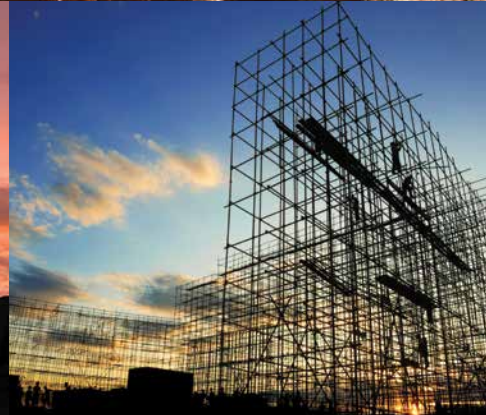


Eaton's Excavator Applications

Market Served:
Construction and Mining



Excavator solutions



EATON

Powering Business Worldwide

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Tough jobs call for tough solutions

That's why you need to demand Eaton. As a global technology leader in power management, Eaton's portfolio of electrical, hydraulic, and mechanical solutions help you operate more efficiently, more safely and with improved sustainability.

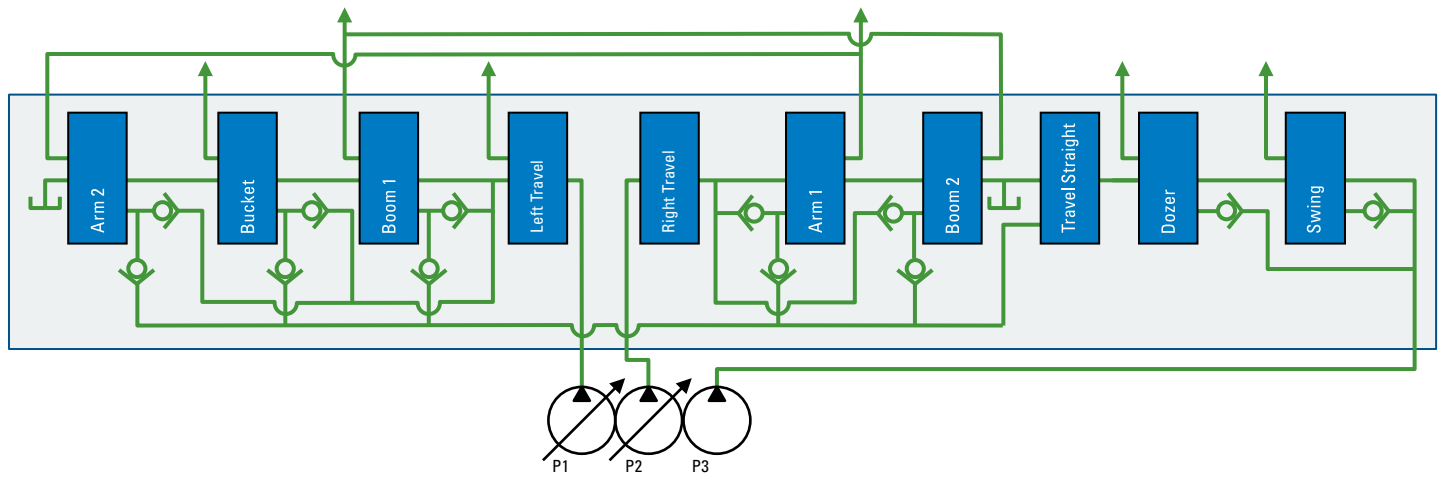
From road building to demolition, from rock quarries to utilities, we have a strong track record of delivering durable products for machines that need to do the heavy lifting on your job sites. You'll find Eaton on mini, midi and large excavators.

From hoses and fittings to pumps and valves to motors and electronic controls and software to electrical and filtration, Eaton products help make customers' machines more productive and more efficient.

Our brand and systems engineering expertise are highly respected and trusted in the construction and mining industry. Uniquely positioned to offer complete hydraulic and electrical systems...Eaton offers one of the most complete line of products and solutions for the excavator platform. Turn the page to learn how to put our technology to work for you.



