

HS 252 - STANDARD ASSEMBLY TORQUES

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REVISION LOG

Rev.	Remarks
77	Added Section 17.14 – Torque values for IGUS CFX Clamps
76	Table 30 - Heavy-Duty Hose Clamp (T-Bolt Style). Model number and torque values updated
75	Added Section 17.13 - Torque value for EV9 Flow Control Valve (HPN 7610661)
74	Added Section 17.8.1 – Torque value for Hydac Differential Pressure Transmitter (HPN 6404099). Torque values for orifices on hydraulic manifolds added (See Table 27). Torque values for gas valves added (See Section 17.12)
73	Updated torque for heater bands which have corrugated sheet metal on the outside diameter and also having an M6 clamping screw (Section 15, Table 22). Also updated torque values in section 17.7 for the Hydac oil level sight gauge to align with supplier specification.
72	Updated torque requirements for EOAT Tube Retainer Pins in section 19.2. Section 17.8 Torque values for Hydac PTs reviewed with Hydac (Feb. 16, 2022) and increased from 20 N-m to 40 N-m. The purpose of the increased torque is to reduce/eliminate oil leakage from PT and fitting interface. Both Hydac and Husky test results show insignificant effect of increased torque on PT performance (i.e. insignificant null point shift).
71	Added section 19.13: Torque Specification for NexPET Core Sleeve Set Screws. DLO specifications updated (2205)
70	Updated CoolPik Vacuum/Blow Pin Torque Specifications Table 40 with values for M20 blow pins
69	Removed Adhesive info and moved to HS 897 – Adhesive Standard. Left Torque/Loctite info for clamp fasteners.
68	Section 17.08 Torque values added for new Hydac PT HPN 9247632
67	Lubrication notes added to section 14 - Torque values for fittings (HGT-FT)

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66	Section 14 Torque values for fittings (HGT-FT) reviewed and updated: Section 14.1 relocated and revised to clarify assembly lubrication practices. Tables 12, 13, 14, 15, 18 and 19 updated as per the latest industry standards from Parker and Manuli. Section 17.11 added: Torque value for male pressure test point specified as per latest Hydac catalog.
65	ORFS hose end fittings specifications: Increased torque values in table 13. Note: Previous torque values were too low especially for the smaller sizes and failed a pull test audit. Manuli torque values for nut tightening have been tested and approved. Warning: Husky torque specifications apply to lubricated parts while Manuli's apply in dry conditions. As a result, Husky exceeds Manuli's recommended preload.
	DLO Details 2015 specifications: Sheet 1: Added Spade terminal "S0" and "S8" Code. Sheet 6: HPN 7404990 updated AWG and Torque value. HPN 5832899 updated AWG value.
	Sheet 8: Added * Larger termination screws Sheet 10: HPN 2172625 added load side termination details Sheet 11: Added HPN 2351717 Sheet 12: Added HPN 6344019
	Sheet 14: Added HPN 8425223
64	DLO Details 1933 table updated to reflect current product usage along with torque value consolidation - See section 15 or DLO Details (English) 1937 or DLO Details (Chinese) 1937 specifications
63	DLO device torque specifications changes (DLO Details 1933) - See section 15 or <u>HGT-EL DLO</u>
62	Unit changed from ft-lb to in-lb in Table 22 - HGT-EL Metric and Imperial Screws, Mounting Hardware (Electrical Applications) to align with other tables and tooling in use
61	HF and Cxx stopper code notes updated in HGT-EL DLO
60	Section 17.6 Added value for 2.5" G2 Section 17.5 Updated table for DBDS relief valves
59	Added Section 17.10 for Numatics air valve assemblies
58	Section 17.8 updated. Old Hydac pressure transducer (HPN 3875996) replaced with new (HPN 7980938)
57	Added torques for Stopflex hose bands and heavy-duty hose clamp (T-Bolt style)
56	Added torque for electrical cabinet door ground stud
55	Updated as per SR 51455: Added note/picture for Cold Half and Hot Runner Mounting to Machine Platen in Husky General Torque (HGT) - Standard Applications
54	Updated as per SR 50799: Added sections 19.9, 19.10, 19.11, 19.12. Updated Sections 19.5, 19.6, 19.7, 19.9. Replaced and moved the table from section 19.7 to section 19.8
53	Added torque specifications for Premolded Cables, Electrical Applications). Bookmarks to multiple tables added. Table for HGT- 35 specifications updated (Stainless steel A2, socket head cap screw application added)
52	Table for HGT-EL Heater Bands, Electrical Applications updated. Torque values for UNC # 1/4 - 20 spider straps and post terminal nut added. Torque values for Danfoss pressure transducers added (see section 17.9)
51	Added torque specifications for Neck Ring Plugs
50	Section 15 - HGT-EL Heater Bands, Electrical Applications updated. Torque value applied to ground stud nut specified.
49	Section 4 – References updated for HGT 80, 50 and 35 torque calculations (units of measure added)
48	Torque value for solid state relay added
47	2739013 CAM follower torque specifications updated
46	Table 1 updated and new Figure 1 added to clarify Husky General Torque Standard Applications (#1 to 8)
45	Torque values for Watlow heater bands added
44	Updated torque values for Watlow heater bands, torque values for Hydac oil level indicators added (see section 17.7), torque values for Hydac pressure transducers added (see section 17.8). HGT-EL DLO updated as per latest master



43	Updated torque values for HGT-LHCS (Low Head Cap Screws)
42	Section 19.1
41	Baumuller torque values in HGT-EL DLO updated to reflect mid-range torque values
40	Minor addition to sheet 6 in HGT-EL DLO as per manufacturing request
39	HGT-LHCS (Low Head Cap Screws) specifications added (section 13). Warning section added (section 5)
38	Section 13 updated (HGL-EL). Torque values for DLO related connections removed and consolidated into a separate document: HGT-EL DLO
37	Updated torque values for COOLPIK blow/vacuum pins in section 19.3 . Reference SIR 105554
36	Torque values for heater bands added/updated
35	Added note that states: "this document has a duplicate copy that's published to <u>www.husky.co</u> , all future revisions must be posted to www. husky.ca"
34	Reference to Ampco 18 mounting screws removed
33	Added screw interchangeability notes in tables 4, 5, 6, and 8. Added screw interchangeability warning in section 5
32	Added new Section 17 for PET Mold and Hot Runner Special Torque Applications
31	Tables under section 15.8 reformatted (bladder accumulator neck adaptor specifications)
30	Torque values for accumulator neck adaptors added
29	Application notes (section 5.1) reviewed and updated: Torque values for high temperature applications (>150°C) statement clarified
28	HGT-EL torque values for Breakers, fuses and lugs updated
27	Baumueller BM44XX Servo Drive Torque values added
26	Torque values for SAE plugs reviewed and updated
26 25	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7
26 25 24	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7 Torque values added to HGT-EL Lugged Connections - Electrical Applications
26 25 24 23	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7 Torque values added to HGT-EL Lugged Connections - Electrical Applications Torque values for SAE plugs updated
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26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7 Torque values added to HGT-EL Lugged Connections - Electrical Applications Torque values for SAE plugs updated Torque values for SAE plugs updated Torque values for SK plugs updated Torque values for Woehner and Ferraz Shawmut fuse holder added Torque values for Woehner and Ferraz Shawmut fuse holder added Torques for Bosch Rexroth DBDS pressure relief valves added (see section 17.5) Lubricants section removed (transferred to HS 609) Section 7.1, gearbox oil added Hoist ring torquing requirements updated (SR 13841) Remove note in revision 15 Add note for 4mm socket option for M10 (see section 10, B note) Updated 'Table 1 – Husky General Torque Standards Applications': HR and Mold Liftbars with M30 installations to use HGT-35 – SR13141 Uroques for electrical components added. References to "Husky Classes" added (see section 14). Holokrome, YFS, etc. socket head cap screws). Added applications notes (section 5.1) updated to clarify the default preload (HGT-80, 50 or 35). Drawing specifications section updated (see section 14). Torque table shown on assembly drawings replaced by a note referring to the HS 252. Approved hydraulic oils specified in HS 207. Reference to HS207 added to "Lubricants for General Application" section (Table 2).
$\begin{array}{c} 26\\ 25\\ 24\\ 23\\ 22\\ 21\\ 20\\ 19\\ 18\\ 17\\ 16\\ 15\\ 14\\ 13\\ 12\\ 11\\ 10\\ 9\\ 8\\ 7\\ 6\\ \end{array}$	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7 Torque values for SAE plugs updated Torque values for SAE plugs updated Torque values for SAE plugs updated Torque values for Semens 5SY series breaker added Torque values for Somens 5SY series breaker added Torque values for Bosch Rexroth DBDS pressure relief valves added (see section 17.5) Lubricants section removed (transferred to HS 609) Section 7.1, gearbox oil added Hoist ring torquing requirements updated (SR 13841) Remove note in revision 15 Add note for 4mm socket option for M10 (see section 10, B note) Updated "Table 1 – Husky General Torque Standards Applications": HR and Mold Liftbars with M30 installations to use HGT-35 – SR13141 Updated "Table 1 – Husky General Torque Standards Applications": HR Liftbars to use HGT-50 as well – SR13141 Torque sfor electrical components added. References to "Husky Classes" added (e.g. Unbrako, Holokrome, YFS, etc. socket head cap screws). Added applications notes for adhesives usage and selection (section 7.2.1 and 7.2.2 added) Table 1 and application notes (section 5.1) updated to clarify the default preload (HGT-80, 50 or 35). Drawing specifications section updated (see section 14). Torque table shown on assembly drawings replaced by a note referring to the HS 252.
$\begin{array}{c} 26\\ 25\\ 24\\ 23\\ 22\\ 21\\ 20\\ 19\\ 18\\ 17\\ 16\\ 15\\ 14\\ 13\\ 12\\ 11\\ 10\\ 9\\ 8\\ 7\\ 6\\ 5\\ 5\\ \end{array}$	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7 Torque values for SAE plugs updated Torque values for SAE plugs updated Torque values for SAE plugs updated Torque values for Soch Rexroth DBDS pressure relief valves added (see section 17.5) Lubricants section removed (transferred to HS 609) Section 7.1, gearbox oil added Hoist ring torquing requirements updated (SR 13841) Remove note in revision 15 Add note for 4mm socket option for M10 (see section 10, B note) Updated 'Table 1 – Husky General Torque Standards Applications': HR and Mold Liftbars with M30 installations to use HGT-35 – SR13141 Updated 'Table 1 – Husky General Torque Standards Applications': HR Liftbars to use HGT-50 as well – SR13141 Updated 'Table 1 – Husky General Torque Standards Applications': HR Liftbars to use HGT-50 as well – SR13141 Torques for electrical components added. References to "Husky Classes" added (e.g. Ubrako, Holokrome, YFS, etc. socket head cap screws). Adde applications notes for adhesives usage and selection (section 7.2.1 and 7.2.2 added) Table 1 and application notes (section 5.1) updated to clarify the default preload (HCT-80, 50 or 35). Drawing specifications section updated (see section 19) Added Manuli hose fittings, torque tolerances added to +/4% (section 6 updated) <td< th=""></td<>
$\begin{array}{c} 26\\ 25\\ 24\\ 23\\ 22\\ 21\\ 20\\ 19\\ 18\\ 17\\ 16\\ 15\\ 14\\ 13\\ 12\\ 11\\ 10\\ 9\\ 8\\ 7\\ 6\\ 5\\ 4\\ \end{array}$	Torque values for SAE plugs reviewed and updated CAM follower torque values have been in Section 15.7 Torque values added to HGT-EL Lugged Connections - Electrical Applications Torque values for SAE plugs updated Torque values for SX plugs updated Torque values for Somens 5SY series breaker added Torque values for Bosch Rexroth DBDS pressure relief valves added (see section 17.5) Lubricants section removed (transferred to HS 609) Section 7.1, gearbox oil added Hoist ring torquing requirements updated (SR 13841) Remove note in revision 15 Add note for 4mm socket option for M10 (see section 10, B note) Updated 'Table 1 – Husky General Torque Standards Applications': HR and Mold Liftbars with M30 installations to use HGT-35 – SR13141 Torques for electrical components added. References to "Husky Classes" added (e.g. Ubrako, Holokrome, YFS, etc. socket head cap screws). Added applications notes (section 5.1) updated to clarify the default preload (HGT-80, 50 or 35). Draving specifications section updated (see section 14). Torque table shown on assembly drawings replaced by a note referring to the HS 252. Approved hydraulic oils specified in HS 207. Reference to HS207 added to "Lubricants for General Application" section (Table 2). Note: table 2 transferred to HS 609 (see revision 19) Added Manuli hose fittings, torque tolerances changed to +/-4% (section 6 updated) <



HS 252 - STANDARD ASSEMBLY TORQUES				
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2	New format, new part numbers for FGL-2 grease, updated notes and units of measure
1	Published to Site
0	Original Issue



1 SCOPE

HGT (Husky General Torque) is a general torque standard that applies to threaded connections that do not have their respective torque values indicated on the drawing. Any other torque values such as the supplier's recommended torque specifications specified in Section 17 or any other deviations from the general standard must be individually specified on the drawing. Any deviations from this standard must be justified by calculations.

