



EMERSON[™]
Industrial Automation

Unimotor

Fan blown high performance
AC brushless servo motor

075 to 190 Frames
5.2 Nm to 68.0 Nm
(151.6 Nm Peak)



Unimotor fan blown range

075-190 Unimotor fm fan blown motors

Based on Unimotor fm mechanics with modified electro-magnetic construction, the fan blown version has been designed to give greater performance across the torque range. For example, the 190 fan blown variant increases the stall torque from 50.6Nm to 68Nm when compared to the standard Unimotor fm motor. This extra torque allows for increased application performance with higher rms values achievable.

The motors available have been selected to give the best torque increases across the available frame sizes.

To allow for the higher currents required, the 142 fan blown range is only available with the size 1.5 (53A rated) power connector.



For more information regarding brake torque, switching frequency derating, feedback selection and cables, please refer to the Unimotor fm Product Data.



Quick reference table

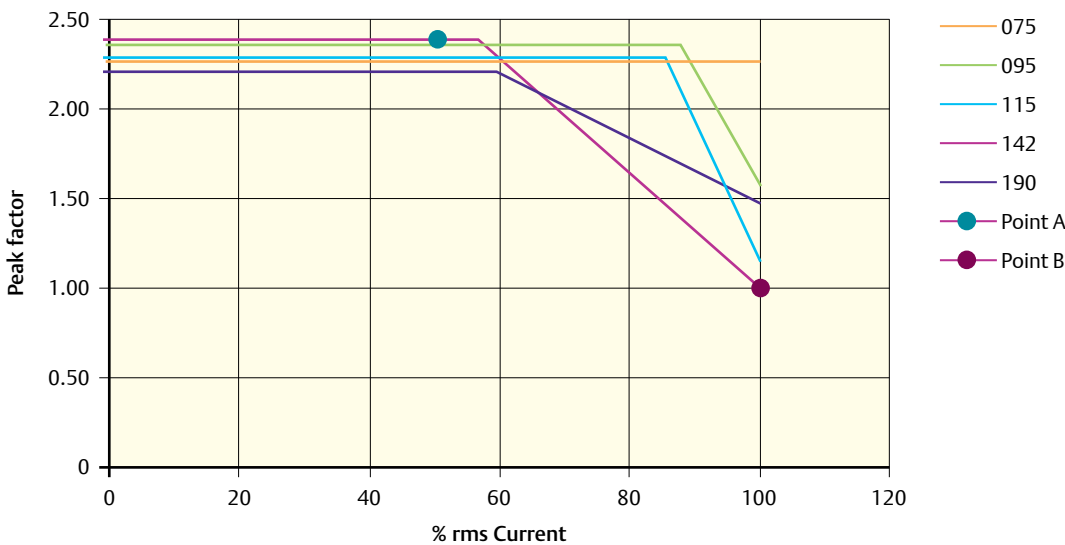
Frame size	PCD (mm)	Unimotor U4										Page No.
075	75	5.2										6
095	100		9.0									7
115	115			15.2	20.01							8
142	165				18.9	29.5						9
190	215						41.0	68.0				10
Stall	0	5	8	10	15	20	30	50	70			(Nm)

Peak torque information

With the Unimotor fm fan blown range, the stall and rated torque increase while there is no increase in the peak torque value. This means that the peak factors for fan blown motors are different to standard self cooled motors and these new values are shown in the table right.

Unimotor fm	Peak factor @ 0 -100% rms	
075	2.25	
095	Peak factor @ 0 to 88% rms	Peak factor @ 100% rms
	2.35	1.57
115	Peak factor @ 0 to 86% rms	Peak factor @ 100% rms
	2.28	1.14
142	Peak factor @ 0 - 57% rms	Peak factor @ 100% rms
	2.38	1.00
190	Peak factor @ 0 - 60% rms	Peak factor @ 100% rms
	2.20	1.47

Figure 1 Unimotor fm fan blown motor peak torque graph



Peak torque is defined for a maximum period of 250ms, rms 3000rpm, $\Delta_{max} = 100^{\circ}\text{C}$, 40°C ambient

