

2 MODEL DOCUMENTS

2.1 DRAFT TYPICAL TERMS OF REFERENCE FOR CONSULTANTS

Background

(Brief description of the Authority's organization and supply system.)

Objectives

The Authority proposes to undertake a study of the whole distribution system from source stations to consumers' fittings with a view to reducing the unaccounted-for water (UFW) and improving control of the system. The UFW appears to be excessive partly due to defects in consumers' meters and certain illegal practices and partly because of losses by waste including underground leakage.

The aim is to reduce metering losses by about not less than 15* percent within a period of three years and losses caused by all forms of waste by about 25 percent within a period of five years.

The Authority proposes to appoint consultants to assist in various aspects of the study in order to implement the procedure required to undertake the improvements necessary to enable the above objectives to be achieved and leave in place a sustainable organization. Consultants will also be hired to make such additional reductions in UFW in future years as may be economically justified. The attached "Working Guidelines" are provided for your review and comments. The Guidelines would then form part of the terms of reference.

Consultants will be required to assist the Authority in the following aspects of the work:

1. The setting to work and calibration of production meters and large consumption meters, including the correct installation of new meters where required and the regular monitoring of all water delivered by these meters.
2. The reassessment of total UFW.
3. A survey of all illegal connections, followed by the removal or the metering of such connections.
4. A sample survey of the accuracy of consumers' meters and of any irregularities in meter reading in order to assess (a) the total loss attributable to metering deficiencies and (b) the actual unit domestic consumption in different social conditions and supply areas.
5. The allocation of total UFW between metering losses and physical losses due to waste.
6. The training of selected members of the Authority's staff in the practical and administrative aspects of reducing waste.
7. A review of all aspects of metering practice, including possible privatization, incentives to improve performance and, if required, design and supervision of extensions to the meter repair shop.

8. A review of present waste control practices and an economic study of alternative methods for improved waste control, followed by advice on future policy.
9. The survey and remapping of the complete network of mains and consumer services and the establishment of a system to ensure continuous updating.
10. The physical separation of the network into isolated districts serving about 10,000-to-20,000 properties.
11. The measurement, monitoring, and evaluation of rates of flow into the whole system and into each isolated district to facilitate the determination and subsequent control of total waste in each district.
12. The establishment and operation of an active waste detection and repair organization, including the tracing of leaks and all forms of waste by appropriate methods.
13. The institution and enforcement of bylaws for the control of waste water by establishment of a plumbing inspection division or other appropriate measures.
14. A network analysis of the distribution network to determine the status of amount operating conditions.
15. A preliminary economic study of the least-cost network reinforcement required to meet demand foreseen in existing planning proposals for the next ten years.
16. Continued advice, training and management services for a period of (three?) years.

Submissions

Consultants with experience in the relevant administrative, financial, operational, and maintenance problems are invited to submit proposals for undertaking all (or any) of the above, including provision of the necessary services, equipment, and labor for:

Phase I Works covering a period of up to one year, and Phase II Works covering a further period of four years.

Consultants should consider collaboration with local consulting companies in order to achieve greater understanding of local conditions and also to disseminate knowledge and experience more widely to achieve more permanent improvements in the maintenance of the supply.

The proposals for labor, equipment, and time required (a) by the consultants and (b) by the Authority are to be itemized for each of the works described in the following sections.

Scope of Consultants Services

Phase I Works

Large Meters. In some cases, production meters exist for measuring flows of treated water from certain works but are not operating satisfactorily and large consumer meters may be under recording or be completely inoperative causing significant revenue losses. All meters have to be

inspected and, where practicable, put into working order and calibrated at all relevant flows from the station. The calibration should, preferably, be undertaken by measurement of volume changes on suction or delivery tanks, or alternatively, by discharge through test meter or such other means as may be agreed upon by the Authority. Where meters cannot reasonably be put into working order or where meters do not already exist, new meters are to be purchased and installed at the Authority's expense in such a way as to minimize interference with the supply of water. Sufficient meters are to be purchased and installed to enable the total rate of flow from all source works into the distribution system and use by large consumers to be measured at all times.

Reassessment of UFW. Having determined the true figure for total quantity of water produced and delivered into the system, it remains to calculate the total quantity that can be accounted for in supplies to the consumers. Two factors must be kept in mind: (a) the quantity supplied to consumers or used for public purposes but not metered and (b) the lack of correlation between the dates of reading various consumers' meters. A study is required of the seasonal or other variations in accounted for water compared with the water produced. The total UFW for the supply area can then be calculated as a percentage of the water produced. A survey is also required of the number of properties in each district so that UFW can also be calculated in terms of quantity per property per hour. Comparisons should be made of these quantities in the different districts.

Illegal Connections. (Normally applicable only when domestic supplies are metered.) A sample survey must be undertaken of the total number of properties receiving water supply compared with the number of metered connections. This survey should cover different social areas separately to determine the extent of illegal domestic supplies and variations between different areas. It must cover supplies afforded by neighbors through temporary house connections as well as permanent connections. The survey must show the number of inhabitants (as well as properties) receiving an illegal supply. In addition, the survey must cover industrial premises, which may have some unmetered, as well as metered, connections. Where consultants propose to use aerial sewage students or local labor for such surveys, their proposals must be detailed for independent checking to minimize fraud or other inaccuracies in data obtained. Consultants are also required to advise on appropriate steps (bylaws, tariffs, etc.) to be taken to minimize the reconnection of illegal supplies that have been cut off and to ensure that all connections are and remain metered.

Sample Meter Accuracy and Domestic Consumption. A study of the accuracy of existing meters should be made, based on testing a 1 percent random sample of installed meters by means of a portable test meter. The site data must include data on the number of inhabitants served from each meter and the setting of the consumers' control valve when first examined. The accuracy tests must especially include calibration at the flow rate for this normal valve

setting, as well as for very poor flow rates. The Authority's meter readers and other assistants will be made available as necessary for locating meters and other assistance.

The accuracy of meters should be recorded for each manufacturer and type of meter as well as (where the Authority's records are available) the time that has elapsed since the meter was (a) last read and (b) last changed. In addition, information from the last two meter readings for all the meters tested is required to determine total metered consumption through the meters tested, total consumption per capita per day, and, where possible, comparable figures for different districts and different social groups. This study must also investigate any possible irregularities in meter reading, estimate the total effect of any such irregularities, and advise on measures to be adopted to reduce the problem. It should also be aimed at determining the extent of water wastage, including underground leakage, on the consumer's premises.

Nonphysical UFW. Consultants will be required to determine from their surveys of meter accuracy, illegalities, and irregularities the actual quantities of water being delivered to consumers and thus, how much of UFW is attributable to metering deficiency. By deduction from total UFW, that part of UFW attributable to leakage should be calculated.

Training and Equipment. Consultants are required to provide specialized training of not less than 20 weeks for (six?) of the Authority's employees in all aspects of waste detection, leakage repair, and prevention of waste, including inspection of consumer's plumbing and fittings. This training should be undertaken by the consultants' staff in association with employees of a water authority in a developed country. It should include lectures on theoretical aspects but should be particularly devoted to practical training under working conditions using traditional methods as well as more modern equipment for leak detection. This training abroad should be followed by further training by the consultant on the Authority's works. It initially should include assistance on the works described in Sections 4.1 -4.5 and 4.8 of the Working Guidelines and, later, on the proposed Phase II Works. Consultants must provide the specialized leak detection equipment required initially and the specifications for all additional equipment required for implementation of the proposed policy.

As part of the extended training, consultants are required to establish a pilot waste meter district, which will be regularly monitored and studied by all trainees.

Metering Practice. Following the sample tests on consumer meter accuracy, a review is required of present metering practice. This review should focus on the type, diameter, and manufacture of meters in current use; the required level of meter testing, repair, and replacement for effective operation; the possible alternative use of flow limiters for domestic consumers to ensure continued water conservation; and means to simplify maintenance, operation, and billing procedure. The quality of the water supplied, particularly the suspended solids, and the potential

for improvements in quality by better maintenance of the network (including increased flushing, rehabilitation by cleaning, and relining of pipework) are all factors to be taken into account.

The practice for replacement, repair, and testing of meters should be examined and recommendations should be made as to possible incentives for improved output and changes in frequency of reading, replacement, and associated extensions of repair and testing shop facilities. A special study should be made on large meter installation, calibration and maintenance practices.

Attention is to be given to possible privatization of meter reading and billing, which may also include privatization of meter installation, maintenance, testing, and repairs.

Depending on the conclusions and recommendations reached in regard to metering practice, the consultant may be required to design and supervise the construction of extensions to, and management of, meter repair and testing shop facilities.

Waste Detection and Repair Policy. In collaboration with the Authority, consultants are required to (a) review present waste control practices, (b) consider alternative, systematic methods required to meet target reductions in physical UFW, (c) examine the costs of waste detection methods, (d) undertake an economic study of alternative methods, and (e) advise on the policy to be adopted and the administrative and organizational changes to be made for the policy to be implemented, including the establishment of a practicable bonus scheme to stimulate enthusiasm among the inspectors and other personnel engaged in the works.

Phase II Works

Network Survey and Remapping. Existing maps of the distribution network are probably no longer accurate; many valves, hydrants and fittings have been covered over and can no longer be found; many are not operative. Specialized services are required, using electronic methods, to trace all mains and service connections and to plot on new maps to a scale of 1:1,000 showing correct sizes, materials, positions, and depths of all pipelines at 33 meter intervals. The maps are also required to show topographical details with ground elevations to 0.1 meter accuracy at all major pipework connections and otherwise at about 100 meter intervals. This work is to be undertaken in sections beginning with the older parts of the network and eventually covering the whole network.

An organization should be established to ensure that all future extensions, reinforcements, and modifications are recorded as constructed and that all relevant data is transferred to the new maps.

The adoption of a computer mapping system should be considered and approved by the Authority.

Network Zones and Districts. The existing boundaries of zones and districts should be examined. This process should also ensure that the rates of inflow to each district can be monitored at all times. Where districts have not been established, they should be set up; normally they should not contain more than about 20,000 properties. First, the proposed district boundaries should be determined. When they have been approved by the Authority, a project for installing the necessary valving, metering, and modifications should be designed and specified; construction should be supervised and, finally, tested to demonstrate integrity. The district is to be surveyed demographically, and a monitoring system is to be established and maintained in collaboration with the Authority to enable changes in unit and total consumption to be regularly evaluated.

Waste Detection Division. Consultants are required to advise on the setting up (or the re-constitution and enlargement) of active waste detection and repair services. Appropriate organization and staffing, designed to implement the proposed policy as determined by the economic study undertaken in Section 4.8. of the Working Guidelines should be included. Consultants are also required to provide management services to assist in the operation of this division for a period of about four years and to ensure its continued operation thereafter, as may be dictated by economic policy, so as to increase the control of all forms of waste water. The consultant's duties should include, but not be limited to, a review of, and advice on, current procedures for applications for new water services and on customers' internal service and plumbing repairs.

Bylaws. The Authority proposes to request the Government to introduce legislation for the introduction of (or alternatively to reactivate the operation of) bylaws for the control of waste water. Consultants are required to advise on all aspects of the implementation of this policy, including the provision of a plumbing inspectorate to ensure compliance with required standards of fittings and plumbing and with the specifications for all new main laying and repair works. Particular emphasis has to be placed on public relations and, if necessary, on proposed enforcement methods that may be necessary to ensure compliance with the bylaws.

Network Analysis. In order to improve operation and control of the overall program; that is, to extend control of UFW and to determine least-cost network reinforcements to meet planned expansion of the supply, the Authority proposes a computer analysis of the existing network. Following the network survey in Section 4.9 of the Working Guidelines, consultants are required to undertake the necessary network analysis and to ensure correct calibration that represents current conditions. It is expected that certain anomalies may be discovered and that modifications of the network may be advisable in order to simplify operation or reduce the range of operating pressures and thus to reduce waste. Consultants are required to examine all possible modifications and, subject to an economic study, to advise on and to design and specify works for metering those changes that are justified. The network analysis is amply justified to achieve effective control of UFW as well as improved knowledge and operation of the system.

Network Reinforcement. A natural corollary not strictly related to UFW control is the use of the network analysis for least-cost reinforcement of the network in order to meet planned expansion of water supply. This work may be conveniently included in the terms of reference for consultants, who also may be called upon to design and supervise the construction of new main laying work and to ensure improved standards, thus preventing perpetuation of excessive underground leakage.

Continued Advice on Maintenance and Associated Management Services. The Authority is aware that the problems of excessive UFW are only one example of inadequate attention to maintenance of all parts of the system resulting mainly from lack of sufficient trained and experienced personnel. The aim is to correct this situation by improving the training of personnel at all levels and thus improving the management and organization so that a higher level of service and a more reliable supply of water is made available to meet future needs. Consultants are required to maintain a presence of experienced operators working in the Authority for a period of about three years after the conclusion of the contract covering the above works. These operators are to be engaged in in-house training of personnel, advice to the Authority on improvements of operation and maintenance, and ultimately in achieving independence of consultant assistance.

Reports

Consultants should provide the Authority with monthly progress reports during Phase I works, together with a separate report at the conclusion of each of the itemized works.

Consultants are required to prepare, in consultation with the Authority, monitoring indicators and a reporting system designed to provide clear information on the physical achievements and overall progress completed during Phase II works. At the conclusion of these works a comprehensive report is to be furnished giving full details of all data collected and all accomplishments.

The reports should have a succinct executive summary (both in English and the local language) which should have clear conclusions and recommendations.

All reports are to be presented in English (30 copies) and in the local language. The number of local language copies should be decided in consultation with the client.

2.2 TYPICAL BYLAWS FOR THE PREVENTION OF WASTE OR MISUSE OF WATER*

The following bylaws are for use in the U.K. and are suitable when the plumbing system is indirect; that is, the majority or possibly the whole of the supply is delivered to a private storage tank. When the plumbing is direct and there is no private storage tank these bylaws would have to be modified accordingly.

BYLAWS made under

Authority for preventing waste, undue consumption, misuse, or contamination of water supplied by them.

Interpretation

1. In these bylaws, unless the context otherwise requires-

Definitions

"ball valve" means any float-operated valve for controlling the inflow of water to a cistern:

"British Standard" means a standard or specification issued by the British Standards Institution ;

and British Code of Practice means a code of practice issued and available as aforesaid.

"building" means any structure (including a floating structure) whether of a permanent character or not, and whether movable or immovable, and without prejudice to the generality of the foregoing, includes any caravan, vessel, boat or houseboat;

"capacity" in relation to a storage cistern means the capacity of the cistern measured up to the highest level the water can reach when the ballvalve or other device for controlling the inflow of water is fitted or adjusted in the manner required by paragraph (d) of byelaw 40, or, where paragraph (e) of byelaw 41 applies, by that paragraph;

"closed circuit" means any system of pipes and other water fittings through which water circulates and from which water is not drawn for use, and includes any vent pipe fitted thereto but not the feed cistern or the cold feed pipe;

"corrosion-resisting material" means any material which is highly resistant to any corrosive action to which it is likely to be subjected in the circumstance: in which it is used;

"cylinder" means a cylindrical closed vessel capable of containing water under pressure greater than atmospheric pressure;

"distributing pipe" means any pipe (other than an overflow pipe or a flushing pipe) conveying water from a storage cistern, or from a hot water apparatus supplied from a feed cistern, and under pressure from that cistern;

"feed cistern" means any storage cistern used for supplying cold water to a hot water apparatus, cylinder or tank;

"overflowing level" in relation to a warning or other overflow pipe of a cistern, means the lowest level at which water can flow into that pipe from that cistern;

"service pipe" means so much of any pipe for supplying water from a main to any premises as is subject to water pressure from that main, or would be so subject but for the closing of some stopvalve;

"stopvalve" means any device (including a stopcock and stop tap), other than a draw-off tap, for stopping at will the flow of water in a pipe;

"storage cistern" means any cistern, other than a flushing cistern, having a free water surface under atmospheric pressure, but does not include a drinking-trough or drinking-bowl for animals, including poultry;

"tank" means a non-cylindrical closed vessel capable of containing water under pressure greater than atmospheric pressure;

"the undertakers" means the Authority;

"warning pipe" means an overflow pipe so fixed that its outlet, whether inside or outside a building, is in a conspicuous position where the discharge of any water therefrom can be readily seen; and

"water fittings" includes pipes (other than mains), taps, cocks, valves, ferrules, meters, cisterns, baths, waterclosets, soil pans and other similar apparatus used in connection with the supply and use of water.

Compliance with British Standards

2.(1) Any requirement in these byelaws that a water fitting shall comply with a British Standard shall-

(a) be construed as requiring compliance with that Standard only in so far as the Standard relates to the size, nature, materials, strength and workmanship of that fitting; and

(b) be deemed to be satisfied, notwithstanding that the fitting does not comply with that Standard in so far as it relates to those matters, if the fitting is not less efficient and suitable in

relation to the purposes for which these byelaws are made than a fitting which does comply with that Standard in so far as it relates to those matters.

2.(2) Where any requirement of any such Standard relating to any of those matters conflicts with a specific requirement of these byelaws the latter requirement shall prevail.

Application

Application of byelaws generally

3. No person shall

- (a) use a water fitting for the purpose of conveying or receiving water supplied by the undertakers, or cause or permit a water fitting to be used, or to remain arranged or connected so that it can be used, for that purpose, in contravention of a provision of any of the following byelaws, that is to say, byelaws 7, 7A, 8, 10 to 12, 14 to 26 and 28 to 58A, or if the fitting, or its mode of arrangement or connection, or its situation, contravenes, or is not in accordance with, such a provision, or if the fitting is not equipped, provided with fittings or accessories, protected or supported in accordance with or if it is equipped or provided with fittings or accessories or in contravention of, such a provision; or
- (b) arrange or connect a water fitting, or cause or permit a water fitting to be arranged or connected, so that it can be used for the purpose aforesaid, in contravention of, or in a manner or in a situation which contravenes, or is not in accordance with, a provision of any of the said byelaws, or if the fitting contravenes, or is not in accordance with, such a provision; or
- (c) alter a water fitting used for the purpose aforesaid, or cause or permit a water fitting to be altered, so that it contravenes, or is not in accordance with, a provision of any of the said byelaws; or disconnect a water fitting used for the purpose aforesaid, or cause or permit a water fitting to be or remain disconnected, otherwise than for the purpose of repair or renewal, if, as a result of the disconnection, a provision of any of the said byelaws by virtue of which the fitting is required to remain connected will be contravened.

Savings for fittings lawfully fitted

4. (1) None of these byelaws (with the exception of byelaws 7, 10(4) and 24) shall have effect so as to require any person to cease to use, or to arrange, connect, disconnect, alter, dismantle or renew any water fitting lawfully used or capable of being lawfully used on any premises immediately before the byelaw first applied in relation to those premises, or to remove any fitting or accessory from such a fitting or to refit such a fitting in a different situation, or to provide any equipment, fitting, accessory, protection or support for a water fitting then used or capable of being used on any premises where the absence of the required equipment, fitting, accessory, protection or support was not (and is not) unlawful, unless, by reason of the damaged, worn or otherwise unserviceable condition of the water fitting, its faulty arrangement or connection, its situation, equipment, fittings or accessories or the absence of the required equipment, fittings, accessories, protection or support, it causes or permits, or is likely to cause or permit,

waste, undue consumption, misuse, erroneous measurement or contamination of water, or reverberation in pipes.

