Cloud Collector



Cloud Collector Combi

Rainwater Harvesting System

Installation Manual

Cloud Collector

Introduction

Thank you for your purchase of the Cloud Collector Combi system, designed for rainwater harvesting in commercial buildings and large family homes.

This detailed installation manual contains important information, which must be observed during installation. It is imperative that this manual is read and understood by those involved with the
profesional instalation of the system.This manual should be kept on-site during the installation of the system for easy access and reference.

For additional copies please download from our website: www.totalwatersystems.co.uk

Please read these instructions carefully before installing the system.

The Cloud Collector Combi system requires specialist installation. If you do not have relevant experience.], please contact a contractor who does, or contact Total Water System for further advice. info@totalwatersystems.co.uk

WARNING

Failure to correctly install the system will invalidate the warranty! It is the responsibility of the installer to comply with the water supply (water fittings) regulations 1999.

Standards, Guidelines & Certifications

The Cloud Collector Combi complies with the standard for rainwater harvesting systems, BS8515-2009 and complies with the Water Supply (Water Fittings) Regulations 1999 which conforms to the“independent infow” required for reliable separation of service water and the potable water connection which is integrated into the system.

The voltage is supplied through a switching power supply. All external components of the system operate using safe low voltage technology

The model brough to market incorporates design, construction and materials which satisfy the basic safety and health requirments of the EC directive for machinery.

This declaration becomes invalid if any modifications are made tot he equipment without our a



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Compliance with current regulations

Those installing the Cloud Collector Combi System should be conversant and compliant with all current legislation and all relevant documentation pertaint to the rainwater harvesting sytem installation .

The following list can be used for guidance and is not a definitive list to those installing the Cloud Collector Combi rainwater harvesting system.

- Health and Safety at Work Act
- Construction (Design Management) Regulations
- The Building Regulations
- Water supply (water fittings) Regulations 1999
- Regulations under the Electricity Act
- Control of Substances Hazardous to Health Regulations
- British Standards - BS8515
- Water Regulations Advisory Scheme Information and Guidance Note No 9-02-05 marking and identification of pipework

Installation standards

All works to be carried out in accordance with the requirements of the Institute of Electrical Engineers,
The Chartered Institute of Building Service Engineers, the British Standards Institute, Building Regulations and current good working practices. If there are any queries regarding the rainwater system please contact Total Water Systems

Safety instructions

The installation instructions and user manual must be read carefully before installing the equipment. The instructions given here must be adhered to precisely otherwise all warranty claims will become invalid.

The operator of the equipment is responsible for adhering to the safety and installation conditions. Only the original packaging, which is designed for transporting, is to be used when moving the equipment. The emergency overflow must always be connected.

As a safety precaution (in case of improper operation, dry running etc) the equipment will automatically shut off after running continuously for more than 2 hours (the display will flash).

After such an event the equipment can be switched on again by disconnecting and reconnecting the plug in the electrical socket or by switching the isolator on and off at the fuse spur.
The equipment is not designed for continuous operation! Installations on a mains water pipe network may only be carried out by certified technicians.

Introduction

Delivery

The Cloud Collector Combi system components may be delivered to site by various sources - carrier services or haulage distributors. Large equipment will be delivered by haulage distributors (such as the storage tank).

Total Water Systems will endeavour, where possible, to deliver components to site at suitable times–HOWEVER, THIS MAY NOT ALWAYS BE POSSIBLE. Should equipment arrive either early or late Total Water Systems cannot be responsible for delivery times.

Due to the nature of the product, the storage tank and system components may not necessarily arrive together. The customer or appointed contractors are responsible.

For unloading and securing the tank and equipment on site. The storage tank will be offloaded to the nearest hard standing by the site contractor. A fee may be chargeable if goods are not accepted by site, if there is a delay in offloading or for goods returned without prior acceptance in writing from Ttoal Water Systems.

Damage in transit

Our products are carefully checked and tested before despatch. However, the risk of damage during transit cannot be guaranteed.

- Check goods for complete content and damage on receipt.
- Any damage is the responsibility of the carrier. Register any claim with them immediately.
- A report must be made within three working days from the date of delivery of any missing or damaged items. Total Water Systems cannot accept responsibility for missing or damaged items if not reported in writing immediately.

Please contact us directly before returning any goods.





Cloud Collector

Introduction

Service Specifications

These tanks are designed to be installed below ground and completely surrounded with concrete. Generally, the depth from finished ground level to the top crown of the main shell should be no more than 2 metres. This may vary dependent upon ground water conditions.

Deeper inverts may be accommodated on a standard shell providing the water table level does not exceed 2 metres above the top crown of the main shell.

For deeper burial with high water table conditions heavy duty shells are available.

Should you be in any doubt regarding suitable shell applications, please contact Total Water System.

If the tank is installed outside these parameters, it may suffer irreparable damage.

Lift Height (Rate of Rise)

Determine the lift height (m), or rate of rise (m/h) for the specific concrete type used, to ensure that a design pressure (P max) of 15kN/m2 on the tank is not exceeded.

Vibration

The design of the tank assumes minimal compaction of the surrounding concrete. Where necessary, this may be extended to include light internal vibration. Never use deep revibration which will substantially increase the pressure on the tank, possibly causing failure.

Concrete Specification

The specification for the concrete mix to surround the tank may be taken from BS 5328: Part 1: 1991 (including amendments), taking into account the site conditions and application requirements.

For a typical non-structural application in non-aggressive soils a standard mix ST4 with a 50mm slump is generally suitable, but also permits the equivalent designated mix GEN3 to be specified as an alternative.

If for non-typical applications, structural or other reasons a higher than normal designation is required, the purchaser pf the fresh concrete can user table 6 in BS 5328: Part 2: 1991 (amendment 8759/October 1995) for guidance.