To use this graph correctly the rms current and rms speed of the application have to be calculated. The rms current value must then be converted into a percentage of the full motor current available, at the rms speed value. If the full current available is 10A and the rms current is 7.5A, then the percentage rms current value is 75%. This value can then be plotted onto the graph in order to obtain the peak factor. The peak factor is then used as part of the calculation, shown below, for the peak torque value.

$$\text{Peak factor} \times \text{Stall current} \times \text{kt} = \text{Peak torque}$$

An example would be with a 142U4E300 motor, where the % rms current value is calculated to 50%, the peak factor would be 2.38. (Point A)

$$\text{Peak factor} \times \text{Stall current} \times \text{kt} = \text{Peak torque}$$

$$2.38 \times 18.4 \times 1.6 = 70.2\text{Nm}$$

But if the % rms current value were to be calculated at a level of 100%, the peak factor would equal 1.00. (Point B)

$$\text{Peak factor} \times \text{Stall current} \times \text{kt} = \text{Peak torque}$$

$$1.00 \times 18.4 \times 1.6 = 29.5\text{Nm}$$

IP Ratings

Motor

IP65S - No ingress of dust; no contact with or approach to live or moving parts inside the enclosure. Water projected by a nozzle against enclosure from any direction shall have no harmful effects. (Excluding the front shaft seal.)

(S = device standing still during water test)


Fan motor and circuit board

IP54 - The fan motor and circuit board are coated to protect them against splash water and humidity.

Complete Unimotor fm fan blown motor assembly

IP20 - Protected against solid objects >12mm. E.g. fingers.

Ordering information

Use the information below in the illustration to create an order code for a **Unimotor** 
 The details in the band are an example of an order reference (Std = Standard selection, Opt = Optional selection)

095	U	4	D	60	0	V
Frame size	Motor voltage	Peak torque selection	Stator length	Winding speed	Brake	Connection type*
	075 -190 frame	075 -190 frame	075 frame	075 frame	075 -190 frame	075 -190 frame
075	U = 400V	4 =Peak torque	D	60 = 6000 rpm	0 = Not fitted (Std)	A = Power and Signal 90° fixed
095			095 frame	095 frame	1 = Parking brake fitted 24Vdc	B = Power and Signal 90° rotatable
115			D	60 = 6000 rpm		
142			115 frame	115 frame	5 = High energy dissipation parking brake	C = Power 90° rotatable and Signal vertical
190			D	40 = 4000 rpm		
			E	142 frame	X = Special	V = Power and Signal vertical
			142 frame	30 = 3000 rpm		
			C	190 frame		
E			30 = 3000 rpm	X = Special	V = Power and Signal vertical	
190 frame						
C						
E						

*142 and 190 frame motors the Power plug will be size 1.5

A		MA		A		100		220	
Output shaft		Feedback device		Inertia		PCD		Shaft diameter	
075 -190 frame		075 - 142 frame		075 -190 frame		075 frame			
A = Keyed	AE = Resolver			A = Standard	075	Std	19.0	D Std	
B = Plain shaft	CA = Incremental Encoder	4096 ppr		B = High	095 frame				
X = Special	MA = Incremental Encoder	2048 ppr			100	Std	22.0	D Std	
	KA = Incremental Encoder	1024 ppr		115 frame					
	EB = Optical Absolute Multi-turn	EQN 1325		115	Std	24.0	D Std		
	EC = Inductive Absolute Multi-turn	EQI 1331				28.0	E Std		
	FB = Optical Absolute Single turn	ECN 1313		142 frame					
	FC = Inductive Absolute Single turn	ECI 1319		165	Std	28.0	C/E Std		
	RA = Optical SinCos Multi-turn	SRM 50		190 frame					
	SA = Optical SinCos Single turn	SRS 50		215	Std	32.0	C Std		
	XX = Special					38.0	E Std		
		190 frame only							
	AE = Resolver								
	CA = Incremental Encoder (Std)	4096 ppr							
	MA = Incremental Encoder	2048 ppr							
	EB = Optical SinCos Multi-turn	EQN 1325							
	FB = Optical SinCos Single turn	ECN 1313							
	RA = Optical SinCos Multi-turn	SRM 50							
	SA = Optical SinCos Single turn	SRS 50							
	XX = Special								

Frame size 075



$\Delta t = 100^{\circ}\text{C}$ winding 40°C maximum ambient
All data subject to +/-10% tolerance

