Base Load Power Hub (BLPH)

PT, PDT, TT, LT RADAR

FACTORY ACCEPTANCE TEST PROCEDURE

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Revision / Change Log

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CALIBRATION PROCEDURE for SST76 and SST77B

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IOP-SXX-TAR-002

SCOPE:	Present procedure defines all the tests that have to be carried out on following electronic instruments: SST76 – Pressure transmitters SST77B – Differential pressure transmitters
OPERETING MODES:	**PURPOSE** This procedure has to be applied on all instruments in the final phase of the production (testing) **TEST EQUIPMENT** • Pressure generator • Regulated power supply with current indicator • Multi-meter All test equipment must have a Nominal Range at least 20% upper than the instrument **OPERATION SEQUENCE for SST76** • Select the direct (4÷20 mA) or reverse (20÷4 mA) current mode. • Connect the instrument to the pressure inlet on the test bench. • Execute the measurements starting from the lower value indicated on the instrument TAG plate in order to test the 0%, 25%, 50%, 75% and 100% of the nominal range both in the ascending and descending way. • Verify on the multi-meter that the current values are within the tolerances indicated on the production sheet. • Verify on the display that the percentage values are within the tolerances indicated on the production sheet. • Set the desired display calibration (internal to Nominal Range). **Transmitters final display calibration** • Select the desired display measuring unit. **Switches final display calibration** • Select the desired set point by increasing or decreasing the default value. **OPERATION SEQUENCE for SST77B** **Check the effect of the unilateral pressure** • Connect the instrument pressure inlets (**+** and **-**) to the supply inlets of the test bench. • Set on the bench the unilateral pressure value to apply on the instrument.

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This value depends by the instrument calibration range:

Up to 50 mbar → 50 bar
Over 50 mbar → 100 bar (On request 200 bar)

- Open the instrument interception valve on the **+** side.
- Close the instrument interception valve on the **+** side and open the vent valve on the same side.
- Open the instrument interception valve on the **-** side.
- Close the instrument interception valve (**-** side) and open the vent valve on the same side.
- Bring back to zero the pressure and verify the correct working of the instrument by setting a pressure value on the test instrument and verifying the correspondence between the set one and the read one. In these conditions no progressive variations are admitted on the instrument.

Test Of The Static Pressure Influence

- Connect the instrument pressure inlets (**+** and **-**) to the supply inlets of the test bench.
- Increase the pressure in both sides (**+** and **-**) with interception valves opened and vent valves closed until the following values are reached:

  Up to 50 mbar → 50 bar
  Over 50 mbar → 100 bar
- Bring back to zero the pressure and verify the correct working of the instrument by setting a pressure value on the test instrument and verifying the correspondence between the set one and the read one. In these conditions no progressive variations are admitted on the instrument.

Instrument calibration check

- Select the direct (4÷20 mA) or reverse (20÷4 mA) current mode.
- Connect the transmitter + side to the pressure inlet on the test bench and let the – side to be at ATM pressure.
- Execute the measurements starting from the lower value indicated on the instrument TAG plate in order to test the 0%, 25%, 50%, 75% and 100% of the nominal range.
- Verify on the Multi-meter that the current values are within the tolerances indicated on the production sheet.
- Verify on the Display that the percentage values are within the tolerances indicated on the production sheet.
- Set the desired display calibration (internal to Nominal Range).

  Transmitters final display calibration
  - Select the desired display measuring unit.

  Switches final display calibration
  - Select the desired set point by increasing or decreasing the default value.

