

PMA

CABLE PROTECTION



June 2009

PMA UL Listed

Portfolio of Cable Protection Products

PMA has been developing, producing and selling top-quality polyamide cable protection systems since 1975. Our high-quality Swiss products have rapidly earned us an excellent reputation worldwide and established us as the market leader. Our range of more than 6,500 products gives customers the protection they need in railway, mechanical engineering and shipbuilding applications worldwide. PMA products are also the solution of choice in automation, building installations and other projects where power and data cables require dependable protection.

PMA headquarters is in Uster, just outside Zurich, in Switzerland. The majority of the PMA products for the world market are manufactured at this location and it is also the home of our intensive research and development activities. PMA has subsidiaries in the USA and all the major industrialised European countries, Germany, Great Britain, France, Spain, Austria and Italy. Partners distribute the products around the globe. PMA employs around 170 people world wide.

Equita Management GmbH, an investment holding company belonging to the Harald-Quandt Group, based in Bad Homburg Germany is the major shareholder in PMA.

Headquarters and manufacturing facility, PMA AG, Uster/Switzerland





UL Listed Portfolio LISTED

PMA has an extremely broad portfolio of cable protection products, comprising over 6,500 individual items, designed to fulfil the needs of many various application areas.

The characteristics of the specially modified polyamide materials are tailored to manufacture conduits meeting the requirements of many different specific applications, both for internal and external (UV resistant) use. PMA can offer robust, heavy grade conduits with high mechanical strength for static applications and at the other end of the scale light to medium grade conduits with high flexibility and immunity to fatigue for use in

systems where the cables are continually in motion, such as in robotics.

The many different fittings and accessories are designed to allow flexible, easy installation into even the most complex systems.

PMA has experience of the most varied applications world wide for over thirty years. For many installations both in North America and the rest of the world the UL / CSA "Recognition" approval symbols demonstrating compliance with UL1696 / CSA C22.2 Nr. 227.3 are a requirement. A large part of the PMA portfolio carries these symbols.

This catalogue describes a smaller range of products which meet the more stringent requirements for UL / CSA "Listing" approval according to UL1660 / CSA C22.2 Nr 227.2 for conduits and UL514B / CSA C22.2 Nr 227.2 for fittings.

For many designs where a professional engineer is installing the cable protection products into a system a UL / CSA "recognized" product may be sufficient. However for installations where the cable protection is accessible to the public after assembly a "Listed" product may be required. The products in this catalogue are designed to meet the requirements of such installations and all carry a UL "Listed" symbol.



Important Information

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Unique Benefits of PMA Products

Service to the customer is what motivates us. In addition to series production, PMA AG can build fittings and conduits to meet individual requirements as a special service to our customers.

- a safe, reliable system that is easy to install
- vibration-proof connections
- system connection strength
- ingress protection conforming to recognized test methods
- high impact strength even at low temperatures
- high compression strength (peak load)
- long-term reversed-bending resistance
- good chemical resistance
- fire protection (flammability and smoke generation)
- good weather resistance (UV-resistant)
- long wearing
- ...and much more



Areas of Application



Mechanical Engineering

A considerable number of PMA cable protection systems are used in mechanical engineering. A few examples illustrate how varied the range of mechanical engineering applications can be. You will find our products in machine tools, packaging machines, printing machines, as well as heating, ventilation, conveyor, and filling systems. PMA products also make a vital contribution to the smooth operation of high voltage and emergency power systems, can production machinery and woodworking machines, etc. PMA cable protection solutions safeguard cables, wires and data links against heat, cold, tensile stress, pressure stress, and other external influences in the important mechanical engineering industry.

Railway Construction

PMA products have proven their dependability in railway construction projects around the world. This is the reason why large corporations including Siemens, Alstom, Bombardier, Deutsche Bahn, and SNCF have chosen PMA as a supplier over a period of many years. Our special railway engineering product line provides protection and safety on signalling systems, couplings, trucks, and gangways, as well as roof, and underfloor equipment. The range of applications is very extensive. PMA products contribute to the safe operation of trams, locomotives, freight cars, high-speed trains, and even roller coasters.



Automation

In the field of automation, there is a need for products that can withstand the stress of motion-intensive applications. Solutions developed by PMA AG for the automation industry fully meet these requirements. Special conduit designs, supports and abrasion protection sleeves provide optimal protection along the entire length of all moving elements, enabling engineers to achieve a massive reduction in torsional forces. There is good reason why leading robotics manufacturers rely on PMA technology.