Fan box performance

Motor frame size (mm)	075U4
Voltage (Vrms)	380 - 480
	Force - air cooling
Frame length	D
Continuous stall torque (Nm)	5.2
Peak torque (Nm)	11.7
Standard inertia (kgcm ²)	2.0
High inertia (kgcm ²)	2.4
Winding thermal time const. (s)	100
Speed 6000 (rpm)	Kt (Nm/A) = 0.80
	Ke (V/krpm) = 49.00
Rated torque (Nm)	4.0
Stall current (A)	6.5
Rated power (kW)	2.51
R (ph-ph) (Ω)	1.90
L (ph-ph) (mH)	4.80

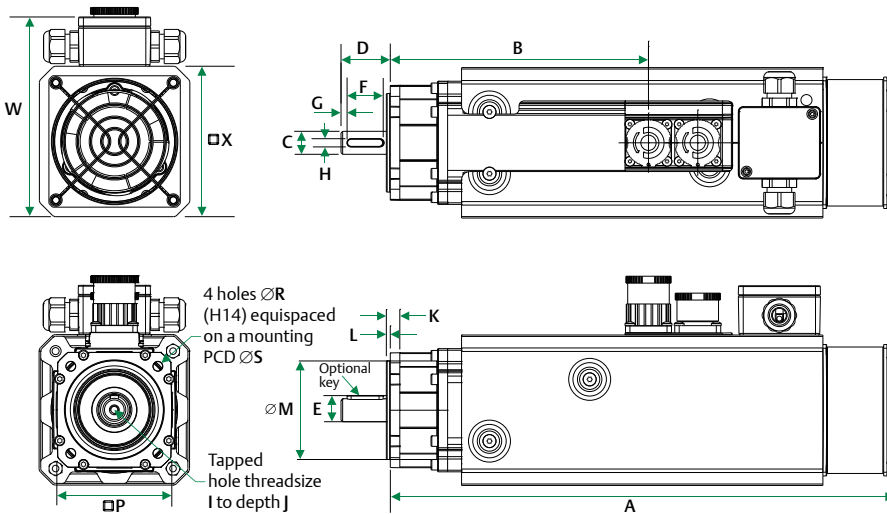
Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency

All other figures relate to a 20°C motor temperature.
Maximum intermittent winding temperature is 140°C

Fan rating

Voltage	Free air flow	Fan current rating
230 Vac	50 m ³ /h	0.05A

Clearance behind fan box: 40mm



Fan blown motor dimension (mm)

Drawing number: IM/0677/GA

	Unbraked length		Braked length		Flange thickness	Register length	Register diameter	Fan box overall height	Flange square	Fixing hole diameter	Fixing hole PCD	Fan box housing	Mounting bolts
	A (± 5.0)	B (± 1.0)	A (± 5.0)	B (± 1.0)									
075D	397.4	247.2	442.4	292.2	5.8	2.40	60.0	121.6	70.0	5.8	75.0	91.6	M5

Connector height (mm)

Connection type	Overall height
A	N (± 1.0)
B	126.5
C	134.0
V	126.5

Shaft dimensions (mm)

	Shaft diameter	Shaft length	Key height	Key length	Key to shaft end	Key width	Tapped hole thread size	Tapped hole diameter
	19.0 D Std	C ($j6$)	D (± 0.45)	E (+0.009 / -0.134)	F (± 0.25)	G (± 1.1)	H (h9)	I
	19.0	40.0	21.5	32.0	3.6	6.0	M6 x 1.0	17.0

Frame size 095



$\Delta t = 100^{\circ}\text{C}$ winding 40°C maximum ambient
All data subject to +/-10% tolerance

Fan box performance

Motor frame size (mm)	095U4
Voltage (Vrms)	380 - 480
	Force - air cooling
Frame length	D
Continuous stall torque (Nm)	9.0
Peak torque (Nm)	22.5
Standard inertia (kgcm ²)	5.1
High inertia (kgcm ²)	7.0
Winding thermal time const. (s)	221
Speed 6000 (rpm)	Kt (Nm/A) = 0.80
	Ke (V/krpm) = 49.00
Rated torque (Nm)	5.8
Stall current (A)	11.3
Rated power (kW)	8.3
R (ph-ph) (Ω)	0.62
L (ph-ph) (mH)	2.70

