Step by Step Guide

HVAC Drive H300

Frame sizes 3 to 12

www.controltechniques.com/support

5 YEAR WARRANTY

Part Number: 0478-0654-04 Issue 4

EN

This guide provides a fast and simple start-up procedure for a basic drive and motor installation.

For help with more advanced installations: Comprehensive user guides, online videos and help tools can be accessed using the web address or QR code above.

⚠ *It is essential to read Section 4.4 in the **H300 User Guide** using the web address or QR code above prior to using the Safe Torque Off function in safety systems.*

EU Declaration of Conformity (including 2006 Machinery Directive)

1. Product model

Unidrive-M and derivative products incorporating a Safe Torque Off (STO) function used as a safety component of a machine. Only the Safe Torque Off function may be used as a safety component of a machine.

2. Name and address of the manufacturer and authorised representative

Manufacturer:	Authorised representative:
Nidec Control Techniques Ltd The Gro Newtown Powys SY16 3BE UK Registered in England and Wales. Company Reg. No. 01236886 Telephone: +44 1686 612000 Email: cthoadmin@mail.nidec.com Web: www.controltechniques.com	Nidec Netherlands B.V. Kubus 155 3364 DG Sliedrecht Netherlands

3. Responsibility

This declaration is issued under the sole responsibility of the manufacturer.

4. Object of the declaration

Model number	Interpretation	Nomenclature aaaa - bbc ddddde
aaaa	Basic series	M600, M700, M701, M702, M708, M709, CSD1, HS70, HS71, HS72, E200, E300, M880, M881, M882, M889, F300, F600, H300, M751, M753, M750, M754
bb	Frame size	01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12
c	Voltage rating	1 = 100 V, 2 = 200 V, 4 = 400 V, 5 = 575 V, 6 = 690 V
ddddd	Current rating	Example 01000 = 100 A
e	Drive format	A = 6P Rectifier + Inverter with internal choke, D = Inverter, E = 6P Rectifier + Inverter, T = 12P Rectifier + Inverter

The model number may be followed by additional characters that do not affect the ratings.

5. Declaration

The safety function STO within the above drive series fulfils the requirements of SIL 3 of EN 61800-5-2 / EN 61508 and Cat 4 / PLe of EN ISO 1384901 and can be used in safety related applications up to these safety levels and in the application area of EN IEC 62061:2021.

Further it can be used for electric passenger and goods lifts within the scope of EN 81-20, clause 5.9.2.5.4 d) as a SIL 3 drive control featuring a defined interface for stopping of the drive by a means of static elements.

The object of the declaration is in conformity with the following European Union harmonisation legislation:Machinery Directive (2006/42/EC)

Electromagnetic Compatibility Directive (2014/30/EU)

Type examination has been carried out by the following notified body:

TUV Rheinland Industrie Service GmbH, Am Grauen Stein, D-51105 Köln, Germany
Notified body identification number: 0035

EC type-examination certificate number: 01/205/5270.03/22 dated 2022-08-26, valid until 2027-08-26.

6. References to the relevant harmonised standards used

The variable speed drive products listed above have been designed and manufactured in accordance with the following European harmonised standards:

EN 61800-5-2:2017	Adjustable speed electrical power drive systems - Part 5-2: Safety requirements - Functional
EN 61800-5-1:2007 + A1: 2017 + A11: 2021, 4.3, 5.2.3.8, 5.2.6	Adjustable speed electrical power drive systems - Part 5-1: Safety requirements - Electrical, thermal and energy
EN ISO 13849-1:2015	Safety of Machinery, Safety-related parts of control systems, General principles for design
IEC 61508 Parts 1 - 7:2010	Functional safety of electrical/ electronic/programmable electronic safety-related systems

7. Signed for and on behalf of:

Person authorised to complete the technical file: Authorised representative (see details above)

DoC authorised by:

Jon Holman-White, Vice President, Research and Development.

Date: 25th July 2025, Newtown, Powys, UK

IMPORTANT NOTICE

These electronic drive products are intended to be used with appropriate motors, controllers, electrical protection components and other equipment to form complete end products or systems. It is the responsibility of the installer to ensure that the design of the complete machine, including its safety-related control system, is carried out in accordance with the requirements of the Machinery Directive and any other relevant legislation. The use of a safety-related drive in itself does not ensure the safety of the machine. Compliance with safety and EMC regulations depends upon installing and configuring drives correctly, including using the specified input filters. The drive must be installed only by professional installers who are familiar with requirements for safety and EMC. The assembler is responsible for ensuring that the end product or system complies with all relevant laws in the country where it is to be used. For more information regarding Safe Torque Off, refer to the Product Documentation.

Contents

English

Introduction

The H300 is a simple and flexible range of drives from 1.1 kW to 500 kW in 10 frame sizes and four input voltage ranges (200 V, 400 V, 575 V and 690 V), which is designed to meet the requirements of HVAC and Refrigeration applications.

This Step-by Step guide provides simple instructions on how to mount the drive, fuse and cable selection, wiring the drive-up, programming the drive and running the motor in keypad mode on frames 3 to 12.

The following information is available for download at:

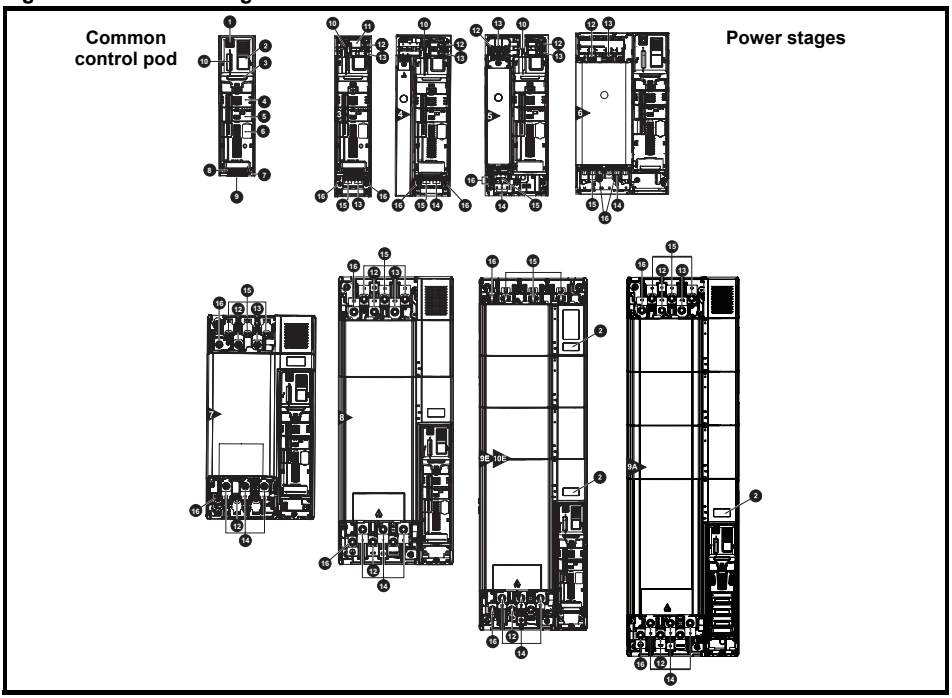
https://acim.nidec.com/en/drives/control-techniques/services

- H300 User Guide

There is also a guided set-up contained in the software tool Connect available from:
https://acim.nidec.com/en/drives/control-techniques/Products/Software/Commissioning/Connect

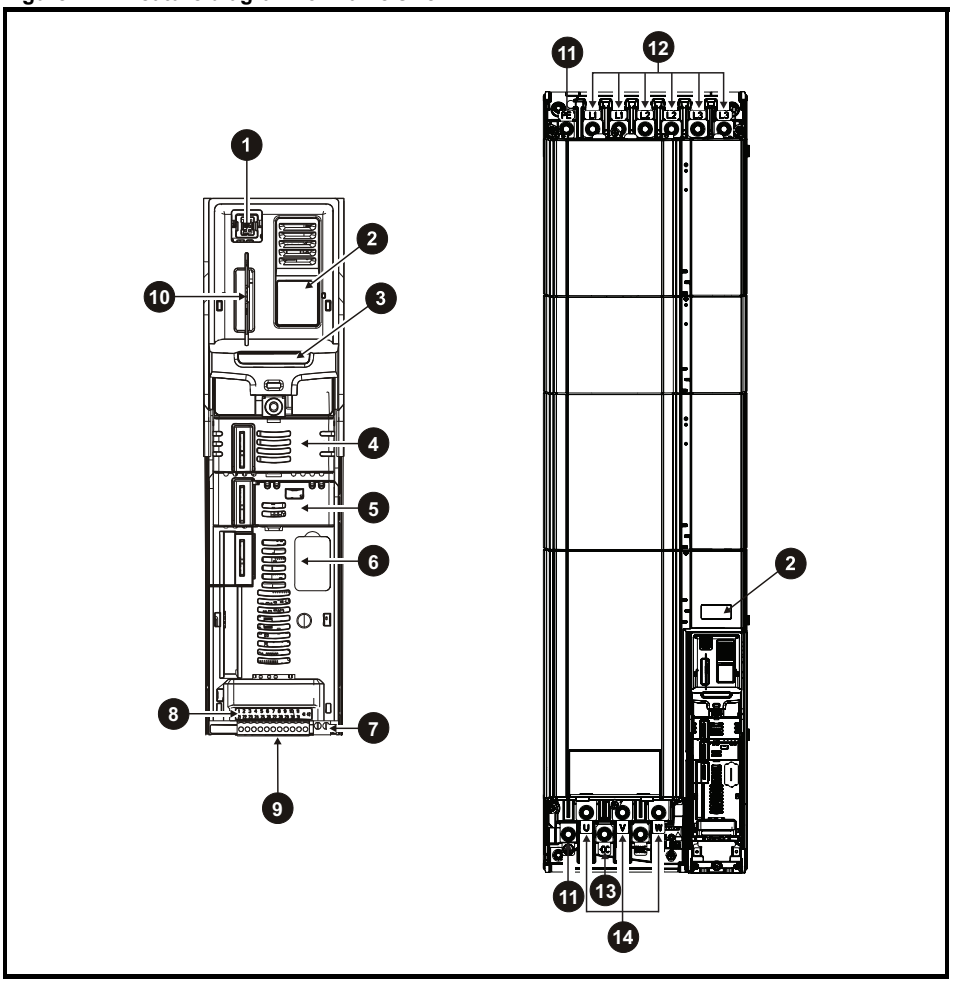
Features of the drive

Figure 1-1 Feature diagram for frame sizes 3 to 10



1. Keypad connection
2. Rating label
3. Identification label
4. Option module slot 1
5. Option module slot 2
6. Option module slot 3
7. Relay connections
8. Control connections
9. Communications port
10. NV media card slot
11. Internal EMC filter
12. DC bus +
13. DC bus -
14. Motor connections
15. AC supply connections
16. Ground connections

Figure 1-2 Feature diagram for frame size 11



Key

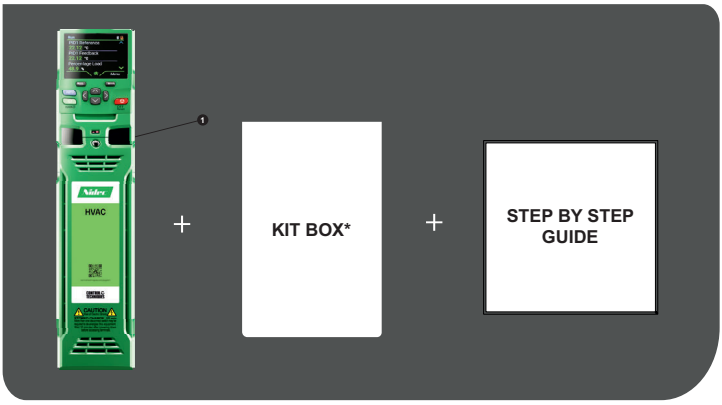
1. Keypad connection
2. Rating label
3. Identification label
4. Option module slot 1
5. Option module slot 2
6. Option module slot 3
7. Relay connections
8. Control connections
9. Communications port
10. NV media card slot
11. Ground connections
12. AC supply connections*
13. DC bus +
14. Motor connections

*Common AC Supply connections are internally linked on the 11E 6 pulse drive

For Frame 12 Drives consult with the Unidrive M Power Module Frame 12 Installation Guide for more concise information.

STEP 1: Check the contents of the box

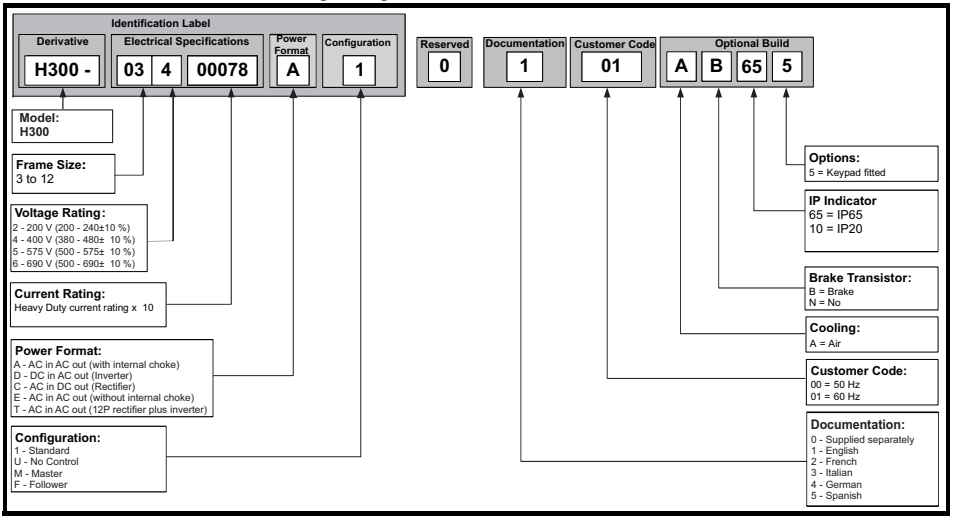
Check you have all the components and your drive has not been damaged during transportation.



* With frame size 7 to 11, surface mounting brackets are also supplied with the drive.

STEP 2: Check model and voltage

The model number can be found on the identification label ❶ on the top of the drive. Please check that the model and the drive voltage range is suitable for the installation.



STEP 3: Mount the drive

The drive should be mounted in an ambient temperature range of - 20 °C to 55 °C (- 4 °F to 131 °F).

Output current derating may be required at ambient temperatures > 40 °C (104 °F). Refer to the **H300 User Guide**. For UL installations, the maximum ambient temperature permitted is 50 °C (122 °F) with any specified derating applied.

The drive can be screwed on a wall or Through-panel mounted (Refer to the **H300 User Guide**). Table 3-1 highlights the clearances.

