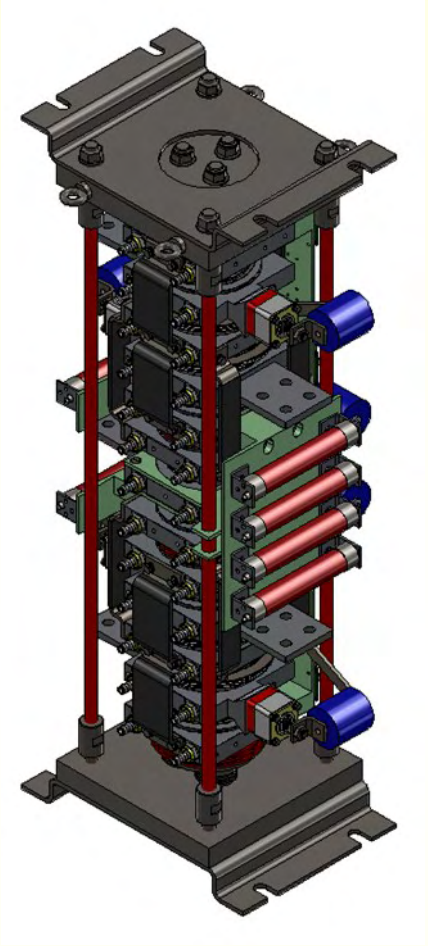
IXYS UK WESTCODE

Press-Pack IGBT's

Devices, assemblies & supporting products



With a track record spanning more than 15 years as a leading innovator in press-pack IGBT technology, IXYS UK is proud to offer their range of 2.5kV, 4.5kV and new 6.5kV devices featuring the latest generation chipsets offering improved SOA.

The standard range now includes the 3000A T2960BJ45E press-pack IGBT, the highest power rated press-pack IGBT ever.
Available as either a full IGBT or IGBT w/integral anti-parallel diode (T1935BJ45G), these devices offer a significant power and current increase over established parts in the same footprint

To support these products, IXYS UK can supply IGBT gate drives specifically designed to work with the press-pack IGBT's and a range of clamps, coolers and ancillary components.

Applications

Medium voltage drives

- Marine drives
- Traction
- Wind power converters

Energy utilities

- STATCOM
- FACTS
- Active VAr controllers
- Renewable generation

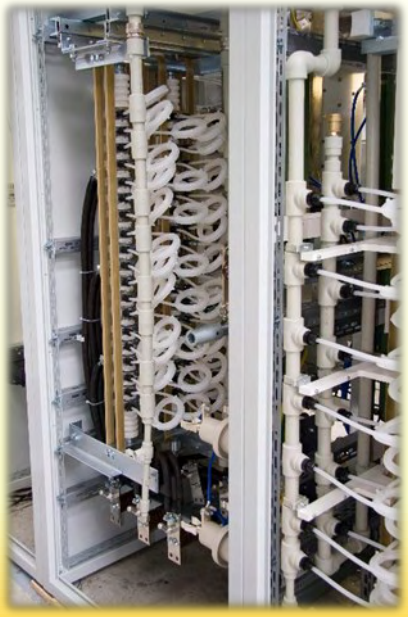


Image courtesy of CKD Elektrotechnika

New — 3000A Press-pack IGBT

Moving the boundaries of power control, IXYS UK presents its newest press-pack IGBT with the highest ever power rating.

Our experience and dedication has led to this new 2960A I_C rated device, available in a fully hermetic, rupture resistant package with electrode diameters of 132mm (168mm overall diameter).

This new 3kA device maximises the current rating within the same package envelope as our existing 2.4kA device and is available as an asymmetric blocking, IGBT only device or with a fully integrated, anti-parallel diode with asymmetrical current rating.

These IGBT's are suitable for applications ranging from ten megawatts up to and above several hundred megawatts.

Typical Applications Include:

- Medium voltage drives for industrial, marine & renewable energy infrastructure applications including wind generation.
- Energy Utilities including STATCOM, FACTS, Active VAr controllers and renewable generation

	Part No.	$V_{DC\ link}$ V	$V_{CE\ (sat)}$ V	$I_{C(DC)}$ A	I_{CRM} A	E_{on} @I_C J	E_{off} @I_C J	Diode V_F V	R_{THJK} IGBT K/W	R_{THJK} Diode K/W	T_{JM} °C
New	T2960BB45E	2800	4.00	2960	5920	16	16	N/A	0.0042	N/A	125
New	T1935BB45G	2800	4.00	1935	3870	7	12	3.80	0.00645	0.0096	125
Established	T2400GB45E	2800	3.60	2400	4800	13	13	N/A	0.0052	N/A	125
Established	T1800GB45A	2800	3.60	1800	3600	11	10.5	3.90	0.0073	0.0144	125

Press-pack IGBT's

IXYS UK's press-pack IGBT's utilise an enhanced planar cell technology, delivering comparable $V_{CE(sat)}$ to modern trench designs whilst retaining the superior RBSOA, SCSOA performance and easy driving characteristics of traditional planar technology. When combined with IXYS UK's proven hermetic press-pack technology, these devices re-define the state-of-the-art for high power switching devices.

Available in a range of packages with electrode diameters of up to 132mm, IXYS UK can offer both reverse conducting and asymmetric blocking types.

Improved diode chips complement the IGBT and offer breakthrough levels of performance and a choice of diode to IGBT ratio enables full utilisation of the IGBT in reverse conducting applications.

IXYS UK's new generation HP-sonic monolithic diodes complement the 2.5kV and 4.5kV asymmetric IGBT range and also support such applications as multi-level diode clamped converters. New multi-chip 6.5kV diodes are now available to support the new 6.5kV asymmetric IGBT's

Press-pack IGBT's are now gaining significant market share in the high performance medium voltage drive sector in the 2MW to 30MW and beyond range. They offer all the benefits of conventional IGBT's and more, over alternative bipolar technology while maintaining the high reliability levels associated with press-pack devices in these systems.