2 PURPOSE

To provide a list of general torque values and lubrication practices to be used on Husky product.

3 DOCUMENT CONTROL

Revisions to this document shall be authorized by Corporate Operations.

4 REFERENCES

The torque values specified in this document come from the following Industry Standards, Suppliers Catalogs and/or formulae:

HGT-80 Metric Fasteners	T = K.F.d	Standard proofload ratios:		
HGT-80 Imperial Fasteners	- Torque T in Newton-meter	80, 50 and 35%.		
HGT-50 Metric Fasteners	- Coefficient of friction $\mu = 0.12$ Torrup coefficient K (0.15 < K < 0.17)	E.g. 80% preload means that		
HGT-50 Imperial Fasteners	- Induced screw load F in Newton	energy to achieve 80% of what		
HGT-35 Metric Fasteners	- Nominal diameter d in meter	the bolt is capable of without		
HGT-35 Imperial Fasteners	- ISO 898-1 (grades 12.9 & 10.9) and ASTM A574	permanent deformation.		
HGT-SS Metric Set Screws	ISO 898/5-1980 Table 5 and ASTM F912-1986 Table	2		
HGT-SS Imperial Screws	ASTM F912-1986			
HGT-LHCS Metric Screws	Torque values provided by manufacturer			
HGT-FT ORFS Tube Ends	Parker Catalog 4300 (April 2017)			
HGT-FT SAE and BSPP Ends	Parker Catalog 4300 (April 2017)			
HGT-FT ORFS Hose Ends	Manuli Hydraulics catalog 2020			
HGT-FT JIC Ends	Parker Catalog 4300 (April 2017)			
HGT-FT NPT and BSPT Plugs and Fittings	Parker Catalog 4300 (April 2017)			
HGT-FT Flareless Tube Ends	Parker Catalog 4300 (April 2017)			
HGT-FT SAE Plugs	Parker Catalog 4300 (April 2017)			
HGT-FT Bulkhead Locknuts	Parker Catalog 4300 (April 2017)			
HGT-FT BSPP Plugs	Former Luxembourg Machine torque standard (LTM)	L111)		
HGT-FT Metric Plugs	Former Luxembourg Machine torque standard (LTM)	L111)		
HGT-EL Metric and Imperial Screws	Electric Components Supplier			
Torque for Hydraulic Valves Mounting Bolts	Torque values provided by manufacturer			
Torque for Orifices on Hydraulic Manifolds	Former Luxembourg Machine torque standard (LTM	L111)		
Torque for Hose/Pipe Clamps Mounting Bolts	Mounting Bolts Former Luxembourg Machine torque standard (LTML111)			
Torques for Hydraulic Motors Mounting Bolts	Its Torque values provided by manufacturer			
Code 61 Split Flange Assemblies	ISO 6162-1994			
AMPCO 18 Applications	Torque values provided by manufacturer			
Code 62 Split Flange Assemblies	ISO 6162-1994			



5 WARNINGS

Always use the correct parts and the proper torques. Incorrect fastener connections can dangerously weaken assemblies. Ensure that all safety information, instructions and warnings such as shown in the two examples below are read and understood before any operation or any maintenance procedures are performed.

CAUTION!

Mechanical hazard – risk of equipment damage. Use of improper torque can result in equipment damage. Consult the assembly drawings for the torque specifications before referring to the torque charts in this section.

WARNING!

Molten plastic spray hazard - risk of serious injury and equipment damage. If incorrectly sized screws are used, equipment damage may occur that could result in uncontained molten plastic spray. If replacing the screws, only use the screw sizes specified in the machine bill of material.

6 APPLICATIONS

HGT consists of seven torque standards HGT-80, HGT-50, HGT-35, HGT-SS, HGT-LHCS, HGT-FT and HGT-EL as shown in Table 1. For mechanical applications, screws are torqued to the HGT-80, HGT-50, HGT-35 or HGT-LHCS standards. For electrical applications, screws and other components are torqued to the HGT-EL standard. Set screws are torqued to the HGT-SS standard and fittings to the HGT-FT standard. Deviations from Husky General Torque Standards for Special PET Mold and Hot Runner applications are listed below and are cited in detail in section 19.

- 19.1 CAM Follower Torque Specifications
- 19.2 EOAT Tube Retainer Pin Torque Specification
- 19.3 CoolPik Vacuum/Blow Pin Torque Specifications
- 19.4 CoolPik Moving Puck Installation Torque Specification
- 19.5 CoolPik Plate Mounting Torque Specification
- 19.6 Mold/Hot Runner Lift Bars Mounting Screws Torque Applications
- 19.7 Gib/Wear Plate Mounting Screws Torque Specification
- 19.8 Neck ring plugs Torque Specification
- 19.9 Stack Inserts Torque Specification
- 19.10 Torque Specification for Water Manifolds to Slides
- 19.11 Torque Specification for Slide to Connecting Bars
- 19.12 Torque Specification for EOAT Assy. to Robot
- 19.13 Torque Specification for NexPET Core Sleeve Set Screws

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Figure 1 – Husky General Torque (HGT) - Standard Applications (# 1 to 8)



Table 1 – Husky General Torque (HGT) - Standard Applications

Application		Hardware		Base/Threaded Material	Torque Standard
	Hot Runner Assemblies	Screws and Threaded Rods	- DIN 912-12.9 SHCS* - DURLOK-12.9-UNB HHS - DIN 976-12.9 ROD	Steel Cast Iron	HGT-80
	1	Set Screws	- ISO 898/5-45H - ASTM F912	N/A	HGT-SS
		Low Head Cap Screws	- DIN 7984	N/A	HGT-LHCS
Mechanical	Cold Half Assemblies (including Cavity plate assembly)	Screws and Threaded Rods	- DIN 912-12.9 SHCS* - DURLOK-12.9-UNB HHS - DIN 933 & 931-10.9 HHCS - DIN 976-12.9&10.9 ROD	Steel Cast Iron	HGT-50
		Set Screws	- ISO 898/5-45H - ASTM F912	N/A	HGT-SS
		Low Head Cap Screws	- DIN 7984-10.9 LHCS	N/A	HGT-LHCS
	Cold Half and Hot Runner Mounting to Machine Platen	SHCS	- DIN 912-12.9 SHCS*	Cast Iron	HGT-50**

* Referred to as "Husky Classes 1, 2, 3 & 4" in HS 258

** When using hex tool adapter to access mold mounting screws, no de-rating of torque value is required - See Figure 2

/... Continuing on next page



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Application		Hardware		Base/Threaded Material	Torque Standard
	Machine Assemblies	Screws and Threaded Rods	- DIN 912-12.9 SHCS* - DURLOK-12.9-UNB HHS - DIN 933 & 931-10.9 HHCS - DIN 976-12.9&10.9 ROD - ASTM A574 SHCS	Steel Cast Iron	HGT-50
Mechanical		Set Screws	- ISO 898/5-45H - ASTM F912	N/A	HGT-SS
	All Assemblies Using a Weaker Base Material 5	Screws and Threaded Rods	 DIN 912-12.9 SHCS* DURLOK-12.9-UNB HHS DIN 933 & 931-10.9 HHCS DIN 976-12.9&10.9 ROD DIN 7991-10.9 FHCS ISO 7380-10.9 BHCS ASTM A574 SHCS 	Cast Aluminum, Aluminum Plate	HGT-35
6	Hydraulic, Lubrication, Air and Water	Hose and Tube Fittings	 O-ring face Seal JIC (37° Flared) NPT, BSPP, Bite SAE Straight Thread 	N/A	HGT-FT
7	Electrical	Screws and other components	- Steel, Al& Cu, Brass screws	N/A	HGT-EL
8	Hoist Rings	Screws	- As supplied with Hoist Ring	N/A	Follow Supplier recommendation

* Referred to as "Husky Classes 1, 2, 3 & 4" in HS 258

Figure 2 – Using Hex Tool Adapter to Access Mold Mounting Screws



6.1 APPLICATION NOTES

- Washers are recommended for oversized holes and slots.
- Heavy washers (DIN 7349) are recommended for cast aluminum applications.
- The HGT-80 standard is recommended for the majority of Hot Runner products: These high strength and/or high fatigue applications use grade 12.9 bolts that will not crush, gall, warp or fracture the joint material under preload (e.g. high-strength alloy steel).
- The HGT-50 standard is recommended for the majority of Machine and Mold product applications. HGT-50 ensures that the area below the screw head does not bear into the seating material and the threads do no shear upon torquing.
- The HGT-35 standard is recommended for those applications where the yield strength of the base material would otherwise be exceeded under a 50% preload. An example is clamping a cantilevered section such as a belt clamp that is subject to bending stress.
- Torque values for high temperature applications (>150°C) should be calculated and individually specified on the drawing as required. If no values are indicated on the drawing, the general HGT standard should be used (e.g. HGT-50 for Machine and Mold applications, HGT-80 for Hot Runner applications).
- In all applications the joint must be designed to carry the load safely and without separation.
- Screw sizes and torque values must be supported by calculations for externally applied loads that are subjected to fatigue action such as pressurized vessels.
- When maintenance or service requires the replacement of screws, it is recommended that they be the same ones specified in the machine Bill of Material. Due to the interchangeability between some metric and imperial screws, incorrect sizes may provide insufficient bolt preload over time.

7 TORQUE TOLERANCES

The more accurate the method of controlling tightness the more of the strength of the fastener can be utilized. The tolerance values specified in this standard pertain to the tool's accuracy and not the induced fastener's load that is affected by other variables such as lubrication, clamped materials, temperature, etc. For example, assembly torque wrenches should be calibrated to stay within +/-4% when applying HGT-50, 80 or 35 and the fastener's induced load accuracy can be expected to range from +/-10-20%.

8 LINK TO HS DOCUMENTS

HS 207 - Approved Hydraulic Fluids: Use products shown in table 1.

HS 609 - Lubricants and coolants: Use products shown in tables 1, 2 or 3 based on applications.

HS 897 - Adhesives: Use products shown in table 2 for soft joint applications.