Ship- and Off-Shore

Safety has absolute top priority in marine applications. Cables and cable bundles are subjected to high stress. Vibration increases the risk of overheating, abrasion damage and shorts. Cable routing around machinery must provide absolute protection, and it is important that the cables can be easily integrated into prefabricated elements such as cabins. Many shipping companies rely on the dependability of our products. PMA products protect the "Queen Mary II" and many other small and large fresh and salt water giants when they are underway.



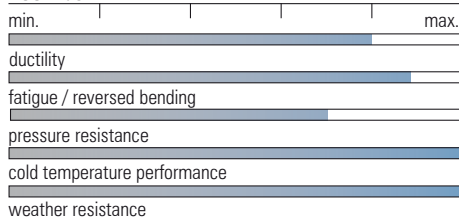
Countless Applications

PMA cable protection products can be used in an extremely wide range of applications. The list is virtually endless and includes industries such as telecommunications, construction equipment and medical equipment. Wherever there is a need for cable protection, the PMA AG product portfolio provides safe, dependable, forward-looking solutions or will develop them specially for you to meet your individual needs.





PUS-Index



PUS very flexible, heavy wall

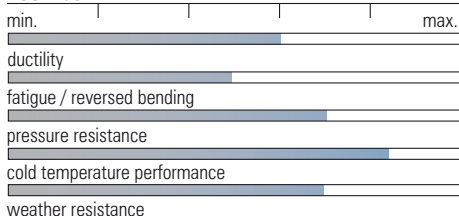


Order no. black	Order no. gray	Conduit size			Fittings available with threads			Dimensions in mm			
		Inch	NW	metric	NPT	metric	PG	inside	outside	static radius	dynamic radius
PUSG-17B	PUSG-17S	1/2"	17	20	1/2"	M20x1.5	16	15.2	21.2	35	85
PUSG-23B	PUSG-23S	3/4"	23	25	3/4"	M25x1.5	21	22.0	28.5	40	110
PUSG-29B	PUSG-29S	1"	29	32	1"	M32x1.5	29	27.7	34.4	50	130
PUSG-36B	PUSG-36S	1 1/4"	36	40	1 1/4"	M40x1.5	36	35.8	42.4	60	180
PUSG-48B	PUSG-48S	1 1/2"	48	50	1 1/2"	M50x1.5	48	46.8	54.4	70	220

- High-grade, specially formulated polyamide 12
- Specification UL 1660 / CSA C22.2 No. 227.2.1-04
- Excellent resistance to ultra violet rays and weathering
- Excellent flexibility
- Good mechanical strength also at low temperatures and humidity
- Self-extinguishing
- Free from halogens and cadmium
- Temperature range: -50°C to 95°C; Short-term to 150°C
- Chemical resistance: To fuels, mineral oils, fats, alkalis, weak acids, etc.



VUS-Index



VUS flexible, heavy-duty



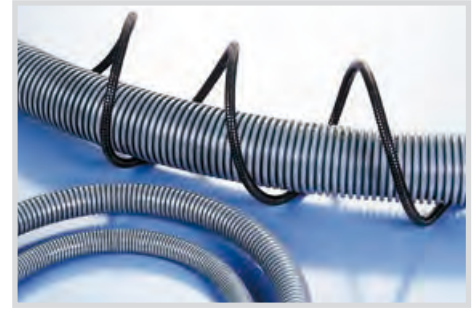
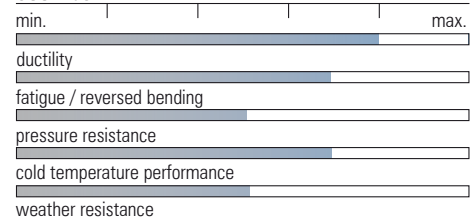
Order no. black	Order no. gray	Conduit size			Fittings available with threads			Dimensions in mm		
		Inch	NW	metric	NPT	metric	PG	inside	outside	stat. radius
VUSG-17B	VUSG-17S	1/2"	17	20	1/2"	M20x1.5	16	15.2	21.2	40
VUSG-23B	VUSG-23S	3/4"	23	25	3/4"	M25x1.5	21	22.0	28.5	50
VUSG-29B	VUSG-29S	1"	29	32	1"	M32x1.5	29	27.7	34.4	60
VUSG-36B	VUSG-36S	1 1/4"	36	40	1 1/4"	M40x1.5	36	35.8	42.4	70
VUSG-48B	VUSG-48S	1 1/2"	48	50	1 1/2"	M50x1.5	48	46.8	54.4	80

