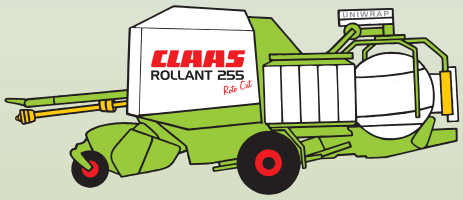
CLAAS



UNIWRAP

Technical Systems

Hydraulic System

SERVICE & PARTS

Contents

1 Hydraulic circuit diagram 5

2 Pre-conditions for use 27

3 Valve block 31

4 Individual components 41

1

Hydraulic circuit diagram

1.1 Hydraulic circuit diagram up to serial no.: 72600130 8

1.2 Hydraulic circuit diagram from machine no.: 72600131, with tipping cradle service shut-off valve (631) 12

1.3 Hydraulic circuit diagram from machine no.: 72600531, with film clamping cutters flow divider (769).....16

1.4 Hydraulic circuit diagram from serial no.: 72601047, with valve combination (630, 706, 769), without 3-stage restrictor (645) 20

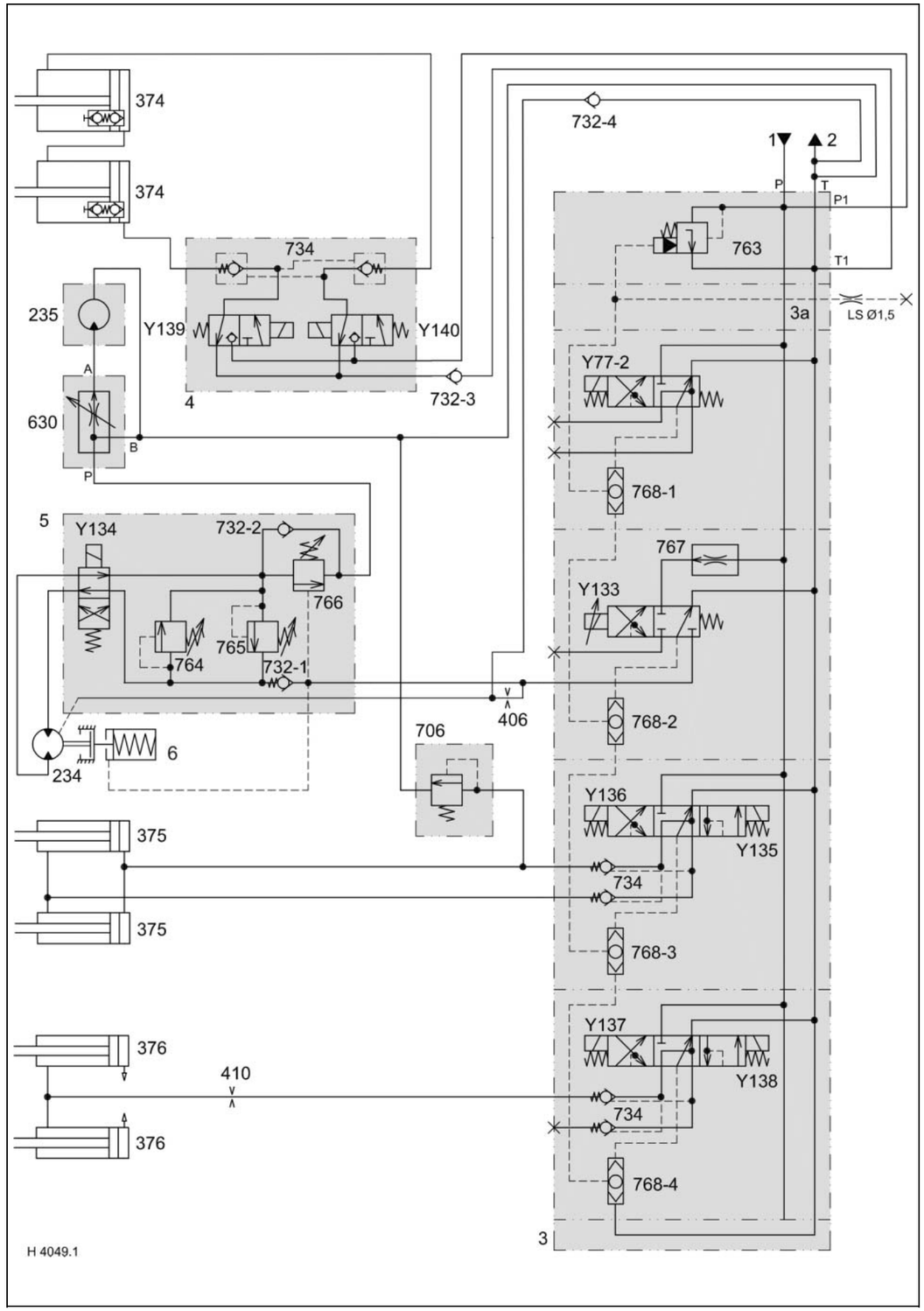
1.5 Hydraulic circuit diagram from serial no.: 72601047, with valve combination (630, 706, 769), with 3-stage restrictor (645) 24

1.1

Hydraulic circuit diagram

- up to serial no.: 72600130

1.1 Hydraulic circuit diagram up to serial no.: 72600130



Key to diagram:

1	Feed line
2	Return line
3	Valve block
3a	Plate
4	Valve block
5	Valve block
6	Disc brake
234	Wrapping arm motor
235	Wrapping table motor
374	Film clamping cutters hydraulic cylinder
375	Tipping cradle hydraulic cylinder
376	Wrapping table hydraulic cylinder
406	Orifice plate Ø 0.8 mm
410	Orifice plate Ø 1.5 mm
630	Wrapping table flow control valve
706	Pressure relief valve
732-1	Non-return valve
732-2	Non-return valve
732-3	Non-return valve
732-4	Non-return valve
734	Lock-up valve unit
763	Input pressure balance
764	Pressure relief valve (left) 115^{+10} bar
765	Pressure relief valve (right) 115^{+10} bar
766	Lower brake valve
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y134	Wrapping arm motor reverse solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve
Y139	Open film cutters solenoid valve
Y140	Close film cutters solenoid valve

Description of function:

Orifice plate (406) Ø 0.8 mm	The orifice plate (406) Ø 0.8 mm avoids pressure build-up and consequently uncontrolled movements of the wrapping arm motor (234).
Wrapping table flow control valve (630)	The wrapping table flow control valve supplies the hydraulic motor (235) via output (A). This volume flow can be adjusted and changes the wrapping table motor / wrapping arm motor speed ratio and consequently the film layer overlaps.
Pressure relief valve (706)	The pressure relief valve limits the pressure to 70 bar when lowering the tipping cradle hydraulic cylinders.
Non-return valve (732-3)	The non-return valve avoids faulty functions of the film clamping cutters by building up pressure in the T line.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Pressure relief valve (764)	The pressure relief valve limits the oil pressure to the wrapping arm motor (234) and the wrapping table motor (drive) connected in series to 115^{+10} bar.
Pressure relief valve (765)	The pressure relief valve limits the oil pressure of the wrapping arm motor (234) to 115^{+10} bar when decelerating.
Lower brake valve (766)	The non-return valves 732-1/ 732-2 and the lower brake valve (766) decelerate the wrapping arm motor (234) hydraulically on both sides if the wrapping arm forward solenoid valve (Y133) is not energized.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Master valve solenoid valve (Y77)	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763).

Description of function:

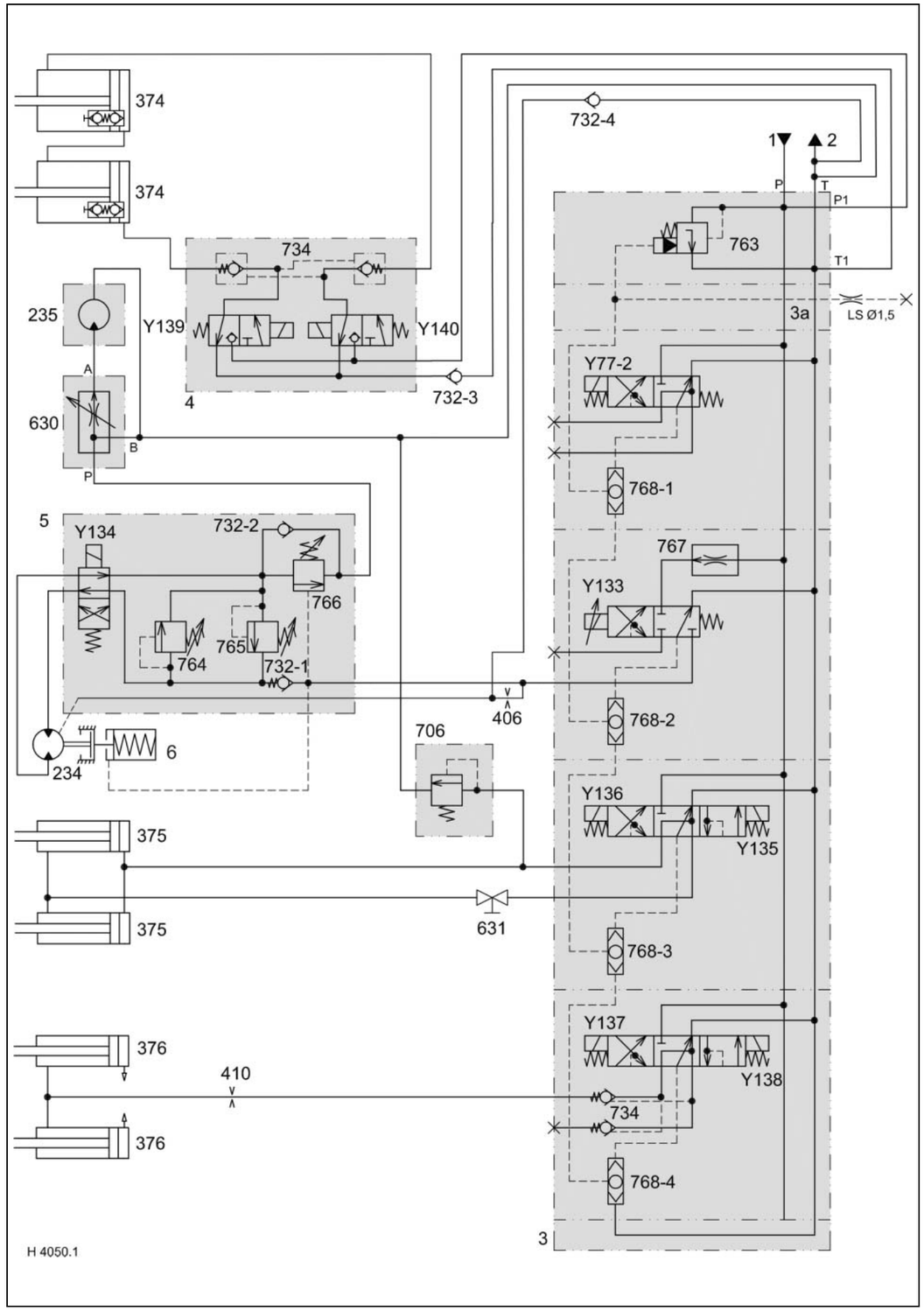
Wrapping arm forward solenoid valve (Y133)	The solenoid valve controls the wrapping arm hydraulic motor. A wrapping arm motor flow controller 767 is provided in the volume flow input and keeps the volume flow constant. When the control unit is activated, this volume flow is pumped to the hydraulic motor (234) which drives the wrapping arm with 28 ... 30 rpm max. The flow controller may be accessed via the screw plug at the bottom of the control unit. The rotational speed of the wrapping arm of 27 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Wrapping arm reverse solenoid valve (Y134)	The solenoid valve changes the direction of oil flow to the wrapping arm motor (234) and consequently its sense of rotation.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit 734 avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit 734 in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.
Open film cutters solenoid valve (Y139)	The solenoid valve opens both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.
Close film cutters solenoid valve (Y140)	The solenoid valve closes both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.

1.2

Hydraulic circuit diagram

- from machine no.: 72600131
- with tipping cradle service shut-off valve (631)

1.2 Hydraulic circuit diagram from machine no.: 72600131, with tipping cradle service shut-off valve (631)



Key to diagram::

1	Feed line
2	Return line
3	Valve block
3a	Plate
4	Clamping cutters valve block
5	Wrapping arm motor valve block
6	Disc brake
234	Wrapping arm motor
235	Wrapping table motor
374	Film clamping cutters hydraulic cylinder
375	Tipping cradle hydraulic cylinder
376	Wrapping table hydraulic cylinder
406	Orifice plate Ø 0.8 mm
410	Orifice plate Ø 1.5 mm
630	Wrapping table flow control valve
631	Tipping cradle shut-off valve
706	Pressure relief valve
732-1	Non-return valve
732-2	Non-return valve
732-3	Non-return valve
732-4	Non-return valve
734	Lock-up valve unit
763	Input pressure balance
764	Pressure relief valve (left) 115^{+10} bar
765	Pressure relief valve (right) 115^{+10} bar
766	Lower brake valve
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y134	Wrapping arm motor reverse solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve
Y139	Open film cutters solenoid valve
Y140	Close film cutters solenoid valve

Description of function:

Orifice plate (406) Ø 0.8 mm	The orifice plate (406) Ø 0.8 mm avoids pressure build-up and consequently uncontrolled movements of the wrapping arm motor (234).
Wrapping table flow control valve (630)	The wrapping table flow control valve supplies the hydraulic motor (235) via output (A). This volume flow can be adjusted and changes the wrapping table motor / wrapping arm motor speed ratio and consequently the film layer overlaps.
Tipping cradle shut-off valve (631)	During service work, the tipping cradle shut-off valve shuts off the oil flow from the hydraulic cylinders 375.
Pressure relief valve (706)	The pressure relief valve limits the pressure to 70 bar when lowering the tipping cradle hydraulic cylinders.
Non-return valve (732-3)	The non-return valve avoids faulty functions of the film clamping cutters by building up pressure in the T line.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Pressure relief valve (764)	The pressure relief valve limits the oil pressure to the wrapping arm motor (234) and the wrapping table motor (drive) connected in series to 115^{+10} bar.
Pressure relief valve (765)	The pressure relief valve limits the oil pressure of the wrapping arm motor (234) to 115^{+10} bar when decelerating.
Lower brake valve (766)	The non-return valves 732-1/ 732-2 and the lower brake valve (766) decelerate the wrapping arm motor (234) hydraulically on both sides if the wrapping arm forward solenoid valve (Y133) is not energized.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Master valve solenoid valve (Y77)	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763).

