

## 80 Series Telstor - Capacitance Level System

- Continuous Level Measurement
- Wide Choice of Rigid and Flexible Electrodes
- ATEX Approved to CENELEC Standards
- Adjustable ON/OFF Control Options
- Calibrated Control Points
- Analogue Retransmission Signal
- IP56 Weatherproof Housing



A complete Telstor System comprises an **80LS Telstor Sensor** and an **80LC Telstor Controller**. The sensor consists of a sensing electrode and a protective head containing a capacitance-to-micro amp transducer. The controller unit contains a power supply, an amplifier and control relays. Alternatively, where the measuring environment is harsh, a system is available in which the electronics (normally mounted in the sensor head) are contained in a separate **80LT transducer head**, which is connected to the **80LE electrode** by 2M of coaxial cable. A wide range of sensing electrodes is available, each assembly being manufactured to the requirements of the customer's application.

Once the system has been calibrated on-site with the material to be measured, the sensor and controller form a matched set.

### ATEX Approved Intrinsically Safe Telstor System

An Intrinsically Safe (IS) Telstor level control system has been certified by Baseefa (2001) Ltd, and comprises a level sensor situated in the hazardous area and a controller mounted in the safe area. The sensor must be connected to the controller via Zener diode safety barriers mounted in the safe area. Single or multiple system barrier housings are available as required.

The certified equipment takes full account of the Baseefa design requirement for probes in tanks (supplementary to the statutory regulations).

The IS sensor electronics use high quality components and are mounted inside a robust sensor head made of die-cast aluminium alloy, giving protection to IP56. The IS sensor is suitable for installing in a Zone 0 (continuous hazard) area in atmospheres to gas grouping IIC (hydrogen). The equipment therefore satisfies the most stringent requirements for intrinsic safety, to the CENELEC European Standard EN50020. The IS Telstor sensor has a temperature class of T4 (BS 5501 Part 1: EN50014), enabling the system to be used in gases with ignition temperatures down to 135°C. The Telstor controller for use with IS systems is fused and can be fitted with a full range of retransmission signal and control options.

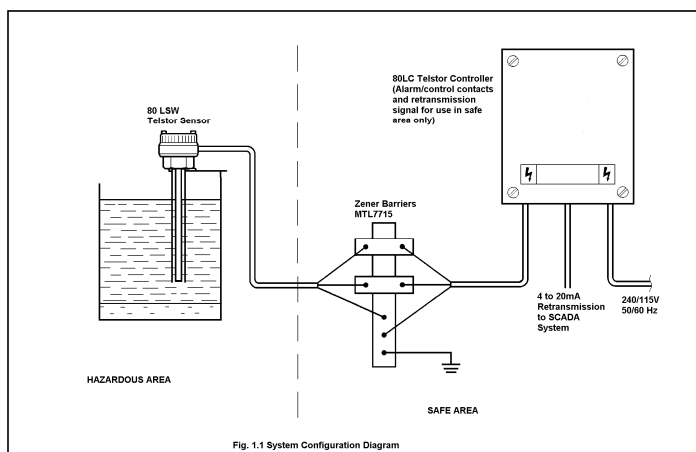


Fig. 1.1 System Configuration Diagram

### CERTIFICATION

#### SENSOR

Category  $\text{Ex}$  II 1G EEx ia IIC T4

Certificate No: Baseefa04ATEX0002X

Issue 2 September 2009



## 80 Series Telstor Controllers

80LC Telstor Controllers comprise a power supply unit, micro amp-to-milliamp circuitry and, where applicable, control relays. A modular method of construction using plug-in printed circuit boards and relays facilitates both maintenance and changes in the operation of the unit, when necessary. The controller is available either in chassis-only form or in a surface-mounted, die-cast weatherproof case. Chassis-only forms are for multi-point installations in protected locations such as within control boxes of cabinets.



### Controller Options

80LC Controllers are supplied with a wide variety of control options and for AC Mains or 24 Volt DC operation. Telstor controllers are supplied in a number of basic forms, each of which is used with a single Telstor sensor.

#### 1) Retransmission Only

This unit only provides a retransmission signal selected from a choice of two output ranges: 0 to 10mA or 4 to 20mA suitable for use with digital process indicators, telemetry systems, data loggers, etc.