Figure 3-3 Recommended spacing

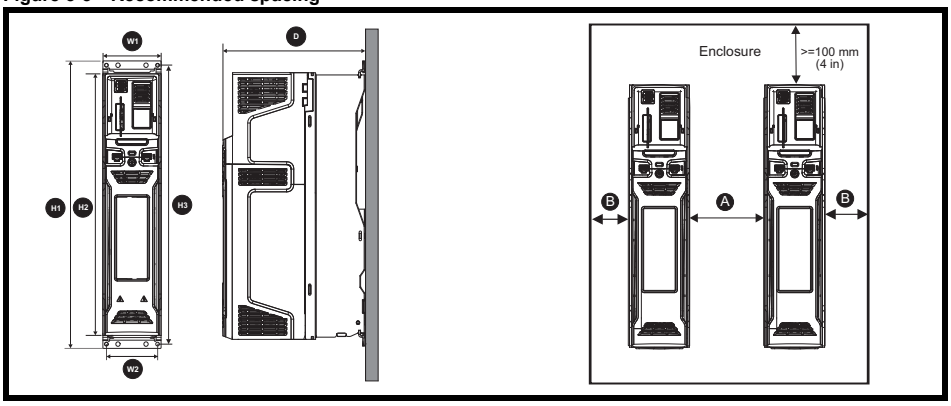


Table 3-1 Drive dimensions and weights

Frame	H1 mm (in)	H2 mm (in)	H3 mm (in)	W1 mm (in)	W2 mm (in)	D mm (in)	Mounting hole diameter	Weight kg (lb)	* Clearance A 40/50 °C (104/122 °F)	* Clearance B
3 03400078 / 03400100	382 (15.04)	365 (14.37)	370 (14.57)	83 (3.27)	73 (2.87)	200 (7.87)	5.5 (0.22)	4.5 (9.9)	0 0	0 0
3 All other variants	382 (15.04)	365 (14.37)	370 (14.57)	83 (3.27)	73 (2.87)	200 (7.87)	5.5 (0.22)	4 (8.8)	0 0	0 0
4	391 (15.39)	365 (14.37)	375 (14.76)	124 (4.88)	106 (4.17)	200 (7.87)	6.5 (0.26)	6.5 (14.3)	0 0	30 mm 1.18 in
5	391 (15.39)	365 (14.37)	375 (14.76)	143 (5.63)	106 (4.17)	200 (7.87)	6.5 (0.26)	7.4 (16.3)	0 / 30 mm (0 / 1.18 in)	30 mm 1.18 in
6	391 (15.39)	365 (14.37)	378 (14.88)	210 (8.27)	196 (7.72)	227 (8.94)	7 (0.27)	14 (30.9)	0 0	30 mm 1.18 in
7	557 (21.93)	508 (20)	538 (21.18)	270 (10.63)	220 (8.66)	280 (11.02)	9 (0.35)	28 (61.7)	30 mm 1.18 in	30 mm 1.18 in
8	804 (31.65)	753 (29.65)	794 (31.26)	310 (12.21)	259 (10.20)	290 (11.42)	9 (0.35)	52 (114.6)	30 mm 1.18 in	30 mm 1.18 in
9A	1108 (43.61)	1049 mm (41.30)	1090 (42.91)	310 (12.21)	259 (10.20)	290 (11.42)	9 (0.35)	66.5 (146.6)	60 mm 2.37 in	45 mm 1.77 in
9E and 10E	1069 (42.09)	1010 (39.70)	1051 (41.38)	310 (12.21)	259 (10.20)	290 (11.42)	9 (0.35)	46 (101.4)	60 mm 2.37 in	45 mm 1.77 in
11E	1242 (48.9)	1190 (46.9)	1222 (48.11)	310 (12.21)	259 (10.20)	313 (12.32)	9 (0.35)	63 (138.9)	60 mm 2.37 in	45 mm 1.77 in
12	1750 (68.89)			295 (11.61)		526 (20.70)		130 (287)		

* Frame 12 drives are mounted with cubicle enclosures where distance is already taken into account.

STEP 4: Select supply / motor cables and fuses

The supply/motor cables and fuses or MCB's used should follow the ratings provided in the table below:

The voltage rating of fuses must be greater than or equal to the highest supply voltage of the system. **Fuses**: The AC supply to the drive must be installed with suitable protection against overload. Failure to observe this requirement will cause risk of fire.

NOTE The product is UL listed for use on a circuit up to 100 kA maximum supply symmetrical fault current, when protected by fuses.

NOTE IEC cable sizes assume Copper conductor, PVC insulation, Installation method B2 and ambient temperature of 40 °C (104 °F). UL cable sizes assume Copper conductor with insulation rated at 75 °C (167 °F).

Table 4-1 200 V drive ratings, cable sizes and fuse ratings (200 V to 240 V ±10 %)

Model	Max. cont. input current	Fuse				Nominal cable size				Normal Duty		
		IEC		UL		European		USA				
	3ph	Nom	Class	Nom	Class	Input	Output	Input	Output	Max. count. output current	Nom power @ 230 V	Motor power @ 230 V
	A	A		A		mm²	mm²	AWG	AWG	A	kW	hp
03200066	10.4	16	gG	20	CC, J or T*	2.5	2.5	14	14	6.6	1.1	1.5
03200080	12.6	20		20		2.5	2.5	14	14	8	1.5	2
03200110	17	20		25		4	4	12	12	11	2.2	3
03200127	20	25		25		4	4	12	12	12.7	3	3
04200180	20	25	gG	25	CC, J or T*	6	6	10	10	18	4	5
04200250	28	32		30		6	6	10	10	25	5.5	7.5
05200300	31	40	gG	40	CC, J or T*	10	10	8	8	30	7.5	10
06200500	48	63	gG	60	CC, J or T*	16	16	4	4	50	11	15
06200580	56	63		70		25	25	3	3	58	15	20
07200750	67	80	gG	80	CC, J or T*	35	35	2	2	75	18.5	25
07200940	84	100		100		35	35	1	1	94	22	30
07201170	105	125		125		70	70	1/0	1/0	117	30	40
08201490	137	200	gR	200	HSJ	6	95	3/0	3/0	149	37	50
08201800	166	200		225		2 x 70	2 x 70	2 x 1	2 x 1	180	45	60
09202160	205	250	gR	250	HSJ	2 x 70 (B1)	2 x 95 (B2)	2 x 2/0		216	55	75
09202660	260	315		300		2 x 95 (B1)	2 x 120 (B2)	2 x 4/0		266	75	100
10203250	305	400	gR	400	HSJ	2 x 120 (B1)	2 x 120 (B2)	2 x 250		325	90	125
10203600	361	450		450		2 x 150 (C)		2 x 300		360	110	150

Table 4-2 Frame 3 to 12 400 V drive ratings, cable sizes and fuse ratings (380 V to 480 V ±10 %)

Model	Max. cont. input current	Fuse				Nominal cable size				Normal Duty		
		IEC		UL		European		USA				
	3ph	Nom	Class	Nom	Class	Input	Output	Input	Output	Max. count. output current	Nom power @ 400 V	Motor power @ 460 V
	A	A		A		mm²	mm²	AWG	AWG	A	kW	hp
03400034	5	10	gG	10	CC, J or T*	1.5	1.5	18	18	3.4	1.1	1.5
03400045	7	10		10		1.5	1.5	16	16	4.5	1.5	2
03400062	9	10		10		1.5	1.5	14	14	6.2	2.2	3
03400077	13	20		20		2.5	2.5	14	14	7.7	3	5
03400104	13	20		20		2.5	2.5	14	14	10.4	4	5
03400123	16	20		20		2.5	2.5	12	12	12.3	5.5	7.5
04400185	19	25	gG	25	CC, J or T*	4	4	10	10	18.5	7.5	10
04400240	24	32		30		6	6	10	10	24	11	15
05400300	29	40	gG	35	CC, J or T*	10	10	8	8	30	15	20
06400380	36	40	gR	40	CC, J or T*	16	16	4	4	38	18.5	25
06400480	46	63		50		16	16	4	4	48	22	30
06400630	60	63		60		25	25	3	3	63	30	40
07400790	74	100	gG	80	CC, J or T*	35	35	2	2	79	37	50
07400940	88	100		100		50	50	1	1	94	45	60
07401120	105	125		125		70	70	1/0	1/0	112	55	75
08401550	155	250	gR	225	HSJ	2 x 50	2 x 50	2 x 1	2 x 1	155	75	100
08401840	177	250		225		2 x 70	2 x 70	2 x 1/0	2 x 1/0	184	90	125
09402210	232	315	gR	300	HSJ	2 x 70 (B1)	2 x 95 (B2)	2 x 3/0	2 x 2/0	221	110	150
09402660	267			350		2 x 95 (B1)	2 x 120 (B2)	2 x 4/0	2 x 4/0	266**	132	200
10403200	332	400	gR	400	HSJ	2 x 120 (C)	2 x 120 (B2)	2 x 300	2 x 250	320	160	250
10403610	397	450		450		2 x 150 (C)	2 x 150 (B2)	2 x 350	2 x 300	361	200	300
11404370	449	500	gR	600	HSJ	4 x 95 (C)	2 x 185 (C)	4 x 3/0	2 x 400	437	225	350
11404870	492	500					2 x 240 (C)	4 x 4/0		487**	250	400
11405070	539	630								507**	280	450
12404800T	720	550	gR	400	gR	4 x 120	3 x 150		3 x 150	600	315	500
12405660T	777	550		450		4 x 150	4 x 150		4 x 120	660	355	550
12406600T	845	550		500					3 x 185	755	400	650
12407200T	995	550		550		4 x 185	4 x 150		4 x 185	865	500	700

* These fuses are fast acting.

** These ratings are for 2 kHz switching frequency. For ratings at 3 kHz switching frequency refer to the power and current ratings in the *H300 User Guide*.

Table 4-3 575 V drive ratings, cable sizes and fuse ratings (500 V to 575 V ±10 %)

Model	Max. cont. input current	Fuse				Nominal cable size				Normal Duty		
		IEC		UL		European		USA				
	3ph	Nom	Class	Nom	Class	Input	Output	Input	Output	Max. count. output current	Nom power @ 575 V	Motor power @ 575 V
	A	A		A		mm²	mm²	AWG	AWG	A	kW	hp
05500039	4	10	gG	10	CC, J or T*	0.75	0.75	16	16	3.9	2.2	3
05500061	7	10		10		1	1	14	14	6.1	4	5
05500100	11	20		20		1.5	1.5	14	14	10	5.5	7.5
06500120	13	20	gG	20	CC, J or T*	2.5	2.5	14	14	12	7.5	10
06500170	19	32		25		4	4	10	10	17	11	15
06500220	24	40		30		6	6	10	10	22	15	20
06500270	29	50		35		10	10	8	8	27	18.5	25
06500340	37	50		40		10	10	6	6	34	22	30
06500430	47	63		50		16	10	6	6	43	30	40
07500530	45	50	gG	50	CC, J or T*	16	16	4	4	53	45	50
07500730	62	80		80		25	25	3	3	73	55	60
08500860	83	125	gR	100	HSJ	35	35	1	1	86	75	75
08501080	104	160		150		50	50	1	1	108	90	100
09501250	166	150	gR	150	HSJ	2 x 70 (B2)	2 x 35 (B2)	2 x 1	2 x 3	125	110	125
09501500	166	200		175			2 x 50 (B2)		2 x 1	150	110	150
10502000	197	250	gR	250	HSJ	2 x 70 (B2)		2 x 2/0		200	150	200
11502480	265	400	gR	400	HSJ	2 x 70 (C)		2 x 3/0		248	185	250
11502880	310					2 x 95 (C)		2 x 4/0		288**	225	300
11503150	338					2 x 120 (C)		2 x 250		315**	250	350

* These fuses are fast acting.

** These ratings are for 2 kHz switching frequency. For ratings at 3 kHz switching frequency refer to the power and current ratings in the *H300 User Guide*.

Table 4-4 Frame 12 575 V drive current, fuse rating and cable size

Model (T/D)	Typical input current	Max cont. input current	Fuse (6 per drive)				Nominal cable size (European) mm²				Nominal cable size (USA)		
			IEC		UL/USA (1)		Input 6 pulse	Input 12 pulse	Output	Cable type (input & output)	Input 6 pulse	Input 12 pulse	Output
		3 ph	Nom	Class	Nom	Class							
	A	A	A		A		mm²				AWG* Kcmil** (mm²)		
12503150	263	372	400	aR	600	See note below	2x150	1x150	1x185	XLPE/ EPR	4x3/0* (85)	2x3/0* (85)	4x1/0* (53.5)
12503600	316	446					2x185	1x185	1x240		4x3/0* (85)	2x3/0* (85)	4x2/0* (67.4)
12504100	347	491					2x240	1x240	2x150		4x4/0* (107.2)	2x4/0* (107.2)	4x3/0* (85)
12504600	389	550					2x240	1x240	2x150		4x250** (127.2)	2x250** (127.2)	4x4/0** (107.2)

(1) Semiconductor fuse A70QS600-4K Up to 100 kA SCCR

Table 4-5 690 V drive ratings, cable sizes and fuse ratings (500 V to 690 V ±10 %)

Model	Max. cont. input current	Fuse				Nominal cable size				Normal Duty		
		IEC		UL		European		USA				
	3ph	Nom	Class	Nom	Class	Input	Output	Input	Output	Max. count. output current	Nom power @ 690 V	Motor power @ 690 V
	A	A		A		mm²	mm²	AWG	AWG	A	kW	hp
07600230	20	25	gG	25	CC, J or T*	10	10	8	8	23	18.5	25
07600300	26	32		30		10	10	6	6	30	22	30
07600360	31	40		35		10	10	6	6	36	30	40
07600460	39	50		50		16	16	4	4	46	37	50
07600520	44	50		50		16	16	4	4	52	45	60
07600730	62	80		80		25	25	3	3	73	55	75
08600860	83	125	gR	100	HSJ	50	50	2	2	86	75	100
08601080	104	160		150		70	70	1/0	1/0	108	90	125
09601250	149	150	gR	150	HSJ	2 x 50 (B2)	2 x 35 (B2)	2 x 1	2 x 3	125	110	150
09601550	171	200		200		2 x 70 (B2)	2 x 50 (B2)	2 x 1/0	2 x 1	155	132	175
10601720	202	225	gR	250	HSJ	2 x 70 (B2)	2 x 70 (B2)	2 x 2/0	2 x 1/0	172	160	200
10601970	225	250		250		2 x 95 (B2)		2 x 3/0	2 x 2/0	197	185	250
11602250	256	400	gR	400	HSJ	2 x 70 (C)		2 x 3/0		225	200	250
11602750	302					2 x 95 (C)		2 x 4/0		275**	250	300
11603050	329					2 x 95 (C)		2 x 250		305**	280	400

* These fuses are fast acting.

** These ratings are for 2 kHz switching frequency. For ratings at 3 kHz switching frequency refer to the power and current ratings in the *H300 User Guide*.

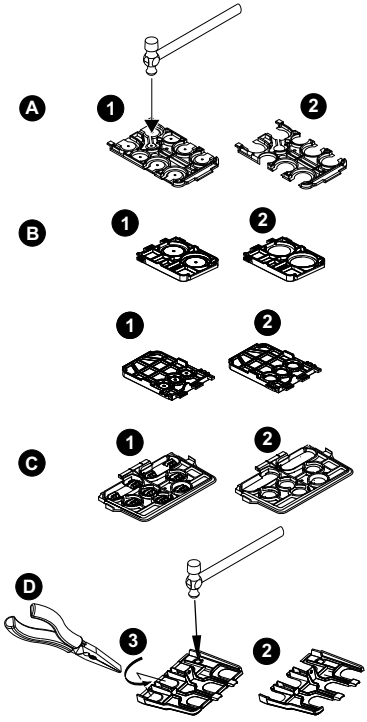
Table 4-6 Frame 12 690 V drive current, fuse rating and cable size

Model (T/D)	Typical input current	Max cont. input current	Fuse (6 per drive)				Nominal cable size (European) mm²				Nominal cable size (USA)		
			IEC		UL/USA (1)		Input 6 pulse	Input 12 pulse	Output	Cable type (input & output)	Input 6 pulse	Input 12 pulse	Output
		3 ph	Nom	Class	Nom	Class							
	A	A	A		A		mm²				AWG* Kcmil** (mm²)		
12503150	311	440	400	aR	600	See note below	2x150	1x150	1x185	XLPE/ EPR	4x3/0* (85)	2x3/0* (85)	4x1/0* (53.5)
12503600	351	496					2x185	1x185	1x240		4x3/0* (85)	2x3/0* (85)	4x2/0* (67.4)
12504100	394	558					2x185	2x240	2x150		4x4/0* (107.2)	2x4/0* (107.2)	4x3/0* (85)
12504600	438	620					2x240	1x240	2x150		4x250** (127.2)	2x250** (127.2)	4x4/0** (107.2)

(1) Semiconductor fuse A70QS600-4K Up to 100 kA SCCR

STEP 5: Remove the finger guard breakouts

Removing the finger-guard break-outs



A: Size 3 to 11

B: Size 5 only

C: Size 6 only

D: Size 7 to 11

Place finger-guard on a flat solid surface and hit relevant break-outs with hammer as shown (1). For sizes 7 to 9 pliers can be used to remove the break-outs, grasp the relevant break-out with the pliers and twist it as shown (3). Continue until all required break-outs are removed (2). Remove any flash / sharp edges once the break-outs are removed.

Finger guard grommets are supplied in the kitbox for size 5 and 6.

STEP 6: Wire the drive up

This step covers connection of input power connection L1,L2, and L3 including the ground terminals, motor phases U V W and the control terminals.

