Test Report

Client Name	:	Acrel Co., Ltd.
Address	:	No.253, Yulv Road, Jiading District, Shanghai China
Product Name	:	Sensor
Date	:	Apr. 18, 2022

Shenzhen Anbotek Compliance Laboratory Limited

Shenzhen Anbotek Compliance Laboratory Limited

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TEST REPORT
IEC 60688
Electrical measuring transducers for converting A.C. and D.C. electrical quantities to analogue or digital signals

Report Number................................ :	78251SC20005401
Date of issue .... :	Apr. 18, 2022
Total number of pages	25 pages

Name of Testing Laboratory preparing the Report .... :	Shenzhen Anbotek Compliance Laboratory Limited
Applicant's name........................... :	Acrel Co., Ltd.
Address .... :	No.253, Yulv Road, Jiading District, Shanghai China

Test specification:	
Standard .... :	EN 60688:2013
Test procedure.............................. :	Type test
Non-standard test method............ :	N/A

Test Report Form No..................... :	EN 60688:2013

General disclaimer:

The test results presented in this report relate only to the object tested.
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Tested by (name, function, signature) :	James zhang Project Engineer	*James zhang*
Approved by (name, function, signature) :	Jeff Zhu Project Manager	*Jeff Zhu*

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Test item description......................... :	Sensor
Trade Mark.. :	Acrel
Manufacturer .... :	Jiangsu Acrel Electrical Manufacturing. Co., Ltd.
	No.31, Hongtu Road, Nanzha Street, Jiangyin City Jiangsu Province, China
Model/Type reference .... :	BM200-TR/V-C22, BM200-DV/I-B11, BM200-DV/V-B11, BM200-DV/I-C22, BM200-DV/V-C22, BM200-TR/I-B11, BM200-TR/V-B11, BM200-TR/I-C12, BM200-TR/V-C12, BM200-TR/I-C22,
	BM200-VR/I- B11, BM200-VR/V- B11, BM200-VR/I-C12, BM200-VR/V-C12, BM200-VR/I-C22, BM200-VR/V-C22, BM100-DIS/I-B11, BM100-DIS/I-B22, BM100-DI/IS-B11, BM100-DI/IS-B22, BM100-DI/I-B11, BM100-DI/V-B11, BM100-DI/I-C12, BM100-DI/V-C12, BM100-DI/I-C22, BM100-DI/V-C22, BM100-DV/I-B11, BM100-DV/V-B11, BM100-DV/I-C12, BM100-DV/V-C12, BM100-DV/I-C22, BM100-DV/V-C22, BM100-TR/I-B11, BM100-TR/V-B11, BM100-TR/I-C12, BM100-TR/V-C12, BM100-TR/I-C22, BM100-TR/V-C22, BM100-VR/I- B11, BM100-VR/V- B11, BM100-VR/I-C12, BM100-VR/V-C12, BM100-VR/I-C22, BM100-VR/V-C22, BM100-DI/I-C11, BM100-DI/V-C11, BM100-DI/I-C12, BM100-DI/V-C12, BM100-DI/I-C22, BM100-DI/V-C22, BM100-DV/I-C11, BM100-DV/V-C11, BD100-AI/I-A11, BD100-AI/V-A11, BD100-AI/I-C12,
	BD100-AI/V-C12, BD100-AI/IC-C12, BD100-AI/VC-C12, BD100-AV/I-A11, BD100-AV/V-A11, BD100-AV/I-C12, BD100-AV/V-C12, BD100-AV/IC-C12, BD100-AV/VC-C12, BD100-DI/I-A11, BD100-DI/V-A11, BD100-DI/I-C12, BD100-DI/V-C12, BD100-DI/IC-C12, BD100-DI/VC-C12, BD100-DV/I-A11, BD100-DV/V-A11, BD100-DV/I-C12, BD100-DV/V-C12, BD100-DV/IC-C12, BD100-DV/VC-C12, BD100-AI/I-C12, BD100-AI/V-C12, BD100-AI/IC-C12, BD100-AI/VC-C12, BD100-AV/I-C12, BD100-AV/V-C12, BD100-AV/IC-C12, BD100-AV/VC-C12, BD100-DI/I-C12, BD100-DI/V-C12, BD100-DI/IC-C12, BD100-DI/VC-C12, BD100-DV/I-C12, BD100-DV/V-C12, BD100-DV/IC-C12, BD100-DV/VC-C12, BD100-F/I-C12, BD100- F/V-C12, BD100- F/IC-C12, BD100- F/VC-C12, BD100-P/I-C12, BD100- P/V-C12, BD100- P/IC-C12, BD100- P/VC-C12, BD100-PF/I-C12, BD100- PF/V-C12, BD100- PF/IC-C12, BD100-PF/VC-C12, JDG4-0.5
Ratings.. :	INPUT: 20-35V⎓