(2) Where, for a reason mentioned in the preceding paragraph, any of these byelaws (other than byelaws 7, 10(4) and 24) has effect as mentioned in that paragraph, or where byelaw 7, 10(4) or 24 has such effect, and any work is rendered necessary by that byelaw, compliance therewith may be postponed for such time as reasonably required for the carrying out of that work.

Closed Circuits

5. Of the following byelaws, only byelaws 6 - 8, 10 - 16, 23, 26, 29(3), 31, 59 and 60 shall apply in relation to any water fitting forming part of a closed circuit.

Fittings used for Industrial or research purposes

6. Where water is
(a) taken by meter and discharged into a storage cistern; and
(b) discharged into the air not less than 150mm above the top edge of the cistern and
(c) conveyed from the cistern for use for industrial or research purposes,
and it is not reasonably practicable for any one or more of the following byelaws (other than byelaws 7 And 8) to be complied with in relation to any water fitting supplied with water from the cistern, that byelaw or those byelaws shall not apply in relation to that fitting.

General provisions

Unserviceable fittings & fittings not mentioned in the byelaws

7. A water fitting falling within either of the following paragraphs, that is to say
(a) any pipe, pipe fitting, draw-off tap, draining tap, stopvalve, ballvalve, float, cistern, cylinder, tank or flushing apparatus or any bath, wash basin, sink, soil pan or similar appliance, being a fitting which is damaged, worn or otherwise unserviceable, or connected or arranged in a faulty manner; and
(b) any fitting not specified in the preceding paragraph, whether or not damaged, worn or otherwise unserviceable, or connected or arranged in a faulty manner,
shall not be used, or be or remain so connected that it can be used, if, notwithstanding that its use or connection does not contravene any of the following byelaws, it causes or permits, or is likely to cause or permit, waste, undue consumption, misuse, erroneous measurement or contamination of water supplied by the undertakers or reverberation in pipes.

Deterioration through electrolytic action

7A. Water fittings of dissimilar metals shall not be used, or be or remain so connected that they can be used, for the purpose of conveying or receiving the same water, unless
(a) the circumstances are such that deterioration of any of the fittings through electrolytic action is not likely to occur; or
(b) effective measures are taken to prevent such deterioration.

Connections which could cause contamination of mains water

8. (1) No pipe or cistern used for conveying or receiving water supplied by the undertakers shall convey or receive, or be or remain so connected that it can convey or receive, water not supplied by the undertakers:

Provided that where the water supplied by the undertakers to any cistern is discharged into the air not less than 150 mm above the top edge thereof, this paragraph shall not apply to that cistern or to any pipe conveying, or any cistern receiving water therefrom.

(2) In the preceding paragraph, "water not supplied by the undertakers" includes, and "water supplied by the undertakers" does not include, water supplied by the undertakers which has been used.

(3) No pipe or cistern used for conveying or receiving potable water shall convey or receive, or be or remain so connected that it can convey or receive, non-potable water; Provided that where the potable water supplied to any cistern is discharged into the air not less than 150 mm above the top edge thereof, this paragraph shall not apply to that cistern or to any pipe conveying, or any cistern receiving, water therefrom.

(4) In the preceding paragraph "non-potable water" means water supplied by the undertakers for non-domestic purposes only, and as being unfit for drinking or culinary purposes, and "potable water" means any other water supplied by the undertakers.

(5) No service pipe or pump delivery pipe drawing water from a service pipe shall convey water from

(a) a distributing pipe; or

(b) a pump delivery pipe drawing water either from a distributing pipe or from a storage cistern.

(6) No pump or other means of increasing pressure shall be installed in a service pipe for the purpose of increasing pressure or rate of flow in or from a service pipe or a fitting or appliance connected to that pipe.

Taps for Drinking Water

9. (1) In any premises: (not being premises: to which section 57 of the factories Act 1961 applies, or premises to which section 11 of the Offices, Shops and Railway Premises Act 1963 applies or which, by or under that Act, are excepted or excluded from the application of that Act) in which water is supplied by the undertakers for domestic purposes, the supply being separately chargeable, the person for the time being entitled or authorised to do so shall provide a draw-off tap in a position convenient for drawing drinking water on a service pipe or a pump delivery pipe drawing water from a service pipe:

Provided that where, by reason of the height at which the water is required to be delivered or of some other circumstance, it is not reasonably practicable to provide in the premises a service pipe or a pump delivery pipe drawing water from a service pipe, the tap may be provided on a pump delivery pipe or distributing pipe drawing water exclusively from a storage cistern which-

- (a) is a closed vessel having a tightly fitting access cover bolted or screwed in position;
- (b) is properly maintained and, where necessary, suitably lined or coated to preserve the potability of the water;
- (c) has an air inlet and an overflow pipe or pipes all suitably screened;
- (d) is, where necessary, insulated against heat; and
- (d) is supplied exclusively from a service pipe, or from a pump delivery pipe drawing water either from a service pipe or from a storage cistern which is a closed vessel equipped, maintained and supplied as aforesaid.

(2) This byelaw shall not have effect so as to require any person to provide a tap on a pipe which was in any premises immediately before this byelaw first applied in relation to those premises if the omission to provide the tap on the pipe was not then unlawful.

(3) No pipe on which a tap is provided in compliance with this byelaw shall be so placed that the water in the pipe is likely to become warm before reaching the tap.

Protection from damage from frost

10. (1) Every water fitting, whether inside or outside a building, shall be so placed as to reduce to the greatest extent which is reasonably practicable the risk of damage to it from frost.

(2) Every water fitting (other than an overflow pipe) which, notwithstanding compliance with the preceding paragraph, is likely to suffer damage from frost shall be effectively protected from such damage

(3) The requirements of the preceding paragraphs shall be deemed to be satisfied if the location, protection and insulation of the fittings are in accordance with the recommendations in that behalf in Sections three, four and five of the British Standard Code of Practice CP 99: 1972 "Frost precautions for water services.

In every building and in every part of a building the supply to which is separately chargeable the water fittings on the downstream side of each stopvalve required by byelaw 24 shall be so arranged that they can be drained to prevent damage to them from frost, and shall be fitted with such draining taps (if any) as may be reasonably necessary for that Purpose.

Protection from damage from other causes

11. Every water fitting, whether inside or outside a building, which is so placed as to be liable to damage from some cause other than frost shall be effectively protected from such damage.

Accessibility of fittings

12. Every water fitting in, on or under a building shall be so placed as to be readily accessible: for purposes of examination, repair, replacement and operation, except where compliance with this requirement is not reasonably practicable or is inconsistent with the provisions of byelaw 10 or 11:

Provided that this byelaw shall not prevent-

(a) the enclosing of any pipe or any fitting thereon in a chase or duct if the pipe and fitting are reasonably accessible for such purposes: or

(b) the embedding of any pipe or pipe fitting in the fabric of a building so far as may be necessary for the efficient operation of any system of space heating.

Disconnection of disused Pipes

13. If a water fitting is disconnected and is not within 28 days reconnected or replaced, the person supplied with water by the undertakers shall disconnect any pipe or part of a pipe which conveyed water supplied by them to that fitting and is not required to convey such water to any other fitting.

Pipes

Support of pipes

14. Every pipe shall be adequately supported and shall be so arranged as to avoid any air lock or reverberation.

Depth of pipes laid underground

15. Every pipe laid in the ground shall, unless it is under a building of a permanent character, at no time be less than 750 mm nor more than 1.35m below the surface of the ground, measured from the top of the pipe to the ground surface.

Provided that if it is not reasonably practicable for a pipe or some part of a pipe to be not less than 750mm below the surface of the ground, that pipe or part shall be at the greatest depth below the surface of the ground that is reasonably practicable, and in every such case the pipe shall be given adequate waterproof insulation and protection against damage from causes other than freezing.

Protection of pipes from corrosion and contact with contaminating substances

16. (1) No pipe or pipe fitting shall be laid, installed or allowed to remain in or on the ground unless it is either of a corrosion-resisting material or effectively protected from external corrosion

(2) No pipe shall pass into or through any ashpit, manure pit, sewer, drain, cesspool, refuse chute or any manhole connected therewith.

(3) No pipe shall be laid, installed or allowed to remain in or on any foul soil or outer substance which could cause contamination of the water in the pipe unless it is impracticable for

the pipe to be elsewhere and all necessary measures are taken to avoid any risk of contamination of the water in the pipe.

(4) No pipe made of any material susceptible to permeation by any gas or other substance which could cause contamination of the water in the pipe shall be laid, installed or allowed to remain in a position where such permeation could reasonably be expected to occur

Dezincification

16A. Every water fitting and every component of a water fitting on any pipe below ground which may be in contact with water shall be resistant or immune to dezincification. Provided that this requirement shall not apply to any fitting or component of any fitting in a closed circuit.

Pipes of lead, wrought iron and steel not to be used

17. No service pipe, pump delivery pipe or distributing pipe, or pipe fitting connected to any such pipe, shall be of lead, wrought iron or of steel other than stainless steel unless: --
either

- (i) the circumstances are such that contamination of water or deterioration of any such pipe or pipe fitting is unlikely to occur; or
- (ii) effective measures are taken to prevent such contamination of water or deterioration of such pipe or pipe fitting.

Provided that this byelaw shall not prohibit the use of a pipe or pipe fitting of wrought iron or steel which:

- (a) (i) forms part of a fire sprinkler or other fire fighting installation from which water is drawn only for fire fighting purposes; and
(ii) is kept charged with water through an automatic alarm valve or is charged with water only when fire occurs; or
- (b) is used in connection with the supply of water for the purpose of building, demolition or constructional work while the work is in progress or for any other temporary purpose during a period not exceeding one month or such longer period not exceeding three months as the undertakers may approve in any particular case.

Pipes of Cast Iron

18. (1) Every service pipe, pump delivery pipe and distributing pipe of cast iron shall be capable of withstanding a hydraulic test pressure of not less than double the pressure to which the pipe will be liable to be subjected under working conditions.

(2) Every such pipe and every pipe fitting on any such pipe shall comply with British Standard 4622: 1970, "Grey iron pipes and fittings" or with British Standard 4772: 1980, "Specification for ductile iron pipes and linings".

(3) Where; pipes are laid in ground, the surface of which is not suitable for heavy trailer loads, such pipes shall be not less than Class C of the said British Standards 1211: 1958 and

2035: 1966 provided that this byelaw shall not apply to a pipe laid in ground unlikely to be subjected to vehicular traffic.

Pipes of Steel

19. (1) Every service pipe, pump delivery pipe of steel (other than a pipe to which paragraph (2) (a) of this byelaw applies) and every distributing pipe of steel in contact with the soil shall comply with the requirements for heavy tubes in British Standard 1387: 1967, "Steel tubes and tubulars suitable for screwing to BS21 pipe threads".

(2) Every steel pipe not in contact with the soil which is of either of the following descriptions-

(a) a service pipe or pump delivery pipe which

(i) forms part of a fire sprinkler or other fire fighting installation from which water is drawn only for fire fighting purposes; and

(ii) is kept charged with water through an automatic alarm valve or is charged with water only when fire occurs; and

(b) a distributing pipe,

shall comply with the requirements for medium tubes in the said British Standard 1387: 1967.

(3) Every malleable cast iron pipe fitting connected to any steel pipe not prohibited by byelaw 17 being a *service pipe* or pump delivery pipe (other than a pipe to which paragraph (2) (a) of this byelaw applies) or a distributing pipe shall comply with the relevant requirements of British Standard 143 & 1256: 1968, "Malleable cast iron and cast copper alloy screwed pipe fittings for steam, air, water, gas and oil", and every cast iron pipe fitting connected to any pipe to which paragraph (2) (a) of this byelaw applies shall comply with British Standard 1641: 1950, "Cast iron pipe fittings for sprinklers and other fire protection installations", or with the relevant requirements of the said British Standard 143 A 1256: 1968.

(4) Every pipe fitting of wrought iron connected to any steel pipe not prohibited by byelaw 17, being a service pipe, a pump delivery pipe or a distributing pipe shall comply with British Standard 1740: Part I : 1971, "Wrought steel pipe fittings (screwed BSP Thread): Part I: Metric Units" and every pipe fitting of steel connected to any such steel pipe shall comply with either the said British Standard 1740: Part I: 1971 or with British Standard 1965: Part 1: 1963, "Butt-welding pipe fittings for pressure purposes: part I : Carbon Steel".

(5) Every pipe and every pipe fitting to which any of the preceding paragraphs of this byelaw applies shall be effectively protected from-

(a) external corrosion; and

(b) internal corrosion, unless it is a pipe or fitting which-

(i) forms part of a fire sprinkler or other fire fighting installation from which water is drawn only for fire fighting purposes; and

(ii) is kept charged with water through an automatic alarm valve or is charged with water only when fire occurs.

Reference in this byelaw to "steel" shall not include stainless steel.

Pipes of Copper

20. (1) (a) Every service pipe, pump, delivery and distributing pipe of copper connected by means of screw joints shall comply with British Standard 2871: Part 2: 1972, "Copper and copper alloys. Tubes: Part 2: Tubes for general purposes", and the thread of every screw in any such joint shall comply with British Standard 61: 1969, "Thread for light gauge copper tubes and fittings".

(b) Every copper alloy pipe fitting for a copper pipe having a screw thread which complies with Table 1 and 2 of the said British Standard 61: 1969 shall comply with British Standard 66 to 99: 1970, "Cast copper alloy pipe fittings for use with screwed copper tubes".

(2) (a) Every service pipe, pump delivery pipe and distributing pipe of copper which is connected by means of capillary or compression fittings or by silver brazing or bronze or autogenous welding and is laid in the ground shall comply with British Standard 2871: Part 1: 1971, "Copper and copper alloys. Tubes: Part 1: Copper tubes for water, gas and sanitation; Table Y.

(b) Every such pipe of copper which is not laid in the ground shall, if connected by capillary or compression fittings, or welding comply with the said British Standard 2871: Part 1: 1971, provided that pipes to Table Z shall not be bent or connected other than by capillary linings or non-manipulative type compression fittings.

(c) Every capillary lining and compression fitting on any service pipe, pump delivery pipe or distributing pipe complying with sub-paragraph (a) or (b) of this paragraph shall comply with British Standard 864: Part 2: 1971, "Capillary and compression tube fittings of copper and copper alloy: Part 2: Metric Units". provided that every compression fitting shall be of Type B if the pipe on which it is fitted complies with British Standard 2871: Part 1: 1971: Table Y, and is laid in the ground.

(e) Where any pipe complying with the said British Standard 2871: part 1: 1971 is connected by bronze welding by gas the welding shall comply with British Standard 1724: 1959, "Bronze welding by gas".

Pipes of Asbestos Cement

21. (1) Every service pipe, pump delivery pipe and distributing pipe of asbestos cement shall be capable of withstanding a hydraulic test pressure of not less than double the pressure to which the pipe will be liable to be subjected under working conditions, and shall comply with British Standard 486: 1981, "Asbestos-cement pressure pipes

(2) Where pipes are laid in ground, the surface of which is not suitable for heavy traffic loads, such pipes shall be not less than Class 25 of the said British Standard 4??6: 1981, provided that this byelaw shall not apply to pipes laid in ground unlikely to be subjected to vehicular traffic.

Pipes of Other Materials

22. (1) Every service pipe, pump delivery pipe, distributing pipe and pipe fitting not being a pipe or fitting of a material specifically mentioned in byelaws 17 to 21 shall be capable of withstanding a hydraulic test pressure of not less than double the pressure to which the pipe will be liable to be subjected under working conditions, and shall be of material the nature, thickness and strength of which is suitable in the circumstances in which the pipe or pipe fitting is to be used.

(2) Every such pipe of polythene shall comply with British Standard 1972: 1967, "Polythene pipe (type 32) for cold water services", or with British Standard 3284: 1967, "Polythene pipe (type 50) for cold water services".

(3) Every such pipe of unplasticised polyvinyl chloride shall comply with British Standard 3505: 1968, "Unplasticized PVC pipe for cold water services". Where pipes are laid in ground, the surface of which is not suitable for heavy traffic loads, such pipes shall be not less than Class C of the said British Standard 3505: 1968 provided that this byelaw shall not apply to a pipe laid in ground unlikely to be subjected to vehicular traffic.

(4) Every such pipe of stainless steel shall (4) comply with British Standard 4127: Part 2: 1972, "Light gauge stainless steel tubes. Part 2. Metric Units".

Fittings in Closed Circuits

23. Every water fitting forming part of a closed circuit shall be of suitable material and capable of withstanding a hydraulic test pressure of not less than double the pressure to which the fitting will be liable to be subjected under working conditions.

Taps and Valves

Stopvalves on Pipes Supplying Buildings

24. (1) Every pipe supplying water to a building (except a pipe conveying water from one building to another building the supply to which is not separately chargeable and which is within the same curtilage) shall be fitted with a stopvalve inside and as near as is reasonably practicable to the point where it enters that building.

(2) Every pipe supplying water to a part of a building which is a part to which the supply is separately chargeable shall (unless the pipe passes through that part to another such

part) be fitted with a stopvalve inside and as near as is reasonably practicable to the point where the pipe enters that part.

(3) Where a pipe supplies water to a part of a building which is a part to which the supply is separately chargeable and passes through that part to another such part, every branch pipe connected to that pipe in the first-mentioned part shall be fitted with a stopvalve as near as is reasonably practicable to the point of connection.

(4) Where a pipe supplies water to a part of a building which is a part to which the supply is separately chargeable and passes through one or more of such parts to another, it shall be so placed that, where entering the first of the parts, it passes through a place, whether inside or outside the building, to which the occupier of each of the parts has access, and in that place the pipe shall be fitted with a stopvalve as near as is reasonably practicable to the point where it enters the building.

(5) Every pipe conveying water from a building to another building the supply to which is not separately chargeable and which is within the same curtilage as, but has no direct access from, the first mentioned building shall, subject to paragraph (6) of this byelaw, be fitted with a stopvalve inside and as near as is reasonably practicable to the point where it enters the first-mentioned building.

(6) Where it is not reasonably practicable to fit a stopvalve inside the first-mentioned building, the said pipe shall be fitted with a stopvalve inside and as near as is reasonably practicable to the point where it enters the other building.

(7) No stopvalve fitted in accordance with any of the preceding paragraphs of this byelaw shall be a plug cock or plug valve.

Stopvalves on Outlet Pipes from Storage Cisterns

25. Every draw-off pipe from every cold water storage cistern of a capacity exceeding 18 litres shall be fitted with a stopvalve as near to the cistern as is reasonably practicable.

Provided that, where such a draw-off pipe is connected directly to a hot water storage cistern, cylinder or tank in such a way that it is not reasonably practicable to fit a stopvalve in that pipe, a stopvalve shall be fitted on every draw-off pipe from the hot water cistern, cylinder or tank, as near thereto as is reasonably practicable.

Location of Draining Taps

25. No draining tap shall be buried in the ground, or so placed that its outlet is in danger of being blocked.

Standpipes

26. No person shall erect or set up, or allow to remain erected or set up, a standpipe for conveying water supplied by the undertakers which is used by the occupants of more than one building, or partly occupied part of a building or tent unless the pipe is provided with a non-concussive self-closing tap and a stopvalve.

