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TEST REPORT

NAME & ADDRESS OF CUSTOMER	REPORT NO.: EE/MTR/02/874 DATE: 28/9/2006	
M/s. RISHABH INSTRUMENTS PVT. LTD., H.O. & Works: F-31, MIDC, SATPUR, NASHIK-422 007 INDIA	CUSTOMER REF No.:RIPL/PSK/ERDA/08-2006/22,Dated:22/8/2006	
	DATE OF SAMPLE RECEIPT	DATE OF TESTING
	24/8/2006	25/8/2006 to 27/9/2006

Programmable Multi-Transducer Model : Rish Ducer MXX with Modbus 485 Input : 415V,5A,Frequency:50Hz $Output_A$: 4mA to 20mA (terminals 15-16) $Output_B$: 4mA to 20mA (terminals 17-18) $Output_C$: 4mA to 20mA (terminals 19-20) $Output_D$: 4mA to 20mA (terminals 21-22) Class Index : 0.2,Auxiliary Supply: 85…230VAC/DC Load : 750Ω Make : Rishabh Instruments Pvt. Ltd. Nasik	**SAMPLE IDENTIFICATION** Sl. No.: 06/03/9783 ERDA Code: EMTRWO0043347/1 Usage group: III

TEST DETAILS

As per sheet no. 2

TEST SPECIFICATION

Tests as per customer requirement and procedure as per IEC: 60688-2002

REMARK - The above transducer conforms to the requirements of the standard in respect of the tests carried out.

NOTE - 1) Only the tests asked by the customer have been carried out.
2) Output between terminal 15 & 16 is denoted as 'A' (Power output).
3) Output between terminal 17 & 18 is denoted as 'B' (Voltage output).
4) Output between terminal 19 & 20 is denoted as 'C' (Current output).
5) Output between terminal 21 & 22 is denoted as 'D' (Power factor output).
6) All tests were carried out with auxiliary voltage 230VAC.

PREPARED BY	CHECKED BY	APPROVED BY
A B Barot		

Note: 1. This report relates only to the particular sample received for testing, in good condition, at ERDA.
2. This report cannot be reproduced in part under any circumstances.
3. Publication of this report requires prior permission in writing from Director, ERDA.
4. Only the tests asked for by the customer have been carried out.

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Sl. No.	Tests	Cl. No.
1	Intrinsic error	4.2 of IEC 60688
2	Response time	5.5 of IEC 60688
3	Variations due to auxiliary supply voltage (AC)	6.2 of IEC 60688
4	Variations due to auxiliary supply frequency	6.3 of IEC 60688
5	Variations due to frequency of the input quantities	6.5 of IEC 60688
6	Variations due to input voltage	As per customer requirement & procedure as per cl.no.6.6 of IEC 60688
7	Variations due to input current	6.7 of IEC 60688
8	Variations due to power factor	6.8 of IEC 60688
9	Variations due to output load	6.9 of IEC 60688
10	Variations due to magnetic field of external origin	6.11 of IEC 60688
11	Variations due to self-heating	6.14 of IEC 60688
12	Variations due to continuous operation	6.15 of IEC 60688
13	Variations due to common mode interference	6.16 of IEC 60688
14	Influence due to overload input	As per customer requirement and procedure as per cl.no.6.18 of IEC 60688
15	Test for temperature rise	6.22 of IEC 60688
16	Power consumption test	As per customer requirement
17	Own consumption	As per customer requirement
18	Influence of operating temperature variation	As per customer requirement
19	Shock Test	6.23 of IEC 60688
20	RS 485 Modbus communications output	As per customer requirement

Prepared by : ABBand

Checked by :

