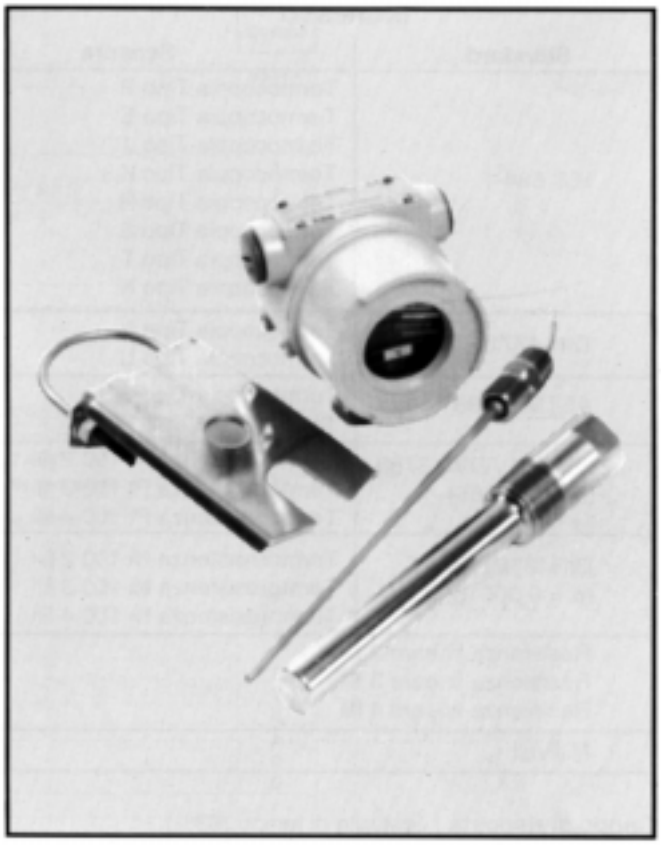
Specification Sheet

# 600T Series Transmitters
# Model 653L
# Electronic temperature transmitter (PC programmable for RTD and resistance)

- **High flexibility and wide rangeability**
- **Primary element and calibration selectable**
- **User-selectable output drive under input failure conditions**
- **Complies with relevant IEC requirements for test procedure and environmental protection**
- **CENELEC Intrinsic Safety / Flameproof and Factory Mutual approvals**
- **Configurable to the actual application by standard PC**



***600T Series transmitter***
***A complete family of process transmitters providing high performance in real operating conditions***

## FEATURES

Model 653L electronic transmitter is an extension of the Kent-Taylor 2-wire analog product line.
It is designed for factory setting, in order to meet the specific application requirement of measuring low level signals from resistance thermometer (RTD) or resistance (ohm).
The instrument can be easily reconfigured for actual requirements by simple procedures through a standard PC equipped with a specific software available on request. (Part no. AN0239)

The temperature transmitter can be mounted directly on a thermowell and thermowell extension, or it can be mounted remotely on a pipestand.
The transmitter assures operational security by using non-volatile memory and also handling up/down scale procedure under sensor anomalies.
Compact, rugged, lightweight, easy to install and service, Kent-Taylor transmitters provide consistently reliable and stable performance under all types of process conditions, coupled with minimum maintenance requirements.

## FUNCTIONAL SPECIFICATIONS

**RTD INPUT**
**Resistance thermometer Pt100 3 wires**
**(IEC 751/DIN 43760; $\alpha$ = 0.00385)**
Measuring range : -200 to +850°C (-328 to +1562°F)
Minimum span : 25°C (45°F)

**Resistance thermometer Ni100 3 wires**
**(DIN 43760; $\alpha$ = 0,00618)**
Measuring range : -60 to +250°C (-76 to +482°F)
Minimum span : 25°C (45°F)

**LINEAR RESISTANCE INPUT**
**3 wires**
Measuring range : 0 to 10 kΩ
Minimum span : 30 Ω

**Response Time** selectable time constant (63%)
0.33 to 60 sec. as defined.

**Loss of input**
The analog signal can be selected up to a minimum value of 3.5 mA or a maximum value of 23 mA.

**Power supply** (at transmitter terminals)
The transmitter operates on 8 to 35 Vdc with no load and is protected against reverse polarity connection.
Minimum operating voltages :
• 8 Vdc without options
• 10 Vdc with optional LCD meter
For Ex ia approval power supply must not exceed 28 Vdc.

