



# ENT 7

## Capacitance Level Switch with Self Test Facility (STF)

### About this User Guide

This guide is part of the device installation.

Read this guide before using the device.

Keep this guide during the entire service life of the device and always have it readily available for reference.

Always hand this guide over to future owners or users of the device.

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- + Read guide before use!
- + Observe all safety information!
- + Keep guide for future use!

**If In Doubt ASK !**

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## WARNING TERMS

The type and source of danger associated with this device is shown here.

Precautions to take in order to avoid the danger are shown here.  
There are three different levels of warning:



<b>DANGER</b>	Imminent danger! Failure to observe the information will result in death or serious injuries.
<b>WARNING</b>	Possible imminent danger! Failure to observe the information may result in death or serious injuries.
<b>CAUTION</b>	Dangerous situation! Failure to observe the information may result in minor or serious injuries and damage to property or device not working as expected.

## General Installation and Wiring requirements

The device must be installed in accordance with the details given later in this guide.

All wiring must be in suitable cable for the application conditions and must comply with the relevant regulations of the electrical supply authority concerned, together with any other statutory requirements which may affect the complete installation.

It is recommended that cable with polyethylene or PVC insulation with a conductor size of at least 1.0mm<sup>2</sup> is used.

### CAUTION

**ATEX installations may only be carried out by qualified and trained personnel in accordance with ATEX specific requirements.**



**MICC cable (Pyro) must never be used under any circumstances**

Signal cables should be run separately from any cables carrying mains voltages.

If signal cables are to be run through areas of high electrical interference it is recommended that screened cable is used with the screens being terminated only to the device earth terminal or as specified.

Specific terminal connection information may be found on identification label(s) on the device unless otherwise advised..

Refer to separately supplied installation guides for information regarding external components of the system such as level sensors, sounders and beacons etc.

### CAUTION



Electrical systems may be impacted and the device switching contact (if fitted) may be destroyed by voltage peaks when inductive loads are switched off.

Use commercially available standard RC combinations such as 0.1µF/100Ω for inductive load switching.

## Troubleshooting

Repairs and fault finding may only be performed by Afriso Eurogauge personnel or qualified personnel under Afriso Eurogauge instruction.

Refer to separately supplied installation guides for information regarding fault finding and repairs on external components.

## Safety

### Intended use

The level switch device may only be used for continuous level monitoring in metal containers, silos and tanks for the storage of the following media, provided such media can be detected with a capacitance probe.

- Liquids
- Granulated materials
- Powdered materials

Any use other than the application explicitly permitted in this guide or authorised by Afriso Eurogauge is not permitted.

### Predictable incorrect application

The device must never be used in the following cases:

- Hazardous area (ATEX)  
If the device is operated in hazardous areas, sparks may cause deflagrations, fires or explosions.

### Safe handling

This product represents state-of-the-art technology and is made according to the pertinent safety regulations. Each device is subjected to a function and safety test prior to shipping.

Operate the device only when it is in perfect condition. Always observe the operating instructions, all pertinent local and national directives and guidelines as well as the applicable safety regulations and directives concerning the prevention of accidents.

### **WARNING** Severe burns or death caused by mains voltage (110/230 VAC, 50/60Hz) in the device



Do not expose the control unit to water.

Interrupt the mains voltage supply before opening the device or before performing maintenance and cleaning work and make sure it cannot be switched on by accident.

Do not tamper with or modify the device in any way whatsoever.

### Transport and storage

#### **CAUTION** Damage to the device due to improper transport.



Do not throw or drop the device.

Protect from wetness, humidity, dirt and dust.

#### **CAUTION** Damage to the device due to improper storage.



Protect from wetness, humidity, dirt and dust.

Store the device in a clean and dry environment.

Only store the device within the permissible temperature range.

### **Staff Qualification**

The device may only be mounted, commissioned, operated, maintained, shut down and disposed of by trained staff. Electrical work may only be performed by trained electricians and in compliance with all applicable local and national directives.

### **Modifications to the device**

Changes or modifications made to the device by unauthorised persons may lead to malfunctions and are prohibited for safety reasons unless specifically instructed by the manufacturer.