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Sr. No.	Particular of tests & Cl. No.	Requirement as per specification	Obtained value	Remarks
1	Intrinsic error Cl.no. 4.2 of IEC 60688)	When the transducer is under reference conditions, the error at any point between the upper and lower nominal values of the output signals shall not exceed the limits of the intrinsic error (±0.2%) expressed as a percentage of the fiducial value.		Conform
	Output A	Input Current (Amp) P.F 0 1.0 1.25 1.0 2.50 1.0 3.75 1.0 5 1.0	Obtained % Error Output A +0.03 +0.06 -0.05 -0.01 +0.06	
	Output **B**	Input Voltage (Volts) 0 103.75 207.5 311.25 415	Output B -0.01 -0.02 -0.07 -0.06 -0.09	
	Output **C**	Input Current (Amp) 0 1.25 2.50 3.75 5	Output C -0.02 -0.04 +0.01 -0.01 -0.03	
	Output **D**	Input Power Factor 0.1 Lead 0.5 Lead UPF 0.5 Lag 0.1 Lag	Output D +0.10 -0.15 -0.01 +0.11 -0.13	
2	Response time (5.5 of IEC 60688)	Measure the response time under reference conditions after preconditioning. The response time shall be <2.4sec (as stated by the manufacturer).	Response time <2.4 sec. for all four outputs.	Conform
3	Variations due to	Nominal range of ac auxiliary supply:	%Voltage Obtained % error	Conform

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Sr. No.	Particular of tests & Cl. No.	Requirement as per specification	Obtained value	Remarks
	auxiliary supply voltage (230V AC) (6.2 of IEC 60688)	80% to 120% Permissible variation: 50 % of class index (±0.1%)	variation for outputs A B 80% -0.02 -0.01 120% +0.03 -0.01 C D 80% -0.01 -0.02 120% -0.01 -0.01	
4	Variations due to auxiliary supply frequency (6.3 of IEC 60688)	Nominal range of frequency of the input quantity: 90% to 110% Permissible variation: 50 % of class index (±0.1%)	Freq (Hz) Obtained % error variation for outputs A B 45 +0.01 -0.01 55 +0.04 -0.01 C D 45 -0.01 -0.01 55 -0.01 -0.01	Conform
5	Variations due to frequency of the input quantities (6.5 of IEC 60688)	Nominal range of frequency of the input quantity: 90% to 110% Permissible variation: 100 % of class index (±0.2%)	Freq (Hz) Obtained % error variation for outputs A B 45 +0.02 +0.01 55 +0.03 +0.03 C D 45 -0.03 -0.01 55 +0.01 +0.01	Conform
6	Variation due to the input voltage. (As per customer requirement & procedure as per cl.no.6.6 of IEC 60688)	Nominal range of input voltage: 80% to 120% Permissible variation: 50 % of class index (±0.1%)	Voltage (%) % error Variation for output A 80 -0.04 120 +0.04	Conform
8	Variation due to	Nominal range of input power factor:	Current:0.5A	Conform

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Sr. No.	Particular of tests & Cl. No.	Requirement as per specification	Obtained value	Remarks
	power factor. (6.8 of IEC 60688)	cosΦ =0.5 lag to unity power factor (upf) to cosΦ = 0.5 lead Permissible variation: 50% of class index (±0.1%)	PowerFactor cosΦ — % error variation A 0.5lag -0.03 0.5lead +0.02 Current: 5A PowerFactor cosΦ — % error variation A 0.5lag -0.04 0.5lead -0.08	
9	Variations due to output load (6.9 of IEC 60688)	Nominal range of output load: 10% to 100% (75Ω to 750Ω) Permissible variation: 50 % of class index (±0.1%)	Output load (Ω) — Obtained %error variation for outputs A, B 75 -0.01 -0.01 750 +0.04 +0.01 (Ω) — C, D 75 +0.08 0.00 750 -0.01 +0.01	Conform
10	Variations due to magnetic field of external origin (400AT) (6.11 of IEC 60688)	Permissible variation: 100 % of class index (±0.2%)	% error variation due to external magnetic field for outputs: A : -0.04 B: +0.02 C: -0.03 D: +0.05	Conform