List of Attachments

Attachment 1: Photo documentation

Summary of testing:

Tests performed (name of test and test clause):	Testing location:
EN 60688:2013	Shenzhen Anbotek Compliance Laboratory Limited
The samples submitted were found to comply with above standards.	1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518128

Copy of marking plate:

> **Sensor**　　　　　　　　　　　　　　　**Acrel**
> **Model: BM200-TR**
> **INPUT: 20-35V⎓**
> **Manufacturer: Jiangsu Acrel Electrical**
> **Manufacturing. Co., Ltd.**
> **Address: No.31, Hongtu Road, Nanzha Street,**
> **Jiangyin City Jiangsu Province, China**
>
> 🚮　CE

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Test item particulars...:	Sensor
Classification of installation and use.......................:	Built-in appliances
Possible test case verdicts:	
- test case does not apply to the test object...........:	N (N.A.)
- test object does meet the requirement..................:	P (Pass)
- test object does not meet the requirement...........:	F (Fail)
Testing..:	
Date of receipt of test item ....:	Apr. 02, 2022
Date (s) of performance of tests.............................:	Apr. 02, 2022 to Apr. 12, 2022
Name and address of factory (ies)...........................:	Jiangsu Acrel Electrical Manufacturing. Co., Ltd. No.31, Hongtu Road, Nanzha Street, Jiangyin City Jiangsu Province, China

General product information:

If there are no other requirements, all tests are conducted in model BM200-TR.
Both models are identical except for appearance.

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EN 60688			
Clause	Requirement + Test	Result - Remark	Verdict

5	**Requirements**		--
5.1	Input values		P
5.1.1	The nominal values of voltage, current, frequency and auxiliary supply shall be 5.1.1 specified by the manufacturer.		P
5.1.2	Adjustment range for transducers that can be adjusted by the user:		P
	a) for the input voltage: 80 % to 120 % of the nominal value;		P
	b) for the input current: 60 % to 130 % of the nominal value.		P
	This means that the nominal value of the output signal can be obtained for any adjusted value of the measurand within the ranges given above.		P
5.1.3	The preferred nominal value of d.c. auxiliary supplies shall be 24 V, 48 V or 110 V.		P
5.2	Analogue output signals		N
5.2.1	General		P
	The lower and upper nominal values of the output signal and the compliance voltage shall be chosen from those given in 5.2.2 and 5.2.3 or 5.2.6.		P
5.2.2	Output current		P
	The signal 4 mA to 20 mA is preferred.		P
5.2.3	Compliance voltage		P
	10 V 15 V		P
5.2.4	Maximum output voltage		P
	The manufacturer shall state the maximum value of the output voltage occurring under any conditions of output load and input. This voltage shall not exceed the limit of safety extra-low voltage.		P
5.2.5	Inteference risk of output current		N
	Attention is drawn to the interference problems which may result if the output current has a low value.		N
5.2.6	Output voltage		P
	0 V to 1 V		N
	0 V to 10 V		P
	− 1 V to 1 V		N
	− 10 V to 10 V		N

EN 60688			
Clause	Requirement + Test	Result - Remark	Verdict
5.3	Output transfer function		P
	For analogue transducers, the used transfer function shall be one of the following curves.		P
	For analogue transducers, variables x, y, y$_1$, y$_2$ can be adjustable.		P
	The accuracy class has to be checked for each point of the transfer function according to the formula: $\frac{Y-R}{R} \times 100$		P
5.4	Digital output signals		N
	The digital output signals chosen shall correspond with the requirements for transducers concerning accuracy and response time as well as with the requirements of the communication system.		N
	For the digital output the class index shall be in conformity with the performance class described in IEC 61557-12.		N
	If outputs relays are provided they shall comply with IEC 60255-151.		N
5.5	Ripple (for analogue outputs)		P
	The maximum ripple content in the output signal shall not exceed twice the class index.		P
5.6	Response time		P
5.6.1	Before determining the response time, the transducer shall be under reference 5.6.1 conditions and the auxiliary circuit shall be energized for at least the pre-conditioning time unless it is energized from one of the input quantities and is not separately accessible.		P
5.6.2	The response time shall be stated by the manufacturer and shall be determined for an 5.6.2 input step such that it would produce a change in output signal from 0 % to 90 % of the fiducial value.		P
5.6.3	If a test for decreasing input is required, the input step should produce a change in 5.6.3 output signal from 1 00 % to 1 0 % of the fiducial value.		P
5.6.4	The interval (see 3.1 .1 9) shall be ± 1 % of the upper nominal value of the output signal.		P
5.6.5	Methods of test for frequency transducers and transducers with suppressed zero shall 5.6.5 be stated by the manufacturer.		P
5.7	Variation due to over-range of the measurand		P