Description of function:

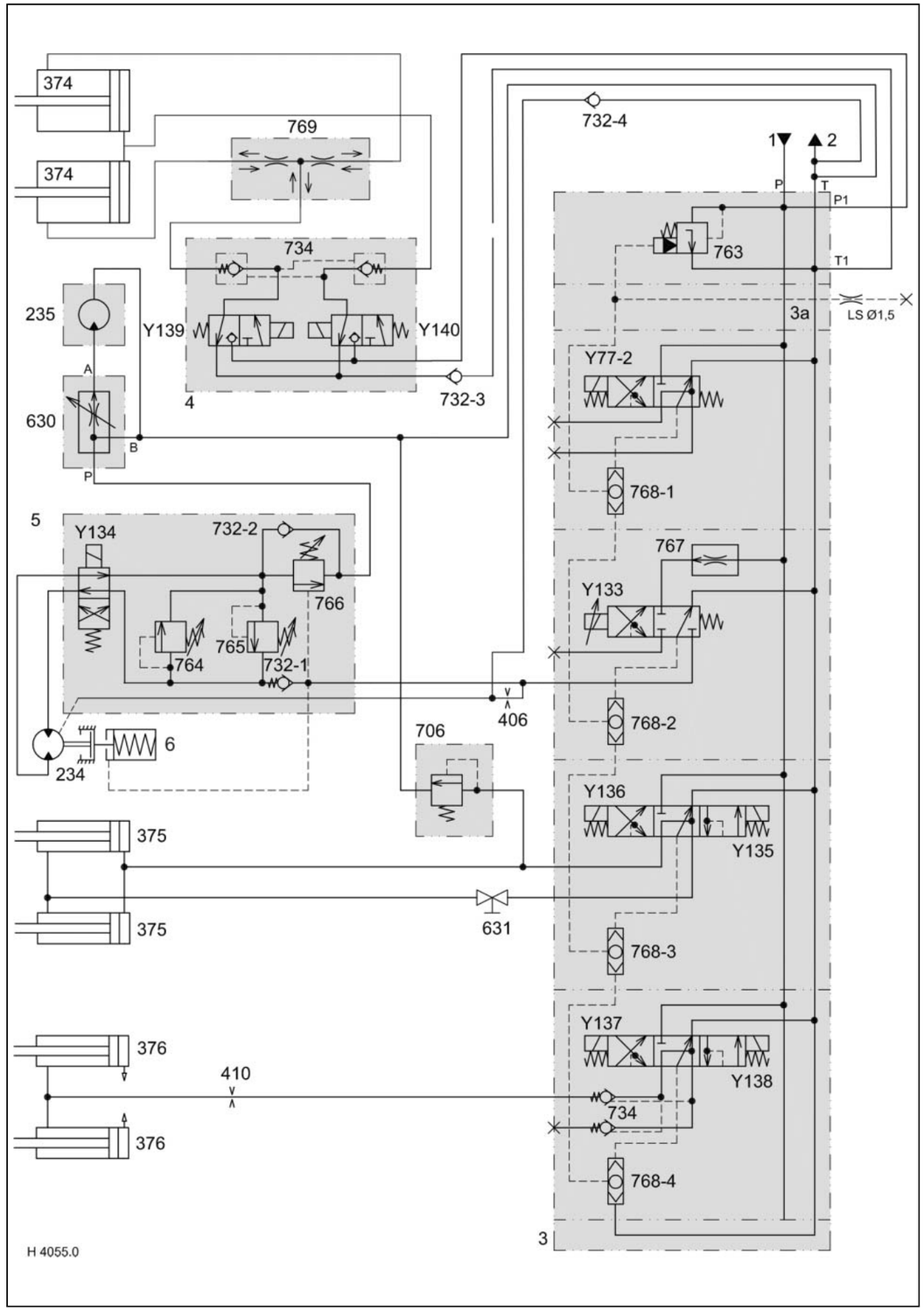
Wrapping arm forward solenoid valve (Y133)	The solenoid valve controls the wrapping arm hydraulic motor. A wrapping arm motor flow controller 767 is provided in the volume flow input and keeps the volume flow constant. When the control unit is activated, this volume flow is pumped to the hydraulic motor (234) which drives the wrapping arm with 28 ... 30 rpm max. The flow controller may be accessed via the screw plug at the bottom of the control unit. The rotational speed of the wrapping arm of 27 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Wrapping arm reverse solenoid valve (Y134)	The solenoid valve changes the direction of oil flow to the wrapping arm motor (234) and consequently its sense of rotation.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit 734 avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit 734 in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.
Open film cutters solenoid valve (Y139)	The solenoid valve opens both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.
Close film cutters solenoid valve (Y140)	The solenoid valve closes both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.

1.3

Hydraulic circuit diagram

- from machine no.: 72600531
- with film clamping cutters flow divider (769)

1.3 Hydraulic circuit diagram from machine no.: 72600531, with film clamping cutters flow divider (769)



Key to diagram:

1	Feed line
2	Return line
3	Valve block
3a	Plate
4	Clamping cutters valve block
5	Wrapping arm motor valve block
6	Disc brake
234	Wrapping arm motor
235	Wrapping table motor
374	Film clamping cutters hydraulic cylinder
375	Tipping cradle hydraulic cylinder
376	Wrapping table hydraulic cylinder
406	Orifice plate Ø 0.8 mm
410	Orifice plate Ø 1.5 mm
630	Wrapping table flow control valve
631	Tipping cradle shut-off valve
706	Pressure relief valve
732-1	Non-return valve
732-2	Non-return valve
732-3	Non-return valve
732-4	Non-return valve
734	Lock-up valve unit
763	Input pressure balance
764	Pressure relief valve (left) 115^{+10} bar
765	Pressure relief valve (right)
766	Lower brake valve
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
769	Film clamping cutters flow divider
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y134	Wrapping arm motor reverse solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve
Y139	Open film cutters solenoid valve
Y140	Close film cutters solenoid valve

Description of function:

Orifice plate (406) Ø 0.8 mm	The orifice plate (406) Ø 0.8 mm avoids pressure build-up and consequently uncontrolled movements of the wrapping arm motor (234).
Wrapping table flow control valve (630)	The wrapping table flow control valve supplies the hydraulic motor (235) via output (A). This volume flow can be adjusted and changes the wrapping table motor / wrapping arm motor speed ratio and consequently the film layer overlaps.
Tipping cradle shut-off valve (631)	During service work, the tipping cradle shut-off valve shuts off the oil flow from the hydraulic cylinders 375.
Pressure relief valve (706)	The pressure relief valve limits the pressure to 70 bar when lowering the tipping cradle hydraulic cylinders.
Non-return valve (732-3)	The non-return valve avoids faulty functions of the film clamping cutters by building up pressure in the T line.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Pressure relief valve (764)	The pressure relief valve limits the oil pressure to the wrapping arm motor (234) and the wrapping table motor (drive) connected in series to 115^{+10} bar.
Pressure relief valve (765)	The pressure relief valve limits the oil pressure of the wrapping arm motor (234) to 115^{+10} bar when decelerating.
Lower brake valve (766)	The non-return valves 732-1/ 732-2 and the lower brake valve (766) decelerate the wrapping arm motor (234) hydraulically on both sides if the wrapping arm forward solenoid valve (Y133) is not energized.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Film clamping cutters flow divider (769)	The flow divider divides the oil flows for opening and closing the film clamping cutters.
Master valve solenoid valve (Y77)	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763).

Description of function:

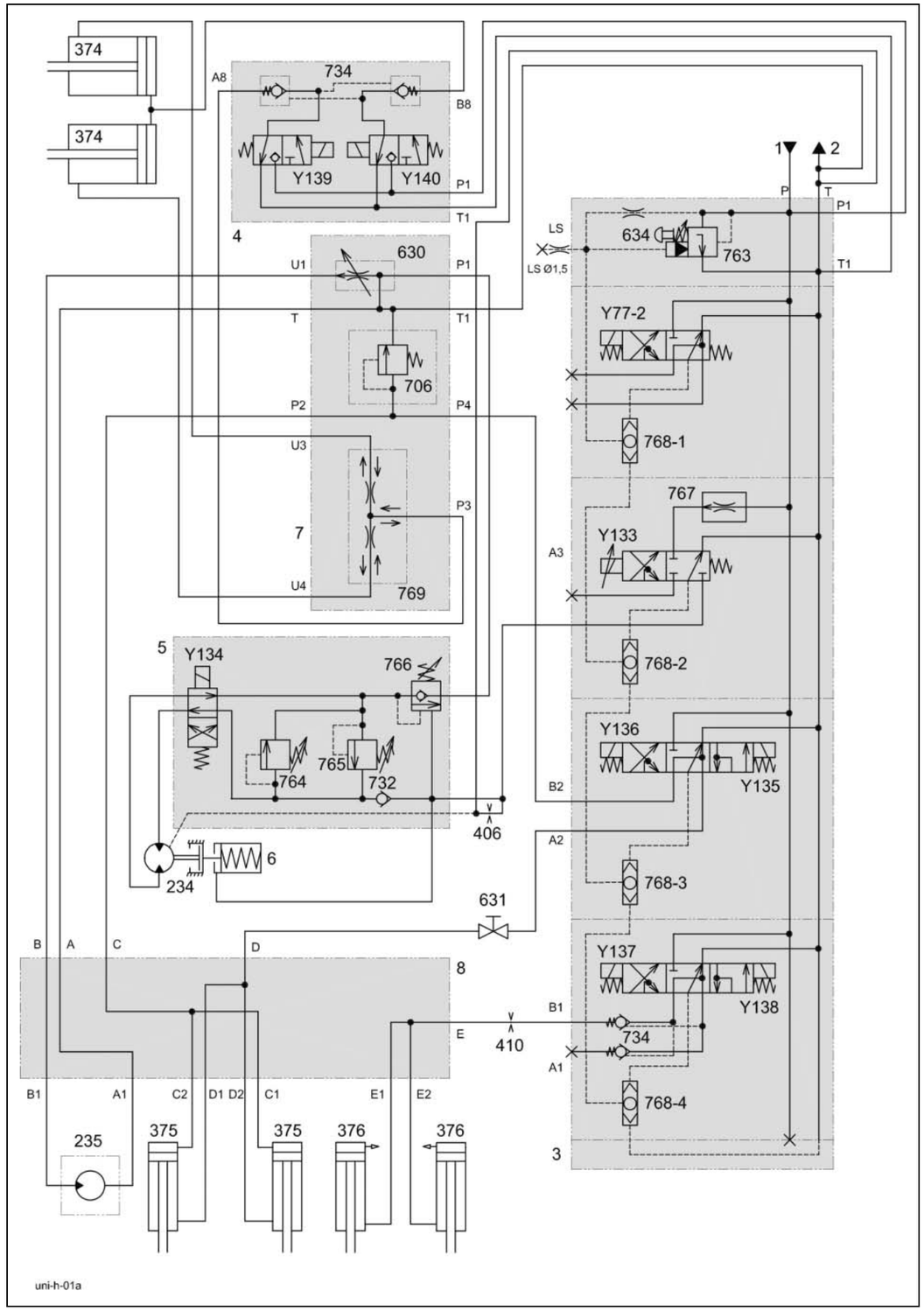
Wrapping arm forward solenoid valve (Y133)	The solenoid valve controls the wrapping arm hydraulic motor. A wrapping arm motor flow controller 767 is provided in the volume flow input and keeps the volume flow constant. When the control unit is activated, this volume flow is pumped to the hydraulic motor (234) which drives the wrapping arm with 28 … 30 rpm max. The flow controller may be accessed via the screw plug at the bottom of the control unit. The rotational speed of the wrapping arm of 27 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Wrapping arm reverse solenoid valve (Y134)	The solenoid valve changes the direction of oil flow to the wrapping arm motor (234) and consequently its sense of rotation.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit 734 avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit 734 in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.
Open film cutters solenoid valve (Y139)	The solenoid valve opens both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.
Close film cutters solenoid valve (Y140)	The solenoid valve closes both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.

1.4

Hydraulic circuit diagram

- from serial no.: 72601047
- with valve combination (630, 706, 769)
- without 3-stage restrictor (645)

1.4 Hydraulic circuit diagram from serial no.: 72601047, with valve combination (630, 706, 769), without 3-stage restrictor (645)



Key to diagram:

1	Feed line
2	Return line
3	Valve block
4	Valve block
5	Valve block
6	Disc brake
7	Valve combination
8	Manifold
234	Wrapping arm motor
235	Wrapping table motor
374	Film clamping cutters hydraulic cylinder
375	Tipping cradle hydraulic cylinder
376	Wrapping table hydraulic cylinder
406	Orifice plate Ø 0.8 mm
410	Orifice plate Ø 1.5 mm
630	Wrapping table flow control valve
631	Tipping cradle shut-off valve
634	System screw
706	Pressure relief valve
732	Non-return valve
734	Lock-up valve unit
763	Input pressure balance
764	Pressure relief valve (left) 115^{+10} bar
765	Pressure relief valve (right)
766	Lower brake valve
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
769	Film clamping cutters flow divider
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y134	Wrapping arm motor reverse solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve
Y139	Open film cutters solenoid valve
Y140	Close film cutters solenoid valve

Description of function:

Orifice plate (406) Ø 0.8 mm	The orifice plate (406) Ø 0.8 mm avoids pressure build-up and consequently uncontrolled movements of the wrapping arm motor (234).
Wrapping table flow control valve (630)	The wrapping table flow control valve supplies the hydraulic motor (235) via output (A). This volume flow can be adjusted and changes the wrapping table motor / wrapping arm motor speed ratio and consequently the film layer overlaps.
Tipping cradle shut-off valve (631)	During service work, the tipping cradle shut-off valve shuts off the oil flow from the hydraulic cylinders 375.
Pressure relief valve (706)	The pressure relief valve limits the pressure to 70 bar when lowering the tipping cradle hydraulic cylinders.
Non-return valve (732-3)	The non-return valve avoids faulty functions of the film clamping cutters by building up pressure in the T line.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Pressure relief valve (764)	The pressure relief valve limits the oil pressure to the wrapping arm motor (234) and the wrapping table motor (drive) connected in series to 115^{+10} bar.
Pressure relief valve (765)	The pressure relief valve limits the oil pressure of the wrapping arm motor (234) when decelerating.
Lower brake valve (766)	The non-return valves 732-1/ 732-2 and the lower brake valve (766) decelerate the wrapping arm motor (234) hydraulically on both sides if the wrapping arm forward solenoid valve (Y133) is not energized.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Film clamping cutters flow divider (769)	The flow divider divides the oil flows for opening and closing the film clamping cutters.
Master valve solenoid valve Y77	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763).

Description of function:

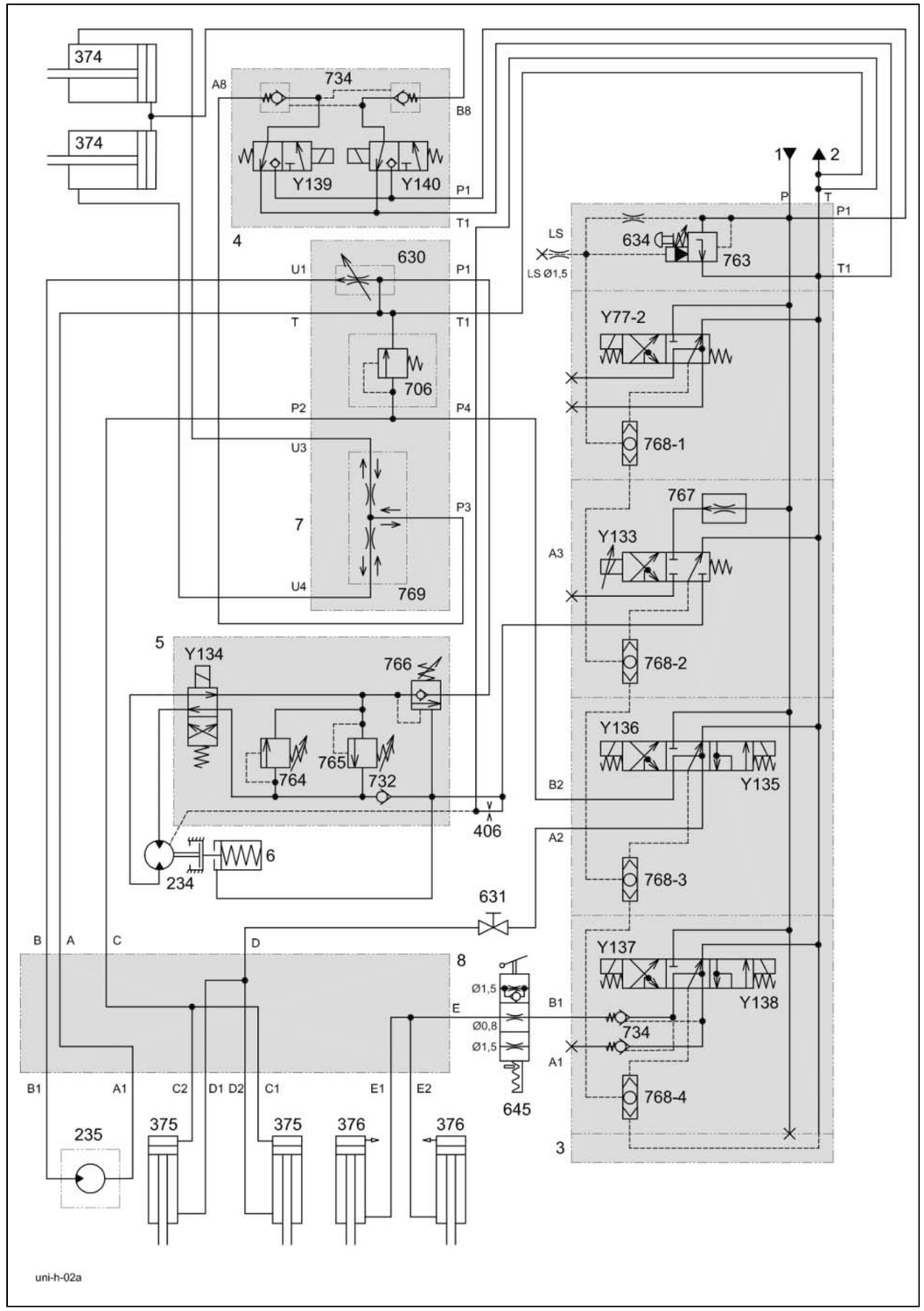
Wrapping arm forward solenoid valve (Y133)	The solenoid valve controls the wrapping arm hydraulic motor. A wrapping arm motor flow controller (767) is provided in the volume flow input and keeps the volume flow constant. When the control unit is activated, this volume flow is pumped to the hydraulic motor (234) which drives the wrapping arm with 28 … 30 rpm max. The flow controller may be accessed via the screw plug at the bottom of the control unit. The rotational speed of the wrapping arm of 27 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Wrapping arm reverse solenoid valve (Y134)	The solenoid valve changes the direction of oil flow to the wrapping arm motor (234) and consequently its sense of rotation.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit (734) avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit (734) in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.
Open film cutters solenoid valve (Y139)	The solenoid valve opens both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.
Close film cutters solenoid valve (Y140)	The solenoid valve closes both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.