9 HGT-80 STANDARD (SCREWS AND THREADED RODS - 80% PRELOAD)

The following torques must be applied to screws in order to produce the desired 80% preload.

Grade 12.9 Fasteners Socket Head Cap Screw* (DIN912)					
Durlock	Hex Head	Cap Screw	(UNB 12.9)		
Threade	d Rod (DIN97	6)			
Size	Torque	(+/- 4%)	Induced Screw		
	N-m	ft-lb	Load (N)		
M4	4.6	3.4	6800		
M5	9.5	7.1	11000		
M6	16	12	15600		
M8	39	29	28400		
M10	77	57	45000		
M12	135	100	65000		
M14	215	160	90000		
M16	330	245	122000		
M20	650	480	190000		
M24	1100	810	273000		
M30	2250	1660	435000		
M36	3850	2840	634000		
M42	6270	4630	870000		
M48	8560	6320	1140000		

Table 2 – HGT-80 Metric Fasteners

ASTM A574 Fasteners Imperial Socket Head Cap Screw						
Size	Torque	(+/- 4%)	Induced Screw			
	N-m	ft-lb	Load (N)			
#8	5	4	7000			
#10	7	5	8700			
1/4	16	12	15800			
5/16	35	25	26100			
3/8**	60	45	38000			
7/16**	95	70	53000			
1/2	150	110	71000			
5/8	290	210	108000			
3/4**	500	360	160000			
7/8	790	580	222000			
1	1180	865	291000			
1 1/8	1680	1240	367000			
1 1/4	2400	1750	466000			
1 3/8	3100	2300	555000			
1 1/2	4100	3040	676000			
1 3/4	6500	4800	911000			

Table 3 – HGT-80 Imperial Fasteners

* Referred to as "Husky Classes 1, 2, 3, and 4" in HS 258.

** When maintenance or service requires the replacement of screws, it is recommended that they be the same ones specified in the machine Bill of Material. Due to the interchangeability between some metric and imperial screws, incorrect sizes may provide insufficient bolt preload over time.



10 HGT-50 STANDARD (SCREWS AND THREADED RODS - 50% PRELOAD)

The following torques must be applied to screws in order to produce the desired 50% preload.

Grade 12.9 and 10.9 Fasteners Socket Head Cap Screw* (DIN912) Hex Head Cap Screw (UNB 12.9, DIN933, DIN931) Threaded Rod (DIN976)					
Size	Torque	: (+/- 4%)	Induced Screw		
	N-m	ft-lb	Load (N)		
M4	3	2.2	4250		
M5	6.2	4.6	8900		
M6	10	7	9800		
M8	25	18	17800		
M10	53	40	31500		
M12	95	70	47000		
M14	130	95	56000		
M16	220	160	85000		
M18**	270	200	93000		
M20	390	290	124000		
M24	660	490	171000		
M30	1300	960	272000		
M36	2300	1700	396000		
M42	3700	2700	544000		
M48	5500	4000	714000		

Table 4 – HGT-50 Metric Fasteners

1					
ASTM A574 Fasteners Imperial Socket Head Cap Screw					
Size	te Torque (+/- 4%)	Induced Screw			
	N-m	ft-lb	Load (N)		
#8	3	2	4360		
#10	4	3	5450		
1/4	11	8	9900		
5/16	22	16	16300		
3/8**	40	30	24000		
7/16**	60	45	33000		
1/2	95	70	44000		
5/8	180	135	68000		
3/4**	310	230	100000		
7/8	490	360	139000		
1	750	550	182000		
1 1/8	1040	770	230000		
1 1/4	1480	1090	291000		
1 3/8	1940	1430	347000		
1 1/2	2580	1900	423000		
1 3/4	4050	2990	570000		

Table 5 – HGT-50 Imperial Fasteners

* Referred to as "Husky Classes 1, 2, 3, and 4" in HS 258.

** When maintenance or service requires the replacement of screws, it is recommended that they be the same ones specified in the machine Bill of Material. Due to the interchangeability between some metric and imperial screws, incorrect sizes may provide insufficient bolt preload over time.



11 HGT-35 STANDARD (SCREWS - 35% PRELOAD)

The following torques must be applied to screws in order to produce the desired 35% preload.

Table 6 – HGT-35 Metric Fasteners

Grade 12.9, 10.9 and A2 Fasteners Socket Head Cap Screw [*] (DIN912) Socket Head Cap Screw ^{****} (Stainless Steel, A2) Hex Head Cap Screw (UNB 12.9, DIN933, DIN931) Flat Head Cap Screw (DIN7991) Button Head Cap Screw (ISO7380)							
Size	Size Torque (+/- 4%) Induced Screw						
	N-m	ft-lb	Load (N)				
M4	2.1	1.5	2980				
M5	4	3	4800				
M6	9	7	7800				
M8	19	14	14200				
M10	37	27	22000				
M12	50	37	24500				
M16	125	90	49000				
M20	250	185	79000				
M24	440	325	115000				
M30	875	650	182000				
M36	1530	1130	265000				

ASTM A574 Fasteners Imperial Socket Head Cap Screw Size Torque (+/- 4%) Induced Screw Load (N) N-m ft-lb #8 2670 1 1 #10 3100 3 2 1/47 5 5800 5/16 14 10 9800 3/8** 14200 23 17 7/16** 38 28 20000 58 42 1/226700 5/8 110 81 41000 3/4** 180 135 60000 220 83000 7/8 300 450 330 111000 1 1 1/8 620 460 138000 890 1 1/4 660 175000 1 3/8 1170 860 208000 1 1/2 1550 1140 254000 1 3/4 2450 1790 342000

Table 7 – HGT-35 Imperial Fasteners

* Referred to as "Husky Classes 1, 2, 3, and 4" in HS 258.

** When maintenance or service requires the replacement of screws, it is recommended that they be the same ones specified in the machine Bill of Material. Due to the interchangeability between some metric and imperial screws, incorrect sizes may provide insufficient bolt preload over time.

*** HGT-35 is the proper torque for stainless steel screws (strength of stainless steel screw is 70% of grade 10.9).



12 HGT-SS STANDARD (SET SCREWS)

The following torques must be applied to set screws.

Table 8 – HGT-SS Metric Set Screws

ISO 898/5-45H Set Screws Metric Socket Set Screw (DIN913-14-15-16)			
Size	Torque	(+/- 4%)	
	N-m	ft-lb	
M3	0.9	0.66	
M4	2.2	1.6	
M5	4	3	
M6	7.2	5.3	
M8	17	12.6	
M10	33	24	
M12	54	40	
M16	134	99	
M20	237	175	
M24	440	325	

Table 9 - HGT-SS Imperial Screws

ASTM F912 Set Screws Imperial Socket Set Screw ANSI B18.3.1)			
Size	Torque ((+/- 4%)	
	N-m	ft-lb	
#5	1.1	0.8	
#6	1.1	0.8	
#8	2.7	2	
#10	4	3	
1/4	9.5	7	
5/16	19	14	
3/8	33	24	
1/2	70	52	
9/16	70	52	
5/8	150	110	
3/4	270	200	
7/8	410	300	
1	570	420	

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13 HGT-LHCS STANDARD (LOW HEAD CAP SCREWS)

The following torques must be applied to low head cap screws.

Table 10 – HGT-LHCS Metric Low Head Cap Screws

Grade 10.9 Low Head Cap Screws Low Head Cap Screws (DIN 7984)				
Size	Torque	(+/- 4%)		
	N-m	in-lb		
M4	2.7	24		
M5	5.4	48		
M6	9.15	81		
M8	22	195		
M10	44	389		
M12	77	682		
M16	190	1681		
M20	371	3284		



14 HGT-FT STANDARD (FITTINGS)

The following tables provide the recommended torque values required for the safe and effective operation of the fittings using a torque wrench or other methods such as "Turn From Finger Tight", "Flats From Finger Tight" or "Flats from Wrench Resistance". For TFFT or FFFT, the joint should be hand tightened snugly and then tightened with a wrench by the number of flats or turns indicated by the table. For "FFWR", the joint should be tightened snugly with a wrench and then tightened again with the same wrench by the number of flats indicated by the table. The torque method of assembly is the preferred method of assembly. It reduces the risk of human error during assembly that is more prevalent in the "FFWR" method. To ensure the most accurate assembly of the fitting, it is strongly recommended that the torque method be utilized.

14.1 IMPORTANT NOTES

- O-rings must always be lubricated.
- Refer to the notes in red and the following symbols to determine if lubricant should be applied to threads.





Apply lubricant to threads

Do not apply lubricant to threads

- Values are for steel fittings in steel ports.
- For stainless steel fittings, please use the upper limit of torque range. Exclusion: NPT and BSPT fittings.
- For brass, aluminum (and other soft metals), decrease torque value by 35%. Exclusion: NPT and BSPT fittings.
- For NPT and BSPT elbows, never back off to achieve alignment.
- For ferrule (bite) fittings, manually screw the nut on the fitting body until finger tight. Continue to tighten the joint with a wrench by the number of flats indicated in the table. If the fitting body was used for ferrule pre-set, the nut must be re-tightened to the same fitting body used earlier in pre-set.
- Assembled parts (nut and adapter) must have identical plating.
- Torque values shown apply to the ends indicated by arrows.

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Table 11 - HGT-FT ORFS Tube Ends

O-ring Face)-ring Face Seal Tube Ends				
		📫 🖷			
SAE Dash Size	Thread Size Inch	Tube Side Torque * (+10% - 0) Nm (ft-lb)	FFWR Tube Nuts (min-max)	FFWR Swivel & Hose Ends (min-max)	
-4	9/16 - 18	25 (18)	1/4 - 1/2	1/2 - 3/4	
-6	11/16 - 16	40 (30)	1/4 - 1/2	1/2 - 3/4	
-8	13/16 - 16	55 (40)	1/4 - 1/2	1/2 - 3/4	
-10	1 -14	80 (60)	1/4 - 1/2	1/2 - 3/4	
-12	1-3/16 - 12	115 (85)	1/4 - 1/2	1/3 - 1/2	
-16	1-7/16 - 12	150 (110)	1/4 - 1/2	1/3 - 1/2	
-20	1-11/16 - 12	205 (150)	1/4 - 1/2	1/3 - 1/2	
-24	2 - 12	315 (230)	1/4 - 1/2	1/3 - 1/2	
-32	2 1/2 -12	510 (375)	1/4 - 1/2	1/3 - 1/2	

* IMPORTANT: Recommended torques values are only applicable for nut tightening in dry conditions (no oil or lubrication on threads and sealing surfaces, only O-rings must be lubricated). For brass, aluminum (and other soft metals), decrease torque value by 35%. However, FFWR is the same.



Table 12 – HGT-FT ORFS Hose Ends (Manuli Hose Fittings)

O-ring Fac	O-ring Face Seal					
SAE	Hose	Thread	Recommend	led Torque *	Rotation	FFFT
Dash Size	ID	Size	Nm (0, +10%)	ft-lbs (0, +10%)	Angle (degrees)	Hose Ends
-4	1/4"	9/16"-18	26	19	45°	3/4
-6	3/8"	11/16"-16	42	31	45°	3/4
-8	1/2"	13/16"-16	57	42	60°	3/4
-10	5/8"	1"-14	85	63	45°	1
-12	3/4"	1 3/16"-12	122	90	45°	3/4
-16	1"	1 7/16"-12	156	115	45°	3/4
-20	1 1/4"	1 11/16"-12	200	148	45°	3/4
-24	1 1/2"	2"-12	256	189	45°	3/4

* IMPORTANT: Recommended torques values are only applicable for nut tightening in dry conditions (no oil or lubrication on threads and sealing surfaces, only O-rings must be lubricated).