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Clause	Requirement + Test	Result - Remark	Verdict
	If, by agreement, a transducer is required to operate with an input up to 1 50 % of the nominal value, the difference between the intrinsic error at 1 00 % and the error at 1 50 % (under reference conditions) of the nominal value of the input shall not exceed 50 % of the class index.		P
	For active power and reactive power transducers, 1 50 % of the nominal value is achieved by increasing the current while retaining the voltage at the nominal value.		P
5.8	Limiting value of the output signal		P
	The output signal shall be limited to a maximum of twice the upper nominal value.		P
	When the measurand is not between its lower and upper nominal values, the transducer shall not, under any conditions, for example over-current or under-voltage, produce an output having a value between its lower and upper nominal values.		P
5.9	Limiting conditions of operation		P
	The limits of the nominal ranges of use given in Clause 6 are those within which the transducer will comply with the requirements of this standard. It is possible to operate transducers beyond these limits but the user should note that:		N
	the accuracy may not be maintained and/or		P
	the designed operational lifetime may be reduced.		P
	As an example, many transducers will operate in ambient temperatures as low as –25 °C and as high as +70 °C but the manufacturer should be consulted as to the degradation to be expected in both accuracy and operational lifetime.		P
5.10	Limits of the measuring range		N
	When the limits of the measuring range do not coincide with the lower and upper nominal values of the output, the limits of the measuring range shall be marked (see 7.1 i)).		N
5.11	Limiting conditions for storage and transport		P
	Unless otherwise stated by the manufacturer, transducers shall be capable of withstanding, without damage, exposure to temperatures within the range –40 °C to +70 °C.		P
	After returning to reference conditions, they shall meet the requirements of this standard.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer shall specify any additional limiting condition required to ensure the integrity of the transducer.		P
5.12	Sealing		N
	When the transducer is sealed to prevent unauthorized adjustment, access to the internal circuit and to the components within the case shall not be possible without destroying the seal.		N
5.13	Stability		P
	Transducers shall comply with the relevant limits of intrinsic error specified for their respective accuracy classes for a period specified by the manufacturer, provided that the conditions of use, transport and storage specified by the manufacturer are complied with.		P
6	Tests		P
6.1	General		P
6.1.1	Determination of variations		P
	The variations shall be determined for each influence quantity. During the tests, all other influence quantities shall be maintained at reference conditions.		P
	The variations shall be determined for each influence quantity. During the tests, all other influence quantities shall be maintained at reference conditions.		P
	Variations shall be determined at the upper nominal value of the output and, at least, at one other point. For apparent power, active power and reactive power transducers, these values shall be obtained by maintaining the voltage and power factor at their reference conditions and varying the value of the current.		P
	When a reference range is specified, the influence quantity shall be varied between each of the limits of the reference range and any value in that part of the nominal range of use which is adjacent to the chosen limit of the reference range.		P
6.1.2	Environmental conditions		P
	The conditions of temperature and humidity are classified according to the severity dictated by the usage group in accordance with Table 5.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For the purpose of this standard, ambient temperature shall be the temperature measured at a single representative point with the transducer operating normally. This measuring point shall be adjacent to the transducer, exposed to free air circulation and not significantly affected by heat from the transducer or by direct solar radiation and other sources of heat.		P
	Humidity is not considered to be an influence quantity provided that the environmental conditions are within the limits specified.		p
6.1.3	Computations		P
	In the following subclauses, a computation is required according to a formula. The terms in the formulae follow a general principle:		P
	R is the value of the output signal under reference conditions;		P
	X (or Y) is the value of the output signal measured at one extreme of the influence quantity;		P
	F is the fiducial value.		P
6.2	Variations due to auxiliary supply voltage		P
6.2.1	Application		P
	All transducers requiring a d.c. or an a.c. auxiliary supply except where this is obtained from the input voltage or current and the connections cannot be separated for testing purposes.		N
6.2.2	Procedure		P
	Apply the nominal value of auxiliary supply voltage and record the value of the output signal (R).		P
	At a constant value of the measurand, reduce the auxiliary supply voltage to the lower limit given in 6.2.4 and record the value of the output signal (X). Increase the auxiliary supply voltage to the upper limit given in 6.2.4 and record the value of the output signal (Y).		P
6.2.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
	and: $\frac{Y-R}{F} \times 100$		P
6.2.4	Permissible variations		P
	For a.c. auxiliary supplies		N
	For d.c. auxiliary supplies		P

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Clause	Requirement + Test	Result - Remark	Verdict

