



SLOVENSKI STANDARD
oSIST prEN IEC 62828-1:2024
01-maj-2024

Referenčni pogoji in postopki za preskušanje industrijskih in procesnih merilnih oddajnikov - 1. del: Splošni postopki za vse vrste oddajnikov

Reference conditions and procedures for testing industrial and process measurement transmitters - Part 1: General procedures for all types of transmitters

Referenzbedingungen und Testmethoden für Industrie- und Prozessmessgrößenumformer - Teil 1: Allgemeine Testmethoden für alle Arten von Messumformern

Conditions de référence et procédures pour l'essai des transmetteurs de mesure industrielle et de processus - Partie 1: Procédures générales pour tous les types de transmetteurs

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ICS:

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OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Reference conditions and procedures for testing industrial and process measurement transmitters - Part 1: General procedures for all types of transmitters

PROPOSED STABILITY DATE: 2029

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

REFERENCE CONDITIONS AND PROCEDURES FOR TESTING INDUSTRIAL AND PROCESS MEASUREMENT TRANSMITTERS

Part 1: General procedures for all types of transmitters

FOREWORD

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195 International Standard IEC 62828-1 has been prepared by Subcommittee 65B: Measurement
196 and control devices, of IEC Technical Committee 65: Industrial-process measurement, control
197 and automation.

198 The text of this standard is based on the following documents:

FDIS	Report on voting

199
200 Full information on the voting for the approval of this standard can be found in the report on
201 voting indicated in the above table.

202 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

203 The committee has decided that the contents of this publication will remain unchanged until the
204 stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to
205 the specific publication. At this date, the publication will be

- 206 • reconfirmed,
207 • withdrawn,
208 • replaced by a revised edition, or
209 • amended.

210

211 The National Committees are requested to note that for this publication the stability date
212 is 202X.

213 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
214 AT THE PUBLICATION STAGE.

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222

INTRODUCTION

223 Most of the current IEC standards on industrial and process measurement transmitters are
224 rather old and were developed having in mind devices based on analogue technologies. Today's
225 digital industrial and process measurement transmitters are quite different from those analogue
226 transmitters: they include more functions and newer interfaces, both towards the computing
227 section (mostly digital electronic) and towards the measuring section (mostly mechanical). Even
228 if some standards dealing with digital process measurement transmitters already exist, they are
229 not sufficient, since some aspects of the performance are not covered by appropriate test
230 methods.

231 In addition, existing IEC test standards for industrial and process measurement transmitters are
232 spread over many documents, so that for manufacturers and users it is difficult, impractical and
233 time-consuming to identify and select all the standards to be applied to a device measuring a
234 specific process quantity (pressure, temperature, flow, level, etc.).

235 To help manufacturers and users, it was decided to review, complete and reorganize the
236 relevant IEC standards and to create a more suitable, effective and comprehensive standard
237 series that provides in a systematic way all the necessary specifications and tests required for
238 different industrial and process measurement transmitters.

239 To solve the issues mentioned above and to provide an added value for the stakeholders, the
240 new standard series on industrial and process measurement transmitters covers the following
241 main aspects:

- 242 • Applicable normative references
- 243 • Specific terms and definitions
- 244 • Typical configurations and architectures for the various types of industrial and process
245 measurement transmitters
- 246 • Hardware and software aspects
- 247 • Interfaces (to the process, to the operator, to the other measurement and control
248 devices)
- 249 • Physical, mechanical and electrical requirements and relevant tests; clear definition of
250 the test categories: type tests, acceptance tests and routine tests
- 251 • Performance (its specification, tests and verification)
- 252 • Environmental protection, hazardous areas application, functional safety, etc.
- 253 • Structure of the technical documentation.

254

255 To cover in a systematic way all the topics to be addressed, the standard series is organized in
256 several parts. An updated list of all parts of the IEC 62828-x series, published under the general
257 title "Reference conditions and procedures for testing industrial and process measurement
258 transmitters", can be found on the IEC website. At the moment of the publication of this
259 standard, the IEC 62828 consists of the following parts:

- 260 • Part 1: General procedures for all types of transmitters
- 261 • Part 2: Specific procedures for pressure transmitters
- 262 • Part 3: Specific procedures for temperature transmitters
- 263 • Part 4: Specific procedures for level transmitters
- 264 • Part 5: Specific procedures for flow transmitters

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REFERENCE CONDITIONS AND PROCEDURES FOR TESTING INDUSTRIAL AND PROCESS MEASUREMENT TRANSMITTERS

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Part 1: General procedures for all types of transmitters

1. Scope

275
276 This Part of IEC 62828 establishes a general framework for defining reference conditions and
277 test procedures applicable for assessing the measurement performances of all types of
278 industrial and process measurement transmitters (PMTs) used in measuring and control
279 systems for industrial process and machinery.

280 For the purpose of this document, an analogue PMT is a process measurement transmitter with
281 only analogue current and/or voltage output(s), irrespective the technology adopted and the
282 complexity of the circuitry. All the other process measurement transmitters, with digital output(s)
283 only or with hybrid analogue and digital output(s), are considered to be digital PMTs.

