



## Approved Components List

Global Common

SD-007

ISSUED March 8, 2007

REVISED December 10, 2025

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## 1. Scope

The intent of this approved components list is to minimize the proliferation of components within Nexteer Automotive. Any deviation from this list shall be submitted in writing and written approval obtained from the appropriate Nexteer Automotive Engineer in Charge.

## RECORD OF REVISIONS

Revision	Date	Section	Description
001	08MR07	ALL	ORIGINAL APPROVAL & ISSUE DATE
002	31MY09	ALL	This release of SD-007-GC is global common and replaces SD-007, SD-007-NA and all SD-007-xxx global site preferred / approved components lists.
003	06NO09	ALL	Company name updated and "GC" removed from specification number. All SD documents are global common. Added SMC ISO valves, Festo 63 mm bore cylinders and Rockwell PanelView Plus Compact HMI's.
004	17DE10	ALL	General fluid power and electrical safety update
005	15OC12	ALL	General fluid power and electrical update.
006	06JN14	ALL	General fluid power and electrical update.
007	12OC15	ALL	General fluid power and electrical update.
008	10DE15	ALL	Fixed formatting issues and missing switch updates.
009	24FE17	ALL	General fluid power and electrical update.
010	28JN18	ALL	General fluid power and electrical update.
011	15NO19	ALL	Entire Specification update
012	24JA22	ALL	General fluid power and electrical update.
013	01DE23	ALL	General fluid power and electrical update.
014	04NO24	ALL	Significant updates to most sections with added component options and clarifications.
015	10DE25	ALL	General fluid power and electrical update.
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## 2. Manufacturing Engineering - Major Mechanical Components

The "Component" column is organized by component type. Nexteer Automotive does not have requirements for technologies not listed.

The "Requirements" column has two functions:

- 1) Where component brand or part numbers are designated, this is the Nexteer Automotive approved (required) component.
  - Where multiple brands or part numbers are listed, OEM's are allowed to select the one that provides the best value. Components are not listed in any preferred order.
- 2) Where specifications are provided, components are required to meet these specifications.

NOTE: To identify regional requirements, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

The "Examples" column lists components that meet the requirements listed in the "Requirements" column. The example components are not required. These example components are readily available in our global regions. Example components are not listed in any preferred order.

NOTE: To identify regional preferences, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

For equipment being built for a specific plant site, the global common components and the components listed in the plant site appendices A, B, or C are approved components.

Component	Requirements	Examples
A. Brake, Electric	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.	Midwest Reuland Warner
B. Clutch / Brake 1. Air  NOTE: Air is preferred over Electric.  2. Electric	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.  NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.	Posidyne Som-Pac Nexen / Horton (Requires single point lubrication)  Warner Steams Dynatorque
C. Driverless Vehicles (AMR, AGV, AGIV, FMR)	NOTE: All autonomous Mobile Robots and Automated Guided Vehicles shall comply with the safety requirements and protective measures detailed in ISO 3691-4 or ANSI/ITSDF B56.5.	KUKA Omron MiR
D. Gear Reducers	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.	Bonfiglioli Ohio Bosch-Rexroth Siemens Boston SEW Eurodrive Lenze Sumitomo Drive Tech Morse Nord Drive systems Winsmith
E. Indexers	NOTE: Shall use SD-007 approved VFD for control.	Camco-Ferguson Swanson Erie Weiss
F. Leak Testing Units	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.	Cincinnati Test Systems Cosmo Sciometric
G. Mist Collectors	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.	3nine (NA) Royal Filterist
H. Electric Presses	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer.  NOTE: Promess UltraPro controllers require the use of a PULS Power Supply CT10.241 and PULS Buffer module UF20.241 NOTE: Promess U.S.A Version shall be ordered when purchasing outside of the U.S.A.	Kistler Oacis Tox Promess U.S.A
I. Industrial Robot Hardware 1. Actuator  NOTE: Selection of hardware is application specific. Refer to SD-1040 for guidance.	<u>Fanuc</u> Fanuc Mate Series Fanuc M Series & R Series Fanuc SCARA Series  <u>KUKA</u> KR Cybertech KR Agilus KR Iontec KR Quantec KR SCARA	

Component	Requirements	Examples
2. Controller  NOTE: For Fanuc European Controllers it is preferred to purchase with Auto/T1 operator panel rather than installing the Retro Kit.	<u>Fanuc</u> R-30iB Plus Mate R-30iB Plus A-Cabinet R-30iB Compact Plus  <u>KUKA</u> KR5 KR5 micro	
J. Industrial Robot Software 1. EIP Options a) Ethernet / IP Adapter Software  NOTE: Required on all applications.	<u>Fanuc</u> R784 Ethernet / IP Adapter R860 Advanced EIP (Includes R784 Ethernet / IP Adapter)  <u>KUKA</u> KUKA.EtherNet/IP M/S (Includes safety PLC support)	
b) Ethernet / IP Safety  NOTE: Required to support safety PLC applications.	<u>Fanuc</u> R713 Ethernet / IP Safety	
2. Motion Options	<u>Fanuc</u> R809 Motion Package (NA) J684 Collision Guard Pack (B) (C) (I) (E) R663 Constant Path (B) (C) (I) (E) R806 ADV-CP Path Control (B) (C) (I) (E) R805 ADV-CP Speed Control (B) (C) (I) (E) R792 Singularity Avoidance (B) (C) (I) (E) R583 Motion Interface (B) (C) (I) (E)  <u>KUKA</u> All options included within the base software.	
3. Safety Rated Soft Axis Option	<u>Fanuc</u> J567 DCS Position & Speed Check R859 Advanced DCS Package (Includes both J567 and R764 software packages)  <u>KUKA</u> KUKA.SafeOperation	
4. Karel	<u>Fanuc</u> R632 Karel	
K. Industrial Robot Vision (Guidance) 1. 2D Applications	iRVision Cognex Keyence SensoPart	
2. 3D Applications	Keyence RB Series Fanuc 3DV Series SICK	
3. Random Bin Picking	Keyence RB Series	
L. Screwdrivers	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer  Atlas Copco Stanley Webber	
M. Shaft Overload 1. Not Timed	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer	Dodge Morse
2. Timed	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer	Ferguson Standard Tool
N. Variable Ratio Pulleys	NOTE: Refer To Manufacturing Equipment Purchase Specification or Purchasing Manufacturing Engineer NOTE: All pulleys and sprockets to be attached with a taper lock or equivalent device	Reeves Woods

## 3. Manufacturing Engineering - Process and Test Engineering

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Component	Requirements	Examples
<b>A. Data Acquisition Cards</b>  NOTE: Submit proposed choice to Manufacturing Test Engineer for Approval.	Pxle-1073 Chassis w/ Integrated Mxle Controller (High density, scalable, high speed simultaneous sampling +500KS/s) Pcile Controller Card 5 Peripheral Slot 1 Port PCIe, 3m Cable  USB-6002 USB-6003 (High speed sampling) USB-6356 (High speed simultaneous sampling) USB-6341 USB-4065 (multifunction measure DAQ, requires 1A instrumental fuse)	National Instruments X Series DAQ cards (USB bus) USB-6451 Spring Terminal
1. I/O Connector Block	SCB-68A (w/ Cable SHC68-68-RMIO) SCB-68 HSDIO (w/ Cable SHC68-C68-RDIO2)	
2. FPGA (Field Programmable Gate Array)	USB-7846R (R-Series Multifunction RIO w/ Kintex-7 160T) USB-7856R (R-Series Multifunction RIO w/ Kintex-7 160T)	
<b>B. DC Power Supply</b> 1. Low Power (0 - 10A)	Ripple - 3mV Max Input AC Selectable Must be mounted in Cabinet	Sola HD SilverLine
2. Medium Power (10-50A)	Ripple - 150mV Max Input AC 85-265V Must be mounted in Cabinet	TDK SWS 500L-12
3. High Power (+50A) - Programmable DC	Ripple - 150mV Max Input AC Configurable Protect from external Contaminants	Sorensen DCS 20-15E w/ M130 ethernet option Ametek Asterion AST4-125AR Delta Elektronika SM-66-AR-110 TDK Lambda GEN-20-250-3P480
<b>C. Motion Control</b>	Allen-Bradley Kinetix 5500 2198-H0**ERS 2198-H2DCK, Feedback Converter Kit for MPL Motors NOTE: Refer to section 7.D.1 for complete requirements NOTE: Allowed on PLC Controlled Test Equipment only.  Kinetix 5100 2198-E****ERS NOTE: Allowed on LabVIEW Controlled Test Equipment only.  Nidec Nidec M600 NOTE: Allowed for Speed Control on Test Equipment only. NOTE: Allowed only on Retool LabVIEW based Test Equipment already using Momentum IO modules.  Nidec M700 NOTE: Allowed on Test Equipment only.	

Component	Requirements	Examples
D. I/O Modules	<p>Phoenix AXL F BK ETH - Axioline Communication Module AXL F DI16/1 DO16/1 2H (24Vdc - 16DI &amp; 16DO expansion-Module)</p> <p>MOXA ioTinkx 4510 Modbus Adapter Communication Module ioTinkx 45MR-1600 (16-In Expansion Module) ioTinkx 45MR-2600 (16-Out Expansion Module)</p> <p>NOTE: Allowed on LabVIEW base Test Equipment only</p> <p>Schneider Electric - Momentum 170 ENT 11001 (Ethernet w/ built-in Web Server) 170 ADM 350 10 (24Vdc, 160DI &amp; 16DO I/O Module) 170 ADM 350 10 (24Vdc, 160DI &amp; 16DO I/O Module)</p> <p>NOTE: Allowed only on Retool LabVIEW based Test Equipment already using Momentum IO modules.</p>	
E. Signal Conditioning	<p>Built in Power Supply Adjustable gain/offset for coarse and fine Analog Output 0-10V IP 54 minimum for protective case Built in output Anti-aliasing filter (preferable)</p>	<p>Interface SGA (AC/DC Powered Signal Conditioner)</p>
F. Transducers		
1. Current	<p>Closed Loop Hall Effect CE</p>	<p>LEM LA-205 LEM LTS 6-NP LEM IT-60-S ULTRASTAB</p>
2. Load Cell	<p>0.05% FSA Maximum Tension / Compression Style Minimum +/-150% FS Overload CE</p>	<p>Lebow 3140-P Series</p> <p>Interface Series 1100 Ultra Precision Lowprofile ©</p> <p>Honeywell 314-CS Models 0.02/0.04% FSA</p> <p>Futek LCB450 (5000lb)</p>
3. Piezo - Electric	<p>Kistler 914XB Series PCB 2X1B PCB 260Axx Amplifier Kistler 5073Axxx Amplifier Kistler 5015Axxx Amplifier/DAQ National Instruments USB-4432 Amplifier PCB 482CXX CE</p>	<p>Kistler, PCB Piezotronics (contact ME in charge for model selection)</p>
4. Position (LVDT)	<p>IP67 (IP67G+ for applications with oil) CE</p>	<p>Keyence GT2 Series MTS - Tempsonics</p>
5. Torque (Non-Rotary)	<p>0.1% FSA Maximum 4.0E+03 Spring Rate (Nm/rad) Minimum IP40 Minimum CE</p>	<p>Interface Model 5355 Solid Flange Reaction Torque Transducer</p> <p>Honeywell 2012 Flange Reaction Torque Sensor</p> <p>Lorenze DF-30 Flange Reaction Torque Sensor</p>
6. Torque (Rotary)	<p>24Vdc Input 0-10Vdc output 0.1% FSA Maximum 10KHz Sampling Rate Minimum 4.0E+03 Spring Rate (Nm/rad) Minimum IP40 Minimum CE</p>	<p>Interface T25 Series: 10Nm Range 10V analog output option (Applications torque measured 4nm &amp; 100RPM Max)</p> <p>Interface T25 Series: 20Nm Range 10V analog output option</p> <p>Interface T25 Series: 200Nm Range 10V analog output option (Applications torque measured 50Nm Minimum) Lorenz Equivalent Model</p>

Component	Requirements	Examples
G. Software Requirements 1. Test Equipment	National Instruments LabVIEW 2017 or newer Professional Development Software	
2. CNC	Fanuc Fanuc Ladder III	

#### 4. Machine Pneumatic Components

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<b>A. Accessories</b>		
1. Thread Sealants	RTV, Teflon tape, and horsehair sealants shall NOT be used. NOTE: BSPP fittings with face seals do not require thread sealant.	
a) NPT, BSPT (R) Pipe Connections	<u>Loctite</u> 567 PST General Purpose 2087067 (50 ml) 2087069 (250 ml) NOTE: White, anaerobic, 400F, NPT/BSPT tapered threads	
b) BSPP (G) Pipe Connections	<u>Loctite</u> 577 PST General Purpose 2068749 (50 ml) 2068748 (250 ml) NOTE: Yellow, anaerobic, 300F, straight threads	
2. Thread Adapters (NPT/BSPP)		
a) BSPP (male) to NPT (female)		<u>Festo</u> AD-G1/8-1/8NPT-I 9395 AD-G1/4-1/4NPT-I 9396 AD-G3/8-3/8NPT-I 9396 AD-G1/2-1/2NPT-I 9396 AD-G3/4-3/4NPT-I 546550 AD-G1-1NPT-I 546546  <u>Parker</u> 1/8X1/8F4OHGS 1/4X1/4F4OHGS 3/8X3/8F4OHGS 1/2X1/2F4OHGS 3/4X3/4F4OHGS 1X1F4OHGS
b) NPT (male) to BSPP (female)		<u>Festo</u> AD-1/8NPT-G1/8-I 9624 AD-1/4NPT-G1/4-I 9625 AD-3/8NPT-G3/8-I 9626 AD-1/2NPT-G1/2-I 9627 AD-3/4NPT-G3/4-I 546551 AD-1NPT-G1-I 546547
c) Nipple - BSPP (male) to NPT (male)		<u>Festo</u> E-G1/8-1/8NPT 9630 E-G1/4-1/4NPT 9631 E-G3/8-3/8NPT 9632 E-G1/2-1/3NPT 9633 E-G3/4-3/4NPT 546549



Component	Requirements	Examples
3. Quick Disconnect Couplings a.) General	A-A-59439 (formerly Mil-C-4109) and ISO 6150-B Industrial Interchange only.	<u>Parker</u> B33                      1/4 NPT B33E                    3/8 NPT  <u>Hansen</u> 3000-11B                1/4 NPT 3200-15E                3/8 NPT
b) Bubble-Tight	<u>Swagelok</u> "QC" & "QF" Series	
4. Surge Tanks	Brazil (B) Brazilian Regulatory Standard: NR-13 – Boilers and Pressure Vessels  China (C) China National Standard: GB 150 – Pressure Vessels  Europe (E), the below applicable standards below shall be met: Pressure Equipment Directive (PED) 2014/68/EU Simple Pressure Vessels Directive (SPVD) 2014/29/EU Unfired Pressure Vessels EN/13445  North America (NA) ASME BPVC Rules for Construction of Pressure Vessels - Section VIII-Division 1-(2023) (NA) NOTE: For other locations, consult governmental pressure vessel codes.	
5. Vacuum Devices a) Air-Operated	<u>Festo</u> VN OVEM OVTL NOTE: With blow off, with or without display.  <u>SMC</u> ZH ZL112A-DYL ZM1*1H-*5LZ-E17 ZK2*A	
6. Flow Meter a) Electronic 1) Test	<u>Hastings</u> HFM Series	
2) General	<u>Hedland</u>  <u>SMC</u> PF2M Series PF2A Series  <u>FESTO</u> SFAB Series	
b) Differential Pressure	Meriam - Laminar Flow Element	
c) Rotameters	Fisher-Porter Brooks	

Component	Requirements	Examples
7. Gauge		
a) Pressure		
1) General Purpose	3.0% Full Scale (FS) accuracy or better Units of PSI / Bar Units of Pascal (C)	<u>Festo</u> MA-40-10-1/8-EN 162835 MA-50-10-1/4-EN 162838 MA-40-1.0-R1/8-MPA-E-RG (C) 526778 MA-50-1.0-R1/4-MPA-E-RG (C) 526781 MA-50-0.25-R1/4-MPA-E-RG (C) 526780  <u>SMC</u> G36-P10-01-X30
2) Push-In for Sandwich Regulator	5.0% Full Scale (FS) accuracy or better Units of PSI / Bar Units of Pascal (C)	<u>Festo</u> PAGN-26-10-P10 543488 PAGN-40-10-P10 548009 PAGN-26-1M-P10 (C) 563736 PAGN-40-1M-P10 (C) 563738
3) Test	Units of PSI / Bar 4.25" Diameter NPT 0.25% Full Scale (FS) accuracy or better NIST Traceability paperwork required	Helicoid Ashcroft
b) Gauge adapter	<u>Schroeder</u> S1215DCNPT14 12 x 1.5 Connection 1/4 NPT	
c) Pressure tap, Test Port	<u>Schroeder</u> S1215G14WDP 12 x 1.5 Connection G1/4	
8. Muffler, Exhaust, Silencer	<u>Numatics</u> M1MB 1/8 BSPT M2MB 1/4 BSPT M3MB 3/8 BSPT M4MB 1/2 BSPT M5MB 3/4 BSPT M6MB 1 BSPT M5MN 3/4 NPT M6MN 1 NPT  <u>Alhwtco</u> B18, 0554018 1/8 BSPT B28, 0554028 1/4 BSPT B38, 0554038 3/8 BSPT B48, 0554048 1/2 BSPT B68, 0554068 3/4 BSPT B88, 0554088 1 BSPT B68, 0154068 3/4 NPT B88, 0154088 1 NPT  <u>Festo</u> U-1/8-B 6841 1/8 BSPT U-1/4-B 6842 1/4 BSPT U-3/8-B 6843 3/8 BSPT U-1/2-B 6844 1/2 BSPT U-3/4-B 6845 3/4 BSPT U-3/4-B-NPT 6845 3/4 NPT U-1-B 151990 1 BSPT  NOTE: NPT models are allowed for pneumatic shut-off valves only.	
9. Air Nozzles / Air Knives	Shall not exceed 80 dB(A)	<u>Exair</u> <u>Silvent</u> <u>Windjet</u> <u>SMC</u> KNH* Series

Component	Requirements	Examples
10. Safety Rated Manual Blow Off Gun	OSHA 1910.242(b)	<u>Exair</u> 1697-PEEK-12-CS 938812 (12" extension) 900453 (coupler 1/8") 901221 (chip shield)  <u>GUARDIAR, WHISPERJET</u> 80LJ012AA  <u>SMC</u> KNAG-Q10-180
B. Actuators	NOTE: Spring loaded cylinders require the Fluid Power Engineer's prior approval. NOTE: FK rod aligner required on guided applications	
1. Linear (with rod)	Double-acting only Cylinder rods shall have male threads NOTE: An asterisk (*) within the Linear (with rod) section refers to required stroke length. Deviation requires the Fluid Power Engineer's prior approval.	
a) Compact - ISO 21287 1) Single Rod	<u>Festo</u> ADN-25-* -A-P-A ADN-50-* -A-P-A ADN-63-* -A-P-A ADN-100-* -A-P-A  <u>SMC</u> CD55B25-*DCMZ CD55B50-*DCMZ CD55B63-*DCMZ CD55B100-*DCMZ	<u>Stroke Lengths</u> 10, 15, 20, 25, 30, 40, 50, 60 M5 G1/8 10, 15, 20, 25, 30, 40, 50, 60, 80 G1/8 G1/8  <u>Stroke Lengths</u> 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 80, 100, 125 M5 G1/8 G1/8 G1/8
2) Double Rod	<u>Festo</u> ADN-25-* -A-P-A-S2 ADN-50-* -A-P-A-S2 ADN-63-* -A-P-A-S2 ADN-100-* -A-P-A-S2  <u>SMC</u> CD55WB25-*DCMZ CD55WB50-*DCMZ CD55WB63-*DCMZ CD55WB100-*DCMZ	<u>Stroke Lengths</u> 10, 15, 20, 25, 30, 40, 50, 60 M5 G1/8 10, 15, 20, 25, 30, 40, 50, 60, 80 G1/8 G1/8  <u>Stroke Lengths</u> 10, 15, 20, 25, 30, 40, 50, 60, 80 M5 G1/8 G1/8 G1/8
3) Single Rod - Non-Rotating	<u>Festo</u> ADNGF-50-* -P-A ADNGF-63-* -P-A ADNGF-100-* -P-A  <u>SMC</u> CDQMB50TF-* CDQMB63TF-* CDQMB100TF-*	<u>Stroke Lengths</u> 10, 15, 20, 25, 30, 40, 50, 60, 80 G1/8 G1/8 G1/8  <u>Stroke Lengths</u> 10, 15, 20, 25, 30, 35, 40, 45, 50, 75, 100 G1/4 G1/4 G3/8
4) Double Rod - Non-Rotating	<u>Festo</u> ADNGF-50-* -P-A-S2 ADNGF-63-* -P-A-S2 ADNGF-100-* -P-A-S2	<u>Stroke Lengths</u> 10, 15, 20, 25, 30, 40, 50, 60, 80 G1/8 G1/8 G1/8
5) High Force - Special Applications	NOTE: Requires the Fluid Power Engineer's prior approval.  <u>Festo</u> ADNH-25-* -A-P-A-*N ADNH-40-* -A-P-A-*N ADNH-63-* -A-P-A-*N ADNH-100-* -A-P-A-*N	

