1 Triton Square
Combined Attenuation & Water Recycling Package

INCIDENT & INJURY FREE: The Lendlease Way

Revision	Revision Detail	By	Checked	Date
Rev C02	For Approval	WM	JY	02/10/19

Trade Contractor

TClarke

TClarke
45 Moorfields,
London,
EC2Y 9AE

Photograph Required (Mandatory)

Status Stamp

Technical Submittal Description: (full description required)

Combined Attenuation and Water Recycling Package

Document Number and Title	246868-T_C-ZZ-B1-TS-XX-52009	Revision	C02

Technical Submittal Information: (to be completed by Trade Contractor)

Trade Contractor:	TClarke
Works Package Number:	43111.01
Sample Title:	Combined Attenuation and Water Recycling Package
Description:	Combined Attenuation and Water Recycling Package
Manufacturer(s):	Aquality
Material:	As per data sheets
Size:	As per data sheets
Type:	As per data sheets
Model Number:	As per data sheets
Manufacture Process:	N/A
Drawing Reference(s):	246868-A_A-XX-XX-DR-PX-52811 T03 Rainwater Schematic
	246868-A_A-XX-B1-DR-PX-52011 T04
Specification Reference(s):	246868-A_A-XX-XX-SP-MX-00002-M&PH Schedules T04,
	EDS-P13
Finish/Texture/Pattern/Print:	As per data sheets
Colour:	As per data sheets
Other/Comments	N/A
No. of physical Samples	N/A
EPD Certificate	N/A
ISO 14001	N/A
FSC	N/A
BES6001	N/A

Reviewer Record (to be completed by Reviewers, and recorded on Aconex)

Lead Reviewer:

Organisation	**Name**	**Comments:** (add below or refer to attachments as required)
Date	**Signature**	

Reviewed by:

Organisation	**Name**	**Approval Status / Comments:**
Date	**Signature**	
Organisation	**Name**	**Approval Status / Comments:**
Date	**Signature**	
Organisation	**Name**	**Approval Status / Comments:**
Date	**Signature**	
Organisation	**Name**	**Approval Status / Comments:**
Date	**Signature**	

Notes:

- Workshop held with Arups following issue of Rev P01. All comments have been addressed as per items agreed during the workshop.
- Package is being coordinated with BMS contractor and we have confirmed that all BMS requirements have been met for this system.
- All loads and electrical supplies are being coordinated with the electrical design.
- Final plant layouts and pipework configuration will be confirmed upon completion of modelling for the PH plantroom. This will be issued at a later date.
- Aqua-lity and TClarke CAD team are coordinating final pipework and equipment layouts.

- Arup EDS to be revised to reflect the correct info in the offered column based on the proposed products (for example for submersible self priming circulation pumps, integrated submerged filtrate pumps, non-potable booster set pumps) **Confirmed.**

- Coarse Filter, 4000 Liters Storage, and Membrane Drawings are missing(were submitted in RevP01). **Included.**

- Please in the next submission cloud or highlight (e.g. in green) the changes compared to rev P02) **Confirmed**

Highlights in green

Additional filters have been added in to all schematics and drawings. All comments addressed from Rev C01

06/02/2019

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London - 1 Triton Square - Rev 03

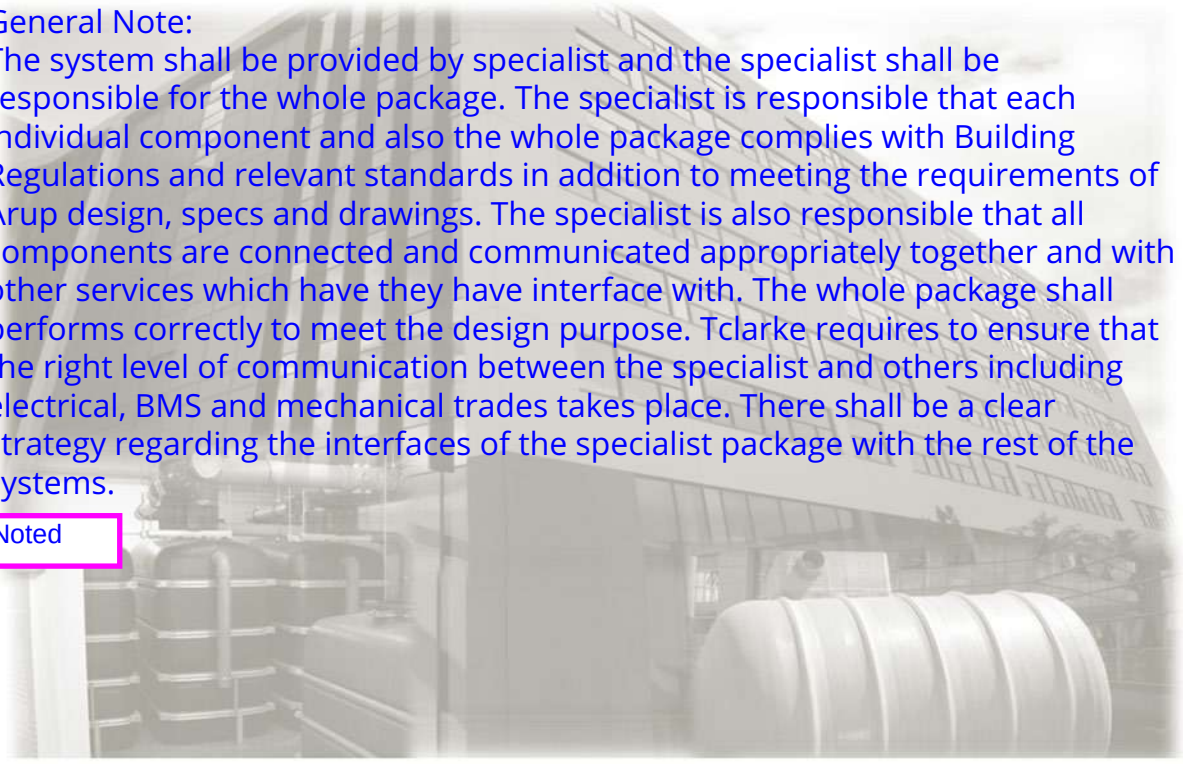
Project ref.: 4185-17

Prepared for: T Clarke

Prepared by: Christopher James
Design Team Lead

General Note:
The system shall be provided by specialist and the specialist shall be responsible for the whole package. The specialist is responsible that each individual component and also the whole package complies with Building Regulations and relevant standards in addition to meeting the requirements of Arup design, specs and drawings. The specialist is also responsible that all components are connected and communicated appropriately together and with other services which have they have interface with. The whole package shall performs correctly to meet the design purpose. Tclarke requires to ensure that the right level of communication between the specialist and others including electrical, BMS and mechanical trades takes place. There shall be a clear strategy regarding the interfaces of the specialist package with the rest of the systems.

Noted



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Equipment Data Sheet P13- Combined Attenuation & Water Recycling Package

Job Title:	**1 Triton Square**			Job Number:	**246868**
Job Stage:	**Stage 4**	Status:	**Tender**	Made by:	**PM**
Revision:	**T02**	Date:	**27/10/2017**	Checked by:	**NR**
Revision Description:					

General Information

Number Required	1 Package
Location	Basement 01 - PH Plantroom
System	Water Services
Type	Combined Attenuation & Water Recycling Package
Equipment Reference	CAWRP-B01-1

Suggested Supplier

Model Reference	N/A
Manufacturer	Aquality
Contact Name	Lutz Johnen
Telephone Number	0044 2089 91 37 25
E-mail Address	johnen@aqua-lity.co.uk

Or Equal

1. Grey Water System

1 A grey water recycling plant, suitable for indoor installation and fully compliant with the requirements of BS 8525, shall be provided by a specialist supplier to recycle waste water collected from showers for re-use for non-potable cold water applications.

2 The collected waste water shall go through stages of membrane filtration, storage and direct/indirect loop aeration to produce grey water (process water) that meets the hygienic, micro-biological requirements of the EU Bathing Water Guideline 76/160/EEC, 2006/7/EC and BS 8525:2010. Further effluent qualities: COD: <20 mg/l; BOD 5: <5 mg/l; suspended solids: 0 mg/l; turbidity: 0 NTU.

3 The plant shall be provided with an automatic mains water top-up facility in full compliance with BS 8525 and BS EN 1717.

4 The plant shall be fully automatic in operation, through a programmable micro-processor based control system, located in a set mounted control panel. A clear addressable display mounted on the panel fascia shall provide indication and levels of plant status, system settings and parameters, failure indication and levels within storage tanks as a minimum. A facility shall be provided for common fault indication to the BMS.

5 Recycled water storage tanks shall supply to compact control unit with multi-stage centrifugal pumps arranged for duty and assist operation. Pumps shall be complete with inverter drives.

Performance

	Required	Offered
Effective Capacity	12000	12000

1.1. Grey Water Collection

1.1.1. Grey Water Pre-Filter

	Required	Offered	
Number	1	1	
Type of Filteration	Physical	Physical	
Level of Filteration	Coarse	Coarse	
Direction	Horizental	Horizental	
Material	Stainless Steel 304S	Stainless Steel 304S	
Grid Type	S Grid	S Grid	
Mesh Size	0.7	0.7	mm
Automatic Backwash	Yes	Yes	
Backwash Control Valve	25	25	mm
Overflow	100	150	mm
Filter Outlet Connection	100	150	mm
Filter Inlet Connection	100	150	mm

Comments

1 To ensure maximum filter efficiency a calming distance of a minimum of 1m straight grey water pipe shall be provided at the inlet connection of the grey water filter.

2 The filter shall be installed on support frame or shall be suspended from ceiling.

Arups/ T Clark/ Aquality agreed to keep DN 150 sized coarse filter, as it would allow for a higher flow rate capacity and reduce on maintenance (i.e. cleaning frequency) - as per meeting on 29/11/18.

1.1.2. Grey Water Buffer Tanks

	Required	Offered	
Total Effective Capacity	12000	12000	litres
Number of Tanks	3	3	
Effective Capacity of Each Buffer Tank	4000	4000	litres
Type of Tank	Single Piece	Single Piece	
Material	Black HDPE	Black HDPE	

Comments

1 Each buffer tank shall have bracket connections and low-level tank interconnection sets.

2 Indirect aeration via loop circulation system shall be provided to support aerobic biological treatment in all greywater storage tanks and to achieve longer storage periods.

3 Level control/float switch shall be provided for each buffer tank.

4 Tanks shall be individually vented to atmosphere via vent pipes.

Install of ventilation pipework to be coordinated between T Clarke & Aquality, as part of the plant room design coordination.

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Equipment Data Sheet
P13-Combined Attenuation & Water Recycling Package

Job Title:	**1 Triton Square**			Job Number:	**246868**
Job Stage:	**Stage 4**	Status:	**Tender**	Made by:	**PM**
Revision:	**T02**	Date:	**27/10/2017**	Checked by:	**NR**
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Dimensions (per Tank)

	Required	Offered	
Length	2430	2430	mm
Width	995	995	mm
Height	1950	1950	mm
Inspection Lid	400	400	mm
Vent Pipe	50	50	mm

1.1.2.1. Submersible Self-Priming Circulation Pump to Transfer Grey Water from Buffer Tanks to Membrane Tanks

	Required	Offered	
Number	1	1	
Number per Buffer Tank	Only 1 pump and for last buffer tank	1 pump in final buffer tank	
Type	Submersible	Submersible	
Configuration	Duty	Duty	
Duty Flow	1-3	3	l/s
Duty Head	5 (max)	0.6	bar
Closed Valve Pressure	MS	1.2	bar

Comments

1 Submersible self-priming circulation pump for greywater transfer between tanks.

Dimensions:

Overall Diameter / Ø	165	mm
Overall Height	334	mm
Impeller / Ø	n/a	mm
Suction Header Ø	n/a	mm
Delivery Header Ø	32	mm
Operating weight	7	kg

Construction:

Pump Casing Material	Technopolymer
Shaft Material	Technopolymer
Impeller Material	Technopolymer
Seal Type	MS
Seal Facing Type	MS

Electrics:

	Required	Offered	
Electrical Supply	230	230	V/Ø
Electrical Supply	50	50	Hz
Duty Load	0.55	0.55	kW
Starting Current	N/A		A
Running Current	3.4		A
Power Source	Electricty		
Starter Type	DOL		
Normal Feed	Yes	Yes	
Essential Feed	N/A	N/A	

Controls

Fixed Speed
Close Coupled

Speed Control
Drive Type

BMS Outputs

	Required	Offered
Common Alarm Volt Free Contact	Yes	Yes
Individual Pump Run Status	Yes	No

Arups / T Clarke / Aquality agreed to omit the individual pump run status alarms - 29/11/18

1.2. Grey Water Treatment & Transfer

1.2.1. Greywater Membrane Filtration Tank

	Required	Offered	
Total Treatment Capacity	12000	12000	litres
Number of Tanks	4	4	
Nominal Capacity of Each Membrane Filteration Tank	690	690	litres
Type of Tank	Single Piece	Single Piece	
Material	Black HDPE	Black HDPE	

Comments

1 Direct aeration system via aerator and externally mounted compressor shall be provided for bio-degrading organic load using steel plate consoles with vibration stop.
2 Level control/float switch shall be provided for each tank.
3 Submerged PES flat sheet membrane filtration modules with molecular weight cut off at 150 kDa (nominal pore size 35 nm), including EPDM tube aerator, stainless-steel chassis 304 S/S, pre-installed in tanks shall be provided for ultrafiltration and physical disinfection.

Dimensions (per Tank)

	Required	Offered	
Length	720	720	mm
Width	720	720	mm
Height	1690	1690	mm
Inspection Lid	400	400	mm
Vent Pipe	N/A	N/A	mm

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Equipment Data Sheet
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Revision:	**T02**	Date:	**27/10/2017**	Checked by:	**NR**
Revision Description:					

1.2.2. Integrated Submerged Filtrate Pumps to Transfer Treated Greywater from Membrane Filtration Tanks to Transfer Tank

	Required	Offered	
Number	4	4	
Number per Membrane Filteration Tank	1	1	
Type	Submersible	Submersible	
Configuration	Duty	Duty	
Duty Head	0.025	0.04	l/s
Duty Flow	2 (max)	0.3	bar
Closed Valve Pressure	MS	0.3	bar

Comments

1 Integrated submerged filtrate pumps shall be provided for filtrate transfer to process water storage tanks.

Dimensions:

Overall Length	125	mm
Overall Width	75	mm
Overall Height	200	mm
Impeller / Ø	n/a	mm
Suction Header Ø	20	mm
Delivery Header Ø	20	mm
Operating weight	<1	kg

Construction:

Pump Casing Material	ABS
Shaft Material	ABS
Impeller Material	ABS
Seal Type	MS
Seal Facing Type	MS

Electrics:

	Required	Offered	
Electrical Supply	230	230	V/Ø
Electrical Supply	50	50	Hz
Duty Load	0.043	0.045	kW
Starting Current	n/a		A
Running Current	0.21		A
Power Source	Electricty		
Starter Type	DOL		
Normal Feed	Yes	Yes	
Essential Feed	N/A		

Controls

Speed Control	Fixed Speed
Drive Type	MS

BMS Outputs

	Required	Offered
Common Alarm Volt Free Contact	Yes	Yes
Individual Pump Run Status	Yes	No

Arups / T Clarke / Aquality agreed to omit the individual pump run status alarms - 29/11/18

1.2.3 Treated Grey Water Transfer Tank

	Required	Offered	
Total Effective Capacity	4000	4000	litres
Number of Tanks	1	1	
Nominal Capacity of Each Tank	4000	4000	litres
Type of Tank	Single Piece	Single Piece	
Material	Black HDPE	Black HDPE	

Comments

1 The transfer tank shall have bracket connections and low level tank interconnection sets.

2 Level control via compact control unit with integrated pumps shall be provided.

3 The non-potable water shall meet the hygienic-microbiological requirements of the EU bathing water guideline 2006/7/EG and the British Standard BS 8525.

4 Ventilation shall be provided via air admittance / balancing valves.

Dimensions (per Tank)

	Required	Offered	
Length	2430	2430	mm
Width	995	995	mm
Height	1950	1950	mm
Inspection Lid	400	400	mm
Vent Pipe	N/A	N/A	mm

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Equipment Data Sheet
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Revision Description:					

1.2.4 Transfer Pump to Transfer Treated Grey Water from Transfer Tank to Combined Storage Tank

	Required	Offered	
Number	1	1	
Number per Tank	1	1	
Type	Submersible	Submersible	
Configuration	Duty	Duty	
Duty Flow	2	3	l/s
Duty Head	1	0.6	bar
Closed Valve Pressure	MS	1.2	bar

Comments

1 Submersible self-priming circulation pump for greywater transfer shall be provided.

2 Dry run protection shall be provided.

Note, transfer pump is powered by the Non-potable package/ control unit

Dimensions:

Overall Diameter / Ø	165	mm
Overall Height	334	mm
Impeller / Ø	n/a	mm
Suction Header Ø	n/a	mm
Delivery Header Ø	32	mm
Operating weight	7	kg

Construction:

Pump Casing Material	Technopolymer
Shaft Material	Technopolymer
Impeller Material	Technopolymer
Seal Type	NBR Rubber
Seal Facing Type	MS

Electrics:

	Required	Offered	
Electrical Supply	230	230	V/Ø
Electrical Supply	50	50	Hz
Duty Load	0.55	0.55	kW
Starting Current	n/a		A
Running Current	3.4		A
Power Source	Electricty		
Starter Type	DOL		
Normal Feed	Yes	Yes	
Essential Feed	N/A		

Controls

Speed Control	Fixed Speed
Drive Type	

BMS Outputs

	Required	Offered
Common Alarm Volt Free Contact	Yes	Yes
Individual Pump Run Status	Yes	No

Arups / T Clarke / Aquality agreed to omit the individual pump run status alarms - 29/11/18

1.2.5 Grey Water Treatment Plant Control Panel

	Required	Offered	
Type of Contol Panel	Electronic	Electronic	
IP	65	65	
Electric Supply	Single Phase	Single Phase	
	230	230	V
	50	50	Hz
	8	16	A
	1000	1000	W

Comments

1 Electronic control panel with micro-processor and LED display for operation status, settings and fault indication installed in polycarbonate chassis IP 65, shall be provided.

2 Volt-free contact to BMS system for general fault alarm shall be provided.

3 Visual and acoustical alarms shall be provided.

4 Power and signalling manifold for all level sensors / float switches, tank-internal transfer pumps, aerators, membrane filtration modules and valves shall be provided.

5 Colour-coded or labelled connections shall be provided.

BMS Outputs

	Required	Offered
Common Alarm Volt Free Contact	Yes	Yes

1.3 Combined Attenuation, Rainwater Harvesting & Treated Grey Water System

1.3.1 Combined Attenuation, Rainwater Harvesting & Treated Grey Water Tank

Performance

	Required	Offered	
Effective Capacity	285	285	litres
Nominal Capacity	355.25	355.25	litres

Comments

1 The combined tank shall be connected to CMAC Storm water managament system.

2 Forcast based control system which proportuinaly drain down tank before storm event shall be provided.

3 Storm control system to include web gateway water management platform shall be provided.

4 BV rainwater filters shall be provided.

Construction

Arrangement	Externally Flanged Sides
	Internally Flanged Base
Type of Construction	Hot Press Moulded Tank
Tank Material	GRP- Sectional

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Equipment Data Sheet
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Revision:	**T02**	Date:	**27/10/2017**	Checked by:	**NR**
Revision Description:					

Dimensions

Overall Internal Length	14500	mm
Overall Internal Width	7000	mm
Overall Internal Height	3500	mm
Overall External Length Overall	14830	mm
External Width	7330	mm
Overall External Height	3540	mm
Inlet Connection Size	Various	mm
Outlet Connection Size	Various	mm
Overflow Size	100	mm
Warning Pipe Size	25	mm
Vent Pipe Size	50	mm
Drain Outlet Size	50	mm
Ball Valve Housing Length	N/A	mm
Ball Valve Housing Width	N/A	mm
Ball Valve Housing Height	N/A	mm
Height of Plinth/Leveling Steels	100	mm

Options

	Required	Offered
Ball Valve Housing	No	No
Internal Ladder	Yes	Yes
External Ladder	Yes	Yes
Immersion Heaters	No	No
Sealed Heavy Duty Lid	No	No
Sealed Light Duty Lid	Yes	Yes
Access Hatch	Yes	Yes
Structural Internal Division	No	No
Contents Gauge	No	No
Overflow Screening	Yes	Yes
Warning Pipe Screening	No	No
Factory Insulation	Yes	Yes
Site Insulation	Yes	Yes
Base leveling steels	Yes	Yes
Airgap	No	No
Safety guardrail	Yes	Yes

Controls

	Required	Offered
High Level Alarm Switch	MS	No
Low Level Alarm Switch	MS	No
Temprature Sensor	MS	No
BMS Links	MS	No

Arups / T Clarke / Aquality agreed to omit the ball valve housings and internal tank division - 29/11/18.

Tank can still be maintained without impacting on supply - mains water back-up is provided into a separate dedicated break in the booster pump set. This will also reduce on the amount of pipework connections and electrical instruments/ sensors.

Incoming greywater flow will be controlled by level sensors, rather than mechanical ball valves - refer to process control philsophy note.

1.3.2 Attenuation Pump

	Required	Offered	
Number	2	2	
Type	Centrifugal	Centrifugal	
Configuration	Duty/Standby	Duty/Standby	
Duty Flow	30	30	l/s
Duty Head	2	2	bar
Closed Valve Pressure	MS	16	bar
Pressure Vessel Capcity	18	18	litres

Comments

1 Aqua-Storm Control shall be provided.

Dimensions:

Overall Length	1483	mm
Overall Width / Ø	1410	mm
Overall Height	1500	mm
Impeller / Ø	225	mm
Suction Header Ø	150	mm
Delivery Header Ø	150	mm
Operating weight	457	kg

Construction:

Pump Casing Material	Stainless Steel 1.4301
Shaft Material	Stainless Steel 1.4301
Impeller Material	Stainless Steel 1.4301
Seal Type	Stainless Steel 1.4301
Seal Facing Type	Stainless Steel 1.4301
Pressure Vessel Shell Material	Steel
Pressure Vessel Diaphragm	Rubber

Electrics:

	Required	Offered	
Electrical Supply	415	415	V/Ø
Electrical Supply	50	50	Hz
Duty Load	2*7.5	2*11	kW
Starting Current	<1		A
Running Current	42.4		A
Power Source	Electricty		
Starter Type	Soft Start		
Normal Feed	Y	Y	
Essential Feed	N/A		

Options

	Required	Offered
Anti Condensation Heaters	No	No
Voltmeter	No	No
Ammeter	No	No
Pump Isolating Valves	Yes	Yes
Pump non-return valve	Yes	Yes
Pump Strainers	No	No
Test Points	Yes	Yes
Pressure Gauge	Yes	Yes
Pressure Transmitter	Yes	Yes

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Control Panel

	Required	Offered
Weather Proof Housing (IP54)	No	No
Normal Housing (IP52)	Yes	Yes
Start / Stop Buttons	Yes	Yes
Individual Pump Run Lights	Yes	Yes
Individual Pump Trip Lights	Yes	Yes
Supply On Lights	Yes	Yes
Minimum Run Timers	Yes	Yes
Hand Auto / On / Off Switch	Yes	Yes
Tank Interface Lights	No	No
Lockable with Padlock	No	No
Lockable with Cylinder Lock	No	No
Lamp Test Switch	No	No
Self Testing Lights	No	No
Location	Basement 01	

Controls

Speed Control	Inverter
Drive Type	Variable Speed

BMS Outputs

	Required	Offered
Common Alarm Volt Free Contact	Yes	Yes
Individual Pump Run Status	Yes	No

Arups / T Clarke / Aquality agreed to omit the individual pump run status alarms - 29/11/18

1.3.3 Non-Potable Package including Booster Pump Set & Break Tank

Comments

1 Compact control unit with booster pump set with fully-automatic and water efficient (demand-oriented) water top-up or manual changeover shall be provided. This shall enable the system to run fully on mains water e.g. during maintenance without any loss of service.

2 Integrated touch-screen display shall be provided for indication of operational status, system pressure, level in non-potable water tank and break tank, and any alarms.

3 WRAS approved solenoid valve with water hammer prevention and pre-filter shall be provided.

4 Emergency overflowshall be provided and shall be connected via tundish or bunded gully to drain point.

5 Break tank with AA-type air gap as per BS 8525 / BS EN 1717, shall be provided.

3 WRAS approved solenoid valve with water hammer prevention and pre-filter shall be provided.

4 Emergency overflowshall be provided and shall be connected via tundish or bunded gully to drain point.

5 300 LitresBreak tank with AA-type air gap as per BS 8525 / BS EN 1717, sahll be provided.

6 Dry run protection shall be provided.

1.3.3.1 Non-Potable Booster Set

	Required	Offered	
Number	3	3	
Type	Multistage Centrifugal variable speed	Multistage Centrifugal variable speed	
Configuration	Duty/ Assist/Standby	Duty/ Assist/Standby	
Duty Flow	6	3 (per pump)	l/s
Duty Head	8	8	bar
Closed Valve Pressure	MS	10.9	bar
Pressure Vessel Capcity	300	300	litres

Dimensions:

Overall Length	1700	mm
Overall Width / Ø	1200	mm
Overall Height	1950	mm
Impeller / Ø	160	mm
Suction Header Ø	65	mm
Delivery Header Ø	65	mm
Operating weight	450	kg
Pressure Vessel Height	1267	mm
Pressure Vessel Diameter Ø	634	mm

Construction:

Pump Casing Material	Steel
Shaft Material	Stainless Steel 1.4301
Impeller Material	Stainless Steel 1.4301
Seal Type	Stainless Steel 1.4301
Seal Facing Type	SIC / EPDM
Pressure Vessel Shell Material	Stainless Steel 1.4301
Pressure Vessel Diaphragm	Stainless Steel / EPDM

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Electrics:

	Required	Offered	
Electrical Supply	415	400	V/Ø
Electrical Supply	50	50	Hz
Duty Load	3 * 4	3 * 4	kW
Starting Current	<1		A
Running Current	36		A
Power Source	Electricity		
Starter Type	Soft Start		
Normal Feed	Yes	Yes	
Essential Feed	N/A		

Options

	Required	Offered
Anti Condensation Heaters	No	No
Voltmeter	No	No
Ammeter	No	No
Pump Isolating Valves	Yes	Yes
Pump non-return valve	Yes	Yes
Pump Strainers	Yes	Yes
Test Points	Yes	Yes
Pressure Gauge	Yes	Yes
Pressure Transmitter Connection Set	Yes	Yes
Floating Extraction	Yes	Yes
UV Synchronizer	Yes	Yes

Control Panel

	Required	Offered
Weather Proof Housing (IP54)	-	-
Normal Housing (IP52)	Yes	Yes
Start / Stop Buttons	Yes	Yes
Individual Pump Run Lights	Yes	Yes
Individual Pump Trip Lights	Yes	Yes
Supply On Lights	Yes	Yes
Minimum Run Timers	Yes	Yes
Hand Auto / On / Off Switch	Yes	Yes
Tank Interface Lights	Yes	Yes
Lockable with Padlock	Yes	Yes
Lockable with Cylinder Lock	No	No
Lamp Test Switch	Yes	Yes
Self Testing Lights	No	No
Leakage Alarm	Yes	Yes
Pipe Burst Alarm	Yes	Yes
Intergrated Touch Scrren Display	Yes	Yes
Dry Run and Cavitation Protection	Yes	Yes
Stagnation Prevention	Yes	Yes
Mains Water Back-up Fault Alarm	Yes	Yes
Location	Basement 01	

Controls

Speed Control Drive Type	Variable Speed Inverter

BMS Outputs

	Required	Offered
Common Alarm Volt Free Contact	Yes	Yes
Individual Pump Run Status	Yes	No

Arups / T Clarke / Aquality agreed to omit the individual pump run status alarms - 29/11/18

Note: running current for the Non-Potable Booster/ Control Panel allows for the power input to supply the UV disinfection unit and Treated Greywater Transfer supply pump to combined tank (Ref 1.2.4).

1.4. Remote Monitoring System

1 Volt-free contact alarms and monitoring information shall be made available on an internet dashboard interface.

2 Supplies BMS fault information

3 Real time water meter data and totalizer

4 GSM reception shall be provided in the plant room.

5 Alarm signals shall be transmitted to the local BMS.

6 Cloud-baed platform for monitoring grey/rain and attenuation systems displayed through on line task board shall be provided.

7 Platform providing real-time site specific data through secure mutiple user login shall be provided.

General Comment

The system shall be provided by specialist and the the specialist will be responsible for the whole package.