### **Use of spare parts and accessories**

Use of unsuitable spare parts and accessories may cause damage to the device. Use only genuine manufacturer spare parts and accessories.

### **Liability information**

The manufacturer shall not be liable in any form whatsoever for direct or consequential damage resulting from failure to observe the technical instructions, guidelines and recommendations given in this guide or ancillary documents.

The manufacturer or sales agent shall not be liable for costs or damages incurred by the user or by third parties in the usage or application of this panel, in particular in case of improper use of the device, misuse or malfunction of the connection, malfunction of the device or of connected devices.

The manufacturer or sales agent shall not be liable for damage whatsoever resulting from any use other than the use explicitly permitted in this guide or ancillary documents.

The manufacturer shall not be liable for misprints.

### **Disposal and Recycling**

Switch off the supply voltage and disconnect from device.

Disconnect all other terminals and remove wiring from device.

Dismount the device.

To protect the environment, this device must **not** be disposed together with normal household waste

Dispose of the device according to local directives and guidelines.

This device consists of materials that can be recycled.

Electronic inserts can be easily separated and the device consists of recyclable materials.

Where it is not possible to dispose of the device locally in accordance with environmental regulations please contact us for return or disposal instructions.

### **Warranty**

The manufacturer's warranty for this device is 24 months after the date of purchase.

This warranty shall be good in all countries this device is sold by the manufacturer or its authorised dealers or agents.

Refer to separately supplied installation guides for information regarding warranty on external components.

### **Copyright**

The manufacturer retains the copyright to this device. This guide or any separately supplied installation guide may not be reprinted, translated, copied in part or in whole without prior written consent.

We reserve the right to make technical modifications with reference to the specifications in this guide without notice.

### **Customer Satisfaction**

Customer satisfaction is our prime objective.

Please get in touch with us if you have any questions, suggestions or problems concerning the device or external components.

### **Contact**

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### Application - ENT 7 Level Switch

The ENT 7 Capacitance Level Switch is intended for high or low level detection of liquids, slurries, free-flowing powders and granular materials in silos, tanks, etc. The choice of electrode configuration makes the ENT 7 equally useful with conducting as well as non-conducting products.

The device is provided with a system test facility powered from a remote ACU 2030 alarm control unit. This introduces a capacitance change across the probe terminals which causes the output relay to de-energise.

### Application - ACU 2030 Alarm Unit

The ACU 2030 heavy duty alarm unit with system test facility is designed to operate in conjunction with the ENT 7 capacitance level switches. The device provides audible and visual alarms of level alarm conditions in tanks, sumps or bund enclosures. A system test facility is provided which switches the ENT 7 into an alarm condition. The unit is specifically designed for outdoor mounting and is protected to IP65.

### Operation - ENT 7 Level Switch

The ENT 7 operates on the principle of a changing electric field caused by the presence or absence of material around the electrode. This change, after amplification, is used to operate the output relay. An internal Failsafe Switch offers the option of failsafe facilities for either high or low level alarms, LED indicators show the state of the output relay. A multi-turn Sensitivity Control allows accurate adjustment of the switch point.

### Operation - ACU 2030 Alarm Control Unit

The ACU 2030 unit incorporates both visual and audible alarms, a set of voltage-free output relay contacts, system test and audible alarm mute pushbuttons. When the relay contacts on the ENT 7 level switch change state, due to the presence of an alarm condition, a DC circuit is completed and the alarm circuit in the ACU 2030 is activated. When an alarm condition is present the red alarm LED will come on, the sounder will operate and the output relay will energise. Operating the mute pushbutton will silence the sounder. Operating the system test button switches the ENT 7 into an alarm condition which in turn causes the red alarm LED to come on, the sounder to operate and the output relay to energise.

## INSTALLATION

### Mechanical

#### CAUTION



Check that the electrode and the insulation is correct for the application, if in doubt, consult the Afriso Eurogauge Technical Department for advice.

The device must be mounted in such a position that the maximum permissible ambient (external) temperature of 60°C is not exceeded. When the device is mounted into the side of the vessel ensure that the cable entries point downwards.

