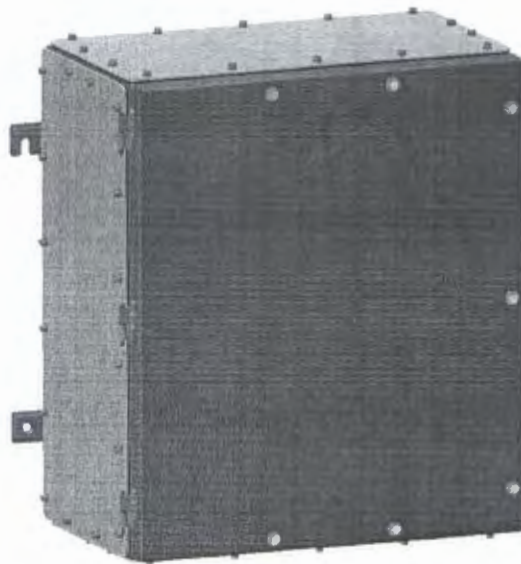




SHOMAL Engineering & Manufacturing Co.

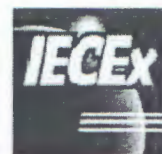
OPERATING INSTRUCTION

SPM SERIES OF STEEL JUNCTION BOXES



SPM SERIES

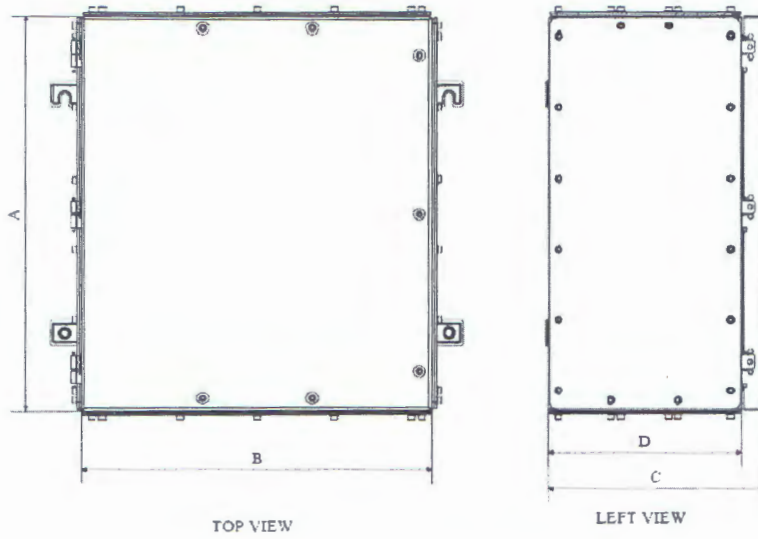
WI-21(PCD-P-01)



THIS GUIDE SHOULD BE READ CAREFULLY BEFORE INSTALLATION.
INCORRECT INSTALLATION AND USE OF THE ENCLOSURES CAN INVALIDATE THE GUARANTEE!

DIMENTIONAL DRAWINGS:

Note: It shall be considered that in "SPM H", $A < B$ and in "SPM V", $A > B$



SPM H TYPE	A	B	C	D
SPM1	120	120	90	
SPM2 14	300	200	153	120
SPM2 20	300	200	213	180
SPM3 14	300	300	153	120
SPM3 20	300	300	213	180
SPM3 30	300	300	313	280
SPM4 14	370	320	153	120
SPM4 20	370	320	213	180
SPM4 30	370	320	313	280
SPM5 14	450	380	153	120
SPM5 20	450	380	213	180
SPM5 30	450	380	313	280
SPM6 14	600	510	153	120
SPM6 20	600	510	213	180
SPM6 30	600	510	313	280
SPM7 14	800	510	153	120
SPM7 20	800	510	213	180
SPM7 30	800	510	313	280
SPM8 14	950	650	153	120
SPM8 20	950	650	213	180
SPM8 30	950	650	313	280
SPM9 14	1250	800	153	120
SPM9 20	1250	800	213	180
SPM9 30	1250	800	313	280