Equipment List, Specifications & Services

Part Number	Qty	Description
G17306	1	**Aqua-Recycling-Control 480B+, with 4000l tanks** Grey water treatment system package using Bio-Membrane Technology. For treatment of low-contaminated greywater from showers and to provide colourless, odourless high-quality non-potable water for toilet and urinal flushing. Daily greywater treatment capacity of up to 12,000 litres. Ultrafiltration-Membrane-Bio-Reactor Greywater Treatment System, equipped with: 1) Coarse filter for mechanical pre-treatment to remove all undissolved water contents (e.g. textile fluff, hair); stainless-steel filter plate with 0.7mm slot size; high-quality PE-chassis; with automated backwash function which includes water spray nozzles, 1" solenoid valve and controls (**refer to EDS 1.1.1**) 2) 3 no. 4000 litre greywater buffer tanks to equilibrate the quantity and quality of raw greywater. Tanks made of grey high-quality PE HD, equipped with float switch, submerged self-priming circulation pump with 2m PVC flex tube, PVC drain 1½", PE tank low-level interconnection kit 2" (**refer to EDS 1.1.2 & 1.1.2.1**) 3) 4no. UF-MBR-tanks containing eco-friendly membrane bioreactor. Tanks made of grey high-quality PE-HD, equipped with level sensor, air compressor incl. console and 3m PVC-aerator-flex tube, submerged PES-membrane filter incl. EPDM-tube aerator, stainless-steel chassis, submerged filtrate pump with 3m PVC filtrate flex tube (**refer to EDS 1.2.1 & 1.2.2**) 4) 1 no. 4000 litre greywater transfer tank to balance water supply and demand. Tanks made of grey high-quality PE-HD, level sensor, PVC-drain 1½", PE tank low-level interconnection kit 2" (**refer to EDS 1.2.3**) 5) Automated Aquality-control unit to manage all operating processes, installed in polycarbonate chassis IP 65, with LCD menu, hotkey-function to engage different operating modes (automatic rainwater feed), fill level control, setup menu to adjust settings (filtration, aeration, backwash, fill level calibration), visual malfunction message, power cables to all electrical components 5m (**refer to EDS 1.2.5**). Technical information: - Greywater buffer storage: 12,000 litres (nominal) - Treated greywater transfer storage: 4,000 litres (nominal) - Energy consumption: 1.75 kWh/m³ non-potable water - Slot size coarse filter: 0.7 mm - Pore size membrane filter: 38 nm (nanometres) - Active membrane surface: 25 m² - Electrical Supply: 230V 50Hz 16A, 0.85kW (for all elec. components in this package) - Approximate floor space required in standard layout: 13.7m x 4m (55m²) - Minimum room height for membrane maintenance: 2.6m Standard connection lengths: - Cable length between control and tanks: 5m - Compressor hose to ISB-MBR-tank: 5m - Greywater pump hose to ISBMBR-tank: 5m - Clear water pump hose between ISB-MBR-tank and non-potable water tank: 5m Hydraulic connections: a. DN 150 greywater inlet from showers / baths / hand-wash basins b. DN 150 greywater overflow to foul water drain (fully piped to stub stack) c. 1 ¼ " treated greywater transfer to combined storage tank d. DN 100 emergency overflow greywater transfer tank (to floor drain gully) e. 1" automatic coarse filter cleaning; flow pressure: 1-4 bar

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Part Number	Qty	Description
G13341	1	**Automatic water drain-down package (operated via Aqua-Control unit)** Automatic drainage of stagnant process water after defined time-period according to BS 8525 - With electricity failsafe counter - Including motorised ball valve 1" - Including software package for the Aqua-Control control unit
G10006	1	**Treated Greywater Transfer Pump (EDS ref: 1.2.4)** Supplies treated greywater from the holding tank to the combined storage tank Single Phase Stainless Steel Submersible Pump 10m Cable
G10007	1	**285m3 (Actual) Combined Attenuation/ Greywater/ Rainwater Storage Tank - 14,500 (l) x 7,000 (w) x 3,500mm (h) (EDS ref: 1.3.1)** Non-potable (clear) water storage tank Glass-reinforced plastic, hot press moulded and pre-insulated, nominal wall thickness 40mm, c/w with heavy duty cover, manholes and screened vents as per specification. Internally flanged base and externally flanged sides - 500mm access required from all sides of the tank. Includes all inlet and outlet connections and levelling steels (30 no. 7200mm long Lin' mtr. 100 x 50 x 5mm. Features: Tank External Dimensions (L x W x H): 14830 X 7330 X 3540 mm Min. Spatial Dimensions (L x W x H): 16430 X 8330 X 4690 mm Nominal Capacity: 355,250 Litres
G11025	4	**BV Filter 5 (EDS Ref - 1.3.1.4)** A unique filter submerged in the rainwater tank, with no overflow required. Comprising calmed inlet, sedimentation chamber and aerobic bio-degradation zone. Maintenance typically only needed every 5 to 10 years. DN 250 inlet, for roof areas up to 2,600m², dependent on local rainfall and roof type Dimensions: 2,570mm height x 805mm diameter Empty weight: 95kg
G10006	1	**Attenuation pump set - 30l/s @ 2 bar, duty/ standby config. (EDS ref. 1.3.2)** Double pump set for discharging attenuated water to surface water drainage. Comes on a pre-built skid, mounted with suction and discharge manifolds, with variable speed drives. Installation: Maximum operating pressure: 16 bar Maximum inlet pressure: PN 16 bar Flange standard: DIN2642 Manifold inlet: DN80 Manifold outlet: DN65 Materials: Pump housing: Stainlees Steel Electrical data: IE Efficiency class: IE3 Rated power: 7.5 kW per pump

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Part Number	Qty	Description
		Mains frequency: 50 Hz Rated voltage: 2 x 380-415 V Rated current: 32 A Start. method: electronically Enclosure class (IEC 34-5): IP54
G13200	1	**Aqua-Control 5000 - 6 l/s @ 8 bar, VSD, duty/ assist/ standby config. (refer to EDS 1.3.3.1)** Central electronic control unit for combined rainwater harvesting and greywater recycling systems with pressurised distribution and fully automatic water management. For use with non-potable water systems with internal, above ground storage tanks. Integrated non-self-priming double booster pump set with multistage, vertical centrifugal pumps - Demand activated booster pump control (cascade principle); - Pump configuration: duty/assist/standby triple-pump set; - Variable speed inverter control [on all pumps]; - Automatic, demand activated and water efficient mains water back-up via integrated break tank and AA-type air gap (as per BS 8515 / BS 8525), enabling the system to run fully on mains water e.g. during maintenance; - Air ingress and cavitation prevention to maximise lifetime of pumps; - Integrated touch screen display for indication of operation status, system pressure, level in non-potable water storage tank, run time meter per pump, settings and detailed failure indication etc; - Automatic and manual changeover to mains water supply; - Integrated dry run protection, mains water back-up fault alarm, switchable pipe burst and leakage alarm function; - Fully adjustable stagnation prevention for mains water pipe; - Volt free contact (3A @ 30V DC) for alarm signal or general fault message to building management systems; - Pressure and water level sensor included, control and all internal components pre-wired and pre-installed in a compact powder coated steel housing with isolation switch; - Basic control functions are included in the standard software package. Unit dims: 1200mm x 1700mm x 1950mm (l x w x h) Electrical connections: 400V 50Hz 36A, 3 x 4kW Connections Suction & Discharge: DN 65 Weight: approx. 450kg
G13378	1	**Reverse flow prevention package for Aqua-Control 5000** Package includes: - Motorised ball valve 2 ½ " (Nickel plated brass body) - Additional in- and outputs - Software upgrade to block water from entering the Aqua-Control unit during automatic maintenance (stagnation prevention on the mainswater pipe branch).
G10006	1	**Floating extraction 2 ½ “, 2m hose (for Aqua-Control)** Floating extraction to draw cleanest water from an underground rainwater tank. It includes: - 2m suction hose 2 1/2" - Strainer and plastic ball - Non-return valve - Male threaded connection BSP 2 1/2"
G15027	1	**Pressure vessel 300l (16 bar)**

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Part Number	Qty	Description
		For installation on the pressurised outlet to serviced appliances, reducing operation of pumps and avoiding water hammers in the pipework.
G19215	1	**UV Disinfection Package #15 (22.0 m³/h with 2-step pre-filtration)** For use in water reclamation systems, e.g. rainwater harvesting systems or greywater recycling systems, where a higher water quality is required. Scope of supply: Flow rate: 22m3/h Filter Housing: 1 no. RF DN65 Filter Cartridges 90-micron manually operated backwash: FSS473 (1 no.) (drain connection required) Filter Cartridges 5-micron in Stainless Steel housing: SB40-5 (5 no.) Technical data: Flow Rate (m3/h): 22 @ 300 J/m2 Nominal Power (W): 290 Max Pressure Rating (bar): 16 Connections: 4" BSPM No. of lamps: 4 Fuse (A): 6 Prefilters first: 90 Prefilters Second: 5 Dimensions: Dimensions L x W (Ø) x H (mm) UV system: 950 x 184 x 365 Dimensions H x Dia (Ø) (mm) Prefilter (each): 1334 x 300 Weight (kg): 40 Materials: Chamber material: 316 stainless steel
G13340	1	**UV Disinfection ECO-synchroniser for AC 5000** Control feature for the Aqua-Control unit. The feature allows running a UV disinfection unit more efficiently by turning it off during mainswater demand periods, e.g. on low occupaction or appliance usage. It will also signal to the Aqua-Control to switch to mains water in case the UV is faulty or needs maintenance. This is relayed via the BMS of the Aqua-Control.
G15059	2	**Water Meter, 2 ½" (Reclaimed and Mains Water)** High precision cold water meter, for flow metering on the reclaimed water pressure pipe or the mains water top-up pipe. c/w pulse output module. to be used in conjunction with remote monitoring package - Nominal flow rate 63.0 m³/hr - Flow rate range 0.2 - 70 m³/h - Max Temp 30 °C - 1 impulse per 10 litres from pulse output modules - Meter length 200 mm
G20220	1	**Remote monitoring for combined non-potable water system (refer to EDS 1.4)** Internet-based monitoring feature transmits metering data, system status information and alarms to mobile-friendly web-based dashboard interface.

Part Number	Qty	Description
G20400	1	**Aqua-Storm-Control Lite System** To provide part or all of the overall storm attenuation volume required on the site through an active attenuation system (rainwater harvesting tank plus forecast based control system). The system comprises of the following: - control panel - level sensor (pressure transducer) - site controller to connect to weather predictive data - GSM SIM card and aerial with 20m cable (length TBC) - DN150 motorised buttefly valve (Type B) - includes the first 2 years' maintenance contract/ service

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DESIGN CRITERIA

Refer to following design documentation:

- Mechanical & Public Health Services Particular Specification – T03 – 02.08.18 (246868-A_A-XX-XX-SP-MX-00002)

- Equipment Data Sheet – P13-Combined Attenuation & Water Recycling Package – T02 0 27.10.17

- Public Health Services Drainage Basement Layout – T03 – 01.08.2018 (246868-A_A-XX-B10-DR-PX-52011)

Please note, Aquality are coordinating with relevant mechanical and electrical trades for demarcation of provided services and power requirements. This will also include design coordination and modelling of the packaged plant/ equipment to ensure spatial fit and connection to other building services (drainage, MCWS, distribution, power, BMS etc.), which will be shown on T Clarke construction drawings to be released at a later date.

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Components:

1	Greywater Pre Filter
2	Greywater Buffer Tanks
3	Greywater Membrane Filtration Tank
4	Treated Greywater Transfer Tank
5	GWRS Control Panel (wall mounted)
6	Compressors (wall/rack mounted)
7	Greywater Pre Filter Flushing Valve
8	Automatic tank drain down valve
9	Treated Greywater Transfer Pump
10	Attenuation Pump Set
11	Rainwater Filter
12	Combined Att, RWH & GW Storage Tank
13	Combined Tank Manual Drain
14	Non-Potable Booster Pump inc. break tank
15	Reverse Flow Prevention Valve
16	Expansion vessel
17	UV Disinfection Package
18	Mainswater Filter
19	Non-Potable Water Meter
20	Mainswater Top-up Water Meter
21	-
22	Aqua-Storm Control Panel (wall mounted)
23	Remote Monitoring Panel (wall mounted)

Connections:

A	DN 150	Greywater inlet
B	DN 150	Greywater overflow
C	DN 150	Greywater outlet (to storage tank)
D	DN 50	Tank drain down
E	1"	Automatic coarse filter cleaning; pressure 1-2 bar
F	DN 50	Ventilation Pipe
G	DN 100	Outlet connection to Attenuation Pumps
H	2"	Combined tank drain down
I	DN 300	Rainwater inlet
J	DN 300	Vertical access point for inspection
K	2 ½ "	Floating extrcation
L	2 ½ "	NPW Booster Set suction
M	2 ½ "	NPW Booster Set discharge
N	2 ½ "	NPW Booster Set mains water top up
O	DN 100	NPW Booster Set emergency overflow
P	2 ½"	Test connection with isolation valve and end-cap
Q	DN 150	Combined Tank Emergency Overflow
R	2"	UV Inlet & Outlet connections
S	DN 150	Incoming Greywater Collection Pipe
T	DN 300	Incoming Rainwater Collection Pipe
U	1 ¼"	Greywater Transfer Pipe
V	½ "	Greywater Filtrate Hose
W	DN 100	Greywater Recirculation Pipework
X	DN 32	Treated Greywater Transfer Pipework
Y	DN 160	Attenuation Discharge to Drain

Combined Attenuation, Rainwater Harvesting & Greywater Recycling System
Brand: Aquality
Type: Aqua-Recycling-Control 480B Plus with Aqua-Control 5000 and accessories
Pore size filter membranes: 38 nanometer. Programmable and fully-automatic: filter cleaning for greywater coarse filter, stagnation prevention for mainswater pipe and non-potable water storage tank, basement tank safety valve
Min. ceiling height for MBR-Tank maintenance: 2,500 mm;
Minimum height above Coarse filter for maintenance: 600 mm;
Dimension largest tank: L x W x H = 2,430 x 995 x 1,950 mm;
Empty weight heaviest component: ca. 238 kg;
Max. treatment capacity: 12,000 litres/day;
Greywater storage volume: 12,000 l
Attenuation/ Rainwater storage volume: 285m^3
Non-potable water storage volume: 4,000 l

Key
- pipes (mains water)
- pipes (greywater)
- pipes (reclaimed water)
- pipes (circulation)
- pipes (overflow/ drainage)
- tank interconnection
- flex tubes/hose
- pipes (ventilation)
- cables
- pipe (rainwater)

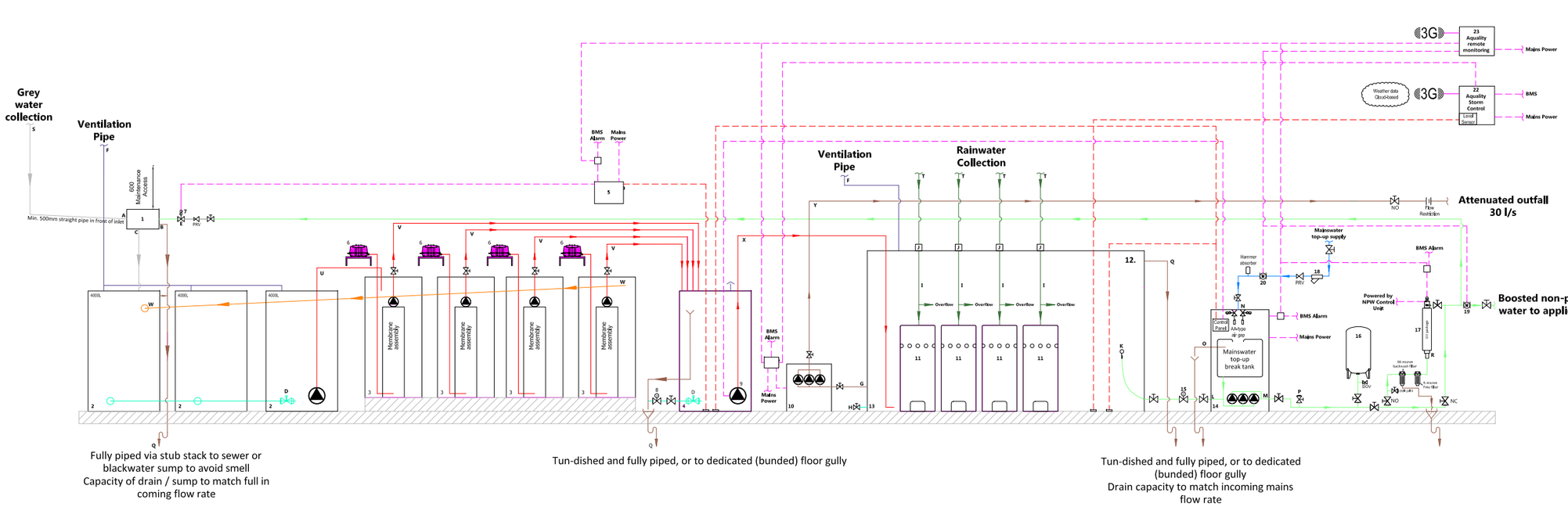
Electrical power supplies:
- Greywater Treatment Control: 230/1/ 50 16A, 0.85 kW
- NPW Booster Set/ Control: 400/3/50 36A, 3 x 4 kW
- Attenuation Pump Set: 415/3/50 42.4A, 2 x 11kW
- Remote Monitoring Control: 230/1/50 3A
- Aqua-Storm Control: 230/1/50 10A

BMS Outputs (VFC's):
- 1 x NPW Booster general fault
- 1 x Attenuation pumps general fault
- 1 x Greywater System general fault
- 1 x UV system general fault
- 1 x Aqua Storm Control general fault

Pulsed Outputs:
- 1 x NPW Meter Consumption
- 1 X MW Meter Consumption

Air ventilation of relevant greywater storage and non-potable water storage tanks must be provided via ventilation pipes. Frost protection and air ventilation of the plant location must be guaranteed. Greywater collection pipes, drainage pipes for overflows from tanks and filters, non-potable water distribution pipe work, mainswater pipes, cables for power supplies, BMS or other interfaces outside or below slab of the plantroom of the water reclamation system and drainage facilities for Aqua-Control and sludge removal (where required with back flow prevention or sump pump) are not included in the scope of supply of Aquality Trading & Consulting Ltd. These are to be provided by others.
All Greywater inlets or overflows to to downstream drainage are recommended to be fully piped to prevent potential water damage or odour. All emergency overflows should be visible via tundish or bunded floor drain point to indicate a potential malfunction.

No liability for printing errors. We reserve the right to make technical changes. All transactions are subject to our general terms and conditions. Please contact our office for further information.



Project: London - 1 Triton Square	
Title: Process Schematic	
System: **Combined Non-potable Water System** Attenuation, Rainwater Harvesting & Greywater Recycling	
Project-No: 4185-17	Drawing-No: 4185-01
Project state: Construction	Date: 30-09-2019
Scale: NTS @A3	Revision: 3
Drawn by: CJ	Checked by: DP

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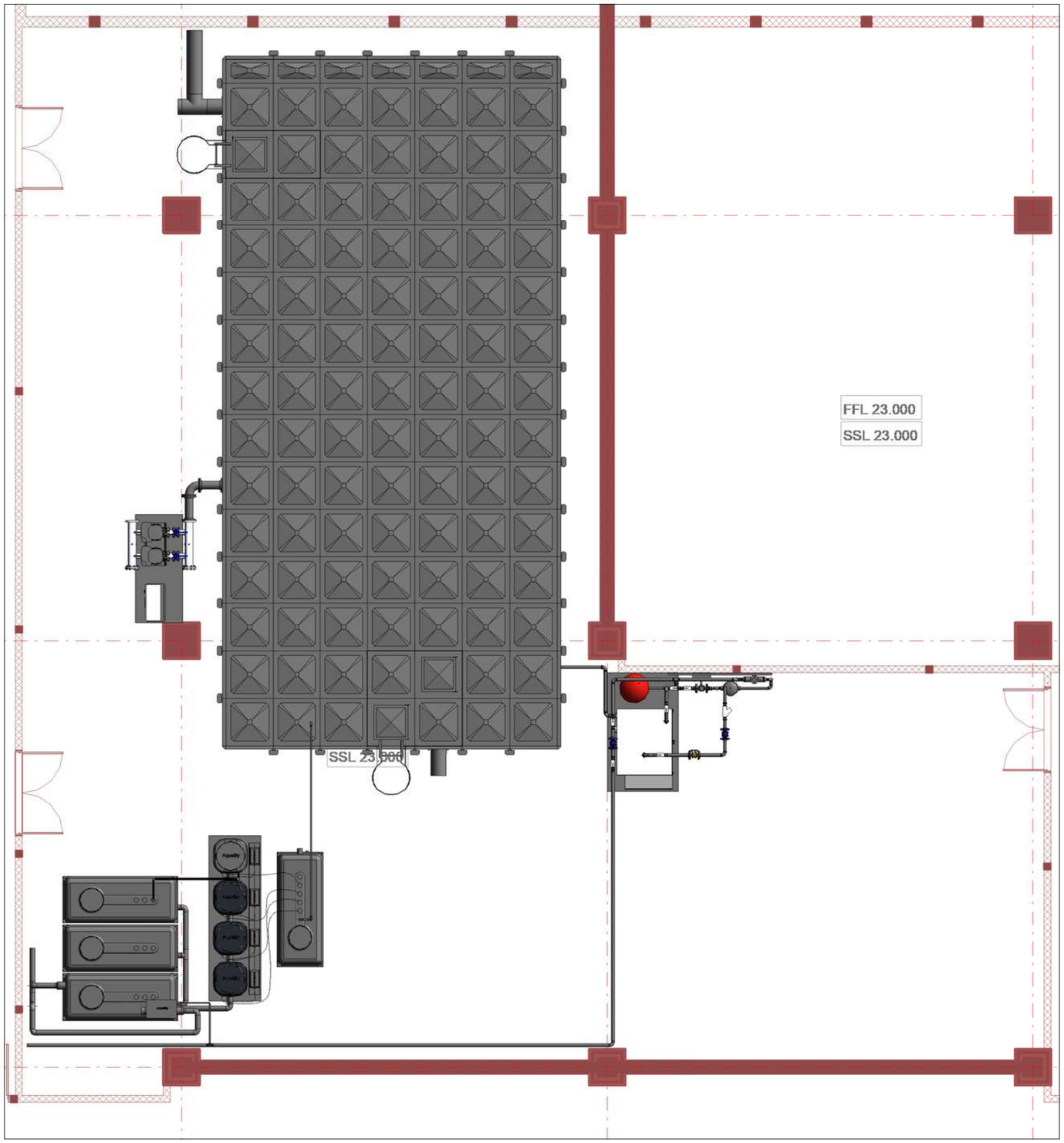
General Note:-

These are preliminary drawings and subject to change.

Construction drawings will be prepared and approved as part of the design coordination between Aquality and T Clarke



Project: Project Triton	
Drawing Title : Plantroom Layout	
System: Combined Rainwater attenuation tank and Greywater system layout	
Project -No: 4185-17	Drawing - No: 4185-03-ATT-GW
Project state: Coordination	Date: 12/10/18
Scale: 1 : 100	Revision: 00
Drawn by: DP	Checked by: --

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Components	
1	Greywater Pre Filter
2	Greywater Buffer Tanks
3	Greywater Membrane Filtration Tank
4	Treated Greywater Transfer Tank
5	GWRS control panel wall mounted)
6	Compressors (wall/rack mounted)
7	Greywater Pre Filter Flushing Valve
8	Automatic Tank Drain Down Valve
9	Treated Greywater Transfer Pump
10	Attenuation Pump Set
11	Rainwater filter
12	Combined Att, RWH & GW Storage Tank
13	Combined Tank Manual Drain
14	Non-potable Package (inc. booster pump & Controls)
15	Reverse Flow Prevention Valve
16	Expansion Vessel
17	UV Disinfection Package
18	Mainswater Filter
19	Non-potable Water Meter
20	Mainswater Top-up Meter
21	-
22	Aqua-Storm Control Panel (wall mounted)
23	Remote Monitoring System Panel
24	UV Control Panel

Connections		
A	DN 150	Greywater inlet
B	DN 150	Greywater overflow
C	DN 150	Greywater outlet (to buffer tank)
D	DN 50	Tank drain down
E	1"	Automatic coarse filter cleaning (pressure 1-2 bar)
F	DN 50	Ventilation Pipe
G	DN 150	Attenuation discharge
H	2"	Combined tank drain down
I	DN 300	Rainwater inlet
J	DN 300	Vertical access point for inspection
K	2 ½ "	Floating extrcation
L	2 ½ "	Aqua control 5000 suction
M	2 ½ "	Aqua control 5000 discharge
N	2 ½ "	Aqua control mains water top up
O	DN100	Aqua control emergency overflow
P	2 ½ "	Test connection with isolation valve and endcap
Q	DN 150	Combined Tank Emergency Overflow (TBC)
R	2"	UV Inlet & Outlet connections

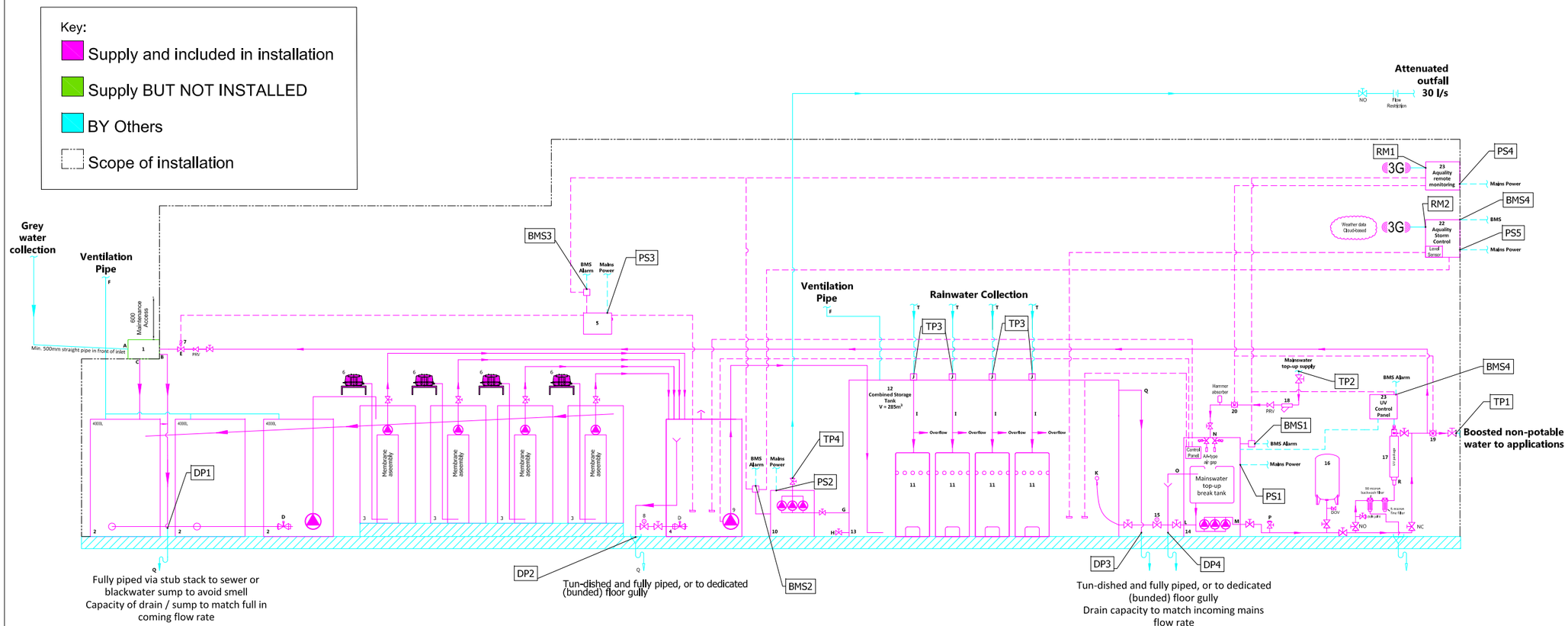
Terminations and Power Schedule - allowance/material			
TP1	2 ½ "	Booster Non-potable Water	3m copper soldered
TP2	2 ½ "	Mains Water Top Up	3m copper soldered
TP3	2 x DN 300	Rainwater Inlet to filter	HDPE, electrofusion welded
TP4	DN160	Attenuation Discharge	HDPE, electrofusion welded
PS1	400/3/50, 36A	Aqua Control 5000	3m length cable, to local rotary isolator switch
PS2	415/3/50, 42.4A	Attenuation Pump Set	3m length cable, to local rotary isolator switch
PS3	230/1/50, 16A	Aqua-Recycling Control	3m length cable, to fused spur connection or isolator
PS4	230/1/50, 3A	Remote Monitoring Control	3m length cable, to fused spur connection or isolator
PS5	230/1/50, 10A	Aqua-Storm Control	3m length cable, to fused spur connection or isolator
BMS1	VFC	General Fault Aqua Control 5000	N/A
BMS2	VFC	General Fault	N/A
BMS3	VFC	General Fault GW System	N/A
BMS4	VFC	UV General Fault	N/A
BMS5	VFC	Aqua Storm Control General Fault	N/A
RM1	GSM	Water consumption and fault logging via IoT platform	Aerial and cable length (TBC)
RM2	GSM	Weather data IoT platform	Aerial and cable length (TBC)
DP1	DN 100	Raw Greywater Emergency Overflow	3m, HDPE electrofusion welded
DP2	DN 100	Greywater Storage Tank Emergency Overflow	3m, HDPE electrofusion welded
DP3	DN 150	Combined Tank Emergency Overflow (TBC)	3m, HDPE electrofusion welded
DP4	DN 100	Emergency Overflow AC 5000 unit	3m, HDPE electrofusion welded

Installation Notes

- No Cast-iron pipework allowed
- No Scaffolding included
- Hired MEWP or tower lowered/delivered into the plantroom by client
- MEWP operator supplied by client if applicable
- Guaranteed cleared access below the equipment destination
- Scaffolding to be de-commissioned as necessary
- No other contractors working in the plantroom during the installation period
- Removal of access equipment by client to preferred collection point
- Removal of rubbish to designated waste area on site
- As per the commercial install agreement

Key:

- Supply and included in installation
- Supply BUT NOT INSTALLED
- BY Others
- Scope of installation



Project:	London - 1 Triton Square
Title:	Specialist Package Demarcation
System:	**Combined Non-potable Water System** Attenuation, Rainwater Harvesting & Greywater Recycling
Project-No: 4185-17	Drawing-No: 4185-02
Project state: Design	Date: 30-Sep-2019
Scale: NTS @A3	Revision: 3
Drawn by: CJ	Checked by: CF

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Process Control Philosophy

Project Name: 1 Triton Square

Project Ref: 4185-17

Design Consultant: Arup

M&E Contractor: T Clark

Project Scope

An integrated, non-potable water management system is to be implemented at 1 Triton Square. This is a combined system that incorporates weather monitoring technology (Aqua Storm Control). This system counts towards 100% of attenuation volumes on the development at same time as harvesting rainwater and collecting domestic greywater from showers. The collected water is then treated to a high standard and reused for toilet flushing in order to reduce potable water consumption on site. In addition, the system will help to reduce rainfall run-off and slowly release it at a permissible rate, to the sewer overflow.

System Overview Philosophy

The effective storage capacity of 285m3 is split between the treated greywater, rainwater harvesting and attenuation volumes. Rainwater from roofs and hard standing areas is captured via a drainage system and piped directly into the combined storage tank through sediment filters. Greywater is collected from separate drainage pipework to a dedicated holding tank where the water is processed (up to $12m^3$ per day) and transferred to the combined storage tank. The non-potable water is then drawn off by the booster pump set and pumped through a UV disinfection unit before supplying the distribution system.

The active attenuation system (ASC) is linked directly to the Met office rain prediction technology. When rainfall is predicted, the ASC recognises the anticipated rainfall event. The control system responds by lowering the water in the attenuation tank to a safe level, so when the rain arrives all the necessary attenuation capacity is available within the combined tank. This is performed by activating the motorised control valve and energising the attenuation pump set (pressure induced or a digital output - TBC) to allow the tank to drain at a specific rate of 30 l/s. When the tank has been proportionally drained down, the pump will stop, and the control valve will close.

When the combined storage tank is at a low level, a signal from the level sensor will automatically trigger the non-potable booster set to switch over to mains water back up, without impacting on supply. The unit has an integrated break tank with an AA type air gap (compliant with water regulations). This can also be manually initiated at the control panel during system maintenance (i.e. tank cleaning).

The BMS is only operating a monitoring/alarm function and has no direct control over the operation of the equipment or system, as this is a fully autonomous and a standalone package.