6.3	Variations due to auxiliary supply frequency		P
6.3.1	Application		N
	All transducers requiring an a.c. auxiliary supply except where this is obtained from the input voltage or current and the connections cannot be separated for testing purposes.		N
6.3.2	Procedure		N
	Apply the nominal value of auxiliary supply frequency and record the value of the output signal (R). At a constant value of the measurand, reduce the auxiliary supply frequency to the lower limit given in 6.3.4 and record the value of the output signal (X).		N
	Increase the auxiliary supply frequency to the upper limit given in 6.3.4 and record the value of the output signal (Y).		N
6.3.3	Computation		N
	The variations are: $\frac{X-R}{F} \times 100$		N
	and:$\frac{Y-R}{F} \times 100$		N
6.3.4	Permissible variations		P
6.4	Variations due to ambient temperature		P
6.4.1	Application		P
	All transducers.		P
6.4.2	Procedure		P
	At a constant value of the measurand and at reference temperature, record the value of the output signal (R).		P
	Increase the ambient temperature to the upper limit given in 6.4.4 and allow sufficient time for conditions to stabilize (30 min is usually adequate). Record the value of the output signal (X).		P
	Reduce the ambient temperature to the lower limit given in 6.4.4 and allow the same stabilization to take place. Record the value of the output signal (Y).		P
6.4.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
	and:$\frac{Y-R}{F} \times 100$		P
6.4.4	Permissible variations		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.5	Variations due to the frequency of the input quantity(ies)		P
6.5.1	Application		P
	All transducers except frequency transducers. Frequency sensitive transducers (e.g. those employing phase shifting circuits) are exceptions and the nominal range of use shall always be marked.		P
6.5.2	Procedure		N
	Apply the nominal value of the input frequency and record the value of the output signal (R).		N
	At a constant value of the measurand, reduce the frequency to the lower limit given in 6.5.4 and record the value of the output signal (X).		N
	Increase the frequency to the upper limit given in 6.5.4 and record the value of the output signal (Y).		N
6.5.3	Computation		N
	The variations are: $\frac{X-R}{F} \times 100$		N
	and: $\frac{Y-R}{F} \times 100$		N
6.5.4	Permissible variations		N
6.6	Variations due to the input voltage		N
6.6.1	Application		N
	All transducers except voltage and current transducers.		N
6.6.2	Procedure		P
	Apply the nominal value of the input voltage and record the value of the output signal (R).		P
	At a constant value of the measurand, reduce the voltage to the lower limit given in 6.6.4 and record the value of the output signal (X).		P
	Increase the voltage to the upper limit given in 6.6.4 and record the value of the output signal (Y).		P
6.6.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
	and: $\frac{Y-R}{F} \times 100$		P
6.6.4	Permissible variations		P
6.7	Variations due to the input current		P
6.7.1	Application		N

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Clause	Requirement + Test	Result - Remark	Verdict
	Phase angle and power factor transducers.		N
6.7.2	Procedure		P
	Apply the nominal value of the input current and record the value of the output signal (R).		P
	At a constant value of the measurand, reduce the input current to the lower limit given in 6.7.4 and record the value of the output signal (X).		P
	Increase the input current to the upper limit given in 6.7.4 and record the value of the output signal (Y).		P
6.7.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
	and: $\frac{Y-R}{F} \times 100$		P
6.7.4	Permissible variations		P
6.8	Variations due to power factor		N
6.8.1	Application		N
	Apparent, active and reactive power transducers.		N
6.8.2	Procedure		N
	Apply respectively 50 % (5 %) of the nominal value of the input current at a power factor of 1 ,0 and record the two values of the output signal (R). At a constant value of the measurand, increase the input current to 1 00 % (1 0 %) of the nominal value and reduce the power factor to 0,5 lag/lead, respectively. Record the two values of the output signal (X).		N
	For convenience, when testing the reactive power transducers, it is usual to apply the equivalent values of sin φ		N
	Active power transducers shall also be tested for error at a power factor of zero and reactive power transducers at a sin φ = 0.		N
6.8.3	Computation		N
	The variations are: $\frac{X-R}{F} \times 100$		N
	and: $\frac{Y-R}{F} \times 100$		N
6.8.4	Permissible variations		N
	For all transducers, the error at a power factor of zero (or sin φ = 0) shall not exceed 1 00 % of the class index.		N
6.9	Variation due to output load		P

Clause	Requirement + Test	Result - Remark	Verdict
	EN 60688		
6.9.1	Application		P
	All variable output load transducers.		P
6.9.2	Procedure		P
	Apply a value of output load equal to the mean value of the nominal range and record the value of the output signal (R).		P
	At a constant value of the measurand, reduce the resistance of the output load to the lower limit given in 6.9.4 and record the value of the output signal (X).		P
	Increase the resistance of the output load to the upper limit given in 6.9.4 and record the value of the output signal (Y).		P
6.9.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
	and: $\frac{Y-R}{F} \times 100$		P
6.9.4	Permissible variations		P
6.10	Variations due to distortion of the input quantity(ies)		N
6.10.1	Application		N
	All transducers characterized by the manufacturer for use on systems having distorted waveforms, except harmonics transducers.		N
6.10.2	Procedure		N
	Apply the chosen value of input quantity with no distortion and record the value of the output signal (R). Introduce third harmonic distortion at the level given in 6.10.4, maintaining the r.m.s. values constant, and record the value of the output signal (X). The phase relationship between the harmonic and the fundamental should be varied so as to determine the most unfavourable conditions.		N
	For apparent, active and reactive power transducers, the test is performed with distorted current waveform and then repeated with distorted voltage waveform.		N
	For apparent active and reactive power transducers not employing phase shifters, the permissible variations are given in 6.10.4.		N
	For reactive power transducers employing phase shifters, the permissible variations shall be specified by the manufacturer.		N
6.10.3	Computation		N