Component	Requirements	Examples
b) 12-25mm Bore - ISO 6432 1) Single Rod	<u>Festo</u> <div> <div>Stroke Lengths</div> <div> <div>DSNU-12-*P-A</div> <div>10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 100, 125</div> </div> <div> <div>DSNU-25-*PPV-A</div> <div>10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100</div> </div> </div> <div> <div>M5</div> <div>G1/8</div> </div>	
	<u>SMC</u> <div> <div>Stroke Lengths</div> <div> <div>CD85N12-*B</div> <div>10, 25, 40, 50, 80, 100, 125, 160, 200</div> </div> <div> <div>CD85N25-*C-B</div> <div></div> </div> </div> <div> <div>M5</div> <div>G1/8</div> </div>	
	<u>Festo</u> <div> <div>Stroke Lengths</div> <div> <div>DSNU-12-*P-A-S2</div> <div>10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 100, 150</div> </div> <div> <div>DSNU-25-*PPV-A-S2</div> <div>10, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100, 125</div> </div> </div> <div> <div>M5</div> <div>G1/8</div> </div>	
	<u>SMC</u> <div> <div>Stroke Lengths</div> <div> <div>CD85WE12-*B</div> <div>10, 25, 40, 50, 80, 100, 125, 160, 200</div> </div> <div> <div>CD85WE25-*C-B</div> <div>25, 40, 50, 80, 100, 125, 160, 200, 250, 300</div> </div> </div> <div> <div>M5</div> <div>G1/8</div> </div>	
c) 32-100mm Bore - ISO 15552	NOTE: Linear with male rod end(s). Festo FNC, HNC, or SNBC mounting bracket required. NOTE: Male rod ends whenever possible. NOTE: Pneumatic cushioning on both ends.	
1) Single Rod	<u>Festo</u> <div> <div>Stroke Lengths</div> <div> <div>DSBC-32-*PPVA-N3</div> <div></div> </div> <div> <div>DSBC-50-*PPVA-N3</div> <div>20, 25, 30, 40, 50, 60, 70, 80, 100, 125, 150,</div> </div> <div> <div>DSBC-63-*PPVA-N3</div> <div>160, 200, 250, 300, 320, 400, 500</div> </div> <div> <div>DSBC-80-*PPVA-N3</div> <div></div> </div> <div> <div>DSBC-100-*PPVA-N3</div> <div></div> </div> </div> <div> <div>G1/8</div> <div>G1/4</div> <div>G3/8</div> <div>G3/8</div> <div>G1/2</div> </div>	
	<u>SMC</u> <div> <div>Stroke Lengths</div> <div> <div>CP96SDB32-*C</div> <div></div> </div> <div> <div>CP96SDB50-*C</div> <div>25, 50, 80, 100, 125, 160, 200, 250, 320, 400,</div> </div> <div> <div>CP96SDB63-*C</div> <div>500</div> </div> <div> <div>CP96SDB80-*C</div> <div></div> </div> <div> <div>CP96SDB100-*C</div> <div></div> </div> </div> <div> <div>G1/8</div> <div>G1/4</div> <div>G3/8</div> <div>G3/8</div> <div>G1/2</div> </div>	
	<u>Festo</u> <div> <div>Stroke Lengths</div> <div> <div>DSBC-32-*T-PPVA-N3</div> <div></div> </div> <div> <div>DSBC-50-*T-PPVA-N3</div> <div>20, 25, 30, 40, 50, 60, 70, 80, 100, 125, 150,</div> </div> <div> <div>DSBC-63-*T-PPVA-N3</div> <div>160, 200, 250, 300, 320, 400, 500</div> </div> <div> <div>DSBC-80-*T-PPVA-N3</div> <div></div> </div> <div> <div>DSBC-100-*T-PPVA-N3</div> <div></div> </div> </div> <div> <div>G1/8</div> <div>G1/4</div> <div>G3/8</div> <div>G3/8</div> <div>G1/2</div> </div>	
	<u>SMC</u> <div> <div>Stroke Lengths</div> <div> <div>CP96SDB32-*CW</div> <div></div> </div> <div> <div>CP96SDB50-*CW</div> <div>25, 50, 80, 100, 125, 160, 200, 250, 320, 400,</div> </div> <div> <div>CP96SDB63-*CW</div> <div>500</div> </div> <div> <div>CP96SDB80-*CW</div> <div></div> </div> <div> <div>CP96SDB100-*CW</div> <div></div> </div> </div> <div> <div>G1/8</div> <div>G1/4</div> <div>G3/8</div> <div>G3/8</div> <div>G1/2</div> </div>	
d) > 100mm Bore - ISO 15552	NOTE: Male rod ends whenever possible. NOTE: Pneumatic cushioning on both ends. NOTE: For high force applications.	
1) Single Rod	<u>Festo</u> <div> <div>Stroke Lengths</div> <div> <div>DSBG-125-*PPVA-N3</div> <div>25, 40, 50, 80, 100, 125, 160, 200, 250,</div> </div> <div> <div>DSBG-160-*PPVA-N3</div> <div>320, 400, 500</div> </div> <div> <div>DSBG-200-*PPVA-N3</div> <div></div> </div> </div> <div> <div>G1/2</div> <div>G3/4</div> <div>G3/4</div> </div>	

Component	Requirements	Examples
2. Linear (rodless) a) 8-63mm Bore	<u>Festo</u> DGC-K-*-*PPV-A-GK-FK (External Guiding required) DGC-*-*KF-PPV-A DGC-*-*KF-YSRW-A-1H-PN NOTE: "1H-PN" clamping unit is only available for 25, 32, 40, and 50mm bore sizes. It is not rated for dynamic stopping (safety applications). Only allowed in non-safety related applications.  NOTE: For low-profile requirements. DLGF-KF-*-*PPSA (External Guiding required) DLGF-G-*-*PPSA  <u>SMC</u> MY1B*TF-***Z (External Guiding required) MY1HT*TF-*L (with recirculating ball bearing guide)	
b) Operator Door Applications	SD-1038 Magnetic breakaway, 30lbs or less. NOTE: Example part number below includes required floating bracket and foot mount kit.  <u>Tolomatic</u> 24100222 SK*.* FL FM2 *.* = Stroke length in inches	
3. Slides	<u>Festo</u> DFM-*-*P-A-KF (for strokes less than 200mm) FENG-*-*KF (with DSBC cylinder for strokes greater than 200mm) or DFM-*-*B-PPV-A-KF DGSL-*-*PA (high tolerance) DGST-*-*PA DGSC-*-*P-L (Mini application) DGSS-*-*E1A (Mini application)  <u>SMC</u> MGPL*TF-*Z JMGP* MXH*-*Z MXH2* (Mini application) MXS*TF-*A CY1SG*TF-*Z (magnetically coupled) NOTE: CY1SG slide above requires the Fluid Power Engineer's prior approval.	
4. Brakes & Locks	Load Stopping and Holding = Brakes Load Holding = Locks NOTE: Refer to the Machine Risk Assessment when load stopping (brakes) are required. Load Stopping (brakes) are typically used for control of suspended vertical loads while load holding (locks) are generally used for process requirements.	
a) Cylinder Rod 1) Brakes	<u>SMC</u> C96NDB*.*C NOTE: Use IFM bracket E11797 and IFM MK5101 T-Slot prox sensor.  <u>FESTO</u> DFLC-*-*PPVA-S NOTE: To achieve PLd in Cat. 2, direct monitoring must be implemented using a proximity sensor FESTO DADG-D-F8-*	
2) Locks	<u>SMC</u> C96NDB*.*C NOTE: Use IFM bracket E11797 and IFM MK5101 T-Slot prox sensor.  <u>FESTO</u> DFLC-*-*PPVA-S NOTE: To achieve PLd in Cat. 2, direct monitoring must be implemented using a proximity sensor FESTO DADG-D-F8-*	

Component	Requirements	Examples
b) Rail		
1) Brakes	<u>Zimmer Group</u> MBPS Series	
2) Locks	<u>Zimmer Group</u> MKS Series	
c) Shaft		
1) Brakes	<u>Zimmer Group</u> RBPS****-A  <u>FESTO</u> DACS-* -A-S NOTE: To achieve PLd, monitoring using proximity sensor FESTO DADG-D-F8-* required.	
2) Locks	<u>Zimmer Group</u> MKRS****A  <u>FESTO</u> DACS-* -A-S NOTE: To achieve PLd, monitoring using proximity sensor FESTO DADG-D-F8-* required.	
5. Grippers	NOTE: Refer to the Machine Risk Assessment for gripper valve type and if a internal spring is required.	
a) 2 Jaw (Parallel)	<u>Festo</u> DHPS-* -A DHPS-* -A-NO (spring to open) DHPS-* -A-NC (spring to close)  HGPD-* -A HGPD-* -A-G1 (spring to open) HGPD-* -A-G2 (spring to close) NOTE: HGPD series has sealing port for wet applications  HGPT-* -A-B-* HGPT-* -A-B-* -G1 (spring to open) HGPT-* -A-B-* -G2 (spring to close) NOTE: HGPT series has sealing port for wet applications  HGPL-* -A-B NOTE: Due to the greater range of motion, special consideration shall be given during the Machine Risk Assessment for angular grippers when an operator is loading in proximity of the gripper.  <u>Schunk</u> MPG-plus * NOTE: The MPG-plus series has sealing port for wet applications, for smaller workpieces.  JGP-P * NOTE: The JGP-P series has sealing port for wet applications, budget version for less demanding applications.  PGN plus-P * PGN-plus-P *-IS (spring to open) PGN-plus-P *-AS (spring to close) NOTE: PGN plus series has sealing port for wet applications  DPG-plus *-* DPG-Plus *-*-IS (spring to open) DPG-Plus *-*-AS (spring to close) NOTE: DPG plus series has sealing port for wet applications	

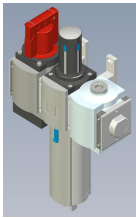
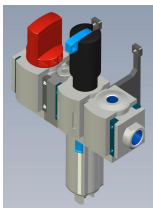
Component	Requirements	Examples
b) 2 Jaw (Angular)	<u>SMC</u> MHZ2-*D MHZ2-*S (spring to open - NO) MHZ2-*C (spring to close - NC)  JMHZ2-*D JMHZ2-*S (spring to open - NO) JMHZ2-*C (spring to close - NC)	
	NOTE: Due to the greater range of motion, special consideration shall be given during the Machine Risk Assessment for angular grippers when an operator is loading in proximity of the gripper.  <u>Schunk</u> DRG *-* DRG *-*-IS (spring to open) DRG *-*-AS (spring to close) NOTE: DRG series has sealing port for wet applications  PRG * GAP * PWG-plus NOTE: PRG/GAP/PWG-plus series has sealing port for wet applications	
	<u>Festo</u> DHDS-**-A DHDS-**-A-NC (spring to close)  HGDD-**-A HGDD-**-A-G1 (spring to open) HGDD-**-A-G2 (spring to close) NOTE: HGDD series has sealing port for wet applications  HGDT-**-A HGDT-**-A-G1 (spring to open) HGDT-**-A-G2 (spring to close) NOTE: HGDT series has sealing port for wet applications  <u>Schunk</u> DPZ-plus * DPZ-plus *-IS (spring to open) DPZ-plus *-AS (spring to close) NOTE: DPZ series has sealing port for wet applications  MPZ * PZB-plus * PZN-plus * NOTE: MPZ/PZB-plus/PZN-plus series has sealing port for wet applications	
6. Tool Changers (quick changers)	BSPP Locked / Unlocked status Tool plate presence status NOTE: Generally used for robot applications	<u>ATI</u> <u>Schunk</u> CPB *                      Automatic CPS *                      Automatic CMS *                      Manual CWS *                      Manual
7. Escapements	<u>SMC</u> MIS32TF-*D MIW32TF-*D  <u>Festo</u> HPV-*-*A HPVS-*-*A	

Component	Requirements	Examples
8. Rotary Actuators	<p>NOTE: Rotary actuators with shock absorbers used with a center-exhaust valve can create unintended motion after power is removed from valve.</p> <p><u>Festo</u> DSM-B DRRD</p> <p><u>SMC</u> MSQ*A-XF CRB*-*-A</p> <p><u>Schunk</u> SRM * SRU-plus *</p> <p>NOTE: Rotary modules with shock absorbers, pneumatically powered, possible pneumatic and electric feedthroughs and intermediate positions between 0-180 degrees of rotation.</p>	
9. Pneumatic Clamps a) Toggle Clamps	<p>NOTE: When air is lost to toggle clamps, they will stay clamped with force.</p> <p>Destaco Elesa-Ganter KIFIX (B)</p>	<p><u>Destaco</u> 802-UE 82L*G-2**B800</p> <p><u>Elesa-Ganter</u> 862</p> <p><u>KIFIX</u> KF-017 DB P</p>
b) Swing Clamps	<p>NOTE: Requires the Fluid Power Engineer's prior approval. NOTE: When air is lost to swing clamps, they will relax and lose clamping force. Special consideration must be taken so that a loss of clamping force will not cause a hazard to interrupt process requirements, or damage tooling or product.</p> <p>Destaco</p>	<p><u>Destaco</u> 9500 Series</p>
10. Stopper Actuators (shot pin)	<p><u>Festo</u> DFSP-32-25-S-PA (double acting, spring advance)</p>	
C. Conductors & Fittings 1. Hose a) Sizes 3/8" - 1"	<p>Sizes 3/8", 1/2", 3/4", 1" only</p>	<p><u>Parker</u> Push-Lok 801 Series 801-6 (3/8") 801-8 (1/2") 801-12 (3/4") 801-16 (1") 801 Series hose requires HY Series crimp fittings or 82 Series field attachable fittings.</p>
b) Sizes 1-1/2", 2"	<p>Sizes 1-1/2, 2" only</p>	<p><u>Parker</u> GST II (Series 7092, Red) 7092 Series 1-1/2" require 43 Series crimp fittings. 7092 Series 2" require 43 Series crimp fittings.</p>
c) Velocity Fuse	<p><u>Ross</u> "Hoze-Fuze" velocity fuse required on supply inlet of hose 3/4" and larger.</p>	



Component	Requirements	Examples
2. Polyurethane Tubing	6, 10, 12mm tubing sizes only NOTE: Must be suitably protected using nylon spiral wrap and tubing clamps.	
a) Normal Applications	<u>Festo</u> PUN-H-6x1-SW (Black) 197391 PUN-H-6x2-BL (Blue) 197384 PUN-H-10x1.5-SW (Black) 197393 PUN-H-10x1.5-BL (Blue) 197386 PUN-H-12x2-SW (Black) 197394 PUN-H-12x2-BL (Blue) 197387	
	<u>SMC</u> TUH0604B-* (Black) TUH0604BU-* (Blue, translucent) TUH1065B-* (Black) TUH1065BU-* (Blue, translucent) TUH1208B-* (Black) TUH1208BU-* (Blue, translucent)	
b) Welding / High Temperature Application	<u>Festo</u> PAN series with Festo NPQH fittings and Turck silicone cover, ST ID 3/8" / 30mm or ST ID 1/2" / 30mm	
c) Polyurethane Tubing Fittings	ISO 1179-1	
d) Fittings	NOTE: Threads smaller than M5 are not permitted <u>Festo</u> QS-G series  <u>SMC</u> KQ2***-G0*A BSPP KQ2***-M5A M5 M-5G2 (gasket for M5 threads)	
4. Steel Tubing	Seamless SAE J524 or Metric E235+N / St. 37.4; 1.0308 according to EN 10305 NOTE: Metric tubing preferred for all applications  O.D. x Wall Thickness R6 x 1 R10 x 1.5 R12 x 1.5 R15 x 1.5 R20 x 2 R25 x 2	<u>Parker</u> R06X1 R10X1.5 R12X1.5 R15X1.5 R20X2 R25X2
a) Fittings	ISO 1179-1 NOTE: Threads smaller than M5 are not permitted	
1) Connections	ISO 8434-1: 24° cone connectors (with elastomeric seal) or ISO 8434-2: 37° flared connectors NOTE: ISO 8434-1 is preferred	<u>Parker</u> EO-2 Triple-Lok
2) Stud Ends	ISO 1179-2: stud ends with elastomeric seal (type E) or ISO 1179-3: stud ends with O-ring sealing with retaining ring (types G and H)	<u>Parker</u>
b) Steel Tubing Support Clamp	Per DIN 3015, Part 1	<u>Hydro-Craft</u> Hydro-strut Hydro-clamp  <u>Hydac</u> HRL, HRS  <u>Zsi</u>  <u>Stauff</u>

Component	Requirements	Examples																																				
5. Aluminum Pipe	<p>NOTE: The Parker Transair system may only be used with accessories (fittings/couplings) dedicated to this series.</p> <p>NOTE: The aluminum pipe system may be used as an air header provided it is protected against damage.</p> <p><u>PARKER</u> Transair System</p>																																					
D. Pre-Assembled Air Preparation Unit	<p>NOTE: Any modifications to the below Nexteer configuration codes require the Fluid Power Engineer's prior approval. Modifications may be warranted if specialty components are required such as coalescing filters, reclassifiers, flow sensors, or additional branch modules.</p> <p>NOTE: The below Nexteer configuration codes come pre-assembled. If required to purchase components separately (under special circumstances), ensure components are installed in same position as the configuration code. Contact Fluid Power Engineer for more information if needed.</p> <p>NOTE: For pre-assembled air preparation units, Nexteer recommends using drip legs located in section 6. Drip Leg to minimize the number of variations.</p> <p>NOTE: SCFM is the max flow demand of the equipment that the air preparation unit is required to supply. SCFM calculators can be found online or contact Nexteer Fluid Power Engineer for Nexteer version.</p>																																					
1. Stand-Alone Machine a) 1 - 40 SCFM	<p>NOTE: Most Nexteer stand-alone machines will fall into this SCFM range. Higher air demand machines, may be an exception. The next SCFM range should be considered for high air flow demand machines. Complete SCFM calculations to be certain.</p> <p><u>Festo (MS6)</u> 23641014 G3/4 23643299 (C) G3/4</p> <p><u>Itemized Parts List of Assembly</u></p> <table><tr><td>MS6-EM1-1/2-R</td><td>Shut-Off valve</td><td>1</td><td>541279</td></tr><tr><td>MS6-WPB</td><td>Bracket</td><td>2</td><td>526074</td></tr><tr><td>MS6-LF-1/2-EUM</td><td>Filter(40m)</td><td>1</td><td>529619</td></tr><tr><td>MS6-LFR-1/2-D6-C-U-M-AS</td><td>Filter(5m)/Reg.</td><td>1</td><td>526490</td></tr><tr><td>MS6-LFR-1/2-D6-C-U-M-MPA-AS (C)</td><td>Filter(5m)/Reg.</td><td>1</td><td>526490</td></tr><tr><td>MS6-FRM-1/2</td><td>Branch module</td><td>1</td><td>529853</td></tr><tr><td>MS6-AGE</td><td>Connect plate</td><td>1</td><td>526083</td></tr><tr><td>MS6-MV1</td><td>Connector</td><td>3</td><td>8119204</td></tr><tr><td>B-1/2</td><td>Blanking plug</td><td>1</td><td>3571</td></tr></table> <p><u>SMC (40 Series)</u> VHS40-F04-M-D Shut-Off valve 1 Y400T-D Bracket 2 AF40-F04-78-40-D Filter(40m) 1 AW40K-F04E-8-D Filter(5m)/Reg. 1 Y44-F04-D Branch module 1 E400-F04-D Connect plate 1 Y400-D Connector 2 TB0* Blanking plug</p>	MS6-EM1-1/2-R	Shut-Off valve	1	541279	MS6-WPB	Bracket	2	526074	MS6-LF-1/2-EUM	Filter(40m)	1	529619	MS6-LFR-1/2-D6-C-U-M-AS	Filter(5m)/Reg.	1	526490	MS6-LFR-1/2-D6-C-U-M-MPA-AS (C)	Filter(5m)/Reg.	1	526490	MS6-FRM-1/2	Branch module	1	529853	MS6-AGE	Connect plate	1	526083	MS6-MV1	Connector	3	8119204	B-1/2	Blanking plug	1	3571	
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MS6-MV1	Connector	3	8119204																																			
B-1/2	Blanking plug	1	3571																																			
b) 40 - 120 SCFM	<p>NOTE: Few Nexteer stand-alone machines will fall into this SCFM range. Higher air demand machines, such as washers, may require this size air preparation unit. Complete SCFM calculations to be certain.</p> <p><u>Festo (MS9)</u> 23641803 G1 23643325 (C) G1</p> <p><u>Itemized Parts List of Assembly</u></p> <table><tr><td>MS9-WPM</td><td>Bracket</td><td>2</td><td>552948</td></tr><tr><td>MS9-EM-1-R-VS</td><td>Shut-Off valve</td><td>1</td><td>562178</td></tr><tr><td>MS9-LF-G-EUM</td><td>Filter(40m)</td><td>1</td><td>564106</td></tr><tr><td>MS9-LFR-G-D6-CUM-AG-BAR-AS</td><td>Filter(5m)/Reg.</td><td>1</td><td>564114</td></tr><tr><td>MS9-LFR-G-D6-C-U-M-AG-MPA-AS (C)</td><td>Filter(5m)/Reg.</td><td>1</td><td>562531</td></tr><tr><td>MS9-FRM-G-VS</td><td>Branch module</td><td>1</td><td>564145</td></tr><tr><td>MS9-AGF</td><td>Connect plate</td><td>1</td><td>552956</td></tr><tr><td>MS9-MV</td><td>Connector</td><td>3</td><td>552950</td></tr><tr><td>B-1</td><td>Blanking plug</td><td>1</td><td>5763</td></tr></table>	MS9-WPM	Bracket	2	552948	MS9-EM-1-R-VS	Shut-Off valve	1	562178	MS9-LF-G-EUM	Filter(40m)	1	564106	MS9-LFR-G-D6-CUM-AG-BAR-AS	Filter(5m)/Reg.	1	564114	MS9-LFR-G-D6-C-U-M-AG-MPA-AS (C)	Filter(5m)/Reg.	1	562531	MS9-FRM-G-VS	Branch module	1	564145	MS9-AGF	Connect plate	1	552956	MS9-MV	Connector	3	552950	B-1	Blanking plug	1	5763	
MS9-WPM	Bracket	2	552948																																			
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MS9-MV	Connector	3	552950																																			
B-1	Blanking plug	1	5763																																			