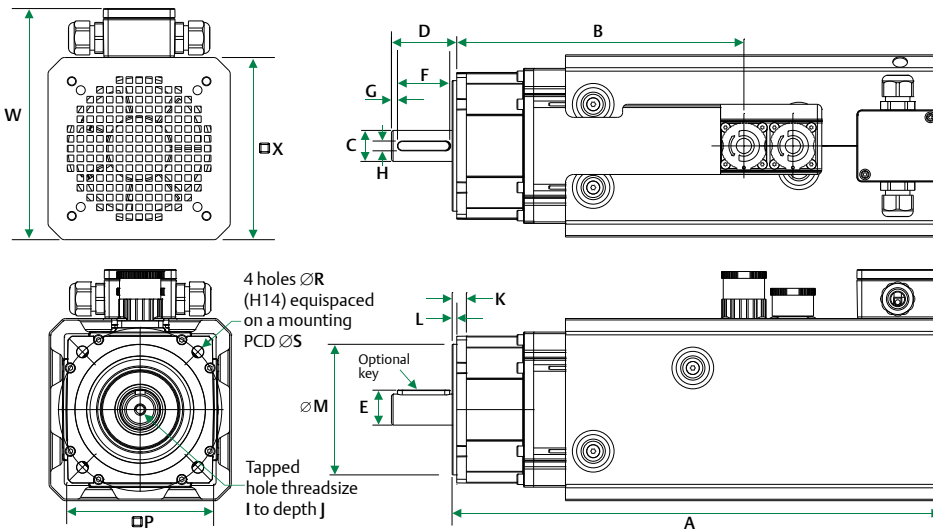
Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency

All other figures relate to a 20°C motor temperature.
Maximum intermittent winding temperature is 140°C

Fan rating

Voltage	Free air flow	Fan current rating
230 Vac	67 m ³ /h	0.05A

Clearance behind fan box: 40mm



Fan blown motor dimension (mm)

Drawing number: IM/0678/GA

	Unbraked length		Braked length		Flange thickness	Register length	Register diameter	Fan box overall height	Flange square	Fixing hole diameter	Fixing hole PCD	Fan box housing	Mounting bolts
	A (± 5.0)	B (± 1.0)	A (± 5.0)	B (± 1.0)									
095D	386.6	265.9	431.6	310.9	5.9	2.80	80.0	141.6	90.0	7.0	100.0	111.6	M6

Connector height (mm)

Connection type	Overall height N (± 1.0)
A	139.5
B	147.0
C	147.0
V	139.5

Shaft dimensions (mm)

	Shaft diameter	Shaft length	Key height	Key length	Key to shaft end	Key width	Tapped hole thread size	Tapped hole diameter
	22.0 D Std	C ($j6$)	D (± 0.45)	E (+0.009 / -0.134)	F (± 0.25)	G (± 1.1)	H (h9)	I
	22.0	50.0	24.5	40.0	4.6	6.0	M8 x 1.25	20.0

Frame size 115



$\Delta t = 100^{\circ}\text{C}$ winding 40°C maximum ambient
All data subject to +/-10% tolerance

Fan box performance

Motor frame size (mm)	115U4	
Voltage (Vrms)	380 - 480	
	Force - air cooling	
Frame length	D	E
Continuous stall torque (Nm)	15.2	20.1
Peak torque (Nm)	37.2	45.9
Standard inertia (kgcm ²)	11.4	13.8
High inertia (kgcm ²)	16.6	18.9
Winding thermal time const. (s)	217	241
Speed 4000 (rpm)	Kt (Nm/A) = 1.20 Ke (V/krpm) = 73.50	
Rated torque (Nm)	12.0	16.1
Stall current (A)	12.7	16.8
Rated power (kW)	5.03	6.74
R (ph-ph) (Ω)	0.73	0.57
L (ph-ph) (mH)	4.70	3.90