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Clause	Requirement + Test	Result - Remark	Verdict
	EN 60688		
	The variations are: $\frac{X-R}{F} \times 100$		N
6.10.4	Permissible variations		N
6.11	Variation due to magnetic field of external origin		P
6.11.1	Application		P
	All transducers.		P
6.11.2	Procedure		P
	The transducer is placed in the centre of a coil of 1 m mean diameter, of square cross section and of radial thickness small compared with the diameter (see Note). 400 ampere-turns in this coil will produce, at the centre of the coil, in the absence of the transducer under test, a magnetic field strength of 0,4 kA/m. The magnetic field shall be produced by a current of the same kind and frequency as that which energizes the measuring circuit and shall be such as to have the most unfavourable combination of phase and orientation. The values of a.c. fields are expressed in r.m.s. values.		P
	Any transducer having an external dimension exceeding 250 mm shall be tested in a coil of mean diameter not less than four times the maximum dimensions of the transducer. The magnetic field strength being the same as that given above.		P
	In the absence of the external field, record the value of the output signal (R).		P
	At a constant value of the measurand, apply the external field and record the value of the output signal (X).		P
6.11.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
6.11.4	Permissible variations		P
6.12	Variation due to unbalanced currents		P
6.12.1	Application		P
	Multi-element apparent, active and reactive power transducers.		P
6.12.2	Procedure		P
	The currents shall be balanced and adjusted so that the output signal is approximately in the middle of the span or, if zero output signal is within the span, half-way between zero and the upper nominal value of the output signal. Record the value of the output signal (R).		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Disconnect one current, maintaining the voltages balanced and symmetrical, and adjust the other currents, maintaining them equal, so as to restore the initial value of the measurand.		P
	Record the value of the output signal (X).		P
6.12.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
6.12.4	Permissible variations		P
6.13	Variation due to interaction between measuring elements		N
6.13.1	Application		N
	All multi-element apparent, active power and reactive power transducers except those employing two measuring elements for measuring three-phase four-wired unbalanced power with three current circuits (sometimes known as "two and a half elements") and those reactive power transducers using cross-connection methods.		N
6.13.2	Procedure		N
	The voltage input of one measuring circuit alone shall be energized at nominal voltage. The current input of each of the other measuring circuits shall be energized in turn at nominal current. The maximum departure of the output signal (X) from that corresponding to zero of the measurand shall be noted whilst the phase angle between the voltage and currents is changed through 360°.		N
	If the auxiliary supply is common to one of the voltage input circuits, this circuit shall be the one to which the voltage is applied.		N
6.13.3	Computation		N
	The variation is: $\frac{X}{Y} \times 100$		N
6.13.4	Permissible variations		N
6.14	Variation due to self-heating		P
	Application		P
	All transducers.		P
6.14.2	Method		P
	The transducer shall be at ambient temperature and shall have been disconnected for at least 4 h. Energize the transducer in accordance with 4.5.4 (except for the condition of "30 min" as specified in Table 2).		P

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Clause	Requirement + Test	Result - Remark	Verdict
	After 1 min and before the third minute, determine the value of the output signal (X). Repeat this procedure between the 30th and 35th minute after energization (R).		P
6.14.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
6.14.4	Permissible variations		P
6.15	Variation due to continuous operation		P
6.15.1	Application		P
	All transducers.		P
6.15.2	Procedure		P
	Energize the transducer under reference conditions for at least the preconditioning period. Record the value of the output (R). After a convenient period of continuous operation, for example 6 h, note the value of the output (X).		P
6.15.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
6.15.4	Permissible variation		P
	A variation is allowed but the transducer shall continue to comply in all respects with the requirements appropriate to its accuracy class.		P
6.16	Variation due to common mode interference		P
6.16.1	Application		P
	All transducers having an analogue output signal.		P
6.16.2	Procedure		P
	At a constant value of the measurand near the upper nominal value, record the value of the output signal (R). Apply a voltage of 1 00 V r.m.s., at 45 Hz to 65 Hz, between either output terminal and earth. Record the value of the output signal (X).		P
6.16.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
6.16.4	Permissible variation		P
6.17	Variation due to series mode interference		P
6.17.1	Application		P
	All transducers having an analogue current output signal.		P