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Sr. No.	Particular of tests & Cl. No.	Requirement as per specification	Obtained value	Remarks
11	Variation due to self heating (6.14 of IEC 60688)	The transducer shall be at ambient temperature and shall have been disconnected for at least 4 h. The transducer shall be energized at its reference voltage (including the auxiliary supply). After 1 min and before the third minute, determine the value of the output signal. Repeat this procedure between the 30th and 35th minute after energization. Permissible variation: 100 % of class index (±0.2%)	Obtained % error variation for outputs A: +0.05 B : +0.03 C: +0.02 D : +0.07	Conform
12	Variations due to continuous operation (6.15 of IEC 60688)	Energize the transducer under reference conditions for at least the preconditioning period. Record the value of the output. After a convenient period of continuous operation, (6 h), note the value of the output. **Permissible variation**: The transducer shall continue to comply in all respects with the requirements appropriate to its accuracy class.	The transducer was subjected to the test of continuous operation. The transducer continued to comply with the requirements appropriate to its accuracy class after 6 h of continuous operation for all four outputs.	Conform
13	Variation due to common mode interference (6.16 of IEC 60688)	With the transducer at a constant value of the measurand near the upper nominal value record the value of output. Apply a voltage of 100 V r.m.s at 45 Hz to 65 Hz between either output terminal or earth and record the value of the output. Permissible variation: 100 % of class index (±0.2%)	The transducer was subjected to the test of common mode interference. Obtained % error variation for outputs A: +0.15 B: +0.01 C: +0.10 D: +0.04	Conform

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14	Influence due to overload input (As per customer requirement and procedure as per cl.no 6.18 of IEC 60688)			Conform
a)	Continuous overload condition	Apply a overload value of input quantities for 24 hrs in a) Voltage circuits: 120% of the nominal value. Take reading at reference condition after 2hrs of cooling. b) Current circuits: 10A Take reading at reference condition after 2hrs of cooling.	Transducer withstood the test Satisfactory for all four outputs. Transducer withstood the test Satisfactory for all four outputs.	
b)	Short term overload condition	a) Apply the overload value of the input quantity $1.5U_{r.}$, in voltage circuit No. of applications :10 Duration of one application: 10sec Interval between two successive application: 10sec	Transducer withstood the test	
		b) Apply the overload value of the input quantity 100A, in current circuit No. of application :5 Duration of one application: 3sec Interval between two successive application: 5 min	Transducer withstood the test	
		c) Apply the overload value of the input quantity 250A, in current circuit No. of application :1 Duration of one application: 1sec Interval between two successive application: 1hr	Transducer withstood the test	

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Sr. No.	Particular of tests & Cl. No.	Requirement as per specification	Obtained value	Remarks
		After the test transducer shall comply with accuracy class.	After the test the transducer complied with the requirements appropriate to its class index.	
15	Test for temperature rise (6.22 of IEC 60688)	The transducer shall be energized with each voltage circuit shall carry a voltage 1.2 times the nominal voltage and each current circuit shall carry a current of 1.1 times the nominal current. These conditions shall be maintained for at least 2 h. The temperature rise of the following parts of the transducer shall not exceed: -For input circuits: 60K -For the exterior surface: 25K	Temperature rise 2.3°C 1.4 °C	Conform
16	Power consumption test (As per customer requirement)	Apparent power consumption in auxiliary supply shall not exceed 10VA.	4.95VA	Conform
17	Own consumption test (As per customer requirement)	Apparent power consumption in input voltage shall be ≤ U*U/400KΩ Apparent power consumption in input current path shall be <0.3VA.	Rph :0.12 VA Yph :0.13 VA Bph :0.13 VA Rph :0.07 VA Yph :0.08 VA Bph :0.13 VA	Conform
18	Influence of operating temperature variation (As per customer requirement)	At temperature of 23°C note the readings. Keep the transducer energized at -25°C for 2hours.Note the readings. Repeat the same procedure for 55°C. Permissible variation: 100 % of class index (±0.2%/10K)	Temp. (°C) / Obtained % error variation for outputs/10K A / B 0: +0.02 / +0.01 45: +0.04 / +0.06 C / D 0: +0.01 / -0.01 45: -0.01 / 0.00	Conform

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Sr. No.	Particular of tests & Cl. No.	Requirement as per specification	Obtained value	Remarks
19	Shock Test (6.23 of IEC 60688)	The test shall be carried out as per IEC 60068-2-27, under the following conditions: -Transducer in non-operating condition, without the packing -half sine pulse -peak acceleration: 50 gn -duration of pulse: 11ms Number of shock: Three shock in six direction. After the test, the transducer shall show no mechanical damage and shall operate correctly.	Transducer was subjected to shock test No internal or external damage observed in the transducer after the test. After the test transducer operated correctly.	Conform
20	RS 485 Modbus communications output (As per customer requirement)	Parameters available via modbus interface at Baud rate = 9600 to be check	Satisfactory	Conform

Prepared by : A B Rant

Checked by :