

Report No.: 78251SC20005401

Test Report

Client Name : Acrel Co., Ltd.

Address : No.253, Yulv Road, Jiading District, Shanghai China

Product Name : Sensor

Date : Apr. 18, 2022



* Approved *

Shenzhen Anbotek Compliance Laboratory Limited





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:	Anbo tek sobotek Anboro y sotek
Standard	EN 60688:2013
Test procedure:	Type test
Non-standard test method:	N/A provide Annu Annu Annu Annu Annu Annu Annu Ann
Test Report Form No	EN 60688:2013
General disclaimer:	k sotek Anbotek Anbor tek sobotek Anb
The test results presented in this report	t relate only to the object tested.

Laboratory.

Tested by (name, function, signature) :	James zhang Project Engineer	James 2 hang
Approved by (name, function, signature) :	Jeff Zhu Project Manager	Jelf hu

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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/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,
podek Anborek	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-DI/I-A11, BD100-DI/I-C12, BD100-DI/V-C12, BD100-DI/IC-C12, BD100-DI/V-C12, BD100-DV/V-A11, BD100-DV/I-C12, BD100-DV/I-C12, BD100-DV/V-C12, BD100-DV/V-C12, BD100-DV/VC-C12, BD100-AI/IC-C12, BD100-AI/IC-C12, BD100-AI/IC-C12, BD100-AI/IC-C12, BD100-AV/IC-C12, BD100-AV/IC-C12, BD100-AV/IC-C12, BD100-AV/IC-C12, BD100-AV/IC-C12, BD100-AV/IC-C12, BD100-DV/IC-C12, BD100-DV/IC-C12, BD100-DI/I-C12, BD100-DI/I-C12, BD100-DI/IC-C12, BD100-DI/IC-C12, BD100-DI/IC-C12, BD100-DV/IC-C12, BD100-DV/IC-C12, BD100-DV/IC-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-F/I-C12, BD100-P/I-C12, BD10
Ratings	INPUT: 20-35V===

List of Attachments Attachment 1: Photo documentation

Summary of testing:

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Tests performed (name of test and test clause): EN 60688:2013

The samples submitted were found to comply with above standards.

Testing location:

Shenzhen Anbotek Compliance Laboratory Limited

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518128



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



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Test item particulars:	Sensor
Classification of installation and use:	Built-in appliances
Possible test case verdicts:	stek Anborek Anborrak borek
- 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:	Anbora Ana otek Anboren Anbo
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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Clause	Requirement + Test	Result - Remark	Verdict
ter Ann	tak abotek Anbo, Anbo, Anbo,	Anboter Anu tek abc	itek p
5	Requirements		
5.1	Input values	Anborek Anbor A	Ret
5.1.1 mbore	The nominal values of voltage, current, frequency and auxiliary supply shall be 5.1.1 specified by the manufacturer.	Anbotek Anbotek Anbotek Anbotek	Anbotel
5.1.2 pmb ^c	Adjustment range for transducers that can be adjusted by the user:	nbotek Anbolek Anbo	er P
hotek A	a) for the input voltage: 80 % to 120 % of the nominal value;	Anbotek Anbotek Ar	oo ^{tek} P
Anbotek	b) for the input current: 60 % to 130 % of the nominal value.	Anbotek Anbotek	Ant P Anbotek
Anboter Anbot	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.	tek Anbolen Anbo botek Anbolek Anbolek	P _{Anbo}
5.1.3	The preferred nominal value of d.c. auxiliary supplies shall be 24 V, 48 V or 110 V.	Anbotek Anbotek An	pote ^K P
5.2	Analogue output signals	Anbo tek abotek	Aupolo N
5.2.1	General	Anbor An hotek	Pote
Anboh	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.	ortek Anbone Anborek Anborek	Probo
5.2.2	Output current	Anboten Anbo	o ^{tek} P
nbotek	The signal 4 mA to 20 mA is preferred.	Anbotek Anbo	Noot P
5.2.3	Compliance voltage	Nobotek Anbourge	Potek
Anbotek	10 V 15 V	ek Anbotek Anbotek	P
5.2.4	Maximum output voltage	otor And atek unbote	P Ant
botek I	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.	Anbotek Anbotek Anb	nbotek
5.2.5	Inteference risk of output current	k sabotek Anbor	Note
anbotel ak anbr	Attention is drawn to the interference problems which may result if the output current has a low value.	otek Anbotek Anbotek Anbotek	N Anb
5.2.6	Output voltage	hotek Anbotek Anb	P
otek	0 V to 1 V	Ante otek unbotek A	N
Ano	0 V to 10 V	Anby tek abotek	Anbola .
Anbor	- 1 V to 1 V	Anbor Ar botek	N
Anbore	- 10 V to 10 V	otek Anboi At thotek	Nanbo