1.5

Hydraulic circuit diagram

- from serial no.: 72601047
- with valve combination (630, 706, 769)
- with 3-stage restrictor (645)

1.5 Hydraulic circuit diagram from serial no.: 72601047, with valve combination (630, 706, 769), with 3-stage restrictor (645)



Key to diagram:

1	Feed line
2	Return line
3	Valve block
4	Valve block
5	Valve block
6	Disc brake
7	Valve combination
8	Manifold
234	Wrapping arm motor
235	Wrapping table motor
374	Film clamping cutters hydraulic cylinder
375	Tipping cradle hydraulic cylinder
376	Wrapping table hydraulic cylinder
406	Orifice plate Ø 0.8 mm
410	Orifice plate Ø 1.5 mm
630	Wrapping table flow control valve
631	Tipping cradle shut-off valve
634	System screw
645	3-stage restrictor
706	Pressure relief valve
732	Non-return valve
734	Lock-up valve unit
763	Input pressure balance
764	Pressure relief valve (left) 115^{+10} bar
765	Pressure relief valve (right)
766	Lower brake valve
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
769	Film clamping cutters flow divider
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y134	Wrapping arm motor reverse solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve
Y139	Open film cutters solenoid valve
Y140	Close film cutters solenoid valve

Description of function:

Orifice plate (406) Ø 0.8 mm	The orifice plate (406) Ø 0.8 mm avoids pressure build-up and consequently uncontrolled movements of the wrapping arm motor (234).
Wrapping table flow control valve (630)	The wrapping table flow control valve supplies the hydraulic motor (235) via output (A). This volume flow can be adjusted and changes the wrapping table motor / wrapping arm motor speed ratio and consequently the film layer overlaps.
Tipping cradle shut-off valve (631)	During service work, the tipping cradle shut-off valve shuts off the oil flow from the hydraulic cylinders 375.
Pressure relief valve (706)	The pressure relief valve limits the pressure to 70 bar when lowering the tipping cradle hydraulic cylinders.
Non-return valve (732-3)	The non-return valve avoids faulty functions of the film clamping cutters by building up pressure in the T line.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Pressure relief valve (764)	The pressure relief valve limits the oil pressure to the wrapping arm motor (234) and the wrapping table motor (drive) connected in series to 115^{+10} bar.
Pressure relief valve (765)	The pressure relief valve limits the oil pressure of the wrapping arm motor (234) when decelerating.
Lower brake valve (766)	The non-return valves 732-1/ 732-2 and the lower brake valve (766) decelerate the wrapping arm motor (234) hydraulically on both sides if the wrapping arm forward solenoid valve (Y133) is not energized.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Film clamping cutters flow divider (769)	The flow divider divides the oil flows for opening and closing the film clamping cutters.
Master valve solenoid valve (Y77)	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763).

Description of function:

Wrapping arm forward solenoid valve (Y133)	The solenoid valve controls the wrapping arm hydraulic motor. A wrapping arm motor flow controller (767) is provided in the volume flow input and keeps the volume flow constant. When the control unit is activated, this volume flow is pumped to the hydraulic motor (234) which drives the wrapping arm with 28 … 30 rpm max. The flow controller may be accessed via the screw plug at the bottom of the control unit. The rotational speed of the wrapping arm of 27 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Wrapping arm reverse solenoid valve (Y134)	The solenoid valve changes the direction of oil flow to the wrapping arm motor (234) and consequently its sense of rotation.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit (734) avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit (734) in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.
Open film cutters solenoid valve (Y139)	The solenoid valve opens both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.
Close film cutters solenoid valve (Y140)	The solenoid valve closes both film cutters. The wrapping table raise solenoid coil (Y138) is actuated simultaneously with solenoid coils (Y139). This is necessary in order to build up pressure in the LS line to make the input pressure balance (763) close.
3-stage restrictor (645)	To enable raising and lowering the wrapping table at different speeds, the respective speed may be preselected using the 3-stage restrictor, see chapter 4-15.

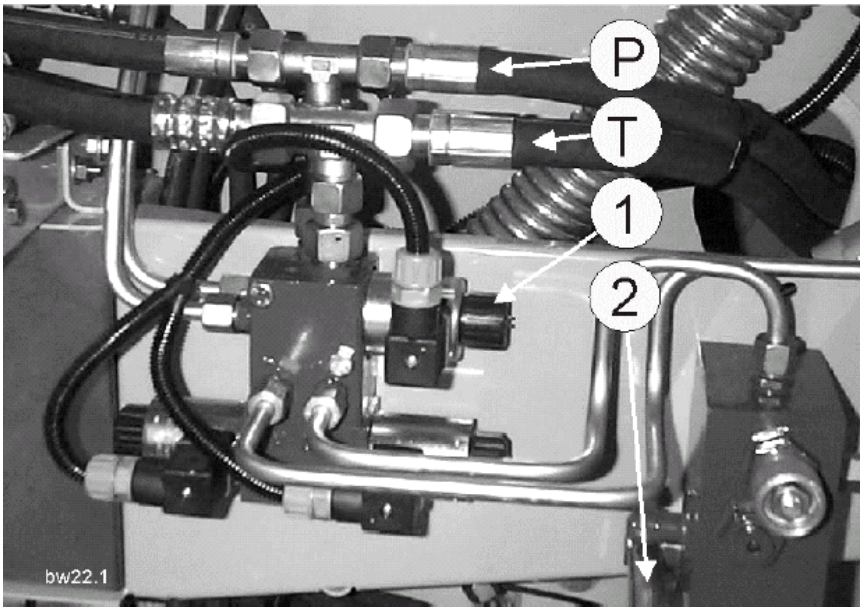
2

Pre-conditions for use

2.1 Blocking the master valve (Y77) 28

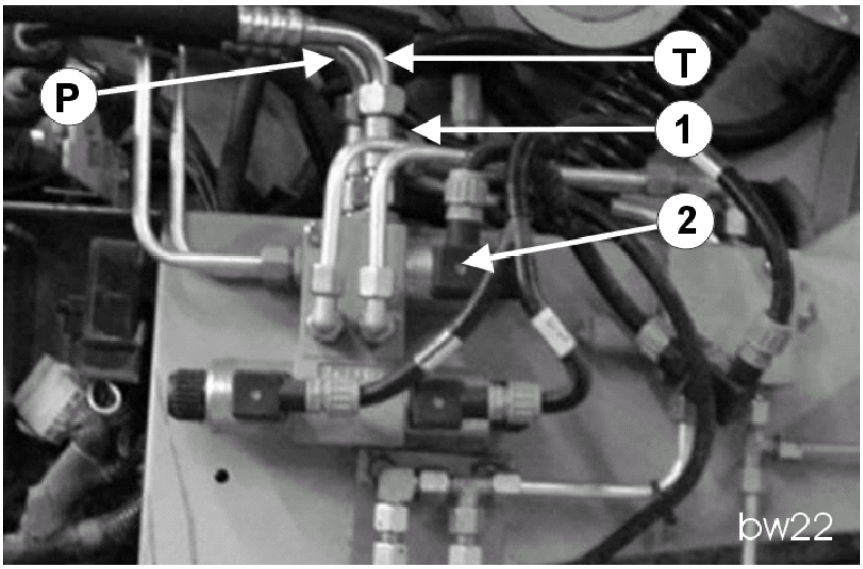
2.2 Connection to tractor hydraulic system 29

2.1
Blocking the master valve (Y77)
From serial no.



1 Circulation shut-off valve solenoid coil (Y77-1)
Caution: The screw must be turned in.
The circulation shut-off valve is now permanently shut off.
2 Hand lever.
Horizontally (to the outside) = Working position
Vertically (to the bottom) = The tailgate is safeguarded in open position (for service work)
P Feed line to UNIWRAP.
T Return line from UNIWRAP.

Up to machine no.



1 Tee
2 Circulation shut-off valve solenoid coil (Y77-1)
P Feed line to UNIWRAP.
T Return line from UNIWRAP.

2.2 Connection to tractor hydraulic system

Description of function: 1/2

The attachment can be connected to any tractor hydraulic system available on the market.

Connection to tractors with constant-flow hydraulic system

The quick release coupling 1 is connected to a control unit port of the tractor with adjustable oil flow.
This control unit provides oil supply for the attachment and is adjusted to a constant volume flow of Q_{max} = 35 to 50 l/min.

The system screw 634 is turned out up to the stop so that the input pressure balance 763 is operative.

The quick release coupling 2 is in general connected to the pressureless return line T of the tractor.
If a pressureless return line is not allowed in continuous operation (e.g. because lubrication of the tractor gearbox is not guaranteed), a double-acting control unit can be used for supplying oil to the attachment.
In this case, the quick release coupling 1 is connected to port A (feed) and quick release coupling 2 to port B (return) of the corresponding tractor control valve.

Adjust the volume flow to Q_{max} = 35 to 50 l/min; please refer also to the tractor's Operating Manual (e.g. "Continuous operation of hydraulic motors").

The LS connection (LS, working hydraulics signal) is not used here.

If the tractor is not provided with a flow-adjustable control unit, the volume flow must not exceed 35 to 50 l/min.

Connection to tractors with constant-pressure hydraulic system

The quick release coupling 1 is connected to a control unit port of the tractor with adjustable oil flow.
This control unit provides oil supply for the attachment and is adjusted to an oil flow of Q_{max} = 35 to 50 l/min.

The system screw 634 is turned in up to the stop so that the input pressure balance 763 is blocked.
The tractor's hydraulic pump is shut down when the system pressure has been reached.

The quick release coupling 2 is connected to port T (pressureless return line) of the tractor.

The LS connection (LS, working hydraulics signal) is not used here.

Description of function: 2/2

Connection to tractors with load-sensing system and a Power Beyond port

The quick release coupling 1 is connected directly to the pump via the Power Beyond port P.

The quick release coupling 2 is connected to port T (pressureless return line) of the tractor.

Here the LS connection (LS, working hydraulics signal) is connected with the LS signal port of the tractor (the kit is available from the spare parts department).

The system screw 634 is turned in up to the stop so that the input pressure balance 763 is blocked.
The tractor's hydraulic pump regulates as a function of the attachment's load signal.

Test points/characteristics

When no function is active on the attachment, the attachment must not load the tractor hydraulically.
(The tractor engine speed must not be reduced).
The allowed temperature of the tractor's hydraulic system must not be exceeded; see also the Operator's Manual of the tractor.

Connection to tractors with load-sensing system without a Power Beyond port

The quick release coupling 1 is connected to a control unit port of the tractor with adjustable oil flow.
This control unit provides oil supply for the attachment and is adjusted to a constant volume flow of Q_{max} = 35 to 50 l/min.

The system screw 634 is turned out up to the stop so that the input pressure balance 763 is operative.

The quick release coupling 2 is in general connected to the pressureless return line T of the tractor.
If a pressureless return line is not allowed in continuous operation (e.g. because lubrication of the tractor gearbox is not guaranteed), a double-acting control unit can be used for supplying oil to the attachment.
In this case, the quick release coupling 1 is connected to port A (feed) and quick release coupling 2 to port B (return) of the corresponding tractor control valve.

Adjust the volume flow to Q_{max} = 35 to 50 l/min; please refer also to the tractor's Operating Manual (e.g. "Continuous operation of hydraulic motors").

The LS connection (LS, working hydraulics signal) is not used here.

If the tractor is not provided with a flow-adjustable control unit, the volume flow must not exceed 35 to 50 l/min.

3

Valve block

3.1 Valve block, up to machine no. 130 34

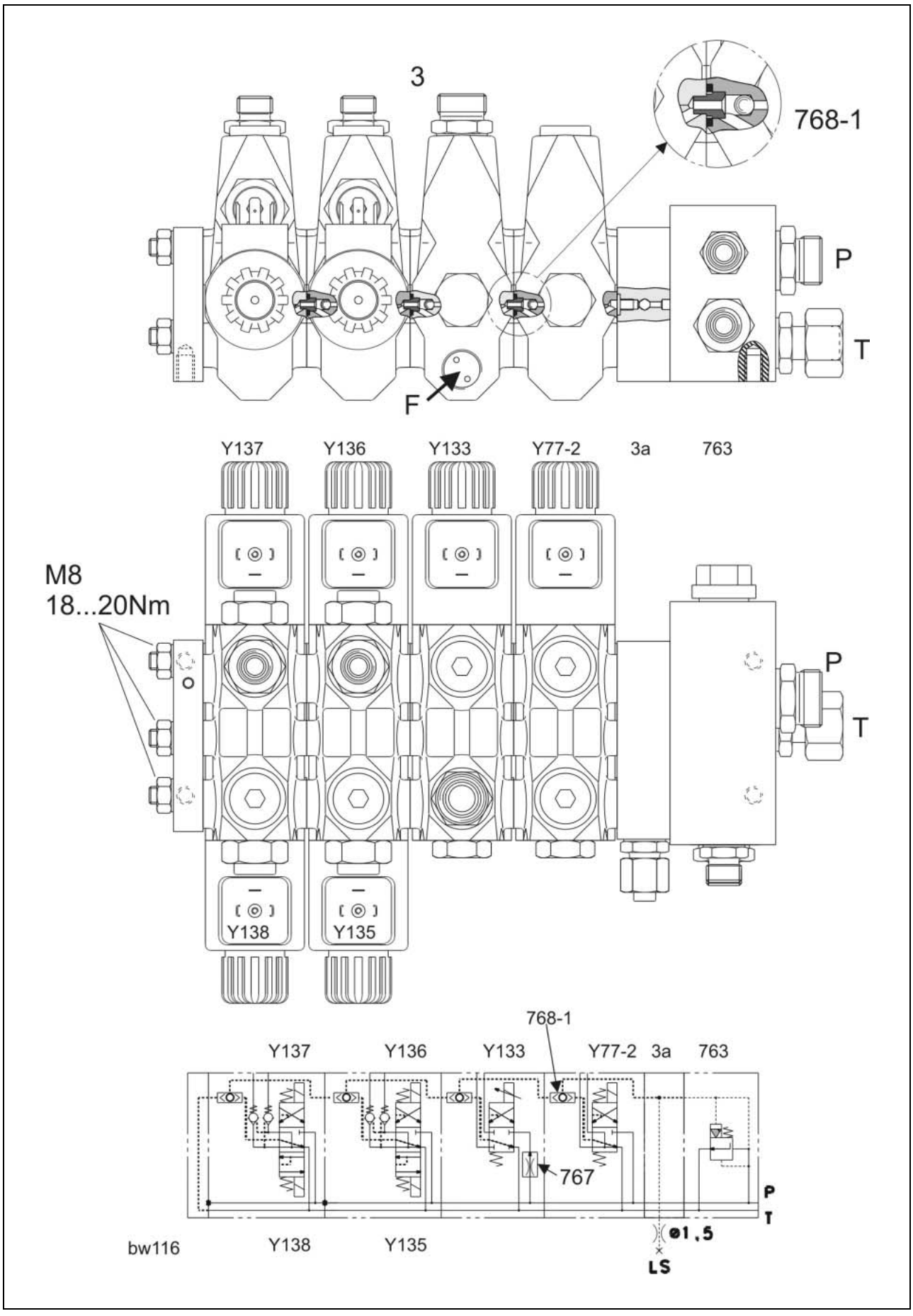
3.2 Valve block - from machine no. 131,
with tipping cradle service shut-off valve (631) 38