Eaton's excavator hydraulic system



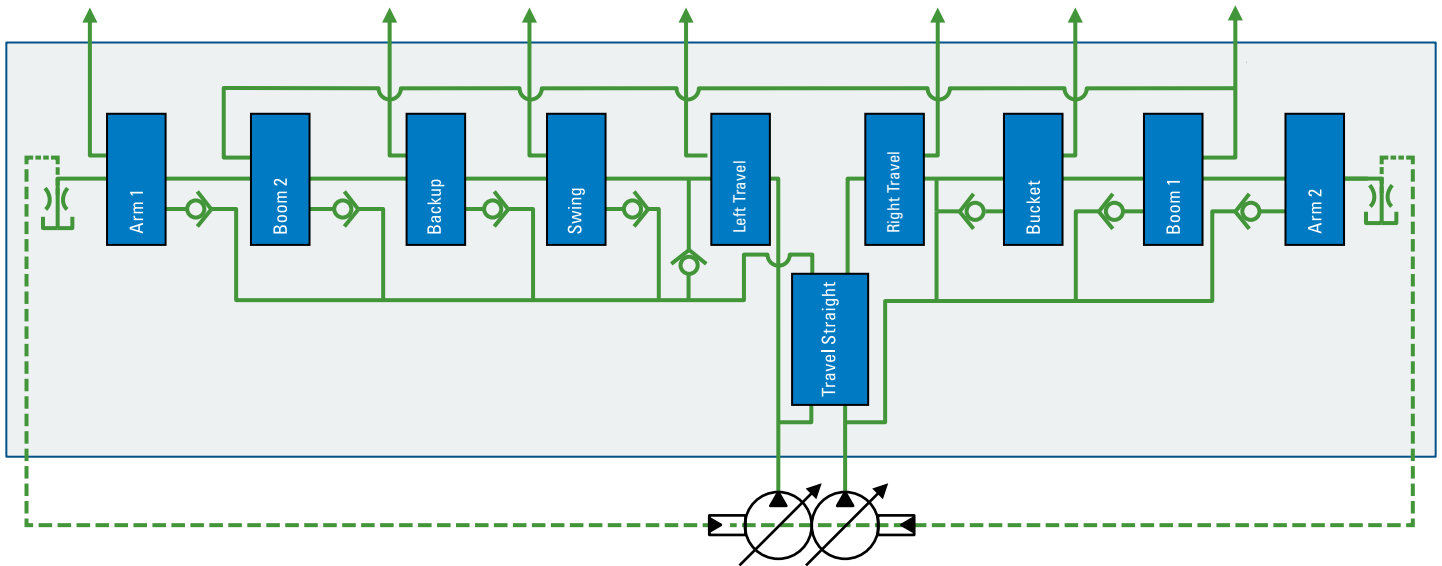
Open Center Control System

- Applied widely in mini excavators.
- Reliable and easy for maintenance, reliable in the market.
- Eaton has patent of P3 flow combination, providing high working speed and high productivity.
- Dual pump with one rotating group, compact design, providing identical dual flow output.
- Constant power control and third pump power override control.

Eaton products offering:

CMJ valves, JMV track drive motors, JMF swing drive motors, HRCs joysticks and pedals.

Eaton's excavator hydraulic system



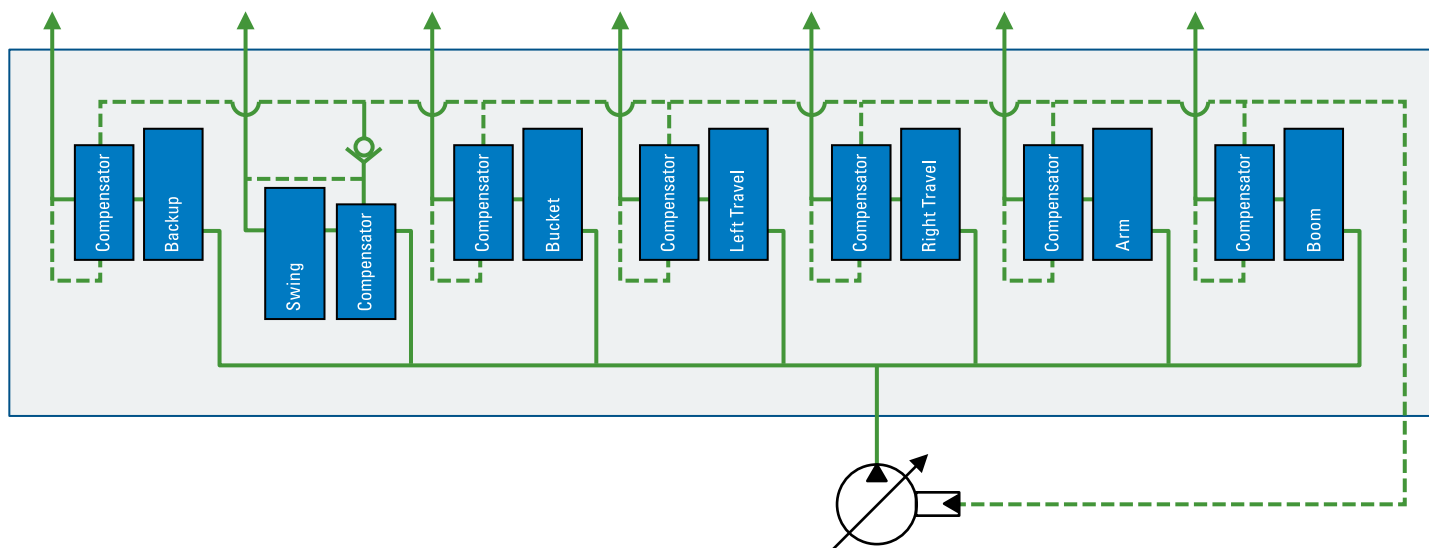
Open Center Negative Flow Control System

- Applied widely in midi and large excavators.
- Reliable and easy for maintenance, reliable in the market.
- Main control valve is two-block design, including various functions of boom, arm and bucket flow combination, load holding, straight-line travel and boom lifting prioritized.
- Main pump is back to back design, with negative flow control, cross power control and power summation controlled by an electro-hydraulic proportional valve.

Eaton products offering:

CMJ valves, JPVB pumps, JMV track drive motors, JMF swing drive motors, HRCs joysticks and pedals.

Eaton's excavator hydraulic system



Closed Center Post-Compensation Load Sensing System

- Typically applied in larger or 4-ton to 8-ton excavators.
- Single circuit design. Travel straight valve and features including flow distribution and combination are not required, and not impacted by varying loads.
- Flow is delivered by demand, not affected by load changes.
- Pressure differential among multiple actuators is post-compensated, and therefore able to avoid flow saturation.
- Closed center, post-compensation load sensing system allows power on demand, leading to improved fuel economy.
- Sectional architecture allows easy configuration of the main control valve.
- Single section flow is from 100 to 600 LPM. There is no need for multi-section combination.

Eaton products offering:

X20 pumps, CLS load sensing mobile valves, JMV track drive motors, JMF swing drive motors, HRCs joysticks and pedals.

Eaton's excavator hydraulic system



Performance and efficiency

Eaton hydraulic systems for excavators have earned a global reputation for durability, reliability and high productivity. Our people are known for their support of customers and their expertise in designing solutions that deliver efficiency and performance. Eaton solutions range from pumps to filtration, from electrical controls to hoses. Eaton products can be found on today's best-selling excavator. Eaton's complete system approach helps equipment manufacturers to optimize machine performance and cut fuel costs.

