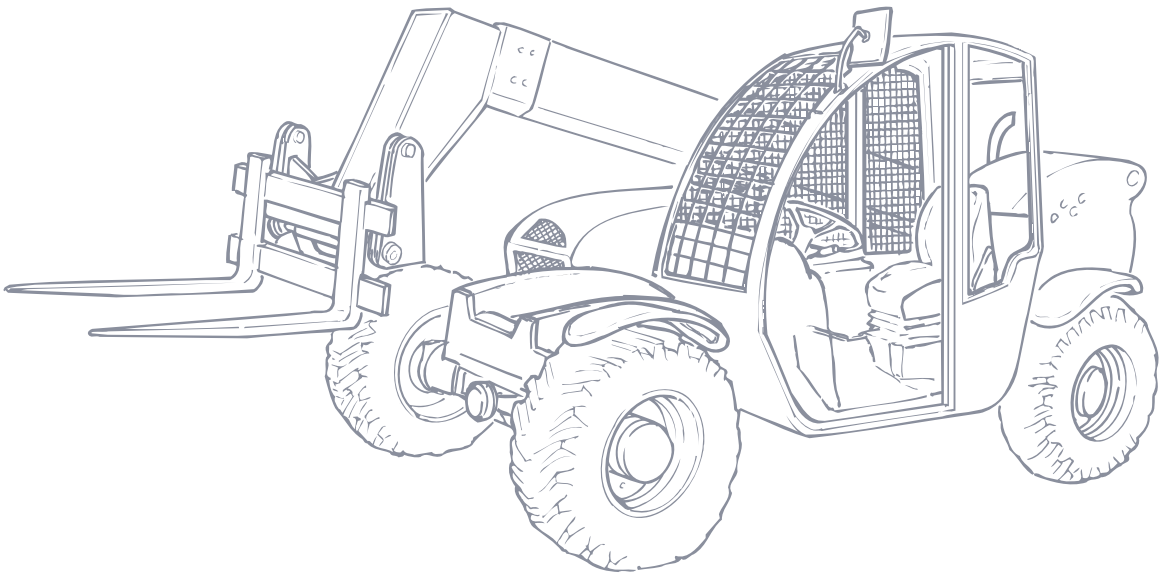
A TEREX COMPANY

WORKSHOP MANUAL

Code 57.4401.8200 - 1st Edition 04/2006

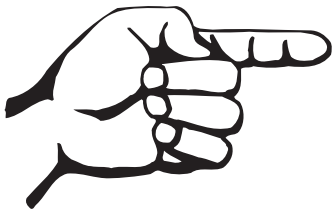
Handler with telescopic boom

GTH 55-19 *(da matr. xxxxxx)*



English
Edition

INDEX



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WORKSHOP MANUAL

Code 57.4401.8200 - 1st Edition 04/2006

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I, the undersigned.....
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The consignee

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Revision No.	Revision date	Revised pages	Notes	Issued by
1	04-2006		Publicated	
2				
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Sect. B SAFETY REGULATIONS

Sect. C TECHNICAL OPERATION DATA

Sect. D CHECKS AND ADJUSTMENTS

Sect. E DISMANTLING AND REASSEMBLY

Sect. F TROUBLESHOOTING

Sect. G DANA AXLE ASSEMBLY/DISMANTLING

Sect. H DEUTZ ENGINE MAINTENANCE

Sect. I REPAIR INSTRUCTIONS - REXROTH PUMP

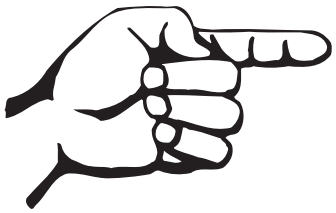
Sect. L REPAIR INSTRUCTIONS - REXROTH MOTOR

Machine denomination	Literature valid up to serial number
GTH 55-19	xxxxxx

Section C
TECHNICAL OPERATING DATA

SECTION INDEX

C.01 Principles of hydraulics .....
C.02 Hydraulic symbols ..... page 3
C.03 Hydraulic schemes 4
C.04 Electrical symbols 5
C.05 Wiring diagrams 6
C.06 Cylinder size 21
C.07 Control lever 26
C.08 Hydraulic main valve 27
C.09 Pumps and motors 28
C.10 Valves 30



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C.02 HYDRAULIC SYMBOLS

ACTUATORS
- Emergency controls
- Pushbutton control
- Rotary control
- Pedal control
- Proximity control
- Lever control
- Timed control
- Mechanical/manual control
- Key control

RESISTANCES
- Resistance
- Resistor
- Potentiometer
- Variable resistance

SIGNALS
- Intermittent lamp
- Whistle
- Lamp
- Buzzer
- Siren
- Bell
- Horn

FUSES AND RELAYS
- Horizontal fuse
- Relay

ACCUMULATORS
- Battery
- Thermocouple
- Element

TERMINALS AND GROUNDS
- Ring
- Ground
- Terminal
- Ground to frame
- Knot
- Protection ground
- Frame ground 2

COILS
- Coil
- Mechanical coupling coil
- Winding
- A/C coil
- Coil with diode
- Winding with diode

CONNECTORS
- Connector

STATIC APPLICATIONS
- Auto-transformer
- Transformer

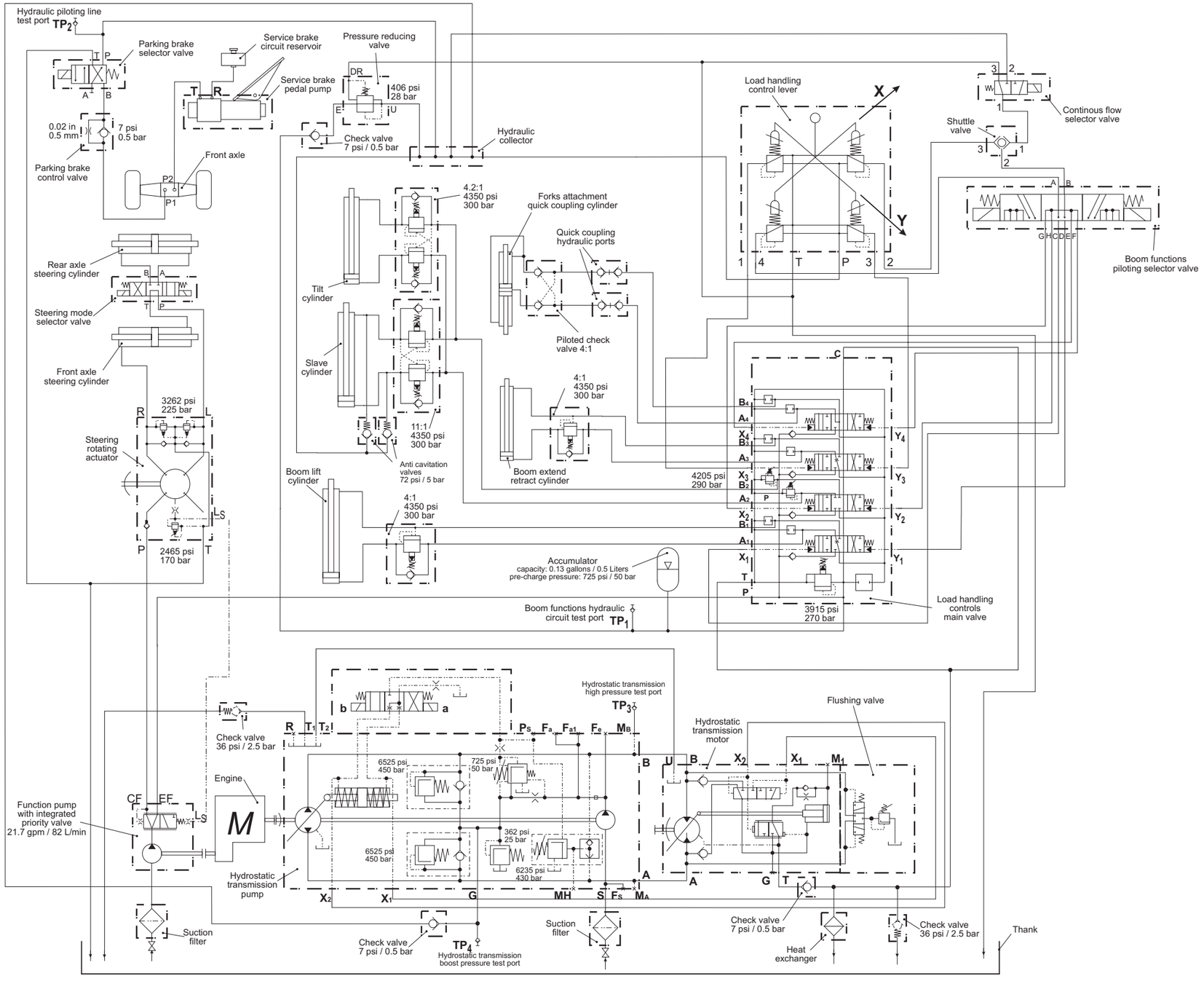
DYNAMIC APPLICATIONS
- Motor
- Generator
- As_3p_motor

ELECTRONIC PARTS
- Rectifier
- Light-emitting diode
- Diode
- Condenser

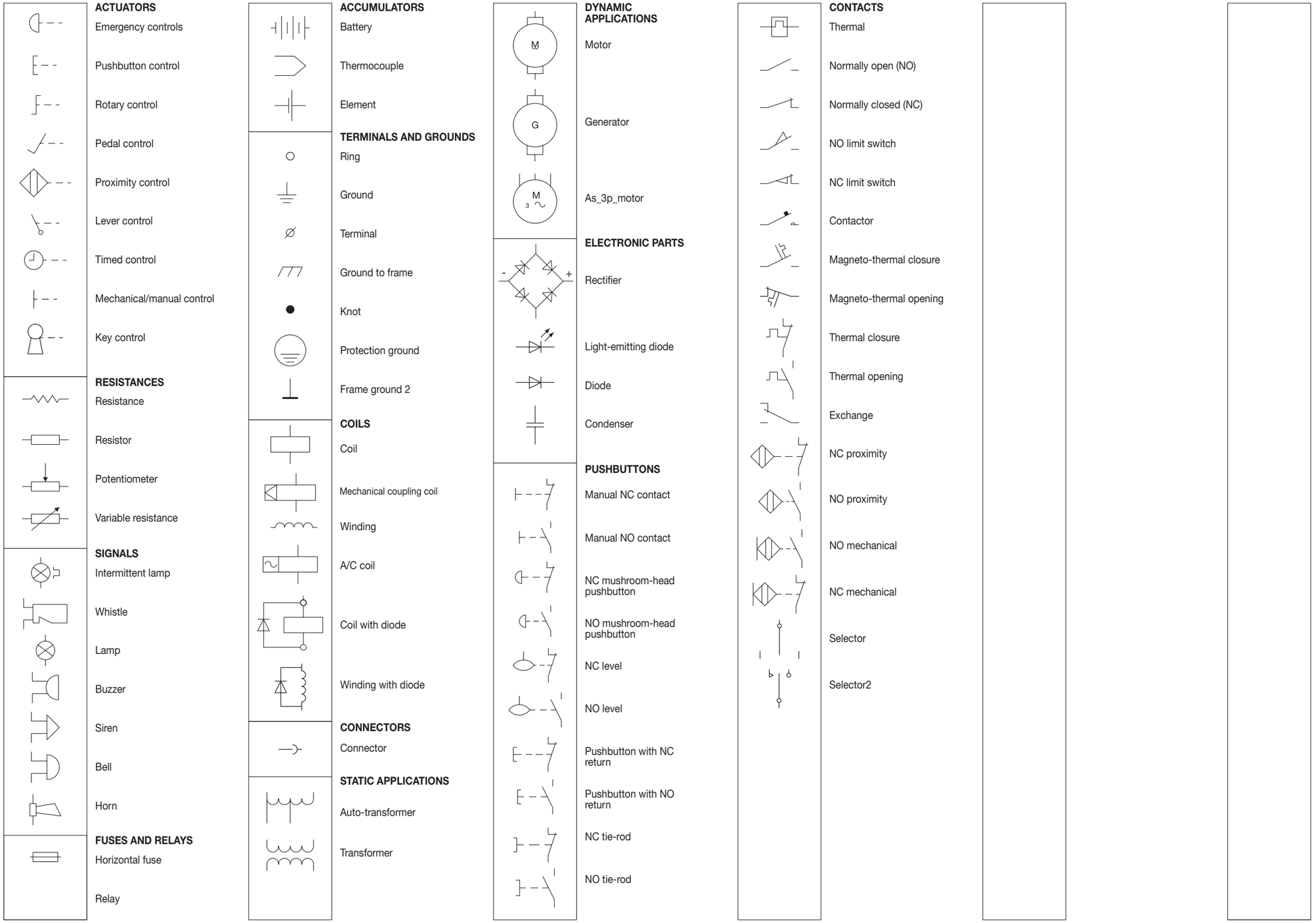
PUSHBUTTONS
- Manual NC contact
- Manual NO contact
- NC mushroom-head pushbutton
- NO mushroom-head pushbutton
- NC level
- NO level
- Pushbutton with NC return
- Pushbutton with NO return
- NC tie-rod
- NO tie-rod

CONTACTS
- Thermal
- Normally open (NO)
- Normally closed (NC)
- NO limit switch
- NC limit switch
- Contactor
- Magneto-thermal closure
- Magneto-thermal opening
- Thermal closure
- Thermal opening
- Exchange
- NC proximity
- NO proximity
- NO mechanical
- NC mechanical
- Selector
- Selector2

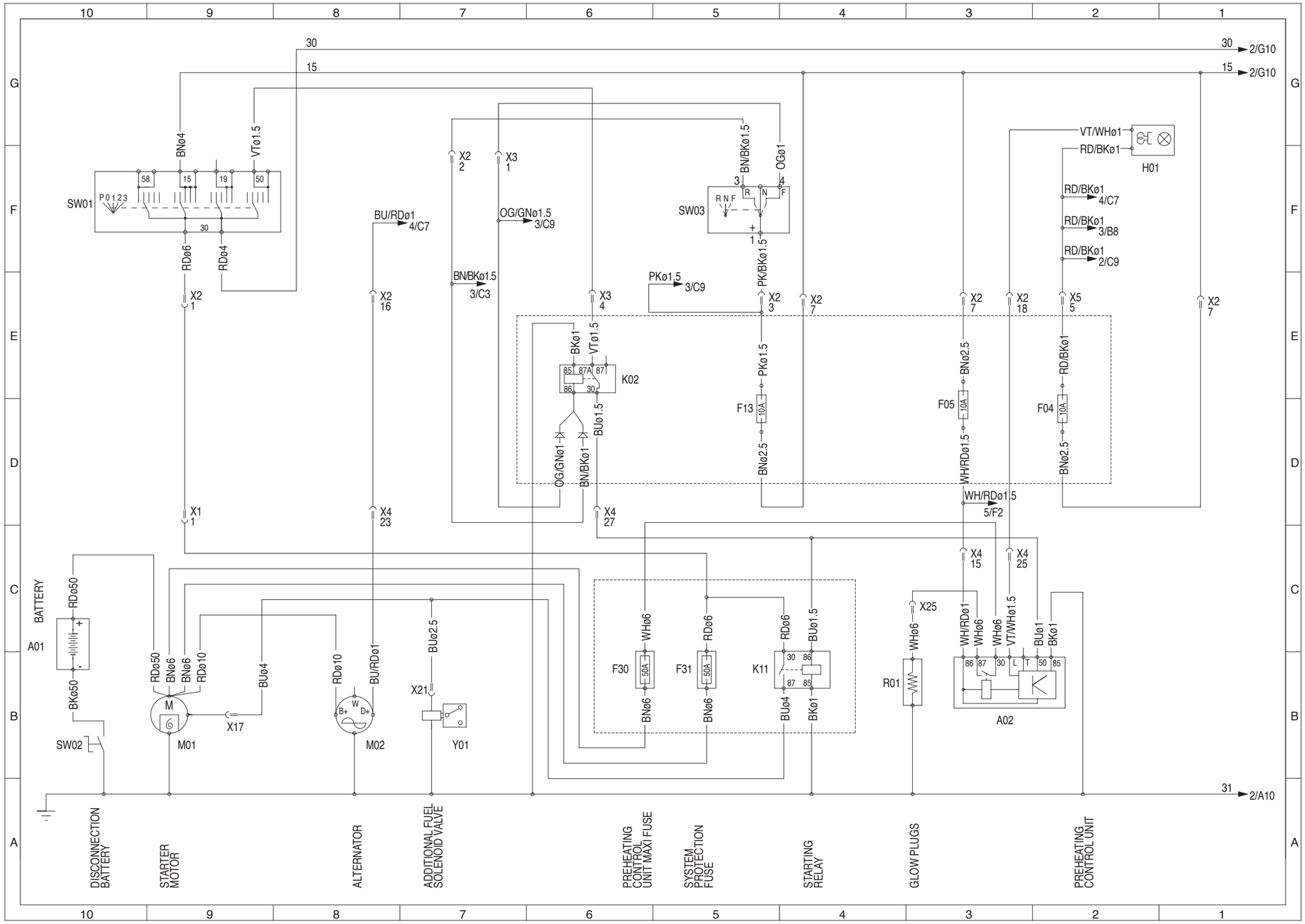
Operation: General hydraulic scheme	*Table:* **C.03**



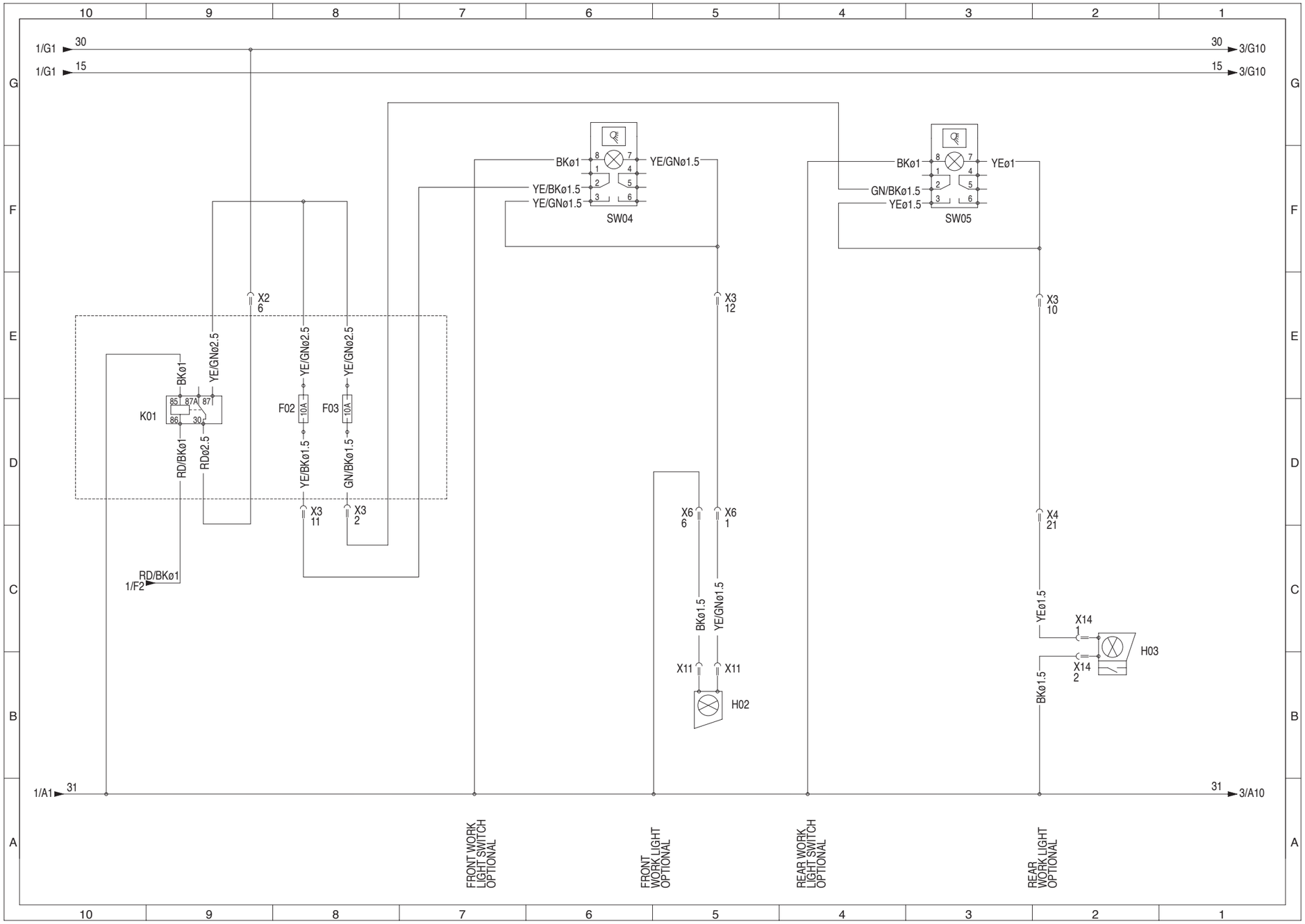
C.04 ELECTRICAL SYMBOLS



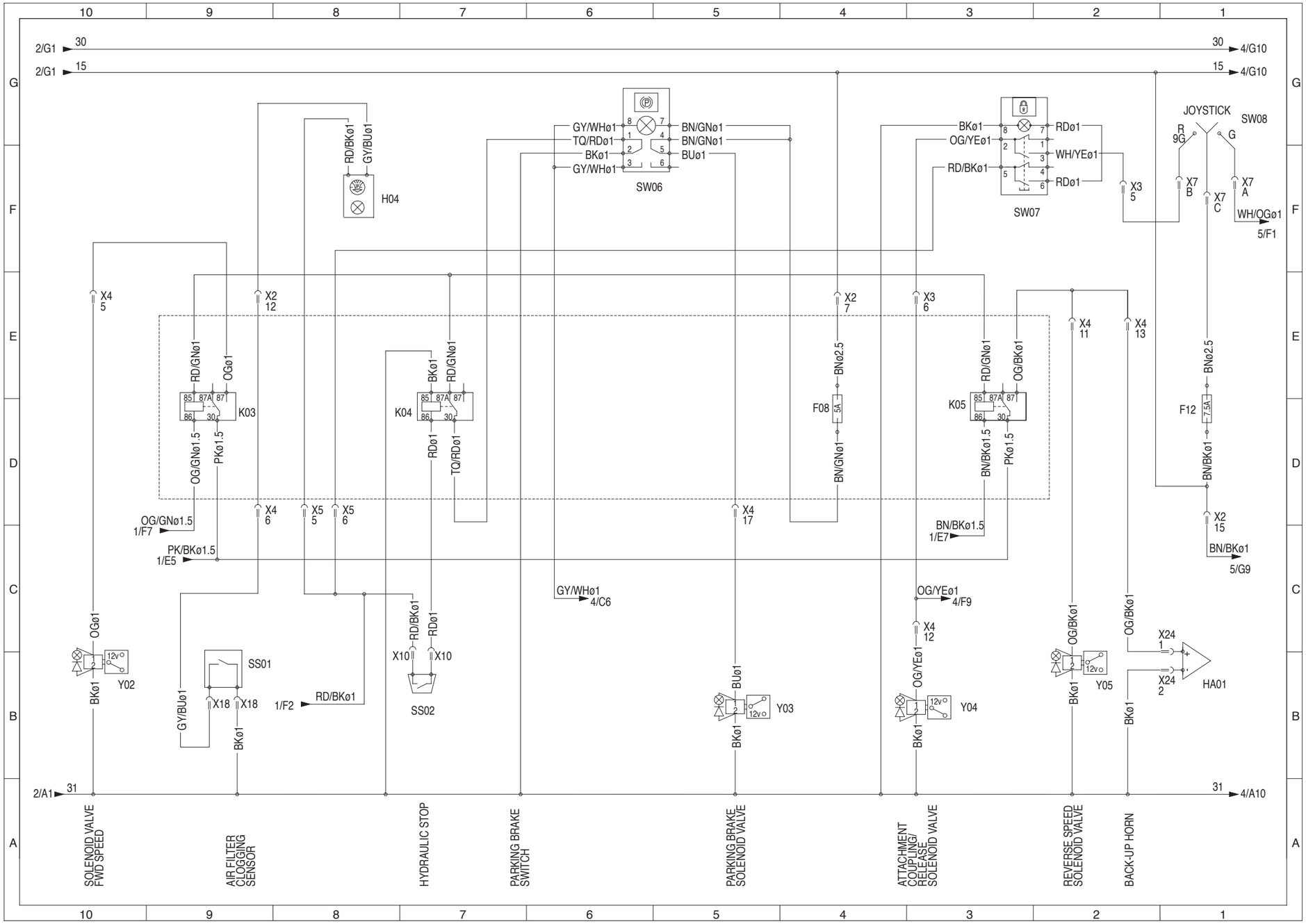
Operation: Wiring diagram - page 1 of 6	*Table:* **C.05.01**