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	Zero stability check for low range instruments • Electronic differential pressure transmitters have to maintain zero stability when unilateral or static pressure is applied. • Stability directly depends by the oil quantity introduced in the instrument. • Following checks have to be performed once the zero and span calibration has been done and before the thermal calibration. • Please note that: **Low range instruments → Accuracy <** ±0.5% **Medium range instruments → Accuracy <** ±0.2% • Instrument must be in standard conditions. • Apply a 10 bar pressure on the **+** side for 30 seconds then release it. • Wait 60 seconds then verify that the zero accuracy. • Apply a 10 bar pressure on the **-** side for 30 seconds then release it. • Wait 60 seconds then verify that the zero accuracy. • Apply a 10 bar pressure on both sides then release it. • Verify that the zero accuracy is within the related values. • If the zero error is >±0.5% / ±0.2% then the instrument must be rejected. • On rejected instruments must be operated a diaphragm control in order to exclude defects or damages and a new oil charge must be executed. **ACCEPTANCE CRITERIA** • The test result is POSITIVE if, for all the five ascending and descending tested points, the accuracy is within the value indicated on the working sheet. The test result is NEGATIVE if, at least one accuracy doesn't comply with the required one.
REFERENCES:	This instruction has been drawn up in accordance with the ISO 9001 quality system.
FORMS:	-

CALIBRATION PROCEDURE for SST72

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IOP-SX2-TAR-002

SCOPE:	Present procedure defines all the tests that have to be carried out on following temperature gauges: SST72 – Smart Temperature Transmitter Exd
OPERATING MODES:	**1 PURPOSE** This procedure has to be applied on all transmitters in the final phase of the production (testing) **2 TEST EQUIPMENT** • Reference Class A temperature transmitter • Temperature generator (Bath or Climatic chamber) **3 OPERATIONS SEQUENCE** • Prepare the temperature generator at a required temperature value, and let it stabilize. • Put the gauge and the Class A instrument into the temperature generator for at least 5 minutes to achieve the required temperature and execute the measurements starting from the lower value indicated on the instrument TAG plate in order to test the 0%, 25%, 50%, 75% and 100% of the nominal range both in ascending and descending way. • Remove the instrument from the bath and wait for at least 5 minutes to achieve room temperature. • Instruments over going the required specification limits of accuracy, shall be send back to production facility for re-check and re-calibration. • Instrument showing results within the required specification limits of accuracy shall be cleaned and send to final inspection and packing. **4 ACCEPTATION CRITERIA** • The test result is POSITIVE if, for all the five ascending and descending tested points, the accuracy is within the gauge class. • The test result is NEGATIVE if, at least one accuracy doesn't comply with the required one.
REFERENCES:	This instruction has been drawn up in accordance with the ISO 9001 quality system.
FORMS:	-

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HYDROTEST PROCEDURE for SST76 and SST77B

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IOP-SSX-PRE-002

SCOPE:	Present procedure defines the Hydrotest method that have to be carried out on following electronic instruments: SST76 – Pressure transmitters SST77B – Differential pressure transmitters
OPERATING MODES:	**PURPOSE** This procedure has to be applied on all instruments in the final phase of the production phase only if it is required by customer. **TEST EQUIPMENT** • Pressure generator • Regulated power supply with current indicator • Multi-meter All test equipment must have a Nominal Range at least 20% upper than the instrument **OPERATION SEQUENCE for SST76** • Select the direct (4÷20 mA) or reverse (20÷4 mA) current mode. • Connect the instrument to the pressure inlet on the test bench. • Apply a test pressure equal to Pt=1.43*Ps where Ps is the Maximum Working Pressure. Please note that Ps is the minimum value of maximum working pressure choosing between the sensor and the process connection rating. • Maintain the applied pressure for 10 s. • Verify there is not any leakage. • Verify that the current output is forced to 3.85 or 20.8 mA and the display shows the ALARM mode. • Bring back to zero the pressure and verify the correct working of the instrument by setting a pressure value on the test instrument and verifying the correspondence between the set one and the read one. In these conditions no progressive variations are admitted on the instrument. **OPERATION SEQUENCE for SS77B** o **Check the effect of the unilateral pressure** • Connect the instrument pressure inlets (**+** and **-**) to the supply inlets of the test bench. • Set on the bench the unilateral pressure value to apply on the instrument. This value depends by the instrument calibration range: **Up to 50 mbar → 50 bar** **Over 50 mbar → 100 bar (On request 200 bar)** • Open the instrument interception valve on the **+** side. • Close the instrument interception valve on the **+** side and open the vent valve on the same side. • Open the instrument interception valve on the **-** side. • Close the instrument interception valve (**-** side) and open the vent valve on the same side. • Bring back to zero the pressure and verify the correct working of the instrument by setting a pressure value on the test instrument and verifying the correspondence between the set one and the read one. In these conditions no progressive variations are admitted on the instrument.