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Clause	Requirement + Test	Result - Remark	Verdict
6.17.2	Procedure		P
	At a constant value of the measurand near the upper nominal value and with the compliance voltage at 80 % of the maximum value, record the value of the output signal (R).		P
	Apply a voltage of 1 V r.m.s. at 45 Hz to 65 Hz, in series with the output signal. Record the value of the output signal (X).		P
6.17.3	Computation		P
	The variations are: $\frac{X-R}{F} \times 100$		P
6.17.4	Permissible variations		P
6.17.5	Permissible excessive inputs		P
	After completion of the tests described in 6.1 7.6 and 6.1 7.7 and after having regained equilibrium with the reference value of the ambient temperature, the transducer shall comply with the requirements appropriate to its class index.		P
6.17.6	Continuous excessive inputs		P
	The transducer shall withstand the application of excessive inputs simultaneously for 24 h.		P
	a) Voltage inputs, including auxiliary supplies, shall be subjected to 1 20 % of the nominal value of the voltage.		P
	b) Current inputs shall be subjected to 1 20 % of the nominal value of the current.		P
6.17.7	Excessive inputs of short duration		P
	The tests shall be made under reference conditions. The excessive input amplitudes of short duration which shall be applied to transducers are:		P
	a) for voltage inputs: 200 % of the nominal value of the measured voltage applied for 1 s and repeated 1 0 times at 1 0 s intervals;		P
	b) for current inputs: 20 times the nominal value of the measured current applied for 1 s and repeated 5 times at 300 s intervals.		P
	The test circuit shall be substantially non-reactive.		P
	After testing, the intrinsic characteristics of the transducer shall be unchanged.		P
6.18	Voltage test, insulation tests and other safety requirements		P
	The requirements for the voltage test and other safety requirements are included in IEC 61 01 0-1 to which reference shall be made.		P

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Clause	Requirement + Test	Result - Remark	Verdict

6.19	Impulse voltage tests		P
6.19.1	A peak test voltage of 5 kV in both positive and negative senses, having the 6.19.1 standardized impulse waveform of 1 ,2/50 μs, shall be applied to transducers as follows:		N
	between the earth terminal and all the other terminals connected together;		N
	between the terminals of each circuit in turn, all other circuits being earthed.		N
	Three positive and three negative impulses shall be applied at intervals of not less than 5 s. Any flashover (capacitance discharge) shall be considered a criterion of failure unless occurring in a component designed for such.		N
	For further details of the impulse voltage test, reference shall be made to IEC 61 01 0-1 and IEC 61 01 0-2-030.		N
6.19.2	After completion of the impulse voltage test, the transducer shall comply with the 6.19.2 requirements appropriate to its class index.		P
6.19.3	Auxiliary circuits with a reference voltage of over 40 V shall be subjected to the 6.19.3 impulse voltage test under the same conditions as those already given for the other circuits.		N
6.20	High frequency disturbance test		P
	See the IEC 61326 series.		P
6.21	Test for temperature rise		P
	The transducer shall be energized as follows:		P
	each current circuit shall carry a current of 1 ,1 times the nominal current and		P
	each voltage circuit shall be supplied with a voltage of 1 ,2 times the nominal voltage.		P
	These conditions shall be maintained for at least 2 h. During the test the transducer shall not be exposed to forced ventilation nor to direct solar radiation.		P
	The temperature rise of the following parts of the transducer shall not exceed:		P
	for input circuits: 60 K;		P
	for the exterior surface: 25 K.		P
6.22	Other tests		P
	If, by agreement, other tests are required, refer to the following publications:		P
	for vibration: IEC 60068-2-6;		P