Higher efficiency for greater profitability

Eaton's open center hydraulic system, including CMJ80, HRCs, JMV and JMF motors, helped customer's excavator to increase productivity significantly.

Higher reliability, controllability and operator comfort

Eaton's improved HRC4 joysticks feature robust seals that endure – proven by a three-million cycle lab durability test. The design contributes to easy and precise control and delivers 50% reduction in the potential for internal leakage. The new aluminum housing is 50% lighter than previous cast iron. And, operators will experience greater comfort and handling with 15% lower operating torque.

Manufacturing for competitiveness and stronger quality

Eaton produces thousands of piston pumps and motors every year, with proven experience and performance in various platforms. Eaton's production teams demonstrate their expertise each day delivering quality and improving processes to ensure efficiency in manufacturing.

Strong application and service support you quick response

Eaton's global team includes experts in hydraulics systems for excavators, design, test, application and field service. Our Application and Commercial Engineering teams and global network of distributors are dedicated to solving your toughest challenges.

Eaton-related training courses

Eaton's Asia Pacific Training Center in Shanghai provides hands on training courses on excavator-rated products and application. Trainees will gain knowledge from product principles to application fundamentals, from excavator operation to trouble shooting.

Eaton's excavator hydraulic system



System Components

- 1 Main Pump
- 2 Main Control Valve

Actuator Components

- 3 Track Drive Motor
- 4 Swing Drive Motor

Control Components

- 5 Joysticks
- 6 Pedal

Accessories

- 7 Dozer Valve
- 8 Customized Manifolds
- 9 Fluid Conveyance
- 10 Filtration

Electronics

- 11 HMI Display
- 12 Controller

Electrical Products

- 13 VEC (Vehicle Electrical Center)
- 14 Equalizer
- 15 Switch

1 Main Pump
X20



JPVD



JPVB



2 Main Control Valve
CMJ



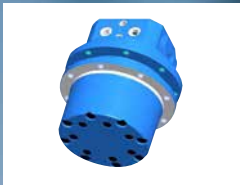
CLS



3 Track Drive Motor
JMV



K-D/TRB



4 Swing Drive Motor
JMF



S/2K/4K/6K



5 Joysticks
HRC4



6 Pedal
HRCP



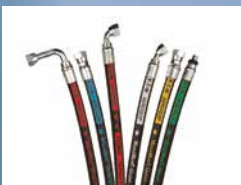
7 Dozer Valve
HRC2



8 Customized Manifolds
Hose Rupture Valve & Pilot Valve



9 Fluid Conveyance



10 Filtration



11 HMI Display
VFX



12 Controller
HFX



13 Multiplexed Vehicle Electrical Center



14 DC-DC Converter/ Equalizer



15 Switch



Eaton's excavator hydraulic system recommended products

System Components - Open-center System

Main Pumps



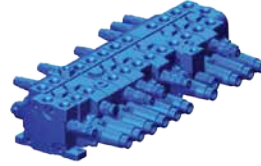
JPVB Open Circuit Piston Pumps

Eaton JPVB pump features back-to-back design, with matured negative flow control, providing high reliability and performance with competitive cost.

Specifications

Displacement: 112cc/r X2
Rated Pressure: 350 bar
Peak Pressure: 390 bar
Rated Speed:
Max. 2360 RPM @ > -0.1 bar suction pressure
Max. 2700 RPM @ >1 bar suction pressure
Machine Weight: 20-25 ton

Main Control Valves



CMJ Open Center Mobile Control Valves

Eaton's CMJ open center valves have an optimized flow path and spool design and patent design of P3 flow combination, which help excavators to perform more efficiently.

Specifications

Rated Flow (spool size):
60 LPM (14.5mm)
80 LPM (16mm)
300 LPM (28mm, Negative Flow Control)
Rated Pressure: Up to 355 bar
Pilot Pressure: 50 bar
Machine Weight: 5-7, 20-25 ton

System Components - Load-sensing System

Main Pumps



X20 Open Circuit Piston Pumps

X20 series pumps perform under high operating pressures and feature a small envelope size for compact applications. Ideal for mobile applications, featuring both clockwise and counterclockwise rotation drives.

Specifications

Displacements: 28,41,49, 62,74, 80, 98 cc/r
Rated Pressure: Up to 280 bar, intermittent to 320 bar
Speed Range: 3000–3600 RPM
Applied Control: Torque Control with minimum displacement
Machine Weight: 5-10 ton

Main Control Valves



CLS Load Sensing Mobile Valves

Eaton CLS valve is available up to 12 sections. This is flow sharing load sensing valve, and controllability can be maintained in a flow saturation condition.

Specifications

Rated Flow(work port):
100, 180 LPM
Rated Pressure: 350 bar
Machine Weight: 5-10 ton

Eaton's excavator hydraulic system recommended products

Actuator Components

Swing Drive Motors



S/2K/4K/6K Orbit Motors

Eaton's orbit motors applied for mini excavators swing drive, have compact design, high efficiency and high reliability. Integrated new designed shockless valve makes swing start and stop smoothly. The low-speed high-torque motors without reduction gears, can provide quiet operation and reduce maintenance cost.

Specifications

Displacement: 165-490 cc/r
Rated pressure: up to 196 bar
Rated speed: 80 RPM
Torque: up to 1128 N.m
Machine Weight: 0.5~3.5 ton

Track Drive Motors



TRB Series Orbit Motors

Eaton's orbit motors applied for mini excavators track drive, have high starting and operating torque efficiency and high reliability. Integrated counterbalance valve can provide smooth start. The low-speed high-torque motors without reduction gears, can provide quiet operation and reduce maintenance cost.

