



Approved Components List

Global Common

SD-007

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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.

Where an approved supplier is followed by "(Special Applications)," these components may be used but require the Controls Engineer's prior approval.

2. Manufacturing Engineering - Major Mechanical Components

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

The "Global Common / Requirement" column has two functions:

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

NOTE: To identify regional requirements, the following notation is 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 supplier's components may be used.

The "Examples" column lists example components that may be used providing they meet the specifications of the "Global Common / Requirement" column. 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 notation is 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 listed supplier's components may be used.

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

NOTE: Changes since the last revision are highlighted.

Mechanical Component	Global Common / Requirement	Examples
A. Brakes, Electric	Midwest Reuland Warner	
B. Clutch / Brake	NOTE: Air is preferred over Electric.	
1. Air	Posidyne Som-Pac Nexen / Horton (Requires single point lubrication)	
2. Electric	Warner Steams Dynatorque (Special Applications)	
C. Gear Reducers	Requirements based on application	<div> Bonfiglioli Bosch – Rexroth Boston Lenze Morse Nord Drivesystems </div> <div> Ohio Seimens SEW Eurodrive Sumitomo Drive Tech Winsmith </div>
D. Indexers	Camco-Ferguson Swanson Erie Weiss	
E. Leak Testing Units	Refer to the Manufacturing Equipment Purchase Specification or the Purchasing Engineer. Cincinnati Test Systems Cosmo Sciometric	
F. Mist Collectors	3nine (NA) Royal Filterist	
G. Electric Presses	Refer to the Manufacturing Equipment Purchase Specification or the Purchasing Engineer. Kistler Oacis Promess U.S.A. NOTE: Promess UltraPro controllers require the use of a separate PULS Power Supply CT10.241 and PULS Buffer module UF20.241 Tox	

Mechanical Component	Global Common / Requirement	Examples
H. Industrial Robot Hardware	Selection of hardware below is application specific, refer to SD-1040 for clarification.	
1. Actuators	<u>Fanuc Mate Series</u> Arc Mate Series LR Mate Series <u>Fanuc M Series & R Series</u> M-10i Series M-20i Series M-710i Series R-1000i Series R-2000i Series <u>Fanuc SCARA Series</u> SR-3i Series SR-6i Series SR-12i Series SR-20i Series	
2. Controller NOTE: For European controllers it is preferred to purchase with Auto/T1 operator panel rather than installing the Retro Kit.	<u>Fanuc Mate Series</u> R-30iB Plus Mate <u>Fanuc M Series & R Series</u> R-30iB Plus A-Cabinet <u>Fanuc SCARA Series</u> R-30iB Compact Plus	
3. Safety I/O NOTE: Adds SFDI / SFDO signals to the robot controller.	<u>Fanuc R-30iB Plus Mate</u> Mate-Safety-IO (NA) A05B-2650-J132 (B) (C) (I) (E) A05B-2650-J180 (B) (C) (I) (E) A05B-2600-J131 (B) (C) (I) (E) <u>Fanuc R-30iB Plus A-Cabinet</u> MHIB-SAFETY-IO (NA) A05B-2602-J201 (B) (C) (I) (E) A05B-2605-J445 (B) (C) (I) (E) A05B-2600-J131 (B) (C) (I) (E)	

Mechanical Component	Global Common / Requirement	Examples
4. Transit Board, End Effector I/O NOTE: Required based on Machine Risk Assessment.	<u>Fanuc R-30iB Plus A-Cabinet</u> A05B-2626-J465	
5. Auto / T1 Switch Retro Kit NOTE: Retro Kit required for robot controllers provided with T2 mode.	A05B-2601-K201	
I. Industrial Robot Software	Software options below are all required unless specified. Refer to SD-1040 for clarification.	
1. EIP Options (a or b required)		
a) Advanced Ethernet / IP Package	R860 Advanced EIP Package (NA) R784 Ethernet / IP Adapter (B) (C) (I) (E) R822 Ethernet / IP EDA (B) (C) (I) (E) R850 PC Remote iPendant (B) (C) (I) (E) R553 HMI Device (SNPX) (B) (C) (I) (E) R843 Remote / iPendant (B) (C) (I) (E)	
b) Ethernet / IP Adapter Software	R784 Ethernet / IP Adapter Software	
c) Ethernet / IP Safety (required with safety PLC)	R713 Ethernet / IP Safety	
2. Motion Package	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)	
3. DCS Options (a or b required)		
a) Advanced DCS Package	R859 Advanced DCS Package (NA) J567 DCS Pos/Speed Check (B) (C) (I) (E) J568 DCS Safe I/O Connect (B) (C) (I) (E) R764 4D Graphics (B) (C) (I) (E)	
b) DCS Position & Speed Check	J567 DCS Position & Speed Check NOTE: Allowed when application does not require Safe IO connect	
4. Karel	R632 Karel	

Mechanical Component	Global Common / Requirement	Examples
J. Driverless Industrial Vehicles	<p>Omron MiR</p> <p>Additional Autonomous Mobile Robots and Automated Guided Vehicles manufacturers shall have written approval from Core Controls & Automation prior to purchase.</p> <p>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/TSDF B56.5.</p>	
K. Screwdrivers	<p>Refer to the Manufacturing Equipment Purchase Specification or the Purchasing Engineer.</p> <p>Atlas Copco Stanley Webber</p>	
L. Shaft Overload		
1. Not Timed	Dodge Morse	
2. Timed	Ferguson Standard Tool	
M. Variable Ratio Pulleys	Reeves Woods	
NOTE: All pulleys are sprockets to be attached with a taper lock or equivalent device.		

3. Manufacturing Engineering – Process and Test Engineering

The “Process & Test Engineering” column is organized by components. Nexteer Automotive does not have requirements for technologies not listed.

The “Global Common / Requirement” column has two functions:

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

NOTE: To identify regional requirements, the following notation is 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 supplier’s components may be used.

The “Examples” column lists example components that may be used providing they meet the specifications of the “Global Common / Requirement” column. 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 notation is 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 listed supplier’s components may be used.

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

NOTE: Changes since the last revision are highlighted.

Process and Test Engineering	Global Common / Requirement	Examples
A. Data Acquisition Cards NOTE: Submit proposed choice to Manufacturing Test Engineer for Approval.	PXIe-1073 Chassis w/ Integrated MXIe Controller (High density, scalable, high speed simultaneous sampling +500KS/s) PCIe Controller Card 5 Peripheral Slot 1 Port PCIe, 3m Cable USB-6003 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)
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)	
B. DC Power Supply		
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 - 100mV Max Input AC 85-265V Must be mounted in Cabinet	TDK SWS 600L-12
3. High Power (+50A) Programmable DC	Ripple - 100mV Max Input AC Configurable Protect from external Contaminants	Sorensen DCS 20-150E w/ M130 ethernet option TDK Lambda GEN-20-250-3P480

Process and Test Engineering	Global Common / Requirement	Examples
C. Motion Control	<p>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.</p> <p>Kinetix 300 2097-V***** NOTE: Allowed on LabVIEW Controlled Test Equipment only.</p> <p>Nidec Nidec M600 NOTE: Allowed for Speed Control on Test Equipment only.</p> <p>Nidec M700 NOTE: Allowed for Regenerative Function on Test Equipment only.</p>	
D. I/O Modules	<p>Phoenix ILB ETH (24Vdc – 16DI & 16DO - 2TX I/O Module) NOTE: Allowed on LabVIEW based Test Equipment only.</p> <p>Schneider Electric - Momentum 170 ENT 11001 (Ethernet w/ built-in Web Server) 170 ADM 350 10 (24Vdc, 16DI & 16DO I/O Module) NOTE: Allowed only on Retool LabVIEW based Test Equipment already using Momentum IO modules.</p>	
E. Signal Conditioner	<p>Built in Power Supply Adjustable gain/offset for coarse and fine Analog output 0-10V IP54 minimum for protective case Built in output Anti-aliasing filter (preferable)</p>	<p>Interface SGA (AC/DC Powered Signal Conditioner)</p>

Process and Test Engineering	Global Common / Requirement	Examples
F. Transducers		
1. Current	Closed Loop Hall Effect CE	LEM LA-205 LEM LTS 6-NP
2. Load Cell	0.05% FSA Maximum Tension / Compression Style Minimum 200% FS Overload CE	Lebow 3140-P Series Interface Series 1100 Ultra Precision Lowprofile © Honeywell 314-CS Models 0.02/0.04% FSA Futek LCB450 (5000lb)
3. Piezo - Electric	Kistler 914XB Series PCB 2X1B PCB 260Axx Amplifier Kistler 5073AXXX Amplifier Kistler 5015AXXX Amplifier/DAQ National Instruments USB-4432 Amplifier PCB 482CXX CE	Kistler, PCB Piezotronics (contact ME in charge for model selection)
4. Position (LVDT)	IP67 (IP67G+ for applications with oil) CE	Keyence GT2 Series MTS - Temposonics
5. Torque – Non-Rotary	0.1% FSA Maximum 4.0E+03 Spring Rate (Nm/rad) Minimum IP44 Minimum CE	Interface Model 5355 Solid Flange Reaction Torque Transducer Honeywell 2102 Flange Reaction Torque Sensor Lorenz DF-30 Flange Reaction Torque Sensor
6. Torque - Rotary	24Vdc Input 0-10Vdc output 0.1% FSA Maximum 10KHz Sampling Rate Minimum 4.0E+03 Spring Rate (Nm/rad) Minimum IP44 Minimum CE	Interface T25 Series - 10Nm Range, 10V analog output option (Applications torque measured 4Nm & 100RPM Max) Interface T25 Series - 20Nm Range, 10V analog output option Interface T25 Series - 200Nm Range, 10V analog output option (Applications torque measured 50Nm Minimum) Lorenz Equivalent Model
G. Software Requirements		
1. Test Equipment	National Instruments LabVIEW 2015 or newer Professional Development Software	
2. CNC	Fanuc Fanuc Ladder – III	

4. Pneumatic Components

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

All components shall be pre-lubricated for life by the manufacturer. Actuators or valves requiring additional line lubrication require advance written approval.

All components shall be rated for a minimum 125 PSI service.

All threaded pressurized fittings shall be BSPP or G thread except for the main air drop which is NPT. BSPT or R threads are not permitted except for use on mufflers.

NOTE: Changes since the last revision are highlighted.

Pneumatic Component	Global Common / Requirement	Examples
A. Accessories		
1. Thread Sealant (Tapered threads only)	Loctite PST 2087067 or 577 NOTE: RTV, Teflon tape and horsehair sealants shall NOT be used	
2. Storage Tanks	ASME Pressure Vessel Code – Division 1, (NA) Section VIII – R2004 NOTE: All others – CE Directive 97/23/EC Unfired pressure vessel code, EN/13445 for pressures greater than 0.5 bar, Directive 87/404EC simple.	
3. Vacuum Devices		
a) Motor-Operated	Busch High Vacuum Gast Low Vacuum	
b) Air-Operated	Festo VN, OVEM with blow off, with or without display SMC ZH, ZL112A-DBL, ZL112A-DBL-Q, ZM1*1H-*5LZ-E17	
4. Flow Meter		
a) Electronic		
1) Test	Hastings HFM Series	
2) General	Hedland SMC PFM/PF2A (Special Applications)	
b) Differential Pressure	Meriam – Laminar Flow Element	
c) Rotameters	Fisher-Porter Brooks	
5. Gauge		
a) Pressure	2.5" Diameter, PSI / Bar, NPT, 2% Accuracy China requires units of Pascal	

Pneumatic Component	Global Common / Requirement			Examples	
1) General Purpose	Festo			Festo	
	MA-40-1,0-R1/8-MPA-E-RG	526778 (1 MPa)	(C)	MA-40-10-1/8-EN	162835
	MA-50-1,0-R1/4-MPA-E-RG	526781 (1 MPa)	(C)	MA-50-10-1/4-EN	162838
	MA-50-0,25-R1/4-MPA-E-RG	526780 (.25MPa)	(C)		
2) Push-In for Sandwich Regulator	SMC			SMC	
	G36-P10-01-X30	(1 MPa)	(C)	G36-P10-01-X30	
	Festo			Festo	
	PAGN-26-1M-P10	563736 (1 MPa)	(C)	PAGN-26-10-P10	543488
3) Test	PAGN-40-1M-P10	563738 (1 MPa)	(C)	PAGN-40-10-P10	548009
	4.25" Diameter, PSI/Bar, NPT, 0.25% Accuracy			Helicoid	
	NIST Traceability paperwork required			Ashcroft	
b) Gauge adapter NOTE: 12X1,5 connection is required	Schroeder				
	S1215DCNPT14 (1/4 NPT)				
c) Pressure tap, Test Port NOTE: 12X1,5 connection is required	Schroeder				
	SP1215G14WDP (1/4 BSPP)				
6. Muffler, Exhaust	BSPT, <80dBa, Bronze or plastic sintered and paper elements are not permitted.			Numatics	
				M1MB	(1/8 BSPT)
				M2MB	(1/4 BSPT)
				M3MB	(3/8 BSPT)
				M4MB	(1/2 BSPT)
				M5MB	(3/4 BSPT)
				M6MB	(1 BSPT)
				M6MN	(1 NPT)
	NOTE: Festo mufflers containing plastic sintered, or paper elements are not allowed.				