SPM V TYPE	A	B	C	D
SPM1	120	120	90	
SPM2 14	200	300	153	120
SPM2 20	200	300	213	180
SPM3 14	300	300	153	120
SPM3 20	300	300	213	180
SPM3 30	300	300	313	280
SPM4 14	320	370	153	120
SPM4 20	320	370	213	180
SPM4 30	320	370	313	280
SPM5 14	380	450	153	120
SPM5 20	380	450	213	180
SPM5 30	380	450	313	280
SPM6 14	510	600	153	120
SPM6 20	510	600	213	180
SPM6 30	510	600	313	280
SPM7 14	510	800	153	120
SPM7 20	510	800	213	180
SPM7 30	510	800	313	280
SPM8 14	650	950	153	120
SPM8 20	650	950	213	180
SPM8 30	650	950	313	280
SPM9 14	800	1250	153	120
SPM9 20	800	1250	213	180
SPM9 30	800	1250	313	280

IMPORTANT NOTES:

- 1) This guide should be read carefully before installation.
- 2) Incorrect installation and use of the terminal boxes can invalidate the guarantee.

CONFORMITY WITH STANDARDS:

The junction boxes SPM series meet the requirements of the following standards:

EN 60079-0: 2012, IEC 60079-0: 2011

EN 60079-7: 2007, IEC 60079-7: 2006

EN 60079-11: 2012, IEC 60079-11: 2011

EN 60079-31: 2014, IEC 60079-31: 2013

EN 60529: 2013, IEC 60529: 1989 AMD1: 1999, AMD2: 2013

And directive 94/9/EC: equipment and protective systems intended for use in potentially explosive atmospheres.

The junction boxes also fulfill further requirements such as those of the directive on electromagnetic compatibility (directive 89/336/EEC).

The junction boxes have been designed, manufactured and tested according to the ISO 9001:2008.



SAFETY INSTRUCTIONS:

The junction boxes are not suitable for zone 0 and zone 20 hazardous areas. The temperature class and explosion group marked on the junction boxes shall be observed.

The apparatus shall not be used in dust layers > 50mm according to IEC 60079-31.

Modifications to the terminal boxes or changes of their design are not permitted. They shall be used for intended purpose and in perfect and clean condition.

For replacement and repair, only genuine SEMC spare parts shall be used.

Repairs that affect the explosion protection may only be carried out by SEMC or qualified electrician in compliance with the respective national regulations.

Prior to taking the junction boxes into operation, they shall be checked in accordance with the "taking into operation" of this manual.

Before the initial operation, any foreign object shall be removed from the junction boxes.

Observe the national safety rules and regulations for prevention of accidents as well as safety instructions included in this operating instruction.

FIELD OF APPLICATION:

CAT II 2G for use in zone 1 or zone 2. Area as defined in IEC/EN 60079-14.

CAT II 2D for use in zone 21 or 22. Area as defined in IEC/EN 60079-14.

AMBIENT TEMPERATURE:

-20°C TO +40°C or -30°C TO +55°C

PERMANENT STORAGE TEMPERATURE IN ORIGINAL PACKAGE

-20°C TO +80°C

MARKING:

ATEX Marking	IECEX Marking
Ex II 2 G D IP66 Ex e IIC TB Gb Ex tb IIIC T1°C Db Ex ia/ib IIC TB Ga/Gb (Only in case of Ex ia/ib circuits) Certificate No: TÜV 13 ATEX 7439 X	Ex e IIC TB Gb Ex tb IIIC T1°C Db Ex ia/ib IIC TB Ga/Gb (Only in case of Ex ia/ib circuits) IP66 Certificate No: IECEX TUR 13.0012 X

TERMINAL BOX WATTAGE FACTOR CALCULATION METHOD:

The maximum dissipated power of junction box is given by following formula:

$$W = N \times R \times I^2$$

W: Maximum dissipated wattage (table 4)

N: No. of terminals fitted

R: Combined terminal resistance + conductor resistance

I: Maximum current

Typical cable resistances are given in Table 1, but may vary depending on the cable manufacturer.

Terminal resistances are defined in Table 2 as per terminal certification data.