Specifications

Displacement:
K-D series: 180 cc/r
TRB series low speed: 311-490 cc/r
TRB series high speed: 195-245 cc/r
Rated pressure: up to 206 bar
Torque: up to 1607 N.m
Machine Weight: 0.5~1.7 ton



JMF Swing Drive Motors

Eaton's JMF swing drive motors with integrated reduction gear and multi-functioning valves can absorb changes in pressure and torque to minimize mechanical shocks when the motor stops. This technology helps vehicles achieve smooth movement for consistent boom and bucket operations and high capacity for reliable performance under heavy loads.

Specifications

Displacement: 29-233 cc/r
Rated pressure: up to 320 bar, intermittent to 385 bar
Torque: up to 23166 N.m
Machine Weight: 5~36 ton, double motors up to 120 ton



JMV Track Drive Motors

Eaton's JMV swing drive motors are compact design with integrated reduction gear and multi-functioning valves. With more than a half million units in operation today, our motors optimized design helps reduce power loss, ensure smooth starting and stopping and improve overall mechanical efficiency of the application.

Specifications

Displacement: 16-274 cc/r
Rated pressure: up to 350 bar, intermittent to 420 bar
Torque: up to 94438 N.m @ low speed, 59016 N.m @ high speed
Machine Weight: 1.5~50 ton

Eaton's excavator hydraulic system recommended products

Hydraulic Remote Control Components

Joysticks and Pedals



Eaton's joysticks and pedals, designed to minimize pressure loss, have excellent response to small operator demands. Eaton also provides full range of variable control valves and designed for your request.

- HRC4 joystick is double functions; optimized seal and materials design provide higher reliability, precise control and operator comfort.
- HRC2 joystick is single function, with multiple sections available, applied in <14 ton excavators with dozer functions.
- HRCP pedals have various types, like double pedal with damping or without damping, single pedal.

Specifications

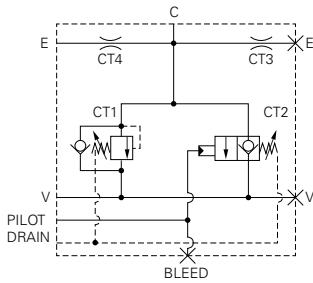
Rated flow: 8~30 LPM

Output Pressure: 0~40 bar

Maximum inlet pressure:
50 bar for aluminum, 100 bar for cast iron

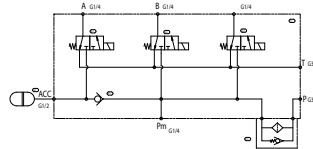
Accessories

Hose Rupture Valve/Pilot Pressure Valve



Eaton has developed a range of hose rupture valves, that are designed to meet the stipulations of ISO8643 and can be applied to numerous different machines. The valve block can be customized design to suit the a variety of installations.

Eaton's pilot pressure valve blocks are specific design for excavator application to match different machines' requirements.



Filtration



Eaton currently offers a selection of more than 4,000 different Internormen™ filter elements, including corresponding filter housings. We provide customers with a different kind of filtration, from tank-mounted return line filters, to in-line or flange mounted high pressure filters, to manifold side mounted or manifold bottom mounted pressure filters, to air breathers and suction strainers.

Eaton's excavator hydraulic system recommended products

Electronics

VFX Displays, HFX Controllers



Eaton electronics provide you both robust hardware and customized program.

- Easily integrate electronic control into systems
- Rapidly design applications with Eaton libraries
- Create your own value-adding libraries
- Reduce your development time

Specifications

VFX Displays

4.3" and 7" sizes
2 CAN interface
IP67 rated
-40 to 85°C

HFX Controllers

12, 20, 32, 48 I/O and flexible I/O configurations
32 bit, 200 MHz
3 CAN, 1 USB channels
IP67 & IP69K rated
-40 to 105°C
Pro-FX™ Control software development tool base on CODESYS V3.5

Electrical Products

Multiplexed Vehicle Electrical Center



Function

- Monitor the components' status continuously
- Drive the relay activation response to the message from the controller
- CANbus diagnosis

Features

- Rated Voltage: 12VDC/24VDC
- Rated Current: 200A
- Input Optional: connector/studs
- Ingress Protection: IP66
- Operating Temperature Ratings: -40°C~ 85°C
- Components: the industry standard 2.8mm footprint
- Output Connector: colored/keyed, sealed

DC-DC Converter/Equalizer



Eaton offers an expanded line of DC-DC Converters and Battery Equalizers from low to high output current capabilities (5 amps to 100 amps).

Features

- Low standby current drain
- Operating Temperature Ratings: -40°C~ 85°C
- Thermally protected for over temperature
- Short circuit and over current protected
- Reverse polarity protected
- Overvoltage/lower voltage protected
- Typical efficiency of 94%
- IP67 (optional)
- EMI/EMC Compliance SAE, ISO, CE standards according to the customer's request

Eaton's excavator hydraulic system recommended products

Electrical Products

Eaton Switch



Eaton Vehicle and Commercial Controls offer a broad range of solutions not only for on and off-road vehicles, but for many commercial machine applications requiring rugged, dependable switches.

Keypad Features

- Compliance: SAE J1939/CAN2.0B
- Ingress Protection: IP68
- Different indicator
- Voltage: 9 to 32VDC
- Simple Installation
- Electrical/mechanical life: 500k cycles

Fluid Conveyance

Pilot & Return Hoses



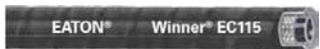
SAE J517 100R 1AT Type S, EN853 1SN

- Size from -04 to -48 with operating pressure from 40 to 225 bar
- Operating temperature (Continuous): -40 to 100°C
- 150,000 cycles impulse performance
- MSHA approved cover material



Exceeds SAE 100 R1 AT, EN853 1SN

- Size from -4 to -48 with operating pressure: From 41 to 255 bar
- Operating temperature (Continuous): -40 to 127°C
- Flexible: 1/2 Min bend radius
- DURA-TUFF™ cover (8 times Abrasion Resistance VS Standard)
- MSHA approved cover material