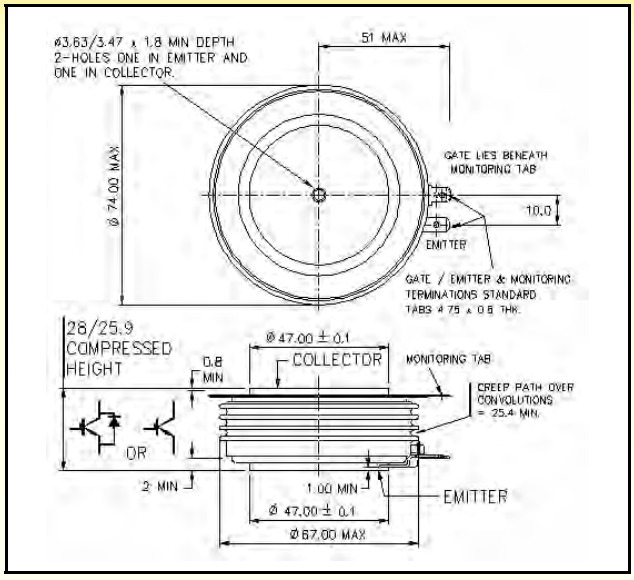
Part No.	V_{CES} V	I_C A	$V_{CE(sat)}$ $I_C=I_C$ V	Reverse Conducting	Diode V_F $I_F=I_C$ V	T_{JMAX} °C	Outline
T0360ND25A	2500	360	3.07	Y	2.25	125	W40
T0500ND25E	2500	500	3.06	N	N/A	125	W40
T0570VD25G	2500	570	3.06	Y	2.01	125	W67
T0850VD25E	2500	850	3.04	N	N/A	125	W67
T1200TD25A	2500	1200	3.15	Y	2.50	125	W41
T1500TD25E	2500	1500	3.06	N	N/A	125	W41
T2250AD25E	2500	2250	3.03	N	N/A	125	W71
T0160NB45A	4500	160	3.4	Y	3.75	125	W40
T0240NB45E	4500	240	3.8	N	N/A	125	W40
T0340VB45G	4500	340	3.5	Y	3.45	125	W67
T0510VB45E	4500	510	3.6	N	N/A	125	W67
T0600TB45A	4500	600	3.7	Y	3.9	125	W41
T0800TB45E	4500	800	3.5	N	N/A	125	W41
T0800EB45G	4500	800	3.6	Y	3.5	125	W44
T0900EB45A	4500	900	3.8	Y	3.9	125	W44
T1200EB45E	4500	1200	3.6	N	N/A	125	W44
T1600GB45G	4500	1600	3.5	Y	3.45	125	W45
T1800GB45A	4500	1800	3.6	Y	3.9	125	W45
T2400GB45E	4500	2400	3.6	N	N/A	125	W45
T0258HF65G	6500	258	4.80	Y	3.45	125	W95
T0385HF65E	6500	385	4.80	N	N/A	125	W95
T0600AF65G	6500	600	4.80	Y	3.45	125	W98
T0900AF65E	6500	900	4.80	N	N/A	125	W98
T0900DF65A	6500	900	4.80	Y	3.40	125	W96
T1290BF65A	6500	1290	4.80	Y	3.60	125	W103
T1375DF65E	6500	1375	4.80	N	N/A	125	W96
T1890BF65E	6500	1890	4.80	N	N/A	125	W103

Features and Benefits

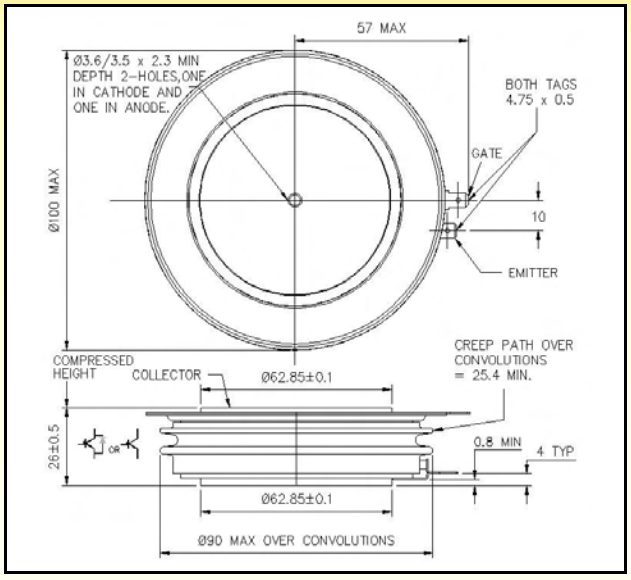
- Bondless construction for improved reliability
- Hermetic devices suitable for all cooling options including direct liquid immersion
- Explosion and rupture resistant (at more than 10 times the energy of a similarly rated module)
- High thermal cycling resistance
- Double side cooling
- Mechanically compatible with GTO thyristors allowing upgrading of existing equipment and designs to new IGBT technology