Pneumatic Component	Global Common / Requirement	Examples
7. Safety Rated Manual Blow Gun	<p>NOTE: Norgren mufflers must be used with an adapter on the Festo Manifolds.</p>	<p>Norgren</p> <p>MB001B (1/8 BSPT)</p> <p>MB002B (1/4 BSPT)</p> <p>MB003B (3/8 BSPT)</p> <p>MB004B (1/2 BSPT)</p> <p>MB006B (3/4 BSPT)</p> <p>MB008B (1 BSPT)</p> <p>MB008A (1 NPT)</p> <p>Alwitco</p> <p>B18, 0554018 (1/8 BSPT)</p> <p>B28, 0554028 (1/4 BSPT)</p> <p>B38, 0554038 (3/8 BSPT)</p> <p>B48, 0554048 (1/2 BSPT)</p> <p>B68, 0554068 (3/4 BSPT)</p> <p>B88, 0554088 (1 BSPT)</p> <p>B88, 0154088 (1 NPT)</p>
	OSHA 1910.242(b)	<p>Exair</p> <p>1697-PEEK-12-CS</p> <p>For retrofitting an existing 1697_PEEK with a 12" extension and chip shield, use:</p> <p>938812 (extension)</p> <p>900453 (coupler 1/8")</p> <p>901221 (chip shield)</p> <p>GUARDAIR, WHISPERJET</p> <p>80LJ012AA</p>

Pneumatic Component	Global Common / Requirement	Examples																										
B. Actuators (Standard Rod Lengths Only)																												
1. Linear with Male Rod(s) End	Double-acting only. (Spring loaded cylinders are Special Applications)																											
	NOTE: FK rod aligner required on guided applications.																											
a) Compact ISO 21287	<table><tr><td>Festo</td><td>SMC</td></tr><tr><td>Single Rod</td><td></td></tr><tr><td>ADN-25-15-A-P-A</td><td>CD55B25-15M</td></tr><tr><td>ADN-25-25-A-P-A</td><td>CD55B25-25M</td></tr><tr><td>ADN-50-15-A-P-A</td><td>CD55B50-15M</td></tr><tr><td>ADN-50-25-A-P-A</td><td>CD55B50-25M</td></tr><tr><td>ADN-50-50-A-P-A</td><td>CD55B50-50M</td></tr><tr><td>ADN-63-15-A-P-A</td><td>CD55B63-15M</td></tr><tr><td>ADN-63-25-A-P-A</td><td>CD55B63-25M</td></tr><tr><td>ADN-63-50-A-P-A</td><td>CD55B63-50M</td></tr><tr><td>ADN-100-15-A P-A</td><td>CD55B100-15M</td></tr><tr><td>ADN-100-25-A-P-A</td><td>CD55B100-25M</td></tr><tr><td>ADN-100-50-A P-A</td><td>CD55B100-50M</td></tr></table>	Festo	SMC	Single Rod		ADN-25-15-A-P-A	CD55B25-15M	ADN-25-25-A-P-A	CD55B25-25M	ADN-50-15-A-P-A	CD55B50-15M	ADN-50-25-A-P-A	CD55B50-25M	ADN-50-50-A-P-A	CD55B50-50M	ADN-63-15-A-P-A	CD55B63-15M	ADN-63-25-A-P-A	CD55B63-25M	ADN-63-50-A-P-A	CD55B63-50M	ADN-100-15-A P-A	CD55B100-15M	ADN-100-25-A-P-A	CD55B100-25M	ADN-100-50-A P-A	CD55B100-50M	
Festo	SMC																											
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ADN-50-25-A-P-A	CD55B50-25M																											
ADN-50-50-A-P-A	CD55B50-50M																											
ADN-63-15-A-P-A	CD55B63-15M																											
ADN-63-25-A-P-A	CD55B63-25M																											
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ADN-100-50-A P-A	CD55B100-50M																											
	<table><tr><td>Double Rod</td><td></td></tr><tr><td>ADN-25-15-A-P-A-S2</td><td></td></tr><tr><td>ADN-25-25-A-P-A-S2</td><td></td></tr><tr><td>ADN-50-15-A-P-A-S2</td><td></td></tr><tr><td>ADN-50-25-A-P-A-S2</td><td></td></tr><tr><td>ADN-50-50-A-P-A-S2</td><td></td></tr><tr><td>ADN-63-15-A-P-A-S2</td><td></td></tr><tr><td>ADN-63-25-A-P-A-S2</td><td></td></tr><tr><td>ADN-63-50-A-P-A-S2</td><td></td></tr><tr><td>ADN-100-15-A-P-A-S2</td><td></td></tr><tr><td>ADN-100-25-A-P-A-S2</td><td></td></tr><tr><td>ADN-100-50-A-P-A-S2</td><td></td></tr></table>	Double Rod		ADN-25-15-A-P-A-S2		ADN-25-25-A-P-A-S2		ADN-50-15-A-P-A-S2		ADN-50-25-A-P-A-S2		ADN-50-50-A-P-A-S2		ADN-63-15-A-P-A-S2		ADN-63-25-A-P-A-S2		ADN-63-50-A-P-A-S2		ADN-100-15-A-P-A-S2		ADN-100-25-A-P-A-S2		ADN-100-50-A-P-A-S2				
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ADN-100-50-A-P-A-S2																												

Pneumatic Component	Global Common / Requirement		Examples
	Festo	SMC	
	Single Rod - Non-Rotating		
	ADNGF-50-15-P-A	CDQMB50TF-15	
	ADNGF-50-25-P-A	CDQMB50TF-25	
	ADNGF-50-50-P-A	CDQMB50TF-50	
	ADNGF-63-15-P-A	CDQMB63TF-15	
	ADNGF-63-25-P-A	CDQMB63TF-25	
	ADNGF-63-50-P-A	CDQMB63TF-50	
	ADNGF-100-15-P-A	CDQMB100TF-15	
	ADNGF-100-25-P-A	CDQMB100TF-25	
	ADNGF-100-50-P-A	CDQMB100TF-50	
ISO 21287 (Special Applications)	Double Rod - Non-Rotating		
	ADNGF-50-15-P-A-S2		
	ADNGF-50-25-P-A-S2		
	ADNGF-50-50-P-A-S2		
	ADNGF-63-15-P-A-S2		
	ADNGF-63-25-P-A-S2		
	ADNGF-63-50-P-A-S2		
	ADNGF-100-15-P-A-S2		
	ADNGF-100-25-P-A-S2		
	ADNGF-100-50-P-A-S2		
b) < 25mm (12-25mm) Bore ISO 6432	Festo	SMC	
	High Force		
	ADNH-25-*-A-P-A-*N		
	ADNH-40-*-A-P-A-*N		
	ADNH-63-*-A-P-A-*N		
	ADNH-100-*-A-P-A-*N		
	Single Rod		
	DSNU-12-10-P-A	CD85N12-10-B	
	DSNU-12-25-P-A	CD85N12-25-B	
	DSNU-12-50-P-A	CD85N12-50-B	
	DSNU-12-100-P-A	CD85N12-100-B	
	DSNU-12-160-P-A	CD85N12-160-B	
	DSNU-25-25-PPV-A	CD85N25-25C-B	
	DSNU-25-50-PPV-A	CD85N25-50C-B	
	DSNU-25-100-PPV-A	CD85N25-100C-B	
	DSNU-25-160-PPV-A	CD85N25-160C-B	

Pneumatic Component	Global Common / Requirement		Examples
c) > 32mm (32-100mm) Bore ISO 15552 Linear with Male Rod(s) End Festo FNC, HNC, or SNBC mounting bracket required. Male rod ends whenever possible. Pneumatic cushioning on both ends.	Festo	SMC	
	Double Rod		
	DSNU-12-10-P-A-S2	CD85WE12-10-B	
	DSNU-12-25-P-A-S2	CD85WE12-25-B	
	DSNU-12-50-P-A-S2	CD85WE12-50-B	
	DSNU-12-100-P-A-S2	CD85WE12-100-B	
	DSNU-12-160-P-A-S2	CD85WE12-160-B	
	DSNU-25-25-PPV-A-S2	CD85WE25-25C-B	
	DSNU-25-50-PPV-A-S2	CD85WE25-50C-B	
	DSNU-25-100-PPV-A-S2	CD85WE25-100C-B	
	DSNU-25-160-PPV-A-S2	CD85WE25-160C-B	
	Festo	SMC	
	Single Rod		
	DSBC-32-50-PPVA-N3	CP96SDB32-50C	
	DSBC-32-100-PPVA-N3	CP96SDB32-100C	
	DSBC-32-160-PPVA-N3	CP96SDB32-160C	
	DSBC-32-200-PPVA-N3	CP96SDB32-200C	
	DSBC-50-50-PPVA-N3	CP96SDB50-50C	
	DSBC-50-100-PPVA-N3	CP96SDB50-100C	
	DSBC-50-160-PPVA-N3	CP96SDB50-160C	
	DSBC-50-200-PPVA-N3	CP96SDB50-200C	
	DSBC-63-50-PPVA-N3	CP96SDB63-50C	
	DSBC-63-100-PPVA-N3	CP96SDB63-100C	
	DSBC-63-160-PPVA-N3	CP96SDB63-160C	
	DSBC-63-200-PPVA-N3	CP96SDB63-200C	
	DSBC-80-50-PPVA-N3	CP96SDB80-50C	
	DSBC-80-100-PPVA-N3	CP96SDB80-100C	
	DSBC-80-160-PPVA-N3	CP96SDB80-160C	
	DSBC-80-200-PPVA-N3	CP96SDB80-200C	
	DSBC-100-50-PPVA-N3	CP96SDB100-50C	
	DSBC-100-100-PPVA-N3	CP96SDB100-100C	
	DSBC-100-160-PPVA-N3	CP96SDB100-160C	
	DSBC-100-200-PPVA-N3	CP96SDB100-200C	

Pneumatic Component	Global Common / Requirement	Examples
	Festo Double Rod DSBC-32-50-T-PPVA-N3 CP96SDB32-50CW DSBC-32-100-T-PPVA-N3 CP96SDB32-100CW DSBC-32-160-T-PPVA-N3 CP96SDB32-160CW DSBC-32-200-T-PPVA-N3 CP96SDB32-200CW DSBC-50-50-T-PPVA-N3 CP96SDB50-50CW DSBC-50-100-T-PPVA-N3 CP96SDB50-100CW DSBC-50-160-T-PPVA-N3 CP96SDB50-160CW DSBC-50-200-T-PPVA-N3 CP96SDB50-200CW DSBC-63-50-T-PPVA-N3 CP96SDB63-50CW DSBC-63-100-T-PPVA-N3 CP96SDB63-100CW DSBC-63-160-T-PPVA-N3 CP96SDB63-160CW DSBC-63-200-T-PPVA-N3 CP96SDB63-200CW DSBC-80-50-T-PPVA-N3 CP96SDB80-50CW DSBC-80-100-T-PPVA-N3 CP96SDB80-100CW DSBC-80-160-T-PPVA-N3 CP96SDB80-160CW DSBC-80-200-T-PPVA-N3 CP96SDB80-200CW DSBC-50-100-T-PPVA-N3 CP96SDB100-50CW DSBC-100-100-T-PPVA-N3 CP96SDB100-100CW DSBC-100-160-T-PPVA-N3 CP96SDB100-160CW DSBC-100-200-T-PPVA-N3 CP96SDB100-200CW	
d) Vertical Load Holding Applications where loads are greater than 35lbs and less than 100lbs. The use of Pneumatics to support loads greater than 100lbs is discouraged. Where loss of a brake function can create a safety issue, damage tooling, or create a bad part, the brake shall be monitored by a pressure switch or a valve with a spool position sensor.	SMC Rod lock C95NDB*-*-D Series (with Rod Brake) NOTE: Use IFM bracket E11797 with IFM MK5101 T-Slot proximity sensor. NOTE: C95N brakes are rated for static holding and dynamic stopping. Rail lock Zimmer Group MBPS MKS (Special Applications) Holding only, not rated for stopping or safety applications.	

Pneumatic Component	Global Common / Requirement	Examples
2. Linear (Rodless) a) 8-63mm Bore	Festo DGC-K-*-PPV-A-GK-FK (External Guiding required) DGC-*-*-KF-PPV-A DGC-*-*-KF-YSRW-A-1H-PN (Clamping unit, 25-50mm, Acceptable only in non-safety related applications) SMC MY1B**TF-***Z (External Guiding required) MY1HT**TF (with recirculating ball bearing guide)	
b) For Operator Door Applications Magnetic breakaway, 30lbs or less. Example part number includes the required floating bracket and foot mount kit.	Tolomatic 24100222 SK*.* FL FM2 *.* = Stroke length in inches (Special Applications – Refer to Nexteer Auto Door Specification SD-1038)	
3. Air Motors	ARO	
4. Slides	Festo DFM-*-*-P-A-KF (for strokes less than 100mm) FENG-*-*-KF (With DSBC cylinder for strokes greater than 100mm) DGSL-*-*-PA (Special Applications) High Tolerance DGST-*-*-PA SLS-*-*-PA SMC MGPL*TF-*Z MXH*-*Z MXS*TF-*A CY1S15TF - Magnetically coupled (Special Applications)	

Pneumatic Component	Global Common / Requirement	Examples
5. Grippers NOTE: Due to the greater range of motion, special consideration shall be given during the Machine Risk Assessment for angular grippers if an Operator is loading to the gripper. In addition, the use of single acting grippers (spring return) is a special application and requires prior written approval.	2 Jaw (Parallel) Festo HGPD-*-A DHPS-*-A HGPT-*-A-B (HGPL-*-A-B - Special Applications) SMC MHZ2 Schunk PGN-plus 2 Jaw (Angular) (Special Applications) 3 Jaw (Parallel) Festo DHDS**-A HGDT**-A HGDD**-A (Sealed 3 Jaw) Schunk (For Wet locations) DPG-plus - Linear DRG – Angular (Special Applications) DPZ-plus (Sealed 3 Jaw)	
6. Escapements	SMC MIS*TF, MIW*TF Festo HPV-*-A, HPVS-*-A	
7. Rotary Actuators	Festo DSM-B, DRRD SMC MSQ*-XF, CRB-XF	

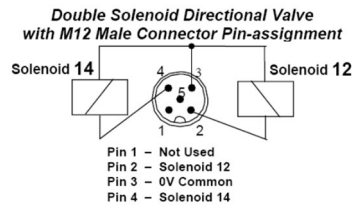
Pneumatic Component	Global Common / Requirement	Examples
8. Clamps (Manual and Pneumatic toggle clamps) NOTE: Swing clamps are special application and require prior written approval	Destaco Elesa-ganter KIFIX	802UE 82L2G-203B800 862 KF-017 DB P
9. Stopper Actuators (Shot Pin)	Festo DFSP-32-25-S-PA (Double acting, spring advance)	
C. Conductors 1. Hose a) Sizes ¼" – 1" b) Sizes 1¼" – 2"		Parker Push-Lok 801 Series Parker GST II (Series 7092, Red)
2. Velocity Fuse	Ross "Hoze-Fuze" velocity fuse required on supply inlet of hose ¾" and larger.	
3. Polyurethane Tubing (6, 10mm sizes only. Must be suitably protected using nylon spiral wrap and tubing clamps.) Use Festo PUN-H for wet applications Welding and high temperature (Special Applications)	Festo PUN-H-6x1-SW (Black) 197391 PUN-H-6x1-BL (Blue) 197384 PUN-H-10x1.5-SW (Black) 197393 PUN-H-10x1.5-BL (Blue) 197386 With QS-G series fittings (BSPP thread) SMC TUH0604B-* (Black) TUH0604BU-* (Blue) TUH1065B-* (Black) TUH1065BU-* (Blue) With KQ2 Series Fittings Festo PAN series with Festo NPQH fittings and Turck silicone cover, ST ID 3/8" / 30mm or ST ID ½" / 30mm.	
4. Steel Tubing	Must conform to SAE J524 (Metric)	Dia. x Wall Thickness R6 (0.236) x 1 (0.039) R10 (0.393) x 1 (0.039) R12 (0.472) x 1.5 (0.059) R20 (0.787) x 2 (0.078) R25 (0.984) x 2.5 (0.098)

Pneumatic Component	Global Common / Requirement	Examples
5. Steel Tubing Support Clamp	Per DIN 3015, Part 1	Hydro-Craft Hydro-strut, Hydro-clamp Hydac HRL, HRS ZSi Stauff
D. Connectors	ISO 1179 – BSPP and ISO228-1 only. Threaded connections smaller than M5 are not permitted.	
1. Fittings		
a) Adapters	SAE J514 / ISO8434-2	
b) Quick Disconnects		
1) General	Mil-C-4109E Industrial Interchange only	Parker B33E Hansen 3000-11B
2) Bubble-Tight	Swagelok "QC" & "QF" Series	
c) Polyurethane (6, 10mm tubing sizes only)	Festo QS-G – Quick Star (BSPP thread) SMC KQ2-A	
d) Steel	37 Degree – SAE J514 and ISO8434-2 or O-ring face seal – SAE J1453 / ISO8434-3	Parker Triple-Lok Parker Seal-Lok
e) Swivel, Rotary Unions	Dueblin Aeroquip	
E. Air Preparation (Filter, Lubricator, and Regulators) Metal Bowl, Manual Drains Only.	NOTE: Cleanliness level to meet ISO 8573-1 For standard application general use, the air quality is to meet class 5.5.5.7.4. For sensitive applications, the air quality shall meet ISO class 1.3.2.	Standardize on the ¾ size whenever possible. G1/8, ¼, ½, and 1" are special applications.

