


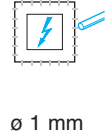
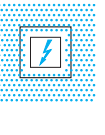



The Ingress Protection (IP) for all low voltage enclosures up to 1000 V a.c. and 1500 V d.c. is defined in identical fashion by the standards EN 60529 - IEC 529 it comprises the letters IP followed by two character numerals:

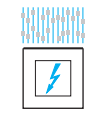
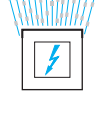


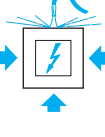
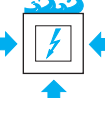
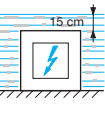
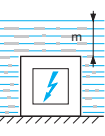
The first character numeral indicates the degree of protection provided by the enclosure with respect to persons, also to the equipment inside the enclosure.

The second character numeral indicates the degree of protection provided by the enclosure with respect to harmful ingress of water; a third character may be used to indicate mechanical strength. An x signifies that no test has been carried out.

The first character numeral
Protection against solid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against solid objects greater than 50mm	A large surface of the body, such as a hand (but no protection against deliberate access) solid objects exceeding 50mm in diameter
2		Protected against solid objects greater than 12.5mm	Fingers or similar objects not exceeding 80mm in length; solid objects exceeding 12.5 mm in diameter
3		Protected against solid objects greater than 2.5mm	Tools, wires, etc...., of diameter or thickness greater than 2.5mm; solid objects exceeding 2.5 mm in diameter
4		Protected against solid objects greater than 1.0mm	Wires or strips of thickness greater than 1.0mm; solid objects exceeding 1.0 mm in diameter
5		Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment
6		Dust-tight	No ingress of dust

The second character numeral
Protection against liquid substances.

IP	Test	Short description	Definition
0		Non-Protected	No special protection.
1		Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect
2		Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when the enclosure is tilted at any angle up to 15° from its normal position
3		Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect
4		Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect
5		Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effect
6		Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities
7		Protected against the effect of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time
8		Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer

Consumer Units & Distribution Boards

As you might expect, consideration has been given to the design of the enclosure to accommodate the range of MCB and RCCB devices which are suitable for use in domestic or similar installations, or generally in installations where unskilled persons have access to their use. This, describes the European Norm covering the requirements of LV Distribution Boards suitable for this application. The full title is:

EN 60439-3

Specification for low voltage switchgear and control switchgear assemblies. Part 3. Particular requirements for low-voltage switchgear and control gear assemblies intended to be installed in places where unskilled persons have access to their use -

Distribution boards

This standard covers the supplementary requirements for enclosure distribution boards suitable for indoor use containing protective devices and intended for use either in domestic applications or in other places where unskilled persons have access for their use. Control and/or signalling devices may also be included.

They are for use on ac, with a nominal voltage to earth not exceeding 300V. The outgoing circuits contain short circuit protection devices, each having a rated current not exceeding 125A with a total incoming load current not exceeding 250A.

Customer Distribution Boards which are generally known in Ireland as Consumer Units are also included in this Standard. The additional test requirements are set out in annex ZA which calls for the assembly to withstand a short-circuit fault of 16kA when protected by a 100A specified fuse.

By definition a customer distribution board or consumer unit is an integrated assembly, for the control and distribution of electrical energy, principally in domestic installations, incorporating manual means of double pole isolation in the incoming circuits, and are designed for use exclusively with one or more of the following outgoing circuit protective devices: fuses, MCB's and RCBO's.

The units may also incorporate RCCB's. Polarity must be observed throughout and the consumer unit is type tested when energised through a 100A type II fuse complying with BS1361. The rated current of a consumer unit is determined by the rated current of the incoming protective device, usually 63A, 80A or 100A, the rated current of the incoming device(s) is limited to 100A.

As there are no diversity factors applied to consumer units, the incoming circuit and the bus-bar system must be able to carry their full rated current without exceeding the temperature rise limits.

Panelboards

The idea of group mounting MCCBs or MCBs on to a vertical three phase bus-bar system came from North America during the 1960s, where it had been used very effectively for a number of years. The design takes advantage of the modular dimensions of the circuit breakers which, together with the simple bus-bar system, proved to be very economical and safe. The basic design philosophy behind the panelboard is to provide a three phase distribution board capable of accommodating MCCBs, which is simple to specify, manufacture and install, and can be made available "off the shelf" or on a very short delivery cycle.

Generally installed for commercial and light industrial application the panelboard is, however, used in many different types of applications.

Panelboards are covered by the European Norm for Low-voltage Switchgear and Control Gear Assemblies EN 60439 Part 1, which is the specification for type-tested and partially type-tested assemblies (general requirements).

Panelboards are usually type-tested assemblies but, unlike consumer units and distribution boards, they do not, as yet, have their own particular standard, so care must be taken in their selection and application. It is important that the system designer understands, and is able to use, the technical information that the manufacturer is required to publish regarding the panelboard. Most of the information is straightforward and presents little problem, except perhaps for internal separation (Form numbers), degree of protection (IP rating) and short-circuit withstand strength.

Internal Separation

The internal separation of assemblies is described EN 60439 and is concerned with three requirements which can be met by the suitable arrangement of barriers or partitions.

- Protection against contact with live parts belonging to adjacent functional units.
- Limitation of the possibility of initiating and spreading of arcing faults.
- Prevention of the passage of solid foreign bodies from one unit of an assembly to an adjacent unit.

