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User manual

ITKU-117-01-11-19-EN

PM02.EX

Intrinsically safe power supply

NOVEMBER 2019

PRECAUTIONS

Prior to installation, use or maintenance activities, carefully read this user manual. Use the PM02.EX-*-* power supply only as intended. This user manual must be at a reach of the operator's hand in the course of the device operation.

	Symbol marking sections that are extremely important for protection against explosion.
	The device must be applied in accordance with the intended use only.
	Prior to installation and start, it is necessary to analyse whether the device complies with the usage requirements regarding particular hazardous area.
	In case of any sign of damage, it is necessary to disconnect the device form the mains immediately. The damaged component must be replaced or repaired by RADWAG service directly.
	While installing the device, it is necessary to follow strictly this service manual requirements. Not adhering to the requirements results with loss of explosion safety.
	The PM02.EX-*-* power supply can be connected only to intrinsically safe instruments characterised with respective intrinsic safety parameters provided further down this user manual. Connection method must be accordant with this user manual requirements. Connecting other than intrinsically safe or certified device, results with loss of explosion safety of the complete set.
	The PM02.EX-*-* power supply may be used as a component of a device/set intended for operation in hazardous area. The manufacturer of such a device/set is obliged to carry out analysis of the complete device/set in order to confirm compliance with standards.
	The device must be connected to the grounding permanently.
	To minimize the risk of electrostatic discharges, it is not allowed to use the device in places, where mechanisms causing electrostatic charges greater than those caused by rubbing the surface by hand occur.
	Technical condition of the power supply must be tested and inspected by a trained personnel, in accordance with this user manual, at least once every three months.

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1. INTENDED USE AND DESIGN

The PM02.EX-*-* power supply is equipped with intrinsically safe output circuits. This device is powered from the mains of the following voltage: 100÷240V AC. It is an associated facility for permanent installation, intended to supply with power intrinsically safe devices, including PL.*.*.HRP.EX.* weighing platforms.

The power supply consists of the following components:

1	Stainless steel housing cover.
2	Stainless steel housing base.
3	Fastening bolts.
4	Power supply electronics covered with filling compound.
5	Intrinsically safe circuit connector.
6	Receiver power cord.
7	Power cord.
8	Cable glands.
9	Grounding terminal.

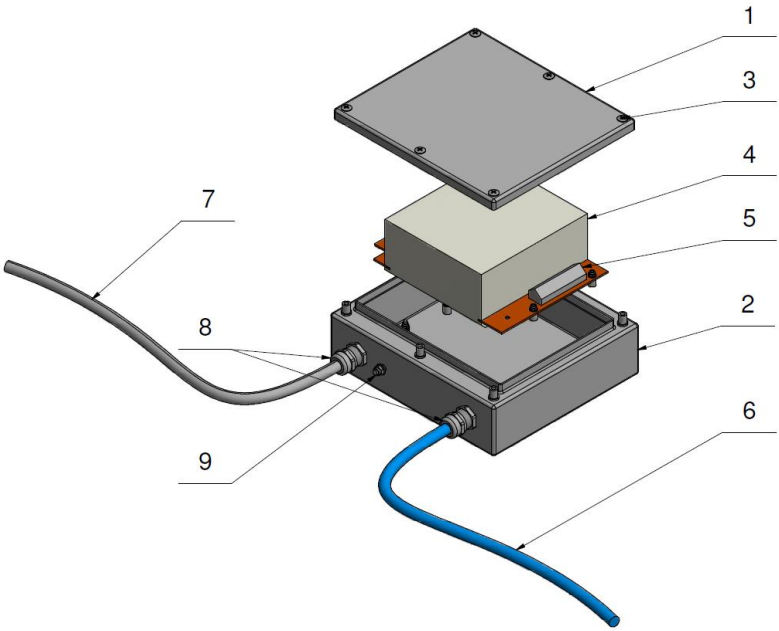


Fig.1. Main components of the power supply

PM02.EX-*-* power supply marking

Due to the place of power supply installation and the method of connecting intrinsically safe output circuits, the versions of PM02.EX-*-* power supply are marked in accordance with the coding method presented below.

