PRÜFEINRICHTUNGEN TEST EQUIPMENT
PTL Dr. Grabenhorst GmbH
D-95343 Stadtsteinach P.O. BOX 12 53
physics
technics
lab-topics

Test Sphere Ø 50 mm without handle

to prove the degree of protection **IP1X** "Protected against solid foreign objects of diameter 50 mm and more"
according to **IEC** (e. g. **529** / 11.89 § 13.1 Table VII) and
VDE (e. g. **0470** Part 1 / 11.92 § 13.1 Table 7), **Article No.: P 10.22**

Test Sphere Ø 50 mm with handle

to prove the degree of protection **IP1XA** "Protected against access to hazardous parts with the back of the hand"
according to **IEC** (e. g. **529** / 11.89 § 12.1 Table VI)
as well as **VDE** (e. g. **0470** Part 1 / 11.92 § 12.1 Table 6 and **0106** Part 100 § 2.5),

without dynamometer, b), e) **Article No.: P 10.09**
with dynamometer 0...50 N, c), d) **Article No.: P 10.24** (Fig.)

Test Sphere Ø 12,5 mm without handle

to prove the degree of protection **IP2X** "Protected against solid foreign objects of diameter 12,5 mm and more"
according to **IEC** (e. g. **529** / 11.89 § 13.1 Table VII) and
VDE (e. g. **0470** Part 1 / 11.92 § 13.1 Table 7), **Article No.: P 10.23**

Test Sphere Ø 12,5 mm with handle

to prove the degree of protection **IP2X** " Protected against solid foreign objects of diameter 12,5 mm and more"
according to **DIN** (e. g. **40 050** Part 9 / 5.93 § 7.3.2 Table 6),

without dynamometer, b) **Article No.: P 10.10**
with dynamometer 0...30 N, c), d) **Article No.: P 10.25** (Fig.)

IEC Steel Rod Ø 2,5 mm, 100 mm long, spherical stop

to prove the degrees of protection **IP3XC** and **IP3X** "Protected against access to hazardous parts with a tool and against solid foreign objects of diameter 2,5 mm and more"
according to **IEC** (e. g. **529** / 11.89 § 12.1 Table VI and § 13.1 Table VII)
as well as **VDE** (e. g. **0470** Part 1 / 11.92 § 12.1 Table 6 and § 13.1 Table 7),

without dynamometer, a), b) **Article No.: P 10.16**
with dynamometer 3 N, b) **Article No.: P 10.26** (Fig.)

IEC Steel Wire Ø 1 mm, 100 mm long, spherical stop

to prove the degrees of protection **IP4XD, IP5XD, IP6XD** and **IP4X** "Protected against access to hazardous parts with a wire and against solid foreign objects of diameter 1 mm and more "
according to **IEC** (e. g. **529** / 11.89 § 12.1 Table VI and § 13.1 Table VII)
as well as **VDE** (e. g. **0470** Part 1 / 11.92 § 12.1 Table 6 and § 13.1 Table 7),

without dynamometer, a), b) **Article No.: P 10.17** (Fig.)
with dynamometer 1 N, b) **Article No.: P 10.27**

a), b), c)...: remarks see 2 pages ahead

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Geschäftsführer / PRESIDENT: Dr.-Ing. Dieter Grabenhorst VDE / VDI REG.: Amtsgericht Bayreuth, HRB 1096
USt.-Id.Nr. / VAT No.: DE 133083240
Telefon / TELEPHONE: (0 92 25) 9 86-0 **email:** info@ptl-test.de
Telefax / TELEFAX: (0 92 25) 9 86-40 **http:**//www.ptl-test.de

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Short Test Pin Ø 3 mm / Ø 4 mm, 15 mm long, b), e)
according to **IEC** (e. g. **335-1** / 4.91 § 8.1.2 Fig. 2),
CEE (e. g. **10** Part 1 / 10.64 § 8a Fig. 2),
and **VDE** (e. g. **0700** Part 1 / 11.90 § 8.1 Fig. 2), **Article No.: P 10.11**

Long Test Pin Ø 3 mm / Ø 4 mm, 50 mm long, b), e)
according to **IEC** (e. g. **1032** / 8.90 § 6.2 Fig. 7)
and **CEE** (e. g. **11** Part I / 4.64 § 8c Fig. 3), **Article No.: P 10.02**

Test Mandrel Ø 30 mm, 80 mm long, a), b), c)
according to **IEC** (e. g. **335-1** / 4.91 § 8.1.3 Fig. 3),
CEE (e. g. **11** Part I / 4.64 § 8a Fig. 2)
and **VDE** (e. g. **0700** Part 1 / 11.90 § 8.1 Fig. 3), **Article No.: P 10.03**