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	○ **Test Of The Static Pressure Influence** • Connect the instrument pressure inlets (**+** and **-**) to the supply inlets of the test bench. • Increase the pressure in both sides (**+** and **-**) with interception valves opened and vent valves closed until the following values are reached: **Up to 50 mbar → 50 bar** **Over 50 mbar → 100 bar** • Bring back to zero the pressure and verify the correct working of the instrument by setting a pressure value on the test instrument and verifying the correspondence between the set one and the read one. In these conditions no progressive variations are admitted on the instrument. **ACCEPTANCE CRITERIA** • The test result is POSITIVE if there is correspondence between the generated pressure value and the read one. • The test result is NEGATIVE if there is leakage from the process connection or if there is not correspondence between the generated pressure value and the read one.
REFERENCES:	This instruction has been drawn up in accordance with the ISO 9001 quality system.
FORMS:	-

TAG REFERENCE TABLE:

#	MODEL	TAG	Test Pressure	Test Time	Test Temperature	Acceptance Criteria
1	SST77B	43-LT-001	143 bar	10 s	Ambient (25 °C)	No leakage
2	SST77B	43-LT-003	143 bar	10 s	Ambient (25 °C)	No leakage
3	SST76 (threaded)	25-PT-001	143 bar	10 s	Ambient (25 °C)	No leakage
4	SST76 (threaded)	25-PT-002	143 bar	10 s	Ambient (25 °C)	No leakage
5	SST76 (threaded)	25-PT-004	143 bar	10 s	Ambient (25 °C)	No leakage
6	SST76 (threaded)	25-PT-035	143 bar	10 s	Ambient (25 °C)	No leakage
7	SST76 (threaded)	25-PT-006	143 bar	10 s	Ambient (25 °C)	No leakage
8	SST76 (threaded)	25-PT-037	143 bar	10 s	Ambient (25 °C)	No leakage
9	SST76 (threaded)	25-PT-008	143 bar	10 s	Ambient (25 °C)	No leakage
10	SST76 (threaded)	25-PT-040	143 bar	10 s	Ambient (25 °C)	No leakage
11	SST76 (threaded)	25-PT-009	143 bar	10 s	Ambient (25 °C)	No leakage
12	SST76 (threaded)	25-PT-043	143 bar	10 s	Ambient (25 °C)	No leakage
13	SST76 (threaded)	25-PT-011	143 bar	10 s	Ambient (25 °C)	No leakage
14	SST76 (threaded)	25-PT-046	143 bar	10 s	Ambient (25 °C)	No leakage
15	SST76 (threaded)	25-PT-012	143 bar	10 s	Ambient (25 °C)	No leakage
16	SST76 (threaded)	25-PT-049	143 bar	10 s	Ambient (25 °C)	No leakage
17	SST76 (threaded)	25-PT-055A	42,9 bar	10 s	Ambient (25 °C)	No leakage
18	SST76 (threaded)	25-PT-055B	42,9 bar	10 s	Ambient (25 °C)	No leakage
19	SST76 (threaded)	43-PT-001	7,15 bar	10 s	Ambient (25 °C)	No leakage
20	SST76 (threaded)	50-PT-014	42,9 bar	10 s	Ambient (25 °C)	No leakage
21	SST76 (threaded)	63-PT-003	42,9 bar	10 s	Ambient (25 °C)	No leakage
22	SST76 (threaded)	63-PT-004	42,9 bar	10 s	Ambient (25 °C)	No leakage
23	SST76 (threaded)	64-PT-031A	42,9 bar	10 s	Ambient (25 °C)	No leakage
24	SST76 (threaded)	64-PT-031B	42,9 bar	10 s	Ambient (25 °C)	No leakage
25	SST76 (threaded)	64-PT-002	42,9 bar	10 s	Ambient (25 °C)	No leakage
26	SST76 (threaded)	80-PT-002	42,9 bar	10 s	Ambient (25 °C)	No leakage
27	SST76 (flanged)	50-PT-001	28,6 bar	10 s	Ambient (25 °C)	No leakage
28	SST76 (flanged)	50-PT-002	28,6 bar	10 s	Ambient (25 °C)	No leakage