Form numbers are given to some typical forms of separation -

Form 1 - No separation

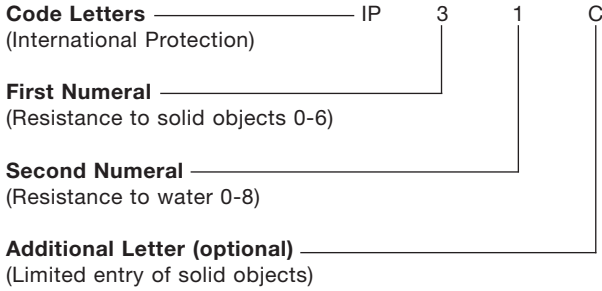
Form 2 - Separation of bus-bars from the functional units

Form 3 - Separation of bus-bars from the functional units and separation of all functional units from one another, but not their outgoing terminals.

Form 4 - Separation of bus-bars from the functional units and separation of all functional units from one another including their outgoing terminals.

Degree of Protection of Enclosures

The degree of protection provided by an enclosure is indicated by the IP code in the following way -



For example, an enclosure with an index IP20 would provide protection against solid bodies greater than 12mm but offer no protection against water; however an index IP31 would provide protection against solid bodies greater than 2.5mm and in addition against vertically dripping water.

Sometimes the letter 'X' is used in place of the first or second numeral to indicate that tests have not been made or are not considered relevant. For example IP4X provides protection against a 1mm probe but has not been tested for the ingress of water. Refer to page 330 for ingress protection chart.

Invicta 125 Panelboard

Enclosure - Degree of protection (door closed)		IP3X
Internal Separation		Form 3
Bus-bar rated current		400A
Bus-bar rated short-time withstand current		35kA for 1s direct connected (unconditional)
Incoming -	Main Terminals	400A
	Non-Auto MCCB	400A
	MCCB	400A
Outgoing -	H125 MCCBs	16 to 125A
	4 way	
	6 way	
	8 way	
	12 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125		15kA
• Incomer - non-auto MCCB - outgoing H125		15kA
• Incomer - H400 MCCB - outgoing H125		25kA

Table 1

Short-Circuit Withstand

The European Norm requires the manufacturer to state the following:

For a panelboard with an incoming MCCB -

- The maximum allowable value of prospective shortcircuit current at the terminals of the incoming MCCB.

For a panelboard where a short-circuit protective device is not incorporated in the incoming unit (Main Terminals) -

- The rated short-time withstand current
- The rated peak withstand current
- The withstand time period if different from one second.

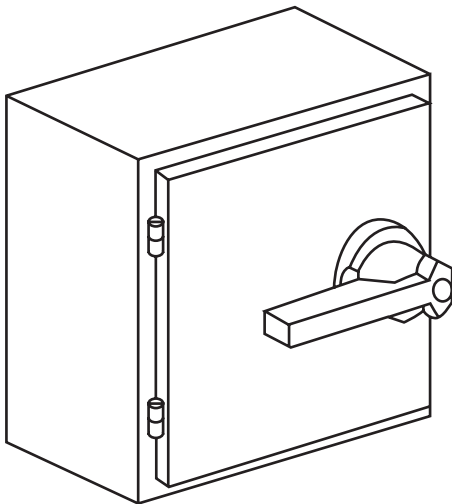
All Invicta panel boards have been independently tested at a UK ASTA approved test laboratory.

To assist in the selection of the correct panelboard, suitable for use on systems having prospective fault levels ranging from 15 to 50kA, Hager have prepared the following simple charts.

Invicta 250 Panelboard

Enclosure - Degree of protection (door closed) IP3X

Internal Separation	Form 3	
Bus-bar rated current	800A	
Bus-bar rated short-time withstand current	35kA for 1s	
Rated conditional short circuit current	40kA - direct connected with 250A MCCB outgoing	
Incoming -	Main Terminals	800A
	Non-Auto MCCB	800A
	MCCB	800A
Outgoing -	H125 MCCBs	16 to 125A
	H250 MCCBs	160 to 250A
	6 way	
	8 way	
	12 way	
Maximum Prospective Short-circuit level at point of application with		
• Incomer - main terminals - outgoing H125	15kA	
• Incomer - main terminals - outgoing only H250	40kA	
• Incomer - non-auto MCCB - outgoing H125	15kA	
• Incomer - non-auto MCCB - outgoing only H250	40kA	
• Incomer - H400 MCCB - outgoing H125	25kA	
• Incomer - H400 MCCB - outgoing only H250	35kA	
• Incomer - H800 MCCB - outgoing only H250	50kA	



Cat Ref.	Description	Height	Width	Depth
JFB202U	20A SPSN	250	200	150
JFB203U	32A SPSN	250	200	150
JFB302U	20A TPN	250	200	150
JFB303U	32A TPN	250	200	150
JFB402U	20A TPSN	250	200	150
JFB403U	32A TPSN	250	200	150
JFD206U	63A SPSN	325	300	150
JFD306U	63A TPN	325	300	150
JFD406U	63A TPSN	325	300	150
JFE210U	100A SPSN	400	375	200
JFE310U	100A TPN	400	375	200
JFE410U	100A TPSN	400	375	200
JFG312U	125A TPN	500	375	200
JFG412U	125A TPSN	500	375	200
JFG316U	160A TPN	500	375	200
JFG416U	160A TPSN	500	375	200
JFG320U	200A TPN	500	375	200
JFG420U	200A TPSN	500	375	200
JFG325U	250A TPN	500	375	200
JFG425U	250A TPSN	500	375	200
JFH331U	315A TPN	650	500	300
JFH431U	315A TPSN	650	500	300
JFH340U	400A TPN	650	500	300
JFH440U	400A TPSN	650	500	300
JFI363U	630A TPN	800	600	350
JFI463U	630A TPSN	800	600	350
JFI380U	800A TPN	800	600	350
JFI480U	800A TPSN	800	600	350

All dimensions are in mm and exclude the handle.
Add 70mm to the depth to allow for the handle (110mm for 630 / 800A)