Outlines

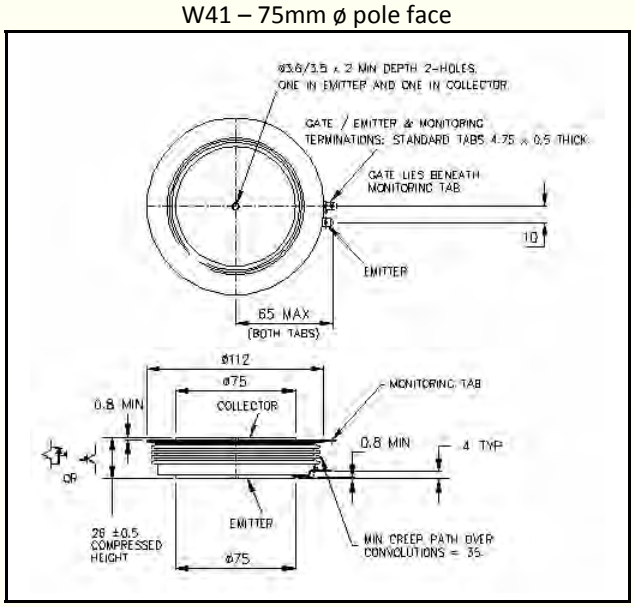
W40 – 47mm ø pole face



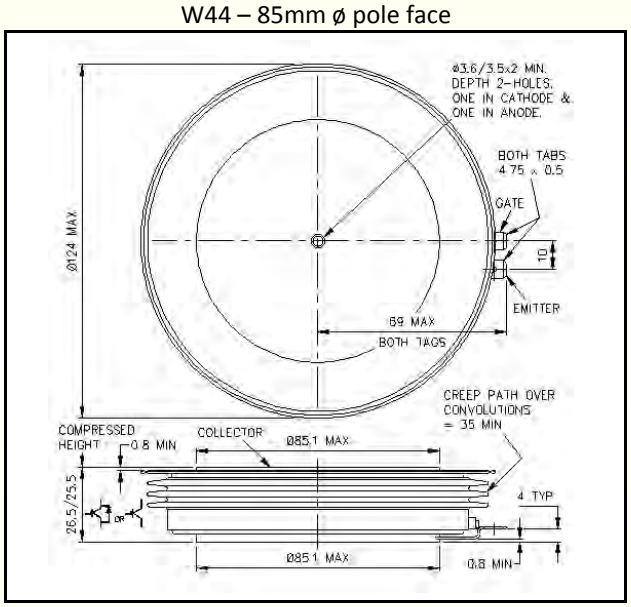
W67 – 63mm ø pole face



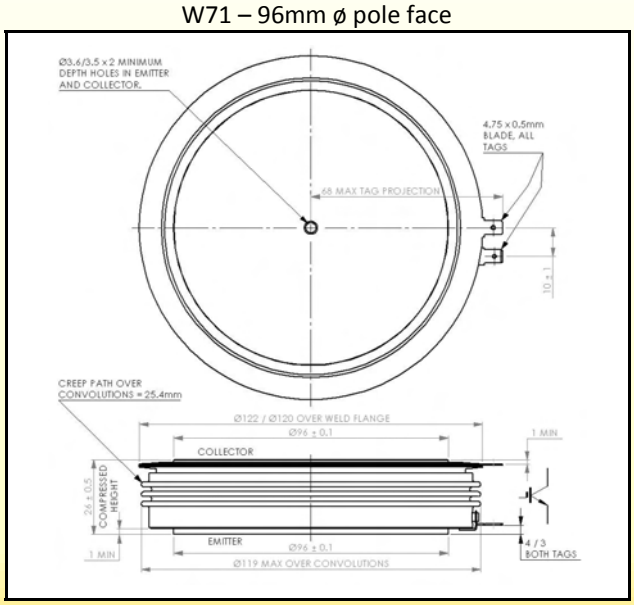
W41 – 75mm ø pole face



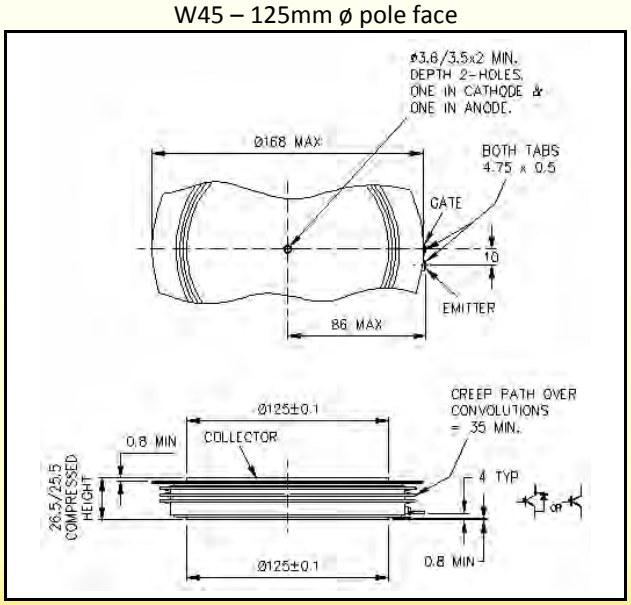
W44 – 85mm ø pole face



W71 – 96mm ø pole face

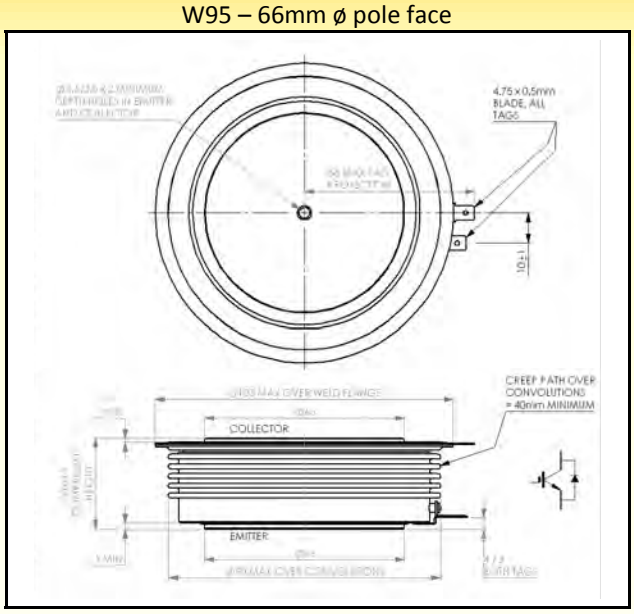


W45 – 125mm ø pole face

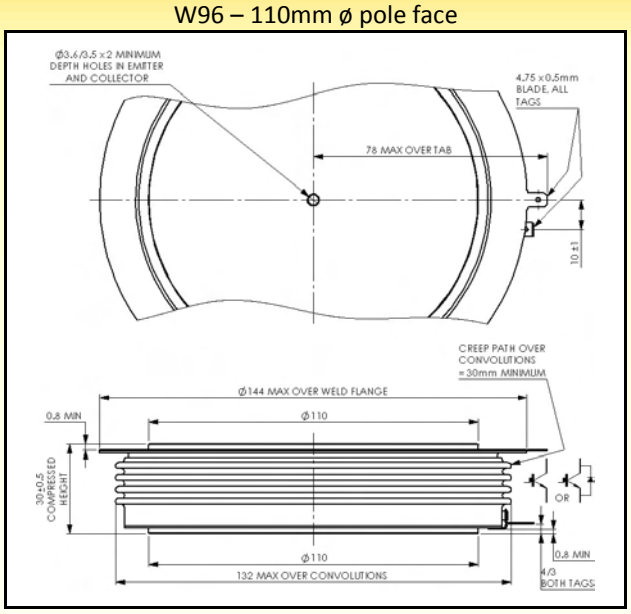


Outlines

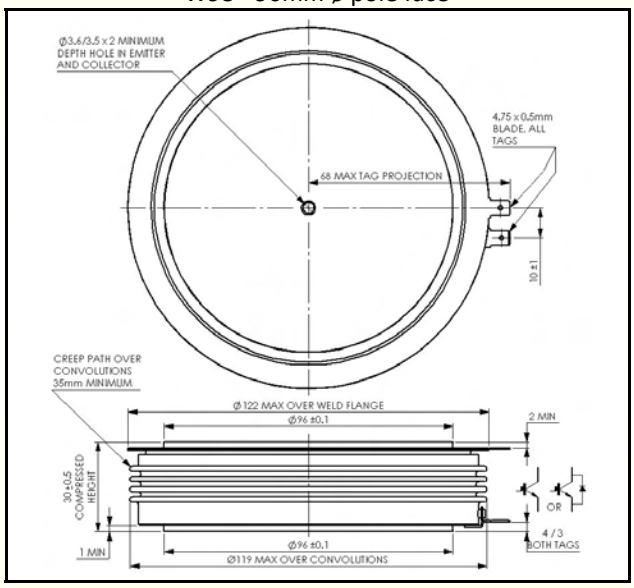
W95 – 66mm ø pole face



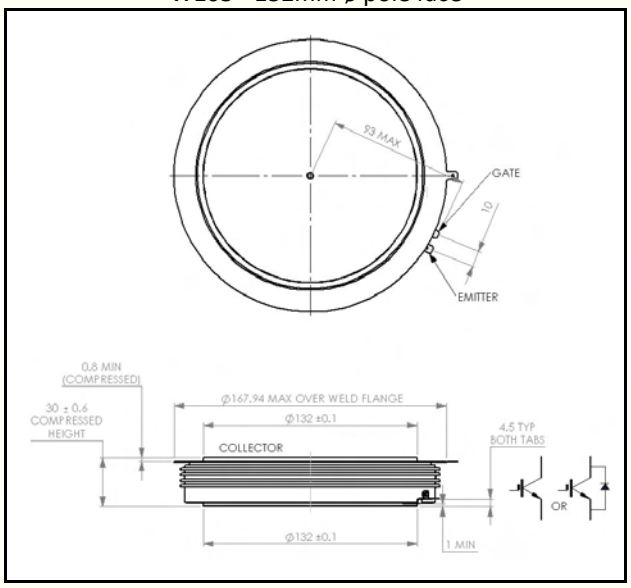
W96 – 110mm ø pole face