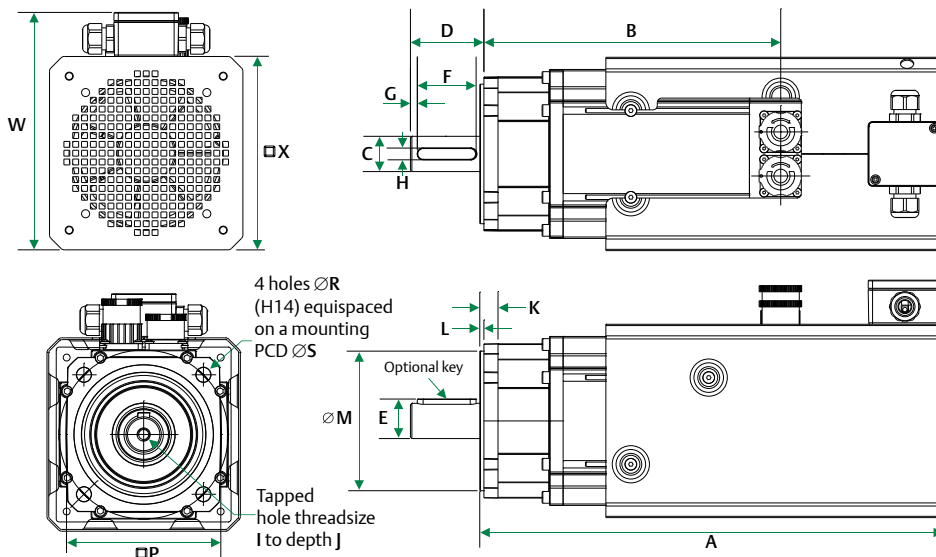
Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency

All other figures relate to a 20°C motor temperature.
Maximum intermittent winding temperature is 140°C

Fan rating

Voltage	Free air flow	Fan current rating
230 Vac	160 m ³ /h	0.08A

Clearance behind fan box: 40mm



Fan blown motor dimension (mm)

Drawing number: IM/0679/GA

	Unbraked length		Braked length		Flange thickness	Register length	Register diameter	Fan box overall height	Flange square	Fixing hole diameter	Fixing hole PCD	Fan box housing	Mounting bolts
	A (± 5.0)	B (± 1.0)	A (± 5.0)	B (± 1.0)									
115D	403.0	292.0	448.0	337.0	9.6	2.80	95.0	161.6	105.0	10.0	115.0	131.6	M8
115E	433.0	322.0	478.0	367.0									

Connector height (mm)

Connection type	Overall height
	N (± 1.0)
A	157.0
B	164.5
C	164.5
V	157.0

Shaft dimensions (mm)

	Shaft diameter	Shaft length	Key height	Key length	Key to shaft end	Key width	Tapped hole thread size	Tapped hole diameter
	C ($j6$)	D (± 0.45)	E (+0.009 / -0.134)	F (± 0.25)	G (± 1.1)	H (h9)	I	J (± 0.4)
24.0 D Std	24.0	50.0	27.0	40.0	4.6	8.0	M8 x 1.25	20.0
28.0 E Std	28.0	60.0	31.0	50.0	4.6	8.0	M10 x 1.5	23.0