Component	Requirements	Examples
2. Assembly Lines a) Main Drop 1) 40 - 120 SCFM 	<u>Festo (MS9)</u> 23642378 G1 23643333 (C) G1  <u>Itemized Parts List of Assembly</u> MS9-WPM Bracket 2 552948 MS9-EM-1-R-VS Shut-Off valve 1 562178 MS9-LFR-G-D6-EUM-AG-BAR-AS Filter(40m)/Reg 1 564110 MS9-LFR-G-D6-E-U-M-AG-MPA-AS (C) Filter(40m)/Reg 1 562531 MS9-FRM-G-VS Branch module 1 564145 MS9-AGF Connect plate 1 552956 MS9-MV Connector 1 552950 B-1 Blanking plug 1 5763	
b) Station (Included In Assembly Line) 1) 1 - 40 SCFM 	NOTE: Nexteer configuration codes under this section only come in one size as Nexteer's past experience has shown that assembly line stations do not demand enough air flow to warrant larger sizes.  <u>Festo (MS6)</u> 23641799 G3/4 23643308 (C) G3/4  <u>Itemized Parts List of Assembly</u> MS6-EM1-1/2-R Shut-Off valve 1 541279 MS6-WPB Bracket 3 526074 MS6-FRM-FRZ Branch module 1 549337 MS6-LFR-1/2-D6-C-U-M-AS Filter(5m)/Reg. 1 526490 MS6-LFR-1/2-D6-C-U-M-MPA-AS (C) Filter(5m)/Reg. 1 526490 MS6-FRM-1/2 Branch module 1 529853 MS6-AGE Connect plate 1 526083 MS6-MV1 Connector 3 8119204 B-1/2 Blanking plug 4 3571	
E. Individual Air Preparation 1. Filter a) 40 Micron	<u>Festo</u> MS6-LF-1/2-EUM 40m 529619 MS6-LFP-E (element) 40m 534500  MS9-LF-G-EUM 40m 564106 MS9-LFP-E (element) 40m 570310  <u>SMC</u> AF40-F04-78-40-D 40m AF40P-060S-7-40B (element) 40m  AF50-F06-27-40-D 40m AF50P-060S-7-40B (element) 40m	
b) 5 Micron	<u>Festo</u> MS6-LF-1/2-CUM 5m 529611 MS6-LFP-C (element) 5m 534499  MS9-LF-G-CUM 5m 564108 MS9-LFP-C (element) 5m 570309  <u>SMC</u> AF40-F04-8-D 5m AF40P-060S (element) 5m  AF50-F06-8-D 5m AF50P-060S (element) 5m	

Component	Requirements	Examples																								
c) 1 Micron	<p>NOTE: Requires the Fluid Power Engineer's prior approval.</p> <p><u>Festo</u></p> <table><tr><td>MS6-LFM-1/2-B-U-M-DA</td><td>1m</td><td>527670</td></tr><tr><td>MS6-LFM-B (element)</td><td>1m</td><td>532910</td></tr></table> <p><u>SMC</u></p> <table><tr><td>AFF40-F04-8-D</td><td>1m</td><td></td></tr><tr><td>AFF44P-060AS (element)</td><td>1m</td><td></td></tr></table>	MS6-LFM-1/2-B-U-M-DA	1m	527670	MS6-LFM-B (element)	1m	532910	AFF40-F04-8-D	1m		AFF44P-060AS (element)	1m														
MS6-LFM-1/2-B-U-M-DA	1m	527670																								
MS6-LFM-B (element)	1m	532910																								
AFF40-F04-8-D	1m																									
AFF44P-060AS (element)	1m																									
d) 0.01 Micron	<p>NOTE: Requires the Fluid Power Engineer's prior approval.</p> <p><u>Festo</u></p> <table><tr><td>MS6-LFM-1/2-A-U-M-DA</td><td>0.01m</td><td>527670</td></tr><tr><td>MS6-LFM-A (element)</td><td>0.01m</td><td>532909</td></tr></table> <p><u>SMC</u></p> <table><tr><td>AFD40-F04-8-D</td><td>0.01m</td><td></td></tr><tr><td>AFD40P-060AS (element)</td><td>0.01m</td><td></td></tr></table>	MS6-LFM-1/2-A-U-M-DA	0.01m	527670	MS6-LFM-A (element)	0.01m	532909	AFD40-F04-8-D	0.01m		AFD40P-060AS (element)	0.01m														
MS6-LFM-1/2-A-U-M-DA	0.01m	527670																								
MS6-LFM-A (element)	0.01m	532909																								
AFD40-F04-8-D	0.01m																									
AFD40P-060AS (element)	0.01m																									
e) Reclassifier	<p><u>Festo</u></p> <table><tr><td>LFU-1/2</td><td></td><td>10494</td></tr><tr><td>LFPU-1/2 (element)</td><td></td><td>10496</td></tr><tr><td>LFU-1</td><td></td><td>10495</td></tr><tr><td>LFPU-1 (element)</td><td></td><td>10497</td></tr></table>	LFU-1/2		10494	LFPU-1/2 (element)		10496	LFU-1		10495	LFPU-1 (element)		10497													
LFU-1/2		10494																								
LFPU-1/2 (element)		10496																								
LFU-1		10495																								
LFPU-1 (element)		10497																								
2. Regulator																										
a) General Purpose	<p><u>Festo</u></p> <table><tr><td>MS6-LR-AGE-D6-AS</td><td>4.35-101 psi</td><td>G3/4</td><td>527663</td></tr><tr><td>MS6-LR-AGE-D6-MPA-AS (C)</td><td>4.35-101 psi</td><td>G3/4</td><td>527663</td></tr><tr><td>LRVS-D (Lock)</td><td></td><td></td><td>193786</td></tr></table> <p>NOTE: These regulators come with G3/4 connector plates. When assembling an air prep unit, remove connector plates and install on inlet and outlet of the air prep assembly.</p> <p><u>SMC</u></p> <table><tr><td>AR50K-F06G-B (E) (C)</td><td>0.02-0.2 MPa</td><td></td><td></td></tr><tr><td>AR40K-F04G-D</td><td>0.05-0.85 MPa</td><td></td><td></td></tr><tr><td>AR50K-F06G-D (E) (C)</td><td>0.05-0.85 MPa</td><td></td><td></td></tr></table>	MS6-LR-AGE-D6-AS	4.35-101 psi	G3/4	527663	MS6-LR-AGE-D6-MPA-AS (C)	4.35-101 psi	G3/4	527663	LRVS-D (Lock)			193786	AR50K-F06G-B (E) (C)	0.02-0.2 MPa			AR40K-F04G-D	0.05-0.85 MPa			AR50K-F06G-D (E) (C)	0.05-0.85 MPa			
MS6-LR-AGE-D6-AS	4.35-101 psi	G3/4	527663																							
MS6-LR-AGE-D6-MPA-AS (C)	4.35-101 psi	G3/4	527663																							
LRVS-D (Lock)			193786																							
AR50K-F06G-B (E) (C)	0.02-0.2 MPa																									
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AR50K-F06G-D (E) (C)	0.05-0.85 MPa																									
NOTE: Lock is required for auto door applications.																										
b) Precision	<p><u>Festo</u></p> <table><tr><td>MS6-LRP-1/4-D4-A8</td><td>0.75-36 psi</td><td></td><td>538006</td></tr><tr><td>MS6-LRP-1/2-D2-A8</td><td>0.75-10 psi</td><td></td><td>538020</td></tr><tr><td>MS6-LRP-1/2-D4-A8</td><td>0.75-36 psi</td><td></td><td>538022</td></tr><tr><td>MS6-LRP-1/2-D5-A8</td><td>1.45-58 psi</td><td></td><td>538024</td></tr></table> <p><u>SMC</u></p> <table><tr><td>ARP40K-F04G-3</td><td>1.2-87 PSI</td><td>0.08-6 Bar</td><td></td></tr></table>	MS6-LRP-1/4-D4-A8	0.75-36 psi		538006	MS6-LRP-1/2-D2-A8	0.75-10 psi		538020	MS6-LRP-1/2-D4-A8	0.75-36 psi		538022	MS6-LRP-1/2-D5-A8	1.45-58 psi		538024	ARP40K-F04G-3	1.2-87 PSI	0.08-6 Bar						
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MS6-LRP-1/2-D5-A8	1.45-58 psi		538024																							
ARP40K-F04G-3	1.2-87 PSI	0.08-6 Bar																								
3. Lubricator																										
a) In-Line	<p><u>Festo</u></p> <table><tr><td>MS6-LOE-1/2-U</td><td></td><td></td><td>529777</td></tr></table> <p><u>SMC</u></p> <table><tr><td>AL40-F04-8-D</td><td></td><td></td><td></td></tr></table>	MS6-LOE-1/2-U			529777	AL40-F04-8-D																				
MS6-LOE-1/2-U			529777																							
AL40-F04-8-D																										
b) Single Point	Master Pneumatic Multi point with M476RP reservoir or similar																									
4. Mounting Options	<p><u>Festo</u></p> <table><tr><td>MS6-WP (mounting bracket)</td><td></td><td>532195</td></tr><tr><td>MS6-MV1 (module connector)</td><td></td><td>8119204</td></tr></table> <p>MS9-WP (mounting bracket)</p> <p>MS9-MV (module connector)</p> <p>552947</p> <p>552950</p> <p><u>SMC</u></p> <p>Y400T</p> <p>Y400T-D (spacer with bracket)</p> <p>Y600-D</p> <p>Y600T-D (spacer with bracket)</p>	MS6-WP (mounting bracket)		532195	MS6-MV1 (module connector)		8119204																			
MS6-WP (mounting bracket)		532195																								
MS6-MV1 (module connector)		8119204																								

Component	Requirements	Examples
5. Branch Module	<u>Festo</u> MS6-FRM-1/2 529853 MS9-FRM-G-VS 564145  <u>SMC</u> Y64-F04-D G1/2 Y64-F06-D G3/4	
6. Drip Leg	NOTE: Builder has the option to fabricate own drip leg meeting Nexteer requirements or to use the pre-built options below. NOTE: North America plants will need a NPT to BSPP (G) thread adapter installed when using the SMC drip leg. All other regions shall not have the adapter installed. NOTE: A ball valve selected from section F.1.a. shall be installed to manually drain drip leg. NOTE: Plant will install ball valve before the drip leg regardless of implementation method.  <u>SMC</u> FAPP-06-DDL00006 G3/4 FAPP-08-DDL00007 G1 FAPP-12-DDL00008 G1-1/2 FAPP-16-DDL00012 G2	
F. Valves		
1. Ball		
a) Manual	1/4 turn, 150 psi, WOG (Water, oil or gas), full ported	<u>Festo</u> QH-1/4 G1/4 9541 QH-3/8 G3/8 9542 QH-1/2 G1/2 9543 QH-3/4 G3/4 9544
b) Pneumatic	NOTE: Use for high cyclic applications.  <u>SVF</u> With Adjustable Stem Seal	
2. Check		
a) In-Line	<u>Festo</u> H-1/4-B G1/4 11689 H-1/2-B G1/2 11691  <u>SMC</u> AKB02A-02S 1/4 R AKB04A-04S 1/2 R	
b) Pilot Operated (PO check)	<u>Festo</u> HGL-M5-B M5 530029 HGL-1/8-B G1/8 530030 HGL-1/4-B G1/4 530031 HGL-3/8-B G3/8 530032 HGL-1/2-B G1/2 530033	
c) Manual Override	<u>Festo</u> HAB-1/8 G1/8 184585 HAB-1/4 G1/4 184586 HAB-3/8 G3/8 184587 HAB-1/2 G1/2 184588  <u>Aladco</u> 312501BSPP G1/4	
3. Directional (electronically controlled)	ISO 15407-2:2003 18mm (size 18) NOTE: Requires the Fluid Power Engineer's prior approval. 26mm (size 26)  ISO 5599-2:2001 52mm (size 2E) only  24VDC, Manual Non-locking flush overrides. Wiring Configuration for individual sub-base (M12 connector) ISO 20401:2017 IEC 60947-5-2:2007, Figure D.2	

Component	Requirements	Examples
a) Manifold Mount, 5-Way ISO 15407-2, 18mm  (*) = Configuration selection code (37 Pin External Pilot only) Up to 22 coils (IP65 or 67)	<u>Festo</u> Discrete Multi-Pin Connector 44E-MP1-P+G* (electrical) 539215 44P-N-X-*A-**** (pneumatic)  IO-Link Serial Connector 44E-LK-P (electrical) 44P-N-X-*A-**** (pneumatic)  IO-Link Actuator Power Splitter Cable <u>Balluff</u> BCCOFCF  NOTE: Each base accommodates 2 valves or 4 addresses. NOTE: At the time of this release the Festo configurator does not include the electrical power separation module for IO-Link manifolds. If this module is required, this will have to be ordered separately and installed onsite. See below for part number.  <u>Festo (VISA series) - Valve Size 18 (18mm)</u> 5/2 Valve, Single Solenoid, Spring Offset (O) VSA-B-M52-MZD-A2-1T1L 539185 5/2 Valve, Double Solenoid, Detent (J) VSA-B-B52-ZD-A2-1T1L 539182 5/3 Valve, Double Solenoid, Open Center (E) VSA-B-P53E-ZD-A2-1T1L 539187 5/2 Valve, Single Solenoid, Spring Offset (SO) VSA-B-M52-MZD-A2-1T1L-APP 573202 (With spool monitoring. Commonly used for brake applications) 3/2 Valve, Dual 3-Way Solenoid, N.C., N.C. (K) VSA-B-T32C-AZD-A2-1T1L 539176 (Commonly used for conveyor pallet control. Not for cylinder control) Single Sandwich Reg, Short (6 bar) (ZF) VABF-S4-2-R1C2-C-6 540151 Manifold Sub-base (DbI) (B) VABV-S4-1S-G14-2T2 539220 Individual Sub-base (M12) VABS-S4-2S-G18-R3 8078242 Blanking Plate (L) VABB-S4-2-WT 539213 37 Pin, 27 Wire Cable (5 Meter) (GO) NEBV-S1W37-KM-5-LE27 543275 37 Pin, 27 Wire Cable (10 Meter) (GP) NEBV-S1W37-KM-10-LE27 543276 Vertical Supply Plate, Port 11 (ZU) VABF-S4-2-P1A3-G18 540173  <u>SMC - Valve Size 18 (18mm)</u> Manifold Assembly VV802*-03F-MD0-W1-R-Q 5/2 Valve, Single Solenoid, Spring Offset VSR8-2-FG-S-3VZR VSR8-2-FG-S-3VZR-Q (E) 5/2 Valve, Double Solenoid, Detent VSR8-2-FG-D-3VZR VSR8-2-FG-D-3VZR-Q (E) 5/3 Valve, Double Solenoid, Open Center VSR8-2-FJG-D-3VZR VSR8-2-FJG-D-3VZR-Q (E) 3/2 Valve, Dual 3-Way Solenoid, N.C., N.C. VSR8-2-FDAG-D-3VZR Manifold Sub-base (Sgl) MBS8020-03F-D-1 Manifold End Plate (Left) MES802D-04F-R Manifold End Plate (Right) MES802U-03F Blanking Plate VVS8020-11A Cable, 26 pin, Circular, 5m cable (MD3) AXT100-MC26-050 Circular Connector Housing Asm. VVQC1000-M26-1 Vertical Supply Plate vv802-P-01F Supply Block Plate VVS8020-16A Tie Rods VV802-TR-** Fanuc robot EE connector UIUSP-DUP01068	NOTE: Commonly used for pallet control, not for cylinder control.
b) Manifold Mount, 5-Way ISO 15407-2, 26mm  (*) = Configuration selection code (37 Pin External Pilot only) Up to 22 coils (IP65 or 67)	<u>Festo</u> Discrete Multi-Pin Connector 44E-MP1-P+G* (electrical) 539215 44P-N-X-*B-**** (pneumatic)  IO-Link Serial Connector 44E-LK-P (electrical) 44P-N-X-*B-**** (pneumatic)  IO-Link Actuator Power Splitter Cable <u>Balluff</u> BCCOFCF  NOTE: Each base accommodates 2 valves or 4 addresses. NOTE: At the time of this release the Festo configurator does not include the electrical power separation module for IO-Link manifolds. If this module is required, this will have to be ordered separately and installed onsite. See below for part number.	

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Component		Requirements		Examples
5/2 Valve, Single Solenoid, Spring Offset 5/2 Valve, Double Solenoid, Detent 5/3 Valve, Double Solenoid, Open Center Single Sandwich Reg (6 bar) Manifold Sub-base Manifold End Plate – L (discrete) (37 Pin Ext Pilot) Manifold End Plate – R Individual Sub-base (M12) Blanking Plate Gauge (bar/psi) Gauge (MPa) 37 PIN/5 Meter 27 Wire cable 37 Pin, 27 Wire Cable (10 Meter) Non-Locking Manual Override Cap Override Cap (Pkg of 10) Vertical Supply Plate, Port 11	(O)	<u>Festo</u> VSVA-B-M52-MZD-D2-1T1L	560821	
	(J)	VSVA-B-B52-ZD-D2-1T1L	560818	
	(E)	VSVA-B-P53E-ZD-D2-1T1L	560823	
	(ZF)	VABF-S2-2-R1C2-C-6	555771	
	(D)	VABV-S2-2S-G12-T2	560841	
	(MP1)	VABE-S6-1LT-C-M1-S37	543414	
	(X1)	VABE-S6-2RZ-G34	560839	
		VABS-S2-2S-G12-R3	555640	
	(L)	VABB-S2-2-WT	560845	
	(U)	PAGN-40-10-P10	548009	
	(WU)	PAGN-40-1M-P10	563738	
	(GO)	NEBV-S1W37-KM-5-LE27	543275	
	(GP)	NEBV-S1W37-KM-10-LE27	543276	
	(N)	VAMC-S6-CH	541010	
	(ZU)	VABF-S2-2-P1A3-G12	555786	
d) 2/3-Way Valve Air Pilot		<u>Festo</u> VL/O-3-1/4 VL/O-3-1/2 VL/O-3-3/4	9984 9983 10049	
Air Pilot with separate solenoid		<u>Festo</u> MFH-3-1/4-S MFH-3-1/2-S MFH-3-3/4-S	7959 7960 11968	
		w/ 24VDC solenoid coil MSFG-24/42-50/60	4527	
		Peter-Paul Leak Test NOTE: Requires the Fluid Power Engineer's prior approval.		
e) Press-Brake/Clutch		<u>Ross</u> 3573A5152W 24VDC 3/4 NPT Crossflow with L-G monitor NOTE: Other sizes requires the Fluid Power Engineer's prior approval. NOTE: Pressure sensor monitoring of lockout indicator (port "L") and pneumatic reset are required.		
f) Safety-Rated Exhaust (Blocking) Valve		<u>Ross</u> DM1CDB20A31 DM1CDB42A31 DM1CDA54A31 DM1CDA55A31 G1/4 G1/2 G3/4 G1  <u>Norgren/Herion XSz Series</u> XSZ-8 2492806.3053.024.00 PSV XSZ-8, DBL-SOL, W/ DIN-B Solenoids & Connectors G1/4  XSZ-10 2492930.3053.024.00 PSV XSZ-10, DBL-SOL, W/ DIN-B Solenoids & Connectors G1/2  XSZ-20 2493038.0201.024.00 PSV XSZ-20, DBL-SOL, W/ DIN-A Solenoids & Connectors G3/4  XSZ-32 2493130.0801.024.00 PSV XSZ-32, DBL-SOL, W/ DIN-A Solenoids & Connectors G1  NOTE: The PSV fault indicator is required for each Norgren/Herion valve and must be ordered/assembled separately. 1028063, PSV fault indicator.		