#### 2) ON/OFF Control - Single Trip/Double Trip - Fixed Differential

This controller contains one or two control relays, each with two sets of changeover contacts, for alarm or control. The control differential, which is the distance between the electrode levels at which the capacitance change energises and de-energises each relay, is fixed (typically 1% of the electrode length). The points at which the control is effected is adjustable along the length of the electrode.

#### 3) ON/OFF Control - Single Trip/Double Trip - Adjustable Differential

This controller contains one or two control relays, each with two sets of changeover contacts, for alarm or control. The levels at which control is effected, and the differential between these levels, are adjustable from 1% to 100% of the length of the electrode.

#### 4) Retransmission and ON/OFF Control

Units described in 2) and 3) above can also be supplied with a retransmission output.

### Technical Specifications:

#### Operating Temperature Limits

-40° to +80°C (-40° to +176°F)

#### Operating Humidity Limits

0 to 80% RH non-condensing

#### Power Supply

110V or 230V  $\pm 15\%$ , 50/60 Hz  
or 24 Volt DC

Fused options for IS application

#### Retransmission Signal

0 to 10mA into 1k $\Omega$  max.  
4 to 20mA into 500 $\Omega$  max.

#### Safety on Failure

Fail-safe at high or low level is set by links on the pcb.

#### Relay Contact Rating

Double pole changeover contacts  
First pole (with arc suppression)  
250V a.c. 5A a.c. 1250W (non-inductive)  
250V d.c. 5A d.c. 50W (non-inductive)  
Second pole (without arc suppression)  
(Note: these contacts are used to switch internal lamps where fitted)  
250V a.c. 2A a.c. 500W (non-inductive)  
250V d.c. 2A d.c. 20W (non-inductive)

#### Indication of Relay Operation

Internal LED in parallel with relay coil  
External none or lamps mounted on box

#### Response time of Controller

Adjustable Differential Trip no delay  
Fixed Differential Trip 5S or 0.5S delay  
(selectable by on-site removal of capacitor)

#### Housing

Die-cast aluminium alloy weatherproof case with screw-on gasketed cover finished in semi-gloss dark grey epoxy resin based paint.

#### Protection

IP56

#### Chassis Housing

ABS plastic dust cover with terminals top and bottom. No internally mounted signal lamps. Protection IP20

#### Weight

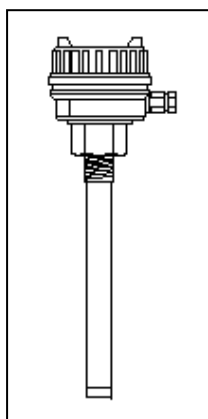
Die-cast case 2.2Kg  
Chassis only 1.0Kg



## 80 Series Telstor Electrodes

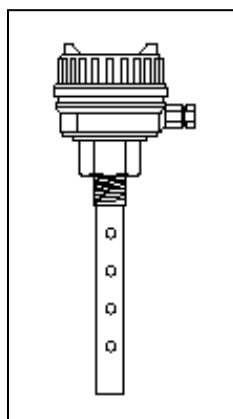
The standard sensor electronics are mounted on a plug-in printed circuit board protected by a tough, moulded plastic cover. This unit plugs into a second board fastened inside the head. The wires linking the sensor with the controller are connected to three large terminals mounted on the second board. This arrangement simplifies both installation and servicing and permits the use of heavy conductors, e.g. armoured cable.

The choice of a sensing electrode depends upon the particular application, a wide range of electrode types being available for use in almost every situation. Each electrode assembly is manufactured to the specific requirements of the customer's application. A selection from the types available is illustrated below. For further technical advice on your application, please contact our internal sales department.



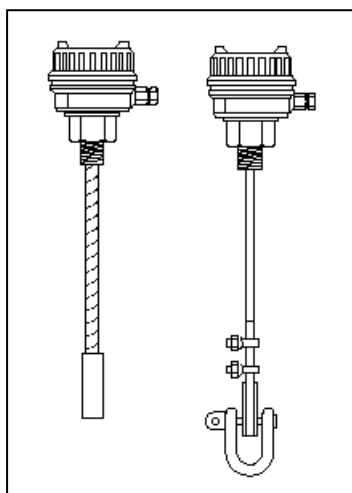
### Rigid Electrodes

The rod of the standard rigid electrode is made of stainless steel and, depending upon the application, may be covered, or part covered, with PTFE or PVDF.