Test Needle Ø 1 mm, 20 mm long, a), b), c)
according to **IEC** (e. g. **65** / 1985 § 9.1.4 Fig. 6)
and **VDE** (e. g. **0860** Part 1 / 5.89 § 9.1.4 Fig. 6), **Article No.: P 10.06**

Test Nail
to pin up at a Push and Pull Dynamometer or at a Rigid Test Finger with integrated dynamometer,
according to **IEC** (e. g. **335-1** / 4.91 § 22.11 Fig. 10), **Article No.: P 10.41**

Test Needle Ø 0,5 mm, 20 mm long, a), b), c)
according to **IEC** (e. g. **1032** / 8.90 § 6.2.1 Fig. 12)
and **VDE** (e. g. **0470** Part 2 / Draft 4.93 § 6.2.1 Fig. 12), **Article No.: P 10.46**

Test Rod Ø 25 mm, 80 mm long, a), b), c)
conical stop, front flat, interchangeable: metal/plastics,
according to **IEC** (e. g. **1032** / 8.90 § 6.2.2 Fig. 13 and 14) as well as
VDE (e. g. **0470** Part 2 / Draft 4.93 § 6.2.2 Fig. 13 and 14), **Article No.: P 10.55**

Test Bar width 125 mm, 5 mm thick, 270 mm long, a), b)
according to **IEC** (e. g. **1032** / 8.90 § 6.2.3 Fig. 17)
and **VDE** (e. g. **0470** Part 2 / Draft 4.93 § 6.2.3 Fig. 17), **Article No.: P 10.56**

Test Bar width 50 mm, 5 mm thick, 175 mm long, a), b)
according to **IEC** (e. g. **1032** / 8.90 § 6.2.3 Fig. 18)
and **VDE** (e. g. **0470** Part 2 / Draft 4.93 § 6.2.3 Fig. 18), **Article No.: P 10.57**

Test Bar width 3 mm, 1 mm thick, 80 mm long, a), b), c)
according to **IEC** (e. g. **1032** / 8.90 § 6.2.1 Fig. 9)
and **VDE** (e. g. **0470** Part 2 / Draft 4.93 § 6.2.1 Fig. 9), **Article No.: P 10.58**

Test Rod Ø 6 mm, with 90° tip, 80 mm long, a), b), c)
according to **IEC** (e. g. **1032** / 8.90 § 6.2.2 Fig. 15)
and **VDE** (e. g. **0470** Part 2 / Draft 4.93 § 6.2.2 Fig. 15), **Article No.: P 10.59**

a), b), c)...: remarks see page ahead

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Firmensitz / DOMICILE: Industriestrasse 15, D-95346 Stadtsteinach
Geschäftsführer / PRESIDENT: Dr.-Ing. Dieter Grabenhorst VDE / VDI, REG.: Amtsgericht Bayreuth, HRB 1096
USt.-Id.Nr. / VAT No.: DE 133083240
Telefon / TELEPHONE: (0 92 25) 9 86-0
email: info@ptl-test.de
Telefax / TELEFAX: (0 92 25) 9 86-40
http://www.ptl-test.de

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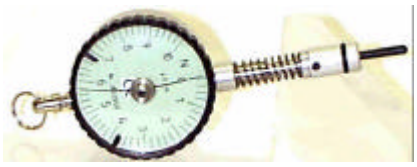
Push and Pull Dynamometers d), f)

to apply forces with Test Fingers, Test Hooks and so on
according to **IEC** (e. g. **884-1** / 6.94 § 10.1),
CEE (e. g. **7** / 5.63 § 9a and **20** Part 1 / 5.73 § 8.1),
EN (e. g. **60 335-1** / 1988 § 8.1)
as well as **VDE** (e. g. **0470** Part 1 / 11.92 § 12.1 and § 13.1),



with circular scale	0.....10 N	**Article No.: P 10.30**	(Fig.)
with circular scale	0.....50 N	**Article No.: P 10.31**	
with circular scale	0...100 N	**Article No.: P 10.32**	
with circular scale	0...250 N	**Article No.: P 10.33**	
with linear scale	0.....10 N	**Article No.: P 10.34**	
with linear scale	0.....50 N	**Article No.: P 10.35**	
with linear scale	0...100 N	**Article No.: P 10.36**	(Fig.)
with linear scale	0...250 N	**Article No.: P 10.37**	