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Table 13 – HGT-FT SAE and BSPP Ends

Adjustable and Non-Adjustable SAE and BSPP Ends (Plugs excluded)				
SAE Dash	Thread Size	Torque * (+10% - 0)		
Size	Inch	JIC, Ferrule Fittings	JIC, Ferrule & Pipe Fittings	Face Seal Fittings
		Adjustable	Non- Adjustable ↓	Adjustable and Non-Adjustable
		Nm (ft-lb)	Nm (ft-lb)	Nm (ft-lb)
-4	7/16 - 20	20 (15)	29 (15)	20 (15)
-6	9/16 - 18	40 (30)	40 (30)	46 (35)
-8	3/4 - 16	70 (52)	70 (52)	80 (60)
-10	7/8 - 14	115 (85)	115 (85)	135 (100)
-12	1-1/16 - 12	185 (135)	185 (135)	185 (135)
-14	1-3/16 - 12	235 (175)	235 (175)	235 (175)
-16	1-5/16 - 12	270 (200)	270 (200)	270 (200)
-20	1-5/8 - 12	340 (250)	340 (250)	340 (250)
-24	1-7/8 - 12	415 (305)	415 (305)	415 (305)
-32	2-1/2 - 12	510 (375)	510 (375)	510 (375)

* IMPORTANT: Lubricate threads before assembly. Values in chart are for plated steel fittings in steel ports. For stainless steel fittings, use the upper limit of torque range. For brass and aluminum, decrease torque value by 35%.



Table 14 – HGT-FT JIC Ends

JIC (37 De	IIC (37 Deg Flared Tube) Ends			
SAE Dash Size	Thread Size Inch	Assembly Torque * (+10% - 0) Nm (ft-lb)	Tube End FFWR	Hose End or Swivel Nut FFWR
4	7/16 - 20	18 (13)	2 1/2	2
6	9/16 - 18	30 (22)	2	1 1/2
8	3/4 - 16	57 (42)	2	1 1/2
10	7/8 - 14	81 (60)	1 1/2	1 1/2
12	1-1/16 - 12	115 (84)	1 1/2	1 1/4
14	1-3/16 - 12	135 (100)	1 1/2	1 1/4
16	1-5/16 - 12	160 (118)	1 1/2	1
20	1-5/8 - 12	230 (168)	1	1
24	1-7/8 - 12	265 (195)	1	1
32	2-1/2 - 12	360 (265)	1	1
40	3-12	Not Applicable	1	1

* IMPORTANT: Torque values are for unlubricated carbon steel components and properly lubricated stainless-steel components.



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Table 15 – HGT-FT NPT and BSPT Plugs and Fittings





Table 16 – HGT-FT Flareless Tube Ends



* IMPORTANT: Carbon steel components: Lubricate threads before assembly. No additional lubrication is required for stainless steel fittings as the nuts are prelubricated.



Note: For final assembly of swivel nut fittings (R6BU, C6BU and S6BU), a 3/4 TFFT is required for all sizes.

Table 17 – HGT-FT SAE Plugs

SAE Stra	SAE Straight Thread Plugs			
SAE Dash	Thread Size	Torque *	(+10% - 0)	
Size	5120	Hollow Hex Plug	Hex Plug	
		↓ I lug	↓	
	Inch	Nm (ft-lb)	Nm (ft-lb)	
-2	5/16 - 24	7 (5.2)	10 (7.4)	
-3	3/8 - 24	11 (8.1)	18 (13)	
-4	7/16 - 20	20 (14.8)	29 (21)	
-5	1/2 - 20	28 (20.7)	32 (23)	
-6	9/16 - 18	40 (30)	40 (30)	
-8	3/4 - 16	70 (52)	70 (52)	
-10	7/8 - 14	115 (85)	115 (85)	
-12	1-1/16 - 12	185 (135)	185 (135)	
-14	1-3/16 - 12	235 (175)	235 (175)	
-16	1-5/16 - 12	270 (200)	270 (200)	
-20	1-5/8 - 12	340 (250)	340 (250)	
-24	1-7/8 - 12	415 (305)	415 (305)	
-32	2-1/2 - 12	510 (375)	510 (375)	

Table 18 – HGT-FT Bulkhead Locknuts



365 (270)

Not Applicable

365 (270)

420 (310)

* IMPORTANT: Torque values are only applicable for nut tightening in dry conditions



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24

32

* IMPORTANT:

Lubricate threads

before assembly.



Table 19 – HGT-FT BSPP Plugs

BSPP Plugs		
Thread Size	Torque * (+10% - 0) ↓	
Inch	Nm (ft-lb)	
1/8 - 28	13 (9.6)	
1/4 - 19	30 (22)	
3/8 - 19	60 (44)	
1/2 - 14	80 (60)	
3/4 - 14	140 (105)	
1 - 11	200 (155)	
1-1/4 - 11	400 (295)	
1-1/2 - 11	450 (330)	





Table 20 – HGT-FT Metric Plugs

Metric Plugs					
Thread	Torque * (+10% - 0)				
Sıze	¥				
Metric	Nm (ft-lb)				
M42	400 (295)				
M48	500 (370)				
M52	600 (440)				
M60	800 (590)				
M64	850 (630)				
M68	1000 (740)				
M70	1100 (810)				
M75	1300 (960)				
M80	1550 (1150)				
M85	1800 (1330)				
M90	2000 (1480)				





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15 HGT-EL STANDARD (ELECTRICAL APPLICATIONS)

The following torque values should be used in the case of electrical applications. Notes: For nonstandard components, use the recommended manufacturer's specifications. For DLO (Diesel Locomotive Cable) related connections, please call Husky Service or refer to section 20.1 - DLO Device Details.

Table 21 – HGT-EL Metric and Imperial Screws, Mounting Hardware (ElectricalApplications)

Metric and Imperial Screws								
Si	Size Torque Nm (in-lb) (+10% - 0)							
		Steel Al & Cu Brass						
M3	#4	0.7 (6.2)	0.3 (2.6)	0.6 (5.3)				
M3.5	#6	1 (8.8)	0.5 (4.4)	0.8 (7.1)				
M4	#8	1.3 (11.5)	0.7 (6.2)	1.2 (10.6)				
M5	#10	1.9 (16.8) 1 (8.8) 1.7 (15.0)						
M6	1/4	6 (53.1) 3 (26.5) 5 (44.2)						
M8	5/16	8 (70.8)	8 (70.8) 4 (35.4) 5 (44.2)					
M10	3/8	10 (88.5)	5 (44.2)	8 (70.8)				

 Table 22 – HGT-EL Heater Bands (Electrical Applications)

Heater Band Fasteners								
Fastener Size	Fastener Type							
	Nickel or Zinc Plated Dry	Nickel or Zinc Plated Anti-Seize	Black Oxide Dry	Black Oxide Anti-Seize				
UNC # 6 - 32	30 lb-in / 3.4 N-m	20 lb-in / 2.3 N-m	20 lb-in / 2.3 N-m	15 lb-in / 1.7 N-m				
UNC # 8 - 32	40 lb-in / 4.5 N-m	30 lb-in / 3.4 N-m	25 lb-in / 2.8 N-m	20 lb-in / 2.3 N-m				
UNC # 10 - 24	55 lb-in / 6.2 N-m	35 lb-in / 4.0 N-m	35 lb-in / 4.0 N-m	30 lb-in / 3.4 N-m				
UNC # 1/4 - 20	80 lb-in / 9.0 N-m	55 lb-in / 6.2 N-m	50 lb-in / 5.6 N-m	45 lb-in / 5.1 N-m				
UNC # 1/4 - 20 Barrel Bar Clamp* and Spider Straps	80 lb-in / 9.0 N-m	80 lb-in / 9.0 N-m	80 lb-in / 9.0 N-m	80 lb-in / 9.0 N-m				
UNC # 5/16 - 18	80 lb-in / 9.0 N-m	80 lb-in / 9.0 N-m	80 lb-in / 9.0 N-m	80 lb-in / 9.0 N-m				
M6***	80 lb-in / 9.0 N-m	55 lb-in / 6.2 N-m	N/A	N/A				
U (D 10 10	1	1911 : / 20 N						

Heater Band Ground Stud Nut **18 lb-in / 2.0 N-m maximumPost Terminal Nut **24 lb-in / 2.7 N-m maximum

* For screws attached to each other through a 'common' barrel bar clamp

** Use an open ended wrench to hold the nut closest to the heater as the wiring nut is torqued (threaded ground stud must not rotate).

*** For heater bands with corrugated sheet metal on outside diameter



Table 23 – HGT-EL Solid State Relays (Electrical Applications)

Solid state relays (e.g. HPN 231452, Crydom	15 to 20 lb-in / 1.7 to 2.2 N-m
model# H12D4840DE 40A Dual SSR)	

Table 24 – HGT-EL Premolded Cables (Electrical Applications)

Premolded Cable Size	Torque
M8	3.5 lb-in / 0.4 N-m
M12	5.5 lb-in / 0.6 N-m

Table 25 – HGT-EL Electrical Cabinet Door Ground Stud (Electrical Applications)

M6

35 lb-in / 4.0 N-m

16 DRAWING SPECIFICATIONS

- All fasteners and fittings requiring a torque value that deviates from the HGT standards or special torque specifications displayed in section 17 must be individually specified on the drawing next to the item reference (balloon or arrow on the assembly drawing as shown in Figure 3).
- A note referring to the torque standard (HS 252) will be inscribed in the title block of the assembly drawing (see in Figure 4).

Figure 3 – Individual Torque Specifications





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Figure 4 – Husky General Torque Chart

FOR TORQUE SPECIFICATIONS, REFER TO HS 252	METRIC THIS DRAWING AND INFORMATION CONTAINED MITHIN IS CONFIDENTIAL AND/OR PROPRIATION TO HUSKY INJECTION WOLDING SYSTEMS LTD. OR ONE OF ITS SUBSIDIARIES UNLEKTY AND WAT NOT BE COFIED. DISCLOSED OR USED. IN WHOLE OR IN PART. WITHOUT THE PRIOR WRITTEN CONSENT OF HUSKY.
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17 SUPPLIER RECOMMENDED TORQUE SPECIFICATIONS

The following torque values are recommended by suppliers and must be followed unless otherwise specified on the drawing.

17.1 HYDRAULIC MANIFOLDS – TORQUE VALUES FOR SCREWS

Torque N-m (ft-lb) MinMax.										
Bolt Size		Bosh			Rexroth Moog/Hydrolux		ux	Hyd. Option		
	Prop. Valves	Direct Valves	Cartridges	Prop. Valves	Direct Valves	Cartridges	Prop. Valves	Direct Valves	Cartridges	Segment Manifold
M5	6-8 (4.4-5.9)	6-8 (4.4-5.9)		6.2-8.9 (4.6-6.6)	6.2-8.9 (4.6-6.6)		5.8-7.8 (4.2-5.7)	7.2-8 (5.3-5.9)		8.9-9.8 (6.6-7.2)
M6	11-14 (8.1-10.3)	11-14 (8.1-10.3)		11-15.5 (8.1-11.4)	11-15.5 (8.1-11.4)		9.4-12.6 (6.9-9.3)	11.7-13 (8.6-9.6)		15.5-17 (11.5-12.6)
M8			26-31 (19-23)			23-32 (17-23)			27-30 (20-22)	32-35 (23-26)
M10	40-50 (30-37)	50-60 (37-44)		53-75 (39-55)	53-75 (39-55)		46-62 (34-45)	50-55 (37-40)		75-83 (55-61)
M12	90-120 (66-88)	85-100 (63-73)	90-105 (66-77)	91-130 (67-96)	91-130 (67-96)	77-110 (57-81)	80-108 (59-80)	90-100 (66-74)	90-100 (66-74)	110-121 (81-89)
M16			240-260 (178-192)			189-270 (139-199)			270-300 (199-221)	270-297 (200-219)
M20	450-560 (332-410)		450-500 (332-369)	301-430 (222-317)	301-430 (222-317)	364-520 (268-383)	391-529 (288-390)	495-550 (365-406)	495-550 (365-405)	520-572 (385-422)
M24						630-900 (464-664)			810-900 (598-664)	900-990 (665-730)
M30						1260-1800 (929-1327)			1620-1800 (1195-1328)	1800-1980 (1330-1460)
Lubricant	Hydraulic Oil Grease							Grease		

Table 26 – Torque for Hydraulic Valves Mounting Bolts

Note: Those values are mandatory, regardless of screw quality used.