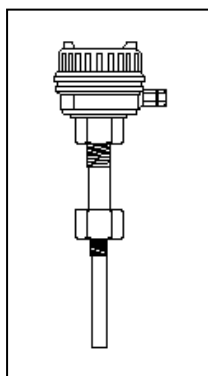
### Concentric Electrode

For hydrocarbons, liquid gases and other liquids of low dielectric constant, a concentric electrode is recommended. An earth tube surrounding the electrode rod acts in place of the walls of the vessel in the capacitance system, with resultant increases in sensitivity and accuracy.



### Flexible Electrodes

Flexible rope electrodes are used in systems where the electrode length exceeds 4.0m (13.2 ft) and in applications involving **solid material**, such as coal or rock, which would damage a rigid electrode. There are two basic types of flexible electrode: one comprises a steel rope with an electrically 'live' or 'dead' stainless steel weight; while the other consists of a steel rope with an insulated 'D' shackle, for fixing to the sides of the container. The flexible rope electrode may be installed at an angle to the vertical to prevent rat-holing in certain materials and may be doubled-up to obtain greater capacitance change.



### High Temperature Operation

The maximum operating temperature of the sensor electronics is 55°C. Where a sensor is to be fitted to hot vessels, there are two means of reducing the temperature at the electronics to within their operating range: either using a stainless steel stand-off or a separate transducer containing the electronics.

Issue 2 September 2009



## 80 Series Telstor Electrodes

### Technical Specifications:

#### Operating temperature limits of sensor head

-40° to +55°C (80LS and 80LT)

#### Operating temperature limits of electrode

PTFE or PVDF insulated -40° to 180°C (-40° to 356°F)  
Polypropylene insulated -40° to 110°C (-40 to 230°F)  
(Dependent on structure of electrode)

#### Operating Humidity Limits

0 to 80% RH non-condensing

#### Maximum Working Pressure

40 bar (580 psi) at 20°C (68°F) (straight rigid electrode only)

#### Safety on Failure

Fail-safe at high or low level is set by links on the pcb.

#### Electrode Type

Rigid stainless steel rod 12mm dia. full or part-insulated by PTFE, Polypropylene or PVDF

Flexible bare stainless steel rope or galvanised steel rope covered with polypropylene or stranded stainless steel rope covered with FEP

#### Electrode Structure

Standard or with Stand-Off options

#### Electrode Mounting

Stainless steel boss 1" BSP with nut and washer  
Other mounting options available on request

#### O-Ring Materials in Contact with the Measured Variable

Viton as standard - options include Silicone, Nitrile Rubber or PTFE which may be fitted to suit the application.

#### Electrode Length

Rigid - straight or bent from 160mm up to 4000mm in 20mm steps

Flexible - 240mm up to 25000mm in 20mm steps

#### Electrode Fixing (flexible probe only)

- 1) None
- 2) With electrically live, or dead, bare stainless steel weight
- 3) mild steel weight covered with PTFE
- 4) Nylon thimble, stainless steel 'D' shackle and 'U' clamps

#### Electrode Head

Die-cast aluminium alloy weatherproof with silicone rubber 'O'-ring and Walkerite gasket