284 This part of IEC 62828 constitutes a common reference for the other parts of the series.

285 Specific test procedures and additional requirements for given types of PMTs (pressure,
286 temperature, level, flow, etc.) are covered by other parts of this series.

287 Proximity devices according IEC 60947-series with analogue output are excluded from the
288 scope of this standard.

289 Note 1: in industrial and process applications, to indicate the process measurement transmitters it is common also
290 to use the terms “industrial transmitters”, or “process transmitters”.

291 Note 2: for better clarity, when the complete definition “industrial and process measurement transmitter” makes the
292 sentence too long in this standard, the short term “transmitter”, or PMT, is used instead.

293

2. Normative references

294
295 The following referenced documents are indispensable for the application of this document. For
296 dated references, only the edition cited applies. For undated references, the latest edition of
297 the referenced document (including any amendments) applies.

298 IEC 60050-300:2020, *International Electrotechnical Vocabulary (IEV)*
299 – *Electrical and electronic measurements and measuring instruments*
300 – *Part 311: General terms relating to measurements*
301 – *Part 312: General terms relating to electrical measurements*
302 – *Part 313: Types of electrical measuring instruments*
303 – *Part 314: Specific terms according to the type of instrument*
304

305 IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

306 IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

307 IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

308 IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests - Test Ea and guidance: Shock*

309 IEC 60068-2-31:2008, *Environmental testing – Part 2-31: Tests – Test Ec: Rough handling*
310 *shocks, primarily for equipment-type specimens*

311 IEC 60068-2-78:2012, *Environmental testing – Part 2-78:Tests – Test Cab: Damp heat, steady*
312 *state*

313

- 314 IEC 60079 (all parts), *Electrical apparatus for explosive gas atmospheres*
- 315 IEC 60529:1989 + Amd1:1999 + Amd2:2013, *Degrees of protection provided by enclosures (IP*
316 *code)*
- 317 IEC 60654-1:1993, *Industrial-process measurement and control equipment - Operating*
318 *conditions - Part 1: Climatic conditions*
- 319 IEC 60654-3:1983, *Operating conditions for industrial-process measurement and control*
320 *equipment - Part 3: Mechanical influences*
- 321 IEC 60654-4:1987, *Operating conditions for industrial-process measurement and control*
322 *equipment. Part 4: Corrosive and erosive influences.*
- 323 IEC 61158 (all parts), *Industrial communication networks – Fieldbus specifications*
- 324 IEC 61326-1:2020, *Electrical equipment for measurement, control and laboratory use - EMC*
325 *requirements - Part 1: General requirements*
- 326 IEC 61499 series, *Function blocks*
- 327 IEC 61804 (all parts), *Function blocks (FB) for process control*
- 328 IEC 61918:2018 *Industrial communication networks - Installation of communication networks in*
329 *industrial premises*
- 330 IEC 61987-1:2006, *Industrial-process measurement and control - Data structures and elements*
331 *in process equipment catalogues - Part 1: Measuring equipment with analogue and digital*
332 *output*
- 333 IEC 61987-11:2016, *Industrial-process measurement and control - Data structures and*
334 *elements in process equipment catalogues - Part 11: List of Properties (LOP) of measuring*
335 *equipment for electronic data exchange - Generic structures*
- 336 IEC 61987-13:2016, *Industrial-process measurement and control - Data structures and*
337 *elements in process equipment catalogues - Part 13: Lists of properties (LOP) for pressure*
338 *measuring equipment for electronic data exchange*
- 339 IEC 62262:2002, *Degrees of protection provided by enclosures for electrical equipment against*
340 *external mechanical impacts (IK Code)*
- 341 IEC 62381:2012, *Automation systems in the process industry - Factory acceptance test (FAT),*
342 *site acceptance test (SAT) and site integration test (SIT)*
- 343 ISO 10012:2004, *Measurement management systems - Requirements for measurement*
344 *processes and measuring equipment*
- 345 ISO/IEC Guide 98-3:2008, *Uncertainty of measurement - Part 3: Guide to the expression of*
346 *uncertainty in measurement (GUM:1995)*
- 347 ISO/IEC Guide 99:2007, *International Vocabulary of Metrology - Basic and general concepts*
348 *and associated terms (VIM:2007)*

349 **3. Terms, definitions and abbreviated terms**

350 **3.1 Terms and definitions**

351 For the purposes of this document, the following terms and definitions apply.

352 ISO and IEC maintain terminological databases for use in standardization at the following
353 address:

- 354 • IEC Electropedia; available at <http://www.electropedia.org>
- 355 • ISO Online browsing platform: available at <http://www.iso.org/obp>

356 The terms are divided in four groups for consistency.

357 3.1.1 Terms related to accuracy

358 3.1.1.1

359 **accuracy (of a measuring instrument)**

360 quality which characterizes the ability of a measuring instrument to provide an indicated value
361 close to a true value of the measurand

362 Note 1 to entry: This term is used in the "true value" approach.

363 Note 2 to entry: Accuracy is all the better when the indicated value is closer to the corresponding true value.

364 [SOURCE: IEC 60050-311:2001, 311-06-08]

365 3.1.1.2

366 **communication interface**

367 Interface for input or output of variable parameters (e.g. correction of the characteristic curve)
368 and data (e.g. measurement and calibration data, electronic nameplate, device status) of the
369 pressure transmitter.