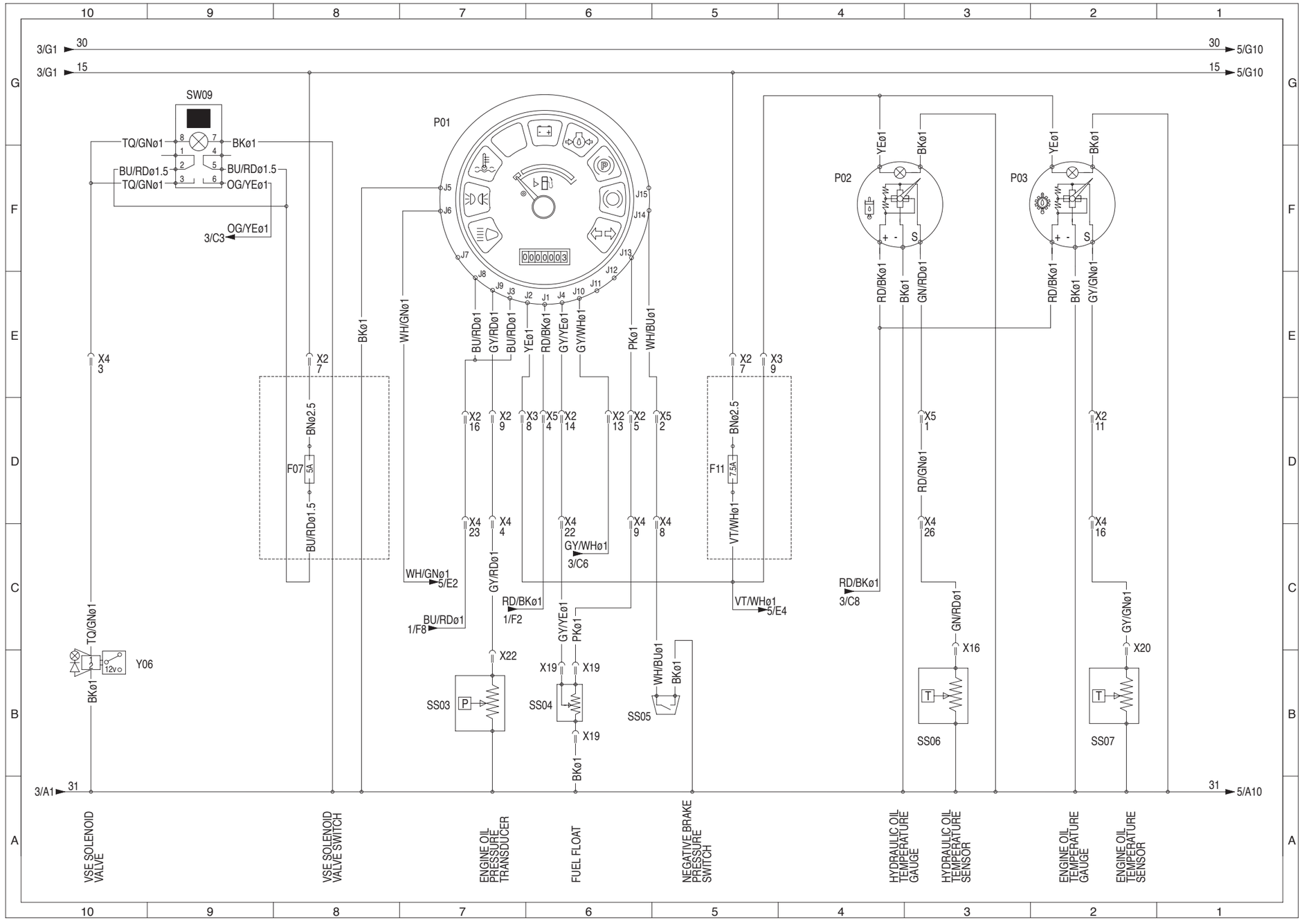
Operation: Wiring diagram - page 2 of 6	*Table:* **C.05.02**



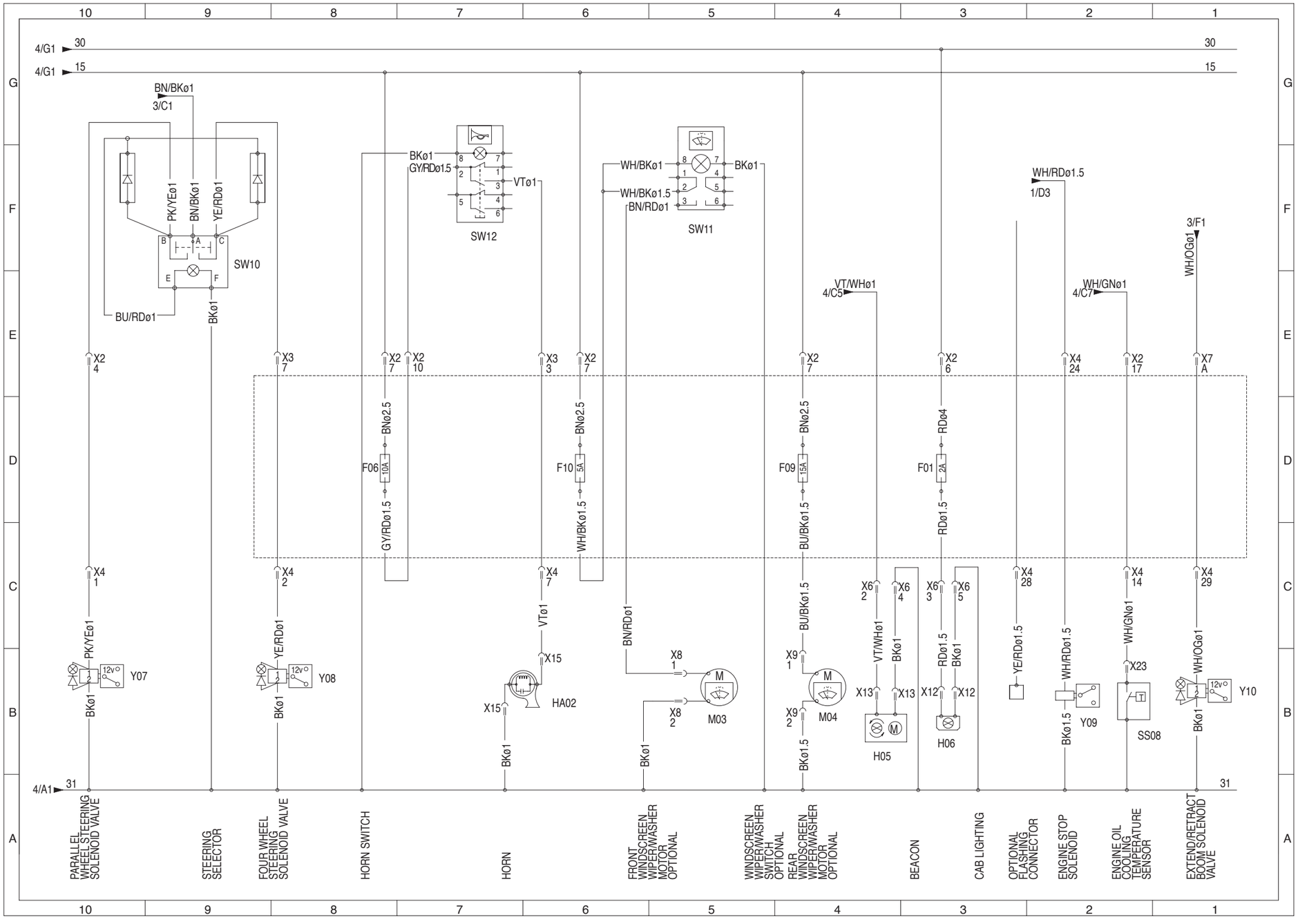
Operation: Wiring diagram - page 3 of 6	*Table:* **C.05.03**



Operation: Wiring diagram - page 4 of 6	*Table:* **C.05.04**



Operation: Wiring diagram - page 5 of 6	*Table:* **C.05.05**



Operation: Wiring diagram - page 6 of 6	Table: C.05.06

COLOUR TABLE	
Acronym	Colour
BK	Black
BN	Brown
RD	Red
OG	Orange
YE	Yellow
GN	Green
BU	Blue
VT	Violet
GY	Grey
WH	White
PK	Pink
TQ	Turquoise

LIST OF ABBREVIATION	
Label	Description
F##	Fuse
H##	Lamp, light
HA##	Clacson or back-up horn
K##	Relè
M##	Motor engine or pump
P##	Indicator
R##	Resistance
RP##	Potentiometer
SW##	Switces, selector
SS##	Sensor, microswitches, pressure switches, transducer
Y##	Solenoid valve
X##	Connectors
A##	Other components

Operation: Legend wiring diagram	Table: C.05.07

Label	Description	Page	Position
F1	INTERIOR LAMP POWER SUPPLY	5	D3
F2	FRONTWORK LIGHT SWITCH POWER SUPPLY	2	D8
F3	REAR WORK LIGHT SWITCH POWER SUPPLY	2	D8
F4	K1 RELAY EXCITATION, HYDRAULIC STOP, FUEL GAUGE INSTRUMENT POWER SUPPLY, GLOWE LIGHT INSTRUMENT, AIR FILTER SOILED WARNING LIGHT, VSE SWITCH LIGHT	1	D3
F5	POWER SUPPLY: ENGINE STOP SOLENOID, PREHEATING CONTROL UNIT	1	D3
F6	HORN SWITCH POWER SUPPLY	5	D8
F7	ATTACHMENT COUPLING/RELEASE SOLENOID VALVE POWER SUPPLY	4	D8
F8	PARKING BRAKE SWITCH POWER SUPPLY, PARKING BRAKE SOLENOID VALVE POWER SUPPLY	3	D4
F9	REAR WINDSCREEN WIPER/WASHER MOTOR POWER SUPPLY	5	D4
F10	WINDSCREEN WIPER/WASHER SWITCH POWER SUPPLY	5	D6
F11	BEACON POWER SUPPLY, LIGHTING: FUEL GAUGE WARNING LIGHT, HYDRAULIC OIL TEMPERATURE GAUGE ENGINE OIL TEMPERATURE GAUGE	4	D5
F12	STEERING SELECTOR POWER SUPPLY, JOISTICK	3	D1
F13	RELAY K3/RELAY K5 POWER SUPPLY	1	D5
F30	PREHEATING CONTROL UNIT MAXIFUSE	1	B6
F31	SYSTEM PROTECTION FUSE	1	B5
H01	PREHEATING GLOW PLUGS WARNING LIGHT	1	F2
H02	FRONT WORK LIGHT OPTIONAL	2	B5
H03	REAR WORK LIGHT OPTIONAL	2	B2
H04	AIR FILTER SOILED WARNING LIGHT	3	F8
H05	BEACON	5	B4
H06	CAB LIGHTING	5	B3
HA01	BACK-UP HORN	3	B1
HA02	HORN	5	B6
K1	FRONT/REAR WORK LIGHTS OPTIONAL	2	D9
K2	ENGINE START ENABLING COMMAND WITH SPEED LEVER IN NEUTER	1	E6
K3	FORWARD SPEED	3	D9
K4	FORWARD/REVERS SPEED ENABLING COMMAND	3	D4
K5	REVERSE SPEED	3	D3
K11	STARTING RELAY	1	B5
M01	STARTER MOTOR	1	B9
M02	ALTERNATOR	1	B8
M03	FRONT WINDSCREEN WIPER/WASHER MOTOR OPTIONAL	5	B5
M04	REAR WINDSCREEN WIPER/WASHER MOTOR OPTIONAL	5	B4
P01	WARNING LIGHTS-FUEL GAUGE	4	G7
P02	HYDRAULIC OIL TEMPERATURE GAUGE	4	F4
P03	ENGINE OIL TEMPERATURE GAUGE	4	F2

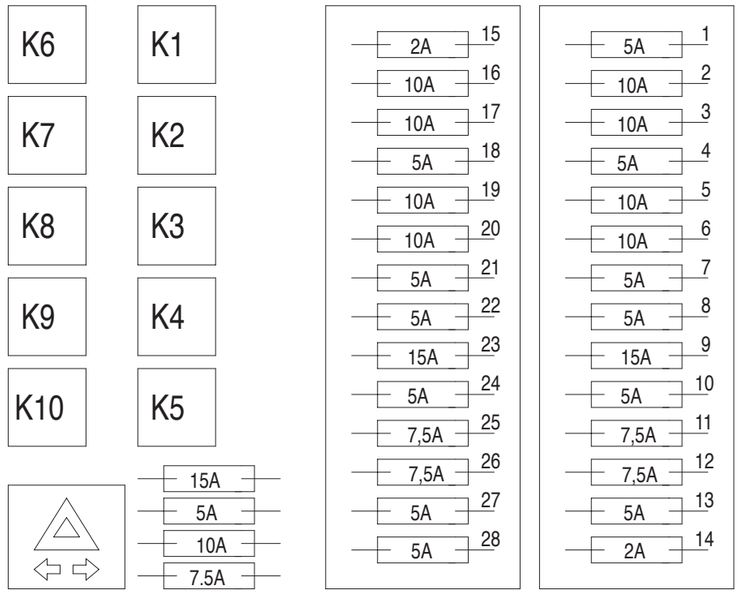
Label	Description	Page	Position
R01	GLOW PLUGS	1	B4
SW01	IGNITION KEY SWITCH	1	F10
SW02	DISCONNECTION BATTERY	1	B10
SW03	CHANGEOVER-OVER SWITCH	1	F5
SW04	FRONT WORK LIGHT SWITCH OPTIONAL	2	F6
SW05	REAR WORK LIGHT SWITCH OPTIONAL	2	F3
SW06	PARKING BRAKE SWITCH	3	F6
SW07	ATTACHMENT COUPLING/RELEASE SWITCH	3	G2
SW08	JOYSTICK	3	G1
SW09	VSE SOLENOID SWITCH	4	G9
SW10	STEERING SELECTOR	5	E9
SW11	FRONT WINDSCREEN WIPER/WASHER SWITCH OPTIONAL	5	F5
SW12	HORN SWITCH	5	F7
SS01	AIR FILTER CLOGGING SENSOR	3	B9
SS02	HYDRAULIC STOP	3	B7
SS03	ENGINE OIL PRESSURE TRANSDUCER	4	B7
SS04	FUEL FLOAT	4	B6
SS05	NEGATIVE BRAKE PRESSURE SWITCH	4	B5
SS06	HYDRAULIC OIL TEMPERATURE SENSOR	4	B3
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SS08	ENGINE OIL COOLING TEMPERATURE SENSOR	5	B2
Y01	ADDITIONAL FUEL SOLENOID VALVE	1	B7
Y02	SOLENOID VALVE-FWD SPEED	3	C10
Y03	PARKING BRAKE SOLENOID VALVE	3	B5
Y04	ATTACHMENT COUPLING/RELEASE SOLENOID VALVE	3	B3
Y05	REVERSE SPEED SOLENOID VALVE	3	B2
Y06	VSE SOLENOID VALVE	4	B10
Y07	WHEEL STEERING SOLENOID VALVE	5	B10
Y08	WHEEL STEERING SOLENOID VALVE	5	B8
Y09	ENGINE STOP SOLENOID	5	B2
Y10	EXTEND/RETRACT BOOM SOLENOID VALVE	5	B1
A01	12V BATTERY	1	C10
A02	PREHEATING CONTROL UNIT	1	B3

Operation: Legend wiring diagram	Table: C.05.07

Label	Description	Page	Position
X01	ENGINE CONNECTOR 4 WAYS		
X02	CAB CONNECTOR 18 WAYS		
X03	CAB CONNECTOR 12 WAYS		
X04	ENGINE CONNECTOR 29 WAYS		
X05	CAB CONNECTOR 6 WAYS		
X06	CAB CONNECTOR 6 WAYS		
X07	JOYSTICK CONNECTOR 3 WAYS		
X08	FRONT WINDSCREEN CONNECTOR 2 WAYS		
X09	REAR WINDSCREEN CONNECTOR 2 WAYS		
X10	HYDRAULIC STOP CONNECTOR 2 WAYS		
X11	WORK LIGHT CONNECTOR 2 WAYS		
X12	CAB LIGHTING CONNECTOR 2 WAYS		
X13	BEACON CONNECTOR 2 WAYS		
X14	BEACON CONNECTOR 2 WAYS		
X15	KLAXON CONNECTOR 2 WAYS		
X16	HYDRAULIC OIL TEMPERATURE CONNECTOR 1 WAY	4	B3
X17	STARTER MOTOR CONNECTOR 1 WAY	1	B9
X18	AIR FILTER CLOGGING CONNECTOR 2 WAYS		
X19	FUEL LEVEL CONNECTOR 3 WAYS	4	B6
X20	ENGINE OIL TEMPERATURE CONNECTOR 1 WAY	4	B2
X21	ADDITIONAL FUEL CONNECTOR 1 WAY	1	B7
X22	ENGINE OIL PRESSURE CONNECTOR 1 WAY	4	B7
X23	HIGH TEMPERATURTE CONNECTOR 1 WAY	5	B2
X24	BACK-UP HORN CONNECTOR 2 WAYS		
X25	GLOW PLUGS CONNECTOR 1 WAY		

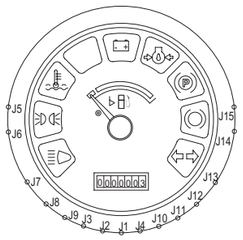
Operation: Fuse and relays	Table: C.05.08

FUSES AND RELAYS



Operation: Connectors	Table: C.05.09

P01 — DASHBOARD LIGHT INDICATOR



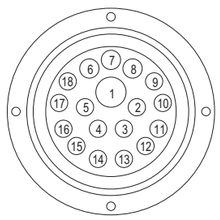
Pin	Colour Engine Line	Colour Fuse Line	Description
J1	RD/BKø1		+12 V FROM F04
J2	YEø1		LIGHT DASHBOARD FROM F11
J3	BU/RDø1		LIGHT BATTERY + SIGNAL COUNTER FROM M02
J4	GY/YEø1		FUEL LEVEL FROM SS04
J5	BKø1		GROUND
J6	WH/GNø1		HIGH TEMPERATURE FROM SS08
J7	N. C.		
J8	BU/RDø1		LIGHT BATTERY + SIGNAL COUNTER FROM M02
J9	GY/RDø1		ENGINE OIL PRESSURE FROM SS03
J10	GY/WHø1		PARKING BRAKE FROM SW06
J11	N. C.		
J12	N. C.		
J13	PKø1		LIGHT LOW LEVEL FUEL FROM SS04
J14	WH/BUø1		BRAKE PRESSURE FROM SS05

X01 — ENGINE CONNECTOR 4 WAYS



Pin	Colour Engine Line	Colour Fuse Line	Description
1	RDø6		+12 V FROM F31
2	BKø2.5		GROUND
3	BKø4		GROUND
4	N.C.		