#### Protection

IP56

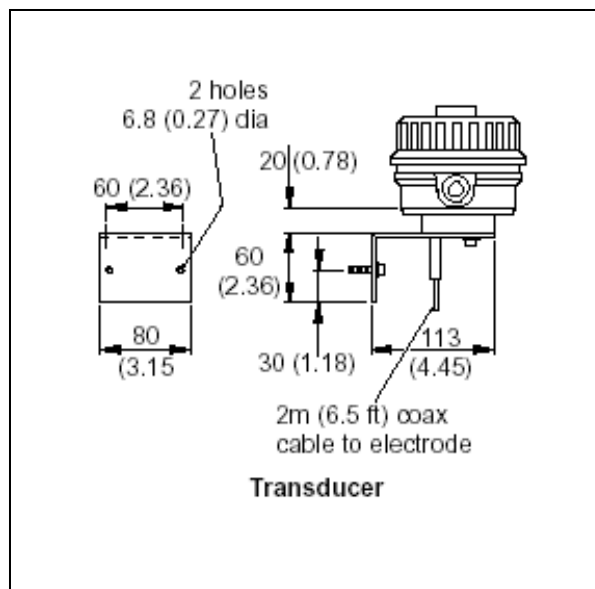
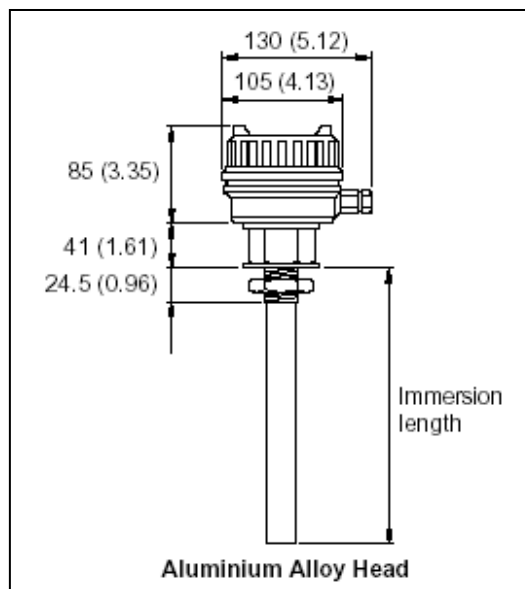
#### Electrical Connector to Sensor

20mm conduit entry

#### Weight of Sensor

Typically 2.0Kg for 500mm rigid electrode length

### Overall Dimensions - Electrodes - dimensions in mm (in.)



Issue 2 September 2009



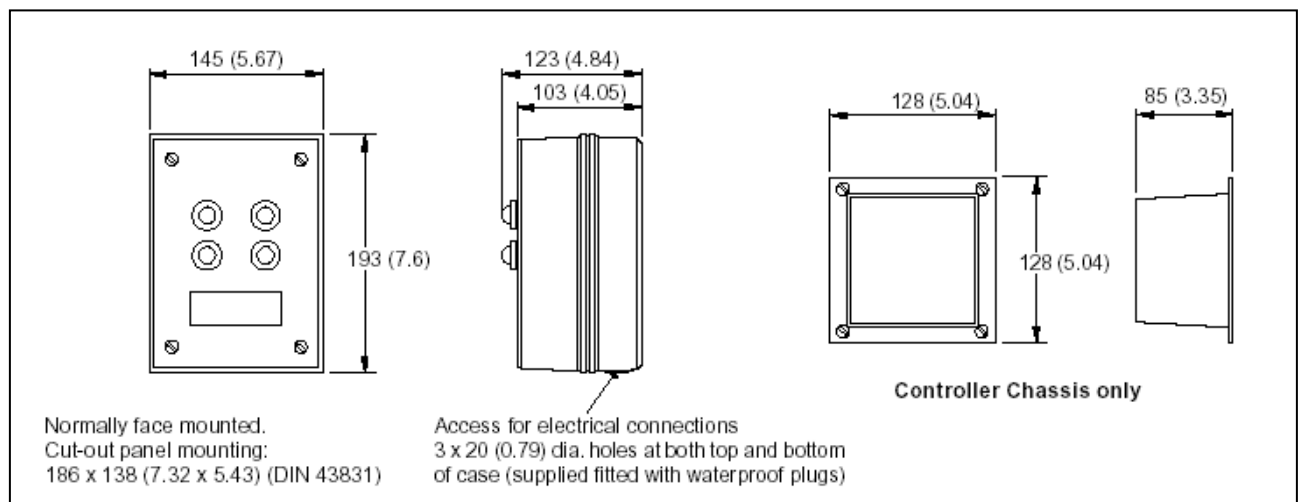
Lee-Dickens Ltd, Rushton Road, Desborough, Kettering, Northamptonshire, NN14 2QW, U.K.