PM02.EX-*-*

The method of connecting intrinsically safe output circuits:

1. Output circuits led through the gland using cable, wires ends are terminated with tubular end sleeves.
2. Output circuits led through the gland using cable. The cable terminated with M12 4P plug (male). Power supply version intended for supplying PL.*.*.HRP.EX.* weighing platforms

Use of the power supply depends on the place of installation:

1. Power supply intended for operation in hazardous area.
2. Power supply intended for operation outside hazardous area (in safe area), it is equipped with intrinsically safe output circuits which may be placed in the hazardous area.

PM02.EX-*-* power supply comes in two installation options:

Installation option - 1: **PM02.EX-1-*** power supply intended for operation in hazardous area:

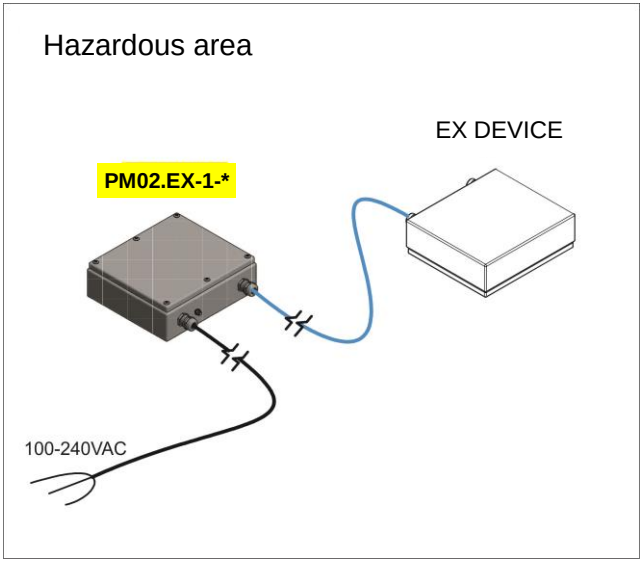


Fig.2. Power supply in hazardous area

Installation option - 2: **PM02.EX-2-*** power supply intended for operation in safe area, the intrinsically safe circuits are led to the hazardous area.

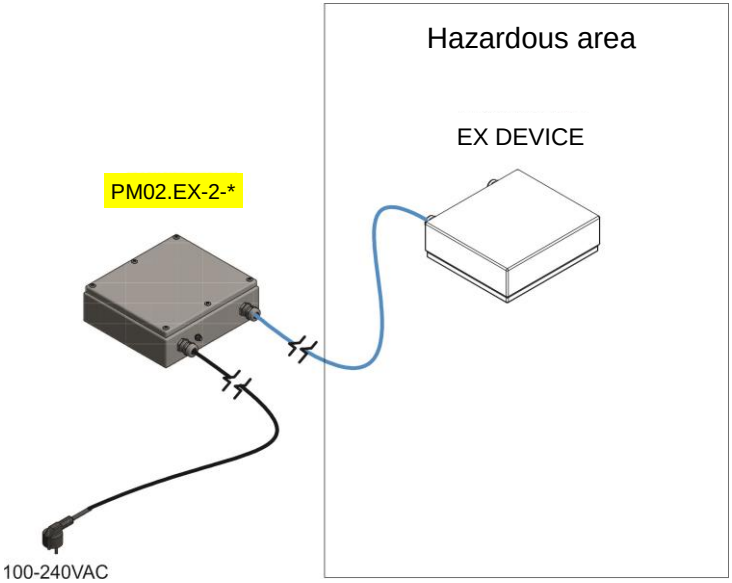


Fig.3. Power supply in safe area

PM02.EX-*-* – power supply – overall dimensions:

