

S5000 DC & ZFV | 概览 / Overview

ZFV | 选型指南 / Selection guide

直流设备的隔离开关，可以采用各种电流，最大电压为1500V DC21B。有2P、3P+3P、4P和4P+4P几种型号，可以用作主开关。

需要注意的是，PV设备需要保证安全断开。维护时，可以将标准配电柜手柄锁定在“OFF”位置。Telergon的这类PV开关，全都配备了标准化的外壳。

附件包括桥式连接和接线端护板。

还可以按要求提供：各种额定值的转换开关（参见第76 - 77页的技术参数）。

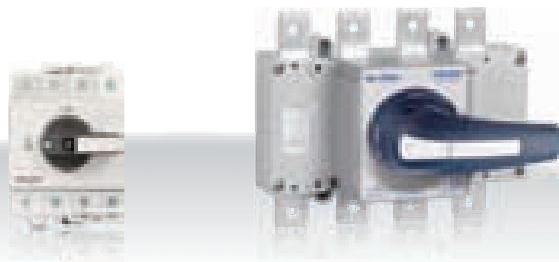
Switch disconnectors for DC applications are available in a wide range of currents and voltages up to 1500V DC21B. 2P, 3P+3P, 4P and 4P+4P versions are available, acting as a main switch.

They are specially indicated for PV installations, where a safe disconnection is required. Standard panel handle is padlockable in "OFF" position, for maintenance purposes. Telergon uses this range of switches in all standardized enclosed applications for PV (see page 79).

Bridging links and terminal shrouds are available as accessories (see page 69).

Also available under request:

- Different ratings (see technical information on pages 76 - 77).
- Changeover switches.



Relevant characteristics for photovoltaic installations

光伏设备的相关特点

- > U_i (V) 额定绝缘电压1.000 Vdc.
- > U_{oc} (V) 光伏系统的开路电压。
- > U_{ef} (V) 光伏设备的负载电压。
- > I_{ef} (A) 设备的负载工作电流。
- > I_{sc} (A) 光伏设备的短路电流。
- > 某些PV系统必须配备感应部件（电缆、逆变器等）。
- > 开关的规格取决于最大工作电压，即开路电压。
- > 应当保持：
 - $U_i \geq U_{oc}$
 - 建议 U_i 的值介于 U_{oc} 的10-15%之间。
 - $U_e \geq U_{ef}$
 - $I_e \geq I_{ef}$
 - $I_e \geq I_{sc}$

- > U_i (V) Rated insulation voltage 1.000Vdc.
- > U_{oc} (V) Open circuit voltage of the photovoltaic system.
- > U_{ef} (V) Photovoltaic installation functioning voltage on load.
- > I_{ef} (A) Installation working current under load.
- > I_{sc} (A) Short-circuit current of the photovoltaic installation.
- > In certain places of Pv Systems, inductive component must be considered (cables, inverter, etc.).
- > The sizing of the switch must be done considering open circuit voltage as maximum operation voltage.
- > It necessary to comply with:
 - $U_i \geq U_{oc}$
 - We recommend to set U_i between 10 and 15% over U_{oc} .
 - $U_e \geq U_{ef}$
 - $I_e \geq I_{ef}$
 - $I_e \geq I_{sc}$

ZFV						开关 O-I / On-Off switch ^(*)	
U_e (Vdc)	安培 Amps	规格 Size	连接 Connection	极数 Poles	型号 Code	采用防护级别IP65的塑料外壳 In plastic enclosure IP65	
1000	DC21B	13	00		2	ZFV32 SMAH1 A2	型号 Code
		25			4	ZFV25 SMAH1 A4B	
		32			4	ZFV32 SMAH1 A4B	

^(*) 开关 + 桥式连接 + 可以锁定的指示手柄。

^(*) Switch + bridging links + padlockable handle.



负荷开关 ZFV 2P / 4P 连接
Switch - disconnectors ZFV 2P / 4P connection

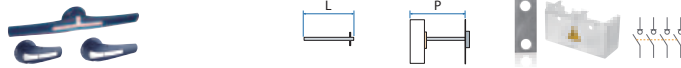
负荷开关 ZFV 4P 连接
Switch - disconnectors ZFV 4P connection

ZFV | 尺寸 / Dimensions (mm)

系列 Series	安培 Amps	规格 Size	正视图 Front view	俯视图 Side view	接线图 de 连接 Connection diagram
ZFV	13 25 32	00	 2P 4P	 2P 4P	 2P 4P
			 25 32	 25 32	 25 32

S5000 DC | 选型指南 / Selection guide

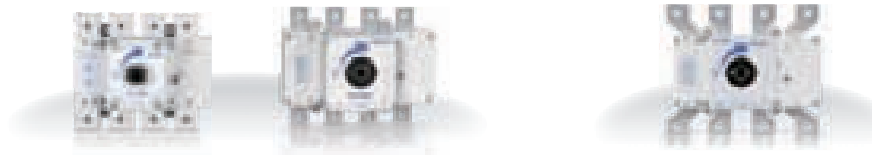
S5000 DC | 选型指南 / Selection guide



S5000 DC 1000 V				开关 O-I On-Off switch	直接手柄 Direct handle	外部手柄 External handle			轴外伸部 Shaft extensions						桥式连与 端子罩 Bridging links & terminal shrouds	接线图 Connection diagram	
Ue (Vdc)	安培 Amps	规格 Size	连接 Connection	4P ^(*)		蓝色 / Blue			型号 1 / Type 1		型号 2 / Type 2						
				型号 Code	型号 Code	型号 Code	L (mm)	P (mm)	型号 Code	L (mm)	P (mm)	型号 Code	L (mm)	P (mm)			
900	DC21B	40	0	⊕	S5-01604PB0	DS-SI01	DS-SA01	177	85...195,5	DS-EP04	250	90...263	DS-EP05	347	90...400	见第5-6页 see page 5-6	
		40	0	⊕	S5-01604PS0	DS-SI01	DS-SA01	177	85...195,5	DS-EP04	250	90...263	DS-EP05	347	90...400		
1000	DC21B	100	1	⊕	S5-01254PRO	DS-SI11	DS-SA11	227	103...256	DS-EP14	376	108...400	DS-EP15	536	108...560		
		160	1	⊕	S5-02004PRO	DS-SI11	DS-SA11	227	103...256	DS-EP14	376	108...400	DS-EP15	536	108...560		
		250	1	⊕	S5-03154PRO	DS-SI11	DS-SA11	227	103...256	DS-EP14	376	108...400	DS-EP15	536	108...560		
		400	1	⊕	S5-04004PC0	DS-SI11	DS-SA11	227	103...256	DS-EP14	376	108...400	DS-EP15	536	108...560		
		500	2	⊕	S5-06304PRO	DS-LI21	DS-LA21	195	134...240	DS-EP24	345	139...400	DS-EP24	535	139...560		
		630	2	⊕	S5-08004PC0	DS-LI21	DS-LA21	195	134...240	DS-EP24	345	139...400	DS-EP24	535	139...560		
		850	3	⊕	S5-12504PC0	DS-LI31	DS-LA31	186	145...242	DS-EP32	336	150...400	DS-EP24	535	150...600		
		1250	4	⊕	S5-18004PS0	DS-LI41	DS-LA41	239	235...400	DS-EP44	204	240...400	DS-EP45	635	240...836		

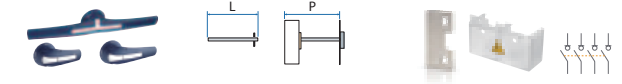
^(*) 4极同时断开。

^(*) 4 poles simultaneous breaking.