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Greywater Recycling System

The greywater passes through a coarse filter to remove any large debris and is collected and stored in a series of interconnected buffer tanks. The untreated greywater is then pumped over to the membrane tanks, which undergoes biological (aerobic) treatment. The membrane tanks are linked together by an overflow pipe which recirculates the greywater back to the buffer tanks (indirect aeration). The submerged filtrate pump draws the greywater through the membrane and delivers filtered water to the treated greywater transfer tank. This tank has a submersible pump to transfer the water directly to the combined storage tank, when the water level is below a set point (80% capacity – this is programmable). If the transfer tank is full as indicated by the level control sensor, the membranes will stop filtering and any incoming greywater will overflow to the foul drain.

The coarse filter is backwashed on a regular basis using non-potable water that is supplied on the pressure side of the booster pumps. The flush is controlled by a solenoid valve at a pre-determined interval and time period (programmable).

The storage times of the treated greywater is also monitored in the transfer tank. When not in use for a pre-determined period (>21 days, programmable), the tank is automatically drained down to replenish the system. This is controlled by a motorised valve on a timer that allows the water to be discharged to the foul drain.

The whole process is monitored and controlled by the greywater panel and linked to the BMS for common fault indication.

Rainwater System

The rainwater is collected via a siphonic drainage system connected to roof terraces and other hard standing areas from the site. All collected water is channelled to the basement where siphon is broken before the pipes reach the combined storage tank. The rainwater then passes through the in-tank BV filter which acts as both a calming inlet and sedimentation chamber. When the filter chamber has reached capacity (due to the accumulation of the sediment) the rainwater will overflow direct into the tank.

The main function of the combined storage tank is to attenuate and transfer reclaimed water to the non-potable distribution system. Water levels in the combined storage tank are monitored by the non-potable package control panel.

Aqua Storm Control (ASC)

The ASC will monitor the water level in the combined storage tank via a pressure transducer. It will calculate the current volume of water in the tank and simultaneously check the local weather conditions through the

For small storm events, the ASC will calculate the storage capacity available and use an algorithm to predict the volume of rainfall to be received, plus a pre-determined safety factor (usually 30%, but this can be adjusted). If the potential storm rainfall yield is less than the available tank capacity, then no further actions will be performed. If these conditions change i.e. large storm event, and the rainfall yield is greater than the available capacity, the ASC will open the control valve and start the attenuation pump to drain down the tank until there is sufficient capacity available including the safety factor.

During large storm events where the storm yield is greater than the tank capacity, the ASC will open the control valve and initiate the attenuation pump. The system will continue to monitor the weather conditions and tank to ensure it is able to receive and retain the full storm event. If the tank is fully empty (<25% - TBC at

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commissioning), the non-potable booster pump set will switch over to mains water mode and continue to supply water to the WC's. The greywater system will continue to treat and process any incoming water.

System failure alarms shall be transmitted to the cloud-based platform and the BMS for general faults. Email or text based alerts can be set-up for users on the web interface. The ASC system communicates to the platform via a 3G connection. An aerial will be used to boost the signal strength of the 3G connection if deemed necessary.

Operation during tank maintenance:

- The ASC system has a manual override mode. It will continue to monitor the incoming weather patterns, but it will not activate any components.

- The non-potable control panel will still monitor the water level in the combined tank via a dedicated level sensor. If there is no available water in the tank because it has been drained, the unit switches to mains water or it can be manually switched over to mains water mode at the panel.

- The grey water transfer pump isolator should be turned off. This will stop the greywater system from transferring process water to the combined tank. The greywater system will continue to process water until the transfer tank is full it will then shut the greywater system down until the transfer pump is turned back on.

Aqua Storm Control Failure:

- If the ASC valve fails to respond during the health check test, it will generate a valve fault signal via the BMS and on the internet platform;

- If there is a power failure from the building or a signal/ comms loss back to the ASC platform, this will generate a fault. The ASC panel is equipped with a battery back-up, so it can run without a power source for a limited period of time (approx. 48 hours);

- If the ASC valve is open and the tank level does not reduce, a pump fault will be generated via the BMS and on the internet platform. An additional BMS fault from the attenuation pump set will also be activated;

- If the ASC is unable to attain a level reading, it will generate a sensor fault via the BMS and on the internet platform.

- Within all failure scenarios the system defaults back to a storm attenuation system - actuated valve open.

Refer to the Piping and Instrumentation Diagram (4185-06) for an overview of the controls relating to this combined attenuation, rainwater harvesting and greywater recycling system.

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KEY

- Reclaimed Rainwater
- Greywater
- Overflow
- Instrumentation / Control
- Mains Power
- Alarm/ BMS outputs
- GSM Cellular
- Outside of system scope

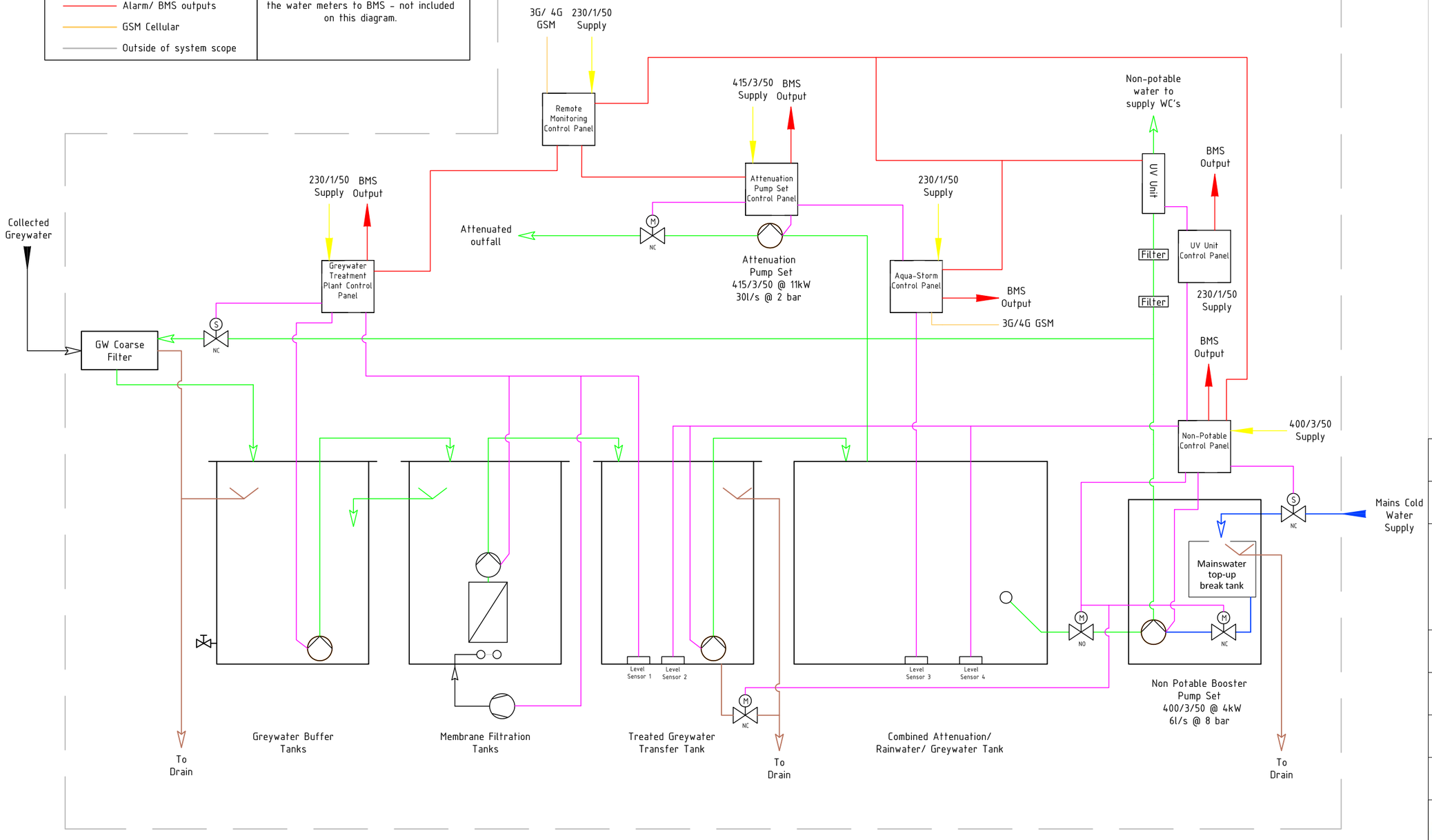
BMS Outputs

There are 5 VFC outputs (signals spilt with remote monitoring system)

See tech sub for more details on control philosophy

Notes

There are also 2 pulsed outputs from the water meters to BMS - not included on this diagram.



Project:	1 Triton Square
Title:	Piping & Instrumentation Diagram
System:	Combined Attenuation, RWH & Greywater Reclamation System
Project-No: 4185-17	Drawing-No: 4185-06
Project state: Tender	Date: 10.12.2018
Scale: NTS @A3	Revision: 2
Drawn by: C. James	Checked by: D. Pellegrini

aquality
intelligent water management

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Rainwater BV Filter (EDS - 1.3.1.4)

Item Nos G11022, G11023, G11024, G11025, G11026

Typical applications:

- For attenuation systems or rainwater harvesting combined with soakaway;
- For rainwater harvesting systems where space for filter installation is constricted or a level drop in the drain pipe due to the filter would be problematic;
- As an alternative RW filter system where a conventional filter at high level would be difficult to install or access for maintenance;
- RW harvesting projects where filter maintenance needs to be kept to a minimum.

Features:

- Fully submerged in the rainwater harvesting tank;
- Calmed inlet with marble gravel inside, which can help neutralise rainwater acidity due to mineral deficiency;
- Sedimentation chamber with aerobic biology performing continuous mineralisation (breaking down) of sediment, refreshed and oxygenated with every rainfall;
- Lid with inlet from the top, removable for inspection and maintenance;
- A flexible foam disk around the calmed inlet increases the surface area harbouring the aerobic biology;
- Optimised flow design across the compartments to the diffusers to maximise the effectiveness of the biologic degradation processes.

Advantages

- No overflow: 100% water yield, no rainwater is lost due to dirty filter grids;
- Depending on organic load, maintenance is only required every five to 10 years;
- Degradation process based purely on biologic principles, no chemicals or electricity required;
- Easily installed: stands on the bottom of the rainwater tank, no high-level access required;
- Can be retrofitted into most rainwater tanks.

Functioning principles

1. Calmed inlet with marble gravel: reduces incoming water velocity and acidity, as minerals from the marble mineral compensate potential acidity (due to mineral deficiency) of the rainwater.
2. Sedimentation of organic and inorganic matter in the filter chamber: Initially, sediment will accumulate in the filter. This harbours the aerobic mineralising biology (biofilm) breaking down the incoming organic load.
3. Aerobic Bio-Degradation: most of the accumulating biomass will be broken down (mineralised) thanks to the rain water itself being rich in oxygen and a friendly biology building up in the chamber. The regular rainfall in the UK will ensure that anaerobic conditions that would lead to fouling and smell cannot establish. The surface area for the biology is increased by the inclusion of a foam disc around the calmed inlet.

Inspection and Maintenance

Frequency for filter service depends on the organic loads, but is typically only required in 5-10 year intervals. If collecting from areas receiving large quantities of leaves, it is recommended to install a filter mesh over the roof rainwater inlets or gutters.

For maintenance, the rainwater tank has to be empty. The BV Filter is opened and the liquid removed, either by draining into the tank or by lowering a submersible pump into the filter and pumping sludge out. The material removed during filter cleaning can be safely composted. No filter grid cleaning or part exchange is needed.

Technical data

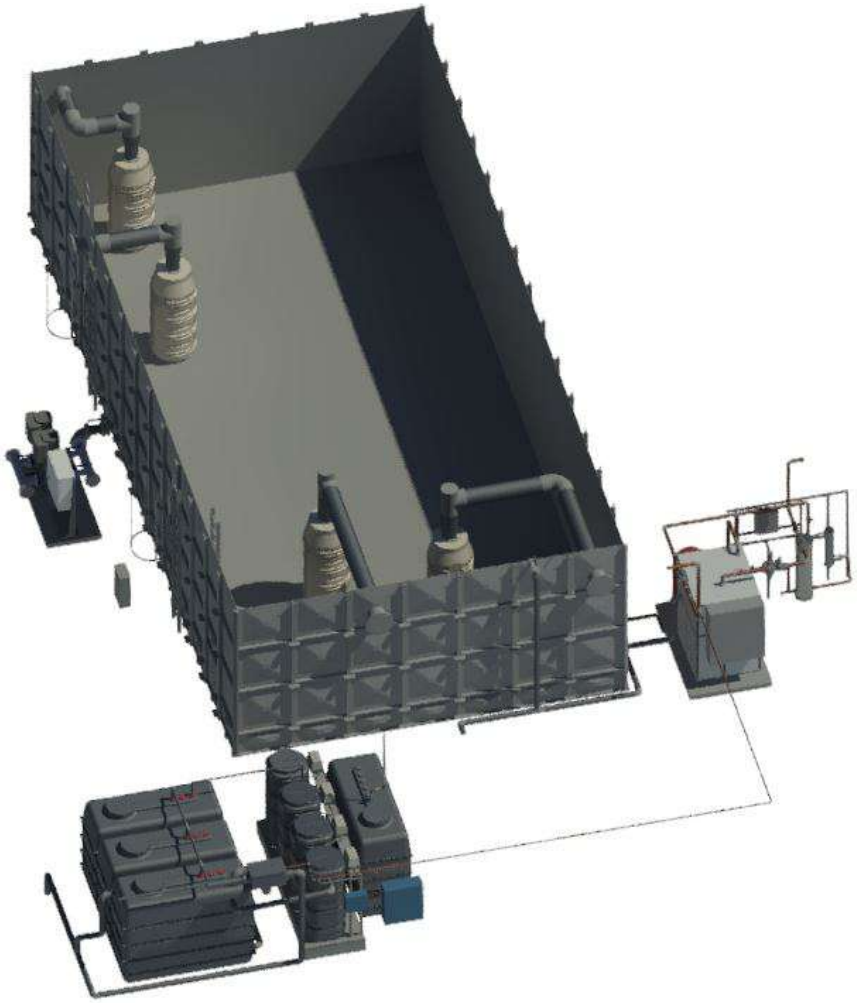
Product code	Item	Inlet pipe size	Design flow rate (l/s)	Connectible roof area (*)	Dimensions (height x diameter) [mm]	Empty weight
G11022	BV 1	DN 100	5	250m²	860 x 490	9.5kg
G11023	BV 2	DN 150	12	600m²	1,740 x 550	47kg
G11024	BV 3	DN 200	36	1,800m²	2,210 x 550	55kg
G11025	BV 5	DN 250	52	2,600m²	2,570 x 805	95kg
G11026	BV 6	DN 300	112	5,600m²	2,950 x 1,220	160kg

* Standard values based on a maximum rainfall of 200 litres per second, per hectare. The actual connectable roof area depends on the local rainfall and is site-specific.

Materials

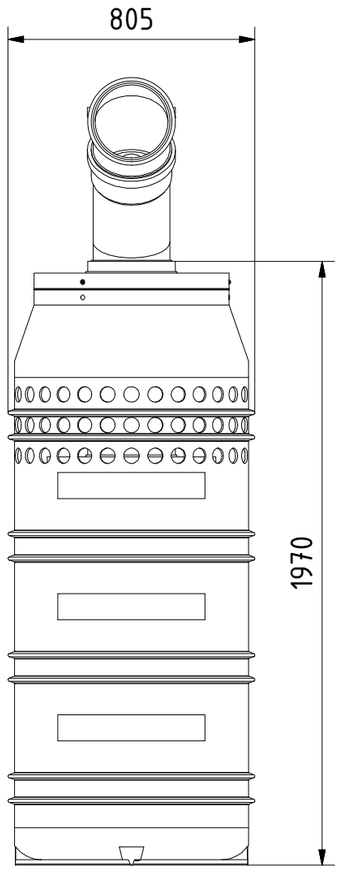
- Polyethylene (PE)
- Marble gravel

Proposed Installation

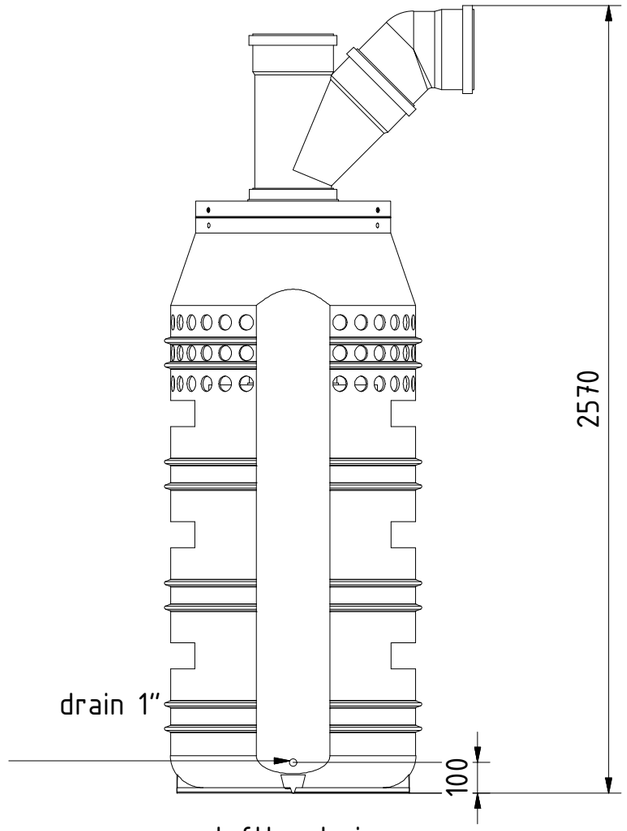


Aquality Trading and Consulting Ltd reserves the right to make technical changes.

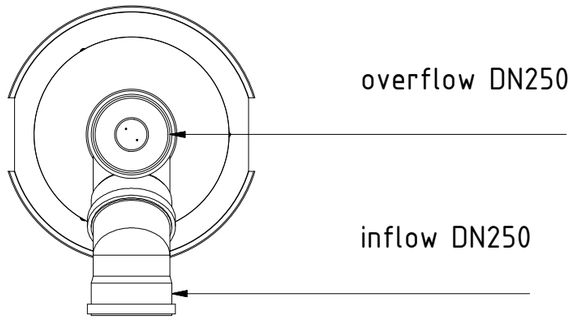
Rainwater Filter (EDS - 1.3.1.4)



front view



lefthand view



top view

	all dimensions in mm	scale 1:20	weight -
	creator DP / date 27.03.2017		material

All tank-connections are displayed as example. They are not pre-installed and have to be adapted in place.

* Additional equipment required

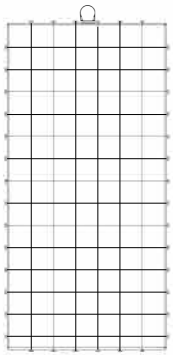
Technical developments and changes in individual items, as well as errors, misprint and price alterations reserved. Photos and drawings are non binding. Depending on the technology, minor dimensions, weight and color variations may occur.

BV Filter 5

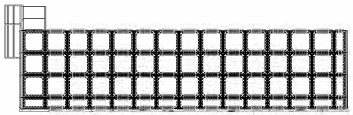
art nr. G11025

sheet 1 / 1

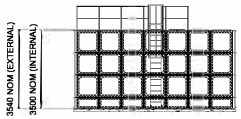
Combined Attenuation, Rainwater Harvesting & Treated Greywater Tank (EDS - 1.3.1)



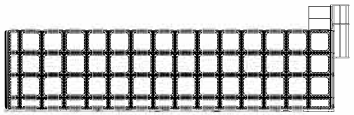
BASE



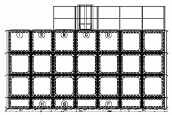
RIGHT ELEVATION



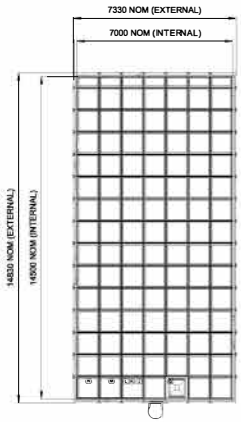
FRONT ELEVATION



LEFT ELEVATION



BACK ELEVATION



PLAN

Tank dimension drawing only.

A more detailed production drawing showing all tank connections and accessories will be issued for approval once the plant room layout and services are fully coordinated between all parties involved.

THE CONNECTION POSITION DIMENSIONS ARE ALWAYS TAKEN FROM THE BOTTOM LEFT OF THE PANEL THAT IT IS PLACED ON. THE HORIZONTAL AND VERTICAL DIMENSIONS REFERENCE A POINT IN THE CENTRE OF THE CONNECTION

ITEM	ELEV	CATEGORY	CODE	QTY	SHORT DESCRIPTION	POSITION DIM-H	POSITION DIM-V
A	Front	External Ladders	FAC-3.5	1	Aluminium Caged ladder	3045	
B	Back	Overflow	FOF-200	1	200mm PN16 Flange c/w Screened Overflow	490	800
C	Back	Overflow	FOF-200	1	200mm PN16 Flange c/w ScreenedOverflow	492	800
D	Back	Overflow	FOF-200	1	200mm PN16 Flange c/w Screened Overflow	482	800
E	Back	Overflow	FOF-200	1	200mm PN16 Flange c/w Screened Overflow	487	800
F	Back	Drain	FSB-2	1	2" threaded socket boss	491	200
G	Back	Outlet	FSP-SPF-100	1	100mm PN10Flange c/w Spool Piece	501	200
H	Back	Outlet	FSP-SPF-065	1	65mm PN16 Flange c/w Spool Piece	507	200
I	Back	Warning Fl pe	TOF-1	1	1" Pushfit Screened Fitting	484	800
J	Cover	Inlet	FSB-1	1	1" threaded socket boss	800	800
K	Cover	Inlet	FSB-1	1	1" threaded socket boss	466	791
L	Cover	Inlet	FSP-SPF-050	1	50mm PN16 Flange c/w Spool Piece	200	800
M	Cover	Inlet	FSP-SPF-250-LID	1	250mm PN16 c/w Spool Piece	557	800
N	Cover	Inlet	FSP-SPF-250-LID	1	250mm PN16 c/w Spool Piece	521	800
O	Cover	Flat Roof Panels	106-CVI	1	Flat roof panel for walking on		
P	Cover	Manways	MWC-1X1	1	Clpped lid 1x1m cover access panel		
Q	Cover	Vent	SCV-2	1	2" Screened Air Vent	202	800
R	Cover	Hand Rail	HR-ALU-1.1M	11	1.1m high Aluminium Handrail		
S	Base	Base Steel	ST-BX-100X50-GLV	216	100x50x5mm RHS Base Steel - MS Galv		
T	Internal	External Ladders	IGL-3.5	1	Internal GRP Ladder		

1. Tank Base: Important Information

   Steels are Included.

   30 no. 7200mm long Lin' mtr. 100x50x5mm RHS Base Steel - MS Galv steels placed at 500mm centres to run parallel to width.

   Orientation of Pier Walls/Supporting Steel and divider location (if applicable) are criticaland should match provided specifications as the tank is specifically designed.

   The top surface should be level to a tolerance of no more than 2mm in any 1m or a total of 6mm in any 6m measured laterally or diagonally.

   To avoid delay to the installation of your tank, and possibly additional costs, please ensure you review and adhere to the technical details & information in relation to the tank base specification. It is also the customer's responsibility to ensure the base is of the necessary structural integrity. Please call us immediately if you have any questions or concerns on tank base specification.

For Information

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JOB TITLE Project Triton, London	JOB No.
CLIENT	QUOTE No.
ESTIMATE TITLE RWH Tank	ESTIMATE No.

DATE	TANK TYPE	SCALE
12/09/2018		NOT TO SCALE

Attenuation Discharge Pump Set (EDS - 1.3.2)

Pressure booster system supplied as compact assembly according to DIN standard 1988/T5.

All pumps are speed-controlled.

From 0.37 to 11 kW, the booster system is equipped with CR, CRE, CRI, CRIE pumps with electronically commutated permanent-magnet motors with extremely high efficiency. The total efficiency of the motor including the frequency converter applies to IE5 level in IEC60034-31.

From 15 to 22 kW, the booster system is equipped with CR, CRE, CRI, CRIE pumps with motors with integrated frequency control. The total efficiency of the motor including the frequency converter is better than the IE3 level in IEC60034-31, even though this standard only applies to the motor.

* Hydro MPC-E maintains a constant pressure through continuous adjustment of the speed of the pumps.
* The system performance is adapted to the demand through cutting in/out the required number of pumps and through parallel control of the pumps in operation.
* Pump changeover is automatic and depends on load, time and fault.

The system consists of these parts:

* Pump parts in contact with the pumped liquid are made of stainless steel EN DIN 1.4301
* Pump bases and heads are of either cast iron/stainless steel (CRI) or cast iron EN-GJS-500-7 (CR), depending on pump type; other vital parts are made of stainless steel EN DIN 1.4301
* The pumps are equipped with a service-friendly cartridge shaft seal, HQQE (SiC/SiC/EPDM)
* Two stainless steel manifolds to EN DIN 1.4571
* Stainless steel base frame to EN DIN 1.4301 up to CR 64. Above CR 64 the pumps are placed on a galvanized C-profile frame
* One non-return valve (POM) and two isolating valves for each pump
* Non-return valves are certified according to DVGW, isolating valves according to DIN and DVGW
* Adapter with isolating valve for connection of diaphragm tank
* Pressure gauge and pressure transmitter (analog output 4-20 mA)
* Control MPC in a steel cabinet, IP54, including main switch, all required fuses, motor protection, switching equipment and microprocessor-controlled CU 352.

Dry-running protection and diaphragm tank are available according to the list of accessories.

Pump operation is controlled by Control MPC with the following functions:

Intelligent multipump controller, CU 352.
Constant-pressure control through continuously variable adjustment of the speed of each individual pump.
PID controller with adjustable PI parameters (Kp + Ti).
Constant pressure at setpoint, independent of inlet pressure.
Soft pressure build-up (To prevent water hammer during startup).
On/off operation at low flow.
Automatic cascade control of pumps for optimum efficiency.
Selection of min. time between start/stop, automatic pump changeover and pump priority.
Automatic pump test function to prevent idle pumps from seizing up.
Possibility of standby pump allocation.
Possibility of backup sensor (redundant primary sensor).
Secondary sensor (Possible to switch to another sensor/setpoint).
Multi-sensor (up to 6 sensors to influence the setpoint).
Manual operation.
Possibility of external setpoint influence.
Log function.
Setpoint ramp.

Possibility of digital remote-control functions:
System on/off.
Max., min. or user-defined duty.
Up to 6 alternative setpoints.
Digital inputs and outputs can be configured individually.
Pump and system monitoring functions:
Minimum and maximum limits of current value.
Inlet pressure.
Non-return valve monitoring.
Motor protection.
Sensors and cables monitored for malfunction.
Alarm log with the previous 24 warnings/alarms.
Display and indication functions:
Colour screen display.
Green indicator light for operating indications and red indicator light for fault indications
Potential-free changeover contacts for operation and fault.
Grundfos bus communication.

It is possible to add CIM communication modules for communicating with Scada/BMS.

Pumps, piping, cabling complete as well as Control MPC are mounted on the base frame.
The booster system has been preset and tested.

Flow media:	Water
Allowed liquid temp.:	5 °C .. 60 °C
System pressure max.:	16 bar
Flow (Plant):	81.11 l/s
Flow without one stand-by pump	acc. DIN 1988/T5: 38.06 l/s
Mains suply:	380-415 V
Nom. current of plant:	42,4A-415V
Nominal power:	11 kW
Net weight:	457 kg

Maximum head: 3.818 bar
Maximum flow: 81.11 l/s

Technical Details and Features

CRE 95-1-1 A-F-A-E-HQQE

Product No.: 99264346

Vertical, multistage centrifugal pump with inlet and outlet ports on same the level (inline). The pump head and base are in cast iron – all other wetted parts are in stainless steel. The Grundfos cartridge shaft seal ensures high reliability, safe handling, and easy access and service. Power transmission is via a rigid split coupling. Pipe connection is via DIN flanges.

The pump is fitted with a 3-phase, fan-cooled, permanent-magnet, synchronous motor.
The motor efficiency is classified as IE5 in accordance with IEC 60034-30-2.
The motor includes a frequency converter and PI controller in the motor terminal box. This enables continuously variable control of the motor speed, which again enables adaptation of the performance to a given requirement.

