Level Probes for WasteWater Solutions

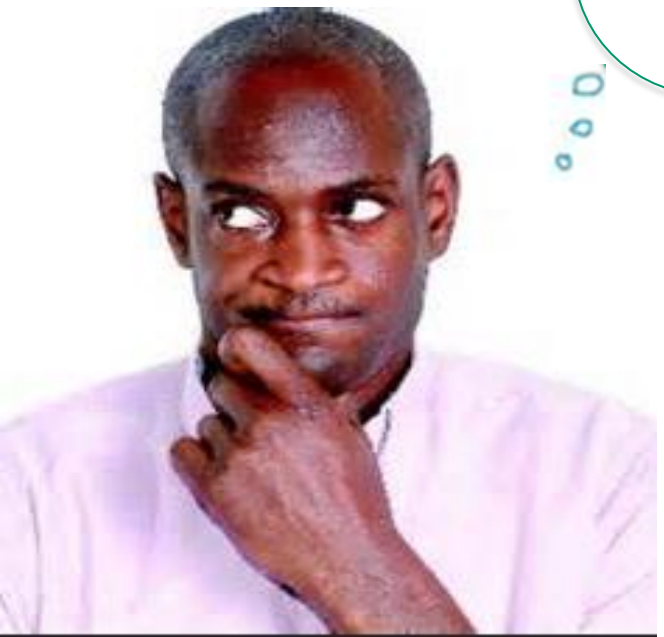
WESTLEY FOONG

AUTOMATION MANAGER, MONITORING & CONTROLS

Level Probes Choices…

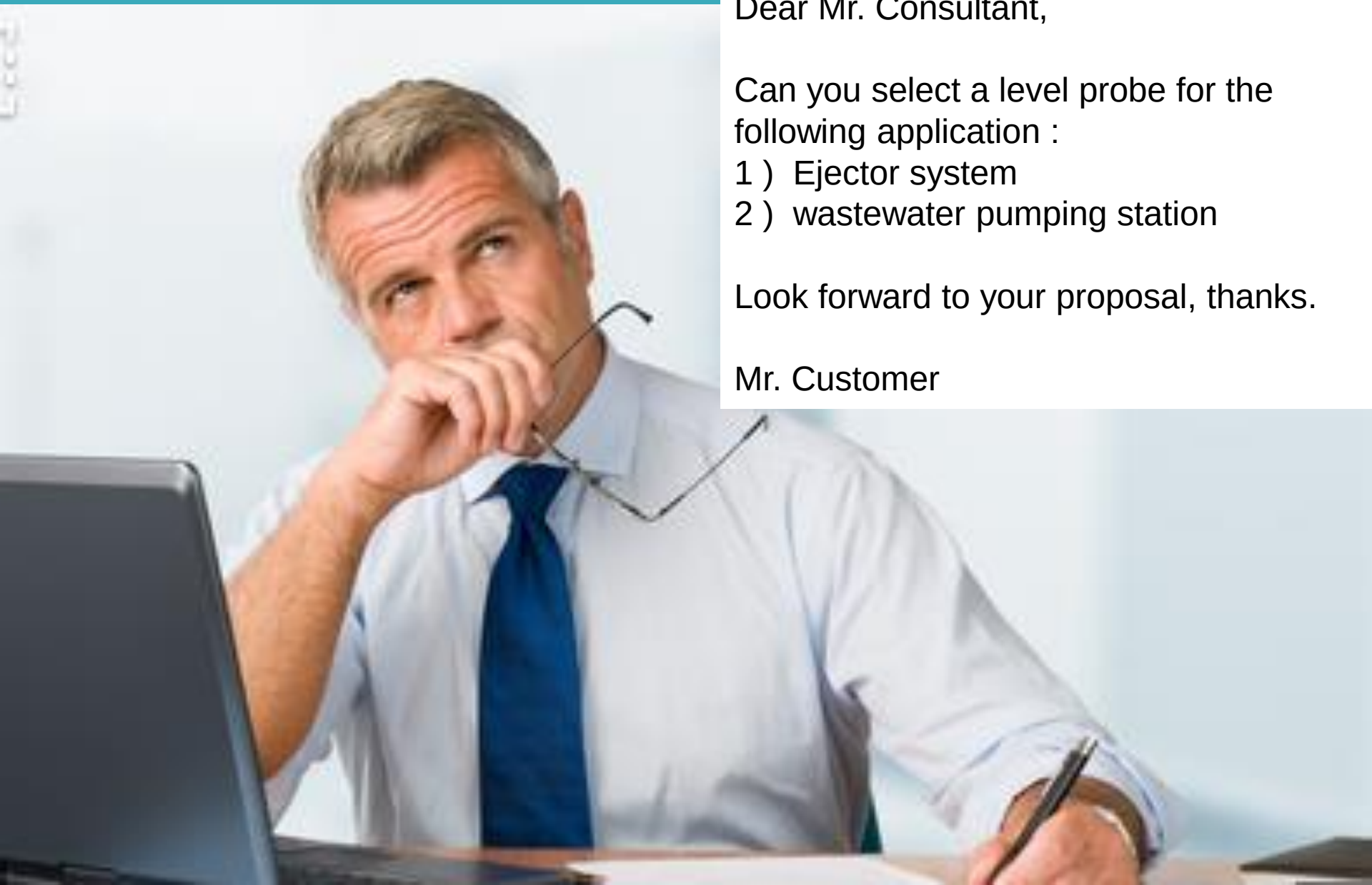
There are so many choices for level probes, how do I select the right one for my application?





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Sewage Pumping System – Singapore



Dear Mr. Consultant,

Can you select a level probe for the following application :