The tools required for this are terminal screwdriver, flat screwdriver, M7, M8, M10 and M17 sockets T20 and T25 driver. When wiring the drive's power, ground and control connections, they should be tightened to the recommended torque settings shown in the table below:

Table 6-1 Drive control and relay terminal data

Model	Connection type	Torque settings
All	Plug-in terminal block	2.0 Nm (17.7 lb in)
Frame 12		0.5 Nm (4.4 lb in)

Table 6-2 Drive power terminal data

Model size	AC and motor terminals		DC terminal		Ground terminal	
	Recommended	Maximum	Recommended	Maximum	Recommended	Maximum
3 and 4	Plug-in terminal block		T20 Torx (M4)		T20 Torx (M4) / M4 Nut (7 mm AF)	
	0.7 Nm (4.4 lb in)	0.8 Nm (7.1 lb in)	2.0 Nm (17.7 lb in)	2.5 Nm (22.1 lb in)	2.0 Nm (17.7 lb in)	2.5 Nm (22.1 lb in)
5	Plug-in terminal block		T20 Torx (M4) / M4 Nut (7 mm AF)		M5 Nut (8 mm AF)	
	1.5 Nm (13.3 lb in)	1.8 Nm (15.9 lb in)	1.5 Nm (13.3 lb in)	2.5 Nm (22.1 lb in)	2.0 Nm (17.7 lb in)	5.0 Nm (44.3 lb in)
6	M6 Nut (10 mm AF)		M6 Nut (10 mm AF)		M6 Nut (10 mm AF)	
	6.0 Nm (53.1 lb in)	8.0 Nm (70.8 lb in)	6.0 Nm (53.1 lb in)	8.0 Nm (70.8 lb in)	6.0 Nm (53.1 lb in)	8.0 Nm (70.8 lb in)
7	M8 Nut (13 mm AF)		M8 Nut (13 mm AF)		M8 Nut (13 mm AF)	
	12 Nm (106.2 lb in)	14 Nm (123.9 lb in)	12 Nm (106.2 lb in)	14 Nm (123.9 lb in)	12 Nm (106.2 lb in)	14 Nm (123.9 lb in)
8 to 11	M10 Nut (17 mm AF)		M10 Nut (17 mm AF)		M10 Nut (17 mm AF)	
	15 Nm (132.8 lb in)	20 Nm (177 lb in)	15 Nm (132.8 lb in)	20 Nm (177 lb in)	15 Nm (132.8 lb in)	20 Nm (177 lb in)
12	M10 Nut (17 mm AF)		M10 Nut (17 mm AF)		M8 Nut (13 mm AF)	
	30 Nm (265.5 lb in)		30 Nm (265.5 lb in)		12 Nm (106.2 lb in)	

Power and Ground connections

Connect the supply and motor connections using the cables and fuses quoted in the table shown in Step 4.

Figure 6-1 Size 3 power and ground connections

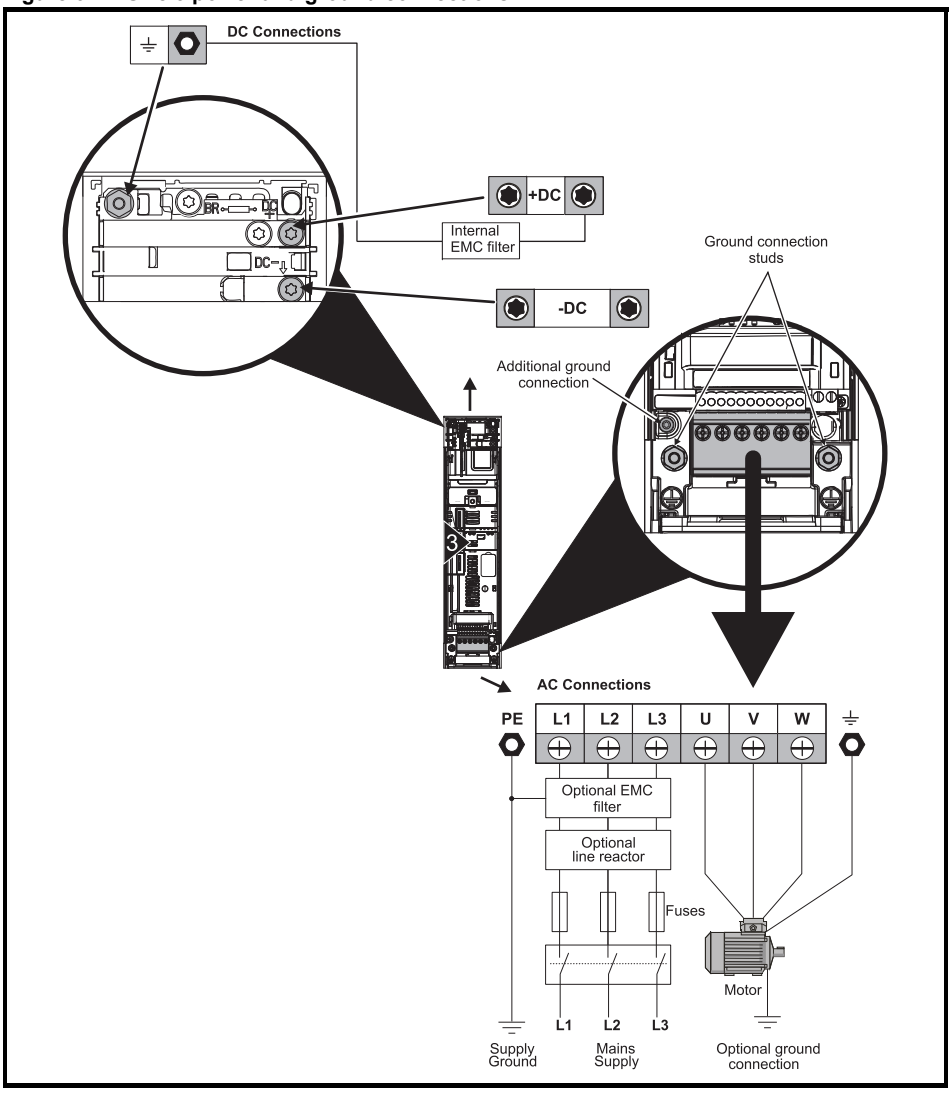


Figure 6-2 Size 4 power and ground connections

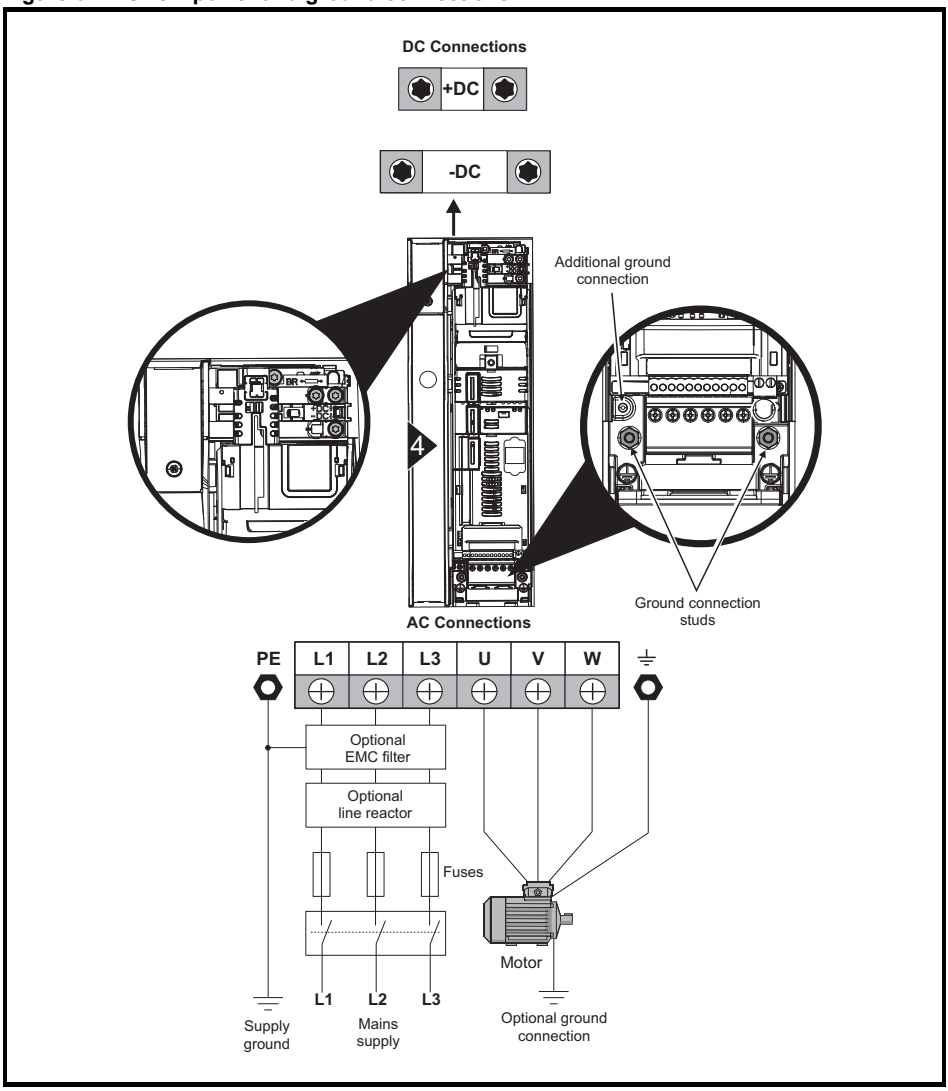


Figure 6-3 Size 5 power and ground connections

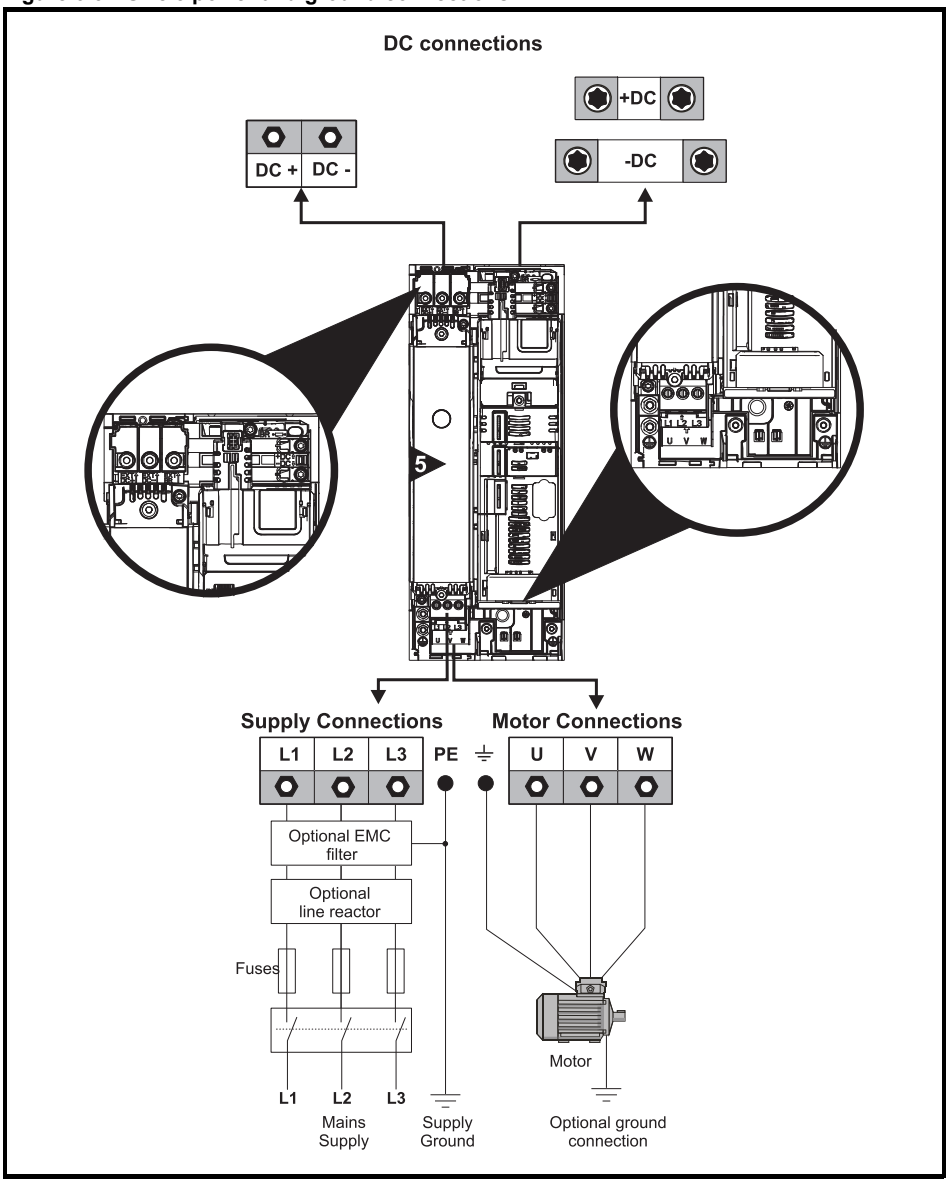


Figure 6-4 Size 6 power and ground connections

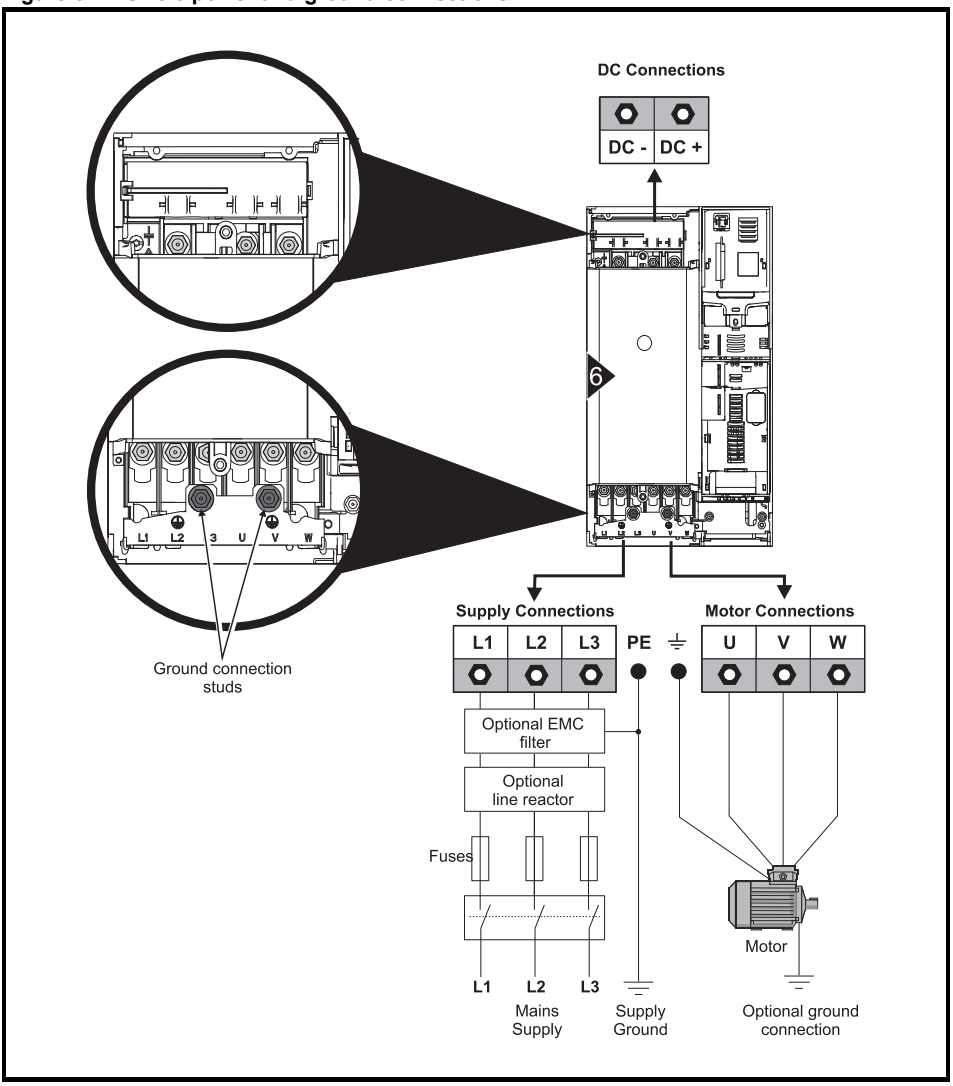


Figure 6-5 Size 7 and 8 power and ground connections (size 7 shown)