17.2 HYDRAULIC MANIFOLDS – TORQUE VALUES FOR ORIFICES

Table 27 – Torque for Orifices on Hydraulic Manifolds

Hydraulic Manifolds – Orifices					
Bolt Size	Torque (+/- 4%)				
	N-m	ft-lb			
M5	4	3			
M6	6	4.5			
M8	13.5	10			
M10	27	20			
M12	47	35			
M16	110	80			
M20	195	145			
M24	330	245			
M30	650	480			
Lubricant	Gr	rease			

17.3 HOSE/PIPE CLAMPS – TORQUE VALUES FOR SCREWS

	Lubricant			Torque in Nm (ft-lb) (+/- 4%) with Clamping Material			
Clamp Type		Bolt Size	Clamp Size	Aluminum (AL)	Polypropylene (PP)	Polyamid (PA)	
Single clamp Light series		M6	0 to 6	12 (9)	8 (5.9)	10 (7.4)	
			1	30 (22)	12 (9)	20 (15)	
		M10	2	30 (22)	12 (9)	20 (15)	
Single clamp	Lastita		3	35 (26)	15 (11)	25 (18)	
Heavy series		M12	4	55 (40)	30 (22)	40 (30)	
		M16	5	120 (90)	45 (33)	55 (40)	
	Locute	M20	6	220 (160)	80 (60)	150 (110)	
		M24	7	250 (180)	110 (80)	250 (180)	
		M6	1	N/A	5 (3.7)	6 (4.4)	
			2	N/A			
Twin clamp		M8	3	N/A	12 (8.9)	12 (8.9)	
			4	N/A			
			5	N/A	8 (5.9)	8 (5.9)	

Table 28 – Torque for Stauff or Hydac Hose/Pipe Clamps Mounting Bolts

					3.5	
Table 29 –	Torque	for Sta	nflex H	ose Bands	Mounting	Rolts
	IUIque		pitca II	ose Dunus	Trivanting	DOIO

Stopflex Hose Bands							
Hose Band	Hose Outside I	Diameter (mm)	Bolt Size (metric)	Bolt Tightening Torque			
Model Number	Ø MIN	Ø MAX	ØM	Nm (ft-lb) (+/- 4%)			
STOPFA13135	13	13.5	M6	3 (2)			
STOPFA1415	14	15	M6	3 (2)			
STOPFA1718	17	18	M6	3 (2)			
STOPFA1819	18	19	M6	3 (2)			
STOPFA2122	21	22	M6	3 (2)			
STOPFA3031	30	31	M6	7 (5)			
STOPFA3233	32	33	M6	7 (5)			
STOPFA3839	38	39	M6	7 (5)			
STOPFA3940	39	40	M6	7 (5)			
STOPFA4547	45	47	M8	10 (7)			
STOPFA5354	53	54	M8	10 (7)			
STOPFA5456	54	56	M8	10 (7)			
STOPFA5759	57	59	M8	10 (7)			
STOPFA6668	66	68	M8	10 (7)			
STOPFA7274	72	74	M8	10 (7)			

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Table 30 – Heavy-Duty Hose Clamp (T-Bolt Style)

King Seal Fastener Technology Part # KTB425 (100-108mm) HPN 10534088	50-60 in-lb (5.6-6.8 N-m)	
--	------------------------------	--

17.4 HYDRAULIC MOTORS – TORQUE FOR MOUNTING BOLTS

Torque N-m (ft-lb) +/-tolerance value		
Bolt Size	Hagglungs Hydraulic Motors	
M16	280 +/-15 (205 +/-11)	
M20	540 +/-20 (400 +/-15)	
M24	900 +/- 30 (665 +/-22)	
Lubricant	Hydraulic Oil	

17.5 BOSCH REXROTH DBDS PRESSURE RELIEF VALVES

Table 32 – Bosh Rexroth DBDS Pressure Relief Valves

Size	Maximum Tightening Torque * (+/- 5%)	
NG	N-m	ft-lb
6	80	59
10	150	110
20	300	221
30	500	369

* The tightening torques are recommended values assuming a friction coefficient of 0.12 and the use of a torque wrench.

17.6 BLADDER ACCUMULATOR NECK ADAPTOR SPECIFICATIONS

 Table 33 – Bladder Accumulator Neck Adaptor Specifications

Accumulator Size Accumulator Port Size	Torque [N-m]	Torque [ft-lb]
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10L	BSPP 2" (G 2")	339 N-m	250 ft-lb
20L	BSPP 2" (G 2")	339 N-m	250 ft-lb
32L	BSPP 2" (G 2")	339 N-m	250 ft-lb
50L/54L	BSPP 2" (G 2")	339 N-m	250 ft-lb
50L High Flow	BSPP 2 ½" (G 2 ½")	420 N-m	310 ft-lb

17.7 HYDAC OIL LEVEL SIGHT GAUGE

HPN 2841146 (Hydac Model # 3070285 FSK127-2.5/0/-/12)	M12 banjo bolts	Lubricated bolt: 6 N-m (+0.5, 0)
HPN 7604852 (Hydac Model # 3532906 FSKV-176-1.0/W/-/12 2SP)		4.4 ft-lb (+0.4, 0) Dry bolt: 8 N-m (0, -0.5) 5 0 ft lb (-0.4)

17.8 HYDAC PRESSURE TRANSDUCERS

HPN 7980938 (Hydac Model # 926910 Pressure transmitter HDA 4776-A-300-453)	40 N-m (+10%, -0)	30 ft-lb (+10%, -0)
HPN 9247632 (Hydac Model # 927321 Pressure transmitter HPT 1776-A-0300-453)	40 N-m (+10%, -0)	30 ft-lb (+10%, -0)

17.8.1 Hydac Differential Pressure Transmitter

HPN 6404099	100 N-m	74 ft-lb
(Hydac PN # 924030 Differential Pressure Transmitter HDT 5416-C- 05.0-S-000, G1/2	(+10%, -0)	(+10%, -0)

17.9 DANFOSS PRESSURE TRANSDUCER

HPN 6830141	M12x1	33 ft-lb (45 N-m)
Danfoss Part # 063G2021, MBS 1250, 300 bar		(+10%, -0)



17.10 NUMATICS AIR VALVE ASSEMBLY TORQUE SPECIFICATIONS

The following torque specifications are recommended by the supplier and should be used unless otherwise specified. These specifications apply to Numatics 2012, 2035, ISO 1, ISO 2 & ISO 3 air valve assemblies.

17.10.1 TORQUE SPECIFICATIONS FOR NUMATICS 2012 & 2035 AIR VALVE ASSEMBLIES

Figure 5 – Numatics 2012 & 2035 Air Valve Assemblies



Table 34 – Numatics 2012 & 2035 Air Valve Assemblies

		2012 Air Valve Assy		2035 Air Valve Assy	
Fastener	Description Torque		Torque		
			in-lb	N-m	in-lb
1	Valve to Manifold	0.9-1.1	8-10	2.5-2.8	22-25
2	Valve to Sandwich Plate	0.9-1.1	8-10	2.8-3.4	25-30
3	Sandwich Plate to Manifold	0.9-1.1	8-10	2.8-3.4	25-30
4	Blanking Plate to Manifold	1.4-1.7	12-15	2.8-3.4	25-30



17.10.2 TORQUE SPECIFICATIONS FOR NUMATICS ISO 1, 2 & 3 AIR VALVE ASSEMBLIES

Figure 6 – Numatics ISO 1, 2 & 3 Air Valve Assemblies



Table 35 – Numatics ISO 1, 2 & 3 Air Valve Assemblies

Deviction		ISO 1, 2 & 3 Air Valve Assemblies	
Fastener	Description	Tor	que
		N-mm	in-lb
1	Valve to Manifold	3.6-4.3	32-38
2	Valve to Sandwich Plate	3.6-4.3	32-38
3 Sandwich Plate to Manifold		3.6-4.3	32-38
4	Blanking Plate to Manifold	3.6-4.3	32-38

17.11 HYDAC MALE PRESSURE TEST POINT

HPN 2638323	Thread 9/16-18 UNF	25 ft-lb (35 N-m)
Hydac designation: 6003737 (9/16-18 UNF,		(+10%, -0)
630 bar, 1620 series, O-ring/Form E)		



17.12 ACCUMULATOR GAS VALVES

HPN 9007755 Denergy designation: AV500-4000	22 ft-lb (30 N-m) (+10%, -0)		
HPN 11862074 Denergy designation: GV03-00	22 ft-lb (30 N-m) (+10%, -0)	T	

Note: Gas valves for standard accumulators, 4000psi

17.13 EV9 FLOW CONTROL VALVE

HPN 7610661 Sun Hydraulics designation: FXAAXAV 0.25 LPM (Liters Per Minute)	25 ft-lb (34 N-m) (+10%, -0)	
		•

Note: Fixed orifice, pressure compensated flow control valve, 5000psi

17.14 IGUS CFX CLAMPS

HPN	Model #	1.1 ft-lb (1.5 N-m)	Single, double or triple clamp housings
741401	CFX12.1	(+10%, -0)	
741403	CFX12.2		
2200645	CFX12.3		
741400	CFX14.1		
741402	CFX14.2		
2295429	CFX14.3		
2143391	CFX16.1		•
2200643	CFXL16.1		۲
741570	CFX16.2		
2206628	CFX16.3		
745860	CFX18.1		and the second sec
742126	CFX18.2		
741399	CFX20.1		
2240786	CFX20.2		
745859	CFX22.1		•
741569	CFX22.2		(
747804	CFX26.1		
742128	CFX30.1		
6837530	CFX30.2		
7577891	CFXL30.2		
3623334	CFX38.1		
746702	CFX42.1		A Br



18 INTERNATIONAL STANDARDS TORQUE SPECIFICATIONS

The following torque values obtained from international standards are specified on the drawing when deviating from the Husky general torque standard.

18.1 ISO 6162:1994 - SPLIT FLANGE ASSEMBLIES

Table 36 – Code 61 Split Flange Assemblies

4 Bolt Split Flange Assemblies Code 61 (25 bar to 350 bar series)					
Bolt Size	Torque (+25% - 0) See Section 18.3				
	N-m	ft-lb			
M8	25	18			
M10	53 40				
M12	95 70				
M16	220 160				
Lubricant	Lubriplate FGL-1 or Molykote G – rapid plus with MoS2				

4 Bolt Split Flange Assemblies Code 62 (400 bar series)				
Bolt Size	Torque (+25% - 0) See Section 18.3			
	N-m	ft-lb		
M8	25	18		
M10	53	40		
M12	95	70		
M14	150	110		
M16	220	160		
M20	390	290		
Lubricant	Lubriplate FGL-1 or Molykote G – rapid plus with MoS2			

Table 37 - Code 62 Split Flange Assemblies

18.2 CAUTION

It is important that all screws be lightly torqued (e.g. from 1 to 2 FFFT) before applying the final recommended torque values to avoid breaking the flange halves during installation.