Controls:

Frequency converter:	Built-in
Pressure sensor:	N

Liquid:

Pumped liquid:	Water
Liquid temperature range:	-20 .. 120 °C
Liquid temperature during operation:	20 °C
Density:	998.2 kg/m³

Technical:

Actual calculated flow:	30 l/s
Rated flow:	31.67 l/s
Resulting head of the pump:	2 bar
Pump orientation:	Vertical
Shaft seal arrangement:	Single
Code for shaft seal:	HQQE
Curve tolerance:	ISO9906:2012 3B

Materials:

Base:	Ductile cast iron EN 1563 EN-GJS-500-7
Impeller:	Stainless steel EN 1.4301
Bearing:	WC/WC
Support bearing:	Graflon
Material certified according to:	European standards

Installation:

Maximum ambient temperature:	50 °C
Maximum operating pressure:	16 bar
Max pressure at stated temp:	16 bar / 120 °C
Type of connection:	DIN
Size of inlet connection:	DN 100
Size of outlet connection:	DN 100
Pressure rating for pipe connection:	PN 16
Flange size for motor:	FF300

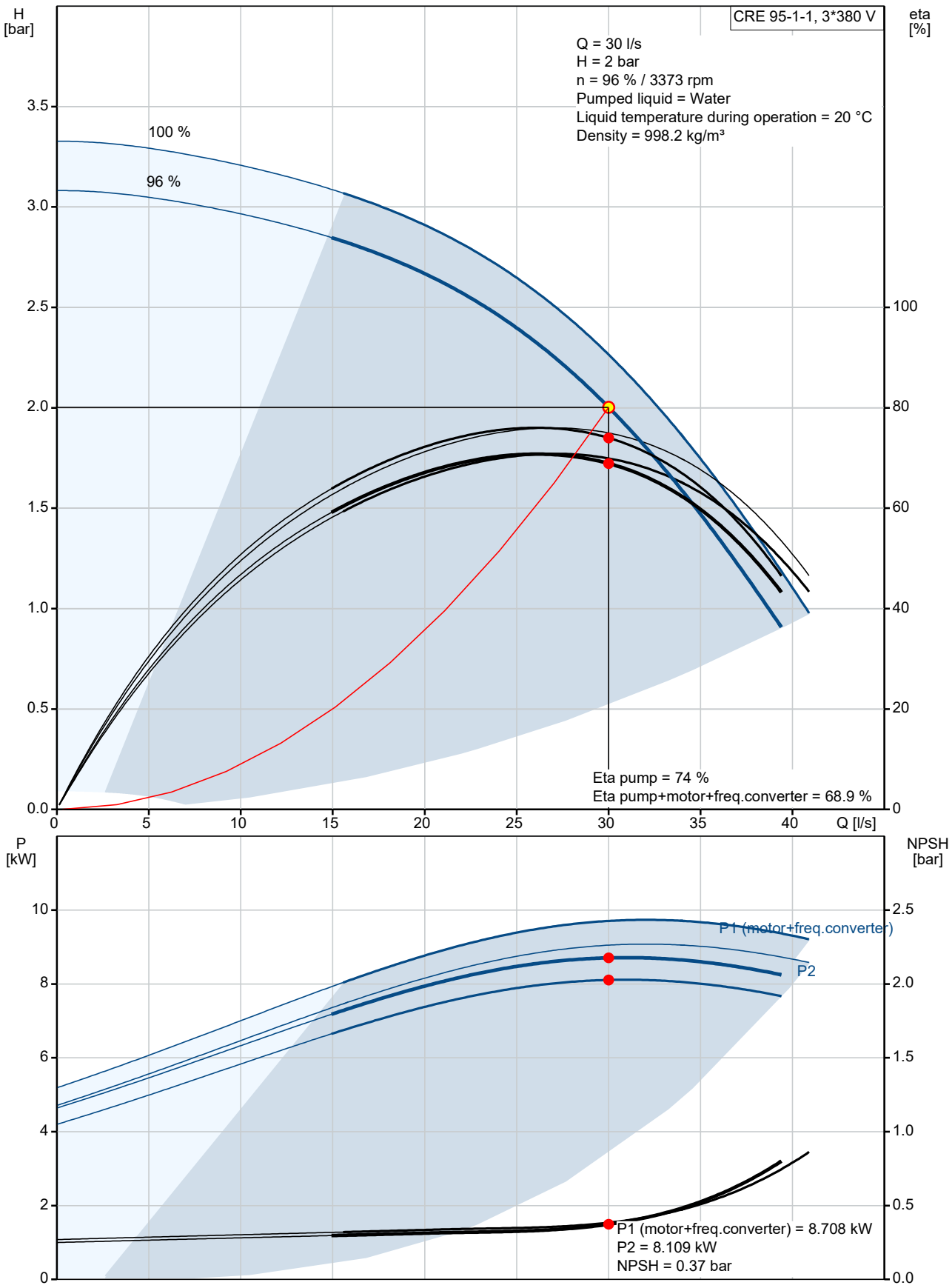
Electrical data:

Motor standard:	IEC
Motor type:	160MH
IE Efficiency class:	IE5
Rated power - P2:	11 kW
Power (P2) required by pump:	11 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 380-500 V
Rated current:	20.3-16.0 A
Cos phi - power factor:	0.93-0.90
Rated speed:	360-4000 rpm
Efficiency:	93.1%
Motor efficiency at full load:	93.1 %
Enclosure class (IEC 34-5):	IP55
Insulation class (IEC 85):	F

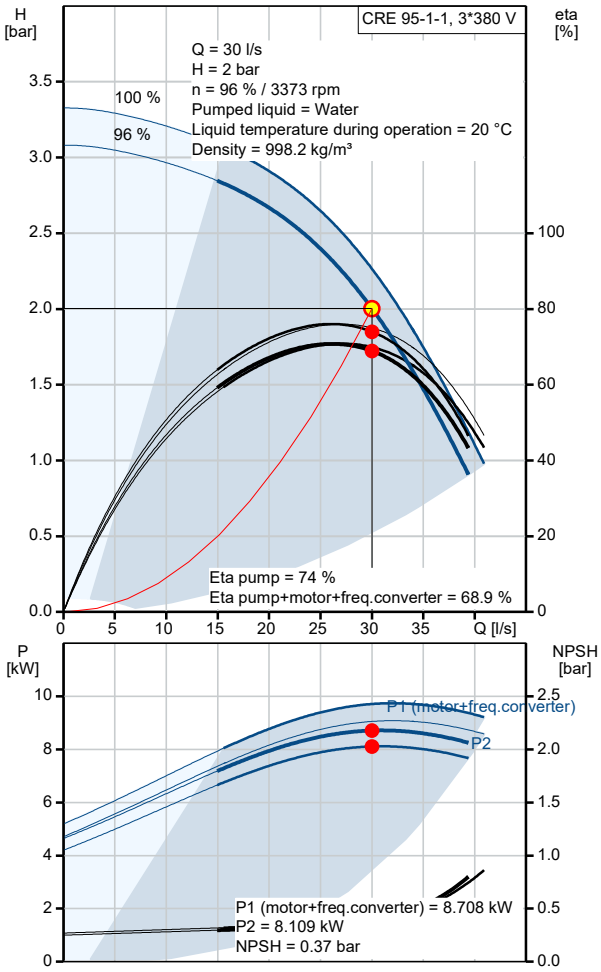
Others:

Net weight:	165 kg
Gross weight:	219 kg
Shipping volume:	1.14 m³
Thrust handling device:	N
Approvals:	CE, EAC, ACS, WRAS

99264346 CRE 95-1-1 A-F-A-E-HQQE 50 Hz

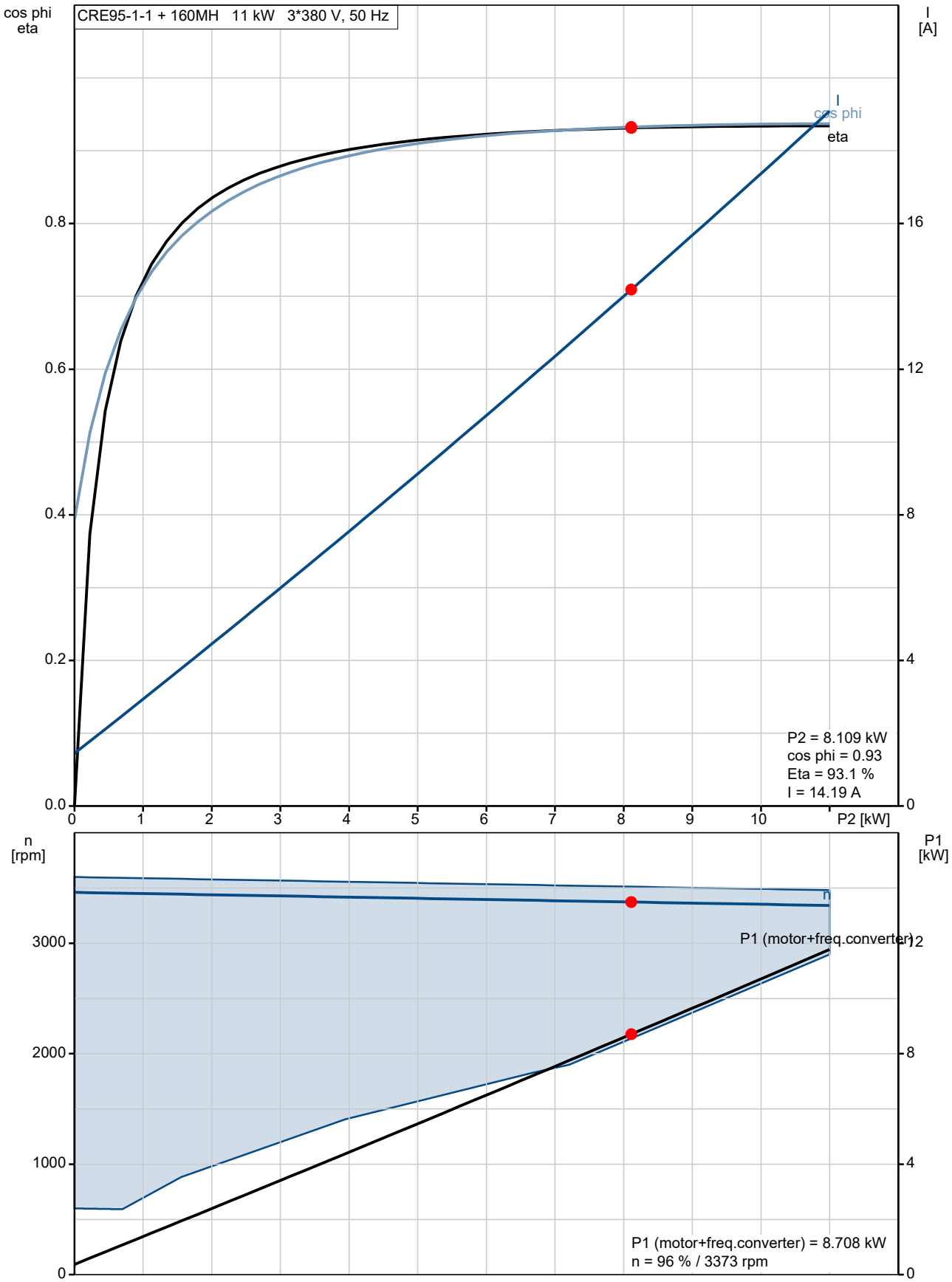


Description	Value
General information:	
Product name:	CRE 95-1-1 A-F-A-E-HQQE
Product No:	99264346
EAN number:	5713826222673
Technical:	
Actual calculated flow:	30 l/s
Rated flow:	31.67 l/s
Resulting head of the pump:	2 bar
Stages:	1
Impellers:	1
Number of reduced-diameter impellers:	1
Low NPSH:	N
Pump orientation:	Vertical
Shaft seal arrangement:	Single
Code for shaft seal:	HQQE
Curve tolerance:	ISO9906:2012 3B
Pump version:	A
Model:	A
Materials:	
Base:	Ductile cast iron
	EN 1563 EN-GJS-500-7
Impeller:	Stainless steel
	EN 1.4301
Material code:	A
Code for rubber:	E
Bearing:	WC/WC
Support bearing:	Graflon
Material certified according to:	European standards
Installation:	
Maximum ambient temperature:	50 °C
Maximum operating pressure:	16 bar
Max pressure at stated temp:	16 bar / 120 °C
Type of connection:	DIN
Size of inlet connection:	DN 100
Size of outlet connection:	DN 100
Pressure rating for pipe connection:	PN 16
Flange size for motor:	FF300
Connect code:	F
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	-20 .. 120 °C
Liquid temperature during operation:	20 °C
Density:	998.2 kg/m³
Electrical data:	
Motor standard:	IEC
Motor type:	160MH
IE Efficiency class:	IE5
Rated power - P2:	11 kW
Power (P2) required by pump:	11 kW
Mains frequency:	50 Hz
Rated voltage:	3 x 380-500 V
Rated current:	20.3-16.0 A
Cos phi - power factor:	0.93-0.90
Rated speed:	360-4000 rpm
Efficiency:	93.1%
Motor efficiency at full load:	93.1 %
Enclosure class (IEC 34-5):	IP55

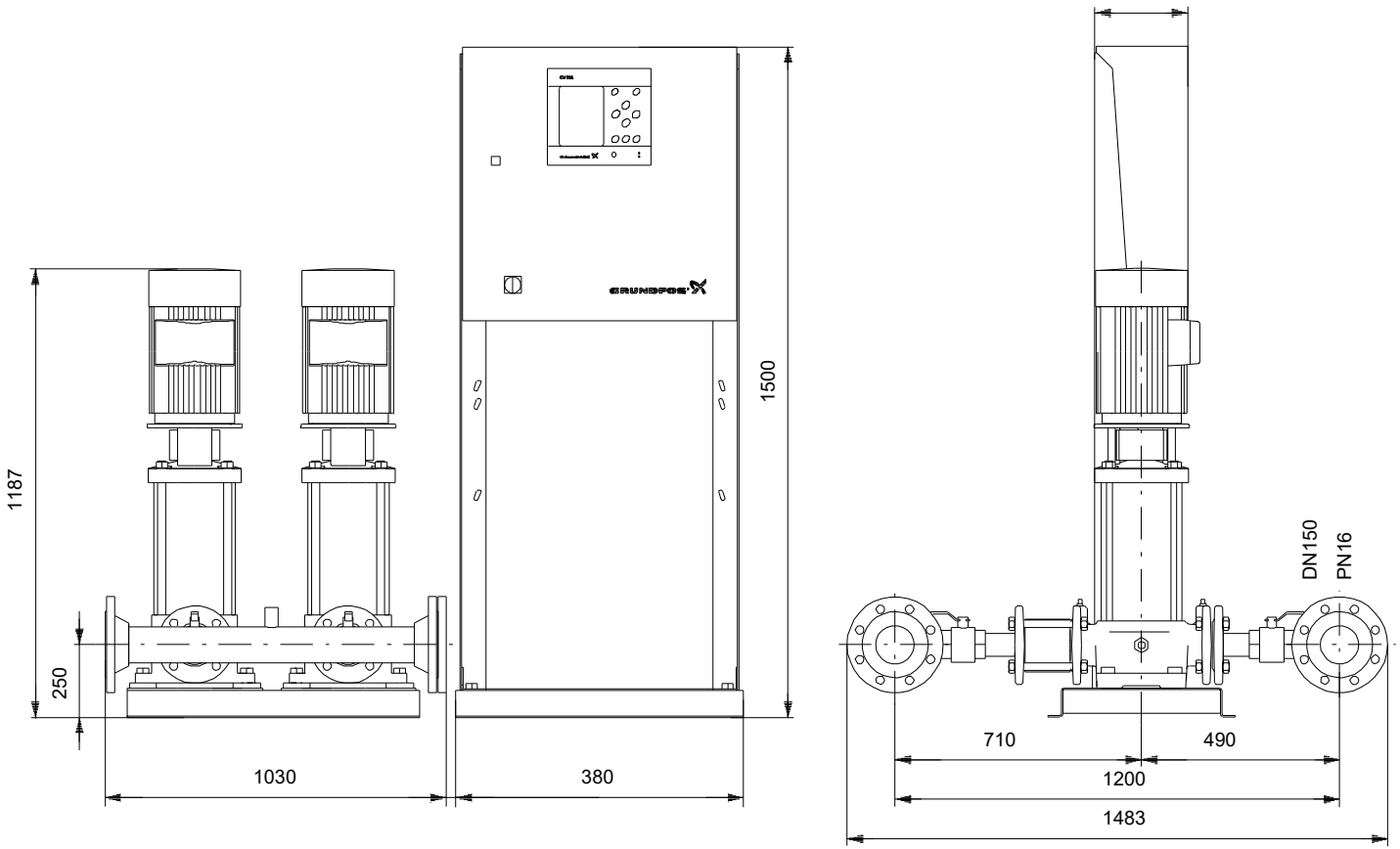


Description	Value
Insulation class (IEC 85):	F
Motor protec:	YES
Motor No:	98971053
Controls:	
Function Module:	300
Frequency converter:	Built-in
Pressure sensor:	N
Others:	
Net weight:	165 kg
Gross weight:	219 kg
Shipping volume:	1.14 m³
Thrust handling device:	N
Approvals:	CE, EAC, ACS, WRAS

99264346 CRE 95-1-1 A-F-A-E-HQQE 50 Hz



Dimensional Drawing



Note: All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Aqua-Recycling-Control system

Example picture of Aqua-Recycling-Control,
including Aqua-Control (not included in scope of supply)

Typical applications

- Decentralized waste water treatment for local re-use in non-potable water applications
- For use within education facilities, commercial, residential or other buildings to off-set mains water demand for non-potable water applications
- Greywater sources: low contaminated wastewater from showers, bathtubs or hand wash basins
- Non-potable water applications: toilet flushing, washing machines, irrigation, cleaning or commercial applications on request

Features

- Electronic control with 4-line LCD or touch screen display (with Aqua-Control 1500 ECO and upwards)
- Greywater coarse filter with PE housing, horizontal stainless-steel filter grid, sprinkler nozzle, controls and solenoid valve for fully-automatic cleaning
- PE-HD greywater storage tanks with man hole and low-level interconnection set
- PE-HD ISB-MBR tank with manhole, pre-fitted with ISB-membrane filtration module and aerator
- PE-HD non-potable water storage tanks with manhole and low-level interconnection set
- Compressors including hoses
- Submersible pumps and float switches including cables
- Volt-free contact (VFC) for connection to Building Management Systems on the control panel of the Aqua-Recycling-Control which is switched in case of malfunction to provide common fault signal to Building Management System or external alarm device. The normally-closed (NC) contact disconnects the circuit when the relay is activated; the circuit is connected when the relay is inactive. It is also called a Form B contact or “break” contact and also provides a fault signal when the power supply to the Aquality-Control unit is interrupted. The circuit is able to receive up to 230V 5A (inductive).

Operation principle

- Grey water treatment process using Bio-Membrane-Technology. For treatment of low contaminated greywater from bathtubs, showers and hand wash basins to provide high-quality non-potable water for a local re-use (e. g. for toilet flushing, washing machine, household cleaning purposes, garden watering or industrial applications).
- Greywater is collected from showers, bathtubs and/or hand wash basins and diverted to the greywater coarse filter by pipe work that is separate from other wastewater pipe work.
- Greywater coarse filter, buffer, treatment and storage tanks are located in an internal plant room. (For underground systems see specification sheet for Aqua-Recycling-Control G)
- The greywater is treated in three stages: coarse filtration, biological treatment (aeration) and membrane filtration:
    - In the greywater coarse filter solids are separated from the raw greywater.
    - After mechanical pre-filtration the greywater is diverted to the greywater tank for storage and bio-degrading organic loads (indirect aeration).
    - Thereafter the water is diverted to the ISB-MBR-units for further bio-degrading organic loads (direct aeration) and ultra-filtration via ISB-membrane (38nm). Solids, biomass, bacteria and adsorbed viruses are separated by the membrane bioreactor process.
    - The treated water is then diverted into non-potable water storage tanks for re-use.
- The non-potable water quality complies with the requirements of the EU bathing water directive 2006/7/EC as well as the hygienic requirements of irrigation water specified in DIN 19650 (1999) class 2, and to British Standard 8525 (2010).

Specification for greywater treatment system

- Brand: Aquality Trading and Consulting Ltd
- Type: Aqua-Recycling-Control

ISB-Membrane-Bio-Reactor Greywater Treatment System, equipped with:

1) Coarse filter for mechanical pre-treatment to remove all un-dissolved water contents (e.g. textile fluff, hair); stainless-steel filter plate with mesh size 0.7mm; high-quality PE-chassis; with automated backwash function including water spray nozzles, solenoid valve and controls.

2) Greywater storage tanks to equilibrate the quantity and quality of raw greywater. Tanks made of grey high-quality PE HD, equipped with float switch, submerged circulation pump with 3m PVC-flex tube, PVC-drain 1½", PVC-tank-low-level-interconnection-kit 2".

3) ISB-MBR-units based on a membrane bioreactor using eco-friendly Bio-Membrane-Technology. Tanks made of grey high-quality PE-HD, equipped with level sensor, air compressor incl. console and 5m PVC-aerator-flex tube, submerged PES-membrane filter incl. EPDM-tube aerator, stainless-steel chassis, filtrate pump M140 with 3 m PVC-filtrate-flex tube.

4) Non-potable water storage tank to equilibrate the water-supply and water-demand. Tanks made of grey high quality PE-HD, level sensor, PVC-drain 1½", PVC-tank-low-level-interconnection-kit 2".

5) Automated Aquality-control unit to manage all operating processes, installed in polycarbonate-chassis IP 65, menu-dialog via LCD-display, hotkey-function to engage different operating-modes (automatic rainwater feed), fill level control, setup menu to change pre-settings (filtration, aeration, backwash, fill level calibration etc.), visual malfunction message, all power supply lines to electrical components 5 m.

Technical Data

All systems have the following technical specifications in common:

- Mesh size coarse filter: 0.7mm
- pore size membrane filter: 38nm
- Energy consumption: .....1.75kWh per m^3 of treated non-potable water

Technical information depending on system size is provided in the following table (see next page).

Technical Data

	ARC 46 B+	ARC 80 B+	ARC 120 B+	ARC 240 B+	ARC 360 B+	ARC 480 B+	ARC 600 B+
Aquality item code	G17301	G17302	G17303	G17304	G17305	G17306	G17307
Treatment capacity [litres/day]	up to 1,150	up to 2,000	up to 3,000	up to 6,000	up to 9,000	up to 12,000	up to 15,000
Greywater storage [litres]	ca. 600	ca. 2,000	ca. 3,000	ca. 6,000	ca. 9,000	ca. 12,000	ca. 15,000
Non-potable water storage [litres]	ca. 1,500	ca. 2,000	ca. 3,000	ca. 6,000	ca. 9,000	ca. 12,000	ca. 15,000
No. of membrane tanks	1			2	3	4	5
Active membrane surface	6.25 m²			12.5 m²	18.75 m²	25 m²	31.25 m²
Rated airflow at 180mbar	120 l/min			240 l/min	360 l/min	480 l/min	600 l/min
Electrical power supply	1× single phase 230 V 50 Hz (not including power requirement for non-potable water pressurisation pump set)						
Electrical load	3 A, 400 W			5 A, 550 W	5 A, 700 W	16 A, 850 W	16A, 1,000W
Space requirements L × W [mm] in standard plant room configuration	4,100 × 2,300	4,400 × 4,000	5,500 × 4,000	7,600 × 4,000	10,400 × 4,000	13,700 × 4,000	16,500 × 4,000
Minimum height above coarse filter required for access and maintenance	600 mm						
Minimum clear ceiling height required for MBR filter maintenance	2,600 mm						
Largest component dimensions L × W × H [mm]	1,560 × 720 × 1,640	2,070 × 720 × 1,690	2,230 × 995 × 1,650 (or with bespoke 4,000l tanks: 2,430 × 995 × 1,950)				
Total plant empty weight	300 kg	630 kg	800 kg	1,200 kg	1,600 kg	2,000 kg	2,500 kg
Heaviest component Empty weight	100 kg	180 kg (or with bespoke 4,000l tanks: 238 kg)					
Coarse filter connections	DN 100			DN 150			
Coarse filter backwash solenoid valve	½"			1"			

Standard connections lengths

- Cable length between control and tanks: 5m
- Compressor hose length to ISB-MBR-tank: 5m
- Greywater pump hose length to ISB-MBR-tank: 5m
- Clear water pump hose length between ISB-MBR-tank and non-potable water tank: ... 5m

Hydraulic connections

a. Greywater inlet from showers

b. Greywater overflow to foul water drain (piped)

c. Non-potable water suction pipe connection

g. DN 100 emergency overflow non-potable water storage tank (floor drain point)

j. Automatic coarse filter cleaning, flow pressure: 1 – 4 bar

Notes

- Air ventilation of greywater tanks must be provided via greywater collection pipes.
- Frost protection and air ventilation of the plant location must be guaranteed.
- Greywater collection pipes, drainage pipes for overflows from tanks and coarse filter, drainage facilities for Aqua-Control and sludge removal (overflows where required with back flow prevention or sump pump), non-potable water or mains water pipes, cables for power supplies, BMS or other interfaces are not included in the scope of supply of Aquality Trading & Consulting Ltd. These items and builders works of all platforms are to be provided by others.
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- We reserve the right to make technical changes. All transactions are subject to our general terms and conditions. Please contact our office for further information.

Aquality Greywater Recycling Systems
Aqua-Recycling-Control B/G+

Average discharge values for recycled greywater (clear water)

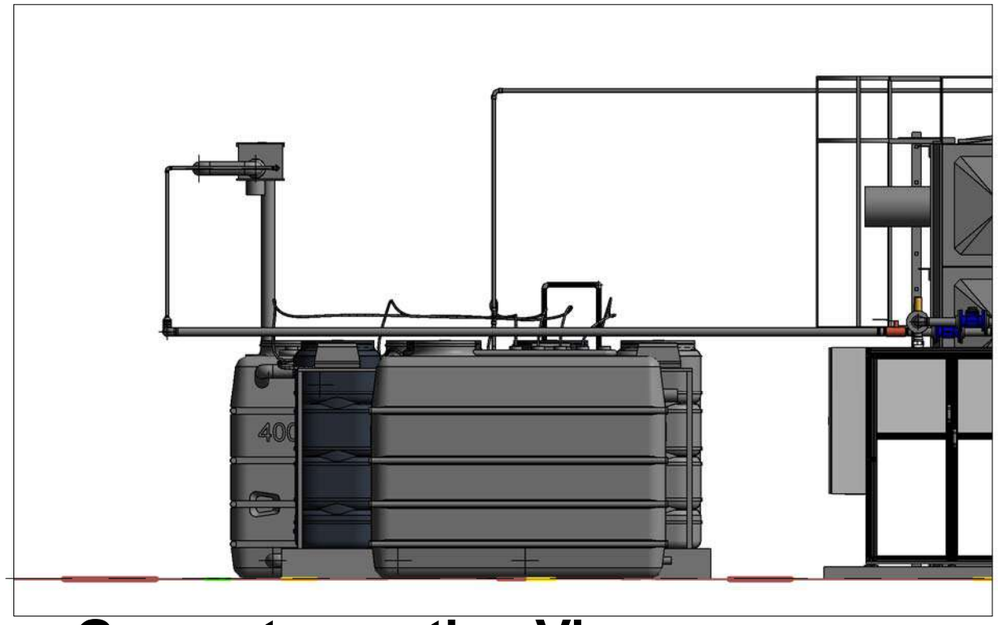
Grey water sources: showers, hand wash basins, bathtubs

Parameter	Grey water intake [1]	Water Quality Aquality clear water	BS 8525-1 [2]	2006/7/EC Bathing Water Directive	DIN 19650 Class 2 Irrigation	DIN 4261 Infiltration
COD [mg/l]	150 – 400 Ø 225	<20	Not specified	Not specified	Not specified	<100
BOD_5 [mg/l]	85 – 200 Ø 111	<3	Not specified	Not specified	Not specified	<20
Suspended Solids [mg/l]	30 – 70 Ø 40	0	Not specified	Not specified	Not specified	Not specified
pH	7.5 – 8.2	7 - 9	5 – 9.5	Not specified	Not specified	Not specified
Turbidity [NTU]	Not specified	1	<10	Not specified	Not specified	Not specified
Chlorine [mg/l]	Not specified	Depending on greywater quality	2	Not specified	Not specified	Not specified
Bromine [mg/l]	Not specified	Depending on greywater quality	5	Not specified	Not specified	Not specified
Total coliform Bacteria [CFU/100ml]	10^3 - 10^7	<100	<1,000	<10,000	Not specified	Not specified
Escherichia coli [CFU/100ml]	10^3 - 10^7	<10	<250	<500	< 200	Not specified
Intestinal enterococci [CFU/100ml]	Not specified	<1	<100	<200	Not specified	Not specified
Legionella Pneumophila [CFU/100ml]	Not specified	0	0	Not specified	Not specified	Not specified

Sources

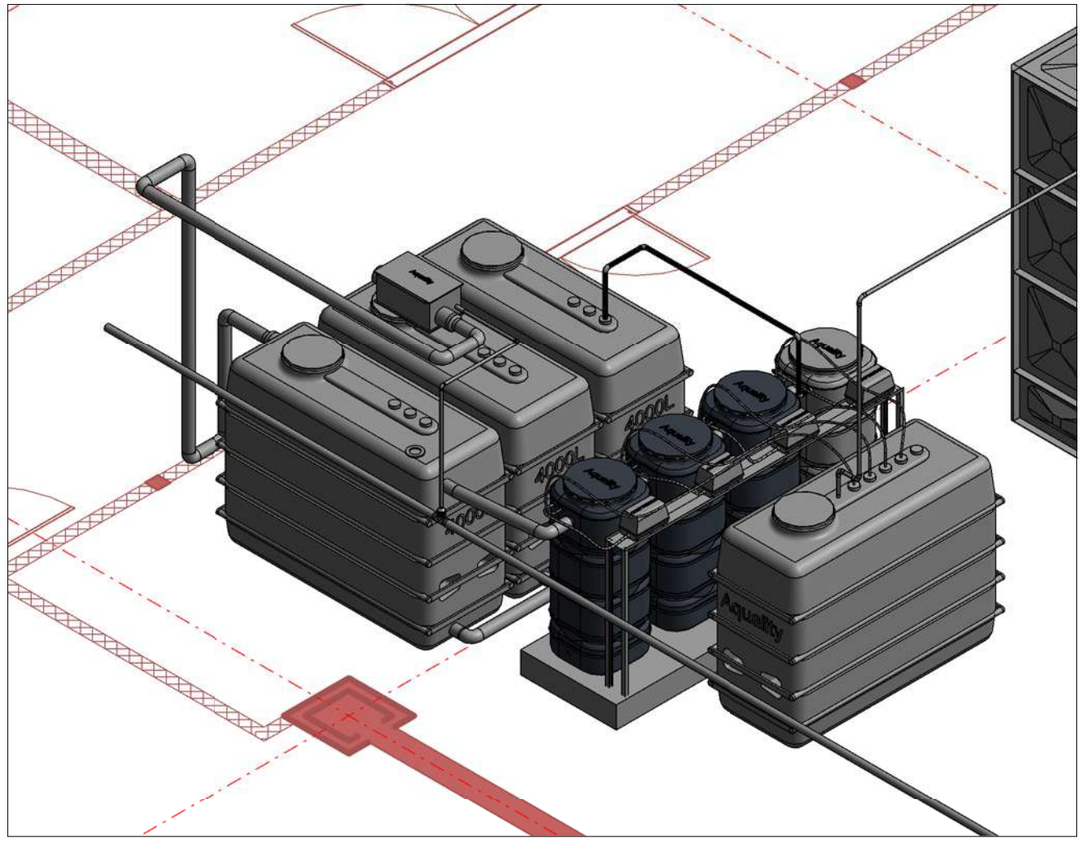
[1] Intake quality as per fbr-Information sheet H201 (2005), Table 1

[2] British Standard 8525-1 (2010), Tables 3 and 4

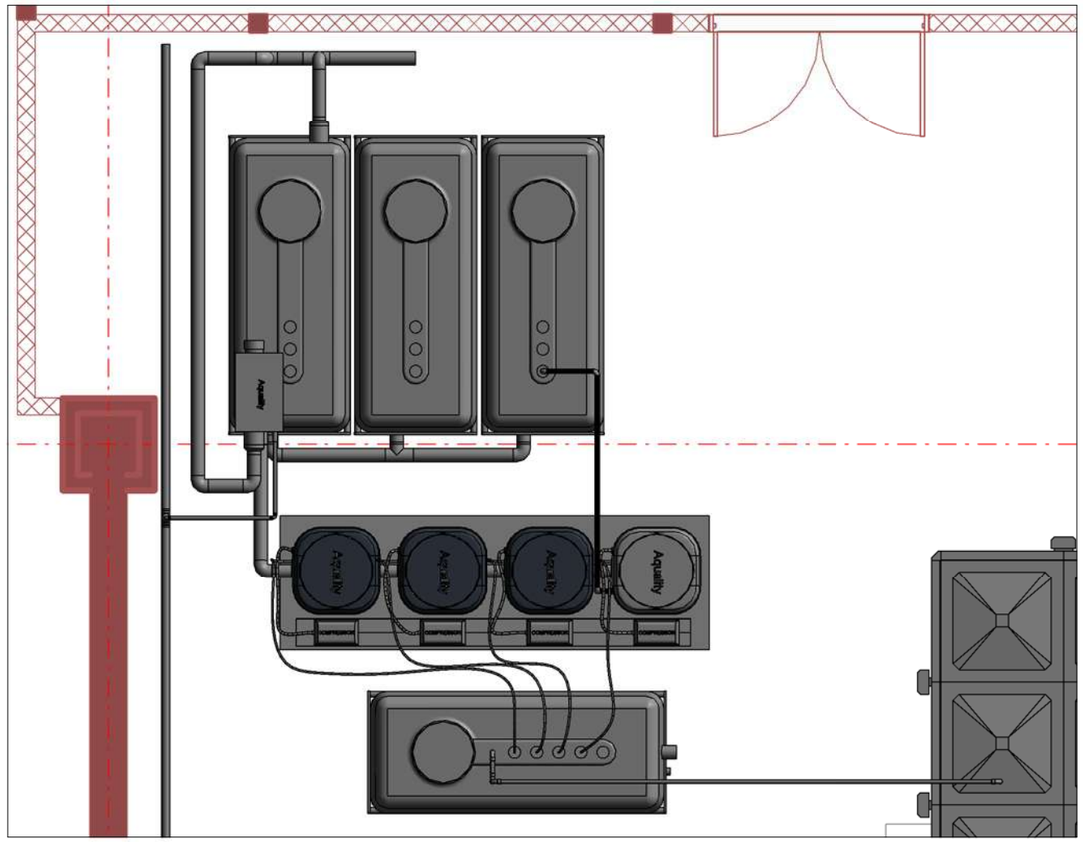


2 Greywater section View

1 : 50



3 Greywater View



1 Greywater Top View

General Note:-

These are preliminary drawings and subject to change.