Mounting is by either a 1", 1½" BSP parallel or 1½" BSP taper thread. Flanges are available as an option. When fitting the device into the mounting boss, use a 'C' spanner on the metal boss.

**DO NOT** use the housing to turn the device into the boss.

Make certain that the rubber sealing ring is in place before securing the cover and that the four cover screws are securely tightened down.

### Electrical

The supply and relay output connections are entirely isolated and may be used separately.

Connect the supply to the appropriate terminals on the 'SUPPLY' terminal block; the connectors are removable.

The compression glands are for cables with an outer diameter of 5-8mm and must be securely tightened to prevent the ingress of dust or moisture and to ensure compliance with the IP67 physical protection.

The internal earth is connected to the mounting boss and must be connected to a suitable external earth.

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## Installation - ACU 2030

### Mechanical

The ACU 2030 unit is designed for outdoor mounting on any suitable flat vertical surface. Unscrew the four captive screws in the lid of the device and carefully remove the lid.

The base of the device is then fixed to the mounting surface by means of four screws through the fixing holes in the base of the device.

### Electrical

Wiring to the ACU 2030 alarm control unit must be in suitable cable for the application conditions, and the installation must comply with all statutory requirements that may effect the complete installation. The device must be supplied via an unswitched fuse unit to prevent unauthorised isolation of the system.

Standard electric installation cable, suitable for a 110/230Vac supply must be used and consideration must also be given to any special environmental conditions.

## Commissioning - ENT 7 Level Switch

Set the fail-safe switch to high or low level as required by the application.

With the vessel **EMPTY**, use the trim tool provided on the inside of the instrument lid, or a small instrument screwdriver to adjust the multi-turn switchpoint control potentiometer.

### High Level (HL)

If red alarm LED is on - turn the control clockwise until the green LED comes on, then turn the control clockwise one more turn.

If green normal LED is on - turn the control anti-clockwise until the red LED comes on, then turn the control clockwise until the green LED comes on and then turn the control clockwise for one more turn.

### Low Level (LL)

If green normal LED is on - turn the control clockwise until the red LED comes on, then turn the control clockwise one more turn.

If red alarm LED is on - turn the control anti-clockwise until the green LED comes on, then turn the control clockwise until the red LED comes on and then turn the control clockwise for one more turn.

*For maximum sensitivity the control may be turned by half a turn only and not one turn as described above.*

### Maintenance

No maintenance is normally required. However, it is advisable that the electrode is checked for any signs of damage or wear at intervals when the installation is cleaned.

## Commissioning - ACU 2030

Once the unit has been wired up the system function should be tested by operating the system test pushbutton.

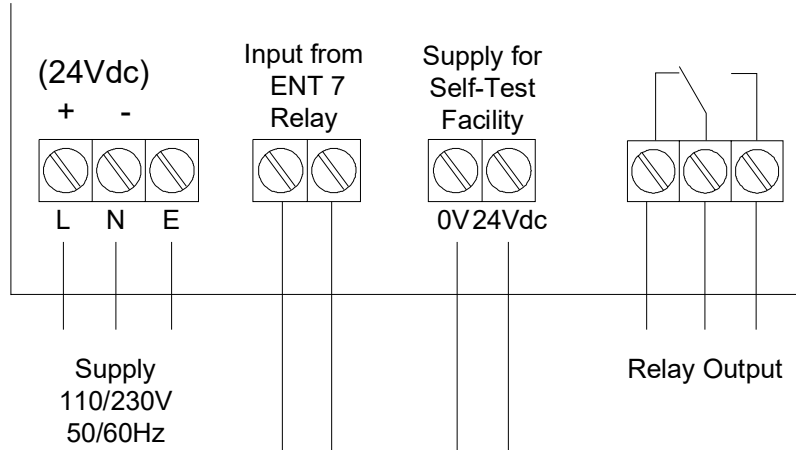
This will cause the red alarm LED to come on, the sounder to operate and the output relay to de-energise. The sounder can be cancelled by operating the mute pushbutton.

