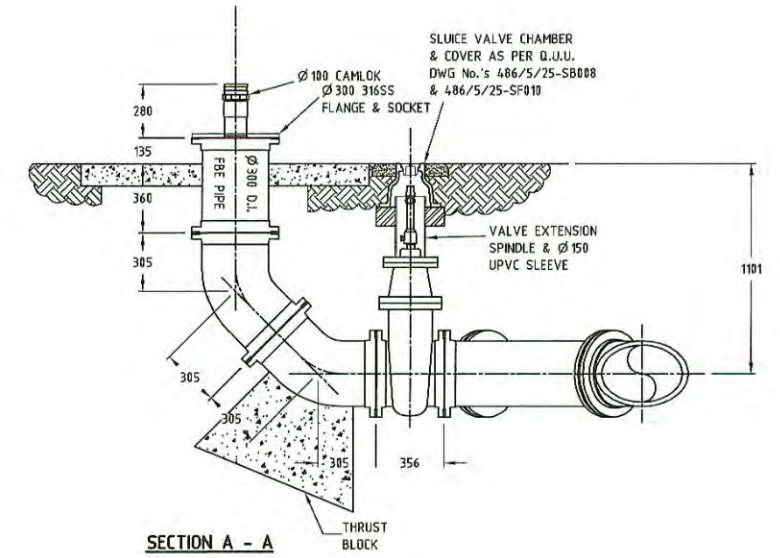
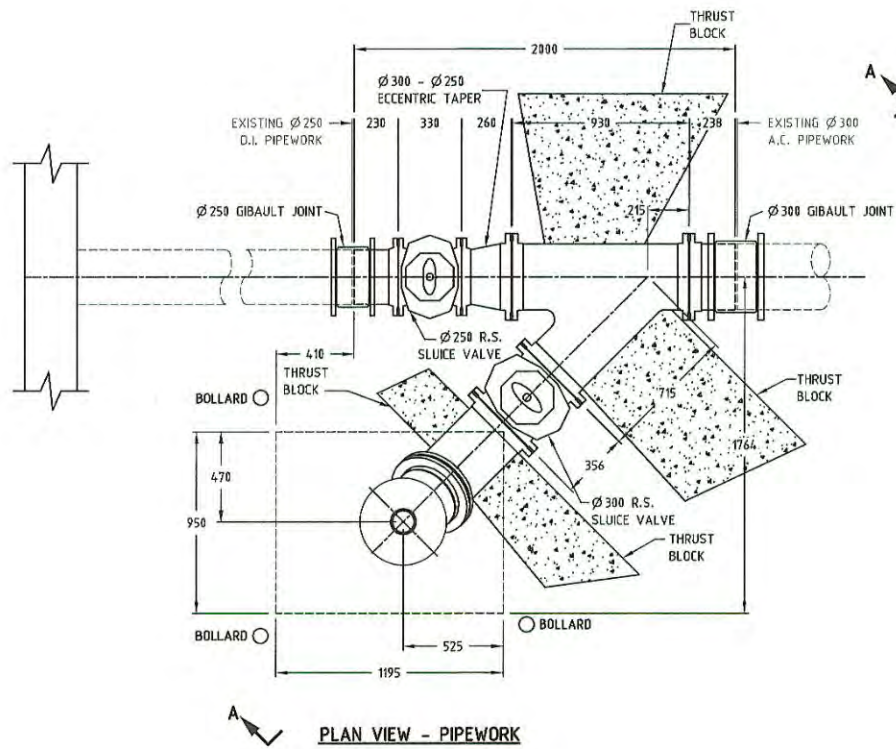
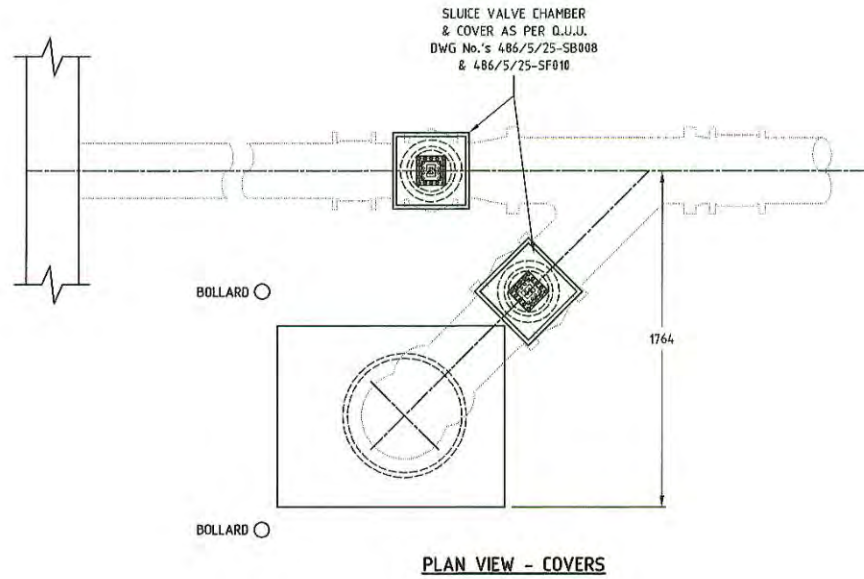
SIGNED: *[Signature]* DATE: 28/8/13