Adapter Ø 12 mm / Ø 10 mm

to fix the probes with handle Ø 10 mm to the Push and Pull Dynamometers, **Article No.: P 10.61**

Test Hook

according to **IEC** (e. g. **65** / 1985 § 8.2 Fig. 4)
and **VDE** (e. g. **0860** Part 1 / 5.89 § 8.2 Fig. 4), **Article No.: P 10.40**

Electrical Contact Indicator

with transformer 230 V/42 V 25 mA 50-60 Hz,
with pilot lamp 36-45 V / 2 W, with 2 connecting leads and with 2 tapping clips
according to **IEC** (e. g. **529** / 11.89 § 12.2 and **598-1** /6.92 § 8.2.5),
CEE (e. g. **7** / 5.63 § 9a and **10** Part 1 / 10.64 § 8a),
EN (e. g. **60 335-1** / 1988 § 8.1) as well as
VDE (e. g. **0470** Part 1 / 11.92 § 12.2), **Article No.: P 10.28**

W o r k m a n s h i p : The active parts of the test fingers and -pins consist of hardened stainless steel. The isolating parts are made of POM (Polyoxymethylene).

a) with longitudinal bore Ø 12 mm at the end of the handle to pin up at the rod Ø 12 mm of a Push and Pull Dynamometer

b) with longitudinal bore Ø 4 mm in the handle to connect a test lead with banana plug

c) with radial bore Ø 4 mm in the handle to connect a test lead with banana plug, necessary if a Push and Pull Dynamometer is mounted

d) with eyelet and key ring at the rod protruding from the handle, to measure pull forces, e. g. with the Test Hook P 10.40

e) to pin up at a Push and Pull Dynamometer by means of the Adapter Ø 12 mm / Ø 10 mm, Article No. P 10.61

f) with rod Ø 12 mm at one end to apply push forces, e. g. to the probes marked with a)

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USt.-Id.Nr. / VAT No.: DE 133083240
Telefon / TELEPHONE: (0 92 25) 9 86-0
email: info@ptl-test.de
Telefax / TELEFAX: (0 92 25) 9 86-40
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PTL Dust Test Chamber

for checking the protection against solid foreign objects to verify the degrees of protection IP5X "Dust-protected" and IP6X "Dust-tight"

according to **IEC 60529** / 1989-11 § 13.1 Table VII Fig. 2,

Sense and purpose

Enclosures with the degree of protection IP5X "Dust-protected" do not have to prevent ingress of dust totally. However dust should not penetrate in an amount sufficient to interfere with the satisfactory operation of the equipment enclosed or to impair safety.

In the case of enclosures with degree of protection IP6X "Dust-tight", it is necessary to prove that no dust can penetrate into the inside of the enclosure.

Test equipment

The tests are carried out by means of a dust chamber with a sealed test cabinet, in which talcum powder is kept in suspension by means of an air stream. The talcum powder must be prepared in such a manner that it will pass through a sieve with a mesh size 0,075 mm.

The quantity of talcum given in the regulation is 2 kg per cubic metre test cabinet volume.

Test procedure

The enclosure under test is suspended in the test cabinet and connected to a vacuum pump. This produces inside the specimen a depression of maximum 2 kPa = 20 mbar (= approx. 200 mm water column) below atmospheric pressure.

The test is completed after 2 hours, if within 2 hours 80 to 120 times the air volume of the specimen has been drawn through.

Firmensitz / DOMICILE: Industriestrasse 15 DE - 95346 Stadtsteinach
Geschäftsführer / PRESIDENT: Jürgen Grabenhorst VDE / VDI REG.: Amtsgericht Bayreuth, HRB 1096
USt.-Id. Nr. / VAT No.: DE 811392275
Telefon / TELPHONE: +49 (0 92 25) 9 86-0
Telefax / TELEFAX: +49 (0 92 25) 9 86-40
email: info@ptl-test.de **http://www.ptl-test.de**