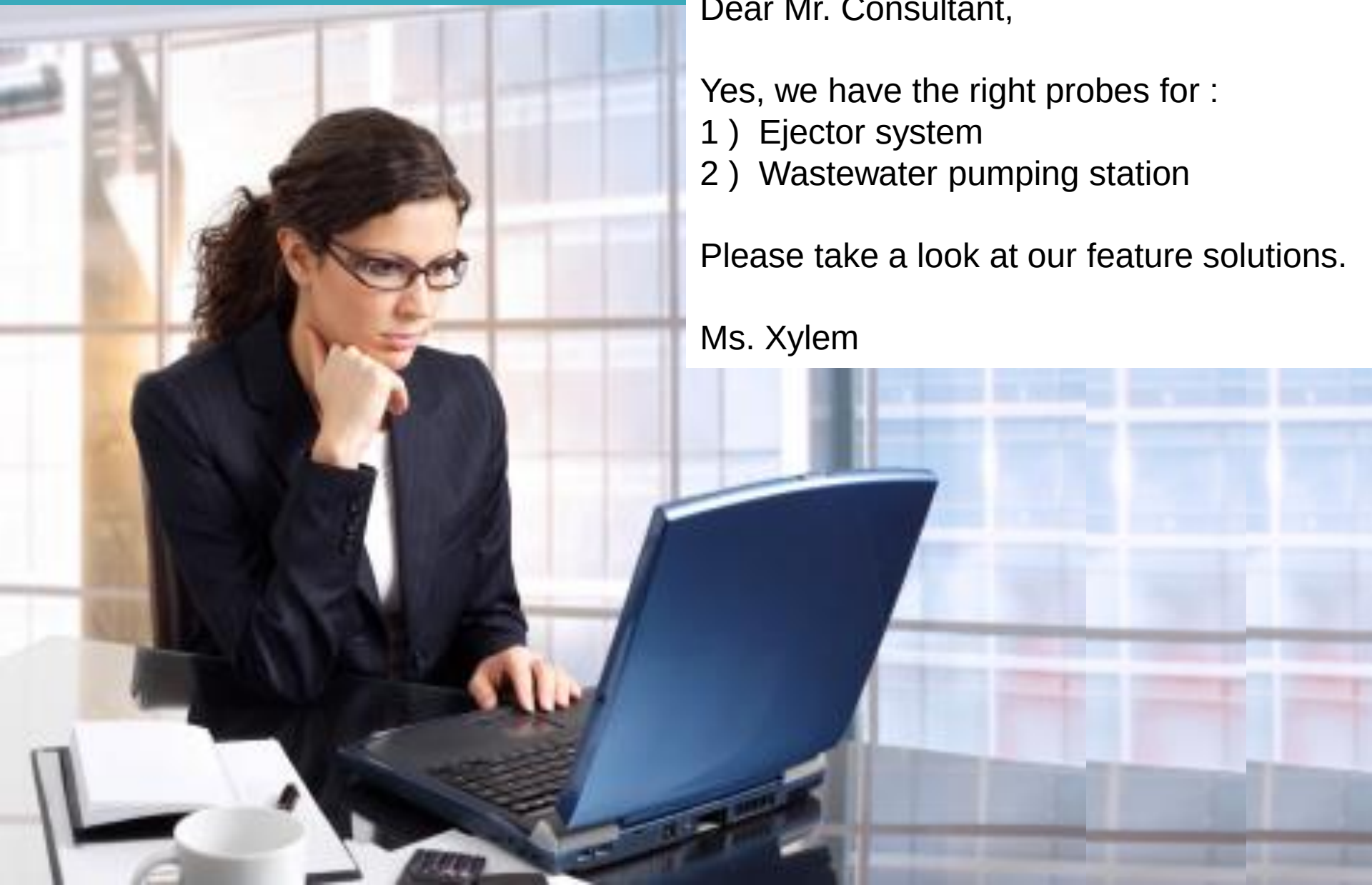
1) Ejector system

2) wastewater pumping station

Look forward to your proposal, thanks.

Mr. Customer

Xylem Solution



Dear Mr. Consultant,

Yes, we have the right probes for :
1) Ejector system
2) Wastewater pumping station

Please take a look at our feature solutions.

Ms. Xylem

Level Probes Selection

Criteria for long lasting performance:

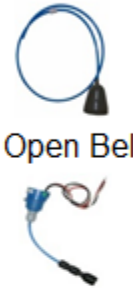
- Adapted for wastewater
- Wide range of level products to fit a wide variety of applications
- Combining robustness, price and performance to match today's demands
- Appropriate accessories selected for level product range



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Measuring Devices Product Range

Analog Level | **Semi-Analog / Digital Level** | **Flow**

Ultrasonic	Hydrostatic			Conductive	Acc.	Pneumatic	Level Switches & Over Flow			El.Magnetic
	High-End  To be Released 2016	Mid-End 	Low-End 			 Open Bell	Standard 	EX  		
LSU 100	LTU 801	LTU 601	LTU 401	Level Probe	LI 531 etc.	LTU 301	ENM 10		NF 5	003S	MagFlux

WhyXylem Measuring Devices from Xylem?

In order to boost pump and RTU sales and to be a complete supplier for wastewater installations, Xylem offers a full range of level & flow control products under the Flygt name!

Nobody understands level & flow measuring better than ourselves from the years of gained experience and the assortment has been developed to combine robustness, price/performance with attractiveness to offer an outstanding product range to match today's demands.

The product range covers every angle of measurement to fit all possible purposes: simple solutions, advanced functionality, PSS, non-contact, over flow, the right approvals and the needed accessories like cable holders & safety barriers!

Flygt Level Products Are Meant to Last!

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Selection 1 : Ejector System - Hydrostatic

Types of Hydrostatic Level Transmitters

• **Piezo-Resistive Devices**

Difference in pressure causes a physical movement in the sensor, which results in a change of resistance. This change in resistance is turned into a 4-20mA signal. Conventional resistive pressure measurement devices include film resistors, strain gauges, metal alloys, and polycrystalline semiconductors. Flygt's LTU 601 is a Piezo-Resistive device.





• **Capacitive Devices**

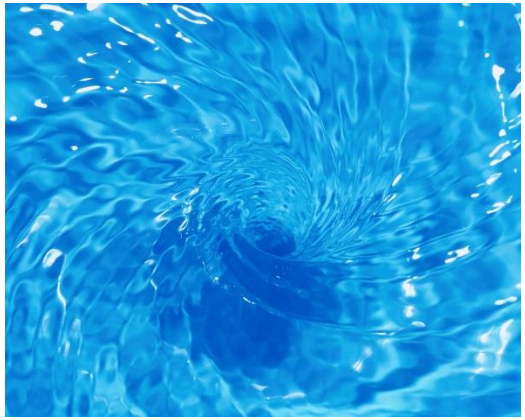
Changes in hydrostatic pressure creates microscopic movement in capacitive plates, which is converted to an analog output by the device. Flygt's LTU 401 is a Capacitive device



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Installation Considerations- Hydrostatic Level Transmitters

- Should be installed minimum of 0,15m from the bottom of the well and installed such that it cannot come into contact with the pump.



- Where swirling inside the well causes a whirlpool effect due to large amounts of inflow, install a “stilling” tube where the level transmitter can stay in without moving around due to the water motion caused by the inflow. Make holes in the tube that allows for easy cleaning of the level transmitter with a hose if necessary.

- Hydrostatic level transmitters need to always use the moisture filter/vent cap that comes pre mounted on the reference/air tube at delivery. It prevents moisture from entering the reference tube. Do not cut or remove! Moisture inside the vent tube will cause the device to malfunction.

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Selection 1 : Ejector System - Hydrostatic

The Next Step in Robust High Performance Level Measurement

✓ **The Flygt Level Transmitting Unit LTU 701, is a HART-programmable piezoresistive silicon pressure level sensor, intended for measuring a liquid level.**

✓ **The output is a standard 4–20 mA direct current, proportional to the measured level.**

✓ **LTU 701 is well adapted to the prevalent control systems on the market including, of course the Flygt controllers of the APP, FGC and ATU-ranges.**

✓ **Approvals incorporate ATEX & cCSAus, with 0.1% accuracy and configurable via HART communication**



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Selection 1 : Ejector System - Hydrostatic

LTU 701 is specifically engineered to withstand the harsh environmental conditions typically encountered by Flygt pumps:

- sewage

- slurry

- viscous liquids

as well as

- sea water



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Selection 1 : Ejector System - Hydrostatic

Accessories

Part	Part number
EX-barrier	843055
Junction box, including surge arrester and HART resistor	839505
HART modem, including USB connection with clips, 470 Ω resistor and PC software CD	830062

N.B. The sensors (part no. 837578, 837579, 838201, 838202, 838203 and 838204 - See table on next page) all have the same pressure sensor (range 0–20m) and can be calibrated from 0 to 20m, by means of a Hart modem.