- High-grade, specially formulated polyamide 6
- Specification UL 1660 / CSA C22.2 No. 227.2.1-04
- Very good resistance to ultra violet rays and weathering
- Good flexibility
- High mechanical strength also at low temperatures and humidity
- Self-extinguishing
- Free from halogens and cadmium
- Excellent mechanical properties also at low temperatures
- Temperature range: -50°C to 105°C; Short-term to 160°C
- Chemical resistance: To fuels, mineral oils, fats, alkalis, weak acids, etc.

CUS very flexible, medium-wall


Order no. black	Order no. gray	Conduit size		Fittings available with threads			Dimensions in mm		
		Inch	NW metric	NPT	metric	PG	inside	outside	static radius
CUSG-17B	CUSG-17S	½"	17 20	½"	M20x1.5	16	16.2	21.2	40
CUSG-23B	CUSG-23S	¾"	23 25	¾"	M25x1.5	21	21.9	28.5	45
CUSG-29B	CUSG-29S	1"	29 32	1"	M32x1.5	29	27.6	34.5	55
CUSG-36B	CUSG-36S	1¼"	36 40	1¼"	M40x1.5	36	36.0	42.5	60
CUSG-48B	CUSG-48S	1½"	48 50	1½"	M50x1.5	48	47.0	54.5	70

- High-grade, specially formulated polyamide 6
- Specification UL 1660 / CSA C22.2 No. 227.2.1-04
- Very good flexibility
- Good impact strength also at low temperatures and humidity
- Self-extinguishing
- Free from halogens and cadmium
- Temperature range: -40°C to 105°C; Short-term to 160°C
- Chemical resistance: To fuels, mineral oils, fats, alkalis, weak acids, etc.


CUS-Index




- extremely high impact resistance
- vibration-resistant connection to PMA FLEXPLus conduits
- easy installation
- high conduit pull-out strength
- very good chemical properties
- free from halogens and cadmium
- fits conduit profile coarse (G)

UNV-M-UL Connector straight, metric thread**

(Lock nut delivered with the fitting)



Order no. black	Order no. gray	Thread size metric	Conduit size NW	Thread length	Outside Diameter	Length
BUNV-M207-UL	SUNV-M207-UL	M20x1.5	17	11.0 mm	29.5 mm	47.5 mm
BUNV-M257-UL	SUNV-M257-UL	M25x1.5	17	12.0 mm	32.0 mm	48.5 mm
BUNV-M253-UL	SUNV-M253-UL	M25x1.5	23	12.0 mm	37.0 mm	52.0 mm
BUNV-M323-UL	SUNV-M323-UL	M32x1.5	23	15.0 mm	43.0 mm	55.5 mm
BUNV-M329-UL	SUNV-M329-UL	M32x1.5	29	15.0 mm	44.0 mm	56.0 mm
BUNV-M409-UL	SUNV-M409-UL	M40x1.5	29	19.0 mm	49.0 mm	60.0 mm
BUNV-M406-UL	SUNV-M406-UL	M40x1.5	36	19.0 mm	55.0 mm	72.5 mm
BUNV-M506-UL	SUNV-M506-UL	M50x1.5	36	19.0 mm	59.0 mm	72.0 mm
BUNV-M508-UL	SUNV-M508-UL	M50x1.5	48	19.0 mm	69.0 mm	72.5 mm
BUNV-M638-UL	SUNV-M638-UL	M63x1.5	48	19.0 mm	75.0 mm	72.0 mm



- extremely high impact resistance
- vibration-resistant connection to PMA FLEXPLus conduits
- easy installation
- high conduit pull-out strength
- very good chemical properties
- free from halogens and cadmium
- fits conduit profile coarse (G)

UAV-M-UL Connector 45° elbow, metric thread**

(Lock nut delivered with the fitting)