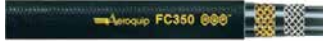
EN857 1SC

- Size from -04 to -48 with operating pressure from 88 to 225 bar
- Operating temperature (Continuous): -40 to 100°C
- 150,000 cycles
- MSHA approved cover material

Eaton's excavator hydraulic system recommended products

Fluid Conveyance

Engine Hose



- Size from -4 to -24 with operating pressure: 17 to 140 bar
- Operating temperature: -49 to +150°C (Air Max to 121°C)
- More flexible and lighter for easy handling & routing
- Vacuum rating (in/Hg): 17 to 28
- Compatible to air, gasoline, fuel, lubricant oils and coolants.
- Meets DOT FMVSS 106 type AII/AAMVA/TMC/ATA

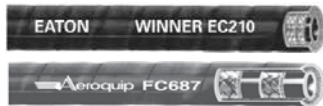
Air Condition Hose



Exceeds SAE J2064

- Size from -6 to -16 with operating pressure: 35 bar
- Operating temperature (Continuous): -40 to +135°C
- Excellent effusion resistance
- Maximum resistance to moisture ingress
- Superior flexibility

Braided Working Hoses



SAE J517 100R2 Type S/ EN853 2SN

- Size from -04 to -48 with operating pressure from 80 to 400 bar
- Operating temperature (Continuous): -40 to 100°C
- 200,000 cycles impulse performance
- MSHA approved cover material
- Qualified with Winner® fitting



EN857 2SC

- Size from -04 to -48 with operating pressure from 165 to 225 bar
- Operating temperature (Continuous): -40 to 100°C
- 200,000 cycles impulse performance
- MSHA approved cover material
- Qualified with Winner® fitting (-16)



Exceeds SAE 100 R2 AT, EN853 2SN



- Operating working pressure: From 110 to 448 bar
- Operating temperature (Continuous): -40 to 127°C
- Exceeds SAE 100 R2 AT, EN853 2SN
- DURA-TUFF™ cover (8 times Abrasion Resistance VS Standard)



Exceeds SAE 100 R16s, EN857 2SC



- Operating working pressure: From 110 to 448 bar
- Operating temperature (Continuous): -40 to 127°C
- Flexible: 1/2 Min bend radius
- DURA-TUFF™ cover (8 times Abrasion Resistance VS Standard)

Eaton's excavator hydraulic system recommended products

Fluid Conveyance

4-Spiral Working Hoses



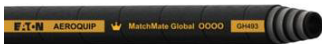
Exceeds EN 856 4SP

- Size from -06 to -16 with operating pressure from 320 to 490 bar
- Operating temperature (Continuous): -40 to 100°C
- > 500,000 cycles impulse performance (1W fittings)
- MSHA approved cover material
- Qualified with Winner[®] fitting



Exceed EN 856 4SH

- Size from -12 to -32 with operating pressure from 250 to 420 bar
- Operating temperature (Continuous): -40 to 100°C
- > 2,000,000 cycles impulse performance (-12/-16 with 1W fittings)
- GH506-16(420 bar) 11% ↑ VS 4SH-16 (380 bar) from other brands
- MSHA approved cover material
- Qualified with Winner[®] fitting
- Class 0 cool down leakage in accordance with SAE J1176



Exceed R13/R12(-12 & -16); Exceed 4SP/R12(-08 to -16)

- Size from -06 to -32 with operating pressure from 280 to 448 bar
- Operating temperature (Continuous): -40 to 127°C
- > 1,000,000 cycles impulse performance (TTC12 fittings)
- 2/5 bend radius of 4SP/R13 with higher WP
- MSHA approved cover material
- DURA-TUFF[™] cover (8 times Abrasion Resistance VS Standard)
- Qualified with Winner[®] fitting (-6 to -16)



Exceed SAE J517 100R13

- Size from -06 to -32 with operating pressure from 280 to 448 bar
- Operating temperature (Continuous): -40 to 127°C
- > 1,500,000 cycles impulse performance @1.5 WP with TTC Fittings
- ½ bend radius VS R13 hose
- MSHA approved cover material
- DURA-TUFF[™] cover (8 times Abrasion Resistance VS Standard)

6-Spiral Working Hoses



Exceed SAE J517 100R15

- Size from -20 to -32 with operating pressure 420 bar
- Operating temperature (Continuous): -40 to 120°C
- > 2,000,000 cycles flex impulse performance (1W fittings)
- MSHA approved cover material
- Class 0 cool down leakage in accordance with SAE J1176

Large Size - High Pressure Working Hose



- Size from -40, -48 with operating pressure 350 bar
- Operating temperature (Continuous): -40 to 100°C
- > 1,900,000 cycles impulse performance (1W fittings)
- 780 mm bend radius
- MSHA approved cover material
- Class 0 cool down leakage in accordance with SAE J1176

Eaton's excavator hydraulic system recommended products

Fluid Conveyance

Ultra-High Pressure Working Hose



**Exceeds EN856/4SP (-10);
Exceed SAE J517 100R15
(-12 to -20)**

- Size from -10 to -20 with operating pressure 500 bar
- Operating temperature (Continuous): -40 to 100°C
- > 3,000,000 cycles impulse performance @ WP (1W fittings)
- Up to 27% reduction in force to bend VS standard SAE 100R15
- 10% reduced bend radius VS standard SAE 100R15
- DURA-TUFF™ cover (8 times Abrasion Resistance VS Standard)
- MSHA approved cover material
- Class 0 cool down leakage in accordance with SAE J1176

STC Eaton



Perfect Solution for Hydraulic Pilot/Fuel Lines - Fast & Easy Installation of Hose in Limited Access Areas