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ler Aur	tak poolek Anbo, An polek	anbote. Ant ook ob	stek P
5.3	Output transfer function	Anbotek Anbo, A	boteP
Anbotek	For analogue transducers, the used transfer function shall be one of the following curves.	Anbotek Anbotek	Anbohak
Anbote	For analogue transducers, variables x, y, y_1 , y_2 can be adjustable.	Anbotek Anbotek Anbotek	Poore
otek p	The accuracy class has to be checked for each point of the transfer function according to the formula: $\frac{Y-R}{R} \times 100$	Anbotek Anbotek Anbo	ek P ^{hr} p
5.4	Digital output signals	Anboten Anbo	N
Amboter Amboter	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.	rek Anborek Anborek htek Anborek Anborek	Notek
otek Al	For the digital output the class index shall be in conformity with the performance class described in IEC 61557-12.	Anbotek Anbotek Anbo	N A
Anbotek	If outputs relays are provided they shall comply with IEC 60255-151.	Ante Anbotek Anbotek	Anbotek
5.5 proton	Ripple (for analogue outputs)	ek Anbote Anti-	Pnbot
Anbo	The maximum ripple content in the output signal shall not exceed twice the class index.	potek Anboten Anto	P P
5.6	Response time	Anbols & Ann hotek Ant	oter 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.	Anbore Ann Ann Anborek Anborek Anborek orek Anborek Anborek	Anborek Anborek Anbor
5.6.2	The response time shall be stated by the manufacturer and shall be determined for an 5.6.2	anbotek Anbotek Anb	P
Anbotek	input step such that it would produce a change in output signal from 0 % to 90 % of the fiducial value.	Anbotek Anbotek A	Anbotek
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.	otek Anbotek Anbotek	P
5.6.4	The interval (see 3.1 .1 9) shall be \pm 1 % of the upper nominal value of the output signal.	Anbotek Anbotek Anbo	P
5.6.5	Methods of test for frequency transducers and transducers with suppressed zero shall 5.6.5 be stated by the manufacturer.	Anbotek Anboundek	Anberel
5.7	Variation due to over-range of the measurand	rek sobotek Anbois	Р

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Clause

Requirement + Test

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Verdict

Ρ

Result - Remark

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If, by agreement, a transducer is required to operate with an input up to 1 50 % of the nominal	Anbotek Anb
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.	Anborek Anborek
For active power and reactive power transducers, 1 50 % of the nominal value is achieved by	nbotek Anbotek

Anbotek	conditions) of the nominal value of the input shall not exceed 50 % of the class index.	htek Anbotek Anbotek	Anbo
otek Anbo	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.	nbotek Anbotek Anbo Anbotek Anbotek Anbo	ek P Ar
5.8	Limiting value of the output signal	Anbo, welk abotek	Anbore
Anbo.	The output signal shall be limited to a maximum of twice the upper nominal value.	Anborek Anborek	Pote
stek Anbot otek Ant	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.	Anbotek Anbotek Anbo Anbotek Anbotek Anbo	P An
5.9	Limiting conditions of operation	abotek Anboit	Potek
Anbotek Anbote	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:	ok Anbotek Anbotek Dotek Anbotek Anbotek	Anbor Anbor
hotek	the accuracy may not be maintained and/or	An hotek Anboter An	Р
~otek	the designed operational lifetime may be reduced.	An hotek Anboten	Prek
Ann Anbotek Anbote	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.	ok Anbotek Anbotek Anbotek	AntP Anbote
5.10	Limits of the measuring range	and otek anbotek Anb	N
Anbotek Anbotek	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)).	Anbotek Anbotek Anbotek Anbotek Anbotek	Anborek Anborek
5.11 And	Limiting conditions for storage and transport	otek Anbor protection	PAnb
ootek Anbo	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.	Anbotek Anbotek Anbotek Anbo	botek botek
Anbotek	After returning to reference conditions, they shall meet the requirements of this standard.	Anbotek Anbotek	P Anbotek
-10~		107 10	