**Warm-up time**
Operation within specification in less than 5 min.

**Update time**
135 ms approx.

**Input impedance**
10 MΩ

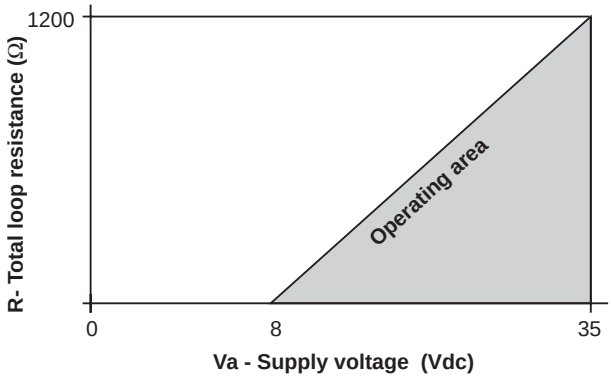
**Output signal**
Two-wire 4 to 20 mA dc., linear with ohms or linear with true temperature for RTD.

**Optional output meter**
LCD : 3 1/2 digit (±1999 counts) with 10 mm (3/8 in) high, 7-segment characters. Engineering unit labels are provided.

**Max. offset (input)**
50% of max. value

**Load limitations**
Total loop resistance including optional remote indicator line : see figure.

$$R(k\Omega) = \frac{\text{Supply voltage - min. operating voltage (Vdc)}}{23}$$




**Temperature limits**
**Ambient**
-40 and +85°C (-40 and +185°F)
with LCD meter : -20 and +80°C (-4 and +176°F)
**Storage**
-50 and +120°C (-58 and +248°F)
with LCD meter : -40 and +85°C (-40 and +185°F)

**Humidity**
0 to 90% RH

## PERFORMANCE SPECIFICATIONS

If not otherwise stated values as % should be considered percent of calibrated span.

**COMMON CHARACTERISTICS**

**Linearity error**
< 0.1%

**Temperature coefficient**
<± 0.01%/°C

**Signal/noise ratio**
min. 60 dB

**Output meter indication accuracy**
LCD : ± 0.1% of calibrated span ± 1 digit

**Supply voltage**
Within voltage/load specified limits the total effect is less than 0.005%/V.

**Load**
Within load/voltage specified limits the total effect is less than 0.01%/100Ω.

**EMI/RFI**
Meets EN50081 for emmission and EN50082 for immunity when instrument is properly installed with or without output meter.

**Vibration**
IEC 68-2-6 Test FC
Lloyd's specification no. 1 : 4g/2-100 Hz

**Mounting Position**
The transmitter may be mounted in any position with no effect on output signal.

**RTD INPUT**

**Basic accuracy**
± 0.3°C

**Sensor current**
0.2 mA to 0.4 mA

**Temperature coefficient**
span <100°C : ± 0.01°C/°C

**Effect of sensor cable resistance (3-wire)**
<0.002 Ω/Ω

**Max. cable resistance per wire**
10 Ω

**LINEAR RESISTANCE INPUT**

**Sensor current**
0.2 mA to 0.4 mA

**Effect of sensor cable resistance (3-wire)**
< 0.002 Ω/Ω

**Max. cable resistance per wire**
10 Ω

## Configuration

The transmitter is supplied according to ordered configuration option as follows :

**Standard configuration**
Sensor type, calibration @ 4-20 mA values (specify range when ordering), response time, broken sensor drive and optional LCD meter scale are in accordance with selected options .

## PHYSICAL SPECIFICATIONS

## Materials

**Housing and covers**
Low copper aluminium alloy with baked epoxy finish;
AISI 316 L ss

**Covers O-ring**
Buna N

**Tagging**
AISI 316 ss data plate attached to the electronics housing.

**Mounting bracket (*)**
Zinc plated carbon steel with chrome passivation; AISI 316 L ss

## Optional extras

**Output meter** Plug-in rotatable type, LCD.
Standard LCD meter scale is 0 to 100% linear; special linear scale to specified range and engineering unit is available.

**Supplemental customer tag**
AISI 316 ss tag fastened to the transmitter with stainless steel wire for customer's tag data up to a maximum of 56 characters and spaces on two lines for tag number and tag name, and up to a maximum of 28 characters and spaces for calibration details.

**Configuration kit**
Includes 3.5" configuration program disk, a RS232 interface unit, a cable set for transmitter and PC connection providing adaptor and the user manual (order as Part no. AN0239).

**Mounting bracket**
For 60 mm. (2in) stand pipe or wall mounting.

## Environmental protection

**Wet and dust-laden atmospheres**

The transmitter is dust and sand tight and protected against immersion effects as defined by IEC 529 (1989) to IP67.
Suitable for tropical climate operation as defined in DIN 40.040, application class GQC.