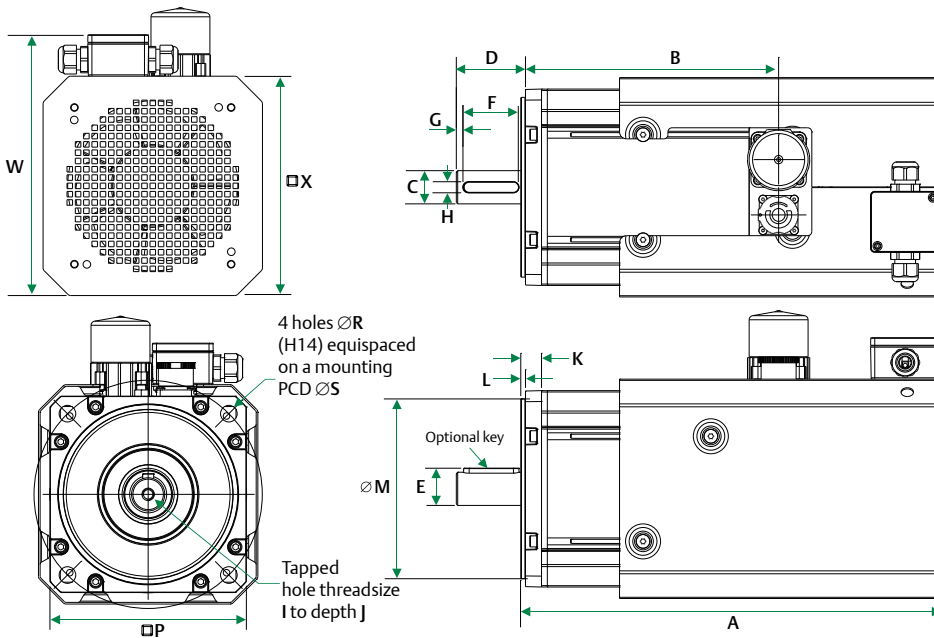
Frame size 142



$\Delta t = 100^{\circ}\text{C}$ winding 40°C maximum ambient
All data subject to +/-10% tolerance

Fan box performance

Motor frame size (mm)	142U4	
Voltage (Vrms)	380 - 480	
	Force - air cooling	
Frame length	C	E
Continuous stall torque (Nm)	18.9	29.5
Peak torque (Nm)	45.9	70.2
Standard inertia (kgcm ²)	22.2	35.4
High inertia (kgcm ²)	36.5	49.7
Winding thermal time const. (s)	275	365
Speed 3000 (rpm)	Kt (Nm/A) = 1.60 Ke (V/krpm) = 98.00	
Rated torque (Nm)	16.1	25.0
Stall current (A)	11.8	18.4
Rated power (kW)	5.06	7.85
R (ph-ph) (Ω)	0.94	0.44
L (ph-ph) (mH)	8.30	5.77



Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency

All other figures relate to a 20°C motor temperature.
Maximum intermittent winding temperature is 140°C

Fan rating

Voltage	Free air flow	Fan current rating
230 Vac	160 m ³ /h	0.08A

Clearance behind fan box: 50mm

Fan blown motor dimension (mm)

Drawing number: IM/0680/GA

	Unbraked length		Braked length		Flange thickness	Register length	Register diameter	Fan box overall height	Flange square	Fixing hole diameter	Fixing hole PCD	Fan box housing	Mounting bolts
	A (± 5.0)	B (± 1.0)	A (± 5.0)	B (± 1.0)									
142C	367.0	249.7	412.0	294.7	11.6	3.4	130.0	188.1	142.0	12.0	165.0	158.6	M10
142E	427.0	309.7	472.0	354.7									

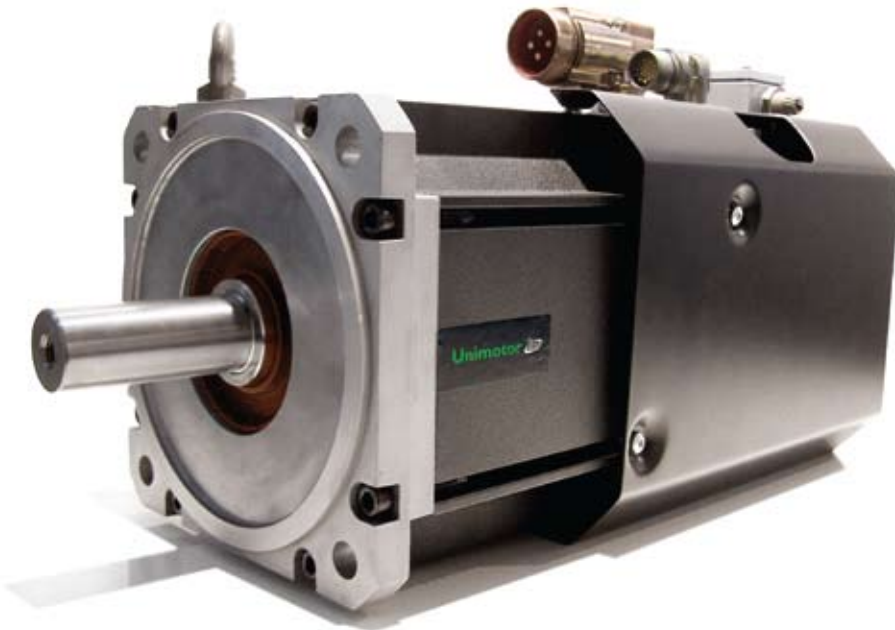
Connector height (mm)