Impact of Concrete on Discharge

The effects of impact on discharge are considerable. These are controlled by the vertical form height, the tank diameter and the method of discharge. Under no circumstances should concrete be discharged directly onto the tank.

Loadings

If the tank is installed in an area where traffic or other superimposed loadings can be applied, consult a structural engineer for the design of a reinforced concrete slab to prevent the load being transmitted to the tank (or its concrete surround). If this slab is constructed immediately above the tank, it should be separated from the concrete surrounding the tank by a compressible material.



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Transportation, unloading and storage of tanks

1. Tanks must be held down during transportation using nylon straps, do NOT use cables or chains to hold tanks.

2. Do NOT over tighten straps to cause deformation of the tank shell.

3. Tanks are best lifted by crane and webbing lifting straps – do NOT use chains or wire ropes in contact with the tank.

4. We highly recommend the use of a lifting beam for tanks longer than 8 meters.

5. Smaller tanks may be lifted with other suitable site equipment, but greater care is needed to control the lift and to ensure the tank is not damaged.

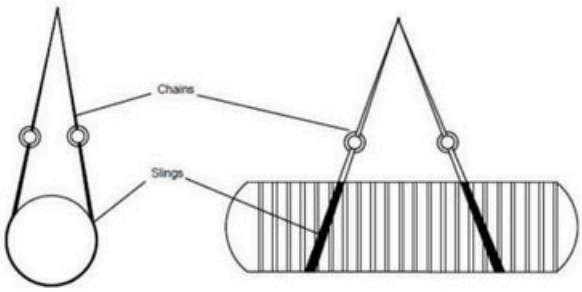
6. Move tanks only by lifting and setting, do NOT drag or roll.

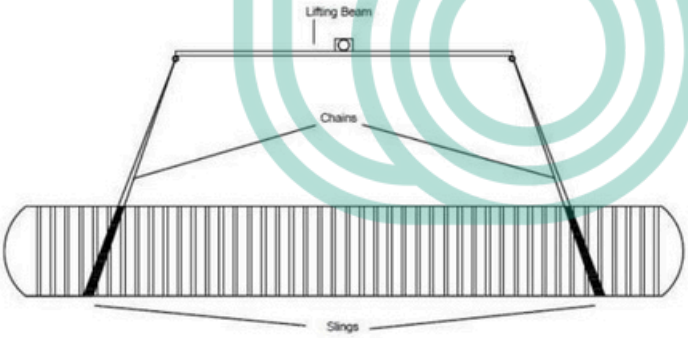
7. Do NOT drop or roll tanks from truck.

8. Places tanks carefully onto a smooth level even surface, free from rocks, large stones or other debris that could cause point loads.

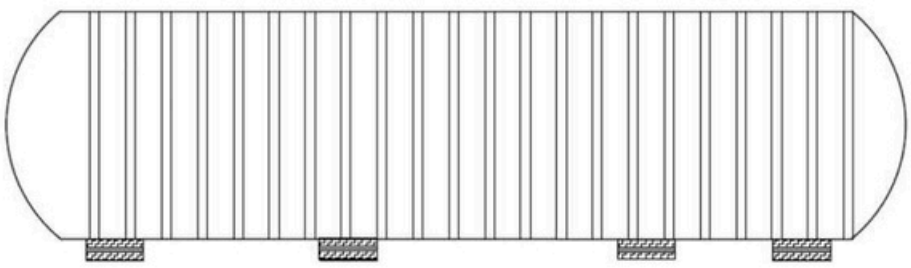
9. Chock tanks using tyres, sandbags or similar to prevent rolling.

10. In high winds conditions, consideration should be given to strapping down the tanks to prevent damage.









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Pre-installation inspection

1. Tanks should be subject to a visual inspection prior to installation

2. Special consideration should be given to lifting straps positions

3. Any damage should be notified to the delivery driver and to the supplier

4. Do not attempt to carry out any un authorised repairs, as this will invalidate the warranty on the tank

5. Check for fractures to the shell or ribs, de laminations, scratches or abrasions deeper tanks 1.5mm, stress cracks or star crazing