**Hazardous atmospheres**

With or without output meter
INTRINSIC SAFETY
- CENELEC DEMKO approval; certificate no. 97D.122159
  EEx ia IIC T4 ($T_{amb}$ -40 to +85°C)/T6 ($T_{amb}$ -40 to +60°C)

FLAMEPROOF
- CENELEC/CESI Approval; certificate no. Ex-95.D.111
  EEx d IIC T5 ($T_{amb}$ -40 to +85°C)/T6 ($T_{amb}$ -40 to +70°C)

FACTORY MUTUAL :
- Explosionproof: Class I, Div. 1, Groups B, C, D
- Dust ignitionproof : Class II, Div. 1, Groups E, F, G
- Suitable for : Class II, Div. 2, Groups F, G; Class III, Div. 1, 2
- Nonincendive: Class I, Div. 2, Groups A, B, C, D
- Intrinsically safe: Class I,II, III, Div. 1, Groups A, B, C, D, E, F, G

## Electrical connections

Two 1/2 NPT or M20 x 1.5 or PG 13.5 or 1/2 GK threaded conduit entries, direct on housing, both available for output/ supply signal when the sensor is mounted remotely. Alternatively, one 1/2 NPT threaded entry for integrally mounted sensor and one 1/2 NPT or M20 x 1.5 or PG 13.5 or 1/2 GK threaded entry for output/supply signal, direct on housing.

**Terminal block**

- two terminals for 4-20 mA output/supply signal wiring up to 2.5 $mm^2$ (14 AWG) and two jacks compatible with 3 mm dia miniature plugs.
- three terminals for input signal wiring up to 1.5 $mm^2$ (16 AWG)

**Grounding**

Internal and external 6 $mm^2$ (10 AWG) ground termination points are provided

## Mass

1 kg approx (2 lbs) without sensor and options

## Packing

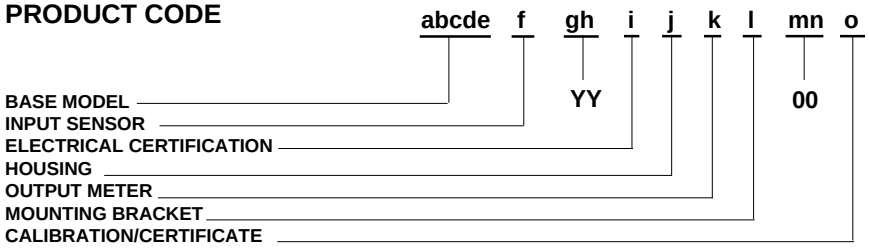
Expanded polythene box

(*) U-bolt material : AISI 400 ss; screws material: high-strength alloy steel or AISI 316ss

# ORDERING INFORMATION

Select one character or set of characters from each category and specify complete catalog number.

## PRODUCT CODE




**abcde** **BASE MODEL -** 1st to 5th characters

| | Codice |
|---|---|
| Temperature Transmitter | **653LY** |

**f** **INPUT SENSOR -** 6th character

| | |
|---|---|
| Remote | **1** |
| Integrally mounted (NOTE 1) (one 1/2" NPT CONNECTION ENTRY IS PROVIDED) | **5** |

**NOTE 1** : quoted separately

**gh** 7th and 8th characters

| | |
|---|---|
| Use code | **YY** |

**i** **ELECTRICAL CERTIFICATION -** 9th character

| | |
|---|---|
| General Purpose | **1** |
| Intrinsic Safety to CENELEC EN50014/20 DEMKO approval to EEx ia IIC T6/T4 | **2** |
| Flameproof to CENELEC EN50014/18 CESI approval to EEx d IIC T6/T5 (**NOTE 2**) | **3** |
| Intrinsic Safety and Flameproof, as above, CESI approval **(NOTE 2)** | **U** |
| Factory Mutual (FM) (only available with **Remote sensor** and **1/2" NPT electrical connections**) | **7** |

**NOTE 2** : if integral sensor is required this must be supplied by ABB Kent-Taylor Lenno

**HOUSING -** 10th character

**j**

| **Material** | **Electrical connections** | |
|---|---|---|
| Aluminium alloy | 1/2" NPT | **1** |
| | CM 20 | **2** |
| | Pg 13.5 | **3** |
| | 1/2" GK | **4** |
| AISI 316 L ss | 1/2" NPT | **A** |
| | CM 20 | **C** |
| | Pg 13.5 | **D** |
| | 1/2" GK | **F** |