Construction drawings will be prepared and approved as part of the design coordination between Aquality and T Clarke

Project: Project Triton	
Drawing Title : Greywater Detail	
System: Greywater Recycling System	
Project -No: 4185-17	Drawing - No: 4185-03-GW
Project state: Coordination	Date: 12/10/18
Scale: 1 : 50	Revision: R00
Drawn by: DP	Checked by: TBC

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intelligent water management

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www.aquality.co.uk

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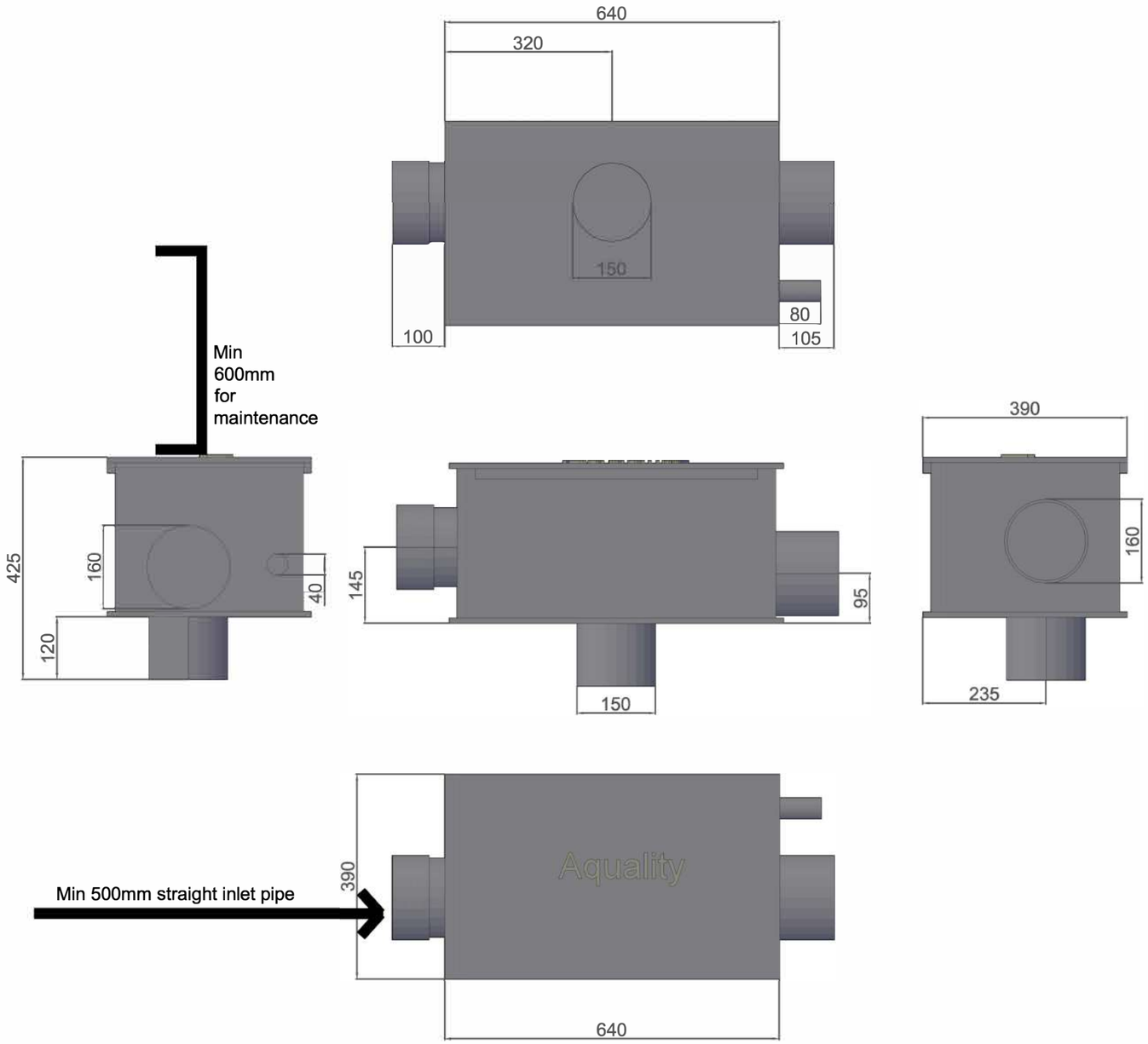


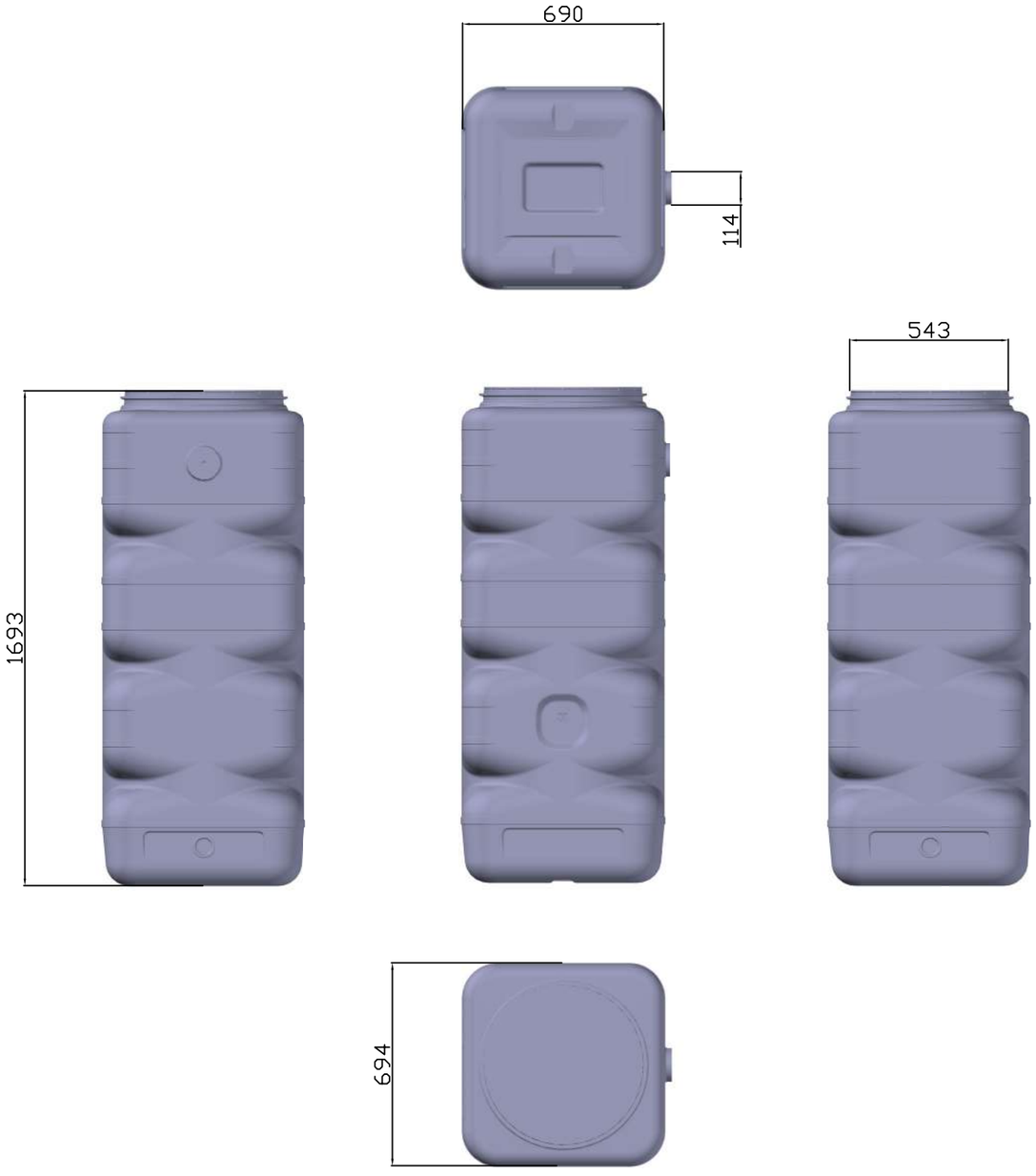
Note:

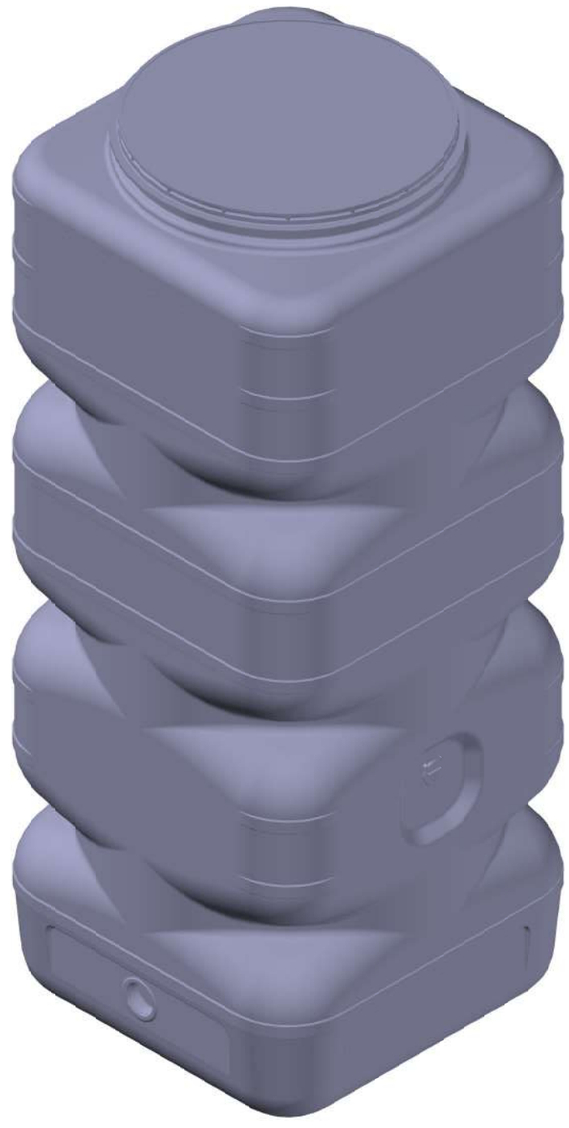
- **min. 600mm above filter for maintenance and access/inspection**
- **min. 500mm of straight pipe inlet to avoid turbulence**

System:

AQUALITY - GW COARSE FILTER MAX II

Project: N/A			Project-No: N/A
Title: Coarse Filter II	Drawn by: DP	Checked by: ...	aquality intelligent water management
Date: 07-01-2015		Project state: N/A	AQUAlity Trading & Consulting 6 Wadsworth Road London UB6 7JJ www.aqua-lity.co.uk Tel.: +44 (0)845 270 7171
Drawing-No: N/A	Revision: 0	Scale: A3 @ 1:10	





System:

MEMBRANE TANK AQF 690

Project: N/A			Project-No: N/A
Title: AQF 690	Drawn by: DP		Checked by: DN
Date: 15.12.2015		Project state: N/A	
Drawing-No: N/A	Revision: N/A	Scale: 1:20 @ A3	

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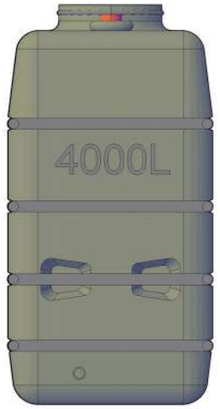

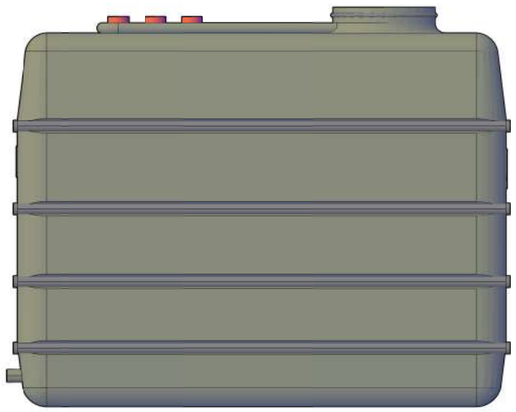

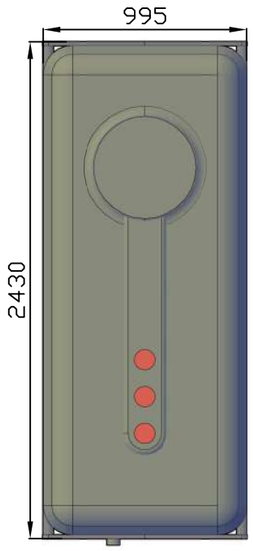

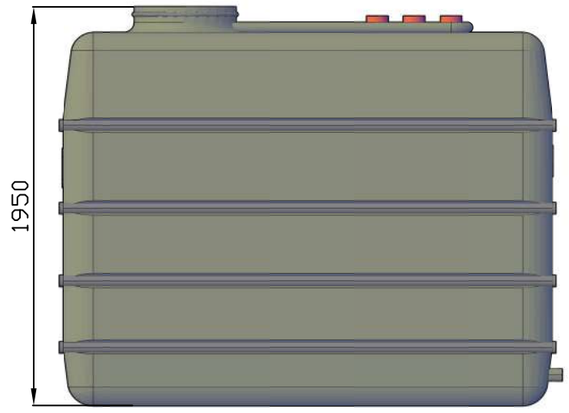

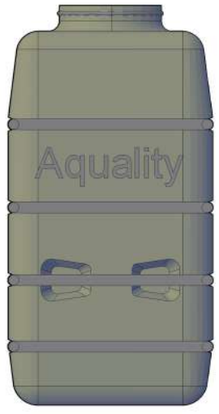

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Project: 1 Triton Square	
Title: PE 4000L Tank	
System: **Greywater Recycling System** 12,000 litre per day treatment system	
Project-No: 4185-17	Drawing-No: 4185-04a
Project state: Tender	Date: 2018-July-20
Scale: 1:30 @ A3	Revision: 0
Drawn by: D.P	Checked by: C.J

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Sub. Circulation Pump (EDS - 1.1.2.1) & Sub. Transfer Pump (EDS - 1.2.4)

DATA SHEET

2018-06-23

Receiver **From**

Society
Reference
Address
Phone
Fax
E-mail

Item n° :
103002754

Model :
NOVA 600 M-NA SV

Pump data

Free passage :	10 mm
Pressure rating :	
Min. fluid temperature :	0 °C
Max. fluid temperature :	35 °C
Max. Temperature operating :	40 °C

Requested data

Flow :	0 m³/h
Head :	0 m
Fluid :	Water
Fluid Temperature :	20 °C
Density :	0,99819 kg/dm³
Kinematic viscosity :	1,0004 mm²/s
Vapor pressure :	2,2045 kPa

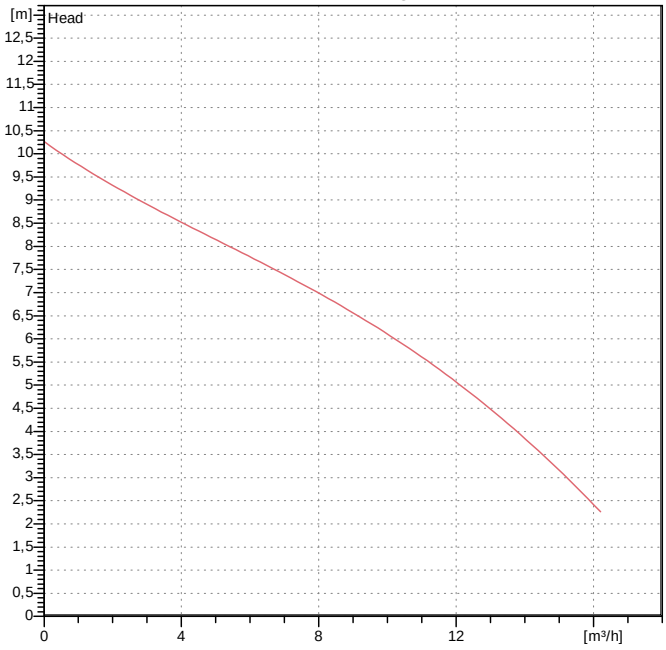
Hydraulic data (duty point)

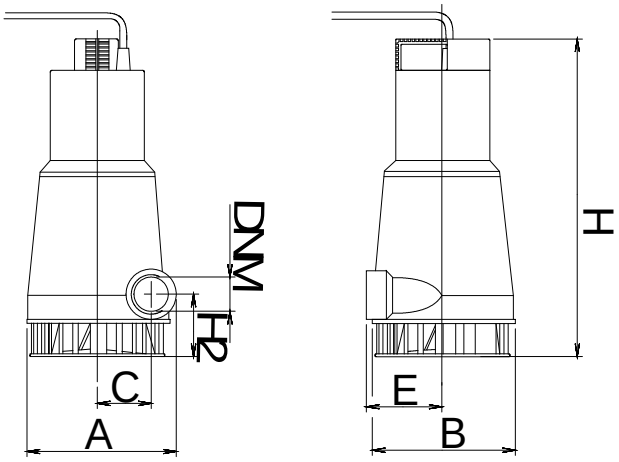
Flow :
Head :

Materials

Pump body	Technopolymer
Impeller	Technopolymer
OR ring	NBR Rubber
Motor top body	AISI 304 X5 Cr Ni 1810 UNI 6900/71
Rotor shaft	AISI 431
Seeger ring	12E - UNI 7435 STAINLESS
Wear disk	Technopolymer

Curve tolerance according to ISO 9906





Motor data

Motor brand :	DAB	
Nominal power P2:	0,55 kW	
Rated speed :	2850 1/min	
Rated voltage :	1~ 220-240 V	50 Hz
Nominal current :	3,4 A	
Degree of protection :	IP 68	

Weight : 6,7 kg

Dimensions in mm

A	162
B	165
C	56
DNM	1" 1/4 G
E	90
H	334
H2	70,5

Pump connection

Suction side		/
Discharge side	1 " 1/4 G	/ --

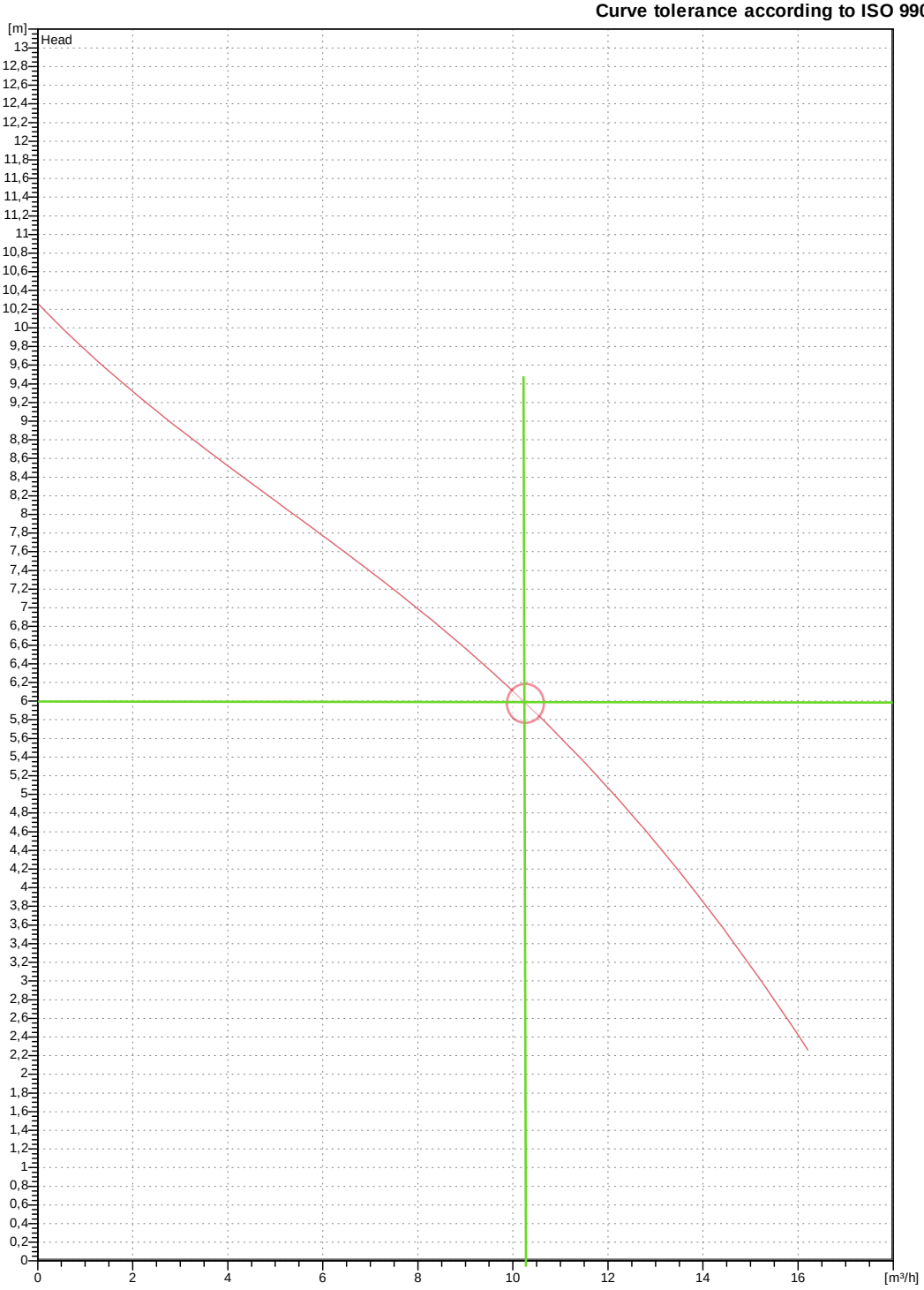
PERFORMANCE CURVES

2018-06-23

Receiver	From
Society Reference Address Phone Fax E-mail	

NOVA 600 M-NA SV

Curve tolerance according to ISO 9906



Hydraulic data (duty point)

Suction side	Discharge side	Flow :	Head :	Rated speed :
	1 " 1/4 G --	0 m³/h	0 m	2850 1/min

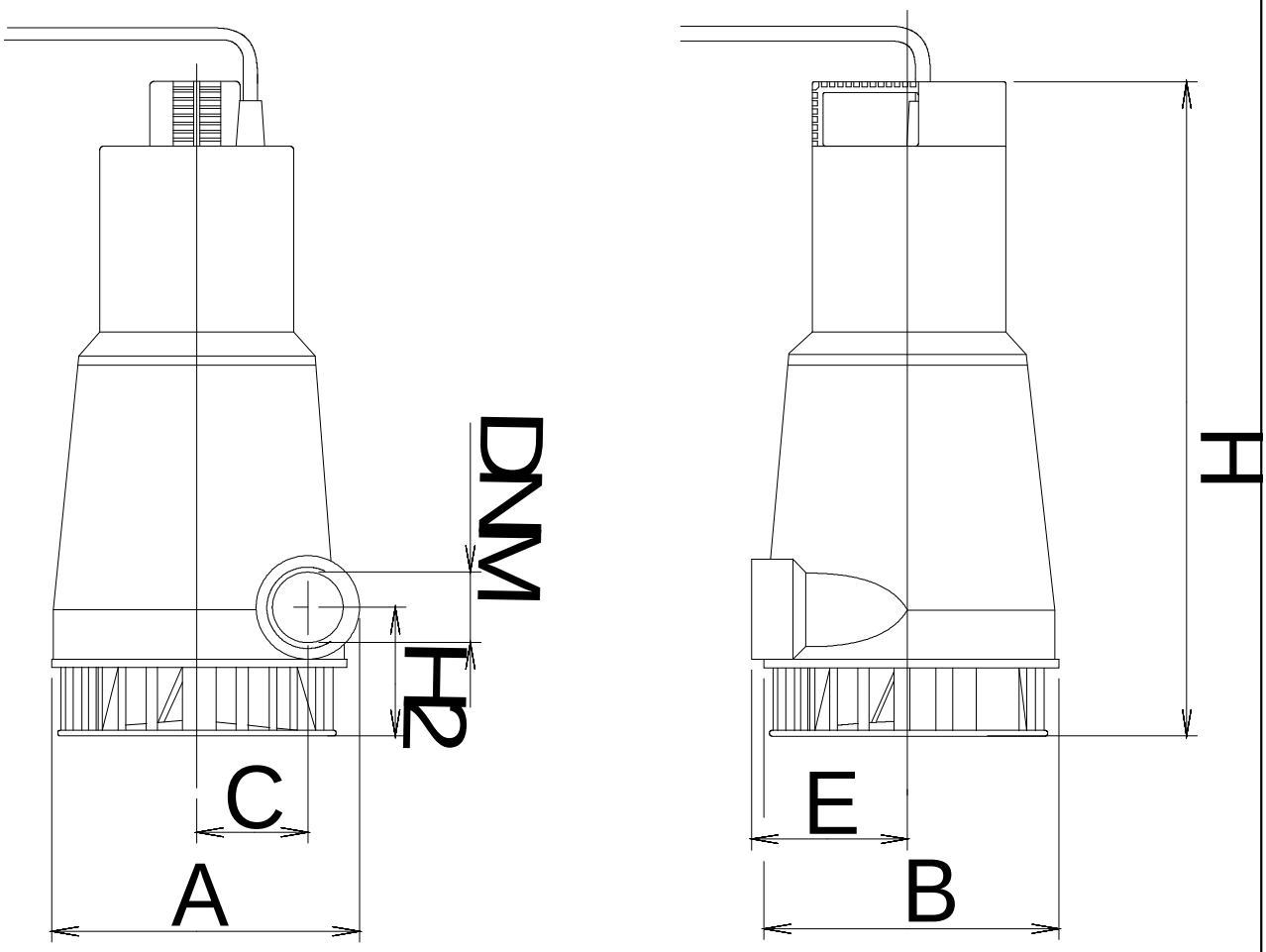
Project	Project ID	Created by	Created on
			2015-06-23

DIMENSIONAL DRAWING

2018-06-23

Receiver	From
Society Reference Address Phone Fax E-mail	

NOVA 600 M-NA SV



Dimensions in mm			Pump connection
1	A	162	
2	B	165	Suction
3	C	56	
4	DNM	1" 1/4 G	
5	E	90	
6	H	334	Discharge
7	H2	70,5	1 " 1/4 G
			--

Project	Project ID	Created by	Created on
			2018-06-23

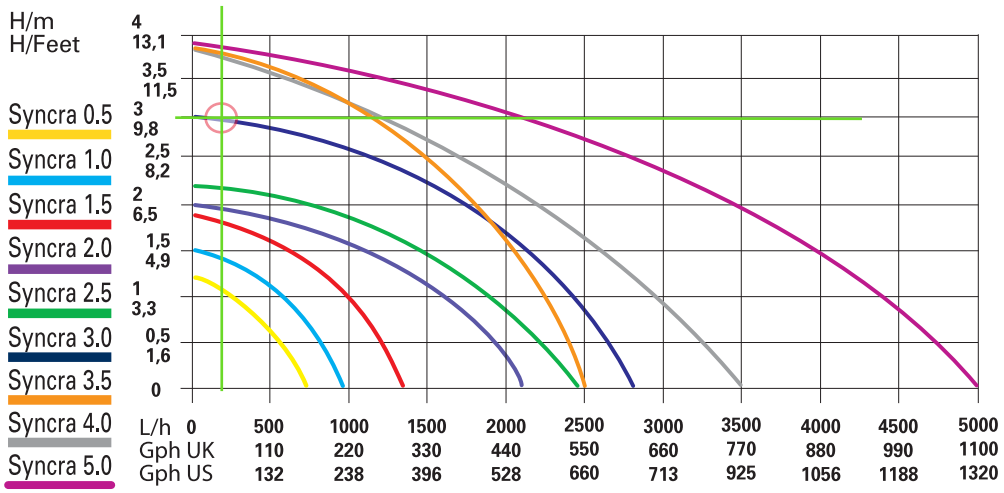
Submerged Filtrate Pump (EDS Ref - 1.2.2)

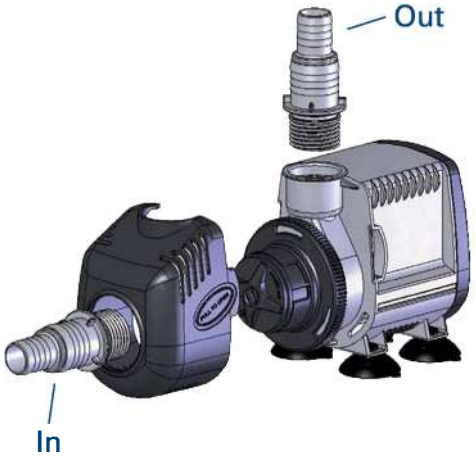
Multifunctional pump for aquarium, fountain, protein skimmer etc.