3.1

Valve block

- up to machine no. 130

3.1 Valve block, up to machine no. 130



Key to diagram:

F	Screw plug Access to flow controller. **Note:** Screw plug F must not protrude.
P	Pump (supply line)
T	Return line (tank)
3a	Intermediate plate
763	Input pressure balance
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve

Description of function:

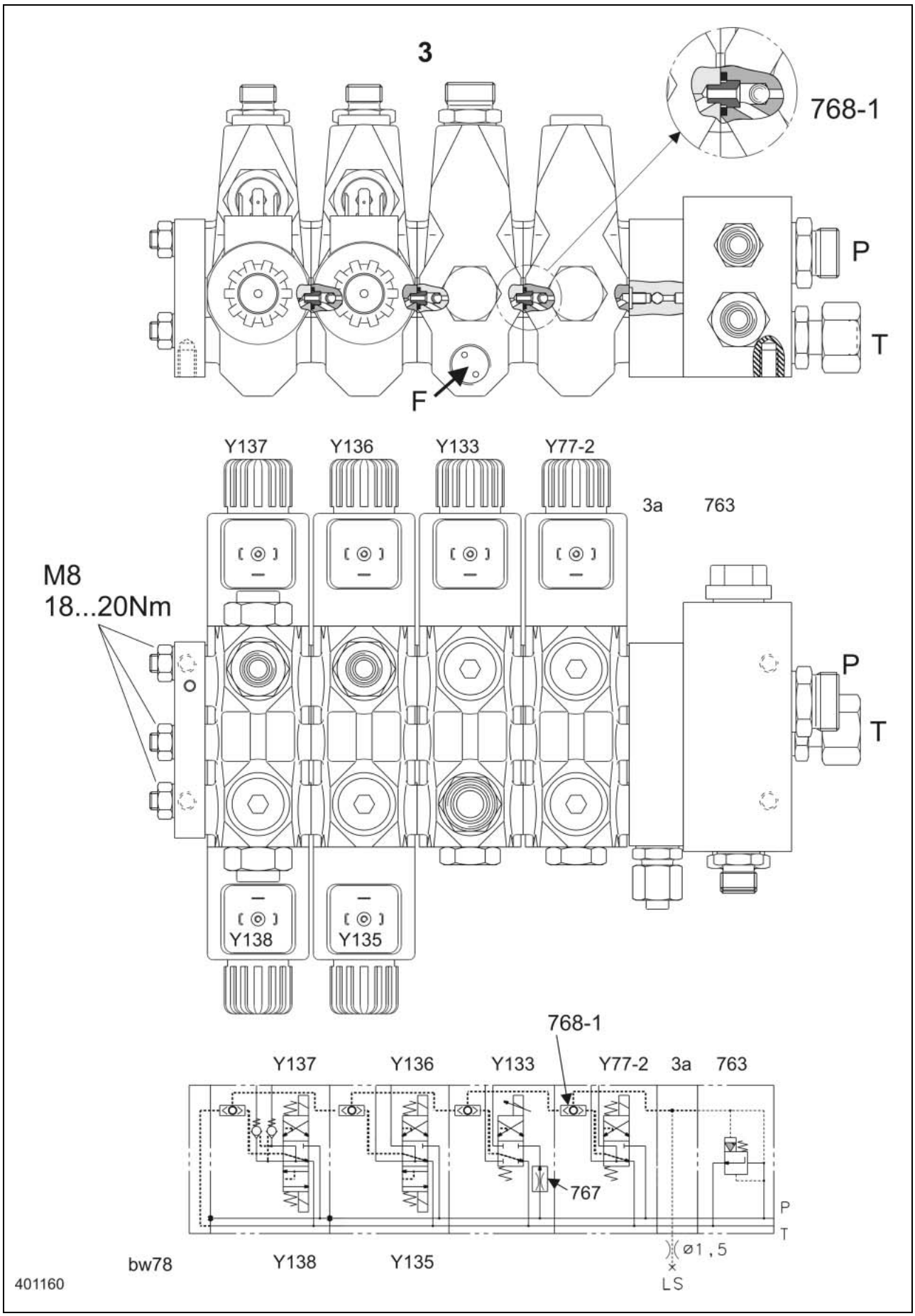
Intermediate plate (3a)	A connection from P to T is open in the intermediate plate. The LS connection is closed.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Master valve solenoid valve (Y77)	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763). Now the entire volume flow of the baler is available for performing hydraulic functions.
Wrapping arm forward solenoid valve (Y133)	Controls the wrapping arm hydraulic motor. A flow control valve is provided in the volume flow input which limits the volume flow to approx. 20l/min on the SAM wrapping arm motor or approx. 31l/min on the Danfoss wrapping arm motor. When the control unit is activated, this volume flow is pumped to the wrapping arm motor (234) which drives the wrapping arm with 28 ... 30 rpm max. The flow controller may be accessed via the screw plug (F) at the bottom of the control unit. If required, adjust the maximum rotational speed of the wrapping arm between 28 ... 30 rpm by carefully turning in or our the screw. Screw plug (F) must not protrude. The rotational speed of 28 ... 30 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit 734 avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit 734 in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.

3.2

Valve block

- from machine no. 131
- with tipping cradle service shut-off valve (631)

3.2 Valve block - from machine no. 131, with tipping cradle service shut-off valve (631)



Key to diagram:

F	Screw plug Access to flow controller. **Note:** Screw plug F must not protrude.
P	Pump (supply line)
T	Return line (tank)
3a	Intermediate plate
763	Input pressure balance
767	Wrapping arm motor flow controller
768	LS signal shuttle valves
Y77	Master valve solenoid valve
Y133	Wrapping arm motor forward solenoid valve
Y135	Lower tipping cradle solenoid valve
Y136	Raise tipping cradle solenoid valve
Y137	Lower wrapping table solenoid valve
Y138	Raise wrapping table solenoid valve

Description of function:

Intermediate plate (3a)	A connection from P to T is open in the intermediate plate. The LS connection is closed.
Input pressure balance (763)	The input pressure balance keeps the connection from P to T open when no control unit is actuated in valve block 3. It is closed by LS pressure. The LS pressure is built up when the master valve (Y77-2) or a control unit in valve block 3 is actuated.
Wrapping arm motor flow controller (767)	The flow controller keeps the volume flow to the wrapping arm motor (234) constant. Maximum wrapping speed (approx. 20 l/min.) with SAM wrapping arm motor. Maximum wrapping speed (approx. 31 l/min.) with Danfoss wrapping arm motor.
LS signal shuttle valves (768)	When operating the control valves in parallel mode, the shuttle valves allow sending the highest load pressure to the input pressure balance (763) in each case.
Master valve solenoid valve (Y77)	The master valve solenoid valve is actuated automatically when a hydraulic function is to be carried out on the baler. Now the pump flow is directed into the LS line so that the pressure that builds up closes the pressure balance (763). Now the entire volume flow of the baler is available for performing hydraulic functions.
Wrapping arm forward solenoid valve (Y133)	Controls the wrapping arm hydraulic motor. A flow control valve is provided in the volume flow input which limits the volume flow to approx. 20 l/min on the SAM wrapping arm motor or approx. 31l/min on the Danfoss wrapping arm motor. When the control unit is activated, this volume flow is pumped to the wrapping arm motor (234) which drives the wrapping arm with 28 ... 30 rpm max. The flow controller may be accessed via the screw plug (F) at the bottom of the control unit. If required, adjust the maximum rotational speed of the wrapping arm between 28 ... 30 rpm by carefully turning in or our the screw. Screw plug (F) must not protrude. The rotational speed of 28 ... 30 rpm ensures that the wrapping process is shorter than the time required for producing the bale.
Lower tipping cradle solenoid valve (Y135)	The solenoid valve lowers the tipping cradle.
Raise tipping cradle solenoid valve (Y136)	The solenoid valve raises the tipping cradle. The lock-up valve unit 734 avoids lowering of the raised tipping cradle.
Lower wrapping table solenoid valve (Y137)	The solenoid valve lowers the wrapping table. The lock-up valve unit 734 in the cylinder line avoids lowering of the loaded wrapping table.
Raise wrapping table solenoid valve (Y138)	The solenoid valve raises the wrapping table.

4

Individual components

4.1 Input pressure balance (763) 42

4.2 Circulation shut-off valve (Y77-2) 46

4.3 Wrapping arm control unit (Y133) 50

4.4 Tipping cradle control unit (Y135 / Y136) 54
4.4.1 Up to serial no.: with lock-up valve unit 54
4.4.2 From serial no.: without lock-up valve unit 58

4.5 Wrapping table control unit (Y137 / Y138) 62

4.6. Clamping cutters control unit (Y139 / Y140) 66

4.7 Flow controller (630) 70

4.8 Pressure relief valve (706) 74

4.9 Wrapping arm motor (234) 76

4.10 Wrapping table motor (235) 78

4.11 Tipping cradle service shut-off valve (631) 80

4.12 Film clamping cutters hydraulic cylinder (374) 82

4.13 Film clamping cutters flow divider (769) 84

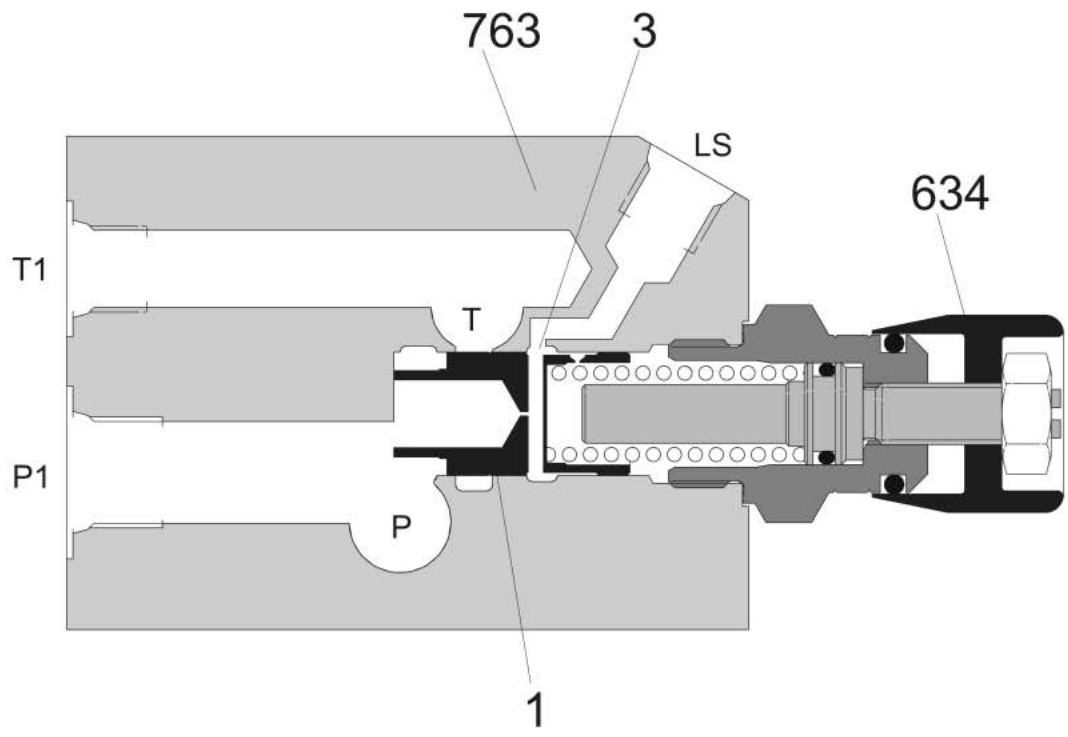
4.14 Wrapping arm motor valve block (4) 90

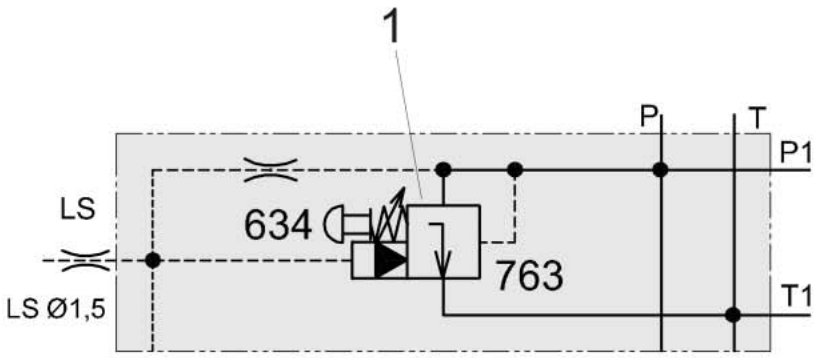
4.15 3-stage restrictor 92

4.16 Valve combination (7) 94

4.17 Manifold (8) 96

4.1 Input pressure balance (763)

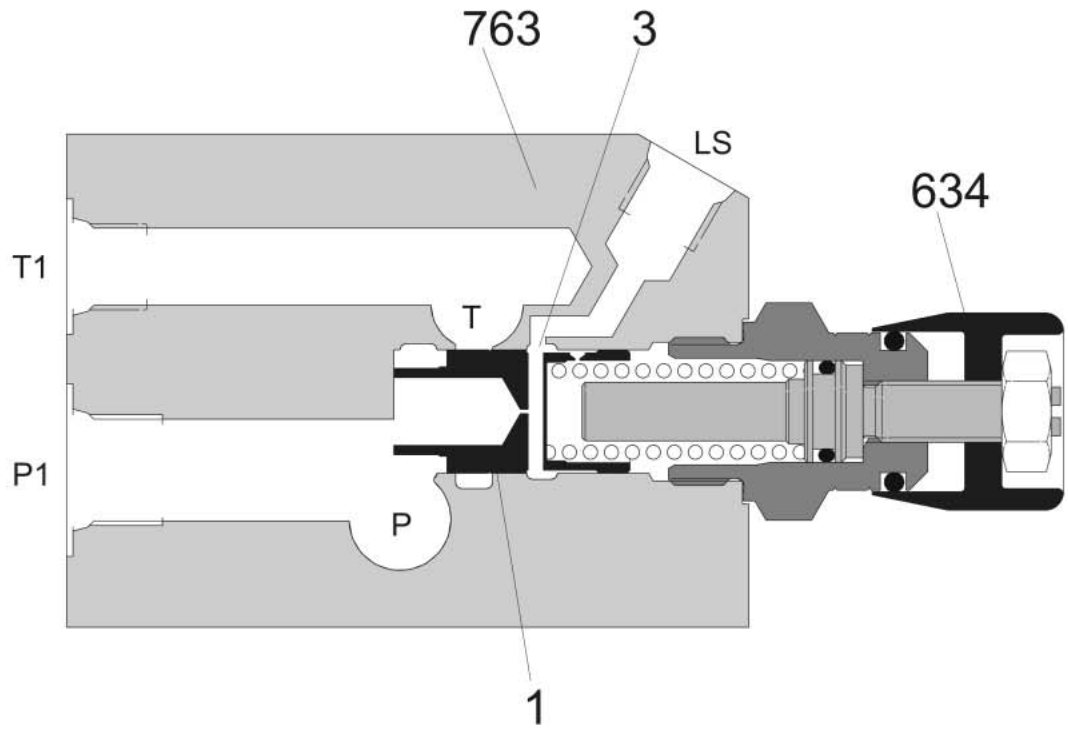


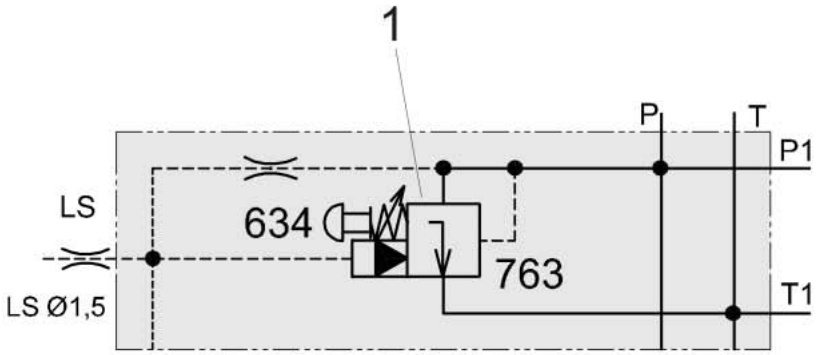


401220

Key to diagram:

P	Channel pump Volume flow input from the baler. Channel P continues through each downstream control unit and is connected with the spool in each case.
P1	Port. Supply of film cutter control unit
LS	The LS channel is connected to each of the downstream control units. Here the load pressure is applied when a control unit is actuated.
T	Return line (tank). The channel T continues through each of the downstream control units and is connected with the spool in each case.
T1	Port. Return line input from the film cutter control unit.
1	Control ram The compression spring pushes it to the left-hand stop when no volume flow is flowing.
3	Bore It connects the LS channel (load pressure) with the spring space of the control ram.
634	System screw (option)
763	Input pressure balance



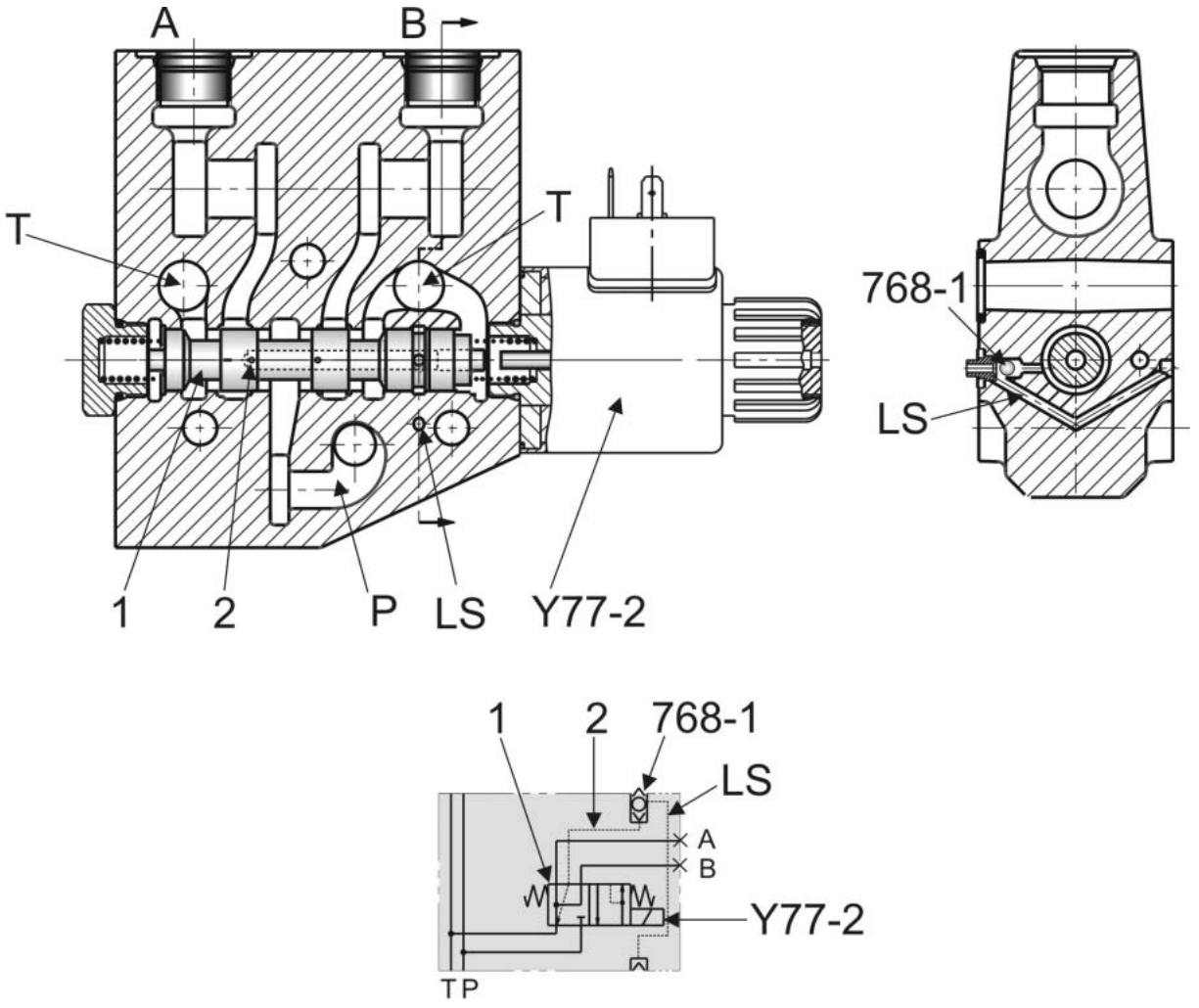


401220

Description of function:

No volume flow flowing	The pressure spring pushes the control piston (1) to the left-hand stop. The connection from P to T is closed.
Volume flow flowing – but no control unit is actuated	The compression spring pushes the control ram (1) to its left-hand stop. The connection from P to T is closed. Volume flow enters the pressure balance via channel P (from the tractor via the baler) and flows to each of the downstream control units. Since no control unit is actuated, each spool shuts off the volume flow. This builds up pressure which acts on the left-hand face end of the control piston (1) and moves it to the right against the pressure spring. Now the connection from P to T is opened so that the volume flow flows back to the baler. At the same time, a partial volume flow flows via the orifice plate (inside the control piston) into the spring space of the control piston. The spring space is pressureless because it is connected with the channel (LS) via bore (3). This channel is pressureless, too, because no control unit is actuated. A pressure difference (Δp) of 9 bar results at the control piston because: pressure ahead of the control piston = 9 bar pressure in the spring space = 0 bar
A control unit is actuated, e.g. the tipping cradle is raised.	When the corresponding control unit is actuated, volume flow flows via channel P and the spool into the tipping cradle cylinders. The load pressure now generated is directed into the control piston spring space through the LS channel and via bore (3). This pressure build-up moves the control piston (1) to the left, partly closing the connection from P to T. This closing is necessary to make volume flow available for raising the tipping cradle. However, the control piston is pushed to the left only until the pressure difference (Δp) of 9 bar is re-established. A part of the volume flow will continue to flow back to the baler via channel T. When the tipping cradle cylinders have moved up to their stop, the pressure rises and is applied in the control piston spring space via the LS channel and pushes the control piston to the left-hand stop. The pressure inside channel P actuates the pressure relief valve on the tractor (the baler and the UNIWRAP are supplied with volume flow from here).

4.2 Circulation shut-off valve (Y77-2)



Key to diagram:

P	Channel pump Volume flow input from the baler. Channel P continues through each downstream control unit and is connected with the spool in each case.
T	Return line (tank). The channel T continues through each of the downstream control units and is connected with the spool in each case.
A	Port. The connection is closed.
B	Port. The connection is closed.
LS	The LS channel is connected to each of the downstream control units. Here the load pressure is applied when a control unit is actuated.
1	Spool. Actuated by solenoid valve (3).
2	Bore in the spool. It is connected with the LS channel that ends at the upstream input pressure balance.
Y77-2	Master valve solenoid valve It actuates the spool (1).
768-1	LS signal shuttle valves

Description of function:

The circulation shut-off valve solenoid coil (Y77-2) is actuated whenever a hydraulic function is to be carried out on the baler (e.g. open tailgate, raise pick-up ...).

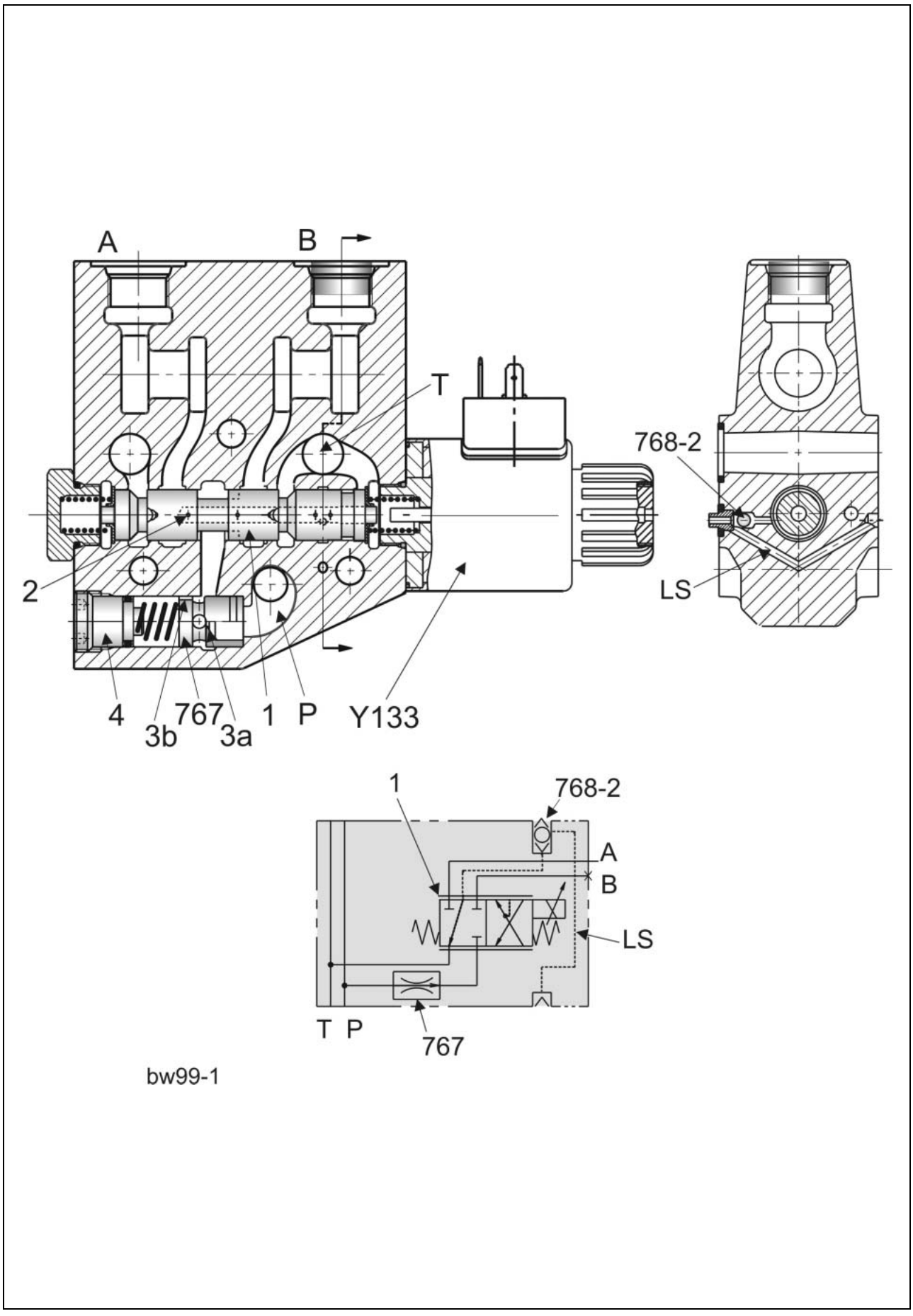
No volume flow flowing

Due to the two pressure springs located at the face end, spool (2) is positioned so that (see figure):
- channel P is shut off at the spool
- ports A and B are connected with the tank
- bore (2) is connected with the tank.

Hydraulic requirement from the baler

The UNIWRAP electronics module actuates circulation shut-off valve solenoid coil (Y77-2). Solenoid coil (Y77-2) moves spool (1) to the left-hand stop, thus opening the connection from P to A. Since port A is closed, pressure is built up which then is applied in the LS channel via bore (2) and LS signal shuttle valve (768-1). This pressure signal is directed to the upstream input pressure balance (763) via the LS channel.The pressure balance (763) switches over and shuts off the connection from P to T which had been open so far. The volume flow is now available to the baler.

4.3 Wrapping arm control unit (Y133)



Key to diagram:

P Channel pump
Volume flow input from the baler. Channel P continues through each downstream control unit and is connected with the spool in each case.

T Return line (tank)
The channel T continues through each of the downstream control units and is connected with the spool in each case.

LS The LS channel is connected to each of the downstream control units.
When the wrapping arm rotates, the load pressure acts here. This pressure signal ends in the input pressure balance.

A Port
The wrapping arm hydraulic motor is connected here.

B Port
The connection is closed.

1 Spool
Actuated by solenoid valve (6).

2 Bore
In the spool, senses the load pressure in port A. Is connected with the LS channel which ends in the input pressure balance.

3 2-way flow controller
It limits the max. volume flow to the wrapping arm motor to 20 l/min, resulting in a wrapping arm speed of 28 ... 30 l/min.

- 3a Orifice plate
- 3b Connection
  Is a spiral groove which directs the load pressure from port A (wrapping arm hydraulic motor) into the spring space.

4 Spring support
This allows changing the spring force.

767 Wrapping arm motor flow controller

768-2 LS signal shuttle valve

Y133 Solenoid valve
- Is a proportional solenoid valve and actuates spool (1).
- Is actuated by the UNIWRAP electronics module.

Description of function:

No volume flow flowing	Due to the two pressure springs located at the face end, spool (2) is positioned so (see figure) that ports P and A are shut off.
Oil supply is available, but control unit is not yet actuated	The volume flow enters the control unit via channel P and flows through orifice plate (3a) to spool (1). Since the spool stops the flow, pressure is built up which acts on the right-hand face end of the 2-way flow controller (3) and via connection (3b) also in the spring space. This compensates the pressure at the 2-way flow controller (3) which is pushed to the right-hand stop by the pressure spring.
Control unit is actuated	The speed of the hydraulic motor which drives the wrapping arm depends on the amount of volume flow. The higher the volume flow, the higher the motor speed. When the input volume flow is constant, the hydraulic motor speed will be constant as well. When the wrapping arm starts, its speed is to be continuously increased from 0 to 28 ... 30 rpm. To realise this start-up behaviour, the volume flow to the hydraulic motor must be continuously increased. The UNIWRAP electronics module actuates the solenoid coil (Y133) and continuously increases its force which moves the spool (1) against the pressure spring to the left. This opens the connection from P to A continuously, thus constantly increasing the volume flow and consequently the hydraulic motor speed. When the solenoid coil (Y133) has moved the spool (1) fully to the left against the pressure spring, the spool gap has reached its maximum opening position. In this position, the 2-way flow controller (767) regulates the volume flow to approx. 20 l/min on the SAM wrapping arm motor or approx. 31 l/min on the Danfoss wrapping arm motor, independently from the load. This keeps the hydraulic motor speed constant.

Control behaviour

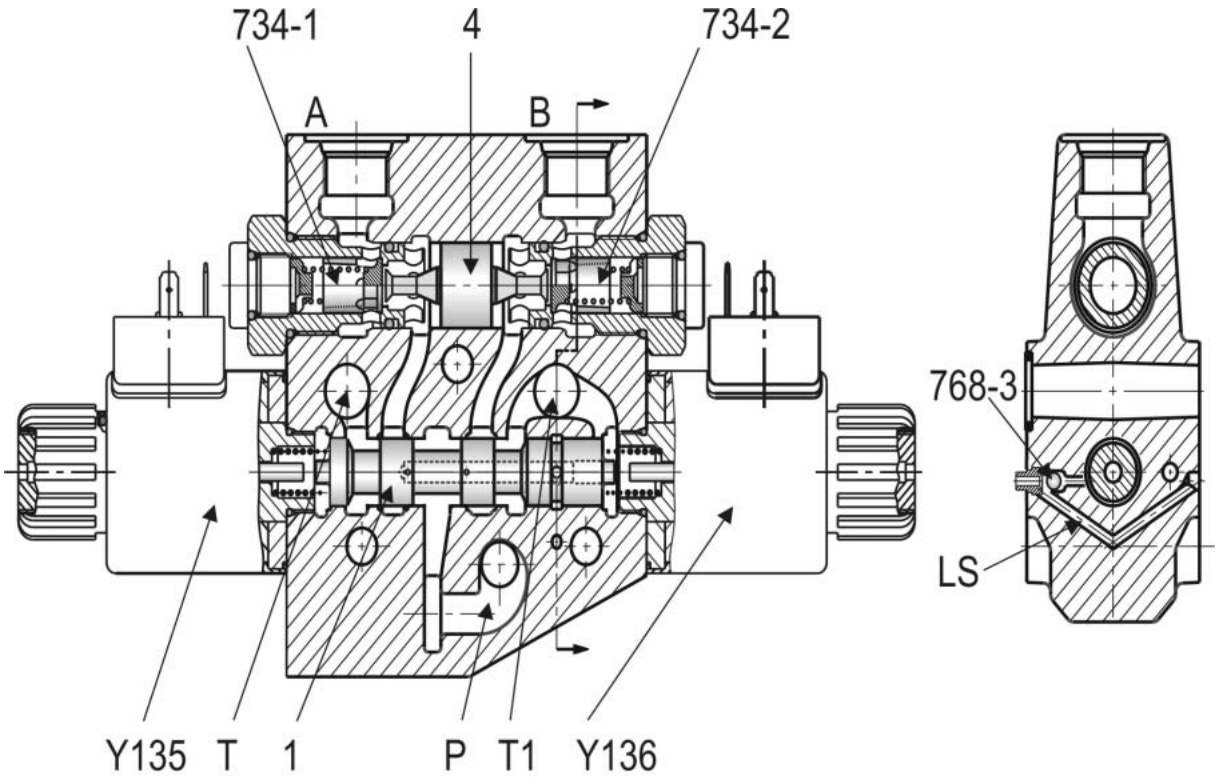
When volume flow flows through the 2-way flow controller (767), different pressure levels are generated:
- The pump pressure is applied ahead of the orifice plate (3a)
- The load pressure is applied behind the orifice plate (3a) via connection (3b).