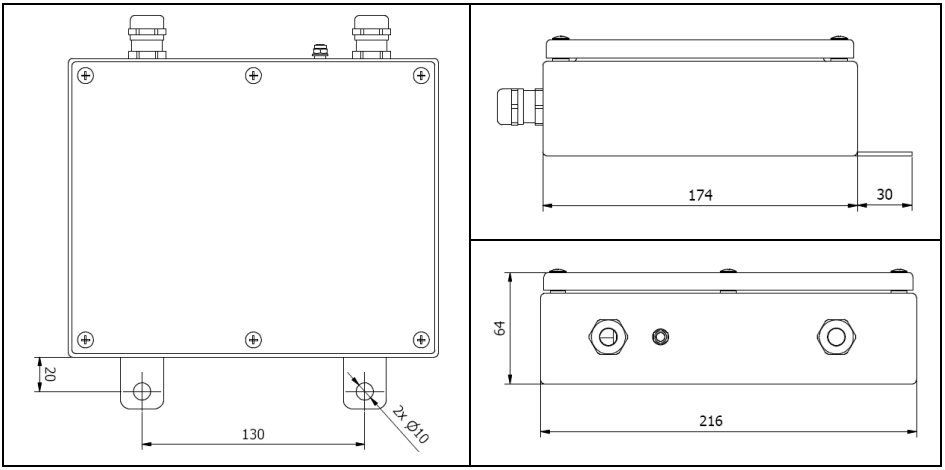


Fig.4. Overall dimensions

2. TECHNICAL SPECIFICATIONS

	PM02.EX-1-*	**PM02.EX-2-***
Housing	Stainless steel	Stainless steel
IP rating by PN-EN 60529	IP66/IP68	IP66/IP68
Power supply	100÷240 VAC 50/60 Hz	100÷240 VAC 50/60 Hz
Power consumption	0.2.A	0.2.A
Power consumption	15W	15W
Ambient temperature	-20°C ÷ 40°C	-20°C ÷ 40°C
Relative humidity	10÷85% RH, non-condensing conditions	10÷85% RH, non-condensing conditions
Certificates	OBAC 19 ATEX 0215X IECEx OBAC 19.0010X	OBAC 19 ATEX 0215X IECEx OBAC 19.0010X
Marking for gases	Ex II 2G Ex eb mb [ib] IIC T4 Gb	Ex II (2)G [Ex ib Gb] IIC
Marking for dusts	Ex II 2D Ex tb [ib] IIIC T70°C Db	Ex II (2)D [Ex ib Db] IIIC
Hazardous area	(gases) 1, 2; (dusts) 21, 22	(gases) 1, 2; (dusts) 21, 22

3. USAGE CONDITIONS

3.1. Electrostatic Charges Hazard

In order to minimize electrostatic charges hazard it is necessary to:

- make sure that the power supply is permanently grounded in the course of operation,
- follow cleaning-relevant recommendations that are to be found in section 7 of this user manual.

	***It is not allowed to use the power supply in places where mechanisms causing electrostatic charges greater than those caused by rubbing the surface by hand occur.***

3.2. Output Parameters of **PM02.EX-*-*** Power Supply

Circuit mark	U_o	I_o	P_o	C_o	L_o
V1	7.60 V	600 mA	3.8 W	1 µF	89 µH
V2	7.14 V	118 mA	0.7 W	2.1 µF	200 µH
V3	8.60 V	87 mA	0.64 W	0.71 µF	1 mH
V4	11.55 V	42 mA	0.49 W	0.68 µF	0.5 mH
V5	-11.55 V	-42 mA	0.49 W	0.68 µF	0.5 mH

4. WARRANTY CONDITIONS

A. RADWAG feels obliged to repair or exchange all elements that appear to be faulty by production or by construction.
B. Defining defects of unclear origin and means of their elimination can only be realized with the assistance of the manufacturer and the user representatives.
C. RADWAG does not bear any responsibility for damage or losses resulting from unauthorized or inadequate performing of production or service processes.
D. The warranty does not cover:
   - mechanical damage caused by product exploitation other than intended, damage of thermal and chemical origin, damage caused by lightning, overvoltage in the power network or other random event,
   - inappropriate cleaning habits.
E. Loss of warranty takes place if:
   - a repair is carried out outside RADWAG authorized service point,
   - service claims intrusion into mechanical or electronic construction by unauthorized people,
   - the device does not have data plates or they are damaged.
F. For detailed warranty conditions read the warranty certificate.
G. Contact with the central authorized service: +48 (48) 386 63 30.