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Clause	Requirement + Test	Result - Remark	Verdict
ler. Nu	eek sobotek Anbor v sotek	Anbote, And tek abo	stek P
potek nbotek	The manufacturer shall specify any additional limiting condition required to ensure the integrity of the transducer.	Anbotek Anbo, A.	bote ^P
5.12	Sealing	A potet Anbote.	Notel
Anbote Anbote	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.	ntek Anbotek Anbotek Anbotek Anbotek Anbotek	N Anbr
5.13	Stability	Anboten Anbo	oote ^V P
Anbotek Anbotek Anbotek	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.	Anbotek Anbotek Anbotek Anbotek ek Anbotek Anbotek botek Anbotek Anbotek	Anbo P ^k Anbotek Anbo
6	Tests	obotek Anbote Anu	P
6.1	General	An Anbotek Anboten An	BA
6.1.1	Determination of variations	All botek Anboten	And P etek
Anbotek Anbo	The variations shall be determined for each influence quantity. During the tests, all other influence quantities shall be maintained at reference conditions.	ek Anbotek Anbotek potek Anbotek Anbotek	Arp Anbot
ibotek Mabotek	The variations shall be determined for each influence quantity. During the tests, all other influence quantities shall be maintained at reference conditions.	Anbotek Anbotek Anto	otek P Inbotek
Anbotek Anbot ek Anbot botek	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.	Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbote Anbotek Anbotek Anbote	P Anborr
Anbois Anbotek Anbot	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.	Anbotek Anbotek Dtek Anbotek Anbotek Anbotek Anbotek	Anti P ^{len} Antione
6.1.2	Environmental conditions	Inbo, ak botek Aup	Р
po'	The conditions of temperature and humidity are classified according to the severity dictated by the usage group in accordance with Table 5.	Anbotek Anbotek A	anbotek

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e, Vu,	tak abotek Anbot k antek	Anboter Ano tek abr	stek p
anbotek Anbotek Anbotek Anbotek Anbote	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.	Anbotek Anbor An Anbotek Anborek A Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek	Anbotek Anbotek Anbotek Anbotek
otek p	Humidity is not considered to be an influence quantity provided that the environmental conditions are within the limits specified.	Anbotek Anboi An Anbotek Anbotek Ar	pote ^k p
6.1.3	Computations	Anboten Ant otek	Р
Anboten Anbo	In the following subclauses, a computation is required according to a formula. The terms in the formulae follow a general principle:	potek Anbotek Anbotek potek Anbotek Anbotek	P Anbo
otek p	R is the value of the output signal under reference conditions;	Anbotek Anbotek An	ote ^k P
Anbotek	X (or Y) is the value of the output signal measured at one extreme of the influence quantity;	Anbotek Anbotek	Р
anbotek	F is the fiducial value.	tek anborek Anbo	P
6.2	Variations due to auxiliary supply voltage	otek onbotek Anbo	Р
6.2.1	Application	notek Anborek Anbor	Р
Anbotek	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.	Anbotek Anbotek Ant Anbotek Anbotek	nbotek
6.2.2	Procedure	rek Anboren Anbo	Pribote
Anbot	Apply the nominal value of auxiliary supply voltage and record the value of the output signal (R).	otek Anbolos Anbore	PAnt
botek Anbotek Anbotek	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).	Anbotek Anbotek Anbotek Anbotek	P nborek Anborek
6.2.3	Computation	ootek Anbore Am	Panto
sk pnt	The variations are: $\frac{X-R}{F} \times 100$	nbotek Anboren Anbo	Net P
poten I	and: $\frac{Y-R}{F} \times 100$	Anbotek Anbotes And	to ^{ote} P
6.2.4	Permissible variations	Anboli All hotek	AndPer
Anboto	For a.c. auxiliary supplies	Anbore Ant	Note
Anbore	For d.c. auxiliary supplies	otek Anbote, Ann ek	P

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Clause	Requirement + Test	Result - Remark	Verdict
ter Ann	nak ubotek Anbo, k uotek	Anbote, And Jek ob	otek p
6.3	Variations due to auxiliary supply frequency	Anbotek Anbo. At	P
6.3.1	Application	Anborek Anbor A	Net
Anbotek Anbotek	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.	hek Anbotek Anbotek Nek Anbotek Anbotek	Anbotek Anbotek
6.3.2	Procedure	nbote And otek Anbo	N N
Anbotek Anbotek Anbotek Anbotek	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).	Anbotek	Anborek Anborek
otek Anbot	Increase the auxiliary supply frequency to the upper limit given in 6.3.4 and record the value of the output signal (Y).	potek Anbotek Anbotek Anbot	ek N An
6.3.3	Computation	Anbore An	N
anbotek	The variations are: $\frac{X-R}{F} \times 100$	Anbotek Anbote	And Nek
Anbotek	and: $\frac{Y-R}{F} \times 100$	ek Anbotek Anbou	N
6.3.4 Martin	Permissible variations	potek Anbore And	* P ant
6.4	Variations due to ambient temperature	abotek Anbote And	otek P
6.4.1	Application	An botek Anboten An	Р
hotek	All transducers.	An hotek Anboten	Prek
6.4.2	Procedure	k sotek Anbotek	P
ek anb	At a constant value of the measurand and at reference temperature, record the value of the output signal (R).	otek Anbotek Anbotek	P ^{ibo}
potek Anbotek	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).	Anbotek Anbotek Anb	nbotek Anbotek
Anborotek Anbotek	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).	otek Anbotek Anbotek Anbotek	Anbote
6.4.3	Computation	Inbo, by an	Р
notek	The variations are: $\frac{X-R}{F} \times 100$	Anbotek Anbotek A	P
Anbotek	and: $\frac{Y-R}{F} \times 100$	Antotek Anbotek	Ambo: Peter
6.4.4	Permissible variations	tek unbotek Anbors	Р