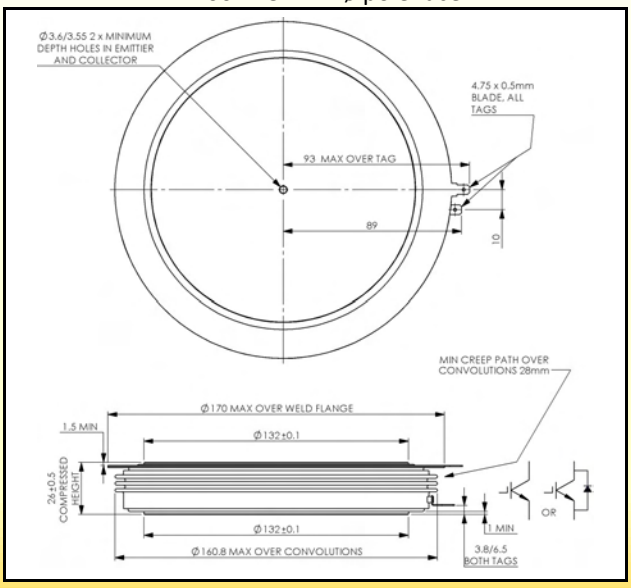
W98 - 96mm ø pole face



W103 - 132mm ø pole face



W106 - 132mm ø pole face



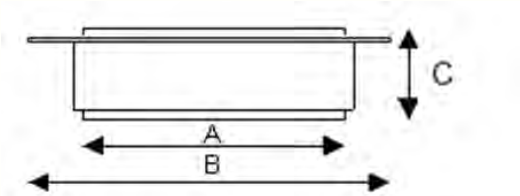
New generation high-power sonic fast recovery diodes

Improved safe operating area (SOA) and reverse recovery characteristics for our 2.5kV, 4.5kV HP-sonic monolithic diode range complements our new asymmetric IGBT range and also supports such applications as multi-level diode clamped converters.
Also available are a new range of multi-chip 6.5kV diodes suitable for the new 6.5kV asymmetric IGBT's.