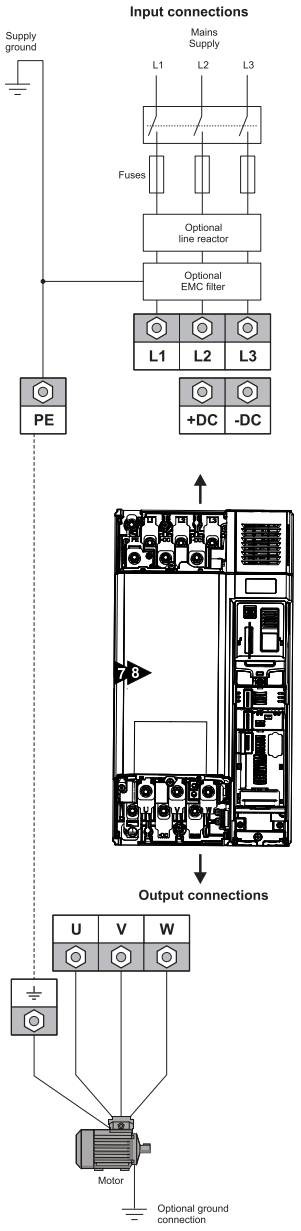


Figure 6-6 Size 9E, 10E power and ground connections

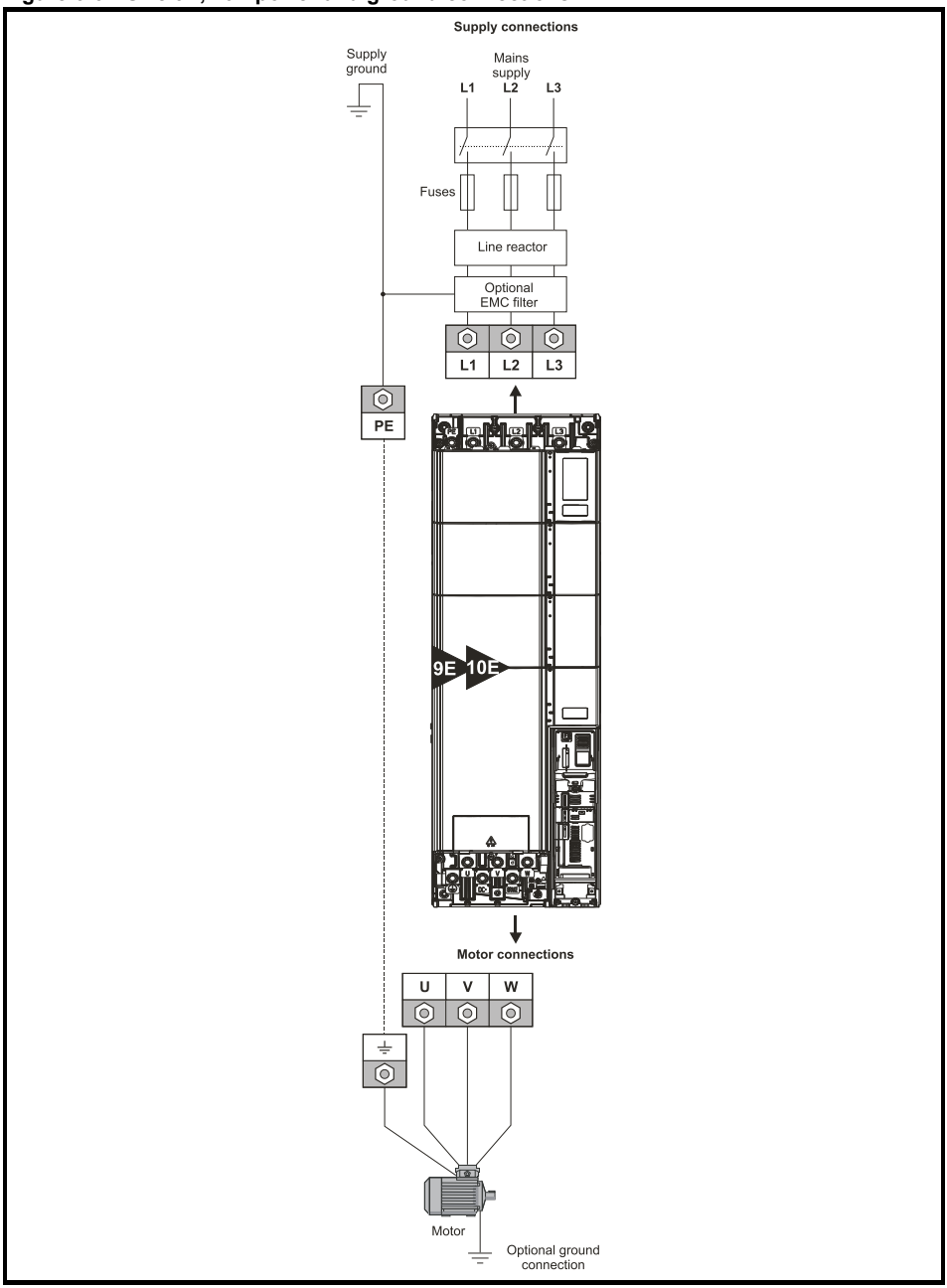


Figure 6-7 Size 9A power and ground connections

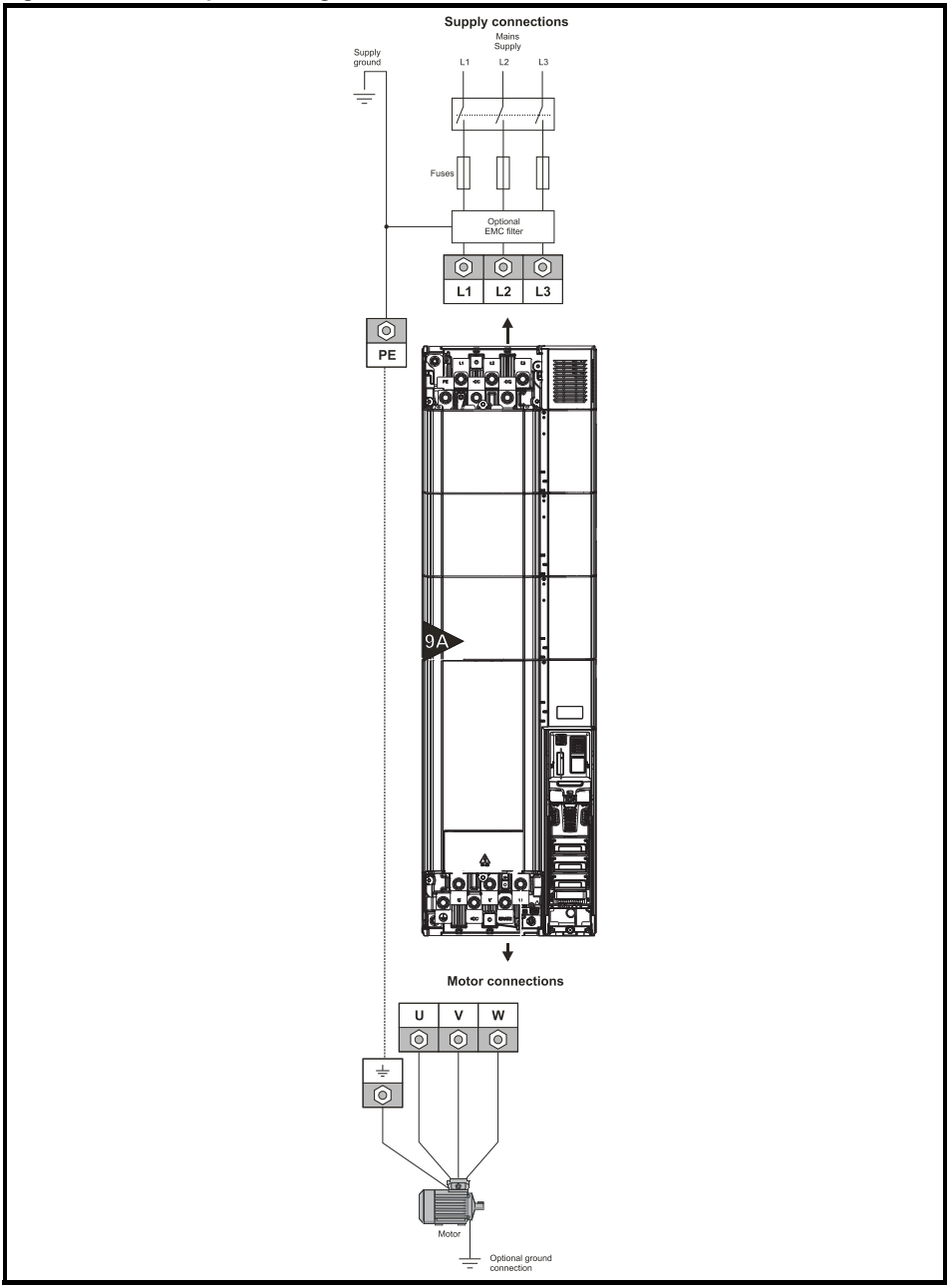


Figure 6-8 Size 11E power and ground connections

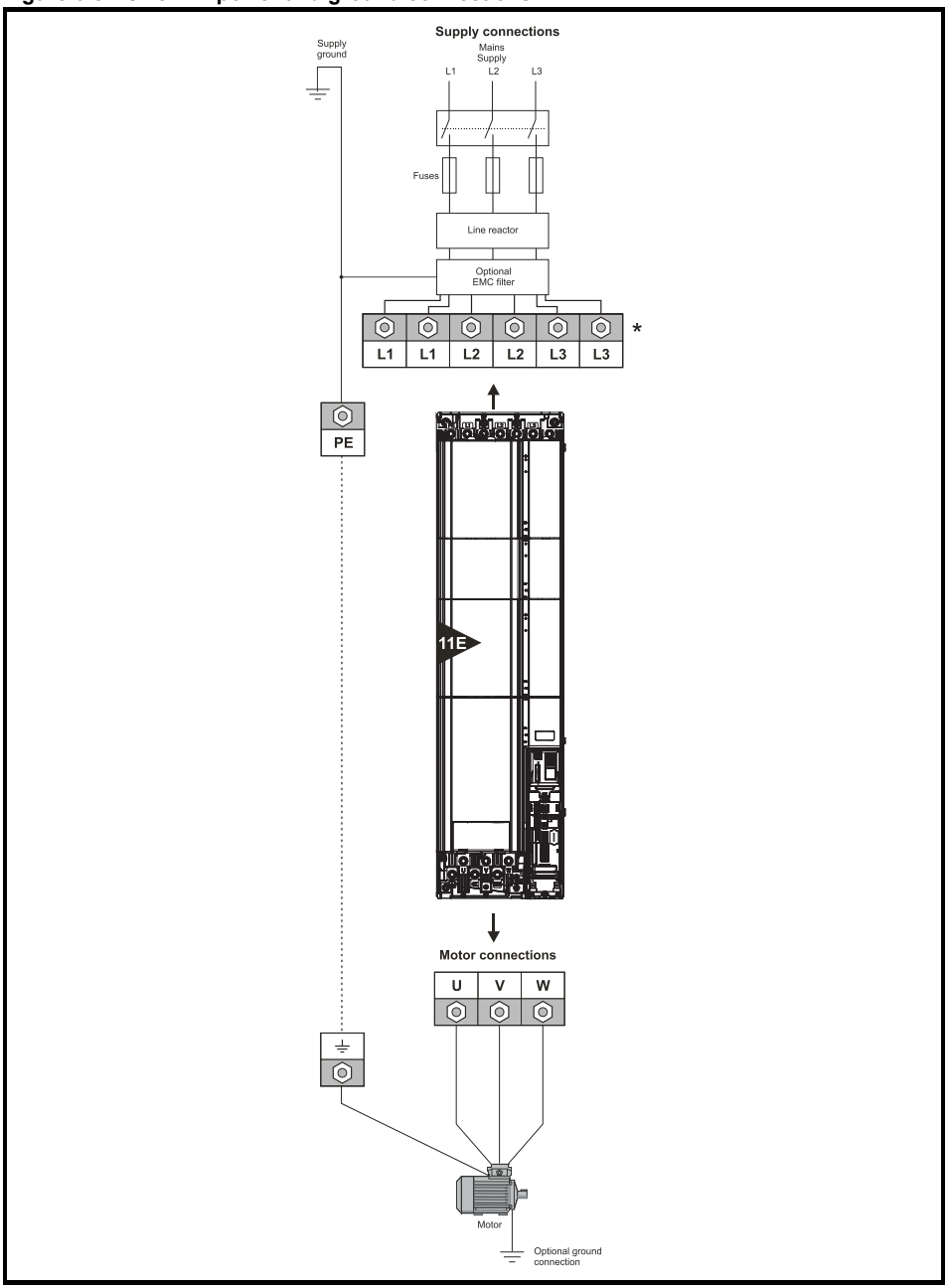
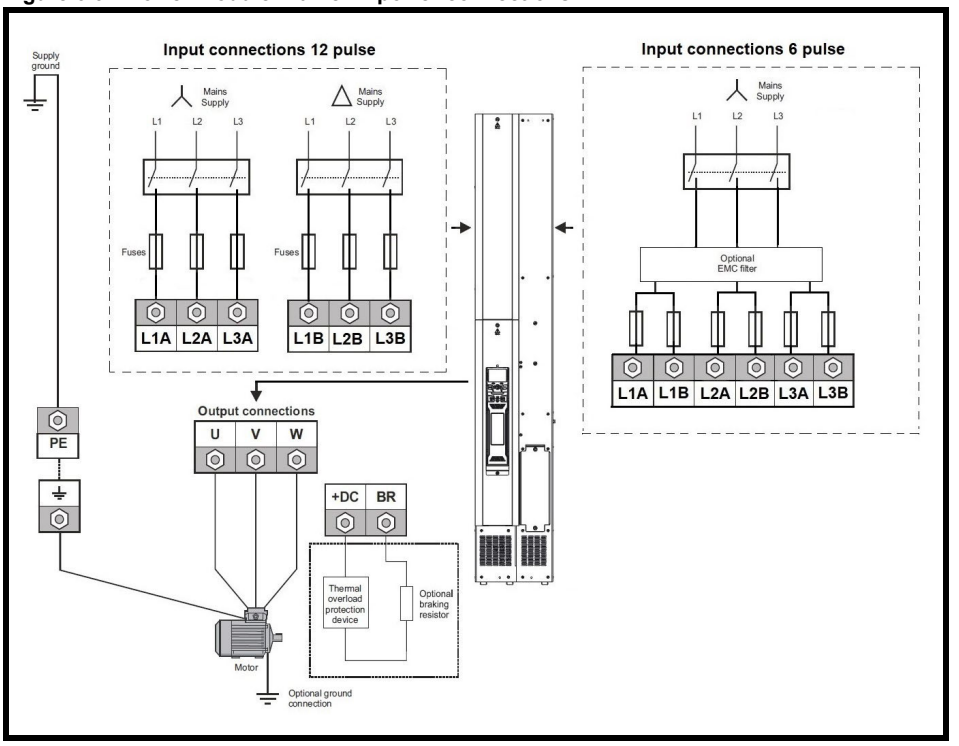


Figure 6-9 Power Module Frame 12 power connections



Electrochemical corrosion of grounding terminals
Ensure that grounding terminals are protected against corrosion i.e. as could be caused by condensation.

The drive must be connected to the system ground of the AC supply. The ground wiring must conform to local regulations and codes of practice.

The ground loop impedance must conform to the requirements of local safety regulations.
The drive must be grounded by a connection capable of carrying the prospective fault current until the protective device (fuse, etc.) disconnects the AC supply.
The ground connections must be inspected and tested at appropriate intervals.