Exception:

The 0–3,5m sensor (part no. 838200) can only be calibrated within its range.

LTU 701 standard measuring ranges

Measure range, m H_2O (bar)	Max overload, m H_2O (bar)	Cable length, m	Intrinsic safety	Part no.
0–3.5 (0–0.35)	25 (2.5)	15	Ex II 1G	838200
0–5.0 (0–0.50)	60 (6.0)	20	Ex II 1G	838201
0–5.0 (0–0.50)	60 (6.0)	50	Ex II 1G	838202
0–10 (0–1.0)	60 (6.0)	25	Ex II 1G	838203
0–20 (0–2.0)	60 (6.0)	35	Ex II 1G	838204
0–5.0 (0–0.50)	60 (6.0)	20		837578
0–10 (0–1.0)	60 (6.0)	25		837579



843055

Zener Barrier



839505

Junction Box



830062

PC-package



832174

Cable Holder

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Selection 1 : Ejector System - Hydrostatic

LTU601 - Mid-End Hydrostatic Level Transmitter



Features:

✓Accuracy 0,5 %.

✓Withstands temperatures up to 60°C continuously

✓Rugged plastic design

✓Large membrane protection holes to prevent clogging

✓Heavy weight for easier and safer installations

✓Attractive looks and feel at first impression with printed part number information

✓Suitable for sea water

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Selection 1 : Ejector System - Hydrostatic

- ✓ LTU 601 FITS PERFECTLY IN FLYGT'S RANGE PRODUCTS
- ✓ LTU 601 IS SPECIFICALLY ENGINEERED TO WITHSTAND THE HARSH ENVIRONMENTAL CONDITIONS TYPICALLY ENCOUNTERED TO FLYGT PRODUCTS (SEWAGE, SLURRY, VISCOUS LIQUIDS, AND SEA WATER)
- ✓ LTU 601 IS A ROBUST HYDROSTATIC LIQUID LEVEL TRANSMITTER FOR USAGE AT WASTEWATER PUMPING STATIONS, TANKS AND CONTAINERS AT SEWAGE PLANTS, WATER WORKS, AND IN INDUSTRIAL PLANTS



Very robust	• Heavy weight enables easier and safer installations • Plastic design with high pull strength PUR Cable • Suitable for sea water installations • Part information is printed on the sensors body to secure long term readability
Minimum clogging	• Large membrane protection holes • Improved technology • Fewer service visits
Excellent reputation and strong track record	• Installed in thousands of units



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Selection 1 : Hydrostatic Comparison

	LTU 701	LTU 601
Standard Measurement Ranges	0-3,5m 0-5m 0-10m 0-20m 	0-3m 0-5m 0-10m 
Max Measurement Range	350m	10m
Standard Cable Lengths	15, 20, 25, 35, 50	12, 20
Max Cable Length	1000m	20m
Customer Specific Measurement Range or Cable Length	On request	No
Suitable RTU?	MultiSmart/APP700 Works with MyConnect/FGC/ATU as well of course!	MyConnect, FGC, Smart Run
Suitability for battery power	Medium	Medium
Specific Approvals	ATEX/cCSAus	
Temperature	Up to 80° C	Up to 60° C
Accuracy	0,1%	0,5%
Able to change measurement range	Yes (HART)	No
Built-in Lightning protection	Selected part numbers	No
Market Price	Premium	Medium

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Selection 2 : Wastewater pumping - Ultrasonic

Ultrasonic Level Transmitter

Features

✓Withstand harsh environment

✓Supplied from a protected power supply

✓A HART communicator can be used in order to re-program level values for the sensor

✓ Low maintenance costs





Typical applications :

✓Non-contact measurement

✓Generally rough conditions

✓Where there is lots of dirt and mud (not foam)

✓In high temperature liquids

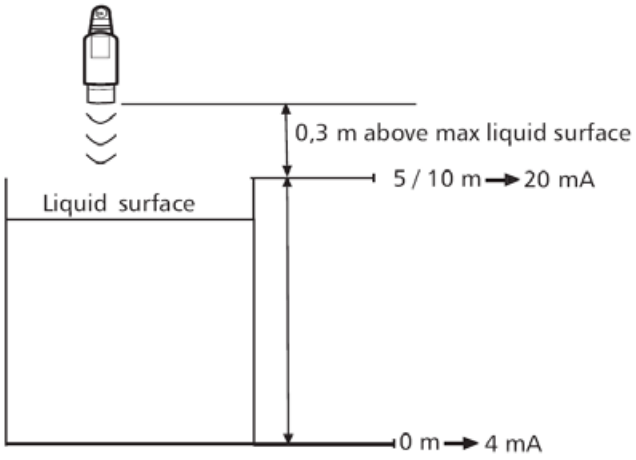
✓Where there is limited space for sensors

✓EX-hazardous applications (ATEX & FM/CSAus approved)

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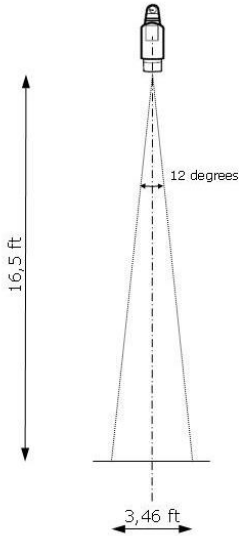
Installation Considerations- Ultrasonic Level Transmitters

- Manufacturer's information with regard to device's beam angle and blanking distance must be taken into consideration
- Should not be placed where surface is foamy or very turbulent; will give erroneous ultrasonic pulse readings *(work around, see next slide)*
- Installations with lots of fat may lead to a fat layer on the lense, which will give erroneous ultrasonic pulse readings unless the lense is cleaned on a regular basis
- Installation should take into account obstructions such as pipes, guide rails, inflow water column, etc.



Blanking distance

Beam angle



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Selection 2 : Wastewater pumping - Ultrasonic

Typical Applications:

- ✓ **Generally rough conditions**
- ✓ **Where there is lots of dirt and mud (preferably no foam)**
- ✓ **In high temperature liquids**
- ✓ **Where there is limited space for sensors**
- ✓ **EX-hazardous applications (ATEX & FM/CSAus approved)**



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Level Accessories – When that extra is needed!