**k** **OUTPUT METER -** 11th character

| | |
|---|---|
| None | **1** |
| Digital LCD linear 0-100% user scalable | **3** |
| Digital LCD linear scale (specify range and engineering units) | **5** |

**l** **MOUNTING BRACKET-** 12th character

| | |
|---|---|
| None | **1** |
| Carbon steel | **2** |
| AISI 316 L ss | **3** |

**mn** 13th - 14th character

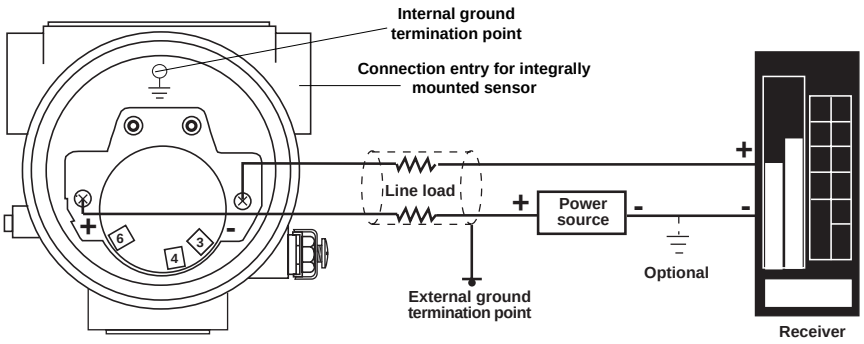
| | |
|---|---|
| Use code | **00** |

**o** **CALIBRATION CERTIFICATE -** 15th character

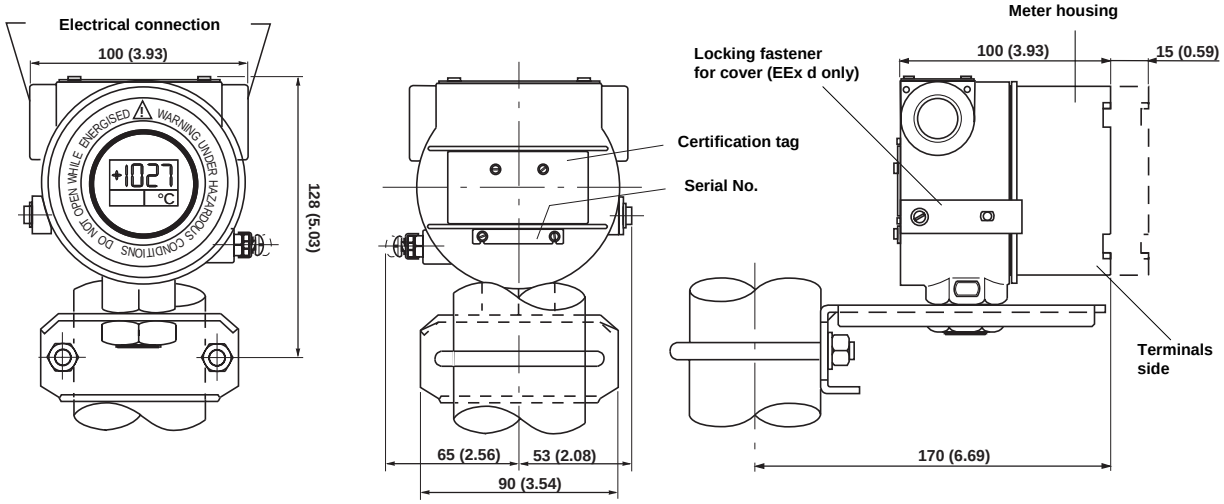
| | |
|---|---|
| Not required | **1** |
| For the transmitter only | **3** |
| For the transmitter and the integrally mounted input sensor | **4** |

## ELECTRICAL CONNECTIONS

| INPUT TYPE | TERMINAL CONNECTION |
|---|---|
| Resistance thermometer and Linear resistance | Terminals 3 and 6 = inputs<br>Terminal 4 = 3rd wire |




## DIMENSIONS AND MOUNTING DETAILS
## (Not for construction unless certified)




The Company's policy is one of continuous product improvement and the right is reserved to modify the specifications contained herein without notice.

SS/653L Rev 1


**ABB Instrumentation spa**
Via Statale 113
22016 Lenno (Como)
Italia
Tel. (0344) 58111
Facsimile (0344) 56278

**ABB Automation Ltd.**
Howard Road
St. Neots, Cambs.
England PE19 3EU
Tel. (01480) 475321,
Facsimile (01480) 217948

**ABB Automation Inc.**
125 East County Line Road
Warminster, Pa.
18974-4995 USA
Tel. (215) 674-6693/6320/6777
Facsimile (215) 674-7184