Pneumatic Component	Global Common / Requirement		Examples
1. Filters	Festo MS Series – Size 6		
a) Coalescing (Special Applications)	MS6-LFM-1/2-A-U-M -DA (0.01m)	527670	
	MS6-LFM-A	532909	
b) 5 Micron	Festo MS6-LF-1/2-C-U-M	529611	
	MS6-LFP-C Element	534499	
	SMC AF50-F06-8-A AF50P-060S Element		
c) 40 Micron Festo – Use ¾” port blocks with air prep assembly	Festo MS6-LF-1/2-E-U-M	529619	
	MS6-LFP-E Element	534500	
	SMC AF50-F06-27-40-A AF50P-060S-7-40B Element		
d) Reclassifier	Festo LFU-1/2	10494	
	LFP-U-1/2 Element	10496	
	LFU-1	10495	
	LFP-U-1 Element	10497	
e) Mounting Bracket	Festo MS6-WP (Assembly Mount)	532195	
	MS6-MV (Assembly Connector)	532799	
	MS6-WB (Stand Alone Mount)	532196	
	MS12-WP (Assembly Mount)	537133	
	MS12-MV (Assembly Connector)	537134	
	SMC Y600T, Y600T-A		
f) Branch Module	Festo MS6-FRM-1/2	529853	
	MS12-FRM-G	541681	

Pneumatic Component	Global Common / Requirement			Examples
g) 1¼" – 1½" NPT	Norgren			
	F17-A00-M1DA	(5m) 1¼ NPTF		
	F17-B01-M1DA	(5m) 1½ NPTF		
	F17-A00-M3DA	(40m) 1¼ NPTF		
	F17-B01-M3DA	(40m) 1½ NPTF		
	Festo 535023			
	MS12-LF-AGG-C-U-M	(5m) 1¼ G		
	MS12-LF-AGH-C-U-M	(5m) 1½ G		
	MS12-LFP-C Element	(5m) 537143		
	MS12-LF-AGG-E-U-M	(40m) 1¼ G		
	MS12-LF-AGH-E-U-M	(40m) 1½ G		
	MS12-LFP-E Element	(40m) 537144		
2. Lubricator (Special Applications)				
a) In-Line	Festo D Series			
	LOE-3/4-D-MIDI	162681		
	SMC			
	AL50-F06-8-A		(E)	
b) Single Point	Master Pneumatic Multi point with M476RP reservoir or similar.			
3. Regulator				
a) General Purpose	Festo			
Lock is required for Auto Door Applications	MS6-LR-AGE-D6-AS	(4.35-101PSI, ¾"G)	527663	
		(4.35-101PSI, ¾"G)	527663 (C)	
	MS6-LR-AGE-MPA-D6-AS	(Lock)	193786	
	LRVS-D			
	SMC			
	AR50K-F06G-B	.02-.2MPa	(E, C)	

Pneumatic Component	Global Common / Requirement	Examples
b) > 1¼" – 2" NPTF	Norgren R17-A00-RGLA (5-125PSI, 1-1/4" NPTF) R17-B00-RGLA (5-125PSI, 1-1/2" NPTF) Festo MS12-LR-AGG-D6-PSI-LD (5-100PSI, 1-1/4" G) MS12-LR-AGG-D6-MPA-LD (.7 MPa) (C) MS12-LR-AGH-D6-PSI-LD (5-100PSI, 1-1/2" G) MS12-LR-AGH-D6-MPA-LD (.7 MPa) (C)	
c) Precision	Siemens Model 40 Fairchild Model 80 SMC ARP40K-F04G-3 Festo MS6-LRP-1/4-D4-A8 (.75-36PSI) 538006 (Special Applications)	
d) Large Capacity	SMC VEX1 Series	
e) Sandwich (ISO 15407/2)	Festo VABF-S4-1-R1C2-C-6E 549876 Norgren VS2672900-KG10	
f) Sandwich (ISO 5599/2) (Special Applications)	Festo VABF-S2-2-R1C2-C-6, 555771, for 5599/2 series valves. Size 2 and greater only.	
F. Valves		
1. Ball		
a) Manual Actuation	¼ turn, 150 PSI, WOG (Water, oil or gas), full ported	Festo QH-1/4 9541 QH-3/8 9542 QH-1/2 9543 QH-3/4 9544

Pneumatic Component	Global Common / Requirement	Examples
b) Pneumatic Actuation	SVF With Adjustable Stem Seal NOTE: Use for high cyclic applications.	
2. Check		
a) In-Line	Festo H-1/4-B 11689 H-1/2-B 11691 SMC AKB02A-02S AKB04A-04S	
b) Pilot Operated – Additional HAB Manual Override (Vent) Required	Festo HGL-M5-B 530029 HGL-1/8-B 530030 HGL-1/4-B 530031 HGL-3/8-B 530032 HGL-1/2-B 530033	
c) Manual Override	Festo HAB-1/8 184585 HAB-1/4 184586 HAB-3/8 184587 HAB-1/2 184588 Aladco 312501BSPP	
3. Directional		
a) Electronically Controlled	ISO 15407/2:2002 (26mm Only) 18mm (Special Applications) 24VDC, Manual Non-locking flush overrides. Must conform to ISO-4414, 7.1 and SD-014, Pneumatic Addendum Shall conform to ISO20401:2005(E) and IEC60947-5-2:2004, Figure D.2	Wiring Configuration for individual Sub-base with M12 connector:  <p><i>Double Solenoid Directional Valve with M12 Male Connector Pin-assignment</i></p> <p>Solenoid 14 Solenoid 12</p> <p>Pin 1 – Not Used Pin 2 – Solenoid 12 Pin 3 – 0V Common Pin 4 – Solenoid 14</p>

Pneumatic Component	Global Common / Requirement		Examples
1) Manifold Mount, 5-Way 15407/2, 26mm (Size 01) () = Configuration selection Code (37 Pin External Pilot only) Up to 22 coils (IP65 or 67) 11 Double Solenoid or any combination of the two.	Festo 539215 44E-MP1-P+G0 Electrical 44P-N-X-*B-*ZFY****		NOTE: Each base accommodates 2 valves or 4 addresses.* = valve and regulator configuration. Valve manifolds to be mounted vertically with valve spools horizontal and mufflers at the bottom.
Single Solenoid Offset (O)	VSVA-B-M52-MZD-A1-1T1L	539159	
Double Solenoid (J)	VSVA-B-B52-ZD-A1-1T1L	539156	
Double Solenoid 3 Position (E)	VSVA-B-P53E-ZD-A1-1T1L	539161	
Single Sandwich Reg (6 bar) (ZFY)	VABF-S4-1-R1C2-C-6E	549876	
Gauge (BAR/PSI) (U)	PAGN-26-10-P10	543488	
Gauge (MPa) (WU)	PAGN-26-1M-P10	563736	
Manifold Sub-base (Dbl) (B)	VABV-S4-1S-G14-2T2	539220	
Manifold End Plate – L (MP1)	VABE-S6-1LT-C-M1-S37	543414	
Manifold End Plate – R (X)	VABE-S6-1RZ-G12	539236	
Individual Sub-base (M12)	VABS-S4-1S-G14-R3	541063	
Blanking Plate (L)	VABB-S4-1-WT	539212	
37 Pin / 5 Meter 27 Wire Cable (GO)	NEBV-S1W37-KM-5-LE27	543275	
Non-Locking Manual Override Cap (Pkg of 10) (N)	VAMC-S6-CH	541010	
Vertical Supply Plate – Port 11 (ZU)	VABF-S4-1-P1A3-G14	540171	
Dual 3-Way Valve (For Conveyor stops or 3-way functions. Not for standard cylinder control) (K)	VSVA-B-T32C-AZD-A1-1T1L	539150	
Single Solenoid with switch (SO)	VSVA-B-M52-MZD-A1-1T1L-APP	560724	
Supply plate (K)	VABF-S6-1-P1A6-G12	539230	
Separator plate (Required for Supply Plate above – Select option K) (US)	VABD-S6-1-P3-C	539228	

Pneumatic Component	Global Common / Requirement	Examples
Manifold Assembly Kit Single Solenoid Offset Double Solenoid Detent Double Solenoid 3 Position Single Sandwich Reg (9 bar) Gauge Manifold Sub-base (Dbl) Manifold End Plate – L (37 Pin Ext Pilot) Manifold End Plate – R Individual Sub-base (M12) Blanking Plate 37 Pin / 5 Meter 27 Wire Cable Vertical Supply Plate Dual 3-Way Valve (For Conveyor stops or 3-way functions. Not for standard cylinder control.)	Numatics G503AVM*300V14X, G503AMM22MA0020, Assembled R503A2B10MA00F1 R503A2B40MA00F1 R503A2B50MA00F1 R503ARS12JA0020 MS02AG521734006 G503AMM22MA0020 P599AE428442001 G503AK428327013 G503AA3A3M59W20 P503AB428359001 SC3705MCX0000000 G503AW428300003 R503A2BD0MA00F1	
Single Solenoid Offset Double Solenoid Detent Double Solenoid 3 Position Single Sandwich Reg Manifold Sub-base (Sgl) Manifold Sub-base (Dbl) Manifold End Plate – Left Individual Sub-base (M12) Blanking Plate 25 PIN/5 Meter cable (IP 65 or 67)	Norgren VS26S527DF313A VS26S522DF313A VS26S722DF313A VS2672900-KG10 VS2672503-BGF0 VS2672502-BGF0 VS2672702-KG00 (25 Pin Ext Pilot) VS2672510-BG00 VS2672904-KG00 V11569-E05	

Pneumatic Component	Global Common / Requirement		Examples
Manifold Assembly Single Solenoid Offset Double Solenoid Detent Single Sandwich Regulator (PSI/BAR) Manifold Sub-base (Sgl) Manifold End Plate (Left) Manifold End Plate (Right) Blanking Plate 26 PIN/5 Meter cable MD3 Fanuc robot EE connector	SMC VV801*-03F-MD0-W1-R-Q VSR8-4-FG-S-3VZR VSR8-4-FG-D-3VZR VVS8040-ARB-P-1-X1L OR VVS8040-ARB-P-1-X1S MBS8040-03F-D-1 MES804D-04F-R MES804U-04F-R VVS8040-11A AXT100-MC26-050 UIUSP-DUP01068		
2) Manifold mount, 5-way 5599/2 Size 2 (Special Applications) NOTE: Requires written justification and supporting engineering calculations.	Festo 539215 44E-MP1-P+G0 Electrical 44P-N-X-*D-*ZF****		NOTE: Each base accommodates 1 valve or 2 addresses.* = valve and regulator configuration. Valve manifolds to be mounted vertically with valve spools horizontal and mufflers at the bottom
Single Solenoid Offset (O) Double Solenoid Detent (J) Double Solenoid 3 Position (E) Single Sandwich Reg (6 bar) (ZF) Manifold Sub-base (D) Manifold End Plate – L (MP1) (37 Pin Ext Pilot) Manifold End Plate – R (X1) Individual Sub-base (M12) Blanking Plate (L) Gauge (BAR/PSI) (U) Gauge (MPa) (WU) 37 PIN/5 Meter 27 Wire cable (GO) Up to 22 coils (IP 65 or 67) Non-Locking Manual Override Cap (Pkg of 10) Vertical Supply Plate-Port 11 () = Configurator selection code. (ZU)	Festo VSVA-B-M52-MZD-D2-1T1L 560821 VSVA-B-B52-ZD-D2-1T1L 560818 VSVA-B-P53E-ZD-D2-1T1L 560823 VABF-S2-2-R1C2-C-6 555771 VABV-S2-2S-G12-T2 560841 VABE-S6-1LT-C-M1-S37 543414 VABE-S6-2RZ-G34 560839 VABS-S2-2S-G12-R3 555640 VABB-S2-2-WT 560845 PAGN-40-10-P10 548009 PAGN-40-1M-P10 563738 (C) NEBV-S1W37-KM-5-LE27 543275 VAMC-S6-CH 541010 VABF-S2-2-P1A3-G12 555786		

Pneumatic Component	Global Common / Requirement	Examples
3) 2/3-Way Valve Air Pilot	Festo VL/O-3-1/4 9984 VL/O-3-1/2 9983 VL/O-3-3/4 10049	
Air Pilot with separate solenoid	MFH-3-3/4-S 11968 w/ 24VDC Coil 4527 Peter-Paul Leak Test (Special Applications)	
4) Press-Brake / Clutch	Ross 3573A5152W, 3/4NPT, 24VDC. Crossflow with L-G monitor Other sizes (Special Applications) Pressure Switch monitoring of lockout indicator (port "L") and pneumatic reset are required	

Pneumatic Component	Global Common / Requirement	Examples
5) Safety Valve (If required by the Machine Risk Assessment)	<p>Ross</p> <p>DM1CDB20A31, G1/4 6.5W per coil</p> <p>DM1CDB42A31, G1/2 6.5W per coil</p> <p>DM1CDA54A31, G3/4 15W per coil</p> <p>DM1CDA55A31, G1 15W per coil</p> <p>Norgren/Herion XSz Series</p> <p>XSZ8, 1/4G, 24VDC</p> <p>2492806.3053.024.00</p> <p>PSV XSZ-8, G1/4, DBL-SOL, 24VDC, W/ DIN-B Solenoids & Connectors, 4.8W per coil</p> <p>XSZ10, 1/2G, 24VDC</p> <p>2492930.3053.024.00</p> <p>PSV XSZ-10, G1/2, DBL-SOL, 24 VDC, W/ DIN-B Solenoids & Connectors, 4.8W per coil</p> <p>XSZ20, 3/4G, 24VDC</p> <p>2493038.0201.024.00</p> <p>PSV XSZ-20,G3/4, DBL-SOL, 24 VDC, W/ DIN-A Solenoids & Connectors, 11W per coil</p> <p>XSZ32, 1 G, 24VDC</p> <p>2493130.0801.024.00</p> <p>PSV XSZ-32, G1,DBL-SOL, 24 VDC, W/ DIN-A Solenoids & Connectors, 16W per coil</p> <p>NOTE: The PSV fault indicator is required for each valve and must be Ordered/Assembled separately. 1028063, PSV fault indicator</p>	