## 80 Series Telstor Controllers - Order Guide

<b>Telstor Controller</b>	<b>80LC/</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Power Supply</b>					
110V / 230V 50/60Hz		1			
24 Volt DC		2			
110V / 230V 50/60Hz fused *		5			
<b>No. and Type of Trips</b>					
None				R*	
One fixed differential trip fail-safe low			1		
One fixed differential trip fail-safe high			2		
One adjustable differential latching trip fail-safe low			3		
One adjustable differential latching trip fail-safe high			4		
Two fixed differential trips fail-safe low			5		
Two fixed differential trips fail-safe high			6		
Two fixed differential trips, one fail-safe high, one fail-safe high			7		
Two adjustable differential latching trips fail-safe low			8		
Two adjustable differential latching trips fail-safe high			9		
Two adjustable differential latching trips, one fail-safe low, one fail-safe high			0		
One adjustable differential latching trip fail-safe low and one fixed diff trip fail-safe low			A		
One adjustable differential latching trip fail-safe high and one fixed diff trip fail-safe high			B		
One adjustable differential latching trip fail-safe low and one fixed diff trip fail-safe high			C		
One adjustable differential latching trip fail-safe high and one fixed diff trip fail-safe low			D		
<b>Retransmission Signal and Integral Indicator</b>					
None				0	
0 to 10mA without integral indicator				2	
4 to 20mA without integral indicator				3	
0 to 10mA with integral indicator				B	
4 to 20mA with integral indicator				C	
<b>Lamps and Housing</b>					
Case without lamps					0*
Case with only one lamp (Mains ON)					1
Case with two lamps (High or Low Alarm)					2
Case with 4 lamps ( 2 High or 2 Low Alarms)					4
Chassis only (plastic cover - no lamps)					7

**\*Notes:**     **Only** lamps option 0 is available with a fused power supply  
                   **Only** lamps option 1 is available with control option R

### Overall Dimensions - Controller { Dimensions in mm (in.) }



Issue 2 September 2009



## 80 Series Telstor Probes - Rigid and Flexible - Order Guide

<b>Telstor Electrodes</b>	80L	X	X/	XX	X	XX	X/	XXXX X
<b>Sensor Type</b>								
Sensor		S						
Transducer		T						
Head only (no sensor board)		E						
<b>Sensor Operation</b>								
Plug-in electronics - normal range - LS or LT only			C					
Plug-in electronics - extended range - LS or LT only			D					
None - LE only			O					
Plug-in electronics - normal range IS - LS only			W					
Plug-in electronics - extended range IS - LS only			Y					
<b>Electrode Type - Rigid</b>								
Straight standard part PVDF insulation*				10				
Concentric part PVDF insulation*				12				
Straight standard part Polypropylene insulation				20				
Straight standard full PTFE insulation				30				
Straight standard full PVDF insulation*				50				
Special fully insulated concentric				SP				
<b>Electrode Type - Flexible</b>								
6mm dia. bare stainless steel rope				61				
6mm dia. galvanised, polypropylene covered s/s rope				71				
3.5mm dia. FEP covered stainless steel rope				75				
<b>Electrode Material - Rigid</b>							B	
Stainless steel								
<b>Electrode Termination - Flexible</b>								
S/S weight, bare, live (types 61 & 71 only)							N	
S/S weight, bare, dead (types 61 & 71 only)							P	
S/S weight, bare, dead with galvanised eye-bolt (types 61 & 71 only)							Q	
PTFE covered mild steel weight, live (type 75 only)							R	
Nylon thimble, stainless steel shackle and clamp (types 61 & 71 only)							V	
<b>Electrode Structure</b>								
No-stand-off							00	
Stand-off 100mm (3.93 in.) length							10	
Stand-off 200mm (7.87 in.) length							20	
Stand-off 300mm (11.81 in.) length							30	
<b>Electrode Mounting</b>								
1 in. BSP 316 stainless steel boss with nut and washer								B
Non-standard ( specify in text of order required mounting )								X
<b>Electrode Length - Rigid</b>								
Minimum 160mm (6.3 in.) [ in 20mm (0.78 in.) increments]								00160
↓								↓
Maximum 4000mm (13.1 ft)								04000
<b>Bent Electrode - Rigid</b>								or
Rigid types 10, 20 or 30 only								
Lengths L1, L2 and angle 'A' to be given in written description								000BB
Normal limits are L1 + L2 = 4000mm (13.1 ft) max								
L1 or L2 = 160mm (6.3 in.) minimum								
Angle 'A' = 0 to 90°								
<b>Electrode Length - Flexible</b>								
Minimum 240mm (9.45 in.) [ in 20mm (0.78 in.) increments]								00240
↓								↓
Maximum 25000mm (82 ft)								25000

\* **Note:** Unsuitable for Alkaline solutions

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