A new range of pumps which ensure a high energy saving, which are quiet, powerful, resistant and with an ergonomic design.
Syncra Silent, by an their innovative technology, guarantee an extreme versatility of uses.
They are ideal for fresh and salt water aquariums, protein skimmers, indoor and outdoor fountains, water-cooling and all submersible and in-line applications which require high performances and total silence. Thanks to SICCE's 37 years of experience, **Syncra Silent** are equipped with a synchronous motor and an advanced rotor which makes the pumps 100% silent.

Syncra 3.0	
VOLT 240 ~	VOLT 120 ~
Hz 50	Hz 60
WATT 45	WATT 48
A 0,21	A 0.43
H-m 3	Feet 9.9
max 2.700 l/h	714 US gph

◯ = Pump duty point





SYNCRA	Pumps dimensions LxWxH	In hose connector ø	Out hose connector ø
0.5	mm 90x48x72	mm 13 - 18	mm 13 - 18
1.0	mm 90x48x72	mm 13 - 18	mm 13 - 18
1.5	mm 103x60x78	mm 15 - 20	mm 15 - 20
2.0	mm 123x85x105	mm 20 - 25	mm 20 - 25
2.5	mm 123x85x105	mm 20 - 25	mm 20 - 25
3.0	mm 123x85x105	mm 20 - 25	mm 20 - 25
3.5	mm 173x99x118	mm 25 - 32	mm 20 - 25
4.0	mm 173x99x118	mm 25 - 32	mm 20 - 25
5.0	mm 173x99x118	mm 25 - 32	mm 20 - 25

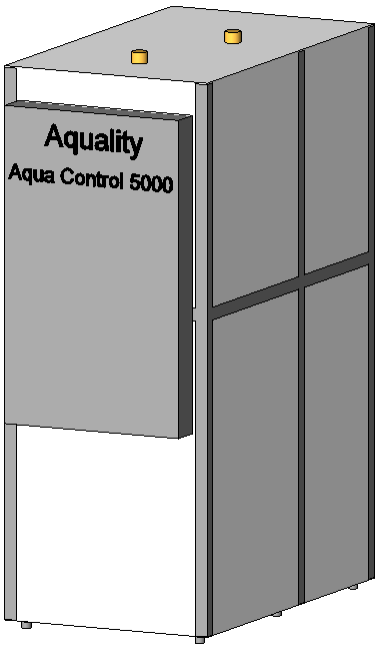
Spare Parts

SYNCRA	Rotor + Shaft + Rubbers		Hose connector + O-ring	Suckers
	230 - 240 V	120 V		
0.5	SGR0049	SGR0050	STR0012 (½ inch)	SVE0021
1.0	SGR0051	SGR0052	STR0012 (½ inch)	SVE0021
1.5	SGR0053	SGR0054	STR0013 (½ inch)	SVE0021
2.0	SGR0047	SGR0058	STR0011 (¾ inch)	SVE0020
2.5	SGR0057	-	STR0011 (¾ inch)	SVE0020
3.0	SGR0048	SGR0059	STR0011 (¾ inch)	SVE0020
3.5	SGR0069	SGR0070	STR0011 (¾ inch) - STR0015 (1 inch)	SVE0020
4.0	SGR0069	SGR0070	STR0011 (¾ inch) - STR0015 (1 inch)	SVE0020
5.0	SGR0069	SGR0070	STR0011 (¾ inch) - STR0015 (1 inch)	SVE0020

PACKAGING DIMENSIONS	L.	D.	H.
Syncra 0.5/1.0/1.5	mm 125	mm 70	mm 150
Syncra 2.0/2.5/3.0	mm 125	mm 75	mm 200
Syncra 3.5/4.0/5.0	mm 185	mm 120	mm 140

Non-Potable Booster Set (EDS - 1.3.3.1)

Item No: G13200



Typical applications:

- Central electronic control unit for **rainwater harvesting** or **greywater recycling** systems with pressurised distribution and fully automatic water management
- For use with internal, external, above or below ground storage tanks for non-potable water use (e.g. toilets, washing machine, irrigation or other). The unit has to be located dry & frost-free above ground.
- Three-phase 400V 50/60Hz supply
- Modular concept

Features:

- Integrated customized booster pump set with multi-staged, vertical centrifugal pumps as per customer requirement
- Double, triple or larger booster pump sets available
- Demand activated booster pump control (cascade principle).
- Automatic, demand activated and water efficient mains water back-up via integrated break tank and AA-type air gap (BS 8515 / BS 8525)
- Integrated **touch screen** or **4-line LCD display** for indication of operation status, system pressure, level in non-potable water storage tank, run time meter per pump, settings and detailed failure indication etc.
- Automatic and manual changeover to mains water supply.
- Integrated dry run protection, mains water back-up fault alarm, switchable **pipe burst and leakage alarm** function.
- Fully adjustable **stagnation prevention** for mains water pipe.
- Volt free contact (3A 30VDC) for alarm signal or general fault message to building management systems. Detailed status or fault messages via Modbus Profibus or other available as options.
- Pressure and water level sensor included, control and all internal components pre-wired and pre-installed in a compact Bosch Aluminium Frame housing with isolation switch.

Additional control features (add-ons)

- Basement tank package c/w safety valve (G13378)
- Automatic tank drain down package c/w drain valve (G13341)
- UV-synchronizer control for low energy use of UV treatment system and switchover to mainswater operation in case of UV system failure (G13340)
- Variable speed control on all pumps

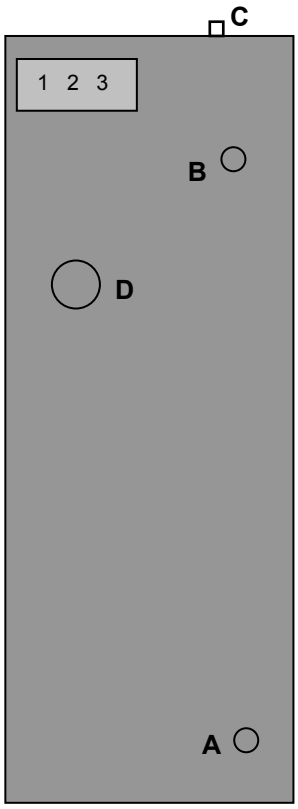
Functioning principle

The Aqua-Control is a fully equipped control unit with integrated break tank, booster pump set and electronic control. The control unit monitors the water level in the non-potable water holding tank as well as in the mains back up break tank. The integrated booster pump set pressurises the non-potable water directly to the applications. Depending on the tank location, one or more supply pumps can be installed in the storage tank to lift the non-potable water from the tank to the control unit. Several supply pumps can be fully controlled and monitored by the Aqua-Control.

In case of non-potable water shortage or on manual setting (e.g. during maintenance), the Aqua-Control feeds mains water automatically and demand-efficiently into the intermediate tank (in compliance with BS 8515 / BS 8525 / WRAS). As an automatic maintenance feature the solenoid valve of the mains water back-up system is regularly opened: if mains water has not been used for a certain time period, the unit will flush the mains water pipe and thereby avoid stagnation. Preset standard settings can be adjusted to meet project specific needs.

Rear view example

All the positions of the hydraulic connections are indicative and can be adapted to the requirements on site.

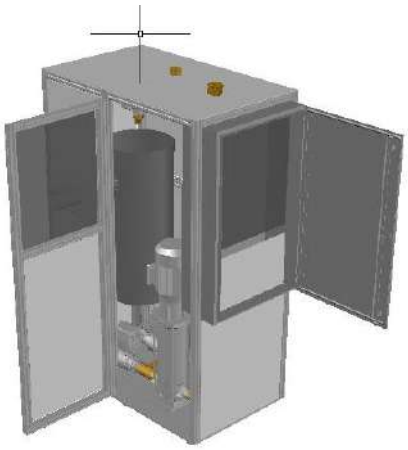


Connected services:

1	Supply pump or Basement tank package
2	External communication volt-free contact as standard, RS 232, Ethernet via OPC server to Modbus, ProfiBUS, BacNet etc. optional on request
3	Volt free contact to BMS (3A @ 30VDC)
A	Supply pump or suction pipe connection - 2 ½"
B	Pressure pipe outlet - 2 ½"
C	Mains water top-up incoming connection (from top) - 2 ½"
D	Break tank emergency overflow - DN100

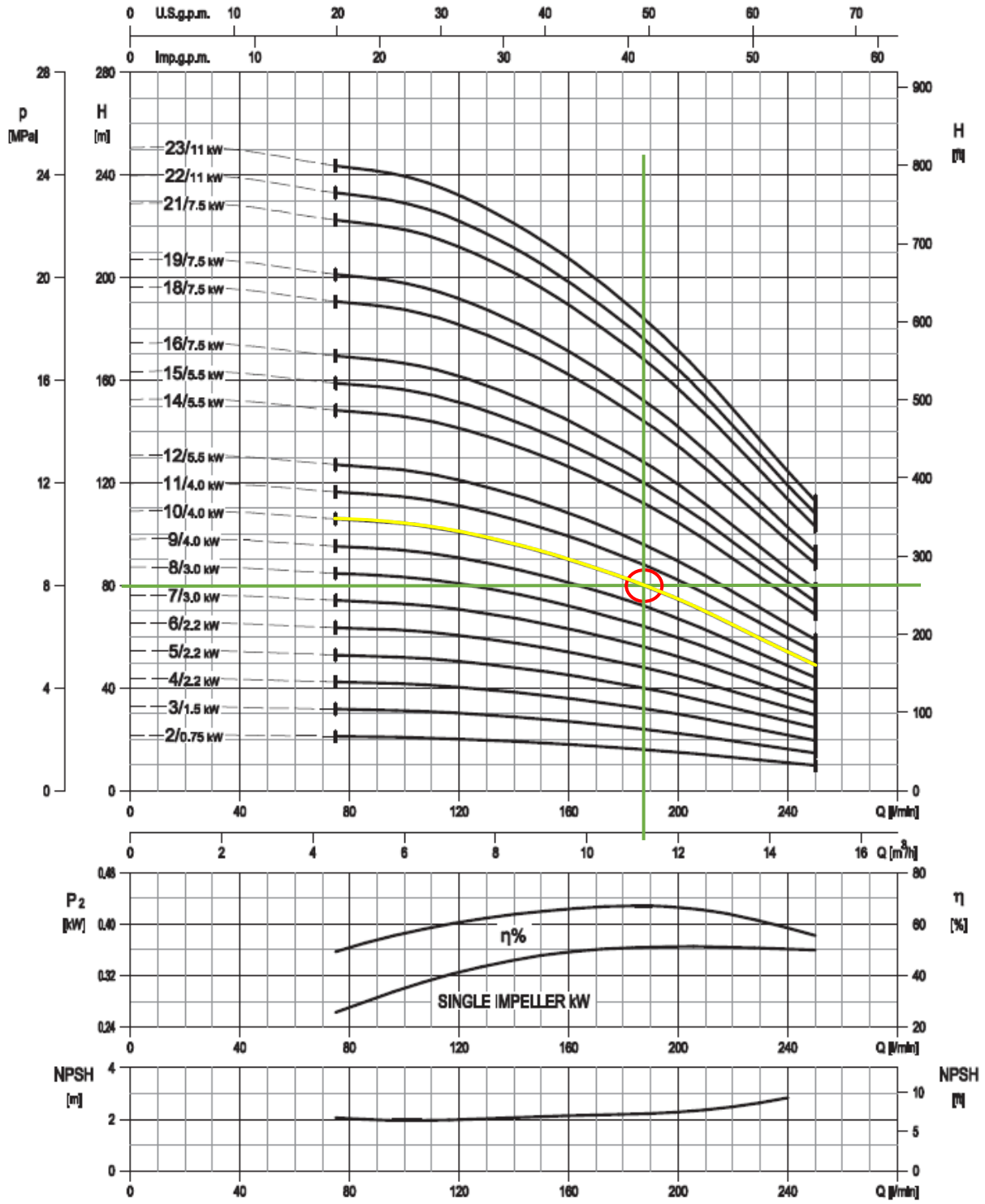
Electrical connections on pump configuration:

- 400 V / 3ph / 50Hz, 36A,



Aquality Trading and Consulting Ltd reserves the right to make technical changes.

Pump Performance Curve:



Note: Duty-Assist configuration - each pump delivers half the flow rate (21.6/ 2 = 10.8m^3/h), at full pressure (8 bar).

DNV·GL

MANAGEMENT SYSTEM CERTIFICATE

Certificato no./Certificate No.:
164980-2014-AE-ITA-ACCREDIA

Data prima emissione/Initial date:
14 ottobre 2014

Validità:/Valid:
14 ottobre 2017 - 14 ottobre 2020

Si certifica che il sistema di gestione di/This is to certify that the management system of

EBARA PUMPS EUROPE S.p.A.

Sede Legale: Via Pacinotti,32 - 36040 Brendola (VI) - Italy

È conforme ai requisiti della norma per il Sistema di Gestione Ambientale/
Has been found to conform to the Environmental Management System standard:

UNI EN ISO 14001:2015 (ISO 14001:2015)

Valutato secondo le prescrizioni del Regolamento Tecnico RT-09/
Evaluated according to the requirements of Technical Regulations RT-09

Questa certificazione è valida
per il seguente campo applicativo:

Progettazione e produzione di pompe e sistemi di pompaggio attraverso le fasi di stampaggio plastica, taglio lamiera e coils, stampaggio lamiera, saldatura, tornitura e fresatura, lavaggio, passivazione, lucidatura, verniciatura, assemblaggio e collaudo

(Settore EA: 18 - 17 - 14)

This certificate is valid
for the following scope:

Design, and manufacturing of pumps and pumping systems by means of plastic moulding, metal cutting and shearing, metal stamping, welding, machining and milling, cleaning, passivation, polishing, painting, assembly and testing

(EA Sector: 18 - 17 - 14)

Luogo e Data/Place and date:
Vimercate (MB), 12 ottobre 2017

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

SGQ N° 003 A
SGA N° 003 D
SGE N° 007 M
SCR N° 004 F
EMAS N° 009 P
PRD N° 003 B
PRS N° 094 C
SSI N° 002 G

Membro di MLA EA per gli schemi di accreditamento SGQ, SGA, PRD, PRS, ISP, GHG, LAB e LAT, di MLA IAF per gli schemi di accreditamento SGQ, SGA, SSI, FSM e PRD e di MRA ILAC per gli schemi di accreditamento LAB, MED, LAT e ISP

Per l'Organismo di Certificazione/
For the Certification Body

Nicola Privato
Management Representative

Certificato no.:/Certificate No.: 164980-2014-AE-ITA-ACCREDIA
Luogo e Data:/Place and date: Vimercate (MB), 12 ottobre 2017

Appendix to Certificate

Site Name	Site Address	Site Scope Local	Site Scope
EBARA PUMPS EUROPE S.p.A. Sede Legale e Operativa	Via Pacinotti, 32 36040 Brendola (VI) Italy	Progettazione e produzione di pompe e sistemi di pompaggio attraverso le fasi di lavaggio e passivazione, saldatura, tornitura e fresatura, verniciatura, assemblaggio, collaudo	Design and production of pumps and pumping systems by means of cleaning and passivation, welding, machining and milling, painting, assembly and testing
EBARA PUMPS EUROPE S.p.A. Sede Operativa	Via Campo Sportivo, 30 38023 Cles (TN) Italy	Produzione di pompe e sistemi di pompaggio attraverso le fasi di stampaggio plastica, taglio lamiera e coils , stampaggio lamiera, lavaggio, saldatura, tornitura e fresatura , sabbiatura, lucidatura, assemblaggio, collaudo	Production of pumps and pumping systems by means of plastics moulding, metal cutting and shearing, metal stamping, cleaning, welding, machining and milling, polishing, assembly, testing

La validità del presente Certificato è subordinata al rispetto delle condizioni contenute nel Contratto di Certificazione/
Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.
DNV GL Business Assurance Italia S.r.l., Via Energy Park, 14 - 20871 Vimercate (MB) - Italy. TEL:039 68 99 905. www.dnvgl.it/assurance

Floating extraction TWIST/ SAFF

Item No. G 12415/ G 12416/ G 12417/ G 12418/ G 13354/ G 10006 (bespoke)

Product advantages

- Simple and secure connection
- Extraction of cleanest water
- Maintenance free

Operation

The floating extractions TWIST and SAFF can be used in domestic and commercial rainwater harvesting systems. They always take the cleanest rainwater from 15 cm below the surface. At low rainwater level the sieve does not touch the floor of the holding tank because of the hose length. Therefore the pump is protected from the floating layer as well as the sediment.

Equipment

Floating extraction TWIST

With 1.5 - 3 m hose
Package for flexible extraction of rainwater from the storage tank, pre-assembled including:

- 1 x float ball
- 1 x coarse filter
- 1 x 2 ½" non-return valve
- 1 x special 2 ½" rubber spiral hose (prevents germs forming) 2 m
- 1 x brass 2 ½" threaded coupling as passage tank including seal and hose clamps

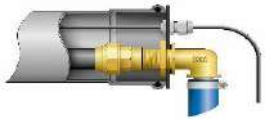
Floating extraction SAFF

With 2 m/ 3 m hose
Connection and characteristics identical to TWIST but instead of sieves, extra fine filter SAFF, mesh made in stainless steel with PE-floating ball

Materials

- Holding tank passage made in brass
- Spiral hose made in anti-germ Thermoplastic
- Check-valve made in stainless steel
- Filter and hose clamps made in stainless steel
- Float made in polyethylene

Installation scheme

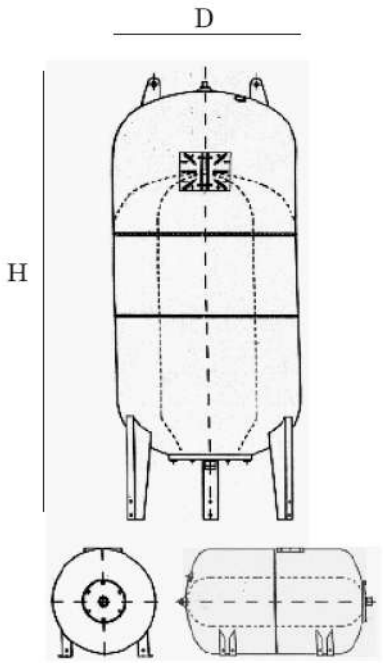


The specially designed holding tank passage offers a water-tight connection through the side of the tank using a special seal.

Aquality Trading and Consulting Ltd. reserves the right to make technical changes.

Pressure Vessel

Items No G15020–G15028; G15201–G15203



A pressure vessel should be used in any larger rainwater harvesting or greywater recycling system to decrease the operating cycles of the pump and thereby extending the life span of the pumps of the system.

To enable a pressure system to operate, the vessel must be set up correctly. The pre-set air pressure must be less than the lowest switch-on pressure. For normal domestic type installations, the pre-set pressure should be approximately 3psi less than the switch-on pressure. When working with systems at higher pressures or with larger horizontal pressure vessels, this difference may need to be as much as 15psi. The pre-set pressure always has to be measured with the vessel drained.

Technical information

Non-flowing diaphragm pressure expansion vessels for non-potable water applications.
Approval in accordance with the EU Pressure Equipment Directive 97/23/EC.

Item No	Max. pressure rating	Capacity	Dimensions		Connector	Colour	Empty Weight
			Diameter	Height			
	bar	litres	mm	mm	inches / DN		kg
G15020	8	60	380	850	1''	red	17
G15021	10	100	406	880	1''	grey	15
G15022	10	200	534	1,050	1¼"	grey	34
G15023	10	300	630	1,400	1½''	red	59
G15024	10	500	780	1,550	1½''	red	114
G15025	16	100	450	965	1''	red	25
G15026	16	200	634	967	1¼"	grey	46
G15027	16	300	634	1,267	1¼"	grey	77
G15028	16	500	780	1,550	1½''	red	114
G15201	25	120	450	1,235	DN 50	blue	130
G15202	25	180	450	1,515	DN 50	blue	167
G15203	25	300	750	1,318	DN 50	blue	150

Aquality Trading and Consulting Ltd reserves the right to make technical changes.

Water Meter (incl. pulse sensor)

Item No G15061, G15062, G15063, G15064, G15065, G15066

Typical applications:

- As an accessory for the remote monitoring system. To collect and store consumption data from the reclaimed and mains water top-up meters (via pulse output) to monitor plant performance.

Features

- Two no. 2-wire pulse sensors
- Two no. 30mm union kits

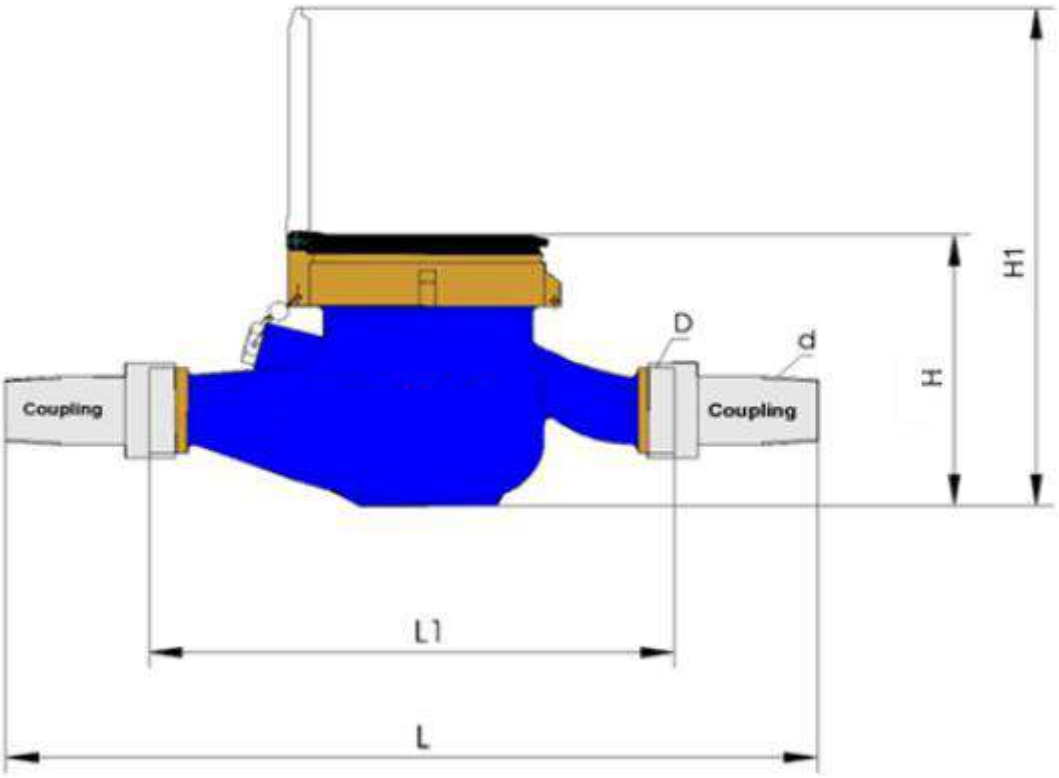
Function

One water meter is installed in the non-potable water distribution pipe to measure the non-potable water consumption. The other water meter is installed in the mains water supply pipe to measure the mains water top-up consumption. Rainwater or greywater usage is calculated as the difference between the two-meter readings.

Technical data

Size Imperial (Metric)	Q Minimal m3/hr	Q Nominal m3/hr	Q Maximum m3/hr	Min reading	Max reading	Liters per pulse
1" (25mm)	0.07	3.5	7	0.0001	999999	1
1 ¼" (32mm)	0.1	6	12	0.0001	999999	10
1 ½" (40mm)	0.2	10	20	0.0001	999999	10
2" (50mm)	0.45	15	30	0.0001	999999	100
2 ½" (65mm)	0.75	25	50	0.0001	999999	100
3" (80mm)	1.2	40	80	0.0001	999999	100
4" (100mm)	1.8	60	120	0.0001	999999	100

Dimensions



Size Imperial (Metric)	Meter and coupling length (L)	Length (L1)	Connection 'D'	Width	Height (H1/H)	Weight (KG)
1" (25mm)	355	260	G 1	103	130/200	2.62
1 ¼" (32mm)	380	260	G 1 ¼	104	118/198	2.8
1 ½" (40mm)	431	300	G 1 ½	124	163/260	5.1
2" (50mm)	450	300	G2	125	163/260	8.2
2 ½" (65mm)	-	200	Flange	195	242	13
3" (76mm)	-	225	Flange	200	275.8	16
4" (100mm)	-	250	Flange	220	285.8	18

Spare parts:

- Water meter (G15033)
- 2 wire pulse sensor (G15034)
- Union kit 30mm (G15035)

Aquality Trading and Consulting Ltd reserves the right to make technical changes.

UV Disinfection Systems

Item No G19201, G19202, G19203, G19204, G19205, G19206, G19207, G19208, G19209, G19210, G19211, G19212, G19213, G19214, G19215, G19216

Typical applications:

For use in water reclamation systems, e.g. rainwater harvesting systems or greywater recycling systems, where a higher water quality is required.

Features:

- Water resistant power control
- Long life/high reliability UV lamp
- Simple to install
- Lamp on indicator
- Simple to service
- Electropolished chamber
- Commonplace UV lamps
- 2-stage pre-filtration (25 / 5 micron)

UV systems 7 to 12 only (G19207-G19212):

- UV lamp running indicator
- UV lamp status – three-way indicator display showing the status of the system
- Switch to reset the internal hour counter
- Volt free contact output for remote display of lamp on indicator

UV systems 13 to 16 only (G19213-G19216):

- An hours run meter, indicating lamps run time
- Lamp on indicator

Optional features:

UV systems 1 to 6 only (G19201-G19206):

- Lamp/electrical failure indicator
- UV lamp status indicator
- Volt free contacts

UV systems 13 to 16 only (G19213-G19216):

- UV MONITOR

An optional UV monitor provides accurate measurement of instantaneous UV intensity. Should intensity fall below a pre-determined level the monitor will activate a local or remote warning device (see separate data sheet).

Functioning principle:

Ultraviolet (UV) disinfection systems use a UV light source, which is enclosed in a transparent protective sleeve. They are mounted so that water can pass through a flow chamber, and UV rays are admitted and absorbed into the stream. When ultraviolet energy is absorbed by the reproductive mechanisms of bacteria and viruses, the genetic material (DNA/RNA) is rearranged and they can no longer reproduce. They are therefore considered dead and the risk of disease has been eliminated. UV disinfection is a non-residual disinfection method and should be applied as close as possible to the point of use.

Technical data:

Product Code	UV System	Flow Rate [m³/h]*	Nominal Power [W]	Pressure Rating Steady [bar]	Fuse [A]	Prefilters [µ]	
						First	Second
G19215	#15	22	290	16	6	90	5

* Flow rates based on 30 mJ/cm² at 98 % transmission

Power supply: 230 V ± 10 % / single phase / 50-60 Hz

Scope of supply:

Product Code	UV System	Flow Rate [m³/h]*	Filter Housing	Filter Cartridges		Volts Free Contacts	Run time meter
				90 µ	5 µ		
G192мр	#мр	н2	RF 5bcp	C{{пто	{ . пл (р no.)	x	x

o: optional; x: included

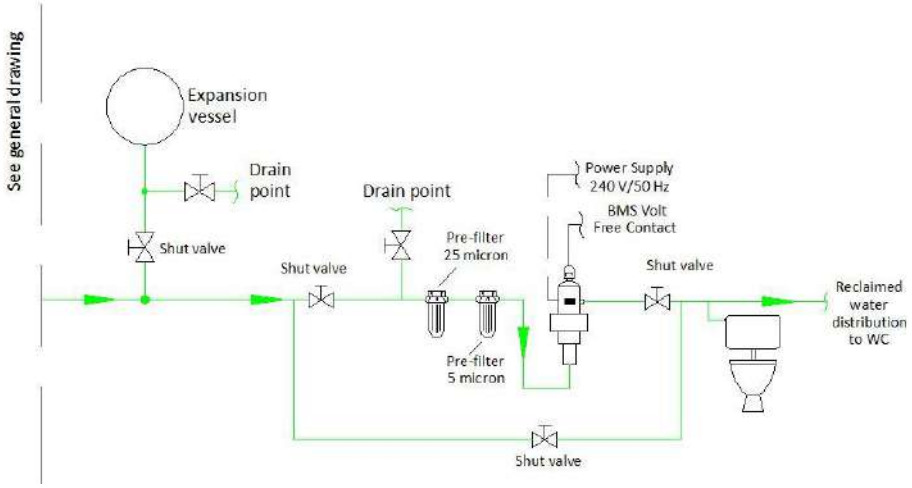
Dimensions:

Product Code	UV System	Flow Rate [m³/h] *	Dimensions L x W(Ø) x H [mm]		Weight [kg]
			UV system	Prefilter (each)	
G19215	#15	22	950 x 184 x 365	300 x 1334	40

Materials

Product Code	UV system	Chamber material
G19201-G19212	#1-12	304 stainless steel
G19213-G19214	#13-14	316 stainless steel
G19215-G19216	#15-16	304 stainless steel

Schematic diagram:



Aquality Trading and Consulting Ltd. reserves the right to make technical changes.

Certificate of Approval

This is to certify that the Management System of:

BWT AQUA AG

Hauptstr. 192, 4147 Aesch/BL, Switzerland

has been approved by LRQA to the following standards:

ISO 9001:2015 | ISO 14001:2015 | OHSAS 18001:2007

P.G. Cornelissen - Area Manager North Europe

Issued by: Lloyd's Register EMEA Niederlassung Wien

For and on behalf of: Lloyd's Register Quality Assurance Limited

This certificate forms part of the approval identified by approval number: 0019197/0019198/0019199

Current issue date: 9 July 2018
Expiry date: 2 July 2021
Certificate identity number: 10105370

Original approval(s):
ISO 9001 – 26 May 2003
ISO 14001 – 16 July 2013
OHSAS 18001 – 5 July 2016

Approval number(s): ISO 9001 – 0019198-009 / ISO 14001 – 0019199-009 / OHSAS 18007 – 0019197-009

The scope of this approval is applicable to:
Development, manufacturing, sales and service of water treatment systems and products for commercial and private use.