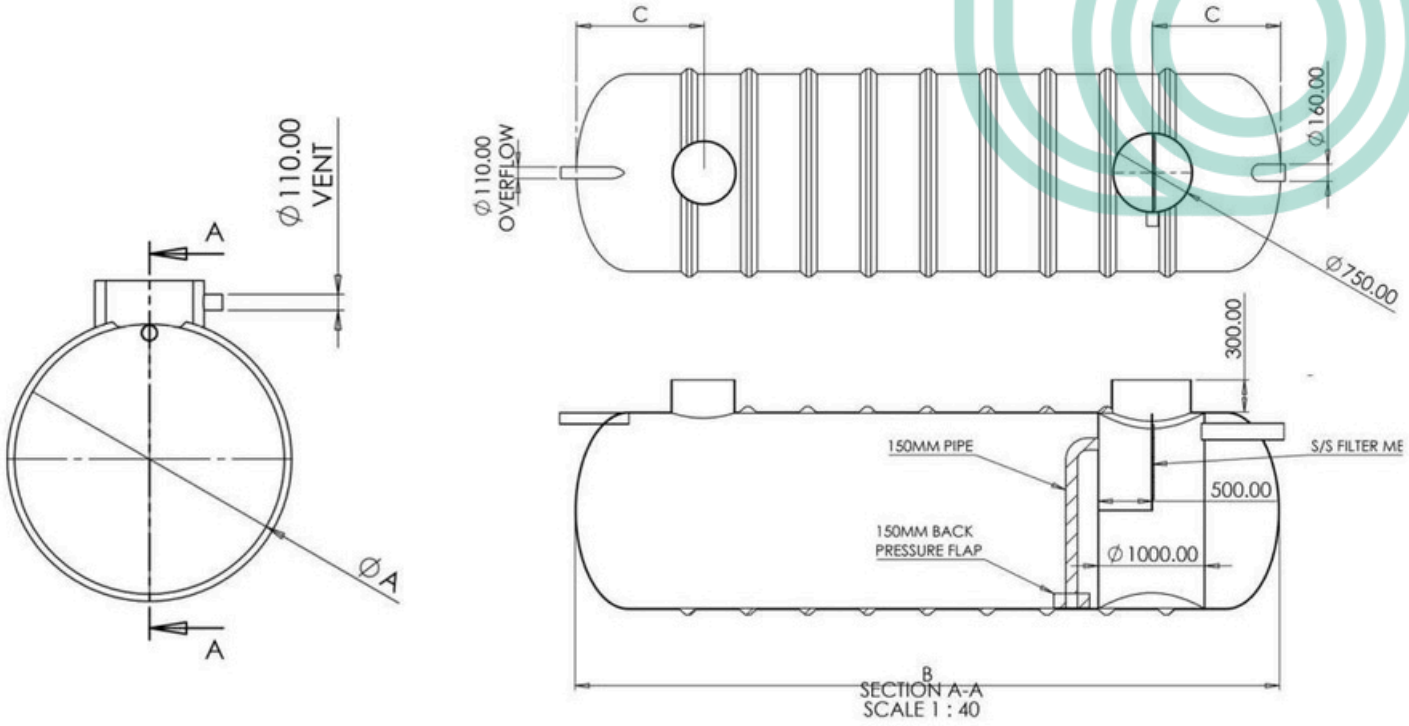
6. Check invert depth is correct and inlet and outlet pipe orientations are correct

Installation procedures must be in accordance with the health and safety at work act 1974, and othersrelevant legislation. Your procedures must also align with good building practice.

Excavate for the tank, allowing sufficient clearance for the minimum concrete surround thickness as shown in the table below, whilst also taking into account any shoring/ trench supports used.

The depth of the excavation is determined by the inlet and outlet pipe invert levels relative to the bottom of the tank, and allowing for the minimum base thickness shown.

Dimensioned details of the separator can be taken from the relevant drawing. Ground instability at formation level e.g. running sand may necessitate over excavation and stabilisation with hard core or blinding concrete.



NOTE: check the depth to the base slab is within the service specification requirements for the tank.

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CAPACITY	A	B	C
6000L	1500mm	3600mm	1200mm
8000L	1850mm	3350mm	1600mm
10000L	1850mm	4230mm	1600mm
12000L	1850mm	5070mm	1600mm
14000L	1850mm	5800mm	1600mm
16000L	1850mm	6600mm	1600mm
18000L	1850mm	7160mm	1600mm
20000L	2500mm	4800mm	1600mm
25000L	2500mm	5540mm	1600mm
30000L	2500mm	6550mm	1600mm
40000L	2500mm	8600mm	1600mm
50000L	2500mm	11000mm	1600mm

1. Pour the concrete into the bottom of the excavation to form a level and smooth base onto which the tank can sit. This should be to the minimum thickness given in the table above.

2. Place the tank onto the concrete base, while the concrete is still wet, and determine the correct orientation for the tank inlet(s) and outlet(s), i.e. the higher pipe on the tank is to be connected to your downstream (outlet) pipe work. Connect and seal your pipe work to the tank, checking alignment, and ensure that there is an adequate and correct fall for each pipe lift.

3. Fill the chamber with clean water to depth of 300mm and recheck the pipe work levels. Commence backfilling evenly around the tank with concrete ensuring there are no voids. Continue filling the chamber with water whilst evenly backfilling with concrete ensuring that the progressive water level is no more than 300mm above concrete level.

4. Connect and seal turret extensions prior to completing the concrete encasement of the main tank to the height shown ion the table. Allow this concrete to set.

5. Using appropriate formwork, continue pouring concrete around the tank superstructure (i.e. bypass chamber, access turrets) in lift heights not exceeding 500mm, allowing the initial set between each lift.

NOTE: Never increase the lift height or accelerate the rate of rise for the concrete type used, or allow the concrete to be compacted to an extent which will cause any part of the tank superstructure to distort.

6. Complete backfill to ground level using free flowing material. Trim all access turrets and prepare suitable footings for each manhole frame ensuring that any loads on the covers are not transmitted to the tank access turrets or access extensions, if fitted.

Installation

Control of Groundwater

Tanks must not be subjected to buoyant forces during installation, taking account of ground water levels and surfaces water run-off, and their accumulation in the tank pit, even if tanks are anchored.

The excavation should be maintained dry by pumping or whatever suitable means until the concrete surround is cured.

Access Shaft Extensions

Access extensions shall be surrounded with concrete poured in 500mm lifts allowing initial set between each lift. The pressure from concrete placed in higher lifts may cause access extensions to distort or collapse.

Please note that loose shafts should be sealed using silicon sealant Sikaflex -291 or similar prior to installation to prevent ingress of ground water under high water table conditions. It is the contractor's responsibility to ensure a watertight seal.

Bouyancy & Anchoring

Where depth of cover over the tank exceeds 70% of the tank diameter, it will not require mechanical anchoring in worst case conditions of empty tank with tank pit flooded to ground level. If depth of cover is less than this, then mechanical anchoring is required for worst case conditions.