- Size from -04 To -16 with Operating pressure from 280 to 400 bar
- Snap to Connect/No Torque
- Properly function after Connect/Disconnect test (250 times)
- Impulse test in excess of 133% of DIN2ST operating pressures
- Extreme temperature test (-40 to 150°C)
- 0 Class leakage performance per SAE J1176
- Elimination of cross-threading & hose twisting

Quick Coupling – Eaton – Hansen & Gromelle



Exceed ISO 16028

- Size from -04 to -32 with operating pressure from 200 To 350 bar
- Working pressure is 41% higher than ISO 16028
- Push-to-connect
- Standard sleeve lock prevents accidental disconnection
- Color identification rings available to prevent crossing of lines

Adapter – Eaton – Aeroquip & Winner®



- Satisfying most standards in the world
- Adapter plating exceed ISO 3768 & SAE standard in salt spray test.
 - Standard Cr3 - 120 h No Red Rust
 - Advanced Cr3 - 360 h No Red Rust
 - Nickel Zinc Plating - 1000 h No Red Rust
- Tolerance of angular on sealing face is +/- 0.5° ; SAE standard (+/- 3°)

Hose Fittings – Eaton – Aeroquip & Winner®



- Non skive crimping
- 1-piece or 2-piece available
- Satisfying most standards in the world: ISO/DIN/JIN/GB
- Both carbon steel and stainless available
- Cr3+ plating, Nickel Zinc Plating and other plating available
- Identical ring on socket for easy match with hose
- Compatible with most crimpers in the market

Eaton's excavator hydraulic system application guidance

Typical tonnage System		1 ton Open Center	1.5 ton Open Center	2.5 ton Open Center	3.5 ton Open Center
System Components	Main Pump Main Control Valve				
Actuator Components	Swing Drive Motor Track Drive Motor	2-160 TRBV31	2-200 TRBV39	4-310 JMV016	N6K JMV023
Hydraulic Remote Control Components	Joysticks Pedal	HRC4 & HRC2 HRCP	HRC4 & HRC2 HRCP	HRC4 & HRC2 HRCP	HRC4 & HRC2 HRCP
Accessories	Hose Rupture Valve Pilot Pressure Valve				
Electronics	Controllers Displays	HFX VFX	HFX VFX	HFX VFX	HFX VFX
Electrical Products	Power Distribution Power Management Vehicle Control	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch
Fluid Conveyance	Hose	Control & Return Hose: EC110/FC686/GH663 Size from -04 to -06 <hr/> Working Hose: EC210/FC687/GH793 Size from -06 to -08 <hr/> Flexible Working Hose: EC215/GH781 Size From -06 to -08 <hr/> Fuel Hose: GH100/FC350 Size from -5 to -6 <hr/>			
Fitting		Fittings: Code 61 Winner: 87311Y AQ: 1AFL <hr/> Code 62 Winner: 87611Y <hr/> DKO Winner: 10411Y/20411Y/10511Y/20511Y AQ: 1ADL/1ADS <hr/> JIC Winner: 16711Y/26711Y AQ: 1AAFJ/1AAMJ <hr/> ORFS Winner: 14211Y/24211Y AQ: 1AAFR <hr/> JIS Winner: 18611Y/28611Y AQ: 1AJF <hr/> BSP Winner: 12611Y/22611Y AQ: 1AJM <hr/>			
Adapter		Adapter: DKO Winner: 1CJ/1DJ AQ: 15.063/15.147 <hr/> JIC Winner: 1J AQ: 2027 <hr/> ORFS Winner: 1F AQ: FF2000T <hr/> JIS BSPP Winner: 1S AQ: FF2593 <hr/> BSP Winner: 1BJ AQ: 2063 <hr/> Size from -04 to -32 <hr/>			
Quick Coupling		FF series Size From -06 to -16 <hr/>			

Eaton's excavator hydraulic system application guidance

Typical tonnage System		6 ton Load Sensing	6 ton Open Center	8 ton Load Sensing	14 ton Negative Flow Control
System Components	Main Pump Main Control Valve	ADU062*TC CLS100	CMJ80	ADY098*TC CLS180	
Actuator Components	Swing Drive Motor Track Drive Motor	JMF030 JMV044	JMF030 JMV044	JMF047 JMV053	JMF068 JMV076
Hydraulic Remote Control Components	Joysticks Pedal	HRC4 & HRC2 HRCP	HRC4 & HRC2 HRCP	HRC4 & HRC2 HRCP	HRC4 & HRC2 HRCP
Accessories	Hose Rupture Valve Pilot Pressure Valve	1CEBL91 Customized manifolds	1CEBL91	1CEBL151	1CEBL256
Electronics	Controllers Displays	HFX VFX	HFX VFX	HFX VFX	HFX VFX
Electrical Products	Power Distribution Power Management Vehicle Control	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch
Fluid Conveyance	Hose	Control & Return Hose: EC110/FC686/GH663 Size from -04 to -06			EC110/FC686/GH663 Size from -04 to -12
		Working Hose: EC210/FC687/GH793 Size from -06 to -08			2755/GH506 Size from -10 to -12
		Flexible Working Hose: EC215/GH781 Size From -06 to -08			EC330GH493/FC500 Size from -10 to -12
		Fuel Hose: GH100/FC350 Size from -5 to -6			GH100/FC350 Size from -5 to -6
		Fitting	Fittings: Code 61		Winner: 87311Y AQ:1AFL
Code 62			Winner: 87611Y		
DKO			Winner: 10411Y/20411Y/10511Y/20511Y AQ: 1ADL/1ADS		
JIC			Winner: 16711Y/26711Y AQ: 1AAFJ/1AAMJ		
ORFS			Winner: 14211Y/24211Y AQ:1AAFR		
JIS			Winner: 18611Y/28611Y AQ: 1AJF		
BSP			Winner:12611Y/22611Y AQ: 1AJM		
Adapter	Adapter: DKO		Winner: 1CJ/1DJ AQ: 15.063/15.147		
	JIC		Winner: 1J AQ: 2027		
	ORFS		Winner:1F AQ: FF2000T		
	JIS BSPP		Winner: 1S AQ: FF2593		
	BSP		Winner: 1BJ AQ: 2063		
	Size from -04 to -32				
Quick Coupling		FF series Size From -06 to -16			

