2 Data

Warning

The voltages present in the Drive are capable of inflicting a severe electric shock and may be lethal. The Stop function of the Drive does not remove dangerous voltages from the Drive or the driven machine.

AC supplies to the Drive must be disconnected at least 15 minutes before any cover is removed or servicing work is performed.

2.1 Model range

Model size	AC supply	Models	Current ratings		Duration of I_{pk}
			I_{nom}	I_{pk}	secs
1	380V to 460V	SA005	5.6	8.4	30
2	380V to 460V	SA010	9.5	14.3	30
		SA016	16	24	30
		SA022	22	33	30
3	380V to 460V	SA038	38	57	30
		SA059	59	88.5	30
4	380V to 460V	SA091	91	136.5	60
		SA110	110	165	60
		SA150	150	225	60

2.2 Ingress protection (IP and NEMA 1)

Model sizes 1 and 2 are rated at IP20. The cooling fans for the heatsink are rated at IP20.

Model sizes 3 and 4 are supplied as a stand-alone unit in a protective case having an enclosure specification which is rated as IP00 (in accordance with the IEC529) or NEMA 1. The cooling fans for the heatsink are rated as IP20.

For Drives supplied in an IP00 case, a DC bus choke (inductor) and an optional braking resistor should be installed externally to the Drive. For Drives supplied in a NEMA 1 case, a DC bus choke and braking resistor are installed internally.

2.3 AC supply

Balanced 3-phase.
50Hz −2Hz to 60Hz +2Hz
380V −10% to 460V +10%

2.4 Drive output

Maximum motor speed: 9000 RPM
Maximum output voltage:
Equal to the AC supply voltage

2.5 Ambient temperature and humidity

Ambient temperature range:

−10°C to +50°C (14°F to 122°F) non-condensing

Local heat sources (such as other equipment) that raise the air temperature above +50°C (122°F) must be removed.

2.6 Vibration

Conformance to the requirements of IEC 68−2−34

2.7 Derating

Maximum altitude without derating is 1000m (3200ft). Derate full load current by 1% for each additional l00m (320ft).

2.8 Starts per hour

Drive

Unlimited

Motor

Refer to motor manufacturer.

2.9 PWM switching frequencies

SA005, SA010, SA016, SA022	8kHz
SA038, SA059	4kHz, 8kHz
SA091, SA110, SA150	4kHz

2.10 Serial communications

RS485 full duplex (RS422 can also be used)

Protocol: ANSI x 3.28–2.5–A4–N, positive logic

Timing

Write to Drive:

25ms at 9600 Baud
l5ms at 19.2 kBaud

Read from the Drive:

30ms at 9600 Baud
16ms at 19.2 kBaud

2.11 Resolver specification

Voltage	6V
Frequency	10kHz
Primary	Rotor
Number of poles	2
Transformation ratio	0.28 ±10%
Phase shift	–14° nominal
Primary current	40mA nominal
Power input	120mW
Electrical error	±15 minutes
Impedance ZRO	73 + jl29 Ω
Impedance ZSO	116 + j159 Ω
Impedance ZSS	95 + j162 Ω
Excitation winding resistance	28Ω
Stator winding resistance	18Ω
Temperature range	–55°C to 155°C –97°F to 240°F
Inertia	$2.0gm^2 \times 10^{-5}$

2.12 Resolver resolution

14-bit when **Pr99** < 3200 RPM
12 bit when **Pr99** ≥ 3200 RPM

2.13 Response times

Scanning rate for speed loop	512µs
Scanning rate for current loop	128µs
Sampling time of analogue inputs	512µs
Rise time of digital outputs	10µs
Speed loop resolution	0.01%
Current loop resolution	10 bits
Speed loop bandwidth	320Hz
Current loop bandwidth	2kHz
Max delay of STOP input	15ms
Max delay of limit switch input	2ms
Max delay of external trip input	5ms

2.14 Electromagnetic compatibility (EMC)

When all the following conditions are met, the installation can meet the requirements for conducted emissions of EN50081-2:

The specified RFI filter (or ferrite absorber ring and capacitor network) is used
The recommendations for the wiring arrangements are followed
The motor cable passes through a pair of ferrite rings (as specified)

Immunity

In accordance with IEC801 without significant disturbance to operation at the following level:

Part 4 (Transient Burst) Level 3

2.15 Frequency accuracy

Output frequency is within 100ppm of the demanded frequency.