Pneumatic Component	Global Common / Requirement		Examples
6) Proportional Valve (Special Applications)			
a) Directional	Festo MPYE VPWP Norgren VP60		
b) Pressure	Fairchild 7800 series I/P Rosemount 3051C Emerson High Flow (Special Applications) SMC ITV1050-33F2L4 ITV3050-33F4L4		
4. Flow Control (Installed in Cycle Port Recommended)			
a) Meter-In (Required)	Festo GRLZ-M5-B GRLZ-1/8-B GRLZ-1/4-B SMC AS1210-M5 AS2210-G01-X396 AS2210-G02-X396 AS4210-G04-X396	 151183 151188 151195 M5 1/8G 1/4G 1/2G	

Pneumatic Component	Global Common / Requirement	Examples
b) Meter-Out (Special Applications)	Festo GRLA-M5-B 151160 GRLA-1/8-B 151165 GRLA-1/4-B 151172 GRLA-3/8-B 151178 GRLA-1/2-B 151179 SMC AS1200-M5 M5 AS2200-G01-X396 1/8G AS2200-G02-X396 1/4G AS4200-G04-X396 1/2G	
c) Meter-In or Meter-Out In-Line	Festo GR-1/8-B 151215 GR-1/4 2101 GR-3/8-B 6308 GR-1/2 3720 GRO-M5-B 151214 GRO-1/8-B 151216 GRO-1/4-B 2109 SMC AS1000-M5 AS2000-F01 1/8G AS2000-F02 1/4G AS3000-F03 3/8G AS4000-F04 1/2G SMC (Door applications) AS2001F-06T ASD330F-01-06ST	
5. Relief	SME Certified	Watts Jayco

Pneumatic Component	Global Common / Requirement	Examples
6. Safety Lock-Out with Exhaust NOTE: Lockable in the OFF position only. a) ¾" NPT Only	Ross Y1523C5012 Festo HE-N3/4-LO, 197131	
b) 1¼" – 2" NPTF	Ross Y1523C7012 (1¼") Y1523C8002 (1½") Y1523C9012 (2") Norgren C0022C (1¼") C0022D (1½")	
7. Shuttle	Festo OS-1/4-B 6682	
8. Temperature Control – Air Operated	Powers Accritemp II Rigit Bulb Controller and 593 Flowrite II Control Valve H.O. Trerice 87700 Pneumatic Controller with 910 Series Control Valve	
9. Two-Hand, Anti-Tie Down Air logic (Special Applications)	Numatics CSO-0602	

Pneumatic Component	Global Common / Requirement	Examples
10. Quick Exhaust NOTE: Quick exhausts are not to be used as a method of decreasing stop distance relating to safeguarding placement.	Festo	
	SEU-1/8	4616
	SEU-1/4	6753
	SEU-3/8	6755
	SEU-1/2	6822
	VBQF-U-G18-E	547531
	VBQF-U-G14-E	548001
	SMC	
	AQ2000-F01	
	AQ2000-F02	
	AQ3000-F03	
	AQ5000-F04	
	AQ5000-F06	

5. Hydraulic Components

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

The "Global Common / Requirement" column has two functions:

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

NOTE: To identify regional requirements, the following notation is 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 supplier's components may be used.

The "Examples" column lists example components that may be used providing they meet the specifications of the "Global Common / Requirement" column. 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 notation is 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 listed supplier's components may be used.

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

All threaded pressurized fittings shall be BSPP or 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.

NOTE: Changes since the last revision are highlighted.

Hydraulic Component	Global Common / Requirement	Examples
A. Accessories		
1. Accumulators	Region certification required.	
a) Bladder Type	Top Load Required	Hydac SB330TR
Australian – AS1210		
(B) – ASME or PED	Parker VGU/F.25/250.8TS5.3 charge kit required with each machine equipped with accumulator.	Nacol 210 series 3000 PSI
(C) – SELO (ASME / PED)		
(E) - PED, CE	ISO4570-8VI or .305-32 fill connector only.	Parker (India) BA-***-T Series
(NA) – ASME		
b) Piston Type (Special Applications)	Tobul A30 Series (3000 PSI)	
c) Pulsation / Noise Suppressors	Wilkes and McLean WM (210 Bar)	
2. Accumulator Safety Block	Bosch-Rexroth ABZSS, Version E	
	Hydac SAF**E16Y1N250AS**L	
3. Air Breather (3 Micron)	Schroeder ABF-3/10-M-P12	
	Eaton-Vickers BR-210	
	Hydac BLBN080G10W	
4. Flow Meter		
a) Electrical (Special Applications)	VSE VS Series	
b) Visual	6000 PSI basic stainless-steel flow meter. Hedland H702S - 002 (.2-2.0 GPM, ¼ BSPP) H702S - 005 (.5-5.0 GPM, ¼ BSPP) H702S - 010 (1-10.0 GPM, ¼ BSPP) H702S - 020 (2-20.0 GPM, ¼ BSPP) H702S – 030 (3-30.0 GPM, ¼ BSPP)	

Hydraulic Component	Global Common / Requirement	Examples
5. Flow Switches	<p>Hedland H702B-xxx-F1 - Flow alert flow switch</p> <p>IFM Efector SI5010 (Fast response) with: E40096 M18x1.5, G1/4 adapter, or E40106 M18x1.5, 1/4NPT adapter and U40030 ½" NPT tee. Pressure applications of 1450-4350 PSI</p> <p>SA5000 With temperature. Coolant, cutting fluid and water applications less than 1450 PSI</p> <p>Pressures less than 230 PSI SM6004 (0-6.6 GPM, 1/2G, Analog, 4-20mA) SM7004 (0-13.2 GPM, 3/4G, Analog, 4-20mA) SM8004 (0-26.4 GPM, 1G, Analog, 4-20mA) SM9004 (1.3-80 GPM, 2G, Analog, 4-20mA) SM2004 (1.3-160 GPM, 2G, Analog, 4-20ma)</p> <p>De-ionized or Distilled Water Applications only Universal Flow Monitors CP4-M1T1C1, 1.2-12GPM</p>	
6. Coupling, Drive	<p>Magnaloy "Load Lock" with "H" Insert</p> <p>KTR Rotex Standard</p>	
7. Gauge		
a) Pressure	2.5" Dia., 3000 PSI, 2%, Dual scale PSI/MPa, ¼"NPT	
b) Gauge adapter	Schroeder S1215DCNPT14 (1/4" NPT)	
c) Pressure tap, Test Port	Schroeder SP1215G14WDP (1/4"BSPP)	
8. Flow Divider	(Special Applications)	

Hydraulic Component	Global Common / Requirement	Examples
9. Isolation Mounts – Pump Mounting	VMC RD series Korfund Double deflection	
10. Isolation Pad Material	Fabreeka Fabcel [®] pads (Horizontal) Comcord (Vertical) or Equivalent	
11. Intensifier a) Air / Oil Double Acting Press	(Special Applications) Hypercyl HPI, HPS and HZseries – BSPP-NX Option Required HFP-1 Hyperfill filtered fill unit is required and must be securely attached to each unit along with laminated fill instructions. Spare seal kit must also be included along with CD 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.	
b) Continuous Motion Press	Air-Hydraulic Haskel Hytec 100191 (400 – 1500 PSI) 100987 (925 – 3325 PSI)	
12. Manifolds, Multiple Stations	Must conform to ISO-4413, 7.3 and SD-013, Hydraulic Addendum. Steel Only.	DAMAN Med-Kas Bosch-Rexroth HSR
13. Pump / Motor “C” Face Adapters	SAE J799	Magnaloy BSF
14. Rod Coupler, Self-Aligning	Milwaukee MC Series English threads only Parker	

Hydraulic Component	Global Common / Requirement	Examples
15. Sight Gauge with Thermometer	Lube Devices G615 Series Hydro-Craft HSG-66-T5-w/temp dial Bosch-Rexroth	
16. Shock Absorbers	Ace Enertrols	
17. Sub-Plates or Manifolds	Must conform to ISO-4413, 7.3 and SD-013 addendum. Steel Only	Daman Med-Kas Bosch-Rexroth HSR
18. Temperature Control (Water Modulating)	Thermal Transfer 65128 115F-180F, 55GPM-75GPM, 1"NPT 65141 bulb well. Hydac	
19. Water Strainer	Bronze, 300 PSI, 20 Mesh, Stainless Wire Screen	Thermal Transfer 65297 (1" NPT)
20. Water Flow Indicator	John C. Ernst Flapper Sight Indicator, 142 3/4- (3/4 NPT)	
B. Actuators		
1. Linear	ISO 6020 (Tie Rod) or 6022 (Mill Style) Stroke adjusters, cushions, removable rod gland seals and female rod end with alignment coupler required. Acceptable mounting types: ME5, ME6, MP5, MS2, MT4	
a) > 25mm – 200mm Bore	Bosch-Rexroth CDT3 (160/ Bar 2320 PSI) Bosch-Rexroth. (Special Applications) CDT4 (200 Bar/2900 PSI) NOTE: NFPA mount only CDH2 (250 Bar) Eaton-Hydro-line HM (210 Bar) (6020) IHM (210 Bar) (6020) Parker MMA (6022) HMI	

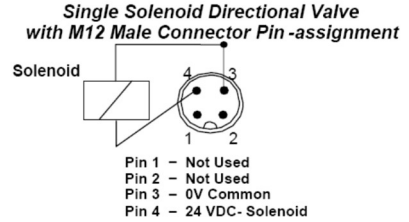
Hydraulic Component	Global Common / Requirement	Examples
b) < 25mm Bore	Aurora Tom Thumb – EH Parker	
2. Motors (Hydraulic)	Eaton-Vickers Char-Lynn series Bosch-Rexroth A4FM	
3. Rotary Actuators		
a) Vane	Parker Tork-Mor Series	
b) Cylinder	PHD Moog Flo-Tork	
4. Clamps	Vektex Enerpac	
C. Conductors		
1. Hose	Must conform to ISO-4413, 9.5 and SD-013, Hydraulic Addendum. ISO 1436 / 11, 3862-1, ISO-18752 (C), (I), (E) SAE J517 (NA)	
a) ¼" to 2"	¼" to 1-1/4" 1-1/2" to 2"	Parker 387-TC with 43 series Fittings 787TC - with 77 series fittings
2. Pipe	Must conform to ISO-4413, 9.2 and SD-013, Hydraulic Addendum. Pressure lines must be rated for 3000 PSI with 4:1 safety factor.	
a) ¼"		Schedule 40 standard
b) 3/8", ½", ¾"		Schedule 80 extra strong
c) 1", 1¼", 1½", 2"		Schedule 160 double extra strong.
3. Tubing, Steel	Must conform to ISO 3304 or SAE J524.	Dia. x Wall Thickness R6 x 1 R10 x 1.5 R12 x 2 R20 x 2.5 R25 x 3 R30 x 4 R38 x 5

Hydraulic Component	Global Common / Requirement	Examples
4. Tubing & Pipe Support Clamps	(Per DIN 3015, Part 1)	Hydro-Craft Hydro-strut, Hydro-clamp ZSi Stauff Hydac HRL, HRS
D. Connectors	ISO 1179-BSPP	
1. Fittings		
a) Style	BSPP	Parker NS
b) Disconnect, Quick	MIL-C-25427A (Valved both sides)	Hansen Aeroquip FD-56
c) Disconnect, Quick Fill Point	Parker H8-63 with H8-66 dust cover (1") – Hydraulic H6-63 with H6-66 dust cover (3/4") – Lubrication Dust cover required.	
d) Steel Tubing Connection	SAE J1453 or ISO 8434-3 (O-ring Face Seal)	Parker Seal-Lok or Parflange
e) Swivel, Rotary Union	Dueblin Aeroquip Single Connection Carr-Lane Multi-Connections	
2. Flanges	SAE J-514 or J-518	DMIC Anchor Parker

Hydraulic Component	Global Common / Requirement	Examples
E. Fluid Conditioning	ISO 4406	
1. Filter	Must meet SAE J2066 specification. Also known as the GM HF3 and HF4 and conform to ISO-4413, 8.3 and SD-013, Hydraulic Addendum.	
	Initial fill / fluid requirements shall meet a cleanliness level of (17/15/13) per ISO 4406.	
a) Pressure	Use Pall, Schroeder or Hydac elements only.	Schroeder KF30, KF50, KC50, KFH50, MKF50 Pall 9660, 9710 Hydac HF3P, HF4P
b) Return	Use Pall, Schroeder or Hydac elements only	Schroeder RT, TF3, KF3, KFH50, KTK, KTF Pall 8800, 8900, 6300, 6400 Hydac HF4R
2. Heat Exchanger		
a) Air – Oil	Thermal Transfer (Special Applications) RM-*-*-43 Bosch-Rexroth KOL (Special Applications) Hydac	
b) Water – Oil	Thermal Transfer EKM-*-*-R EKFM-*-*-R ITT Standard BCF Hydac HEX***-**CB*	

Hydraulic Component	Global Common / Requirement	Examples
c) Chiller (Water Glycol)	Hydac RFCS-BL-****/1.0/W/***-**-*/A/1/FM/000 Kelvin Koolant Koolers Daikin	
F. Valves		
1. Air Bleed	Eaton-Vickers ABS Hydac AEV-6/12	
2. Ball		
a) Low Pressure	Pump inlet, 400 PSI, full port, ¼ turn	DMIC BVAL-0250B-4321 BVAL-0375B-4321 BVAL-0500B-4321 BVAL-0750B-4321 BVAL-1000B-4321 BVAL-1250B-4321 BVAL-1500B-4321