NAME of SIGNATORY: G. SIOGRI

RPEQ No. or LICENCE: 9321

COMPANY NAME: QUU

START DATE: FINISH DATE:



- NOTE:-
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH QUU DRAWING No. 486/5/25-0003-702 AMEND. O
  2. THRUST BLOCKS (WHERE REQUIRED) ARE TO BE DESIGNED AND INSTALLED AS PER WSAA AND QUU STANDARDS.

Sheet 04

SCALE 1:20  
(A1 SHEET)  
SCALE OF METERS

**J. & P. RICHARDSON**  
INDUSTRIES PTY LTD ELECTRICAL CONTRACTORS AND ENGINEERS  
A.B.N. 23 001 952 325 114 CAMPBELL AVE WACOL QLD 4076  
PH. (07) 3271 2911 FAX. (07) 3271 3623  
EMAIL: jpr@jpr.com.au

Date: 21-1-13 Traced: P.H. Checked: P.H. JPR Drawing No.: P12-C61162/X3 Rev.: E

E	24-7-13	AMMENDMENT AS PER QUU REQUIREMENTS	P.C.		DRAFTED	P.HOUSTON			
D	3-6-13	AS INSTALLED	P.C.	P.H.	DRAFTING CHECK	P.HOUSTON	DESIGN	R.P.E.Q. No. DATE	MANAGER ENGINEERING SERVICES DATE
C	13-2-13	PIGGING POINT PIPE LENGTH ADDED	P.H.	P.H.	CAD FILE	C61162X3D.DWG	DESIGN CHECK	R.P.E.Q. No. DATE	CLIENT DELEGATE DATE
No.	DATE	AMMENDMENT	DRN.	APD.	B.C.C. FILE No.				



SITE  
SP333  
SEWAGE PUMP STATION  
UPGRADE  
ASHBURN ROAD, EBBWVALE

TITLE  
PROPOSED BYPASS &  
PUMP OUT POINT  
PIPEWORK LAYOUT

SHEET No. 4 OF 4

Queensland Urban Utilities DRAWING No.

486/5/7-0407-004

AMEND.

E



## 8 SERVICE & MAINTENANCE

This product is designed to operate under specific environmental, supply and load conditions. Should these conditions change, consult a licenced electrician or electrical engineer before operating this product.

These procedures are to be performed only by a licenced electrician as they may expose live equipment.

The Switchgear and Controlgear Assembly is essentially maintenance free, however the following safety measures and routine maintenance is recommended.

Where fitted, ensure cabinet vents and filters are clear and clean.

During operation, ensure all doors and covers are secure and closed.

All faults are to be investigated and repaired by an appropriately licenced electrician.

All components to be operated in accordance with manufacturers data.

The protective devices within switchboards are designed to operate in the event of a short circuit or overload condition. In the event of these devices operating under such conditions the device or devices must be inspected and tested by a suitably trained person to ascertain its condition prior to reconnecting the protective device to the supply.

### **Periodic checks should ensure**

**The switchboard is clean and free of any contaminants, which could reduce the insulation properties of the switchboard.**

**All entries are sealed to ensure no vermin can enter.**

**There is no evidence of overheating, arcing or moisture.**

**The earthing system is maintained and is adequate to allow correct operation of protective devices.**

**Insulation resistance is maintained to appropriate levels.**

**Check terminations for correct tension.**

**Test operation of protective devices.**

**Re-calibrate instrument loops as required.**

Refer to AS-CONSTRUCTED electrical drawings for details of protection equipment settings.

**No special tools or equipment are required to perform routine maintenance.**