Drinking Troughs

28. (1) Every pipe supplying water to a drinking-trough or drinking-bowl for animals, including poultry, shall be fitted with a ballvalve or some other not less effective device for controlling the inflow of water, so designed as to prevent overflow, and every such ballvalve, or device shall be effectively protected from damage, contamination and unauthorised interference provided that this paragraph shall not apply to a pipe if

(a) the water in the pipe flows by gravitation from a storage cistern; and

(b) the trough or bowl to which the pipe supplies water is placed at such a level as to prevent overflow.

- (2) No such trough or bowl shall be supplied directly from a service pipe or pump delivery pipe drawing water from a service pipe unless the inlet is fixed at a distance above the top edge of the trough or bowl which

(a) is sufficient, having regard to the design of the trough or bowl and the use to be made of it to prevent contamination of the water in the service pipe; and

(b) is in no case less than 25mm.

Draw-Off Taps

29. (1) Every metal bodied draw-off tap shall comply with the relevant requirements of British Standard 5412: 1976, "Specification for the performance of draw-off taps with metal bodies for water services".

(2) Every plastic bodied draw-off tap shall comply with the relevant requirements of British Standard 5413: 1976, "Specification for the performance of draw-off taps with plastic bodies for water services".

(3) Every draining tap shall comply with British Standard 2879: 1980, "Draining taps (screw-down pattern)", or with the relevant requirements of British Standard 1010: Part 2: 1973, "Draw-off taps and stopvalves for water services (screw-down pattern). Part 2. Draw-off taps and above ground stopvalves"

Stopvalves

30. (1) Every above-ground stopvalve not exceeding nominal size 2 shall comply with the relevant requirements of the said British Standard 1010: part 2: 1973.

(2) Every underground stopvalve not exceeding nominal size 2 shall comply with British Standard 5433: 1976, "Underground stopvalves for water services".

(3) Every stopvalve exceeding nominal size 2 shall comply with the relevant requirements of British Standard 5163: 1974, "Double flanged cast iron wedge gate valves for waterworks purposes".

Operation of Stopvalves

30. Every stopvalve shall be so placed that it can be readily operated by the means by which it is designed to be operated.

Ballvalves

32. (1) Every ballvalve of the piston type shall comply with British Standard 1212: Part I : 1953, "Ballvalves (excluding floats): part I : Piston type" and every ballvalve of the diaphragm type shall comply with either British Standard 1212: Part 2: 1970, "Ballvalves (excluding floats): Part 2: Diaphragm type (brass body)", or British Standard 1212: Part 3: 1979, "Float operated valves (excluding floats): part 3: Diaphragm type (plastics body) for cold water services".

(2) Every ballvalve not of the piston type or the diaphragm type shall comply with such of the following requirements as are relevant

(a) every high pressure valve shall close against a working pressure of 14 bar, every medium pressure valve against a working pressure of 7 bar, and every low pressure valve against a working pressure of 3 bar; and every high pressure medium pressure and low pressure valve, not being a valve having an interchangeable orifice seating, shall have the letter "H.P." "M.P.", or "L.P." cast or stamped on the body of the fitting, or shall be otherwise clearly identified as a high, medium or low pressure valve, and every valve shall, while held mechanically in the closed position, be capable of withstanding a pressure of 20 bar;

(b) the component parts of every valve of a nominal size not exceeding 50 mm shall be of a suitable and corrosion resisting material and the lever shall be made of such material as will ensure that it does not bend under working conditions and

(c) every valve wholly or partly of ferrous metal of nominal size exceeding 50 mm shall

(i) be provided with a flange on its inlet suitable for a nominal pressure of 16 bar complying with British Standard 4504: Part I : 1969, "Flanges and bolting for pipes, valves and fittings. Metric series: Part I: Ferrous"

(ii) have all parts of ferrous metal protected against corrosion by coating, or by galvanising in accordance with British Standard 1387: 1967, "Steel tubes and tubular: suitable for screwing to BS 21 pipe threads", and

(iii) have all ferrous working surfaces lined or faced with, and the orifice seating made of, a suitable and corrosion-resisting material.

(3) Every ballvalve float shall comply with British Standard 1968: 1953, "Floats for ballvalves (copper)", or with British Standard 2456: 1973, "Floats (plastics) for ballvalves for hot and cold water", or with the requirements of the said British Standard 1212: part 2: 1970 so far as they relate to floats of materials other than copper and plastics.

Storage cisterns

Placing of Storage Cisterns

33. Every storage cistern from which water is drawn for domestic purposes shall be so placed and equipped that the interior thereof can be readily inspected and cleansed, and no such cistern shall be so placed and equipped that the water therein is liable to contamination.

Support and covering of storage cisterns

34. (1) Every storage cistern shall be adequately supported and, if water for domestic purposes is drawn from it, shall be suitably covered but not so as to be airtight.

(2) Every cover shall effectively exclude light and shall be rigid with overlapping edges so constructed that it cannot easily be dislodged and shall be of material which will not contaminate any condensate.

Avoidance of flooding buried or sunken cisterns

35. (1) No storage cistern shall be so placed that it is in danger of being flooded.

(2) No such cistern shall be buried or sunk in the ground unless

(a) there is sufficient space around and beneath it for the purposes of maintenance and the detection of leakage; and

(b) either

(i) it is a closed vessel with a tightly fitting access cover bolted or screwed in position, and all inlet and overflow pipe or pipes are suitably screened;

or

(ii) its inlet pipe discharges into the air not less than 150 mm above its top edge:

Provided that sub-paragraph (a) of this paragraph shall not apply in relation to a concrete cistern, designed and constructed in accordance with the relevant recommendations in British Standard 5337: 1976, "Code of practice for the structural use of concrete for retaining aqueous liquids".

Materials for Storage Cisterns

36. (1) Every storage cistern shall be watertight and of adequate strength and shall be constructed of galvanized iron, steel, copper, polythene, polypropylene, asbestos-cement, concrete or some other not less suitable material, but not lead.

(2) Where the cistern is not made of a corrosion-resisting material it shall be effectively protected from corrosion.

British Standards for Storage Cisterns

37. (1) Every storage cistern of mild steel shall comply with the requirements for Grade A or Grade B cisterns in British Standard 417: Part I: 1964, "Galvanized mild steel cisterns and covers, tanks and cylinders, Part I. Imperial Units" or British Standard 417: Part 2: 1973, "Galvanized mild steel cisterns and covers, tanks and cylinders. Part 2. Metric Units". Where

Grade B cisterns are installed they shall be suitably protected against corrosion where necessary.

(2) Every storage cistern of asbestos cement shall comply with British Standard 2777: 1974, "Asbestos-cement cisterns".

(3) Every storage cistern built up of cast iron plates shall comply with British Standard 1563: 1949, "Cast iron sectional tanks (rectangular)".

(4) Every storage cistern built up of pressed steel plates shall comply with British Standard 1564: 1975, "Pressed steel sectional rectangular tanks".

(5) Every storage cistern of polythene or polypropylene shall comply with British Standard 4213: 1975, "Cold water storage cisterns (polyolefin or olefin copolymer) and cistern covers".

Capacity of Storage Cisterns in Houses

38. (1) Where in any house there is a cold water storage cistern which is not connected to any other such cistern its capacity shall not be less than

(a) 115 litres, if it is not used as a feed cistern;

or

(b) 230 litres, if it is used both as a feed cistern and for other purposes.

(2) Where in any house there are two or more cold water storage cisterns connected together, the sum of their capacities shall be not less than

(a) 115 litres, if none of them is used as a feed cistern;

or

(b) 210 litres, if they are together used both as a feed cistern and for other purposes.

(3) In this byelaw "house" means premises separately occupied as a private dwelling.

Storage Cisterns to be fitted with Ballvalves

39. (1) Every pipe supplying water to a cold water storage cistern shall be fitted with a ballvalve or shall have some other not less effective device for controlling the inflow of water so designed as to prevent overflow:

Provided that where two or more cold water storage cisterns at the same level are connected together this paragraph shall not apply to a pipe used only to connect one cistern to another.

(2) Every such pipe, whether fitted with a ballvalve or nut, other than a pipe used only to connect one cistern to another, shall be fitted in such a position that it discharges at a level higher than the overflowing level of the overflow pipe or, if there is more than one overflow pipe, the highest overflow pipe, by not less than the diameter of the said overflow pipe, unless there is an effective means of preventing the siphonage of water back through the inlet

(3) Where a ballvalve is fitted to a cistern, the size of the orifice, the size of the float and the length of the lever shall be such that, when the float is immersed to an extent not exceeding half its volume, the valve is watertight against the highest pressure at which it may be required to work.

(4) Every ballvalve shall be securely and rigidly fixed to the cistern which it serves.

Warning pipes on storage cisterns holding not more than 4.5 cubic metres

40. Every cold water storage cistern which would hold not more than 4.5 cubic metres if filled to the top edge shall comply with the following requirements

(a) it shall be fitted with an efficient warning pipe of a corrosion-resisting material and with no other overflow pipe;

(b) no warning pipe shall rise in level outside the cistern;

(c) the internal diameter of the warning pipe shall be greater than the internal diameter of the inlet pipe and in no case less than 19 mm; and

(d) (i) when the cistern is first installed; and

(ii) when the existing ballvalve or other device for controlling the inflow of water to the cistern is repaired or readjusted; and

(iii) when a new ballvalve or other device is fitted,

the ballvalve or other device shall be so fitted and adjusted that the highest level the water can reach is lower than the overflowing level of the warning pipe by not less than 25 mm, or the internal diameter of the warning pipe, whichever is the greater.

Overflow pipes on storage cisterns holding more than 4.5 cubic metres

41. Every cold water storage cistern which would hold more than 4.5 cubic metres if filled to the top edge shall comply with the following requirements

(a) it shall be fitted with an efficient overflow pipe or pipes of a corrosion-resisting material and, if none of those overflow pipes is an efficient warning pipe, with an efficient warning pipe or with some other device which effectively indicates when the water reaches a level not less than 50 mm below the overflowing level of the overflow pipe or, if there is more than one overflow pipe, the lowest overflow pipe;

(b) no overflow pipe shall rise in level outside the cistern;

(c) where a warning pipe but no other overflow pipe is fitted, the cistern shall comply with the requirements of paragraphs (c) and (d) of byelaw 40;

(d) where both a warning pipe and some other overflow pipe or pipes are fitted

(i) the internal diameter of the warning pipe shall be not less than 25 mm; and

(ii) the cistern shall comply with the requirements of paragraph (d) of byelaw 40; and

(e) where the cistern is fitted with some device (other than a warning pipe) of the kind mentioned in paragraph (a) of this byelaw, then, on each occasion mentioned in paragraph (d) of byelaw 40, the ballvalve or other device for controlling the inflow of water shall be so fitted and adjusted that the highest level the water can reach is lower than the overflowing level of the

overflow pipe or, where there is more than one overflow pipe, the lowest overflow pipe, by not less than 50 mm.

Hot water apparatus

Distance Between hot water apparatus and draw-off taps

42. The length of any pipe conveying hot water from any hot water apparatus, hot water storage cistern, cylinder or tank, or flow and return system to any draw-off tap shall not exceed that specified in respect of that pipe, by reference to the largest internal diameter of any part of it, in the following table -

| Largest Internal Diameter of Pipe | Length in Metres |
|--|------------------|
| Not exceeding 19 mm | 12.0 |
| Exceeding 19mm but not exceeding 25 mm | 7.5 |
| Exceeding 25mm | 3.0 |

Position of Outlets in Relation to Level of Water in Cylinders and Tanks

43. No tap or other means of drawing water (other than a tap with a removable key for emptying the system) shall be connected to any part of a hot water system in such a position that by its use the level of the water in the hot water storage cistern, cylinder or tank can be lowered

(a) below the level of the top of any pipe connecting the cistern, cylinder or tank to the apparatus in which the water in the system is heated or

(b) more than one-half of the depth of the cistern or one-fourth of the depth of the cylinder or tank:

Provided that

(i) if the hot water system includes two or more hot water cylinders or tanks at different levels this byelaw shall apply only in relation to the lowest cylinder or tank; and

(ii) this byelaw shall not apply in relation either to an open vessel in which water is directly heated or to a hot water storage cistern, cylinder or tank forming part of a hot water system in which water is heated only under thermostatic control by electricity, gas or oil.

Hot Water Cisterns not to have Ballvalves

44. No hot water storage cistern shall be fitted with a ballvalve unless such ballvalve is of material suitable for the purpose and complies in its construction and fitting with the provisions of byelaws 39, 40 and 41 as if the cistern to which it is fitted were a cold water storage cistern.

Outlets from Feed Cisterns to Hot Water Apparatus

45. Every outlet from a cistern to hot water apparatus shall be at a distance of not less than 25 mm above the bottom of the cistern. Every pipe which delivers water from a feed cistern to a hot water apparatus not of the instantaneous type or to a hot water cylinder or tank shall deliver water to that apparatus, cylinder or tank only.

Hot Water Apparatus not to be connected directly to Service Pipe

46. Where any apparatus in which water is heated is supplied with cold water from a service pipe or a pump delivery pipe drawing water from a service pipe, the pipe shall not be connected directly to the apparatus but shall discharge into the air not less than 13 mm above the top edge of the apparatus:

Provided that this byelaw shall not apply in relation to a water-heater which -

- (a) is of the instantaneous type; or
 - (b) is not capable of holding more than 15 litres,
- if

(i) the working pressure to which the apparatus is subjected is no higher than that for which it is designed;

(ii) the apparatus (being a gas water-heater) is so constructed that no leakage between the gas and water spaces can occur;

(iii) the water space is completely enclosed and its contents have no contact with the atmosphere except through the outlet pipe or vent pipe; and

(iv) the water is discharged from the apparatus into the air at a level not less than 13 mm above the lowest part of the top edge of the bath, wash basin, sink or other appliance supplied therefrom.

Mixing Valves

47. No mixing valve, pipe or other water fitting in which hot water and cold water are mixed shall be or remain so connected as to mix either:

(a) water supplied from a hot water apparatus connected directly to a service pipe, or to a pump delivery pipe drawing water from a service pipe, with cold water not supplied directly from a service pipe or a pump delivery pipe drawing water from a service pipe; or

(b) water supplied from a hot water apparatus not connected directly to a service pipe, or to a pump delivery pipe drawing water from a service pipe, with cold water supplied directly from a service pipe or a pump delivery pipe drawing water from a service pipe.

Materials for Hot Water Pipes

48. Every pipe used for conveying hot water shall be of copper or some other corrosion-resisting material which is not less suitable.

Materials for and Support of Hot Water Cylinders & Tanks

49. (1) Every hot water cylinder or tank shall be constructed of copper or some other not less suitable material and shall be adequately supported.

(2) Where the hot water cylinder or tank is not made of corrosion-resisting material, it shall be effectively protected from corrosion.

British Standards for Hot Water Cylinders & Tanks

50. Every hot water cylinder or tank to which any of the following British Standards applies, namely

- 417: Part 1: 1964, "Galvanized mild steel cisterns and covers, tanks and cylinders. Part I. Imperial Units";
- 417: Part 2: 1973, "Galvanized mild steel cisterns and covers, tanks and cylinders. Part 2. Metric Units";
- 1565: Part 1: 1949, "Galvanised mild steel indirect cylinders, annular or saddle-back type. Part I. Imperial Units";
- 1565: Part 2: 1973, "Galvanized mild steel indirect cylinders, annular or saddleback type. Part 2. Metric Units";
- 699: 1972, "Copper cylinders for domestic purposes";
- 1566: Part 1: 1972, "Copper indirect cylinders for domestic purposes. Part 1. Double feed indirect cylinders";
- 1566: part 2: 1972, "Copper indirect cylinders for domestic purposes. Part 2. Single feed indirect cylinders";
- 843: 1976, "Therrnal-storage electric water heaters (constructional and water requirements)";
- 853: Part 1: 1960, "Calorifiers for central heating and hot water supply. Part 1. Mild steel and cast iron";
- 853: part 2: 1960, "Calorifiers for central heating and hot water supply. Part 2. Copper"; and
- 3198: 1960, "Combination hot water storage units (copper) for domestic purposes";

shall comply with the relevant requirements of that Standard.

Capacity of Hot Water Storage Cisterns, Cylinders & Tanks

51. Every hot water storage cistern, cylinder or tank, unless forming part of a hot water system in which water is heated only under thermostatic control by electricity, gas or oil, shall be capable of holding not less than 115 litres:

Provided that if the hot water system includes. two or more hot water cylinders or tanks at different levels, this byelaw shall apply only to the lowest cylinder or tank.

Baths, wash basins and sinks

Inlets & Outlets of Baths Etc.

52. (1) Every inlet to a bath, wash basin, sink or similar appliance shall be separate from, and unconnected with, any outlet therefrom.

(2) Every outlet for emptying a bath (other than a shower bath), wash basin, sink or ,similar appliance shall be provided with a well-fitting and readily accessible watertight plug or with some other not less effective device for closing the outlet:

Provided that this paragraph shall not apply in relation to

(a) any appliance required by law to be fitted with an unplugged waste-pipe; or

(b) any appliance, to which water is delivered exclusively by a fitting or fittings so designed and arranged as to be incapable of delivering water to that appliance or, in the case of a washing trough, any unit thereof at a rate exceeding 0.06 litres per second.

(3) Every fitting for delivering water to a washing trough shall be so designed and arranged as to be capable of discharging water to one unit of the trough without simultaneously discharging it to another or others.

(4) In this byelaw

"washing trough" means a wash basin, washing trough or sink measuring internally 1,200 mm or more over its longest or widest part; and

"unit", in relation to such a trough, means 600 mm of the length of the trough or, in the case of a circular or oval trough, 600 mm of the circumference thereof.

Position of Taps on Baths etc>

53. Every draw-off tap or other fitting (other than the flushing pipe of a flushing cistern) which discharges water into a bath, wash basin, sink or similar appliance shall be fitted in such a position that it cannot discharge at a level lower than 13 mm above the lowest part of the top edge of the appliance: .

Provided that-

(a) this byelaw shall not require a fitting which incorporates a hand-operated hosepipe or to which such a hosepipe is attached to be so fitted that it cannot discharge through the hosepipe at a level lower than that level, if there is an effective means of preventing the siphonage of water back through every pipe conveying water to the fitting; and

(b) this byelaw shall not require any fitting to be so fitted that it cannot discharge at a level lower than that level, if every pipe conveying water to that fitting

(i) draws water only from a storage cistern or from a cylinder or tank having a vent open to the atmosphere; and

(ii) is connected to the cistern, cylinder or tank at a level not less than 25 mm higher than the level of the lowest part of the top edge of the appliance; and

(iii) does not convey water to any draw-off tap or other fitting (other than a draining tap) which discharges water at a level lower than the last mentioned level.

Flushing cistern

Waterclosets and Urinals to be fitted with Flushing Cisterns

54. Every watercloset pan and every urinal shall be provided with a flushing cistern or with some other not less efficient and suitable flushing apparatus.