负荷开关 S5000 DC 4P 连接
Switch - disconnectors S5000 DC 4P connection

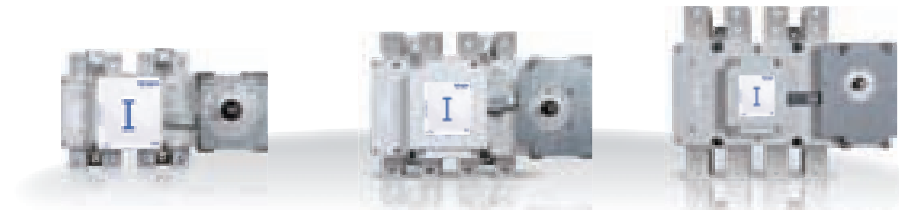
负荷开关 S5000 DC 4P 连接
Switch - disconnectors S5000 DC 4P connection



S5000 DC 1000 V (多级)				开关 O-I On-Off switch	直接手柄 Direct handle	外部手柄 External handle			桥式连与 端子罩 Bridging links & terminal shrouds	接线图 Connection diagram	
Ue (Vdc)	安培 Amps	规格 Size	连接 Connection	8P		蓝色 / Blue					
				型号 Code	型号 Code	型号 Code	L (mm)	P (mm)			
1000	DC21B	250	1	⊕	S5M02508PRO0U	DS-LI12	DS-LA12	227	288...422	见第5-6页 see page 5-6	
		400	2	⊕	S5M06308PRO0U	DS-LI22	DS-LA22	239	325...490		
		700	3	⊕	S5M12508PC00U	DS-LI41	DS-LA41	239	408...573		
		1250	4	⊕	S5M18008PS00U	DS-LI41	DS-LA41	239	408...573		

另有3或4极线路，欢迎垂询。

Also available 3 or 4 strings, please consult.



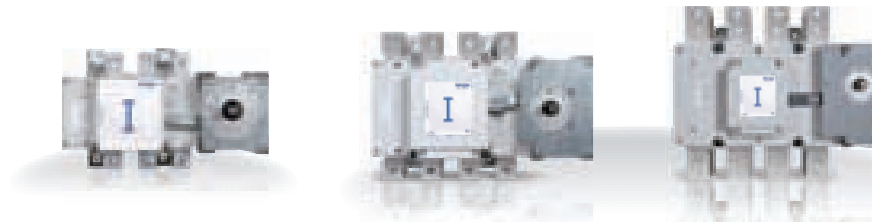
负荷开关 S5000 DC 8P (多级) 连接
Switch - disconnectors S5000 DC 8P (multi-string) connection

S5000 DC UL CSA | 选型指南 / Selection guide

S5000 DC 1500 V				开关 O-I On-Off switch		直接手柄 Direct handle	外部手柄 External handle			桥式连与 端子罩 Bridging links & terminal shrouds	接线图 Connection diagram	
Ue (Vdc)	规格 Size	连接 Connection	A Amps	3P+3P		4P+4P ^(*)		蓝色 / Blue				
				型号 Code	安培 Amps	型号 Code	型号 Code	L (mm)	P (mm)			
1500	DC21B	1	200	S5M031533R0	315	S5M031544R0	DS-LI12	DS-LA12	227	288...422	见第5-6页 see page 5-6	
		2	400	S5M063033R0	500	S5M063044R0	DS-LI22	DS-LA22	239	325...490		
		3	600	S5M125033C0	800	S5M125044C0	DS-LI41	DS-LA41	239	408...573		
		4	1000	S5M180033S0	1250	S5M180044S0	DS-LI41	DS-LA41	239	408...573		

^(*) 4极同时断开。

^(*) 4 poles simultaneous breaking.



负荷开关 S5000 DC 3P + 3P 连接
Switch - disconnectors S5000 DC 3P + 3P connection

负荷开关 S5000 DC
Switch - disconnectors S5000 DC 4P + 4P connection

S5000 DC 1000V UL CSA ^(*)				开关 O-I On-Off switch	直接手柄 Direct handle	外部手柄 External handle			桥式连与 端子罩 Bridging links & terminal shrouds	接线图 Connection diagram
Ue (Vdc)	安培 Amps	规格 Size	连接 Connection	4P ^(*)		黑色 / Negro				
				型号 Code	型号 Code	型号 Code	L (mm)	P (mm)		
1000	250	1	⊕	S5-02504PRO0U	DS-EI11	DS-EN11	191	108...240	见第5-6页 see page 5-6	
	400	2	⊕	S5-06304PRO0U	DS-EI21	DS-EN21	195	139...240		
	700	3	⊕	S5-12504PC00U ^(*)	DS-EI31	DS-EN31	186	150...240		
	1250	4	⊕	S5-18004PS00U	DS-EI41	DS-EN41	239	240...400		

^(*) 4极同时断开。 ^(*) 正在审批。 ^(*) 这类开关应当按照相应的接线图的说明，配备输入和输出接线端盖。

^(*) 4 poles simultaneous breaking. ^(*) Approval in process. ^(*) These switches should be completed with input and output terminal covers, according to the wiring diagram selected.



符合
UL 98B
CAN/CSA C22.2 NO. 4-04的规定

S5000 DC | 接线图 / Connection diagram

S5000 DC | 附件 / Accessories

S5000 DC 4P

	接线图 Connection diagram	桥式连接 / Bridging links	端子罩 / Terminal shrouds
A			
B			
C			

S5000 DC 8P (多极)

	接线图 Connection diagram	桥式连接 / Bridging links		端子罩 / Terminal shrouds (正面开关)
		正面开关 Frontal switch	后部开关 Rear switch	(on frontal switch only)
A				
B				
C				
D				

S5000 DC 3P + 3P

	接线图 Connection diagram	桥式连接 / Bridging links		端子罩 / Terminal shrouds (正面开关)
		正面开关 Frontal switch	后部开关 Rear switch	(on frontal switch only)
E				
F				

S5000 DC 4P + 4P

	接线图 Connection diagram	桥式连接 / Bridging links		端子罩 / Terminal shrouds (正面开关)
		正面开关 Frontal switch	后部开关 Rear switch	(on frontal switch only)
C				
D				



ETL产品型号+OU
ETL product code
adding OU:
DS-CU_0U

防护板 Shield protection	接线端护板 (两片) / Terminal shrouds (2 pieces) *									
	规格0 / Size 0		规格1 / Size 1 *		规格2 / Size 2		规格3 / Size 3		规格4 / Size 4	
接线图 Diagram	接线图 Diagram		接线图 Diagram		接线图 Diagram		接线图 Diagram		接线图 Diagram	
A - B	A	B	A	B	A	B	A	B	A	B
IEC产品型号 IEC product code	DS-CU01	DS-CU18	DS-CU10	DS-CU28	DS-CU20	DS-CU38	DS-CU30	DS-CU48	DS-CU40	
	DS-CU01	DS-CU19	DS-CU11	DS-CU29	DS-CU21	DS-CU39	DS-CU31	DS-CU49	DS-CU41	
	C - D	C - D		C - D		C - D		C - D		
IEC产品型号 IEC product code	DS-CU01	DS-CU18	DS-CU28		DS-CU38		DS-CU48			
	DS-CU01	DS-CU10	DS-CU20		DS-CU30		DS-CU40			
	E - F	E - F		E - F		E - F		E - F		
IEC产品型号 IEC product code	-	DS-CU18	DS-CU28		DS-CU38		DS-CU48			
	-	DS-CU10	DS-CU20		DS-CU30		DS-CU40			

* 3P+3P,4P+4P,8P的端子罩仅适用于正面安装的负荷开关
* For the switches 3P+3P, 4P+4P & 8P the shrouds can only be fitted in the frontal switch.
** 连接请咨询
** Please consult for connection.