### Maintenance

No maintenance is normally required

**Wiring Connections**

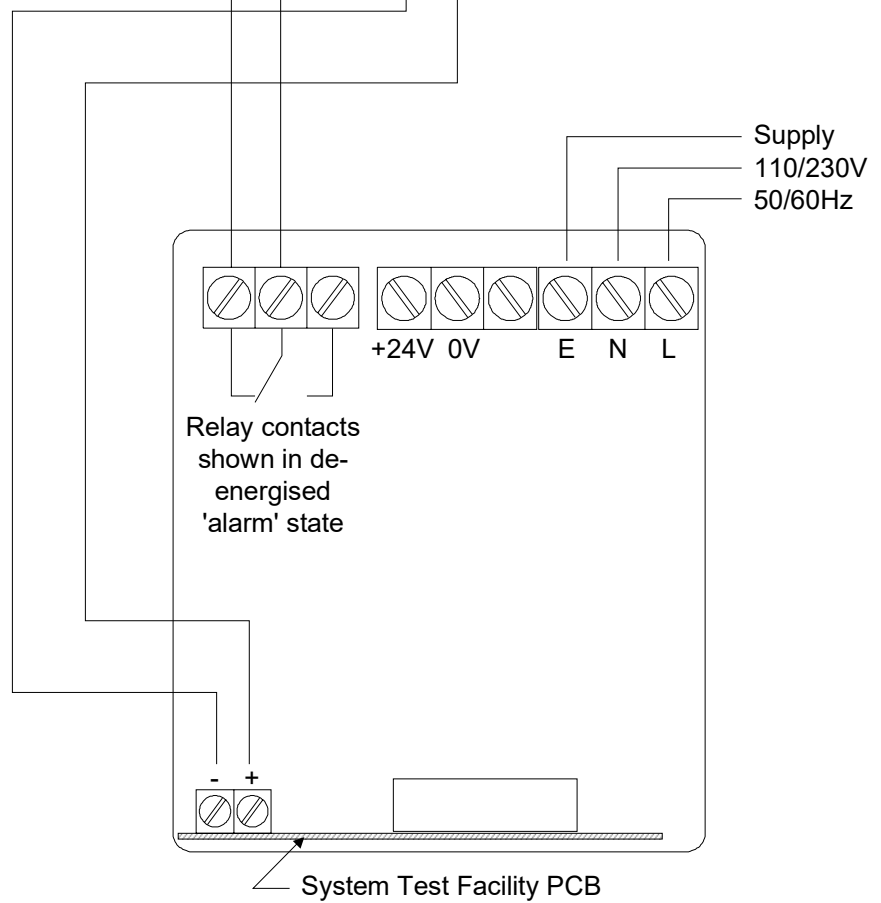
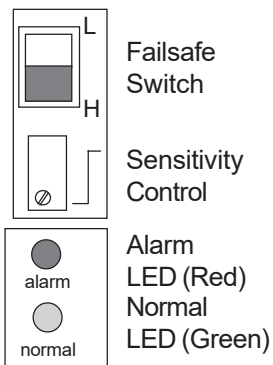
**ACU 2030-STF Internal Connections**