COPPER CONDUCTOR RESISTANCE		
CONDUCTOR CROSS SECTIONAL AREA (mm ²)	RESISTANCE (OHM/m)	RESISTANCE FOR 0.66m CONDUCTOR LENGTH (OHM)
0.5	0.036	0.02376
0.7	0.0258	0.017028
1	0.0181	0.011946
1.5	0.0121	0.007986
2.5	0.00741	0.0048906
4	0.00461	0.0030426
6	0.00308	0.0020328
10	0.00183	0.0012078
16	0.00115	0.000759
25	0.000724	0.00047784
35	0.000524	0.00034584
50	0.000362	0.00023892
70	0.000268	0.00017688
95	0.000189	0.00012474
120	0.000151	0.00009966
150	0.000121	0.00007986
240	0.00007625	0.000050325
300	0.000061	0.00004026

Table 1

Terminal Type	Conductor Size (mm ²)		ATEX Certificate No.	IECEX Certificate No.	Max Ampere	Max Voltage	Terminal Resistance (Ohm)
	Min	Max					
WDU 1.5/ZZ	0.13	2.5	KEMA 98ATEX1685 U	IECEX ULD 05.0008U	15	550	0.000862
WDU 2.5 /1.5/ZR	0.13	4	KEMA 98ATEX1685 U	IECEX ULD 05.0008U	21	550	0.000654
WDU 2.5	0.13	4	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	21	550	0.0002
WDU 2.5N	0.13	4	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	21	420	0.00031
WDU 4	0.13	6	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	28	750	0.00014
WDU 6	0.5	10	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	36	550	0.00009
WDU 10	1.31	16	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	50	550	0.000075
WDU 16	1.5	25	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	66	750	0.00005
WDU 35	2.5	50	KEMA 98ATEX1683 U	IECEX ULD 05.0008U	109	750	0.000028
WDU 50N	5.26	70	KEMA 98ATEX1683 U	N/A	153	750	0.00005
WDU 70/95	16	120	KEMA 98ATEX1686 U	N/A	202	750	0.00005
WDU 120/150	35	150	KEMA 98ATEX1686 U	N/A	234	1100	0.00005
WDU 240	70	240	KEMA 01ATEX2186 U	N/A	240	750	0.0000276
WDK 2.5	0.13	4	KEMA 98ATEX1687 U	IECEX ULD 05.0008U	21	275	0.000862
WFF35	2.5	50	KEMA 98ATEX1684 U	IECEX KEM 07.0053U	150	1100	0.000384
WFF70	2.5	95	KEMA 98ATEX1684 U	IECEX KEM 07.0053U	232	1100	0.0002654
WFF120	6	150	KEMA 98ATEX1684 U	IECEX KEM 07.0053U	309	1100	0.0001933
WFF185	10	240	KEMA 98ATEX1684 U	IECEX KEM 07.0053U	415	1100	0.0001954
WFF300	25	300	KEMA 98ATEX1684 U	IECEX KEM 07.0053U	520	1100	0.0001673
SAK 2.5	0.5	4	KEMA 97ATEX1798 U	IECEX KEM 06.0014U	24	500	0.00035
SAK 4	0.5	6	KEMA 97ATEX1798 U	IECEX KEM 06.0014U	32	800	0.0003
SAK 6N	0.5	10	KEMA 97ATEX1798 U	IECEX KEM 06.0014U	41	800	0.0002
SAK 10	1.5	16	KEMA 97ATEX1798 U	IECEX KEM 06.0014U	57	800	0.00004
SAK 16	2.5	16	KEMA 97ATEX1798 U	IECEX KEM 06.0014U	76	1000	0.000023
SAK 35	6	50	KEMA 97ATEX1798 U	IECEX KEM 06.0014U	125	800	0.000092
ZDU 2.5	0.08	4	KEMA 97ATEX2521 U	IECEX ULD 05.0009U	21	550	0.00065
ZDU2.5/3AN	0.08	4	KEMA 97ATEX2521 U	IECEX ULD 05.0009U	21	550	0.00069
ZDU2.5/4AN	0.08	4	KEMA 97ATEX2521 U	IECEX ULD 05.0009U	21	550	0.0005
ZDU2.5/2X2AN	0.08	4	KEMA 97ATEX2521 U	IECEX ULD 05.0009U	21	550	0.00082
ZDU 4	0.21	6	KEMA 97ATEX2521 U	IECEX ULD 05.0009U	28	550	0.00041
ZDU 6	0.21	6	KEMA 97ATEX2521 U	IECEX ULD 05.0009U	36	550	0.00027
ZDK2.5/1.5	0.08	2.5	KEMA 97ATEX4677 U	IECEX ULD 05.0009U	18	275	0.00082
UK 1.5N	0.14	0.7	KEMA 98ATEX1651 U	IECEX KEM 06.0034U	17	275	0.0004571
UK 2.5N	0.2	2.5	KEMA 98ATEX1651 U	IECEX KEM 06.0034U	28	550	0.0004166
UK 3N	0.2	2.5	KEMA 98ATEX1651 U	IECEX KEM 06.0034U	28	750	0.0005
UK 5N	0.2	4	KEMA 98ATEX1651 U	IECEX KEM 06.0034U	38	750	0.000375
UK 6N	0.2	6	KEMA 98ATEX1651 U	IECEX KEM 06.0034U	53	750	0.000158
UK 10N	0.5	10	KEMA 98ATEX1786 U	IECEX KEM 06.0029U	73	750	0.0001228
UK 16N	0.75	16	KEMA 98ATEX1786 U	IECEX KEM 06.0029U	88	750	0.000171
UK 35	0.75	35	KEMA 98ATEX1786 U	IECEX KEM 06.0029U	145	750	0.000088
UKH 50	10	50	KEMA 98ATEX1786 U	IECEX KEM 06.0029U	135	750	0.0001
UKH 95	16	95	KEMA 98ATEX1786 U	IECEX KEM 06.0029U	210	750	0.0000646
UKH 150	25	150	KEMA 99ATEX8332 U	IECEX KEM 06.0030U	265	726	0.00006535
RTP 2.5	0.5	4	KEMA 04ATEX2285 U	N/A	24	500	0.000146
RTP 4	0.5	4	KEMA 04ATEX2265 U	N/A	32	500	0.000175
RTP 6	0.5	10	KEMA 04ATEX2265 U	N/A	41	800	0.000066
RTP 10	0.5	16	KEMA 04ATEX2265 U	N/A	57	800	0.000072
RTP 16	0.5	16	KEMA 04ATEX2265 U	N/A	76	800	0.000112
RTP 25	0.5	25	KEMA 04ATEX2265 U	N/A	101	800	0.000069
RTP 35	1.5	35	KEMA 04ATEX2265 U	N/A	125	800	0.000022
RTP 50	10	50	KEMA 04ATEX2265 U	N/A	150	1000	0.000087