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er An	tak potek Anboi Air potek	anboten And tek ob	otek p
6.5	Variations due to the frequency of the input quantity(ies)	Anbotek Anbor An	(bote)P
6.5.1	Application	Anbb tek abotek	AnbP
Anbor	All transducers except frequency transducers. Frequency sensitive transducers (e.g. those	Anborek Anborek	P
otek Anto	employing phase shifting circuits) are exceptions and the nominal range of use shall always be marked.	nbotek Anbotek Anbo	ek pi
6.5.2	Procedure	And otek unbotek Ar	N
Anbotek	Apply the nominal value of the input frequency and record the value of the output signal (R).	Anbotek Anbotek	Anbon N
Anbote Anbr	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).	tek Anbotek Anbotek	N Anbo
otek A	Increase the frequency to the upper limit given in 6.5.4 and record the value of the output signal (Y).	Anbotek Anbote And	pote ^K N
6.5.3	Computation	Anborn Ak hotek	Anboth
Anbor	The variations are: $\frac{X-R}{F} \times 100$	Anborn And	ArNoter
Anosbo	and: $\frac{Y-R}{F} \times 100$	et Anu botek Anbotek	Nnbor
6.5.4	Permissible variations	por An botek Anbot	N AM
6.6	Variations due to the input voltage	Anbor An botek Ant	oten N
6.6.1	Application	Anborn Autorek	unbo ^t N
Anbotek	All transducers except voltage and current transducers.	Anbotek Anbotek	AnNtek
6.6.2	Procedure	ak abotek Anbote.	Р
lek An	Apply the nominal value of the input voltage and record the value of the output signal (R).	nbotek Anbotek Anbote	P Ant
anbotek	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).	Anbotek Anbotek Anbotek	nboteP
Anbotek	Increase the voltage to the upper limit given in 6.6.4 and record the value of the output signal (Y).	Anbotek Anbo	Panbote
6.6.3	Computation	oter And otek unbote	PAND
ek Ant	The variations are: $\frac{X-R}{F} \times 100$	nbotek Anbo	N ^{ek} P p
yotek	and: $\frac{Y-R}{F} \times 100$	Anborek Anborek A	Nbote P
6.6.4	Permissible variations	And otek unbotek	Anboi P
6.7	Variations due to the input current	And stek anbotek	PP'00'
6.7.1	Application	oter Ando ak abotek	Npnbo

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ler Ann	rek obotek Anbo, An potek	Anbote, And Jek ab	stek p
potek p	Phase angle and power factor transducers.	Anbotek Anbo. At	bote N
6.7.2	Procedure	Anborek Anbor A	Ret
Anbotek	Apply the nominal value of the input current and record the value of the output signal (R).	Anbotek Anbotek	Ampotek
Anbo,	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).	nbotek Anbotek Anbotek Anbotek	PAnb ^c
oter A	Increase the input current to the upper limit given in 6.7.4 and record the value of the output signal (Y).	Anbotek Anbotek Ar	oo ^{tek} P
6.7.3	Computation	Ant Lotek Anboten	Amb P .ek
Anbotek	The variations are: $\frac{X-R}{F} \times 100$	lek Anbotek Anbotek	P
k Anbo	and: $\frac{Y-R}{F} \times 100$	botek Anbotek Anbore	P
6.7.4	Permissible variations	botek Anbote An	P
6.8	Variations due to power factor	An hotek Anboten An	N
6.8.1	Application	And wotek Anbotek	Anbo N .ok
Anustek	Apparent, active and reactive power transducers.	Ant otek unbotek	⊳≦N [®]
6.8.2	Procedure	en Anbrek abotek	Nabor
tek Anbo hotek An Anbotek Anbotek	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).	potek Anbo Anbotek Anbotek Anbotek Anbotek Anbotek Anb Anbotek Anbotek Anbotek Anbotek	K N Ani otek Inbotek Anbotek
lek Anb	For convenience, when testing the reactive power transducers, it is usual to apply the equivalent values of sin ϕ	potek Anbote And	N Ant
Anbotek	Active power transducers shall also be tested for error at a power factor of zero and reactive power transducers at a sin $\phi = 0$.	Anbotek Anbotek Anbotek A	hbotrN
6.8.3	Computation	ek Anbotek Anbo	Noote
Anbote	The variations are: $\frac{X-R}{F} \times 100$	otek Anbotek Anbo	N
ak Anb	and: $\frac{Y-R}{F} \times 100$	nbotek Anboro Atu	Kelt N
6.8.4	Permissible variations	Anboten Anbo	NooteN
Anbotek Anbotek	For all transducers, the error at a power factor of zero (or sin $\phi = 0$) shall not exceed 1 00 % of the class index.	Anbotek Anbootek Anbotek Anbootek	AnbNek
6.9	Variation due to output load	stek Anbotek Anbo	P