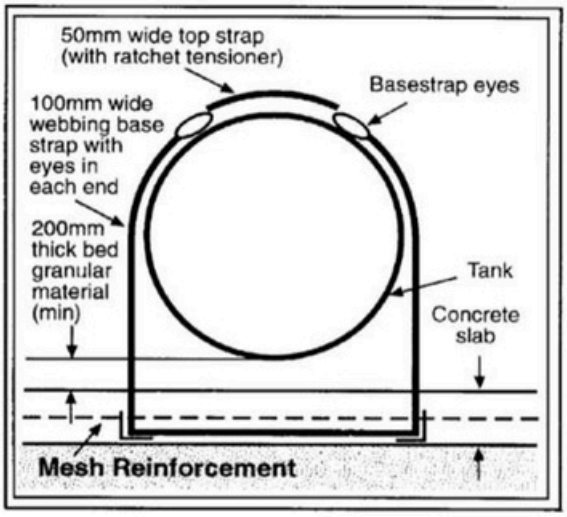
Two methods are possible:-

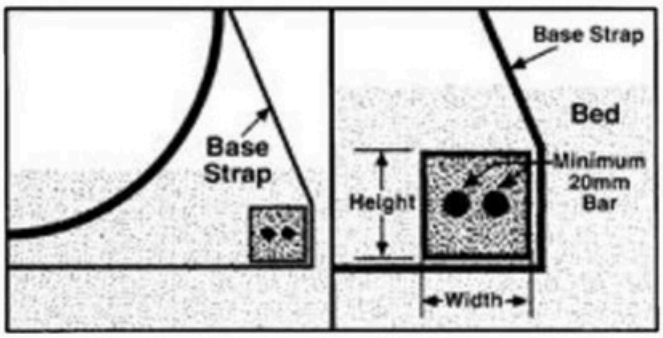
Option 1 - Reinforced Concrete Anchor Slab

Reinforced concrete anchor slab of minimum thickness 200 mm, sized to cover the excavation area. The slab should incorporate webbing anchor straps.

Option 2 - Concrete Deadman Anchors

Reinforced (two 20mm steel bars) concrete beam (pre-cast or in situ) each side of the tank of equal length to the tank, and with section as shown below.





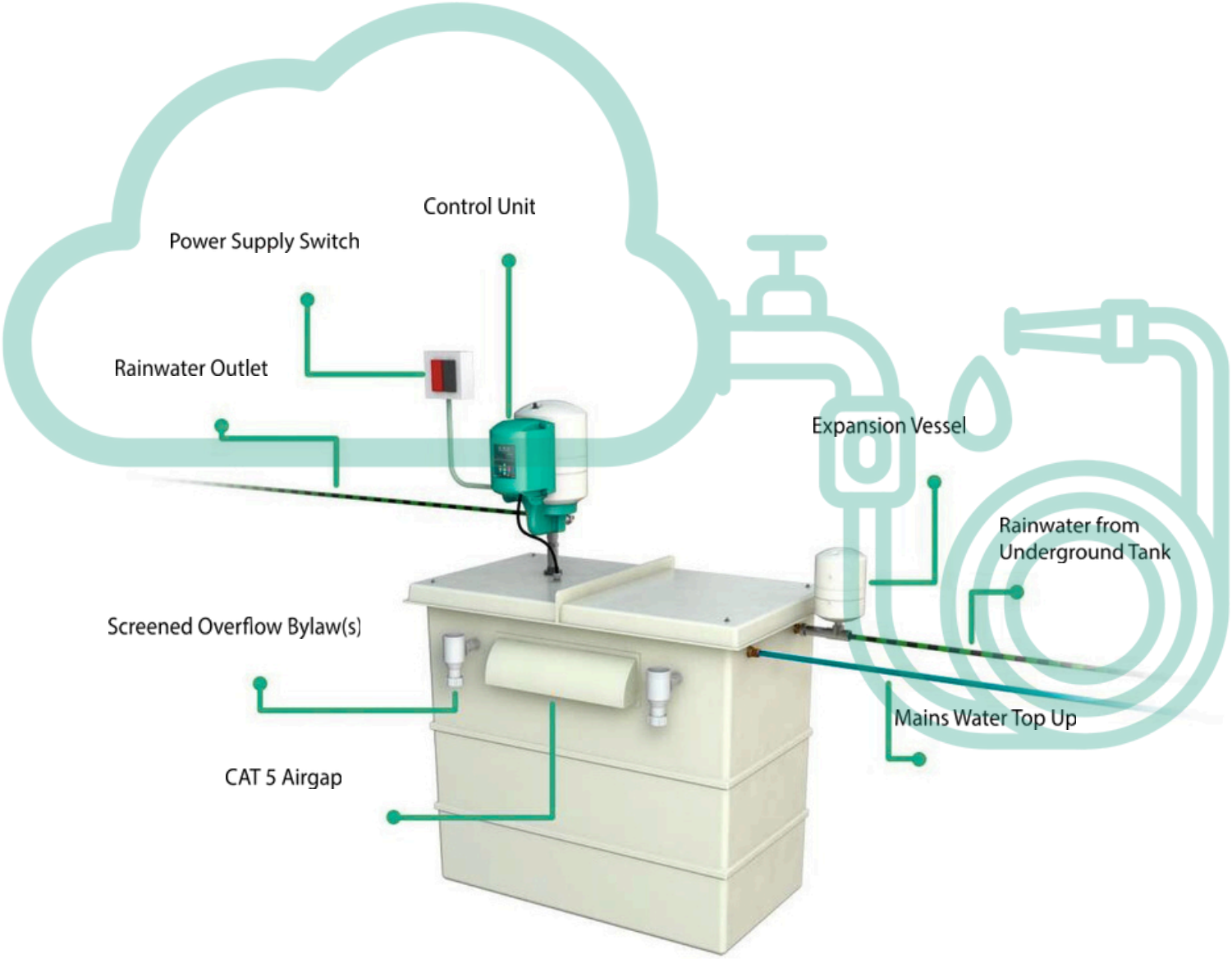
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Installation of Mechanical Works