These diodes incorporate a unique manufacturing process and lifetime control to offer a class leading trade-off between conduction and switching losses. The wide SOA makes them ideal as freewheeling diodes for snubberless IGBT and IGCT applications.

Features

- Robust dynamic characteristics – di/dt> 4000A/µs
- Up to 150°C operating junction temperature
- Soft fast recovery – no snap off
- Low recovery losses, low forward voltage drop
- Snubberless operation



Applications

- Anti-parallel diodes of IGBT's and IGCT's
- Clamp and snubber diodes
- Any application which requires a fast low loss diode
- Ideally suited for:
  - Traction
  - Medium voltage drives
  - Renewables
  - Induction heating
  - Pulsed power applications

	V_{RRM}	I_{FAV}	I_{FSM}	I^2t	V_{T0}	r_T	T_{JM}	R_{thJK}	Dimension		
		T_K=55°C	10ms ½ sine		@T_{JM}			180° Sine	mm		
			V_R ≤60% V_{RRM}								
Part No.	V	A	A	A^2s	V	mΩ	°C	K/W	A	B	C
E0170YC45C	4500	210	1390	9.67×10^3	2.580	7.170	150	0.073	25	42	26
E0280YH25C	2500	350	2330	27.1×10^3	1.410	2.600	150	0.073	25	42	26
E0330MF65F	6500	277	3070	47.1×10^3	1.890	5.800	125	0.043	50	75	30
E0460QC45C	4500	532	5750	165×10^3	2.150	3.040	150	0.029	38	60	26
E0660NC45C	4500	765	7318	268×10^3	2.000	2.236	150	0.020	47	74	NC – 26
E0660NH45C	4500	765	7318	268×10^3	2.000	2.236	150	0.020	47	74	NH – 14
E0770HF65F	6500	632	7060	249×10^3	1.890	2.358	125	0.019	66	100	30
E0800QC25C	2500	960	10700	575×10^3	1.410	0.839	150	0.029	38	60	26
E1000TF65F	6500	915	10400	537×10^3	2.291	1.185	125	0.015	75	112	30
E1200NC25C	2500	1338	13300	884×10^3	1.305	0.678	150	0.020	47	74	26
E1300VF45C	4500	1350	14000	1.08×10^6	2.310	0.930	150	0.013	63	100	26
E1375EF65F	6500	1125	13400	898×10^3	1.890	1.423	125	0.011	85	124	30
E2060FF65F	6500	1690	22100	2.44×10^6	1.890	0.951	125	0.007	100	144	30
E2250VF25C	2500	2426	25200	3.17×10^6	1.510	0.250	150	0.013	63	100	26
E2400TC45C	4500	2233	25600	3.29×10^6	2.060	0.590	150	0.008	75	112	26
E4000TC25C	2500	4080	50000	12.5×10^6	1.406	0.149	150	0.008	75	112	26

IGBT gate drives

The C044BG400 IGBT Gate Driver is a low power consumption driver with on board VCE desaturation detection for high reliability application. The driver features a fibre-optic communication interface for drive, status and switching feedback signals. A fully supervised DC/DC converter with EMI filtering, low coupling capacitance and high partial discharge level is integrated into the board. The high voltage collector sense and gate interface are implemented on a separate card to allow close coupling to the IGBT. A range of pre-configured boards is available to complement IXYS UK's range of press-pack IGBTs – other applications on request.

Part Number	IGBT Type
C0044BG400SBK	T0160NB45A
C0044BG400SBL	T0240NB45E
C0044BG400SBQ	T0340VB45G
C0044BG400SBA	T0360ND25A
C0044BG400SBB	T0500ND25E
C0044BG400SBE	T0510VB45E
C0044BG400SBF	T0570VD25G
C0044BG400SBM	T0600TB45A
C0044BG400SBG	T0800EB45G
C0044BG400SBN	T0800TB45E
C0044BG400SBH	T0850VD25E
C0044BG400SBP	T0900EB45A
C0044BG400SBR	T1200EB45E
C0044BG400SBC	T1200TD25A
C0044BG400SBD	T1500TD25E
C0044BG400SBJ	T1600GB45G
C0044BG400SBS	T1800GB45A
C0044BG400SBV	T2250AD25E
C0044BG400SBT	T2400GB45E

Features and benefits

- High reliability topology
- Designed for ultra-low power consumption
- Built in DC/DC converter with soft start
- Integrated input filter for low EMI
- Separate low impedance path for parasitic EMI currents
- PD-voltage levels available up to 11kV on request
- Low impedance from gate to emitter at start-up and power fail
- Monitoring of all secondary supply voltages
- Monitoring of IGBT switching status (V_{CE} de-sat condition)
- Soft switch-off at V_{CE} de-sat fault condition
- Fibre-optic links for switching commands and status control
- Low light protection for input signal
- Short-pulse suppression, configurable
- Balanced propagation delay time
- Gate current up to 44A
- Optional gate speed-up capacitors

6.5kV gate drives in development

Please contact IXYS UK for more information

Press-pack IGBT 3-level inverters

A range of 3-level topology assemblies using press-pack IGBT technology have been developed to serve applications at the highest end of the power market.

3 separate designs are available, a totally independent 3.3kV system, a 6.6kV system and a 10kV system. The 6.6kV and 10kV systems are based on the combination of 2 IGBT stacks and 1 diode stack. Each system benefits from direct water cooling to provide highly effective heat dissipation away from the devices and pre-loaded disc spring clamping to evenly distribute the applied force across the entire surface area of the device.