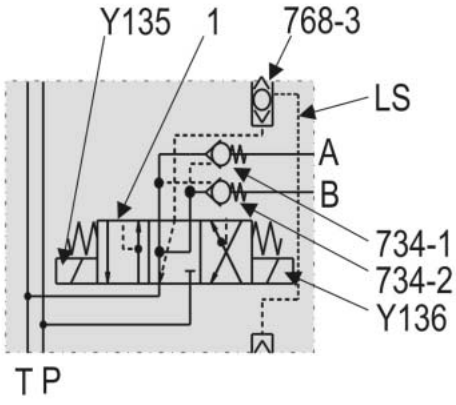
The pressure behind the orifice plate (3a) is lower than the pressure ahead of the orifice plate. This pressure difference is referred to as Δp. The flow controller keeps this Δp constant even when the load pressure (in the spring space) changes. When Δp is constant, the volume flow is also constant.

Load pressure

The load pressure generated is directed through the hollow-drilled spool via bore (2), actuates the LS signal shuttle valve (768-2) and is then transmitted into the LS channel which ends at the upstream input pressure balance (763).

4.4 Tipping cradle control unit (Y135 / Y136)
4.4.1 Up to serial no.: with lock-up valve unit





bw100-1

Key to diagram:

P	Channel pump Volume flow input.
T	Return line (tank)
LS	LS channel. When the tipping cradle is actuated, the load pressure acts here. This pressure signal ends in the input pressure balance.
A	Port To the rod spaces of the hydraulic cylinders. The tipping cradle is raised when pressure is built up.
B	Port To the piston spaces of the hydraulic cylinders. The tipping cradle is lowered when pressure is built up.
1	Spool Actuated by solenoid valve (6).
4	Ram Opens the non-return valve (734-1) or (734-2)
734-1	Lock-up valve unit non-return valve This seals off port A and is opened by ram (4).
734-2	Lock-up valve unit non-return valve This seals off port B and is opened by ram (4).
768-3	LS signal shuttle valve
Y136	Raise tipping cradle solenoid valve The solenoid valve moves the spool (1) to the left.
Y135	Lower tipping cradle solenoid valve The solenoid valve moves the spool (1) to the right.

Description of function:

No volume flow flowing, the solenoid valves are not actuated.

Due to the two pressure springs located at the face end, spool (1) is positioned so (see figure) that port P is shut off.
Ports A and B are sealed by the non-return valves.

Raise tipping cradle

Solenoid coil (Y136) is actuated by the UNIWRAP electronics module and moves spool (1) to the left.
Volume flow flows from channel P via the spool gap in front of the lock-up valve unit non-return valve (734-1). Pressure is built up which:
- opens the lock-up valve unit non-return valve (734-1) and
- moves the piston (4) to the right.

The volume flow flows from port A via the open lock-up valve unit non-return valve (734-1) into the rod spaces of the hydraulic cylinders - the tipping cradle is raised.
At the same time, the piston (4) is moved to the right and opens the lock-up valve unit non-return valve (734-2). Port B (piston spaces of hydraulic cylinders) is connected with the tank (T1) via the open lock-up valve unit non-return valve (734-2) and spool (1).

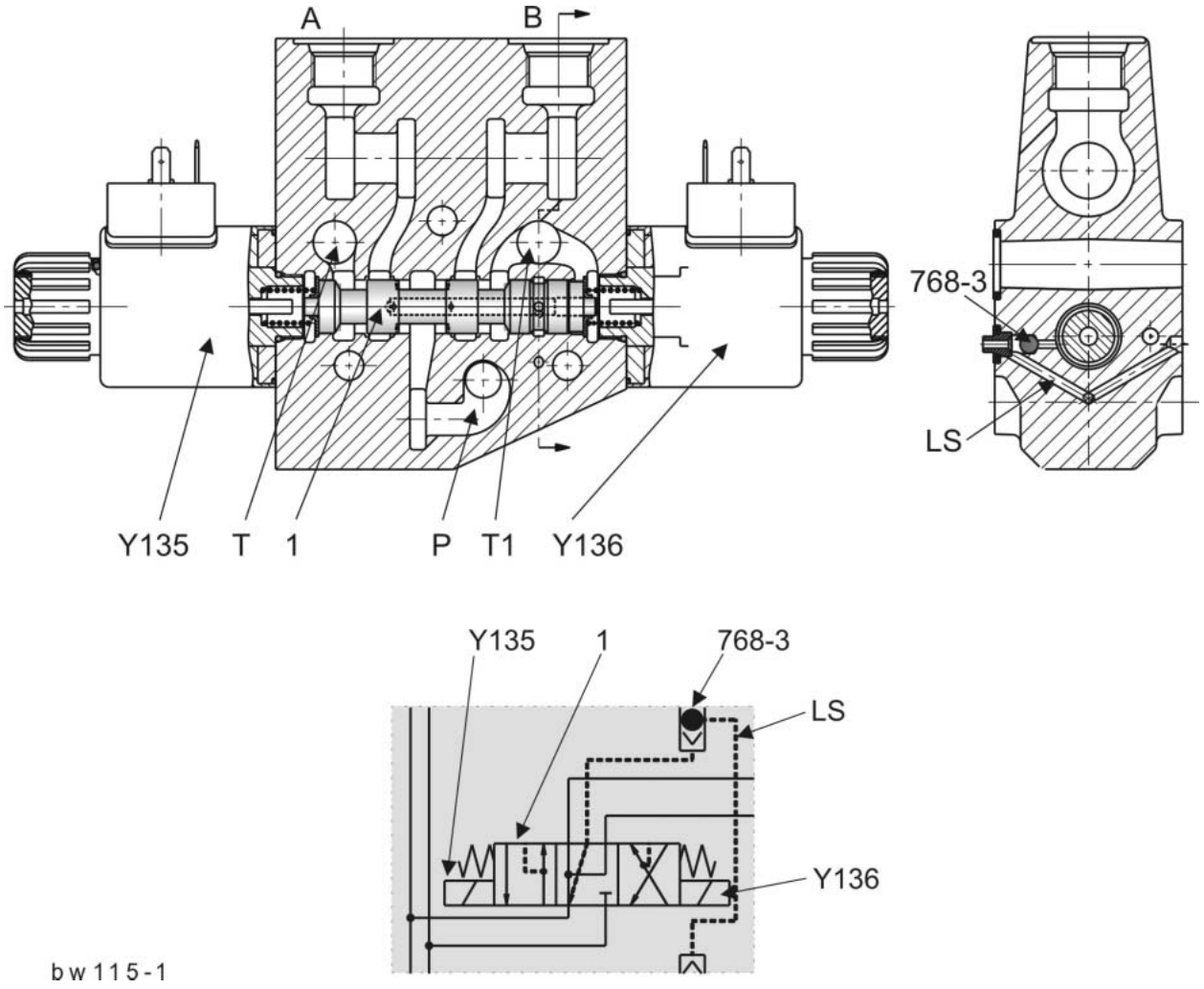
Lower tipping cradle

Solenoid coil (Y135) is actuated by the UNIWRAP electronics module and moves spool (1) to the right.
Volume flow flows from channel P via the spool gap in front of the lock-up valve unit non-return valve (734-2). Pressure is built up which:
- opens the lock-up valve unit non-return valve (734-2) and
- moves the piston (4) to the left.

The volume flow from port B flows via the open lock-up valve unit non-return valve (734-2) into the piston spaces of the hydraulic cylinders - the tipping cradle is lowered.
At the same time, the piston (4) is moved to the left and opens the lock-up valve unit non-return valve (734-1). Port A (rod spaces of the hydraulic cylinders) is connected with the tank (T) via the open lock-up valve unit non-return valve (734-1) and spool (1).

Notes:

4.4 Tipping cradle control unit (Y135 / Y136)
4.4.2 From serial no.: without lock-up valve unit



Key to diagram:

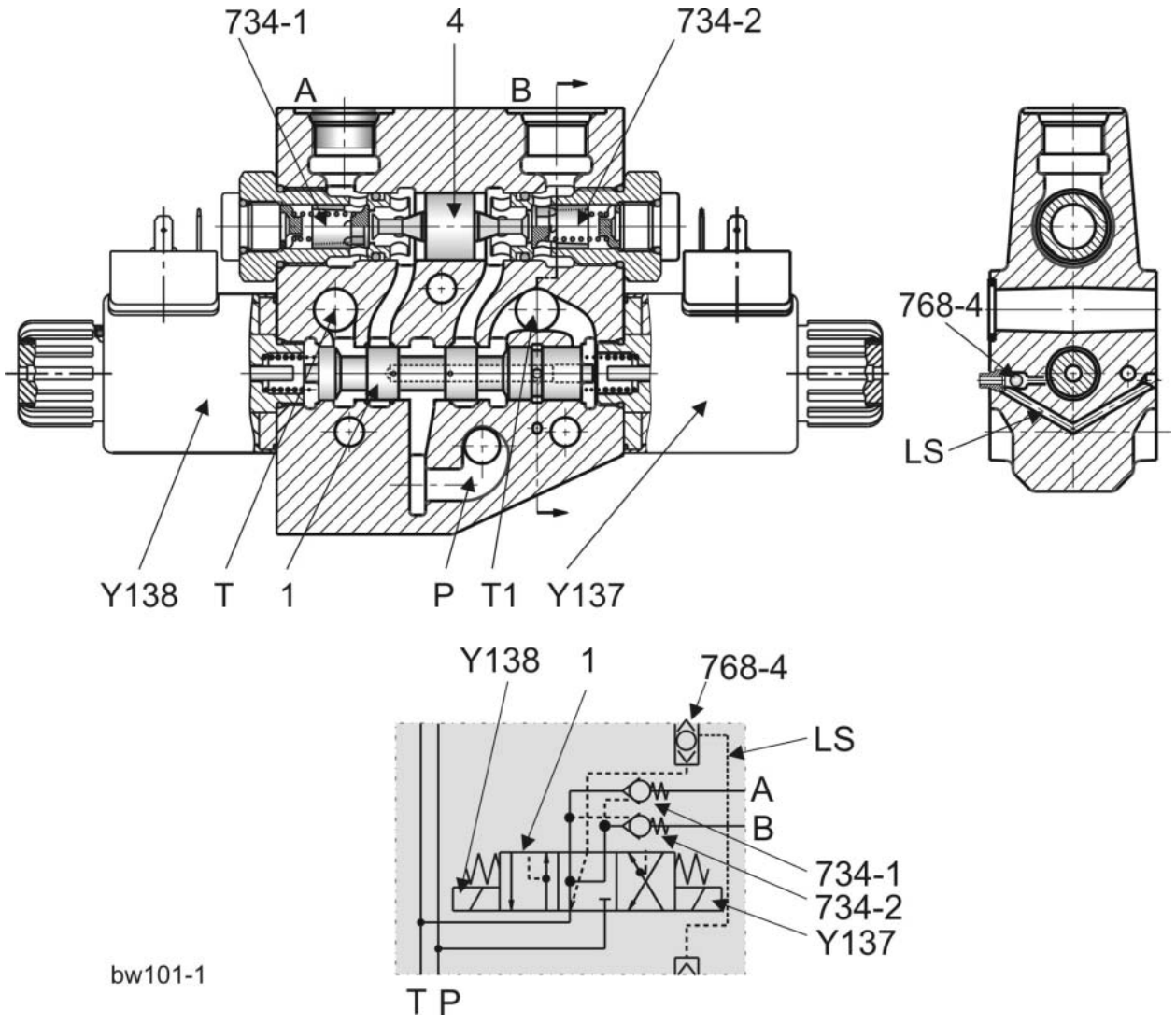
P	Channel pump Volume flow input.
T, T1	Return line (tank)
LS	LS channel When the tipping cradle is actuated, the load pressure acts here. This pressure signal ends in the input pressure balance.
A	Port To the rod spaces of the hydraulic cylinders. The tipping cradle is raised when pressure is built up.
B	Port To the piston spaces of the hydraulic cylinders. The tipping cradle is lowered when pressure is built up.
1	Spool Actuated by solenoid valve (6).
768-3	LS signal shuttle valve
Y136	Raise tipping cradle solenoid valve The solenoid valve moves the spool (1) to the left.
Y135	Lower tipping cradle solenoid valve The solenoid valve moves the spool (1) to the right.

Description of function:

No volume flow flowing, the solenoid valves are not actuated.	Due to the two pressure springs located at the face end, spool (1) is positioned so (see figure) that port P is shut off.
Raise tipping cradle	Solenoid coil (Y136) is actuated by the UNIWRAP electronics module and moves spool (1) to the left. Volume flow flows from channel P via the spool gap to port A and continues into the rod spaces of the hydraulic cylinders – the tipping cradle is raised. At the same time, volume flow from the piston spaces of the hydraulic cylinders flows via port B into the tank (T1).
Lower tipping cradle	Solenoid coil (Y135) is actuated by the UNIWRAP electronics module and moves spool (1) to the right. Volume flow flows from channel P via the spool gap to port B and continues into the piston spaces of the hydraulic cylinders – the tipping cradle is lowered. At the same time, the volume flow from the rod spaces of the hydraulic cylinders flows via port A into the tank (T).