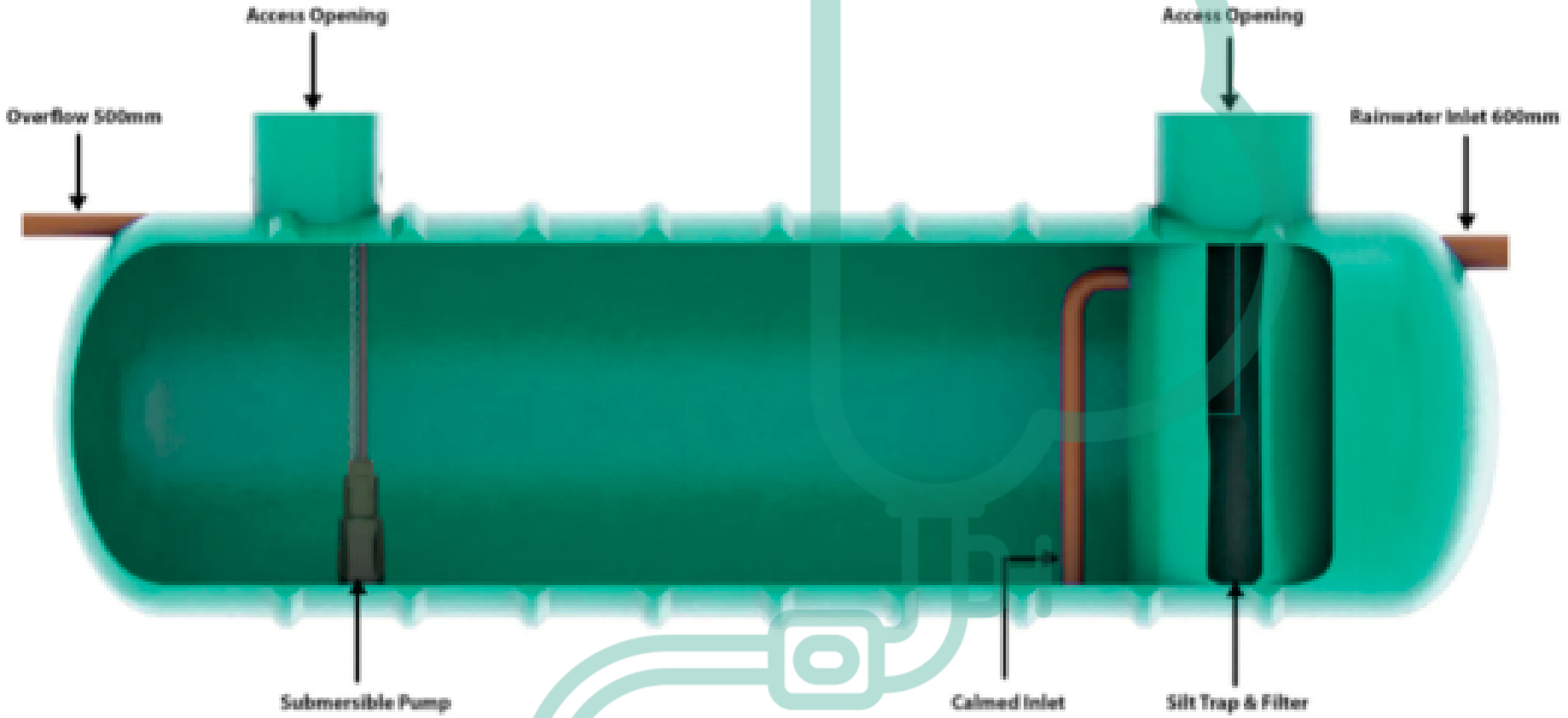
Control Panel

The control panel is the central hub of the system. All the rainwater must pass through here on its way to the points of use.

The unit comprises of the pump, a small water storage tank (break tank), a pressure vessel and the pump(s) inverter which enables the whole system to function and includes the display panel.



Below Ground Chamber Overview



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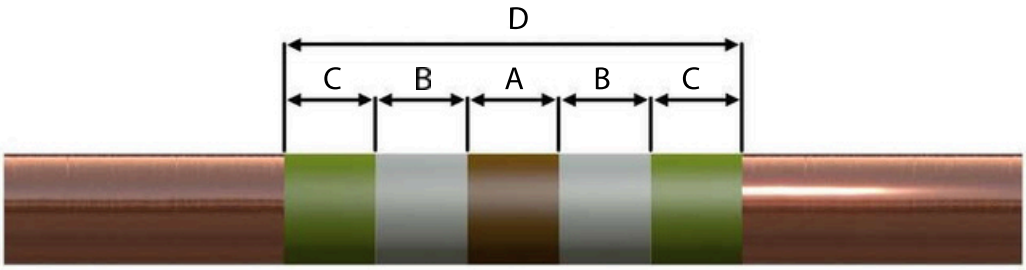
Pipework & Labeling