These assemblies are custom manufactured and can be adapted to suit any mechanical or electrical configuration

3.3kV system - Complete phase leg

Power Rating (MW)	8
Nominal Line Current (Amps)	1600
No. of IGBT's	4
No. of Diodes	6
No. of Coolers	13
Required IGBT Type	T2400GB45E
Required Diode Type	E2400TC45C

6.6kV system

Phase leg requirement – 2 × IGBT stack & 1 × diode stack

Power Rating (MW)	12
Nominal Line Current (Amps)	1000
No. of IGBT's	4
No. of Diodes	4
No. of Coolers	5
Required IGBT Type	T1600GB45G
Required Diode Type	E2400TC45C

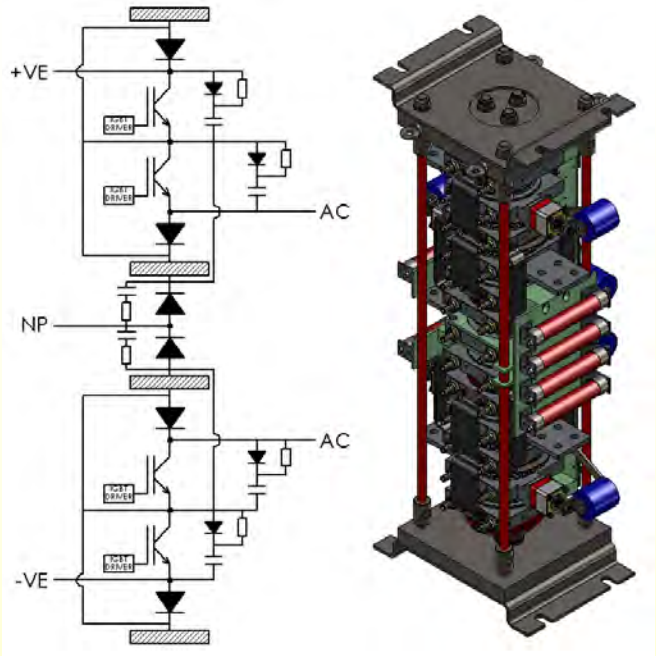
10kV system

Phase leg requirement – 2 × IGBT stack & 1 × diode stack

Power Rating (MW)	16
Nominal Line Current (Amps)	1000
No. of IGBT's	6
No. of Diodes	6
No. of Coolers	7
Required IGBT Type	T1600GB45G
Required Diode Type	E2400TC45C

Features and benefits

- Direct water cooled for effective heat dissipation
- Pre-loaded clamping to evenly distribute the applied force
- Isolated clamping rod system
- Integrated snubber circuit
- Single unit mechanical configuration: Short inductance paths for relative size of unit to avoid high stray inductance
- Advanced optically fired gate trigger circuits



3.3kV system - Complete phase leg

New—DC link capacitors

The E50 PK16 capacitor can be universally used for the assembly of low inductance DC buffer circuits and DC filters; with its high energy density it can replace banks of series-connected electrolytic capacitors as well as large film capacitors in rectangular cases.

The capacitance in a DC buffer circuit must be sufficiently sized to both handle and smoothen the occurring ripple currents. The traditional use of series/parallel-connected electrolytic capacitors offered large capacitance at seeming low cost, however the low cost per microfarad is countered by very low current strength, the high sensitivity to voltage and current surges, as well as high risk of field failures resulting in high maintenance cost. Advanced know-how in special capacitor film coating and many years of practical experience in designing and manufacturing capacitors have allowed the design of the E50 PK16 range with high current density. With fivefold the current strength of conventional electrolytic capacitors, it is not necessary to reproduce the same capacitance in film technology. Instead, the user now gets a superior technical solution within the same – or even less – space.

Thanks to its compact cylindrical aluminium (NT) or plastic (N4) can design these capacitors are ideal for both electrical and mechanical requirements of high-speed IGBT converters. Its robust terminals and the robust fixing stud allow for very simple and reliable mounting that unites lowest inductance and highest current strength. The particularly large creepage and clearance distances make this design suitable for a wide range of operating voltages. As a result, existing standard converter concepts can easily be adapted to new applications without having to change the principal construction and to re-approve the entire system. The capacitors listed below have been designed specifically to match the requirements of IXYS UK's press-pack IGBT range in most inverter/converter applications.

Features and benefits

- Superior voltage and current strength
- Dramatic increase in operational life
- Drastic reduction of failures
- Minimisation of power dissipation losses
- Substantial reduction of self-inductance and series resistance
- More exact manufacturing tolerances
- Elimination of sharing resistors