2.16 Weights

The weights of the most powerful model in each size are as follows:

Model size 1: 5.5kg (12lb)
Model size 2: 9.5kg (21lb)
Model size 3: 22.3kg (49lb)
Model size 4: 56kg (123lb)

2.17 Power ratings ????

Note

Power ratings are for typical 3-phase 6-pole 380V AC motors.

Displacement factor (fundamental power factor) at input closely approximates to unity, but is dependent on supply impedance.

400V nominal supply voltage, 150% overload.

Model	Output	Motor Rating	Input			
	100% RMS current		100% RMS current		100% fundamental current	
	A	kW	A	kVA	A	kW
SA005	5.6	2.2	???			
SA010	9.5	4.0				
SA016	16	7.5				
SA022	22	11				???
SA038	38	18.5	38	24	33	22.9
SA059	59	30	58	38	51	35.3
SA091	91	45	90	60	79	54.7
SA110	110	55	109	71	97	67.2
SA150	150	75	144	95	133	92.1

2.18 Losses and efficiency

Note

Figures quoted are at maximum output power.

Model	Total power loss		Efficiency at 460V	
	4kHz (100%)	8kHz (100%)	4kHz	8kHz%
	W	W	%	%
SA005		162		93.1
SA010		248		94.2
SA016		385		95.1
SA022		476		95.8
SA038	523	674	97.3	96.5
SA059	724	913	97.6	97.0
SA091	1106		97.6	
SA110	1322		97.7	
SA150	1897		97.5	

2.19 DC bus choke ratings

DC bus chokes are fitted internally on the SA010, SA016, and SA022 Drives. No DC bus choke is needed for the SA005.

Ripple frequency = 6 × supply frequency

Ratings and values quoted are design minima.

Drive Size	Choke ratings			Weight	
	mH	ARMS	Apk	kg	lb
SA038	1.50	45	85	6.4	14
SA059	0.70	75	143	8.4	19
SA091	0.45	111	224	14.5	32
SA110	0.50	130	251	22.5	50
SA150	0.40	176	352	32.0	71

Dimensions

Refer to the following diagrams.