Table 4

Cable Extension Boxes for Fuse Combination Switches

Cat Ref.	Rating	Height	Width	Depth
JZA701	125 / 250A	200	375	200
JZA702	315 / 400A	250	500	300
JZA703	630 / 800A	300	600	350

Thermal current I _{th} (40°C)	20A	32A	63A	100A	125A	160A	200A	250A	315A	400A	630A*	800A*
Fuse size: BS	A1	A1	A2-A3	A4	B1-B2	B1-B2 B1-B2	B1-B3	B1-B3	B1-B4	C1-C2	C1-C3	800A*
Rated insulated voltage												
Ui (V)	800	800	800	800	800	800	800	800	800	800	1000 1000	
Impulse voltage U _{imp}	8000 8000	8000 8000	8000 8000	8000 8000	8000 8000	12000 12000						
Operational current I _e (A)	A B	A B	A B	A B	A B	A B	A B	A B	A B	A B	A B	A B
415V ac AC-22A/AC-23B	20 20	32 32	63 63	100 100	125 125	160 160	200 200	250 250	315 315	400 400	630 630	800 800
Motor power (kW)												
400V ac	9	15	30	51	63	80	100	**	160 160	220 220	355 355	**
Reactive power 400V ac (kVAR)	15	45	25	45	55	60	75	**	125	150	2x125	**
Overload capacity												
Short-circuit with fuses (kA Rms)	50	50	50	50	50	50	50	50	50	50	50	50
Fuse rating (A)	20	32	63	100	125	160	200	250	315	400	630	800
BS88												
Making & breaking Characteristics												
Breaking capacity 400V AC-23B (A Rms)	160	256	500	800	1000	1280	1600	2000	2520	3200	**	**
Making capacity 400V AC-23B (A Rms)	200	320	630	1000	1250	1600	2000	2500	3150	4000	**	**
Withstand mechanical (Number of operations)	20,000	20,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	8000	8000
Electrical (Number of operations)	-	-	-	-	-	-	**	-	-	-	-	**
Tightening torque	2	2	6	9	9	9	20			20	20	40 40
Connection												
Minimum Cu												
Cable section (mm ²)	2.5	2.5	10	25	35	50	70	70	185	185	2x150	2x150
Maximum Cu												
Cable section (mm ²)	16	16	25	95	95	95	240	240	240	240	2x300	2x300
Fuse types	NIT20	NIT32	TIS63	TCP100	TF125	TF160	TF200	TKF250	TKF315	TMF400	TTM630	TLM800

* 630A AC22B making and breaking

* 800A

** Please call our technical support helpline for these details

Table 5

Switch Disconnectors

Cat Ref.	Description	Height	Width	Depth
JAB302	20A TPN	250	200	150
JAB303	32A TPN	250	200	150
JAB306	63A TPN	250	200	150
JAB310	100A TPN	250	200	150
JAC312	125A TPN	300	250	150
JAC316	160A TPN	300	250	150
JAE320	200A TPN	400	375	200
JAE325	250A TPN	400	375	200
JAG331	315A TPN	500	375	200
JAG340	400A TPN	500	375	200
JAH363	630A TPN	650	500	300
JAH380	800A TPN	650	500	300
JAB402	20A TPSN	250	200	150
JAB403	32A TPSN	250	200	150
JAB406	63A TPSN	250	200	150
JAB410	100A TPSN	250	200	150
JAC412	125A TPSN	300	250	150
JAC416	160A TPSN	300	250	150
JAE420	200A TPSN	400	375	200
JAE425	250A TPSN	400	375	200
JAG431	315A TPSN	500	375	200
JAG440	400A TPSN	500	375	200
JAH463	630A TPSN	650	500	300
JAH480	800A TPSN	650	500	300

Table 7

All dimensions are in mm and exclude the handle.
Add 70mm to the depth to allow for the handle

Cable Extension Boxes for Switch Disconnectors

Cat Ref.	Rating	Height	Width	Depth
JZA700	125 / 160A	200	250	200
JZA701	315 / 400	200	375	300
JZA702	630 / 800	250	500	300

	20	32	63	100	125	160	200	250	315	400	630	800
Enclosed thermal current Ithe												
Rated insulation voltage Ui (V)	800	800	800	800	800	800	800	800	800	800	1000	1000
Rated Thermal current Ithe (A)	20	32	63	100	125	160	200	250	315	400	630	800
Rated operational Current												
AC21A	500VAC 20	32	63	100	125	160	160	250	250	250	630	800
AC22A	20	32	63	100	125	125	125	250	250	250	500	800
AC21A	690VAC 20	32	63	100	125	160	160	200	200	200	500	800
AC22A	20	32	63	100	125	125	125	125	125	125	315	800
Overload capacity												
Icw Rated Short time withstand value (kA/s)	1.26	1.26	1.5	1.5	7	7	7	9	9	9	13	26
R.M.S. value (kA)	0.16	0.256	0.504	0.64	1	1.28	1.28	2	2	2	5.04	6.4
Peak withstand value (kA)	-	-	-	-	20	20	18	30	23	23	45	55
Rated short circuit making capacity (kA)	1.8	1.8	2.1	2.1	11.9	11.9	11.9	15.3	15.3	15.3	26	54.6
Rated impulse withstand voltage Uimp (kV)	8	8	8	8	8	8	8	8	8	8	12	12
Mechanical endurance												
Number of operations	100,000	100,000	100,000	100,000	10,000	10,000	10,000	10,000	10,000	5,000	5,000	5,000
Maximum cable size mm ²	16	16	50	50	50	95	95	150	185	240	2x300	2x300
Tightening torque	2	4	4	9	9	9	20	20	20	20	20	20

Table 9

Cat Ref.	Description	Height	Width	Depth
JG00S	10A TPN	136	100	74
JG01S	16A TPN	136	100	105
JG02S	25A TPN	136	100	105
JG03S	40A TPN	201	136	105
JG04S	63A TPN	201	136	118
JG05S	80A TPN	201	136	118

Table 6

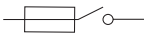
All dimensions are in mm and exclude the handle.
 Add 27mm to the depth to allow for the handle on 10-25A products.
 Add 32mm to the depth to allow for the handle on 40-80A products.