Order no. black	Order no. gray	Thread size metric	Conduit size NW	Thread length	Outside Diameter	Length	Height
BUAV-M207-UL	SUAV-M207-UL	M20x1.5	17	11.0 mm	29.5 mm	55.5 mm	51.5 mm
BUAV-M253-UL	SUAV-M253-UL	M25x1.5	23	12.0 mm	37.0 mm	65.0 mm	58.5 mm
BUAV-M329-UL	SUAV-M329-UL	M32x1.5	29	15.0 mm	44.0 mm	73.5 mm	66.5 mm
BUAV-M406-UL	SUAV-M406-UL	M40x1.5	36	19.0 mm	53.5 mm	92.5 mm	85.5 mm
BUAV-M506-UL	SUAV-M506-UL	M50x1.5	36	19.0 mm	53.5 mm	92.5 mm	89.5 mm
BUAV-M508-UL	SUAV-M508-UL	M50x1.5	48	19.0 mm	66.0 mm	100.0 mm	96.0 mm
BUAV-M638-UL	SUAV-M638-UL	M63x1.5	48	19.0 mm	66.0 mm	100.0 mm	104.0 mm



- extremely high impact resistance
- vibration-resistant connection to PMA FLEXPLus conduits
- easy installation
- high conduit pull-out strength
- very good chemical properties
- free from halogens and cadmium
- fits conduit profile coarse (G)

UWV-M-UL Connector 90° elbow, metric thread**

(Lock nut delivered with the fitting)



Order no. black	Order no. gray	Thread size metric	Conduit size NW	Thread length	Outside Diameter	Length	Height
BUWV-M207-UL	SUWV-M207-UL	M20x1.5	17	11.0 mm	29.5 mm	58.5 mm	43.5 mm
BUWV-M253-UL	SUWV-M253-UL	M25x1.5	23	12.0 mm	37.0 mm	65.0 mm	54.0 mm
BUWV-M329-UL	SUWV-M329-UL	M32x1.5	29	15.0 mm	44.0 mm	73.0 mm	64.5 mm
BUWV-M406-UL	SUWV-M406-UL	M40x1.5	36	19.0 mm	53.5 mm	96.0 mm	78.0 mm
BUWV-M508-UL	SUWV-M508-UL	M50x1.5	48	19.0 mm	66.0 mm	106.0 mm	91.5 mm

UNV-N-UL** Connector straight, NPT thread

(Lock nuts available on request)



Order no. black	Order no. gray	Thread size NPT	Conduit size NW	Thread length	Outside Diameter	Length
BUNV-N027-UL	SUNV-N027-UL	1/2"	17	13.0 mm	29.5 mm	49.5 mm
BUNV-N043-UL	SUNV-N043-UL	3/4"	23	14.0 mm	37.0 mm	54.0 mm
BUNV-N069-UL	SUNV-N069-UL	1"	29	15.0 mm	44.0 mm	56.0 mm
BUNV-N076-UL	SUNV-N076-UL	1 1/4"	36	18.0 mm	55.0 mm	71.0 mm
BUNV-N088-UL	SUNV-N088-UL	1 1/2"	48	18.0 mm	69.0 mm	71.5 mm
BUNV-N098-UL	SUNV-N098-UL	2"	48	18.0 mm	69.0 mm	71.5 mm



- extremely high impact resistance
- vibration-resistant connection to PMA FLEXPlus conduits
- easy installation
- high conduit pull-out strength
- very good chemical properties
- free from halogens and cadmium
- fits conduit profile coarse (G)

UAV-N-UL** Connector 45° elbow, NPT thread

(Lock nuts available on request)



Order no. black	Order no. gray	Thread size NPT	Conduit size NW	Thread length	Outside Diameter	Length	Height
BUAV-N027-UL	SUAV-N027-UL	1/2"	17	13.0 mm	29.5 mm	57.5 mm	51.5 mm
BUAV-N043-UL	SUAV-N043-UL	3/4"	23	14.0 mm	37.0 mm	67.0 mm	60.0 mm
BUAV-N069-UL	SUAV-N069-UL	1"	29	15.0 mm	44.0 mm	73.5 mm	67.0 mm
BUAV-N076-UL	SUAV-N076-UL	1 1/4"	36	18.0 mm	53.5 mm	91.5 mm	85.5 mm
BUAV-N088-UL	SUAV-N088-UL	1 1/2"	36	18.0 mm	66.0 mm	99.0 mm	96.0 mm
BUAV-N098-UL	SUAV-N097-UL	2"	48	18.0 mm	66.0 mm	99.0 mm	101.0 mm



