PKC GROUP

BATTERY TERMINALS

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PKC GROUP

CATALOG INDEX

PKC Group

PKC Group is a global leader in the design, development, and production of high-quality, cost-effective wiring systems, components, and electronics for the commercial vehicle, automotive, agricultural, construction, recreational, energy, and industrial electronics industries.

Wiring Systems:

From a single wire harness to an entire Electrical Distribution System (EDS), PKC delivers power where and when you need it.

System integrity is consistently achieved through architecture optimization, proven change control processes, and the vertical integration of key PKC brand components into the EDS design, including:

- **Power Distribution Centers**
- **Connector Systems**
- **Terminal Systems**
- **Routing and Retention Aids**
- **Wire and Cable**

Specializing in the design and customization of unique products with demanding requirements, PKC is capable of providing a wide range of EDS support, from full service supplier to build to print provider.

Electronics:

PKC Electronics provides complete support, from design and development to production, of customized electronics.

Through operational excellence, PKC consistently reduces customer costs while extending product life cycles. With strategically placed facilities around the globe, PKC offers a wide range of customizable products and services, including:

- **Smart Power Distribution Centers**
- **Electronic Control Units**
- **DC to DC Converters**
- **Battery Management**
- **Custom Testing Aids for Electronic Devices**
- **Contract Manufacturing**

Together, PKC Wiring Systems and Electronics divisions offer a fully integrated Electrical and Electronics Distribution System (EDS) provider to our customers.

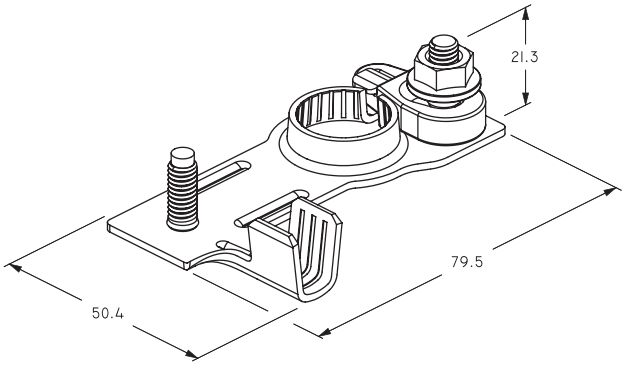
Battery Terminals

The PKC Group Verti-Grip Battery Terminals incorporate an innovative and unique vertical access fastener design. Combined with proven reliability, these terminals can be used in several applications. Several variations are available to meet customer specific needs such as bend direction, bend angle, indexing tabs, and auxiliary studs. Specifically the Z-Bend battery terminal can be applied to recessed battery posts where most other battery terminal suppliers can not.

Benefits and Features:

- Proven robust design
- Simplified Vertical access to fastener
- Many crimp exit directions available to provide the right solution
- Multiple terminal family designs available
- Multiple wire crimp configurations (additional available upon request)
- Multiple designs to meet SAE or DIN standards
- Corrosion resistant
- Simplified serviceability
- Service Temp: -40°C to +125°C

Verti-Grip "L" Series



Design Features

COLD CRANKING CURRENT:	650 Amps Estimated Using 0 Awg Wire 600 Amps (Using the 40mm² or 1 Awg Wire)
CURRENT RATING:	200 Amps Estimated Using 0 Awg Wire 180 Amps (Using the 40mm² or 1 Awg Wire) 150 Amps (Using the 16mm² or 6 Awg Wire)
AXIAL HOLDING FORCE:	1100N Min.
ROTATIONAL HOLDING TORQUE:	10N-m Min.
OTHER:	Additional grip combinations available upon request. Additional plating types available upon request. Current ratings dependent on wire size.