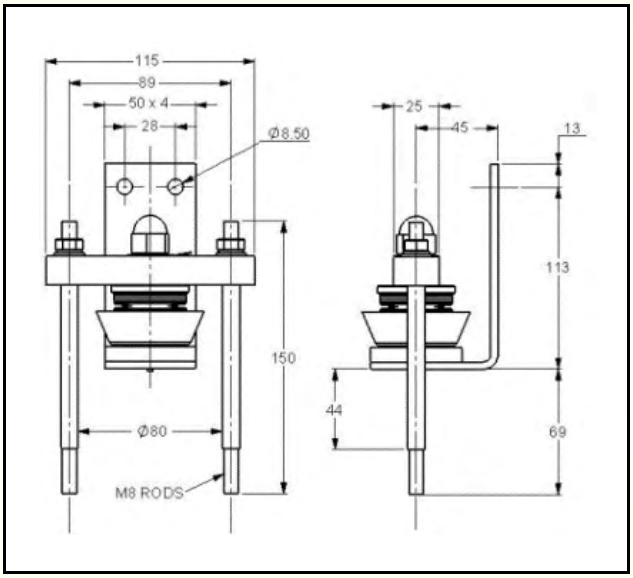
New—DC link capacitors

Part No.	V_{DC} V	Capacitance µF	Series resistance R_S Ω	Maximum current I_{MAX} A	Inductance L_e nH	Diameter mm	Length mm	Design
E50.N15-254N5W	1300	250	4.20	60	40	85	155	N5
E50.N15-304NTW	1300	300	3.70	60	40	85	155	NT
E50.R16-554NTW	1300	545	2.30	80	40	116	165	NT
E50.N25-564NTW	1300	560	2.30	60	60	85	252	NT
E50.R23-824NTW	1300	820	1.70	100	50	116	230	NT
E50.R29-115NTW	1300	1090	1.40	100	60	116	295	NT
E50.R34-145NTW	1300	1370	1.10	100	70	116	345	NT
E50.S29-165NTW	1300	1560	1.10	120	70	136	295	NT
E50.S34-205NTW	1300	1950	0.69	120	70	136	345	NT
E50.N15-603NTW	2800	60	1.3	50	40	85	155	NT
E50.N23-104NTW	2800	100	1.70	60	60	85	232	NT
E50.R16-114NTW	2800	110	0.66	80	40	116	165	NT
E50.R23-174NTW	2800	165	0.63	100	50	116	230	NT
E50.R29-224NTW	2800	220	0.62	100	60	116	295	NT
E50.R34-284NTW	2800	275	0.85	100	70	116	345	NT
E50.S29-314NTW	2800	310	0.61	120	70	136	295	NT
E50.S34-394NTW	2800	390	0.76	120	70	136	345	NT
E50.N15-293NTW	3600	29	1.40	50	40	85	155	NT
E50.N23-503NTW	3600	50	1.90	60	60	85	232	NT
E50.R16-573NTW	3600	57	0.67	80	40	116	165	NT
E50.R23-863NTW	3600	85.5	0.65	100	50	116	230	NT
E50.R29-114NTW	3600	114	0.68	100	60	116	295	NT
E50.R34-144NTW	3600	142	0.88	100	70	116	345	NT
E50.S29-164NTW	3600	160	0.63	120	70	136	295	NT

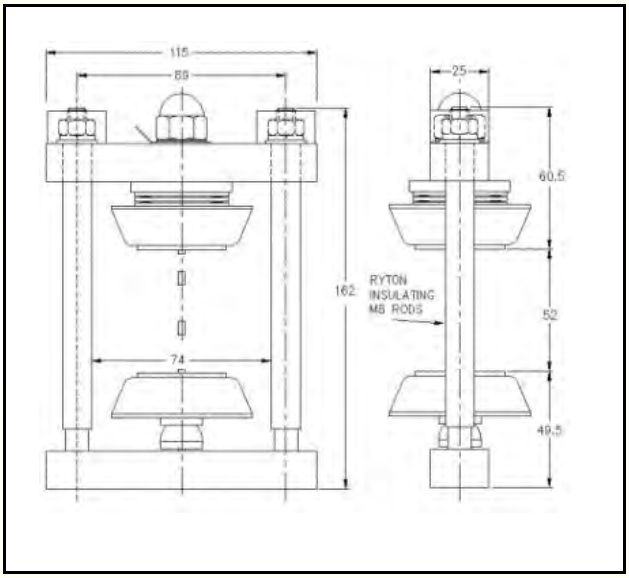
Recommended clamps for capsule IGBT's

Device type	Device housing code	Electrode diameter (mm)	Max capsule height (mm)	Recommended clamps
Press-pack IGBT	NB/ND	47	28	XK1000D/SA074M
	VB/VB	63	26	XK3060D/SA140ML
	TB/TD	75	26	XK2000D/SA114M
	AB/AD	96	26	XK3060D/SA140ML
	EB	85	26.5	XK3060D/SA140ML
	GB	125	26.5	XK6120D/SA180ML
	HF	66	30	*Consult Factory*
	DF	110	30	*Consult Factory*
	AF	122	30	XK3060D/SA140ML
	BF	132	30	XK6120D/SA180ML
	BJ	132	26	Consult Factory