UKAS MANAGEMENT SYSTEMS
001

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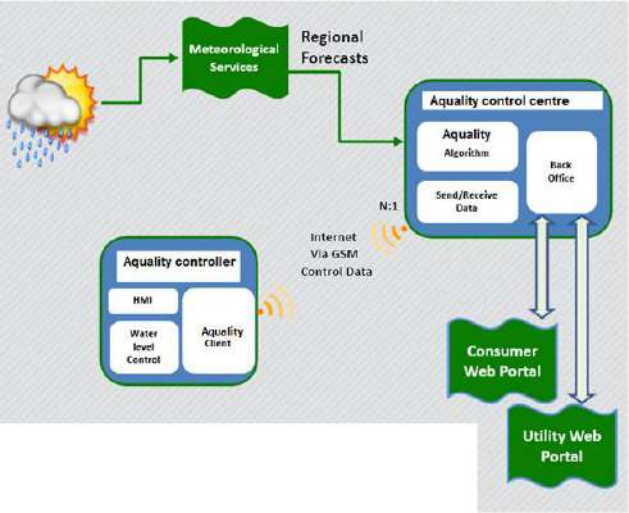
Issued by: Lloyd's Register EMEA Niederlassung Wien, Opernring 1/R/741-744, 1010 Wien, Austria for and on behalf of: Lloyd's Register Quality Assurance Limited, 1 Trinity Park, Bickenhill Lane, Birmingham B37 7ES, United Kingdom

Aquality Storm Control (ASC) Lite

(Item No. G20400)



Typical Applications:

- Rainwater/ surface water harvesting
- Combined sewer overflow reduction
- Optimised weather dependent irrigation

Key Features:

- Automated control – the system will automatically control the water level in the tank through the operation of an actuating valve (binary open/ close state).
- Proportional tank draw down at 20 levels in 5% increments
- Manual control – remote, online manual control for overriding automation from a web-dashboard.
- Housing type – the controller is IP66 moisture ingress protected and has on-board temperature sensors to enable charging boosts in sub-zero conditions.
- In case of piped overflows, pump can be operated by ASC
- Fail-safe system:
    - The site controller has been carefully designed to complete a “system handshake”;
    - Issues SMS warning messages to ASC and site operators;
    - System is capable of outputting to BMS system for general fault alarms;
    - The control panel has a built-in battery backup to allow the system to continue working in the event of power failure;
    - Within all the failure scenarios, the system defaults back to a storm attenuation system (actuator valve open);

Benefits:

- Significantly reduces payback time on rainwater harvesting systems
- Reduces storm loading in combined sewer systems
- Reduced discharge rate from sites in majority of storm events
- Reduces water demand on public water supply
- Provides real-time alerts on attenuation outlet blockages

Functioning Principles:

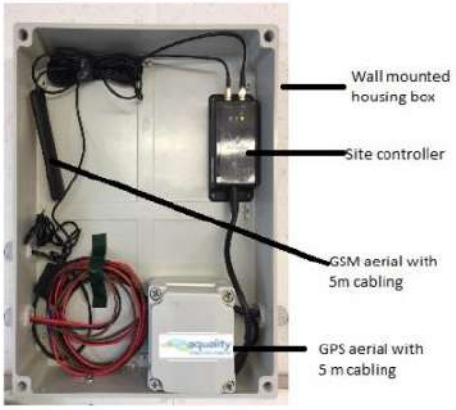
The Aquality Storm Control Lite system allows any rainwater harvesting tank volume to count towards the sites storm attenuation volume requirement. Alternatively, the system can be installed within a storm attenuation system to allow any attenuation tank to act as a rainwater harvesting system.

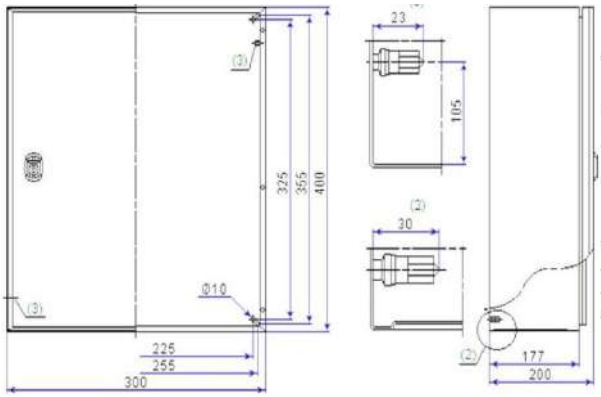
The system works by linking the tanks to a rainfall forecast algorithm. This allows the tanks to be drained down at the allowable discharge rate (Greenfield runoff or otherwise agreed with the lead local flood authority) prior to significant rainfall events (above a 1:5 year event typically).

The control centre receives site specific rainfall predictions from various sources including the British Met office. The controller runs this data through an algorithm estimating the likely runoff volume for the upcoming rain events. The site controller then automatically takes action to ensure civil infrastructure is adequately prepared to deal with the predicted runoff.

Technical Details and Drawings

Control Panel:

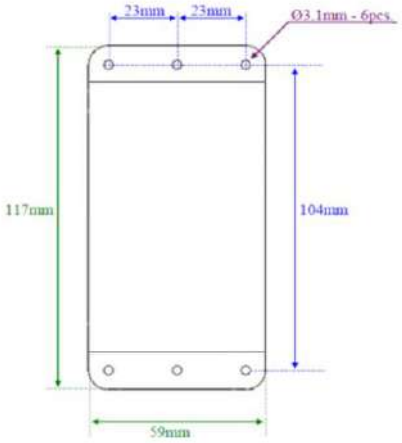




Colour		Grey (RAL 7035)
Housing Type		Mild Steel
		(Guaranteed IP 66 moisture resistant)
Weight		600 grams (approx.)
Dimensions (mm)	Width	300
	Depth	400
	Height	200

The unit should ideally be located in an above ground kiosk or plant room. The unit should NOT be directly exposed to the elements or extremes in temperatures. The unit will need to be located so access can be gained for electrical input from the water level sensor power supply and GSM aerial. Electrical output will be required to the valve/pump controller. 12m of cabling is supplied as standard from the control unit to water level sensor and 5m of cabling is supplied as standard from the control unit to GSM aerial. Longer cable lengths can be provided on request.

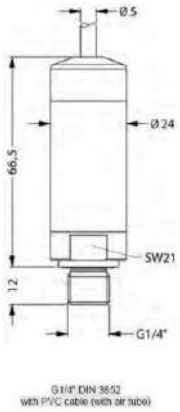
Site Controller:



Colour		Black
Housing Type		ULP9 Plastic with sealing membrane
		(Guaranteed IP 66 moisture resistant)
Weight		250 grams (approx.)
Power Supply		8 to 36 VDC
Failsafe system		The controller has a built in rechargeable battery backup pack which allows the system to continue working in the event of a power failure. This means the system can continue to operate for over 2 weeks without power. Once power is restored the system will automatically recharge the battery pack.
Dimensions (mm)	Width	59
	Depth	30
	Height	92

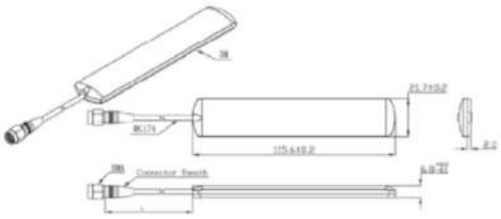
*all dimensions are shown without mounting flanges

Level Sensor:



Housing Type		Stainless steel 1.4301 (304)
Suitable for following media		Water
		Fuel oil
Weight		approx. 120 grams (without cable)
Dimensions for cable (m)	Length	3/6/9/12 other on request
	Weight	25 g/m
Current consumption		2-wire: max 25 mA
		3-wire ratiometric : typ. 15 mA
		3-wire voltage: typ. 5 mA(short circuit current: max. 20mA)

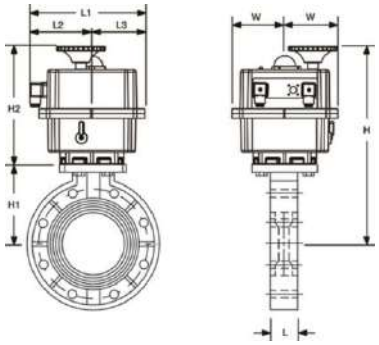
GSM Aerial:



On the majority of sites, a small (22mm X 116mm) GSM aerial stuck to a plant room wall or internal kiosk wall is sufficient to operate the unit. If this is not the case a larger aerial or booster may be required. Aquality's engineers will determine the suitable aerial position on a site by site basis.

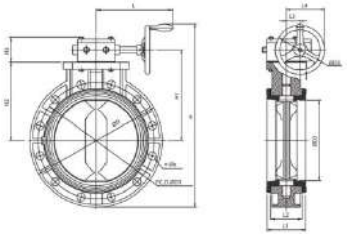
Motorised Actuator Valve (Type B) - Attenuation Discharge Control Valve:

- The Aquality Type B Valve is available in sizes ranging from 100mm-600mm diameter;
- The valve opens and closes, to control water levels within the tank, based on signals received from the Aquality site controller;
- The valve can be provided to suit either AC or DC power supplies for either 12V-24V or 85V-240V. The valve unit also contains a rechargeable battery pack which allows the system to continue operation if mains power is lost.
- The Aquality valve housing is both weatherproof (IP67) and anti-corrosive. The valve actuator contains an internal thermostatic anti-condensation heater that prevents moisture forming within the actuator housing. The valve is usually supplied with standard flanged connections.



	100mm	150mm	200mm	250mm	300mm	350mm	400mm	450mm	500mm	600mm
Hole Size (mm)	19	22	22	25	25	29	29	32	32	35
H1 (mm)	138	179	211	283.5	340					
H (mm)	334	433	465	538.5	596					
H2 (mm)	196	254	254	255	256					
L (mm)	57	70	85	109	131.5					
L1 (mm)	177	235	235	235	235					
L2 (mm)	126	107	107	107	107					
L3 (mm)	51	128	128	128	128					
W (mm)	55	214	214	214	214					
Size	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
End Connection	Flanged Wafer	Flanged Wafer	Flanged Wafer	Flanged Wafer	Flanged Wafer	Flanged Wafer	Flanged Wafer	Flanged Wafer	anged Wa	Flanged Wafer
Seals	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM
Liner/Seals	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM	EPDM
Material Body / Disc	PVC/PP	PVC/PP	PVC/PP	PVC/PP	PVC/PP	PVC/PP	PVC/PP	PVC/PP	PVC/PP	PVC/PP
Actuation Type	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric	Electric
Torque: Operating (N/mm)	70.1	105.1	175.1	315.2	367.8	741.1	855.1	969.2	1,083.20	1,254.10

All dimensions in mm



Nom Imp	Size	D	D1	D2	D3	H	H1	H2	H3	L	L1	L2	L3	L4	# Holes	Hole Size
4"	102	229	191	103	200	324	173	138	71	120	57	47	39	139	8	19
6"	152	288	241	153	200	394	214	179	71	120	70	65	39	139	8	22
8"	152	343	298	203	202	524	255	210	77	284	85	73	60	161	8	22
10"	254	411	362	255	202	588	283	240	77	284	109	96	60	161	8	22
12"	305	490	432	310	250	702	340	298	78	330	132	116	60	185	12	25
14"	356	530	476	355	252	733	342	300	78	330	127	116	60	185	12	29
16"	406	596	540	398	300	870	420	345	120	353	166	152	81	231	16	29
18"	457	630	578	452	300	885	445	370	120	353	179	163	81	231	16	32
20"	457	696	635	500	406	1037	486	410	143	390	189	172	120	323	20	32
24"	610	813	750	602	406	1166	556	480	143	390	209	194	120	323	20	35

All dimensions in mm

The Aquality valve should be located on a pipe discharging from the invert of the active attenuation tank. Care should be taken to ensure the Aquality valve is located so as not to intrude on the operation of the discharge control valve (Vortex Flow control) which is used to restrict the flow off the site to the allowable discharge rate. The valve should be located within a suitably designed inspection chamber or manhole to allow for ease of access to the valve for future maintenance purposes.

Specification clause:

The real time flow control system using continuous monitoring and adaptive control shall be Aqua Storm Control Lite by Aquality Ltd, Wadsworth Rd, Perivale, London UB6 7JJ. The system shall comprise of Control panel with GSM aerial, actuated valve type B 150mm diameter, level sensor, GSM Aerial, site controller, and connected to geocellular data capable of reading and predicting weather data to manage flow rates out of the drainage structure.

NBS Specification:

The Aqua Storm Control real time flow control should be specified in NBS section R12:315 Below ground drainage systems. Assistance in completing this clause can be found in the Aquality Trading and Consulting Ltd entry in NBS Plus or a model specification can be downloaded from www.aqua-lity.co.uk. For further assistance, please contact the Aquality Engineering Team.

Note: Valve schedule (number and type) to be provided with as-built drawings and will be developed as part of the design coordination between Aquality and T Clarke.

Aquality will provide a 3G/4G GSM SIM card to allow the ASC device to connect with the cloud based platform.

Remote Monitoring Package (EDS - 1.4)

Item No: G13200

Typical applications:

- Central monitoring system for **rainwater harvesting, greywater recycling or Combined systems.**
- Provides cloud based platform for system information
- Single phase 230v 50hz supply, 3 Amps
- Modular concept
- Based on 3G/ 4G connectivity

Features (Hardware):

- Internal MCB
- 24V DC Power supply
- Internal back up batteries in the event of power loss
- PLC controller
- Backplate mounted on DIN rail and fitted into a GRP IP56 housing.
- Common Fault to BMS (VFC)
- Power/Fault/Warning indication light.

Features (Software):

- Provides a cloud based platform that is implemented for monitoring the Aquality system. The platform can provide user specific task boards to display near real-time conditions for both on-site operating parameters as well as web based third party information.
- The platform shall employ cloud computing for data persistence and can implement multi-factor user authentication for secure login
- Aquality can remotely monitor the systems performance and provide a reactive maintenance service to ensure system functoriality

Standard Versions

- Water metering data
- Equipment faults
- 3G/ 4G connection

Functioning Principle

The Aquality remote monitoring package is a custom package which is designed to work with the Aquality recycling and harvesting systems. It is a GRP enclosure which is wall mountable and only requires a 3G connection. In some cases where the plant room signal is poor a marshalling box can be provided.

The standard system setup works by using water meter data (pulsed output meters required) to calculate the amount of mains water and reclaimed water to give running totals and logs. The panel also receives the BMS fault signals from the equipment. This then puts an alert on the platform to show that there is a problem with a piece of hardware. The panel itself has a BMS output which will activate when the panel fails or any of the connected equipment fails.

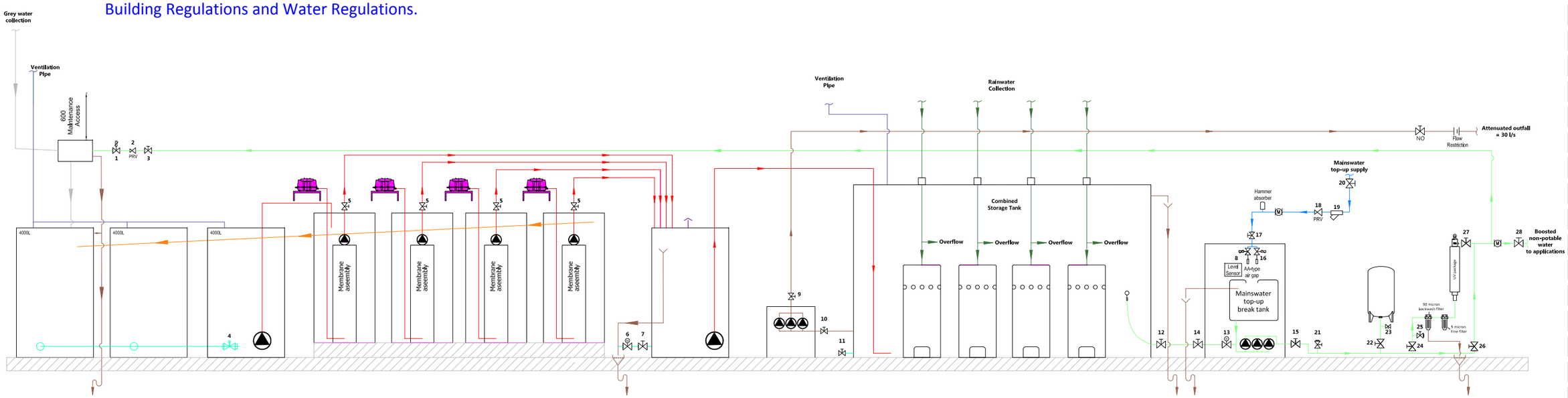
More advance versions can have additional inputs such as turbidity monitoring giving a NTU value and flow metering of individual components. The panels can be configured to receive analogue and digital inputs depending on what is required to be monitored.

The panel is lockable and has a single run/fault/failure indication light on the front.

Note: all communication interface requirements will be coordinated between T Clarke, Aquality and the relevant electrical/ BMS contractor.

Aquality will provide a 3G/4G GSM SIM card to allow the ASC device to connect with the cloud based platform.

As this is a specialist package, the specialist will remain responsible for using the right number and type of valves and has to follow Arup design intent as minimum requirement. The valves shall comply with Building Regulations and Water Regulations.



VALVES			
ID	**Size**	**Valve Description/ Type**	**Material**
1	DN 25	Solenoid Valve	Brass, female thread, EPDM seal; PN16
2	DN 25	Pressure Reducing Valve	DZR Brass Body, male thread
3	DN 25	Isolation Ball Valve	Brass (Nickel plated), BSPT female
4	DN 50	Drain Ball Valve	Brass (Nickel plated), BSPT female
5	DN 15	Balancing Valve for Filtrate Flow	Brass, female thread
6	DN 25	Actuated Ball Valve	Nickel plated brass body, BSP female; PN40
7	DN 25	Isolation Ball Valve	Brass (Nickel plated), BSPT female
8	DN 40	Solenoid Valve	Brass, female thread, EPDM seal; PN16
9	DN 150	Isolation Butterfly Valve	Ductile Iron Body, multi flange wafer type; PN16
10	DN 150	Isolation Butterfly Valve	Ductile Iron Body, multi flange wafer type; PN16
11	DN 50	Drain Ball Valve	Brass (Nickel plated), BSPT female
12	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
13	DN 65	Actuated Ball Valve	Nickel plated brass body, BSP female; PN30
14	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female

VALVES			
15	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
16	DN 40	Solenoid Valve	Brass, female thread, EPDM seal; PN16
17	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
18	DN 50	Pressure Reducing Valve	DZR Brass Body, male thread
19	DN 65	Strainer (Y-filter)	Brass, female thread; PN25
20	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
21	DN 65	Pressure Test Point Ball Valve	Brass (Nickel plated), BSPT female
22	DN 32	Isolation Ball Valve	Brass (Nickel plated), BSPT female
23	DN 25	Expansion Vessel Drain Tap	Bronze (Nickel plated), BSPT male
24	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
25	DN 25	UV Assembly Drain Tap	Brass (Nickel plated), BSPT female
26	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
27	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
28	DN 65	Isolation Ball Valve	Brass (Nickel plated), BSPT female
29	-	-	-

Key

- pipes (mains water)
- pipes (greywater)
- pipes (reclaimed water)
- pipes (circulation)
- pipes (overflow/ drainage)
- tank interconnection
- flex tubes/hose
- pipes (ventilation)
- cables
- pipe (rainwater)

Project:
1 Triton Square

Title:
Valve Schedule

System:
Combined Non-potable Water System
Attenuation,
Rainwater Harvesting &
Greywater Recycling

Project-No:	Drawing-No:
4185-17	4185-07
Project state:	Date:
Construction	30/09/2019
Scale:	Revision:
NTS @A3	1
Drawn by:	Checked by:
CJ	CF

aquality
intelligent water management

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Valve No. 1, 8 & 16

Data sheet

Servo-operated 2/2-way solenoid valves Type EV220B 15 – EV220B 50

EV220B 15 – EV220B 50 is a universal indirect servo-operated 2/2-way solenoid valve program. Valve body in brass, dezincification resistant brass and stainless steel ensures that a broad variety of application can be covered.
Built-in pilot filter as standard, adjustable closing time and enclosures up to IP67 ensures optimal performance even under critical working conditions.

Features and versions:

- For water, steam, oil, compressed air and gases
- Flow range for water: 1.3 – 160 m^3/h
- Differential pressure: 0.3 – 16 bar
- Media temperature from -30 – 140 °C
- Ambient temperature: Up to 80 °C
- Coil enclosure: Up to IP67
- Thread connections: From G ½ – G 2
- DN 15 – 50
- Viscosity: Up to 50 cSt
- Water hammer damped
- Built in filter for protection of pilot system
- Adjustable closing time available
- EV220B NC and NO brass version for neutral liquids and gasses
- EV220BD NC DZR version for neutral and slightly aggressive liquids and gases
- EV220BSS NC Stainless steel version for neutral and aggressive liquids and gases
- Also available with NPT thread.

Brass valve body, NC

Connection ISO228/1	Seal material	Orifice size	K_V - value [m^3/h]	Differential pressure min. to max.[6] [bar]	Media temperature min. to max. [°C]	Code number
G ½	EPDM[1]	15	4	0.3 – 16	-30 – 120[4]	**032U7115**
	NBR[2]	15	4	0.3 – 16	-10 – 90	**032U7170**
	FKM[3]	15	4	0.3 – 10	0 – 100[5]	**032U7116**
G ¾	EPDM[1]	20	8	0.3 – 16	-30 – 120[4]	**032U7120**
	NBR[2]	20	7.5	0.3 – 16	-10 – 90	**032U7171**
	FKM[3]	20	8	0.3 – 10	0 – 100[5]	**032U7121**
G 1	EPDM[1]	25	11	0.3 – 16	-30 – 120[4]	**032U7125**
	NBR[2]	25	11	0.3 – 16	-10 – 90	**032U7172**
	FKM[3]	25	11	0.3 – 10	0 – 100[5]	**032U7126**
G 1 ¼	EPDM[1]	32	18	0.3 – 16	-30 – 120[4]	**032U7132**
	NBR[2]	32	18	0.3 – 16	-10 – 90	**032U7173**
	FKM[3]	32	18	0.3 – 10	0 – 100[5]	**032U7133**
G 1 ½	EPDM[1]	40	24	0.3 – 16	-30 – 120[4]	**032U7140**
	NBR[2]	40	24	0.3 – 16	-10 – 90	**032U7174**
	FKM[3]	40	24	0.3 – 10	0 – 100[5]	**032U7141**
G 2	EPDM[1]	50	40	0.3 – 16	-30 – 120[4]	**032U7150**
	NBR[2]	50	40	0.3 – 16	-10 – 90	**032U7175**
	FKM[3]	50	40	0.3 – 10	0 – 100[5]	**032U7151**

Brass valve body, NO

Connection ISO228/1	Seal material	Orifice size	K_V - value [m^3/h]	Differential pressure min. to max. [bar] [6]	Media temperature min. to max. [°C]	Code number
G ½	EPDM[1]	15	4	0.3 – 16	-30 – 120[4]	**032U7117**
	NBR[2]	15	4	0.3 – 16	-10 – 90	**032U7180**
	FKM[3]	15	4	0.3 – 10	0 – 100[5]	**032U7118**
G ¾	EPDM[1]	20	8	0.3 – 16	-30 – 120[4]	**032U7122**
	NBR[2]	20	7.5	0.3 – 16	-10 – 90	**032U7181**
	FKM[3]	20	8	0.3 – 10	0 – 100[5]	**032U7123**
G 1	EPDM[1]	25	11	0.3 – 16	-30 – 120[4]	**032U7127**
	NBR[2]	25	11	0.3 – 16	-10 – 90	**032U7182**
	FKM[3]	25	11	0.3 – 10	0 – 100[5]	**032U7128**
G 1 ¼	EPDM[1]	32	18	0.3 – 16	-30 – 120[4]	**032U7134**
	NBR[2]	32	18	0.3 – 16	-10 – 90	**032U7183**
	FKM[3]	32	18	0.3 – 10	0 – 100[5]	**032U7135**
G 1 ½	EPDM[1]	40	24	0.3 – 10	-30 – 120[4]	**032U7142**
	NBR[2]	40	24	0.3 – 10	-10 – 90	**032U7184**
	FKM[3]	40	24	0.3 – 10	0 – 100[5]	**032U7143**
G 2	EPDM[1]	50	40	0.3 – 10	-30 – 120[4]	**032U7152**
	NBR[2]	50	40	0.3 – 10	-10 – 90	**032U7185**
	FKM[3]	50	40	0.3 – 10	0 – 100[5]	**032U7153**

1) EPDM is recommended for water.
2) NBR is suitable for oil, water and air
3) FKM is suitable for oil and air. For water at max. +60 °C
4) Low pressure steam, 4 bar: Max. +140 °C
   BA AC/DC and BB/BE DC coils: Max. +100 °C
   BO and BP coils: Max. +90 °C
5) For water: Max. +60 °C
   BO and BP coils: Max. +90 °C
6) Only 10 bars on liquids (NO)

Technical data, brass valve body, NC and NO

Main type	EV220B 15B	EV220B 20B	EV220B 25B	EV220B 32B	EV220B 40B	EV220B 50B
Time to open [ms] [1]	40	40	300	1000	1500	5000
Time to close [ms] [1]	350	1000	1000	2500	4000	10000

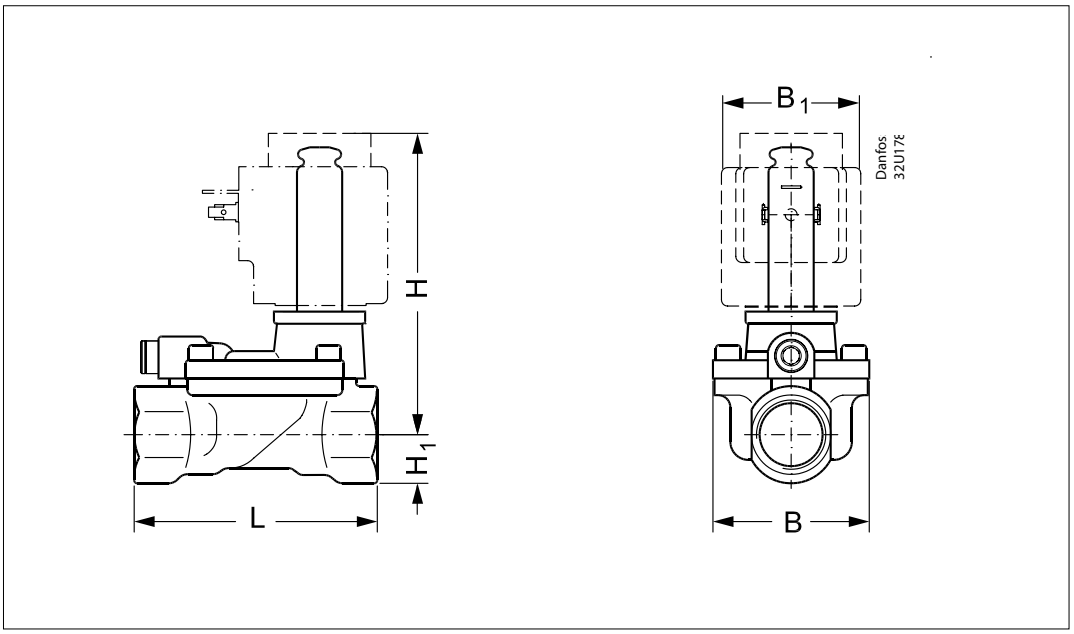
[1] The times are indicative and apply to water. The exact times will depend on the pressure conditions. Closing times can be changed by replacement of the equalizing orifice.