X02 — CAB CONNECTOR 18 WAYS



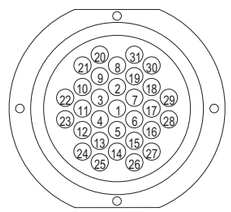
Pin	Colour Engine Line	Colour Fuse Line	Description
1	RDø6		+12 V FROM F31
2	BN/BKø1.5		SW03 POSITION R TO K2 AND K5
3	PK/BKø1.5		+12 V PER DEVIO SW03
4	PK/YEø1		FROM SW10 TO Y07
5	PKø1		LIGHT LOW LEVEL FUEL J13 OF P01
6	RDø4		+12 V TO K1
7	BNø4		+12 V FROM KEY SWITCH
8	BKø2.5		GROUND
9	GY/RDø1		LIGHT ENGINE OIL PRESSURE J09 OF P01
10	GY/RDø1.5		+12 V PER SW12
11	GY/GNø1		FROM ENGINE OIL TEMPER.SENSOR TO P03
12	GY/GNø1		LIGHT FILTER FROM CLOGGING SENSOR SS1
13	GY/WHø1		PARKING BRAKE LIGHT J10 OF P01
14	GY/YEø1		FUEL LEVEL J04 OF P01
15	BN/BKø1		+12 V STEERING SELECTOR
16	BU/RDø1		ALTERNATOR AND BATTERY LIGHT J03-J08 OF P01
17	WH/GNø1		FROM SENSOR SS08 TO J6 OF P01
18	VT/WHø1.5		PREHEATING LIGHT H01 FROM A02

X03 — CAB CONNECTOR 12 WAYS



Pin	Colour Engine Line	Colour Fuse Line	Description
1	OG/GNø1.5		FROM SW03 F TO K02 AND K03
2	GN/BKø1.5		+12 V PER SW05
3	VTø1		+12 V FROM SW12 TO HA02 (KLAXON)
4	VTø1.5		+12 V PER K2
5	WH/YEø1		+12 V PER SW07
6	OG/YEø1		SWITCH SW07
7	YE/RDø1		FROM SW10 TO Y08
8	YEø1		+12 V PER J02 OF P01
9	YEø1		+12 V LIGHT P02 AND P03
10	YEø1.5		+12 V REAR WORK LIGHTFROM SW05 TO H03
11	YE/BKø1.5		+12 V PER SW04 FROM F02
12	YE/GNø1.5		+12 V PER X06 PIN 1 FROM SW04 TO H02

X04 — ENGINE CONNECTOR 29 WAYS



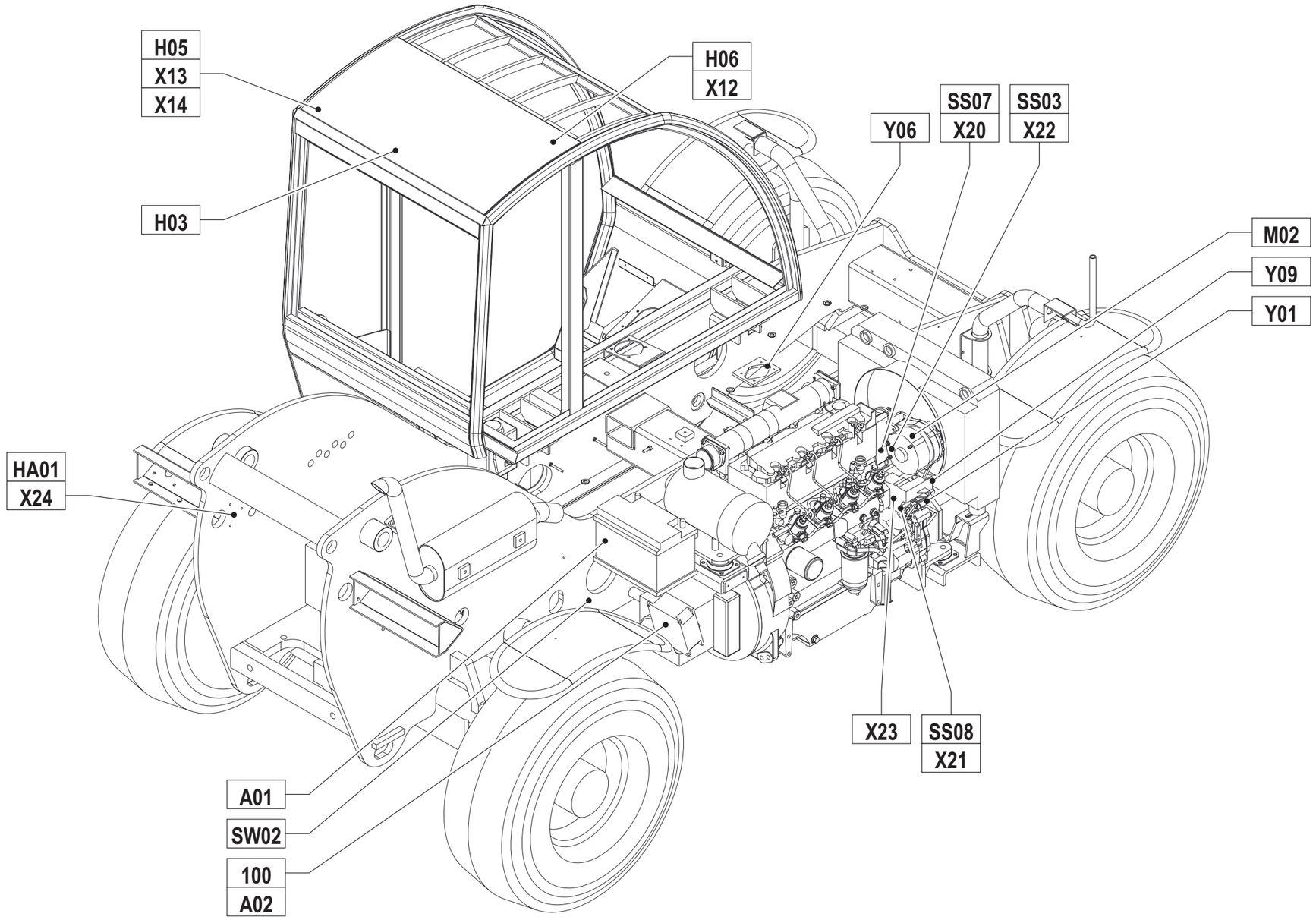
Pin	Colour Engine Line	Colour Fuse Line	Description
1	PK/YEø1		+12 V S. V. PARALLEL STEER. FROM SW10 TO YO7
2	YE/RDø1		+12 V S. V. FOURWHEEL STEER. FROM SW10 TO Y08
3	TQ/GNø1		+12 V S.V. VSE FROM SW09 TO Y06
4	GY/RDø1		ENGINE OIL PRESSURE LIGHT FROM SS03 TO P01
5	OGø1		+12 V FRONT SPEED FROM K03 TO Y02
6	GY/BUø1		AIR FILTERCLOGGING SENSOR SS01 TO H04
7	VTø1		+12 V KLAXON FROM HA02 TO SW12
8	WH/BUø1		NEGATIVE BRAKE PRESSURE SWITCH SS05 TO P01
9	PKø1		FUEL FLOAT SSO4 TO P01
10	N. C.		
11	OG/BKø1		+12 V REAR SPEED FROM K05 TO Y05
12	OG/YEø1		S.V. RELEASE ATTACH. FROM Y04 TO SW07 AND SW09
13	OG/BKø1		+12 V BACK-UP HORN FROM K05 TO HA01
14	WH/GNø1		HIGH TEMP. ENG. SENSOR FROM SS09 TO P01
15	WH/RDø1		+12 V GLOW PLUGS FROM F02 TO A02
16	GY/GNø1		ENGINE OIL TEMP. SENSOR SS07 TO P03
17	BUø1		S.V. PARKING BRAKE SW03 TO Y03
18	N. C.		
19	N. C.		
20	N. C.		
21	YEø1.5		+12 V REAR WORK LIGHT SW05 TO H03
22	GY/YEø1		FUEL FLOAT SS04 TO P01
23	BU/RDø1		RECHARGE BATTERY SIGNAL M02 TO P01
24	WH/RDø1.5		ENGINE STOP SOLENOID FROM F05 TO Y09
25	VT/WHø1.5	VT/WHø1	PREHEATING LIGHT FROM K02 TO A02
26	GN/RDø1		HYDR. OIL TEMP. SENSOR SS06 A P02
27	YE/RDø1.5	BUø1.5	+12 V START MOTOR DEUTZ FROM K02 TO A02
28	YE/RDø1.5		OPTIONAL
29	WH/OGø1		+12 V EXTEND/RETRACT S.V. FROM SW08 TO Y10

Operation: Connectors	Table: C.05.09

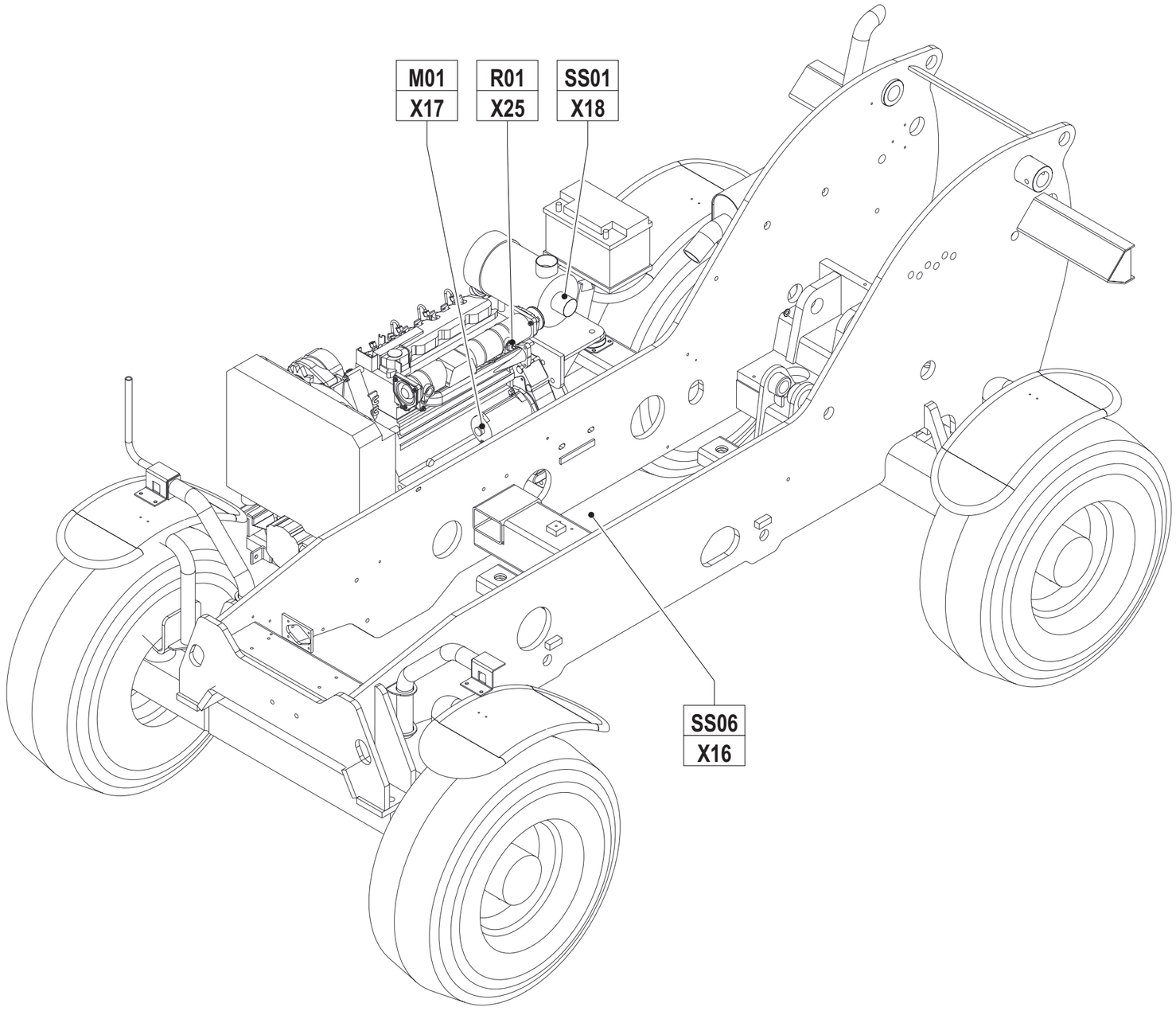
Connector	Pin	Colour Engine Line	Colour Fuse Line	Description
X05 CAB CONNECTOR 6 WAYS	1	GN/RDø1		SIGNAL PER P02 FROM SS06
	2	WH/BUø1		+12 V BRAKE PRESS. LIGHT P01 J14
	3	N. C.		
	4	RD/BKø1		+12 V J1 OF P01
	5	RD/BKø1		+12 V H01, ECCIT. K01, SS02, H04
	6	RD/BKø1		+12 V LIGHT SW07
X06 CAB CONNECTOR 6 WAYS	1	YE/GNø1.5		WORK LIGHT OPTIONAL H02
	2	WH/VTø1		BEACON H05
	3	RDø1.5		CAB LIGHTING H06
	4	BKø1		GROUND
	5	BKø1		GROUND
	6	BKø1		GROUND
X07 JOYSTICK CONNECTOR 3 WAYS	A	WH/OGø1		JOYSTICK SIDE 1
	B	WH/GNø1		JOYSTICK SIDE 2
	C	BN/BKø1		+12 V JOYSTICK
X08 FRONT WINDSCREEN CONNECTOR 2 WAYS	1	BN/RDø1		+12 V WINDSCREEN M03
	2	BKø1		GROUND
X09 REAR WINDSCREEN CONNECTOR 2 WAYS	1	BU/BKø1.5		+12 V WINDSCREEN M04
	2	BKø1.5		GROUND
X10 HYDRAULIC STOP CONNECTOR 2 WAYS	1	RD/BKø1		HYDRAULIC STOP SIGNAL
	2	RDø1		HYDRAULIC STOP SIGNAL
WORK LIGHT CONNEC. 2 WAYS X11	1	YE/GNø1.5		+12 V LIGHT H02
	2	BKø1.5		GROUND
CAB LIGHTING CONNEC. 2 WAYS X12	1	RDø1.5		+12 V CAB LIGHTING H06
	2	BKø1		GROUND
BEACON CONNEC. 2 WAYS X13	1	WH/VTø1		+12 V BEACON H05
	2	BKø1		GROUND
X14 BEACON CONNEC. 2 WAYS	1	YEø1.5		+12 V LIGHT H03
	2	BKø1.5		GROUND

Connector	Pin	Colour Engine Line	Colour Fuse Line	Description
X15 KLAXON CONNEC. 2 WAYS	1	VTø1		+12 V KLAXON HA02
	2	BKø1		GROUND
OIL TEMP. SENS. CONNECTOR X16	1	GN/RDø1		HYDR. OIL TEMP.SENSOR SS06
START. TEMP. CONNECTOR X17	1	BUø4		STARTER TEMPERATURE M01
X18 AIR FILT. CLOG. SENS. CONNECT. 2 WAYS	1	GY/BUø1		AIR FILTER CLOGGING SENSOR SS01
	2	BKø1		GROUND
X19 FUEL FOLAT CONNECTOR 3 WAYS	1	GY/YEø1		FUEL FLOAT SS04
	2	PKø1		FUEL FLOAT SS04
	4	BKø1		GROUND
OIL TEMP. SENS. CONNECTOR X20	1	GY/GNø1		ENGINE OIL TEMP. SENSOR SS07
ADDITIONAL FUEL CONNECTOR X21	1	BUø2.5		ADDITIONAL FUEL Y01
OIL PRESS. CONNECTOR X22	1	GY/RDø1		ENGINE OIL PRESSURE SENSOR SS03
HIGH TEMP. CONNECTOR X23	1	WH/GNø1		HIGH TEMPERATURE SENSOR SS08
X24 BACK-UP HORN CONNECTOR 2 WAYS	1	OG/BKø1		BACK-UP HORN HA01
	2	BKø1		GROUND
GLOW PLUGS CONNECTOR X25	1	WH/GNø1		GLOW PLUGS R01

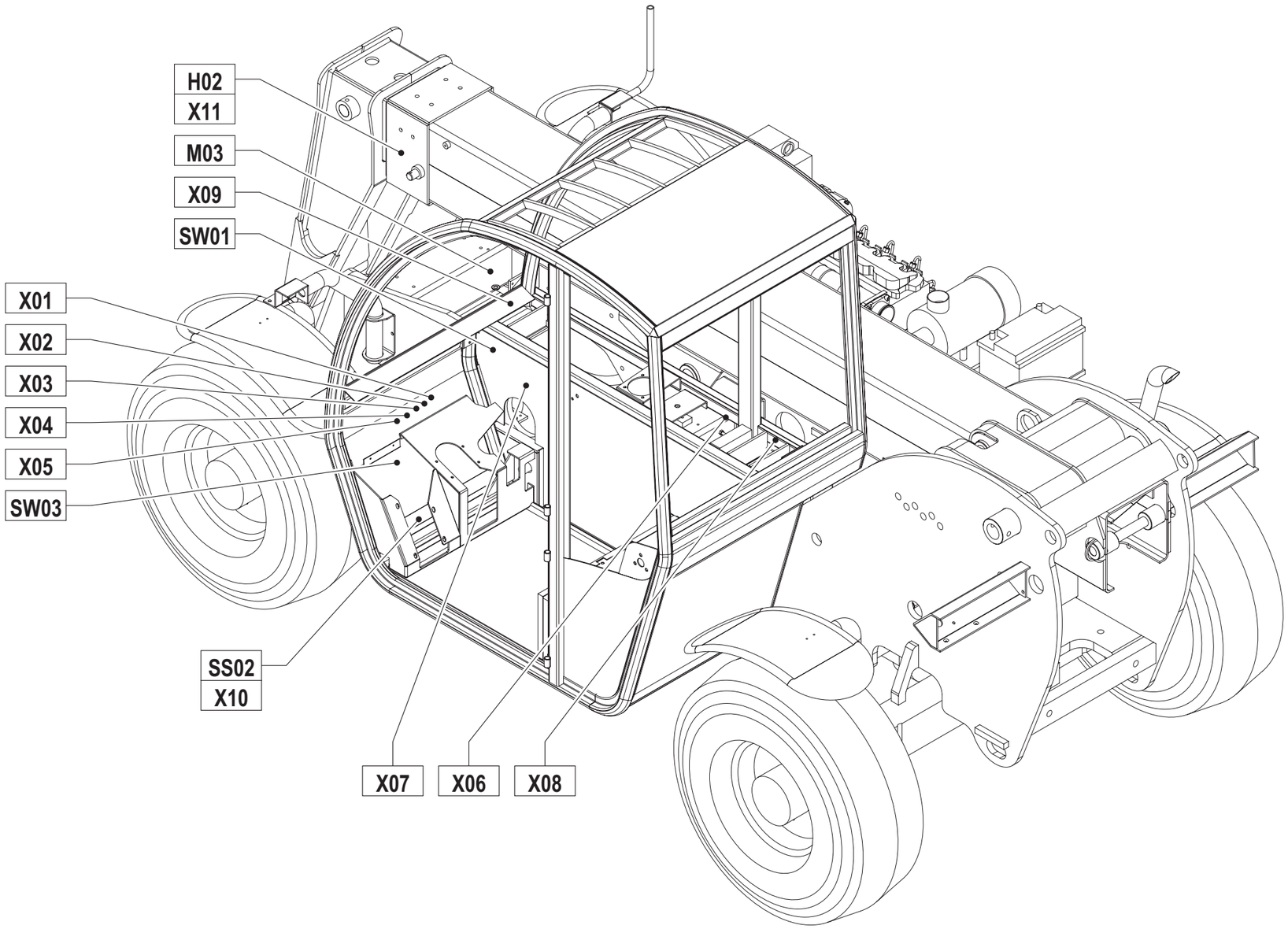
Operation: Position of the electrical components on the machine	*Table:* **C.05.10**