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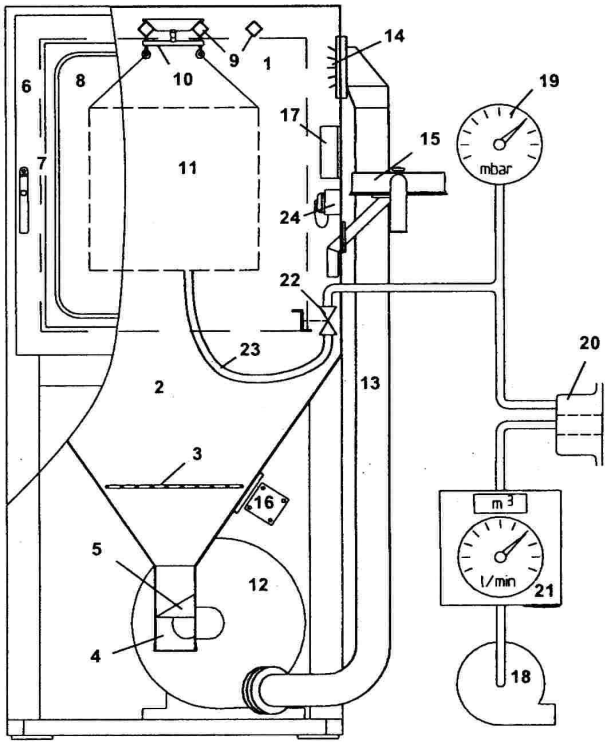
Standard outfit:

1 test cabinet (1) with inner dimensions: width = 800 mm, height = 900 mm, depth depending on size, doorway: width = 660 mm, height = 760 mm, with solid door threshold suitable for supporting heavy specimens, dust catch channel outside beneath the door threshold,

1 to 3 funnel shaped bottoms (2), coarse mesh protective grids (3) to protect the dust circulation pumps from large parts, square shaped funnel drains (4) with removable bottom caps, with repellent sheets (5) above the intake openings to protect the dust circulation pumps from small solids,



1 front door (6), with lock and key, with adjustable rubber seal, with hinges and handle (7), surface of the window pane behind the door threshold, thereby scarcely any trickling of dust when the door is opened, window (8) of safety glass with hand-operated window wiper,

4 square slide rails (9) with 1 or 2 slides (10) beneath the ceiling, to suspend the specimen (11),

1 to 3 dust circulation pumps (12) with transfer pipes (13) and dust distribution outlets (14),

1 pressure compensation device (15) with exchangeable filter element,

1 to 3 electric vibrators (16) at the funnels, to remove dust deposition from the walls,

1 to 3 electric heating elements (17) inside of the test cabinet to keep the talcum powder dry to avoid agglomeration,

1 depression indicator (19), scale to -40 mbar,

1 vacuum pump (18), to cause a depression inside of the specimen,

1 dust filter (20) with exchangeable filter element, to collect the dust, which has been exhausted out of the specimen,

1 air volume meter (21) with pointer and counter,

1 vacuum connecting fitting with shut-off valve (22), with hose (23) to connect the specimen,

1 socket-outlet (24) inside of the test cabinet for energizing the specimen, two-pole with side earthing contacts according to CEE 7 Standard Sheet III, connectable to a separate voltage source, too.

In the control cabinet: main switch, key switch, switches for the functions each, programmable timer as Unit Timer for the complete installation, as Interval Timer for the socket-outlet and to control the vibration.

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Selling sizes and outfit variants:

Test cabinet internal depth:	Dust circulations:	Rear door:	Article No.:
1.000 mm	1	no	**P 14.41**
1.000 mm	1	yes	**P 14.41-2**
1.200 mm	1	yes	**P 14.42**
2.000 mm	2	yes	**P 14.44**
2.400 mm	2	yes	**P 14.45**
3.000 mm	3	yes	**P 14.46**

Design:

Manufactured from rectangular stainless steel tubes and stainless sheet steel, outside sprayed with primer and with papyrus-white structure-varnish with stone-grey highlights, inside pickled,

control cabinet with control and monitoring elements located on the right-hand side, instrument board, control panel and base door of control cabinet made of anodized aluminium,

for connection to three-phase 3 x 400 V 50 Hz, mains connection cable 3 m with 5pole plug CEE 17, Standard Sheet II, 16 A 3 P + N + PE.

Rear door designed and equipped exactly like the front door, however mounted axially symmetrical to the front door in the rear wall.

Programmable timer, Type Siemens LOGO! as Unit Timer for the complete installation, as Interval Timer for the socket-outlet and to control the vibration.

Accessories:

Talcum powder, additional, for refill, 1 bucket with 10 kg, **Article No.: P 14.82**
Testing sieve, to check the talcum powder,
nominal width of mesh 0,075 mm, **Article No.: P 14.83**