Pipework

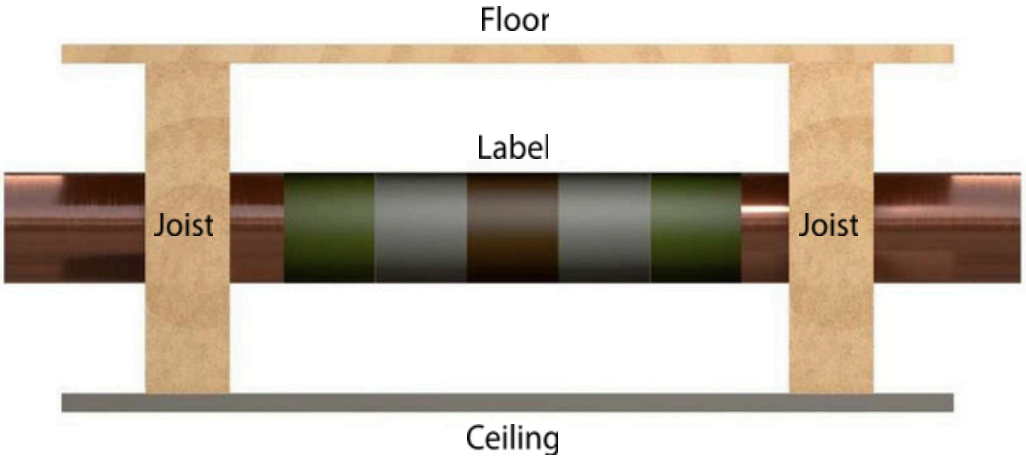
To completely reduce the risk of cross-connection and contamination of the wholesome water supply it is essential that all reused water pipework is both readily distinguishable from other pipework and instantly recognisable wherever it is located, for example inside a property, beneath the street, or on private land.

So that accidental or deliberate operation, that could put the wholesome supply at risk, can be avoided, all apparatus such as valves and washouts on systems distributing reused water should be suitably marked and significantly different from those normally used on wholesome water distribution networks.

Please use the following instructions in connection with the warning labels (**available as an option)** to ensure your system is correctly labelled and meets WRAS regulation standards IGN:No 9.02.05



Pipe Diameter	A	B	C	D
d<50mm	30mm	30mm	30mm	150mm
50mm<d<100mm	75mm	75mm	75mm	375mm
100mm<d	150mm	150mm	150mm	750mm



Examples of recommended labelling for pipework inside buildings. All pipework inside buildings should be labelled as shown above to ensure it is easily identifiable as a rainwater supply.

Marking of pipework in areas not easily exposed. When only small sections of pipework are visible for example between floor joists, a label should be applied at least in every void as demonstrated.

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Pipework & Labeling

Labelling

All rainwater storage facilities and points of use, garden taps and washing machines for example, should be clearly labelled using signage as shown.

Mains Water Stop Tap

Caution: Rainwater Harvesting System installed in this property supplying: -

- ☐ **Toilet**
- ☐ **Garden / Outside Tap**
- ☐ **Washing Machine**

Rainwater



NOT suitable for drinking

Garden Tap
Cold Boosted Rainwater

WC Cistern
Cold Boosted Rainwater

Any pipework carrying rainwater, to other points of use, that is located outside the building should be black plastic pipe marked with green horizontal stripes at the four quadrants as illustrated.



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Troubleshooting

Alarm List

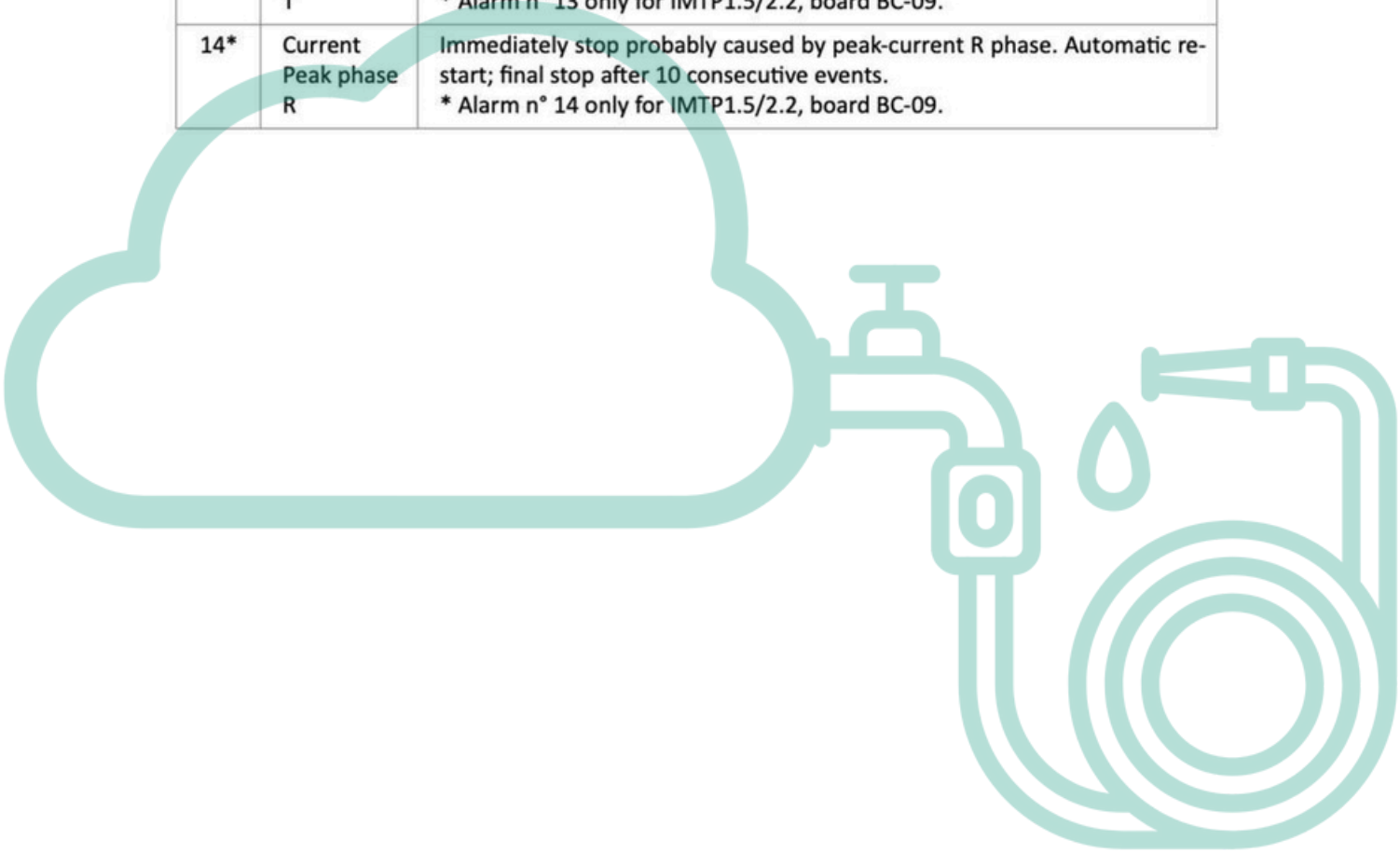
Alarm N°	Alarm Type	Description
1	Current Peak	Immediately stop probably caused by short circuit Automatic re-start; final stop after 10 consecutive events
2	Over-Voltage	Normally caused by over voltage pick supply. Automatic re-start; final stop after 10 consecutive events
3	Inverter Temperatur	Over temperature IGBT protection (90°C) Automatic re-start; final stop after 10 consecutive events
4	Thermal protection	Motor thermal protection related to nominal current set, for motor insulations saving at high temperatures. Automatic re-start; final stop after 10 consecutive events
5	Dry operating	Null input flow or air presence; Automatic re-start; final stop after 5 consecutive events
6	Pressure sensor problem	Pressure sensor output problem Automatic re-start; final stop after 10 consecutive events
7	Under-Voltage	Input voltage under the minimum working limit. Automatic re-start; final stop after 10 consecutive events
8	Enable OFF	Open contact between EN e C (figure 14-15-16): stop the motor; the motor restart when the contact will close again
9	Over-Current IGBT	Over current on the IGBT, overtaking a current limit value setting Automatic re-start; final stop after 10 consecutive events (for models with AW04 El. Board)
10	INPUT-OUTPUT inverted	Connection mistake: Voltage supply connected on the output and Motor cable connected on the entrance: reverse in order to enable the motor.
11*	Fault IGBT 0-1	IGBT 0-1 problem. Automatic re-start; final stop after 10 consecutive events. * Alarm n°11 only for IMMP1.1/1.8/2.2 models, board AW-04.
12*	Fault IGBT 2-3	IGBT 2-3 problem. Automatic re-start; final stop after 10 consecutive events. * Alarm n°12 only for IMMP1.1/1.8/2.2 models, board AW-04.
13**	Minimum Flow	The pump stop for minimum flow limit achievement. It's a normal working condition of the system (no demand of water on the delivery) even thug is on the alarm list, Automatic re-start; no limits. *Alarm n°13 only for IMMP1.1/1.8/2.2 models, board AW-04; **Alarm n°11 only for IMTP1.5/2.2 models, board BC-09 and ITTP1.5/2.2/3.0 models.