Hydraulic Component	Global Common / Requirement	Examples
b) High Pressure	Up to 6000 PSI, full port, ¼ turn	DMIC BVH-0250B-1113 BVH-0375B-1113 BVH-0500B-1113 BVH-0750B-1113 BVH-1000B-1113 BVH-1250B-1113 BVH-1500B-1113 Hydac KHB-G1/8-1112-01X-A KHB-G1/4-1112-01X-A KHB-G3/8-1112-01X-A KHB-G1/2-1112-01X-A KHB-G3/4-1112-01X-A KHB-G1-1112-01X-A KHM-G11/4-1112-01X-A KHM-G11/2-1112-01X-A KHM-G2-1112-01X-A
3. Gauge Isolator	Parker 9GT400SV Hydac MS4 or MS6	
4. Check		
a) In-Line or Gasket-Mounted	Bosch-Rexroth S, MS-R Parker 9C	
b) Pilot Operated	Parker	
5. Directional		
a) Cartridge, Screw-In	NFPA/T3.5.50-200x	Eaton-Vickers Bosch-Rexroth Continental - "Command Controls components only. SUN products are not permitted"
b) Cartridge, Slip-In	ISO 7368 (24342)	Eaton-Vickers Bosch-Rexroth
c) Deceleration and Feed	(Special Applications)	

Hydraulic Component	Global Common / Requirement	Examples
d) Four-Way	Must conform to ISO-4413, 7.4 and SD-013, Hydraulic Addendum. 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 Single Solenoid Spring Return	<p>Eaton-Vickers DG4V-3-2A-M-FPM4WL-D7-H7-60-EN623 (30W)</p> <p>Bosch-Rexroth 4WE6D6X/EG24N9DK35L/62=AN (30W)</p> <p>Continental VSD03M-1A-GBD4-70L-B (24W)</p>	
Double Solenoid Detented (Special Applications)	<p>Eaton-Vickers DG4V-3-2N-M-FPM4WL-D7-H7-60-EN623 (30W)</p> <p>Bosch-Rexroth 4WE6D6X/OFEG24N9DK35L/62=AN (30W)</p> <p>Continental VSD03M-2A-GBD4-70L-B (24W)</p>	
Double Solenoid Spring Center Float Spool – A&B to T NOTE: Blocked center is not permitted.	<p>Eaton-Vickers DG4V-3-6C-M-FPM4WL-D7-H7-60-EN623 (30W)</p> <p>Bosch-Rexroth 4WE6J6X/EG24N9DK35L/62=AN (30W)</p> <p>Continental VSD03M-3F-GBD4-70L-B (24W)</p>	
Valves with Monitored Spool Positions for Safety Applications	Eaton-Vickers DG4V3-2A-M-S4-FPA5WL-H-2-60	

Hydraulic Component	Global Common / Requirement	Examples
Safety Manifold, BSPP w/M5x.8 Metric Bolt	MED-KAS 29902	
	Continental IC-0302-XXX-D-M-1317	
Bubble Tight for Use with Air Over Oil Applications	Hawe NBVP 16 W -G24 (Single solenoid, Spring Offset) 30W NBVP 16 D -G24 (3 Pos., Spring Centered, A&B-T) 30W	
2) D05 ISO 4401 Single Solenoid Spring Return	Eaton-Vickers DG4V4-012A-M-PM4WL-D7-HL-4-10-S607	
	Bosch-Rexroth 4WE10D4X/CG24N9DK35L=AN	
	Continental VSD05M-1A-GBD4-70L-B	
Double Solenoid Detented (Special Applications)	Eaton-Vickers DG4V4-012N-M- PM4WL -D7-H-4-10-S607	
	Bosch-Rexroth 4WE10D4X/OFCG24N9DK35L=AN	
	Continental VSD05M-2A-GBD4-70L-B	
Double Solenoid Spring Center Float Spool – A&B to T NOTE: Blocked center is not permitted.	Eaton-Vickers DG4V4-016C-M-PM4WL-D7-H-4-10-S607	
	Bosch-Rexroth 4WE10J4X/CG24N9DK35L=AN	
	Continental VSD05M-3F-GBD4-70L-B	
Valves with Monitored Spool Position for Safety Applications	ATOS DKE-1631/2/A/FV-X24VDC 1NO/1NC Monitoring contact (36W)	
Safety Manifold, BSPP w/M6x1 Metric Bolt	MED-KAS 29903	
	Continental IC-0502-XXX-D-M-1317	

Hydraulic Component	Global Common / Requirement	Examples
e) Proportional Euro or integral cards only.	Eaton-Vickers K(B)SDG4V-3, 1* Series KBSDG4V-5, 1* Series Bosch-Rexroth 4WREE 4WRKE Continental VED03M PowerFlow Series	
f) Two / Three-Way, In-Line (Special Applications)	Eaton-Vickers SV1-10-C-3G-24DG (2-way) SV1-10-3-3G-24DG (3-way) Bosch-Rexroth VEPS KKDSR1 Continental CEMDV-1*-C5-B-M12 Oilgear High Flow Applications	
6. Flow Control and Needle a) Standard Adjustable	DMIC FC1H-****B Parker 9F****S, 9N****S	
b) Compensated	Eaton-Vickers FCG-03-28-22-S10 Continental F12M-***-G-F	
c) Proportional (Special Applications)	Bosch-Rexroth Eaton-Vickers Continental	
7. Modular, Stacking Steel bodies only	Bosch-Rexroth Eaton-Vickers Continental PowerFlow Series	

Hydraulic Component	Global Common / Requirement	Examples
a) Pressure Reducing / Relieving	Bosch-Rexroth D03 (P-port) ZDR6DP2-4X/25YM/12 (25BAR, 362 PSI) ZDR6DP2-4X/75YM/12 (75BAR, 1087 PSI) ZDR6DP2-4X/150YM/12 (150BAR, 2175 PSI) ZDR6DP2-4X/210YM/12 (210BAR, 3045 PSI) D05 (P-port) ZDR10DP2-5X/25YM/12 (25BAR, 362 PSI) ZDR10DP2-5X/75YM/12 (75BAR, 1087 PSI) ZDR10DP2-5X/150YM/12 (150BAR, 2175 PSI) ZDR10DP2-5X/210YM/12 (210BAR, 3045 PSI) Eaton-Vickers Continental PowerFlow Series	
b) Relief	Bosch-Rexroth 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) Eaton-Vickers Continental PowerFlow Series	
c) Flow Control	Bosch-Rexroth D03 Z2FS6-2-4X/2QV (A and B - Meter-in or out) D05 Z2FS10-5-3X/V (A and B - Meter-in or out) Eaton-Vickers Continental PowerFlow Series	

Hydraulic Component	Global Common / Requirement			Examples
d) Pilot Operated Check	Bosch-Rexroth D03 Z2S6-1-6X/V (A and B line) D05 Z2S10-1-3X/V (A and B line) Eaton-Vickers Continental Command Controls			
8. In-Line Relief	Bosch-Rexroth Eaton-Vickers Continental Command Controls			
9. Servo (Special Applications)	Bosch Rexroth Eaton-Vickers SM4 series Moog 72 or 78 Series			
G. Power Units (Flooded inlet only)	Must conform to ISO-4413, 8.2 and SD-013, Hydraulic Addendum.			
1. Compact (3) Actuators or less only.	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. (Special Applications) Contact Controls Engineer for other options.
2. Compact Energy Savings Incoming Power must be 200 – 220V _{AC} .	Daikin	GPM / PSI		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 CSE Controls Engineer
	EHU3007-40-N-902-N	8 / 1000	(CE-Self)	
	EHU30R-M0701-30-N	8 / 1000	(CE-Self)	
	SUT06D4016-30-01-N	10 / 2300	(CE-Self)	
	SUT10D6021-30-01-N	16 / 3000	(CE-Self)	
	SUT10D8021-30-01-N	22 / 3000	(CE-Self)	
	(N = Air Filter installed)			
3. Hydrostatic (Special Applications)				

Hydraulic Component	Global Common / Requirement	Examples
4. Standard (Special Applications)	Must conform to ISO-4413, 8.2 and SD-013, Hydraulic Addendum.	Shaltz Fluid Power Overhead Series, SD6*****SS or Equivalent Contact Controls Engineer for other options.
H. Pumps 1. External Gear	All pumps to meet SAE Mounting requirements. Parker DMIC DPG Bosch-Rexroth AZP	

Hydraulic Component	Global Common / Requirement	Examples
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.	Bosch-Rexroth A10VSO18DRG/31RVKC62N00,(8GPM), R902502752 Oilgear PVWJ A-FRAME 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) Bosch-Rexroth AA10VSO45DR/31RVKC62N00,(20GPM), R902502741 Oilgear PVWJ B-FRAME 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) Bosch-Rexroth AA10VSO71DR/31RVKC92N00,(32GPM), R902502701 Oilgear PVWJ C-FRAME 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) Bosch-Rexroth AA10VSO100DR/31RVKC62N00,(45GPM), R902502997 Oilgear PVWJ -098-A1UV-RSFY-P-LNNNN (45 GPM) PVWJ -098-A1UV-RSFY-P-1NNNN (45 GPM) Bosch-Rexroth AA10VSO140DR/31RVKD62N00,(63GPM), R902503003	

Hydraulic Component	Global Common / Requirement	Examples
3. Screw 4. Vane a) Fixed Delivery b) Variable Delivery (7 GPM @ 1800 RPM, 325 – 3000 PSI) (11 GPM @ 1800 RPM, 325 – 3000 PSI) (15 GPM @ 1800 RPM, 325 – 3000 PSI) (20 GPM @ 1800 RPM, 325 – 3000 PSI)	Oilgear PVWJ -130-A1UV-RSFY-P-LNNNN (60 GPM) PVWJ -130-A1UV-RSFY-P-1NNNN (60 GPM) Eaton-Vickers PVM (Special Applications)	
	IMO	
	Bosch-Rexroth VPV	
	Eaton-Vickers V and VMQ Industrial	
	2 Stage, remote pressure control capable, with flange ports. NOTE: PVX is the same as Bosch-Rexroth VPV series and is made by Continental, private labeled by B-R.	
	Bosch-Rexroth 0513R18C3 VPV16SM21HYB03 Continental PVX-8B-30-RF-P-1S-17-A/-BSPP	
	Bosch-Rexroth 0513R18C3 VPV25SM21HYB03 Continental PVX-11B-30-RF-P-1S-17-A/-BSPP	
	Bosch-Rexroth 0513R18C3 VPV32SM21HYB03 Continental PVX-15B-30-RF-P-1S-17-A/-BSPP	
	Bosch-Rexroth 0513R18C3 VPV63SM21HYB05 Continental PVX-29B-30-RF-P-5S-17-A /-BSPP	

Hydraulic Component	Global Common / Requirement	Examples
(29 GPM @ 1800 RPM, 325 – 3000 PSI)	Bosch-Rexroth 0513R18C3 VPV45SM21HYB05	
	Continental PVX-20B-30-RF-P-5S-17-A /-BSPP	
(36 GPM @ 1800 RPM, 325 – 3000 PSI)	Bosch-Rexroth 0513R18C3 VPV80SM21HYB05	
	Continental PVX-36B-30-RF-P-5S-17-A /-BSPP	
(46 GPM @ 1800 RPM, 325 – 3000 PSI)	Bosch-Rexroth 0513R18C3 VPV100SM21HYB04	
	Continental PVX-46B-25-RF-P-5S-17-A /-BSPP	
(60 GPM @ 1800 RPM, 325 – 3000 PSI)	Bosch-Rexroth 0513R18C3 VPV130SM21HYB04	
	Continental PVX-60B-25-RF-P-5S-17-A /-BSPP	
(75 GPM @ 1800 RPM, 325 – 3000 PSI)	Bosch-Rexroth 0513R18C3 VPV164SM21HYB04	
	Continental PVX-75B-25-RF-P-5S-17-A /-BSPP	

6. Lubrication Components

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

The "Global Common / Requirement" column has two functions:

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

NOTE: To identify regional requirements, the following notation is 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 supplier's components may be used.

The "Examples" column lists example components that may be used providing they meet the specifications of the "Global Common / Requirement" column. 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 notation is 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 listed supplier's components may be used.

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

Reference GM LS-1 (GM 1720, Version 5.0, Jan 2015) and GM LS-2 (GM 1721, Version 6, Jan 2011) for proper application and fluid selection.

Contact the Nexteer Automotive Lubrication Engineer to obtain the non-productive lubricant specification for machine tool lubricants, and the GM LS-2 product approval and cross reference listing. GM LS-1 and GM LS-2 are available at <https://www.nexteerdatabase.com/>.

NOTE: Approval of the lubrication system by the following is required on each application:

Control Engineer

Lubrication Engineer

NOTE: Changes since the last revision are highlighted.

Machine Lubrication Component	Global Common / Requirement	Examples
A. Accessories 1. Regulator (Mastic)	BSPP Connections Only Ingersoll Rand 300-911-AS GP Reeves GPR4100C (Range 20-250PSI) GPR4300C (Range 20-500PSI) 4000 Series - Not for use with Teflon or RTV GPR5000-3 (Range 1000-3000 PSI) 3/8" NPT GPR5000-6 (Range 100-1250 PSI) 3/8" NPT GPR5000-7 (Range 750-2500 PSI) 3/4" NPT (high flow and thick materials) ARO 651780-A1B-B (Range 1000-3000 PSI) 3/8" NPT 651780-A1A-B (Range 100-1250 PSI) 3/8" NPT 651780-C1B-B (Range 750-2500 PSI) 3/4" NPT (high flow and thick materials) Dopag Piston Large Body 450.00.12 (217-2175 PSI range, 1/2" BSPP) 450.00.11 (87-725 PSI range, 1/2" BSPP) Medium Body 450.00.10 (87-725 PSI range, 3/8" BSPP) Small Body 400.25.93 (100-725 PSI range) Diaphragm (Abrasive or thick and Teflon materials) 402.25.30 (145-2150 PSI, 1/2" BSPP) 402.25.60 (58-725 PSI, 1/2" BSPP) 400.26.56 (Teflon Applications)	
2. High pressure flexible lines for lubrication applications	Parker NN4X.65 NN6X1 With brass compression fittings Graco 17S556 with 17R56* BSPT Fittings	

Machine Lubrication Component	Global Common / Requirement	Examples
3. Relief	Graco (grease)	
	(750 PSI) 563163	
	(1000 PSI) 563164	
	(1250 PSI) 563165	
	(1500 PSI) 563166	
	(2000 PSI) 563167	
	(2500 PSI) 563168	
	(3000 PSI) 563169	
	Graco (air)	
	(50 PSI) 214691	
4. Block Cycle Indicator 4-Pin Micro	(60 PSI) 110065	
	(75 PSI) 108124	
5. Pressure Switch	Graco P1=557829	
B. Lubrication System	Graco MPP-T*-BSPP-A3-G3-L*-P1 MPP-GP*-BSPP-A3-G3-L*-P1	
C. Pumps	Graco ALS-25M 563306 with BSPP base plate 563357	
D. Divider Valves	Graco MSP Series (BSPP connections only)	
E. Filters		
1. Breather	Facet 569022-01	
	Gitz 1633-037801	
	Hydrocraft HCBP-8	
2. Fill Filter Assembly (Oil)	Graco 563095 (10m)	
3. Line Filter a) Lower Pressure (Oil) Replacement Element	Graco 563095 (10m, 150PSI)	
	563093	