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USt.-Id. Nr. / VAT No.: DE 811392275
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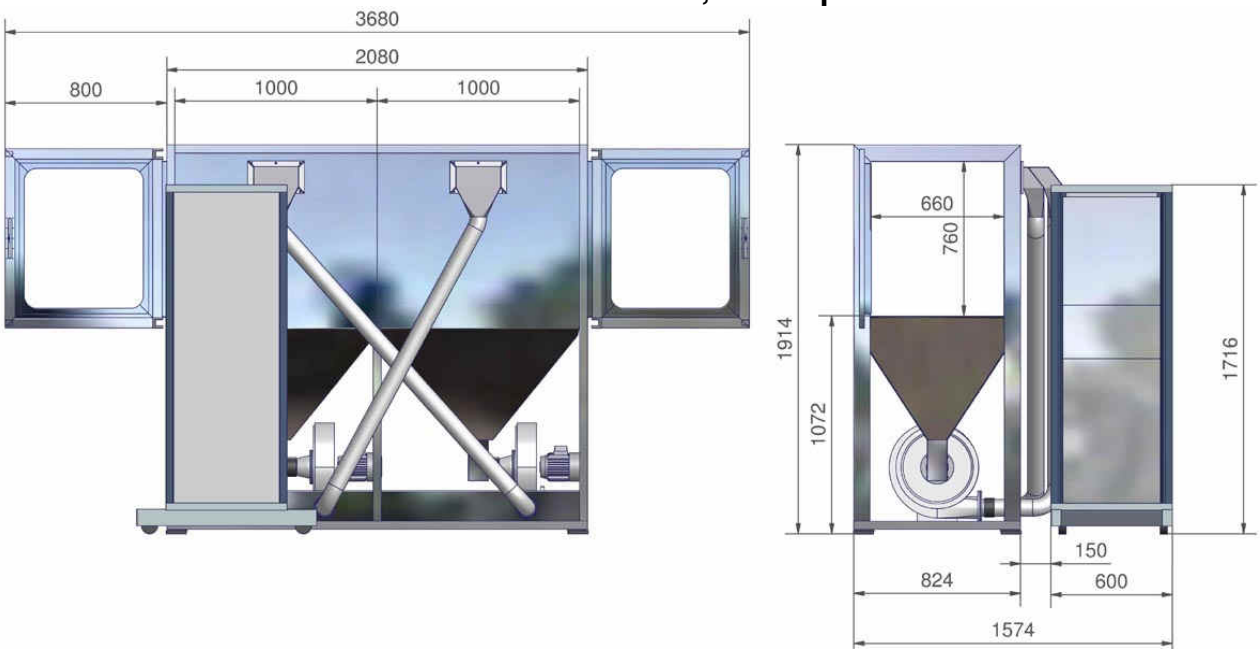
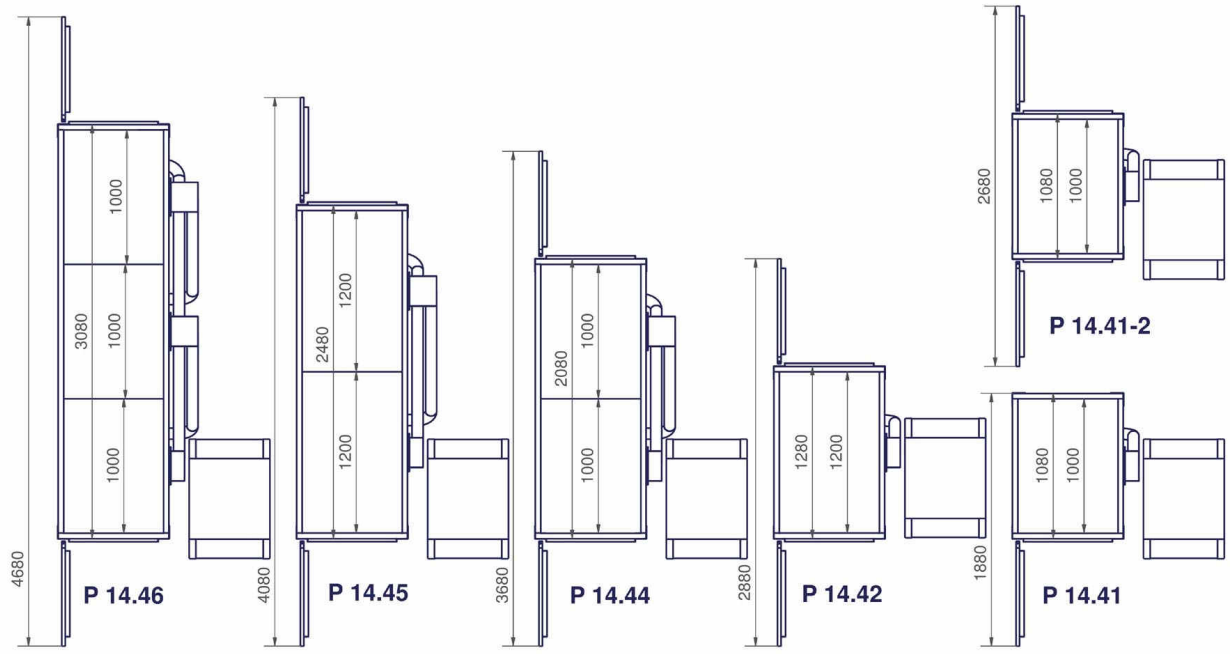
Dimensions of PTL Dust Test Chamber, example P 14.44