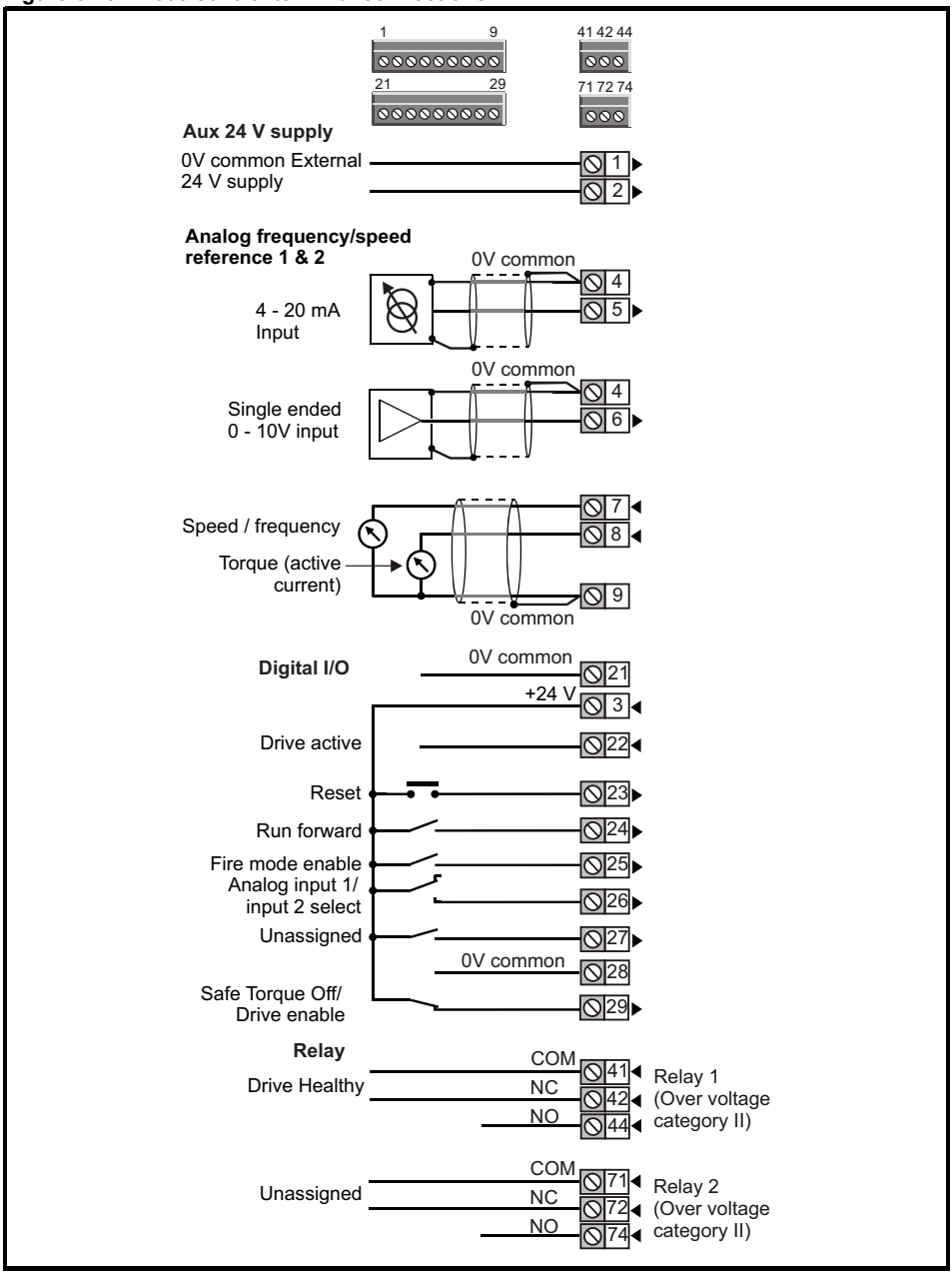
Table 6-3 Protective ground cable ratings

Input phase conductor size	Minimum ground conductor size
≤ 10 mm²	Either 10 mm² or two conductors of the same cross-sectional area as the input phase conductor
> 10 mm² and ≤ 16 mm²	The same cross-sectional area as the input phase conductor
> 16 mm² and ≤ 35 mm²	16 mm²
> 35 mm²	Half of the cross-sectional area of the input phase conductor

Control connections

The control terminals are configured by default for the arrangement shown below:

Figure 6-10 H300 control terminal connections



Communications connections

The drive offers a 2 wire EIA-485 serial interface located beneath the control terminals, see Figure 6-11 *Location of the comms connector* below. The drive supports the Modbus RTU, BACnet MSTP protocols. See Table 6-4 for the connection details.

Figure 6-11 Location of the comms connector

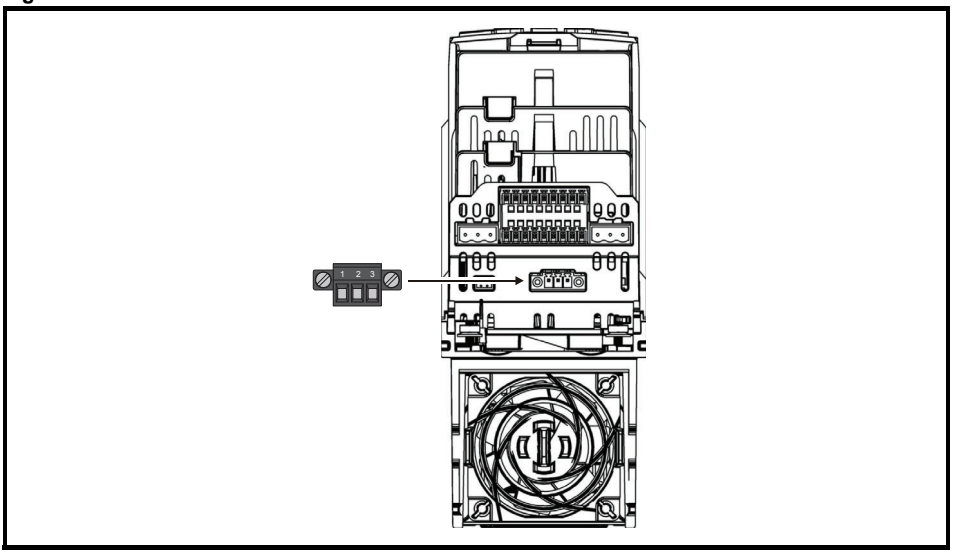


Table 6-4 Serial communication port pin-outs

Pin	Function
1	RX TX
2	Isolated 0V
3	RX\ TX\

EIA-485 Serial communications

The serial communications port is a 3 way screw type connector, which is isolated from the power stage and the other control terminals.The communications port applies a 2 unit load to the communications network.

USB/EIA-232 to EIA-485 Communications

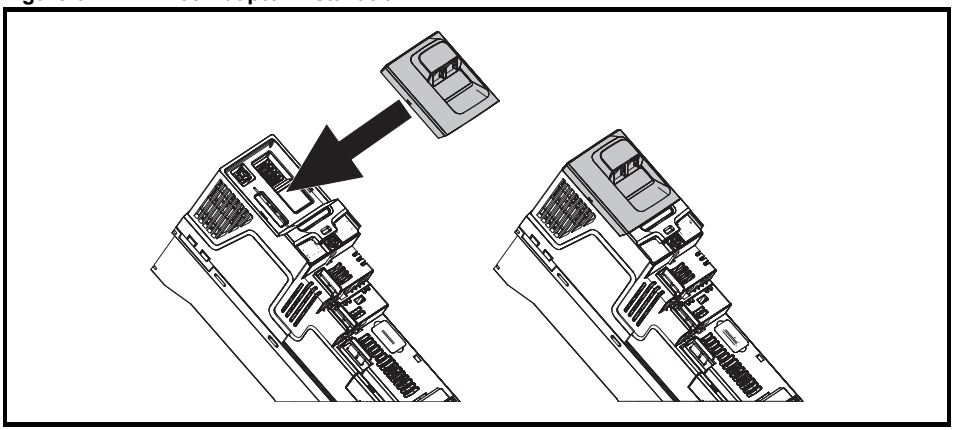
An external USB/EIA-232 hardware interface such as a PC cannot be used directly with the 2-wire EIA-485 interface of the drive.

To gain access to the drive parameters (including connection to Connect), a KI-485 Adaptor should be installed as shown in Figure 6-12 and used in conjunction with a suitable USB to EIA-485 isolated converter. A suitable isolated converter is available from Control Techniques:

- CT USB Comms Cable (CT part number: 4500-0096).

A KI-485 Adaptor is also required for remote LCD keypad operation. The communications cable between the KI-485 Adaptor and keypad is wired one to one. The maximum cable length is 100 m when conductors of 0.129 mm² (AWG 26) or larger are used and the cable shield should be connected to the grounded panel / cubicle at the keypad end of the cable.

Figure 6-12 KI-485 Adaptor Installation



To install, align the KI-485 Adaptor and press gently in the direction shown until it clicks into position.

To remove, reverse the installation instructions.

NOTE IEC cable sizes assume Copper conductor, PVC insulation, Installation method B2 and ambient temperature of 40 °C (104 °F). UL cable sizes assume Copper conductor with insulation rated at 75 °C (167 °F).

When using the Control Techniques converters or any other suitable converter with the drive, it is recommended that no terminating resistors be connected on the network. It may be necessary to disconnect the terminating resistor within the converter depending on which type is used.

STEP 7: Use the keypad

The keypad display provides information to the user regarding the operating status of the drive, alarms and trip codes. The keypad buttons provide a means for changing parameters, stopping and starting the drive, and the ability to perform a drive reset.

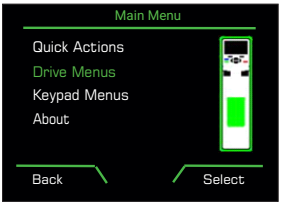
Keypad key identifier

1. Soft key (for text above)
2. Auto
3. Hand
4. Navigation
5. Off / Reset
6. Soft key (for text above)

Press and hold the Hand or Auto buttons for 2 s to select those functions. A short press will activate the Off function.

Instructions to edit parameters

Selecting “Menu” shows the following Main Menu Screen



Selecting "Drive Menus" Provides access to all Menu Lists. Use the ∧ (Up) / ∨ (Down) navigation keys to highlight the required menu then select.

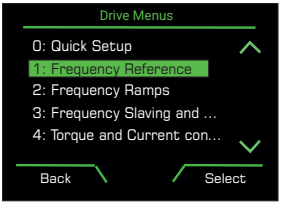
Menu Number	Menu Name (Open-Loop mode listed. RFC-A and RFC-S menus vary slightly)
0	Quick SetUp
1	Frequency Reference
2	Frequency Ramps
3	Frequency Monitoring
4	Torque and Current Control
5	Motor Control
6	Sequencer and Clock
7	Analog I/O
8	Digital I/O
9	User Functions 1
10	Status and Trips
11	Miscellaneous

Menu Number	Menu Name (Open-Loop mode listed. RFC-A and RFC-S menus vary slightly)
12	User Functions 2
14	User PID Controller
15	Option Slot 1
16	Option Slot 2
17	Option Slot 3
18	Application Menu 1
19	Application Menu 2
20	Application Menu 2
22	Menu 0 Set-up
24	Option
29	Building Automation Network Setup

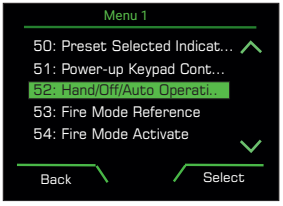
For Instance:

To access parameter 01.052, Menu 1, Parameter 052

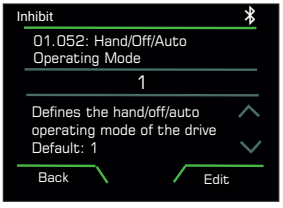
Use ∧ (Up) / ∨ (Down) navigation keys to highlight Menu and select:



Use ∧ ∨ navigation keys to highlight and then select parameter.

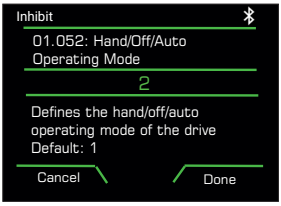


Select 'Edit' to enable change to parameters using ∧ ∨ navigation keys to select the appropriate setting.



Once the appropriate parameter setting has been selected, select ‘Done’. **NOTE** Parameters are not saved unless the Save action has been performed.

To get back to the main menu, keep selecting ‘Back’ until you are back at the default main screen.



Hand / Off / Auto

Hand / Off / Auto functions are enabled if Pr **01.052** is set to a non-zero value, otherwise the keypad buttons are allocated as follows:

- Blue AUTO - Forward/Reverse
- Green - Run
- Red - Reset

When Hand / Off / Auto functions are enabled (Pr **01.052** set to either 1, 2 or 3), then the keypad buttons will be allocated as follows:

- Blue AUTO - Auto
- Green - Hand
- Red - Off/Reset

The value in Pr **01.052** selects Hand/Off/Auto mode on power-up as shown in Table 6-5.

The factory default value of Pr **01.052** is 1 = Auto Mode.

Table 6-5 Hand/Off/Auto mode

Pr 01.052	Power up
0	Hand/Off/Auto disabled
1	Auto Mode
2	Off Mode
3	See table below

Power Down	Power Up
Hand	Off
Off	Off
Auto	Auto

STEP 8: Select the correct mode for operation

Open-loop (OL) mode for use with an induction motor (Default mode)

The drive applies power to the motor at frequencies varied by the user. The motor speed is a result of the output frequency of the drive and slip due to the mechanical load.

RFC-A Sensorless Mode

The drive can directly control the speed of the motor in sensorless mode without using a feedback device. The motor flux is accurately controlled to provide full torque down to zero speed.

Synchronous permanent magnet brushless motor without feedback (RFC-S sensorless mode)

Flux control is not required because the motor is self-excited by the permanent magnets which form part of the rotor. Full torque is available down to zero speed, with salient motors. Position information from the sensorless algorithm is used to ensure the output voltage is matched to the back EMF of the motor.

Diagnostics –

The last 10 trips are stored in Pr **00.050** to Pr **00.059** with Pr **00.050** being the most recent being the most recent trip.

Refer to the *H300 User guide* for a complete list of trips and their meaning.

Larger power induction motors can sometimes suffer from instability when run in an unloaded or lightly loaded condition when controlled by an inverter operating in open loop mode. This effect does not occur on all large induction motors but some motors are more susceptible than others. Often the instability is no longer present once some load is applied to the shaft. In the case of a fan the load can remain at a low level until significant speed is attained. If instability is encountered, then the following steps should be taken to verify the integrity of the installation, as hardware issues relating to the motor, the drive and the cabling can also be a cause instability and are more common. Once hardware issues have been ruled out, then switching to RFC-A sensorless mode will immediately eliminate the effect.

Hardware verification

1. Measure the motor and cable impedance - ensure all phases balanced.
2. Check the motor impedance to earth with a Megger.
3. Ensure the motor is connected correctly - star / delta.
4. Parallel module drives only, multiple module drives - ensure output phases are correctly wired through the sharing chokes, U to U, V to V etc.
5. Check output stage phases, voltage and current for balance (gate drive fault) using an oscilloscope.
6. Current feedback circuit check - use an alternative load to ensure current feedback scaling is correct.
7. Replace the drive if any doubt exists over the hardware integrity.

STEP 9: Run the drive for the first time in Hand mode

Hand mode is where the drive runs from a fixed frequency or speed reference. The user can modify the hand mode frequency or speed as detailed in the following steps.

Before starting, it is important to identify the type of motor used in the application. If the type of motor isn't known, please contact the motor manufacturer to find out if it is an induction or permanent-magnet motor. The Type of Motor also dictates which operating Mode is required within the Drive Induction Motor may require either Open Loop or RFC-A Sensorless modes, whereas a Permanent Magnet Motor will require RFC-S Mode.

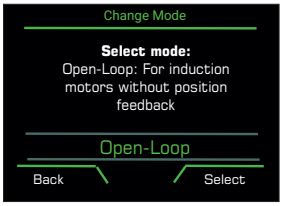
By Default the H300 Drive is factory set for Open-Loop Mode.

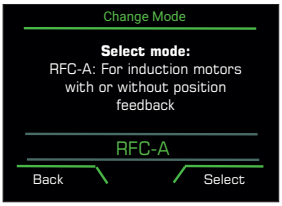
If RFC-A sensorless mode is required at this point, then follow changing the operating mode below.

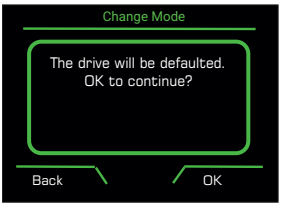
Changing the operating mode

Open Loop is default, if RFC-A Mode is required then Main Menu / Quick Actions/Mode Change.

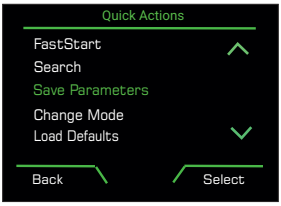
When entering this mode it displays the current mode the drive is saved with. Open Loop is also the factory default. Use the Keypad ∧ ∨ navigations keys navigate to the mode required.





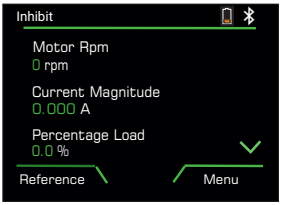


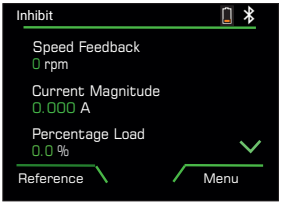
On Selecting OK, a message will appear "preparing Drive", after a few seconds "Mode Change Successful" will appear. Then go back to "Quick Actions" and save parameters

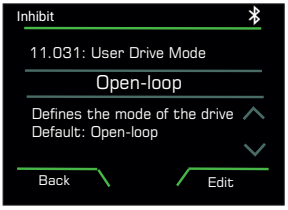


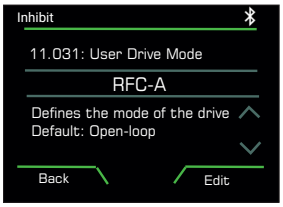
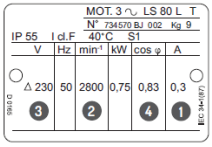
Drive Operating modes
Run an Induction motor in open-loop (OL) or RFC-A Mode

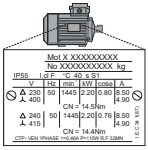
<table>
<tr><th>Action</th><th>Detail</th></tr>
<tr><td>Before power up.</td><td>Open the Enable or Safe Torque Off, Hand and Auto mode switches so the drive powers up in the Inhibit state. Ensure that the motor shaft is free to turn and that all safety guidelines are adhered to.