HYDROTEST PROCEDURE for TWE

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IOP-TWE-PRE-001

SCOPE:	Present procedure defines the Hydrotest method that have to be carried out on following accessories: **TWE** – Flanged Thermowells
OPERATING MODES:	**PURPOSE** This procedure has to be applied on all flanged thermowells in the final phase of the production phase. **TEST EQUIPMENT** • Pressure generator • Reference gauge All test equipment must have a Nominal Range at least 20% upper than the instrument **TEST CONDITIONS (FOLLOWING ASME B16.5)** • Hydrotesting must be done at ambient temperature. • The test fluid must be demineralized water or water containing a corrosion inhibitor. • Other suitable test fluids may be used provided their viscosity is no greater than that of water. • The test fluid temperature shall not exceed 50°C. • The test duration shall be as follows: o ND≤2" → Duration must not exceed 60 s o 2.5"≤ND≤8" → Duration must not exceed 120 s o ND≥10 → Duration must not exceed 180 s **OPERATION SEQUENCE for FLANGED THERMOWELLS** • Hydrotesting of TWE will be executed following **ASME B16.5**. • Connect the thermowell to the flange on the test bench. • Apply a test pressure equal to Pt=1.5*Ps where Ps is the Maximum Working Pressure. Please note that Ps is the flange rating. • Verify the applied pressure on the test gauge. • Maintain the applied pressure for 60, 120 or 180 s depending by the flange Nominal Diameter. • Verify there is not any leakage during the test. • Bring back to zero the pressure and disconnect the thermowell from the test bench. • Bring back to zero the pressure and disconnect the thermowell from the test bench. **ACCEPTANCE CRITERIA** • The test result is POSITIVE if there is not any leakage from the thermowell walls. • The test result is NEGATIVE if there is leakage from the thermowell walls.
REFERENCES:	This OI has been written following **ISO 9001:2015** and **ASME B16.5**

TAG REFERENCE TABLE:

#	MODEL	TAG	Test Pressure	Test Time	Test Temperature	Acceptance Criteria
1	SST72 with TWE	50-TT-001	28,6 bar	10 s	Ambient (25 °C)	No leakage
2	SST72 with TWE	50-TT-002	28,6 bar	10 s	Ambient (25 °C)	No leakage

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ELECTRICAL INSULATION TEST PROCEDURE for TRANSMITTERS