18.3 Notes

- The recommended torque values are consistent with the HGT-50 general standard. Exception: M14 bolts (special size requiring a note on the drawing).
- The recommended torque values may be increased by 25% when flange head screws of property 12.9 screws are used with Unbrako Durlok-12.9 screws.

19 PET MOLD AND HOT RUNNER SPECIAL TORQUE SPECIFICATIONS

Following torque specifications must be applied accordingly to ensure proper installation.

19.1 CAM FOLLOWER TORQUE SPECIFICATIONS

CAM follower HPN	Component	Torque [N-m]	Torque [ft-lb]
1425388	Nut	22 N-m	16 ft-lb
1502548	Nut	87 N-m	64 ft-lb
2720012	Cam Follower	87 N-m	64 ft-lb
2739013	Set Screw	8.5-9 N-m	6.3-6.6 ft-lb
5702962	Cam Follower	87 N-m	64 ft-lb
5792002	Set Screw	8.5-9 N-m	6.3-6.6 ft-lb

1 a D C = C A M F D D W C F D C U C S P C D C A M F D D W C F D C U C S P C D C A M F D D C M C F D C M C F D C M C M C M C M C M C M C M C M C M C	Table 38 –	CAM]	Follower	Torque	Specificati	ons
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19.2 EOAT TUBE RETAINER PIN TORQUE SPECIFICATION

Figure 7 – EOAT Tube Retainer Pin Torque Specification



]	Fable	39 -	EOAT	Tube	Retainer	Pin
]	lorqu	e Spe	ecification	on		

Hex Size (mm)	Torque (N-m)	Torque (ft-lb)
5	37	27
4	20	15

19.3 COOLPIK VACUUM/BLOW PIN TORQUE SPECIFICATIONS

Table 40 - COOLPIK Vacuum/Blow Pin Torque Specifications

Vacuum/Blow	Torque								
Pin Size	N-m	ft-lb							
M6	2	1.4							
M12	15	11							
M16	34	25							
M20	60	44							



19.4 COOLPIK MOVING PUCK INSTALLATION TORQUE SPECIFICATION

Apply following torque during moving puck installation.

Figure 8 – Moving Puck Assembly Installation Torque Specification



Torque the sub-assembly into the COOLPIK plate to 18 N-m through the top of the pin using an 8mm socket.

19.5 COOLPIK PLATE MOUNTING TORQUE SPECIFICATION

Apply HGT-80 [77N-m (56.8 lb-ft)] torque for M10 COOLPIK plate mounting screws.

Figure 9 – COOLPIK Assembly on Machine Plenum



19.6 Mold/Hot Runner Lift Bars Mounting Screws Torque Applications

Арр	olication		Hardware	Base/Threaded Material	Torque Standard
	• Hot Runner/Mold Lift Bars Mounting Screws (Excluding M30 and Larger	Screws and Threaded Rods	- DIN 912-12.9 SHCS - DURLOK-12.9-UNB HHS - DIN 933 & 931-10.9 HHCS - DIN 976-12.9&10.9 ROD - ASTM A574 SHCS	Steel Cast Iron	HGT-50
Mechanical	• Hot Runner/Mold Lift Bars Mounting Screws, M30 and Larger Sizes	Screws and Threaded Rods	 DIN 912-12.9 SHCS DURLOK-12.9-UNB HHS DIN 933 & 931-10.9 HHCS DIN 976-12.9&10.9 ROD DIN 7991-10.9 FHCS ISO 7380-10.9 BHCS ASTM A574 SHCS 	Any Material for Lift Bar Mounting Screws	HGT-35

19.7 GIB/WEAR PLATE MOUNTING SCREWS TORQUE SPECIFICATION

Apply HGT-50 on Gibs and Wear Plates.

Apply HGT-LHCS for Wear Plates using LHCS.

19.8 Neck ring plugs Torque Specification

Apply appropriate torque to the Neck Ring plugs according to the table below.

Table 42 – Neck Ring Plugs Torque Specifications

HPN	Size	Material	Maximum Tightening Torque (+ 10% / - 10%)					
			N-m	ft-lb				
4125714	M5	Brass	1.5	1.1				
6359476	1/16	Brass	7	5.2				

19.9 STACK INSERTS TORQUE SPECIFICATION

Apply HGT-80 on all SHCS's that are used on Stack Inserts.

19.10 Torque Specification for Water Manifolds to Slides

Apply HGT-80 on all SHCS's that are used to mount Slide Water Manifolds to Slides.

19.11 TORQUE SPECIFICATION FOR SLIDE TO CONNECTING BARS

Apply HGT-80 on all SHCS's that are used to mount Slides to Connecting Bars.

19.12 TORQUE SPECIFICATION FOR EOAT ASSY. TO ROBOT

Apply HGT-80 on all SHCS's that are used to mount EOAT Assembly to Robot Carriage.

19.13 TORQUE SPECIFICATION FOR NEXPET CORE SLEEVE SET SCREWS





*Apply LOCTITE® 222 or equivalent to the set screws and tighten them to 3N-m [2.2 lb-ft] - refer to NexPET mold manual for detailed installation instructions.

20 APPENDIX



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20.1DLO DEVICE DETAILS (2205)

Refer to the following sheets (See 6 to 17) for DLO device torque values.



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1	2	3	4	5	6	7	8	9	10)	11	12	13	14	15	16	17	1	18	19
3VA B	Breakers																			
BREAKE	RS	BREAKER LUGS			MOUNTIN	G BOLTS	UNINSULAT	ED FER	RULES			FLEXIBLE E	USBAR			COMPRESS	ON LUGS	/ BUSBA	R	
Туре	SIZE (A)	Туре	HPN	#of Conn.	Torq b-in	jue N-m	AWG	Strip (mm)	AWG	Torque b-in	N-m	Max Width (mm)	Thickness (mm)	Tor b-in	que N-m	Max W x D (mm)	Bolt Size	Tor b-in	que N-m	
3VA51	15-125	3VA9133-0JA11 3VA9134-0JA11	10915876 10973718	1	N/A		14 - 1/0	12	14 - 6 4 - 1/0	44 71	5	13	1 - 7.2	71	8	N/A				
		3VA9133-0JF60 3VA9134-0JF60	10915905 10973732	2 2 2	71	8	14 - 4	12 24 39	14 - 8 6 - 4	53 62	6 7	N/A								
		3VA9133-0QA00 3VA9134-0QA00	10915899 10973740	1	N/A		N/A		•	•	•	N/A				17 x 6.5	M6	71	8	
		3VA9133-0QB00 3VA9134-0QB00	10915916 10973748	1	71	8	N/A					N/A				22 x 8	M6	71	8	
3VA52	70-250	3VA9233-0JA11 3VA9234-0JA11	10943437 10973757	1	N/A		10 - 3/0	19	10 - 4 2 - 3/0	53 89	6 10	- 20	1 - 6	89	10	N/A				
		3VA9233-0JA12 3VA9234-0JA12	10943456 10973768	1	N/A		4 - 313	20	4 - 2 1 - 313	71 142	8 16	- 20	3.2 - 6	106	12					
		3VA9233-0JF60 3VA9234-0JF60	10915946 10973778	2 2 2	177	20	14 - 4	15 26 39	14 - 8 6 - 4	53 62	6 7	N/A								
		3VA9233-0JJ22 3VA9234-0JJ22	10915940 10973780	1	177	20	4 - 4/0	25 50	4 - 4/0	275	31									
		3VA9233-0QA00 3VA9234-0QA00	10915935 10973788	1	N/A		N/A					N/A				25 x 8	M8	177	20	
		3VA9273-0QB00 3VA9274-0QB00	10915949 10973803	2	133	15	N/A					N/A				32 x 10	M10	133	15	
3VA53	300-400	3VA9473-0JA13 3VA9474-0JA13	11002426 11039865	1	N/A		2 - 373	26	2 - 3/0 4/0 - 373	142 248	16 28	- 24	2 - 10	248	28	N/A				
		3VA9473-0JJ23 3VA9474-0JJ23	11002455 11039876	1	355	40	2/0 - 373	31 58	2/0 - 373	450	51	N/A								
		3VA9373-0JF60 3VA9374-0JF60	10973808 10973814	3	355	40	14 - 4	18 35	<u>14 - 8</u> 6 - 4	53 62	6 7									
		3VA9473-0QA00 3VA9474-0QA00	11002457 11039884	1	N/A		N/A					N/A				35 x 10	M10	355	40	
3VA54	450-600	3VA9473-0QB00 3VA9474-0QB00	11002463 11039906	2	355	40	N/A					N/A				40 x 12.5	M10	177	20	
3VA55	600-800	3VA9573-0JB23 3VA9574-0JB23	11039991 11040004	2	275	31	4/0 - 373	26	4/0 - 373	375	42.5	N/A				N/A				
		3VA9673-0JB32 3VA9674-0JB32	11050762 11050778	3	275	31	4/0 - 262	26	4/0 - 262	225	25.5									
		3VA9673-0JJ43 3VA9674-0JJ43	11050763 11050780	2	375	42.5	4/0 - 373	23 45	4/0 - 373	325	36.5									
		3VA9673-0QA00 3VA9674-0QA00	11050770 11050771	1	N/A		N/A					N/A				50 x 10	M10 x1 M10 x2	275	31	
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i				5	6		7	8	9		.0	BUSBAR (APTOR	15	16	17	18	19
т	Manufacturer	Part #	HPN	/ # of Conn.	1S	Tor b-in	que N-m	ទ	Tor b-in	rque N-m		Manufacturer	Part #	HPN	# of Conn.	AWG	Max Busbar (mm)	Strip (mm)	Tor b-in	que N-m
	Wohner	32981	6077583	1	12 BOL	1.8	0.2		Preins 4 AWG v	stalled wire leads		Wohner	01069	6251136	1	N/A	30 x 10	35	133	15
	Semens	8US1213-4AP03 8US1313-4AH03	10915871 10943617	1	E S	71	8		89	10			01538	5960823	1	N/A	30 x 10	45	266	30
		8US1213-4AH04 8US1313-4AM04	10943611 11039967	1	£	106	12	5	177	20			01147	7861105	1	3/0 - 373	N/A	45	266	30
													01240	6679232	1	10 - 2/0	N/A	25	80	9
													01243	6257177	1	6 - 4/0	N/A	25	120	13.5
													32146	8010682	2	12 - 6	N/A	15	27	3