Component	Requirements	Examples
g) Proportional Valve	NOTE: Requires the Fluid Power Engineer's prior approval.	
1) Directional	<u>Festo</u> MPYE VPWP  <u>Norgren</u> VP60	
2) Pressure	<u>Fairchild</u> 7800 series I/P  <u>Rosemount</u> 3051C  <u>Emerson</u> High Flow  <u>SMC</u> ITV1050-33F2L4 ITV3050-33F4L5  <u>FESTO</u> VPPM-8L-L-1-G14-0L6H-LK-S1      1 - 40 SCFM    IO-Link      8024262 VPPM-12L-L-1-G12-0L6H-LK-S1      40 - 150 SCFM    IO-Link      8024265	
4. Flow Control		
a) Meter-In (Nexteer standard)	<u>SMC</u> AS1210-M5      M5 AS2210-G01-X396      G1/8 AS2210-G02-X396      G1/4 AS4210-G04-X396      G1/2  <u>Festo</u> GRLZ-M5-B      M5      151183 GRLZ-1/8-B      G1/8      151188 GRLZ-1/4-B      G1/4      151195 NOTE: For larger sizes, use in-line flow controls listed in the sections below.	
b) Meter-Out (Nexteer PO check circuits / special applications)	<u>SMC</u> AS1200-M5      M5 AS2200-G01-X396      G1/8 AS2200-G02-X396      G1/4 AS4200-G04-X396      G1/2  <u>Festo</u> GRLA-M5-B      M5      151160 GRLA-1/8-B      G1/8      151165 GRLA-1/4-B      G1/4      151172 GRLA-3/8-B      G3/8      151178 GRLA-1/2-B      G1/2      151179	
c) Meter-In or Meter-Out (In-Line)	<u>SMC</u> AS1000-M5      M5 AS2000-F01      G1/8 AS2000-F02      G1/4 AS3000-F03      G3/8 AS4000-F04      G1/2	
d) Door Applications	<u>SMC</u> AS2001F-06T      Tamper-Proof ASD330F-01-06ST      Tamper-Proof NOTE: Use SMC AS-T-1to adjust Tamper-Proof flow controls above.	
e) Deceleration Controller	<u>SMC</u> DAS NOTE: This component is justified for applications with large cylinder strokes NOTE: When using the product along with the built-in air cushion incorporated in the cylinder, pay attention to the adjustment method.	

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## 5. Machine Hydraulic Components

The "Component" column is organized by component type. Nexteer Automotive does not have requirements for technologies not listed.

The "Requirements" column has two functions:

- 1) Where component brand or part numbers are designated, this is the Nexteer Automotive approved (required) component.
  - Where multiple brands or part numbers are listed, OEM's are allowed to select the one that provides the best value. Components are not listed in any preferred order.
- 2) Where specifications are provided, components are required to meet these specifications.

NOTE: To identify regional requirements, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

The "Examples" column lists components that meet the requirements listed in the "Requirements" column. The example components are not required. These example components are readily available in our global regions. Example components are not listed in any preferred order.

NOTE: To identify regional preferences, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

For equipment being built for a specific plant site, the global common components and the components listed in the plant site appendices A, B, or C are approved components.

NOTE: All threaded pressurized fittings shall be BSPP (G) thread. Tube or hose connections shall be O-ring face seal only.

NOTE: If Continental products are selected, they are to be used on US machines only. Continental is not permitted for use in Mexico, Europe, or Asia.

Component	Requirements	Examples
<b>A. Accessories</b>		
<b>1. Accumulators</b>		
a) Bladder Type	NOTE: Region certification required Top load required. Parker VGU/F.25/250.8TS5.3 charge kit required with each machine with accumulator. ISO4570-8VI or .305-32 fill connector only.  Australian - AS1210 (B) - ASME or PED (C) - SELO (ASME/PED) (E) - PED, CE (NA) - ASME	<u>Hydac</u> SB330TR  <u>Nacol</u> 210 series 3000 psi  <u>Parker</u> (I) BA-***-T Series
b) Piston Type	NOTE: Requires the Fluid Power Engineer's prior approval.  <u>Tobul</u> A30 Series                      3000 psi	
c) Pulsation / Noise Suppressors	<u>Wilkes and McLean</u> WM                              201 bar	
<b>2. Accumulator Safety Block</b>	<u>Bosch-Rexroth</u> ABZSS, Version E  <u>Hydac</u> SAF**E16Y1N250AS**L	
<b>3. Air Breather (3 Micron)</b>	<u>Schroeder</u> ABF-3/10-M-P12  <u>Vickers (by Danfoss)</u> BR-210  <u>Hydac</u> BLBN080G10W	
<b>4. Flow Meter</b>	NOTE: Requires the Fluid Power Engineer's prior approval.	
a) Electrical	<u>VSE</u> VS Series	
b) Visual	NOTE: 6000 psi basic stainless-steel flow meter  <u>Hedland</u> H702S - 002                      0.2-2.0 GPM                      G3/4 H702S - 005                      0.5-5.0 GPM                      G3/4 H702S - 010                      1-10.0 GPM                      G3/4 H702S - 020                      2-20.0 GPM                      G3/4 H702S - 030                      3-30.0 GPM                      G3/4	

Component	Requirements	Examples															
5. Flow Switches	<p><u>Hedland</u> H702B-***-F1 - Flow alert flow switch</p> <p><u>IFM Efecter</u> SI5010 (Fast response) with: E40096 M18x1.5, G1/4 adapter, or E40106 M18x1.5, 1/4NPT adapter and U40030 1/2" NPT tee. NOTE: Pressure applications of 1450-4350 psi</p> <p>SA5000 NOTE: Comes with temperature monitoring NOTE: 2 digital outputs, 1 digital output (4-20mA) NOTE: Pressures less than 1450 psi</p> <table> <tr> <td>SM6004</td><td>0-6.6 GPM</td><td>G1/2</td></tr> <tr> <td>SM7004</td><td>0-13.2 GPM</td><td>G3/4</td></tr> <tr> <td>SM8004</td><td>0-26.4 GPM</td><td>G1</td></tr> <tr> <td>SM9004</td><td>1.3-80 GPM</td><td>G2</td></tr> <tr> <td>SM2004</td><td>1.3-160 GPM</td><td>G2</td></tr> </table> <p>NOTE: Comes with temperature monitoring NOTE: 2 analog outputs (4-20mA) NOTE: Pressures less than 230 psi</p> <p><u>Universal Flow Monitors (UFM)</u> CP4-M1T1C1 1.2-12GPM NOTE: De-ionized or Distilled Water Applications only</p>	SM6004	0-6.6 GPM	G1/2	SM7004	0-13.2 GPM	G3/4	SM8004	0-26.4 GPM	G1	SM9004	1.3-80 GPM	G2	SM2004	1.3-160 GPM	G2	
SM6004	0-6.6 GPM	G1/2															
SM7004	0-13.2 GPM	G3/4															
SM8004	0-26.4 GPM	G1															
SM9004	1.3-80 GPM	G2															
SM2004	1.3-160 GPM	G2															
6. Coupling, Drive	<p><u>Magnaloy</u> "Load Lock" with "H" Insert</p> <p><u>KTR</u> Rotex Standard</p>																
7. Gauge a) Pressure	<p>2.5" Diameter 3000 psi 2% accuracy Dual scale psi/Mpa 1/4"NPT</p>																
b) Gauge adapter	<p>NOTE: 12 x 1.5 connection is required</p> <p><u>Schroeder</u> S1215DCNPT14 1/4 NPT</p>																
c) Pressure Tap, Test Port	<p>NOTE: 12 x 1.5 connection is required</p> <p><u>Schroeder</u> SP1215G14WDP G1/4</p>																
8. Flow Divider	<p>NOTE: Requires the Fluid Power Engineer's prior approval.</p>																
9. Isolation Mounts (Pump Mounting)	<p><u>VMC</u> RD Series</p> <p><u>Korfund</u> Double deflection</p>																
10. Isolation Pad Material	<p><u>Fabreeka</u> Fabcel ® Pads (Horizontal)</p> <p><u>Comcord</u> (Vertical) or Equivalent</p>																

Component	Requirements	Examples
11. Intensifier	NOTE: Not allowed for severity 8, 9, 10 applications	
a) Air / Oil Double Acting Press	<p>NOTE: Air / Oil presses should be considered over fully pneumatic and hydraulic presses.</p> <p><u>HyperCyl</u> (NA) HPI HPS HZ HPX</p> <p>NOTE: '-NX' option required. Comes with BSPP ports and with the below. NOTE: HFP-2 filtered fill unit is required and must be securely attached to each unit along with laminated fill instructions. SKE seal kit shall be included with a USB detailing repair procedure. OEM to inform local HyperCyl distributor on purchase order that this unit is for Nexteer Automotive to ensure that these items are delivered with the unit. NOTE: HyperCyl should be considered for the following applications involving forces between 1,000 lbs. - 200,000 lbs.: Pressing, Forming, Piercing, Crimping, Bearing Install</p> <p><u>TOX</u> (B) (C) (I) (E) HZL (cylinder) X-ES (intensifier)</p>	
b) Continuous Motion Press	<p><u>Air-Hydraulic</u> <u>Haskel</u> <u>Hytec</u> 100191 400-1500 psi 100987 925-3325 psi</p>	
12. Manifolds, Multiple Stations	ISO 4413, 7.3 SD-013, Hydraulic Addendum Steel only	<u>DAMAN</u> <u>Med-Kas</u> <u>Bosch-Rexroth HSR</u>
13. Pump / Motor "C" Face Adapters	SAE J799	<u>BSF</u> Magnaloy
14. Rod Coupler, Self-Aligning	<p><u>Milwaukee</u> MC Series NOTE: English threads only</p> <p><u>Parker</u></p>	
15. Sight Gauge with Thermometer	<p><u>Lube Devices</u> G615 Series <u>Hydro-Craft</u> HSG-66-T5-w/temp dial</p> <p><u>Bosch-Rexroth</u></p>	
16. Shock Absorbers	<p><u>Ace</u> <u>Enertrols</u></p>	
17. Sub-Plates or Manifolds	ISO 4413, 7.3 SD-013, Hydraulic Addendum Steel only	<u>Daman</u> <u>Med-Kas</u> <u>Bosch-Rexroth HSR</u>
18. Temperature Control (Water Modulating)	<p><u>Thermal Transfer</u> 65128 55-75 GPM 115F-180F 65141 (bulb well)</p> <p><u>Hydac</u></p>	
19. Water Strainer	Bronze 300 psi 20 Mesh Stainless Wire Screen	<u>Thermal Transfer</u> 65297 1 NPT
20. Water Flow Indicator (Flapper Sight Indicator)	<u>John C. Ernst</u> 142	

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Component	Requirements	Examples
4. Tubing & Pipe Support Clamps	DIN 3015, Part 1	<a href="#">Hydro-Craft</a> Hydro-Strut Hydro-Clamp  <a href="#">Zsi</a>  <a href="#">Stauff</a>  <a href="#">Hydac</a> HRL HRS
D. Connectors		
1. Fittings		
a) Needle Valve	ISO 1179 - BSPP	<a href="#">Parker</a> NS
b) Disconnect, Quick	ISO 1179 - BSPP MIL-C-25427A (valved both sides)	<a href="#">Hansen</a> Aeroquip FD-56
c) Disconnect, Quick Fill Point	<a href="#">Parker</a> H8-63 with H8-66 dust cover (1") – Hydraulic H6-63 with H6-66 dust cover (3/4") – Lubrication NOTE: Dust cover required	
d) Steel Tubing Connection	ISO 1179 - BSPP SAE J1453 or ISO 8434-3 (O-ring Face Seal)	<a href="#">Parker</a> Seal-Lok or Parflange
e) Swivel, Rotary Union	ISO 1179 - BSPP  <a href="#">Dueblin</a>  <a href="#">Aeroquip</a> Single Connection  <a href="#">Carr-Lane</a> Multi-Connections	
2. Flanges	ISO 1179 - BSPP SAE J-514 or J-518	<a href="#">DMIC</a> <a href="#">Anchor</a> <a href="#">Parker</a>
E. Fluid Conditioning		
1. Filter		
a) Pressure	ISO 4406 SAE J2066 Specification (Also known as the GM HF3 and HF4) ISO 4413 Clause 8.3 SD-013 Initial fill / fluid shall meet a cleanliness level of (17/15/13) per ISO 4406.  NOTE: Pall, Schroeder, or Hydac elements only.	<a href="#">Schroeder</a> KF30, KF50, KC50, KFH50, MKF50  <a href="#">Pall</a> 9660, 9710  <a href="#">Hydac</a> HF3P, HF4P
b) Return	ISO 4406 SAE J2066 Specification (Also known as the GM HF3 and HF4) ISO 4413 Clause 8.3 SD-013 Initial fill / fluid shall meet a cleanliness level of (17/15/13) per ISO 4406.  NOTE: Pall, Schroeder, or Hydac elements only.	<a href="#">Schroeder</a> RT, TF3, KF3, KFH50, KTK, KTF  <a href="#">Pall</a> 8800, 8900, 6300, 6400  <a href="#">Hydac</a> HF4R

Component	Requirements	Examples
2. Heat Exchanger a) Air – Oil	NOTE: Requires the Fluid Power Engineer's prior approval.  <u>Thermal Transfer</u> RM-*-*-43  <u>Bosch-Rexroth</u> KOL  <u>Hydac</u>	
b) Water – Oil 1) Shell and Tube	<u>Thermal Transfer</u> EKM-*-*-R EKFM-*-*-R  <u>ITT Standard</u> BCF	
2) Plate	<u>Hydac</u> HEX***-**CB*	
c) Chiller (Water Glycol)	<u>Hydac</u> RFCS-BL-****/1.0/W/***-**-*/A/1/FM/000  <u>Kelvin</u>  <u>Koolant Coolers</u>  <u>Daikin</u>	
F. Valves 1. Air Bleed	<u>Vickers (by Danfoss)</u> ABS  <u>Hydac</u> AEV-6/12	
2. Ball a) Low Pressure	Pump Inlet 400 PSI Full Port 1/4 Turn	<u>DMIC</u> BVAL-0250B-4323 G1/4 BVAL-0375B-4323 G3/8 BVAL-0500B-4323 G1/2 BVAL-0750B-4323 G3/4 BVAL-1000B-4323 G1 BVAL-1250B-4323 G1-1/4 BVAL-1500B-4323 G1-1/2
b) High Pressure	Up to 6000 PSI Full Port 1/4 Turn	<u>DMIC</u> BVH-0250B-1113 G1/4 BVH-0375B-1113 G3/8 BVH-0500B-1113 G1/2 BVH-0750B-1113 G3/4 BVH-1000B-1113 G1 BVH-1250B-1113 G1-1/4 BVH-1500B-1113 G1-1/2  <u>Hydac</u> KHB-G1/4-1114-01X-A G1/4 KHB-G3/8-1114-01X-A G3/8 KHB-G1/2-1114-01X-A G1/2 KHB-G3/4-1114-01X-A G3/4 KHB-G1-1114-01X-A G1 KHM-G11/4-1114-01X-A G1-1/4 KHM-G11/2-1114-01X-A G1-1/2 KHM-G2-1114-01X-A G2



Component	Requirements	Examples
3. Gauge Isolator	<u>Parker</u> 9GT400SV  <u>Hydac</u> MS4 or MS6	
4. Check a) In-Line or Gasket-Mounted	<u>Bosch-Rexroth</u> S, MS-R  <u>Parker</u> 9C	
b) Pilot Operated	<u>Parker</u>	
5. Directional a) Cartridge, Screw-In	NFPA/T3.5.50-200x	<u>Vickers (by Danfoss)</u> <u>Bosch-Rexroth</u> <u>Continental</u> - Command Controls components only. SUN products are not permitted.
b) Cartridge, Slip-In	ISO 7368 (24342)	<u>Vickers (by Danfoss)</u> <u>Bosch-Rexroth</u>
c) Deceleration and Feed	NOTE: Requires the Fluid Power Engineer's prior approval.	
d) Four-Way	ISO 4413 Clause 7.4. SD-013  NOTE: Indicator lights, wet armature solenoids, molded 4 pin M12x1 plug in connector (Per ISO 9461) wired according to ANSI/B-93.9-1988 (R-1988) Section: 5 (7.4.3). Flush manual non-locking overrides and 24VDC coils with surge protector.	Energizing Solenoid A (Pin 2) connects port P to A, Energizing Solenoid B (Pin 4) connects port P to B.
1) D03 – ISO 4401 a) Single Solenoid Spring Return	<u>Vickers (by Danfoss)</u> DG4V-3-2A-M-FPM4WL-D7-H7-60-EN623 30W  <u>Bosch-Rexroth</u> 4WE6D6X/EG24N9DK35L/62=AN 30W  <u>Continental</u> VSD03M-1A-GBD4-70L-C 24W	
b) Double Solenoid Detented	<u>Vickers (by Danfoss)</u> DG4V-3-2N-M-FPM4WL-D7-H7-60-EN623 30W  <u>Bosch-Rexroth</u> 4WE6D6X/OFEG24N9DK35L/62=AN 30W  <u>Continental</u> VSD03M-2A-GBD4-70L-C 24W	
c) Double Solenoid Spring Center Float Spool A&B to T	NOTE: Blocked center is not permitted.  <u>Vickers (by Danfoss)</u> DG4V-3-6C-M-FPM4WL-D7-H7-60-EN623 30W  <u>Bosch-Rexroth</u> 4WE6J6X/EG24N9DK35L/62=AN 30W  <u>Continental</u> VSD03M-3F-GBD4-70L-C 24W	
d) Valves with Monitored Spool Positions (for Safety Applications)	<u>Vickers (by Danfoss)</u> DG4V3-2A-M-S4-FPA5WL-H-2-60	

Component	Requirements	Examples
e) Safety Manifold (BSPP, w/M5x.8 Metric Bolt)	<u>MED-KAS</u> 29902  <u>Continental</u> IC-0302-XXX-D-M-1317	
f) Bubble Tight for Use with Air Over Oil Applications	<u>Hawe</u> Single solenoid, Spring Offset NBVP 16 W-G24 30W 3 Pos., Spring Centered, A&B-T NBVP 16 D-G24 30W	
2) D05 ISO 4401 a) Single Solenoid Spring Return	<u>Vickers (by Danfoss)</u> DG4V4-012A-M-PM4WL-D7-HL-4-10-S607  <u>Bosch-Rexroth</u> 4WE10D4X/CG24N9DK35L=AN  <u>Continental</u> VSD05M-1A-GBD4-70L-C	
b) Double Solenoid Detented	<u>Vickers (by Danfoss)</u> DG4V4-012N-M-PM4WL-D7-H-4-10-S607  <u>Bosch-Rexroth</u> 4WE10D4X/OFCG24N9DK35L=AN  <u>Continental</u> VSD05M-2A-GBD4-70L-C	
c) Double Solenoid Spring Center Float Spool A&B to T	NOTE: Blocked center is not permitted.  <u>Vickers (by Danfoss)</u> DG4V4-016C-M-PM4WL-D7-H-4-10-S607  <u>Bosch-Rexroth</u> 4WE10J4X/CG24N9DK35L=AN  <u>Continental</u> VSD05M-3F-GBD4-70L-C	
d) Valves with Monitored Spool Positions for Safety Applications  Safety Manifold, BSPP w/M6x1 Metric Bolt	<u>ATOS</u> DKE-1631/2/A/FV-X24VDC 36W 1NO/1NC Monitoring contact  <u>MED-KAS</u> 29903  <u>Continental</u> IC-0502-XXX-D-M-1317	
e) Proportional	NOTE: Euro or integral cards only  <u>Vickers (by Danfoss)</u> K(B)SDG4V-3, 1* Series KBSDG4V-5, 1* Series  <u>Bosch-Rexroth</u> 4WREE 4WRKE  <u>Continental</u> VED03M PowerFlow Series	