Connection type	Overall height
	N (± 1.0)
A	184.0
B	191.5
C	191.5
V	184.0

Shaft dimensions (mm)

	Shaft diameter	Shaft length	Key height	Key length	Key to shaft end	Key width	Tapped hole thread size	Tapped hole diameter
	C (j6)	D (± 0.45)	E (+0.009 / -0.294)	F (± 0.25)	G (± 1.1)	H (h9)	I	J (± 0.4)
28.0 C/E Std	28.0	60.0	31.0	50.0	4.6	8.0	M10 x 1.5	23.0

Frame size 190



$\Delta t = 100^{\circ}\text{C}$ winding 40°C maximum ambient
All data subject to +/-10% tolerance

Fan box performance

Motor frame size (mm)	190U4	
Voltage (Vrms)	380 - 480	
	Force - air cooling	
Frame length	C	E
Continuous stall torque (Nm)	41.0	68.0
Peak torque (Nm)	93.3	151.6
Standard inertia (kgcm ²)	67.5	105.0
High inertia (kgcm ²)	112.7	150.2
Winding thermal time const. (s)	241	281
Speed 3000 (rpm)	Kt (Nm/A) = 1.60 Ke (V/krpm) = 98.00	
Rated torque (Nm)	35.5	55.0
Stall current (A)	25.6	42.5
Rated power (kW)	11.15	17.30
R (ph-ph) (Ω)	0.41	0.17
L (ph-ph) (mH)	7.35	3.86

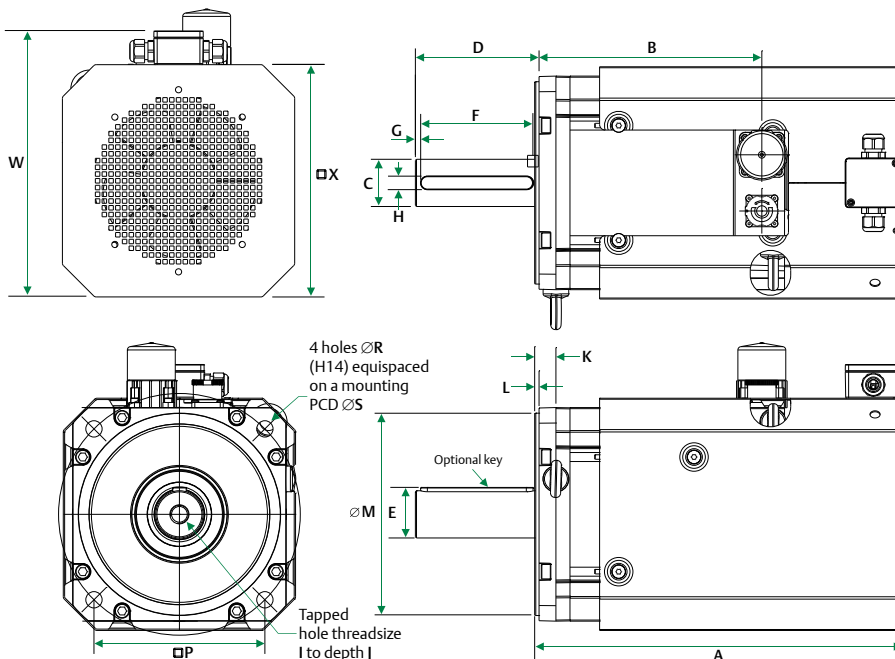
Stall torque, rated torque and power relate to maximum continuous operation tested in a 20°C ambient at 12kHz drive switching frequency

All other figures relate to a 20°C motor temperature.
Maximum intermittent winding temperature is 140°C

Fan rating

Voltage	Free air flow	Fan current rating
230 Vac	325 m ³ /h	0.13A

Clearance behind fan box: 60mm



Fan blown motor dimension (mm)

Drawing number: IM/0681/GA

	Unbraked length		Braked length		Flange thickness K (± 0.5)	Register length L (± 0.1)	Register diameter M (j6)	Fan box overall height W (± 3.0)	Flange square P (± 0.1)	Fixing hole diameter R (H14)	Fixing hole PCD S (± 0.4)	Fan box housing X (± 2.0)	Mounting bolts
	A (± 5.0)	B (± 1.0)	A (± 5.0)	B (± 1.0)									
190C	377.8	252.1	458.6	332.9	15.0	3.90	180.0	236.6	190.0	14.5	215.0	206.6	M12
190E	431.7	306.0	512.5	386.8									