Ballvalves and Warning Pipes on Flushing Cisterns

55. Byelaws 39(I), (3) and (4) and 40 shall, with any necessary modifications, apply to flushing cisterns (other than automatic flushing cisterns) and flushing troughs as they apply to cold water storage cisterns.

Pipes Discharging to Watercloset Pans

56. No pipe, other than a flushing pipe leading only from a flushing apparatus, shall be or remain so arranged or connected that it can deliver water to any watercloset pan or urinal.

Provided that this byelaw shall not apply in relation to a warning pipe from which any water is discharged into the air not less than 150 mm about the top edge of the pan or urinal.

Design & Arrangement of Flushing Cisterns for Waterclosets

57. (1) Subject to the provisions of paragraph (2) of this byelaw no flushing cistern, flushing trough or other flushing apparatus serving a watercloset pan or pans shall be of such a design or be or remain so arranged that the volume of the flush or, in the case of an apparatus designed to give flushes of two different volumes, of the larger of the two flushes (excluding the water entering a cistern or trough during the flush) exceeds 9 litres (with the upward variation permitted by the British Standard specified in paragraph (3) of this byelaw).

(2) On and after the 1st January 1983, every flushing cistern, flushing trough or other flushing apparatus serving a watercloset pan or pans of the washdown type installed in domestic dwellings shall be of such a design and be and remain so arranged that it will give at the choice of the user, a flush of one or other of two different volumes, of which the larger (excluding the water entering the cistern or trough during the flush) shall not exceed 9 litres (with the upward variation permitted by the British Standard specified in paragraph (3) of this byelaw),

(3) Every such flushing cistern and, so far as the requirements of the Standard would be appropriate in relation to flushing troughs, every such flushing trough shall comply with British Standard 1125: 1973. "WC flushing cisterns (including dual flush cisterns and flush pipes)", save in so far as that Standard prescribes the volume of the flush.

(4) Every watercloset pan shall be of such a design and be and remain so arranged and connected that after normal use its Contents will be effectively cleared by one flush (being the larger of the two flushes in the case of an apparatus designed to give flushes of two different volumes) from the apparatus serving it.

Design & Arrangement of Flushing Cisterns for Urinals

58. (1) No flushing cistern or other flushing apparatus serving a urinal shall be of such a design or be or remain so arranged as to give a flush of more than 4.5 litres (with the upward variation permitted by one or other of the British Standards specified in paragraph (2) of this byelaw, whichever is appropriate) per stall or bowl or per 700 mm width of slab.

(2) Every such flushing cistern shall comply with British Standard 1876: 1972, "Automatic flushing cisterns for urinals", or with British Standard 1135: 1973, "WC flushing cisterns (including Dual flush cisterns and flush pipes)", save in so far as the appropriate Standard prescribes the volume of the flush.

Operation of Automatic Flushing Cisterns

58A (1) No automatic flushing cistern serving a urinal shall be or remain so arranged that it flushes the urinal automatically at intervals of less than twenty minutes.

(2) Every automatic flushing cistern serving a urinal shall be fitted with a time switch or some other not less effective device for ensuring that the cistern will only operate within such hours as are set on such time switch or device.

Notice to the undertakers

Notices to The Undertakers

59. (1) At least 7 days before fitting or altering (otherwise than by way of repair or renewal) any water fitting used or to be used in connection with an existing supply of water from the undertakers, a person shall give to them notice in writing of his intention in that behalf.

(2) At least 7 days before.

(a) back-filling any excavation in which a pipe used or to be used for conveying water supplied by the undertakers is laid; or

(b) laying such a pipe by mole-plough,

a person shall give to the undertakers notice in writing of the date on which he expects to begin that work, and shall not, without their consent, begin that work before that date.

Penalties

Penalties

Any person contravening any of these byelaws shall be liable on summary conviction to a fine not exceeding the sum of 400 pounds in respect of each offence and in the case of a continuing offence, to a further fine not exceeding 50 pounds for each day during which the offence continues after conviction therefor.

3 SUPPLIERS TECHNICAL PRODUCT INFORMATION

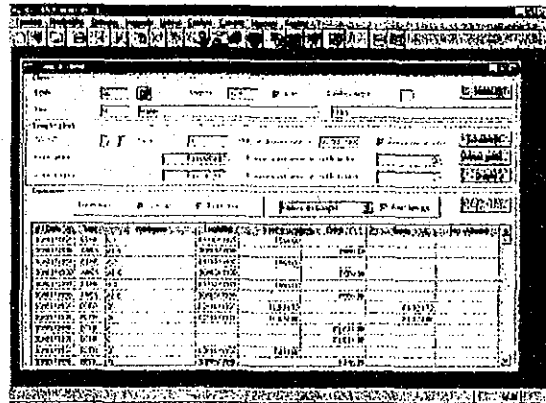


CUSTOMER INFORMATION SYSTEM

THE CUSTOMER SOFTCARE

X7 is a customer information system for public utilities (water, electricity, gas, sewerage, solid waste, ...) covering the whole range of functions within the profession :

- Management of the invoicing and accounting processes
- Management of the customer relations (follow-up of commercial and technical processes, claims, visits, reminders, disconnection, mailing,...)
- Management of technical data (meters, on site operations, GIS interface)
- Spreading of information about accounting, financial, technical reports, including thematic maps



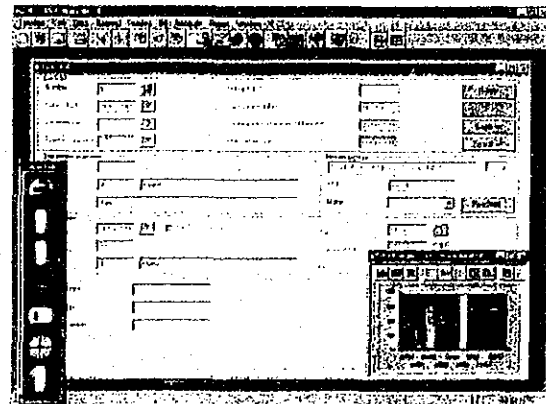
FOR AN EVOLUTIONARY CONTEXT

The high degree of parameterisation of X7 has been created to be adapted to the geographic, cultural and legal contexts of each country.

As a truly cosmopolitan product, X7 is translated in several languages and alphabets (French, English, Spanish but also Arabic, Romanian). Once set up, X7 evolves with the utility and its commercial and operational context :

- taking over or outsourcing some functions,
- working out new prices,
- including new services,
- taking into account new commercial processes...

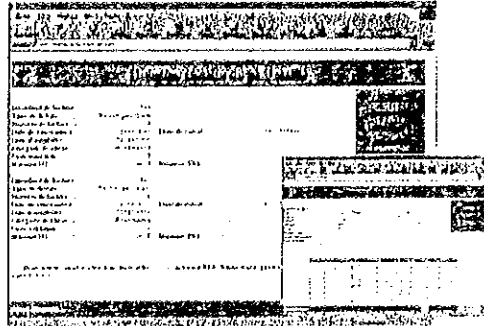
The software can also reply quickly and with no technical risk to any changes of operational procedures relative to the deregulation of the market.



FROM WINDOWS TO INTERNET

X7 is based on standard technologies (Windows, Oracle,...), and it guarantees interactions with all market tools, in order to extend its functions and offer new and original opportunities in information technology (internet, e-business).

The simplicity of the menus and its graphic user interface makes possible an «intuitive» take over of the tool and facilitates the training of new users, who find the system user-friendly.

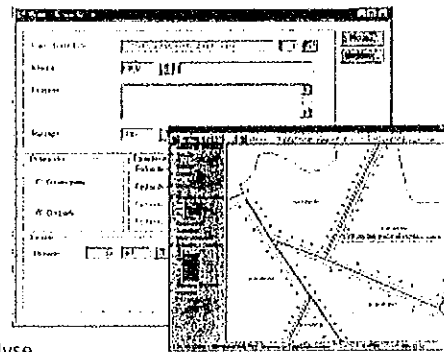


THE HEART OF THE INFORMATION SYSTEM

All the utility departments are concerned by X7 and its multiple interfaces :

- Accounting interface
- Hand held or remote meter reading
- GIS interface, network management tools (SCADA) and network modelling tools
- Management of performance charts, Management information system (MIS)
- Organisation of on site interventions
- Call centre

X7 makes it possible to get all commercial data and to link it with technical data (collected from GIS, measurements or modelling) in order to analyse network and/or supply problems and to decide the best strategy to undertake.

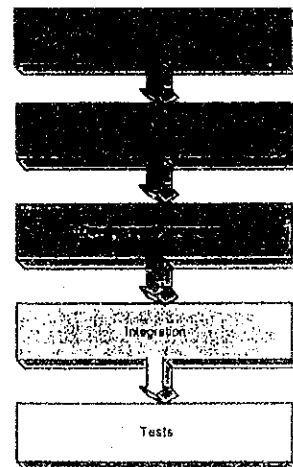


A TRUE WORKING PARTNERSHIP

We think that the setting up of a new customer management software is more than a simple information technology project, and that is why we will assist you during all the steps of X7 implementation.

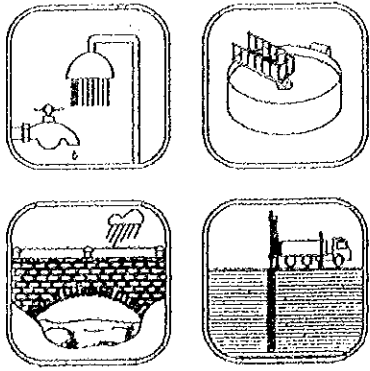
At every stage, besides the technical tasks (software and hardware installation, bespoke developments, data migration, parameters setting up, reporting ...), the actions of information, communication, training, organisation, support and assistance will be undertaken, in order to assist you in the management of these matters and to ensure the adherence of future users to the new X7 system.

Thus by linking all your staff collaborators and clients, X7 is guaranteed to meet your customer service needs.




SAFEGE
Systèmes d'Information

Parc de l'île - 15/27 rue du Port - BP727 - 92007 Nanterre Cedex - France
Tél. (33) 1 46 14 71 10 - Fax (33) 1 46 14 71 26 - <http://www.safege.fr>

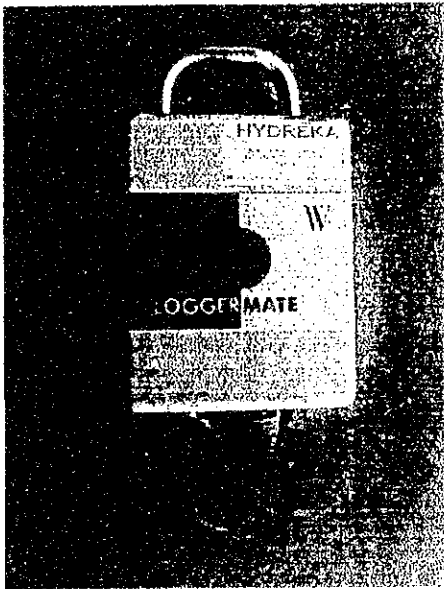


HYDREKA

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The loggermate is the newest member of the Loggermate series of data loggers. It is a reliable, robust and powerful logger (pulse or 4-20 mA logger) which is lighter; smaller and more cost effective than any other in the range. Built into a sturdy shockproof aluminium box and fully potted, it can be completely submerged and used in the most demanding environments.

Data logging may be carried out at user definable intervals of either 1, 5, 15 or 60 minutes and the internal cyclic memory can hold 16 000 readings (170 days of data at 15 minutes samples). The Loggermate features a sealed window in the outer case, through which infra-red communication can take place using a probe connected to a data collection unit. The unique protocol, employed by the infra-red communication method, performs automatic error checking and allows consistent data transfer at speeds up to 19.2 Kbaud.


This rapid data transfer method allows 90 days of data at 15 minute logging to be transferred in under 15 seconds.


The reliable flow channel of a Loggermate series logger can accept data from any pulsed output, either volt free contact or open collector signals, at frequencies of up to 40Hz allowing connection to many pulse output devices.

The Loggermate must have the data downloaded by infra-red probe. The infra-red probes are manufactured to be linked to a RS 232 port (PC or laptop) a HYDREKA own dedicated unit the RM 201. Data can then be transferred from the RM 201 via a serial cable to a PC.

HYDREKA - 34, route de Saint Romain - 69450 SAINT CYR AU MONT D'OR - France
Tél. : (33) 04 72 53 11 53 - Fax : (33) 04 78 83 44 37 - E-mail : sales@hydreka.fr

TECHNICALS SPECIFICATIONS

-  Infra-red.

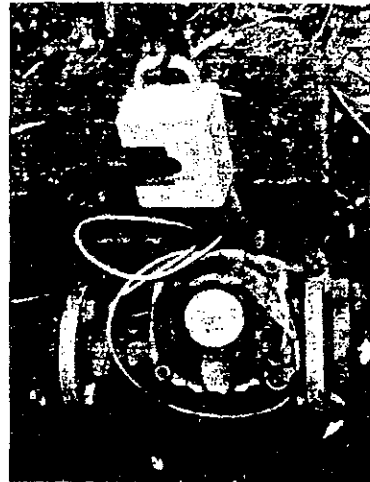
- 
 - Flow sensor type* ; Solid state MeterMate, PU10, PSM, or any pulse output from volt free contacts or open collector signals.
 - Input Frequency* ; Up to 40Hz

- Data logging :
 - Logging memory* ; 32 Kbytes of cyclic data logging memory available. (5.5 months logging at 15 minute sampling).
 - Sampling interval* ; User selectable 1, 5, 15 or 60 Minute interval.

- Power :
 - Power source* ; Fully sealed internal Lithium batteries with design life of 10 years.

- Environment :
 - Operating* ; Temperature range : -5 °C to + 70°C
 - Storage* ; Temperature range : -20°C to + 70°C

- Physical :
 - Construction* ; Sturdy lightweight container, fully potted
 - Dimensions* ; 55 X 85 X 170 mm approximately
 - Weight* ; 0.8 Kg approximately
 - IP rating* ; IP 68 standard



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RESOCAD

GEOGRAPHICAL INFORMATION SYSTEM FOR WATER COMPANIES

BETTER KNOWLEDGE FOR BETTER ENVIRONMENT MANAGEMENT

RESOCAD is a geographical information system for network managers. It is part of the water company information system providing access to information within a technical framework that meets the users' needs while respecting their environment :

- Technical tool with powerful CAD functions to allow the consulting company to set up databases : *network elements digitalisation, detailed equipment description, display of data attributes, longitudinal profile creation, technical map publishing functions;*
- Engineer's project tool : *SQL and geographical requests, results display on the map and creation of thematic maps, connection to simulation tools;*
- Programming tool for decision-makers : *Past operation and intervention management, customer mapping, reporting...;*
- Information tool to communicate with decision-makers and consumers through an efficient web interface.

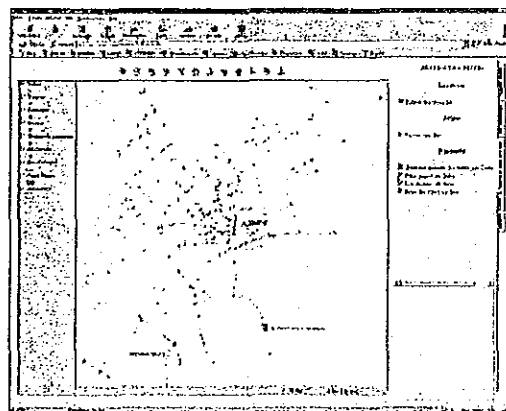


A USER-FRIENDLY TOOL

RESOCAD is the result of SAFEGE's work experience with its customers. It consists of three main elements :

- A core software application that combines typical GIS functions (creating/updating, consulting, processing) and a user-friendly interface that makes it accessible to any potential user whatever his computer skills.
- Easy-to-use standard data models that describe each element managed by the system.
- Operational application functions for a quick GIS valorisation within the company.

RESOCAD was developed using standard technologies. It combines customisation tools with a functions library to allow companies to develop the system themselves. In terms of database management systems, RESOCAD integrates standardised data management tools (Oracle, SQL Server, Access.). It can thus easily be built around the existing information system of the company.

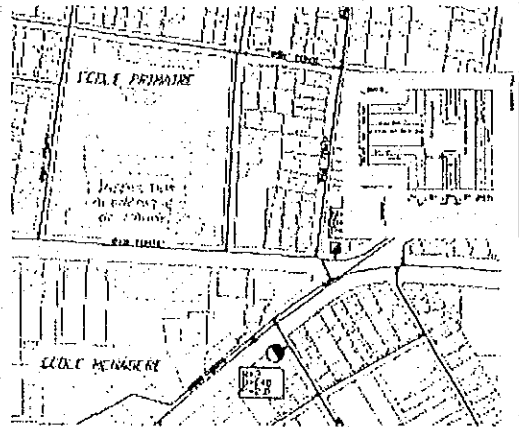


GEOGRAPHICAL DIMENSION FOR EVERY SERVICE

Because a designer requires other features than a manager's, it is necessary he be given a tool that suits both the computer environment and his own uses.

Because geographical information brings on an added value to the everyday life of the companies' various agents, RESOCAD was conceived to make the most of various graphical generators. It also relies on their power while ensuring the proper data sharing among the various systems.

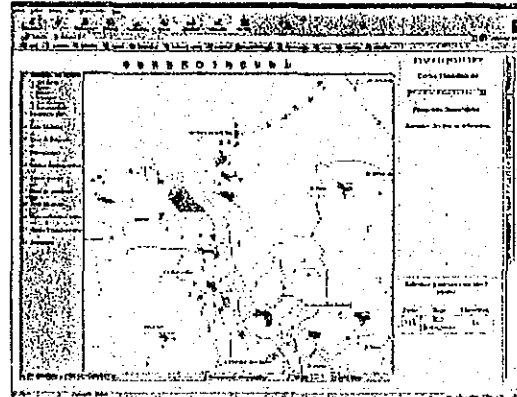
That is why RESOCAD was developed to fit both CAD graphical generators like AutoCAD and Internet/Intranet GIS like Autodesk MapGuide.



IT IS ALSO YOUR PROJECT

The implementation of a geographical information system requires a number of factors that put the stress on the approach :

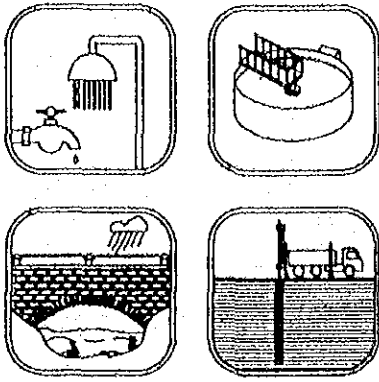
- Choice of data,
- communication (contracts and techniques) with partners,
- database creation,
- system set-up,
- start-up assistance,
- technical assistance,
- extension scheduling of the system...



Besides the software applications, these are the best to bring your GIS project to a successful end. SAFEGE already has this unavoidable experience as well as a genuine notion of what service means, since it is the heart of its activity.