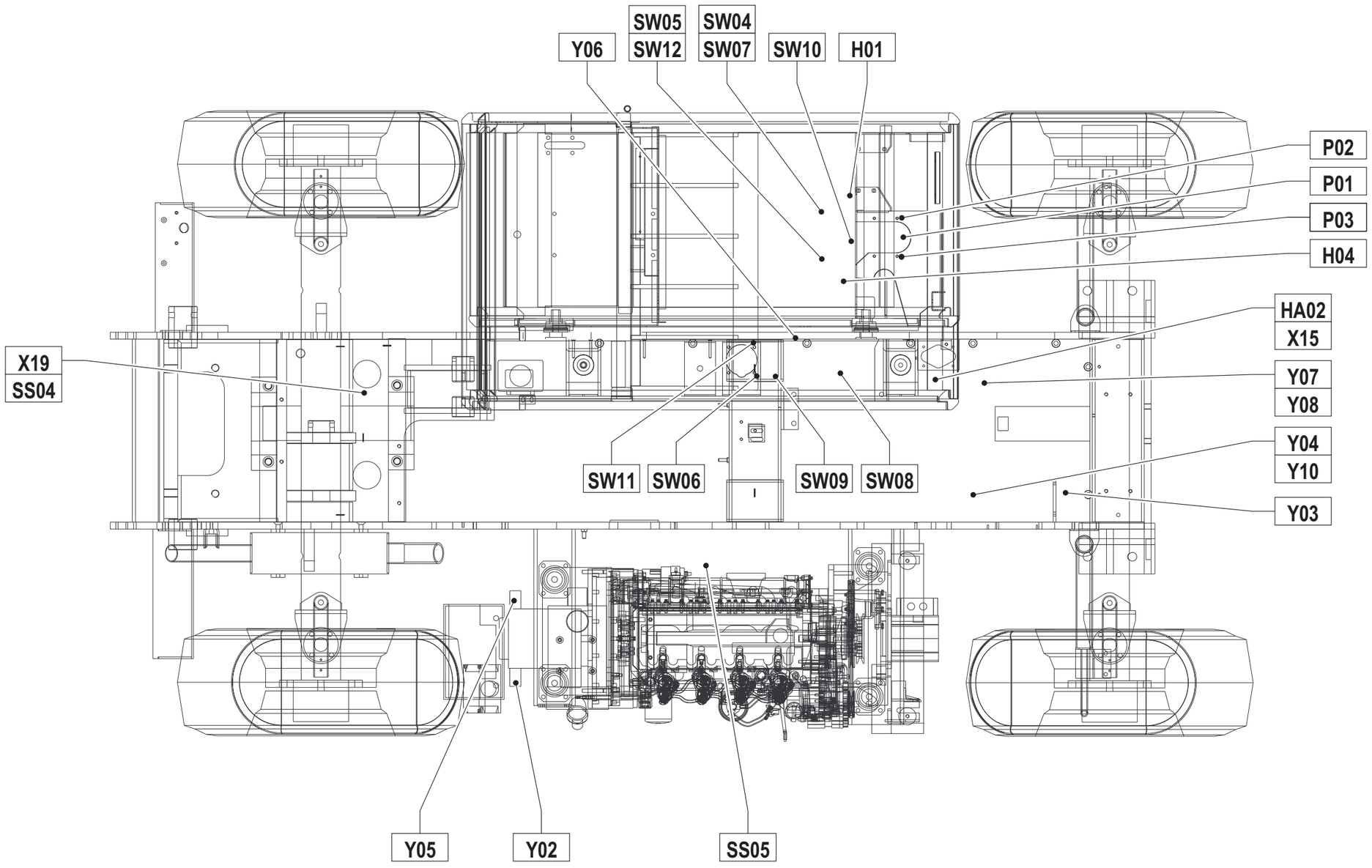
Operation: Position of the electrical components on the machine	*Table:* **C.05.10**



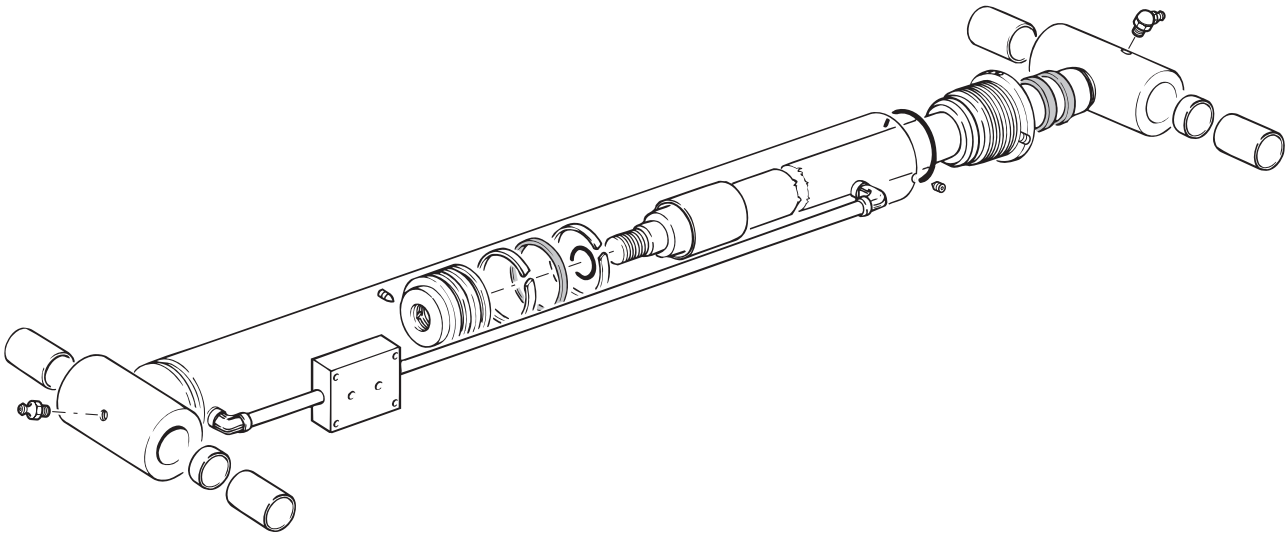
Operation: Position of the electrical components on the machine	*Table:* **C.05.10**

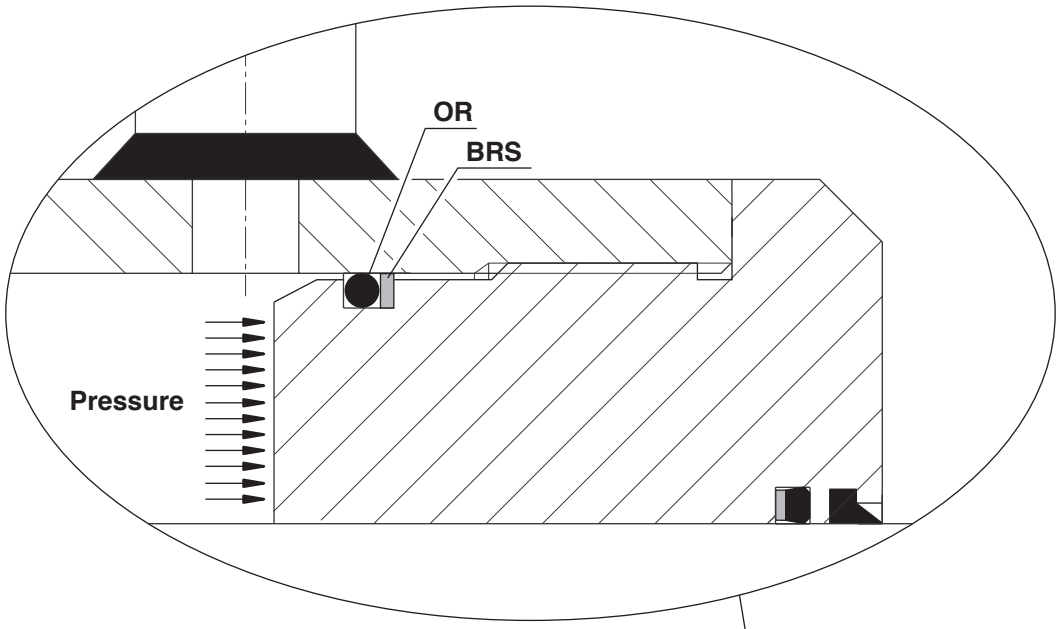


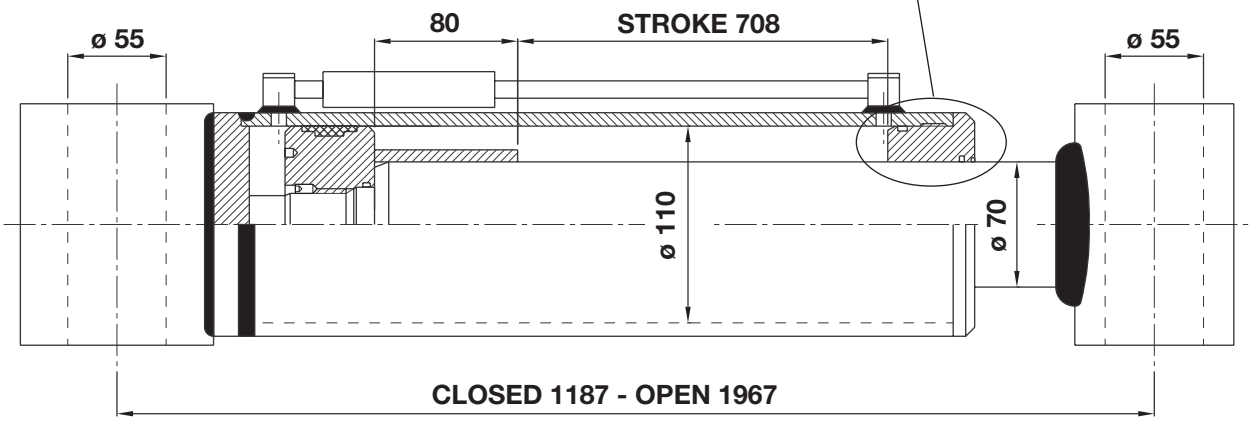
Operation: Position of the electrical components on the machine	*Table:* **C.05.10**



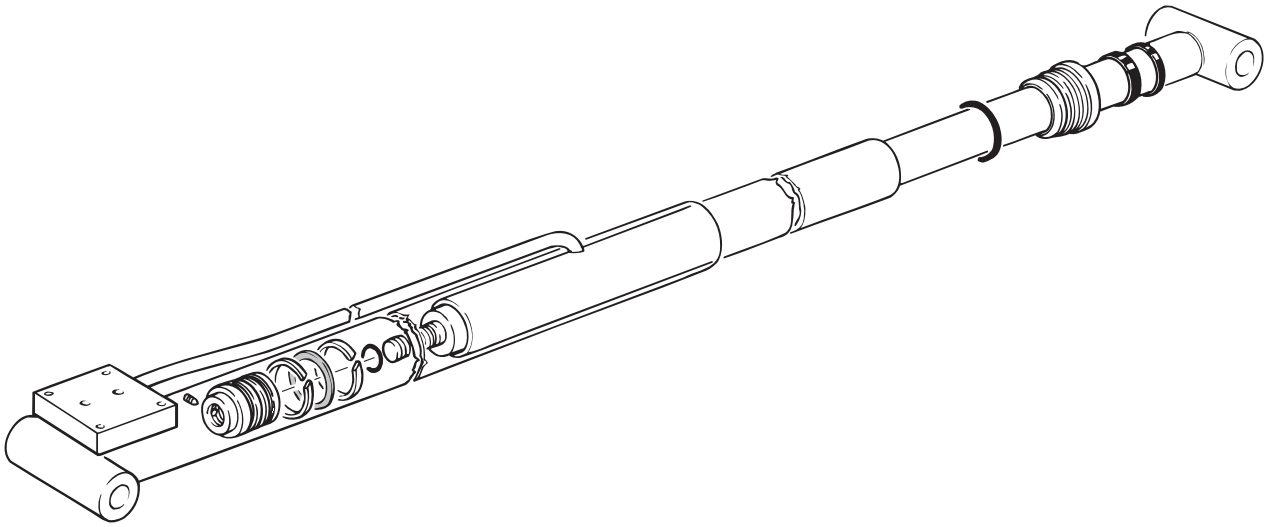
Operation: Boom raising cylinder	Table: C.06.01

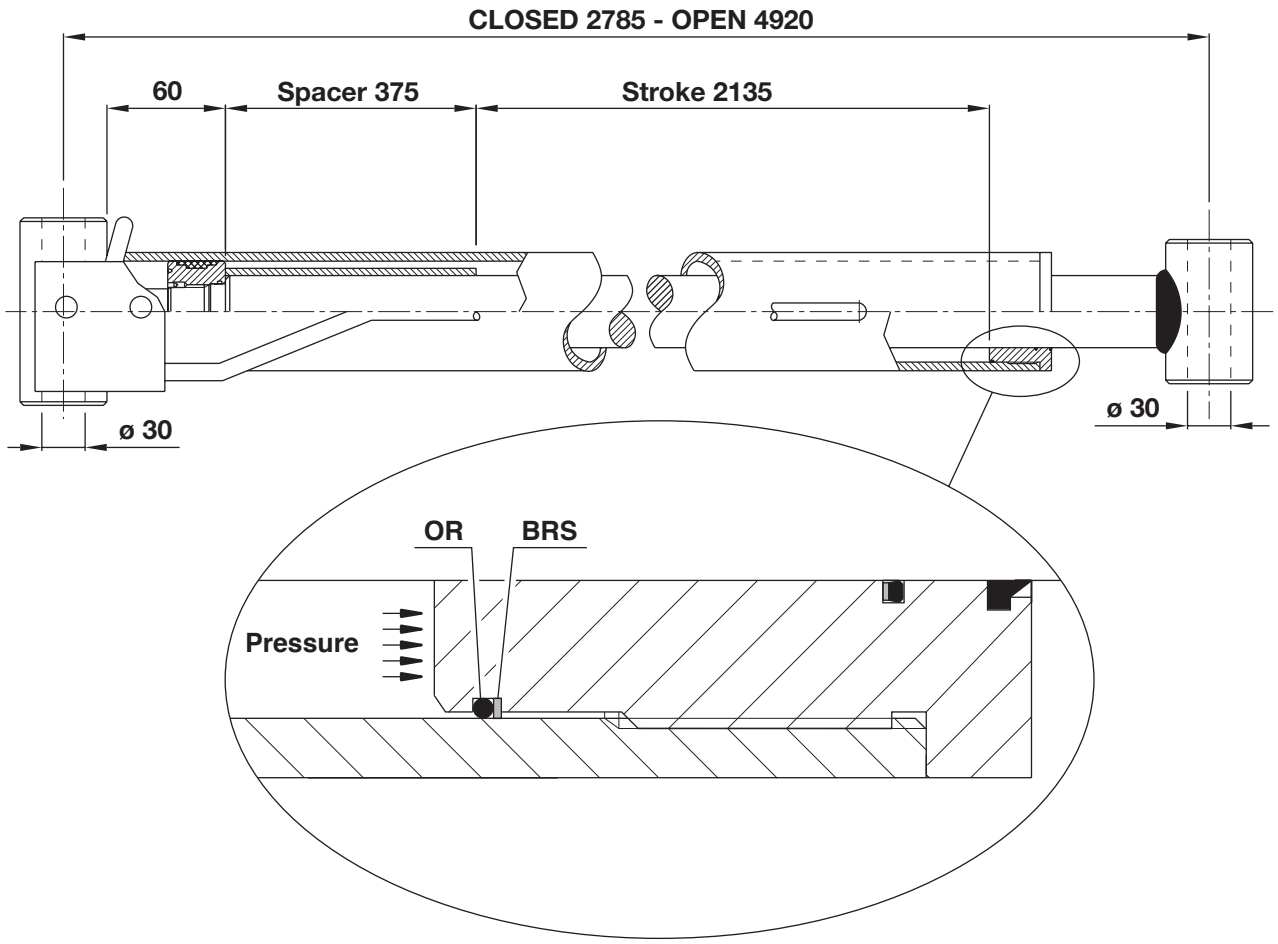




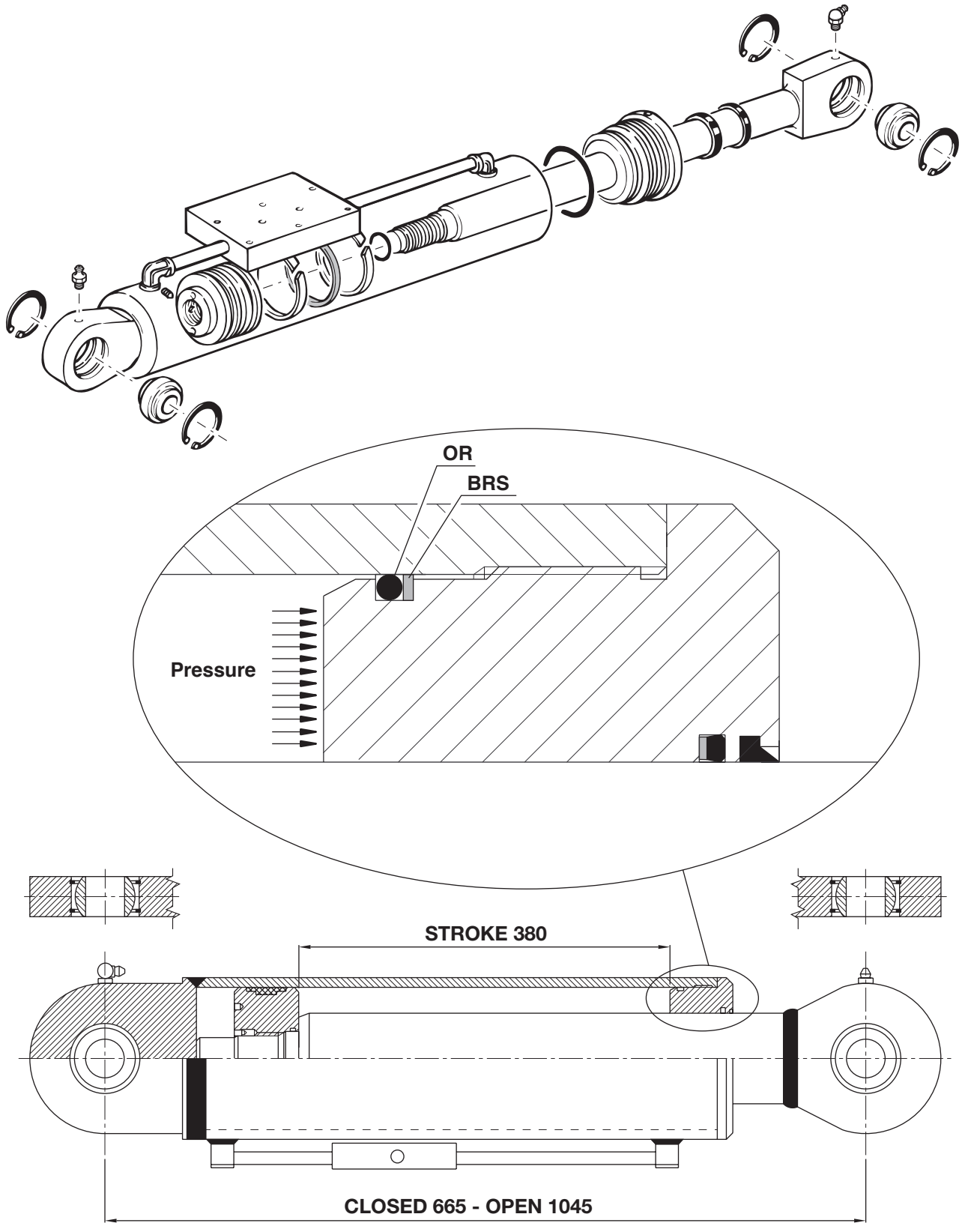


Operation: Boom extension cylinder	Table: C.06.02

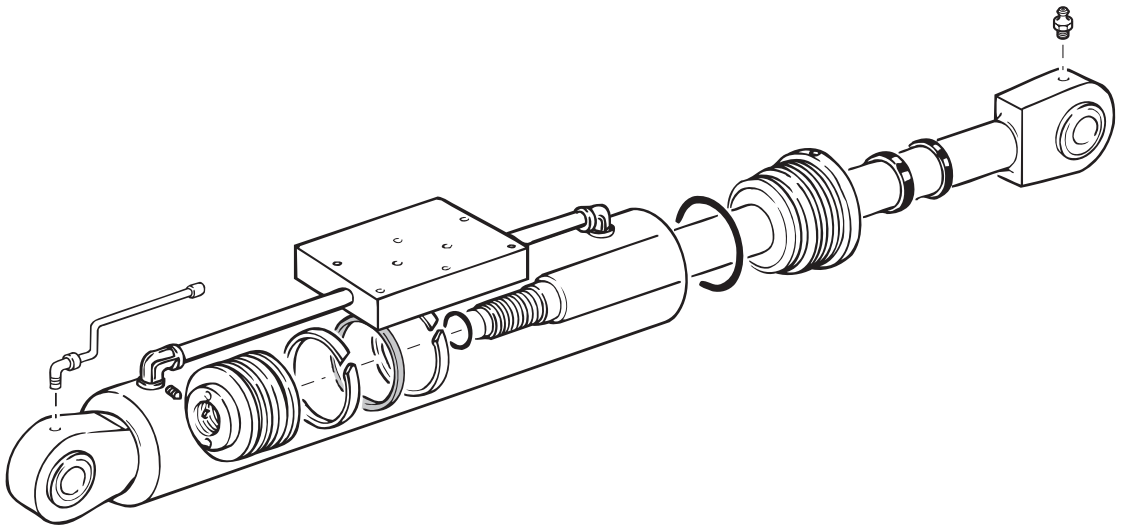


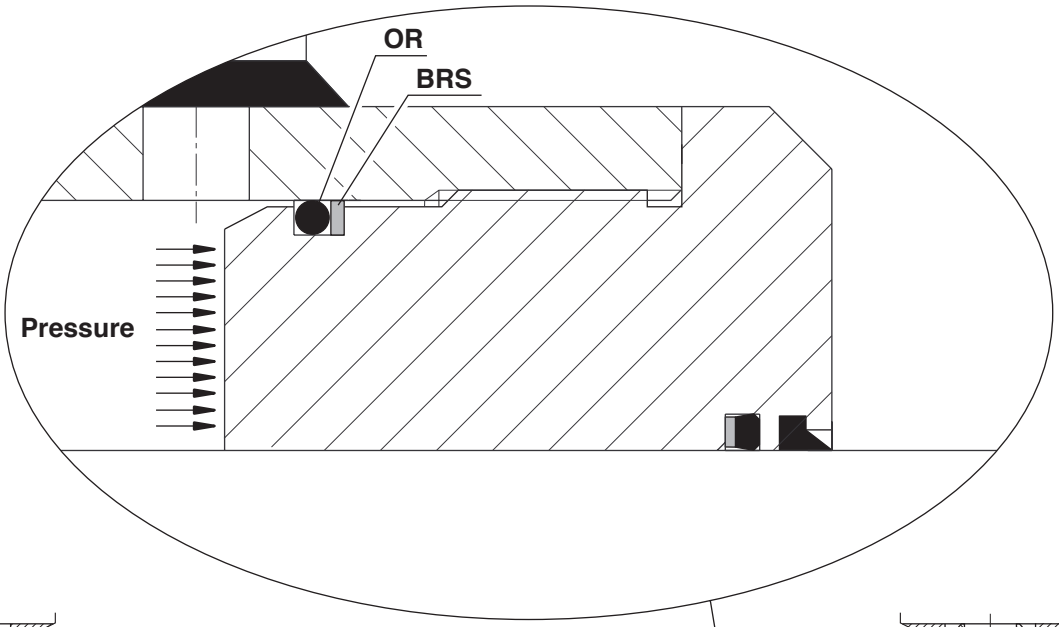


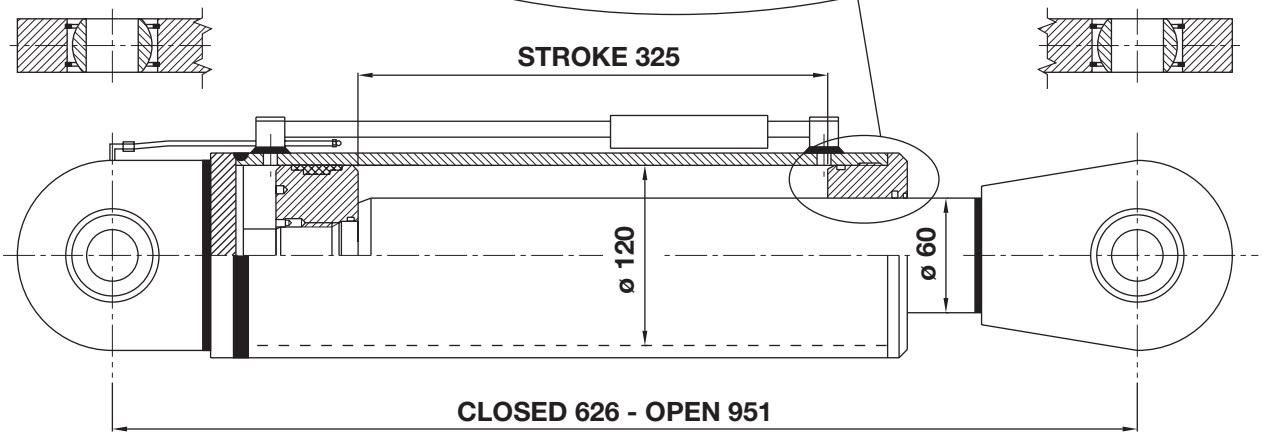
Operation: Balance cylinder	*Table:* **C.06.03**