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Clause	Requirement + Test	Result - Remark	Verdict
	for shock: IEC 60068-2-27;		P
	for electromagnetic compatibility: IEC 61 326-1.		P
7	Marking and information		P
7.1	Marking on the case		P
	Transducers shall bear, on (or visible through) one of the external surfaces of the case, the markings listed below. The markings shall be legible and indelible. The symbols referred to below are specified in Table 7.		P
	a) Manufacturer's name or mark.		P
	b) Manufacturer's type designation.		P
	c) Serial number or date code.		P
	d) Software version (version of software that resides in the transducer (if any, for digital transducers only)).		N
	e) Class index (symbol E-1 0 or E-1 1).		P
	f) Nature of the measurand and number of circuits (symbol B-2, B-4 or B-6 to B-1 0).		P
	g) Lower and upper nominal values of the measurand.		P
	h) Ratios of current transformers and voltage transformers, if any, with which the transducer is intended to be used.		P
	i) Range of values of the output current (voltage) and output load within which specified operation is obtained (analogue signals only).		P
	j) Limits of the measuring range, if appropriate (see 5.9).		P
	k) Serial number(s) of the associated equipment, if applicable.		P
	l) Value(s) of the auxiliary supply, if relevant.		P
	m) Symbol showing that some other essential information is given in a separate document (symbol F-33).		P
	n) Space for adjustment data (if appropriate).		P
	o) Nominal range of use for temperature, symbolized as usage group I, II or III.		P
	p) Common mode voltage.		N
	q) Overvoltage category (see IEC 61 01 0 series).		N
	r) Pollution degree according to IEC 61 01 0 series.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	s) Other required safety symbols according to IEC 61 01 0-1 .		P
	If the markings and symbols are on an easily removable part, such as a cover, the transducer shall have a serial number which shall also be marked on the body of the transducer.		P
	Transducers having a non-linear relationship between input and output shall be marked with the symbol F-33, and actual relationship between input and output shall be given in a separate document.		N
7.2	Markings relating to the reference conditions and nominal ranges of use for transducers		P
7.2.1	The reference values (or ranges) and nominal ranges of use, if different from those given in Tables 3 and 4 and Clause 6, shall be marked on the transducer or given in a separate document.		P
7.2.2	When a reference value or a reference range is marked, it shall be identified by underlining.		P
7.2.3	Table 6 shows the significance of the various markings, for example for temperature.		P
	Three or four numbers shall always be used.		P
7.3	Identification of connections and terminals		P
	If so required for the correct use of the transducer, a diagram or table of connections shall be supplied and the terminals shall be clearly marked to show the proper method of connection.		P
	If a terminal of a measuring circuit is intended to be kept at, or near to earth (ground) potential (for example, for safety or functional reasons), it shall either be marked with a capital N if it is intended to be connected to the neutral conductor of an a.c. supply circuit, or it shall be marked with symbol F-45 (see Table 7) in all other circumstances.		P
	The earthing terminal(s) shall be marked using symbol(s) F-31 and/or F-42 to F-45, as appropriate.		P
7.4	Information to be given in a separate document		P
	The following information shall be given in the document supplied with the transducer:		P
	response time;		P
	the variation due to a magnetic field of external origin;		P

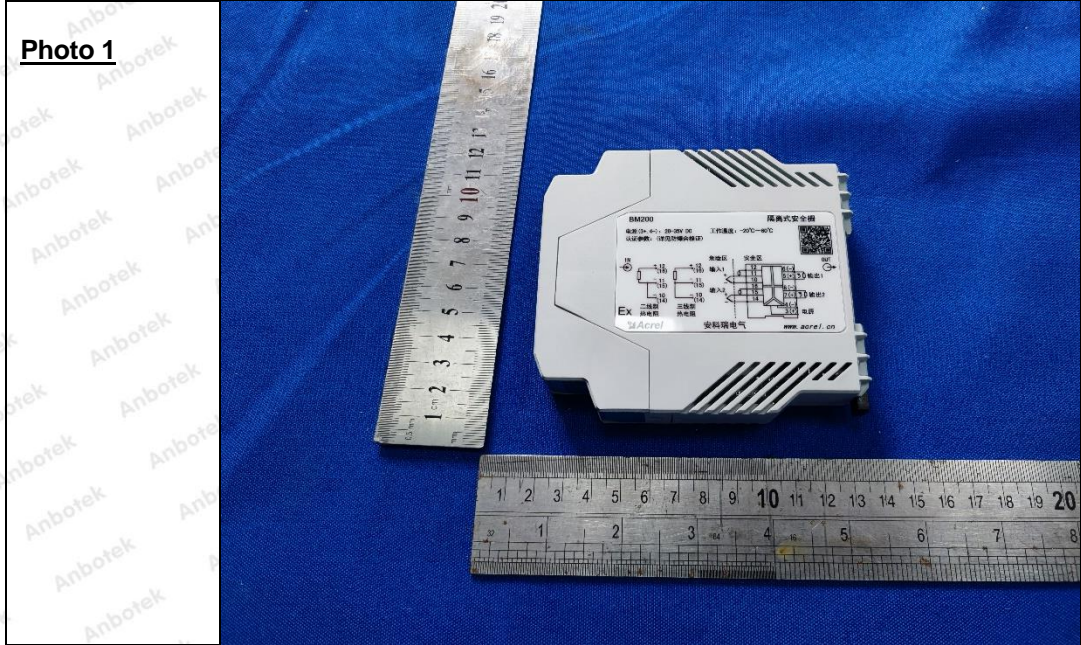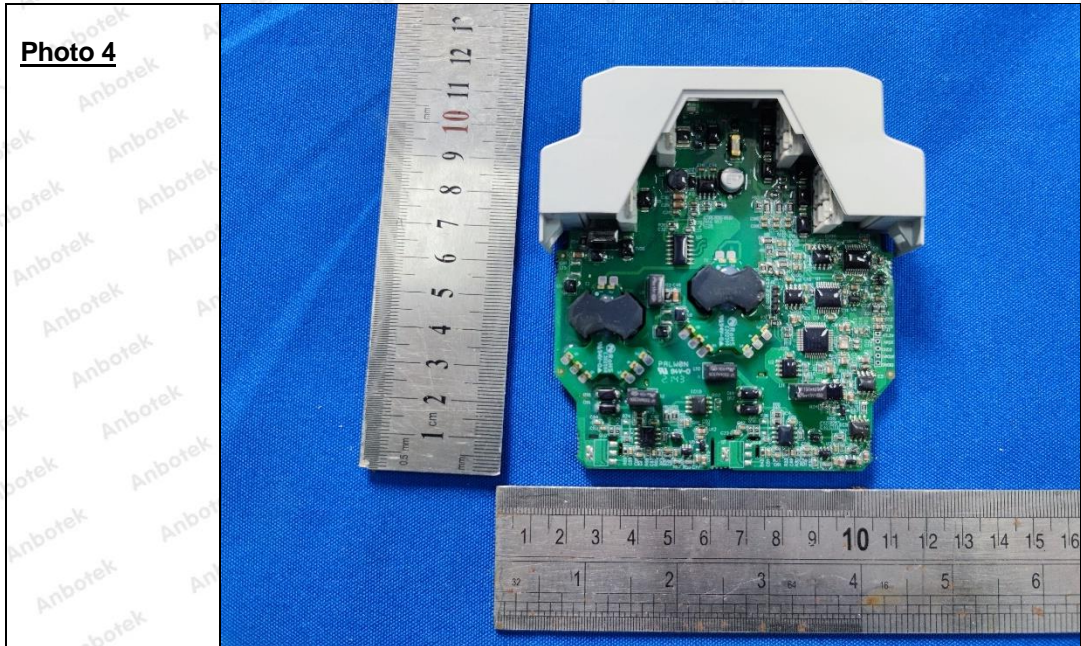| EN 60688			
Clause	Requirement + Test	Result - Remark	Verdict
	the actual relationship between input and output. (see required indications according to type of curves given in 5.3 for output current transfer functions).		P