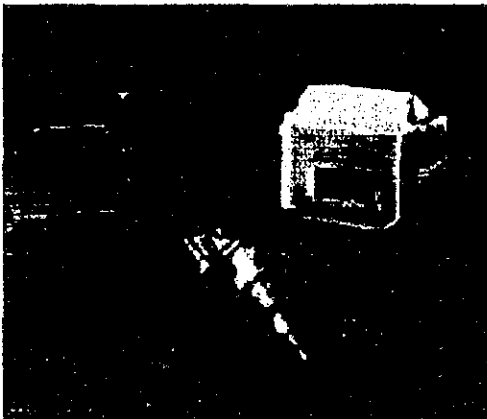
Parc de l'Ile - 15/27 rue du Port - BP727 - 92007 Nanterre Cedex - France
Tél. (33) 1 46 14 71 10 - Fax (33) 1 46 14 71 26 - <http://www.safege.fr>



HYDREKA

**un seul système
pour l'enregistrement
et l'édition des données**

AquaProbe II Insertion- Type Electromagnetic Probe Flowmeter



*Aquaprobe – the economic
alternative to full-bore flow metering*

- Fully submersible, rugged and robust sensor and transmitter reliable, maintenance free operation in arduous environments
- 'Hot tap' capability enables installation with no interruption to normal water supply
- Good accuracy over wide operating flow range in both forward and reverse flow directions enables user to accurately measure peak daytime flows and minimal night flows
- Price virtually independent of pipe diameter

low cost alternative to full bore meters

- 'Fit and Flow™' foolproof installation. No on-site setup
- Suitable for permanent or temporary installation total user flexibility
- No moving components and hence no bearing wear problems stable calibration and reliable operation
- Choice of transmitter
- Battery Operation – 2 1 / 2 year life no external power supply required facilitates installation in remote location
- AC powering with optional battery
- Backup continuous measurement even during power-down

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Tél. : (33) 04 72 53 11 53 - Fax : (33) 04 78 83 44 37 - E-mail : sales@hydreka.fr

Radiodetection RD400PXL-2

The digital PXL-2 cable and pipe locator has been designed to meet the needs of the general operator and those wishing to gather information in more demanding areas such as highly congested sites.

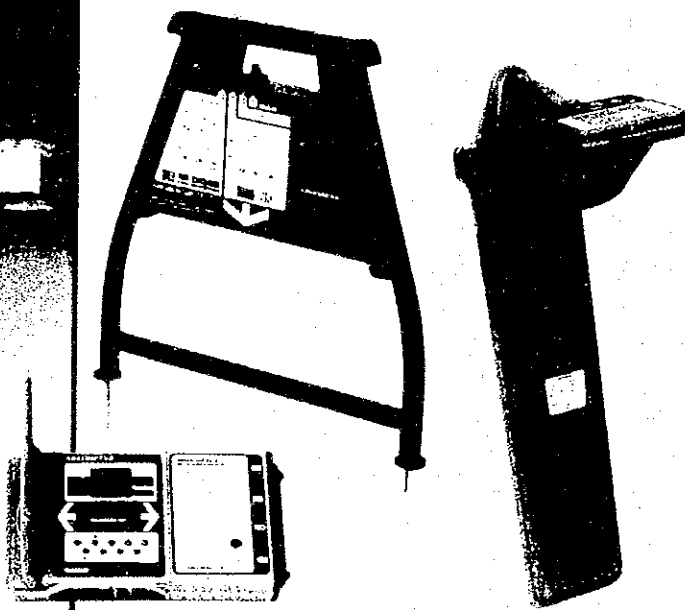
Radiodetection has incorporated all the latest technological advances in one easy-to-use instrument for a wide range of locating applications.

The RD400PXL-2 (33 kHz) locator combines all the features of the renowned RD400 series.

Features include:

- signal strength
- peak or null locate
- signal current measurement
- depth to service
- range of active and passive locate modes.

Radiodetection has worked alongside industry to ensure it provides the products that meet the needs of the customer.



Radiodetection



Whatever the application, the RD400PXL-2 can provide the solution

- Locating and pinpointing all types of cable
- Duct tracing

What Makes the RD400PXL-2 the best choice

- Easy to use
- Versatile
- Accurate
- Rugged and weatherproof
- Cost-effective
- Manufactured to ISO 9001

RD400PXL-2 Receiver Features

Current Measurement :-

Very fast auto current measurement in active modes.

Frequency:-

33 kHz for optimum tracing performance.

Depth :-

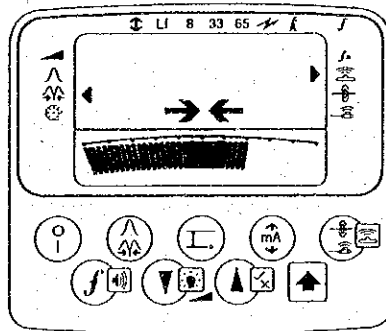
Very fast auto depth measurement in active modes.

Display :-

Large Liquid Crystal Display allows information to be clearly displayed

Semi Auto Gain :-

One touch automatic gain.



Left/right indication (in null mode) is displayed on the LCD to give additional guidance and confidence when locating

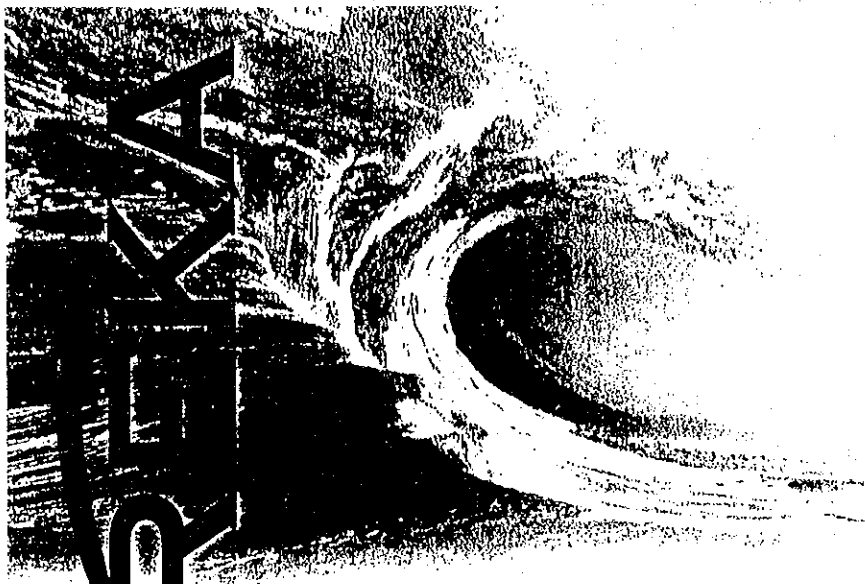
Radiodetection Ltd
Western Drive
Bristol BS14 OAZ, UK
Tel: +44 (0)117 9767776
Fax: +44 (0)117 9767775
email: sales.uk@radiodetection.com
http://www.radiodetection.com



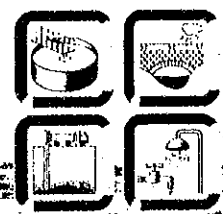
Radiodetection

Radiodetection products are under continuous development are subject to change without notice.

NPSS43EN/0



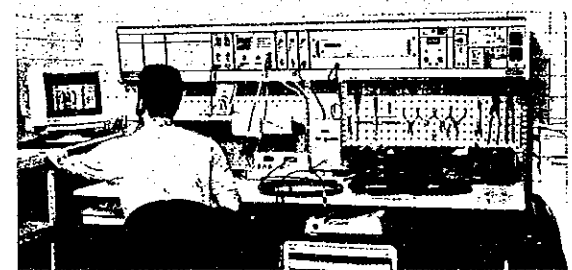
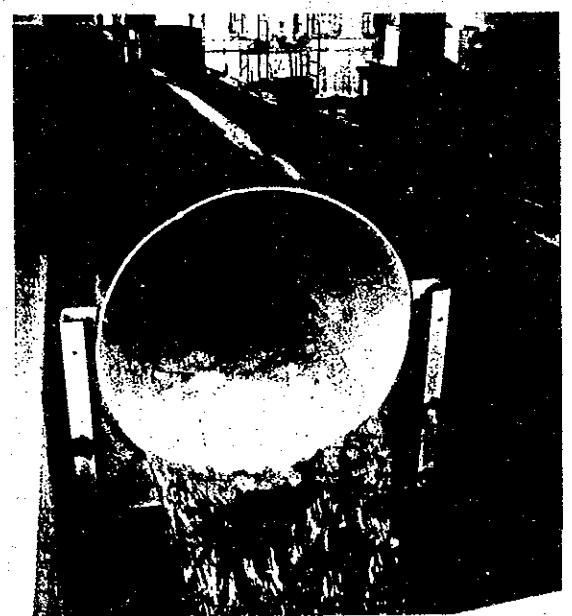
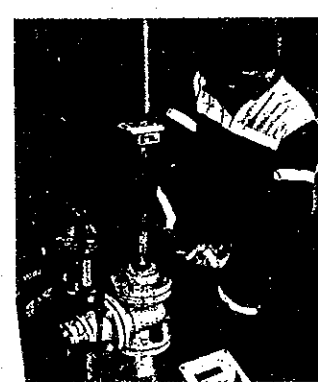
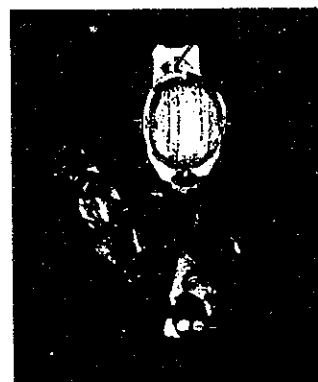
INTEGRATED
MEASURING
SYSTEMS FOR
ALL PARTS OF
THE WATER
CYCLE



HYDREKA

From sensor
to data analysis,

Hydreka
has the solution to make easier
testing and management
of your water network.



Data loggers

Flow meters

Depth and
pressure sensors

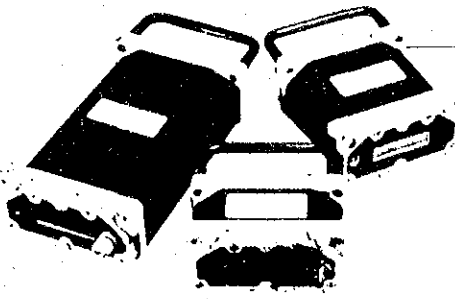
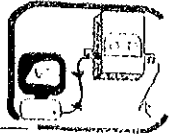
Leak location

Instrument hire

Calibration and testing

Training

DATA LOGGERS



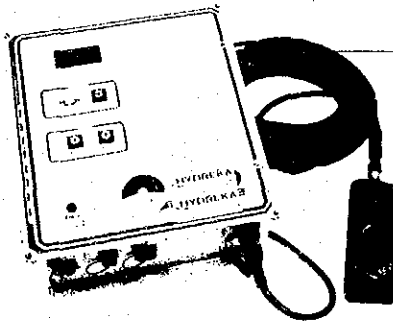
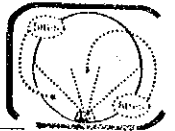
STAND ALONE UNIT

Drinking/Waste/ Riverand underground water

A full range of loggers, 1 to 12 channels various signal inputs and power option

- Network surveys
- Leakage measurement on industrial or household networks
- Pressure and flow permanent monitoring
- Level measurement
- RTC/radio or GSM link

FLOWMETERS

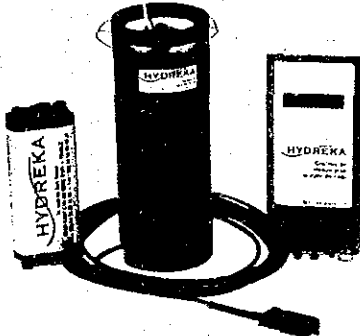


VELOCITY PROFILER

Sewerage

Open channel velocity profiler

- Monitoring and verifying existing flow measurement
- Waste water surveys
- Layout of network and reservoir requirements

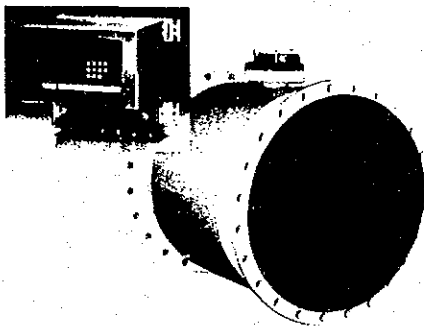


DEPTH/VELOCITY DOPPLER FLOWMETER

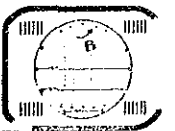


Sewerage

- Sewer network surveys
- Layout of network and reservoir requirements
- Volume measurement



ELECTROMAGNETIC INSERTION FLOWMETER FOR DISTRIBUTION PIPE AND OPEN CHANNEL



Sewerage

- Network step testing
- Permanent networks surveys



DOPPLER FLOWMETER FOR DISTRIBUTION PIPE



Sewerage

- Pump gauging
- Volume measurement
- Network surveys

FLOWMETERS

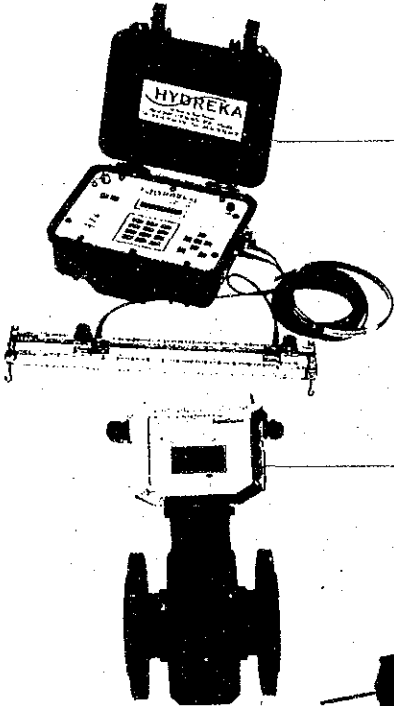


OPEN CHANNEL TRANSIT TIME FLOWMETER



Sewerage/ Surface water

- Waste water network surveys



DISTRIBUTION PIPE TRANSIT TIME FLOWMETER

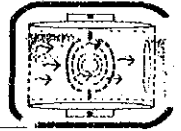


Drinking water

- Drinking water analysis
- Non-intrusive flowmeter

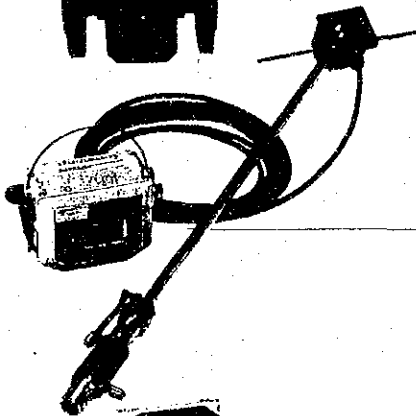
DISTRIBUTION PIPE ELECTROMAGNETIC FLOWMETER

Self contained or externally-powered flowmeter for distribution pipes



Drinking and waste water

- Metering of drinking and waste water networks
- Permanent network surveys
- Self contained, 3 years life

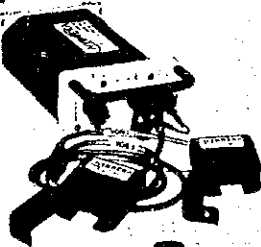


ELECTROMAGNETIC INSERTION FLOWMETER FOR DISTRIBUTION PIPES



Drinking water

- Network step testing
- Flow and pressure monitoring
- Installation without interruption to supply

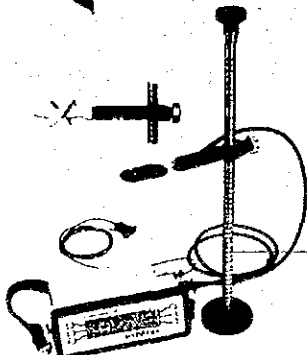


AMPERAGE MEASURING CLAMS



Drinking water/Waste water

- Pump activity measurement
- Volume measurement



VELOCITY METER



Waste/Drinking water

- gauging Q-86

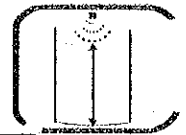
DEPTH-PRESSURE-RAINGAUGE



ULTRASONIC LEVEL SENSORS

Drinking water/Waste/Surface water

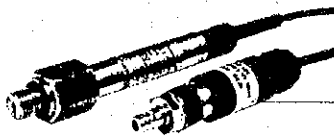
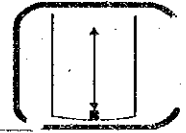
- Non contact depth measurement in reservoir
- Depth/flow conversion



SUBMERSIBLE LEVEL PROBE

Drinking/Waste/surface and underground water

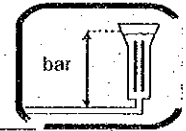
- Depth measurement in reservoir
- Depth / flow conversion
- Water table or river monitoring



PRESSURE SENSORS

Drinking Water

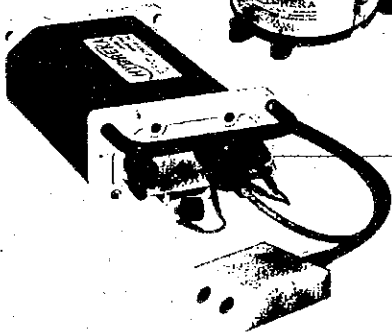
- Pressure measurement on distribution pipe



TIPPING BUCKET RAIN GAUGE

Waste water

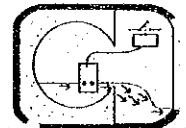
- Rainfall totalisation
- Rainfall intensity



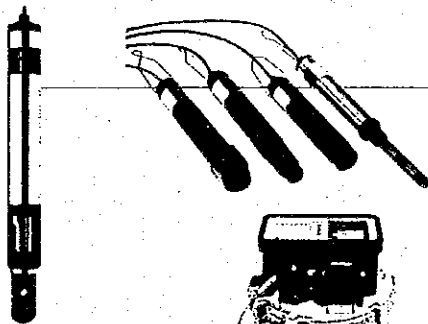
OVERFLOW DETECTOR

Sewerage

- Storm overflows monitoring
- Network surveys



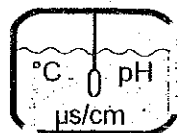
WATER QUALITY SENSORS



WATER QUALITY MEASUREMENTS

Waste/ Underground/ Surface and Drinking water

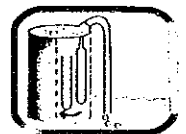
- Constant water quality monitoring
- Turbidity, dissolved oxygen, conductivity, temperature, pH, redox and level



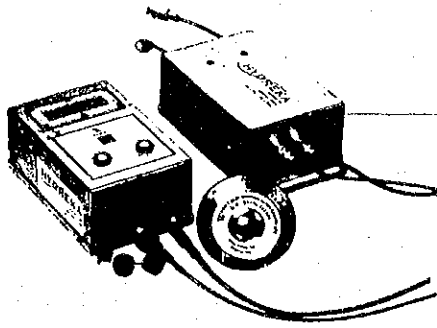
SELF CONTAINED SAMPLER

Waste/Drinking and surface water

- Automatic sampling



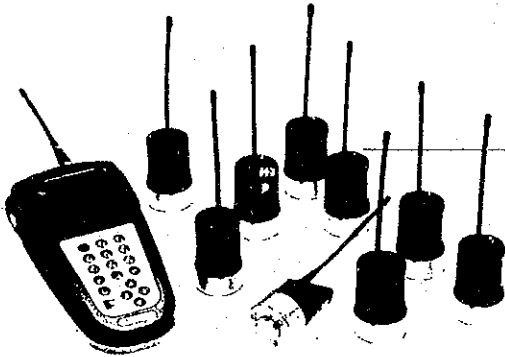
LEAK LOCATION



LEAKAGE CONTROL

Pressure (PRV) controller/Drinking water

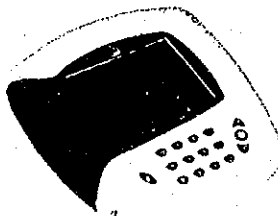
- Pressure control to limit leakage



LEAK DETECTION SYSTEM

Drinking Water

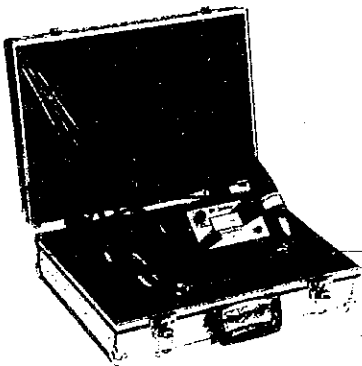
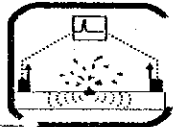
- Permanent monitoring and leak location on drinking water networks



ACOUSTIC CORRELATOR

Drinking water

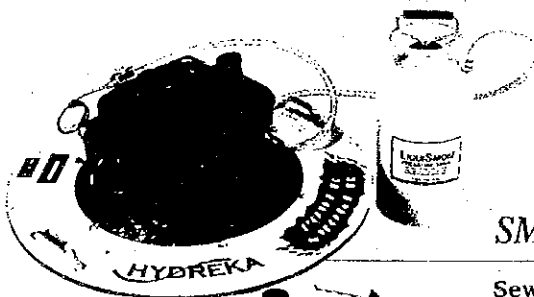
- Leak position pinpointing



ACOUSTIC DETECTOR

Drinking water

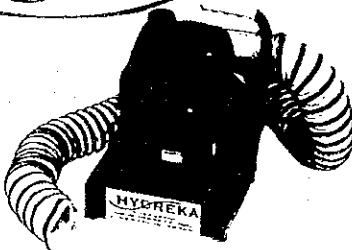
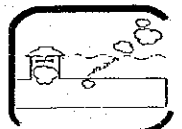
- Leak location by ground listening



SMOKE GENERATOR

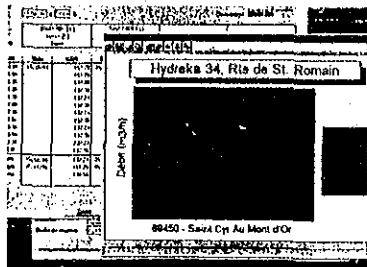
Sewerage

- Test of the integrity of connections in sewer networks
- Identification of missing ends/connections



To meet the needs of its customers,
HYDREKA offers a wide range of services
 to complement its products.