Machine Lubrication Component	Global Common / Requirement	Examples
b) High Pressure (Oil) Spin On Replacement Element	Graco 563516 (10m, 3000 PSI) 563509	
c) High Pressure (Grease) Block Strainer Replacement Element	Graco 564406 (149m, 100 Mesh, 7500 PSI) 557700	
d) High Pressure (Oil) Block Filter Replacement Element	Graco 563516 (10m, 3000 PSI) 563509	

Part Lubrication Component	Global Common / Requirement	Examples
A. Accessories		
1. Tooling Shutoff / Anti-Drool Valve – Pneumatically actuated	GP Reeves KA2973	
2. Flow Switch Required for dispense amounts less than 2g.	GP Reeves Low Pressure <1000 PSI FS3009-4 High Pressure <3000 PSI FS3002	

Part Lubrication Component	Global Common / Requirement	Examples
3. Regulator (Mastic)	<p>Ingersoll Rand 300-911-AS</p> <p>GP Reeves GPR4100C (Range 20-250PSI) GPR4300C (Range 50-500PSI) 4000 series - Not for use with Teflon or RTV</p> <p>GPR5000-3 (Range 1000-3000 PSI) 3/8" NPT GPR5000-6 (Range 100-1250 PSI) 3/8" NPT GPR5000-7 (Range 750-2500 PSI) 3/4" NPT (high flow and thick materials)</p> <p>ARO 651780-A1B-B (Range 1000-3000 PSI) 3/8" NPT 651780-A1A-B (Range 100-1250 PSI) 3/8" NPT 651780-C1B-B (Range 750-2500 PSI) 3/4" NPT (high flow and thick materials)</p> <p>Dopag Piston Large Body 450.00.12 (217-2175 PSI range, 1/2" BSPP) 450.00.11 (87-725 PSI range, 1/2" BSPP) Medium Body 450.00.10 (87-725 PSI range, 3/8" BSPP) Small Body 400.25.93 (100-725 PSI range)</p> <p>Diaphragm (Abrasive or thick and Teflon materials) 402.25.30 (145-2150 PSI, 1/2" BSPP) 402.25.60 (58-725 PSI, 1/2" BSPP) 400.26.56 (Teflon Applications)</p>	
4. Ball valves	<p>3000 PSI minimum Full ported BSPP only Ball valves used for isolation must be lockable in the off position only</p>	

Part Lubrication Component	Global Common / Requirement	Examples
5. High Pressure Grease Strainer	<p>Reference E.3.c above</p> <p>GP Reeves GF1149, (149 Micron, 100 Mesh, 3000 PSI) KA10393 (replacement element)</p> <p>GF1420-8, (420 Micron, 40 Mesh, ½" NPT, 3000 PSI) KA10394 (replacement element)</p> <p>Graco 564406 (149m, 100 Mesh, 7500 PSI) 557700 (replacement element)</p> <p>Dopag 401.41.02 (60 Mesh, 3/4G inlet, 3/8G outlet) 401.41.03, (100 Mesh, 3/4G inlet, 3/8G outlet)</p> <p>Lincoln 84528 (570 Micron, 35 Mesh, ½" NPT)</p>	

Part Lubrication Component	Global Common / Requirement	Examples
<p>B. Pumps</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: 5 and 55 Gallon Barrel Units only. Ratios of 20:1 or 22:1 only for petroleum grease or Teflon based materials. Sticky grease may require a higher ratio pump, but grease pressures shall be limited to a maximum of 3000 PSI.</p> <p>The following barrel sizes are considered special application and are not permitted without prior written approval:</p> <p>6 Gallon (16L) 8 Gallon (30L) 16 Gallon (60L) 30 Gallon (115L)</p>	<p>GP Reeves</p> <p>Option 38NX For single machines with Lithium or Calcium based greases. Select the Samoa pump option for all regions except China.</p> <ul style="list-style-type: none"> - Control panel, 24VDC - Low level and empty sensors - Stack light and relay control - Solenoid valve for pump ON/OFF control <p>Option 40NX For supplying single machines with separation prone materials such as Teflon and RTV. Select the ARO 22:1 pump option for all locations. For Crevseal select higher 43:1 ratio ARO pump with 6" side cylinders.</p> <ul style="list-style-type: none"> - Control panel, 24VDC - Low level and empty sensors - Stack light and relay control - ISO Solenoid valve for pump ON/OFF control - ISO Solenoid valve for ram ON/OFF control - ISO Solenoid valve for depressurization valve - 35-minute idle timer <p>Option 41NX For supplying multiple machines with Lithium, Calcium or Teflon based grease and RTV in limited cases where machines are in close proximity to the pump. Select the Samoa 20:1 pump option for Lithium and Calcium based greases for all regions except China which requires the ARO 22:1 option. All Teflon and RTV based material shall use the ARO 22:1 option for all manufacturing regions.</p> <p>This 41NX option shall not be selected for multiple machines requiring Crevseal due to excessive pressure requirements.</p> <ul style="list-style-type: none"> - Control panel with Allen Bradley PLC (L16) and Ethernet switch - Low level and empty sensors - Stack light and relay control - ISO Solenoid valve for pump ON/OFF control - ISO Solenoid valve for ram ON/OFF control - ISO Solenoid valve for depressurization valve - 35-minute idle timer 	

Part Lubrication Component	Global Common / Requirement	Examples

Part Lubrication Component	Global Common / Requirement	Examples
1. 55 Gallon	<p>NOTE: Add “-CE” to end of model number to include CE Approval, labelling, and documentation. (example: GDP20-400G-38NX-CE)</p> <p><u>Option 38NX</u> GDP20-400G-38NX (Samoa 20:1, 1700 cc/min, 1400 PSI) GDP22-400G-38NX (ARO 22:1, 1500 cc/min, 1400 PSI)</p> <p><u>Option 40NX</u> GDP20-400G-40NX (Samoa 20:1, 1700 cc/min, 1400 PSI) GDP22-400G-40NX (ARO 22:1, 1500 cc/min, 1400 PSI)</p> <p>NOTE: The G6DP43 option below shall only be used for RTV or Crevseal G6DP43-400G-40NX (ARO 43:1, 1500 cc/min, 3000 PSI)</p> <p><u>Option 41NX</u> GDP20-400G-41NX (Samoa 20:1, 1700 cc/min, 1400 PSI) GDP22-400G-41NX (ARO 22:1, 1500 cc/min, 1400 PSI)</p> <p>NOTE: The G6DP43 option below shall only be used for multiple machines requiring RTV and only with prior written approval G6DP43-400G-41NX (ARO 43:1, 1500 cc/min, 3000 PSI)</p>	
2. 5 Gallon	<p>NOTE: Add “-CE” to end of model number to include CE Approval, labelling, and documentation. (example: GSP20-35lbA-38NX-CE)</p> <p><u>Option 38NX</u> GSP20-35lbA-38NX (Samoa 20:1, 1700 cc/min, 1400 PSI) GSP22-35lbA-38NX (ARO 22:1, 1500 cc/min, 1400 PSI)</p> <p><u>Option 40NX</u> GSP20-35lbA-40NX (Samoa 20:1, 1700 cc/min, 1400 PSI) GSP22-35lbA-40NX (ARO 22:1, 1500 cc/min, 1400 PSI)</p> <p><u>Option 41NX</u> GSP20-35lbA-41NX (Samoa 20:1, 1700 cc/min, 1400 PSI) GSP22-35lbA-41NX (ARO 22:1, 1500 cc/min, 1400 PSI)</p>	

Part Lubrication Component	Global Common / Requirement	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	GP Reeves GPMD3000-.60 -02-03 (0.05 to 0.60 cc) GPMD3000-2-02-03 (0.15 to 2.0 cc) GPMD3000-9-02-03 (0.35 to 9 cc) GPMD3000-20-02-03 (5 to 20 cc) NOTE: The GSS, GSSM, and 10000 Series dispensers are not permitted. Dopag 450.20.03 (0.003 –0.2mL) 1/4G, Max inlet 725 PSI 450.10.06 (0.05 – 0.5mL) 1/8G, Max inlet 1160 PSI 450.10.07 (0.1 – 3.0mL) 1/8G, Max inlet 1160 PSI 415.12.21 (0.5 – 12mL) 1/8G, Max inlet 2175 PSI	
2) Bead	Dopag 450.*** listed above. This 450 dispenser shall supply material to the inlet of an additional 401.*** dispenser. Dual regulators are also required upstream of the 450 dispenser. Viscotec 3RD10, VisLas 164329 B-KC-Viscopro-C (controller, includes 5m cable)	
3) Spray, Stream	(Special Applications – prior written approval and development required) GP Reeves Walther Dopag	

Part Lubrication Component	Global Common / Requirement	Examples
b) Air Detection (compression check)	<p>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.</p>	
1) Single Dispenser	<p><u>Glob, Dab or Shot</u> GP Reeves AA1 (pneumatic)</p> <p><u>Bead</u> GP Reeves 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> 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. GP Reeves GUS *****-ST-CT8-DIP GUS *****-FL-CT8-DIP</p> <p><u>Pump with Detection Package (GUS)</u> 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. GP Reeves SP20_35A6-GUS*****-FL2-CT8-DIP SP22_35A6-GUS*****-FL2-CT8-DIP</p>	

Part Lubrication Component	Global Common / Requirement	Examples
2. RTV		
a) Dispense Type		
1) Glob, Dab, or Shot	Dopag 450.20.03 (0.003 – 0.2mL) 1/4G, Max inlet 725 PSI 450.10.06 (0.05 – 0.5mL) 1/8G, Max inlet 1160 PSI 450.10.07 (0.1 – 3.0mL) 1/8G, Max inlet 1160 PSI 415.12.21 (0.5 – 12mL) 1/8G, Max inlet 2175 PSI PVA SB400-C	
2) Bead	<u>XYZ Mounting</u> Dopag 450.***.*** listed above. This 450 dispenser shall supply material to the inlet of an additional 401.***.*** dispenser. Dual regulators are also required upstream of the 450 dispenser. <u>Robot Mounting</u> PVA RMP-SB400-C CONT-1-TS (controller) NOTE: Select IP42 controller if mounted in electrical enclosure or installed in clean room. Select IP54 controller for general plant use. NOTE: G-Series, 10-gauge x 3" needle is recommended Viscotec 3RD10, VisLas 164329 B-KC-Viscopro-C (controller, includes 5m cable)	
3. Gap Fill		
a) Single Component (1K)	PVA SB400-C	
b) Two Component (2K)	Scheugenpflug Process Module Dispensing (process unit) DOS A280 (fluid delivery) P 016 (dispensing head)	

7. Machine Controls Electrical Components

The "Machine Controls Electrical Component" column is organized by components. Nexteer Automotive does not have requirements for technologies not listed.

The "Global Common / Requirement" column has two functions:

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

NOTE: To identify regional requirements, the following notation is 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 supplier's components may be used.

The "Examples" column lists example components that may be used providing they meet the specifications of the "Global Common / Requirement" column. 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 notation is 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 listed supplier's components may be used.

NOTE: Where an approved supplier is followed by "(Special Applications)," these components may be used but require the Controls Engineer's prior approval.

NOTE: Changes since the last revision are highlighted.

Machine Controls Electrical	Global Common / Requirement	Examples
A. Circuit Breakers 1. Molded Case Circuit Breaker NOTE: Typically used for 480V _{AC} / 380V _{AC} .	IEC 60947-2 CE CCC (C) IP2X Minimum NOTE: Type D trip curve on primary side for transformers and power supplies unless otherwise noted by device manufacturer.	Allen-Bradley 140U-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 480V _{AC} / 380V _{AC} / 220V _{AC} / 120V _{AC} .	IEC 60947-2 or UL489 CE CCC (C) DIN Rail Mount IP2X Minimum NOTE: Type D trip curve on primary side for transformers and power supplies 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 24V _{DC} .	IEC 60947-2 or UL-1077 CE CCC (C) DIN Rail Mount IP2X Minimum NOTE: Type D trip curve on primary side for transformers and power supplies 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 1692-ZR Series Puls PISA11-Series Phoenix Contact PTCB E1 (2909909) E-T-A REX12-T

Machine Controls Electrical	Global Common / Requirement	Examples
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-RCDA*A25 Schneider Electric Multi 9 - M9R11225 Acti 9 - A9R52225 (C)
B. Power Supplies 1. Switched Mode DC	DIN Rail Mounted CE 24vdc IP2X Minimum 50/60hz – Single or 3-Phase Efficiency rating of 90% or higher	Allen-Bradley Bulletin 1606 PULS (C) Sola - SDN Series
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) NOTE: Requires use of motion processor PowerFlex 755 20G1*****0NNNNN (380-480VAC 3ph, 1.0-350HP) 20-750-S (Safe Torque Off Module) 20-HIM-A6 (Human Interface Module)	

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Machine Controls Electrical	Global Common / Requirement	Examples
3. Multi-Axis Systems		
a) Two Axis	IAI (Intelligent Actuator Inc.) IK - 2-Axis Kit X/Y Stroke – X=300mm Y=300mm IK2-SXBA21HHS-A-30-30-T2-5L-CT-CT-K XSEL-Q-2-150A-100A-EP-P1-EEE-2-2 Controller Single axis replacement actuator RCS2-SS8C-A-150-20-300-T2-R05 RCS2-SS8R-A-100-20-300-T2-R05 ISB - 2-Axis Kit X/Y Stroke – X=300mm Y=300mm ICSB2-BB1M-WA-30-30-T2-5L-CT XSEL-Q-2-100WAI-60WAI-EP-P1-EEE-2-2 Controller Single axis replacement actuator X: ISB-MXM-WA-100-10-300-T2-M-A3S-AQ Y: ISB-SXM-WA-60-8-300-T2-M-A2S-AQ Software for the XSEL controller IAI-101-XA-MW	
b) Three Axis	IAI (Intelligent Actuator Inc.) IK - 3-Axis Kit X/Y/Z Stroke – X=300mm Y=300mm, Z=100mm IK3-SBBG11HHLS-A-30-30-10B-T2-5L-CT-CT-K XSEL-Q-3-100A-60A-30AB-EP-P1-EEE-2-2 Controller Single axis replacement actuator RCS2-SS8R-A-100-20-300-T2-R05-ML RCS2-SA7R-A-60-20-300-T2-R05-ML RCS2-SA6R-A-30-3-100-T2-R05-MR-B ISB - 3-Axis Kit X/Y/Z Stroke – X=300mm Y=300mm Z=100mm ICSB3-BB1MB1L-WA-30-30-10B-T2-3L-CT-CT XSEL-Q-3-100WAI-60WAI-60WAI-B-EP-P1-EEE-2-2 Controller Single axis replacement actuator X: ISB-MXM-WA-100-10-300-T2-M-A3S-AQ Y: ISB-SXM-WA-60-8-300-T2-M-A1S-AQ Z: ISB-SXM-WA-60-4-100-T2-M-A3S-AQ-B Software for the XSEL controller IAI-101-XA-MW	