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Clause	Requirement + Test	Result - Remark	Verdict
ie. An	stak unbotek Ando sk upotek	Anbore Ann tek mbr	ster 1
6.9.1	Application	Anbotek Anbo ok	hote'P
nbotek	All variable output load transducers.	Anbotek Anbors A	Ret
6.9.2	Procedure	h abotek Anbot	Pute
Anbote Anbote	Apply a value of output load equal to the mean value of the nominal range and record the value of the output signal (R).	otek Anbotek Anbotek	P
otek Inbotek	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).	Anbotek Anbotek Anbo Anbotek Anbotek Ar	P
Anbore	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).	tek Anbotek Anbotek	Anbo
6.9.3	Computation	botek Anboy Att	P
otek pi	The variations are: $\frac{X-R}{F} \times 100$	Anbotek Anbotek An	o ^{tek} P
nborestek	and: $\frac{Y-R}{F} \times 100$	Anboren Anborek	Anbo'P
6.9.4	Permissible variations	Anbo Lak abotek	P.PO10
6.10	Variations due to distortion of the input quantity(ies)	ek Anbor Ar botek	Nabo
6.10.1	Application	potek Anbor An	K N N
itek Ar	All transducers characterized by the manufacturer for use on systems having distorted waveforms, except harmonics transducers.	Anbotek Anbotek Ant	otek N
6.10.2	Procedure	anbotek Anbore	Niek
Anbotek Anbotek botek botek	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 6.1 0.4, 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.	orek Anborek Anborek Anborek Anborek Anborek Anborek Anborek Anborek Anborek Anborek Anborek Anb	Antonek obotek
Anbotek	For apparent, active and reactive power transducers, the test is performed with distorted current waveform and then repeated with distorted voltage waveform.	k Anbotek Anbotek otek Anbotek Anbotek	Anbote Anbote
potek Ant	For apparent active and reactive power transducers not employing phase shifters, the permissible variations are given in 6.1 0.4.	Anbotek Anbotek Anbo	tek N I
Anbotek	For reactive power transducers employing phase shifters, the permissible variations shall be specified by the manufacturer.	Anbotek Anbotek	Anb N ^{elk}
6.10.3	Computation	itek Anbore Ann otek	Nado

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Clause	Requirement + i est	Result - Remark	verdict
Ann	Lotek anbolek Anbo with stotek	Anbors Ans sotek anbo	ter
	The variations are: $\frac{X-R}{F} \times 100$	Anboten Anbo	(pote)N
6.10.4	Permissible variations	Anbote, Anu otek	Anb Nek
6.11	Variation due to magnetic field of external origin	Anboten Anb	Phote
6.11.1 00 ¹⁰¹	Application	otek Anboten Anbo	P
k anboi	All transducers.	wotek Anbotek Anbo	P
6.11.2	Procedure	nu votek Anbotek Anbo	Р
Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Inbotek	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.	Amborek Amborek Amborek Amborek Amborek ek Amborek Amborek borek Amborek Amborek Amborek Amborek Amborek Amborek Amborek Amborek Amborek Amborek Amborek	Porek Anborek Anborek Anborek Anborek
Anbo Anbote	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.	ok Anbo potek Anbotek Anbotek potek Anbotek Anbote	K Anbo
	In the absence of the external field, record the value of the output signal (R).	Anbotek Anbote An	mboth
Anborek	At a constant value of the measurand, apply the external field and record the value of the output signal (X).	Anborek Anborek	And P
6.11.3	Computation	oten Anbe	P
an Anbi	The variations are: $\frac{X-R}{F} \times 100$	unbotek Anbountek unb	stek P
6.11.4	Permissible variations	Anboren Anbo Atek	nb ^{ote} P
6.12	Variation due to unbalanced currents	Anboten Anbo	Ant
6.12.1	Application	Anboten Anb	Phot
Anboteh	Multi-element apparent, active and reactive power transducers.	otek Anbotek Anbo	P
6.12.2	Procedure	inbolis An wotek Anbo	P
Anbotek Anbotek	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)	Anbore Ano Ano Ano Anborek Anborek Anborek Anborek Anborek Anborek	Anbotek Anbotek