SERVICES



WINFLUID SOFTWARE

Software running under Windows which configures loggers and sensors, downloads and process data, and automatically controls a telemetry network.



INSTRUMENT HIRE

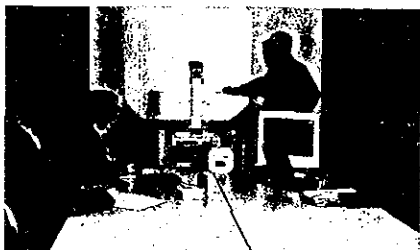
- Permanent availability
- Cost determined by use
- External management of your measuring instruments
- Biggest European rental stock of network measuring instruments

CALIBRATION AND TESTING

Working to ISO 9001 certification, HYDREKA possesses an automated calibration rig. **The in-house hydraulic lab**, equipped with COFRAC/NAMAS controlled flowmeter, calibrates measuring instruments.



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TRAINING

Our dedicated facilities and in-house support are available to assist customers to achieve the best results from our equipment



HYDREKA
 metrauib

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 e-mail : hydreka@hydreka.fr - web : <http://www.hydreka.fr>

Société Anonyme au capital de 254248 € - RCS Lyon : B 344 069 935 - APE 742 C - Siret 344 069 935 00031

HALMA GROUP
 COMPANY

Q-89

FUJI WATER LEAK DETECTOR

LD-7

The compact water leak detector of only 450gm. designed for outdoor operation does not fatigue the operator working on a site for many hours.

The characteristic Ball of Patent Pending eliminates the wind noise transmitted through the cable into the Pick-up of high sensitivity.

Patent Pending

- *08/876,095
- *9711760,0
- *9-135163



Instruments for the location of underground utilities and water leaks.

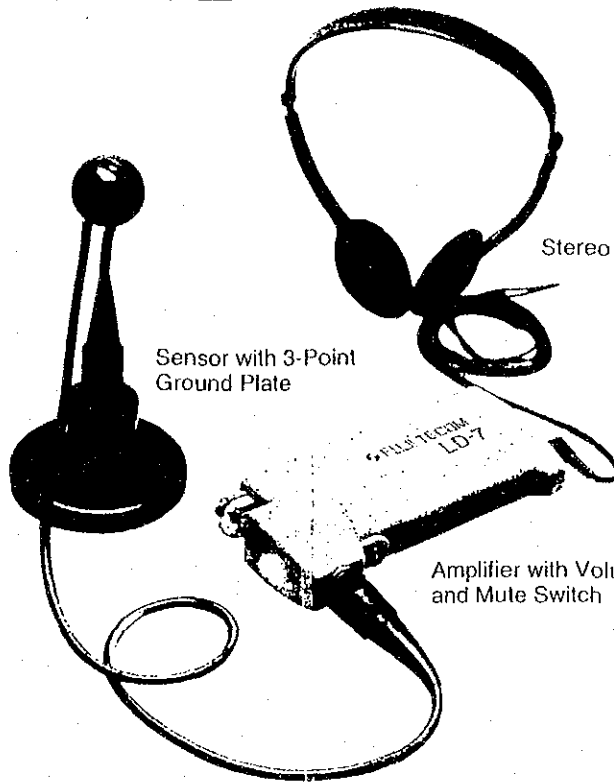
FUJI TECOM INC.

Q-90

FUJI WATER LEAK DETECTOR

LD-7

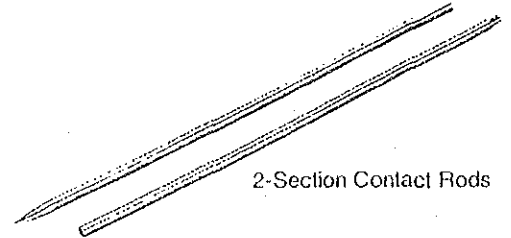
● STANDARD ITEMS



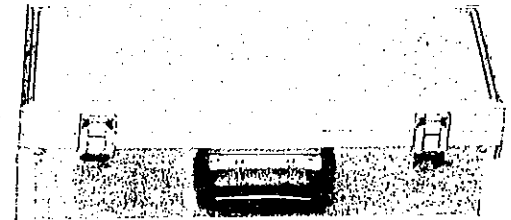
Sensor with 3-Point Ground Plate

Stereo Headphones

Amplifier with Volume Control and Mute Switch



2-Section Contact Rods



Aluminum Carrying Case

FEATURES

- Compact amplifier (with mute switch) fits inside the palm of the user's hand. Press the mute switch (on/off) to activate the leak sounds in the headphones, and then release the mute switch when moving the sensor (protects your hearing!).
- Designed for all of the water leak detection applications, including leak surveys and leak pinpointing. Use the 3-point ground plate for pinpointing on streets and concrete slabs. Use the optional magnet base or the contact rod for leak surveys at hydrants, valves, or meters.
- Extremely compact and lightweight. The entire LD-7 inside its aluminum carrying case measures only 380×160×110 mm, small enough to be stored behind the seat inside the cab of the truck.

SPECIFICATIONS

(Amplifier)

| | |
|-----------------------|--|
| Amplification | : 61.0dB±3dB |
| Power Consumption | : 20.0mA or less |
| Frequency Character | : 100~1000 Hz |
| Operation Temperature | : -5°C~+55°C |
| Power Source | : UM-3 or AA Dry Cell Batteries (1.5V×2) |
| Size and Weight | : 146mm×30mm×68mm 230gm |

(Pick-up)

| | |
|-----------------|---------------------------|
| Element | : Piezoelectric Element |
| Sensitivity | : 1.00V/g at 400Hz |
| Size and Weight | : Dia. 76mm×49mm 220gm |

(Headphones)

| | |
|-----------|-----------------------------------|
| Impedance | : 20ohms (mini-stereo headphones) |
|-----------|-----------------------------------|

(Aluminum Carrying Case)

| | |
|------------------------|-----------------------------------|
| Size and Weight (full) | : 380mm×160mm×110mm 2.2kg full |
|------------------------|-----------------------------------|

We reserve the right to change specifications without prior notice.



Instruments for the location of underground utilities and water leaks.

FUJI TECOM INC.

Head office : 1-11 Izumi-cho, Kanda, Chiyoda-ku, Tokyo, Japan
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E-Mail : FUJI-TECOM@msn.com

Branch Office : Sapporo, Sendai, Tokyo, Shinetsu, Nagoya, Osaka
Hiroshima, Kyushu

Technical Development Center : Niiza

AGENT

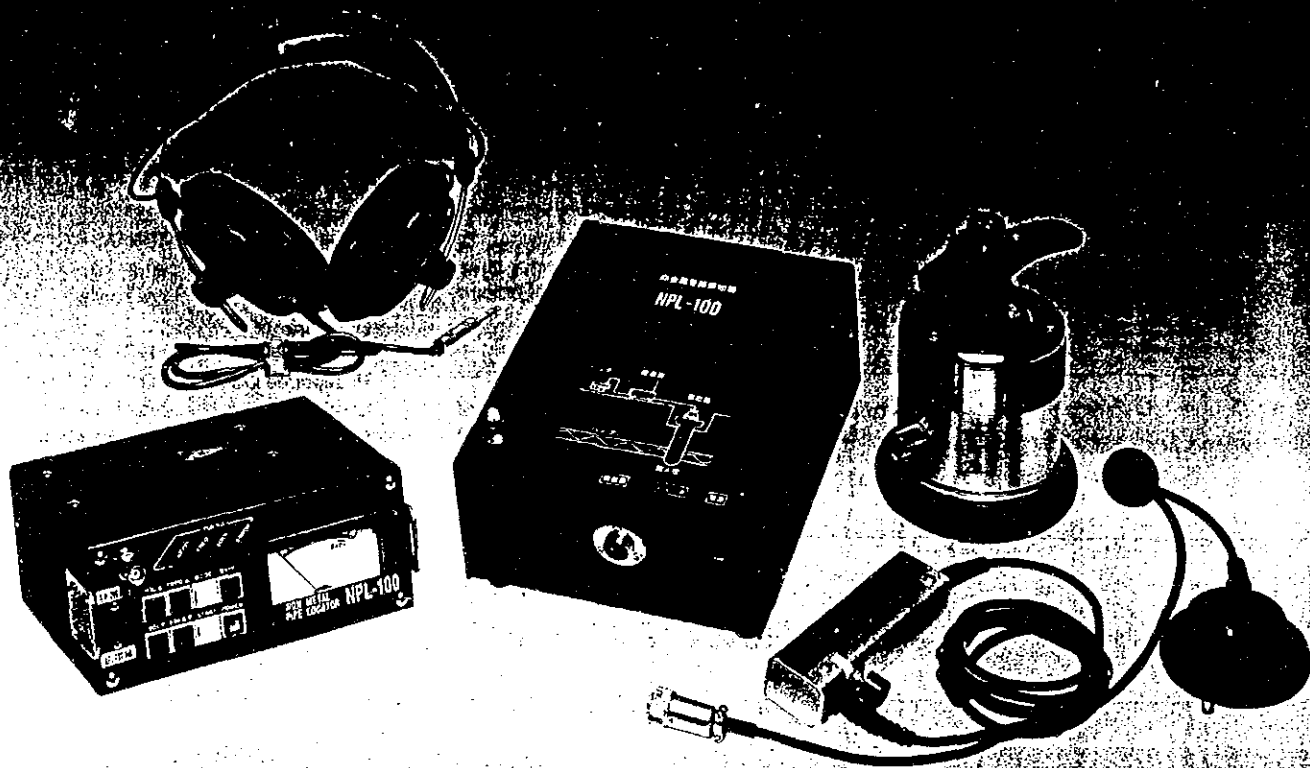
FUJI NON-METALLIC PIPE LOCATOR

NPL-100

Patent No.855951

The new NPL-100 non-metallic pipe locator is a further developed version of the PL-130 well-reputed in the water supply industry and has the automatic adjustment function for tuning in a resonance frequency of each pipe.

Because of the unique principle, the NPL-100 can locate not only the non-metallic pipes but also the metallic pipes including the metallic pipes with insulating joints.



Instruments for the location of underground utilities and water leaks.

FUJI TECOM INC.

Q-92

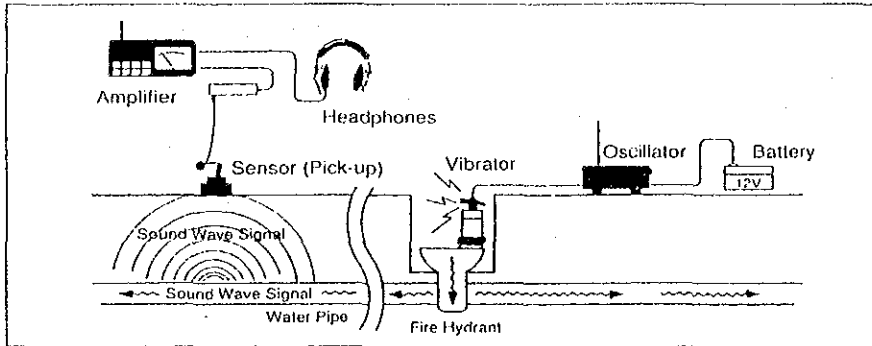
FUJI NON-METALLIC PIPE LOCATOR

NPL-100

PRINCIPLE

As shown by the following figure, the sound wave signal is transmitted into the pressured water inside of the buried pipe from the firehydrant by the vibrator of NPL-100 locator and radially reaches the ground surface.

The sensor of NPL-100 locator catches the sound wave signal on the ground surface and the receiver amplifies for operating the large indicator meter and headphones.



STRUCTURE

- Transmitter consisting of :
 - Oscillator 1
 - Vibrator 1
 - Antenna 1
 - Connecting cable 2
 - Meter adaptor..... 1
- Receiver consisting of :
 - Amplifier 1
 - Sensor (Pick-up) 1
 - Headphones 1
- Aluminum carrying case 1

SPECIFICATIONS

- Oscillator
 - Power Source : 12V DC
 - Power Consumption : 20W
 - Frequency : 50~500Hz
 - Operating Temperature Range : -10°C~+55°C
 - Size : 170 (W) x210 (L) x 120 (D) mm
 - Weight : 1.0kg
- Amplifier
 - Power Source : LR6 Battery 1.5Vx 6pcs. (9V DC)
 - Current Consumption : 100mA
 - Amplification : 80dB
 - Frequency : 80~500Hz
 - Operating Temperature Range : -10°C~+55°C
 - Headphone Output : 8Ω (Stereophonic Type)
 - Level Indication : Meter Needle
 - Size : 170 (W) x75 (L) x 140 (D) mm
 - Weight : 1.0kg
- Sensor (Pick-up)
 - Type : Piezoelectric Acceleration Sensor
 - Sensitivity : 0.7V/g (at 400Hz)
 - Size : φ 80x50mm
 - Weight : 0.5kg

FEATURES

- 1 The location, direction and bending of all kind of water pipes can be detected with the NPL-100 locator for the preliminary survey for preventing the damage of pipe and for mapping the correct drawings.
- 2 The sound wave signal of NPL-100 locator is not affected by the magnetic field and the filter built in its receiver intercepts the external noises such as the traffic and footstep noises.
- 3 The operator can tune the frequency of sound wave in the resonant point of each pipe by the remote control of radio wave at the side of the receiver unit.
- 4 The NPL-100 locator can locate the non-metallic pipes such as the asbestos and P.V.C. as well as the metallic pipes including the iron pipes jointed with the insulated material.

We reserve the right to change specifications without prior notice.



Instruments for the location of underground utilities and water leaks.

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Branch Office : Sapporo, Sendai, Tokyo, Shinetsu, Nagoya, Osaka
 Hiroshima, Kyushu

Technical Development Center : Niiza

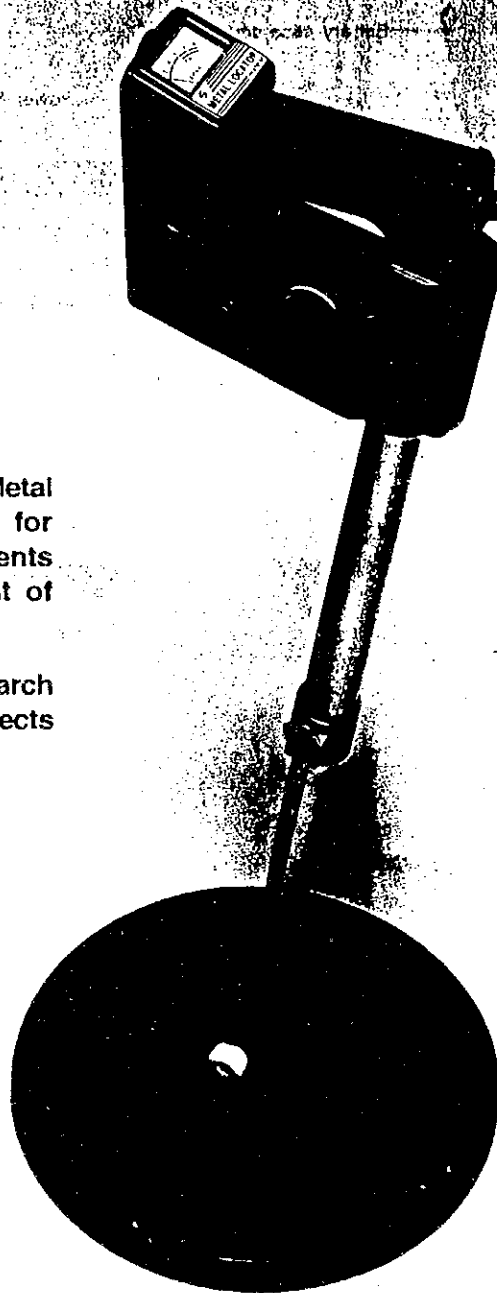
AGENT

FUJI METAL LOCATOR

F-90M

The advanced design of the F-90M Metal Locator contains a re-set function for storing and comparing measurements eliminating the need for adjustment of sensitivity.

The F-90M includes a waterproof search antenna that can locate metal objects under more than a foot of water.