桥式连接 (两片) / Bridging links (2 pieces)							
规格 / Size 0		规格 / Size 1		规格 / Size 2	规格 / Size 3	规格 / Size 4	
接线图 Diagram	接线图 Diagram	接线图 Diagram	接线图 Diagram	接线图 Diagram	接线图 Diagram	接线图 Diagram	
A - B	A - B	A - B	A - B	A - B	A - B	A - B	
S5000 DC 4P 型号 Code	DS-PI05	DS-PI01	DS-PI11	DS-PI14	DS-PI21	DS-PI31	DS-PI41



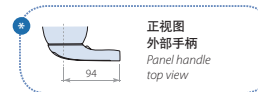
桥式连接 (两片或三片) / Bridging links (2/3 pieces)								
规格 / Size 1		规格 / Size 2		规格 / Size 3		规格 / Size 4		
接线图 / Diagram		接线图 / Diagram		接线图 / Diagram		接线图 / Diagram		
A - B	C	A - B	B	A - B	B	A - B	B	
S5000 DC 4P UL CSA 型号 Code	DS-PI120U	DS-PI130U	DS-PI220U	DS-PI230U	DS-PI320U	DS-PI330U	DS-PI420U	DS-PI430U
	A - B	C - D	A - B	C - D	A - B	C - D	A - B	C - D
S5000 DC 8P (multi-string) 型号 Code	DS-PI120U	DS-PI130U	DS-PI220U	DS-PI230U	DS-PI320U	DS-PI330U	DS-PI420U	DS-PI430U
	DS-PI170U	DS-PI160U	DS-PI270U	DS-PI260U	DS-PI370U	DS-PI360U	DS-PI470U	DS-PI460U
	E - F		E - F		E - F		E - F	
S5000 DC 3P+3P 型号 Code	DS-PI120U	咨询 Consult	DS-PI220U	DS-PI230U	DS-PI320U	DS-PI330U	DS-PI420U	DS-PI430U
	DS-PI170U	咨询 Consult	DS-PI270U	DS-PI260U	DS-PI370U	DS-PI360U	DS-PI470U	DS-PI460U
	C - D		C - D		C - D		C - D	
S5000 DC 4P+4P 型号 Code	DS-PI130U	咨询 Consult	DS-PI230U	DS-PI260U	DS-PI330U	DS-PI360U	DS-PI430U	DS-PI460U
	DS-PI160U	咨询 Consult	DS-PI260U	DS-PI260U	DS-PI360U	DS-PI360U	DS-PI460U	DS-PI460U

S5000 DC | 尺寸 / Dimensions (mm)

S5000 DC | 尺寸 / Dimensions (mm)

外部手柄 / Panel handle

安培 Amps (Ith)	规格 Size	正视图 Front view	俯视图 Side view
160	0		
160			
125 200 315	1		
400			
630 800	2		
1250	3		
1800	4		



直接手柄 / Direct handle

正视图 Top view	配电柜上的 手柄钻孔 Panel drilling handle	配电柜上手柄和锁定装置开设的钻孔 Panel drilling for handle and keylock device		尺寸 (mm) Dimensions (mm)															
		单 / simple	双 / double																
		咨询 Consult	咨询 Consult	<table border="1"> <thead> <tr> <th></th> <th>H</th> <th>I</th> <th>J</th> <th>øT</th> </tr> </thead> <tbody> <tr> <td>125 A</td> <td>130</td> <td>150</td> <td>20</td> <td>M8</td> </tr> <tr> <td>315 A</td> <td>143</td> <td>167</td> <td>25</td> <td>M10</td> </tr> </tbody> </table>		H	I	J	øT	125 A	130	150	20	M8	315 A	143	167	25	M10
	H	I	J		øT														
125 A	130	150	20		M8														
315 A	143	167	25		M10														
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		咨询 Consult	咨询 Consult																

S5000 DC UL | 尺寸 / Dimensions (mm)

S5000 DC UL | 尺寸 / Dimensions (mm)

		外部手柄 / Panel handle		指示手柄 / Direct handle	
安培 Amps	规格 Size	正视图 Front view	俯视图 Side view	正视图 Top view	配电柜上的钻孔 Panel drilling
250	1				
400	2				
700	3				
1250	4				

ZFV DC | 技术参数 / Technical information

参照 / According to:		1000Vdc以下ZFV负荷开关 Switch - disconnectors ZFV up to 1000 Vdc		
IEC-EN-UNE 60947-1 IEC-EN-UNE 60947-3				
规格 / Size		00		
型号 / Code		ZFV25 SMAH1 A4B	ZFV32 SMAH1 A2	ZFV32 SMAH1 A4B
极数 / Poles		25	32	32
周围环境的额定热电流 / Rated thermal current in ambient		4P	2P	4P
额定绝缘电压 / Rated insulation voltage		25	32	32
额定冲击耐受电压 / Rated impulse withstand voltage		1000	1000	1000
额定工作电流 Rated operational current ^{(*)1} Ie L/R= 1ms		Uimp kV	8	8
短路参数 / Short - circuit behaviour		Ue 1000 Vdc	DC21B	A
短路接通容量 / Short - circuit making capacity		25	13	32
最大功率耗散 / Maximum power dissipation (Ie max. DC21B)		800	900	1000
线路容量 / Connecting capacity		10	8	16
电缆 (Cu) / Rigid or stranded cable		4 - 16	4 - 16	4 - 16
弹性电缆 / Flexible cable		4 - 10	4 - 10	4 - 10
弹性电缆 (多芯) / Flexible cable (multicore cable end)		4 - 10	4 - 10	4 - 10
接线端螺栓的规格 / Size of terminal screw		M4 Pz ²	M4 Pz ²	M4 Pz ²
扭矩 / Tightening torque		1,2 - 1,8	1,2 - 1,8	1,2 - 1,8

^{(*)1} 可以采用其它电压及类别：请与我公司协商。

^{(*)1} Other voltages and / or utilization categories. Please consult.