Check that the Drive is in the inhibited state and that The drive enable signal is not given (terminal 29), and Run signals are not active.</td></tr>
<tr><td>Power up the drive.</td><td>After power up the display indicates as shown below.
Open-Loop Mode
 

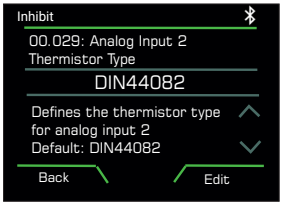
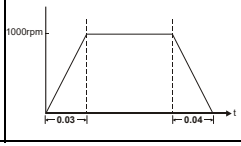
RFC-A Mode
 
</td></tr>
<tr><td>Ensure Pr 11.031 is set to Open-Loop

(Note - Open-Loop is factory default)</td><td>Open-Loop Mode
 

RFC-A Mode
 
</td></tr>
<tr><td>Configure the motor name plate details.</td><td>
<table>
<tr><th>Open-Loop and RFC-A</th></tr>
<tr><td>• Motor rated voltage in Pr 00.018 (V) - check if 人 or △ connection</td></tr>
<tr><td>• Set Rated Speed Pr 00.019, the motor rated speed in rpm</td></tr>
<tr><td>• Set Rated Current Pr 00.020 to the motor rated current in Amps</td></tr>
<tr><td>• Set Rated Frequency Pr 00.021, the motor rated frequency in Hz</td></tr>
</table>
Typical motor nameplate examples




</td></tr>
</table>

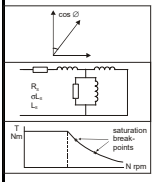
Configure motor thermal protection.	For Open-Loop and RFC-A modes, if the Motor requires thermal protection the H300 Drives has the following Thermistor types programmed within parameter Pr **00.029** Analog Input 2 Thermistor Type. DIN44082 (Default) KTY84 PT100 PT1000 PT2000 NI1000 Parameter Pr **00.027** Analog Input 2 Mode will need to be set to either of the following as required by the application. Therm Short Cct Thermistor Therm No Trip 
Set acceleration and deceleration rate	For Open-Loop and RFC-A modes, Enter: • Acceleration rate in Pr **00.012** (s to Pr **01.006**) • Deceleration rate in Pr **00.013** (s from Pr **01.006**) 

Autotune

For Open-Loop and RFC-A modes, the drive is able to perform either a stationary or a rotating autotune. The motor must be at a standstill before an autotune is enabled. **NOTE** A rotating autotune should be used whenever possible so the measured value of power factor of the motor is used by the drive (Pr **00.024** set to 2).

WARNING

A rotating autotune will cause the motor to accelerate up to $^2/_3$ base speed in the direction selected regardless of the reference provided. Once complete the motor will coast to a stop. The enable signal must be removed before the drive can be made to run at the required reference.
The drive can be stopped at any time by removing the run signal or removing the drive enable.



Open Loop

1. Basic

This test measures the basic control parameters without moving the motor.

1. A stationary Auto Tune is performed on a motor that may be loaded that cannot be uncoupled from load.
2. A stationary auto tune test is performed to measure Stator Resistance (Pr **05.017**), Transient Inductance (Pr **05.024**), Maximum Deadtime Compensation (Pr **05.059**) and Current At Maximum Deadtime Compensation (Pr **05.060**). If Enable Stator Compensation (Pr **05.049**) = 1 then Stator Base Temperature (Pr **05.048**) is made equal to Stator Temperature (Pr **05.046**).

2. Improved

The improved Autotune should only be used if the motor is uncoupled from the load. This test measures the parameters for improved performance by rotating the motor.

1. Auto-tune test 1 is performed.
2. A rotating test is performed in which the motor is accelerated with the currently selected ramps up to a frequency of Rated Frequency (Pr **05.006**) x 2/3, and the frequency is maintained at that level for 4 seconds. Stator Inductance (Pr **05.025**) is measured and this value is used in conjunction with other motor parameters to calculate Rated Power Factor (Pr **05.010**). The no-load motor core losses are measured and written to No-load Core Loss (Pr **04.045**). It is not possible to measure the rated load motor core losses, and so Rated Core Loss (Pr **04.046**) is set to zero. The motor should be unloaded for this test.

RFCA

1. Basic

This test measures the basic control parameters without moving the motor.

1. A stationary Auto Tune is performed on a motor that may be loaded that cannot be uncoupled from load.
2. A stationary test is performed to measure Stator Resistance (Pr **05.017**), Transient Inductance (Pr **05.024**), Maximum Deadtime Compensation (Pr **05.059**) and Current At Maximum Deadtime Compensation (Pr **05.060**). If Enable Stator Compensation (Pr **05.049**) = 1 then Stator Base Temperature (Pr **05.048**) is made equal to Stator Temperature (Pr **05.046**).
3. Stator Resistance (Pr **05.017**) and Transient Inductance (Pr **05.024**) are used to set up Current Controller Kp Gain (Pr **04.013**) and Current Controller Ki Gain (Pr **04.014**). This is only performed once during the test, and so the user can make further adjustments to the current controller gains if required.

2. Improved

The improved Autotune should only be used if the motor is uncoupled from the load. This test measures the parameters for improved performance by rotating the motor.

1. Auto-tune 1 test is performed.
2. A rotating test is performed in which the motor is accelerated with the currently selected ramps up to a frequency of Rated Frequency (Pr **05.006**) x 2/3, and the frequency is maintained at that level for up to 40 seconds. Stator Inductance (Pr **05.025**) is measured and this value is used in conjunction with other motor parameters to calculate Rated Power Factor (Pr **05.010**). Saturation Breakpoint 1 (Pr **05.029**), Saturation Breakpoint 3 (Pr **05.030**), Saturation Breakpoint 2 (Pr **05.062**) and Saturation Breakpoint 4 (Pr **05.063**) are measured. The no-load motor core losses are measured and written to No-load Core Loss (Pr **04.045**). It is not possible to measure the rated load motor core losses, and so Rated Core Loss (Pr **04.046**) is set to zero. The motor should be unloaded for this test.

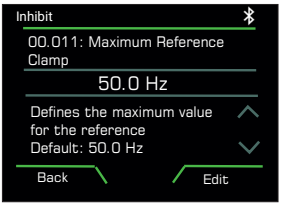
To perform an autotune:

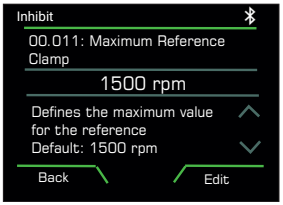
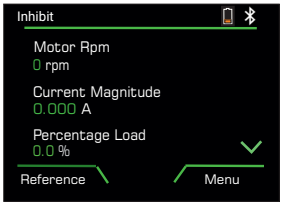
Set Pr **00.024** = 1 for a stationary autotune or set Pr **00.024** = 2 for a rotating autotune
Close the Drive Enable signal (terminal 29). The drive will display 'Off'.
Close the run signal (terminal 24). The upper row of the display will flash 'Auto Tune' while the drive is performing the autotune.

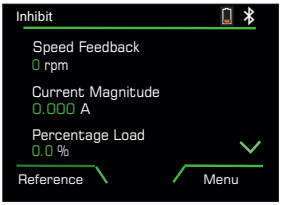
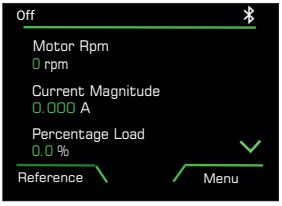
- Wait for the drive to display 'Inhibit' and for the motor to come to a standstill.

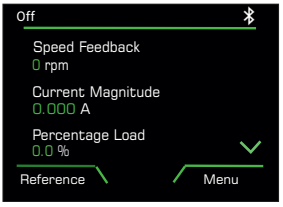
Remove the drive enable and run signal from the drive.

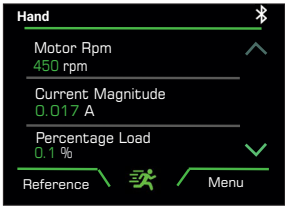
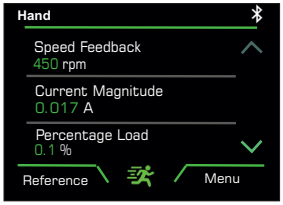
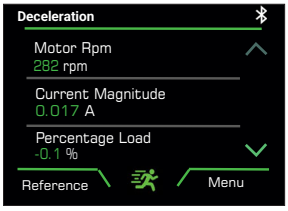
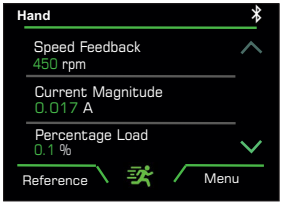
<table>
<tr><td>Save parameters</td><td>Select 'Save Parameters' in Pr mm.000 (enter a value of 1001 in Pr mm.000) using the navigations keys and press the red  reset button or toggle the reset digital input. Alternatively, save parameters using the Main Menu / Quick Actions / Save Parameters</td></tr>
<tr><td>Set the Maximum Reference Clamp.</td><td>By default, Maximum Reference Clamp Pr 00.011 normally matches Rated Frequency Pr 00.021

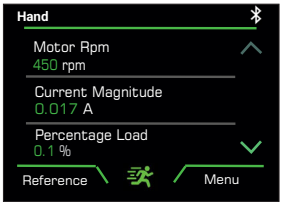
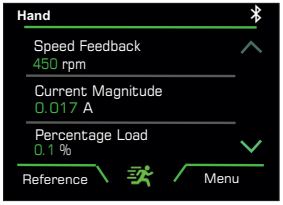
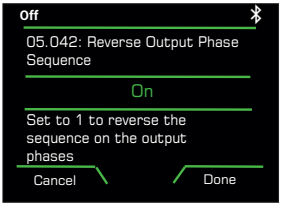
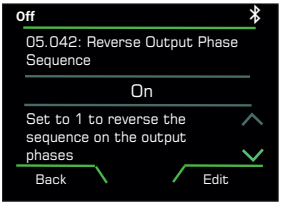
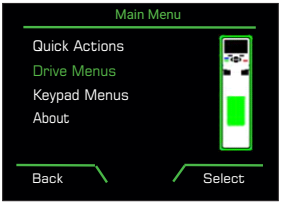
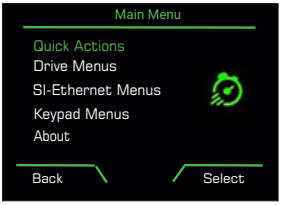
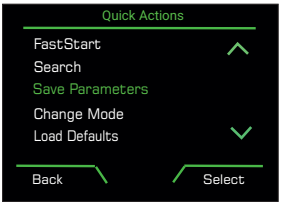
Open-loop Mode
 

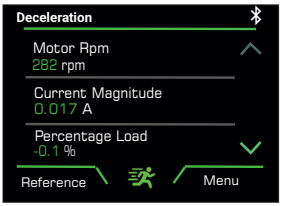
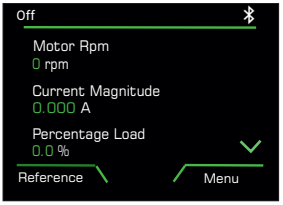
RFC-A Mode
 
</td></tr>
<tr><td>Set the Hand Mode Reference frequency.</td><td>The Drive's reference frequency by default is set to auto within Pr 01.052 at start up, and the reference by default will come through Analog input terminal T5 (by default set to 4-20 mA), by pressing the Hand mode, the keypad reference will be activated and the speed reference will then be determined by the up/Down arrows of the keypad, and will move between the min ref clamp (Pr 00.010 and max ref clamp (Pr 00.011).
Open-loop Mode
 

RFC-A Mode
 
</td></tr>
<tr><td>Enable the drive.</td><td>Close the Enable or Safe Torque Off input switch to the drive. NOTE The screen will change from Inhibit to Off.
Open-loop Mode
 

RFC-A Mode
 
</td></tr>
</table>

Start the motor in Hand mode.	Make sure it is safe to run the motor. Press the Green HAND button, the drive will start and the motor will accelerate to the hand speed reference which is nominally the minimum clamp frequency setting. **Open-loop Mode**  **RFC-A Mode**   Pressing the RED off button will then initiate a stop and the motor will decelerate to zero speed, note the inhibit will remain OFF. **Open-loop Mode**  **RFC-A Mode**  

Check the motor is turning in the correct direction.	Check that the motor is rotating in the correct direction. **NOTE** The speed may need to be lowered in order to note the direction **Open-loop Mode** **RFC-A Mode**   If the motor appears to be running in the wrong direction stop the drive from running by pressing the red OFF / Reset button or by opening the Hand switch. The software status changes to Off (Ready). Either reverse two motor phases electrically when safe to do so, or alternatively, set Reverse Output Phase Sequence Pr **05.042** to On.  After Done is selected the parameter is in use and will work until drive is power cycled.   Navigate back to the Main Menu Screen then use ∧ ∨ navigations keys on the keypad to navigate to Quick Actions.    Navigate to Save Parameters and select, screen will display “Saving Parameters”, then “Save Complete”.

Stop the motor.	For Open-Loop and RFC-A mode, stop the motor by pressing the red OFF / Reset button or by opening the Hand switch. The software status changes to *Off (Ready)*.   

Save parameters for Open-loop and RFC-A modes

Action	Detail	
Save parameters	Select 'Save Parameters' in Pr **mm.000** (alternatively enter a value of 1001 in Pr **mm.000**) and press red  reset button or toggle the reset digital input. Alternatively, save parameters using the Main Menu / Quick Actions / Save Parameters	
Run	Drive is now ready to run	

Run a Permanent-magnet motor in closed-loop sensorless (RFC-S)

To run the H300 Drive in RFC-S mode will require a mode change as the factory defaults are set for Open Loop Induction Motor.

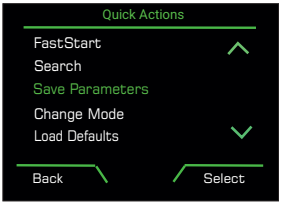
Before powering up the drive open the Enable/ Safe Torque Off input T29, and all run signals, so that the drive powers up in the Inhibit State.

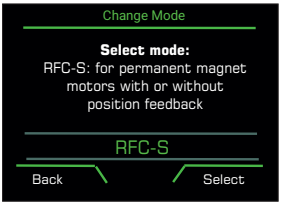
Procedure

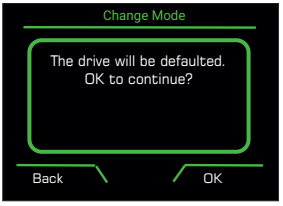
Use the following procedure only if a different operating mode is required:

Ensure the drive is not enabled, i.e. terminal 29 is open or Pr **06.015** is OFF (0)

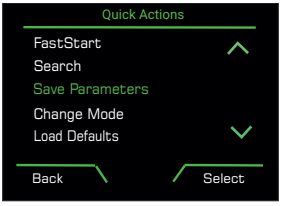
Open Loop is default, if RFC-S Mode is required then Main Menu/ Quick Actions/Mode Change.







On Selecting OK, a message will appear "preparing Drive", after a few seconds "Mode Change Successful" will appear. Then go back to "Quick Actions" and save parameters



1. Either:

- Press the red  reset button
- Toggle the reset digital input
- Carry out a drive reset through serial communications by setting Pr **10.038** to 100.

NOTE

Entering 1253 or 1254 in Pr **mm.000** will only load defaults if the setting of Pr **11.031** has been changed.

Saving parameters

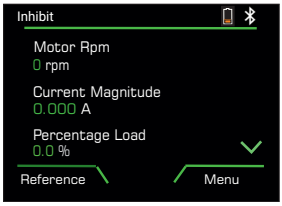
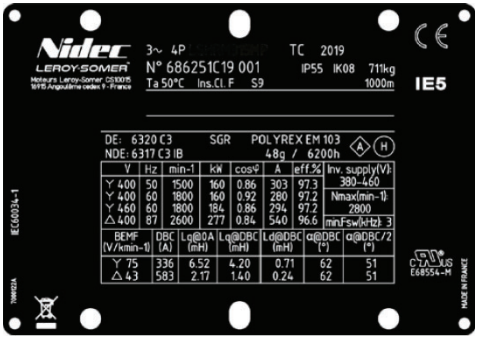
When changing a parameter in Menu 0, the new value is saved when pressing the Enter button to return to parameter view mode from parameter edit mode.