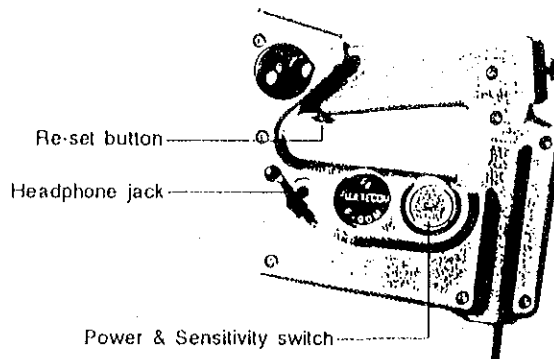
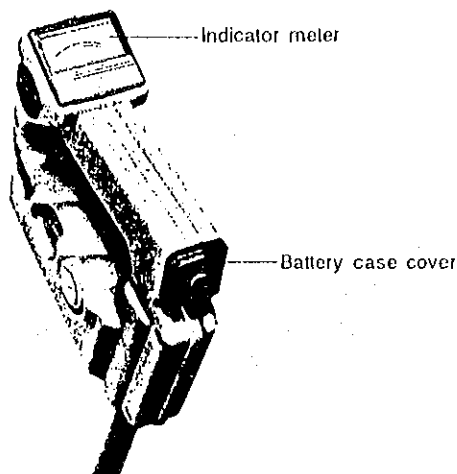


Instruments for the location of underground utilities and water leaks.

FUJI TECOM INC.

FUJI METAL LOCATOR

F-90M



FEATURES

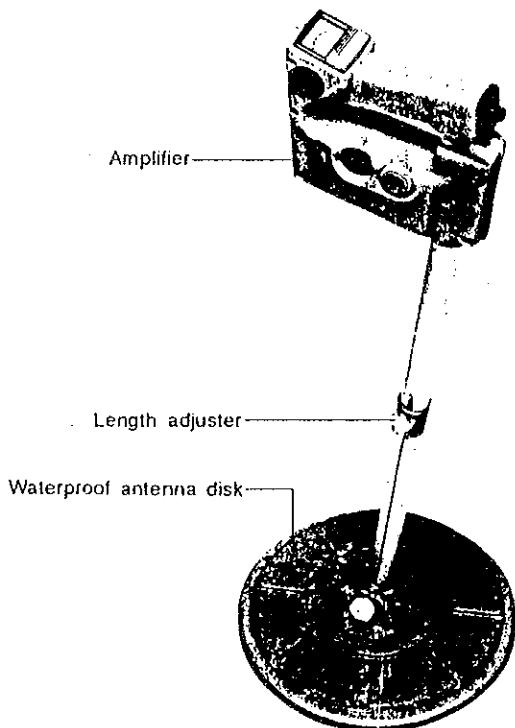
- Large indicator meter of high sensitivity.
- Re-set function eliminating the need to pre-adjust the sensitivity.
- Waterproof search antenna capable of locating objects under water.
- High-soil conductivity function which minimizes the ground influence that can cause ghost effects or the appearance of ghost objects.
- Optional headphones are available. These are particularly useful on a site with background noise or windy conditions.
- Lightweight and collapsible, the F-90M is easy to carry and store.

CONSTRUCTIONS

- The F-90M comes completely with a built-in amplifier, indicator meter and telescopic antenna.
- The F-90M includes:
 - Soft carrying case
 - Instruction manual
- Optional accessories available:
 - Headphones

SPECIFICATIONS

- Frequency : 9.75kHz.
- Power & Sensitivity Switch : Battery check and Sensitivity adjustment
- Indicator : Speaker and Indicator meter
- Power : Type AA (R6P) dry battery × 4 pcs. (6V)
- Battery Life : 25 hours (approx.)
- Operating temperature : -5°C ~ +60°C
- Detectable Depth : 40cm (15 3/4") for a steel disc 10cm (3.9") dia.
60cm (23 1/2") for a steel disc 18cm (7") dia.
- Weight : 1.7kg (3.7 lbs.)
- Dimensions : 170mm × 195mm × 60mm (6.7" × 7.7" × 2.4")
 - Amplifier
 - Antenna : φ 270mm × 30mm (10.6" dia. × 1.2")



We reserve the right to change specifications without prior notice.



Instruments for the location of underground utilities and water leaks.

FUJI TECOM INC.

Head Office : 1-11 Izumi-cho, Kanda, Chiyoda-ku, Tokyo, Japan
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Branch Office : Sapporo, Sendai, Tokyo, Shinetsu, Nagoya, Osaka, Hiroshima, Kyushu

Technical Development Center : Niiza

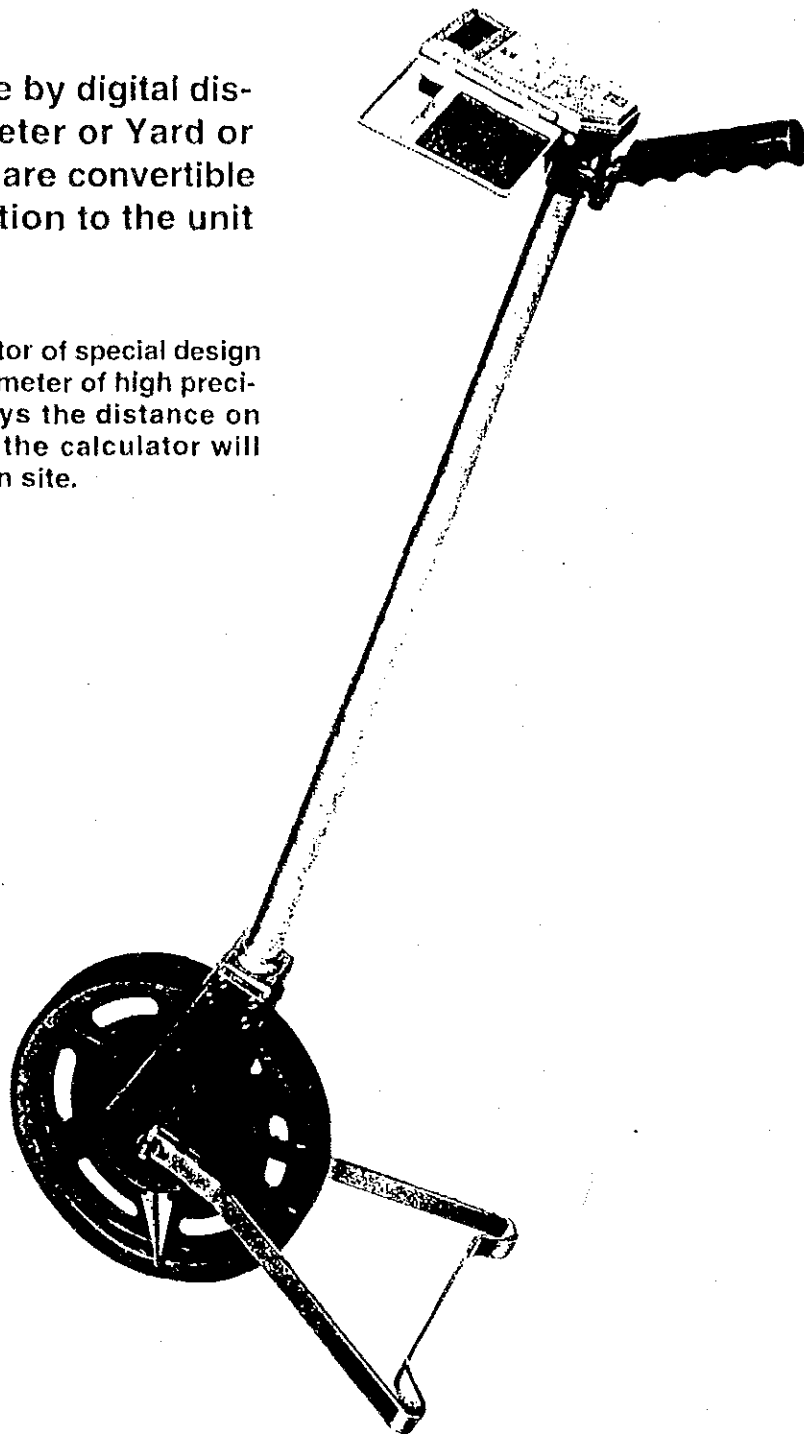
AGENT

FUJI MEASURING WHEEL

F-20

readouts the distance by digital display in the unit of Meter or Yard or Feet and those units are convertible by simple key operation to the unit appealing to you.

The mini-electronic calculator of special design is linked with the magnetometer of high precision and instantly displays the distance on screen. Simultaneously, the calculator will prove its useful function on site.



Instruments for the location of underground utilities and water leaks.

FUJI TECOM INC.

FUJI MEASURING WHEEL

F-20

Features

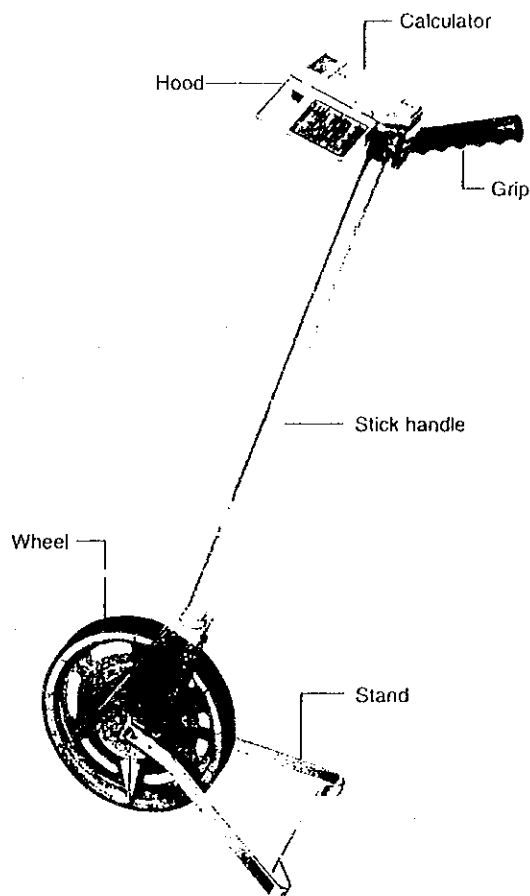
- Quick to convert the distance in meter, yard and feet with only one key operation.
- Suitable to measure the low speed in km/h.
- Handy to carry from site to site.
- Simple to operate the keys located at hand.
- Easy to read the figures displayed on screen.
- The value measured is convertible as it is into a calculation needed on site.
- Lamp lights the screen at night.
- The power switch is automatically turned off within 10 minutes after operation.

Specifications

- Measurement : Magnetometer
- Measurement range : 0.1m~999.9m
- Display : Distance in meter, yard or feet
Speed in 1 km/h to 50 km/h
Calculation in 7 figures
- Check point signal : Buzzer at every distance being set up.
- Accuracy : $\pm 0.1\%$ in distance
- Power supply : 6V (1.5V \times 4)
- Temperature : 0~40°C
- Auto power off : 10 minutes
- Size : H908mm \times L210mm \times W140mm
- Weight : Approx. 1.3kg without carrying bag

Constructions

- Removable mini-electronic calculator of 7 figures.
- Measuring wheel of water-proof with stick handle of adjustable length.



We reserve the right to change specifications without prior notice.



Instruments for the location of underground utilities and water leaks.

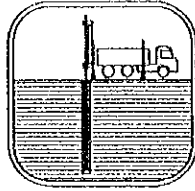
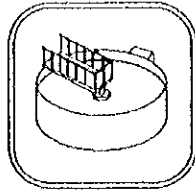
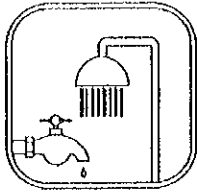
FUJI TECOM INC.

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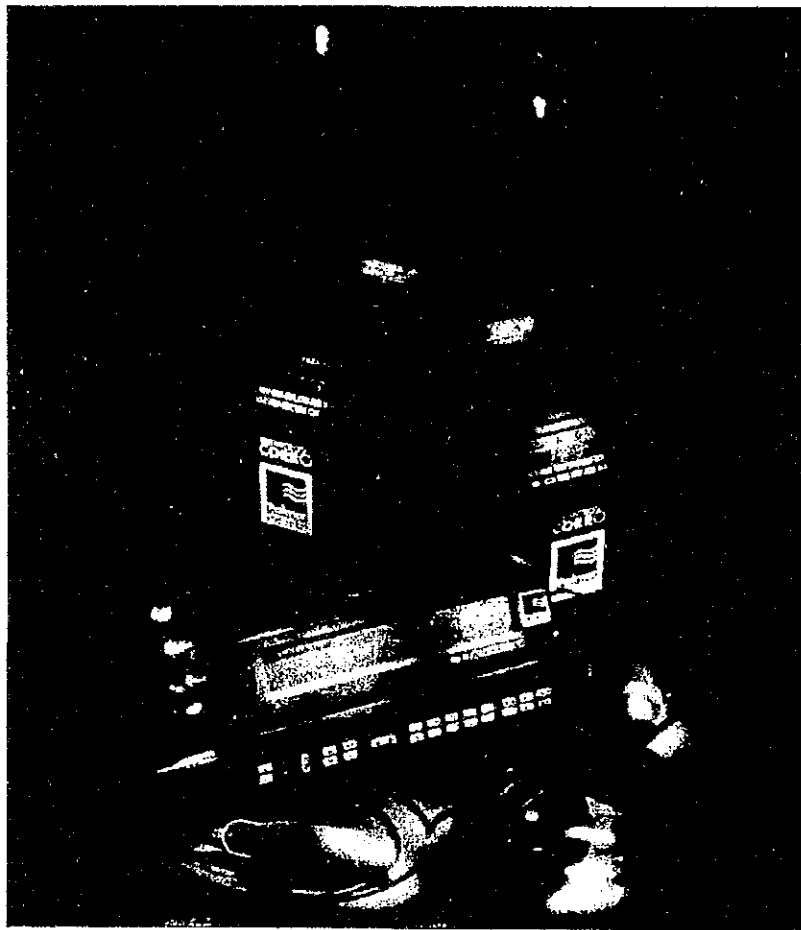


HYDREKA

**Integrated measurement
systems for all parts of
the water cycle**

MICROCORR 6

Leak Noise Correlator



Leakage detection staff require a high performance correlator with a robust design for intensive field use. MicroCorr 6 offers superior correlation technology whilst retaining the ease-of-use of previous MicroCorr models. New, faster electronics are combined with AFS (Assisted Filter Selection) to enable the user to detect leaks quickly, even on plastic pipes. When all the « easy » leaks have been found, reduce leakage still further with MicroCorr 6.

MICROCORR 6



Benefits

- New high sensitivity sensors with extended low frequency response for improved performance on plastic pipes
- Continuous correlation to detect intermittent or weak leak noise
- Dual correlation capability – Time Domain and FFT
- « Hi-Fi » sound quality
- Faster and « cleaner » correlation display
- AFS (Assisted Filter Selection) for difficult leaks
- Robust design for heavy duty use

Scop of Supply

Basic System

- MicroCorr 6 Correlator with carry strap
- MicroCorr 6 Transmitter/ receiver link (red)
- 2 high sensitivity accelerometer sensors with protective shroud and magnetic attachment
- 220-240VAC Power supply/ battery charger (12VDC available)
- Stereo headphones
- Interconnecting leads
- Operating manual

Options

- MicroCorr 6 Transmitter/ receiver link (blue) – for dual radio capability
- AFS (Assisted Filter Selection) – for difficult leak noise situations

Accessories

- Hydrophone sensor kit - for correlation on non-metallic pipes and trunk mains
- Meter box adaptors
- Ground microphone foot- to use correlator in acoustic survey mode
- Carry satchel for correlator unit
- Travel case for correlator or ancillaries
- Instrument box for complete MicroCorr 6 system
- PC download software and interface lead
- Portable, battery-operated A4 printer with interface cable
- 200 metre cable drums (pair)
- Magnetic vehicle mounting aerials (pair)
- Measuring wheel (metric) with stand and carry case
- Vice grip sensor attachment (240mm or 1160mm lengths)
- 12VDC power cable with lighter socket connector
- Interchangeable lead acid battery pack
- Set of 3 battery packs with leads for external charging

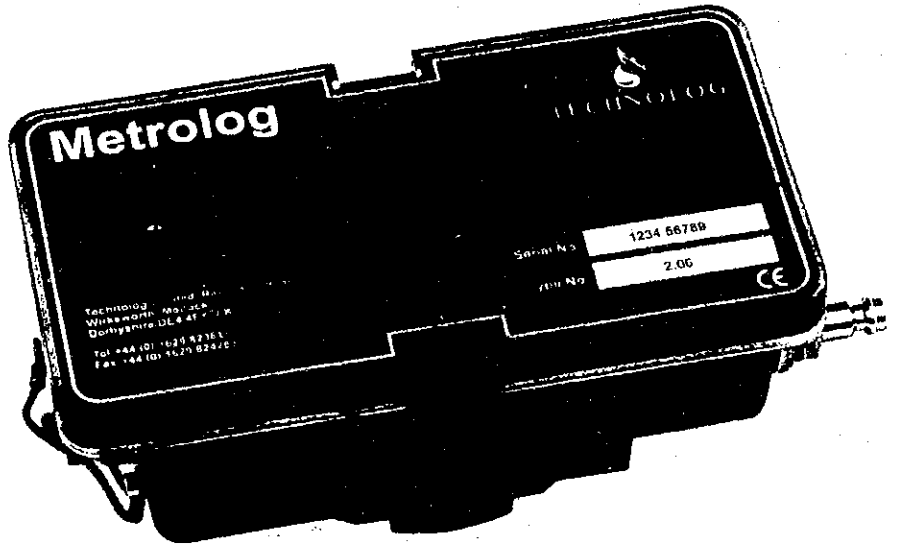
Metrolog

Flow and Pressure Data Loggers

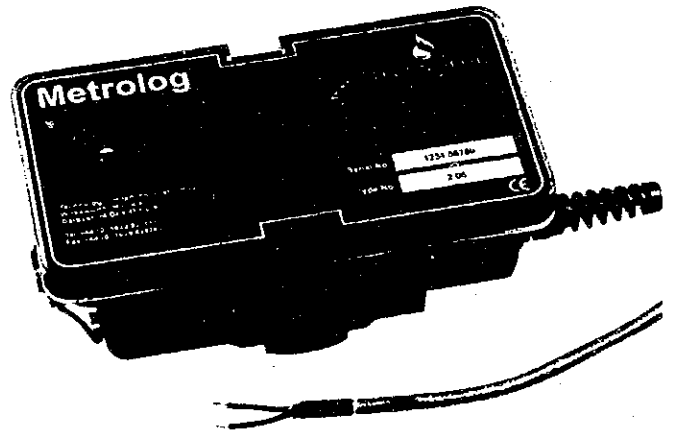
TECHNOLOG

The Metrolog range of data loggers has been developed to monitor and record pressures and flows within water distribution systems.

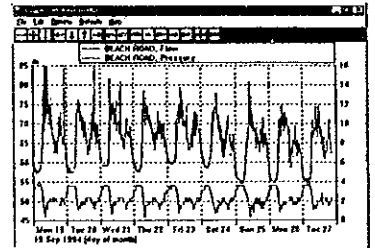
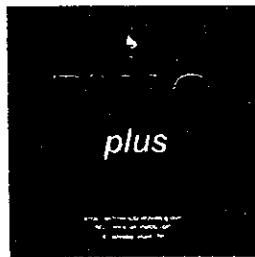
- Light-activated LCD
- Internally powered and housed in a robust, fully waterproof enclosure
- Battery life in excess of 5 years
- Compatible with Technolog's communication and configuration software for PCs, Psion Organiser and Workabout
- Metrolog H and P data loggers feature an integral pressure transducer
- Remote communications options



Metrolog F



Comprehensive data analysis is provided by Technolog's Windows™-based PMAC software .