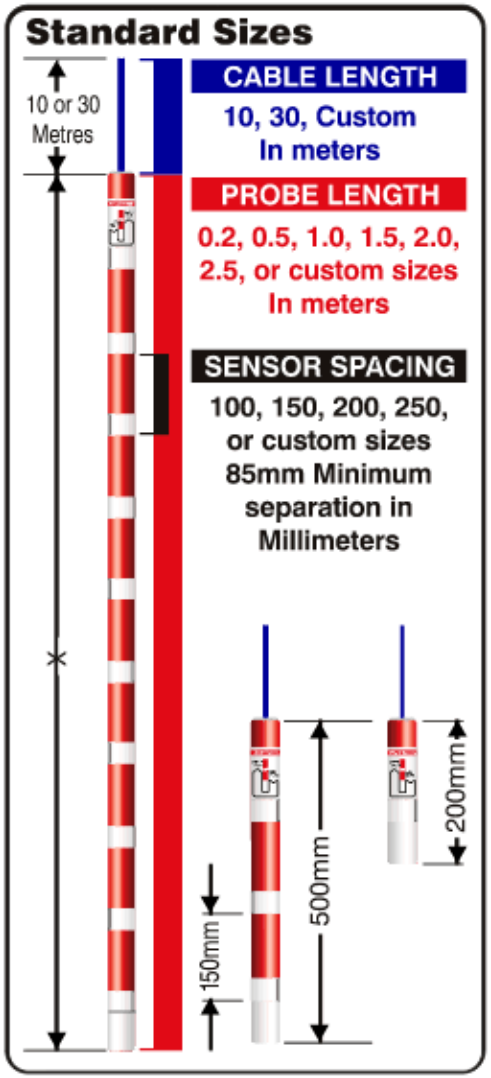


Why?	**Level Indicator LI 531** **834530** - To ease installations - for field indication of the level where the sump and control room are placed far away from each other - When a junction box for connecting extra cable length is needed - When a general digital indicator of a measured value is needed	**Cable Holder** **832174** - When a robust and easy to use spare/extra cable holder is needed	**Cable Holder** **834602** - When used, it will decrease the wear of the cable in the long term perspective compared to when hung by a knot. For a complete package of ENM-10 with the 834602 included, see part numbers 5828840 (Includes 5828802, 1,2 kg / 0,95-1,10 / 6m cable) and 5828841 (Includes 5828803, 1,7 kg / 0,95-1,10 / 13m cable).	**Zener Barriers** **843055 (4-20mA)** **840107 (ENM-10)** - When Flygt ATEX approved products or simple apparatus classified products are to be used in EX environments	**Junction Box** **839595** - When noise/interference protection for VFD applications is needed - For protection for splicing of the sensor cable including any vent tubing, to the screened control leads from the RTU - When needing to connect Flygt HART modem and PC-package for LTU701 (with integrated 470Ω resistor & selectable by ON/OFF switch - For Lightning protection by means of a surge arrester - For easy testing of the sensor setup by means of an internal power control LED - For extra moisture protection of the level transmitter in humid climates
Price?	Mid	Low	Low	Mid	Mid
Suitable for?	LTU 701, LTU 601, LTU 401, LSU 100	Hydrostatic Level Transmitters like LTU701, LTU601 and LTU401	ENM-10	LSU100, LTU701, ENM-10	LTU 701, LTU 601, LSU 100 & Flygt Pump Controllers
More info	http://oasis.xyleminc.com/tpi/tpi.asp	http://oasis.xyleminc.com/tpi/tpi.asp	http://oasis.xyleminc.com/tpi/tpi.asp	http://oasis.xyleminc.com/tpi/tpi.asp	http://oasis.xyleminc.com/tpi/tpi.asp

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selection 2 : wastewater pumping - Multitrode

- 32mm dia uPVC tubing
- Avesta 254 SMO SS alloy sensors
- PVC/PVC multi-core cable
- Fully encapsulated, resin filled
- No moving parts
- Long Life

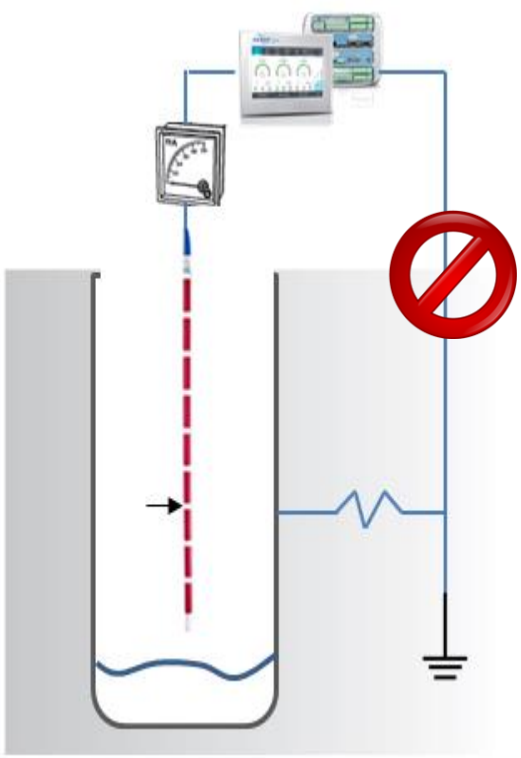


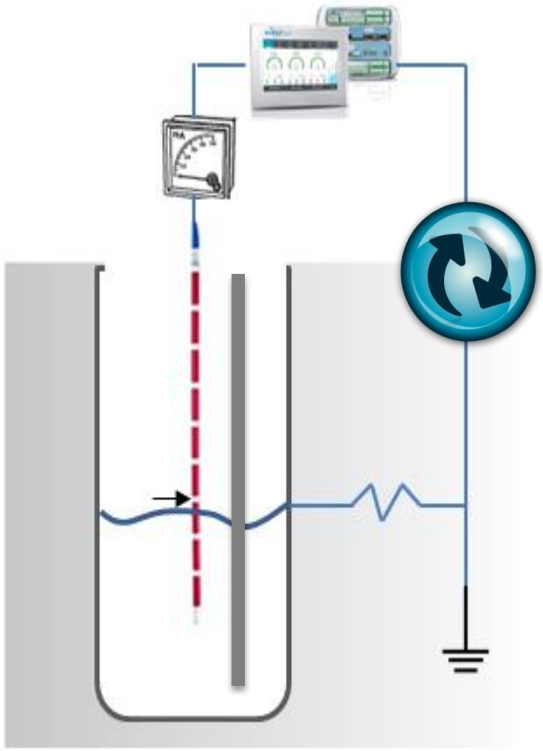
- No moving parts
- No electronics in the probe
- 12VAC probe voltage continuously applied to each “sensor”
- 0.8mA current flow
- No calibration required
- CE and UL Approved
- Ten year warranty
- Extremely low maintenance

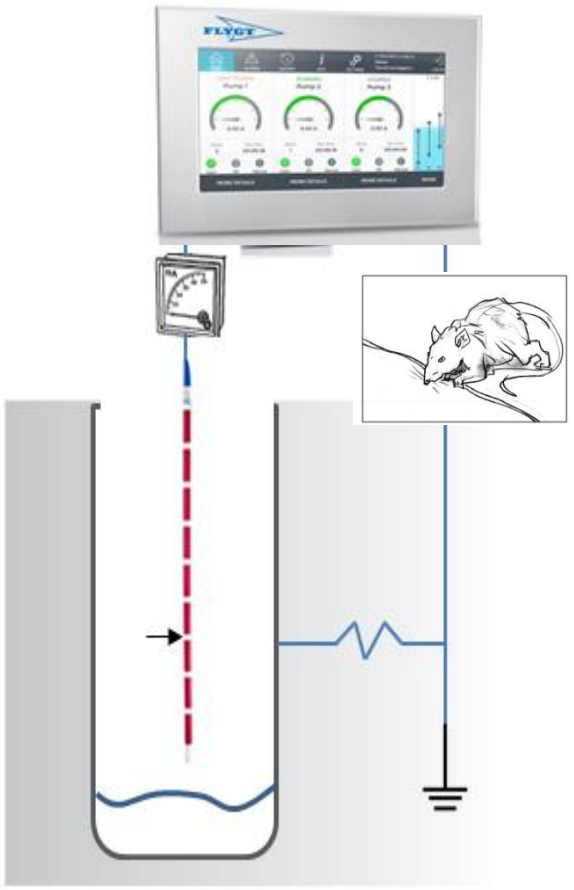
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selection 2 : wastewater pumping - Multitrode