S5000 DC | 技术参数 / Technical information

参照 / According to:		900Vdc以下S5000直流负荷开关 Switch - disconnectors S5000 DC up to 900 Vdc		
IEC-EN-UNE 60947-1 IEC-EN-UNE 60947-3				
规格 / Size		0		
型号 / Code		S5-01604P80/PS0		
周围环境的额定热电流 / Rated thermal current in ambient		160		
Ith		40° C	A	160
		50° C	A	160
		65° C	A	160
额定绝缘电压 / Rated insulation voltage DC20		Ui	V	1000
额定绝缘强度 / Rated dielectric strength		50 Hz., 1 min.	V	4000
额定冲击耐受电压 / Rated impulse withstand voltage		Uimp kV	8	
额定工作电流 Rated operational current ^{(*)1} Ie		Ue		
		400 Vdc	A	DC21B 125
		600 Vdc	A	DC21B 90
		800 Vdc	A	DC21B 60
短路参数 / Short - circuit behaviour		Ue 900 Vdc	A	DC21B 40
短路接通容量 / Short - circuit making capacity ^{(*)2}		Icm	kA (peak)	13
最大功率耗散 / Maximum power dissipation			A ² s (x 10 ³)	198
最小机械操作次数 / Minimum number of mechanical operations ^{(*)3}			循环 / Cycles	30000
最小电气操作次数 / Minimum number of electrical operations			循环 / Cycles	DC21B 900V 300
最大重量 (4极无跳线) / Maximum weight (4 poles - without jumpers)			Kg	1
线路容量 / Connecting capacity				
电缆 / Rigid cable (Cu)			mm ²	95
型材 (厚/宽) / Bar (Thickness / Width)			mm	5/25
扭矩 / Tightening torque			Nm	4/13

^{(*)1} 可以采用其它电压及类别：请与我公司协商。

^{(*)1} Other voltages and / or utilization categories. Please consult.

^{(*)2} 无限度保护装置 (短路保持50...100毫秒)

^{(*)2} Without limiting protective device (short-circuit maintained 50... 100 ms).

^{(*)3} 其它操作模式，请与我公司协商。

^{(*)3} Please consult us for more operations.



S5000 DC | 技术参数 / Technical information

参照 / According to:		1000Vdc以下的S5000直流负荷开关 Switch disconnectors S5000 DC up to 1000 Vdc															
IEC-EN-UNE 60947-1 IEC-EN-UNE 60947-3																	
规格 / Size		1			2			3			4						
型号 / Code		S5-01254P80	S5-02004P80	S5-03154P80	S5-04004P80	S5-06304P80	S5-08004P80	S5-12504P80	S5-18004P80								
周围环境的额定热电流 / Rated thermal current in ambient		125	200	315	400	630	800	1250	1800								
Ith		40° C	A	125	200	315	400	630	800	1250	1800						
		50° C	A	125	200	315	400	630	800	1000	1600						
		65° C	A	125	200	280	280	560	560	900	1400						
额定绝缘电压 / Rated insulation voltage DC20		Ui	V	1000	1000	1000	1000	1000	1000	1000	1000						
额定绝缘强度 / Rated dielectric strength		50 Hz., 1 min.	V	5000	5000	5000	5000	8000	8000	8000	10000						
额定冲击耐受电压 / Rated impulse withstand voltage		Uimp kV	8	8	8	8	12	12	12	12	12						
额定工作电流 Rated operational current ^{(*)1} Ie		Ue															
		400 Vdc	A	DC21B 125	DC21B 200	DC21B 315	DC21B 400	DC21B 630	DC21B 800	DC21B 1250	DC21B 1800						
		600 Vdc	A	DC21B 125	DC21B 200	DC21B 315	DC21B 400	DC21B 630	DC21B 700	DC21B 1000	DC21B 1800						
		1000 Vdc	A	DC21B 100	DC21B 160	DC21B 250	DC21B 400	DC21B 500	DC21B 630	DC21B 850	DC21B 1250						
短路参数 / Short - circuit behaviour																	
短路接通容量 / Short - circuit making capacity ^{(*)2}		Icm	kA (peak)	20	20	20	20	26	26	60	75						
最大功率耗散 / Maximum power dissipation			A ² s (x 10 ³)	1000	1000	1000	1000	1600	1600	4900							
最小机械操作次数 / Minimum number of mechanical operations ^{(*)3}			循环 / Cycles	20000	20000	20000	20000	10000	10000	10000	10000						
最小电气操作次数 / Minimum number of electrical operations			循环 / Cycles	DC21B 1000V 200	DC21B 1000V 200	DC21B 1000V 200	DC21B 1000V 200	DC21B 1000V 200	DC21B 1000V 200	DC21B 1000V 100	DC21B 1000V 100						
最大重量 (4极无跳线) / Maximum weight (4 poles - without jumpers)			Kg	1,9	1,9	1,9	1,9	4,5	4,5	7,6	20,8						
线路容量 / Connecting capacity																	
电缆 / Rigid cable (Cu)			mm ²	185	185	185	240	2x240	2x240	2x300	-						
型材 (厚/宽) / Bar (Thickness / Width)			mm	7/25	7/25	7/25	7/40	2x5/40	2x5/40	2x10/50	2x7/80						
扭矩 / Tightening torque			Nm	13	13	18	24	24	24	45	55						

^{(*)1} 可以采用其它电压及类别：请与我公司协商。

^{(*)1} Other voltages and / or utilization categories. Please consult.

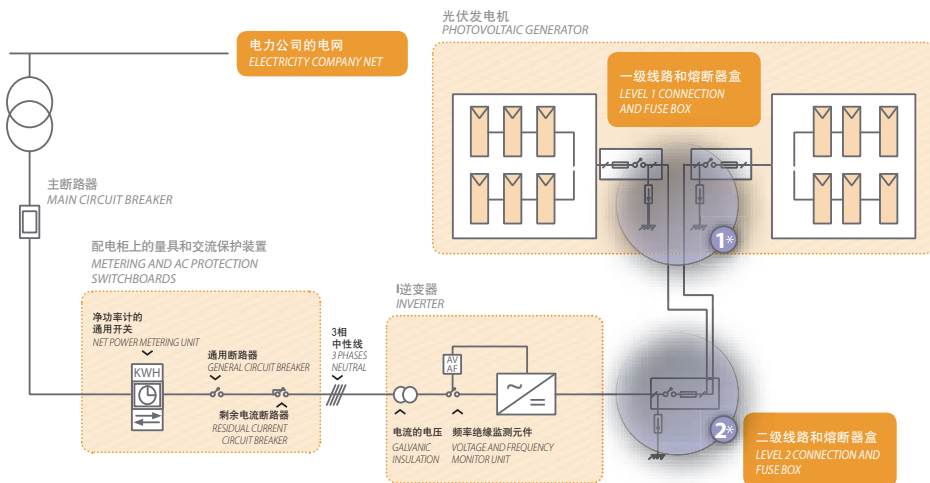
^{(*)2} 无限度保护装置 (短路保持50...100毫秒)

^{(*)2} Without limiting protective device (short-circuit maintained 50... 100 ms).

^{(*)3} 其它操作模式，请与我公司协商。

^{(*)3} Please consult us for more operations.