Machine Controls Electrical	Global Common / Requirement	Examples
E. Enclosure		
1. Enclosures, Operator Panels, Junction Boxes	Minimum of IP54 or NEMA12	Hoffman Rittal SCE
2. Cooling (Fan / Filter, Air Conditioners) NOTE: Thermostats are encouraged	Type 12 filter 10-micron pleated element	
a) Fan & Filter	CE CCC (C) IP54	Hoffman Pfannenberg Rittal
b) Air Conditioners	CE CCC (C) IP54 Condensate Evaporator	Hoffman Pfannenberg Rittal IceQube
3. Power Distribution Blocks	IEC 60947-7-1 or UL1953 Screw Termination Copper and Aluminum Rated IP2X Minimum CE CCC (C)	Allen Bradley 1492-PD Series Eaton CHDB Series Phoenix PTU 35/4x6/6x2,5 (C) PTFIX 6/18x2,5-NS35 (C) Wohner 30Compact (C)
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 (C) Weidmuller

Machine Controls Electrical	Global Common / Requirement	Examples
F. Ethernet Switch 1. Managed (Required for Factory Network Connection) NOTE: All Cisco IE Series switches shall be registered to Nexteer Automotive.	Allen-Bradley Stratix 5700 1783-BMS06TGL - (Lite, 6 ports) 1783-BMS10CGL - (Lite, 10 ports) 1783-BMS10CGP - (Full, CIP Sync Support, 10 ports) 1783-BMS20CGL - (Lite, 20 ports) 1783-BMS20CGP - (Full, CIP Sync Support, 20 ports) Allen-Bradley Stratix 5800 1783-MMS10B (CIP Sync Support, 8-port fixed) 1783-MMS10 (CIP Sync Support, 8-port modular) 1783-MMX8T (CIP Sync Support, 8-port expansion) 1783-MMX16T (CIP Sync Support, 16-port expansion) Cisco 2000 Series IE-2000-4T-G-L (Lite, 6 ports) IE-2000-8TC-G-L (Lite, 10 ports) IE-2000-8TC-G-E (Base, CIP Sync Support, 10 ports) IE-2000-16TC-G-L (Lite, 20 ports) IE-2000-16TC-G-E (Base, CIP Sync Support, 20 ports) Cisco 3000 Series IE-3200-8T2S-E (CIP Sync Support, 8-port fixed) IE-3300-8T2S-E (CIP Sync Support, 8-port modular) IEM-3300-8T= (CIP Sync Support, 8-port expansion) IEM-3300-16T= (CIP Sync Support, 16-port expansion)	
2. Lightly Managed	Allen-Bradley Stratix 2500 1783-LMS5 - (5 ports) 1783-LMS8 - (8 ports) Cisco 1000 Series IE-1000-4T1T-LM - (5 ports) IE-1000-6T2T-LM - (8 ports)	
3. Power Over Ethernet (PoE) Injector NOTE: Allowed only on devices requiring PoE.	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

Machine Controls Electrical	Global Common / Requirement	Examples
4. Ethernet Network Media (Cables) a) PLC, HMI, Ethernet Switches, In-Cabinet Environments b) Open Cable Tray, On Machine Environments	Stranded Copper STP-Shielded Twisted Pair Cat 5e or Cat 6 Patch Cables IP2X Minimum Stranded Copper STP-Shielded 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)	Allen Bradley Belden Panduit NOTE: Types of shielded twisted pair cables that are acceptable include: F/UTP, S/UTP, SF/UTP, U/FTP, F/FTP, S/FTP, or SF/FTP.
G. Fuses 1. Disconnect	UL Class J	
H. Human Machine Interface Devices 1. Graphic Terminal	Allen-Bradley PanelView Plus 7 (Standard) 2711P-T6C2*D8S (5.7") 2711P-T7C2*D8S (6.5") 2711P-T10C2*D8S (10.4") PanelView Plus 7 (Performance) 2711P-T7C2*D9P (6.5") 2711P-T10C2*D9P (10.4")	
I. Code Reader (1D & 2D Codes) 1. Basic Applications NOTE: Feasibility study recommended	Cognex – Dataman DMR-262X-MAX (Fixed) DMR-37*-TMAX (Fixed) DMR-8072**-0200 (Handheld) Keyence SR-1000 (Fixed) SR-1000W (Fixed)	

Machine Controls Electrical	Global Common / Requirement	Examples
2. Challenging Applications NOTE: Feasibility study required	Cognex – Dataman DMR-37*-TMAX (Fixed) DMR-8700DX-E (Handheld) Keyence SR-2000 (Fixed) SR-2000W (Fixed)	
3. Code Verifiers	Cognex 8072V – (Handheld) Webcam Tru Check Omni Series (Paper label) DPM Tower or FlexHite Series (DPM or Laser etched)	
J. Laser Markers 1. Plastic Surface Applications	Refer to the Manufacturing Equipment Purchase Specification and / or the Purchasing Engineer. Keyence MD-X2000 (3 Axis Hybrid Laser Marker 13W) Options: <ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> - Vari-Z/3D marking - iZONIT GigE vision for code read and/or mark location - Auto-focus (Vari-Z option required) - Vortex Cooling 	NOTE: These products meet the AIM-DPM for Barcode Generation (ECC200). Laser Integration (enclosure) must comply with ANSI and OSHA safety standards.

Machine Controls Electrical	Global Common / Requirement	Examples
2. Metal Surface Applications	<p>Keyence</p> <p>MD-X2500 (3 Axis Hybrid Laser Marker 25W)</p> <p>Options:</p> <ul style="list-style-type: none"> - 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) <p>MD-F5200C (3 Axis Hybrid Laser Marker 50W)</p> <p>Telesis</p> <p>F Series Fiber Laser 30, 50, and 100W options (200W upon request)</p> <p>Options:</p> <ul style="list-style-type: none"> - Vari-Z/3D marking - iZONIT GigE vision for code read and/or mark location - Embedded camera for code read (GigE and Cognex options available) <p>Auto-focus (Vari-Z option required)</p>	
K. Lights		
1. Status Lights		
a) Multi-Color LED Pilot Light	<p>24VDC</p> <p>IP65</p> <p>CE</p>	<p>Banner</p> <p>K50LGRYPQ (Tri Color)</p> <p>K30LGRYPQ (Tri Color)</p> <p>K80L4GRYB1PQ (Quad Color)</p> <p>M18GRYPQ</p> <p>WLS27*WGRYB5-****DS24Q</p> <p>WLS28-2*WGRYB5-****DS24Q</p>
b) Stack Lights	<p>24VDC</p> <p>IP65</p> <p>CE</p>	<p>Allen-Bradley</p> <p>855E Series Tower Lights</p> <p>854J (40mm) & 854K (60mm)</p> <p>Banner</p> <p>TL50</p> <p>Balluff</p> <p>BNI008*</p>

Machine Controls Electrical	Global Common / Requirement	Examples
2. Machine Lighting	24VDC IP65 CE	Banner WLC60*W***AQ WLC90W***
3. Work Lighting & Enclosure Lighting	24VDC IP65 CE	Banner WLS28-2*W***DSQ WLS27-*W***DSQ WLS15*DW*****DSQP
L. Motors (3-Phase)	IP54 or TEFC NEMA MG 1-2006 compliant T-Frame Premium Efficiency CE, CSA, UL, CCC – Rated for the intended region NEMA - Design B general applications, Design D for high slip applications (Presses) NOTE: Inverter rated when controlled by variable frequency drive. NOTE: For hydraulic power units, C-Face mounting is required (xxxTC, x's = frame size, T Frame, C Face).	15 HP C-Face Example: Baldor Electric Company - CEM2333T GE Motors – M9306 Marathon Electric - 254TTFNA6026 TECO-Westinghouse – HB0154 Toshiba International - B0154FLT2USH Siemens – GP100 WEG Electric – 01518T3E254TC US Motors (Nidec) – U15P2DC
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.	Meltric Corporation Hubbell Circuit-Lock

Machine Controls Electrical	Global Common / Requirement	Examples
N. Programmable Logic Controllers & Modules		
1. Controllers	Allen-Bradley 5069 CompactLogix 5380 5069-L3**ER 5069-L3**ERM (CIP Motion) NOTE: GuardLogix Controllers are NOT allowed. 1756 ControlLogix 5580 1756-L8*E	
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 EtherNet/IP, 1-256 Motion Axis)	
4. I/O Modules		
a) Chassis Based	Allen Bradley 5069 Compact I/O 1756 ControlLogix I/O NOTE: Safety I/O Modules are NOT allowed. NOTE: 32pt I/O Modules SHALL use removable terminal blocks (RTB) and prewired cables.	
b) In-Cabinet Distributed (IP20)	Allen-Bradley 1734 Point I/O 5069 Compact I/O NOTE: Safety I/O Modules are NOT allowed.	
c) On-Machine Distributed (IP65/67)		
1) EtherNet/IP	Balluff BNI004M - BNI EIP-104-105-Z015 (16pt, Single EtherNet/IP Port) BNI004F - BNI EIP-302-105-Z015 (16pt, Dual EtherNet/IP Ports)	

Machine Controls Electrical	Global Common / Requirement	Examples
2) Network Interface	Balluff BNI004A - BNI EIP-502-105-Z015 (8 port, 4 IO-Link) BNI006A - BNI EIP-508-105-Z015 (8 port, 8 IO-Link) BNI00H2 - BNI EIP-508-005-Z015 (8 port, 8 IO-Link, No display) BNI009T – BNI EIP-507-005-Z040 (4 port, 4 IO-Link, No display)	
3) IO-Link	Balluff BNI0006 - BNI IOL-104-000-K006 (16pt, Discrete Input, Plastic Body) BNI0039 - BNI IOL-104-S01-Z012 (16pt, Discrete Input, Metal Body) BNI00AJ - BNI IOL-719-002-Z012 (8pt Analog input, Metal Body) NOTE: For thermocouple application, only ungrounded thermocouples shall be used with an analog input block. NOTE: Modules require Balluff IO-Link Network Interface.	
5. Communication Gateways	Real Time Automation 435NBX-N700-D (ASCII to EtherNet/IP) 490NBX-NNA1-D (EtherNet TCP/IP to EtherNet/ IP) HMS Anybus HMS-EN2SE-R (EtherNet/IP to Serial)	

Machine Controls Electrical	Global Common / Requirement	Examples
<p>O. Programming Port with Receptacle (External access for Ethernet Devices).</p>	<p>IP54 Minimum CE CCC (C)</p> <p>NOTE: Single phase AC receptacle shall have Residual Current Protection (RCP). Refer to SD-004, section 15 for clarification.</p>	<p>Grace Engineered Products P-R2-K3RF0-U626 (NA) P-R2-M3REF0-U626 (E) P-R2-M3RAF0-U626 (C) P-R2-K3RW0-U626 (B) P-R2-M3RUV0-U626 (Universal)</p> <p>Mencom GF-RJ45-R-32 (NA) EP-RJ45-R-32 (E) DCH2-RJ45-R-32 (C) DBR-RJ45-R-32 (B) DUN-RJ45-R-48 (Universal)</p> <p>MurrElektronik 4000-68522-3251211 (C)</p> <p>Panduit DAP4BC-G3-5 (NA) DAP4BC-F3-5 (E) DAP4BC-I3-5 (C) DAP4BC-23-5 (B) DAP4BC-Z3-5 (Universal – no logo) DAP4BC-NTL01/N (Universal – Nexteer logo)</p>
<p>P. Pushbuttons, Pilot Lights, and Selector Switches</p> <p>1. General Pushbuttons, Pilot Lights, and Selector Switches</p>	<p>IEC 22.5mm IP62 CE</p>	<p>Allen-Bradley 800F (P or M) 800F -AL01 (Locking cover for Robot Teach Mode Selection)</p> <p>Schneider Electric XB4</p>
<p>2. E-Stop Pushbutton</p>	<p>IEC 60947-5-5 ISO 13850 CE Self-Latching Type Red Mushroom Head</p>	<p>Allen-Bradley 800F</p> <p>Schneider Electric XB4</p>

Machine Controls Electrical	Global Common / Requirement	Examples
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 (Cycle Initiation)	IEC 60947-5-1 24Vdc CE	Banner Opto-Touch OTBV*** Banner EZ Light Touch K50APTGRQC E-Z Banner STB Series STBV*** NOTE: For safety applications such as: Two-Hand Control
Q. Operator ID Systems	Refer to the Manufacturing Equipment Purchase Specification and/or contact the purchasing engineer.	
1. Badge Reader		
a) Magnetic Strip	RFIDeas - pcSwipe Enroll MS-300M1AK5 BKT-BASE (Base Kit)	NOTE: Only available in RS-232 ASCII communications.
b) Proximity / RFID	RFIDeas - pcProx Plus KT-800W1AKB-P-IP67 NOTE: Verify card type based on plant region.	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

Machine Controls Electrical	Global Common / Requirement	Examples
S. Relay, Interface NOTE: For low current and low voltage interface applications.	DIN Rail Mounting IP2X Minimum CE CCC (C)	Allen-Bradley 700-HL Series 700HLT1Z24 (hard contact, 24vdc coil) 700HLS1Z24 (solid state 24vdc load, 24vdc 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. Network Interface	Balluff – IO Link Master NOTE: Refer to section 7.N.4.c.2 for complete requirements.	
2. 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.	
3. 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.	