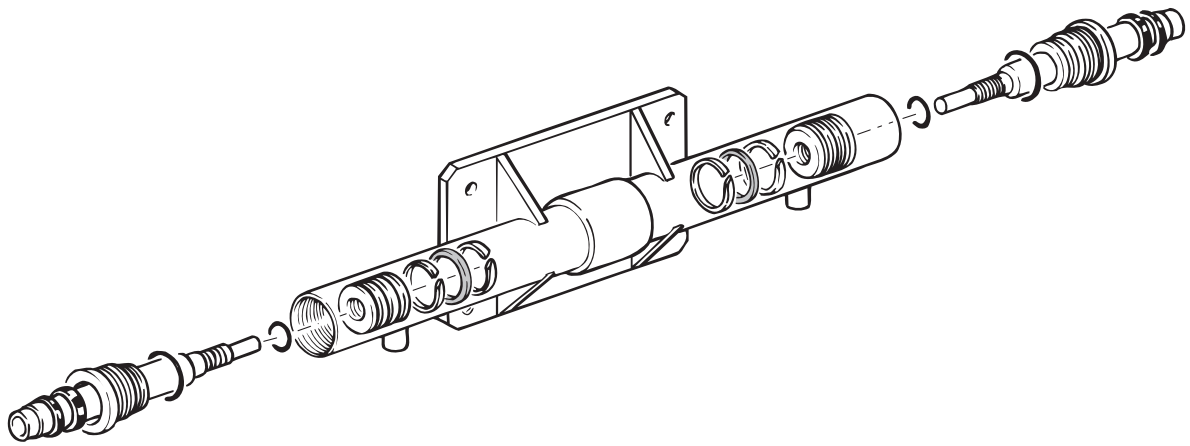
Operation: Fork movement cylinder	*Table:* **C.06.04**

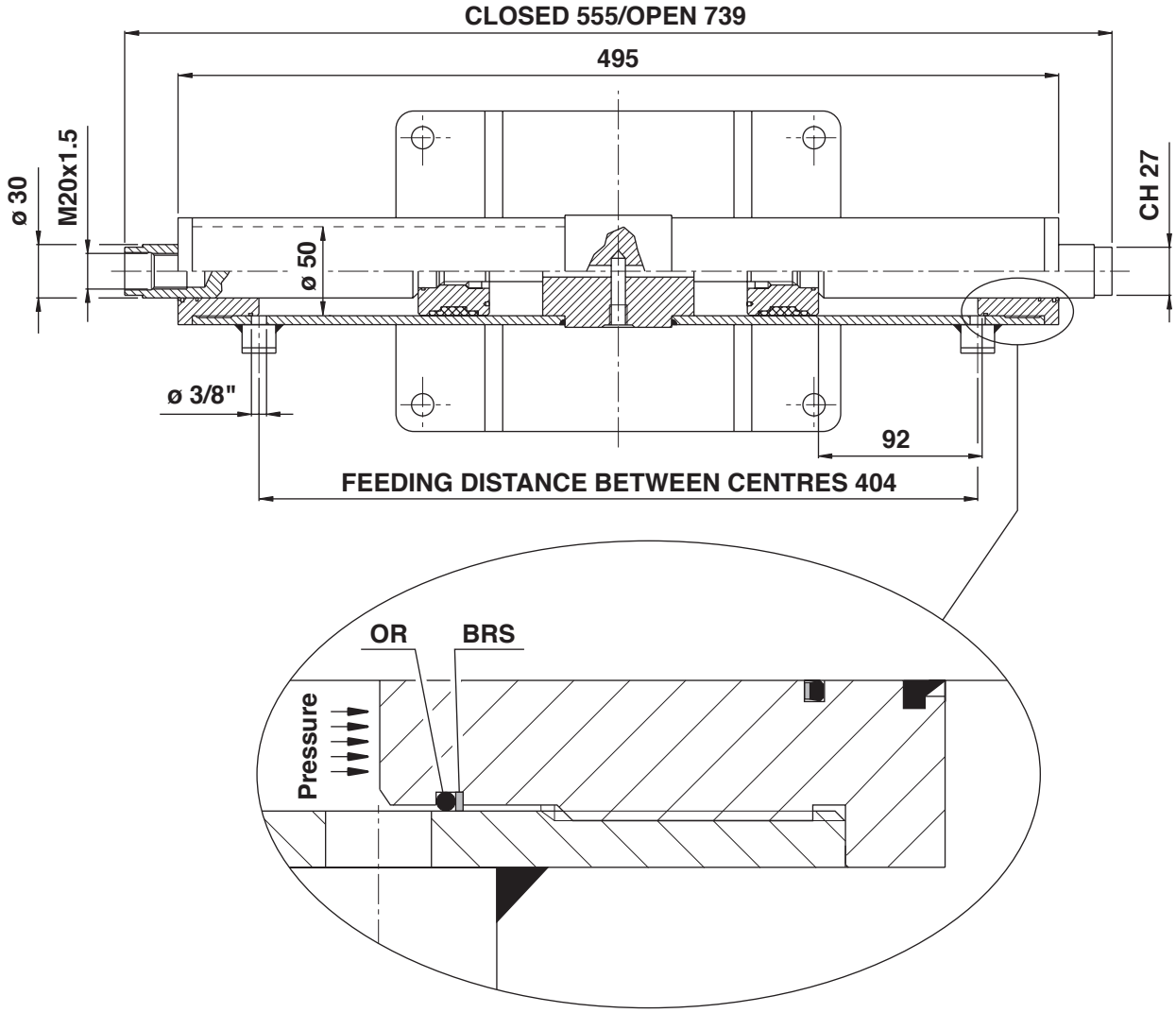




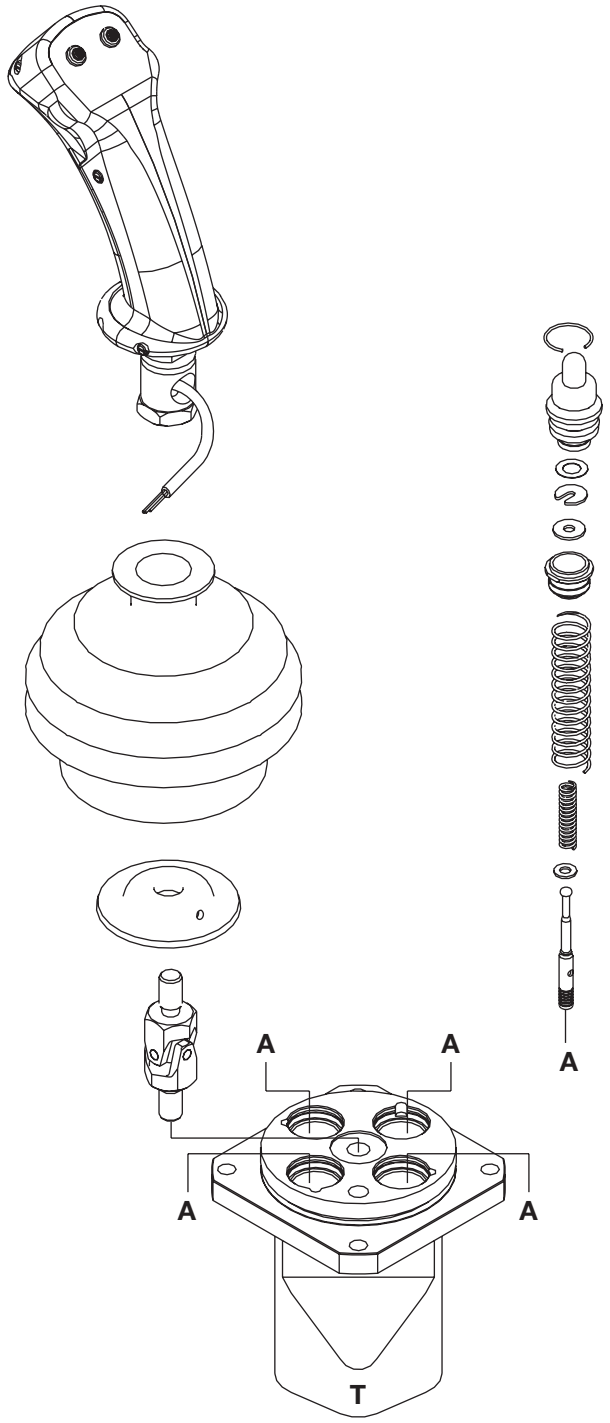


Operation: Attachment locking cylinder	*Table:* **C.06.05**



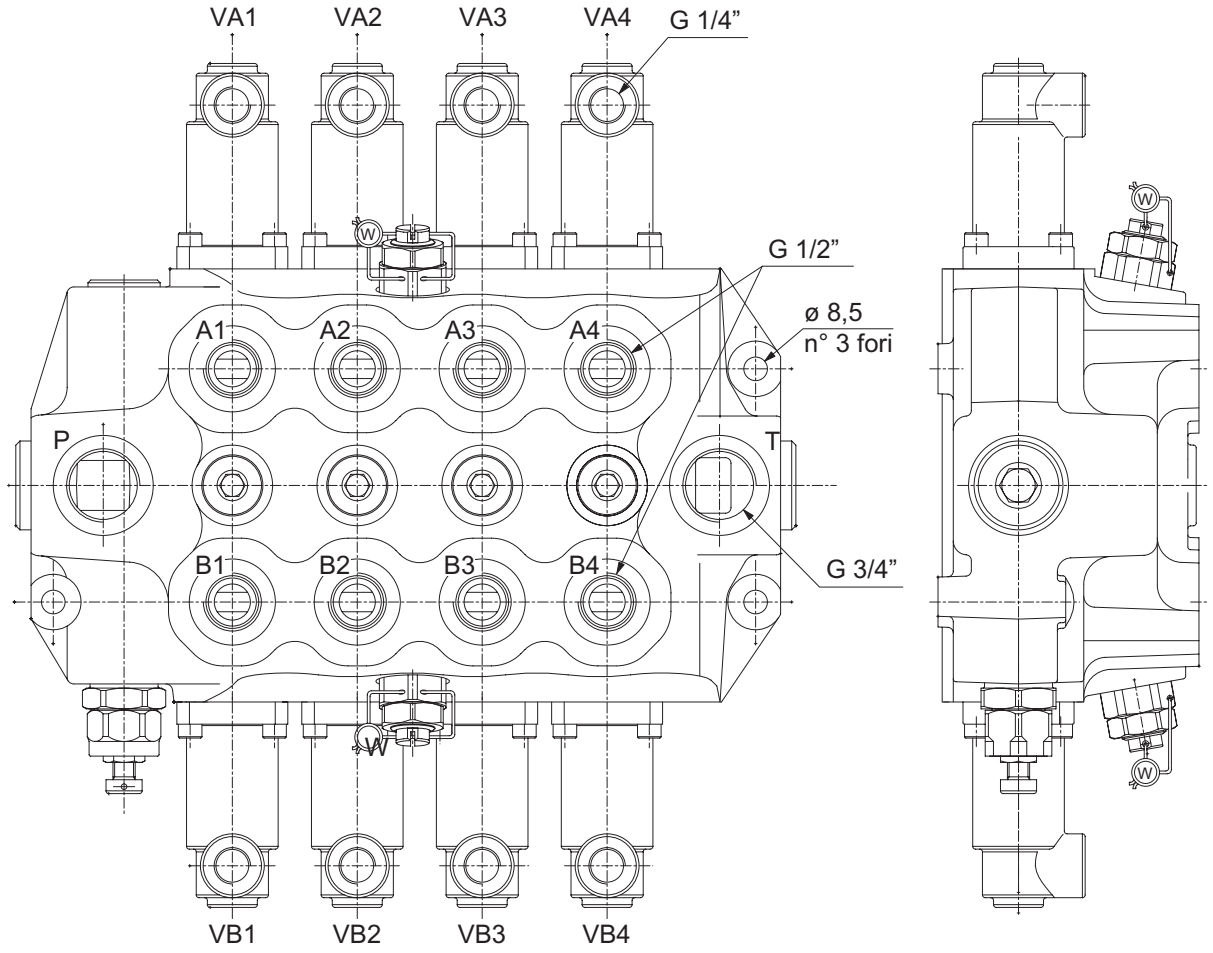


Operation: Hand-lever	Table: C.07



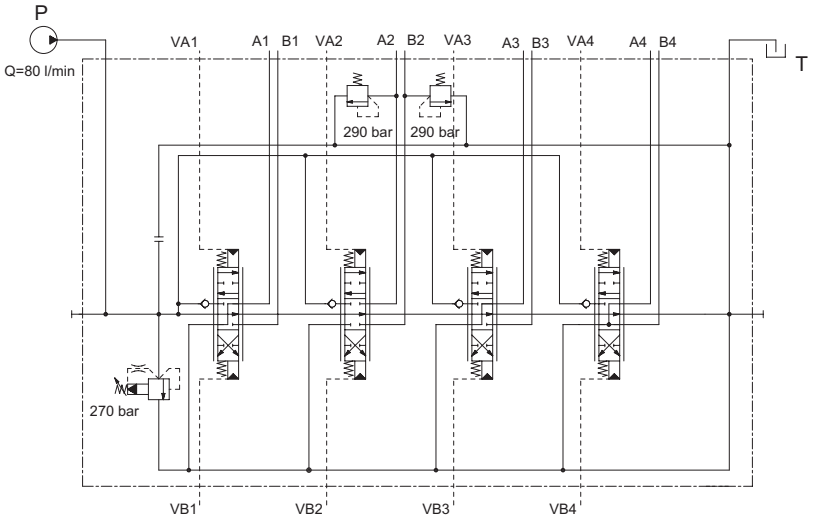


Operation: Hydraulic main valve	*Table:* **C.08**

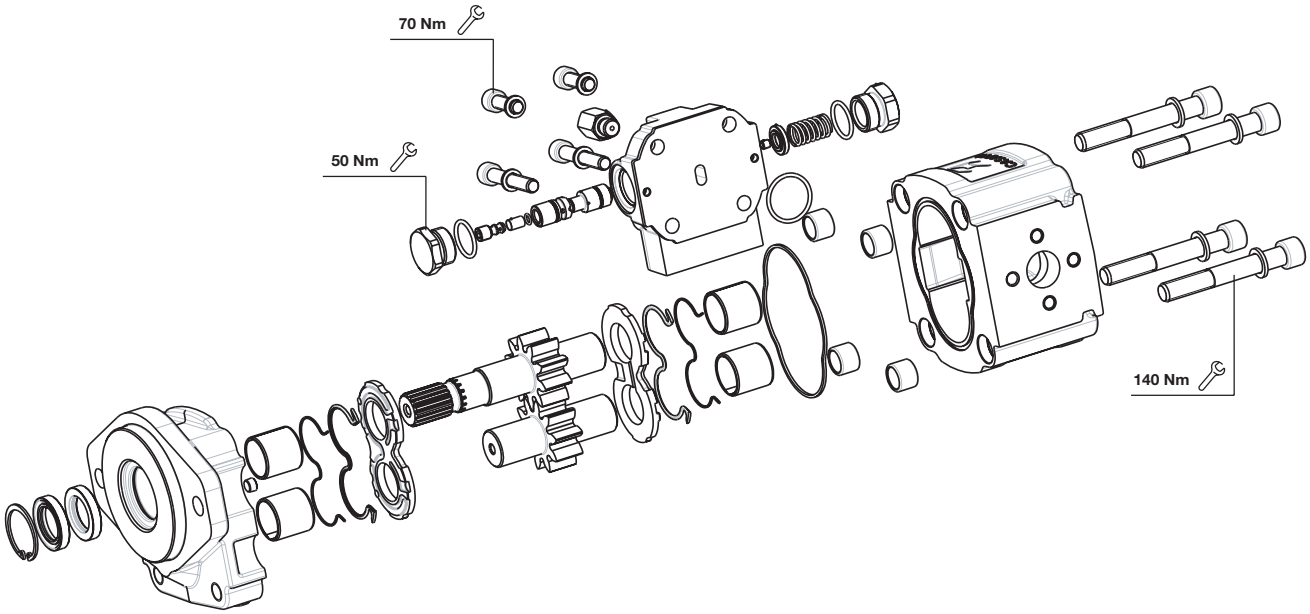


DATA	
Monobloc actuator with paralleled circuit	
Working elements	4
Slider diameter	18 mm
OPERATING CONDITIONS (mineral oil - viscosity 46 mm²/s @ 40|BC)	
Nominal flow	80 l/min
Nominal pressure	315 bar
Max pressure on V	50 bar
Max back-pressure to drain T	25 bar
Max internal leakage A(B)->T @ 100 bar:	3 cm³/min
Viscosity – working range	15 - 75 mm²/s
Viscosity – minimum	12 mm²/s
Viscosity – maximum	400 mm²/s
Ambient temperature	-40|B a +60|BC
Fluid temperature range	-20|B a +80|BC
Admissible contamination degree	19/16 - ISO 4406

HYDRAULIC SCHEME



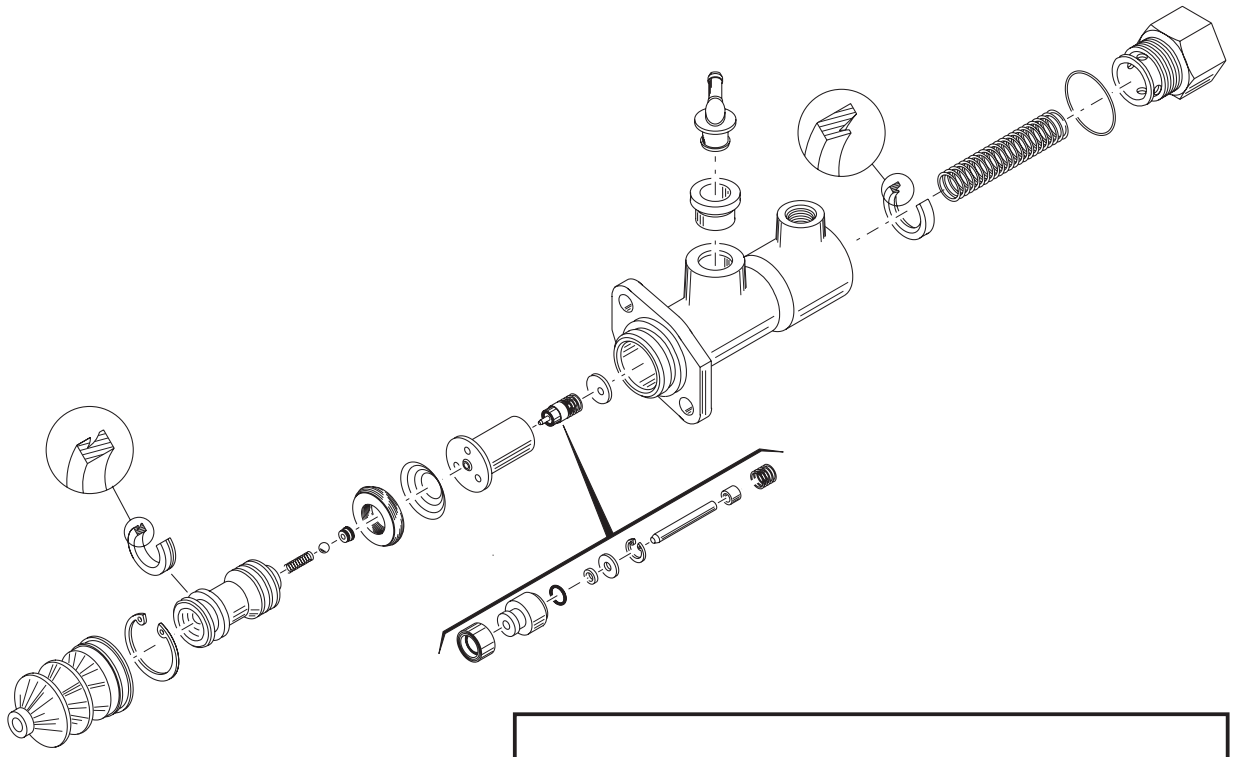
Operation: Hydraulic pump	*Table:* **C.09.01**