5. SECURITY REQUIREMENTS

Prior to the first use, carefully read this user manual. Use the weighing device only as intended.
Power supply, depending on the version, can be used in specific areas:

- **PM02.EX-1-*** power supply intended for operation in hazardous area,
  - zone 1 and 2 where there is a risk of explosion due to mixture of air with vapour, mist or gas, classified as explosion group IIC, IIB and IIA and as temperature class T1, T2, T3, T4.
  - zone 21 and 22 where there is a risk of explosion due to mixture of air with dust, flammable fibres and volatile fuels, classified as explosion group IIIC, IIIB and IIIA.

  Power supply marking:

  - for gases:  II 2G Ex eb mb [ib] IIC T4 Gb, and
  - for dusts:  II 2D Ex tb [ib] IIIC T70°C Db.
- **PM02.EX-2-*** power supply intended for operation outside hazardous area (in safe area), it is equipped with intrinsically safe circuits which may be placed in:

- zone 1 and 2 where there is a risk of explosion due to mixture of air with vapour, mist or gas, classified as explosion group IIC, IIB and IIA and as temperature class T1, T2, T3, T4.
- zone 21 and 22 where there is a risk of explosion due to mixture of air with dust, flammable fibres and volatile fuels, classified as explosion group IIIC, IIIB and IIIA.

Power supply marking:

- for gases:  II [2]G [Ex ib Gb] IIC, and
- for dusts:  II [2]D [Ex ib Db] IIIC.

Explosion safety of PM02.EX-*-* power supply is ensured by:

- PM02.EX-*-* power supply is compliant with: PN-EN IEC 60079-0, PN-EN 60079-11, PN-EN 60079-7, PN-EN 60079-18, PN-EN 60079-31, PN-EN 60529 confirmed by OBAC 19 ATEX 0215X,IECEx OBAC 19.0010X certificates.
- It is necessary to avoid exposing the power supply to static electricity. Functional grounding cable which levels the potentials must always be connected to the marked terminal. Disconnecting the functional grounding cable is forbidden. Disconnecting potentials equalizing cable (e.g. when there is a need to place the device elsewhere) is allowed only if there is no risk of explosive atmosphere.
- **It is necessary to adhere to this user manual guidelines.**

5.1. ATEX Marking – Symbols Meaning



II 2 G Ex ib IIC T4 Gb

Equipment group:
I - to be used
in mines where there's
risk of mine gas explosion
II - to be used
in places where there's
risk of explosion of gases
other than mine gases

Types of
group II devices:
1 - equipment providing
very
high protection level,
- for operation in zone
0,1,2
2 - equipment providing
high protection level,
- for operation in zone 1,2
3 - equipment providing
standard protection
level,
- for operation in zone 2

Explosive atmosphere:
G - caused by mixture of
air with vapour, mist
or gas
D - caused by mixture of
air with dust.

Electrical equipment
corresponding with one
or several anti-explosion
mechanical designs

Symbol of used
explosion proof
mechanical design:
mb - hermetic, for operation
in zone 1,2,
tb - protection via housing
for operation in zones
1,2,
e - increased safety
ia - intrinsically safe design
for operation in zone
0,1,2,
ib - intrinsically safe design
for operation in zone
1,2.

Gas explosion group,
examples:
- IIA: propane (T1)
benzene (T3)
butane (T2)
ethanol (T2)
- IIB: ethylene (T2)
- IIC: acetylene (T2)
hydrogen (T1)
or dust, examples:
- IIIA: volatile fuels
- IIIB: non-conductive dust
- IIIC: conductive dust