Enclosed thermal current Ithe			16	25	40	63	80/100
Rated insulation voltage Ui (V)			690	690	690	690	690
Rated thermal current Ithe (A)			25	40	63	80	100
Rated operational current							
AC-21	400V	Ie (A)	25	40	63	80	100
AC-22	230V		16	25	40	63	100
AC-22	400V	cos phi 0.65	16	20	32	63	100
AC-23	230V		16	20	32	63	100
AC-23	400V	cos phi 0.35	16	15	25	40	63
Rated operational power							
AC-23	230V	(kW)	4	5.5	7.5	11	15
AC-23	400V		7.5	11	15	22	30
Rated fused short circuit current							
Back-up fuse	(A)		63	63	63	80	100
R.M.S. value Ik	(kA)		50	50	50	50	50
Peak value	(kA)		5.4	6.6	7.2	8.3	8.7
Rated short circuit making capacity (Icm) (kA)	5.4		6.6	7.2	8.3	8.7	
Rated short-time withstand current (Icm) (kA)	0.9		1	1.1	1.6	1.7	
Rated breaking capacity Icn (A) AC-23							
	400V	cos phi 0.35	250	270	320	480	504
Electrical endurance (number of operations)			3000	3000	3000	3000	
Mechanical endurance (number of operations)			50000	50000	50000	50000	
Terminals mm ²			1.5-16	1.5-16	1.5-16	2.5-35	2.3-35
Max. thermal torque (Nm)			1.8	1.8	1.8	2.5	2.5

Table 9a

Fuse - Combination Units - EN 60947-3

Many people are attracted to fuse-combination units by their simplicity in application and their reliability in operation. They are particularly useful for use on very high prospective fault level systems where the high energy limiting characteristic of the HRC fuse can be effectively utilised. In the past fuse-combination units came in two forms -

Switch-Fuse  A switch in which one or more poles have a fuse in series.

Fuse-Switch  A switch in which one or more poles have a fuse carrier/link which forms the moving contact.

The definitions of these two basic types of fuse combination units have now been extended to include units suitable for making, breaking and isolation and units which are only suitable for providing isolation for maintenance work.


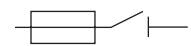
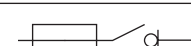
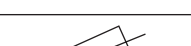
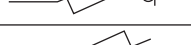

Definition	Symbol	Function
Switch fuse		Making and Breaking current
Disconnecter Fuse		Isolating
Switch Disconnecter Fuse		Making, Breaking and Isolating
Fuse Switch		Making and Breaking Current
Fuse Disconnecter		Isolating
Fuse Switch Disconnecter		Making, Breaking and Isolating

Table 10

However, in order to keep the selection of fuse-combination units as simple as possible, Hager offer a range of high performance double break switch-fuses, which also satisfy the isolating requirement of the European standard. These are correctly shown as and defined as a Fuse Combination Switch.

Switch disconnectors - EN 60947-3. A range of switch disconnectors (isolators) are available for use on lower current ratings from 20A to 125A, these switches are rated at AC-22 and provide a cost effective alternative to the fuse combination switch especially where the utilisation category AC-23 is not required. ie; mixed resistive and inductive loads. These may be used at AC-23 providing they are derated in accordance with Table 9 page 336.

Utilisation categories

Utilisation categories are not new but they are important because they help the designer or specifier identify the correct unit for a particular application.

The designation of the utilisation category is made up of three parts:

- (1) The prefix ac or dc, which indicates the nature of the current.
- (2) The two digit number, which indicates the type of application the unit is suitable for -
 - 21 Connecting and disconnecting under no-load.
 - 22 Switching of resistive loads.
 - 23 Switching of mixed resistive and inductive loads.
 - 23 Switching of highly inductive loads.
- (3) The suffix A or B, which indicates whether the unit is suitable for frequent or infrequent operation.
 - A - Frequent operation
 - B - infrequent operation.

For example a fuse-combination unit feeding a 400V ac circuit of mixed resistive and inductive loads which would need to be operated frequently would require a minimum utilisation category of AC-22A.

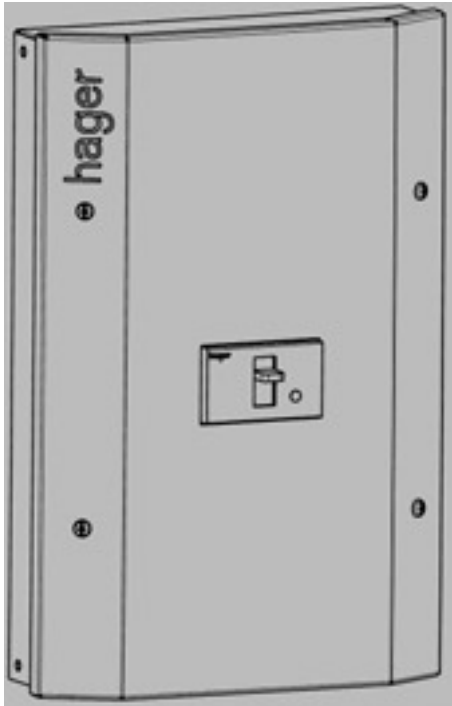
If the load was highly inductive, i.e. motor loads, then the minimum utilisation category would be AC-23A.

Generally, category AC-23 does not cover the switching of capacitors. Usually this is the subject of agreement between manufacturer and user.