CFV | 光伏发电设备
Photovoltaic Power Generation Installations



典型设备的工作原理

光伏发电设备，通过太阳能电池板将太阳能转换为电能。每个电池板产生较低的电压（30 - 60 Vdc），因此，电池板是串联连接的（电压累加）。输出电压范围应当保持在500 - 900 Vdc。这个电压（开路电压）稳定不变，只有在阳光减弱的时候会下降或者消失（电池板接收阳光照片而产生直流电能）。

每个电池板产生的输出电流，随着阳光强弱而产生明显的变化（取决于电池板的类型，电流强度为2-7A）。电流越大，串联的电池板越多（电流累加），从而使电流达到250 - 300A。这个电流被输送到逆变器，转换成交流电以便于使用。

逆变器的下游安装了一个配电柜，配电柜配备了保护装置、断路器和测量装置，用于测量主电路上的电流。电路的末端是变压器，将电流转换到规定值。由于设备的规模（电池板的尺寸、电池组之间的距离，等等），

需要保证电池板的直流端安全连接。电池板本身配备了防故障保护装置，但还需要为电池板下游的设备配备保护装置。

在“直流发电”区内，开关是重要的安全保障装置，可以在维护、检查设备的时候断开电路。

Operational principle
of a typical installation

Photovoltaic power generating installations use solar panels to convert energy from the sun into electricity. Each individual panel generates a low voltage (30-60 Vdc) and, therefore, the panels are connected in series (voltage addition) to provide an output voltage within the range of 500-900 Vdc. This voltage (open circuit voltage) is constant and it only drops or disappears when solar irradiation decreases (panels are generating direct current energy while they receive light from the sun).

Each panel generates an output current that varies considerably according to the solar irradiation (depending on the type of panel, this range is between 2 and 7 A). For higher currents, the groups of panels connected in series are grouped together in parallel (current addition) to give current ranges that may even reach 250-300 A. This current is sent to an inverter that transforms it into AC and ensures it is suitable for consumption.

A switchboard with protection and a circuit breaker is connected downstream the inverter. And a metering unit is measuring the current to the mains. Finally, there is a transformer, which transforms the current to the required mains value.

Due to the size of the installations (size of the panels and distance between units, etc.), a safe solution must be provided to connect the panels in the DC side. The panels include devices that protect them from internal failures, but it's necessary to include devices that protect the rest of the installation downstream the panels. In "DC power generation" areas, switches are important for the safe and selective disconnection of the installation for maintenance or inspection.

1 一级线路板，防护级别IP65 / Level 1 connection boards IP65

位于电池板并联线路支撑框架的地下部分。在这个级别，可以用直流负荷开关切断电池板组（串联）的电流，同时不会干扰其它电池板组，不必整体停机即可达到最佳工作状态，同时又能保证人员和部件的安全。

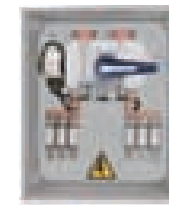
Located underneath the arrays for the parallel connection of the panels fitted to a supporting frame. This level allows for the generation from this group of panels (strings) to be interrupted by means a DC switch - disconnector without affecting the rest, obtaining an optimal exploitation an use of the installation without total stops, also providing security for people and components.



2 二级线路板，防护级别IP65 / Level 2 connection boards IP65

位于逆变器入口前端，连接一级直流负荷开关配电柜的分组电路，保证逆变器可以安全断开（没有电击危险）。

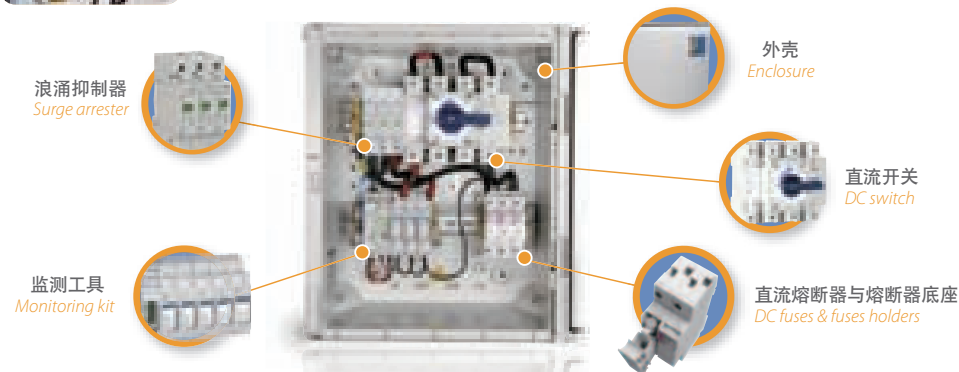
Located before the inverter inlet, is ready to receive the grouped connections of the connection boards level 1. The DC switch - disconnector allows for the inlets to the inverter to be safely disconnected (without the risk of electric shock).



基本特点 / General features

所有部件在供货时，都已经相互连接并固定在底座上，配备了有效、绝缘的配电柜，从而可以方便、安全地连接电路。外壳配备了门扇和顶盖，可以有效地保护内部元件。

All components are supplied interconnected and base mounting fixed. Also present a rational and isolated distribution, allowing easy and safely connections. Are protected inside enclosures, closed by doors or covers.



我公司的标准解决方案

Our standard solutions

我们公司提供了配电柜，使安装更为简便，大大节省了电线和连接线路。配电柜配备了直流负载开关、保护元件（取决于配置）和直流专用熔断器。还可以根据用户的要求定制配电柜（根据数量）。

We offer switchboards for an easier installation, which provide a significant saving on wiring and connection. They are equipped with DC load break switches, protection parts (depending on the configuration) and special fuses for DC. They can also be adapted for customised solutions (depending on numbers).

使用类别 / Utilization categories

符合IEC/EN 60947-3要求的使用类别 / Utilization categories according to IEC/EN 60947-3	使用类别 Utilization category		典型用途 / Typical applications
	A类 ^{* (2)} Category A ^{* (2)}	B类 ^{* (3)} Category B ^{* (3)}	
	电流的特点 / Nature of current		
交流电 Alternating current	AC-20A ^{* (1)}	AC-20B ^{* (1)}	无载条件下的“闭合”和“断开”电路 Connecting and disconnecting under no-load conditions
	AC-21A	AC-21B	通断电阻负载包括通断适中的过载 Switching of resistive loads including moderate overloads
	AC-22A	AC-22B	通断电阻电感混合负载，包括通断适中的过载 Switching of mixed resistive and inductive loads, including moderate overloads
	AC-23A	AC-23B	通断电动机负载或其他高电感负载 Switching of motor loads or other highly inductive loads
直流电 Direct current	DC-20A ^{* (1)}	DC-20B ^{* (1)}	无载条件下的“闭合”和“断开” Connecting and disconnecting under no-load conditions
	DC-21A	DC-21B	通断电阻负载，包括通断适中的过载 Switching of resistive loads including moderate overloads
	DC-22A	DC-22B	通断电阴电感混合负载，包括通断适中的过载 (例如串励电动机) Switching of mixed resistive and inductive loads, including moderate overloads (e.g. shunt motors)
	DC-23A	DC-23B	通断高电感负载(例如串励电动机) Switching of highly inductive loads (e.g. series motors)

^{* (1)}EE UU 禁止使用这类使用类别 / The use of these utilization categories is not permitted in the EE.UU.

^{* (2)}反复操作 / A Repeatedly operation.

^{* (3)}不频繁操作 / B Not very repeatedly operation.

AC-23类包括个别电机的偶然开关。电容和钨丝灯泡的开关，由制造商和用户共同确定。
使用类别项下的设备，通常与电机的启动、加速、停止运行无关。这类设备通常包括：

Category AC-23 includes occasional switching of individual motors. The switching of capacitors or of tungsten filament lamps shall be subject to agreement between manufacturer and user.