Component	Requirements	Examples
f) Two / Three-Way, In-Line	NOTE: Requires the Fluid Power Engineer's prior approval.  <u>Vickers (by Danfoss)</u> SV1-10-C-3G-24DG (2-way) SV1-10-3-3G-24DG (3-way)  <u>Bosch-Rexroth</u> VEPS KKDSR1  <u>Continental</u> CEMDV-1*-C5-B-M12  <u>Oilgear</u> High Flow Applications	
6. Flow Control and Needle a) Standard Adjustable	<u>DMIC</u> FC1H-****B  Parker 9F****S, 9N****S	
b) Compensated	<u>Vickers (by Danfoss)</u> FCG-03-28-22-S10  <u>Continental</u> F12M-***-G-F	
c) Proportional	NOTE: Requires the Fluid Power Engineer's prior approval.  <u>Bosch-Rexroth</u> <u>Vickers (by Danfoss)</u> <u>Continental</u>	
7. Modular, Stacking	NOTE: Steel bodies only  <u>Bosch-Rexroth</u> <u>Vickers (by Danfoss)</u> <u>Continental</u> PowerFlow Series	
a) Pressure Reducing / Relieving	<u>Bosch-Rexroth</u> D03 (P-port) ZDR6DP2-4X/25YM/12                      362 psi / 25 bar ZDR6DP2-4X/75YM/12                      1087 psi / 75 bar ZDR6DP2-4X/150YM/12                    2175 psi / 150 bar ZDR6DP2-4X/210YM/12                   3045 psi / 210 bar  D05 (P-port) ZDR10DP2-5X/25YM/12                    362 psi / 25 bar ZDR10DP2-5X/75YM/12                    1087 psi / 75 bar ZDR10DP2-5X/150YM/12                   2175 psi / 150 bar ZDR10DP2-5X/210YM/12                   3045 psi / 210 bar  <u>Vickers (by Danfoss)</u> <u>Continental</u> PowerFlow Series	

Component	Requirements	Examples
b) Relief	<u>Bosch-Rexroth</u> D03 (P to T) ZDB6VP2-4X/100V 1450 psi / 100 bar ZDB6VP2-4X/200V 2900 psi / 200 bar  D05 (P to T) ZDB10VP2-4X/100V 1450 psi / 100 bar ZDB10VP2-4X/200V 2900 psi / 200 bar  <u>Vickers (by Danfoss)</u> <u>Continental</u> PowerFlow Series	
c) Flow Control	<u>Bosch-Rexroth</u> D03 Z2FS6-2-4X/2QV, (A and B - Meter-in or out)  D05 Z2FS10-5-3X/V, (A and B - Meter-in or out)  <u>Vickers (by Danfoss)</u> <u>Continental</u> PowerFlow Series	
d) Pilot Operated Check	<u>Bosch-Rexroth</u> D03 Z2S6-1-6X/V, (A and B line)  D05 Z2S10-1-3X/V, (A and B line)  <u>Vickers (by Danfoss)</u> <u>Continental</u> <u>Command Controls</u>	
8. In-Line Relief	<u>Bosch-Rexroth</u> <u>Vickers (by Danfoss)</u> <u>Continental</u> <u>Command Controls</u>	
9. Servo	NOTE: Requires the Fluid Power Engineer's prior approval.  <u>Bosch Rexroth</u>  <u>Vickers (by Danfoss)</u> SM4 series  <u>Moog</u> 72 or 78 Series	
G. Power Units (flooded inlet only)		
1. Compact ((3) Actuators or less only)	ISO 4413 Clause 8.2 SD-013  NOTE: Reference GM1720(LS1) and GM1721(LS2) for hydraulic design and fluid requirements. Contact the Nexteer Controls Engineer for further assistance with obtaining the Nexteer SSG lubrication number. Most Power units and pumps will use SSG-111A which is an ISO-46 hydraulic oil.	Shaltz Fluid Power Signature Series SD*****SS or Equivalent.
2. Compact - Energy Savings	NOTE: Incoming Power must be 200 – 220VAC  <u>Daikin</u> EHU3007-40-N-902-N 8 GPM / 1000 psi CE-Self SUT06D4016-30-01-N 10 GPM / 2300 psi CE-Self SUT10D6021-30-01-N 16 GPM / 3000 psi CE-Self SUT10D8021-30-01-N 22 GPM / 3000 psi CE-Self (N = Air Filter installed)	Programming cable CCS230-EHR7-1M and Hybrid_Win programming software are required for each Daikin unit. Program is to be backed up and submitted to Nexteer Controls Engineer

Component	Requirements	Examples
3. Hydrostatic	NOTE: Requires the Fluid Power Engineer's prior approval.	
4. Standard	NOTE: Requires the Fluid Power Engineer's prior approval.  ISO-4413 Clause 8.2 SD-013	Shaltz Fluid Power Overhead Series, SD6****SS or Equivalent
H. Pumps	NOTE: All pumps to meet SAE Mounting requirements.	
1. External Gear	<u>Parker</u>  <u>DMIC</u> DPG  <u>Bosch-Rexroth</u> AZP	
2. Piston – Axial  Oilgear, L = 250 – 1500 psi (Preferred) 1 = 750 min. to max adj. range Reference GM1720(LS1) and GM1721(LS2) for hydraulic design and fluid requirements. Contact the Nexteer Controls Engineer for further assistance with obtaining the Nexteer SSG lubrication number. Most power units and pumps will use SSG-111A which is an ISO-46 hydraulic oil.	<u>Bosch-Rexroth</u> AA10VSO18DRG/31RVKC62N00      8GPM      R902502752  <u>Oilgear PVWJ A-FRAME</u> PVWJ-011-A1UV-RSAY-P-LNNNN      4 GPM PVWJ-011-A1UV-RSAY-P-1NNNN      4 GPM PVWJ-014-A1UV-RSAY-P-LNNNN      6 GPM PVWJ-014-A1UV-RSAY-P-1NNNN      6 GPM PVWJ-022-A1UV-RSAY-P-LNNNN      10 GPM PVWJ-022-A1UV-RSAY-P-1NNNN      10 GPM  <u>Bosch-Rexroth</u> AA10VSO45DR/31RVKC62N00      20 GPM      R902502741  <u>Oilgear PVWJ B-FRAME</u> PVWJ-025-A1UV-RSFY-P-LNNNN      11 GPM PVWJ-025-A1UV-RSFY-P-1NNNN      11 GPM PVWJ-034-A1UV-RSFY-P-LNNNN      15 GPM PVWJ-034-A1UV-RSFY-P-1NNNN      15 GPM PVWJ-046-A1UV-RSFY-P-LNNNN      20 GPM PVWJ-046-A1UV-RSFY-P-1NNNN      20 GPM  <u>Bosch-Rexroth</u> AA10VSO71DR/31RVKC92N00      32 GPM      R902502701  <u>Oilgear PVWJ C-FRAME</u> PVWJ-064-A1UV-RSFY-P-LNNNN      25 GPM PVWJ-064-A1UV-RSFY-P-1NNNN      25 GPM PVWJ-076-A1UV-RSFY-P-LNNNN      34 GPM PVWJ-076-A1UV-RSFY-P-1NNNN      34 GPM  <u>Bosch-Rexroth</u> AA10VSO100DR/31RVKC62N00      45 GPM      R902502997  <u>Oilgear (C-Frame)</u> PVWJ-098-A1UV-RSFY-P-LNNNN      45 GPM PVWJ-098-A1UV-RSFY-P-1NNNN      45 GPM  <u>Bosch-Rexroth</u> AA10VSO140DR/31RVKD62N00      63 GPM      R902503003  <u>Oilgear (C-Frame)</u> PVWJ-130-A1UV-RSFY-P-LNNNN      60 GPM PVWJ-130-A1UV-RSFY-P-1NNNN      60 GPM  <u>Vickers (by Danfoss)</u> PVM NOTE: PVM requires the Fluid Power Engineer's prior approval.	

Component	Requirements	Examples
3. Screw	<u>IMO</u>	
4. Vane	<u>Bosch-Rexroth</u> VPV	
a) Fixed Delivery	<u>Vickers (by Danfoss)</u> V and VMQ Industrial	
b) Variable Delivery	NOTE: PVX is the same as Bosch-Rexroth VPV series and is made by Continental, private labeled by B-R.  2 Stage Remote Pressure Control Capable Flange Ports	
1) 7 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3 VPV16SM21HYB03  <u>Continental</u> PVX-8B-30-RF-P-1S-17-A/-BSPP	
2) 11 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3VPV25SM21HYB0B04  <u>Continental</u> PVX-11B-30-RF-P-1S-17-A/-BSPP	
3) 15 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3VPV32SM21HYB0B04  <u>Continental</u> PVX-15B-30-RF-P-1S-17-A/-BSPP	
4) 20 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3 VPV63SM21HYB05  <u>Continental</u> PVX-20B-30-RF-P-5S-17-A /-BSPP	
5) 29 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3VPV45SM21HYB0B05  <u>Continental</u> PVX-29B-30-RF-P-5S-17-A /-BSPP	
6) 36 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3 VPV80SM21HYB05  <u>Continental</u> PVX-36B-30-RF-P-5S-17-A /-BSPP	
7) 46 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3 VPV100SM21HYB04  <u>Continental</u> PVX-46B-25-RF-P-5S-17-A /-BSPP	
8) 60 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3 VPV130SM21HYB04  <u>Continental</u> PVX-60B-25-RF-P-5S-17-A /-BSPP	
9) 75 GPM @ 1800 RPM (325 – 3000 psi)	<u>Bosch-Rexroth</u> 0513R18C3 VPV164SM21HYB04  <u>Continental</u> PVX-75B-25-RF-P-5S-17-A /-BSPP	

## 6. Lubrication Components

The "Component" column is organized by component type. Nexteer Automotive does not have requirements for technologies not listed.

The "Requirements" column has two functions:

- 1) Where component brand or part numbers are designated, this is the Nexteer Automotive approved (required) component.
  - Where multiple brands or part numbers are listed, OEM's are allowed to select the one that provides the best value. Components are not listed in any preferred order.
- 2) Where specifications are provided, components are required to meet these specifications.

NOTE: To identify regional requirements, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

The "Examples" column lists components that meet the requirements listed in the "Requirements" column. The example components are not required. These example components are readily available in our global regions. Example components are not listed in any preferred order.

NOTE: To identify regional preferences, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

For equipment being built for a specific plant site, the global common components and the components listed in the plant site appendices A, B, or C are approved components.

NOTE: All threaded pressurized fittings shall be BSPP (G) thread. Tube or hose connections shall be O-ring face seal only.

Component	Requirements	Examples												
PRODUCT LUBRICATION														
<b>A. Accessories</b>														
1. Material Shutoff / Anti-Drool Valve	<p>NOTE: Valves are intended to be mounted as close as possible to point of dispense to shut off flow. This ensures stable material pressure and reduces drooling.</p> <table> <tr> <th>GP Reeves</th><th colspan="2">Max Pressure</th></tr> <tr> <td>DV1003-*</td><td>1,500 psi</td><td>1/8 NPT</td></tr> <tr> <td>DV100312-* (in-line)</td><td>1,500 psi</td><td>1/8 NPT</td></tr> </table> <p>NOTE: DV1000 series requires one outlet option to be selected. Option to be chosen is based on application.</p> <table> <tr> <td>DV2973A</td><td>3000 psi</td><td>1/4 NPT</td></tr> </table>	GP Reeves	Max Pressure		DV1003-*	1,500 psi	1/8 NPT	DV100312-* (in-line)	1,500 psi	1/8 NPT	DV2973A	3000 psi	1/4 NPT	
GP Reeves	Max Pressure													
DV1003-*	1,500 psi	1/8 NPT												
DV100312-* (in-line)	1,500 psi	1/8 NPT												
DV2973A	3000 psi	1/4 NPT												
2. Flow Switch / Flow Meter	NOTE: Material Application Chart (MAC) determines if required.													
a) In-Line	<table> <tr> <th>GP Reeves</th><th colspan="2">Max Pressure</th></tr> <tr> <td>FS3009-2 (0.2-4 cc/sec)</td><td>1000 psi</td><td>1/8 NPT</td></tr> <tr> <td>FS3009-4 (0.2-6 cc/sec)</td><td>1000 psi</td><td>1/4 NPT</td></tr> <tr> <td>FS3002 (manifold) (0.1-20 cc/sec)</td><td>3000 psi</td><td></td></tr> </table> <p>NOTE: FSM manifolds available in 1/8", 1/4" and 3/8" ports.</p>	GP Reeves	Max Pressure		FS3009-2 (0.2-4 cc/sec)	1000 psi	1/8 NPT	FS3009-4 (0.2-6 cc/sec)	1000 psi	1/4 NPT	FS3002 (manifold) (0.1-20 cc/sec)	3000 psi		
GP Reeves	Max Pressure													
FS3009-2 (0.2-4 cc/sec)	1000 psi	1/8 NPT												
FS3009-4 (0.2-6 cc/sec)	1000 psi	1/4 NPT												
FS3002 (manifold) (0.1-20 cc/sec)	3000 psi													
b) Clamp-On	NOTE: Nexteer prefers the SD-007 approved Allen Bradley IO-Link Master(s) for use with Keyence IO-Link communication modules for ease of setup and accessibility.													
1) Conductor - Plastic/Nylon a) O.D. - 3.0mm, 3.18mm (1/8"), or 4mm	<p><u>Keyence</u></p> <p>FD-XC1R* (clamp set)</p> <p>FD-XS1 (sensor head)</p> <p>FD-XA1 (IO-Link controller)</p>													
b) O.D. - 6.0mm, 3.35mm (1/4"), or 8mm	<p><u>Keyence</u></p> <p>FD-XC8R* (clamp set)</p> <p>FD-XS8 (sensor head)</p> <p>FD-XA1 (IO-Link controller)</p>													
2) Conductor - Metal / Steel Tubing a) O.D. - 3.0mm, 3.18mm (1/8"), or 4mm	<p><u>Keyence</u></p> <p>FD-XC1M (clamp set)</p> <p>FD-XS1 (sensor head)</p> <p>FD-XA1 (IO-Link controller)</p>													
b) O.D. - 6.0mm, 3.35mm (1/4"), or 8mm	<p><u>Keyence</u></p> <p>FD-XC8M (clamp set)</p> <p>FD-XS8 (sensor head)</p> <p>FD-XA1 (IO-Link controller)</p>													

Component	Requirements	Examples
3. Regulator (Mastic)	Analog pressure gauges are required on all regulator inlets. Analog pressure gauges are optional on all regulator outlets.  <u>GP Reeves</u> MPR-3500-250-D-F-H                      3500 psi                      0-250 psi                      1/4 NPT MPR-3500-500-D-F-H                      3500 psi                      0-500 psi                      1/4 NPT NOTE: Grease only. Not for use with RTV or material with Teflon. NOTE: Part numbers above include outlet dial gauge.  GPR5000-1250-200                      1250 psi                      30-200 psi                      3/8 NPT GPR5000-3000-450                      3000 psi                      75-450 psi                      3/8 NPT GPR5000-3000-1250                      3000 psi                      400-1250 psi                      3/8 NPT GPR5000-6000-1000                      6000 psi                      175-1000 psi                      3/8 NPT GPR5000-6000-3000                      6000 psi                      1000-3000 psi                      3/8 NPT GPR5000-6000-2500                      6000 psi                      750-2500 psi                      3/4 NPT NOTE: For high flow and thick materials, including Teflon based materials. NOTE: Part numbers above include outlet dial gauge.  <u>Dopag (piston)</u> Small Body (ID4) 450.00.00                      3625 psi                      87-725 psi                      G1/4 Medium Body (ID8) 450.00.10                      3625 psi                      87-725 psi                      G3/8 Large Body (ID12) 450.00.11                      3625 psi                      87-725 psi                      G1/2 450.00.12                      3625 psi                      217-2175 psi                      G1/2 NOTE: Use for grease, oil, 1K and 2K silicone applications. NOTE: Part numbers above do not include dial gauges.  <u>Dopag (diaphragm)</u> Medium Body (ID8) 402.25.17                      3625 psi                      58-725 psi                      G3/8 402.25.19                      3625 psi                      145-2175 psi                      G3/8 Large Body (ID12) 402.25.60                      3625 psi                      58-725 psi                      G1/2 402.25.30                      3625 psi                      145-2175 psi                      G1/2 NOTE: Use for adhesive, sealant, and abrasive applications. NOTE: Part numbers above do not include dial gauges.  <u>ARO</u> 651780-A1A-B                      3000 psi                      400-1250 psi                      3/8 NPT 651780-A1B-B                      6000 psi                      1000-3000 psi                      3/8 NPT 651780-C1B-B                      6000 psi                      750-2500 psi                      3/4 NPT NOTE: Use C1B for high flow and thick materials NOTE: Does not include dial gauges.	
	4. Gauges	BSPP only