**Note:** On +24V DC ACU 2030 units the +24V is connected to live and the 0V is connected to neutral.

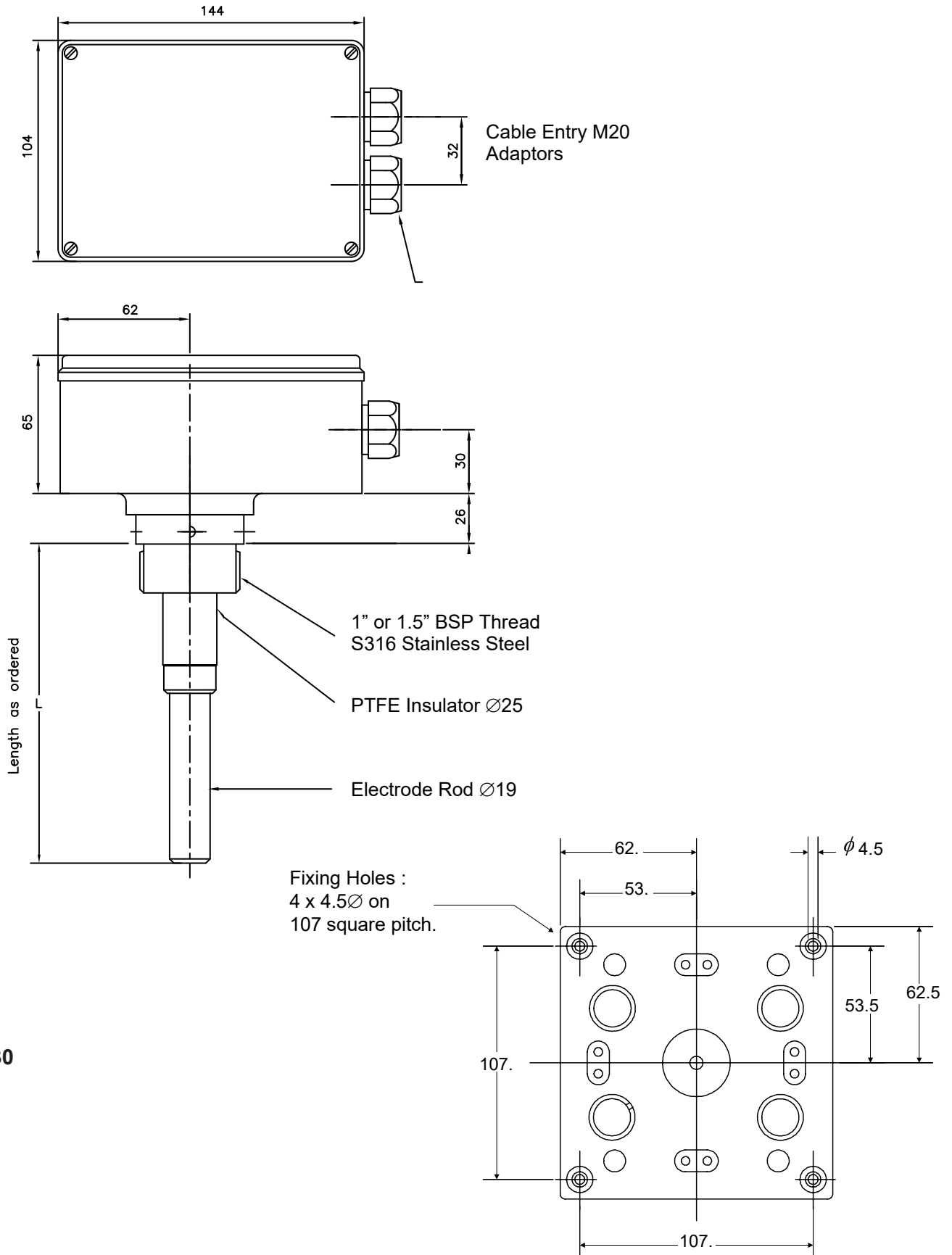
**ENT 7-STF Internal Connections**

**Controls and Indicators**



**Basic Outline and Dimensions**

**ENT 7 - STF**



**ACU 2030**



**Specification - ENT 7 - STF Level Switch**

Supply	110-120Vac (range 95-130Vac), 50/60Hz, 4VA . 220-240Vac (range 190-260Vac) Selected by two plug-in links. 24Vdc (20 - 28Vdc), 4 Watts. Connect to '24V' terminals. Separate supply required for self-test board: 24Vdc.
Part Numbers	1½" BSP carbon (mild) steel fitting
5443321040-STF	Partly insulated, PP, 19mm Ø x 150mm Stub Electrode x M12.
5443321000-STF	Partly insulated, PP, 19mm Ø ≤ 1000mm Electrode.
5443621000-STF	Fully insulated, PP, 25mm Ø x 300mm Electrode.
5443681410-STF	PP insulated flexible probe, M/S adjustable weight. 1" BSP stainless steel fitting
5412221000-STF	Partly insulated, PTFE, 19mm Ø x 300mm Stainless Steel Electrode.
5412821000-STF	Fully insulated, PTFE, 25mm Ø x 225mm Heavy Duty Electrode. 1½" BSP stainless steel fitting
5413321040-STF	Partly insulated, PP, 19mm Ø x 150mm Stub Electrode x M12.
5413321000-STF	Partly insulated, PP, 19mm Ø ≤ 1000mm Electrode.
Capacitance Range	200pF Δ, [100pF Δ with 'H' setting - factory option only].
Sensitivity	<0.5pF @ Co = 10pF, <1.0pF @ Co = 100pF. Adjustable by multi-turn control - 10pF/turn.
Application	High or low level detection of liquids, slurries, free-flowing powders and granular materials in silos, tanks, sumps and pipelines, depending upon electrode type
Output Switching	SPCO - volt-free. 250V @ 4A max, 500VA @ Cos θ = 0.7, 100 Watts DC
Indicators	LED (green) normal On when output relay energised. LED (red) alarm On when output relay de-energised.
Failsafe	High or low level failsafe selection by internal switch. High Level (maximum failsafe) - Electrode uncovered - relay energised - green LED on. Low Level (minimum failsafe) - Electrode covered - relay energised - green LED on.
Temperature	Ambient -20°.... 60°C. Electrode -20°.... 80°C. Note : for higher electrode temperatures a Thermal Barrier must be used
Terminals	1 six way, 1 three way and 1 two way plug-in terminal blocks for supply, relay output and system test - for 1mm <sup>2</sup> conductor size.
Cable Entry	2 x Pg11 cable glands for 5-8mm diameter cable.
Housing	Glass loaded ABS.
Protection	IP65 (BS5490 / IEC529).
Mounting Boss	1½" BSP parallel, standard series. 1" BSP parallel, stainless steel (special versions).