PART NUMBER	GRIP CODE	POLARITY	AUX STUD A/B	POST STANDARD	TYPE	MATERIAL	PLATING
R3311-010	01	NEGATIVE	A	DIN	L	C194	Tin
R3311-011	01	POSITIVE	B	DIN	L	C194	Tin
R3311-012	01	POSITIVE	A	DIN	J	C194	Tin
R3311-013	01	NEGATIVE	A	DIN	J60°	C194	Tin
R3311-014	01	POSITIVE	A	DIN	J60°	C194	Tin
R3311-015	01	NEGATIVE	A	DIN	L60°	C194	Tin
R3311-016	06	POSITIVE	A	DIN	J60°	C194	Tin
R3311-017	06	NEGATIVE	A	DIN	L60°	C194	Tin
R3311-027	01	NEGATIVE	A	DIN	J	C194	Tin

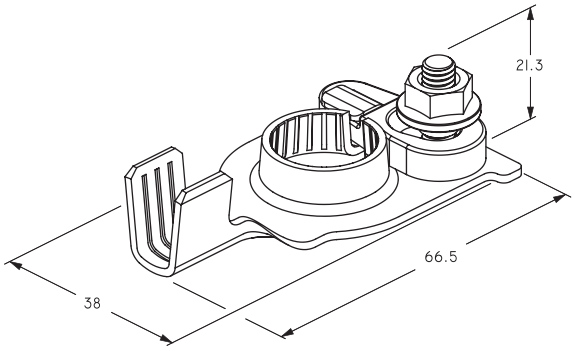
Verti-Grip "L" Series cont.

PART NUMBER	GRIP CODE	POLARITY	AUX STUD A/B	POST STANDARD	TYPE	MATERIAL	PLATING
R3311-028	04	NEGATIVE	A	DIN	J	C194	Tin
R3311-029	04	POSITIVE	A	DIN	L	C194	Tin
R3311-031	01	NEGATIVE	A	SAE/DIN	L	C194	Tin
R3311-032	01	POSITIVE	B S	AE/DIN	L	C194	Tin
R3311-033	01	POSITIVE	A	SAE/DIN	J	C194	Tin
R3311-034	01	NEGATIVE	A S	AE/DIN	J60°	C194	Tin
R3311-035	01	POSITIVE	A	SAE/DIN	J60°	C194	Tin
R3311-036	01	NEGATIVE	A	SAE/DIN	L60°	C194	Tin
R3311-037	06	POSITIVE	A	SAE/DIN	J60°	C194	Tin
R3311-038	06	NEGATIVE	A	SAE/DIN	L60°	C194	Tin
R3311-039	01	NEGATIVE	A	SAE/DIN	J	C194	Tin
R3311-040	04	NEGATIVE	A	SAE/DIN	J	C194	Tin
R3311-041	04	POSITIVE	A	SAE/DIN	L	C194	Tin
R3311-042	01	POSITIVE	A	SAE/DIN	L	C194	Tin
R3311-043	01	POSITIVE	N/A	SAE/DIN	L	C194	Tin
R3311-044	04	NEGATIVE	N/A	SAE/DIN	J60°	C194	Tin
R3311-045	01	POSITIVE	N/A	SAE/DIN	J	C194	Tin
R3311-063	01	NEGATIVE	N/A	SAE/DIN	J	C194	Tin
R3311-064	04	NEGATIVE	A	SAE/DIN	L	C194	Tin
R3311-065	04	NEGATIVE	N/A	SAE/DIN	L	C194	Tin
R3311-066	01	NEGATIVE	N/A	SAE/DIN	J	C194	Tin