Motor Power Circuit Protection

Fuse-combination units can be used very effectively for motor power circuit protection, the energy limiting HRC fuse offering very good protection to its associated starter. Category AC-23A should be specified for this duty. Special motor circuit protection fuse links are available which eliminate the need to fit a larger bodied fuse just to take care of the starting current of the motor.

The protection of motor power circuits should not be confused with the direct switching of a single motor. If a fuse-combination unit is required to perform this function then it must comply with the requirements of Appendix A of EN 60947-3 which makes provision for different utilisation categories for this application.



Cat Ref.	Description	L	N	Height	Width	Depth
JG25M	63A SPN	70mm	M8	420	267	83
JG26M	63A TPN	70mm	M8	420	267	83
JG27M	63A 4P	70mm	M8	420	267	83
JG27R	63A 4P + RCCB	70mm	M8	420	369	83
JG28M	100A SPN	70mm	M8	420	267	83
JG29M	100A TPN	70mm	M8	420	267	83
JG30M	100A 4P	70mm	M8	420	267	83
JG31M	125A SPN	70mm	M8	420	267	83
JG32M	125A TPN	70mm	M8	420	267	83
JG33M	125A 4P	70mm	M8	420	267	83
JG33R	125A 4P + RCCB	70mm	M8	420	369	83
JG34S	125A TPN non auto MCCB	70mm	M8	420	267	83
JG35S	125A 4P non auto MCCB	70mm	M8	420	267	83
JG36M	160A TPN	120mm	M10	660	334	97
JG37M	160A 4P	120mm	M10	660	334	97
JG37R	160A 4P + RCCB	120mm	M10	768	334	97
JG40M	250A TPN	120mm	M10	660	334	97
JG41M	250A 4P	120mm	M10	660	334	97
JG41R	250A 4P + RCCB	120mm	M10	768	334	97
JG42S	250A TPN non auto MCCB	120mm	M10	660	334	97
JG43S	250A 4P non auto MCCB	120mm	M10	660	334	97
JG44M	400A TPN	240mm	M10	870	384	117
JG45M	400A 4P	240mm	M10	870	384	117
JG45R	400A 4P + RCCB	240mm	M10	1000	384	117
JG46S	400A TPN non auto MCCB	240mm	M10	870	384	117
JG47S	400A 4P non auto MCCB	240mm	M10	870	384	117
JG48M	630A TPN	2x240mm	M10	1130	509	157
JG49M	630A 4P	2x240mm	M10	1130	509	157
JG50S	630A TPN non auto MCCB	2x240mm	M10	1130	509	157
JG51S	630A 4P non auto MCCB	2x240mm	M10	1130	509	157

All sizes are in mm

Table 3

Invicta Enclosures

1 row boxes 1-5 modules

This range is ideally suited for the installation of individual modular devices. (RCCBs, MCBs, RCBO's switch disconnectors etc).

The range is available without door, with plain door or with glazed door.

Where larger cables need to be accommodated for switch disconnectors etc extra cabling space is provided in the extended height versions.

All boxes from 2-5 modules are fitted with an earth bar as standard and for those with doors the catch can be replaced with the optional key locking facility.

Enclosures 8-66 modules

One, two or three row enclosures, fitted with DIN rails to accept any combination of Hager modular devices from the simplest switch and MCB arrangements to the more sophisticated control and protection system.

These enclosures feature:

- Ample wiring space
- Full complement of earth and neutral bars fitted as standard
- Significant knockout provision
- Plain or glazed doors
- Optional key lock

For dimensional information see 342

Description		Cat Ref. without door	Cat Ref. plain door	Cat Ref. glazed door
1 row 1 ■ suitable for 1 module RCBO		IU41		
1 row 2 ■		IU2	IU2/D	IU2/GD
1 row 2 ■ extended height		IU42*	*IU42/D	
1 row 3 ■		IU3	IU3/D	
1 row 4 ■		IU4	IU4/D	
1 row 4 ■ extended height		IU44*	*IU44/D	*IU44/GD
1 row 5 ■ extended height		IU45*		
4 mod metal unit	1 x 100A Isolator, AC22A Connection capacity: 50mm ² rigid conductor 35mm ² flexible conductor 1 x 63A Fuse		IU4-16	
4 mod metal unit	1 x 100A Isolator, AC22A Connection capacity: 50mm ² rigid conductor 35mm ² flexible conductor 1 x 100A Fuse		IU44-11	
<i>Note: Recommended maximum cable capacity</i>				
<i>* extended height = 35mm²</i>				
<i>all other references = 6mm²</i>				
1 row 8 ■ with knockouts			JK008	JK008G
1 row 12 ■ with knockouts			JK012	JK012G
1 row 16 ■ with knockouts			JK016	JK016G
1 row 22 ■ with knockouts			JK022	JK022G
2 row 24 ■ (2 x 12) with knockouts			JK024	JK024G
2 row 32 ■ (2 x 16) with knockouts			JK032	JK032G
2 row 44 ■ (2 x 22) with knockouts			JK044	JK044G
3 row 66 ■ (3 x 22) with knockouts			JK066	JK066G



IU41



IU41-11



JK016G

Versatile modular design

The modern design of Invicta enclosures, allows great versatility in circuit design.

This coupled with the extensive range of modular circuit protection control and energy management devices available from Hager offers the circuit designer the facility to match the distribution board precisely to the installation requirements without compromise.

Description

Cat. Ref.