Connector height (mm)

Connection type	Overall height
	N (± 1.0)
A	253.0
B	260.5
C	260.5
V	240.0

Shaft dimensions (mm)









	Shaft diameter C (j6)	Shaft length D (± 0.45)	Key height E (+0.018 / -0.288)	Key length F (± 0.25)	Key to shaft end G (± 1.1)	Key width H (h9)	Tapped hole thread size I	Tapped hole diameter J (± 0.4)
32.0 C Std	32.0 (k6)	80.0	35.0	70.0	4.6	10.0	M12 x 1.75	29.0
38.0 E Std	38.0 (k6)	80.0	41.0	70.0	4.6	10.0	M12 x 1.75	29.0

Cable information

PS	B	A		F	A	015	
Cable type	Jacket	Phase & ground: conductor size		Connection details drive end		Connection details motor end	Cable length
PS= Power (Standard)	B = PUR	H* = 1.0mm ²	10A	C = 6 way power extension connector		A = 075 - 115 Unimotor  power connector	Min = 001 (1m)
PB = Power (with brake)	C = OFS	G = 1.5mm ²	16A	F = Unidrive  (size 1-2) Ferrules			Max = 100 (100m)
		A = 2.5mm ²	22A	G = Unidrive  (size 3) Ring terminals		B = 142 - 190 Unimotor  power connector	
		B = 4.0mm ²	30A	H = Digitax ST and SP0 Ferrules			X = Cut end
		C* = 6.0mm ²	39A	J = Unidrive SP (size 4) Ring terminals			
		D* = 10.0mm ²	53A	X = Cut end			
		E* = 16.0mm ²	70A				

* Only available in OFS

Cable type	PS for motor without brakes, PB for motors with brake.
Jacket	B is for the PUR sheath and is the Dynamic cable selection. C is for the OFS sheath and is the Static cable selection.
Conductor size	Select the conductor size according to the motors STALL CURRENT. Cables of 6mm ² and above will be fitted with ring terminals only. Ratings are for individual cables (not lashed together) in free air temperature up to 40°C - make allowances as appropriate.
Connection detail drive end	Select the correct drive end connection for the drive in use.
Connection detail motor end	Select the correct motor end connection for the motor in use.
Length	Numbers represent the required cable length in metres.

SI	B	A	A	A	015
Cable type	Jacket	Special options		Connection details motor end	Cable length*
SI = Incremental Encoder hyperboloid pins	B = PUR	A = Standard cable		A = Unimotor  Encoder connector	Min = 001 (1m)
SR = Resolver	C** = OFS	E = Twisted screened SS cable		B = Unimotor  Resolver connector	Max = 100 (100m)
SS = Sin/Cos Encoder		L = 8.5mm dia SI cable		C = Unimotor  Sin/Cos connector (Sick)	
SE = Incremental Encoder split pins				F = 90° Unimotor  Encoder connector	
				G = 90° Unimotor  Resolver connector	
				H = 90° Unimotor  Sin/Cos connector (Sick)	
				N = Unimotor  Sin/Cos connector (Heidenhain)	
				O = 90° Unimotor  Sin/Cos connector (Heidenhain)	
				X = Cut end	
				*Max cable length: 50m with the SIBA/SICA as standard, 100m only if +5V tolerance can be maintained. 10m with the SIBL. Heidenhain EC/FC 20m EB/FB 30m with the SSBA cable, EC/FC 20m EB/FB 100m with the SSBE cable.	
				** OFS only available on SI encoder cable	

Cable type	Choose the cable type to match the feedback device.
Jacket	B is for the PUR sheath and is the Dynamic cable selection. C is for the OFS sheath and is the Static cable selection.
Special options	A is for standard cable. L is for the low cost 8.5mm incremental cable.
Connection detail drive end	Select the correct drive end connection for the drive in use.
Connection detail motor end	Select the correct motor end connection for the motor feedback device in use.
Length	Numbers represent the required cable length in metres.

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