- extremely high impact resistance
- vibration-resistant connection to PMA FLEXPlus conduits
- easy installation
- high conduit pull-out strength
- very good chemical properties
- free from halogens and cadmium
- fits conduit profile coarse (G)

UWV-N-UL** Connector 90° elbow, NPT thread

(Lock nuts available on request)



Order no. black	Order no. gray	Thread size NPT	Conduit size NW	Thread length	Outside Diameter	Length	Height
BUWV-N027-UL	SUWV-N027-UL	1/2"	17	13.0 mm	29.5 mm	58.5 mm	45.5 mm
BUWV-N043-UL	SUWV-N043-UL	3/4"	23	14.0 mm	37.0 mm	66.5 mm	56.0 mm
BUWV-N069-UL	SUWV-N069-UL	1"	29	15.0 mm	44.0 mm	73.5 mm	64.5 mm
BUWV-N076-UL	SUWV-N076-UL	1 1/4"	36	18.0 mm	53.5 mm	96.0 mm	77.0 mm
BUWV-N088-UL	SUWV-N088-UL	1 1/2"	48	18.0 mm	66.0 mm	106.0 mm	90.5 mm
BUWV-N098-UL	SUWV-N098-UL	2"	48	18.0 mm	66.0 mm	111.0 mm	90.5 mm



- extremely high impact resistance
- vibration-resistant connection to PMA FLEXPlus conduits
- easy installation
- high conduit pull-out strength
- very good chemical properties
- free from halogens and cadmium
- fits conduit profile coarse (G)



- Polyamide glass fibre reinforced
- **Temperature range:** -40 °C to 105 °C; **Short-term** 150 °C

MN Hexagonal Lock Nuts, metric

These hexagonal lock nuts are suitable for a wide range of applications. High torque guarantees a safe connection of the system

Order no. black	Order no. gray	Fits to thread size metric	Wrench size	Dimensions Height
BMN-M12	GMN-M12	M12x1.5	15.0 mm	2.8 mm
BMN-M16	GMN-M16	M16x1.5	19.0 mm	3.0 mm
BMN-M20	GMN-M20	M20x1.5	24.0 mm	3.5 mm
BMN-M25	GMN-M25	M25x1.5	30.0 mm	4.0 mm
BMN-M32	GMN-M32	M32x1.5	36.0 mm	5.0 mm
BMN-M40	GMN-M40	M40x1.5	46.0 mm	5.0 mm
BMN-M50	GMN-M50	M50x1.5	60.0 mm	5.0 mm
BMN-M63	GMN-M63	M63x1.5	70.0 mm	6.0 mm



- Material: Metal
- Colour: red

PMACUT Cutting Tools

PMACUT is an excellent tool for cutting all PMA conduits. It guarantees precise and safe 90° angle cut.

Order no. Cutting Tool	Order no. Spare blade	Cutting range	For PMAFLEX NW
PMACUT-38	FP-38	0 – 38 mm	07 – 29
PMACUT-52	FP-52	0 – 52 mm	23 – 48

Worldwide Recognitions

All PMA products are rigorously tried and tested to meet the demands of industry worldwide.



Catalog Overview

To order/download our catalogs please refer to: www.pma-usa.org



Company Profile

Overview of the structure and services of PMA Group



PMA North American Selection Guide

From a range of over 6,500 products, cataloged are the most frequently specified



PMAFIX Pro

Next generation cable protection - IP69K for static and dynamic applications



PMAFIX/PMFLEX

The PMA main catalogue with 6'500 superior products



PMA SMART LINE

Functional design with high quality at an excellent price



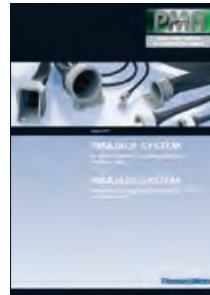
EMC/EMV SYSTEM

Special products for EMC screening



AUTOMATION PRODUCTS

Special products for automation and robotic applications



PMAJACK SYSTEM

Special series of braids and braid terminations



PMA EX-SYSTEM

Load discharging polyamide products for use in explosion endangered areas



RAILWAY INFRASTRUCTURE

PMA's multi-layer conduits for railway infrastructure applications



ENERGY MARKETS

PMA conduit and fittings for the energy generation market

PMA

CABLE PROTECTION



PMA-KAT.22 E

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