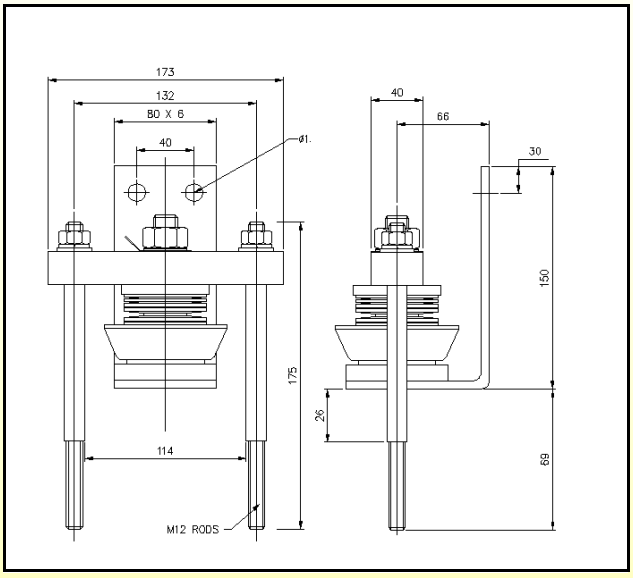
XK1000DA074M



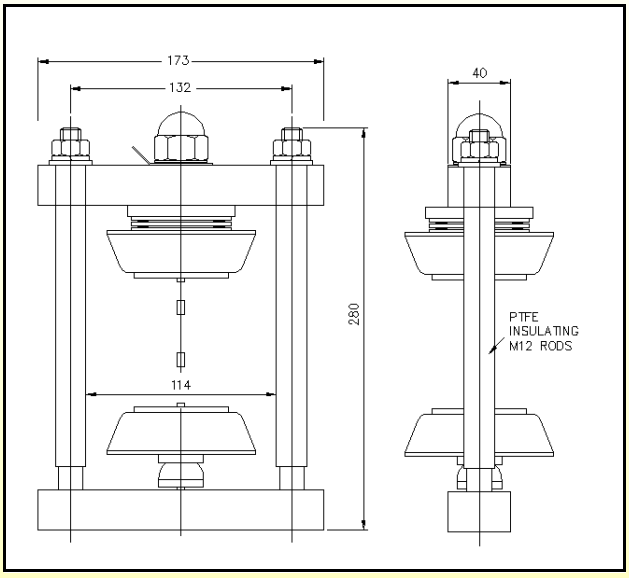
XK1000SA074M



XK2000DA114M



XK2000SA114M



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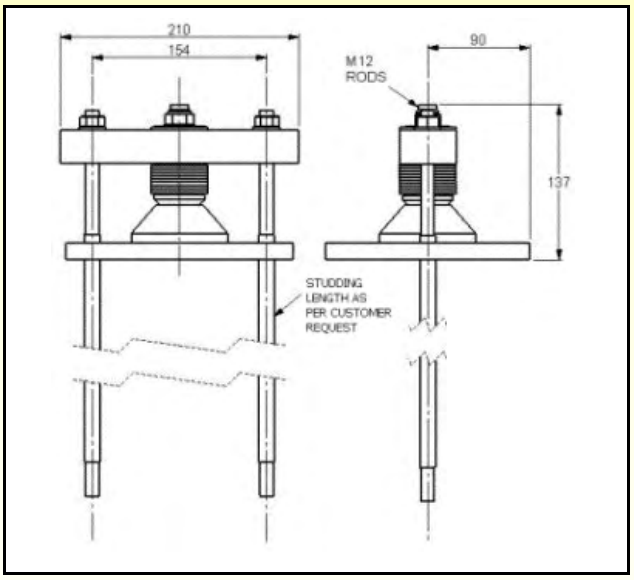

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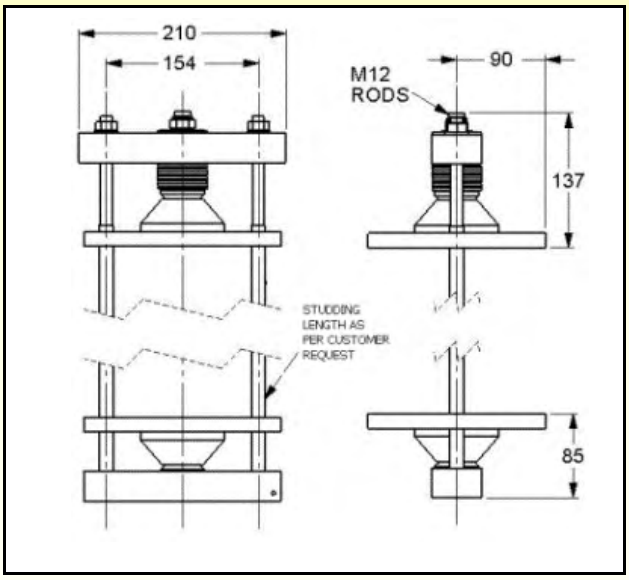

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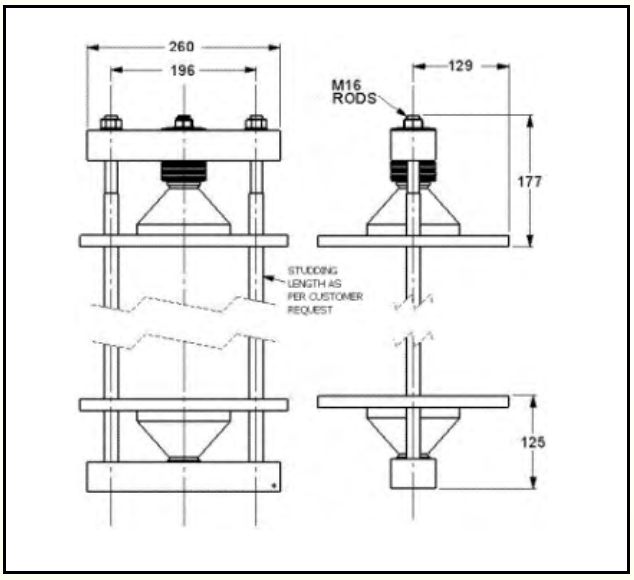

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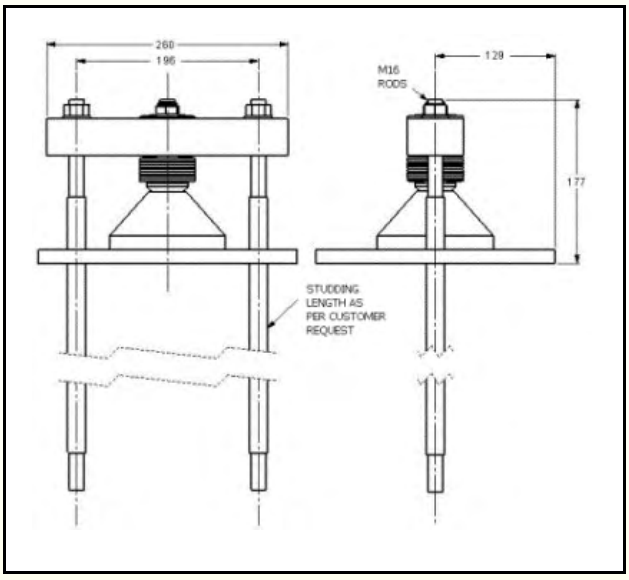

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