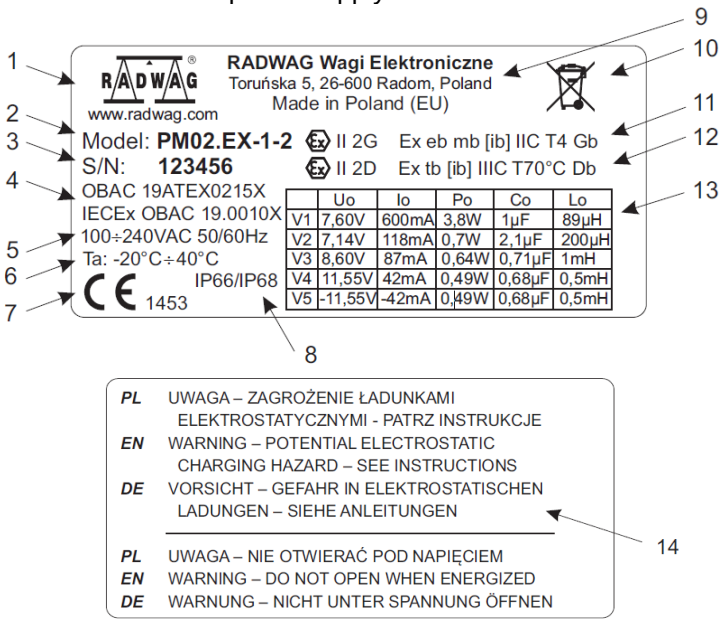
Max surface temperature:
- for gases it is specified as
temperature class
determining max
surface temperature
of device components
that are in touch with
explosive mixture:
T1: 450°C
T2: 300°C
T3: 200°C
T4: 135°C
T5: 100°C
T6: 85°C

- for dusts it is
specified as max
measured surface
temp, e.g.:
T70°C

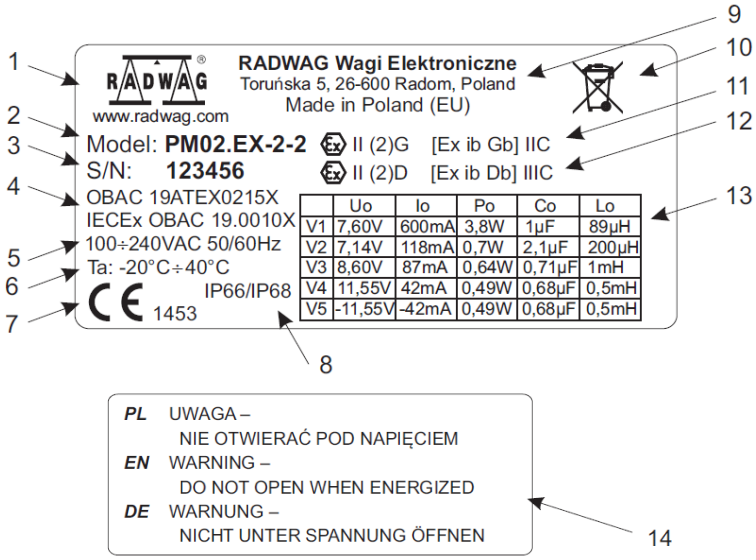
Protection
class gas
atmosphere:
- Ga
- Gb
- Gc
dust atmosphere:
- Da
- Db
- Dc

5.2. Data Plates

Data plates of PM02.EX-1-* power supply:



Data plates of PM02.EX-2-* power supply:



1	Manufacturer’s logo.
2	Power supply model.
3	Serial number
4	Number of ATEX and IECEx certificates, issued for a power supply with „X” symbol - special conditions of use.
5	Power supply
6	Ambient temperature range, at operation.
7	CE mark + notified body no.
8	IP rating
9	Manufacturer’s name and address.
10	WEEE symbol.
11	EX mark: gases (read section 5.1).
12	EX mark: dusts (read section 5.1).
13	Electrical rating
14	Warning about electrostatic charge danger (n/a for PM02.EX-2-* power supply) and against opening at voltage; in Polish, English, German, other .

5.3. Information Stickers Arrangement

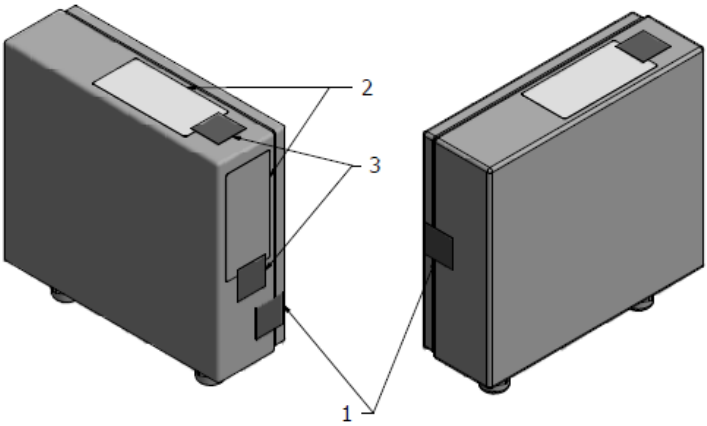


Fig.5. Arrangement of data plates and security stickers

1 - Cover's security seals.
2 - Data plates.
3 - Data plates' security seals (in case of data plates of void seal type, the security seals are not used).