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Component	Requirements	Examples																																																																				
B. Pump Supply System	<p>Each pump supply system shall have a pressure sensor monitoring the output of the pump.</p> <p>NOTE: 6 inch ram cylinders require the Fluid Power Engineer's prior approval.</p> <p>NOTE: Grease pressures shall be limited to a maximum of 3000 psi.</p> <p>NOTE: Every effort shall be made to install the barrel pumps as close to the dispense point as possible. 45 and 90 degree fittings are not permitted in the supply line between the pump outlet and dispenser inlet.</p> <p>NOTE: Not advised to supply multiple machines with Crevseal because of its thick consistency requiring excessive pressure requirements.</p> <p>NOTE: GP Reeves pump motor selection criteria.</p> <ul style="list-style-type: none"><li>- Samoa 20:1 (chop-check) pump option for Lithium and Calcium based materials. For use in all locations except China.</li><li>- ARO 22:1 (chop-check) pump for separation prone materials such as RTV and Teflon based. For use in all locations. Use for Lithium and Calcium based materials for China.</li><li>- ARO 43:1 (chop-check) pump for thicker materials such as Crevseal and RTV. For use in all locations.</li></ul> <p>NOTE: Unlike the GP Reeves part numbers, Graco part numbers below do not include depressurization components. Therefore, the components detailed in section 5 below shall be purchased and installed separately. The Material Application Chart (MAC) determines when depressurization is required. Depressurization designs can be provided upon request.</p> <p>NOTE: Low / empty level sensors with bracket and a pressure sensor will also have to be purchased and installed separately on all Graco pumps. Part numbers and designs can be provided upon request.</p>																																																																					
1. 1 Gallon	<p><u>PVA</u> (Gap Fill applications)</p> <p>PVA-1GPU</p>																																																																					
2. 5 Gallon (20L)	<p>NOTE: Not advised to supply multiple machines with 5 Gallon pump supply system.</p> <p>NOTE: Add "-CE" to end of GP Reeves model numbers to include CE Approval, labeling, and documentation. (example: GSP20-35IbA-40NX-CE)</p> <table><tr><td><u>GP Reeves</u> (NA)</td><td><u>Pump Ratio</u></td><td><u>Cylinder Size</u></td><td><u>Output Pres. @ 70 psi air</u></td></tr><tr><td>GSP20-35IbA-40NX</td><td>20:1 (Samoa)</td><td>3"</td><td>1400 psi</td></tr><tr><td>GSP22-35IbA-40NX</td><td>22:1 (ARO)</td><td>3"</td><td>1540 psi</td></tr><tr><td>GSP20-35IbA-73NX</td><td>20:1 (Samoa)</td><td>3"</td><td>1400 psi</td></tr><tr><td>GSP22-35IbA-73NX</td><td>22:1 (ARO)</td><td>3"</td><td>1540 psi</td></tr></table> <p><u>Graco</u></p> <table><tr><td>CM7A3B</td><td>20:1</td><td>3"</td><td>1400 psi</td></tr></table> <p><u>PVA</u> (Gap Fill applications)</p> <p>PVA-5GPU</p>	<u>GP Reeves</u> (NA)	<u>Pump Ratio</u>	<u>Cylinder Size</u>	<u>Output Pres. @ 70 psi air</u>	GSP20-35IbA-40NX	20:1 (Samoa)	3"	1400 psi	GSP22-35IbA-40NX	22:1 (ARO)	3"	1540 psi	GSP20-35IbA-73NX	20:1 (Samoa)	3"	1400 psi	GSP22-35IbA-73NX	22:1 (ARO)	3"	1540 psi	CM7A3B	20:1	3"	1400 psi																																													
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3. 55 Gallon (200L)	<p>NOTE: Add "-CE" to end of GP Reeves model numbers to include CE Approval, labeling and documentation. (example: GDP20-400I2-40NX-CE)</p> <table><tr><td><u>GP Reeves</u> (NA)</td><td><u>Pump Ratio</u></td><td><u>Cylinder Size</u></td><td><u>Output Pres. @ 70 psi air</u></td></tr><tr><td>GDP20-400I2-40NX</td><td>20:1 (Samoa)</td><td>3"</td><td>1400 psi</td></tr><tr><td>GDP22-400I2-40NX</td><td>22:1 (ARO)</td><td>3"</td><td>1540 psi</td></tr><tr><td>GDP43-400I2-40NX</td><td>43:1 (ARO)</td><td>3"</td><td>3010 psi</td></tr><tr><td>G6DP43-400I2-40NX</td><td>43:1 (ARO)</td><td>6"</td><td>3010 psi</td></tr><tr><td>GDP20-400I2-41NX</td><td>20:1 (Samoa)</td><td>3"</td><td>1400 psi</td></tr><tr><td>GDP22-400I2-41NX</td><td>22:1 (ARO)</td><td>3"</td><td>1540 psi</td></tr><tr><td>GDP43-400I2-41NX</td><td>43:1 (ARO)</td><td>3"</td><td>3010 psi</td></tr><tr><td>G6DP43-400I2-41NX</td><td>43:1 (ARO)</td><td>6"</td><td>3010 psi</td></tr><tr><td>GDP20-400I2-73NX</td><td>20:1 (Samoa)</td><td>3"</td><td>1400 psi</td></tr><tr><td>GDP22-400I2-73NX</td><td>22:1 (ARO)</td><td>3"</td><td>1540 psi</td></tr><tr><td>GDP43-400I2-73NX</td><td>43:1 (ARO)</td><td>3"</td><td>3010 psi</td></tr><tr><td>G6DP43-400I2-73NX</td><td>43:1 (ARO)</td><td>6"</td><td>3010 psi</td></tr><tr><td>GDP20-400I2-74NX</td><td>20:1 (Samoa)</td><td>3"</td><td>1400 psi</td></tr><tr><td>GDP22-400I2-74NX</td><td>22:1 (ARO)</td><td>3"</td><td>1540 psi</td></tr><tr><td>GDP43-400I2-74NX</td><td>43:1 (ARO)</td><td>3"</td><td>3010 psi</td></tr><tr><td>G6DP43-400I2-74NX</td><td>43:1 (ARO)</td><td>6"</td><td>3010 psi</td></tr></table>	<u>GP Reeves</u> (NA)	<u>Pump Ratio</u>	<u>Cylinder Size</u>	<u>Output Pres. @ 70 psi air</u>	GDP20-400I2-40NX	20:1 (Samoa)	3"	1400 psi	GDP22-400I2-40NX	22:1 (ARO)	3"	1540 psi	GDP43-400I2-40NX	43:1 (ARO)	3"	3010 psi	G6DP43-400I2-40NX	43:1 (ARO)	6"	3010 psi	GDP20-400I2-41NX	20:1 (Samoa)	3"	1400 psi	GDP22-400I2-41NX	22:1 (ARO)	3"	1540 psi	GDP43-400I2-41NX	43:1 (ARO)	3"	3010 psi	G6DP43-400I2-41NX	43:1 (ARO)	6"	3010 psi	GDP20-400I2-73NX	20:1 (Samoa)	3"	1400 psi	GDP22-400I2-73NX	22:1 (ARO)	3"	1540 psi	GDP43-400I2-73NX	43:1 (ARO)	3"	3010 psi	G6DP43-400I2-73NX	43:1 (ARO)	6"	3010 psi	GDP20-400I2-74NX	20:1 (Samoa)	3"	1400 psi	GDP22-400I2-74NX	22:1 (ARO)	3"	1540 psi	GDP43-400I2-74NX	43:1 (ARO)	3"	3010 psi	G6DP43-400I2-74NX	43:1 (ARO)	6"	3010 psi	
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Component	Requirements	Examples
4. Options	<u>Graco</u> CM7A59	

Component	Requirements	Examples																																
C. Dispensers	NOTE: Filled and dispensed position sensors are required on all Dopag and GP Reeves GPMD dispensers.																																	
1. Grease																																		
a) Dispense Type																																		
1) Glob, Dab or Shot	<p><u>GP Reeves</u></p> <table><tr><td>GPMD3000-.60 -02-03</td><td>0.05 - 0.60 cc</td><td>600-3000 psi</td></tr><tr><td>GPMD3000-2-02-03</td><td>0.15 - 2.00 cc</td><td>400-3000 psi</td></tr><tr><td>GPMD3000-9-02-03</td><td>0.35 - 9.00 cc</td><td>400-3000 psi</td></tr><tr><td>GPMD3000-20-02-03</td><td>5.00 - 20.0 cc</td><td>400-3000 psi</td></tr></table> <p>NOTE: If dispense amount verification is required per Material Application Chart, option "-27" can be added.</p> <p><u>Dopag</u></p> <table><tr><td>450.20.03</td><td>0.003 - 0.2mL</td><td>725 psi</td><td>G1/4</td><td></td></tr></table> <p>NOTE: Does not have suckback feature as other Dopag part numbers below. To prevent drooling, extended outlet tubing is not allowed. Directly mount dispenser outlet to tooling or use outlet nozzles only.</p> <table><tr><td>1029662 (replaced 450.10.06)</td><td>0.05 - 0.5mL</td><td>1160 psi</td><td>G1/8</td><td></td></tr><tr><td>1023208 (replaced 450.10.07)</td><td>0.1 - 3.0mL</td><td>1160 psi</td><td>G1/8</td><td>G1/8</td></tr><tr><td>415.12.21</td><td>0.5 - 12mL</td><td>2175 psi</td><td>G1/8</td><td></td></tr></table>	GPMD3000-.60 -02-03	0.05 - 0.60 cc	600-3000 psi	GPMD3000-2-02-03	0.15 - 2.00 cc	400-3000 psi	GPMD3000-9-02-03	0.35 - 9.00 cc	400-3000 psi	GPMD3000-20-02-03	5.00 - 20.0 cc	400-3000 psi	450.20.03	0.003 - 0.2mL	725 psi	G1/4		1029662 (replaced 450.10.06)	0.05 - 0.5mL	1160 psi	G1/8		1023208 (replaced 450.10.07)	0.1 - 3.0mL	1160 psi	G1/8	G1/8	415.12.21	0.5 - 12mL	2175 psi	G1/8		
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415.12.21	0.5 - 12mL	2175 psi	G1/8																															
2) Bead	<p><u>Dopag</u></p> <p>Dopag dispensers listed above shall supply material to the inlet of an additional 401.*** dispenser. Dual regulators are also required upstream of the dispenser.</p> <p><u>Viscotec</u></p> <table><tr><td>viproPUMP100 VisLas (proPUMP_7)</td><td>290 psi</td></tr></table> <p>B-KC-Viscopro-C (controller, includes 5m cable)</p>	viproPUMP100 VisLas (proPUMP_7)	290 psi																															
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3) Spray, Stream	<p>GP Reeves</p> <p>Walther</p> <p>Dopag</p>																																	
b) Air Detection (compression check)	NOTE: High severity products where a flow or pressure switch may not be adequate to detect air in the material properly may require a compression test for air content prior to the dispense to ensure the correct amount is delivered to the product. Refer to the Material Application Chart (MAC) and discuss this with the purchasing ME to determine if this will be a requirement. For those applications, these products shall be considered.																																	
1) Single Dispenser	<p><u>Glob, Dab or Shot</u></p> <p><u>GP Reeves</u></p> <p>AA1 (pneumatic)</p> <p><u>Bead</u></p> <p><u>GP Reeves</u></p> <p>AA8 (servo)</p>																																	
2) Multiple Dispensers	<p>NOTE: Where a compression test is required ahead of multiple dispensers of any type, the following products shall be considered. Options are to be discussed and calculations approved prior to placing any orders.</p> <p><u>Standalone Detection Package</u></p> <p>NOTE: To be implemented along with a separate SD-007 approved barrel pump from Section B. Select an SD-007 approved PLC and PNP sensors.</p> <p><u>GP Reeves</u></p> <p>GUS *****-ST-CT8-DIP</p> <p>GUS *****-FL-CT8-DIP</p> <p><u>Pump with Detection Package (GUS)</u></p> <p>NOTE: Pump is to be chosen from SD-007 even though part of GUS package. This system to be implemented with a separate SD-007 approved PLC, PNP sensors, and auto-depressurization.</p> <p><u>GP Reeves</u></p> <p>SP20_35A6-GUS*****-FL2-CT8-DIP</p> <p>SP22_35A6-GUS*****-FL2-CT8-DIP</p>																																	

Component	Requirements	Examples																		
2. RTV a) Dispense Type 1) Glob, Dab, or Shot	<p><u>Dopag</u></p> <table><tr><th></th><th><u>Max Inlet</u></th><th><u>Inlet</u></th></tr><tr><td>450.20.03</td><td>0.003 – 0.2 mL 725 psi</td><td>G1/4</td></tr></table> <p>NOTE: Does not have suckback feature as other Dopag part numbers below. To prevent drooling, extended outlet tubing is not allowed. Directly mount dispenser outlet to tooling or use outlet nozzles only.</p> <table><tr><td>1029662 (replaced 450.10.06)</td><td>0.05 – 0.5 mL 1160 psi</td><td>G1/8</td></tr><tr><td>1023208 (replaced 450.10.07)</td><td>0.1 – 3.0 mL 1160 psi</td><td>G1/8</td></tr><tr><td>415.12.21</td><td>0.5 – 12 mL 2175 psi</td><td>G1/8</td></tr></table> <p><u>PVA</u></p> <table><tr><td>SB400-C</td><td>1500 psi</td><td>1/4 NPT</td></tr></table>		<u>Max Inlet</u>	<u>Inlet</u>	450.20.03	0.003 – 0.2 mL 725 psi	G1/4	1029662 (replaced 450.10.06)	0.05 – 0.5 mL 1160 psi	G1/8	1023208 (replaced 450.10.07)	0.1 – 3.0 mL 1160 psi	G1/8	415.12.21	0.5 – 12 mL 2175 psi	G1/8	SB400-C	1500 psi	1/4 NPT	
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415.12.21	0.5 – 12 mL 2175 psi	G1/8																		
SB400-C	1500 psi	1/4 NPT																		
2) Bead a) Machine Mounted	<p>XYZ Mounting</p> <p><u>Dopag</u></p> <p>Dopag dispensers listed above shall supply material to the inlet of an additional 401.*** dispenser. Dual regulators are also required upstream of the dispenser.</p> <p><u>PVA</u></p> <table><tr><td>SB400-C</td><td>1500 psi</td><td>1/4 NPT</td></tr></table>	SB400-C	1500 psi	1/4 NPT																
SB400-C	1500 psi	1/4 NPT																		
b) Robot Mounted	<p><u>PVA</u></p> <table><tr><td>RMP-SB400-C</td><td>1500 psi</td><td>1/4 NPT</td></tr></table> <p>CONT-RMP-54 (controller)</p> <p>NOTE: IP54 rated controller only.</p> <p>NOTE: G-Series, 10-gauge x 3" needle is recommended</p> <p><u>Viscotec</u></p> <table><tr><td>viproPUMP100 VisLas (viproPUMP_7)</td><td>290 psi</td><td></td></tr></table> <p>B-KC-Viscopro-C (controller, includes 5m cable)</p>	RMP-SB400-C	1500 psi	1/4 NPT	viproPUMP100 VisLas (viproPUMP_7)	290 psi														
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3. Gap Fill a) Single Component (1K)	<p><u>PVA</u></p> <table><tr><td>SB400-C</td><td>1500 psi</td><td>1/4 NPT</td></tr><tr><td>PCP500 (progressive cavity)</td><td>85 psi</td><td>1/4 NPT</td></tr></table>	SB400-C	1500 psi	1/4 NPT	PCP500 (progressive cavity)	85 psi	1/4 NPT													
SB400-C	1500 psi	1/4 NPT																		
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b) Two Component (2K)	<p><u>Scheugenpflug</u></p> <p>Process Module Dispensing (process unit)</p> <p>Fluid Delivery, Pailfeed</p> <p>PF803-2C</p> <p>PFA803-2C (abrasive materials) (replaced A280)</p> <p>Dispenser</p> <p>Dos P016-2C</p> <p>DosPL DPL2001 02/02-2C/01 TCA</p>																			

Component	Requirements	Examples
MACHINE LUBRICATION		
AA. Accessories		
1. Regulator (Mastic)	Refer to Product Lubrication section 6.A.3	
2. High pressure flexible lines	<u>Parker</u> NN4X.65 (4mm OD nylon tube) 300 psi NN6X1 (6mm OD nylon tube) 341 psi With brass compression fittings  <u>Graco</u> 17S55* (6mm OD Nylon Tube) 1000 psi with 17R56* BSPT Fittings	
3. Relief	<u>Graco (grease)</u> 563163 750 psi 563164 1000 psi 563165 1250 psi 563166 1500 psi 563167 2000 psi 563168 2500 psi 563169 3000 psi  <u>Graco (air)</u> 214691 50 psi 110065 60 psi 108124 75 psi	
4. Block Cycle Indicator (M12)	<u>Graco</u> 17L983	
5. Pressure Switch	<u>Graco</u> P1=557829	
BB. Lubrication System	<u>Graco</u> MPP-T*-BSPP-A3-G3-L*-P1 MPP-GP*-BSPP-A3-G3-L*-P1	
CC. Pumps	<u>Graco</u> ALS-25M 563306 with BSPP base plate 563357	
DD. Divider Values	<u>Graco</u> MSP Series (BSPP connections only)	
EE. Filters		
1. Breather	<u>Facet</u> 569022-01  <u>Gitz</u> 1633-037801  <u>Hydrocraft</u> HCBP-8	
2. Fill Filter Assembly (Oil)	<u>Graco</u> 563095 10m	
3. Line Filter		
a) Low Pressure (Oil)	<u>Graco</u> 563095 10m 200 psi 3/4 NPT 563093 (element)	
b) High Pressure (Oil) Spin On	<u>Graco</u> 564004 10m 3000 psi G3/4 556031 (element)	

Component	Requirements				Examples
c) High Pressure (Oil) Block	<u>Graco</u> 563516	10m	7500 psi	G1/4	
	563509 (element)				
d) High Pressure (Grease) Block Strainer	<u>Graco</u> 564406	149m	7500 psi	G1/4	
	557700 (element)				

### 7. Machine Electrical Controls Components

The "Component" column is organized by component type. Nexteer Automotive does not have requirements for technologies not listed.

The "Requirements" column has two functions:

- 1) Where component brand or part numbers are designated, this is the Nexteer Automotive approved (required) component.
  - Where multiple brands or part numbers are listed, OEM's are allowed to select the one that provides the best value. Components are not listed in any preferred order.
- 2) Where specifications are provided, components are required to meet these specifications.

NOTE: To identify regional requirements, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

The "Examples" column lists components that meet the requirements listed in the "Requirements" column. The example components are not required. These example components are readily available in our global regions. Example components are not listed in any preferred order.

NOTE: To identify regional preferences, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

For equipment being built for a specific plant site, the global common components and the components listed in the plant site appendices A, B, or C are approved components.

Component	Requirements	Examples
<b>A. Circuit Breakers</b>		
1. Molded Case Circuit Breaker  NOTE: Typically used for 480VAC / 380VAC	IEC 60947-2 UL 489 (NA) CE CCC IP2X Minimum (C) C Trip Curve - Shall be used unless otherwise noted by device manufacturer D Trip Curve - Shall be used on primary side of transformers and Servo Drives unless otherwise noted by device manufacturer.  NOTE: Not allowed to be used as the main disconnect switch.	Allen-Bradley 140UT-D Series (0-30 A) 140G Series (10-3000 A)  Eaton E125H  Square D HRL36***U31X (15-100 A) JRL36***U31X (100-250 A) LRL36***U31X (250-600 A)
2. Miniature Circuit Breaker  NOTE: Typically used for 480VAC / 380VAC / 220VAC / 120VAC	IEC 60947-2 UL 489 (NA) CE CCC (C) DIN Rail Mount IP2X Minimum C Trip Curve - Shall be used unless otherwise noted by device manufacturer D Trip Curve - Shall be used on primary side of transformers and Servo Drives unless otherwise noted by device manufacturer.	Allen-Bradley 1489-M*C*** 1489-M*D***  Eaton FAZ Series  Schneider Electric Multi 9 – C60 Series Acti 9 – iC65L Series (C)
3. Supplementary Protector  NOTE: Typically used for 24VDC	IEC 60947-2 UL 1077 (NA) CE CCC (C) DIN Rail Mount IP2X Minimum C Trip Curve - Shall be used unless otherwise noted by device manufacturer D Trip Curve - Shall be used on primary side of transformers and Servo Drives unless otherwise noted by device manufacturer.	Allen-Bradley 1492-SPM*C*** 1492-SPM*D***  Schneider Electric Multi 9 – C60 Series Acti 9 – C65N-DC Series (C)
4. Electronic Circuit Protection / Module / Breaker  NOTE: May only be used for devices requiring Class 2 power source.	EN 61000-6-2 CE DIN Rail Mount IP2X Minimum	Allen-Bradley 1694 Series  Puls PISA11-Series  Phoenix Contact PTCB E1 (2909909)
5. Residual Current Devices (RCD)  NOTE: For applications outside North America only. Additional branch circuit current limiting is required when utilizing an RCD.	EN 61008 CE CCC (C) IP2X Minimum Din Rail Mount 30mA Leakage Detection	Allen-Bradley 1492-RCD*A25  Schneider Electric Multi 9 - M9R11225 Acti 9 - A9R52225 (Chiina preference)
<b>B. Power Supplies</b>		
1. Switched Mode DC a) 1-Phase Power Supplies	DIN Rail Mount CE CCC (C) 24VDC IP2X Minimum 50/60HZ Efficiency rating of 90% or higher	PULS (C) CP**..241 QS**..241  Allen-Bradley Bulletin 1606 1606-XLE***E* 1606-XLS***E*



Component	Requirements	Examples
b) 3-Phase Supplies	DIN Rail Mount CE CCC (C) 24VDC IP2X Minimum 50/60HZ Efficiency rating of 90% or higher	PULS (C) CT** .241 QT** .241  Allen-Bradley Bulletin 1606 1606-XLE***E* 1606-XLS***E*
2. Uninterruptable Power Supply (UPS)	Requires USB connection to PC with configuration to command PC to shut down if power outage exceeds one minute. Minimum 5 minutes of battery backup power Audible Alarm Receptacles configured for country of destination	TrippLite INTERNET350U (120VAC) TrippLite AVR550U (220VAC)  APC SMART-UPS (C)
C. Drives (Variable Frequency)	Allen-Bradley PowerFlex 525 25B-D***N114 (380-480VAC 3ph, 0.5-30HP, internal line filtering)  PowerFlex 527 25C-D***N114 (380-480VAC 3ph, 0.5-30HP, internal line filtering)  PowerFlex 755 20G1*****ONNNNN (380-480VAC 3ph, 1.0-350HP) 20-750-S (Safe Torque Off Module) 20-HIM-A6 (Human Interface Module)  Bosch Rexroth EFC5610-**-K**-3P4-MDA-7P-NNNNN-L1NN (0.4kW to 315kW) FEAM03.2-00*-NN-NNNN VFD Shield Connection	
D. Motion Control 1. Servo Drives	Allen-Bradley Kinetix 5300 2198-C****-ERS (Hardwired Safety, Three-phase input supply power only) 2198-DB**-F (AC Line Filter)  NOTE: If using a MPL motor, the following is required: 2198-K53CK-D15M (Feedback Connector Kit) 2090-CPBM7DF (Motor Power / Brake)  Kinetix 5500 2198-H0**-ERS (Hardwired Safety, Three-phase input supply power only) 2198-H0**-ERS2 (Integrated Safety on EtherNet/IP, 3Phase input supply power only) 2198-DB**-F (AC Line Filter)  NOTE: If using a MPL motor, the following is required: 2198-H2DCK (DSL Converter Kit) 2090-CSBM1DF (Motor Power / Brake to meet 50C drive rating) 2090-CFBM7DF (Motor Feedback)  Kinetix 5700 2198-S***-ERS3 (Hardwired / Integrated Safety on EtherNet/IP, Single Axis) 2198-S***-ERS4 (Includes Safe Stopping Functions , Single Axis) 2198-D***-ERS3 (Hardwired / Integrated Safety on EtherNet/IP, Dual Axis) 2198-D***-ERS4 (Includes Safe Stopping Functions , Dual Axis) 2198-DB**-F (AC Line Filter)  Bosch Rexroth HCS01 Servo Drives HMS01.1N-W0***-A-07-NNNN (Three-phase input supply power only) NFD03.1-480-*** (AC Line Filter)  HMS01 Single Axis Drive Inverters HMS01.1N-W0***-A-07-NNNN NFD03.1-480-*** (AC Line Filter)  HMD01 Double Axis Drive Inverters HMD01.1N-W00***-A-07-NNNN NFD03.1-480-*** (AC Line Filter)  Festo CMMT-AS-C*-11A-P3-MP-S1	