Accessories

keylock with 2 keys suitable for all enclosures fitted with door - IU enclosure
JK enclosure

**IKL1
JK222A**

100A 2 pole switch disconnecter

SB299

63A 30mA 2 pole RCCB

CDC263U

100A 30mA 2 pole RCCB

CD284U

100A single module terminal block (MCB profile)

KR50U

Note: For further options please consult Hager

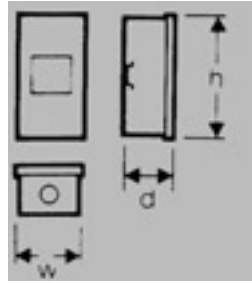
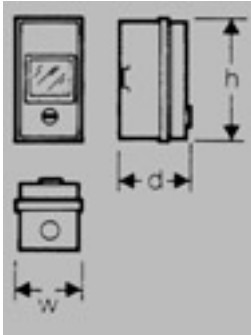


JK222A













CDC263U

Invicta enclosures - IP30 - Dimensions

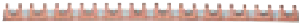



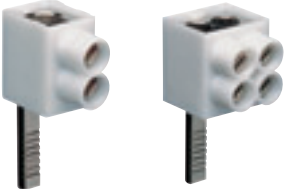



Cat Ref	Height	Width	Depth	Connection	Knockouts
IU41	152mm	50mm	61.5mm	earth only	2 x 20mm
IU2, IU3	152mm	80mm	61.5mm	earth only	2 x 20mm
IU2/D					
IU2/GD	152mm	80mm	87.5mm	earth only	2 x 20mm
IU3/D					
IU4	187mm	115mm	61.5mm	earth only	2 x 25mm
IU4/D	187mm	115mm	87.5mm	earth only	2 x 25mm
IU44	312mm	125mm	73.5mm	earth only	none
IU45					
IU44/D	312mm	125mm	99.5mm	earth only	none
IU44/GD					
IU42	312mm	80mm	61.5mm	earth only	2 x 20mm
IU42/D	312mm	80mm	100mm	earth only	2 x 20mm
IU44-11	312mm	125mm	99.5mm	earth only	none
IU4-16	187mm	115mm	61.5mm	earth only	2 x 25mm



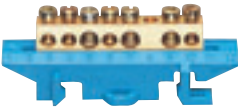
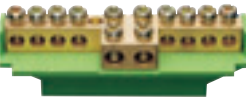
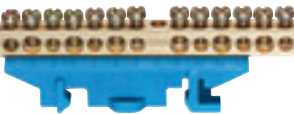
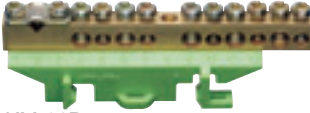






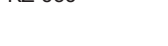
Insulated busbars - prong

	Designation	Section	In	Width in I	Pack qty	Cat. Ref.
1 pole, 1 I step						
 KB 063P	brown insulation (phase)	10	63A	13I	50	KB 063P
	blue insulation (neutral)	10	63A	13I	50	KB 163N
	without insulation	10	63A	13I	50	KB 163I
 KB 163N	insulated	20	100A	57I	10	KB 190B
		20	100A	24I	10	KB 190C
2 poles, 2 I step						
 KB 263A	insulated	10	63A	12I	10	KB 263A
		10	63A	24I	10	KB 263C
		16	80A	56I	10	KB 280B
3 poles, 3 I step						
 KB 363A	insulated	10	63A	12I	10	KB 363A
		10	63A	57I	20	KB 363B
		10	63A	24I	10	KB 363C
		16	80A	12I	25	KB 380A
		16	80A	57I	10	KB 380B
4 poles, 4 I step						
 KB 463A	insulated	10	63A	12I	10	KB 463A
		10	63A	24I	10	KB 463C
		16	80A	12I	25	KB 480A
		16	80A	56I	10	KB 480B
Cable connectors						
 KF 81A	connection from top In 63A	for cables : 25 mm≈		10	10	KF 81A
		for cables : 2 x 16 mm≈		10	10	KF 82A
 KF 82A	connection from side In 63A	for cables : 25 mm≈		10	10	KF 83A
End cap cover						
 KF 83A	for single pole busbars KB 163P and KB 163N				1 set	KZ 021
	for double pole busbars, 10mm≈				1 set	KZ 022
 KZ 021	for triple pole busbars 10 or 16mm≈				1 set	KZ 023
	for four pole busbars 10 or 16mm≈				1 set	KZ 024
 KZ 023						

Insulated busbars - fork and accessories

	Designation	section	In	Width in I	Pack qty	Cat. Ref.	
 KD 190B	1 pole, 1 step	10	63A	12 I	100	KD 163A	
		10	63A	56 I	50	KD 163B	
		16	80A	12 I	100	KD 180A	
		16	80A	56 I	50	KD 180B	
		20	100A	56 I	10	KD 190B	
 KDN 263A	2 pole, 2 step	insulated	10	63A	12 I	10	KDN 263A
			10	63A	24 I	10	KDN 263C
			16	80A	56 I	10	KDN 280B
 KDN 363A	3 pole, 3 step	insulated	10	63A	12 I	10	KDN 363A
			10	63A	57 I	20	KDN 363B
			10	63A	24 I	10	KDN 363C
			16	80A	12 I	25	KDN 380A
			16	80A	57 I	10	KDN 380B
 KDN 463A	4 pole, 4 step	insulated	10	63A	12 I	10	KDN 463A
			10	63A	24 I	10	KDN 463C
			16	80A	12 I	25	KDN 480A
			16	80A	56 I	10	KDN 480B
 KF 81A KF 82A	Cable connectors						
	connection from top In 63A		for cables : 25 mm \approx		10	KF 81A	
	connection from side In 63A		for cables : 2 x 16 mm \approx		10	KF 82A	
 KZN 023	End cap cover						
	for double pole busbars, 10mm \approx				1 set	KZ 022	
	for triple pole busbars 10 or 16mm \approx				1 set	KZ 023	
	for four pole busbars 10 or 16mm \approx				1 set	KZ 024	