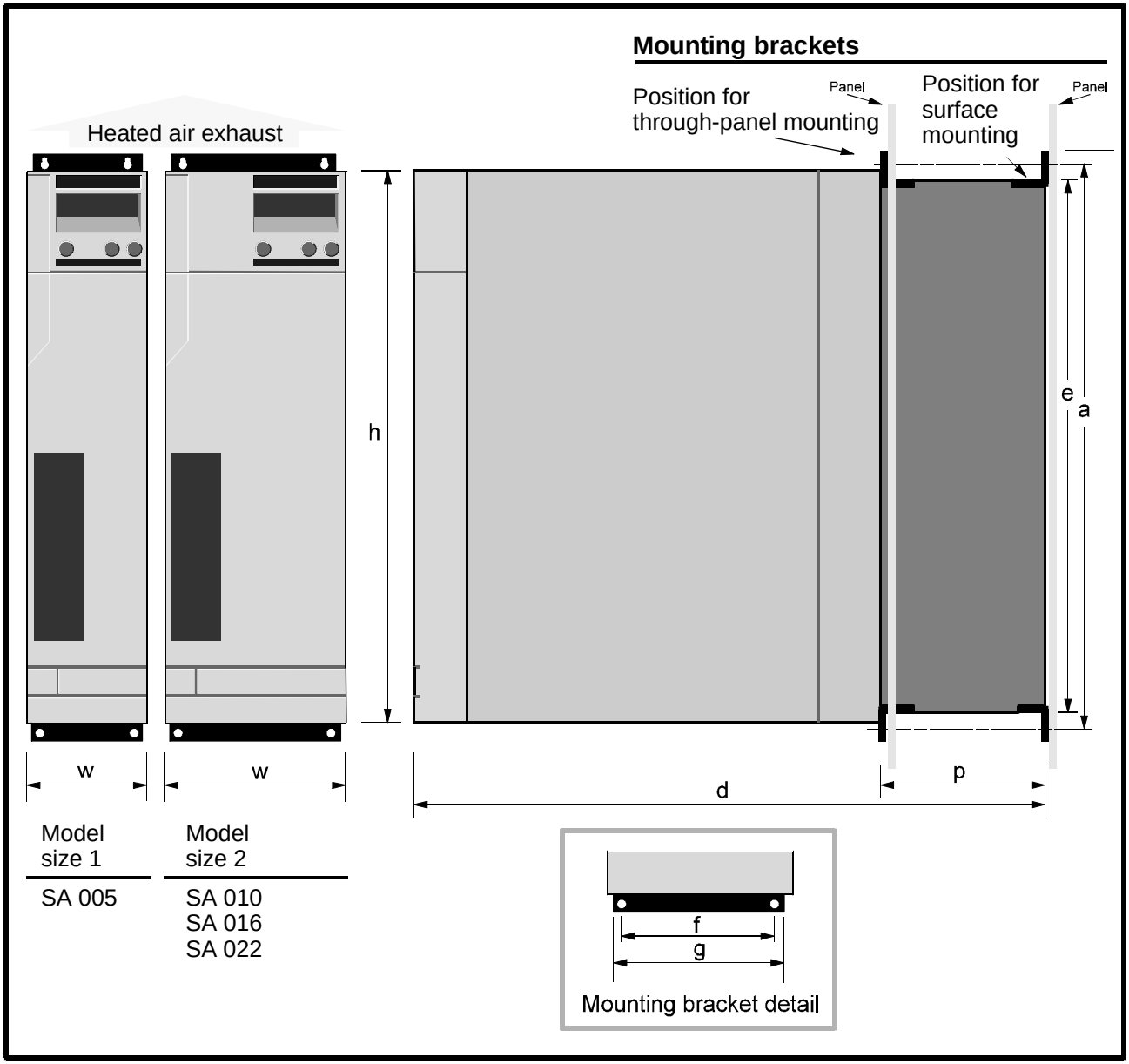

Figure 2–1 Dimensions of model sizes 1 and 2 (See table on opposite page)

Dimension		Model size 1 S005		Model size 2 SA010 SA016 SA022	
		mm	in	mm	in
Height of case	h	352	$13^{7}/_{8}$	352	$13^{7}/_{8}$
Width of case	w	78.5	$3^{1}/_{16}$	127	5
Overall depth	d	323.5	$12^{3}/_{4}$	328.5	$12^{15}/_{16}$
Depth of heatsink	p	95	$3^{7}/_{8}$	100	$3^{15}/_{16}$
Width of heatsink	g	62	$2^{7}/_{16}$	109	$4^{5}/_{16}$
Height of heatsink	e	332	$13^{1}/_{16}$	330	13
Mounting centres top bracket to bottom bracket	a	359.4	$14^{1}/_{8}$	359.4	$14^{1}/_{8}$
Mounting centres of mounting bracket	f	45	$1^{3}/_{4}$	77	$3^{1}/_{16}$
Height of aperture for through-panel mounting		334	$13^{1}/_{8}$	332	$13^{1}/_{16}$
Width of aperture for through-panel mounting		64	$2^{1}/_{2}$	111	$4^{3}/_{8}$
Fixing hole diameter		4mm ($^{3}/_{16}$ins) clear			