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Clause	Requirement + Test	Result - Remark	Verdict
s. Pup.	tak subotek Anborn k sotek	Anboter Ano	otek P
Anbotek Ar	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.	Anbotek Anbotek Anbotek A	Anbotek Anbotek
Amb	Record the value of the output signal (X).	k hotek Anbotek	P
6.12.3	Computation	ord Ann hotek Anbotek	PAnbo
PUL PUL	The variations are: $\frac{X-R}{F} \times 100$	nbote Anu botek Anbo	P P
6.12.4	Permissible variations	Anbore All Alle Alle	P
6.13	Variation due to interaction between measuring elements	Anborek Anbotek	Anbon
6.13.1	Application	rek nnbotek Anbois	N
Anbotek nbotek	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.	Anbotek Anbotek Anbo Anbotek Anbotek Anbo Anbotek Anbotek Anbo Anbotek Anbotek An	Notek Anbolek
6.13.2	Procedure	ek anbotek Anbotek	N
tek Anbote ibotek Anb Anbotek A	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°.	portek Anborek Anbor Anborek Anborek Anbor Anborek Anborek Anborek Anborek Anborek An Anborek Anborek	Anbotek
ek Anbotek	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.	potek Anbotek Anbotek	N ^{nb}
6.13.3	Computation	anboi vek abotek Ant	N
bo. h	The variation is: $\frac{x}{y} \times 100$	Anbour Anbolek	nbot N
6.13.4	Permissible variations	Anbo otek Anbotek	N
6.14	Variation due to self-heating	And sotek Anbotek	P
Ano	Application	oter Anti-	P Anbr
an Aup	All transducers.	nboten Anbo	o ^{kelk} P N
6.14.2	Method	Anbotek Anbo tek	Peter
Anbotek Anbotek Anbotek	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).	Anbotek Anbotek Anbotek Anbotek hek Anbotek Anbotek	Anborek Anbotek

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Clause	Requirement + Test	Result - Remark	Verdict
e. And	tok nbotek Anbor Ar notek	Anbore Anu tek ob	otek l
	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).	Anbotek Anbor An Anbotek Anborek A	boreP Anborek
6.14.3		Anboir An	P
Aupore	The variations are: $\frac{X-R}{F} \times 100$	nek Anbolek Anbolek	P
6.14.4	Permissible variations	nbore All abotek Anbo	Р
6.15	Variation due to continuous operation	Anbore An botek Ar	P
6.15.1	Application	Anbore Ant hotek	AntoP
Anborer	All transducers.	Anbotes And hotek	Poter
6.15.2	Procedure	lek Anboien Ann	Panbo
k Anbol otek An nbotek	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).	Anbotek Anbotek Anbotek Anbotek Anbotek	otek Nibotek
6.15.3	Computation	Anboret Anbo	Potek
Anboten	The variations are: $\frac{X-R}{F} \times 100$	ek Anbotek Anbur	Anbo
6.15.4	Permissible variation	potek Anbover Anos	P P M
tek Ant	A variation is allowed but the transducer shall continue to comply in all respects with the requirements appropriate to its accuracy class.	Anbotek Anbotek Ant	otek P
6.16	Variation due to common mode interference	Anbotek Anbote	Brok
6.16.1	Application	ok anbotek Anbote	Phot
abote	All transducers having an analogue output signal.	stek nbotek Anbot	Р
6.16.2	Procedure	stek sobotek Anbot	Р
potek Anbotek	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).	Anbotek Anbotek Anb	P nbotek Anbotek
6.16.3	Computation	lek sbotek Anboten	Р
anbr	The variations are: $\frac{X-R}{F} \times 100$	butek Anbotek Anbote	P Ant
6.16.4	Permissible variation	int otek Anbotek Anbr	Р
6.17	Variation due to series mode interference	And stek anbotek A	P P
6.17.1	Application	Anbu tek nbotek	Pupple
Anbon	All transducers having an analogue current output signal.	hek Anbotek Anbotek	P