6. INSTALLATION AND START-UP

Prior to installation and start-up, carefully read this user manual. Use the device only as intended.

RADWAG does not bear any responsibility for damage or losses resulting either from improperly carried out installation or misuse.

	***Prior to installation and start, it is necessary to analyse whether the device complies with the usage requirements regarding particular hazardous area. The analysis must be carried out by a qualified personnel.***
	***Installation has to be carried out by an authorized personnel in accordance with regulations, standards and good engineering practice.***

PM02.EX-*-* power supply is intended for fixed installations. It cannot be used during transport. Connection cables must be arranged in a way protecting them from damage.

6.1. Power Supply Arrangement

The power supply must be unpacked in safe area.
The power supply must be placed on an even and stable ground, away from heat sources and processes in which electrostatic dischargers occur. The module must be protected against solar radiation.

	***When transporting the power supply to a different workstation, it is necessary to follow all safety precautions.***

6.2. Connectors Arrangement

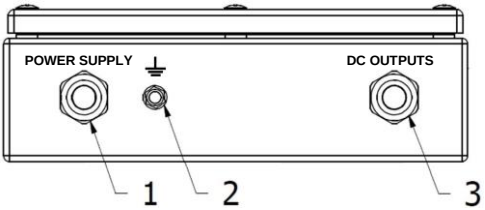


Fig.6. PM02.EX--* power supply connectors arrangement*
1 - Cable gland for power cord.
2 - Grounding terminal.
3 - Cable gland for receiver power cord.

6.3. Power Supply Grounding

- Prepare the functional grounding cable.
- Install the power supply at the workstation.
- Connect the functional grounding cable to the equipotential bonding and to the power supply.
  - The functional grounding cable must be terminated with ring, of 5.2mm diameter, enabling you to couple the cable to the grounding terminal.
  - Use lock washer in order to keep the ring pressed tightly against the housing.
  - Use grounding cable of 4 mm² cross-section with yellow-green shield.
  - Connect the power supply and the device it powers to the same equipotential bonding.

	***Ports marked with „⏚" symbol are intended for the functional grounding cable.***
	***Connect the power supply and the grounding when there is no risk of explosive atmosphere occurrence.***

6.4. Connecting a Peripheral Device to the Power Supply

	***Connect and disconnect the peripheral device from the power supply when there is no risk of explosive atmosphere occurrence.***
	***Prior to 'indicator' - 'power supply' cable connection / disconnection, it is necessary to disconnect the power supply from the mains first.***
	***Prior to connecting peripheral devices to the power supply, read the user manual of connected device.***

Intrinsically safe output circuits are led through the gland using cable. The operator has no access to the internal components of the power supply.
Due to the quantity of led intrinsically safe circuits and cable termination, there are two versions of the power supply: PM02.EX-*-1 and PM02.EX-*-2.

6.4.1. PM02.EX-*-1 Power Supply

V1, V2, V3, V4, V5 output circuits are led through the gland using cable. The cable features removed 150mm of external insulation and wires ends are terminated with tubular end sleeves.

Cable wire numbers are assigned to output circuits in accordance with the table below:

WIRE NUMBER	SIGNAL
1	V5
2	V4
3	V3
4	V2
5	V1
6	GND
7	GND

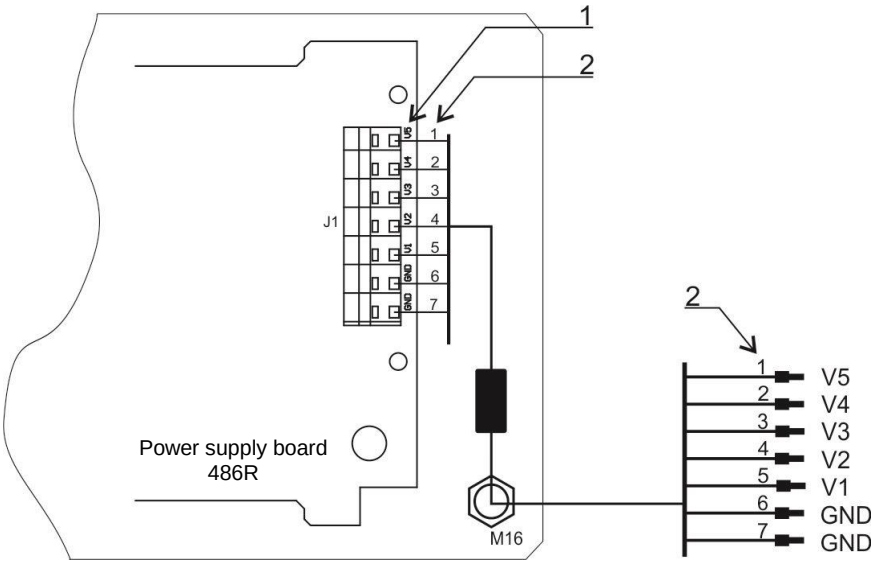


Fig.7. Connection of intrinsically safe cable to PM02.EX--1*
1 – Output voltages marking
2 – Cable wire number

	***The user, on the pain of losing the intrinsic safety, is obliged to connect the cable of intrinsically safe output circuits to the junction box of his/her electrical system. Connections must be made in accordance with Ex standards and Good Engineering Practice.***
	***It is forbidden to connect the power supply to the mains and to use it in case when not all cable wires of the output circuits are connected.***

6.4.2. PM02.EX-*-2 Power Supply

Power supply version intended for supplying RADWAG-designed PL.*.*.HRP.EX.* weighing platforms. The V1, V4, V5 intrinsically safe circuits' cable is terminated with M12 4P plug (male).

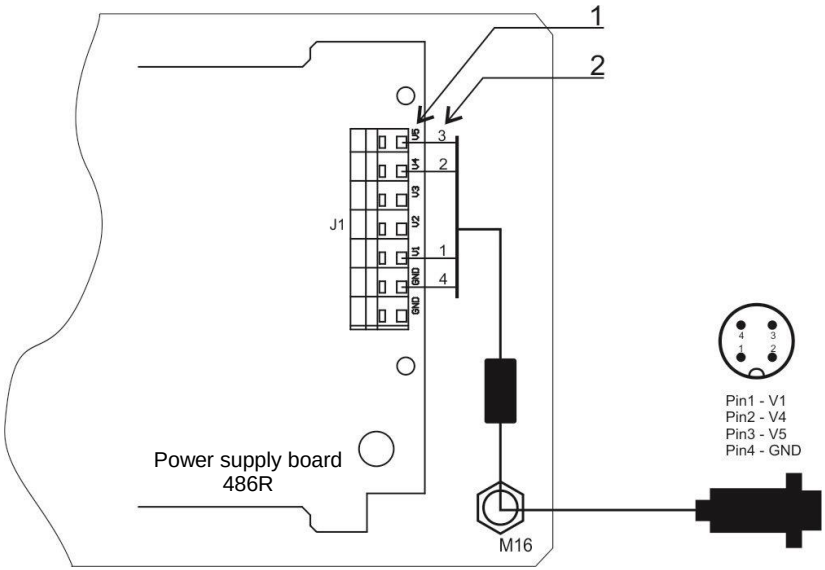


Fig.8. Connection of intrinsically safe cable to PM02.EX--2*

1 – Output voltages marking
2 – Cable wire number

Connecting the power supply to the PL.*.*.HRP.EX.* platform is carried out by connecting the intrinsically safe circuit of the PM02.EX-1-2 or PM02.EX-2-2 power supply to the platform connector marked as DC INPUTS

6.5. Connecting PM02.EX-*-* to the Mains

PM02.EX-*-* power supply, with regard to its location, comes in two installation options:

- **PM02.EX-1-*** - intended for operation in hazardous area,
- **PM02.EX-2-*** - intended for operation in safe area.