Eaton's excavator hydraulic system application guidance

Typical tonnage System		22 ton Negative Flow Control	25ton Negative Flow Control	30ton Negative Flow Control
System Components	Main Pump Main Control Valve	JPVB112 CMJ300		
Actuator Components	Swing Drive Motor Track Drive Motor	JMF151 JMV147	JMF151 JMV168	JMF195 JMV155
Hydraulic Remote Control Components	Joysticks Pedal	HRC4 HRCP	HRC4 HRCP	HRC4 HRCP
Accessories	Hose Rupture Valve Pilot Pressure Valve	1CEBL256 Customized Manifolds	1CEBL256	1CEBL356
Electronics	Controllers Displays	HFX VFX	HFX VFX	HFX VFX
Electrical Products	Power Distribution Power Management Vehicle Control	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch
Fluid Conveyance	Hose	Control & Return Hose: EC110/FC686/GH663 Size from -04 to -24 <hr/> Working Hose: GH506 Size from -12 to -16 <hr/> Flexible Working Hose: FC500 Size from -12 to -16 <hr/> Fuel Hose: GH100/FC350 Size from -5 to -6 <hr/>		
Fitting		Spiral Fitting: Code 61 Winner: 87311 AQ:1BFL <hr/> Code 62 Winner: 87611 AQ:1BFH <hr/> DKO Winner: 10411Y/20411Y/10511Y/20511Y AQ: 1BDL/1BDS <hr/> JIC Winner: 16711Y/26711Y AQ: 1BFJ/1BMJ <hr/> ORFS Winner: 14211Y/24211Y AQ:1BFR <hr/> JIS Winner: 18611Y/28611Y AQ: 1BJF <hr/> BSP Winner:12611Y/22611Y AQ: 1BJM <hr/>		
Adapter		Adapter: DKO Winner: 1CJ/1DJ AQ: 15.063/15.147 <hr/> JIC Winner: 1J AQ: 2027 <hr/> ORFS Winner:1F AQ: FF2000T <hr/> JIS BSPP Winner: 1S AQ: FF2593 <hr/> BSP Winner: 1BJ AQ: 2063 <hr/> Size from -04 to -32 <hr/>		
Quick Coupling		FF series Size From -06 to -16 <hr/>		

Eaton's excavator hydraulic system application guidance

Typical tonnage System		33 ton Load Sensing	36 ton Load Sensing	40 ton +
System Components	Main Pump Main Control Valve			
Actuator Components	Swing Drive Motor Track Drive Motor	JMF233 JMV173	JMF250 JMV185	Double JMF151~250 JMV274
Hydraulic Remote Control Components	Joysticks Pedal	HRC4 HRCP	HRC4 HRCP	HRC4 HRCP
Accessories	Hose Rupture Valve Pilot Pressure Valve	1CEBL356 Customized Manifolds	1CEBL356	1CEBL556
Electronics	Controllers Displays	HFX VFX	HFX VFX	HFX VFX
Electrical Products	Power Distribution Power Management Vehicle Control	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch	VEC Converter/Equalizer Electrical/mechanical switch
Fluid Conveyance	Hose	Control & Return Hose: EC110/FC686/GH663 Size from -04 to -24		1SN Control & Return Hose: EC110/FC686/GH663/EC210 Size from -04 to -32
		Standard Working Hose: GH506 Size from -12 to -16		2SN Control & Return Hose: FC687/GH793 Size from -08 to -10
		Flexible Working Hose: FC500 Size from -12 to -16		Standard Working Hose: GH466/GH506/2755 Size from -20 to -32
		Fuel Hose: GH100/FC350 Size from -5 to -6		Flexible Working Hose: GH493/FC500 Size from -20 to -32
				Fuel Hose: GH100/FC350 Size from -5 to -6
Fitting		Spiral Fitting: Code 61 Winner: 87311 AQ:1BFL		
		Code 62 Winner: 87611 AQ:1BFH		
		DKO Winner: 10411Y/20411Y/10511Y/20511Y AQ: 1BDL/1BDS		
		JIC Winner: 16711Y/26711Y AQ: 1BFJ/1BMJ		
		ORFS Winner: 14211Y/24211Y AQ:1BFR		
		JIS Winner: 18611Y/28611Y AQ: 1BJF		
		BSP Winner:12611Y/22611Y AQ: 1BJM		
Adapter		Adapter: DKO Winner: 1CJ/1DJ AQ: 15.063/15.147		
		JIC Winner: 1J AQ: 2027		
		ORFS Winner:1F AQ: FF2000T		
		JIS BSPP Winner: 1S AQ: FF2593		
		BSP Winner: 1BJ AQ: 2063		
		Size from -04 to -32		
Quick Coupling		FF series Size From -06 to -16		

Excavator application tips

Driving Precautions

- Check the piping and flexible hose is correctly installed.
- Ensure correct direction of rotation of the motor is achieved.
- Check for leakage from all motor parts.
- Ensure the system is operating within the specified working temperature.
- Check the pressure is operating within specified range.

General Precautions

- If you experience abnormal operation of the Swing or Track Drive Motor, consider all elements within the work circuit that could potentially effect the Swing Motor or Track Drive's performance.
- If deemed necessary to disassemble the Swing or Track Drive Motor it is critical to do so in a clean environment, in order to ensure no contamination is introduced during the reassembly process.
- In the event of disassembly, note that the internal hydraulic components of the Swing or Track Drive Motor are precision manufactured and as a result must be handled with care to avoid irreversible damage.