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12*	Current Peak phase S	Immediately stop probably caused by peak-current S phase. Automatic re-start; final stop after 10 consecutive events. * Alarm n° 12 only for IMTP1.5/2.2, board BC-09.
13*	Current Peak phase T	Immediately stop probably caused by peak-current T phase. Automatic re-start; final stop after 10 consecutive events. * Alarm n° 13 only for IMTP1.5/2.2, board BC-09.
14*	Current Peak phase R	Immediately stop probably caused by peak-current R phase. Automatic re-start; final stop after 10 consecutive events. * Alarm n° 14 only for IMTP1.5/2.2, board BC-09.



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Alarm List

N	Possible problem	Possible solution
1	Pressing start button the motor don't start or start and stop after few seconds and the inverter show Over-Current alarm or Current Pick alarm	Check if the input/output of the inverter are respectly connected between line and motor, without inversion (Warning: input/output inversion can damage the electronic board of the inverter). Check the correct connection of the pump (star/delta): possible mistake. Check if all the three wires to the motor are connected good and the three current are balanced. Check if the motor power size is not so high on respect to the inverter size. Check if the inverter is not on Master-Slave condition (Advanced Functions -> Group Functioning) set to slave, without the Master inverter connected and switched on: in this
2	Pressing start button the motor don't start or start and stop immediately and the inverter show Under Voltage alarm	Check that all the input voltage supply wires are connected good on the entrance of the inverter: if the inverter input is three-phases but on the connection there are only two, the inverter switch on and can start the motor, but haven't enough power to supply it. Check that before the inverter the supply line wires size are good to have a limited voltage drop, then a sufficient voltage
3	During working at the maximum power the inverter reduce continuously the output power to the motor then stop the motor and the inverter show Over Temperature IGBT alarm /Inverter Temperature	Temperature of the electronic board of the inverter is too high and the inverter must remain stop for few minutes to reduce the internal temperature before the automatic restart. For wall mounting type be sure that the inverter stand on a wall, in vertical position, protected from directly sunlight, and the air flow is totally free; for motor mounting type check that the air flow from the motor fan is good to limit the aluminum temperature of the inverter case under 60°C; the inverter cannot work continuously at the maximum power with a ambient temperature higher than 40°C and with high temperature can reduce automatically the output
4	Pressure Transducer don't measure the correct pressure value (error > 1 Bar)	Check if the pressure transducer is connected on the delivery of the pump on a correct position, not so close to the impellers and before the valve to close the flow.
5	Pressure Transducer measure a pressure too high when the motor is running then the Inverter reduce the motor velocity at the minimum value (low	Check that the pressure cable is separated from the motor cable, that is a source of noise; specially when the cable of the pressure transducer is too long (long distance between inverter and motor) it's very important to use a shielded type two wire cable, as far as possible to the motor supply cable. Connect the shield to ground only on one terminal, if possible connect it directly on a metal screw to ground near the motor.