Table 2

Terminal Type	Conductor Size (mm ²)		ATEX Certificate No.	IECEX Certificate No.
	Min	Max		
WPE 1.5/ZZ	0.13	2.5	KEMA 98ATEX1685 U	IECEX ULD 05.0008U
WPE 2.5/1.5/ZR	0.05	4	KEMA 98ATEX1685 U	IECEX ULD 05.0008U
WPE 2.5	0.05	4	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 2.5N	0.05	4	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 4	0.13	6	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 4/ZZ	0.13	6	KEMA 08ATEX0014 U	N/A
WPE 4/ZR	0.13	6	KEMA 08ATEX0014 U	N/A
WPE 4N	0.13	6	TÜV 04ATEX2630 U	N/A
WPE 6	0.08	10	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 10	1.31	16	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 16	1.5	25	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 35	2.5	50	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 50N	10	70	KEMA 98ATEX1683 U	N/A
WPE 70N/35	10	95	KEMA 98ATEX1683 U	IECEX ULD 05.0008U
WPE 95N/120N	16	150	KEMA 98ATEX1683 U	N/A
WPE 70/95	13.3	120	KEMA 98ATEX1686 U	N/A
WPE 120/150	33.63	150	KEMA 98ATEX1686 U	N/A
WDK 2.5 PE	0.05	4	KEMA 98ATEX1687 U	IECEX ULD 05.0008U
WDK 2.5N PE	0.05	4	KEMA 00ATEX2061 U	IECEX ULD 05.0008U
WDK 4N PE	0.5	4	KEMA 00ATEX2061 U	IECEX ULD 05.0008U