Testing Data

TEST NAME	ACCEPTANCE CRITERIA	TEST RESULTS			REMARK
		AVG.	MAX.	MIN.	
Terminal Bend Resistance	20 Nm MIN.	222.6	251.9	200.9	As per USCAR except for bending angle. Recorded force measured to bend the terminal 5°
M6 Bolt Push Out Force	1500 N MIN.	1989.5	2049	1879	The stud pushed with: 50 mm/min.
M6 Bolt Torque Thru	12.0 Nm MIN.	26.4	28	23.6	Max torque at which the bolt to terminal joint fails. (use a capped nut)
M6 Bolt Torque Out	15.0 Nm MIN.	17.93	18.4	17.5	Max torque at which the bolt to terminal joint fails. (use a production nut)
Terminal to Post: Rotational Holding Capacity	4.9 Nm MIN.	11.4	15	8	Rotational holding capacity is measured after the 50th clamp/unclamp cycles with minimum installation torque.
Terminal to post: Axial Holding Capacity	147 N MIN.	1747	2221	1227	Pulling speed; 50mm/min.
Terminal Temperature Rise	60°C Rise over ambient (ROA) after 10 sec at 400 Amps.	4	6.3	2.5	Simulates cold cranking the engine: 400 A for 15 sec.; resistance reading at the terminal to post interface at end of cycle.
Terminal to post: Voltage Drop	0.2 mV/A MAX. After 10 sec at 400 Amps.	0.013 0.003	0.019 0.005	0.008 0.001	Crimp resistance Interface resistance Simulates cold cranking the engine: 400 A for 15 sec.; resistance reading at the terminal to post interface at end of cycle.
Terminal to post: Vibration and Mechanical Shock	No Loss of Electrical Continuity (>1 u sec) During Test	0.004 0.023	0.006 0.031	0.002 0.017	Post-test interface resistance (mV/A) Post test crimp resistance (mV/A)
Maximum current capability (Current Rating)	Per USCAR Procedure.	40	43	32.5	ROA Temp. readings at 225 Amps. Terminal rated at 225 Amps. (crimped on the 19mm^2+13mm^2 cables) Clamping torque: 6Nm.
Over Torque on Slider	Test to Failure	34	34	34	Checks the slider strength. Validated by the vendor. Destructive test in special fixture. Max torque needed to damage slider.

Verti-Grip "Short" Series



Design Features

COLD CRANKING CURRENT:	620 Amps Estimated Using 0 Awg Wire 600 Amps (Using the 13mm² and 32mm² Wire)
CURRENT RATING:	250 Amps Estimated Using 0 Awg Wire 250 Amps (Using the 13mm² and 32mm² Wire)
AXIAL HOLDING FORCE:	1100N Min.
ROTATIONAL HOLDING TORQUE:	10N-m Min.
OTHER:	Additional grip combinations available upon request. Additional plating types available upon request. Current ratings dependent on wire size.

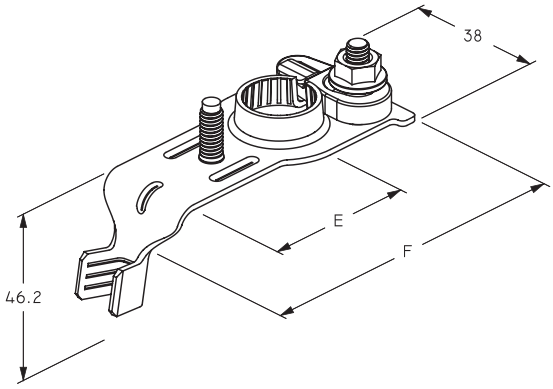
PART NUMBER	GRIP CODE	POLARITY	POST STANDARD	MATERIAL	PLATING
R61014-001	01	POSITIVE	SAE/DIN	C194	Tin
R61014-002	01	NEGATIVE S	AE/DIN	C194	Tin
R61014-003	04	POSITIVE	SAE/DIN	C194	Tin
R61014-004	04	NEGATIVE	SAE/DIN	C194	Tin
R61014-005	06	POSITIVE	SAE/DIN	C194	Tin
R61014-006	06	NEGATIVE	AE/DIN	C194	Tin
R61014-007	00	POSITIVE	SAE/DIN	C194	Tin
R61014-008	01	NEGATIVE	JIS	C194	Tin

Verti-Grip "Short" Series cont.