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Clause	Requirement + Test	Result - Remark	Verdict
er Ann	rek obotek Anbo. A sotek	Anboten And tek abr	stek P
6.17.2	Procedure	unbotek Anbo, A	hoteP
Anbotek	At a constant value of the measurand near the upper nominal value and with the compliance	Anbotek Anbotek	Anbolek
Anbore	voltage at 80 % of the maximum value, record the value of the output signal (R).	tek anbotek Anbotek	Anbote
otek Anbo	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).	nbotek Anbotek Anbote wotek Anbotek Anbo	PARE P
6.17.3	Computation	And otek unbotek Ar	P
Anborek .	The variations are: $\frac{X-R}{F} \times 100$	Anborek Anborek	Anbone P
6.17.4	Permissible variations	ak botek Anboter	Р
6.17.5	Permissible excessive inputs	k hotek Anbotek	P
otek An nbotek	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.	Anbotek	P Af
6.17.6	Continuous excessive inputs	Anbo vek pobotek	P
Anbort	The transducer shall withstand the application of excessive inputs simultaneously for 24 h.	et Anbotek Anbotek	Pabo
tek Ant	a) Voltage inputs, including auxiliary supplies, shall be subjected to 1 20 % of the nominal value of the voltage.	Anbotek Anbotek Anbo	otek P
Anbotek	b) Current inputs shall be subjected to 1 20 % of the nominal value of the current.	Anbotek Anbote	Anbotek
6.17.7	Excessive inputs of short duration	er Anbo tek obotek	Ribor
ek Anbou	The tests shall be made under reference conditions. The excessive input amplitudes of short duration which shall be applied to transducers are:	botek Anbotek Anbotek Anbote	P Ant
botek I	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;	Anbotek Anbotek An	nboteP
Anbotek	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.	ek Anbotek Anbotek	Anbo Anbote
ek w	The test circuit shall be substantially non-reactive.	of Anborek Anbore	P
potek p	After testing, the intrinsic characteristics of the transducer shall be unchanged.	Inbotek Anbotek Anbr	her P
6.18	Voltage test, insulation tests and other safety requirements	Anbotek Anbotek A	Anberek
Anbois	The requirements for the voltage test and other safety requirements are included in IEC 61 01 0-1 to which reference shall be made.	anbotek Anbotek Anbotek	AP ^{oote}

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Clause	Requirement + Test	Result - Remark	Verdict
e. Pui	hak potek Anbor An potek	Anbote, And Jek ob	otek
6.19	Impulse voltage tests	Anbotek Anbo, At	boteP
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:	Anbotek Anbotek Anbotek	Anbolek Anbote
ik Aup	between the earth terminal and all the other terminals connected together;	abotek Anbotek Anbote	NAND
otek p	between the terminals of each circuit in turn, all other circuits being earthed.	Anbotek Anbotek Anu	n vortevN
Anbotek Anbotek Anbotek	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.	Anbotek Anbotek ek Anbotek Anbotek	Anbotek Anbotek
otek Anbr	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.	botek Anbotek Anbo	rek N Ar
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.	Anbotek Anbotek An	Anbotek
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.	ek Anbotek Anbotek Dotek Anbotek Anbotek	MN Anbo
6.20	High frequency disturbance test	unbotek Anbo ek al	ot ^{ek} P
botek	See the IEC 61326 series.	Anborek Anbor At	mot P
6.21	Test for temperature rise	abotek Anbota	Prek
botek	The transducer shall be energized as follows:	it botek Anboro	Р
Anbot	each current circuit shall carry a current of 1,1 times the nominal current and	otek Anbotek Anbotek	P
lek An	each voltage circuit shall be supplied with a voltage of 1,2 times the nominal voltage.	Anbotek Anbotek Ant	otek P
Anbotek Anbotek	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.	Anbotek Anbotek Anbotek Anbotek	Anbotek Anbotek
Anbor	The temperature rise of the following parts of the transducer shall not exceed:	otek Anborek Anbore	PAND
-k pro	for input circuits: 60 K;	inboin Ak hotek and	Р
,0 ¹⁰	for the exterior surface: 25 K.	Anbore k sofek	P
6.22	Other tests	Anboien Anbo tek	Anto P
Anborek	If, by agreement, other tests are required, refer to the following publications:	Anborek Anborek	Roote
Prov	for vibration: IEC 60068-2-6:	and how otek anbotel	PAND