Table 3

SPM	Maximum allowed power dissipation [W]					
	-20°C ≤ Ta ≤ 40°C			-30°C ≤ Ta ≤ 55°C		
	T6(T80°C)	T5(T95°C)	T4(T130°C)	T6(T80°C)	T5(T95°C)	T4(T130°C)
114	2,42	3,33	5,45	1,51	2,42	4,54
214	9,56	13,15	21,51	5,98	9,56	17,93
220	11,80	16,23	26,55	7,38	11,80	22,13
314	12,90	17,74	29,03	8,06	12,90	24,19
320	15,50	21,31	34,88	9,69	15,50	29,06
330	21,30	29,29	47,93	13,31	21,30	39,94
414	14,80	20,35	33,30	9,25	14,80	27,75
420	19,70	27,09	44,33	12,31	19,70	36,94
430	23,60	32,45	53,10	14,75	23,60	44,25
514	20,20	27,78	45,45	12,63	20,20	37,88
520	25,80	35,48	58,05	16,13	25,80	48,38
530	32,80	45,10	73,80	20,50	32,80	61,50
614	33,40	45,93	75,15	20,88	33,40	62,63
620	40,70	55,96	91,58	25,44	40,70	76,31
630	49,10	67,51	110,48	30,69	49,10	92,06
714	44,10	60,64	99,23	27,56	44,10	82,69
720	52,70	72,46	118,58	32,94	52,70	98,81
730	62,20	85,53	139,95	38,88	62,20	116,63
814	63,10	86,76	141,98	39,44	63,10	118,31
820	73,30	100,79	164,93	45,81	73,30	137,44
830	84,50	116,19	190,13	52,81	84,50	158,44
914	99,90	137,36	224,78	62,44	99,90	187,31
920	113,00	155,38	254,25	70,63	113,00	211,88
930	127,00	174,63	285,75	79,38	127,00	238,13

Table 3

EXAMPLE:

Assume a terminal box which has a maximum dissipated power of 10.9 Watts.

Consider 0.231 m length for its maximum internal linear dimension.

The terminal box fitted with 25 SAK 2.5 terminals, operating at 7A each with 2.5mm² cable attached.

Resistance of conductor = 0.00741 Ω/m x 0.365 m = 0.0027Ω per conductor

Resistance of terminal = 0.00035Ω

Total resistance per terminal = 0.00035Ω + 0.0027Ω = 0.00306Ω

Therefore $W = I^2 \times R \times 25 \text{ terminals} = 3.74W$

Since the maximum permitted dissipated power is measured at 10.9W, therefore the assembly of 25 SAK 2.5 terminals would be acceptable.

TO OPEN THE LID AND GLAND PLATES:

1. Disconnect power, (isolate all circuits).
2. Un-tighten all of M6 gland plates and lid's screws.
3. Carefully open the gland plates and lid, ensuring the sealing gaskets are not damaged or misplaced.

TO CLOSE THE LID AND GLAND PLATES:

Any foreign object shall be removed from the apparatus.

Check that the sealing gasket is secured inside the lid and undamaged; moreover check out gland plate's gaskets. Make sure that the lid and gland plates are refitted correctly.

Locate and tighten the M6 lid and gland plates screws properly.

WARNING!!!: If the screws are over tightened, the apparatus can be damaged!

ENCLOSURE INSTALLATION FOR SAFE USE:

1. The IP rating of the enclosure must be maintained for the area of use, by the use of correct arrangement of Cable /gland /sealing arrangements and in accordance with the installation codes as detailed in IEC 60079-14, IEC 60079-31, and this operating instruction.
2. Where other certified components are part of assembly, the user must take in to account any limitations listed on relevant certificates.
3. If an optional Breather/Drain as listed in the enclosure certificate is fitted, the enclosure must be sited such that the Breather/Drain is pointing vertically downwards from its bottom.
The IP rating of the Breather Drain should match with the IP rating of the enclosure.
4. The enclosure has Metric clearance/plain entry holes as standard. Alternative clearance holes are available. Provided they are to a recognized standard e.g. BSPP, ET etc. (Parallel threads only).
Plain entry holes must maintain the following:
 - a) The plain hole shall be no larger than 0.7mm above the major diameter of the entry thread.
 - b) Glands or stopping plugs shall be secured internally by suitable locknuts, such that they will not be dislodged by a 7Nm impact.
 - c) The enclosure shall be maintained at IP 66 by a suitable sealing washer under the shoulder of the cable gland.