Brass terminals ≤ 60A


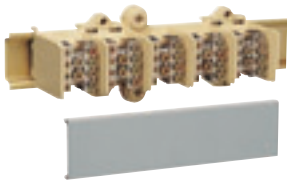

	Description Brass terminals with / without plastic supports for neutral and earth connections	Technical data brass terminals with / without earth = green / yellow support phase = beige support neutral = blue support				in DIN rail with KZ060 rail clip or flat bar 12x2mm	
		<i>Connections number + section</i>	<i>Terminals with support pack qty.</i>	<i>neutral cat. ref.</i>	<i>earth cat. ref.</i>	<i>phase cat. ref.</i>	<i>without support Pack qty.</i>
 KM 04L	2x16 + 2x10 □ 4 connections length 30mm	50	-	-	KM 04L	10	K 140
 KM 08L	4x16 + 4x10 □ 8 connections length 30mm	20	-	-	KM 08L	-	-
 KM 07N	3x16 + 4x10 □ 7 connections length 49mm	50	KM 07N	KM 07E	KM 07L	10	K 142
 KM 10E	5x16 + 5x10 □ 10 connections length 67mm	20	KM 10A	KM 10B	KM 10C	10	K 143
 KM 13N	5x16 + 6x10 □ 11 connections length 73mm	20	KM 11N	KM 11E	KM 11L	10	K 144
 KM 11B	2x16 (double drive) + 8x10 10 connections length 69mm	20	KM 10N	KM 10E	KM 10L	10	K 145
 KM 25N	6x16 + 7x10 □ 13 connections length 85mm	20	KM 13N	KM 13E	-	10	K 148
 KM 25E	1x25 + 5x16 + 5x10 □ 11 connections length 85mm	20	-	KM 11B	-	10	K 151
 K 151	1x25 + 8x16 + 8x10 □ 17 connections length 121mm	20	KM 17N	KM 17E	-	10	K 156
 K 158	1x25 + 11x16 + 13x10 □ 25 connections length 169mm	20	KM 25N	KM 25E	-	10	K 158
 K 159	1x25 + 8x16 + 29x10 □ long length terminals (without support)					10	K 159
 KZ 012	1x25 + 16x16 + 61x10 □ fixing on the flat bar 12 x 2 with supports (see below)					10	K 160
 KZ 060	1x25 + 3x16 + 129x10 □ length 992mm					10	K 162
	supports for K140 to K162 terminals insulating material M4 x 8 fixing screws		blue support for neutral			10	KZ 012
			green / yellow support for earth			10	KZ 013
			beige supports (see below)			10	KZ 014
	Rail clip for fixing terminals on DIN rail not for : KM 08L, KM 10A, KM 10B, KM 10C, KM 10N, KM 10E, KM 10L		mounting on DIN rail			50	KZ 060
			horizontally				



Connection blocks ≤ 125 A

Application :
connection blocks 16□ to 35□
to connect incoming cables
and continue live feed.

technical data :
connection :
incoming : 2 x 25□ or 2 x 35□
outgoing : 16□ or 25□
mounting : fixing on DIN rail

connection blocks include :
one insulated support, brass
connection blocks with
removable antishear plates
to enable the incoming cables
to be connected without cutting.

<i>Designation</i>	<i>Characteristics</i>	<i>Width in 17.5mm</i>	<i>Pack qty.</i>	Cat. ref.
 Connection blocks connection on each pole incoming : 2 x 25□ 4 separate outgoing ways : 16□ K 018	1 pole	2 fi	20	K 018
	I. 34 x h. 50 x w. 52mm			
	2 poles	4	10	K 023
	I. 64 x h. 50 x w. 52mm			
	4 poles	7	5	K 024
	I. 121 x h. 50 x w. 62mm			
 K 025	5 poles	8 fi	5	K 025
	I. 150 x h. 50 x w. 62mm			
	Connection blocks connection : incoming : 2 x 35□ 4 separate outgoing ways : 25□	1 pole	2 fi	10
 K 037	I. 37 x h. 30 x w. 47mm			

	Designation	Characteristics	Pack. qty.	Cat. ref.
	Terminal blocks fixing by clip on DIN rail delivered with : <input type="checkbox"/> insulated back plate <input type="checkbox"/> transparent protection front cover In : by 40°C	In 100A – two poles Icc : 29KA connectors on each terminal : incoming : 1x35□ flexible, outgoing : 1x25 + 10x16□ flexible w. 129 (7.5 ■) x h. 86 x d. 44 mm	1	KJ 01A
		In 80A – four poles Icc : 21KA connectors on each terminal : incoming : 1x16□ flexible, outgoing : 8x10□ flexible w. 88 (5 ■) x h. 86 x d. 44 mm	1	KJ 01B
		In 125A – four poles Icc : 29KA connectors on each terminal : incoming : 1x35□ flexible, outgoing : 1x25 + 10x16□ flexible w. 129 (7.5 ■) x h. 86 x d. 44 mm	1	KJ 01C
		In 125A – four pole Icc : 29KA connectors on each terminal : incoming : 1x35□ flexible, outgoing : 1x25 + 10x16□ flexible w. 129 (7.5 ■) x h. 86 x d. 44 mm	1	KJ 02E
		connection capacity per block : 125 A : (width 27mm) incoming : 1x35□ + 1x165□, outgoing : 6x16□	4	KJ 02D
	modular distribution blocks monobloc, insulated protection for each phase terminal. Cover removable with a tool.	In 160A – four poles Icc : 20KA connectors on each terminal : incoming : 4x50□ flexible, outgoing : 3x35□, 8x16□ flexible w. 162 (9.5 ■) x h. 87 x d. 60 mm (modular shoulder measurement 45mm)	1	KJ 01D
	modular Distribution blocks single pole monobloc, insulated, grey colour fixing by clip on DIN rail	connection capacity per block 160A (width 35mm) incoming : 1x70□, outgoing 6x16□	35 mm 4	KJ 02C
4 x KJ 02A		250 A : incoming : 1x95□, outgoing : 2x25□, 5x16□, 4x10□	45 mm 4	KJ 02A
		400 A : incoming : 1 x 150□, outgoing: 2x25□, 5x16□, 4x10□	45 mm 4	KJ 02B
	Distribution blocks fitting on DIN rail	for connections : 25 to 95 □	25 mm 1	KR 95P
KR 95P		35 to 150 □	31 mm 1	KR 15P