Component	Requirements	Examples
2. Servo Motors	<p>Allen-Bradley VPL-A*****1*A* (0.46-13.38 Nm, 200V Class) VPL-B*****1*A* (0.46-33.0 Nm, 400V Class)</p> <p>MPL-A*****7*AA (0.26-26.8 Nm, 200V Class) MPL-B*****7*AA (0.26-163 Nm, 400V Class)</p> <p>MPM-A*****J7*AA (7.65-30.96 Nm, 200V Class) MPM-B*****J7*AA (2.18-62.8 Nm, 400V Class)</p> <p>VPC-B*****FS (17.6-191.1 Nm, 400V Class)</p> <p>TLP-A*****-D***** (0.16-45.72 Nm, 200V Class) TLP-B*****-D***** (1.27-45.40 Nm, 400V Class)</p> <p>Bosch Rexroth MS2N03-*OBYN-C*****-NNNNN-NN MS2N04-B0BTN-CSSLO-NNNNN-NN</p> <p>Festo EMMT-AS-***-*-HS-RM*</p>	
3. On-Machine Servo Drive and Motor Unit	<p>ArmorKinetic 2198-DSMO*-ERS*-*****-*****</p>	
4. Stepper Drives	<p>Festo CMMT-ST-C8-1C-MP-S0</p>	
5. Stepper Motors	<p>Festo EMMT-ST-***-RM*</p>	
6. Electric Actuators	<p>Festo EGC-***-BS-**-KF-0H-ML-GK (Linear Ballscrew) EGC-***-TB-KF-0H-GK (Linear Belt Drive)</p> <p>ELGA-BS-KF-*****-0H-**-ML (Linear Ballscrew) ELGA-TB-KF-***-0H (Linear Belt Drive)</p> <p>ESBF-BS-***-*** (Cylinder Ballscrew) EAGF-V2-KF-***-*** (Cylinder Guide Unit)</p> <p>EGSL-BS-***-*** (Slide Ballscrew)</p> <p>ERMB-** (Rotary)</p> <p>NOTE: Festo axial and gear box mounting kits available for non-Festo servo motors.</p>	
E. Enclosure		
1. Enclosures, Operator Panels, Junction Boxes	<p>Minimum of IP54 or NEMA12</p>	<p>Hoffman Rittal SCE</p>
2. Enclosure Cooling a) Fan & Filter	<p>CE CCC (C) IP54 Type 12 filter 10-micron pleated element NOTE: Thermostats are encouraged</p>	<p>Hoffman Pfannenberg Rittal</p>
b) Air Conditioners	<p>CE CCC (C) IP54 Condensate Evaporator</p>	<p>Hoffman Pfannenberg Rittal IceQube</p>
3. Power Distribution Blocks	<p>IEC 60947-7-1 or UL1953 Screw Termination Copper and Aluminum Rated IP2X Minimum CE CCC (C)</p>	<p>Allen Bradley 1492-PD Series</p> <p>Eaton CHDB Series</p> <p>Phoenix PTU 35/4x6/6x2,5 (C) PTFIX 6/18x2,5-NS35 (C)</p> <p>Wohner 30Compact (C)</p>

Component	Requirements	Examples
4. Terminals	IEC 60947-7-1 or UL1059 (Non-Protective Earthing) IEC 60947-7-2 (Protective Earthing) DIN Rail Mounted Spring or Screw Clamp Maximum of 2 Tiers IP2X Minimum CE CCC (C)	Allen Bradley 1492 Series  Phoenix UT or PT Series  Weidmuller
F. Ethernet Switch		
1. Managed	Allen-Bradley Stratix 5200 1783-CMS6B (Base Firmware, 4 RJ45 Ports) 1783-CMS6P (Full Firmware, CIP Sync Support, 4 RJ45 Ports) 1783-CMS10B (Base Firmware, 10 RJ45 Ports) 1783-CMS10P (Full Firmware, CIP Sync Support, 10 RJ45 Ports) 1783-CMS20DB (Base Firmware, 20 RJ45 Ports) 1783-CMS20DP (Full Firmware, CIP Sync Support, 20 RJ45 Ports)  Allen-Bradley Stratix 5800 1783-MMS10B (Layer 2 Firmware, 8 RJ45 Ports, Fixed) 1783-MMS10 (Layer 2 Firmware, 8 RJ45 Ports, Modular) 1783-MMX8T (8 RJ45 Ports, Expansion) 1783-MMX16T (16 RJ45 Ports, Expansion)  Cisco 3100 Series IE-3100-4T2S-E (Network Essentials, 6 RJ45 Ports) IE-3100-8T2C-E (Network Essentials, CIP Sync Support, 8 RJ45 Ports) IE-3100-18T2C-E (Network Essentials, 18 RJ45 Ports)  Cisco 3000 Series IE-3200-8T2S-E (Layer 2 Firmware, 8 RJ45 Ports, Fixed) IE-3300-8T2S-E (Layer 2 Firmware, 8 RJ45 Ports, Modular) IEM-3300-8T (8 RJ45 Ports, Expansion) IEM-3300-16T (16 RJ45 Ports, Expansion)	
NOTE: All Cisco IE Series switches shall be registered to Nexteer Automotive.		
2. Lightly Managed	Allen-Bradley Stratix 2500 1783-LMS5 (5 RJ45 Ports) 1783-LMS8 (8 RJ45 Ports)  Cisco 1000 Series IE-1000-4T1T-LM (5 RJ45 Ports) IE-1000-6T2T-LM (8 RJ45 Ports)	
3. Power Over Ethernet (PoE) Injector	IP2X Minimum CE 24Vdc IEEE 802.3af or IEEE 802.3at PoE Ports function at minimum 10/100Mbps DIN Rail Mounted	Hirschmann 942-059-001  MOXA INJ-24A  Phoenix Contact 2703005
NOTE: Allowed only on devices requiring PoE.		
4. Ethernet Network Media (Cables)		
a) PLC, HMI, Ethernet Switches, In-Cabinet Environments	Stranded Copper STP-Shielded Twisted Pair or FTP-Foil Twisted pair Cat 5e or Cat 6 Patch Cables IP2X Minimum	Allen Bradley Belden Panduit
b) Open Cable Tray, On-Machine Environments	Stranded Copper STP-Shielded Twisted Pair or FTP-Foil Twisted pair Cat 5e or Cat 6 Patch Cables IP67 Type CMP, CMR, CMG, or CM (Tray Rated) High Flex (Applications with cable flexing or movement)	
5. Ethernet Bulkhead Connectors	Minimum of IP54 (external to enclosure)	

Component	Requirements	Examples
<b>H. Human Machine Interface Devices</b> 1. Graphic Terminal - Machine Interface  NOTE: For graphic terminal data collection and visualization solutions, see MIT System section B and C.	Allen-Bradley PanelView Plus 7 (Standard) 2711P-T7C2*D8S (6.5") 2711P-T10C2*D8S (10.4")  PanelView Plus 7 (Performance) 2711P-T7C2*D9P (6.5") 2711P-T10C2*D9P (10.4")  Pro-Face ST6000 Series PFXST6500WADE (10") PFXST6600WADE (12")	
<b>I. Code Reader (1D &amp; 2D Codes)</b> 1. Basic Operation  NOTE: Feasibility study recommended.	Cognex – Dataman DMR-290 (Fixed) DMR-390 (Fixed) (C-mount option available) DMR-8700DQ Series (Handheld)  Keyence SR-1000 / SR-1000W (Fixed) HR-X100 (Handheld)  Zebra DS3608 (Handheld) EA3600 (EtherNet/IP Communication Adapter)	
2. Challenging Applications  NOTE: Feasibility study REQUIRED.	Cognex – Dataman DMR-290 (Fixed) DMR-390 (Fixed) (C-mount option available) DMR-8700DX-E (Handheld)  Keyence SR-2000 / SR-2000W (Fixed) SR-X300 / SR-X300W (Fixed) HR-X300 (Handheld) HR-X500 (Handheld for DPM) HR-NU2 (Handheld Network Unit-PoE Injector)	
3. Code Verifiers	Cognex 8072V – (Handheld) DMR-475V-LBL (Fixed) DMR-475V-DPM (Fixed)  Webcam Tru Check Omni Series (Paper label) DPM Tower or FlexHite Series (DPM or Laser etched)	
<b>J. Laser Markers</b>  1. Plastic Surface Applications	NOTE: Refer to the Manufacturing Equipment Purchase Specification and / or the Purchasing Manufacturing Engineer.  Keyence MD-X2000 (3 Axis Hybrid Laser Marker 13W) Options: MD-AD-ZT (Auto-focus/lens inspection software upgrade) MD-AD-3D (3D software to mark on angles/curves/multiple Z-heights) MD-C1 (contactor/Laser Safety Module to achieve PL rating) MD-U1000C (3 Axis UV Laser Marker)  Telesis EVCDSE (1064nm), EV4GDSE (532nm), UV Kryo (355nm) Options: Vari-Z/3D marking iZONIT GigE vision for code read and/or mark location Auto-focus (Vari-Z option required) Vortex Cooling	Laser Integration (enclosure) must comply with ANSI and OSHA safety standards.
2. Metal Surface Application	Keyence MD-X2500 (3 Axis Hybrid Laser Marker 25W) Options: MD-AD-ZT (Auto-focus/lens inspection software upgrade) MD-AD-3D (3D software to mark on angles/curves/multiple Z-heights) MD-C1 (contactor/Laser Safety Module to achieve PL rating) MD-F5200C (3 Axis Hybrid Laser Marker 50W) MD-F5220C (3 Axis Hybrid Laser Marker 50W, wide range)	

Component	Requirements	Examples
	<p>Telesis ExpressMark Fiber Laser XPM50E (50W) XPM100E (100W) Options: 160mm or 254mm lens Vari-Z Adder Auto-focus (Vari-Z option required)(only 3D head)</p> <p>SummitPro Fiber Laser SP50E (50W) SP100E (100W) Options: 160mm or 254mm lens Vari-Z Adder Auto-focus (Vari-Z option required)(only 3D head)</p>	
3. Process Resistant Applications	Shot blast resistant / post process paint or coating LaserAX (Feasibility study required, laser model TBD based on study results)	
4. Stand Alone Complete Laser System	<p>Trumpf TruMark Station 7000</p>	
5. Laser System Enclosure	<p>Class 1 Enclosure Comply with ANSI and OSHA safety standards. Accession Number required</p>	
NOTE: Laser Safety Officer shall be contacted to review each laser enclosure.		
K. Lights		
1. Status Lights		
a) Multi-Color LED Pilot Light	<p>24VDC IP65 CE</p>	<p>Banner K50LGRYPQ (Tri Color) K30LGRYPQ (Tri Color) K80L4GRYB1PQ (Quad Color) M18GRYPQ WLS27*WGRYB5-****DS24Q WLS28-2*WGRYB5-****DS24Q</p>
b) Stack Lights	<p>24VDC IP65 CE</p>	<p>Allen-Bradley 855E Series Tower Lights 854J (40mm) &amp; 854K (60mm)</p> <p>Banner TL50</p> <p>Balluff BNI008*</p>
2. Machine & Work Lighting	<p>24VDC IP65 CE</p>	<p>Banner WLC60*W***AQ WLC90W***</p> <p>Banner WLS28-2*W***DSQ WLS27- *W***DSQ WLS15*DW*****DSQP</p>
3. Enclosure Lighting	<p>24VDC IP2X CE</p>	<p>Banner WLS28-2*W***D*Q WLS27- *W***D*Q WLS15*DW*****D*QP</p>
L. Motors (3-Phase)		
1. Motor Starter / Contactor Controlled		
a) General Applications	<p>TEFC or IP54 NEMA MG 1 or IEC 60034 T-Frame Premium Efficiency or IE3 NEMA Design B or IEC Design N</p> <p>Rated for the intended region UL (NA) CE (E) CCC (C) INMETRO (B) BIS (I)</p>	<p>WEG Electric – 01518T3E254T</p> <p>Marathon Electric - 254TTFNA6026</p> <p>TECO-Westinghouse – HB0154</p>
b) Hydraulic Power Unit	<p>C-Face Mount</p> <p>NOTE: Requirements listed in the General Applications section above are also required.</p>	<p>Baldor Electric Company - CEM2333T</p> <p>US Motors (Nidec) – U15P2DC</p>

Component	Requirements	Examples
c) High Slip Applications (Example: Presses, Heavy Conveyors)	NEMA Design D  NOTE: Requirements listed in the General Applications section above are also required, except NEMA Design B.	
2. Variable Frequency Drive Controlled (VFD)	Inverter Rated  NOTE: Requirements listed in the General Applications section above are also required.	Baldor Electric Company - EM2333T
M. Plug/Socket Combination 1. When interlocking is not required per SD-004.	First Make / Last Break PE (earthing) contact Retaining Means IP54 CE CCC (C)	Harting  Hubbell Twist-Lock
2. When interlocking is required per SD-004. (such as 30A or greater)	First Make / Last Break PE (earthing) contact Retaining Means IP54 CE CCC (C) Interlocking Switching Device (Disconnect only when OFF) NOTE: A switch-rated, or disconnect-rated, plug /socket combination meets this interlocking switching device requirement.	Meltrix Corporation  Hubbell Circuit-Lock
N. Programmable Logic Controllers & Modules 1. Controllers	Allen-Bradley 5069 CompactLogix 5380 & Compact GuardLogix 5380 5069-L3**ER 5069-L3**ERM (CIP Motion) 5069-L3**ERS2 (Safety) 5069-L3**ERMS2 (Safety, CIP Motion)  1756 ControlLogix 5580 & GuardLogix 5580 1756-L8*E 1756-L8*ES (Safety)  1756 ControlLogix 5590 1756-L9**TS	
2. Power Supplies	Allen-Bradley 1756 ControlLogix 1756-PB72 (10A) Chassis Series A or B 1756-PB75 (13A) Chassis Series B	
3. Communication Modules	Allen-Bradley 1756 ControlLogix 1756-EN4TR (Dual Port Ethernets/IP, 1-256 Motion Axis)	
4. I/O Modules a) Chassis Based	Allen-Bradley 5069 CompactLogix I/O & GuardLogix I/O 1756 ControlLogix & GuardLogix I/O  NOTE: OW16 relay output modules shall only be used on applications with a very limited number of cycles due to low mechanical cycles rating per output. NOTE: 32pt 1756 I/O Modules SHALL use removable terminal blocks (RTB) and prewired cables.	
b) In-Cabinet Distributed (IP20)	Allen-Bradley 1734 Point I/O & Point Guard I/O 5034 PointMax I/O 5069 CompactLogix & Compact GuardLogix I/O	
c) On-Machine Distributed (IP65/67)  1) EtherNet/IP  NOTE: RFID applications require Balluff EtherNet/IP IO-Link Masters.	NOTE: Housing material substitutions allowed to meet application requirements.  Allen Bradley 5032-8IOLM12M12LDR (8 port, 8 IO-Link, M12 5-Pin L-Coded Power)  Balluff BNI00L3 - BNI XG3-508-0B5-R067 (8 port, 8 IO-Link, M12 5-Pin L-Coded Power)	

Component	Requirements	Examples
2) IO-Link Hub (Block)	Allen Bradley 1732IL-IB16M12 (16pt Digital Input)  Balluff BNI00J0 - BNI IOL-104-011-K006 (16pt Digital Input) BNI007Z - BNI IOL-302-002-K006 (Configurable, with IO-Link Extension Port 7)  Turck TBIL-M1-16DIP (16pt Digital Input)	
5. Communication Gateways a) ASCII to EtherNet/IP	DIN Rail Mount CE 24VDC IP20 ASCII (Serial) to EtherNet/IP	Real Time Automation 435NBX-N700-D (ASCII to EtherNet/IP)  HMS Anybus HMS-EN2SE-R (EtherNet/IP to Serial)
b) Ethernet TCP/IP to EtherNet/IP	DIN Rail Mount CE 24VDC IP20 Ethernet TCP/IP to EtherNet/IP	Real Time Automation 490NBX-NN1-D (EtherNet TCP/IP to EtherNet/ IP)
O. Programming Port with Receptacle (External access for Ethernet Devices)	IP54 Minimum CE  NOTE: Single phase AC receptacle shall have Residual Current Protection (RCP). Refer to SD-004, section 15 for clarification.	Grace Engineered Products P-R2-K3RF0-U626 (NA configuration) P-R2-M3REF0-U626 (Europe configuration) P-R2-M3RAF0-U626 (China configuration) P-R2-K3RW0-U626 (Brazil configuration) P-R2-M3RUV0-U626 (Universal)  Mencom GF-RJ45-R-32 (NA configuration) DCH2-RJ45-R-32 (China configuration) DBR-RJ45-R-32 (Brazil configuration) DUN-RJ45-R-48 (Universal)  Weidmueller 1450530000 (China configuration) 1450550000 (China configuration) 1962840000 (China configuration) 1487920000 (China configuration) 1450790000 (China configuration)
P. Pushbuttons, Pilot Lights, and Selector Switches 1. General Pushbuttons, Pilot Lights, and Selector Switches	IEC 22.5mm IP62 CE	Allen-Bradley 800F (Europe/Morocco preference) 800F -AL01 (Locking cover for Robot Teach Mode Selection)  Schneider Electric XB4
2. E-Stop Pushbutton	IEC 60947-5-5 ISO 13850 CE Self-Latching Type Red Mushroom Head	Allen-Bradley 800F  Schneider Electric XB4
3. Cable-Operated E-Stop Switch	IEC 60947-5-5 ISO 13850 CE Self-Latching Type	Allen-Bradley 440E  Euchner RPS Series  Telemecanique XY2 Series
4. Zero-Force Buttons a) Cycle Initiation	IEC 60947-5-2 2-Color LED Indication Minimum CE IP67 24VDC PNP Sourcing	Banner EZ Light Touch K50APTGRQC NOTE: This model has Green and Red lights.