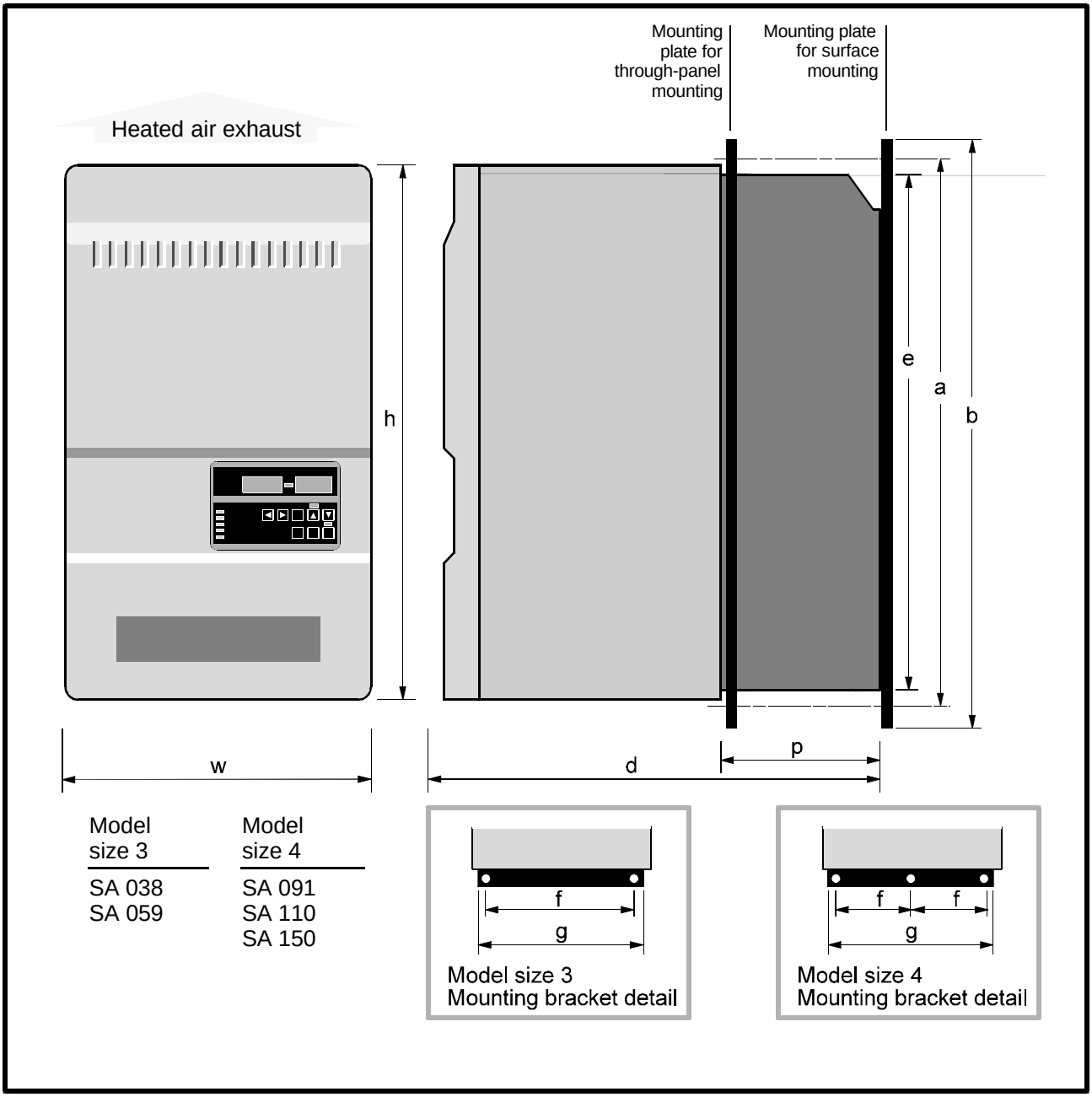

Figure 2–2 Dimensions of model size 3 (See table on opposite page)

Dimension		Model size 3 SA038 SA059		Model size 4 SA091 SA110 SA150	
		mm	in	mm	in
Height of case	h	490	$19^{5}/_{16}$	795	$31^{5}/_{16}$
Width of case	w	330	13	490	$19^{5}/_{16}$
Overall depth	d	283	$11^{3}/_{16}$	305	12
Depth of heatsink	p	139	$5^{1}/_{2}$	135	$5^{5}/_{16}$
Height of heatsink	e	466	$18^{5}/_{16}$	780	$30^{11}/_{16}$
Width of heatsink	g	295	$11^{5}/_{8}$	464.5	$18^{1}/_{4}$
Total height of mounting plates	b	522	$20^{9}/_{16}$	844	$33^{3}/_{16}$
Mounting centres top to bottom	a	502	$19^{3}/_{4}$	815	32
Mounting centres	f	248	$9^{5}/_{16}$	180	$7^{1}/_{16}$
Height of aperture for through-panel mounting		468	$18^{1}/_{2}$	782	$30^{13}/_{16}$
Width of aperture for through-panel mounting		296	$11^{5}/_{8}$	467	$18^{3}/_{8}$
Fixing hole diameter		6mm ($^{1}/_{4}$in) clear		8mm ($^{5}/_{16}$in) clear	