The utilization categories referred do not apply to an equipment normally used to start, accelerate and/or stop individual motors. The utilization categories for such an equipment are dealt according next:

使用类别 / Utilization category	典型用途 / Typical applications
交流 Alternating current	AC-2 绕线式电动机的启动、分断 Slip-ring motors: starting, plugging ⁽¹⁾ , switching off ⁽¹⁾ , marcha a impulsos ⁽¹⁾
	AC-3 鼠笼式异步电机启动、分断 Squirrel-cage motors: starting, switching off of motors during running
	AC-4 鼠笼式异步电动机的启动、揉搓制动与反向运转 ⁽¹⁾ 、点动 ⁽²⁾ Squirrel-cage motors: starting, plugging ⁽¹⁾ , inching ⁽²⁾
直流 Direct current	DC-3 并励电动机启动、反接制动与反向运转 ⁽¹⁾ 、点动 ⁽²⁾ 、电动机的动态分断 Shunt motors: starting, plugging ⁽¹⁾ , inching ⁽²⁾ , dynamic breaking of d.c. motors
	DC-5 串励电动机的启动、反接制动与反向运转 ⁽¹⁾ 、点动 ⁽²⁾ 、电动机的动态分断 Series-motors: starting, plugging ⁽¹⁾ , inching ⁽²⁾ , dynamic breaking of d.c. motors

注 - 电机线路、电容器和钨丝灯泡的开关，由制造商和用户共同确定。

NOTE - The switching of motor circuits, capacitors or tungsten filament lamps shall be subject to special agreement between manufacturer and user.

⁽¹⁾反接制动与反向运转意指当电动机正在运转时通过反接电动机原来的联接方式，使电动机迅速停止或反转。

⁽²⁾Plugging is understood to mean stopping or reversing the motor rapidly by reversing motor primary connections while the motor is running.

⁽³⁾点动意指在短时间内激励电动机一次或重复多次，以此使被驱动机械获得小的移动。

⁽⁴⁾Inching (jogging) is understood to mean energizing a motor once or repeatedly for short periods to obtain small movements of the driven mechanism.

上述资料仅供参考，不能取代标准的要求。请仔细阅读标准的内容。

The previous information is only advisory, it does not replace the specifications of the standard which will be consulted for its exact knowledge.

维护方面的建议：

强烈建议，定期检查电气设备及其部件，保证电气设备及其部件能够正常运行、正常操作，检查意外事故、磨损、老化而造成的损伤。由于电流会产生振动，导致线路松动，对性能造成不良影响，影响部件和电气设备的正常运行，因此需要及时保养线路。忽视这项要求的重要性，不但会使部件和机械设备受损、破坏，还会导致事故、危及人员的安全。

接通设备、部件的电源，开始工作之前，操作人员、用户和相关人员应当采取安全防护措施，使用必要的装备以保证人员安全（适用的工作服、护目镜、安全帽、手套、绝缘鞋等）。每项工作都应当使用适用的工具，对其他人员采取限制措施、发出必要的信号（提示标志、围栏、机械锁定、限制出入等）。在使用这些装备之前，应当检查装备的状态是否正常，保证各种装备达到规定用途要求的最佳状态（工作服没有破损、磨损，工具的绝缘状态良好，等等）。

鉴于于此，与电气有关的工作应当在断电状态下实施，工作场所和相关装备都要符合相关规定的要求。这类工作只能由经过授权的、合格的专业人员完成，因为这类人员了解工作的潜在危害。

MAINTENANCE RECOMMENDATIONS:

Electrical installations as well as their components, are strongly recommended to be checked periodically in order to ensure its proper functioning and maneuverability, and also to detect possible damage due to accidents and wear for use or aging. It is important to make sure household wiring is up-to-date, because of the vibrations provoked by electricity, it may happen that the wiring is loosened over time, thereby adversely affecting the performance and durability of the components like the installation itself.

Neglecting this can not only cause damage or breakage of the components, installations, machinery, and so on, it might also cause accidents and harm to the people.

Before proceeding to work on installations or components in which is or could be (come) present the electricity, operators, users and/or anybody involved must observe safety precautions, using necessary features to ensure personal safety (appropriate work clothes, goggles, helmet, gloves, insulated shoes, and so on). Proper tools must be used for each specific work, also implementing restrictive measures and necessary signaling for other people (warning signs, barriers, mechanical locks, prevent access, and so on). Prior to the use of these elements, it's necessary to check its perfect conditions, while ensuring that they meet optimal conditions to fulfill their mission (clothes without wear or breakage, tools with their isolation conditions, and so on).

For these reasons electricity-related works must be carried out in absence of electricity, in both the area and the affected elements according to the rules applicable to each situation. These works should only be carried out by authorized and qualified professionals who are aware of the potential hazards.

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2013年5月 - May 2013

在新版本发行之前，本文的更新、变更和修正，均通过网站www.telergon.es实施。

Upgrades, changes or corrections to this document at www.telergon.es, until new edition of the same.

直流熔断器底座 / Fuse bases for DC

直流熔断器底座 / Fuse bases for DC



Pronotec推出了1500V以下的直流熔断器底座：带保护性附件的1P NH型熔断器底座（规格有NH-1、NH-1XL、NH-2XL和NH-3L）、NHC型全绝缘式熔断器和2极卡轨式熔断器底座/熔断器隔离开关。上述产品都符合IEC 60269-1/2和IEC 60269-6标准的要求。

Pronotec offers his Fuse bases for DC installations up to 1500 V; the 1P NH type Fuse bases with protection accessories (sizes NH-1, NH-1XL, NH-2XL and NH-3L), the fully insulated type Fuse disconnectors NHC type and 2 pole Fuse rails/ Fuse disconnectors. According to IEC 60269-1/2 and IEC 60269-6 standards.

特点 / Features

- ▶ 经过特殊设计和测试，适用于1500V以下直流光伏的gPV熔断器。
Specially designed and tested for DC photovoltaic applications with gPV fuses up to 1500V DC.
- ▶ Pronotec能够提供DC1500V单极熔断器底座和保护型熔断器底座，这类熔断器底座均采用模块结构，最大电流600A*，规格为1-1XL-2XL-3L。所有热塑料部件的材料，阻燃级别均为V0。NHC-1是一种空载直流熔断器，最大电压1000V、最大电流160 A。
* 熔断器底座的最大额定电流。
Pronotec provides a range of DC 1500 V single pole either open fuse bases or protected and modular ones up to 600 A in sizes 1-1XL-2XL-3L. All the thermoplastic components have V-0 flammability class materials. NHC-size 1 is a off load Fuse-disconnector for DC 1000 V applications up to 160 A.*
* Max. Rated current for open fuse base version.



1P熔断器底座
Open 1P Fuse base



保护型1P熔断器底座
Protected 1P Fuse base



全绝缘1P NHC熔断器底座
Fully insulated 1P NHC Fuse base

- ▶ 2极条形熔断器底座配用于1系列（BBAV和BBAV-P）和1XL-2XL-3L（各种型号的BBAV、BBAV-P和BBCV）。BBAV-P型的正面和侧面的防护级别均为IP20（不带熔断器）。另外，熔断器型（BBCV）配备了两个熔断器手柄，能够方便、快捷地插入、取出熔断器。

The vertical 2 pole fuse base is available for sizes 1 (BBAV and BBAV-P) and 1XL-2XL-3L (for all the versions BBAV, BBAV-P and BBCV). The BBAV-P version provides a front side protection degree (without fuse) of IP20 whereas lateral protection. Additionally, the fuse disconnector version (BBCV) provides two fuse-holders that allows a very simple and effective way at insertion / extraction of the fuse.