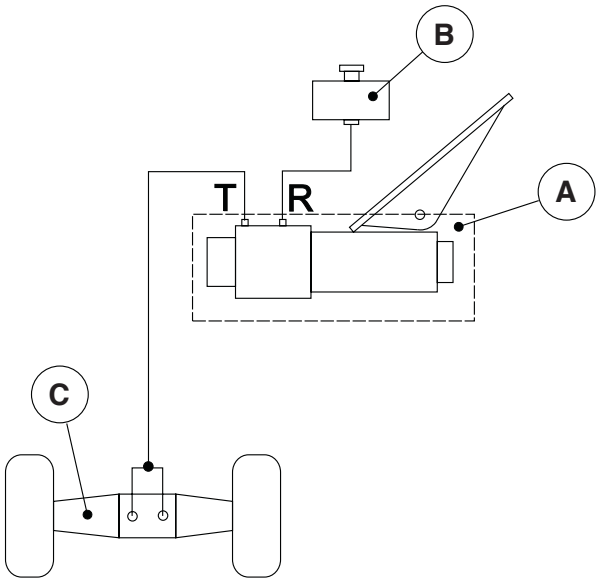


PUMP TECHNICAL DATA

- Rotation direction		Counterclockwise
- Displacement		34.555 cm³/rev
- Inlet pressure range for pump		0.7 - 3 bar
- Max continuous pressure	P1	260 bar
- Max intermittent pressure	P2	280 bar
- Max peak pressure	P3	300 bar
- Speed	min P1	350 min^-1
	max P1	3000 min^-1
- Gaskets		NBR
- Working temperature		-25°C +80°C
- Viscosity range	recommended	12 to 100 mm^2/s
	admissible	max 750 mm^2/s
- Contamination class	ΔP > 200 bar	8 - Nas 1638
	βx = 75-10 μm	19/17/14 - ISO 4406
	ΔP < 200 bar	10 - Nas 1638
	βx = 75-25 μm	21/19/16 - ISO 4406

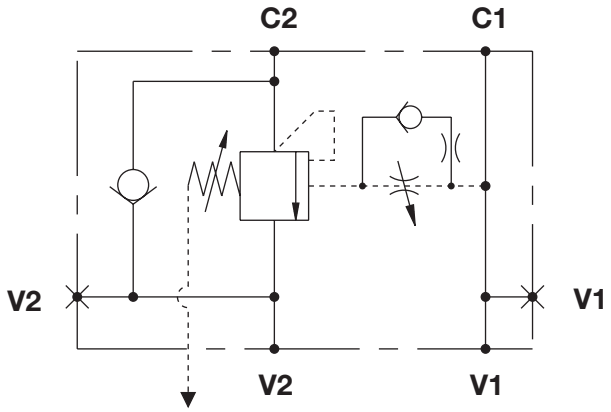
Operation: Brake pump	*Table:* **C.09.02**



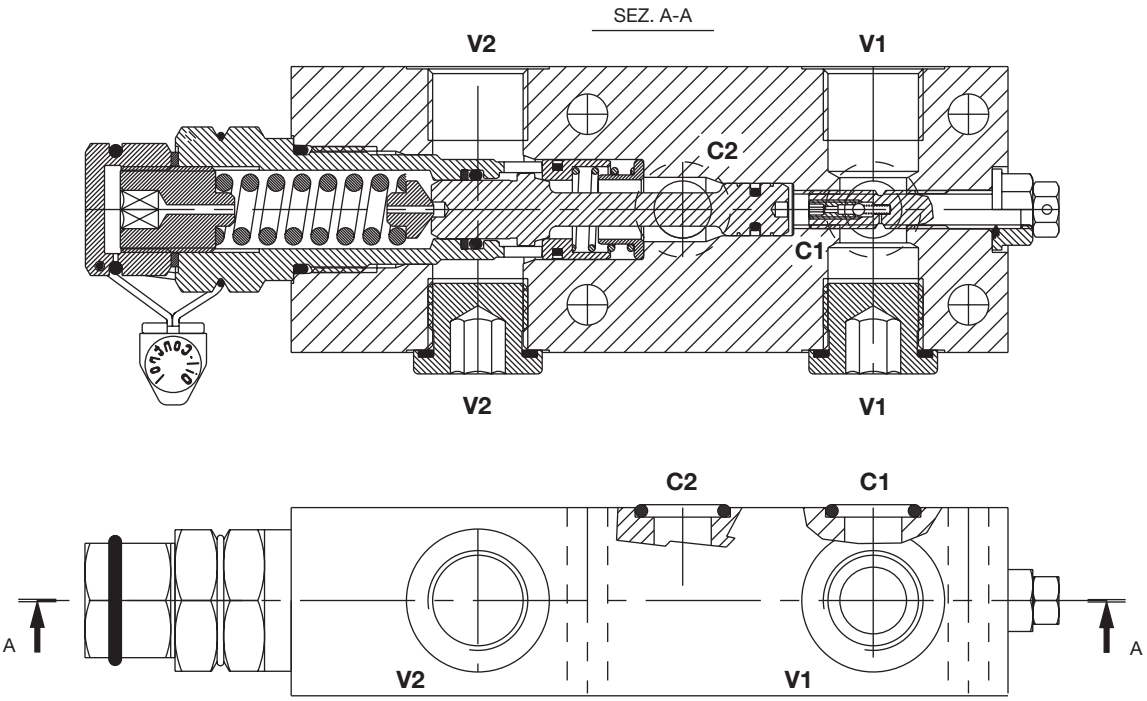


A BRAKE PUMP
B BRAKE OIL SUMP
C FRONT AXLE

Operation: Boom raising and extension cylinder blocking valve	*Table:* **C.10.01**



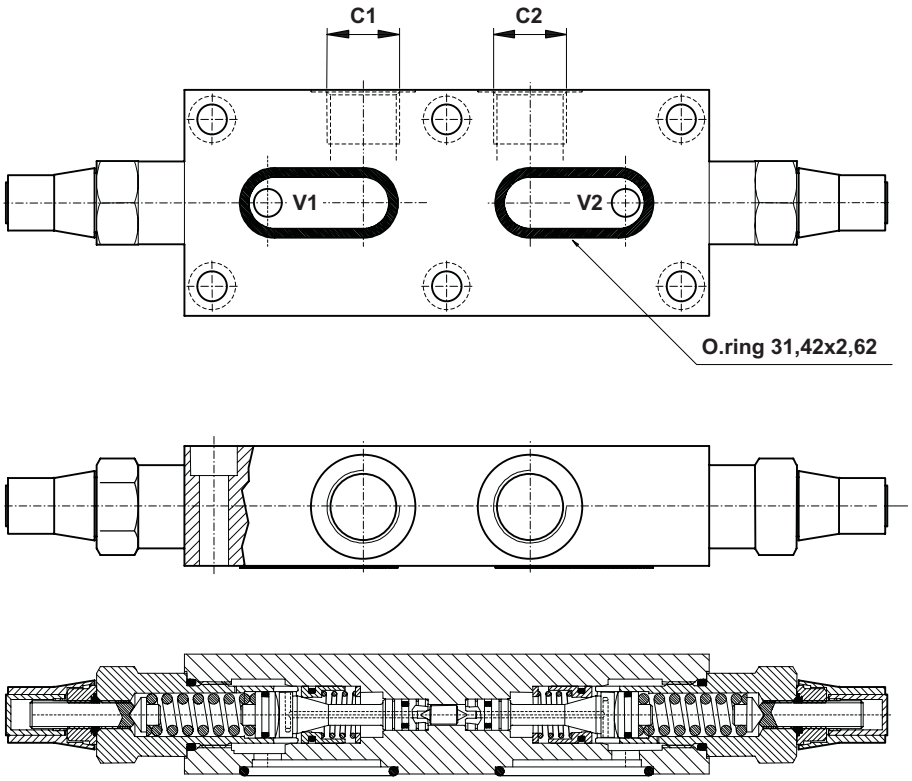
FITTINGS V1-V2: G 1/2”
C1-C2: ø12



TECHNICAL DATA

- Max working pressure = 350 bar
- Piloting ratio = 4:1
- Weight = 2.5 kg
- Valve setting = 1.3 times higher than the load induced pressure
- Steel manifold

Operation: Balance cylinder blocking valve	*Table:* **C.10.02**

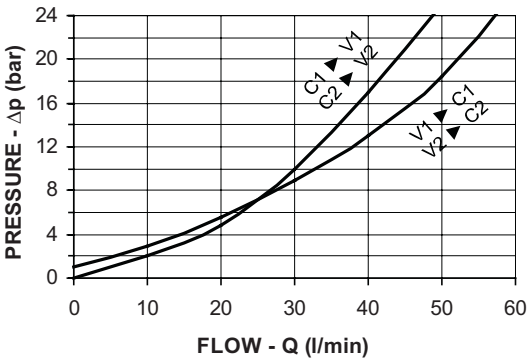


MATERIAL

Manifold: Steel

TECHNICAL DATA

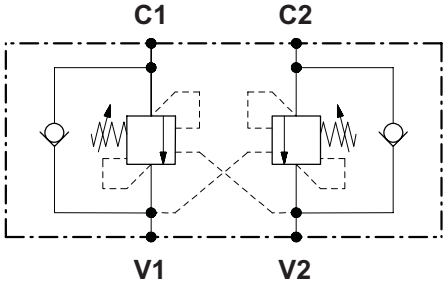
Max flow = see diagram
Max pressure = 350 Bar
Setting = 100 - 350 bar
Standard setting (Q=5 l/min) = 300 bar
Valve setting = 1.3 times higher than
the load induced pressure
Piloting ratio = 11:1
Weight = 2 kg



FITTINGS

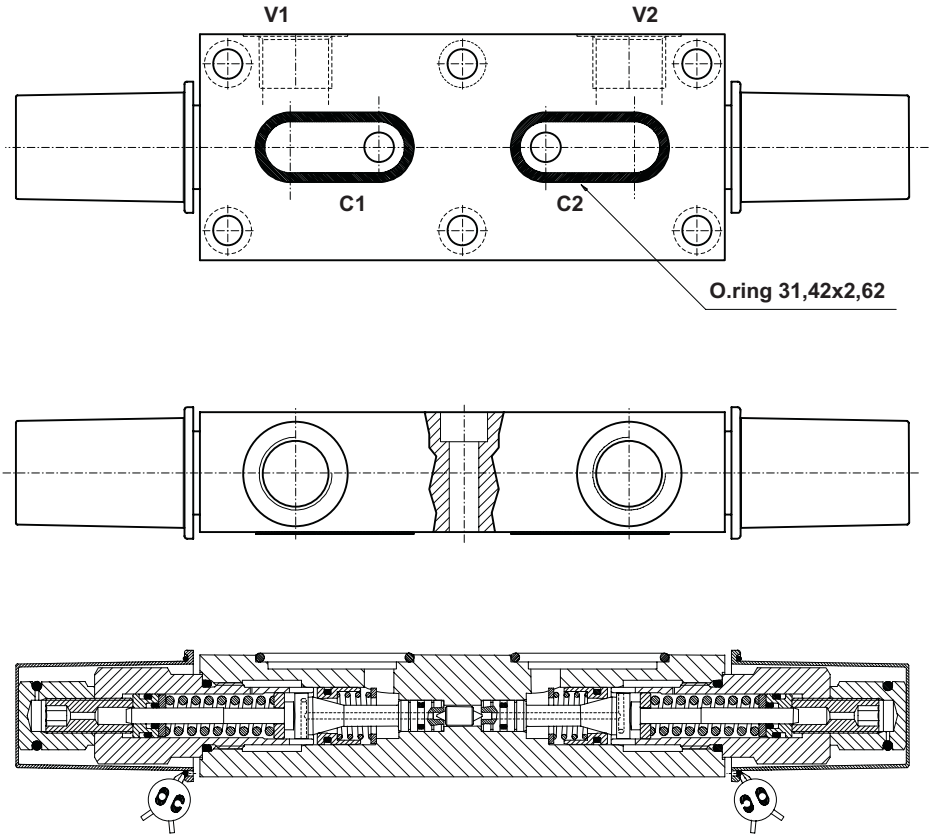
C1-C2 = G 1/2”
V1-V2 = ø 8,5

INSTALLATION SCHEME



Operation: Fork movement cylinder blocking valve

Table: **C.10.03**

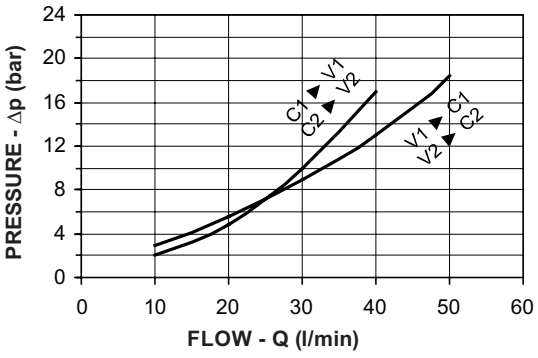


MATERIAL

Manifold: Steel

TECHNICAL DATA

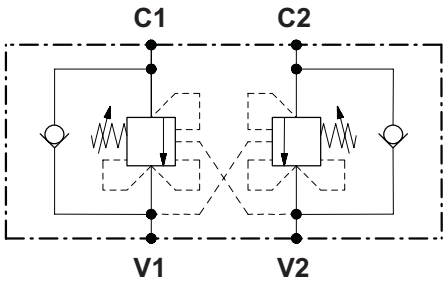
Max flow = see diagram
Max pressure = 350 Bar
Setting = 100 - 350 bar
Standard setting (Q=5 l/min) = 300 bar
Valve setting = 1.3 times higher than the load induced pressure
Piloting ratio = 4,2:1
Weight = 2 kg



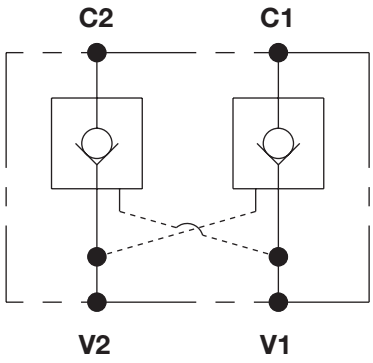
FITTINGS

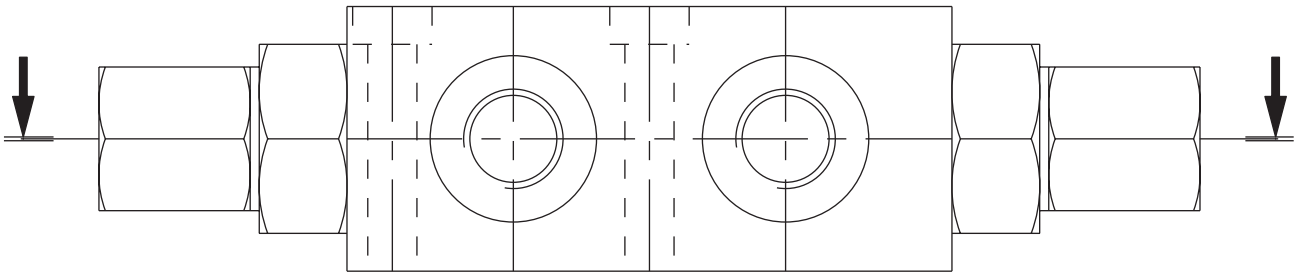
C1-C2 = G 1/2”
V1-V2 = ø 8,5

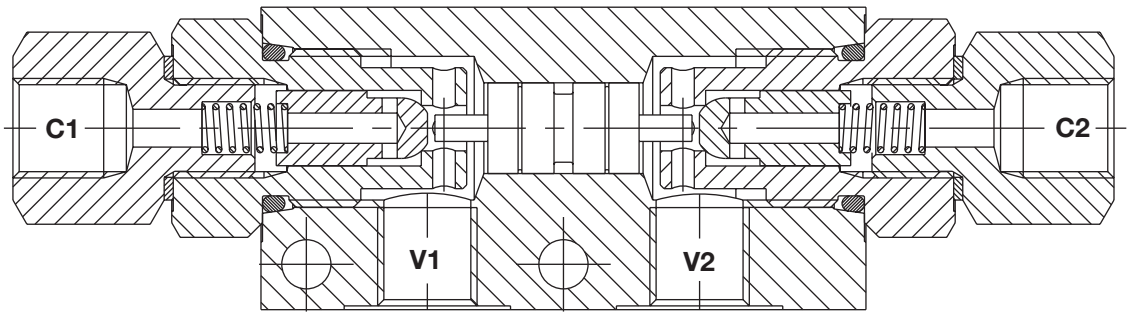
INSTALLATION SCHEME



Operation: Attachment cylinder blocking valve	*Table:* **C.10.04**





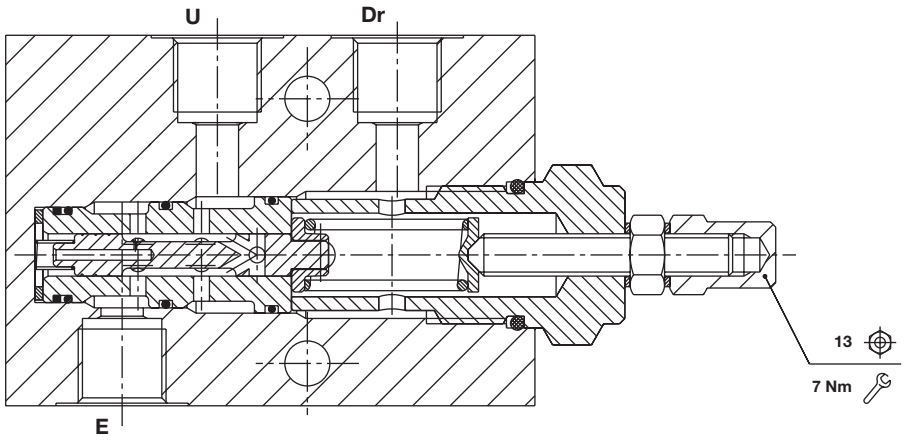


TECHNICAL DATA

- Max working pressure = 350 bar
- Opening pressure = 3 bar
- Max flow = 15 l/min
- Piloting ratio = 4:1
- Weight = 0.7 kg

Operation: Pressure reducing valve

Table:
C.10.05



FILTRATION - OIL CONTAMINATION

TYPE OF SYSTEM TYPE OF VALVE	RECOMMENDED CONTAMINATION LEVEL - ISO 4406
- High performance systems - Systems with working pressures from 210 to 350 bar - Systems with proportional controls - Systems with high frequency cycles	16/13
- Systems with working pressures up to 210 bar - Spool valves - Valves with calibrated orifice	18/14
- Systems with low working pressures - Piloting systems - Systems with low frequency cycles	19/15

MATERIAL

Body: Aluminium 702 State T6
Internal parts: case-hardened and tempered steel

TECHNICAL DATA

Max flow = 20 l/min
Max pressure = 210 Bar
Setting = 5 - 50 bar
(test setting 40 bar with 5 l/min)
Piloting ratio = 1:7
Fluid: 20-200 cSt mineral oil
Ambient temperature = 0 +40 °C
Gaskets : BUNA N

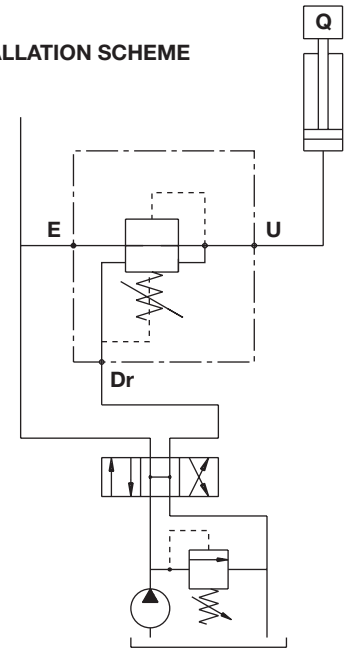
BLOW-BY
Blow-by in Dr: 20 cc/min at a pressure of 150 bar with oil with 46 cSt viscosity

FITTINGS

U - E - Dr = G 3\8”

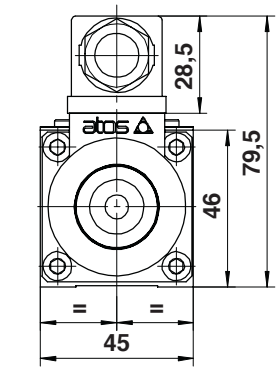
Cylindrical fitting tightening torque 0 60 Nm (do not use conical fittings)