Power supply connection method differs depending on the installation option:

- **PM02.EX-1-*** – power supply – is equipped with power cord of 100 - 240VAC that is not terminated with a plug. Respectively prepared power cord's wire ends (stripped, tin-plated or terminated with tubular end sleeves) must be connected to a terminal block or a plug.

- Select the connector and connect the device to the mains.
- The plugs and terminal blocks must meet the standards applicable to the respective hazardous area.
- Power supply installation has to be carried out by an authorized personnel in accordance with regulations, standards and good engineering practice.

Power cord wire colours and their meaning:

Brown or black or grey	phase	L
Blue	neutral	N
Yellow-green	protective	PE

	***Connect the PM02.EX-1-* power supply to the mains when there is no risk of explosive atmosphere occurrence.***

- **PM02.EX-2-* –** power supply – is equipped with power cord of 100–240VAC that is terminated with a plug featuring a ground pin, the plug type is conditioned by region/country. Connect the cable to the wall outlet with a ground pin.

	***It is not allowed to connect the PM02.EX-2-* power supply's plug to the wall outlet located in the hazardous area.***

7. MAINTENANCE

Prior to maintenance it is necessary to disconnect the power supply from the mains, and to check grounding connection and state. You can clean the indicator using regular household cleaners.

	***Clean the indicator when there is no risk of occurrence of explosive atmosphere.***
	***To minimize an electrostatic discharge hazard, clean the housing using a wet cloth. It is especially important when the power supply is operated in a room where there is dry air. Moisture protects against accumulation of electrostatic charges.***
	***Avoid using abrasive cleaners while cleaning the power supply, do not use concentrated acids, bases, solvents or alcohol.***

	***It is not allowed to clean the power supply using compressed air.***

8. TECHNICAL CONDITION INSPECTION

	***The technical condition of the PM02.EX-*-* power supply must be tested and inspected by a trained personnel (familiar with this user manual content) at least once every three months.***

In the course of inspection check:

- if there is no mechanical damage,
- functional grounding state:
  - cable-housing connection,
  - connection resistance – Max. 100Ω,
- cable glands - loose wires impermissible:
  - gland-housing torque – 10Nm,
  - gland's cup nut torque – 5Nm,
- electrical connections – any sign of cable, cable glands or connectors damage, cutting, abrasion impermissible,
- if the power supply's cover is tightly closed: cover screws torque – 0.5Nm, tighten should it be necessary,
- data plates state - they must be complete and readable (not broken/damaged etc.).

9. SERVICE AND REPAIR

	***In case of any sign of damage, it is necessary to disconnect the device form the mains immediately. The damaged component must be replaced or repaired by RADWAG service directly.***

In case of any problems with correct operation of the power supply, contact the closest manufacturer's service point.

In case of defects, deliver the faulty product to the manufacturer's service point. If the product cannot be delivered to the manufacturer's service point, call the service and report the defect. Repair scope and method will be set up.

	It is NOT ALLOWED to carry out any kind of repair of the device on one's own. Any attempt of power supply design modification, repair etc. by unauthorized persons, will result with loss of validity of manufacturer-issued certificates, declarations and warranty.

10. RECYCLING

PM02.EX-*-* power supplies must be recycled, they are not to be treated as a regular household waste. Platforms to be decommissioned must be decommissioned in accordance with valid legal regulations.



11. STANDARDS

The device is manufactured in accordance with the following standards:

1. EN 61326-1:2013 *Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements.*
2. EN 61010-1:2010 *Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements*.
3. EN IEC 60079-0:2018 *Explosive atmospheres - Part 0: Equipment - General requirements.*
4. EN 60079-7:2015 + A1:2018 *Explosive atmospheres - Part 7: Equipment protection by increased safety "e*".
5. EN 60079-11:2012 *Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i*".
6. EN 60079-18:2015 *Explosive atmospheres -- Part 18: Equipment protection by encapsulation "m*".
7. EN 60079-31:2014 *Explosive atmospheres -- Part 31: Equipment dust ignition protection by enclosure "t*".
8. EN 60529:1991 + A2:2013 *Degrees of protection provided by enclosures (IP Code)*.