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Troubleshooting

Alarm List

6	The Inverter cannot work because remain in Pressure Transducer Problem alarm condition	Check If the wires of the pressure transducer are correctly connected brown on +, white on S contact on the board. Check wiring connection on the cable of the pressure transducer. Warning: In case you need to cut the pressure transducer cable to add a longer cable be sure to switch off the inverter at least 1 minute before to cut this cable, otherwise you can cause a short circuit on the transducer input of the electronic board (damage) if the internal capacitors are not totally
7	The distance between Pressure transducer and Pump is high (long pipe) and the pressure continuously go	You must reduce the velocity of the feedback control reducing the Proportional factor and the Integral factor (Advanced Functions -> P.I.D. Factors). Try to set these values to half and test the system, then, if not enough, reduce more and test again until the pressure control remain stable.
8	The Inverter stop the motor for Minimum Flow with a high flow condition and then re-start and stop again, continuously	A small water membrane Tank charged with 1.5-2 Bar air pressure is required for a correct working; check it. The condition may also caused by a not correct pump curve saving during the automatic check: possibly the delivery was not totally closed and the Inverter checked a higher curve of the pump; repeat the automatic check (Pump data -> check ON, then exit to the menu and press START) closing totally the outlet and try again the functioning. Verify if there is a no-return inlet valve on the pump and if it's working good without loses. It's possible to reduce the flow before stopping reducing the parameter F1 It's possible to reduce the flow before stopping reducing the parameter Minimum Flow Power stop
9	The inverter don't switch off the pump when the valve on delivery is totally closed	Probably check was done with pump not perfectly filled up; remake the check procedure after a complete filling of the pump and try again if pump switch off correctly in minimum flow condition. If the problem remain, try to grow up the function: Advanced Functions -> Motor data -> Minimum flow power stop, upgrading 2% every time and testing pump, till find
10	The hydraulic system have a big tank (>40 l) and, after check did correctly with closed delivery, the pump stop for minimum flow with a high flow, and then re-start and stop again,	Probably during the automatic check there was a flow of water to full up the big tank, for that the pump curve saved by the inverter is not the correct curve (with null flow and maximum pressure). Maintain full of water the tank (pressure near maximum value); repeat the automatic check (Pump data -> check ON, then exit to the menu and press START). When the check finish try to work again testing the minimum flow stop condition of the motor that must be with a small flow.

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11	The Inverter stop the motor for Dry Working condition	Sometimes the problem is caused by the same Automatic Check error that previous point (see possible solution like
		In other cases possibly there is air mixed with the water on the inlet of the pump (verify pipes and junctions).
12	The pump don't switch off for dry working when the inlet pipe and the pump are empty	In normal working condition, with pump and pipes filled up, remake a check procedure (Pump data -> Check=ON) and try again. If the problem remain grow up the parameter: Motor Data -> Dry Working power stop, from 80% default value doing 10% steps, testing every time the pump. If the problem cannot disappear also with Dry working power stop more than 100%, verify that pump haven't any defect (fault seal, impellers, etc) that can cause a big
13	A group of two or more inverters cannot communicate between each other in Master-Slave mode	For the BC inverters type read on left. For the RS type check the correct connection RS485 by a two wires cable (A to A and B to B). Verify the communication set to Master-Slave on Advanced Functions -> Group Functioning (code 0 for the inverter Master, code 1, 2, etc for all the others Inverters Slave)
14	The Inverter conduct on the input voltage supply line electromagnetic noises that disturb other electronic	Check Ground cable connections (Ground system must be radial type, with resistance less than 10 Ohm). All the Inverters have an internal Input EMC filtering stadium, but is available also an additional EMC Input filter (various types, contact the service) for bigger noise suppression with sensitive devices connected on the line.
15	With a long cable between Inverter and Motor sometimes the inverter stop the motor in Pick Current alarm	The motor can have high pick voltage value caused by the high frequency of the PWM combined with the high capacitance to ground of the long cable: we suggest to use an additional inverter output filter for cable longer than 40 meters connecting it directly on the Inverter output. Available various types of output filters, contact the service to receive informations.
16	The Differential Circuit Breaker on the line sometimes switch	Check the Ground system resistance (must be less than 10 Ohm). Use only differential circuit breaker type A (specific for Inverters).
17	The Magneto-Thermal Circuit Breaker on the line switch off the inverter when the pump run at the maximum power	All the inverters may have a high pick value of the sinusoidal caused by the harmonics (5^{th} , 7^{th} , 11^{th}, etc.) and depending by the resistance of the line, but this condition don't increase the energy absorbing value depending by the area under this current curve. Only you need to use a Magneto-Thermal Circuit Breaker with a higher Current value than the value that you can use for the direct pump controlled. Usually it's enough a switch one step higher than the switch useful for the simple motor (see table of the Magneto-Thermal

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Installation Example

1. **Submersible pump complete with dry run protection**
2. **internal filter and sediment trap**
3. **Rainwater pumped line to booster system**
4. **Rainwater inlet to main chamber**
5. **Mains water supply to Cloud Collector Combi system**
6. **Cloud Collector Combi break tank**
7. **Collected rainwater from building roof area**
8. **Outside fed by the Cloud Collector Combi system**
9. **Rainwater pumped to WCs**
10. **Overflow to storm drain or soak-away**

It is recommended that sealed gulleys are installed where the roof area pipework meets the ground (point 7) A local power supply will also need to be provided for both the submersible pump (point 1) and the main Cloud Collector Combi system.

Optional fittings

An optional ultraviolet disinfection unit is also recommended to be fitted in the property for all water to pass through prior to reaching any internal or external outlets.