Testing Data

TEST NAME	ACCEPTANCE CRITERIA	TEST RESULTS			REMARK
		AVG.	MAX.	MIN.	
Terminal Bend Resistance	20 Nm MIN.	281.7	305.7	267.5	As per USCAR except for bending angle. Recorded force measured to bend the terminal 5°
M6 Bolt Push Out Force	1500 N MIN.	1951.6	2013	1779	The stud pushed with: 50 mm/min.
M6 Bolt Torque Thru	12.0 Nm MIN.	22.4	28.8	18.5	Max torque at which the bolt to terminal joint fails. (use a capped nut)
M6 Bolt Torque Out	15.0 Nm MIN.	17.9	18.2	17.5	Max torque at which the bolt to terminal joint fails. (use a production nut)
Terminal to Post: Rotational Holding Capacity	4.9 Nm MIN.	10.5	15.5	7.0	Rotational holding capacity is measured after the 50th clamp/unclamp cycles with minimum installation torque.
Terminal to post: Axial Holding Capacity	147 N MIN.	1824 1940	2172 2250	1492 1656	Pulling speed; 50mm/min.
Terminal Temperature Rise	60°C Rise over ambient (ROA) after 10 sec at 400 Amps.	6.3	8.6	3.9	Simulates cold cranking the engine: 600 A for 15 sec.; resistance reading at the terminal to post interface at end of cycle.
Terminal to post: Voltage Drop	0.2 mV/A MAX. After 10 sec at 400 Amps.	0.008 0.025	0.014 0.168	0.004 0.0001	Crimp resistance Interface resistance Simulates cold cranking the engine: 600 A for 15 sec.; resistance reading at the terminal to post interface at end of cycle.
Terminal to post: Vibration and Mechanical Shock	No Loss of Electrical Continuity (>1 usec) During Test	0.005	0.024	0.002	Post-test interface resistance (mV/A)
Maximum current capability (Current Rating)	Per USCAR Procedure.	36.3	40.63	40.63	ROA Temp. readings at 250 Amps. 250 Amps. (crimped on the $32mm^2$+$19mm^2$ cables)
Over Torque on Slider	Test to Failure	34	34	34	Checks the slider strength. Validated by the vendor. Destructive test in special fixture. Max torque needed to damage slider.

Verti-Grip "B" Series



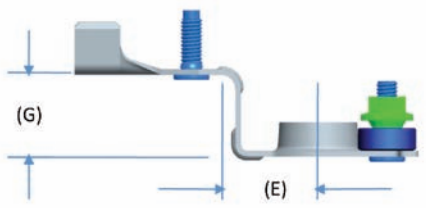
Design Features

COLD CRANKING CURRENT:	600 Amps Estimated Using 0 Awg Wire 400 Amps (Using the 19mm² and 13mm² Wire)
CURRENT RATING:	250 Amps Estimated Using 0 Awg Wire 225 Amps (Using the 19mm² and 13mm² Wire)
AXIAL HOLDING FORCE:	1100N
ROTATIONAL HOLDING TORQUE:	10N-m
OTHER:	Additional grip combinations available upon request. Additional plating types available upon request. Current ratings dependent on wire size.

PART NUMBER	GRIP CODE	POLARITY	AUX STUD	POST STANDARD	TYPE	DIM (E) (mm)	DIM (F) (mm)	MATERIAL	PLATING
R61016-001	01	POSITIVE	NO	SAE/DIN	B	42	91.3	C194	Tin
R61016-002	01	POSITIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-003	01	NEGATIVE	NO	SAE/DIN	B	42	91.3	C194	Tin
R61016-004	01	NEGATIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-005	04	POSITIVE	NO	SAE/DIN	B	42	91.3	C194	Tin
R61016-006	04	POSITIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-007	04	NEGATIVE	NO	SAE/DIN	B	42	91.3	C194	Tin
R61016-008	04	NEGATIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-009	06	POSITIVE	NO	SAE/DIN	B	42	91.3	C194	Tin
R61016-010	06	POSITIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-011	06	NEGATIVE	NO	SAE/DIN	B	42	91.3	C194	Tin
R61016-012	06	NEGATIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-013	00	POSITIVE	NO	SAE/DIN	B	42	91.3	C194	Tin

Verti-Grip "B" Series cont.