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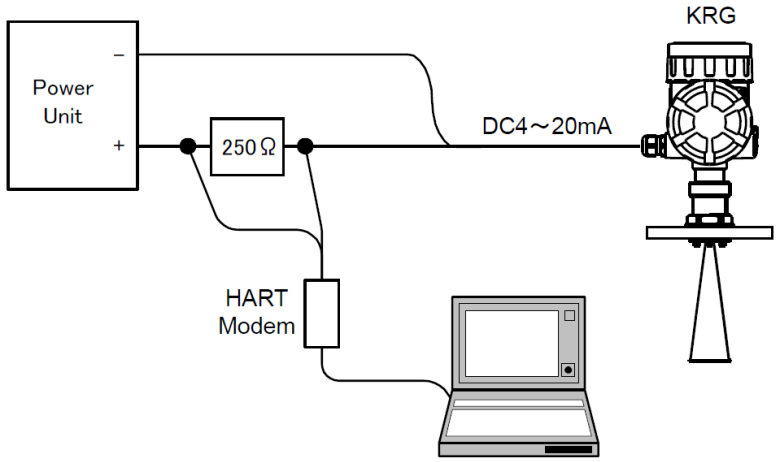
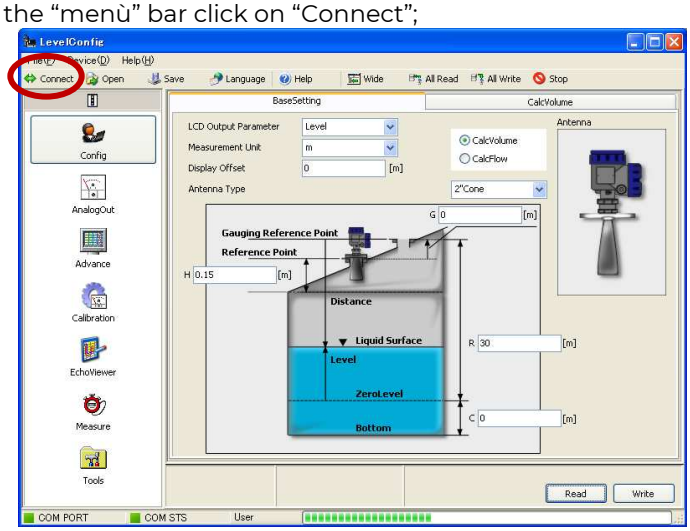
IPP-ISO-002

SCOPE:	ELECTRICAL INSULATION TEST
OPERATING MODE:	1. Insulation test must be done between power supply and signal wires, and the instrument ground. Electrical conductors can be tested at the same time, if the result is successful then the insulation is guaranteed, if the result is unsuccessful conductors must be tested separately in order to find the one with low insulation and evaluate a solution to the problem found. 2. With positive result we mean an insulation greater than **20 Mohm** between the positive and the negative. If the insulation is lower, then the test result is negative. 3. The voltage test value is **500 Vdc**. All the instruments must resist at that voltage. Always verify further information regarding the insulation measurement (especially control plans for ATEX instruments). 4. Insulation test must be done according to production sheet operations, typically in the first step of assembly (ISOL1) and in the last step before the shipping (ISOL2). NB. FOR INSULATION-METER **MEGGER MIT310** THE FIRST ELECTRICAL SHOCK MUST BE DONE IN AIR SINCE THE TRANSITORY VOLTAGE IS NOT COMPLIANT DUE TO WRONG VOLTAGE VALUE EQUAL TO 250% OF THE SETTED ONE. THE CORRECT VOLTAGE VALUE IS ACHIEVED AFTER 250 MS.
REFERENCES:	This instruction has been prepared following ISO 9001 quality system.
DOCUMENTS:	-

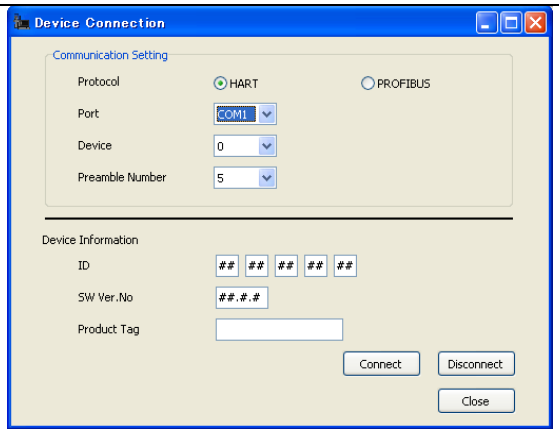
FUNCTIONAL TEST PROCEDURE for KRG RADAR LEVEL TRANSMITTER

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IOP-KRG-FUN-001

SCOPE:	FUNCTIONAL TEST for KRG SERIES
OPERATING MODE:	CONNECTION to PC and VERIFICATION OF PARAMETERS 1) Connect the KRG to the PC by the HART® protocol, following the below connection diagram:  2) Open the “LevelConfig” software; 3) On the “menù” bar click on “Connect”;  4) Select the protocol “HART”, the port, the device number and the preamble, so click on “Connect”:

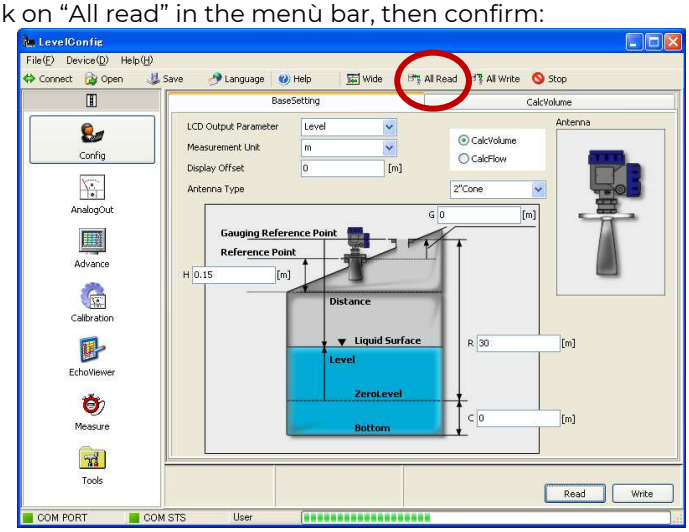
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5) If the connection succeeded, the following message will appear:



6) In order to read and verify all the parameters saved in the instrument, click on “All read” in the menù bar, then confirm:

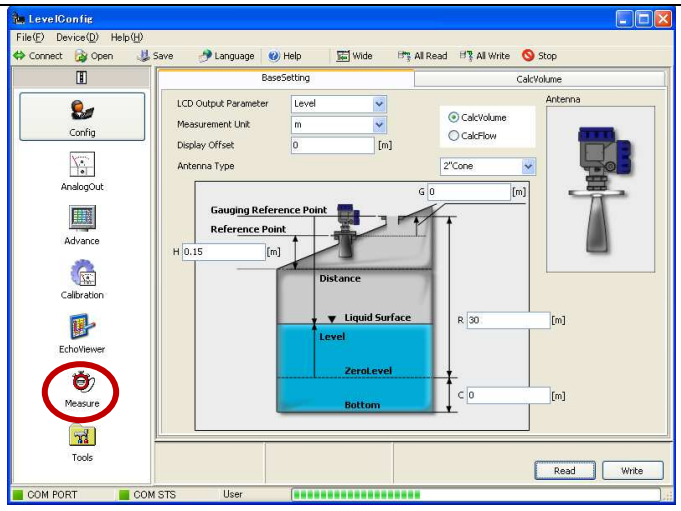


7) Verify the inserted parameters and that the calibration range is equal to what requested.

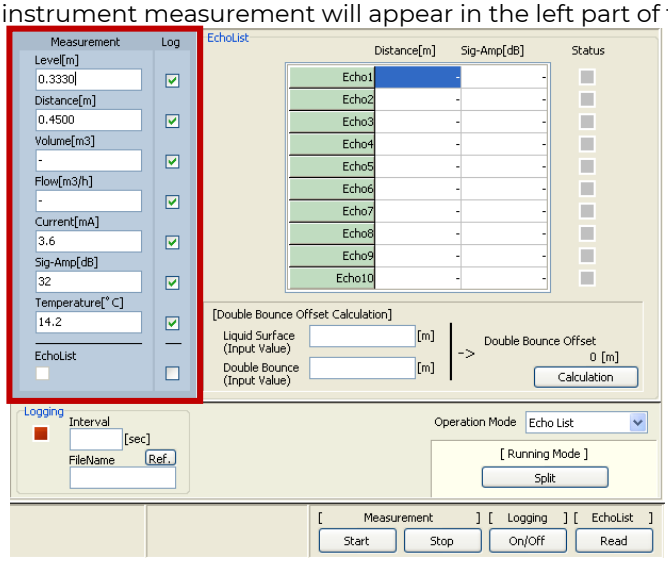
EXECUTION of FUNCTIONAL TEST and VERIFICATION OF ACCURACY:

1) Put an obstacle (ex. table, sheet) at a note distance from the KRG sensor inside the instrument range;
2) Compare the KRG reading with the obstacle distance and verify that the measurement is inside the accuracy;
3) Distance measurement can also be checked and recorded on the software in the “Measurement” menù:

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The instrument measurement will appear in the left part of the screen:



By clicking “Start”, the measurement will start to be recorded. The desired units to be recorded can be selected by flagging the buttons in “Log” column. To end the measurement, click on “Stop”. To export the data in a file, refer to the operating manual.