Internal depth: 2.000 mm, 2 sections at 1.000 mm each
Overall depth: with closed doors: 2.360 mm, with opened doors: 3.680 mm
Overall width: 1.574 mm
Overall height: 1.900 mm + 14 mm for Insulation plates as vibration dampers
Tolerance of all dimensions: +/- 10 mm

Depths of PTL Dust Test Chamber



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Industriestrasse 15
DE - 95346 Stadtsteinach

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Jürgen Grabenhorst VDE / VDI
REG.: Amtsgericht Bayreuth, HRB 1096

USt.-Id. Nr. / VAT No.:
DE 811392275

Telefon / TELPHONE:
+49 (0 92 25) 9 86-0

Telefax / TELEFAX:
+49 (0 92 25) 9 86-40

email: info@ptl-test.de

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PTL Dr. Grabenhorst GmbH
DE-95343 Stadtsteinach P.O. BOX 12 53

Referenzen: PTL-Staubtest-Kammern (Auszug)

REFERENCES: PTL DUST TEST CHAMBERS (EXTRACT)

3 Brothers Lighting Units	EG	Cairo
3F Filippi s.r.l.	IT	Pian di Macina-Pian.
ADVANTECH AE	EL	Ilioupolis-Athens
AEG Aktiengesellschaft	DE	Hameln
Al-Babtain Lighting Company	SA	Riyadh
AMP	NL	Den Bosch
APAVE	FR	Paris
Arabian Fiberglass Product Company	SA	Riyadh
ASRAS Co., Ltd.	TH	Bangkok
Austria Antriebstechnik, G. Bauknecht AG	AT	Zeltweg
B.A.G. Bronzewarenfabrik	CH	Turgi
Bauer Elektromotorenfabrik GmbH, Eberhard	DE	Esslingen
Bauknecht Hausgeräte GmbH	DE	Stuttgart
BEGA Gantenbrink-Verwaltungs-GmbH	DE	Menden
CEAG Concordia Elektrizitäts AG	DE	Bochum
Centro Espanol de Meterologia	ES	Tres Cantos - Madrid
China Electric Manufacturing Corporation	TW	Taoyuan
Claude Societe Anonyme	FR	Boulogne-Billancourt
CSA Group	CA	Edmonton
DEMKO Danmarks Elektriske Materielkontrol	DK	Herlev
EAO Elektro-Apparatebau Olten AG	CH	Olten
ECI Telecom LTD	IL	PETAH-TIKVA
ED & D Educated Design & Development Inc.	US	Morrisville NC
Elda Szczecinek	PL	Szczecinek
Electrical Inspectorate	FI	Helsinki
Elektrotechnicky Zkusebni Ustav	CZ	Praha
Endress + Hauser GmbH + Co.	DE	Maulburg
Epsilon S.A.	FR	Orleans
Evano Instruments	NL	Wezep
EXCEL Inc.	JP	Tokyo
Fein, C.+E.	DE	Stuttgart
FER Fahrzeugelektronik GmbH	DE	Eisenach
HANEL	VN	Hanoi
Harting KGaA	DE	Espelkamp
Heidenhain GmbH, Dr. Johannes	DE	Traunreut
HELLA Autotechnik, s.r.o.	CZ	Mohelnice
Hella Leuchten Systeme GmbH;	DE	Paderborn
Hensel KG, Gustav	DE	Lennestadt
Heraeus Industrietechnik GmbH	DE	Balingen
Hess Form + Licht GmbH	DE	Villingen-Schwenn.
Hummel Metall- und Kunststofftechnik GmbH	DE	Waldkirch
IIS The Standards Institution of Israel	IL	Tel Aviv
IMQ Istituto Italiano del Marchio de Qualità	IT	Milano
Interflex S.A.	ES	Montcada I Reixac
Japan Electrical Testing	JP	
JUMO Juchheim GmbH & Co., M. K.	DE	Fulda
KEMA N. V. tot Keuring van Elektrot. Materalien	NL	Arnheim
Korea Electrical Safety Corporation	KR	Seoul
Körting & Mathiesen GmbH, KANDEM	DE	Limburg
KRONE GmbH	DE	Berlin-Zehlendorf
Martin et Lunel s.a.	FR	Noisy le sec
Mazda Compagnie des Lampes S.A.	FR	Puteaux
Mennekes Elektrotechnik GmbH & Co KG	DE	Lennestadt
Metrawatt GmbH	DE	Nürnberg
Mettler Instrumente AG	CH	Greifensee
Metzenauer & Jung GmbH	DE	Wuppertal
Motorola GmbH	DE	Taunusstein
Neckermann Versand AG	DE	Frankfurt am Main
NEMKO Norges Elektriske Materiellkontroll	NO	Blindern/Oslo
Nepal Bureau of Standards	NP	Kathmandu
Nova-Lux Ges. Brandenburg & Co.	DE	Köln-Braunsfeld
Novelektrik A.G.	CH	Buchs-Dällikon