PART NUMBER	GRIP CODE	POLARITY	AUX STUD	POST STANDARD	TYPE	DIM (E) (mm)	DIM (F) (mm)	MATERIAL	PLATING
R61016-014	00	POSITIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-015	01	POSITIVE	NO	SAE/DIN	Z	21	91.3	C194	Tin
R61016-016	01	NEGATIVE	NO	SAE/DIN	Z	21	91.3	C194	Tin
R61016-017	04	POSITIVE	YES	SAE/DIN	B	54	103.3	C194	Tin
R61016-018	01	NEGATIVE	NO	SAE/DIN	B	54	103.3	C194	Tin
R61016-019	01	NEGATIVE	NO	SAE/DIN	B-45°	48	109	C194	Tin
R61016-020	00	NEGATIVE	YES	SAE/DIN	B	42	91.3	C194	Tin
R61016-022	04	POSITIVE	YES	SAE/DIN	I	54	103.3	C194	Tin
R61016-027	01	POSITIVE	YES	SAE/DIN	Z	22	91.0	C194	Tin
R61016-028	N/A	POSITIVE	YES	SAE/DIN	S	N/A	66.5	C194	Tin



NOTE:
R61016-015, 016, & 027 USE DIMENSION (E) AS SHOWN HERE.
R61016-015 & 016 (G) IS 20.6mm
R61016-027 (G) IS 21.6mm

Testing Data

TEST NAME	ACCEPTANCE CRITERIA	TEST RESULTS			REMARK
		AVG.	MAX.	MIN.	
Terminal Bend Resistance	20 Nm MIN.	222.6	251.9	200.9	As per USCAR except for bending angle. Recorded force measured to bend the terminal 5°
M6 Bolt Push Out Force	1500 N MIN.	1989.5	2049	1879	The stud pushed with: 50 mm/min.
M6 Bolt Torque Thru	12.0 Nm MIN.	26.4	28	23.6	Max torque at which the bolt to terminal joint fails. (use a capped nut)
M6 Bolt Torque Out	15.0 Nm MIN.	17.93	18.4	17.5	Max torque at which the bolt to terminal joint fails. (use a production nut)
Terminal to Post: Rotational Holding Capacity	4.9 Nm MIN.	12.9	16	10	Rotational holding capacity is measured after the 1st clamp/unclamp cycles with minimum installation torque of 6Nm..
Terminal to post: Axial Holding Capacity	147 N MIN.	1747	2221	1227	Pulling speed; 50mm/min.
Terminal Temperature Rise	60°C Rise over ambient (ROA) after 10 sec at 400 Amps.	4	6.3	2.5	Simulates cold cranking the engine: 400 A for 15 sec.; resistance reading at the terminal to post interface at end of cycle. Terminal clamped to the post with minimum installation torque of 6Nm.
Terminal to post: Voltage Drop	0.2 mV/A MAX. After 10 sec at 400 Amps.	0.013 0.003	0.019 0.005	0.008 0.001	Crimp resistance Interface resistance Simulates cold cranking the engine: 400 A for 15 sec.; resistance reading at the terminal to post interface at end of cycle. Terminal clamped to the post with minimum installation torque of 6Nm.
Terminal to post: Vibration and Mechanical Shock	No Loss of Electrical Continuity (>1 u sec) During Test	0.004 0.023	0.006 0.031	0.002 0.017	Post-test interface resistance (mV/A) Post test crimp resistance (mV/A) Terminal clamped to the post with minimum installation torque of 6Nm.
Maximum current capability (Current Rating)	Per USCAR Procedure.	40	43	32.5	ROA Temp. readings at 225 Amps. Terminal rated at 225 Amps. (crimped on the 19mm^2+13mm^2 cables) Terminal clamped to the post with minimum installation torque of 6Nm.
Over Torque on Slider	Test to Failure	34	34	34	Checks the slider strength. Validated by the vendor. Destructive test in special fixture. Max torque needed to damage slider.