- Provides fail-safe reassurance that probe is functional at all times
- Severed cable will provide probe alarm

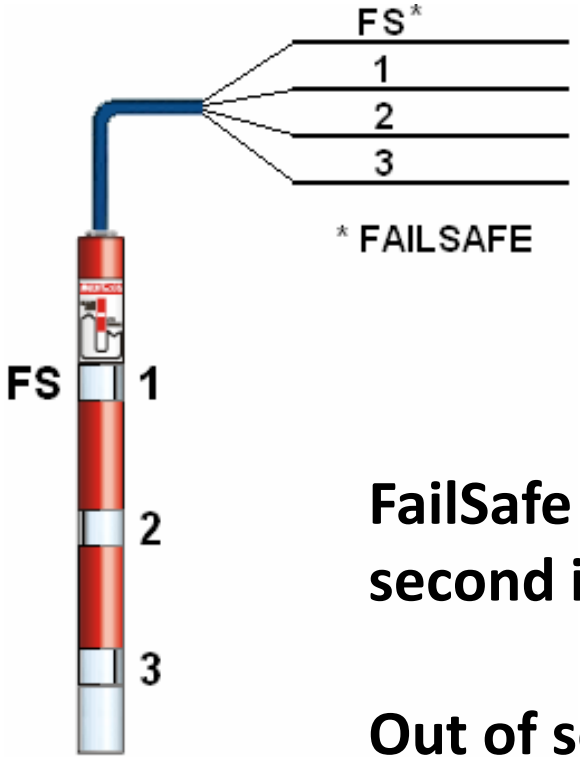






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FailSafe Probe Wiring Details



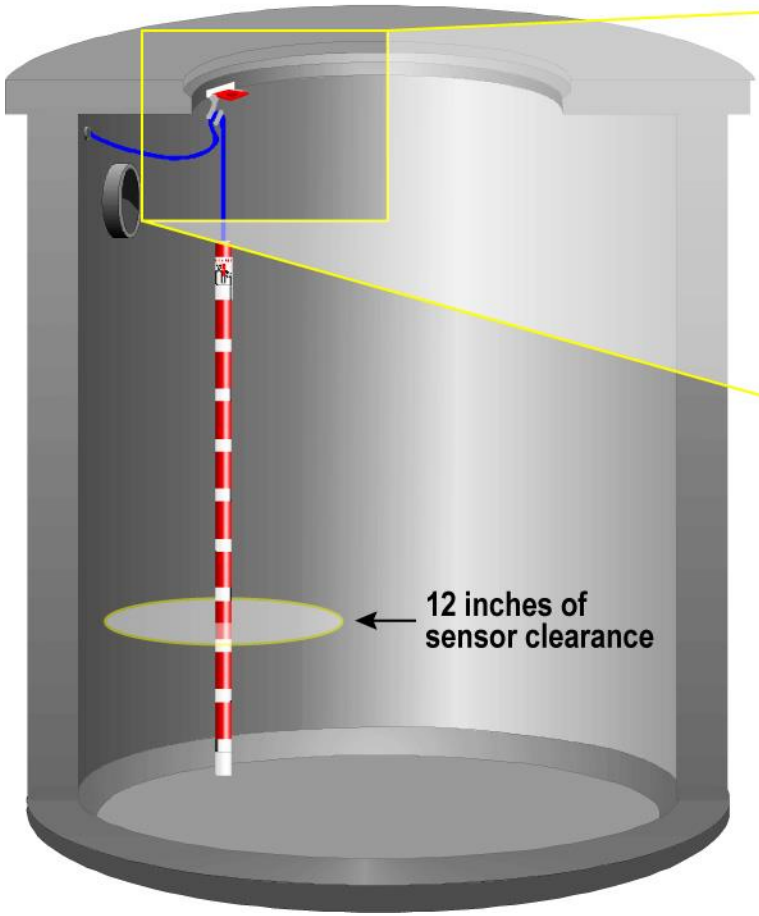
FS = FailSafe integrity test
1 = High-level alarm sensor (pump on)
2 = High-level sensor (pump on)
3 = Low-level sensor (pump off)

FailSafe / alarm sensor continuity sampled at 10 second intervals.

Out of sequence sensors also raise probe fault.

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selection 2 : wastewater pumping - Multitrode





- Mount close to inflow
- Install bottom of probe just above the “snore point” of the pump (volute)
- Ensure 300mm/12 inches of clearance around the probe

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selection 2 : wastewater pumping - Multitrode

- Inflow turbulence naturally prevents build-up on walls
- Also prevents build-up on probe.
- Mount close to, but not directly under, inflow.
- This allows SELF-CLEANING on Multitrode.



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selection 2 : wastewater pumping - Multitrode



Mount the bracket to the side of the well

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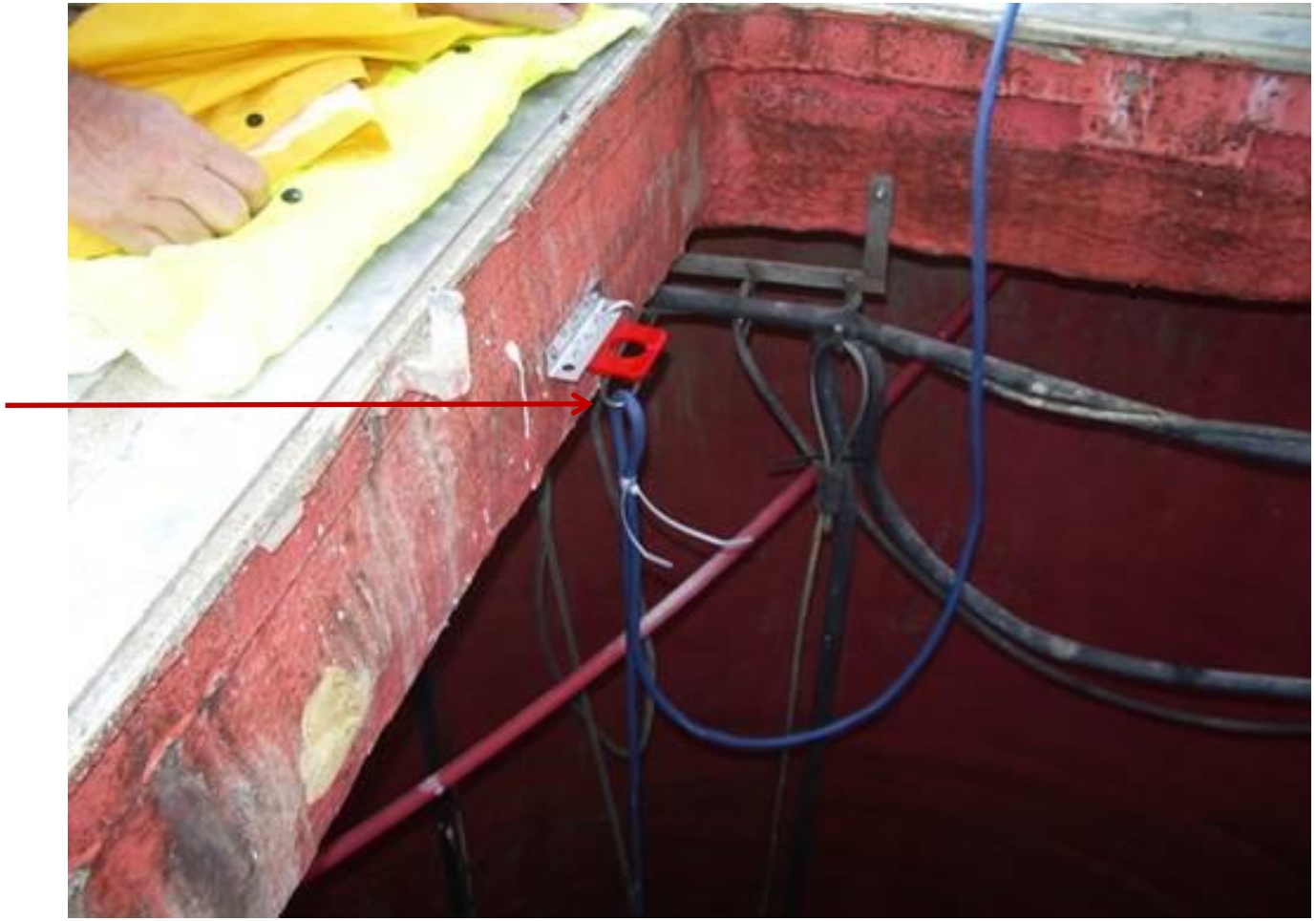
selection 2 : wastewater pumping - Multitrode