OBO Bettermann GmbH + Co	DE	Menden
Philips Eclairage Compagnie (Projelux)	FR	Miribel
Philips Gloeilampenfabriken	NL	Oss
Philips Lighting	GB	Hamilton
Philips Lighting	PL	Ketrzyn
PIC Precision International Corporation	TW	Taipei
Public Procurement Service	KR	Seogu, Taejon
Quatest Quality Assurance & Testing Center 3	VN	Hochiminh City
Reiss International GmbH (ITT)	DE	Tettnang
ROSE Systemtechnik GmbH	DE	Porta Westfalica
Sarel Appareillage Electrique S.A.	FR	Sarre Union
Saudi Arabian Standards Organization	SA	Riyadh
Saudi Fiberglass Products Factory	SA	Sihat
Schaer-Lüderitz GmbH, Dipl.-Ing.	DE	Lübbecke
Schmersal GmbH & Co., K. A.	DE	Wuppertal
SEV Schweizerischer Elektrotechnischer Verein	CH	Zürich
Siemens AG	DE	Amberg
Siemens AG	DE	Bad Neustadt
Siemens AG	DE	Berlin
Siemens AG	DE	Regensburg
Siemens AG	DE	Traunreut
SIPE Sociedade Industr. de Produtos Eléctricos S.A.	PT	Parede-Carcavelos
Sirena S.p.A.	IT	Rosta
SISIR Singapore Inst. of Standards & Ind. Research	SG	Singapore
Spelsberg GmbH & Co. KG, Elektrot. Spezialfabrik	DE	Schalksmühle
Teko GmbH	DE	Krefeld
TERTEC Taiwan Electric Research & Testing Center	TW	Taipei
Tulux AG	CH	Tuggen
TÜV Essen	DE	Essen
TÜV Product Service GmbH	DE	Hannover
TÜV Product Service GmbH	DE	München
TÜV Rheinland e. V.	DE	Köln
TÜV Wien	AT	Wien
UBEA – PUCRS - IPCT	BR	Porto Alegre
UL Underwriters Laboratories Inc.	US	Northbrook
VALEO Deutschland GmbH & Co.	DE	Erdweg
Vandentempel BV	NL	Wezep
VDE Prüf- und Zertifizierungsinstitut	DE	Offenbach
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Zumtobel Aktiengesellschaft	AT	Dornbirn

Firmensitz / DOMICILE:
Industriestrasse 15
DE - 95346 Stadtsteinach

Geschäftsführer / PRESIDENT:
Jürgen Grabenhorst VDE / VDI
REG.: Amtsgericht Bayreuth, HRB 1096

USt.-Id. Nr. / VAT No.:
DE 811392275

Telefon / TELPHONE:
+49 (0 92 25) 9 86-0

Telefax / TELEFAX:
+49 (0 92 25) 9 86-40

email: info@ptl-test.de

http://www.ptl-test.de

PRÜFEINRICHTUNGEN TEST EQUIPMENT
PTL Dr. Grabenhorst GmbH
DE-95343 Stadtsteinach P.O. BOX 12 53

PTL Switch Actuating Unit

as actuating unit for tests of breaking capacity and behavior in normal use, to switch on and off switches for household and similar purposes having rated resistive-load currents up to 16 A, at room temperature, pneumatical driven

in accordance with: **IEC 60669-1** / 2000-03 § 18 and § 19

Standard Outfit:

1 or 3 actuating device(s) for rocker switches and push- button switches with 2 single-acting pneumatic cylinders each, stroke 15 mm, with air throttle valves to adjust the actuating speed, height-adjustable mounted to holders, with multiple adjustable specimen holders, with safety sockets to connect the specimens to external test voltages and loads,

1 housing, made of steel, with protective hood,

1 plug-in unit with front panel for the operating devices,

1 control device for the entire unit: main switch with EMERGENCY OFF function, safety switch for the protective hood,

1 control device for each actuating device: programmable control unit with exchangable programme modules (containing the "test rhythm") and for adjusting and indicating the test parameters "number of strokes" and "stroke time", start and stop push-buttons, push-buttons for moving manually the cylinder pistons and as actuation indicator for the cylinder.