Notes:

4.5 Wrapping table control unit (Y137 / Y138)



Key to diagram:

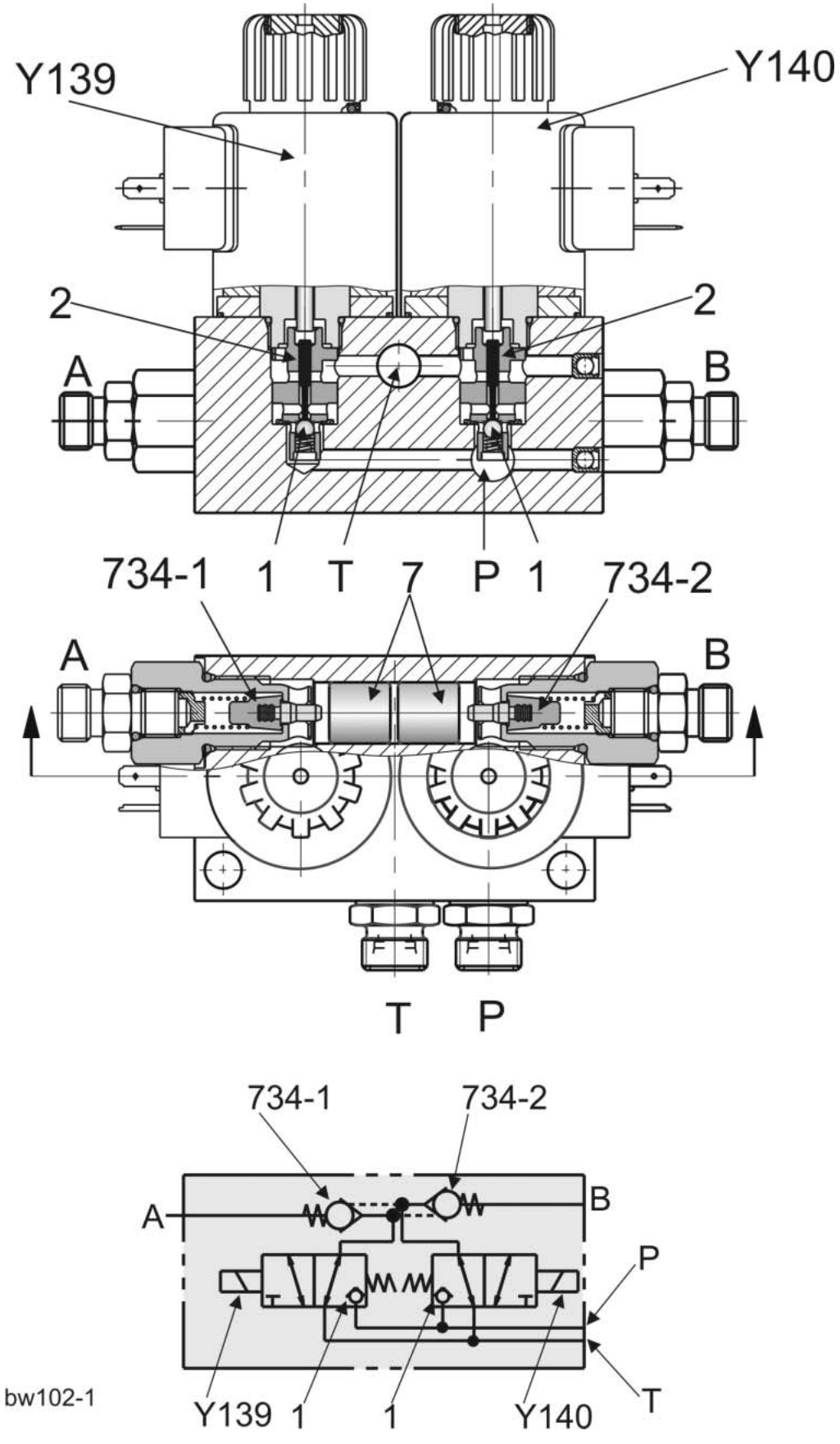
P	Channel pump Volume flow input.
T, T1	Return line (tank)
LS	LS channel When the wrapping table is raised, the load pressure acts here. This pressure signal ends in the input pressure balance.
A	Port Is closed.
B	Port To the rod spaces of the hydraulic cylinders. The wrapping table is raised when pressure is built up.
1	Spool Actuated by solenoid valve (6).
734-1	Lock-up valve unit non-return valve This seals off port A and is opened by ram (4).
734-2	Lock-up valve unit non-return valve This seals off port B and is opened by ram (4).
4	Ram Opens the non-return valve (734-1) or (734-2)
768-4	LS signal shuttle valve
Y137	Lower wrapping table solenoid valve The solenoid valve moves the spool (1) to the left.
Y138	Raise wrapping table solenoid valve The solenoid valve moves the spool (1) to the right.

Description of function:

No volume flow flowing, the solenoid valves are not actuated.	Due to the two pressure springs located at the face end, spool (1) is positioned so (see figure) that port P is shut off. Port B is sealed by non-return valve (2).
Raise wrapping table	Solenoid coil (Y138) is actuated by the UNIWRAP electronics module and moves spool (1) to the right. Volume flow flows from channel P via the spool gap in front of the lock-up valve unit non-return valve (734-2). Pressure is built up which: - opens the lock-up valve unit non-return valve (734-2) and - moves the piston (4) to the left. The volume flow flows via port B and via the open lock-up valve unit non-return valve (734-2) into the rod spaces of the hydraulic cylinders – the wrapping table is raised.
Lower wrapping table	Solenoid coil (Y137) is actuated by the UNIWRAP electronics module and moves spool (1) to the left. Volume flow flows from channel P via the spool gap in front of the lock-up valve unit non-return valve (734-1). Pressure is built up which: - opens the lock-up valve unit non-return valve (734-1) (without importance here since port A is closed) and - moves the piston (4) to the right. The movement of the piston (4) to the right opens the lock-up valve unit non-return valve (734-2). Port B (rod spaces of hydraulic cylinders) is connected with the tank (T1) via the open lock-up valve unit non-return valve (734-2) and the spool (1).

Notes:

4.6. Clamping cutters control unit (Y139 / Y140)



Key to diagram:

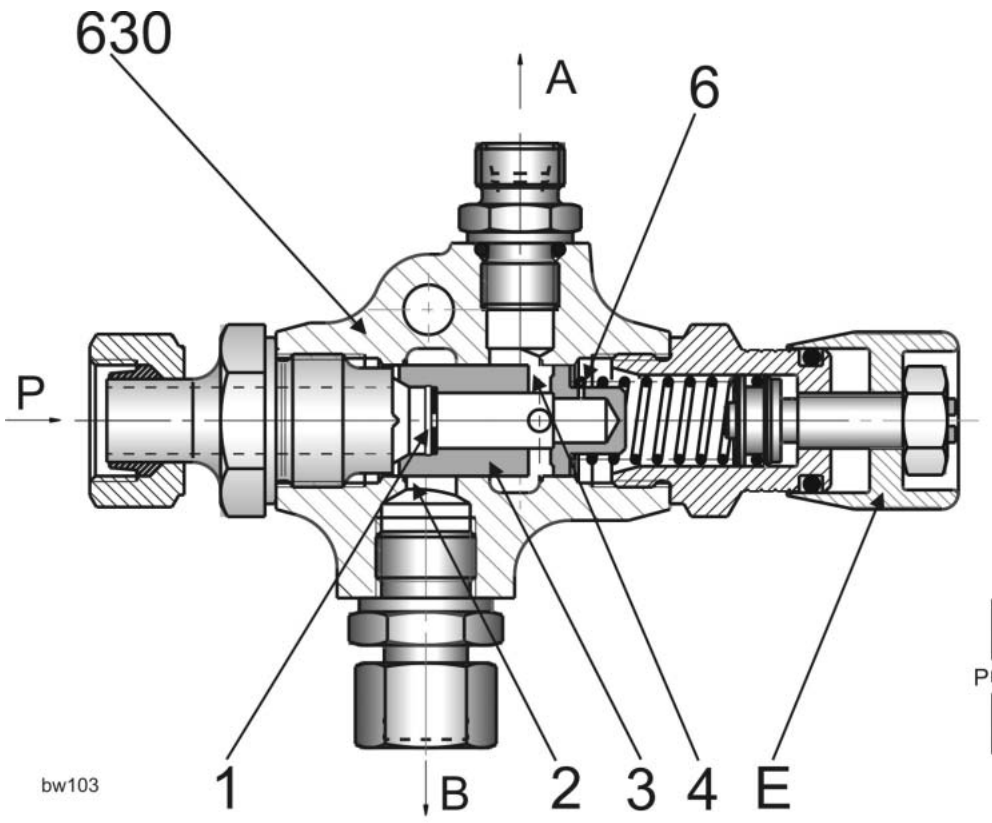
P	Channel pump Volume flow input.
T	Return line (tank)
A	Port to the rod space of the right hydraulic cylinder.
B	Port to the ram space of the left hydraulic cylinder.
1	Ball It is opened by the magnetic tappet (2). When not energized, it closes port P.
2	Magnetic tappet It is pushed down by the solenoid valve (Y139, Y140) and opens ball (1).
7	Ram Opens the non-return valve (734-1) or (734-2)
734-1	Lock-up valve unit non-return valve This seals off port A and is opened by ram (4).
734-2	Lock-up valve unit non-return valve This seals off port B and is opened by ram (4).
Y139	Open film cutters solenoid valve is controlled by the UNIWRAP electronic module, actuates the magnetic tappet (2) and thus opens the ball (1) = connection from P to A.
Y140	Close film cutters solenoid valve is controlled by the UNIWRAP electronic module, actuates the magnetic tappet (2) and thus opens the ball (1) = connection from P to B.

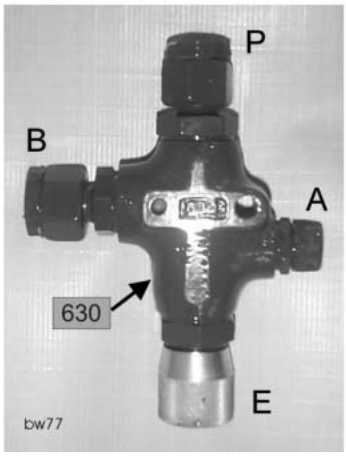
Description of function:

When de-energised, the balls (1) keep the pressure port P closed.
The load ports A and B are connected with tank T.
When a solenoid valve (Y139, Y140) is energized, the magnetic tappet opens the ball (1) against the spring and the applied hydraulic pressure. The connection from P to A or to B is released. At the same time, the ram cone closes the feed line to the tank.
In this condition, a consumer connected to port “A” or “B” can perform work.
After de-energizing solenoid valve (Y139, Y140), port A or B is relieved again towards the tank.

Notes:

4.7 Flow controller (630)
Up to serial no.: 72601047





Bw103-1

Key to diagram:

P Input for total volume flow = Return oil from wrapping arm hydraulic motor (approx. 17 l/min)

A Port
Constant flow output to wrapping table hydraulic motor.

B Port
Residual flow output to tank.

E Adjusting screw
Adjusts the pre-stress of the pressure spring

1 Orifice plate
In the control piston (3), produces the pressure difference Δp which determines the constant flow at port A.

2 Control edge
Controls the passage to port B

3 Control piston
- is pushed to the left-hand stop by the pressure spring when no volume flow is flowing
- is moved by the pressure difference Dp at the orifice plate (1) when volume flow flows.

4 Bore
The constant flow to port A flows via this bore.

6 Connecting bore
Directs the pressure behind the orifice plate into the spring space

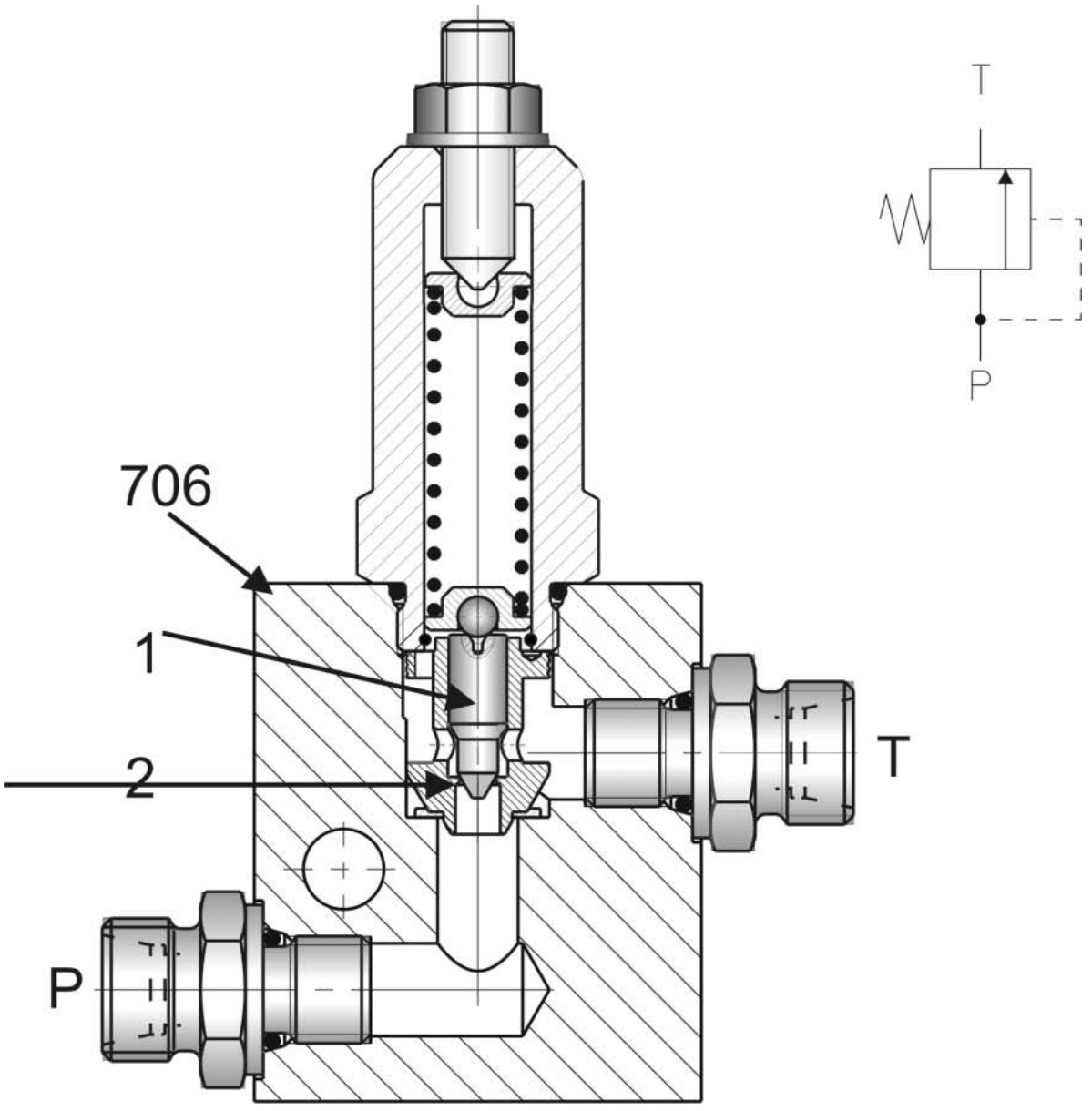
630 Flow controller
Divides the total volume flow (port P) into:
- a constant flow (port A) which drives the wrapping table hydraulic motor and
- a residual flow (port B) which is directed into the tank.

Description of function:

The total volume flow enters the flow controller via port P and flows through the orifice plate (1).
Here the pressure difference ∆p appears. The pressure downstream of the orifice plate (1) is lower than the pressure upstream of it.

The flow controller keeps this ∆p constant, even when the pressure in port A changes. With a constant ∆p at the orifice plate (1), the volume flow leaving via port A and driving the wrapping table hydraulic motor is constant.
The constant flow at output A can be adjusted to up to 6 l/min. with adjusting screw (E). This allows continuous adjustment of the speed of wrapping table rollers between 19 to 25 rpm.
- Low speed = large film overlap;
- High speed = small film overlap.

4.8 Pressure relief valve (706)



Key to diagram:

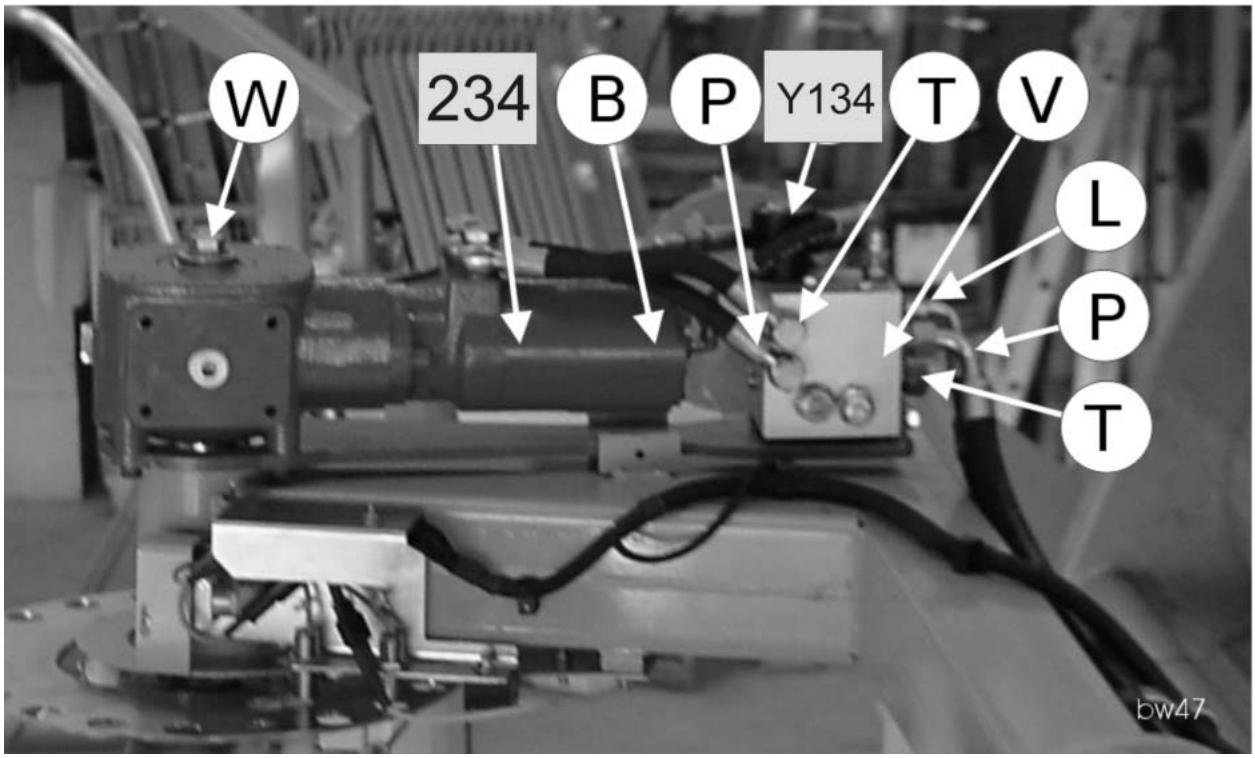
630 Flow controller

706 Pressure relief valve

Description of function:

The pressure relief valve limits the pressure when lowering the tipping cradle to 70 bar.
It is installed below the valve block.