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Clause	Requirement + Test	Result - Remark	Verdict
s. Aur	stek photek Anbo, An botek	Anbote, And ab	otek
potek I	for shock: IEC 60068-2-27;	Anbotek Anbo ek	boteP
nbotek	for electromagnetic compatibility: IEC 61 326-1.	Anbotek Anbor A	Ret
7 potek	Marking and information	k nbotek Anbore	Pote
7.1	Marking on the case	Lek obotek Anbote	Р
k Anb otek 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.	Anbotek	P ^{Arrit} Potek
hotek	a) Manufacturer's name or mark.	An hotek Anboten	And P stel
Anthotek	b) Manufacturer's type designation.	Ant hotek Anbotek	Р
Anu	c) Serial number or date code.	ore Anu otek Anbotek	Panbi
ofek An	d) Software version (version of software that resides in the transducer (if any, for digital transducers only)).	Anbotek Anbotek Anbot	N
nbor	e) Class index (symbol E-1 0 or E-1 1).	Anbois All hotek	AnboP
Anbotek	f) Nature of the measurand and number of circuits (symbol B-2, B-4 or B-6 to B-1 0).	Anbore And	Poten
Anbo	g) Lower and upper nominal values of the measurand.	potek Anbotek Anbote	P
	h) Ratios of current transformers and voltage transformers, if any, with which the transducer is intended to be used.	Anbotek Anbot An Anbotek Anbotek Ant	otek P
Anboron	i) Range of values of the output current (voltage) and output load within which specified	Anbortek Anbortek	AntPrek
pr.	operation is obtained (analogue signals only).	Anbotek Anbote	Ann
ek An	j) Limits of the measuring range, if appropriate (see 5.9).	nbotek Anbotek Anbote	P An
potek	k) Serial number(s) of the associated equipment, if applicable.	Anbotek Anboten And	nboteR
Anbore	I) Value(s) of the auxiliary supply, if relevant.	Anboro An hotek	AntePter
Anbote	m) Symbol showing that some other essential information is given in a separate document (symbol F-33).	otek Anbotek Anbotek otek Anbotek Anbotek	Proof
Su Pur	n) Space for adjustment data (if appropriate).	inboten Anbo	^{rek} P
hotek I	o) Nominal range of use for temperature, symbolized as usage group I, II or III.	Anboten Antoniek A	nbote ^P P
Annatek	p) Common mode voltage.	And sotek unbotek	Anbo
Anou	q) Overvoltage category (see IEC 61 01 0 series).	Anbo otek Anbotek	N
Aupor	r) Pollution degree according to IEC 61 01 0 series	oren Anbo A botek	PAnb

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Clause	Requirement + Test	Result - Remark	Verdict
an Ann	tak pobotak Antoo Ar potak	Anbote, And tek ob	otek l
otek p	s) Other required safety symbols according to IEC 61 01 0-1 .	Anbotek Anbor A.	ibote P
	If the markings and symbols are on an easily removable part, such as a cover, the transducer	Anbotek Anbotek	Anb P Anbote
Anbore	marked on the body of the transducer.	otek Anbore Antohotek	Anb
otek Anb.	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.	Anbotek Anbotek Anbo	ootek
7.2	Markings relating to the reference conditions and nominal ranges of use for transducers	anbotek Anbotek	Ant P Anbotek
7.2.1 Anbo	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.	otek Anbotek Anbotek Anbotek Notek Anbotek Anbotek Anbot	P _{Anb} c
7.2.2	When a reference value or a reference range is marked, it shall be identified by underlining.	Anbotek Anbotek An	P. P. Anbotek
7.2.3	Table 6 shows the significance of the various markings, for example for temperature.	Anbore And	Potek
p. not	Three or four numbers shall always be used.	ak hotek Anbote	P
7.3	Identification of connections and terminals	nooth Ant botek Anbote	P P
anbotek	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.	Anbotek Anbotek Ant Anbotek Anbotek Ant Anbotek Anbotek	oten P Inbotek
Anbotek	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	nt Anbotek Anbotek hotek Anbotek Anbotek	Panbot
botek	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.	Anbotek Anbotek Anb	nbotek
Anboter.	The earthing terminal(s) shall be marked using symbol(s) F-31 and/or F-42 to F-45, as appropriate.	Anbotek Anbotek	AnbPiek
7.4	Information to be given in a separate document	All hotek Anboten	Р
ak Anb	The following information shall be given in the document supplied with the transducer:	obotek Anbotek Anbotek	Р
otek p	response time;	abotek Anbote Anb	Р
Anbotek	the variation due to a magnetic field of external origin;	Anbotek Anboten A	Р

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 Clause
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ause	Inequirement + rest	Nesuli - Nemark Veruici
PUD	rek abotek Anbon k antek	Anboten And tek stootek A
otek p	the actual relationship between input and output. (see required indications according to type of curves given in 5.3 for output current transfer functions).	Anbotek Anbotek A
Aller all	c boten Anot	prin prin poter

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Attachment 1: Photo documentation





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Attachment 1: Photo documentation





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Attachment 1: Photo documentation

Photo 5 -12 11 10 6 . S 0000 12 1 2 3 5 8 9 4 7 10 11 12 13 14 15 16 1 6 5 6 3 4 64

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

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