Design: desk-top unit, plug-in unit construction housing, papyrus-white structure varnished, front panel of anodized aluminium, small parts nickel-plated or browned, for connection to PTL Power Supplies of N 03 series – by multiple coupler – or to other test voltage sources and test loads – by means of an adapter

for **one** specimen **Article No.: F 55.11**
for **three** specimens **Article No.: F 55.13**

Accessories: The following devices for testing other types of switches can be exchanged against the devices for rocker switches and push-buttom switches:

for one tumbler switch
or cord-operated switch **Article No.: F 55.62**
for one rotary switch **Article No.: F 55.67**

PTL Power supplies with ohmic and inductive loads: *see prospectuses N 03e*

Firmensitz / DOMICILE: Industriestrasse 15 DE - 95346 Stadtsteinach
Geschäftsführer / PRESIDENT: Dr.-Ing. Dieter Grabenhorst VDE / VDI REG.: Amtsgericht Bayreuth, HRB 1096
USt.-Id. Nr. / VAT No.: DE 133083240
Telefon / TELPHONE: +49 (0 92 25) 9 86-0
Telefax / TELEFAX: +49 (0 92 25) 9 86-40
email: info@ptl-test.de **http://www.ptl-test.de**

ASRAS CO.,LTD.
1694, 1694/1 Prachasongkhro Road,
Dindaeng, Dindaeng, Bangkok 10400
Tel. 02-692-3980, Fax. 02-692-3978
E-mail: sales@asras.com
www.asras.com; www.asras.co.th

PRÜFEINRICHTUNGEN TEST EQUIPMENT
PTL Dr. Grabenhorst GmbH
D-95343 Stadtsteinach P.O. BOX 12 53
physics
technics
lab-topics

PTL SPLASH APPARATUS

for testing the protection against moisture due to water splashing-up

according to **IEC** (e. g. **60309-1** / 1997-08 § 18.4a Fig. 4),

CEE (e. g. **7** / May 1963 § 16 Fig. 22),

EN (e. g. **60309-1** / 1997 § 18.4a Fig. 4)

as well as **VDE** (e. g. **0620** / 5.1992 § 4.2.3 Fig. 5, **0623 Part 1** / 11.1998 § 18.4a Fig. 4 and **0730** Part 1 / 3.1972 § 15b Fig. 5)

Standard Outfit:

1 nozzle with diameter 2 mm,

1 flow control and stop valve,

1 pressure gauge, measuring range 1 bar,

1 support to hold the nozzle at an angle of 60° to the horizontal, with 50 mm distance to the centre of the bottom of the bowl

1 bowl, tapered, inside diameter 35 / 25 mm, inside height 10 mm.

Design: nozzle and valve of brass, nickel-plated, bowl and support of stainless steel,

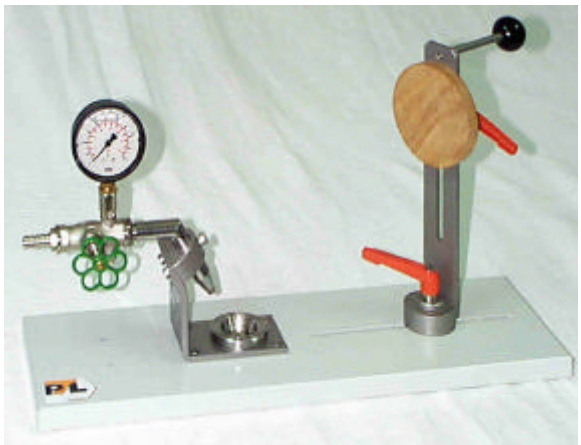
Article No.: P 07.14

Accessories:

Base Plate

to fix the support with nozzle and bowl at 2 places staggered lengthwise each, dimensions approx. 490 mm x 160 mm x 25 mm, of cast iron, papyrus-white structure varnished,

Article No.: P 07.41



Specimen Holder

requires P 07.41, adjustable in height, with hand lever for swiveling around its vertical axis, removable, distance to the bowl infinitely adjustable, with base plate, metal parts of stainless steel,

Article No.: P 07.42

P 07.00-3e1 / 1999-04-21