4) If the measurement is within the accuracy, disconnect the instrument and the check can be considered finished.
If the measurement is outside the accuracy, check the correctness of inserted parameters in “Config” menù (refer to the KRG Operating Manual), then do the test another time.

REFERENCES:	This instruction has been written according the ISO 9001 quality system.
DOCUMENTS:	-

TAG REFERENCE TABLE:

#	MODEL	TAG	Test Pressure	Test Time	Test Temperature	Acceptance Criteria
1	KRG	55-LIT-001	28,6 bar	10 s	Ambient (25 °C)	No leakage

SAMPLE OF CALIBRATION CERTIFICATE (RCS MODEL)

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SPRIANO® TECHNOLOGIES	RAPPORTO DI CALIBRAZIONE / *CALIBRATION REPORT*	**MOD RCS**
		REV 17:11

TIPO STRUMENTO / *TYPE OF INSTRUMENT*	
PROCEDURA DI CALIBRAZIONE / *CALIBRATING PROCEDURE*	
FOGLIO DI CALCOLO / *CALCULATION SHEET*	
ACCURATEZZA TOTALE / *TOTAL ACCURACY*	

SIGLA / TAG.
NUM SERIE / SERIAL NUM

STRUMENTI DI CALIBRAZIONE / *INSTRUMENTS FOR CALIBRATION*	-
	-
	-
	-
	-
	-

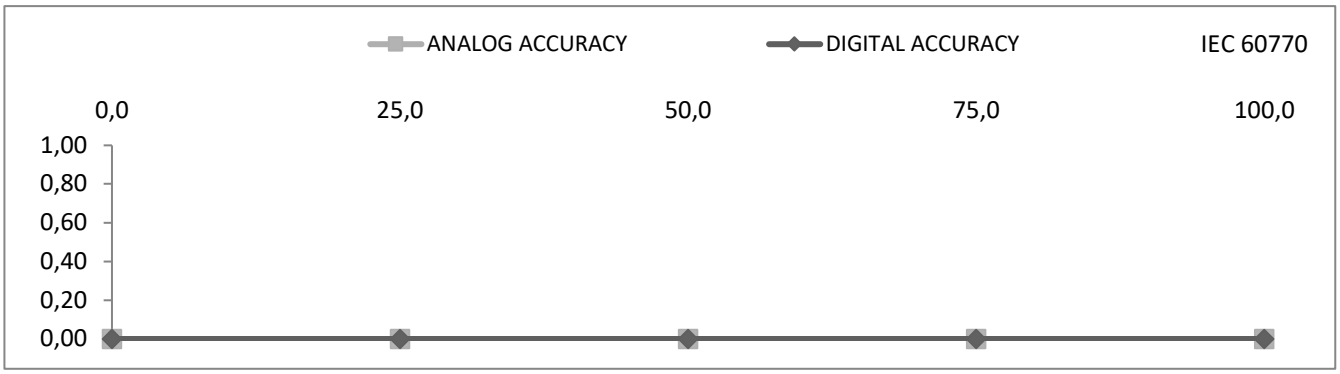
CE

TEMPERATURA / *AMBIENT TEMPERATURE*	15 - 25	°C			
PRESSIONE / *BAROMETRIC PRESSURE*	860 - 1060	mbar			
UMIDITA' RELATIVA / *RELATIVE HUMIDITY*	45 - 75	%			
CAMPO MASSIMO / *MAXIMUM RANGE*		-		°C	
CAMPO TARATURA / *CALIBRATION RANGE*		-		°C	
USCITA / *OUTPUT*		-		mA	