- ▶ 安装在标准的185/370 mm汇流排上。

Mounting on the standard 185/370 mm busbar system.



BBAV-P NH-1



BBAV NH-1XL/2XL/3L



BBAV-P NH-1XL/2XL/3L



BBCV NH-1XL/2XL/3L

直流熔断器底座 / Fuse bases for DC

直流熔断器底座 / Fuse bases for DC

种类 / Range

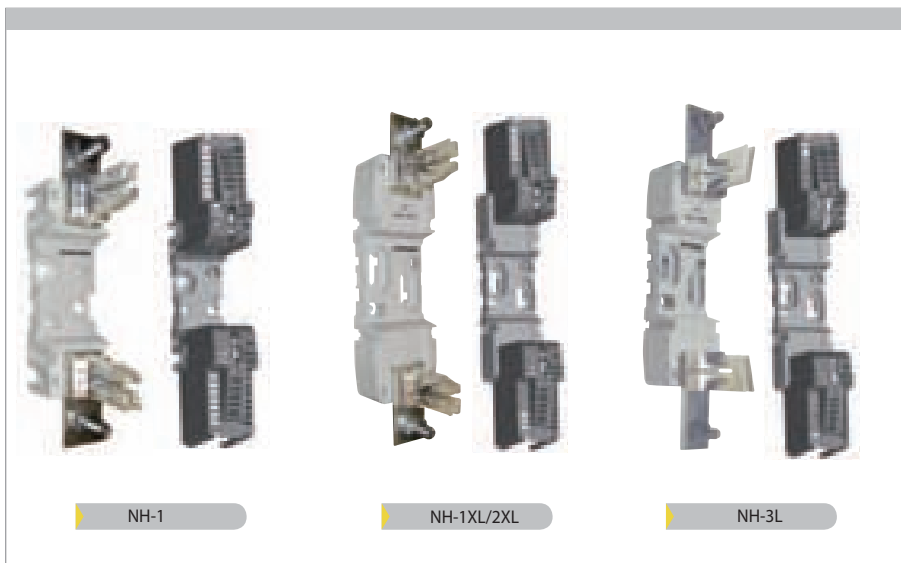
单极直流熔断器底座

One pole DC Fuse bases

编号 Reference	规格 Size	电压 Voltage	电流 Current
434.16.11.10.20	NH-1	1000 V	160A
434.14.11.10.20	NH-1XL / NH-2XL	1500 V	250A
434.15.11.10.20	NH-3L	1500 V	600A*

*不含防护罩

Without contact covers



技术数据 / Technical Data: P. 164
附件 / Accessories: P. 137

尺寸图 / Dimension drawings: P. 139

特点 / Features

单极直流熔断器底座的附件

Accessories One pole DC Fuse bases

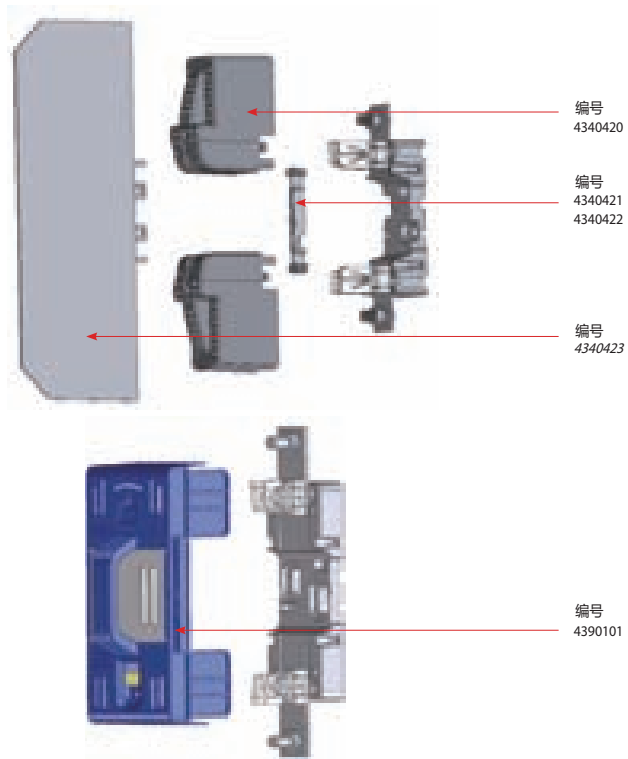
项目 Item	说明 Description	编号 Reference
	单极直流熔断器底座的防护罩 Insulating contact-cover for one pole DC fuse bases	4340420
	适用于NH-1 / NH-1XL / NH-2XL的隔离器 Separator for NH-1 / NH-1XL / NH-2XL	4340421
	适用于NH-3L的隔离器 Separator for NH-3L	4340422
	隔板 Barrier screen	4340423
	熔断器手柄 Fuse holder	4390101
	加长罩 Extension cover	4430414