Machine Controls Electrical	Global Common / Requirement	Examples
U. Safety Interlock Switches 1. Non-Contact (RFID) a) High (unique) Coded	Allen Bradley 440N-Z21U**H* (switch) 440N-Z**UPTB (actuator, plastic barrel) 440N-Z18USSTB (actuator, stainless steel barrel) 440N-ZUPRECB (actuator, rectangular) Euchner CES-I-AR-U-C04-USA-119473 (switch) CES-A-BBN-C04-115271 (actuator) BTC-CES04-S-TH-21-F-123583 (slide bolt) Pilz PSEN cs2.1p / PSEN cs2.1 (540100) (switch & actuator)	
b) Low (standard) Coded NOTE: Only allowed for special applications that require multiple actuators per switch (ex. dial table profile guarding)	Allen Bradley 440N-Z21S**H* (switch) 440N-Z**PTB (actuator, plastic barrel) 440N-Z18SSTB (actuator, stainless steel barrel) 440N-ZPRECB (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) Pilz PSEN cs1.1p / PSEN cs1.1 (540000) (switch & actuator)	

Machine Controls Electrical	Global Common / Requirement	Examples
2. Guard Locking a) Power-ON Release (power to unlock) NOTE: Required for safety of personnel protection, per SD-011 / SD-012	All High (unique) coded Allen-Bradley 440G-LZS21UPR* (switch & actuator) Euchner CTP-L1-AR-U-HA-AZ-SAB-122812 (switch) CTP-L1-AR-U-HA-AE-SAB-122813 (switch) (escape release) CTP-L1-AR-U-HA-AEE-SH-13716 (switch) (escape release, E-Stop, 2 PBs) A-C-H-G-SST-126015 (actuator) Telemecanique XCSE731* (switch) XCSZ** (actuator)	
b) Power-OFF Release (power to lock) NOTE: Allowed for process protection only, per SD-011 / SD-012.	Allen-Bradley 440G-LZS21UPL* (switch and actuator) Euchner CTP-L2-AR-U-HA-AZ-SAB-122814 (switch) CTP-L2-AR-U-HA-AEE-SH-159112 (switch) (escape release, E-Stop, 2 PBs) A-C-H-G-SST-126015 (actuator) Telemecanique XCSE751* (switch) XCSZ** (actuator)	
c) Lockable Slide Bolt	Aut-O-Loc A19461 A19462 Euchner RIEGEL CTP-AC-123653 RIEGEL CTP-ACF-123655	


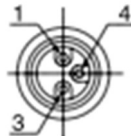
Machine Controls Electrical	Global Common / Requirement	Examples
V. Safety Presence Sensing Devices 1. Safety Light Curtains	14mm Resolution 24VDC IP65 CE IEC 61496-1 compliance to Type 4 ESPE ISO 13849 PL e	Allen Bradley 440L 450L Banner EZ Screen LP EZ Screen LS Keyence GL-R Series SICK C4000 Series De Tec 4 Series
2. Safety Laser Scanners (Area Scanner)	30mm Resolution 24VDC IP65 CE IEC 61496-1 compliance to Type 3 ESPE ISO 13849 PL d Class 1 laser classification	Allen Bradley 442L SICK S300 Mini
W. Safety Relay 1. E-Stop, Safety Gate, Light Curtain	Allen Bradley 440R-D22R2 440R-S1*R2 Pilz PNOZ s4 #750104 PNOZ s5 #750105 (with time delayed contacts)	
2. Contact Expansion	Allen-Bradley 440R-EM4R2 440R-EM4R2D (with time delayed contacts) Pilz PNOZ s7 #750107 PNOZ s9 #750109 (with time delayed contacts) PNOZ s11 #750111	

Machine Controls Electrical	Global Common / Requirement	Examples
3. Two-Hand Control	Allen-Bradley 440R-D23171 Pilz PNOZ s6 #750106	
4. Zero Speed Indicator	Allen-Bradley 440R-S35001 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.	
X. Motor Starters / Contactors		
1. Contactors / Overloads	IEC 60947-4-1 IP2X Minimum DIN rail mounting CE CCC (C) 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) Telemecanique LC1D LC2D (Reversing) LC1F (>75HP, Non-Reversing) LA9F970 (Mechanical Interlock) LRD**** (Overload Relay)
2. Manual Starter / Protector (MSP)	IEC 60947-4-1 IP2X Minimum DIN rail mounting CE CCC (C)	Allen-Bradley 140M Series Telemecanique GV2P Series

Machine Controls Electrical	Global Common / Requirement	Examples
Y. Support Software Requirements 1. Programmable Logic Controllers (PLC)	Rockwell Software - Studio 5000 Design Environment 9324M-RLDT2* (Standard Edition) 9324M-RLDT3* (Professional Edition) Standard Edition Add-Ons 9324M-RLDRT3* (Structured Text Option) (“*” options) 0 = Self Support 1 = 8-5, M-F Support 2 = 24/7 Support Version 32 or newer NOTE: Version 32.011 is not allowed.	
2. Human Machine Interface (HMI)	Rockwell Software FactoryTalk View Studio ME 9701-VWSTNMRT1* Version 11 or newer	
Z. Disconnect Switches 1. Flange Mounted Disconnect	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	Allen-Bradley 1494U Series (C) 1494V Series Square D 9422 Series
2. Rotary Disconnect a) General	Lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum	Allen-Bradley 194R-J30-1753 (30A, Class J) 194R-J60-1753 (60A, Class J) 194R-J100-1753 (100A, Class J) Square D GS2

Machine Controls Electrical	Global Common / Requirement	Examples
b) Robot Disable	Lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum	Allen Bradley 194E-E16-1753-4G (black handle) 194E-FA16 (black handle, enclosure) Schneider V01 (switch disconnect) V01C (switch disconnect) (C) VBFXGE1 (black handle, enclosure)
3. Side Mount Disconnect NOTE: Capable of being interlocked.	Lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum	Allen-Bradley 194R-SDK2 (C) NOTE: Side-Mounted Switch Kit, for all 194R-30/60A disconnect switches.
4. Single Phase Supply	(Special Applications) lockable in OFF position only IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum	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 NOTE: Rotary disconnect used with Bussman Compact Circuit Protector (CCP) below.
5. Supplementary Disconnect	Lockable in OFF position only. IEC 60947-1 - General rules IEC 60947-3 – Switches, disconnects, switch CE CCC (C) IP2X Minimum	Allen-Bradley 194E-FA**E (motor)

Machine Controls Electrical	Global Common / Requirement	Examples
AA. Switches / Sensors		
1. Float / Level	IFM Efector LK8 (Oil, water and coolant applications) LT80** (Oil, water and coolant applications) KI5085 (Plastics or non-ferrous materials) ACT (Advanced Control Technologies) B40033AFD2M558 NOTE: For hydraulic tank level and temperature applications: Level = NOHC Temp = NC – Opens at 130F NOTE: Sensor connection shall be M8 or M12. Special connectors require Controls Engineer prior approval.	
2. Flow	IFM Efector SI5010 (Fast response) with: E40096 M18x1.5, G1/4 adapter, or E40106 M18x1.5, 1/4NPT adapter and U40030 ½" NPT tee. Pressure applications of 1450-4350 PSI SA5000 With temperature. Coolant, cutting fluid and water applications less than 1450 PSI Pressures less than 230 PSI SM6004 (0-6.6 GPM, 1/2G, Analog, 4-20mA) SM7004 (0-13.2 GPM, 3/4G, Analog, 4-20mA) SM8004 (0-26.4 GPM, 1G, Analog, 4-20mA) SM9004 (1.3-80 GPM, 2G, Analog, 4-20mA) SM2004 (1.3-160 GPM, 2G, Analog, 4-20mA) GEMS (Air) FS-10798 Series 25365 DI water applications Universal Flow Monitors (UFM) CP4-M1T1C1, 1.2-12GPM	

Machine Controls Electrical	Global Common / Requirement	Examples
3. Air Gap	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)	
4. Integral Cylinder Proximity T-Slot a) Festo - ADN, ADNGF, DSBC, DGC, DFM, SLZ, HGD 32&50, HPV, DRQ 16-32, DSNU-12-*, DSNU-25 SMC - C95N	Festo SMT-8M-A-PS-24V-E-0,3-M8D, 574334 (Threaded) SMT-8G-PS-24V-E-0,3M-PSG-3S, 547860 (90 degree or short) IFM Efector MK5101 (Snap/Threaded) Turck BIM-UNT-AP6X-0.3M-PSG-3S (Snap/Threaded)	 PIN 1 = + PIN 3 = - PIN 4 = OUT
C-Slot b) Festo - HGPT, HGPD, HGPL SMC - CD55, CDQM	Festo SMT-10M-PS-24V-E-0,3-L-M8D, 551375 (Threaded) SMT-10G-PS-24V-E-0,3Q-M8D, 547863 (90 degree or short) IFM Efector MK5310 (Snap/Threaded) Turck BIM-UNR-AP6X-0.3M-PSG-3S W/M (Snap/Threaded) SMC D-M9PSAPC	 PIN 1 = + PIN 3 = - PIN 4 = OUT

Machine Controls Electrical	Global Common / Requirement	Examples
c) Brackets: Festo - DSNU-12-* SMC - CD85 d) Festo - DSNU-25 SMC - CD85 e) SMC - CD55, CDQM f) SMC - C95N	Festo SMBR-8-12, 175093 IFM Efector E11816 Turck KLR-1 W/ASB-2	
	Festo SMBR-8-25, 175096 IFM Efector E11818 Turck KLR-1 W/ASB-3	
	SMC D-M9PSAPC	
	SMC E11797	
5. Limit a) 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)
b) Wobble / Whisker Stick (Cycle Initiation) NOTE: Not to be used for equipment going to China or Poland.	Honeywell LSJ1A-7N Telemecanique XCK-J	

Machine Controls Electrical	Global Common / Requirement	Examples
<p>6. Pressure and Vacuum</p>	<p>IFM Efector PN2094 (Pneumatic, -14.5-145 PSI) PN2071 (Hydraulic, 0-3,625 PSI)</p> <p>E30420 (Protective cover) EVC00* (90-degree cable) E10077 (Mounting Clamp)</p> <p>Differential (Coolant and Water) IFM Efector PNI024 with PA3024</p>	<p>1/4G</p>

Machine Controls Electrical	Global Common / Requirement	Examples
7. Proximity (Metallic)	<p>LED indication</p> <p>IP65 dry applications, IP67 wet applications</p> <p>Short Circuit Protection, 10-30vdc</p> <p>3 wire PNP sourcing</p> <p>Fully potted threaded barrel</p> <p>Reverse Polarity Protection</p> <p>CE, CCC</p> <p>Stainless steel metal face</p> <p>Wire colors in accordance with EN 60947-5-2</p> <p>PIN1 = BN (Brown, PIN2 = WH (White), PIN3 = BU (Blue), PIN4 = BK (Black)</p> <p>IFM Efector</p> <p>Dry applications – Long distance</p> <p>IM5115, 40mm size, M12, 20mm range (Special Applications)</p> <p>Im5117, 40mm size, M12, 40mm range (Special Applications)</p> <p>IFM Efector</p> <p>Wet or dry applications</p> <p>IEC200, 8mm size, M12, flush, 2mm range</p> <p>IE5379, 8mm size, M12, flush, 2mm range</p> <p>IFT257, 12mm size, M12, flush, 4mm range</p> <p>IFT245, 12mm size, M12, non-flush, 6mm range</p> <p>IGT258, 18mm size, M12, flush, 8mm range</p> <p>IGT249, 18mm size, M12, non-flush, 12mm range</p> <p>IIT243, 30mm size, M12, flush, 15mm range (Special Applications)</p> <p>IIT231, 30mm size, M12, non-flush, 25mm range (Special Applications)</p> <p>IFM Efector</p> <p>Welding applications</p> <p>Weld slag resistant</p> <p>IER200, 8mm size, M12, flush, 2mm range</p> <p>IEW200, 8mm size, M8, flush, 3mm range (Special Applications)</p> <p>IFR207, 12mm size, M12, flush, 4mm range</p> <p>IGR207, 18mm size, M12, flush, 8mm range</p> <p>IIR207, 30mm size, M12, flush, 15mm range (Special Applications)</p>	

Machine Controls Electrical	Global Common / Requirement	Examples
8. Photoelectric (presence, color, shape, distance, etc.)	LED indication IP65 dry applications IP67 wet applications Short Circuit Protection 10-30vdc 3 wire PNP sourcing Reverse Polarity Protection CE	Allen-Bradley Banner IFM Efector "O" Series for through beam, retro-reflective, diffused and laser "OB" Series for fiber optics Keyence Sick
9. Temperature (Coolant and water applications)	IFM Efector TR2439 NOTE: For hydraulic tank level and temperature applications, use ACT Temp/Level switch, 130F B40033AFD2M558.	

Machine Controls Electrical	Global Common / Requirement	Examples
BB. Transformers 1. General Purpose	UL1561 IP2X (Internal/External enclosure mount) CE (E) 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 (C) (requires additional finger safeguard for IP2X) PowerTran Series A480MT SeriesPTN102
2. Transformer Disconnect (lighting) NOTE: For excepted circuit applications (i.e. circuits powered ahead of the Main Disconnect).	CE (E) CCC (C) Isolation transformer with secondary isolation IEC-60742 Within its own enclosure Internal mounted IP2X External mounted IP54 NOTE: Transformer Disconnect shall meet disconnect 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)

Machine Controls Electrical	Global Common / Requirement	Examples
CC. Vision Applications	Feasibility study REQUIRED for all applications. Exception, vision guided robots.	
1. Vision Sensor (Basic Applications)	Cognex In-Sight 2000 Series Keyence IV Series IX Series	
2. Vision Systems (Complex Applications)	Cognex In-Sight 7000, 8500, 9000 Series In-Sight D900 Keyence CV-X Series XGX Series XG-8000 Series	
3. Visualization Display	Cognex – Vision View VVPC-SL (Software for use on PC) VV900-00 (LCD Color Display) VVCE-SL (Software for use on PC HMI) Keyence IV2-CP50 (Intelligent Monitor) CA-MP120T (LCD Color Display)	

8. Manufacturing Information Technology System Components

The "MIT Systems Component" column is organized by components. Nexteer Automotive does not have requirements for technologies not listed.

The "Global Common / Requirement" column has two functions:

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

NOTE: To identify regional requirements, the following notation is 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 supplier's components may be used.

The "Examples" column lists example components that may be used providing they meet the specifications of the "Global Common / Requirement" column. 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 notation is 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 listed supplier's components may be used.

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

NOTE: Changes since the last revision are highlighted.

MIT Systems Component	Global Common / Requirement	Examples
A. Computer Hardware		
1. Standard PC (Traceability / Monitoring / LabView Test Equipment)	<u>Machine Requirements:</u> Win 10 Pro Not Allowed - Wifi devices Vendor software & PC must be compatible with ESET antivirus software. <u>Hardware below is recommended as a minimum:</u> Intel i5 9 th Gen Processor 16GB RAM Memory 512 GB SSD 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)

A. Appendix A – North America

Components in this appendix are approved for use, only if specified in the Manufacturing Engineering Purchase Specification (T-Spec).

Electrical Component	North America

B. Appendix B – Europe & Morocco

Components in this appendix are approved for use, only if specified in the Manufacturing Engineering Purchase Specification (T-Spec).

Electrical Component	Europe & Morocco
	When building equipment, the same as existing equipment, the electrical, pneumatic and hydraulic components may be acceptable based on Controls Engineer approval. Refer to the Manufacturing Engineering Purchase Specification for component requirements.

C. Appendix C – China

Components in this appendix are approved for use, only if specified in the Manufacturing Engineering Purchase Specification (T-Spec).

Electrical Component	China

RECORD OF REVISIONS

Revision No	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 & all SD-007-xxx global site preferred/approved components lists.
003	06N009	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 + 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	28JU18	ALL	General fluid power and electrical update.
011	15N019	ALL	Entire Specification update
012	24JA22	ALL	General fluid power and electrical update.
013	17AU23	ALL	Added Driverless Industrial Vehicles section.
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