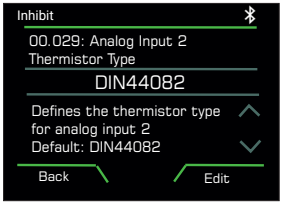
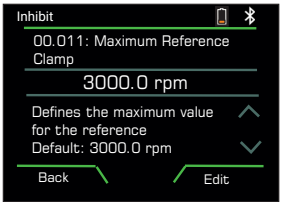
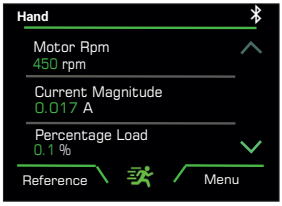
If parameters have been changed in the advanced menus, then the change will not be saved automatically. A save function must be carried out.

Procedure

1. Select 'Save Parameters' in Pr **mm.000** (enter a value of 1001 in Pr **mm.000**) Alternatively, save parameters using the Main Menu / Quick Actions / Save Parameters
2. Either:

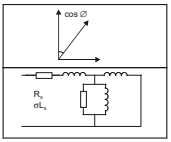
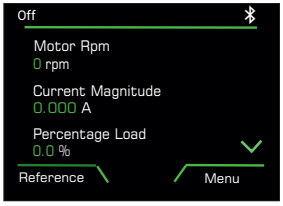
- Press the red reset button
- Toggle the reset digital input
- Carry out a drive reset through serial communications by setting Pr **10.038** to 100

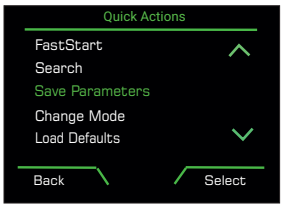
Action	Detail
Before power up.	Open the Enable or Safe Torque Off, Hand and Auto mode switches so the drive powers up in the Inhibit state. Ensure that the motor shaft is free to turn and that all safety guidelines are adhered to.
Power up.	After power, up the display indicates as shown below. 
Configure the motor name plate details.	• Set *Back EMF / Ke* Pr **00.021**, the Back EMF / Ke in Volts per 1000 rpm (V/kmin^{-1}). • Set *Motor Rated Current* Pr **00.020**, the motor rated current in Amps. • Set *Motor Rated S.peed* Pr **00.019**, the motor rated speed in rpm. • Set *Motor Rated Voltage* Pr **00.018**, the motor rated voltage in Volts. • Set *Number of Motor Poles* Pr **00.017,** the number of motor poles. 

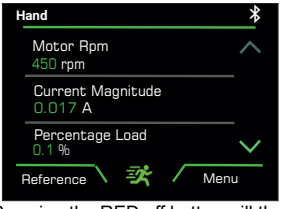
Configure Motor Thermal Protection	If the Motor requires thermal protection the H300 Drive has the following Thermistor types programmed within parameter Pr **00.029** Analog Input 2 Thermistor Type. DIN44082 (Default) KTY84 PT100 PT1000 PT2000 NI1000 Parameter Pr **00.027** Analog Input 2 Mode will need to be set to either of the following as required by the application. Therm Short Cct Thermistor Therm No Trip 
Set the Maximum Reference Clamp	By default, *Maximum Reference Clamp* Pr **00.011** normally matches *Rated Frequency* Pr **00.021** 
Set the Hand Reference Speed	The Drive's reference frequency by default is set to auto within Pr **01.052** at start up, and the reference by default will come through Analog input terminal T5 (by default set to 4-20 mA), by pressing the Hand mode, the keypad reference will be activated and the speed reference will then be determined by the up/Down arrows of the keypad, and will move between the min ref clamp (Pr **00.010** and max ref clamp (Pr **00.011**).  Set HAND mode by pressing the Green HAND button.

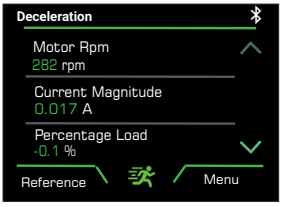
<table>
<tr><td>Autotune</td><td>The drive is able to perform either a stationary or a rotating autotune. The motor must be at a standstill before an autotune is enabled. A rotating autotune should be used whenever possible so the measured value of power factor of the motor is used by the drive.

WARNING
A rotating autotune will cause the motor to accelerate up to 2/3 base speed in the direction selected regardless of the reference provided. Once complete the motor will coast to a stop. The enable signal must be removed before the drive can be made to run at the required reference.
The drive can be stopped at any time by removing the run signal or removing the drive enable.

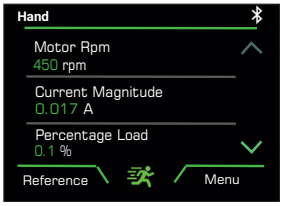
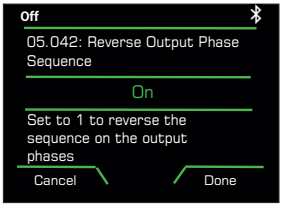
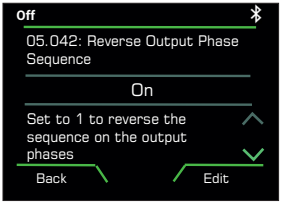
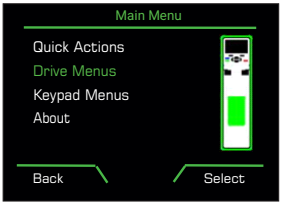
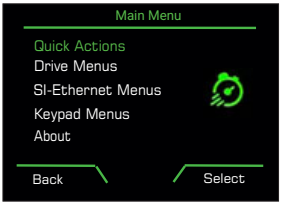
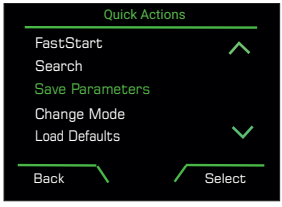
• A stationary autotune can be used when the motor is loaded and it is not possible to uncouple the load from the motor shaft. A stationary autotune measures stator resistance and transient inductance of the motor and values relating to deadtime compensation from the drive. These are required for good performance in vector control modes. A stationary autotune does not measure the power factor of the motor so the value on the motor nameplate must be entered into Rated Power Factor Pr 05.010.
• A rotating autotune should only be used if the motor is uncoupled. A rotating autotune first performs a stationary autotune before rotating the motor at 2/3 base speed in the direction selected. The rotating autotune measures the power factor of the motor.
To perform an autotune:
• Set Pr 00.024 = 1 for a stationary autotune or set Pr 00.024 = 2 for a rotating autotune
• Close the Drive Enable signal (terminal 29). The drive will display ’Off’.
• Close the run signal (terminal 24). The upper row of the display will flash ’Auto Tune’ while the drive is performing the autotune.
• Wait for the drive to display ‘Inhibit’ and for the motor to come to a standstill.</td><td>  </td></tr>
<tr><td>Check saliency</td><td colspan="2">In sensorless mode, when the motor speed is below Pr 00.019 / 10, a special low speed algorithm must be used to control the motor. There are three modes available, with the mode chosen based on the saliency of the motor.
The ratio No-load Lq (Pr 00.042) / Ld (Pr 05.024) provides a measure of the saliency. If this value is > 1.1, then Injection (0) mode may be used. Current (2) mode may be used (but with limitations). If this value is < 1.1, then Current (2) mode must be used.
Set Pr 00.040 for the required mode: Injection (0) or Current (2).</td></tr>
<tr><td>Enable the drive</td><td colspan="2">Close the Enable or Safe Torque Off input switch to the drive. The H300 Drive status changes to Off (Ready).
  </td></tr>
</table>

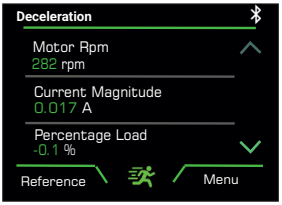
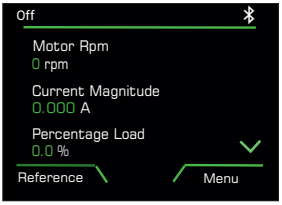
<table>
<tr>
<td>Save the drive parameters</td>
<td> 


</td>
</tr>
<tr>
<td>Start the motor in Hand mode</td>
<td>Make sure it is safe to run the motor. Press the Green HAND button, the drive will start and the motor will accelerate to the hand speed reference which is nominally the minimum clamp frequency setting.
 

Pressing the RED off button will then initiate a stop and the motor will decelerate to zero speed, note the inhibit will remain OFF.
 

Increase the Sensorless Mode Filter value Pr 03.079 in single steps until the required performance is reached. Stop and start the motor making sure it starts and runs at high speed properly.
If the motor doesn’t start properly and there is significant starting torque required to turn the load, check if the RFC Low Speed Mode Pr 05.064 = Injection. If it is set to “Injection” please try setting Pr 05.064 to “Current” instead and Increase the Low Speed Sensorless Current Pr 05.071 to 100 %.</td>
</tr>
</table>

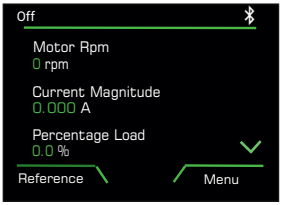
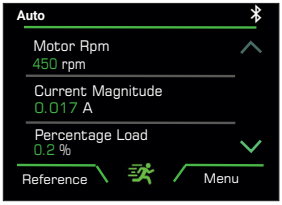
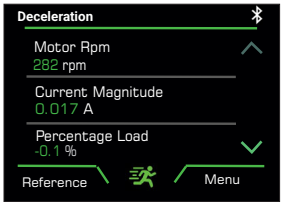
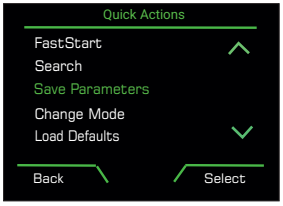
Check the motor is turning in the correct direction.	Check that the motor is rotating in the correct direction. **NOTE** The speed may need to be lowered in order to note the direction  If the motor appears to be running in the wrong direction stop the drive from running. Either reverse two motor phases electrically when safe to do so, or alternatively, set Reverse Output Phase Sequence Pr **05.042** to On. To do this in software, stop the motor by pressing the red OFF / Reset button or by opening the Hand switch. The software status changes to Off (*Ready*).  After Done is selected the parameter is in use and will work until drive is power cycled.   Navigate back to the Main Menu Screen use ∧ ∨ navigations keys on the keypad to navigate to Quick Actions.    Navigate to Save Parameters and select, screen will display “Saving Parameters”, then “Save Complete”.

Stop the motor.	Stop the motor by pressing the red OFF / Reset button or by opening the Hand switch. The software status changes to *Off (Ready)*.   

STEP 10: Running the drive in Auto mode

This section gives guidance on how to get running in Auto mode.

By default the drive is set via Pr **01.052** to Auto (1).

Action	Detail
Enable the drive	Close the Enable or Safe Torque off input to the drive. 
Start the motor in Auto Mode	Make sure that it is safe to run the motor. By applying the run command to a Digital input by (default the Run Forward mode is connected to DIGIN 3 T24 Pr **08.023**), the drive will start and ramp up to a reference value set via the reference selector Pr **01.014**. 
Stop the motor by removing the Run Forward Command or stop button.	The Drive will decelerate to a stop. 
Save the drive parameters.	Set Pr **00.000** to “Save Parameters” and press the red OFF / Reset button.  

Additional Information

Restoring drive defaults

Restoring parameter defaults by this method saves the default values in the drives memory. *User security status* (Pr **00.031**) and *User security code* (Pr **00.030**) are not affected by this procedure).

Procedure

1. Ensure the drive is not enabled, i.e. terminal 29 is open or Pr **06.015** is OFF (0)
2. Select 'Reset 50 Hz Defs' or 'Reset 60 Hz Defs' in Pr **mm.000**. (alternatively, enter 1233 (50 Hz settings) or 1244 (60 Hz settings) in Pr **mm.000**). Alternatively, go to Main Menu / Quick Actions / Load Defaults
3. Either:

- Press the red  reset button
- Toggle the reset digital input
- Carry out a drive reset through serial communications by setting Pr **10.038** to 100

Basic parameters range and default

For information on the full list of Menu 0 parameters please refer to Menu 0000 from the *H300 User Guide*.

Parameter			Range			Default		
			OL	RFC-A	RFC-S	OL	RFC-A	RFC-S
00.001	Motor Rpm	**{05.004}**	±180000 rpm					
	Speed Feedback	**{03.002}**		VM_SPEED rpm				
00.002	Output Frequency	**{05.001}**	VM_SPEED_FREQ_REF Hz	±2000.0 Hz				
00.003	Current Magnitude	**{04.001}**	0.000 to VM_DRIVE_CURRENT_UNIPOLAR A					
00.004	Output Power	**(05.003)**	VM_POWER kW					
00.005	Software Version	**{11.029}**	00.00.00.00 to 99.99.99.99					
00.010	Minimum Reference Clamp	**{01.007}**	VM_NEGATIVE_REF_CLAMP1 Hz / rpm			15 Hz	450 rpm	
00.011	Maximum Reference Clamp	**{01.006}**	VM_POSITIVE_REF_CLAMP1 Hz / rpm			50 Hz default: 50.0 Hz 60 Hz default: 60.0 Hz	50 Hz default: 1500.0 rpm 60 Hz default: 1800.0 rpm	3000.0 rpm
00.012	Acceleration Rate 1	**{02.011}**	0.0 to VM_ACCEL_RATE s to Pr **01.006**	0.000 to VM_ACCEL_RATE s to Pr **01.006**		10.0 s to Pr **01.006**	10.000 s to Pr **01.006**	
00.013	Deceleration Rate 1	**{02.021}**	0.0 to VM_ACCEL_RATE s from Pr **01.006**	0.000 to VM_ACCEL_RATE s from Pr **01.006**		10.0 s from Pr **01.006**	10.000 s from Pr **01.006**	
00.014	Open-loop Control Mode	**{05.014}**	Ur S (0), Ur (1), Fixed (2), Ur Auto (3), Ur I (4), Square (5), Current 1P (6)			Fixed (2)		
	Speed Controller Proportional Gain Kp1	**{03.010}**		0.0000 to 200.0000 s/rad			0.0300 s/rad	
00.015	Dynamic V to F Select	**{05.013}**	Off (0) or On (1)			On (1)		
	Speed Controller Integral Feedback Gain Ki 1	**{03.011}**		0.00 to 655.35 s^2/rad			0.10 s^2/rad	

Parameter			Range			Default		
			OL	RFC-A	RFC-S	OL	RFC-A	RFC-S
00.016	Low Frequency Voltage Boost	{05.015}	0.0 to 25.0 %			0.50 %		
	Speed Controller Differential Feedback Gain Kd1	{03.012}		0.00000 to 0.65535 1/rad			0.00000 1/rad	
00.017	Number Of Motor Poles	{05.011}	Automatic (0) to 480 Poles (240)			Automatic (0)		8 Poles (4)
00.018	Rated Voltage	{05.009}	0 to VM_AC_VOLTAGE_SET V			200V drive: 230V 50Hz default 400V drive: 400V 60Hz default 400V drive: 460V 575V drive: 575V 690V drive: 690V		
00.019	Rated Speed	{05.008}	0 to 33000 rpm	0.00 to 33000.00 rpm		50 Hz default - 1500 rpm 60 Hz default- 1800 rpm	50 Hz default - 1450.00 rpm 60 Hz default- 1750.00 rpm	3000.00 rpm
00.020	Rated Current	{05.007}	0.000 to VM_RATED_CURRENT A			Maximum rated current (Pr 11.060) A		
00.021	Rated Frequency	{05.006}	0.0 to 550.0 Hz			50 Hz default: 50.0 60 Hz default: 60.0		
	Volts per 1000 rpm	{05.033}			0 to 10000 V / 1000 rpm			98 V / 1000 rpm
00.022	Maximum Switching Frequency	{05.018}	2 kHz (0), 3 kHz (1), 4 kHz (2), 6 kHz (3), 8 kHz (4), 12 kHz (5), 16 kHz (6)			3 kHz (1)		
00.023	Catch A Spinning Motor	{06.009}	Disable (0), Enable (1), Fwd Only (2), Rev Only (3)			Enable (1)		
00.024	Auto-tune	{05.012}	0 to 2	0 to 2	0, 1, 2, 6	0		
00.025	Analog Input 1 Mode	{07.007}	4-20 mA Low (-4), 20-4 mA Low (-3), 4-20 mA Hold (-2), 20-4 mA Hold (-1), 0-20 mA (0), 20-0 mA (1),4-20 mA Trip (2), 20-4 mA Trip (3), 4-20 mA (4), 20-4 mA (5), Volt (6), Therm Short Cct (7), Thermistor (8), Therm No Trip (9)			4-20 mA (4)		
00.026	Analog Input 1 Destination	{07.010}	0.000 to 59.999			01.036		
00.027	Analog Input 2 Mode	{07.011}	4-20 mA Low (-4), 20-4 mA Low (-3), 4-20 mA Hold (-2), 20-4 mA Hold (-1), 0-20 mA (0), 20-0 mA (1), 4-20 mA Trip (2), 20-4 mA Trip (3), 4-29 mA (4), 20-4 mA (5), Volt (6), Therm Short Cct (7), Thermistor (8), Therm No Trip (9)			Volt (6)		
00.028	Analog Input 2 Destination	{07.014}	00.000 to 59.999			01.037		
00.029	Analog Input 2 Thermistor Type	{07.058}	DIN44082 (0), KTY84 (1), PT100 (2), PT1000 (3), PT2000 (4), NI1000 (5)			DIN44082 (0)		
00.030	User Security Code	{11.030}	0 to 2147483647			0		
00.031	User Security Status	{11.044}	Menu 0 (0), All Menus (1), Read-only Menu 0 (2), Read-only (3), Status Only (4), No Access (5)			Menu 0 (0)		
00.032	NV Media Card Data Previously Loaded	{11.036}	0 to 999			0		