Quick Connect Terminals

Quick connect terminals for the connection of the earth, neutral and phase.
The distribution blocks are equipped by terminals without screw for direct assembling for cables of 1.5 with 4 mm² and of terminals with cages for the connection of cables for sections from 1.5 to 25 mm².

Neutral = blue connector block
Phase = brown connector block
Earth = green/yellow connector block.
The connector blocks are clipped on supports of the enclosures and cabinets.

These connector block supports exist for the ranges of enclosures and cabinets Volta, Vector, Vega and Gamma. They can also replace one existing support.

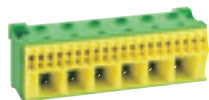
- connector block out of insulating material,
- IP2x,
- maximum intensity: 63 A
- tension of insulation: U_i = 400 V
- conforms to the standard EN 60 998



KN 06P



KN 22N



KN 26E



KN 99P/N/E



VZ 711



VZ 710



GZ 30A



KN 00A



KN 07N



KN 04P

Connections of the distribution blocks : terminals "q.connect" screw in		Pack. qty	Ref		
1.5 at 4 mm ²	1.5 at 25 mm ²		Neutral	Phase	Earth PE
5	1		KN 06N	KN 06P	KN 06E
8	2		KN 10N	KN 10P	KN 10E
11	3		KN 14N	KN 14P	KN 14E
14	4		KN 18N	KN 18P	KN 18E
17	5		KN 22N	KN 22P	KN 22E
20	6		KN 26N	KN 26P	KN 26E

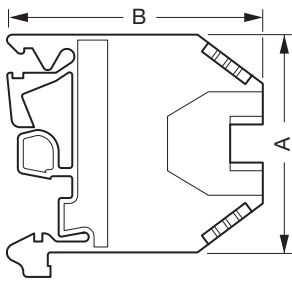
Designation	Characteristics	Ref.
Cables for tap-off between 2 Quick Connect Terminals To connect 2 terminals each other.	for Neutral terminals	KN 99N
	Phase terminals	KN 99P
	Earth terminals	KN 99E

Quick connect for terminal supports. The supports are suitable for all the terminals range (neutral, phase and earth) Choice of the support according to the enclosure range.	for : - Volta, Vector Vega flush	VZ 710
	- Vega surface	VZ 711
	- Gamma	GZ 30A

Terminals universal support	length : 105 mm	KN 00A
Support fixing on 12x2 mm bars on horizontal or vertical DIN rail	Pre-cut support to fit with the terminal size	

Entry terminals For connecting incoming cables up to 25 mm ² U _i = 630 V, 90 A Clip on the terminals support (VZ 711, VZ 710, GZ 30A et KN 00A)	Neutral terminals : 4 x 25 mm ²	KN 04N
	7 x 25 mm ²	KN 07N
	Phase terminals : 4 x 25 mm ²	KN 04P
	7 x 25 mm ²	KN 07P

Terminals



Terminals	dim. in mm	dim. in mm
0.5 at 6 [□]	44.5	48.5
1.5 at 50 [□]	58	51.5
70 [□]	76	79

Connecting terminals from 0.5 to 70 mm²

- great resistance to leakage current KC >600
- mounting on DIN rail
- uniform dimensions reduce number of accessories
- complies to IEC 60947-1

- good tightening capacity, also suitable for two conductors
- conductor guided directly into terminals connector
- guiding of screwdriver via embedded screws
- screws run idle when untightening, very important with electric screwdrivers
- all parts located in the terminal fixed



KX 04F



KX 04H



KX 04N

Designation	cable section		In / A	Width in mm	Ref. Phase	Neutral	Earth PE
	(flexible)	(rigid)					
Phase terminals grey	0.5 - 2.5 [□]	0.5 - 4 [□]	24	5	KX 04F	KX 04N	KX 04H
	0.5 - 4 [□]	0.5 - 6 [□]	32	6	KX 06F	KX 06N	KX 06H
Neutral terminals blue	1 - 10 [□]	1.5 - 16 [□]	57	10	KX 16F	KX 16N	KX 16H
	Earth PE terminals green / yellow automatic earthing of the rail	4 - 16 [□]	4 - 25 [□]	76	12	KX 25F	KX 25N
16 - 35 [□]		16 - 50 [□]	125	16	KX 50F	KX 50N	KX 50H
		70 [□]	192	24	KX 70F		

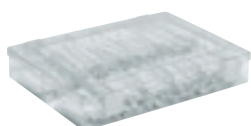
Designation	Characteristics	Width in mm	Ref.
Cover plates beige, in insulating material	for the terminals: KX 04F/N KX 06F/N	1.5	KW 025
	KX 16F/N KX 25F/N	1.5	KW 026
	KX 50F/N	2	KW 031



KW 033

blocking brackets black, in insulating material	for all the terminals of 4 with 50 [□]	8	KW 033
	for terminal KX 70F	10	KW 034

Junctions between terminals can be cutted	for 10 terminals: KX 04F/N		KW 035
	KX 06F/N		KW 036
	KX 16F/N		KW 037



KW 001

Circuit identification labels	box of 12 compartments (~500), clip themselves on the terminals		KW 001
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