Diagnosis & Maintenance

- If the motor is making an unusual sound, unscrew the plug from the case drain and check whether the recommended level of oil is present. Top up the oil level if required. Check the quality of the oil, if impurities are found replace the oil to optimize the life of the Swing or Track Drive Motor.
- If you still experience abnormal operation of the motor, measure the pressure through out the work circuit to assess whether or not the motor is at fault.

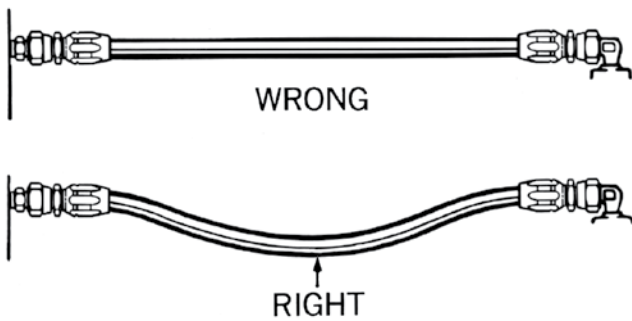
Technical Data

1	Operating temperature rating	-20°C	
2	Oil viscosity recommendation	Gear oil: 80W-90	Hydraulic oil: VG-46
	Viscosity at 40°C	143 mm ² /s	46 mm ² /s
	Viscosity at 100°C	16 mm ² /s	7 mm ² /s
3	Oil cleanliness recommendation	NAS 8, or ISO 17/15/12	
4	Case pressure	2 bar max.	

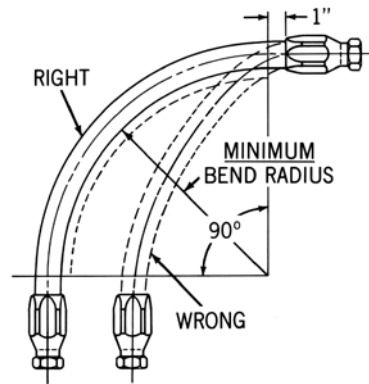
Please contact Eaton sales representatives for more information.



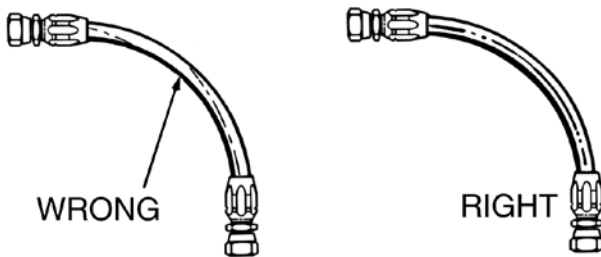
Excavator application tips



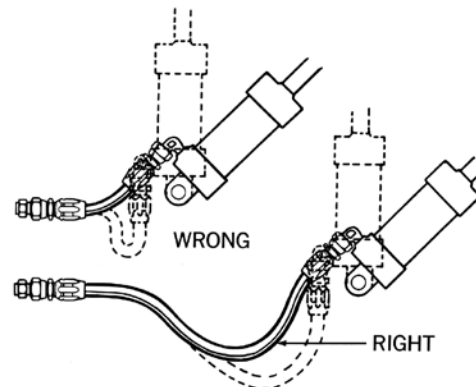
Under pressure, a hose may change in length. Always provide some slack in the hose to allow for this shortening or elongation. (However, excessive slack in hose lines may cause poor appearance.)



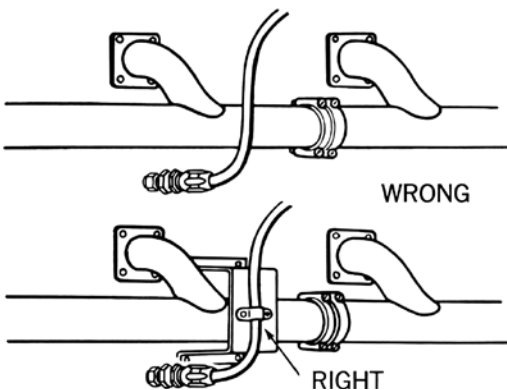
At bends, provide sufficient hose so that it does not have a bend radius less than its recommended minimum bend radius. Too tight a bend may kink the hose and restrict or stop the fluid flow. In many cases the proper use of adapters and hose fittings can eliminate tight bends or kinks.



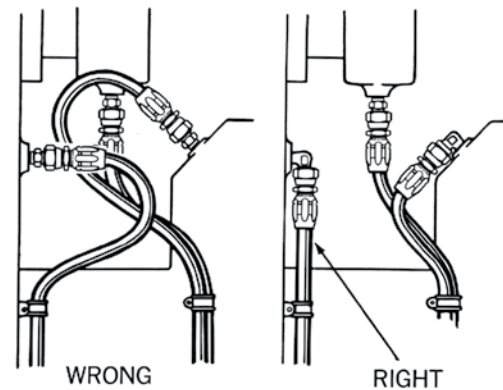
If a hose is installed with a twist in it, operating pressures tend to force it straight. This can loosen the fitting nut. Twisting can cause reinforcement separation and the hose could burst at the point of strain.



In applications where there is considerable vibration or flexing, allow additional hose length. The metal hose fittings, of course, are not flexible, and proper installation protects metal parts from undue stress, and avoids kinks in the hose.



When hose lines pass near an exhaust manifold or other heat source, they should be insulated by a heat resistant boot, firesleeve or a metal baffle. In any application, brackets and clamps keep hoses in place and reduce abrasion. For installations where abrasion to hose cover cannot be prevented with the use of clamps or brackets, a steel protective coil or abrasion resistant sleeve should be placed over the hose.



When 90° adapters were used, this assembly became neater-looking and easier to inspect and maintain. It uses less hose, too!

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