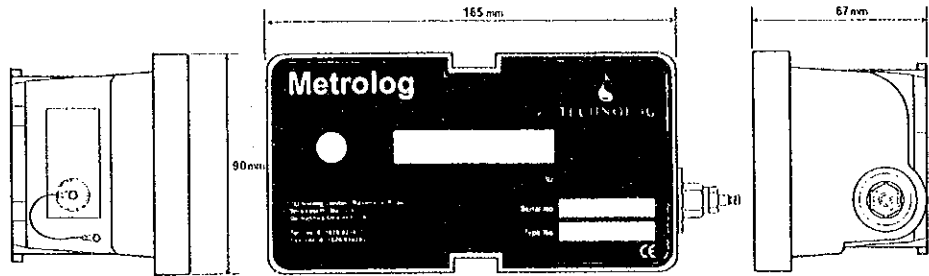
We can provide complete service, installation and maintenance solutions.

Q-100

Flow and Pressure Data Loggers

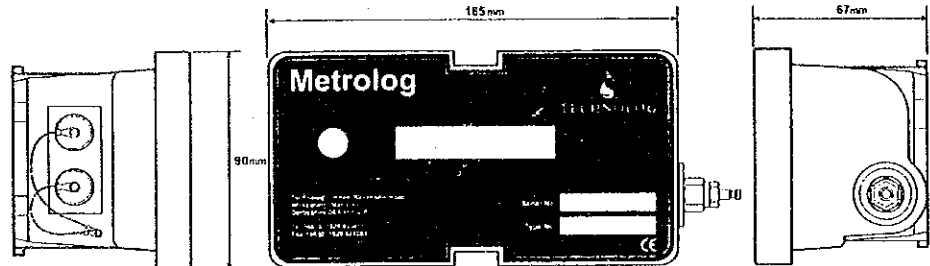
Metrolog H

The Metrolog H pressure and bi-directional flow data logger is designed to be directly mounted onto the Kent Helix 2000 and 3000 series flow meters. This eliminates the need for a pulse unit, additional wiring, connections, and the traditional mechanical index.



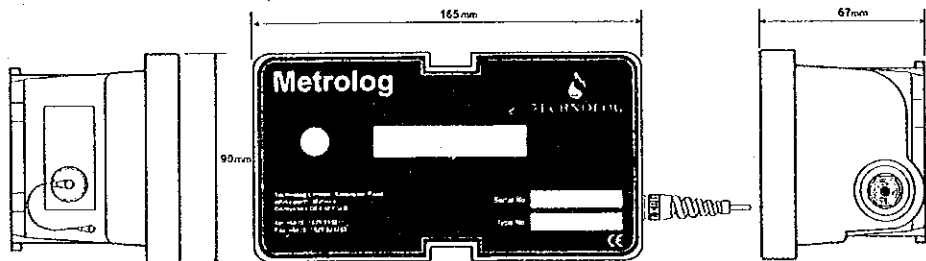
Metrolog P

The Metrolog P flow and pressure data logger utilises the same robust enclosure as the Metrolog H, but with a flow input connector.



Metrolog F

Metrolog F is a cost effective single channel flow data logger with no integral pressure sensor. The flow input cable is pre-wired to the unit, ideal for permanent installations. Metrolog F will accept a pulse signal from most mechanical and electro-magnetic flow meters.

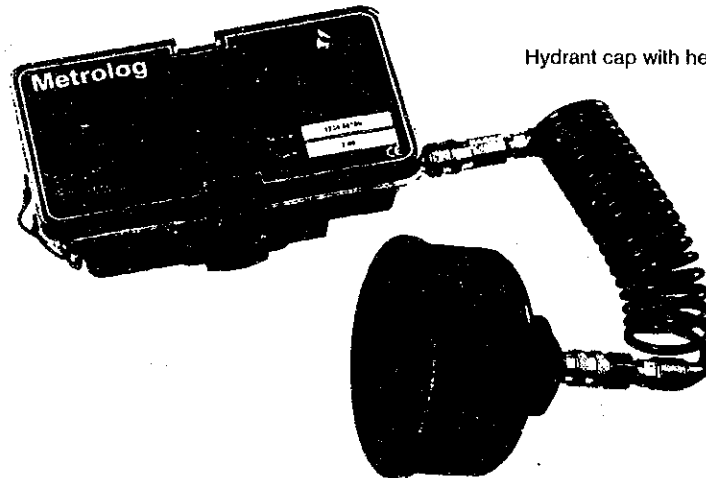




Selection Guide

| | H | MODEL P | F |
|---|-----------------------|---|----------------------------------|
| Display | Yes | Optional | Optional |
| Direct mount – Kent Helix 2000/3000 meters | Yes | – | – |
| Flow | Yes Bi-directional | Optional Uni-directional Bi-directional | Yes Uni-directional |
| Flow input water meter pulser | – | Socket | Integral 1.5 metre Flow Cable |
| Integral pressure sensor | Yes | Yes | – |
| Pressure ranges (metres) | 0-100 or 0-200 | 0-100 or 0-200 | – |

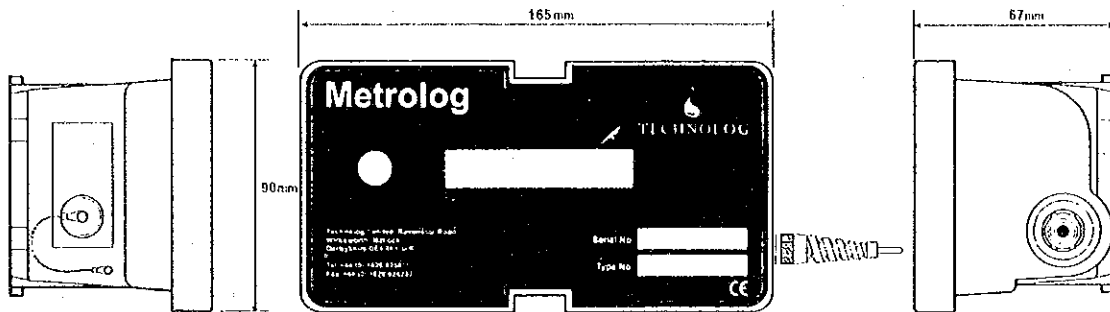
| Memory Capacity | | | |
|--|----------|----------|----------|
| Pressure only, recorded at 15 minute intervals | 260 days | 260 days | – |
| Flow only, recorded at 15 minute intervals | 143 days | 143 days | 143 days |
| Pressure and flow data, recorded at 15 minute intervals | 92 days | 92 days | – |



Hydrant cap with helicoil hose

Accessories

| | H | MODEL P | F | |
|---|---|------------|---|------------------------------------|
| Kent PU10 terminated with 3 way connector | – | • | – | |
| Kent LRP 10 terminated with 3 way connector | – | • | – | |
| Kent Aquamag connector | – | • | • | |
| Quick release helicoil pressure hose | • | • | – | |
| Quick release 12" hydrant hose | • | • | – | |
| Hydrant cap complete with female quick-fit | • | • | – | |
| Stainless steel wall mounting bracket | • | • | • | • = available – = not available |



| | |
|-----------------------|--|
| Inputs | Absolute pressure Bi-directional flow - Metrolog H and P Uni-directional flow - Metrolog P and F |
| Pressure Input | Input range: 100 or 200 metre head of water as standard – other ranges, consult factory Operating temperature range: +1 to 30°C (water) Accuracy/Resolution: 0.5% of range Pressure Port: 1/8" BSP female thread fitted with male probe |
| Flow Input | Channel type: Count: counted over and recorded at preset intervals |
| Serial Port | Type: Optically isolated, full duplex, asynchronous Data Rate: 1200/1200 baud transmit/receive, V22 for remote communication |
| Memory | Type: Solid state. Non-volatile Size: 32 Kilobyte, allocatable between channels as required Data retention: Life of battery |
| Clock | Type: Crystal controlled calendar clock, with leap year adjustment |
| Clock Accuracy | 100 seconds per month maximum error over operating temperature range |
| Supply | Type: Internally powered by single cell, battery change at factory Life: Greater than 5 years or 1 million pressure readings |
| Recording | Recording interval: Programmable between 1 second and 4 hours Logging method: Time based or threshold logging Data storage: Rotating store or store until full |
| Environmental | Operating temperature: -20°C to +50°C Protection classification: IP 68 |
| Connectors | Serial port, 4-way Flow input, 3-way (if fitted), conforming to MIL-C-26482 |
| Mechanical | Weight: 600 grams |

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**HORIZONTAL IMPELLER WOLTMANN
WATER METER**

WPM COSMOS II



Cold water model
40°C

PN 16

ND 400 to 800 mm

Removable measuring
mechanism

COSMOS II pulse
transmitting head
model

COSMOS T armoured
tropicalised head
model

Q-104


SOCAM

WP COSMOS II

Mechanical Impeller Woltmann Water Meter

Due to its high performances and its low head loss, the WP COSMOS II water meter is recommended for production and network purposes.

This meter can be installed in horizontal, vertical or inclined position (not with the dial downwards) to comply with all installation conditions.

VERSATILITY :

The WP COSMOS water meter is available in two models in order to comply with all operating requirements:

The COSMOS II head model can be fitted with up to two Reed pulse units (remote reading, dosing...) and one optoelectronic pulse unit (flowrate indication). Each sensor gives a different pulse value.

Sensor fitting does not require to dismantle the meter body from the network nor to destroy metrological seal (see our leaflet COSMOS II ref. C-A-3-09).

The COSMOS T head model is suited to the hardest operating conditions (high humidity and changing temperature) without any risk of moisture. It can even be permanently flooded.

LEGIBILITY :

The perfect tightness of the COSMOS T model ensures a perfect readability of the totalizer.

On demand, the COSMOS II totalizer may be fitted with a magnet wiper, which enables to clean the moisture that may appear over the numerals. The dial and the lid of the COSMOS II head may be rotated through 360°.

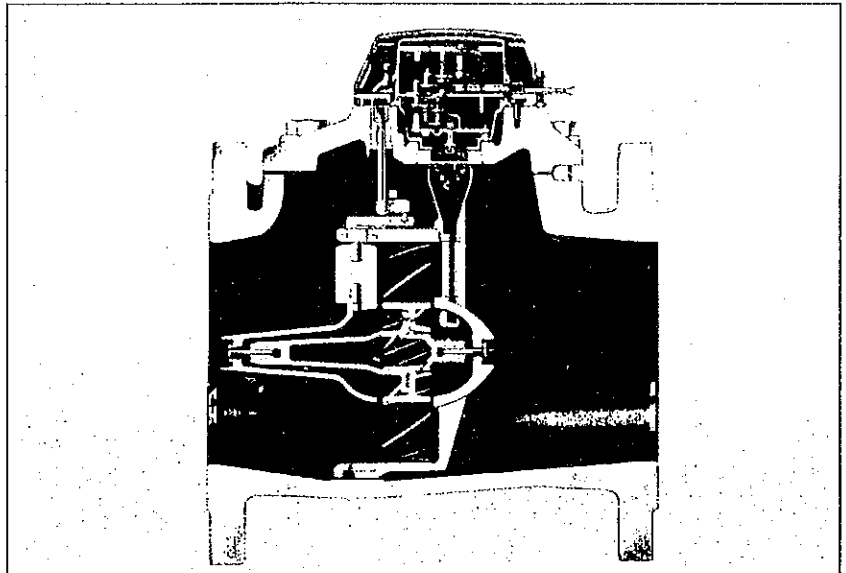
RELIABILITY :

The cast iron body of the meters DN400 to 600 and the welded steel body of the meters DN700 and 800 are protected against internal and external corrosion by an epoxy powder coating.

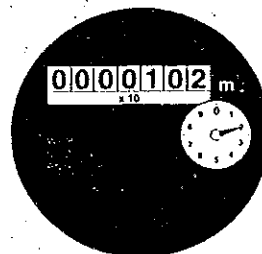
The magnetic transmission is protected from any external influence.

REMOVABLE MECHANISM :

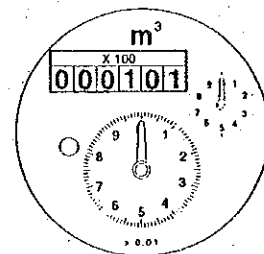
The EEC approved removable measuring mechanism can be replaced in situ without dismantling meter body from pipework.



Dials



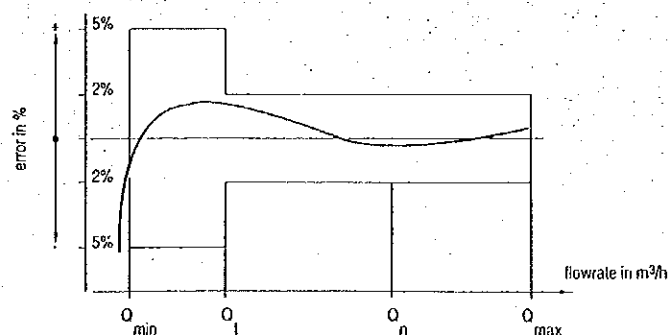
COSMOS T



COSMOS II

| PULSE VALUE | |
|----------------------|-----------------|
| NOMINAL DIAMETER | DN 400 à 800 |
| REED R.01 pulse unit | 100 m³ 10 m³ |
| OPTO OP.1 pulse unit | 0,10 m³ |
| OPTO OP.3 pulse unit | 1 m³ |

Measuring error curve



WP COSMOS II

HORIZONTAL IMPELLER WOLTMANN WATER METER

| COLD WATER 50°C - METROLOGICAL CHARACTERISTICS | | | | |
|--|----------------------|-------------------|------|------|
| NOMINAL DIAMETER | | mm | 400 | 500 |
| Nominal flowrate | Q _n | m ³ /h | 1000 | 1500 |
| Maximal flowrate | Q _{max} | m ³ /h | 2000 | 3000 |
| Minimal flowrate (measuring range ±5%) | Q _{min} ISO | m ³ /h | 30 | 45 |
| Transitional flowrate (measuring range ±2%) | Q _t ISO | m ³ /h | 200 | 300 |

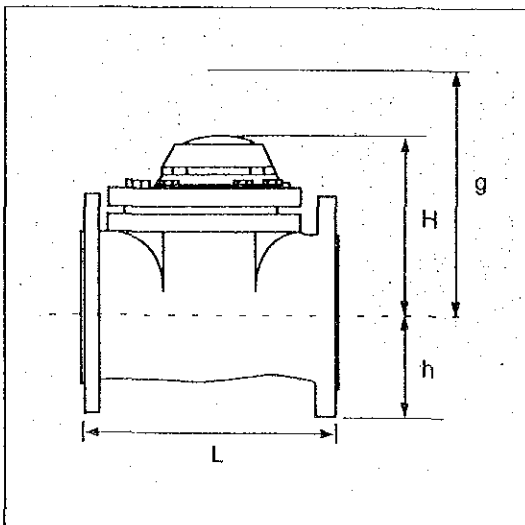
| COLD WATER 50°C - OPERATIONAL CHARACTERISTICS | | | | | | |
|--|-------------------|-------|-------|-------|-------|-------|
| DIAMETRE NOMINAL | mm | 400 | 500 | 600 | 700 | 800 |
| Peak flow | m ³ /h | 3000 | 4500 | 6500 | 9000 | 12000 |
| Permissible continuous load 24h/J | m ³ /h | 2000 | 3000 | 3300 | 4500 | 6000 |
| Real minimal flowrate (measuring range ±5%) | m ³ /h | 25 | 45 | 100 | 130 | 210 |
| Real transitional flowrate (measuring range ±2%) | m ³ /h | 50 | 60 | 180 | 250 | 320 |
| Starts to register at about | m ³ /h | 15 | 20 | 40 | 50 | 60 |
| Maximum registration | m ³ | 108 | 108 | 108 | 108 | 108 |
| Lowest reading unit ⁽¹⁾ | litre | 100 | 100 | 100 | 100 | 100 |
| Working pressure ⁽²⁾ | bar | 16 | 16 | 16 | 16 | 16 |
| Head loss at peak flow | bar | < 0,1 | < 0,1 | < 0,1 | < 0,1 | < 0,1 |

⁽¹⁾ for the WP COSMOS T model, the lowest reading unit is 500 litres

⁽²⁾ PN 16 water meters are designed to sustain a maximal working pressure of 20 bars

| SIZES AND WEIGHT | | | | | | | |
|---------------------|------------------|----|-----|-----|-----|-----|------|
| NOMINAL DIAMETER | | mm | 400 | 500 | 600 | 700 | 800 |
| Length | L | mm | 500 | 500 | 500 | 500 | 600 |
| Height | H | mm | 365 | 412 | 470 | 520 | 570 |
| Height | h | mm | 295 | 353 | 420 | 455 | 512 |
| Height | g ⁽³⁾ | mm | 770 | 860 | 920 | 970 | 1020 |
| Weight of the meter | | kg | 187 | 256 | 270 | 260 | 270 |
| of the mechanism | | kg | 25 | 28 | 28 | 28 | 28 |

⁽³⁾ necessary height to remove the measuring mechanism



MARKING :

An arrow on both sides of the meter shows the direction of flow. The figures give the nominal diameter in mm.

The type of meter, the nominal flowrate, the metrological class and the EC pattern approval number are printed on the nameplate.

The year of manufacture and the individual meter number are printed on the manufacturing plate.

COMPLIANCE :

The water meters WP COSMOS II and WP COSMOS T comply with the prescription of the regulation n°49 of the OIML, with the ISO standard 4064 and with the EC Council Directive 75/33 and BS 5728 standard.

It has been approved according to EC pattern approval under number:

D 80 DN 400 and 500
6.132.01 Class B any position.

WP COSMOS II

OPTIONAL DEVICES



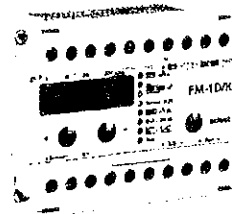
REED PULSE UNIT RD.01 AND RD.02
OPTO-ELECTRONIC PULSE UNIT
OD.01 TO OD.06 :

- Installation without breaking the meter central seal
- Use : remote reading, flowrate indication, titration, remote-control.



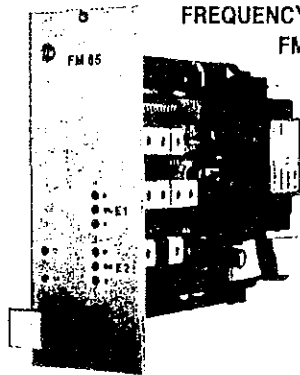
AUTONOMOUS REMOTE
READING
TR200 :

- Presetable index
- Reading guaranteed between -20° C and +60° C



FREQUENCY CONVERTER
FM-1D/K :

- Easy to adjust (thanks to front switches)
- LED indication of flowrate or totalisation



FREQUENCY CONVERTER
FM 85 :

- Use : remote reading, flowrate indication, titration, remote control...
- Adjustable threshold according to the flow (electrovalves or pumps control, alarm)
- Case model or Europcard model

EXPORT DEPARTMENT

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certified quality system



C-A-2-05/c

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