Attachment 1: Photo documentation

Photo 1

Photo 2

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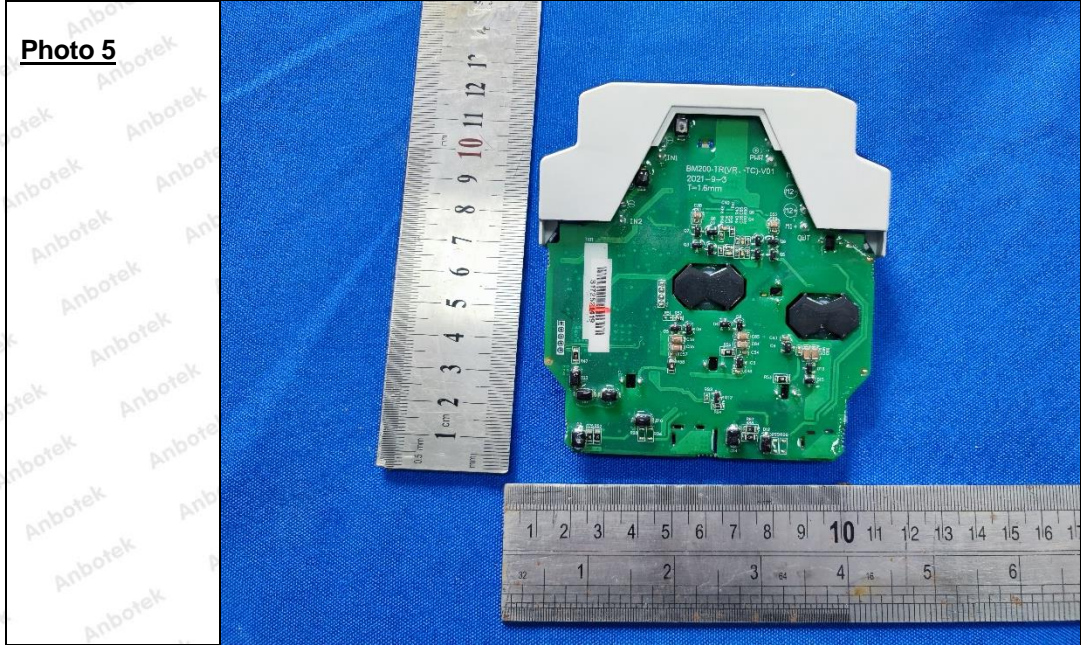www.anbotek.com

Attachment 1: Photo documentation

Photo 3

Photo 4

Attachment 1: Photo documentation

Photo 5

--------------End of report------------