Component	Requirements	Examples
b) Two-Hand Control (Safety Applications)	IEC 61508 ISO 13849-1 PL d CE IP67 24VDC PNP Complimentary Outputs	Banner STB Series STBV***
Q. Operator ID Systems	NOTE: Refer to the Manufacturing Equipment Purchase Specification and/or contact the purchasing engineer.	
1. Badge Reader a) Magnetic Strip  b) Proximity/RFID  NOTE: Verify card type based on plant region.	RFIDeas - pcSwipe Enroll MS-300M1AK5 BKT-BASE (Base Kit)  RFIDeas - pcProx Plus KT-800W1AKB-P-IP67  HSK Series (P)	NOTE: Only available in RS-232 ASCII communications.  NOTE: Nexteer badges are HID Smart Card (8K) using 13.56MHz frequency, ISO/IEC 14443 Type A.
R. Relay, Control  NOTE: Master, control power distribution, and safety circuit relay applications.	IEC Industrial control relay IEC 60947-5-1 IP2X Minimum Minimum Contact Rating of 10A @ AC-12, 5A @ DC-13 Minimum Contact Switching Capacity of 5mA or Less Mechanically Linked Contacts (Force-Guided) DIN rail mounting CE CCC (C)	Allen Bradley 700-EF***QJ 700S-EF***QJC  Telemecanique CAD** BD
S. Relay, Interface  NOTE: For low current and low voltage interface / interlock applications. Do not use to control loads such as brakes or similar.	DIN Rail Mounting IP2X Minimum CE CCC (C)	Allen-Bradley 700-HL Series 700-HLT1Z24 (hard contact, 24vdc coil) 700-HLS1Z24 (solid state 24vdc load & coil)  Telemecanique Miniature Relay RXM4AB2BD (50/60HZ, Coil 24vdc) RXG23BD  Phoenix Contact (C) PLC-R (2966171) PLC-O (2966634)
T. RFID Systems - Pallet/Part Tracking		
1. Antenna	Balluff BIS00LH - BIS M-400-045-001-07-S4 (30mm Cylinder, 0-36mm range) BIS00LK - BIS M-401-045-001-07-S4 (Square Head, 0-60mm range) BIS00LJ - BIS M-400-045-002-07-S4 (30mm Cylinder, 0-20mm range)  NOTE: Distances greater than 2 meters from the BNI Module to Antenna require a SHIELDED M12 Male / Female patch cable.	
2. Data Carriers	Balluff BIS0045 - BIS M-111-02/L (2000 Byte, 30mm x 2.8mm, unlimited READS, 10 million WRITES)  NOTE: Data Carriers that meet iCODE ISO15693 may be considered but require Control Engineer's prior approval.	
U. Safety Interlock Switches		
1. Non-Contact Type	Allen Bradley 440N-Z21S**H* (switch) 440N-Z* *PTB (actuator, plastic barrel) 440N-Z18SSTB (actuator, stainless steel barrel) 440N-ZPREC B (actuator, rectangular)  Euchner CES-I-AR-M-C04-USA-119479 (switch) CES-A-BBN-C04-115271 (actuator) BTC-CES04-S-TH-21-F-123583 (slide Bolt)  Keyence GS-11PC (switch) GS-A01 (actuator)  Pilz PSEN cs1.1p / PSEN cs1.1 (540000) (switch & actuator)	



Component	Requirements	Examples
<p>2. Guard Locking Type</p> <p>NOTE: Guard locking function shall be based on MRA and requirements of SD-012.</p> <p>a) Power-ON to Release (power to unlock)</p> <p>NOTE: Escape Release shall be provided for a Power-ON to Release guard locking switch where full body access is possible.</p>	<p>Euchner STP3A-2131A024L024M-091748 (switch) STP3A-2131A024MC1993-102267 (switch, escape release option) BETAETIGER-S-***-N-0957** (actuator) FE-GRIFF-105329 (escape release)</p> <p>Keyence GS-51PC (switch) GS-A21 (actuator) GS-H02 (escape release)</p> <p>Telemecanique XCSLF373731* (switch) XCSLF373741* (switch) (escape release) XCSZ0* (actuator)</p>	
<p>b) Power-OFF to Release (power to lock)</p>	<p>Allen Bradley 440G-LZS21SPLH (switch / actuator) 440G-LZASPL (spare actuator) 440G-LZAM1 (actuator mounting bracket)</p> <p>Euchner STP4A-2131A024L024M-091749 (switch) BETAETIGER-S-***-N-0957** (actuator)</p> <p>Keyence GS-71PC (switch) GS-A21 (actuator) GS-M9 Series (magnetic hold switch) GS-MA9 Series (actuator)</p> <p>Telemecanique XCSLF373751* (switch) XCSZ0* (actuator)</p>	
<p>c) Lockable Slide Bolt</p>	<p>Aut-O-Loc A19461 A19462</p> <p>Euchner RIEGEL S-* -09638* RIEGEL S-*F-09639* (escape release)</p> <p>Keyence GS-H01</p> <p>Telemecanique XCSZ05</p>	
<p>3. Multi-Function Gate Box</p>	<p>Allen-Bradley 442G-MAB*-URM-C03</p> <p>Euchner MGBS-P-L1-AR-U-R-AEE-SH-159086 MGBS-H-BA1A3-R-157543 (Right Handed Handle) MGBS-H-BA1A3-L-157544 (Left Handed Handle) MGB-L1HE-ARA-R-119924 MGB-L1HE-ARA-L-119926</p> <p>NOTE: E-Stop safety signals require individual annunciation.</p>	
<p>V. Safety Presence Sensing Device</p> <p>1. Safety Light Curtain</p>	<p>14mm (finger) or 30mm (hand) resolution 24VDC IP65 CE IEC 61496-1 compliance to Type 4 ESPE ISO 13849 PL e</p> <p>NOTE: Resolution of light curtain selected will impact stop distance calculations and mounting location.</p>	<p>Allen-Bradley 440L Series 450L Series</p> <p>Banner S4B Series EZ Screen LP and LS</p> <p>SICK De Tec</p> <p>Keyence GL-R Series</p>

Component	Requirements	Examples
2. Safety Laser Scanners (Area Scanner)	30mm resolution capability 24VDC IP65 CE IEC 61496-1 compliance to Type 3 ESPE ISO 13849 PL d Class 1 laser classification	Allen-Bradley 442L  SICK MicroScan3 NanoScan  Keyence SZ-V Series
W. Safety Enable Device 1. 3-Position Enable Device (Hand-Held)	24VDC IP54 CE IEC 60947-5-8	ABB JSHD4 Series  Euchner ZSM Series ZSA / ZSB Series
X. Safety Relay 1. E-Stop, Safety Gate, Light Curtain	Pilz PNOZ s4 #750104 PNOZ s5 #750105 (with time delayed contacts)  Euchner ESM-BA201 ESM-BA301 ESM-BT411 (with time delay contacts)	
2. Contact Expansion	Pilz PNOZ s7 #750107 PNOZ s9 #750109 (with time delayed contacts) PNOZ s11 #750111  Euchner ESM-ES301 ESM-TE301 (with time delay contacts)	
3. Two-Hand Control	Pilz PNOZ s6 #750106	
4. Zero Speed Indicator	Pilz PSWZ X1P #777949	
5. Safety Timer Relay	ABB Sentry TSR10  NOTE: Used on full body access cells with blind spots, requiring a Pre-Reset feature.	
Y. Motor Starters/Contactors 1. Contactors/Overloads	IEC 60947-4-1 IP2X Minimum DIN rail mounting CCC (C) CE  NOTE: For safety circuit expansion contactor application, mechanically linked contacts (force-guided, direct-drive) and low-energy (5mA or less) auxiliary contact switching capability are required.	Allen Bradley 100-E / 100S-E 104-E (Reversing) 193 (Overload Relay)  Schneider LC1D LC2D (Reversing) LC1F (>75HP, Non-Reversing) LA9F970 (Mechanical Interlock) LRD**** (Overload Relay)
2. Motor Starter/Protector (MSP)	IEC 60947-4-1 IP2X Minimum DIN rail mounting CE CCC (C)	Allen-Bradley 140MT Series  Schneider GV2P Series
Z. Support Software Requirements 1. Programmable Logic Controllers (PLC)	Rockwell Software - Studio 5000 Design Environment Version 35 or newer	
2. Human Machine Interface (HMI)	Rockwell Software FactoryTalk View Studio ME Version 15 or newer  ProFace GP-Pro EX Version 4.0 or newer	

Component	Requirements	Examples
<b>AA. Disconnect Switches</b> 1. Flange Mounted Disconnect  2. Rotary Side Mount Disconnect  NOTE: Through-the-door disconnects with rod actuators that allow the handle to disengage from switch when opening the enclosure door shall not be used.  3. Single Phase Supply  4. Supplementary Disconnect (Load Switch)  NOTE: Local motor isolation, disconnect switch and robot disable applications.  5. Disconnect Fuses	Lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum or suitably protected to IP2X Manual override in the ON position	Allen-Bradley 1494U Series (C) 1494V Series  Square D 9422 Series
	Lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum Manual override in the ON position	Allen-Bradley 194R-J30-1753 (30A, Class J) 194R-J60-1753 (60A, Class J) 194R-SDK2 NOTE: Side-Mounted Switch Kit, for all 194R-30/60A disconnect switches.
	lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum Manual override in the ON position	Bussman CCP-1-30CC NOTE: Maximum Fuse Size = 30 Amp LP-CC-30. CCP must be used with VCF2 or similar rotary disconnect.  Square D VCF2
	Lockable in OFF position only. IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum Manual override in the ON position	Allen-Bradley 194E-E** 194E-FA**E (with enclosure) 194E-E16-1753-4G (robot disable)  Schneider V01 (switch disconnect) V01C (switch disconnect) VBFXGE1 (black handle, enclosure)
	Class J	Bussman  Ferraz Shawmut
<b>BB. Switches and Sensors</b> 1. Level a) Oil, water, coolant applications  b) Plastics, non-ferrous materials  2. Flow  3. Air Gaps	IFM Efector LK8122 LK8123 LK8124 NOTE: Each has 4 configurable digital outputs (4 level)  LT8022 LT8023 LT8024 NOTE: Each has 4 configurable digital outputs (2 level / 2 temperature)  LK3122 LK3123 LK3124 NOTE: Each has 1 configurable digital and 1 analog output (2 level)	
	IFM Efector KI5085	
	NOTE: See Hydraulic section A.5 for fluid application flow switch requirements.	
	SMC ISA3-HFP-1N ZS-31-B (cable) ISA-14 (Mounting bracket – Required if not mounted to DIN rail)  Required if mounting multiple units together: ISA-15 Seal for additional station ISA-16-* - Bolt Kit (* indicates number of stations)	

Component	Requirements	Examples
4. Integral Cylinder Proximity a) T-Slot  Festo - ADN, ADNGF, DSBC, DGC, DFM, HGD 32 & 50, HPV, DSNU-12-*, DSNU-25 SMC - C96N	Festo SMT-8M-A-PS-24V-E-0,3-M8D, 574334 SMT-8G-PS-24V-E-0,3Q-M8D, 547860 (90-degree head) NOTE: Both are 0.3 meter, M8 plug termination with external rotatable thread.  IFM Efector MK5101 NOTE: 0.3 meter, M8 plug termination with external fixed thread.  Turck BIM-UNT-AP6X-0,3-PSG3S, 4685722 NOTE: 0.3 meter, M8 plug termination with external fixed thread.	
b) C-Slot  Festo - HGPT, HGPD, HGPL SMC - CD55, CDQM, MHZ2	Festo SMT-10M-PS-24V-E-0,3-L-M8D, 551375 SMT-10G-PS-24V-E-0,3Q-M8D, 547863 (90-degree head) NOTE: Both are 0.3 meter, M8 plug termination with external rotatable thread.  IFM Efector MK5310 NOTE: 0.3 meter, M8 plug termination with external fixed thread.  Turck BIM-UNR-AP6X-0.3M-PSG3S W/M NOTE: 0.3 meter, M8 plug termination with external fixed thread.  SMC D-M9PSAPC NOTE: 0.5 meter, M8 plug termination with external fixed thread.	
c) Brackets Festo - DSNU-12- SMC - CD85	Festo SMBR-8-12, 175093  IFM Efector E11816  Turck KLR-1 W/ASB-2	
Festo - DSNU-25 SMC - CD85	Festo SMBR-8-25, 175096  IFM Efector E11818  Turck KLR-1 W/ASB-3	
SMC - CD55, CDQM	SMC D-M9PSAPC	
SMC - C96NB	IFM E11797	
5. Limit - General Applications	Heavy Duty Industrial Limit Switch Metal Case IEC 60947-5-1 CE  NOTE: In high moisture situations, potted versions (IP66) should be applied.	Allen-Bradley 802 Series  Telemecanique ZCK J1(xx) (body) ZCK E(xx) (head)
6. Pressure and Vacuum  Output 1 = Digital signal Output 2 = Digital or Analog signal	IFM Efector PN2094 (Pneumatic, -14.5-145 psi) (G1/4) PN2099 (Pneumatic vacuum, -14.5-14.5 psi) (G1/4) PN2071 (Hydraulic, 0-3625 psi) (G1/4)  E30420 (Protective cover) EVC00* (90-degree cable) E10077 (Mounting Clamp)	
Output 1 = Digital signal Output 2 = Digital signal	Differential (Coolant and Water) IFM Efector PNIO24 with PA3024 (G1/4) E11566 (splitter)	
Output = Digital signal or IO-Link	FESTO SPAU-P10R-MS6-F-L-PNLK-PNVBA-M8D (Preassembled Air Prep Unit) (8035303) SPAU-P10R-*.L-PNLK-PNVBA-M8* (Standalone - Multipurpose) SACC-PU-G (8003353) - (Protective cover)	
Output = Digital signal or IO-Link	SMC ISE70-F02-L2-*** (pneumatic) (G1/4)	

Component	Requirements	Examples
7. Proximity (Inductive) a) Dry Applications          b) Wet Applications          c) Welding and Hardening Applications          8. Photoelectric (Presence, color, shape, distance, etc.)          9. Temperature (Coolant and water applications)	LED Indication CE IP65 Short Circuit Protection 10-30VDC 3 wire PNP sourcing Stainless Steel Housing Fully Potted Threaded Barrel Reverse Polarity Protection	Balluff  IFM Efector  Telemecanique  Turck
	LED Indication CE IP67 Short Circuit Protection 10-30VDC 3 wire PNP sourcing Stainless Steel Housing Fully Potted Threaded Barrel Reverse Polarity Protection	Balluff  IFM Efector  Telemecanique  Turck
	LED Indication CE IP65 Short Circuit Protection 10-30VDC 3 wire PNP sourcing Stainless Steel Housing Fully Potted Threaded Barrel Reverse Polarity Protection Weld Slag Resistant / Magnetic Field Immune	Balluff  IFM Efector  Telemecanique  Turck
	LED Indication IP65 dry applications IP67 wet applications Short Circuit Protection 10-30VDC 3 wire PNP sourcing Reverse Polarity Protection CE	Banner  IFM Efector  Keyence  Sick
	LED Indication CE IP67 Short Circuit Protection 10-30VDC Reverse Polarity Protection  NOTE: For hydraulic tank level and temperature applications, use ACT Temp/Level switch, 130 FB40033AFD2M558.	IFM Efector TR2439
CC. Transformers 1. General Purpose          2. Transformer Disconnect (lighting)   NOTE: For excepted circuit applications (example: circuits powered ahead of the Main Disconnect).	IEC 60076 or UL1561 IP2X (Internal/External enclosure mount) CE  NOTE: Transformers mounted external to the electrical enclosure must be encapsulated or rated for external use (such as Nema Type 3R)	Square D 9070T **** D1 (requires additional finger safeguard for IP2X) xx S40F  Sola Hevi-Duty HS Series (external mount)  Eaton STZ, DTZ (requires additional finger safeguard for IP2X)  PowerTran Series A480MT SeriesPTN102
	IEC 60742 CE (E) CCC (C) Isolation transformer with secondary isolation Within its own enclosure Internal mounted IP2X External mounted IP54  NOTE: Transformer Disconnect shall meet requirements defined in section 7.Z. NOTE: Ground fault protection is required for any receptacle, either by receptacle or upstream circuit protection.	Dongan Series TDL (IP20 applications) Series TDL12 (IP54 applications)  PowerTran Series PLD (IP20 applications) Series PLDN (IP54 applications)

Component	Requirements	Examples
DD. Vision Applications 1. Vision Sensor (Basic Applications)	NOTE: Feasibility study REQUIRED for all applications, except vision guided robots. Cognex In-Sight 2000 Series In-Sight 2800 Series In-Sight SnAPP Series  Keyence IV Series IX Series	
2. Vision Systems (Complex Application)	Cognex In-Sight 7000, 8000, 9000 Series In-Sight 3800 Series In-Sight D900 Series  Keyence IV Series CV-X Series VS Series XG-8000 Series	
3. Vision Systems 3D	Cognex In-Sight L38 Series  Keyence XGX Series LJ-X8000 Series LJ-S8000 Series	
4. Visualization Display / Software  NOTE: Standard PC, monitor, and software. Installed at readily accessible location.	Cognex – Vision View VVPC-SL (Software for use on PC) 7000, 8000, 9000 VVW-P (SnAPP, 2800, 3800, D900)  Keyence IV3-CP50 (Intelligent Monitor) IV3-Navigator (Software) IV4-Navigator (Software)	

### 8. Manufacturing Information Technology System Components

The "Component" column is organized by component type. Nexteer Automotive does not have requirements for technologies not listed.

The "Requirements" column has two functions:

- 1) Where component brand or part numbers are designated, this is the Nexteer Automotive approved (required) component.
  - Where multiple brands or part numbers are listed, OEM's are allowed to select the one that provides the best value. Components are not listed in any preferred order.
- 2) Where specifications are provided, components are required to meet these specifications.

NOTE: To identify regional requirements, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

The "Examples" column lists components that meet the requirements listed in the "Requirements" column. The example components are not required. These example components are readily available in our global regions. Example components are not listed in any preferred order.

NOTE: To identify regional preferences, the following notations are used: (B) - Brazil; (C) - China; (I) - India; (E) - Europe & Morocco; and (NA) - North America. If not specifically noted with region letter designation, any of the designated components may be used.

For equipment being built for a specific plant site, the global common components and the components listed in the plant site appendices A, B, or C are approved components.

Component	Requirements	Examples
<b>A. Computer Hardware</b> 1. Standard PC (Traceability / Monitoring / LabView Test Equipment)	Machine Requirements: Windows 11 Pro version 24H2 Vendor software & PC must be compatible with ESET antivirus software. NOTE: Wifi devices NOT allowed  Hardware below is recommended as a minimum: Intel i5 14th Gen Processor 16GB RAM Memory 512 GB M.2 NVME SDD 1 Ethernet Port	Dell Precision Advantech
2. Uninterruptable Power Supply (battery backup)	Requires USB connection to PC with configuration to command PC to shut down if power outage exceeds one minute.	TrippLite INTERNET350U (120VAC) TrippLite AVR550U (220VAC)
<b>B. Data Collection &amp; Visualization</b> 1. Graphic Terminal	NOTE: Requires Manufacturing IT and Control Engineer's prior approval.  OptixPanel 2800S-*****-N1S	
<b>C. Support Software Requirements</b> 1. Data Collection & Visualization	NOTE: Requires Manufacturing IT and Control Engineer's prior approval.  FactoryTalk Optix Version 1.6 or newer	

Appendix A - North America		
Components in this appendix are approved for use, only if specified in the Manufacturing Engineering Purchase Specification (T-Spec).		
x. xxx Components		
Component	Requirements	Examples



Appendix B - Europe & Morocco		
Components in this appendix are approved for use, only if specified in the Manufacturing Engineering Purchase Specification (T-Spec).		
x. xxx Components		
Component	Requirements	Examples

Appendix C - China		
Components in this appendix are approved for use, only if specified in the Manufacturing Engineering Purchase Specification (T-Spec).		
7. Machine Electrical Controls Components		
Component	Requirements	Examples
D. Motion Control 1. Servo Drives  NOTE: IAI drives require fan module to achieve ambient temperature rating of 55° C.	IAI (Intelligent Actuator Inc.) RSEL Series RSEL-G-EP-**-FU (Master Unit) RCON-***-* (Driver Unit)  RCON Series RCON-GWG-EP-FU (Master Unit) RCON-***-* (Driver Unit)  RCM-101-USB (Software) RCON-FU (Fan unit)  ABB MicroFlex e190 MicroFlex e180  Siemens SINAMICS S200 Series	
2. Servo Motors	ABB HDS Series  Siemens SIMOTICS S-1 FL2	
6. Electric Actuators	IAI (Intelligent Actuator Inc.) RCP6-SA*C-WA-56P-**-P5-**-* (Slider Actuator) RCP6-RA*C-WA-56P-**-P5-**-* (Rod Style Actuator) RCS4-SA*C-WA-400-**-T4-**-* (Slider Actuator) RCS4-RA*C-WA-400-**-T4-**-* (Rod Style Actuator) RCP2-RTCBL-I-35P-**-360-PS-M (Rotary) RCS2-RTC10L-**-360-T4-M-L (Rotary)	
F. Ethernet Switch 1. Managed  NOTE: Managed switches are required for factory network connections.  2. Lightly Managed	Kyland SICOM3000A-8GE-L5-L5-PN SICOM3000A-16GE-L5-L5-PN  Kyland SICOM3000A-8T-L5-L5-PN SICOM3000A-16T-L5-L5-PN	
N. Programmable Logic Controllers & Modules 1. Controllers     4. I/O Modules c) On-Machine Distributed (IP65/67) 2) IO-Link Master (Network Interface)	Siemens S7-1200 S7-1500  NOTE: Allowed only for specific applications. Applications shall be specified in equipment T-Spec and require Control Engineer's prior approval.  Turck TBEN-L4-8IOLA (8 port, 8 IO-Link, 4-Pin Mini Power)	
T. RFID Systems - Pallet/Part Tracking 1. Antenna	Turck TN-M30-IOL2-H1147 TN-M18-IOL2-H1147 TN-Q40-IOL2-H1147	
2. Data Carriers	Turck TW-R30-K2	