Weight	Approximately 1.5kg (with stub electrode).

**Specification - ACU 2030-STF Alarm Control Unit**

Part Numbers	203001000-1-STF      230Vac Unit. 203001000-2-STF      110Vac Unit. 203001000-4-STF      24Vdc Unit .
Supply	24 and 48Vac units are available to special order. 110V/230Vac : 50Hz : 3VA. Input voltage factory set. 24/48Vac : 50Hz : 3VA. Input voltage factory set. 24Vdc : 2 Watts.
Indicator	Red LED cluster lamp
Sounder	100dB at 1 metre
Controls	System test pushbutton : Mute alarm pushbutton.
Input	Voltage-free relay contact from Afriso Eurogauge range of ENT 7 level switches.
Voltage Output	Regulated 24V supply to self-test facility on ENT 7.
Relay Output	SPCO - Voltage Free. 3 Amps at 250V ac : 750VA. 1A at 12Vdc non-inductive load.
Housing	IP65 Polycarbonate ABS for vertical wall mounting.
Dimensions (mm)	125 x 271 x 80
Cable Entry	2 x Pg 9 cable glands fitted at base of unit.
Weight	0.63 kg
Protection	IP65



## Declaration of Conformity

### ENT 7-STF Capacitance Level Switch with ACU 2030-STF Alarm Control Unit

This is to certify that the above named product fully complies with the Electromagnetic Compatibility Directive 2014/30/EU and the Low Voltage Directive 2014/30/EU of the European Union and with the requirements of the normative sections of the following harmonised European Standards.

BS EN 61000-6-3:2007+A1:2011


Electromagnetic Compatibility - Generic Emission Standard.  
Emission standard for Residential, Commercial and Light Industry.

BS EN 61000-6-2:2005

Electromagnetic Compatibility - Generic Immunity Standard.  
Immunity for industrial environments

BS EN 61010-1:2010

Safety requirements for electrical equipment for measurement, control and laboratory use.

Signed:  D C Ward Position: Technical Manager Date: 14/09/2016

This declaration applies to all 54xx-STF and 20xx-STF Series part number(s) as specified in this User Guide

## Declaration of Product Origin

### ENT 7-STF Capacitance Level Switch with ACU 2030-STF Alarm Control Unit

We confirm that the following product designs originate and have been wholly manufactured within the United Kingdom of Great Britain and Northern Ireland by:

Afriso Eurogauge Ltd.  
Unit 4, Satellite Business Village,  
Fleming Way, Crawley,  
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[www.eurogauge.co.uk](http://www.eurogauge.co.uk)

Signed:  D C Ward Position: Technical Manager Date: 08/01/2014

This declaration applies to all 54xx-STF and 20xx-STF Series part number(s) as specified in this User Guide