370 3.1.1.3

371 **conformity**

372 ability of a measuring instrument to provide an indication having a specified characteristic curve
373 which can be linear, logarithmic, parabolic, etc.

374 3.1.1.4

375 **dead band (dead zone)**

376 finite range of values within which a variation of the input variable does not produce any
377 measurable change in the output variable

378 Note 1 to entry: When this type of characteristic is intentional, it is sometimes called neutral zone

379 Note 2 to entry: This entry was numbered 351-24-14 in IEC 60050-351:2006.

380 Note 3 to entry: This value is usually insignificant for the actual instruments.

381 [SOURCE: IEC 60050-351:2013, 351-45-15, modified (Note 3 added)]

382 3.1.1.5

383 **error**

384 discrepancy between a computed, observed or measured value or condition, and the true,
385 specified or theoretically correct value or condition

386 Note to entry: An error within a system may be caused by failure of one or more of its components, or by activation
387 of a systematic fault.

388 [SOURCE: IEC 60050-192:2015, 192-03-02]

389 3.1.1.6

390 **hysteresis**

391 phenomenon represented by a characteristic curve which has a branch, called ascending
392 branch, for increasing values of the input variable, and a different branch, called descending
393 branch, for decreasing values of the input variable

394 Note to entry: the CDD code of this entry for Electronic Data Exchange is ABB661 and the hysteresis is defined as
395 the difference between consecutive upscale and downscale outputs for any single test cycle at the same input test
396 point

397 [SOURCE: IEC 60050-351:2013, 351-45-16, modified (Note to entry added)]

398 3.1.1.7

399 **inaccuracy**

400 maximum positive and negative deviation from the specified characteristic curve observed in
401 testing a device under specified conditions and by a specified procedure

402 Note to entry: Accuracy is defined in IEC 60050-300, definition 311-06-08.

403 3.1.1.8

404 **linearity**

405 ability of a measuring instrument to provide an indication having a linear relationship with a
406 defined quantity other than an influence quantity

407 Note to entry: The method of expression of lack of linearity is different for different kinds of instrument and is
408 established in each particular instance.

409 [SOURCE: IEC 60050-311:2001, 311-06-05]

410 3.1.1.9

411 **long term drift**

412 drift in output monitored for 30 days at 90 % of span

413 [SOURCE: IEC 61987-1:2008, 3.22]

414 3.1.1.10

415 **long term stability**

416 drift of zero output signal in percent of full scale limit after a given period of normal operating conditions

417 Note 1 to entry: the long term stability can be evaluated over a different period of time, e.g. 6 months, 1, 2 or 5 years.
418 Sometime manufacturers declare a life-time stability.

419 Note 2 to entry: depending the type of PMT, the drift can be referred to an upper range limit (e.g. digital pressure
420 PMTs), a fixed value (e.g. certain level PMTs), a full scale (e.g. some analogue PMTs), etc.

421 Note 3 to entry: the CDD code of this entry for Electronic Data Exchange is ABB551, modified (time period)

422 3.1.1.11

423 **measured error**

424 largest positive or negative value of errors of the average upscale or downscale values at each
425 point of measurement

426 3.1.1.12

427 **measuring range**

428 range defined by two values of the measurand, or quantity to be supplied, within which the limits of
429 uncertainty of the measuring instrument are specified

430 Note to entry: An instrument can have several measuring ranges

431 [SOURCE: IEC 60050-311:2001, 311-03-12]

432 3.1.1.13

433 **non-conformity**

434 deviation from ideal behavior for devices that have a non-linear input/output relationship (which can be
435 linear, logarithmic, parabolic, etc.), determined from the curve plotted using the overall average of
436 corresponding upscale and downscale errors

437 Note 1 to entry: Non-conformity can be calculated and expressed in one of three ways:

438 – independent: curve positioned so as to minimize the maximum deviation;

439 – terminal-based: curve positioned so as to coincide with the actual characteristic curve at the upper and lower
440 range-values;

441 – zero-based: curve positioned so as to coincide with the actual characteristic curve at the lower range-value.

442 Note 2 to entry: The corresponding properties are to be found in the CDD.

443 [SOURCE: IEC 61987-13:2016, modified]

444 3.1.1.14

445 **non-linearity**

446 deviation from ideal behavior for devices that have a linear input/out relationship, determined
447 from the curve plotted using the overall average of corresponding upscale and downscale errors

448 Note 1 to entry: Non-linearity can be calculated and expressed in one of three ways:

449 – independent: line positioned so as to minimize the maximum deviation;

450 – terminal-based: line positioned so as to coincide with the actual characteristic curve at the upper and lower range-
451 values;

452 – zero-based: line positioned so as to coincide with the actual characteristic curve at the lower range-value.

453 Note 2 to entry: The corresponding properties are to be found in the CDD.