Installation	Optional, but vertical solenoid system is recommended.		
Max. test pressure	25 bar		
Viscosity	Max. 50 cSt		
Materials	Valve body:	Brass	W.no. 2.0402
	Armature:	Stainless steel	W.no. 1.4105 / AISI 430 FR
	Armature tube:	Stainless steel	W.no. 1.4306 / AISI 304 L
	Armature stop:	Stainless steel	W.no. 1.4105 / AISI 430 FR
	Springs	Stainless steel	W.no. 1.4310 / AISI 301
	O-rings:	EPDM, FKM or NBR	
	Valve plate:	EPDM, FKM or NBR	
	Diaphragm:	EPDM, FKM or NBR	

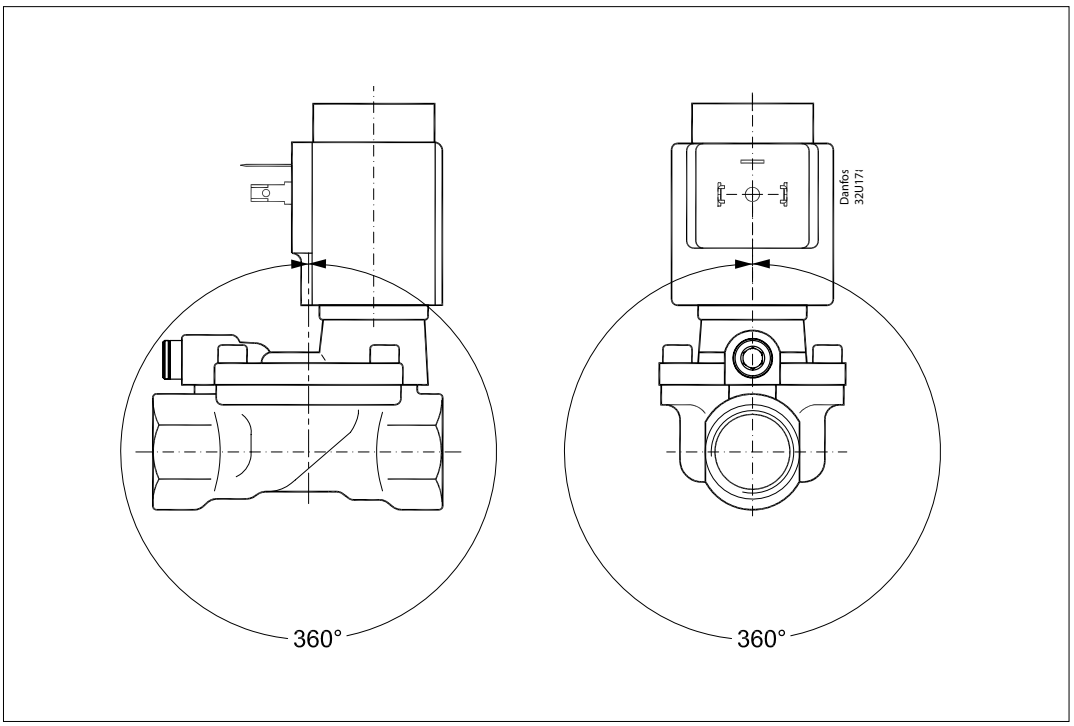
Dimensions and weight: Brass, DZR brass and stainless steel, NC and NO

Type	L [mm]	B [mm]	B_1 [mm] / coil type				H [mm]	H_1 [mm]	Weight without coil [kg]
			BA	BB / BE	BG / BO	BP			
EV220B 15	80.0	52.0	32	46	68	45	99	15.0	0.7
EV220B 20	90.0	58.0	32	46	68	45	103	18.0	0.9
EV220B 25	109.0	70.0	32	46	68	45	113	22.0	1.3
EV220B 32	120.0	82.0	32	46	68	45	120	27.0	2.0
EV220B 40	130.0	95.0	32	46	68	45	129	32.0	3.0
EV220B 50	162.0	113.0	32	46	68	45	135	37.0	4.8

Dimensions



Mounting angle

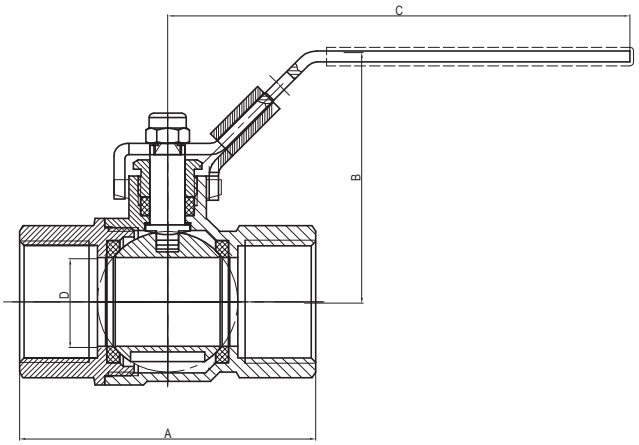


Ball Valves - Manual and Actuated

Brass Full Bore – FIG 966SRL and 966SBL WRAS

Valve No. 3, 4, 7, 11, 22 & 25

Dimensions



Lockable lever as standard

Nominal size in	A mm	B mm	C mm	D mm	Weight kg	966SRL Red Lever Product Code	966SBL Blue Lever Product Code
¼	43.4	44.7	90	8	0.17	37184204	37184108
⅜	45.4	47.8	90	10	0.16	37184215	37184119
½	56.6	52.6	100	15	0.25	37184226	37184130
¾	65.4	56.3	100	19	0.34	37184237	37184141
1	80	67.8	125	24	0.57	37184248	37184152
1¼	90	79.5	140	32	0.82	37184259	37184163
1½	97.6	85	140	40	1.16	37184270	37184174
2	121.2	93.5	160	50	1.93	37184281	37184185

Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 120°C
Pressure Rating	¼" to 1"	40 bar
	1¼" to 2"	32 bar
Maximum Temperature at 10 bar		180°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

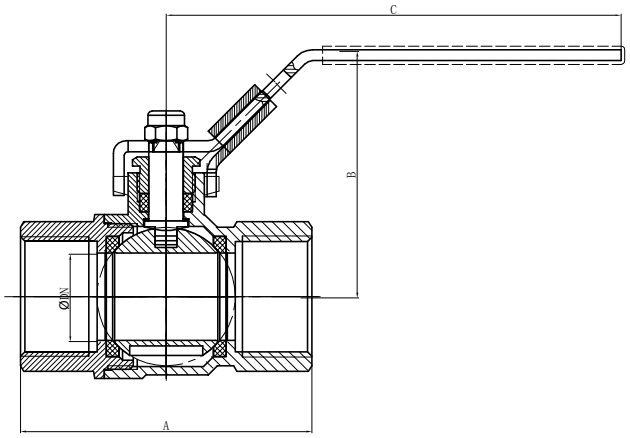
Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Lever	Steel (Zinc plated) Red / Blue PVC Sleeve

Ball Valves - Manual and Actuated

Brass Full Bore – FIG 967SRL and 967SBL WRAS

Valve No. 12, 14, 15, 17, 20, 21, 24 & 26 - 28

Dimensions



Lockable lever as standard

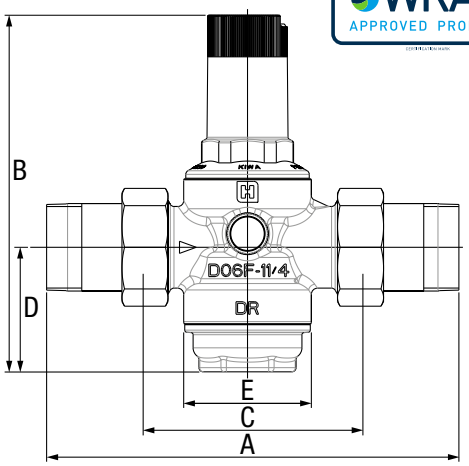
Nominal size in	A mm	B mm	C mm	D mm	Weight kg	967SRL Red Lever Product Code	967SBL Blue Lever Product Code
2½	149.2	122	230	64	3.70	37184706	37184643
3	172.8	130.5	230	77	5.15	37184717	37184654
4	203.6	149	250	99	8.46	37184728	37184665

Technical Specification		
Connections		Screwed BSPT Female to BS EN 10226-2:ISO 7-1 Rc
Non-Shock Temperature Range		-10°C to 120°C
Pressure Rating	2½" to 3"	25 bar
	4"	20 bar
Maximum Temperature at 10 bar	2½" to 3"	180°C
Maximum Temperature at 10 bar	4"	170°C
Conforms to BS EN 13547		
WRAS Approved		
PED directive classification Group 1 and 2		

Materials of Construction	
Body	Brass (Nickel plated) BS EN 12420 CW617N
End Connector	Brass (Nickel plated) BS EN 12420 CW617N
Ball	Brass (Chrome plated) BS EN 12420 CW617N
Anti Blow Out Stem	Brass BS EN 12164 CW614N
Seats	PTFE
Gland 'O' Ring	PTFE
Lever	Steel (Zinc plated) Red / Blue PVC Sleeve

Valve No. 2 & 18

Dimensions



Suitable for use with gauges 53218000 and 53218011

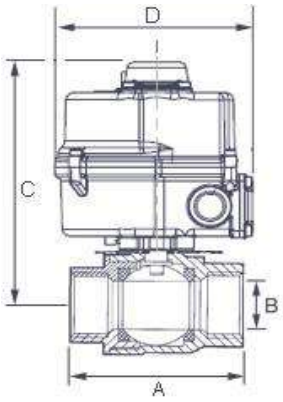
D06 Dimensions

Nominal Size in	Nominal Size mm	A mm	B mm	C mm	D mm	E mm	Weight kg	Product Code
1	–	186	122	107	33	–	1.35	28110028
1¼	–	200	175	105	64	61	2	28110039
1½	–	225	299	130	126	82	3.3	28110050
2	–	255	299	140	126	82	4.5	28110061

Technical Specification		
Connections	15 & 22mm	Compression
	1in to 2in	MBSP
Max Inlet Pressure		25bar
Outlet Pressure		1½ to 6bar (Adjustable)
Max Temperature		70ºC

Materials of Construction	
Body	DZR Brass Body
Filter Mesh	Stainless Steel

Applications: water to 70ºC, compressed air, inert gases, non-aggressive liquids



BV90E

Brass Nickel Plated Ball Valve c/w JV-E Electric Actuator

BSPP Threaded

The BV90E brass bodied full bore ball valves are suited for a many applications offering reliability at an economical cost.

These valves are supplied completely assembled with JV-E electric actuators which are small, lightweight and compact in design but still offering high output torques.

All valve and actuator packages are tested and issued with certification confirming the actuators functionality before despatch.

Features & Benefits

- Optional WRAS approval (½ - 2" only)
- Full bore minimizes pressure drop
- Complete assembled package
- Various voltage options
- Manual override on actuator
- Lightweight & compact
- Visual position indicator on actuator

Pressure & Temperature

Pressure range:-
¼"-1" PN40 Rated
1¼" PN32 Rated
1½"-2½" PN30 Rated
3" PN25 Rated
Temperature range*:-
-20°C to 120°C

SIZE	¼	⅜	½	¾	1	1¼	1½	2	2½	3
A	64	64	64	76	88	96	103	121	165	188
B	11.5	15	15	20	25	32	38	45	62	76
C*	154	154	154	157	161	166	182	189	215	225
D	124	124	124	124	124	124	124	124	124	124
Operation Time 90° 50/60hz Sec.	13	13	13	13	13	13	13	13	13	13
Actuator Type	JV-E05	JV-E05	JV-E05	JV-E05	JV-E05	JV-E05	JV-E05	JV-E05	JV-E05	JV-E05
Weight Kg	1.63	1.61	1.58	1.71	2	2.25	2.46	3.55	5.15	6.8

ACTUATOR SPECIFICATIONS			
Enclosure	Weatherproof Enclosure IP67	Travel Angle	90° ± 5°
Power Supply	110V - 250V AC 50/60Hz / 24V AC 50/60Hz / 24VDC	Casing Material	Aluminium Alloy, Dry Power Polyester Coated
Indicator	Dome Type Mechanical	Terminal Block	Push Button
Limit Switches	2 x Open / 2 x Close, SPDT, 250V AC	Ambient Temperature	-20 to 60°C
Space Heater	110/220V AC Anti-condensation	Mechanism	Spur Gear Type

BALL VALVE MATERIALS	
Body	Brass - Nickel Plated
Ball	Brass - Chrome Plated
Seats	PTFE
Stem	Brass - Nickel Plated

ACTUATOR OPTIONS	
KWT	Watertight IP68
KPU	Potentiometer
KCT	Current Position Transmitter Output 4-20mA
KMC	Modulating Control Unit

*Special actuator mounting kit required for temperatures above 70ºC, contact sales for details and overall height dimensions

All data is designed as a guide and should not be regarded as wholly accurate in every detail
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24.08.00 - 03/17

JV-E

Electric 1/4 Turn
Johnson Valves Actuator
50Nm - 500Nm

The JV-E electric actuator is designed for quarter turn applications on ball and butterfly valves with bases to ISO 5211 & DIN 3337 standard. Small, lightweight and compact in design but still offering high output torques.

Simple Installation

All connections are located in a separate terminal box, minimising the amount of disassembly required.

High Visibility Position Indicator

Making visual checks easy even from a distance.

Weatherproof Unit

IP67 as standard with IP68 as an optional extra.

Efficient Design

High torques are achieved with relatively low power consump-

Captive Bolts

Bolts will not be lost even when the cover is open.

Self Locking

The risk of overheating due to repeated operations is avoided with this feature.

Manual Override as Standard

Hexagon key operated.

STANDARD SPECIFICATIONS			
Enclosure	Weatherproof Enclosure IP67	**Travel Angle**	90° ± 5°
Power Supply	110V - 250V AC 50/60Hz / 24V AC 50/60Hz / 24VDC	**Casing Material**	Aluminium Alloy, Dry Power Polyester Coated
Indicator	Dome Type Mechanical	**Terminal Block**	Push Button
Limit Switches	2 x Open / 2 x Close, SPDT, 250V AC	**Ambient Temperature**	-20 to 60°C
Space Heater	110/220V AC Anti-condensation	**Mechanism**	Scotch-Yoke (JV-E05 - Spur Gear Type)

ADDITIONAL DATA

Model No.	Maximum Torque Output (Nm)			Star Drive (mm)	Operating Time 50 / 60Hz	Duty Cycle IEC34-1	No. of Handle Turns	Manual Operation Hex (mm)	ISO 5211 DIN 3337 Mounting
	0°	45°	90°		90° (sec.)	S2 (%)			
JV-E05	50	50	50	14	13	40 (Max 30 minutes)	18	5	F03, F05, F07
JV-E10	100	65	100	17	22/18	40 (Max 30 minutes)	15	6	F05, F07
JV-E16	160	107	160	17	28/23	40 (Max 30 minutes)	19	6	F05, F07, F10
JV-E28	280	190	280	22	40/33	40 (Max 30 minutes)	23	8	F07, F10, F12
JV-E40	400	270	400	27	40/33	40 (Max 30 minutes)	23	8	F07, F10, F12
JV-E50	500	350	500	27	40/33	40 (Max 30 minutes)	23	8	F07, F10, F12

All data is designed as a guide and should not be regarded as wholly accurate in every detail
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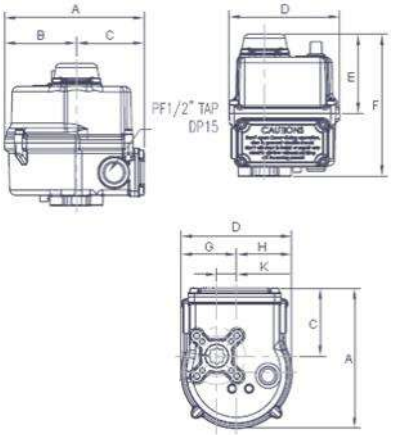
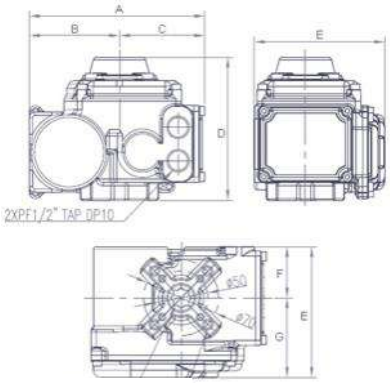
JV-E

Electric 1/4 Turn
Johnson Valves Actuator
50Nm - 500Nm

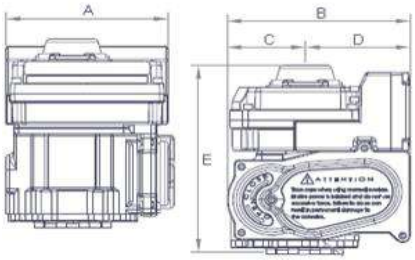
JV-E05



JV-E10



JV-E16 - JV-E50



DIMENSIONS										ISO 5211					Cable	Weight
	A	B	C	D	E	F	G	H	K	F03	F05	F07	F10	F12	Entry	Kg
JV-E05	124	64	60	98	70	125	49	49	18	✓	✓	✓	×	×	½"	1.3
JV-E10	164	84	80	133	122	48	74	-	-	×	✓	✓	×	×	½"	3.0
JV-E16	157	172	74	99	190	-	-	-	-	×	✓	✓	✓	×	½"	6.2
JV-E28	182	209	87	122	209	-	-	-	-	×	×	✓	✓	✓	½"	9.4
JV-E40	182	209	87	122	209	-	-	-	-	×	×	✓	✓	✓	½"	9.4
JV-E50	182	209	87	122	209	-	-	-	-	×	×	✓	✓	✓	½"	9.4

OPTIONS	
KWT	**Watertight IP68**
KPU	**Potentiometer**
KCT	**Current Position Transmitter** Output 4-20mA
KMC	**Modulating Control Unit**

All data is designed as a guide and should not be regarded as wholly accurate in every detail
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Valve No. 5

TACOSETTER INLINE 100

BALANCING VALVE

ADVANTAGES

- Accurate and fast adjustment with scale and without the aid of diagrams, tables or measurement devices
- Direct reading of the set volume flow in l/min
- Variable installation position, maintenance-free
- Regulating valve with isolating facility (rest leakage possible)
- Additional types are also available as make resistant to dezincification

Direct regulation, reading and shut-off of flows in systems

DESCRIPTION

Direct hydraulic balancing and control of flows to consumers or in a subsystem.
Balancing valves offer a quick, easy and accurate method of adjusting the flow rates through heating, ventilation, air conditioning and cooling systems.
Correct balancing of hydraulic circuits ensures optimum energy distribution, resulting in more efficient and economical operation in accordance with the energy saving regulations provided for by legislation.
With TacoSetter Inline 100 balancing valves, any qualified fitter can set the appropriate flow rate using the unique flow measurement device, avoiding investments in training and costly measuring devices.

INSTALLATION POSITION

The valve can be installed in a horizontal, vertical or inclined position. Care should be taken that the arrow is pointing in the direction of the flow.

OPERATION

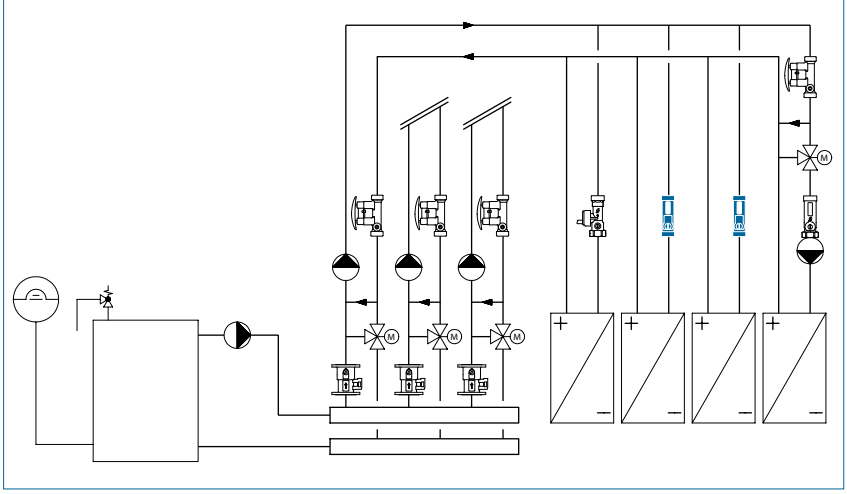
The flow measurement is based on the principle of a baffle float with return spring. The flowmeter is built into the housing.
The balancing can be carried out with a screwdriver at the adjusting screw. The reading position is the bottom line of the baffle float.

BUILDING CATEGORIES

For pipe installations in drinking water, heating and cooling area:

- Apartment blocks, housing estates, multiple dwelling units
- Residential care facilities and hospitals
- Administration and service buildings
- Hotels and restaurants, industrial kitchens
- School buildings and sports facilities
- Commercial and industrial buildings
- Facilities with partial use, such as barracks, camping sites

SYSTEM/BASIC DIAGRAM



SPECIFICATION TEXT

See www.taconova.com

TECHNICAL DATA

General

- Operating temperature $T_{0\ max}$: 100 °C
- Operating pressure $P_{0\ max}$: 10 bar
- Measuring accuracy: ±10 % of the indicated value
- k_{VS} value and measurement range see «Type overview»
- Female thread (cylindrical) to DIN 2999 / ISO 7 or male thread G (cylindrical) to ISO 228

Material

- Housing: see «Type overview»
- Sight glass: heat- and impact resistant plastic
- Seals: EPDM

Fluids

- Heating water (VDI 2035; SWKI BT 102-01; ÖNORM H 5195–1)
- Potable water (DIN 1988-200)
- Water and proprietary additives used against corrosion and freezing up to 50% (see document «Correction curves»)

APPROVALS / CERTIFICATES

- SVGW, KTW, W270, ACS

TYPE OVERVIEW

TacoSetter Inline 100 | Balancing valve made of brass with female thread

Order no.	DN	G × Rp	Measuring range	k_{VS} (m³/h)
223.1202.000	15	¾" × ½"	0,3 – 1,5 (l/min)	0,25
223.1203.000	15	¾" × ½"	0,6 – 2,4 (l/min)	0,6
223.1204.000	15	¾" × ½"	1,0 – 3,5 (l/min)	1,35
223.1208.000	15	¾" × ½"	2,0 – 8,0 (l/min)	1,8
223.1209.000	15	¾" × ½"	3,0 – 12,0 (l/min)	1,85

TacoSetter Inline 100 | Balancing valve made of brass with male thread

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.1233.000	15	¾" × ¾"	0,6 – 2,4 (l/min)	0,6
223.1234.000	15	¾" × ¾"	1,0 – 3,5 (l/min)	1,35
223.1238.000	15	¾" × ¾"	2,0 – 8,0 (l/min)	1,8
223.1239.000	15	¾" × ¾"	3,0 – 12,0 (l/min)	1,85
223.1300.000	20	1" × 1"	4,0 – 15,0 (l/min)	5,0
223.1302.000	20	1" × 1"	8,0 – 30,0 (l/min)	5,0
223.1305.000	20	1" × 1"	10,0 – 40,0 (l/min)	5,0

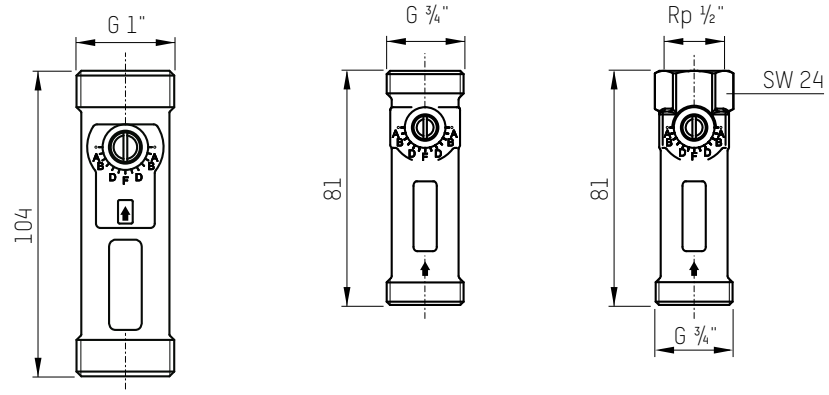
TacoSetter Inline 100 | Balancing valve made of dezincification-resistant (DZR) brass with female thread

Order no.	DN	G × Rp	Measuring range	k_{VS} (m³/h)
223.1204.104	15	¾" × ½"	1,0 – 3,5 (l/min)	1,35
223.1208.104	15	¾" × ½"	2,0 – 8,0 (l/min)	1,8
223.1209.104	15	¾" × ½"	3,0 – 12,0 (l/min)	1,85

TacoSetter Inline 100 | Balancing valve made of dezincification-resistant (DZR) brass with male thread

Order no.	DN	G × G	Measuring range	k_{VS} (m³/h)
223.1232.104	15	¾" × ¾"	0,3 – 1,5 (l/min)	0,25
223.1233.104	15	¾" × ¾"	0,6 – 2,4 (l/min)	0,6
223.1234.104	15	¾" × ¾"	1,0 – 3,5 (l/min)	1,35
223.1238.104	15	¾" × ¾"	2,0 – 8,0 (l/min)	1,8

DIMENSIONAL DRAWING



GLYCOL CORRECTION CURVES

There is a separate diagram for TacoSetter up to DN25 and its flow ranges with nine correction curves for use of anti-frost and anti-corrosion agents.
Corrections are not required for larger dimensions as the deviation lies within the measuring tolerance.
See www.taconova.com

Y-filter WRAS-approved (Brass)

Item Nos G11113, G11114, G11115, G11116, G11117, G11118

Typical applications:

- Accessory for electronic control units for **rainwater harvesting** or **greywater recycling** systems with pressurised distribution and fully automatic water management / mains water top-up
- The filter is installed into the mains water supply pipe close to the control unit to protect the mains water back-up valve from scale particles or other debris.

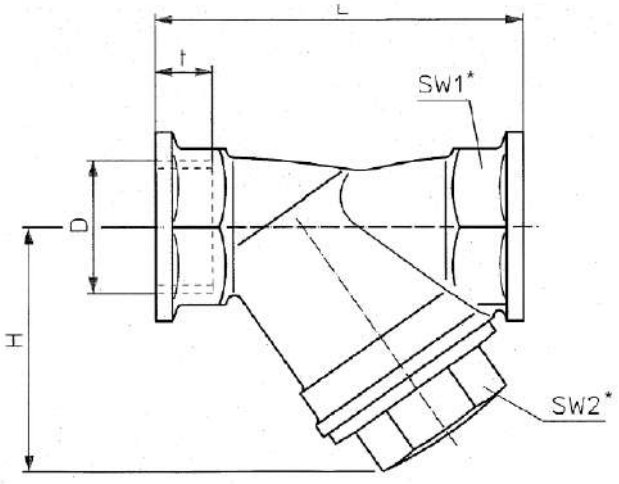
Features

- Corrosion-resistant and long-lasting bronze body, brass bonnet and fluorocarbon O-rings
- Wire basket with 0.25mm mesh size (600 meshes per cm²), exchangeable
- Maximum working pressure: 16 bar
- Maximum operating temperature: 99°

Functioning principles

- The Y-filter protects pipework from impurities and debris, increase the service life of downstream components e.g. solenoid valves and pumps, and prevent early breakdown of machinery and appliances.
- The strainer is plumbed in line and can be installed in any orientation, observing the direction of flow. The wire basket should ideally be in downward position.
- The wire basket has to be inspected periodically and cleaned as required. Debris will accumulate in the side branch section which can be opened with a spanner.
- If necessary, the wire basket can be exchanged.

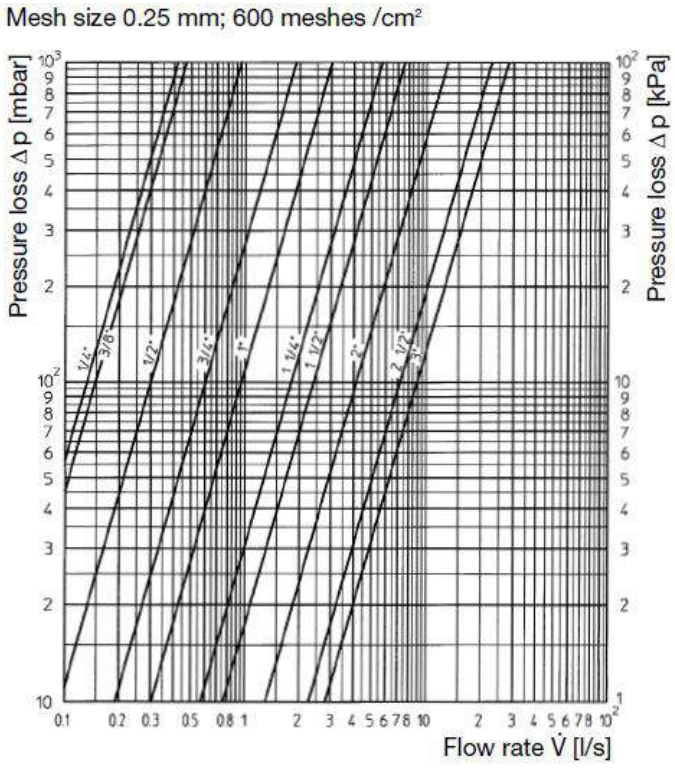
Dimensions



* SW = Spanner size

Item No.	Pipe size [inches]	Pipe size [DN]	L	t	H	SW1*	SW2*
G11113	G 1	25	90	15	61	38	32
G11114	G 1¼	32	112	18	73	47	41
G11115	G 1½	40	120	18	82	54	46
G11116	G 2	50	150	22	94	66	56
G11117	G 2½	65	221	23	116	85	70
G11118	G 3	80	254	26	134	100	75

Flow rate vs pressure loss diagram

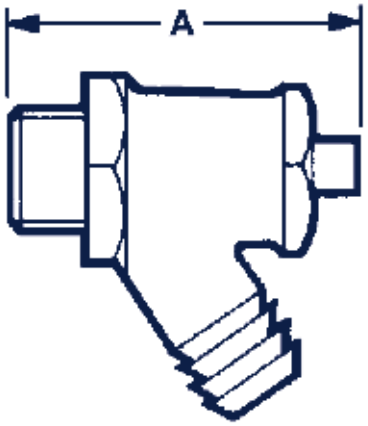


Aquality Trading & Consulting Ltd reserves the right to make technical changes.

Bronze Drain Tap – FIG 370 BS 2879-2

Valve No. 23

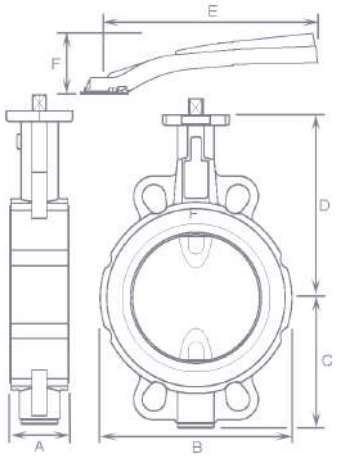
Dimensions



Nominal Size in	Nominal Size mm	A	Weight kg	Product Code
½	15	54	0.22	22066100
¾	20	74.2	0.33	22066111
1	25	82	0.44	22066122

Technical Specification	
Connections	Screwed BSPT Male
Maximum pressure	10bar at 110ºC

Materials of Construction	
Body	Bronze
Cap, stem & disc holder	Brass
Disc & 'O' rings	Rubber



JV100001

Series J9

Ductile Iron (Epoxy Coated) EPDM Lined Butterfly Valve

Multi-Flange Wafer Type

25mm - 400mm
PN6/10/16, ANSI150, BST D & E

450mm - 600mm
PN16

WRAS APPROVED PRODUCT

Economical WRAS approved general purpose valve with an EPDM liner, offering a long life with low maintenance. Self-lubricating bearings ensures perfect guiding and turning of the shaft without seizure or premature wear.

The butterfly valve offers quick opening and closing with full flow in either direction and leak tight shut off.

Flange gaskets not needed since the lining that extends onto the faces acts as a gasket.

Features & Benefits

- WRAS approved*
- Epoxy coated body
- ISO top for direct actuation
- 25mm - 250mm lever operated**
- 300mm - 600mm gearbox operated

* 50mm - 300mm only, contact sales for options
** Gearbox operation available on request

Pressure & Temperature

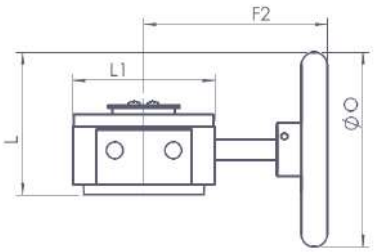
Pressure range:-

25mm - 300mm : 16 bar
250mm - 600mm : 10 bar

Temperature Range:-

–10°C to 120°C

SIZE	DN25	DN32	DN40	DN50	DN65	DN80	DN100	DN125	DN150	DN200	DN250
A	33	33	33	43	46	46	52	56	56	60	68
B	65	73	82	89	102	118	150	174	205	260	318
C	51	56	63	62	69	90	106	119	131	166	202
D	104	110	116	126	136	150	170	180	200	230	266
E	192	192	170	170	170	206	206	285	285	400	530
F	68	68	50	50	50	69	69	90	90	72	72
ISO 5211	F05	F05	F05	F05	F05	F05	F05	F07	F07	F10	F12
Weight Kg	1.7	1.7	1.83	2.68	3.45	4.08	4.83	7.34	8.2	14.9	23.8



SIZE	DN300	DN350	DN400	DN450	DN500	DN600
A	78	78	102	114	127	154
B	376	406	471	539	594	695
C	235	257	292	318	355	444
D	292	335	360	422	480	562
L	190	190	190	183	311	386
L1	170	170	170	151	214	262
F2	226	226	226	216	256	285
ØO	300	300	300	285	285	385
ISO 5211	F12	F12	F12	F14	F14	F16
Weight Kg	31.2	48.3	74.3	107.4	155.8	231.1

MATERIALS	
Body	Epoxy Coated GGG40 Ductile Iron
Disc	316 Stainless Steel
Liner	EPDM
Shaft	316 Stainless Steel
Lever	Aluminium (25mm - 150mm), Ductile Iron (200mm - 250mm)

These valves can be supplied completely assembled with electric, pneumatic or hydraulic actuators.

Contact sales or see datasheets for details.

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Datasheet N0. 100001 - 08/17