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											_										
DHESTRIBU	JTION BL	OCKS										DISTRIBU	UT ION BL	OCKS							
Manufacturer	Part #	HPN	POSTI	ON	# of Conn.	AWG	Strip (mm)	AWG	Torque b-in	N-m		Manufacturer	Part #	HPN	POSTION	#of Conn.	AWG	Strip (mm)	AWG	Torque b-in	N-m
Cooper	PDBFS303	6770277	Line/	Load	1	4 - 313	32	4 - 313	275	31	1	Weidmueller	000		Line	1					
bussman	PDBF5330	5626032	Line		1	4 - 373	32	4 - 373	500	56.5	ĺ		102850	7942923	Load	1	M10	NYA	N/A	133	15
			Load	Row 1	3	14 - 4	30	6-4	45	5	1	Marathon	<u>جې ا</u>	8235602	Line	1	2 - 373	40	6 - 373	375	42.4
				NOW 2	2		13	14 - 10	35	4.5	1		397		, Row 1	1 2		32	6-1	120	13.5
	DOREC377	6107174	Line	<u> </u>	2	4 - 262	30	4 - 262	275	21	i		3 ³⁷		Load Row 2	2 2	14 - 1	16	8	40	4.5
	PUBESS//	015/1/4	une	In 4	4	4 - 202	36	4-202	2/5	51	4								14 - 10	35	4
			Load	Row 1	4	14 - 6	26	8	25	2.8	\mathbf{H}	Ferraz	63131	7147588	Line	1	14 - 1/0	17	14 - 8	50	5.6
				Row 3	4		15	14 - 10	20	2.3	1	Snawmut			Load Row 1	l 2	14 - 6	22	6	35	4
	PDBFS500	7500450	Line/	Load	2	4 - 313	32	4 - 313	275	31					Row	2 2		10	8 10 - 14	25	2.8
	PDBFS504	7500471	Line/	Load	2	4 - 373	32	4 - 373	500	56.5	ĺ										
	16371-1	5002820	Line		1	4 - 313	25	4 - 313	275	31	ĺ										
	16371-3	2246870	Land	Row 1	3	14 - 2	25	* 14 - 2	120	13.5	1										
			LOad	Row 2	3	14 - 6	16	6 - 4	45	5	1										
				Row 3	3		12	8	40	4.5	{										
				Row 1	1		25	14 10		-	f										
	16377-2	4162385	Line	Row 2	1	4 - 4/0	32	4 - 4/0	275	31											
			Load	Row 1	4	14 - 6	25	6	35	4	-										
				Row 3	4	14-0	12	14-10	20	2.3											
	16528-1	3007511	Line		2	2 - 373	45	2 - 373	500	56.5]										
	16528-3	2466523	Load	Row 1	2	6 - 2/0	32	*6-2/0	120	13.5	1										
				Row 2	2	14 - 6 6 - 2/0 14 - 6	16	6 8 14 - 10	35 25 20	4 2.8 2.3											
					۷.	14-0		14 - 10	20	213	1										

* Larger termination screws

Refer to HS 252 for Mechanical Torque specifications

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MACHINE MODEL



MACHINE MODEL

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1	2	3 4	5		6	7	8	9	10		11	12	1	3	14	15	16	17	18	19
	FORS]						
					Ferrule	25	FLEXIBL	E BUSBAR	LUG	5 / BUSB	IAR]						
Manufacturer	Size	Part #	HPN	#of Conn.	AWG	Strip (mm)	Max Width (mm)	Thickness (mm)	Max Wi (mm)	dth B) S	lolt ize	Tor b-in	que N-m]						
Semens	S2 3RT203	BOX LUGS AT	TACHED	1 2	18 - 2 18 - 4	13	N/A		N/A			35	4							
	53 3RT204	BOX LUGS AT	TACHED	1 2	14 - 1 14 - 2	17	9	2.4 - 4.8	N/A			44	5]					AWG	mm ²
		WITHOUT BO	X LUGS		N/A		N/A		15	N	46								26	0.14
	S6 3RT105	3RT1955-4G	2600404	1 2	6 - 2/0 6 - 1/0	20	15.5	2.4 - 4.8	N/A			97	11						22	0.34
		3RT1956-4G	2600407	1 2	6 - 262 6 - 3/0	20	15.5	2.4 - 8											19	1.0
		WITHOUT BO	X LUGS		N/A		N/A		17	N	48								14	2.5
	S10 3RT106	3RT1966-4G	2600408	1 2	3/0-3/3 2/0-373	27	24	4.8 - 10	N/A			177	20						10 8	6 10
		WITHOUT BO	X LUGS		N/A		N/A		25	M	110								6	16 25
	3RT107	3RT1966-4G	2600408	2	2/0-3/3	27	24	4.8 - 10	N/A			177	20						2	35 50
		WITHOUT BO	X LUGS		N/A		N/A		25	M	110									
OVERLOA	D RELA	YS																	STU	DSIZE METRIC
					Ferrule	es	LUGS / B	USBAR]								#2	M2
Manufacturer	Size	Part #	HPN	#of Conn.	AWG	Strip (mm)	Max Width (mm)	Bolt Size	Torq b-in	lue N-m									#4 #5	M2.5 M3
Siemens	S2 3RU213	BOX LUGS AT	TACHED	1 2	18 - 2 18 - 4	13	N/A		35	4									#6 #8 #10	M3.5 M4 M5
	S3 3RU214	BOX LUGS AT	TACHED	1 2	14 - 1 14 - 2	17	N/A		44	5									1/4"	M6 M8
	56 3RB205	RT1955-4G	2600404	1 2	6 - 2/0 6 - 1/0	20	N/A		97	11]								3/8" 7/16"	M10 M11
		RT1956-4G	2600407	1 2	6 - 262 6 - 3/0	20													1/2" 5/8"	M12 M16
		WITHOUT BO	X LUGS		N/A		15	M8			ļ									
	510 3RB206	RT1966-4G	2600408	1 2	3/0 - 373 2/0 - 373	27	N/A		177	20										
		WITHOUT BO:	X LUGS		N/A		25	M10								Refe	er to HS 252	2 for Mecha	nical Torqu	e specifcations

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MOTOR S	TARTER		ORS]									
					Ferru	es	LUGS/	BUSBAR]									
Manufacturer	Size	Part #	HPN	#of Conn.	AWG	Strip (mm)	Max Widt (mm)	h Bolt Size	Tor b-in	rque N-m]									
Semens	52 3RV203	BOX LUGS ATT	TACHED	1 2	18 - 2 18 - 4	13	N/A		35	4]									
	53 3RV204	BOX LUGS ATT	TACHED	1 2	14 - 1 14 - 2	17	N/A		44	5]									
	3RV274	WITHOUT BOX	X LUGS		N/A		15	M6												
MACHINE	/ MOLD	HEATS]									
					Ferru	es	LUGS/	BUSBAR			j									
Manufacturer	Туре	Part #	HPN	#of Conn.	AWG	Strip (mm)	Max Widt (mm)	h Bolt Size	Tor b-in	rque N-m]									
Semens	55Y4	(1,2,3)-Pole		2	14 - 4	15	N/A		27	3]									
	SITOP	6EP1437-3BA10 6EP4137-3AB00	8098974 7829488	2	14 - 6	12]		11	1.2]									
Wohner	AES-CC	31298 31299	4985144 4985089	1	14 - 8	11			20	2.3]									
		31300	4986413		6 - 4		1		25	2.8	ļ									
	CTB-T35	31550	4985169	1	10 - 1/0	15			50	5.6]									
ABA	6 Slot	ICC3.2	7869129	1	N/A		15	M5	20	2.3										
	FCTION	-																		
FE CONN			<i>*</i> - (
Manufacturer	Part #	+ HPN	# of Conn.	AWG	(mm)	Size	b-in	N-m												
Brumall	1024-R0	2172625	1 24	6 - 262	22	N/A	375 40	42.4												
Hoffman	10 Hole	2617195	8	N/A	╧╼╼┥┟	M8	89	10												
1 Martinett	PE busba 6 Hole	2006616	2	N/A		M10 M8	177 89	20 10												
	PE busba	r 3000010	3	N/A	[M10	177	20												
	PE stud	NYA	1	NYA		М6	20	2.3							Refe	er to HS 252	for Mechanica	al Torqu	e specifo	ations
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1	2	3 1	5	6	7	8		9	10	- 11	1	2	13	14	15	16	17	18	19
	LINE FILT	ERS																	
ľ					POWERCO	NNECTIO	DNS			PECON	NECTION								
Ī	Manufacturer	Part #	HPN	Size	max. AWG	Strip (mm)	Bolt Size	Tor b-in	que N-m	Bolt Size	Tor b-in	que N-m							
Ī	BAUMULLER	BFN 3-1-030-001	2351717	30A	8	9	N/A	9	1	M5	18	2						WIRE	GAGE
	(A211)	BFN 3-1-042-001	2351719	42A														AWG	mm ²
		BFN 3-1-056-001	2351721	56A	6	10		15	1.7	M6	35	4						26	0.14
		BFN 3-1-075-001	2351722	75A	4	19		35	4									22	0.34
		BFN 3-1-100-001	2351723	100A	1	24		62	7	M10	53	6						19	0.75
		BFN 3-1-130-001	2351724	130A														16	2.5
		BFN 3-1-180-001	2351726	180A	3/0	27		142	16									12	6
		BFN 3-1-250-001	4683445	250A	N/A		M10	142	16		142	16						6	10
		BFN 3-1-270-001	2620271	270A			M12	221	25		53	6						4	25 35
		BFN 3-1-320-101	4570913	320A			M10	142	16									1	50
		BFN 3-1-400-101	4684162	400A						POWE	Same as R CONNEC	TIONS						STU	DSIZE
		BFN 3-1-600-101	4684158	600A														USA	METRIC
Ī	SIEMENS	65L3000-0BE21-6DA0	5157016	16kW	8	10	N/A	15	1.7	M6	53	6						#2 #4	M2 M2.5
	(A211)	651 2202-08521-18 A0	7375741	3764	,	24	N/A	62	7	M10	80	10						#5	M3.5
		0505205-06051-16A0	/3/3/41	37.644		27	19/5	02		1110	05	10						#8	M4
		65L3203-0BE32-5AA0	6884295	132kW	N/A		M10	221	25	N/A								#10	M5 M6
					L					I								5/16"	M8
																		3/8"	M10

Refer to HS 252 for Mechanical Torque specifications

M11

M12

M16

7/16"

1/2"

5/8"

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Checks	d			DRAWING NO. UNIVERSAL MASTER	11	23

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MACHINE MODEL



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1	2	3 1	5	6	7		8	9	10	11		12	13	14	15	16	17	18	19	
₽	LINE REA	CTORS																		
					POWER	CONNECT	IONS			PECON	VECTION									
	Manufacturer	Part #	HPN	Size	max. AWG	Strip (mm)	Bolt Size	Tor b-in	que N-m	Bolt Size	Tor b-in	que N-m								
	BAUMULLER	BK3-0040/0050-002	6344019	40A	6	15	N/A	9	3	M6	53	6						WIREC	GAGE	
	(A218)	BK3-0065/0080-002	11005628	65A	4	18												AWG	mm ²	
		BK3-0080/0100-002	11005647	80A	1	24		53	6	1								26 24	0.14	
		BK3-0115/0140-002	11005650	115A						M8	106	12						22 20	0.34	
		BK3-0065/0080-001	5831222	65A	N/A		M6	53	6	M6	53	6						19 18	0.75	
		BK3-0080/0100-001	5831202	80A			M8	106	12									16	2.5	
		BK3-0115/0140-001	4922039	115A			M10	133	15	M8	106	12						12	6	
		BK3-0165/0200-001	4684155	165A														6	10	
		BK3-0195/0240-001	4921887	195A														2	35	
		BK3-0275/0340-001	4121316	275A														-	50	
		BK3-0365/0450-001	4420121	365A			M12	177	20									STUD	SIZE	ļ
		BK3-0450/0550-001	4922113	450A														USA #2	METRIC M2	1
		BK3-0615/0750-001	4684150	615A														#4 #5	M2.5 M3	
	SIEMENS (A194)	65L3000-0DE21-6AA0	4858572	16 kW	6	14	N/A	11	1.2									#6 #8	M3.5 M4	
	0.000	65L3000-0DE23-6AA0	4858565	36 kW	2	19		22	2.5	POWE	Same as CONNEC	TONS						#10 1/4"	M5 M6	
		65L3000-0DE25-5AA1	3687230	55 kW	1/0	24		62	7									5/16" 3/8"	M8 M10	
		65L3000-0DE28-0AA1	4858569	80 kW	4/0	35		SPRING	CLAMP	M10	221	25						7/16" 1/2"	M11 M12	
		65L3000-0DE31-2AA1	4858567	120 kW														5/8"	M16	1