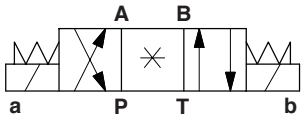
INSTALLATION SCHEME

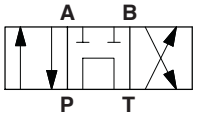


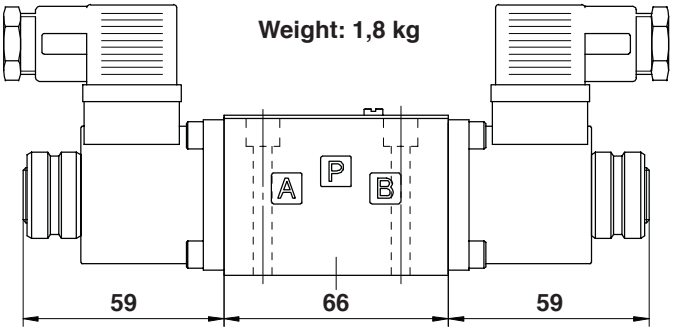
Operation: DHI solenoid valve

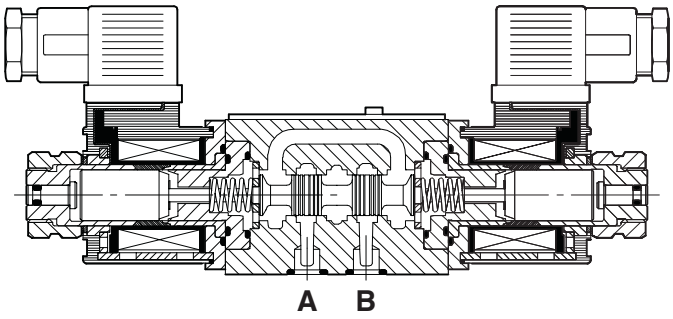
Table:
C.10.06











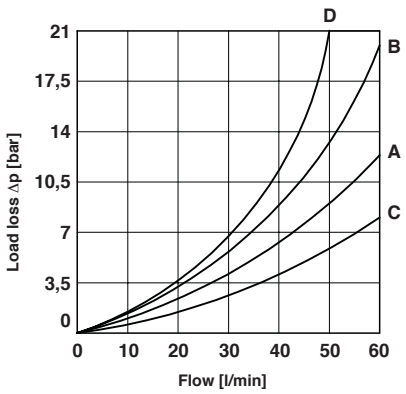
MAIN CHARACTERISTICS OF THE DHI SOLENOID VALVES

Installation position	Any
Coupling surface condition	Surface texture index $\sqrt{}^{0.4}$, flatness ratio 0.01/100 (ISO 1101)
Ambient temperature	-20 °C to +70 °C
Fluid	Hydraulic oil as per DIN 51524
Recommended viscosity	15÷100 mm²/s at 40 °C (ISO VG 15÷100)
Fluid contamination class	ISO 19/16, obtained through 25 μm and ß25≥ 75 line filters (recommended)
Fluid temperature	T ≤ 80 °C, if T ≤ 60 °C choose PE seals
Pressure limits	P, A, B ports: 350 bar – T port: 120 bar
Maximum flow	60 l/min for DI
Utilisation factor	100%
Voltage and power frequency	12 DC
Threshold tolerance	±10%

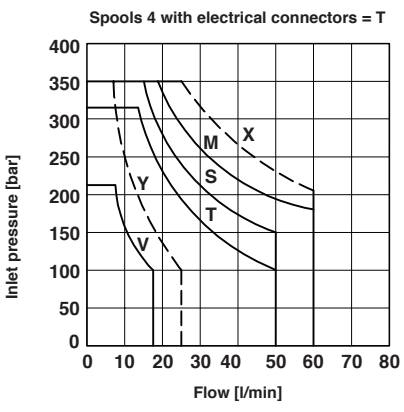
Q/Δp CHARTS

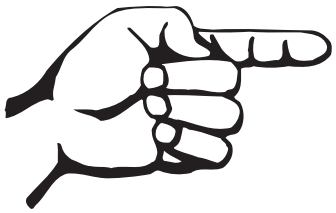
Port / Spool type	P-A	P-B	A-T	B-T	P-T
4	D	D	D	D	A

Tests done with fluid viscosity of 43 mm²/s at 40 °C



Spools 4 with electrical connectors = T





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Section D
CHECKS AND ADJUSTMENTS

SECTION INDEX

D.01 Speed check ..... page 2
D.02 Checking the max. current of the solenoid coils .....
D.03 Checking and calibrating the circuit pressure 4
D.04 Checking the engine oil level 11

Procedure: Checking the movement times of cylinders	Table: D.01

CAUTION

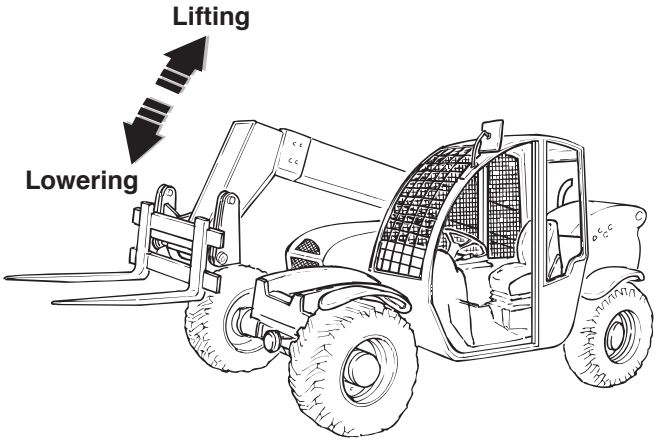
The check of the movement times of the cylinders shall be done with the hydraulic oil at a temperature of 60°.

CAUTION

To check the engine speed, the area easy to reach is the shaft of the CASAPPA pump.
Min engine speed = 950 rpm
Max engine speed = 2700 rpm

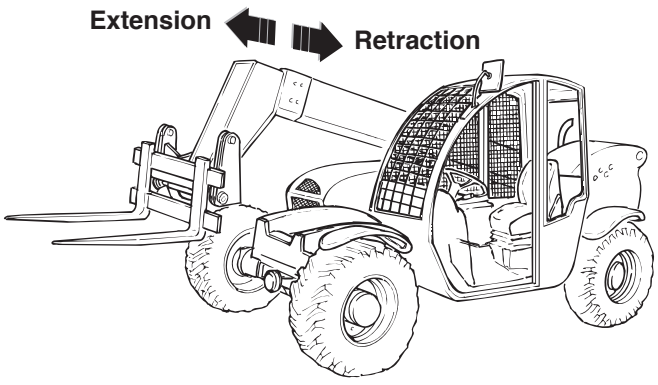
BOOM LIFTING/LOWERING

Time (s)	up	down
Max engine speed	7”	4”
Min. engine speed	18”	11”



BOOM EXTENSION/RETRACTION

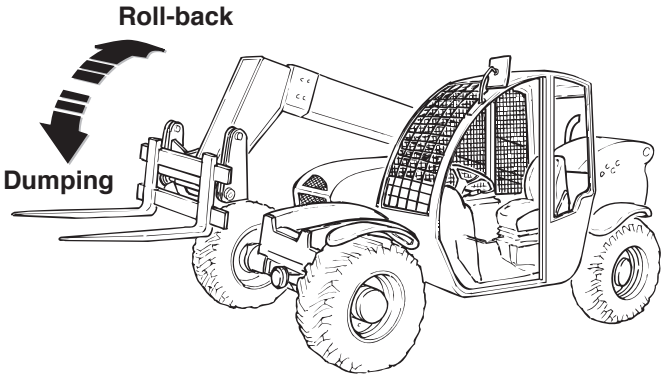
Time (s)	out	in
Max engine speed	7”	4”
Min. engine speed	19”	10”



Procedure: **Checking the movement times of cylinders**	*Table:* **D.01**

ATTACHMENT DUMPING

Time (s)	dumping	roll-back
T. Max	3”	4”
T. Min	10”	12”



CAUTION

The maximum speed that can be attained on a level ground is 24 km/h in both forward and reverse speed.

Procedure: **Checking and calibrating the circuit pressure**	*Table:* **D.03**

1. PRELIMINARY OPERATIONS

Warm up the hydraulic oil to 80°C by keeping one of the elements of the boom main valve to full stroke under pressure.
To reach this temperature in a faster way, cover the oil core of the radiator with a carton in the case of a water-oil combined cooler, or the oil radiator if the machine is equipped with a separate oil radiator.

2. SETTING THE BOOM MAIN VALVE

Find the mini-socket for the pressure gauge **ref. 2** on the **Walvoil** main valve (see **annex 1**).

2.1 SETTING THE MAIN VALVE PRESSURE CONTROL VALVE

Connect a 0-400 bar manometer to the mini-socket **ref. 2**. Fully raise the boom to stroke end by means of joystick **ref. 1**.
Calibrate valve **A** (see **annex 2**) to 270 bar with the Diesel engine at full speed.
To calibrate the safety valves **B** (see **annex 2**), proceed as follows:

- Connect a 0-400 bar manometer to the mini-socket **ref. 2**.
- Increase the pressure of valve **A** of the main valve to 290 bar moving the raising cylinder to stroke end (fully out).
- With the engine running at maximum speed, pitch the forks forward by means of the joystick and act on one of the two valves **B** until reaching a pressure of 280 bar.
- Proceed in adjusting the second valve **B** (280 bar) by pitching the forks back.
- When both fork inclination safety valves have been calibrated, reset the pressure control valve to 270 bar by adjusting the register **A**.

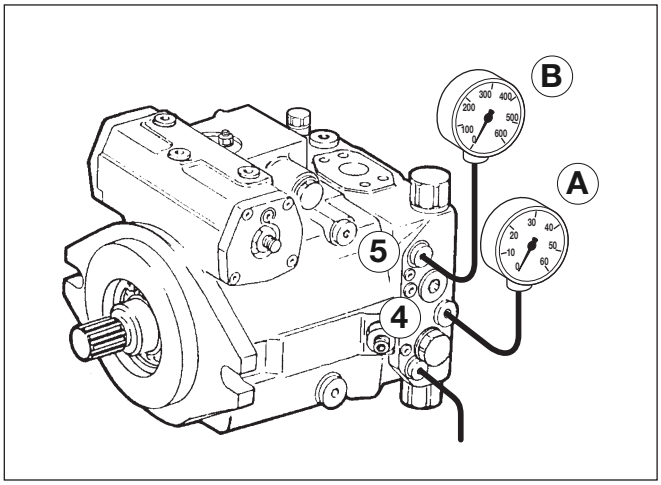
3. SETTING THE PRESSURE RELIEF VALVE

- Fit a fitting with mini-socket ref. **3** in the position shown in **annex 1**.
- Connect a 0-60 bar manometer to the mini-socket **ref. 3** (see **annex 1**), with the engine running at minimum speed moving any of the elements of the main valve to stroke end, then set valve **E** (see an**nex 1**) to 28 bar.
- Remove the manometer from the mini-socket and re-tighten the protection cap.

4. SETTING THE HYDROMATIK PUMP HYDROSTATIC TRANSMISSION

Do the calibration of the hydrostatic transmission with the hydraulic oil at 80°C.

- Connect a 0-60 bar manometer **A** to the mini-socket **ref. 4** to read the boost pressure value.
- Connect a 0-600 bar manometer **B** to the mini-socket **ref. 5** to read the high-pressure value.



Procedure: Checking and calibrating the circuit pressure	Table: D.03

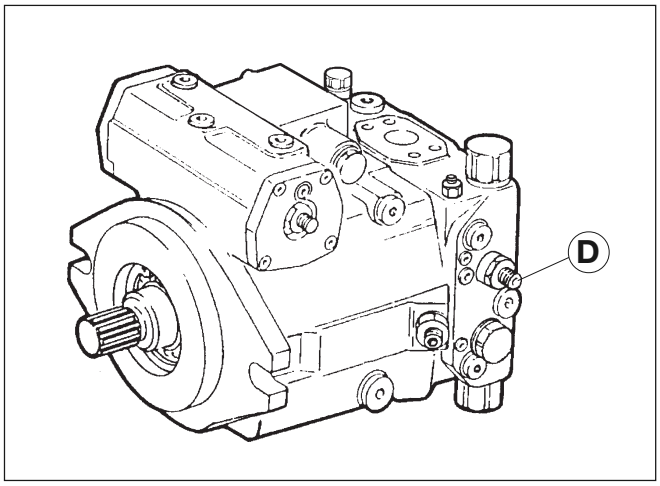
⚠CAUTION

Do not fit the manometer to the application point corresponding to the reverse speed. This operation is extremely dangerous for the serviceman who is calibrating the transmission.

- Hold the selector to neutral position and make sure the maximum speed of the engine does not exceed 2800 rpm. The engine must run at a idle speed of 950 rpm. Otherwise, adjust the minimum speed.
- Read the boost pressure on manometer **A** and ensure it is about 26/28 bar with the engine running at idle speed.
  The boost pressure has not a fixed value but varies from pump to pump.
- Remove coil ref. **5** from solenoid valve ref. **6** (see **annex 3**) so the machine remains braked.

STARTING THE CALIBRATION

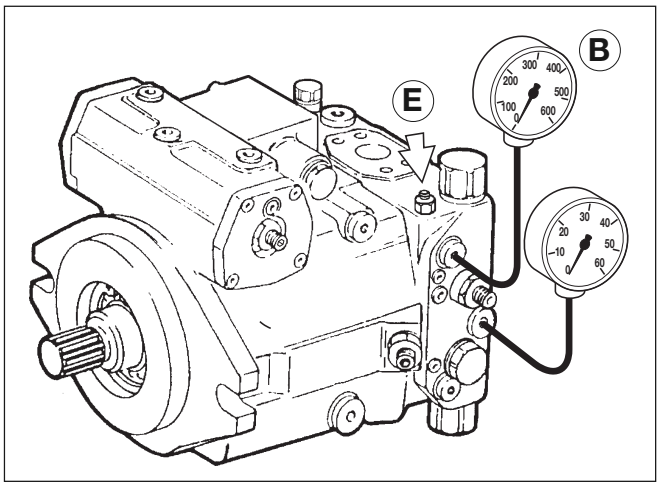
- Set the forward-neutral-reverse selector to the forward or backward position.
- Run the engine at 1200 rpm. Check the value on the tachometer.
- Adjust shutter **D** by means of the register until reading a value of 50 bar on the high-pressure manometer **B**.



4.1 CALIBRATION OF THE MAXIMUM PRESSURE

Do this operation with extreme caution. The proper functioning of pump and transmission depends on this calibration.

- Set the forward-neutral-reverse selector to the forward position.
- Run the engine at maximum speed and check the high-pressure value. If this value is less than 420 bar, increase the pressure to 430 bar by means of the pressure cut-off valve **E**.
- Remove the manometers and do an attempt.

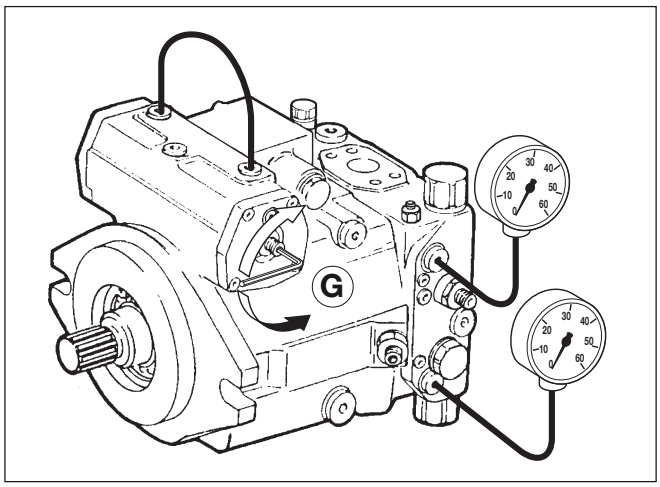


Procedure: **Checking and calibrating the circuit pressure**	*Table:* **D.03**

4.2 CALIBRATION OF THE MECHANICAL ZERO

The calibration of the mechanical zero **G** is required if the machine is set to neutral position with the forward-reverse speed lever.

- Set the forward-neutral-reverse selector to neutral position.
- With the engine running at idle speed, adjust the mechanical zero screw by rotating it until the high-pressure manometer reads the same value measured by the boost pressure manometer.



5. SETTING THE POWER STEERING

- Fit a fitting with mini-socket **Z** in the position shown in **annex 4**.
- Connect a 0-250 bar manometer to the mini-socket **Z**.
- Select the front axle steering mode.
- Move the steering cylinder to stroke end and make sure the value of the power steering **A** is 170 bar. If the value is less, tighten valve **X**; if the value is greater, loosen the valve.

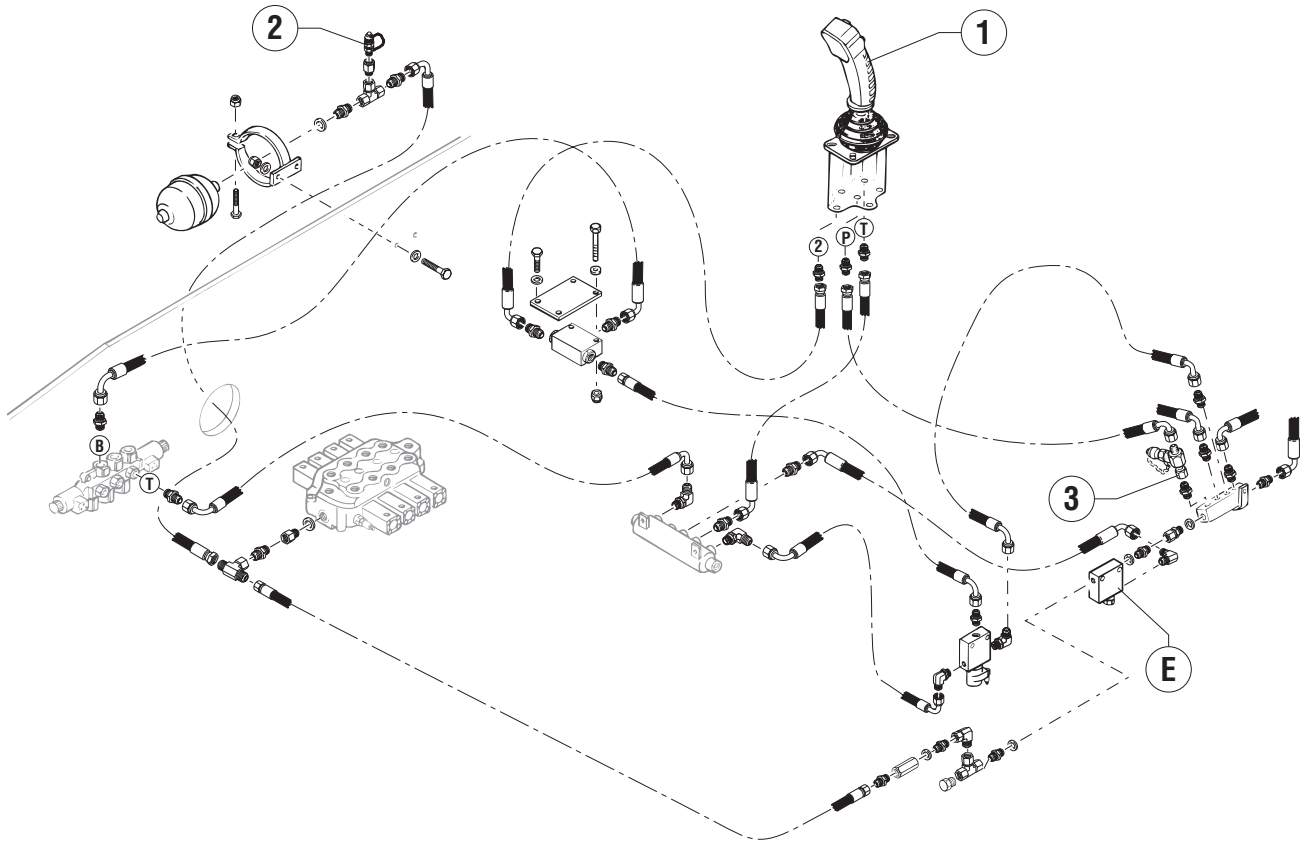
  Note: To gain access to valve **X**, remove the protection cap (see **annex 4**).

5.1 CHECKING THE NEGATIVE BRAKE PRESSURE

Fit a 0-60bar pressure gauge to mini-socket ref. **W** (see **annex 3**) to check the pressure acting on the parking brake of the front axle.
The brake is unlocked when the pressure value is 25 to 28 bar.