d) All unused entry holes must be sealed by a suitable stopping plug, as listed on the enclosure certificate. The stopping plug shall be held in place by a locknut and also the IP rating of the junction box shall be maintained for zone of use.

5. When used under dust layers the maximum depth shall be no greater than 50mm.

The apparatus must not be modified without reference to *SEMC Co.*, as this will invalidate certification.

TERMINAL WIRING (TW):

1. All wiring must be carried out in accordance with the relevant code of practice and/ or instruction e.g. *IEC 60079-14*
2. All terminals and accessories such as cross-connectors shall be installed in accordance with the terminal manufacturer's instructions.
3. The voltage and current and maximum dissipated power shown on the label must not exceed.
4. Where a major portion of the terminals are carrying maximum rated current the temperature at the branching point of the conductors may exceed 70° C. Under these circumstances the installer must insure that the limiting temperature for the cable insulation used acceptable e.g. 85° C (T6).
5. The wiring installation must extend to within 1mm of the metal face of the terminal, unless the relevant certificate allows more.
6. Terminal temperatures must not exceed the operating range specified on the component certificate.
7. Only those terminals shown on terminal schedule attached may be incorporated in the box. (See table 4)
8. The installer must insure that the condition of use for the terminals outlined is complied with the relevant certificate.
9. All terminal screws used and unused shall be fully tightened down by the end user.
10. The installer shall ensure creepage and clearance distance are not reduced, especially between intrinsically safe (IS) and (Non-IS) circuits (e.g. 50mm clearance).
11. Use of the terminal box at ambient temperature below -30°C is dependent upon the minimum service temperature of the terminals.

EARTHING:

These enclosures have an integral internal/external earth stud assembly suitable for the largest conductor size used in the box.

In the case of painted boxes, consideration must be given to the removal of paint e.g. under the earth stud on the inside of the box which may lead to corrosion of the enclosure and potential reduction in earth protection. This area following installation must be protected against corrosion.

TAKING INTO OPERATION:

Prior to taking the apparatus into operation, the test specified in the relevant national regulations will have to be carried out.

Apart from that, the correct functioning and installation of the apparatus in accordance with this operating instruction and other applicable regulations will have to be checked.

Incorrect installation and use of the terminal box can invalidate the guarantee.

SPECIAL CONDITIONS FOR SAFE USE:

- Suitable certified cable glands or blanking elements, that sustain the type of protection and IP66, must be used.
- If a breather is equipped, the lower IP rating is used instead.
- The insulation of conductors must match with temperature requirements.

MAINTENANCE / SERVICING:

The relevant national regulations which apply to the maintenance/servicing of the electrical apparatus in explosive atmosphere shall be observed.

Before opening the enclosure make sure that the apparatus is disconnected from the supply voltage, or take appropriate protective measures.

The required maintenance intervals depend on the respective application and will therefore have to be determined by the user dependent on the conditions of use.

When servicing the apparatus, particularly those parts that are decisive for the type of protection against explosion, will have to be checked (e.g. intactness of enclosure, cable glands, efficiency of the cover gaskets).

If during servicing repairs prove to be necessary, the Repair / Overhaul / Modification of this manual will have to be observed.

REPAIR / OVERHUAL / MODIFICATION:

Repairs may only be carried out with genuine *SEMC* spare parts.

Repairs that affect the explosion protection may only be carried out by *SEMC* or a qualified electrician in compliance with the applicable rules.

Modifications to the apparatus or changes of its design are not permitted.

DISPOSAL / RECYCLING

When the apparatus is disposed of, the respective national regulations on waste disposal will have to be observed.