Leave enough room for convenient access

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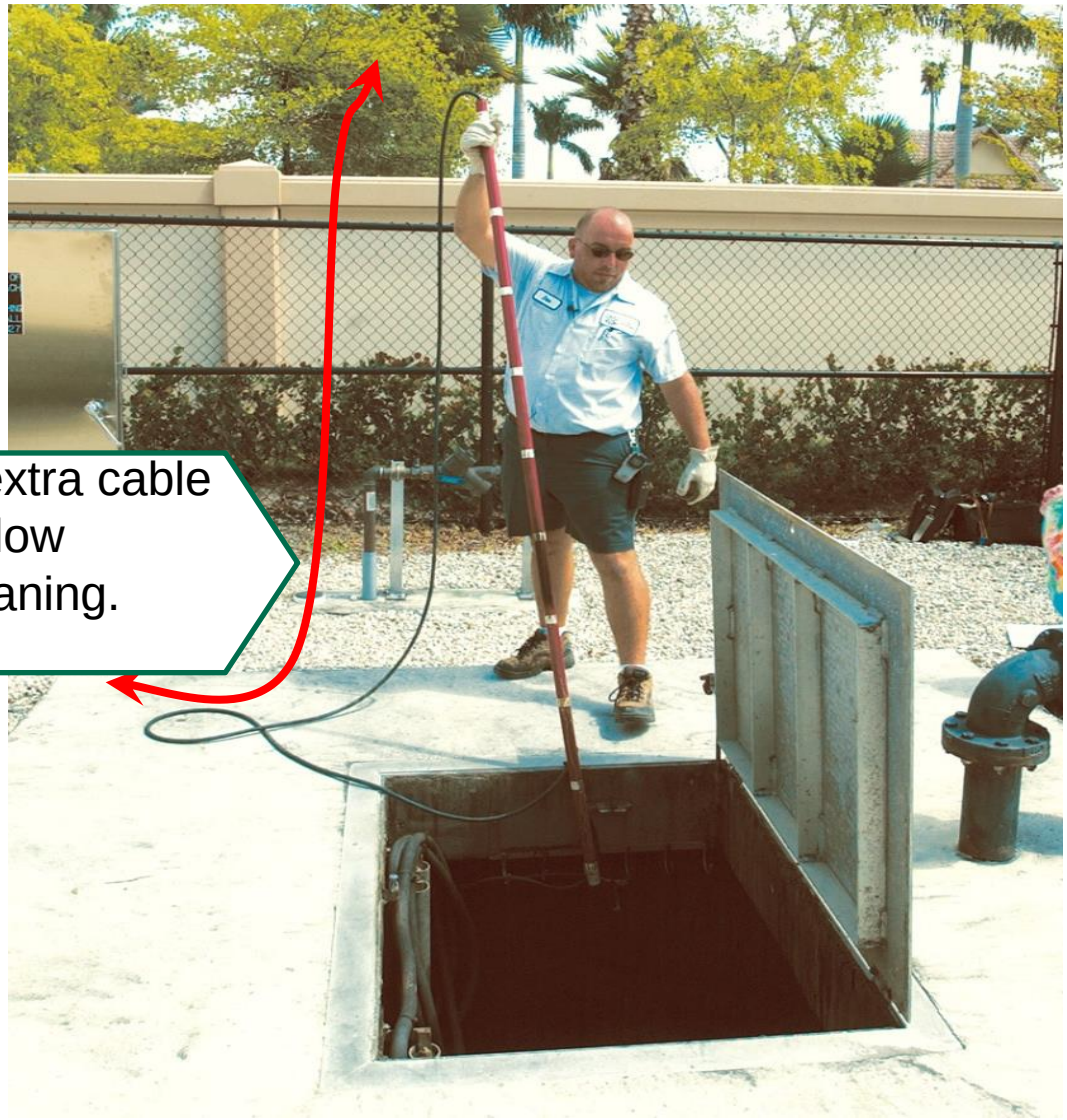
selection 2 : wastewater pumping - Multitrode



Hang the cable from the bracket using hook

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selection 2 : wastewater pumping - Multitrode



Allow enough extra cable in the well to allow removal for cleaning.

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selection 2 : wastewater pumping - Multitrode



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selection 2 : wastewater pumping - Multitrode



Extreme Foam



Heavy Sludge



Fat, Oil and Grease (FOG) in sewage

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selection 2 : wastewater pumping - Multitrode

Probe will work reliably in extreme conditions:

- Sewage with fat, oil, grease
- Thick sludge
- Foaming wet wells
- Cluttered wet wells
- Narrow wet wells
- Turbulence
- Blood and bone in abattoirs