DESCRIPTION

DLO DEVICE DETAILS

Refer to HS 252 for Mechanical Torque specifications

PROJECT #WIRE +
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╋	ACTIVE I	NTERFACE MODUL	.ES									
					POWERCO	NNECTIC	DNS			PECON	NECTION	
	Manufacturer	Part #	HPN	Size	max. AWG	Strip (mm)	Bolt Size	Tor b-in	que N-m	Bolt Size	Tor b-in	que N-m
	SIEMENS	65L3100-0BE21-6AB0	4959543	16 kW	6	14	N/A	15	1.7	M8	115	13
	(4133)	65L3100-0BE23-6AB0	5854353	36 kW	1/0	24		53	6			
		65L3100-0BE25-5AB0	4021256	55 kW								
		65L3100-0BE28-0AB0	4021251	80 kW	N/A		M8	115	13			
		65L3100-0BE31-2AB0	4021250	120 kW								

ACTIVE L	INE MODULES												
				POWERCC	NNECTIC	ONS			PECON	NECTION	DC LINK BUSBAR		
Manufacturer	Part #	HPN	Size	max. AWG	Strip (mm)	Bolt Size	Tor b-in	que N-m	Bolt Size	Tor b-in	que N-m	Tor b-in	que N-m
SIEMENS (A20)	65L3130-7TE21-6AA4	4959545	16 kW	8	12	N/A	15	1.7	M5	27	3	15.9	1.8
	65L3130-7TE23-6AA3	5682121	36 kW	N/A		M6	53	6	M6	53	6		
	65L3130-7TE25-5AA3 65L3131-7TE25-5AA3	5808068 7260842	55 kW			M8	115	13					
	65L3130-7TE28-0AA3 65L3131-7TE28-0AA3	3890439 6849701	80 kW						M8	115	13		
	65L3130-7TE31-2AA3 65L3131-7TE31-2AA3	3869320 6849702	120 kW										
	65L3162-2BM01-0AA0	3869348	DC link	4/0	25	N/A	115	13		N/A			

Edited

Appr Checke Original

WIRE	GAGE
AWG	mm ²
26	0.14
24	0.25
22	0.34
20	0.5
19	0.75
18	1.0
16	1.5
14	2.5
12	4
10	6
8	10
6	16
4	25
2	35
1	50

STU	DSIZE
USA	METRIC
#2	M2
#4	M2.5
#5	MB
#6	M3.5
#8	M4
#10	M5
1/4"	M6
5/16"	M8
3/8"	M10
7/16"	M11
1/2"	M12
5/8"	M16

Refer to HS 252 for Mechanical Torque specifications

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MACHINE MODEL

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1	2		5	6	7	8	1	9	10	11	12	2	13	14	15	16	17	18	19	
₽	SERVO DI	RIVES																		
					POWERCO	NNECTIC	ONS			PECON	NECTION		DC LINK	BUSBAR						
	Manufacturer	Part #	HPN	Size	max. AWG	Strip (mm)	Bolt Size	Tor b-in	que N-m	Bolt Size	Tore b-in	que N-m	Tor b-in	que N-m						
	BAUMULLER	BM4434 BM4435	8425222 8425223	40A 60A	4	16	N/A	18	2		Same as		N/A							
	(203)	BM4443	8425143	80A	1	24	N/A	62	7	POWE	RCONNEC	TIONS						AWG	GAGE mm ²	
		BM4444	8098421	100A														26 24	0.14 0.25	
		BM4445	8098423	130A														22 20	0.34	
		BM4446	8098425	150A														19 18	0.75	
		BM4453	8098510	150A	N/A		M8	106	12									16 14	1.5 2.5	
		BM4454	8098511	210A														12 10	4 6	
		BM4462	8098635	250A			M10	133	15									8	10 16	
		BM4463	8098636	300A														4	25 35	
		BM4466	8098637	350A														1	50	
		BM4472	8098684	450A														STUC	SIZE	7
		BM4473	8098685	594A														USA #2	METRIC	
	SIEMENS (A23)	65L3120-1TE24-5AA3 65L3121-1TE24-5AA3	3869422 7260827	45 A	N/A		М6	53	6	M6	53	6	15.9	1.8				#2 #4 #5	M2.5	
	(A235) (A41, A42)	65L3120-1TE26-0AA3 65L3121-1TE26-0AA3	4870136 6849696	60 A														#6	M3.5	
	(A55)	65L3120-1TE28-5AA3 65L3121-1TE28-5AA3	4054901 6849698	85 A			M8	115	13		115	13						#10	M5 M6	
		65L3120-1TE31-3AA3 65L3121-1TE31-3AA3	4054899 6849699	132 A						M8								5/16"	M8 M10	
		65L3120-1TE32-0AA4 65L3121-1TE32-0AA4	3869421 6849700	200 A														7/16"	M11 M12	
		65L3210-1PE27-5UL0	7251771	37 kW	2	18	N/A	35	4				N/A					5/8"	M16	
		65L3210-1PE31-1UL0	7251769	55 kW	2/0	25	N/A	80	9	POWE	Same as R CONNEC	TIONS								
		65L3210-1PE31-8UL0	7162332	90 kW	N/A		M10	212	24											
		65L3210-1PE32-5UL0	6852710	132 kW											Ref	er to HS 252	for Mechani	cal Torque	specifcal	tions
		MACHINE MODEL				R	Nam lited diese	e D two 2/	ate 4/2022	Time 11:10:58 AM	DESCRIP	TION					PROJECT		WIRE	+
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· N	HS 252 - STANDARD ASSEMBLY T	ORQUES	Page	48 of 50
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1	2	2 3 1 5 6		7		8	9	10	11	12		.3 14	15	16	17	18	19		
⊕	SERVO M	OTORS																	
						POWER	CONNECT	IONS	PECON	NECTION									
	Manufacturer	Part #	HPN	Motor Size	Terminal Box #	Bolt Size	Tor b-in	que N-m	Bolt Size	Torque Ib-in N-m	Cable Entry	ø							
	BAUMULLER	D52-100LO54W-20-5	8008538	100	12	M8	53	6		Same as	M40 x M25 x	(1) (1)					WIRE	GAGE	
		D52-100KO54W-30-5	8008324						POWE	RCONNECTIONS	5						AWG	mm ²	
		D52-100MO54W-30-5	8008338														26	0.14	
		D52-100BO54W-20-5	8008540 8135668		14						M63 x M25 x	(1) (1)					22	0.34	
		D52-100LO54W-30-5	8008350														19	1.0	
		D52-100BO54W-30-5	8008351 8012949														16	2.5	
		D52-132MO54W-20-5	8025038	132	22						M40 x M25 x	د2 د1					12	6	
		D52-132ML54W-30-5	8008355 8010220		24						M63 x M25 x	< 2 < 1					6	10	
		D52-132MO54W-30-5	8008356 8012948														2	35	
		D52-132LO54W-30-5	8008354		26	M10	89	10									1	50	
		D52-132BO54W-30-5	8008353 8012942														STU	DSIZE	
		D52-160KO54W-30-5	8012944	160	32						64 x 25.5 x	2					USA #2	METRIC M2	-
		DS2-160MO54W-30-5	8008366 8012945		34	M12	89	15.5			76 x 25.5 x	2					#4	M2.5 M3	\neg
		D52-160LO54W-30-5	8008358 8012946														#6	M3.5 M4	
		D52-160BO54W-30-5	8008357 8012947														#10	M5 M6	
		D52-200LO54W-27-5	8020273	200	46	M16	89	10			51 x 25.5 x	6 (1					5/16"	M8 M10	
		D52-200MO54W-27-5	8020002								40.5 x	٢2					7/16"	M11 M12	
																	5/8"	M16	\neg

Refer to HS 252 for Mechanical Torque specifications

Dillord	Name	Date	Time 11-56-50 AM	DESCRIPTION	PROJECT	=WIRE	+
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			POWERCO	NNECTIO	ONS			PECONNB	CTION							
Manufacturer	HP	#of Conn.	AWG	Strip (mm)	Bolt Size	Tor b-in	que N-m	AWG	Strip (mm)	Tor b-in	que N-m	Cable Entry Ø				
EMOD	20 - 60	6	N/A		M8	53	6	10 - 1/0	20	71	8	Pg13 x 7 Pg11 x 2			WIRE	GAG
	60 - 100											Pg16 x 7 Pg11 x 2			AWG	n
	100 - 125	6			M10	89	10	1 - 373	1			Pg21 x 7			26	0
	125 - 150	6			M12	137	15.5					Pg11 × 2			22	0.
	200 - 250	6	4 - 4/0	35	N/A	Cage (Clamp *		Sam	e as		M40 x 7 M20 x 1			19 18	0.
	200 - 600	12						PO	WERCON	NECTION	IS	M32 x 13			16 14	2
															47	—

STU	STUDSIZE					
USA	METRIC					
#2	M2					
#4	M2.5					
#5	M3					
#6	M3.5					
#8	M4					
#10	M5					
1/4"	M6					
5/16"	M8					
3/8"	M10					
7/16"	M11					
1/2"	M12					
5/8"	M16					

Refer to HS 252 for Mechanical Torque specifications

/	Name	Date	Time	DESCRIPTION	PROJECT	=WIRE	+
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<u>н</u>						
a	CLASS A> Electrical threaded connections (>30A)					
#	Connection Type					
1	DLO Conductors					
2	Non DLO Conductors (>=8AWG)					
3	Flexible Busbars					
4	Busbar Connection / Mounting Adaptors					
5	Comb-Type Busbars					
6	SINAMICS DC Link busbars					
7	Main Breaker Lug Mounting Bolts					

CLASS A NOTES:

.

2

All Class A connections shall use Torque Record Report

CLASS A TORQUE RECORD REPORT

Lookup torque values must be predefined prior to assembly Operator to record name for each torqued connection point Inspector to record name for each verification point This report is a CTQ supplier deliverable This report will be available for post build reference Refer to <u>SWI-2551</u>

CLASS B -> Electrical threaded connections (<=30A)

10

11

12

13

14

15

16

17

18

19

Connection Type

2

1 Non DLO Conductors (<=10AWG)

9

2 Distribution Blocks (load side)

3 55Y Circuit Breakers

AES-CC Fuse holders

4

5 Control Transformers *

6 DC power supplies *

7 Buffer Module *

8 RV surge suppressors *

9 Outlets *

10 Control Relays *

11 Heat Exchangers *

12 Grounding Studs

13 Bonding Straps

CLASS BNOTES:

All Class B connections shall be tightened and tug tested

* Future design change to spring cage terminals

CLASS C -> Device Mounting				
#	Mounting Type			
1	Busbar supports			
2	Busbar Adaptors			
3	Breakers			
4	Breaker Handles			
5	Distribution Blocks			
6	Contactors			
7	Line Filters			
8	Line Reactors			
9	Servo Drives			
10	Heat Sink			
11	Solid State Relays			
12	Altanium Components			
13	IPC / Battery			
14	Din Rail			
15	Wire Duct			
16	Connector bulkheads / hoods			
17	Strain Relieves / Gland Plates			
18	Enclosure - Accessories			
19	Adaptor plates			
20	Current Transformers			

Torque value reference:

1. Husky DLO Tables 2. H5252 3. Specials -> OEM installation guide



MACHINE MODEL

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	/	Name	Date	Time	DESCRIPTION PROJECT	=WIRE	+
	Edited	dieetwo	10/27/2021	9:35:03 AM	TOROLE CLASSIFICATION	4	┝───┦
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]	Checked				DRAWING NO.	sheet	Tetal
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