NOTE SPECIALI / *FURTHER NOTES*
-

STEP	NOMINAL VALUE	GENERATED VALUE	MEASURED VALUE	NOMINAL OUTPUT	MEASURED OUTPUT	DIGITAL* ACCURACY	ANALOG** ACCURACY
[%]	°C	°C	°C	mA	mA	% FS	% FS
0,0	0,000			0,00		0,000	ND
25,0	0,000			0,00		ND	ND
50,0	0,000			0,00		ND	ND
75,0	0,000			0,00		ND	ND
100,0	0,000			0,00		ND	ND

DIGITAL ACCURACY = 100(MEASURED VALUE - GENERATED VALUE) / MAXIMUM RANGE
**ANALOG ACCURACY = 100*(MEASURED OUTPUT - NOMINAL OUTPUT) / ANALOG FULL SCALE



SI DICHIARA CHE QUESTO PRODOTTO E' CONFORME ALLE SPECIFICHE D'ORDINE E CHE IL COLLAUDO HA DATO ESITO POSITIVO. IL PRODOTTO E' STATO COSTRUITO IN ACCORDO AL SISTEMA DI QUALITA' EN ISO 9001

WE HEREBY DECLARE THIS PRODUCT IS ACCORDING TO ORDER SPECIFICATIONS AND THAT TESTS WERE CARRIED OUT WITH POSITIVE RESULTS. THIS PRODUCT HAS BEEN MANUFACTURED ACCORDING TO QUALITY SYSTEM EN ISO 9001

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OPERATO DA *OPERATED BY*	
CONTROLLATO DA CHECKED BY	

DATA / *DATE*

SAMPLE OF MATERIAL 3.1 & HYDROTEST CERTIFICATE (MAT MODEL)

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SPRIANO® TECHNOLOGIES	RAPPORTO DI COLLAUDO E MATERIALI / *TEST AND MATERIAL REPORT*	**MOD MAT** REV 18:03

TIPO STRUMENTO/TYPE OF INSTRUMENT			
TIPO DI ATTACCO/PROCESS CONNECTION			
DIMENSIONALE NOMINALE/NOMINAL SIZE			mm
PRESSIONE DI LAVORO/WORKING PRESSURE			bar
ESTENSIONE ALETTATA/FINNED EXTENSION			
TEST IDROSTATICO/ HYDRO TEST PROCEDURE			
NOTE/NOTES			

TAG
SERIAL NUMBER

	APP	*PRESSURE [bar]*	*PERIOD [sec]*	*RESULT*
HYDROSTATIC FLUID PRESSURE TEST 1:				
CALIBRATION INSTRUMENT				

CERTIFICATI DEI MATERIALI / *MATERIAL CERTIFICATES*					
POS	**DESCRIPTION**	**DIMENSIONS**	**HEAT**	**CERTIFICATE**	**MATERIAL**

DESCRIZIONE	**APP**	**PROCEDURE**	**CERTIFICATE**
NACE MR0175/01 Compilance			
NACE TM0284/2011 (H.I.C.) Compilance			
Post Weld Heat Treatment (PWHT)			
Penetrant Testing On TWE Welds			
Alloy Internal Coating			
Painting Procedure Body			
Painting Procedure Finned Extension			

CONTROLLO ISPETTIVO / *QUALITY INSPECTION*		
NR	**TIPO DI CONTROLLO / *TYPE OF CONTROL***	**ESITO / *RESULT***
1	CONTROLLO VISIVO / *VISUAL INSPECTION*	
2	CONTROLLO DIMENSIONALE / *DIMENSIONAL INSPECTION*	
3	CONTROLLO FUNZIONALE / *FUNCTIONAL INSPECTION*	

FINAL TEST 100%
NO

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OPERATO DA *OPERATED BY*	
CONTROLLATO DA CHECKED BY	

DATA / DATE