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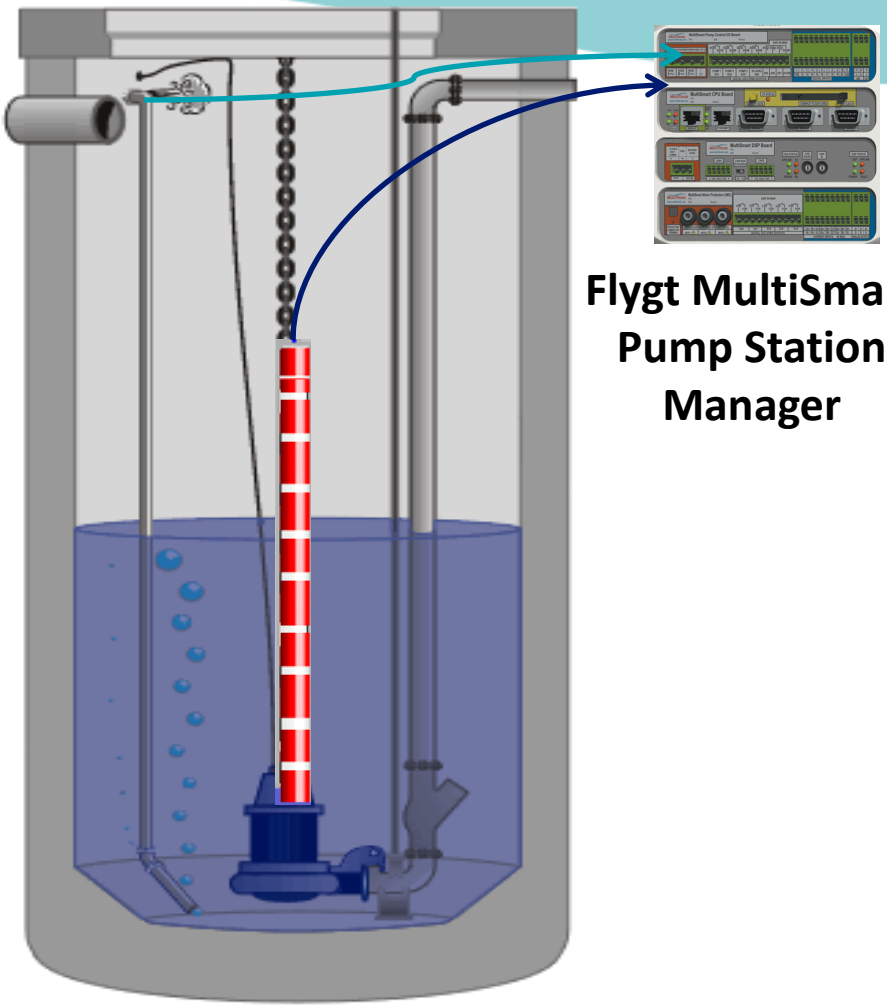
Backup Level Sensing Device

Upon failure of the primary level sensing device, the MultiSmart will automatically switch to the backup level device.

Example:

Primary level input: Bubbler

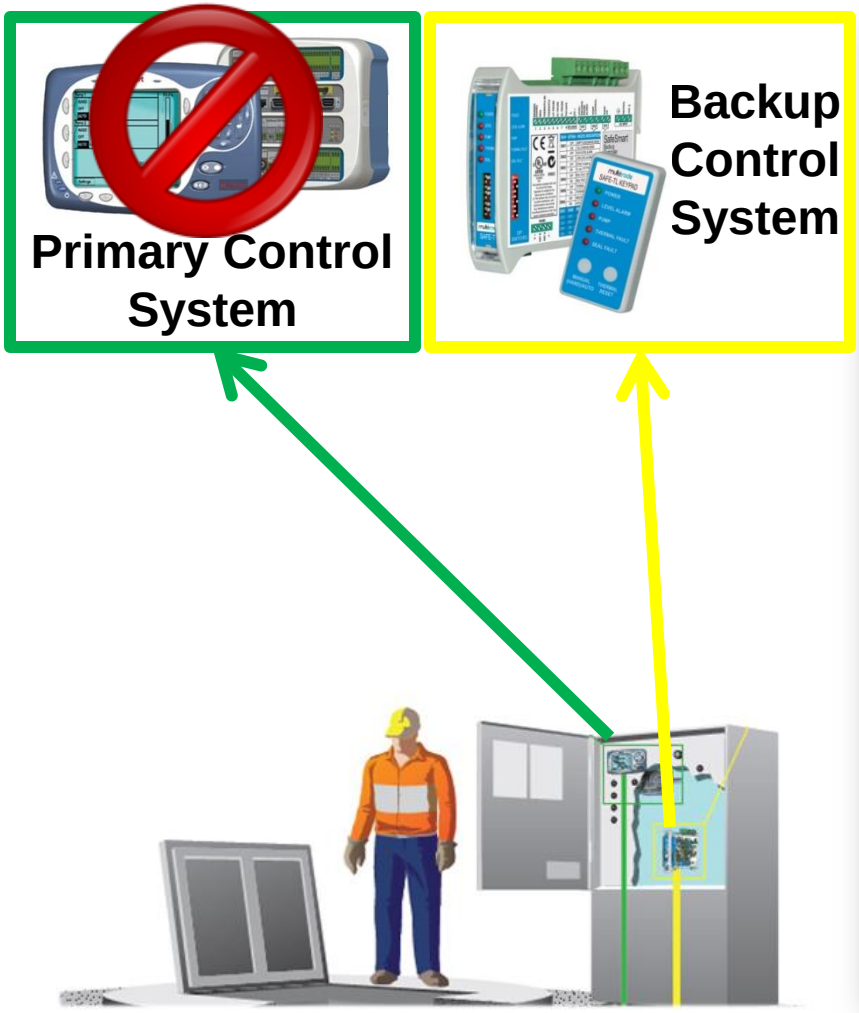
Backup level input: Probe

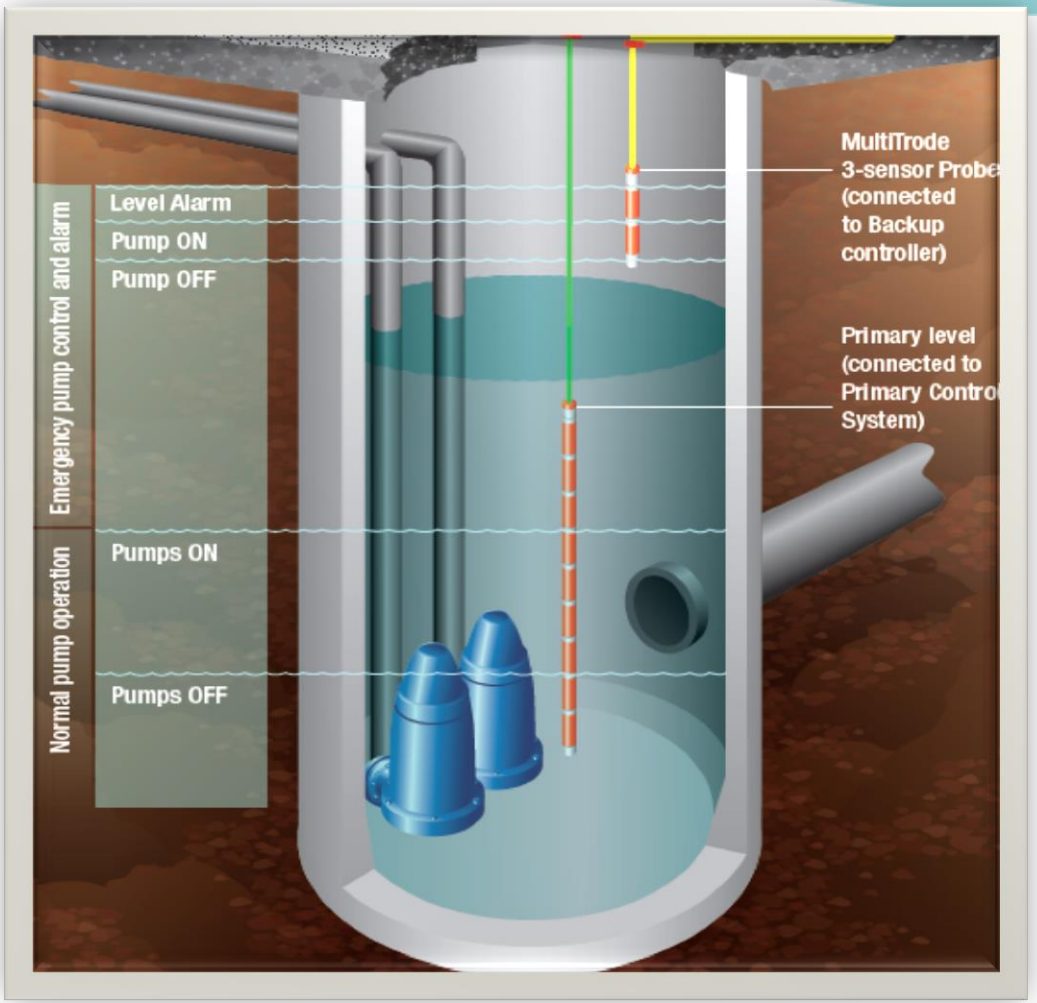


Flygt MultiSmart Pump Station Manager

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Backup Control and Level Sensing Device





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selection 2 : wastewater pumping - Multitrode

SAFE-FSP

- All AC/DC supply voltages
- Covers functionality of FS, MTR & MTRA
- Charge or discharge mode
- Pump control and high/low level ALARM
- Probe fault alarm output
- Monitors pump thermal
- Single pump control or back-up



SAFE-TL

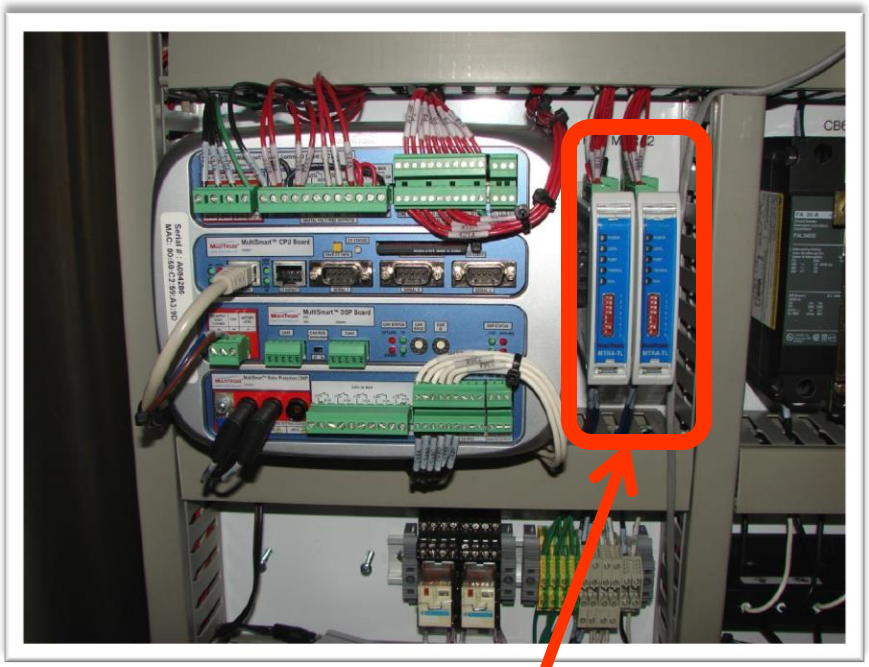
- Same as FSP, with added :
- Monitors pump thermal **and seal**
- Separate keypad for operation



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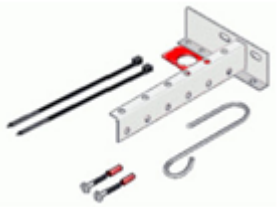
SAFE-FSP or -TL Backup Controller Pictures





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selection 2 : wastewater pumping - Multitrode



- The 837924 MTAK-2 is an extended mounting bracket and cleaning unit to be used when extra space is needed.

Previous part number: 84800049.





- The 837923 MTAK-1 is the part number for the spare mounting bracket and cleaning unit if the one coming with the Level Probe for some reason would need to be replaced. Previous part number: 84800048.



837820 is the part number for the MTISB-10 – the 10 channel Intrinsically Safe Barrier making the Level Probe Suitable for hazardous locations. Previous part number: 84800060

837819 is the part number for the 5 channel MTISB-5. Previous part number: 84800061

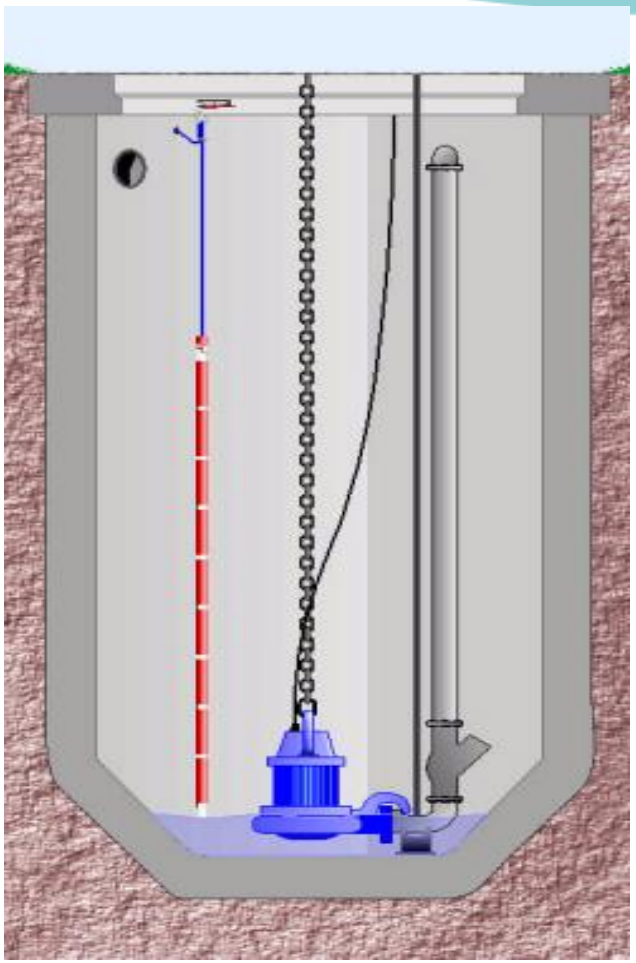
The MTISBs are UL and CSA approved.

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selection 2 : wastewater pumping - Multitrode

Benefits

- ✓ Simple to install
- ✓ Reduces maintenance
- ✓ Eliminate false readings
- ✓ Eliminate pump run on
- ✓ Reduce pump burn out
- ✓ Cuts the risk of spills
- ✓ Ultra reliable and repeatable



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QUESTIONS?











KNOW YOUR LEVEL

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