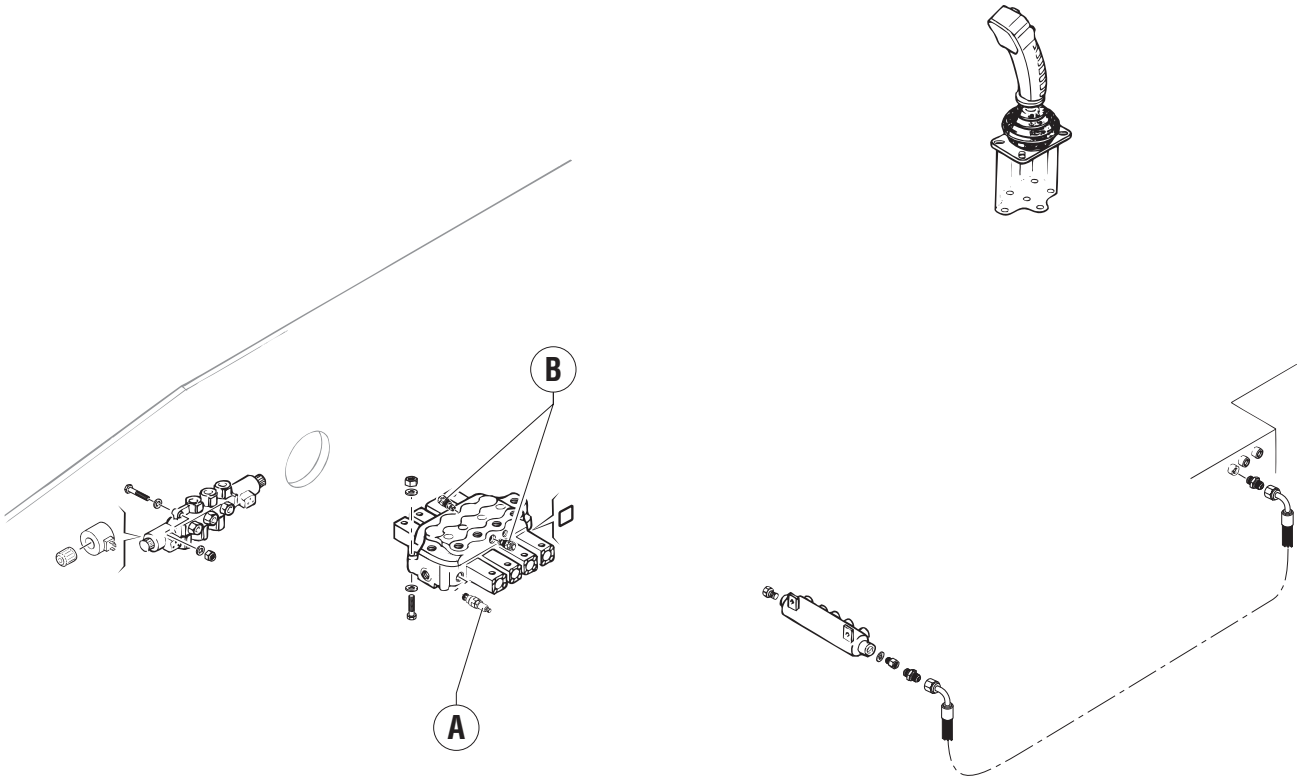
Procedure: **Checking and calibrating the circuit pressure**	*Table:* **D.03**

Annex 1



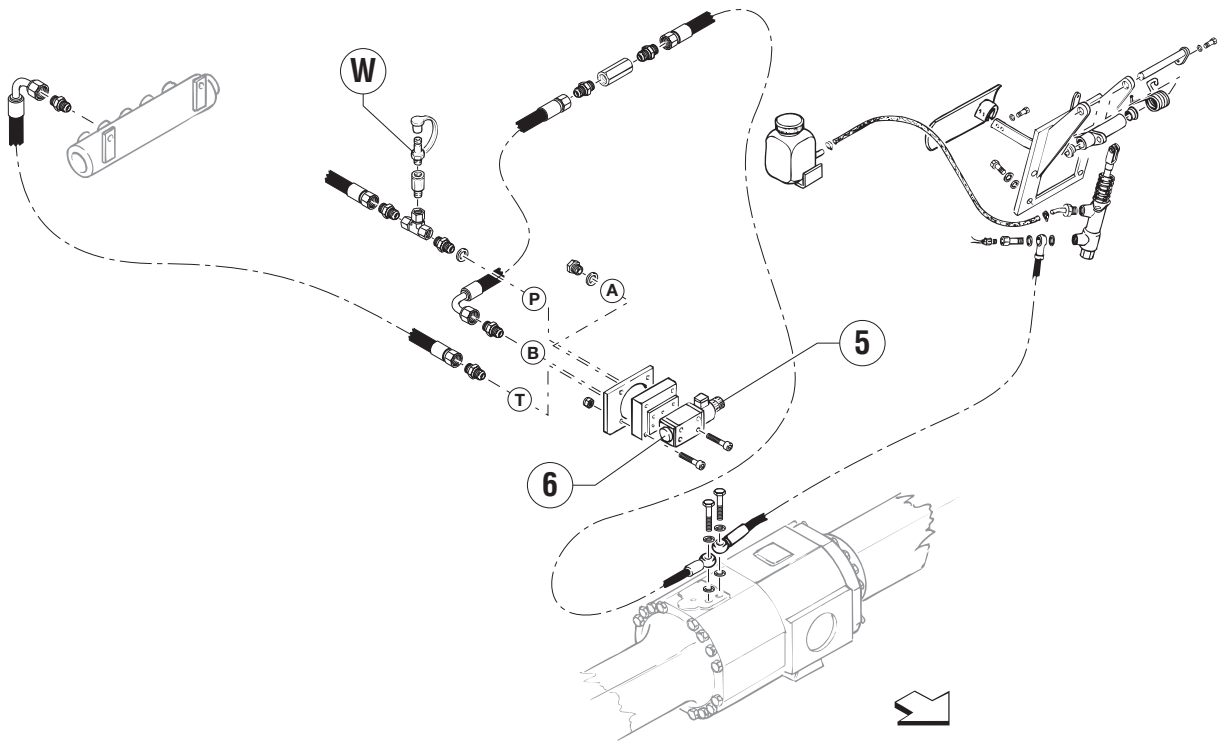
Procedure: **Checking and calibrating the circuit pressure**	*Table:* **D.03**

Annex 2



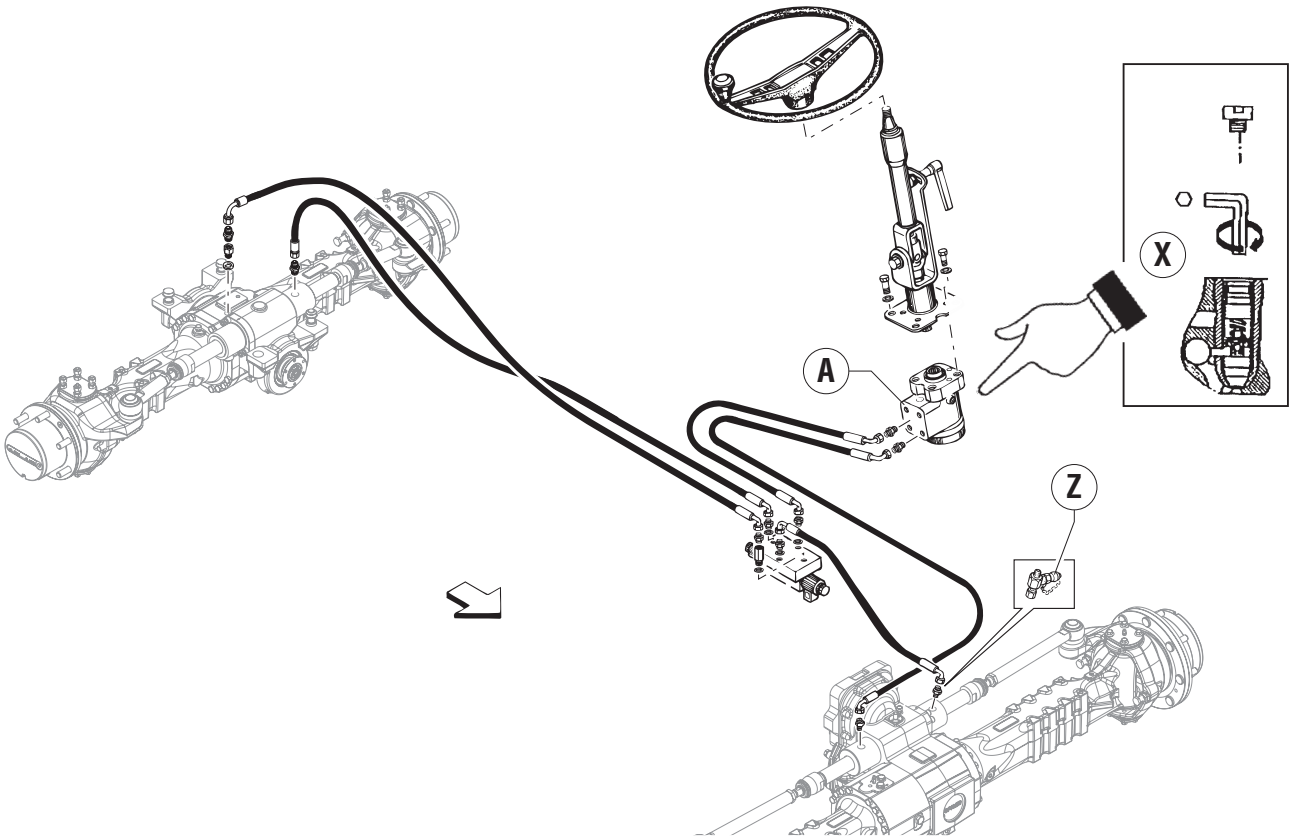
Procedure: **Checking and calibrating the circuit pressure**	*Table:* **D.03**

Annex 3



Procedure: **Checking and calibrating the circuit pressure**	*Table:* **D.03**

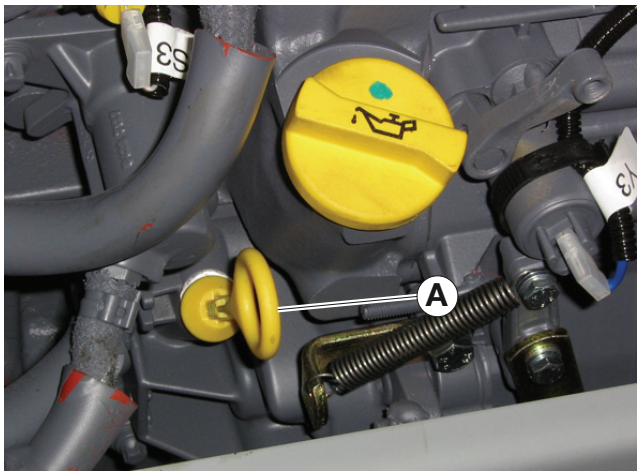
Annex 4

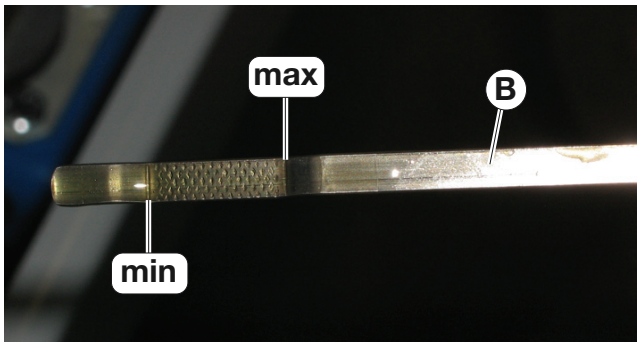


Procedure: **Checking the engine oil level**	*Table:* **D.04**

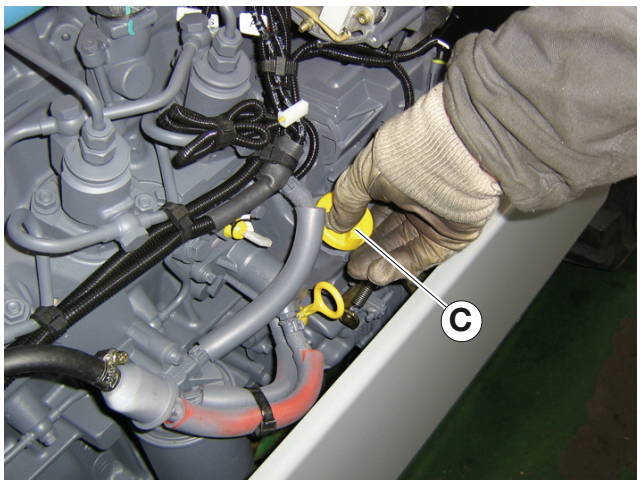
To check the engine oil level:

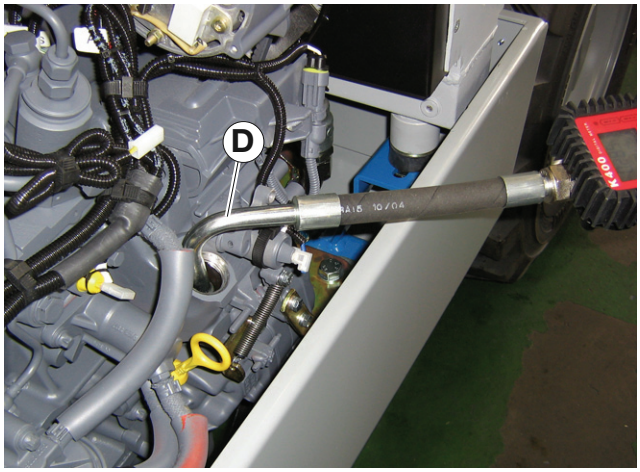
- Park the machine on a flat ground, stop the engine and check the parking brake is engaged.
- Remove dipstick **A** and check if oil reaches the max mark **B**.





- If oil is below this mark, remove plug **C** and pour new oil into the engine using the special appliance **D**.

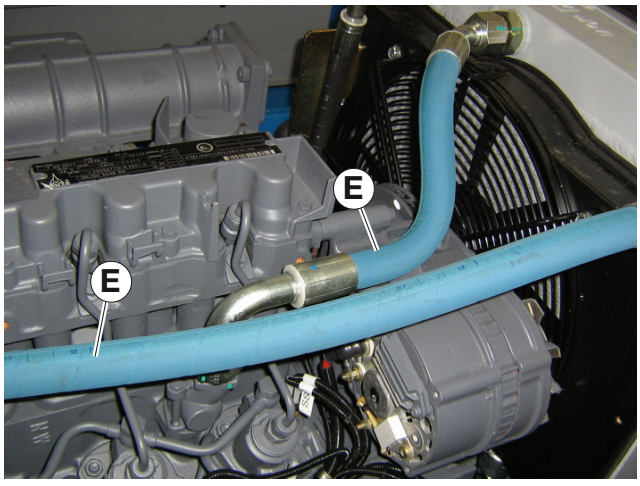


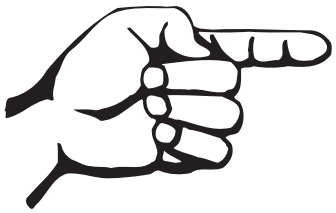


- Remove dipstick **A** once again and check if oil reaches the max mark **B**.
- Refit the plug.

If one of the connecting pipes of radiator **E** breaks:

- Stop the machine immediately, if possible on a flat ground; stop the engine and check the parking brake is engaged.
- Change the damaged pipe.
- Remove dipstick **A** and check if oil reaches the max mark **B**.
- If oil is below this mark, remove plug **C** and pour new oil into the engine using the special appliance **D**.
- Restart the machine and let oil circulate in the engine and the radiator.
- Stop the machine and check again the oil level. If necessary, add new oil step by step until reaching the max level by starting and stopping the engine at every step.





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Section F
TROUBLESHOOTING

SECTION INDEX

Hydraulic faults ..... page 2
Electrical faults 5

⚠ DANGER

Any service, maintenance or troubleshooting must be carried out with the machine stopped, the boom in rest position lowered to the ground, and the transportation locking devices fitted.

Use the wiring diagrams enclosed for finding solenoid valves (EV), fuses (F), relays (E) or other electrical components in an easier way - see ***chapter C - Technical data*** of this manual.

Trouble	Cause	Solution
The boom does not move	• Low pressure	• Set the max pressure of the control block to 270 bar (see sec. D)
	• Hydraulic pump damaged	• Replace the pump
	• Load sensing valve defective	• Check the efficiency of the valve; replace if necessary
	• Leakage on the control block valve	• Dismantle the valve, check and eliminate any foreign matters
	• Pressure reducing valve maladjusted	• Check the efficiency and reset the correct pressure (28 bar) if necessary
	• Joystick damaged	• Check the efficiency of the joystick; replace if necessary
Wrong wheel shafting	• Leakage in the steering cylinders	• Check and replace the seals if necessary (see sec. G)
	• Leakage in the steer selection solenoid valve	• Check the efficiency of the solenoid valve
The steering wheel is hard (low force in the cylinders)	• Low pressure	• Check the pressure; in case, reset (170 bar)
	• Priority valve damaged	• Check the efficiency of the valve; replace if necessary

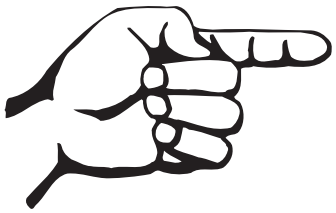
Trouble	Cause	Solution
When the engine is stopped, the lifting cylinder does not support the boom	• Block valves damaged or dirty • Cylinder seal defective	• Check the efficiency of the valves; replace if necessary • Replace the seal
When the engine is stopped, the cylinder does not support the forks	• Block valves damaged or dirty • Cylinder seal defective	• Check the efficiency of the valves; replace if necessary • Replace the seal
When the engine is stopped and the boom is high, the extension cylinder moves in	• Block valves damaged or dirty • Cylinder seal defective	• Check the efficiency of the valves; replace if necessary • Replace the seal
When the load is lifted, the fork cannot be levelled	• Seals of the levelling cylinder worn out • Shockproof valves of the control block dirty or maladjusted • One-way valves of the levelling cylinder dirty or damaged	• Dismantle the cylinder and replace the seals • Remove the valves, dry-clean or replace if damaged, and re-calibrate (see sec. D) • Remove the valves, dry-clean or replace if damaged, and replace in their seats
When the max load is applied, forks move down	• Seals, rod and liner of the fork tilting cylinder worn out • Leakage in the cylinder block valve • Low pressure in the hydraulic circuit	• Dismantle the cylinder and check and replace any defective parts • Check the leakage; remove the valve and rectify or replace • Re-calibrate the control block (see sec. D)
Operating the joystick no function is activated	• Joystick damaged • Control block valve damaged • Pressure reducing valve damaged	• Check the joystick efficiency; replace if necessary • Check the efficiency of the valve; replace if necessary • Check the calibration value of the valve; replace the valve if necessary
The steering wheel is slow and noisy	• Couplings damaged • Hydraulic drive damaged	• Replace the couplings • Replace the hydraulic drive
Differential noisy and high temperature on the body	• No oil • Bearings damaged	• Check the oil level and refill. If trouble cannot be rectified, dismantle the unit (see sec. G) • Replace the bearings (see sec. G)

Trouble	Cause	Solution
When moving out the second telescope, the boom tends to move right and left	• Sliding blocks worn out	• Check the play and replace any worn parts or place shims
When moving out the second telescope, the boom tends to jump	• Grease is insufficient or inadequate • Foreign matters on the sliding blocks and the relevant surfaces of the boom	• Check that the grease smeared on the boom is INTERFLON FIN GREASE LS2; smear the boom againwith grease • Check and eliminate any foreign matters
Low traction	• Drive pump defective	• Check the pressure values of the drive pump (see sec. D) and re-calibrate if necessary. If the overfeeding pressure drops down, replace the pump and clean the pump-motor couplings

Trouble	Cause	Solution
No power to dashboard	• Battery switch off • Battery down • 50A fuse blown • Dashboard damaged • Broken or damaged wiring	• Turn on the switch • Check the battery efficiency; replace if necessary • Change the fuse • Check the dashboard and replace if necessary • Reconnect or replace the wiring
Engine does not start, starter does not run	• 50A fuse blown • Dashboard damaged • K2 relay damaged • Speed switch ruined • 70A engine start relay damaged • Starter defective	• Replace the fuse • Check the dashboard and replace if necessary • Change the relay • Check or replace the speed switch • Change the relay • Change the starter
Engine does not start - starter runs but engine does not start	• No fuel • Fuel filter clogged • Fuel ducts empty • Start aid solenoid damaged • Engine stop solenoid • Broken or damaged wiring	• Refuel • Clean or replace the filter • Eliminate any air • Check the efficiency and replace if necessary • Check the efficiency and replace if necessary • Reconnect or replace the wiring
The machine does not move forward/back	• Speed switch damaged • 10A fuse F13 broken • Relays K3-K4-K5 damaged • Forward/reverse speed solenoid valves damaged • Parking brake micro-switch damaged • Parking brake switch • Broken or damaged wiring	• Check the efficiency or replace the switch if necessary • Change the fuse • Change the relays • Check the efficiency or replace • Check the efficiency or replace • Check the efficiency or replace • Reconnect or replace the wiring

Trouble	Cause	Solution
No steer selection	• 7.5A fuse F12 blown • Steer selector damaged • Coils of the steer selection solenoid valve damaged • Broken or damaged wiring	• Change the fuse • Check or replace the selector • Check the coils; replace if necessary • Reconnect or replace the wiring
Hydraulic oil thermometer defective	• 7.5A fuse F11 blown • Indicator damaged • Temperature sensor defective • Broken or damaged wiring	• Change the fuse • Change the part • Check or replace the sensor • Reconnect or replace the wiring
The parking brake lamp does not come on	• 10A fuse F4 blown • Dashboard instrument damaged • Broken or damaged wiring	• Change the fuse • Change • Reconnect or replace the wiring
The fuel gauge does not work	• 10A fuse F4 blown • Dashboard instrument damaged • Fuel sensor defective • Broken or damaged wiring	• Change the fuse • Change • Check and replace the sensor if necessary • Reconnect or replace the wiring
The engine coolant thermometer does not work	• 7.5A fuse F11 blown • Indicator defective • Temperature sensor defective • Broken or damaged wiring	• Change the fuse • Change the part • Check and replace the sensor if necessary • Reconnect or replace the wiring
High hydraulic oil temperature	• Hydraulic oil bulb damaged • Indicator defective • Radiador clogged	• Check or replace the bulb if necessary • Change the part • Check the radiator and eliminate any impurities from the fins

Trouble	Cause	Solution
The joystick does not pitch the forks	• 7.5A fuse F12 blown • Control block selection valve • Broken or damaged wiring	• Change the fuse • Check the efficiency of the electrical coils; replace the coils if damaged • Reconnect or replace the wiring
The joystick does not lock/ release the attachment	• 7.5A fuse F12 blown • Control block selection valve • Broken or damaged wiring • Operating pushbutton damaged	• Change the fuse • Check the efficiency of the electrical coils; replace the coils if damaged • Reconnect or replace the wiring • Check or replace the fuse



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