直流熔断器底座 / Fuse bases for DC

直流熔断器底座 / Fuse bases for DC

单极直流熔断器底座的装配图

Assembly drawing One pole DC Fuse bases

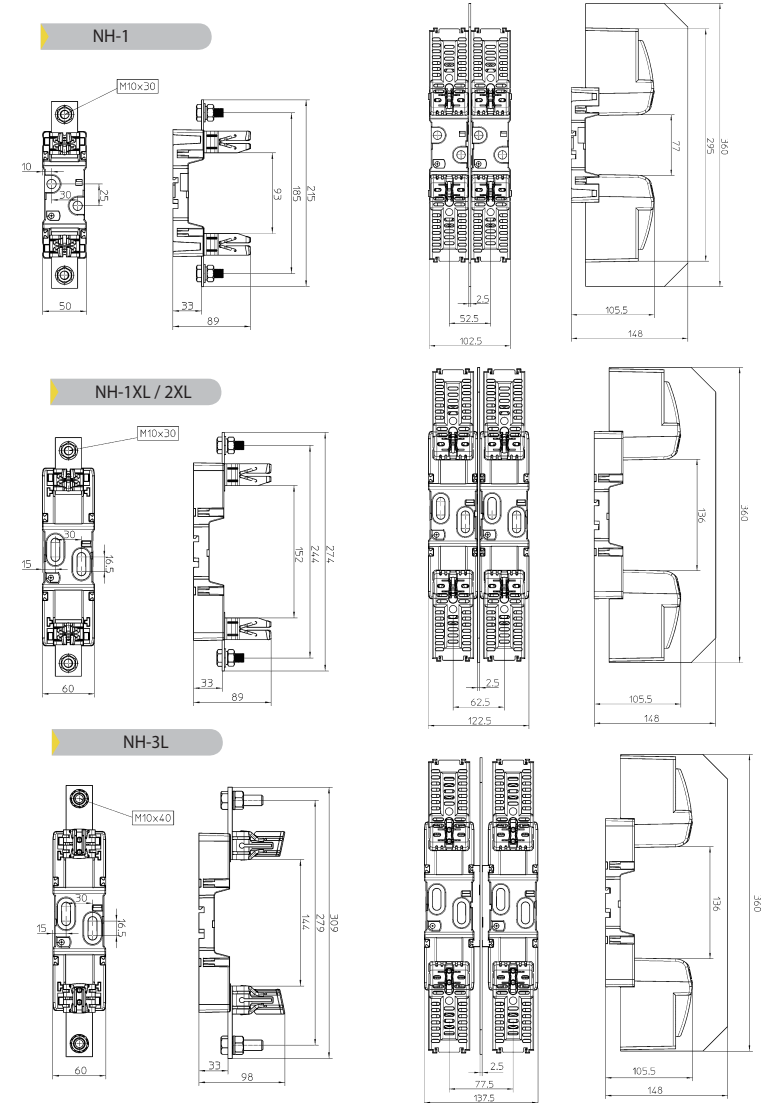


- | | |
|---------------|---|
| 编号
4340420 | 单极直流熔断器底座的绝缘接触式盒盖
<i>Insulating contact-cover for one pole DC fuse bases</i> |
| 编号
4340421 | 适用于NH-1 / NH-1XL / NH-2XL的隔离器
<i>Separator for NH-1 / NH-1XL / NH-2XL</i> |
| 编号
4340422 | 适用于NH-3L隔离器
<i>Separator for NH-3L</i> |

- | | |
|---------------|-----------------------------|
| 编号
4340423 | 隔板
<i>Barrier screen</i> |
| 编号
4390101 | 熔断器手柄
<i>Fuse holder</i> |

单极直流熔断器底座的尺寸图

Dimensions One pole DC Fuse bases



种类 / Range: P. 136

直流熔断器底座 / Fuse bases for DC

种类 / Range

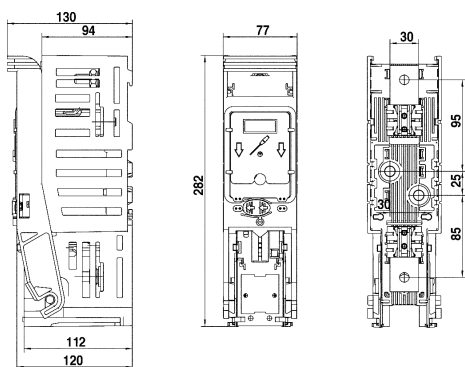
单极直流熔断器隔离开关 - NHC

One pole LV fuse disconnectors - NHC for DC

编号 Reference	类型 Type	电压 Voltage	电流 Current	熔断器 Fuse-link	固定方式 Fixation
422.111.06.01	STD	DC1000V	160A	160A	螺栓 Bolt
422.112.06.01					DIN导轨 DIN Rail



尺寸 / Dimensions



技术参数 / Technical Data: P. 164

直流熔断器底座 / Fuse bases for DC

种类 / Range

2极熔断器底座/ 熔断器隔离开关

Vertical 2 pole Fuse rail / Fuse disconnecter

编号 / Reference	型号 / Type	电流 Current	熔断器 Fuse-link
439.24.06.XX.00	BBAV不带保护装置的2极熔断器底座 / 2 pole Fuse rail without protection	160A	NH-1
439.24.06.XX.03	BBAV-P带保护装置的2极熔断器底座 / 2 pole Fuse rail with protection		
439.25.18.XX.00	BBAV不带保护装置的2极熔断器底座 / 2 pole Fuse rail without protection	250A	NH-1XL
439.25.18.XX.10	BBAV-P带保护装置的2极熔断器底座 / 2 pole Fuse rail with protection		
439.25.18.XX.11	BBCV 2极熔断器隔离开关 / 2 pole Fuse disconnecter		
439.26.18.XX.00	BBAV不带保护装置的2极熔断器底座 / 2 pole Fuse rail without protection		
439.26.18.XX.10	BBAV-P带保护装置的2极熔断器底座 / 2 pole Fuse rail with protection		
439.26.18.XX.11	BBCV 2极熔断器隔离开关 / 2 pole Fuse disconnecter	500A	NH-2XL
439.27.38.XX.00	BBAV不带保护装置的2极熔断器底座 / 2 pole Fuse rail without protection		
439.27.38.XX.10	BBAV-P带保护装置的2极熔断器底座 / 2 pole Fuse rail with protection		
439.27.38.XX.11	BBCV 2极熔断器隔离开关 / 2 pole Fuse disconnecter		

NH-1



BBAV



BBAV-P

NH-1XL / NH-2XL / NH-3L



BBAV



BBAV-P



BBCV

技术参数 / Technical Data: P. 165

接线端的XX编号 / Terminals XX Code: P. 27

尺寸图 / Dimension drawings: P. 27

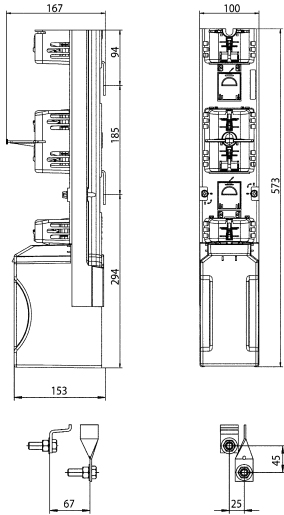
直流熔断器底座 / Fuse bases for DC

种类 / Range

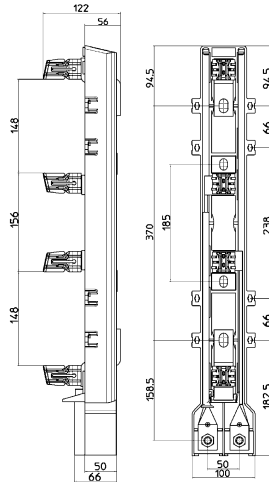
2极条形熔断器底座 / 熔断器隔离开关的尺寸

Dimensions Vertical 2 pole Fuse rail / Fuse disconnecter

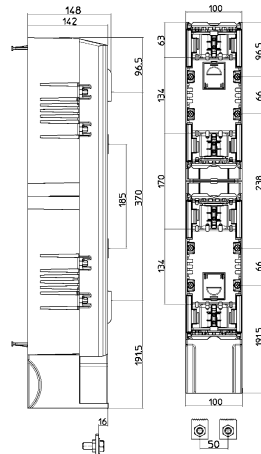
NH-1 BBAV-P



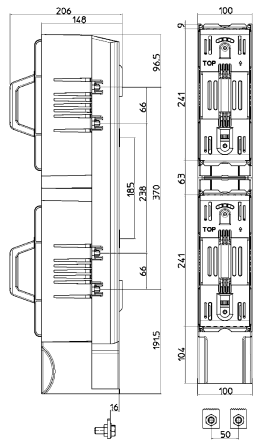
NH-1XL / NH-2XL / NH-3L BBAV



NH-1XL / NH-2XL / NH-3L BBAV-P



NH-1XL / NH-2XL / NH-3L BBCV



XX编号 XX Code	接线端子 Terminals
00	不带螺栓 / Without bolt
01	M8
02	M10
03	M8不锈钢 / M8 Stainless steel
04	M10不锈钢 / M10 Stainless steel
05	M12
06	M12不锈钢 / M12 Stainless steel
07	V形接线端 / V terminal

种类 / Range: P. 26