Parameter			Range			Default		
			OL	RFC-A	RFC-S	OL	RFC-A	RFC-S
00.033	Parameter Cloning	**{11.042}**	None (0), Read (1), Program (2), Auto (3), Boot (4)			None (0)		
00.034	Date	**{06.016}**	00-00-00 to 31-12-99					
00.035	Time	**{06.017}**	00:00:00 to 23:59:59					
00.036	Day Of Week	**{06.018}**	Sunday (0), Monday (1), Tuesday (2), Wednesday (3), Thursday (4), Friday (5), Saturday (6)					
00.037	Date/Time Selector	**{06.019}**	Set (0), Powered (1), Running (2), Acc Powered (3), Local Keypad (4), Remote Keypad (5), Slot 1 (6), Slot 2 (7), Slot 3 (8), Slot 4 (9)			Local Keypad (4)		
00.038	Date Format	**{06.020}**	Std (0) or US (1)			US (1)		
00.040	RFC Low Speed Mode	**{05.064}**			Injection (0), Non-salient (1), Current (2), Current No Test (3)			Non-salient (1)
00.041	Low Speed Sensorless Mode Current	**{05.071}**			0.0 to 1000.0 %			20.0 %
00.042	No-load Lq	**{05.072}**			0.000 to 500.000 mH			0.000 mH
00.043	Iq Test Current for Inductance Measurement	**{05.075}**			0 to 200 %			100 %
00.044	Phase Offset At Iq Test Current	**{05.077}**			±90.0 °			0.0 °
00.045	Lq At The Defined Iq Test Current	**{05.078}**			0.000 to 500.000 mH			0.000 mH
00.046	Id Test Current for Inductance Measurement	**{05.082}**			-100 to 0 %			-50 %
00.047	Lq At The Defined Id Test Current	**{05.084}**			0.000 to 500.000 mH			0.000 mH
00.048	Number Of Auto-reset Attempts	**{10.034}**	None (0), 1 (1), 2 (2), 3 (3), 4 (4), 5 (5), Infinite (6)			5 (5)		
00.049	Auto-reset Delay	**{10.035}**	0.0 to 600.0 s			5.0 s		
00.050	Trip 0	**{10.020}**	0 to 255					
00.051	Trip 1	**{10.021}**	0 to 255					
00.052	Trip 2	**{10.022}**	0 to 255					
00.053	Trip 3	**{10.023}**	0 to 255					
00.054	Trip 4	**{10.024}**	0 to 255					
00.055	Trip 5	**{10.025}**	0 to 255					
00.056	Trip 6	**{10.026}**	0 to 255					
00.057	Trip 7	**{10.027}**	0 to 255					
00.058	Trip 8	**{10.028}**	0 to 255					
00.059	Trip 9	**{10.029}**	0 to 255					
00.060	Trip 0 Date	**{10.041}**	00-00-00 to 31-12-99					
00.061	Trip 0 Time	**{10.042}**	00:00:00 to 23:59:59					

Parameter			Range			Default		
			OL	RFC-A	RFC-S	OL	RFC-A	RFC-S
00.062	Trip 1 Date	**{10.043}**	00-00-00 to 31-12-99					
00.063	Trip 1 Time	**{10.044}**	00:00:00 to 23:59:59					
00.064	Trip 2 Date	**{10.045}**	00-00-00 to 31-12-99					
00.065	Trip 2 Time	**{10.046}**	00:00:00 to 23:59:59					
00.066	Trip 3 Date	**{10.047}**	00-00-00 to 31-12-99					
00.067	Trip 3 Time	**{10.048}**	00:00:00 to 23:59:59					
00.068	Trip 4 Date	**{10.049}**	00-00-00 to 31-12-99					
00.069	Trip 4 Time	**{10.050}**	00:00:00 to 23:59:59					
00.070	Trip 5 Date	**{10.051}**	00-00-00 to 31-12-99					
00.071	Trip 5 Time	**{10.052}**	00:00:00 to 23:59:59					
00.072	Trip 6 Date	**{10.053}**	00-00-00 to 31-12-99					
00.073	Trip 6 Time	**{10.054}**	00:00:00 to 23:59:59					
00.074	Trip 7 Date	**{10.055}**	00-00-00 to 31-12-99					
00.075	Trip 7 Time	**{10.056}**	00:00:00 to 23:59:59					
00.076	Trip 8 Date	**{10.057}**	00-00-00 to 31-12-99					
00.077	Trip 8 Time	**{10.058}**	00:00:00 to 23:59:59					
00.078	Trip 9 Date	**{10.059}**	00-00-00 to 31-12-99					
00.079	Trip 9 Time	**{10.060}**	00:00:00 to 23:59:59					
00.080	NV Media Card Action Status	**{11.078}**	None (0), Active (1), Card Slot 1 (2), Card Slot 2 (3), Card Slot 3 (4), Card Slot 4 (5), Card Product (6), Card User Prog (7), Card Busy (8), Card Data Exists (9), Card Option (10), Card Read Only (11), Card Error (12), Card No Data (13), Card Full (14), Card File Error (15), Card Rating (16), Card File Data (17), Card Derivative (18)					

Diagnostics

To read the latest fault data and history, the data is stored in Pr **10.020** through to Pr **10.029** with Pr **10.020** being the most recent.

To access fault data go to - Main Menu/Drive Menus/10: Status and Trips

Pr **10.020** Trip 0 - Most recent Trip data Pr **10.070** sub-trip data for Pr **10.020**.

Pr **10.021** Trip 1 Pr **10.071** Sub-trip data for Pr **10.021**

Through to:

Pr **10.029** Trip 9 Pr **10.029** Sub-trip Data for Pr **10.029**

Appendix A UL information

A.1 UL file reference

These products are cUL Listed to Canadian and US requirements.

UL file reference is: NMMS/7 E171230.

Products that incorporate the Safe Torque Off (STO) function are Certified for Functional Safety.

UL file reference: FSPC E171230.

A.2 Operating environment

Pollution Degree

Products must be installed in a Pollution Degree 2 environment or better (dry, non-conductive pollution only).

Ambient temperature

The drives have been evaluated for use at ambient temperatures up to 40 °C. The drives have additionally been evaluated for 50 °C and 55 °C ambient air temperatures with a derated output.

The maximum surrounding air temperature is 55 °C.

A.3 Enclosure Ratings

Open Type

The products are Open Type as supplied.

Type 1

When fitted with a conduit box, the products meet the requirements for UL Enclosed Type 1. Suitable conduit boxes are available.

A.4 Through-panel (Type 12) mounting

Mounting hole access

When the drive is through-panel mounted, the main terminal cover(s) must be removed in order to provide access to the mounting holes. Once the drive has been mounted, the terminal cover(s) can be replaced.

A.5 Mounting bracket torque setting

Frame sizes 3 & 4

Through panel mounting brackets should be tightened to a maximum torque of 2 N m (16.8 lb in).

A.6 Installation in air handling spaces (plenum rating)

These products have been evaluated in accordance with the Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products and their Accessories Installed in Air-Handling Spaces, UL 2043.

Products installed in air handling spaces must be Enclosed Type 1 as a minimum. A conduit box must be fitted. Alternatively, the product can be through-panel mounted in a Type 12 enclosure with the heatsink protruding through the wall of the enclosure into the air-handling space.

A.7 Mechanical Installation

Mounting

Products can be mounted on a vertical surface using the brackets provided. Several products may be mounted side by side without airspace between them.

In installations where space is limited, products with frame sizes 3, 4 and 5 may be 'Tile Mounted'. In this configuration, the unit is mounted sideways with the side panel against the mounting surface. A Tile Mounting Kit is available but must be ordered separately.

A.8 Terminal Torque

Torque settings are specified in relevant sections of this guide.

A.9 Electrical Installation

Overvoltage category

Drives have been evaluated for OVC III

Branch circuit Protection

Branch circuit protection must be provided in accordance with the National Electrical Code (NEC), The Canadian Electrical Code, and any additional local codes.

The recommended fuses are specified within this guide.

Opening of branch circuit protective device

The opening of the branch-circuit protective device may be an indication that a fault has been interrupted. To reduce the risk of fire or electric shock, the equipment may be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced. Integral solid-state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local “codes”, or the equivalent.

Cables

Field wiring must use 75 °C rated copper wire only.

Ground connections

UL Listed closed-loop connectors sized according to the field wiring must be used for all ground connections.

Power connections

Frame sizes 3, 4 and 5: These frame sizes use plug-in terminal blocks for the power connections.

Frame sizes 6 to 11: UL Listed closed loop connectors sized according to the field wiring must be used for all power connections.

A.10 Motor overload protection

All models incorporate internal overload protection for the motor load that does not require the use of an external or remote overload protection device. The protection level is adjustable with the maximum current overload being dependent on the values entered into the current limit parameters (Pr **04.005** motoring current limit, Pr **04.006** regenerative current limit and Pr **04.007** symmetrical current limit entered as percentage) and Pr **05.007** motor rated current parameter (entered in Amperes). The duration of the overload is dependent on Pr **04.015** motor thermal time constant.

A.11 Thermal memory retention

All models are provided with thermal memory retention.

A.12 Motor protection using an external sensor

User terminals are provided that can be connected to a motor thermistor to protect the motor from high temperature, in the event of a motor cooling fan failure.

A.13 Transient Surge Suppression

Frames sizes 7 & 8 – 575 V ratings

Transient surge suppression shall be installed on the line side of this equipment and shall be rated to 575 Vac (phase to ground), 575 Vac (phase to phase), suitable for overvoltage category III, and shall provide protection for an impulse withstand voltage peak of 6 kV and a clamping voltage of maximum 2400 V.

A.14 Dynamic braking

The drives have not been evaluated for dynamic braking.

A.15 External Class 2 supply

Frame sizes 7 to 11

The external power supply shall be marked with the following: “Class 2” and the power supply shall not exceed 24 Vdc.

A.16 Modular Drive Systems

Products with DC+ and DC- supply connections have been investigated for use in Modular Drive Systems as inverters when supplied by the converter sections from the Unidrive-M or Mentor MP range. In these applications the inverters are required to be additionally protected by supplemental fuses.

A.17 AC supply, AC supply fuses and short circuit current rating (SCCR)

Frame sizes 3 & 4

Suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical Amperes, 480 Volts AC maximum when protected by the specified fuses.

UL Listed closed-loop connectors sized according to the field wiring shall be used for grounding connections. Frame size 6 only for closed loop connectors on all power connections (size 4 has a power connector like size 3 not studs)

Frame sizes 5 & 6

Suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical Amperes, 575 Volts AC maximum when protected by the specified fuses.

Frame size 7 & 8

Suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical Amperes, (rated voltage in the ratings table or the product label) Volts AC Maximum when protected by the specified fuses.

Frame sizes 9 & 10

Suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical Amperes, (voltage rating in ratings table or the product label) Volts AC Maximum when protected by the specified fuses.

Frame size 11

Suitable for use on a circuit capable of delivering not more than 100,000 RMS symmetrical Amperes, (voltage rating in ratings table or the product label) Volts AC Maximum when protected by the specified fuses.

A.18 Modular / group / parallel installation

Supply wiring

When used in modular drives/group / parallel installation applications the supply wires are not to be larger than 125 % of full load current of the device ratings

CSA (Canadian Standards Authority) approval

Frame sizes 9 to 11 are not certified for CSA approval when used in a modular / parallel setup.

Supply from converters

These devices are only intended to be supplied by converters manufactured by Control Techniques Ltd. when used as inverters.

Warning Before using this product you must read and understand the safety information within the User Guide at the URL below.	**Avertissement** Avant d'utiliser ce produit, il est impératif de lire et de bien comprendre les consignes de sécurité du Guide de mise en service, disponible à l'adresse ci-dessous.
Avvertenza Prima di utilizzare questo prodotto leggere e assicurarsi di aver compreso le informazioni sulla sicurezza contenute nella Guida dell'utente consultabile all'URL indicato qui sotto.	**Warnung** Bevor Sie dieses Produkt verwenden, müssen Sie die Sicherheitshinweise in der Betriebsanleitung unter der nachstehenden URL lesen und verstehen.
Advertencia Antes de utilizar este producto, debe leer y comprender la información de seguridad de la Guía del usuario en la siguiente URL.	**Предупреждение** Преди да използвате този продукт, трябва да прочетете и разберете информацията за безопасност в ръководството за потребителя на URL адреса по-долу.
Upozorenje Prije upotrebe ovog proizvoda morate pročitati i razumjeti sigurnosne informacije iz Korisničkog vodiča na donjem URL-u.	**Varování** Před použitím tohoto výrobku si musíte na níže uvedené adrese URL přečíst v návodu k použití bezpečnostní informace a porozumět jim.
Προειδοποίηση Πριν από τη χρήση αυτού του προϊόντος, πρέπει να διαβάσετε και να κατανοήσετε τις πληροφορίες ασφαλείας που περιλαμβάνει ο Οδηγός χρήστη στην παρακάτω διεύθυνση.	**Aviso** Antes de utilizar este produto, deve ler e compreender as informações de segurança contidas no guia do utilizador que pode encontrar no URL abaixo.
Advarsel Før du tager dette produkt i brug, skal du have læst og forstået sikkerhedsoplysningerne i brugervejledningen på webadressen nedenfor.	**Figyelem** A termék használata előtt el kell olvasnia és meg kell értenie a Felhasználói útmutatóban található biztonsági információkat az alábbi URL-címen.
Avertizare Înainte de a utiliza acest produs, trebuie să citiți și să înțelegeți informațiile referitoare la siguranță din Ghidul de utilizare de la adresa URL de mai jos.	**Waarschuwing** Vóór gebruik van dit product moet u de veiligheidsinformatie in de Handleiding op de URL hieronder lezen en begrijpen..
Upozornenie Pred použitím tohto produktu si musíte prečítať a porozumieť všetkým bezpečnostným pokynom uvedeným v Používateľskej príručke, ktorú nájdete na nasledujúcej adrese URL.	**Hoiatus** Enne selle toote kasutamise alustamist peate lugema ja mõistma alltoodud URL-aadressil asuvas kasutusjuhendis toodud ohutusalast teavet.
Brīdinājums Pirms šā produkta lietošanas ir jāizlasa un jāizprot informācija par drošību, kas iekļauta lietošanas pamācībā tālāk norādītajā URL.	**Opozorilo** Pred uporabo tega izdelka morate prebrati in razumeti varnostne informacije v navodilih za uporabo na spodnjem spletnem naslovu.
Varoitus Ennen kuin käytät tätä tuotetta, sinun on luettava ja ymmärrettävä turvallisuusohjeet, jotka sisältyvät alla mainitussa verkko-osoitteessa olevaan käyttöoppaaseen.	**Įspėjimas** Prieš pradėdami naudoti šį gaminį perskaitykite ir įsitikinkite, kad supratote saugos informaciją, pateiktą naudotojo vadove, esančiame toliau nurodytu universaliu adresu.
Twissija Qabel ma tuża dan il-prodott inti għandek taqra u tifhem l-istruzzjonijiet ta' sikurezza fi ħdan il-Gwida għall-Utent fil-URL t'isfel.	**Varning** Innan du använder denna produkt måste du läsa och förstå säkerhetsinformationen i användarhandboken på nedanstående URL-adress.
Ostrzeżenie Przed przystąpieniem do użytkowania produktu należy przeczytać ze zrozumieniem informacje dotyczące bezpieczeństwa przedstawione w Podręczniku użytkownika dostępnym pod następującym adresem.	

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