4.9 Wrapping arm motor (234)



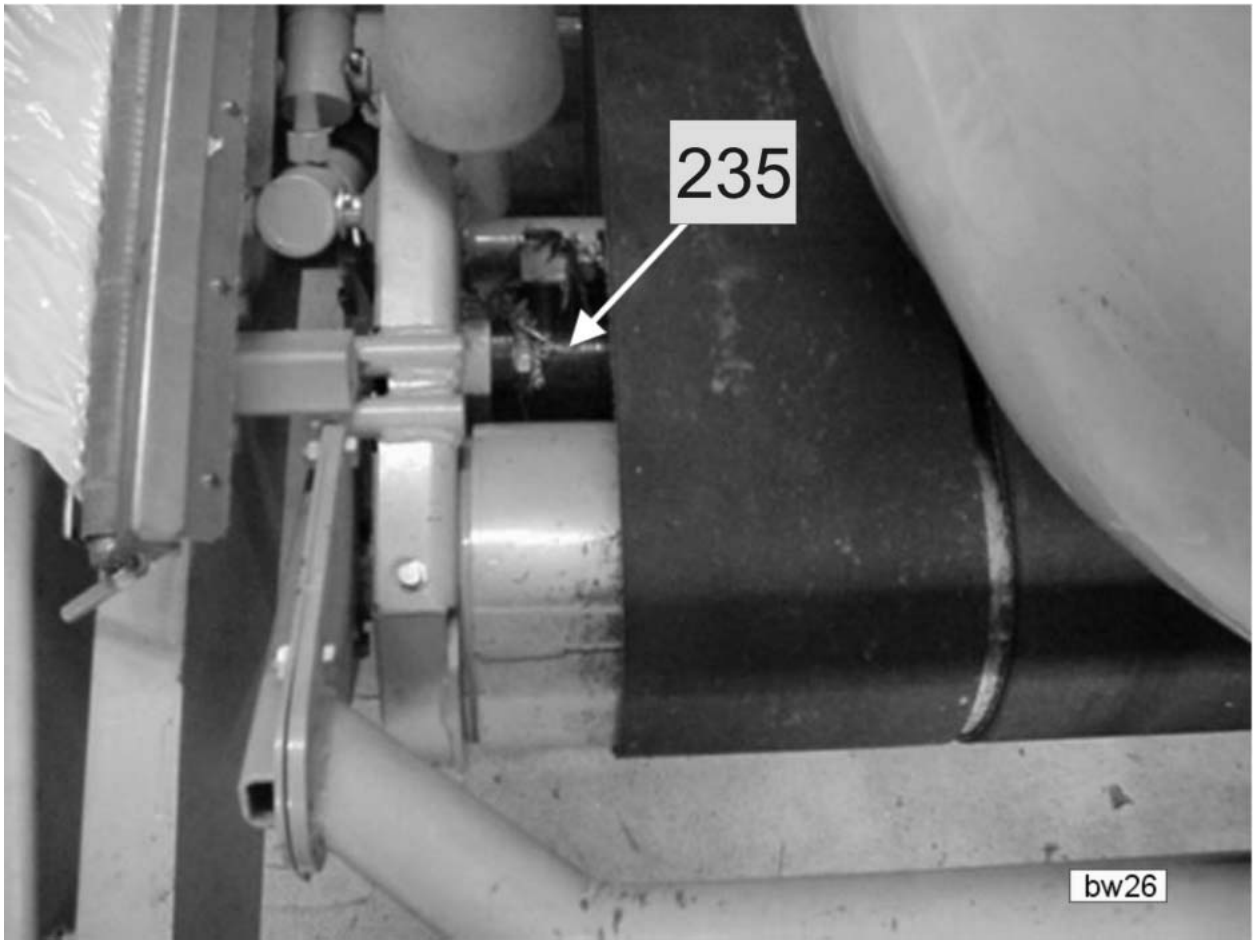
Key to diagram:

W	Wrapping arm drive shaft
234	Wrapping arm hydraulic motor
B	Brake
P	Feed line
T	Return line
Y134	Wrapping arm backward solenoid coil
V	Valve block
L	Leakage oil line

Description of function:

When the wrapping arm rotates, the brake is opened by compressed oil. When the wrapping arm is at standstill, the brake is mechanically closed, preventing wrapping arm rotation by hand.

4.10 Wrapping table motor (235)



Key to diagram: 235 Wrapping table motor

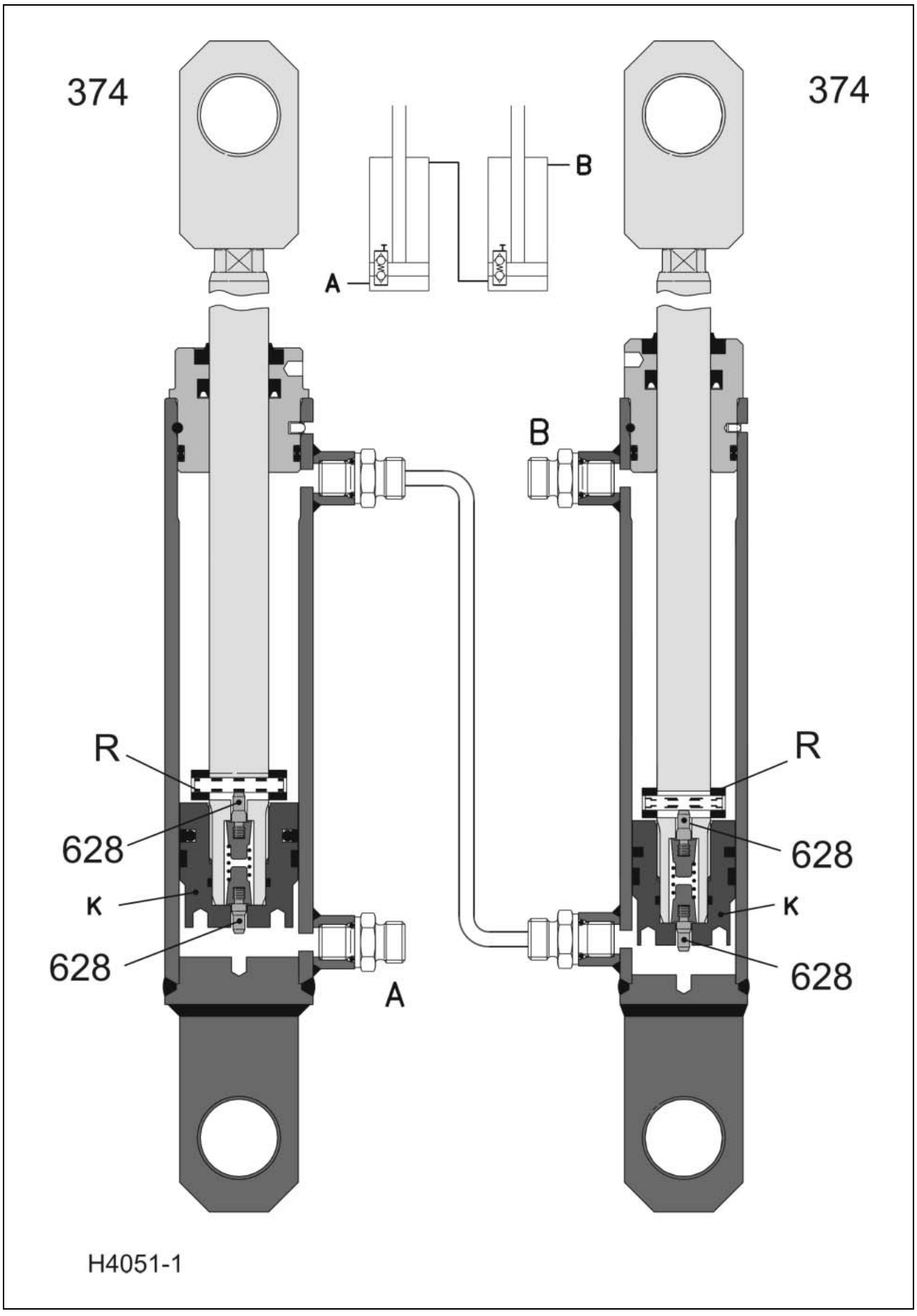
4.11 Tipping cradle service shut-off valve (631)

Key to diagram: 631 Tipping cradle service shut-off valve

Description of function:

The Tipping cradle service shut-off valve 631 is mounted directly on the control unit port.
For service work, the raised tipping cradle can be secured with the shut-off valve.

4.12 Film clamping cutters hydraulic cylinder (374)



Key to diagram:

374	Film clamping cutters hydraulic cylinder
628	Non-return valve
A	Ram space port
B	Rod space port
K	Ram
R	Ring

Description of function:

The hydraulic cylinders are connected in series.

The film cutter cylinders extend when hydraulic pressure is applied at port A.
The film cutter cylinders retract when hydraulic pressure is applied at port B.

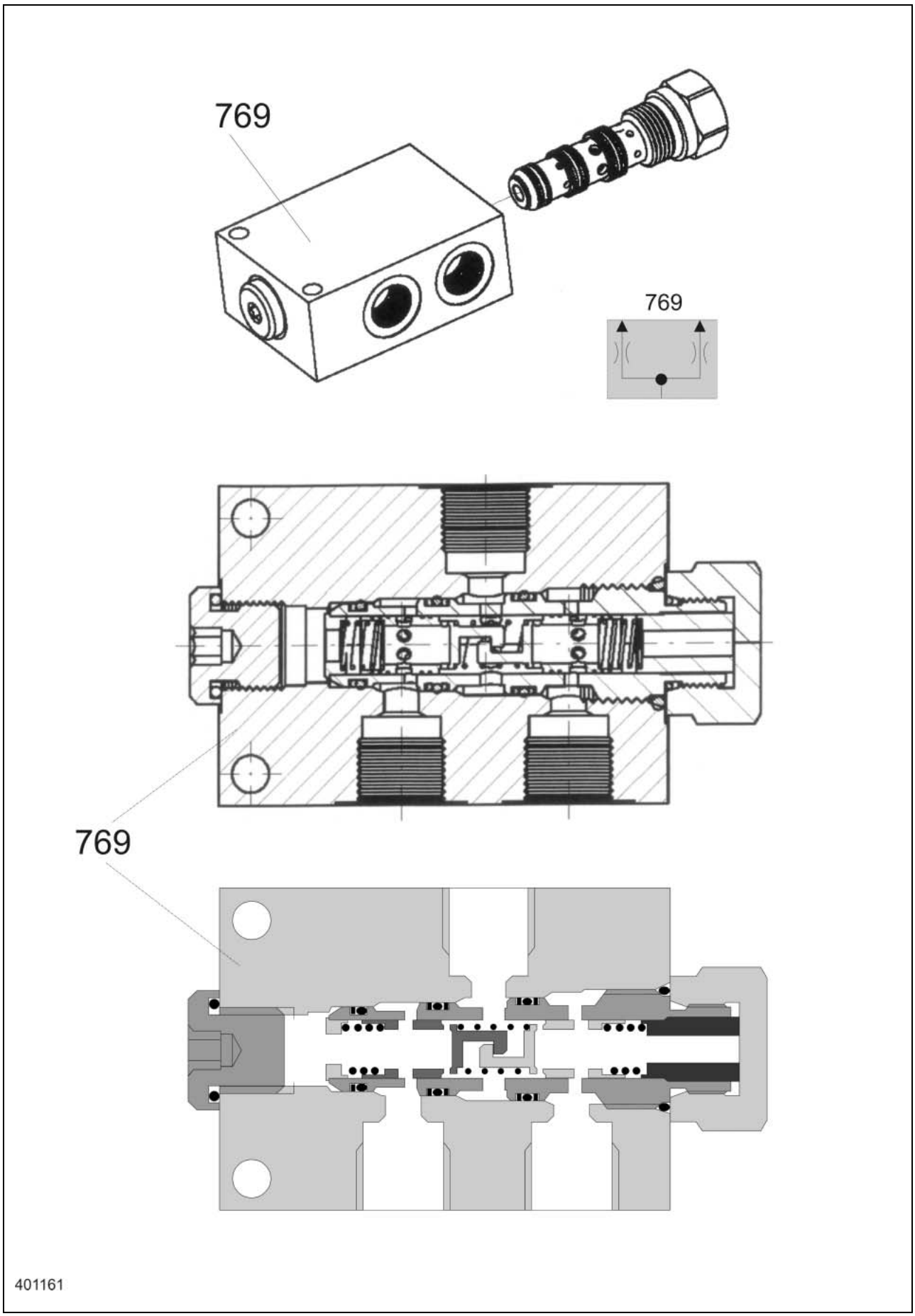
Non-return valves (628)

The non-return valves 628 at the bottom of the rams are not opened mechanically when the hydraulic cylinders are retracted.

Bleeding the hydraulic cylinders

When the cylinders are extended, the rings R open the non-return valves 628 at the top of the rams.
In this position (film clamping cutters are open), the hydraulic oil can flow from A to B.
This position can be used for bleeding the cylinders.

4.13 Film clamping cutters flow divider (769)



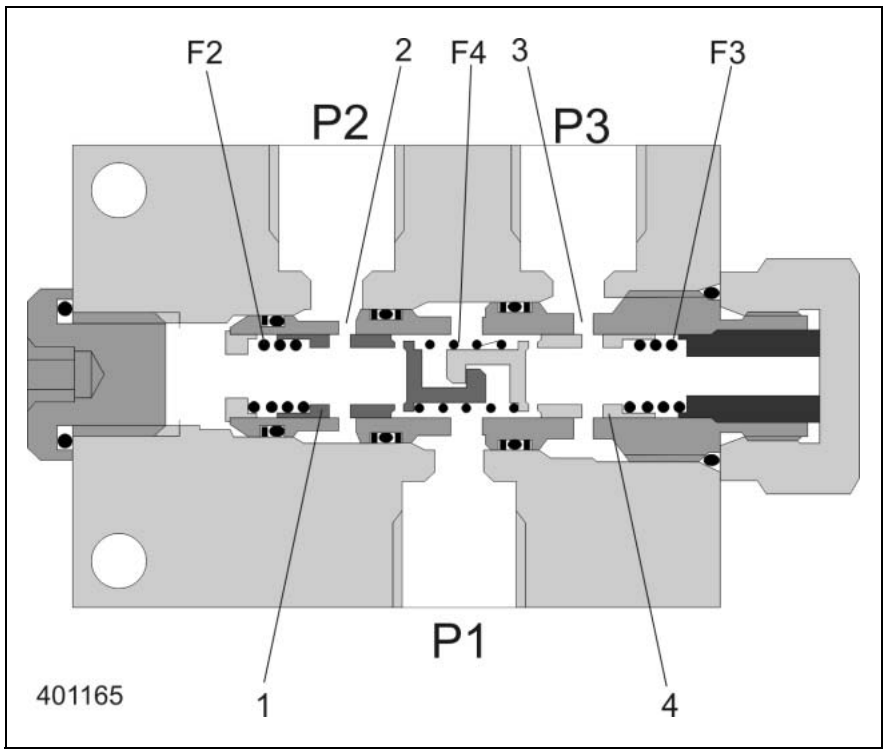
Description of function:

Task

The flow divider divides the supplied volume flow (port P1) into 2 equal volume flows (ports P2 and P3). The hydraulic cylinders of the film cutters are connected here.
These volume flows remain constant even when the loads from consumers at ports (P2 and P3) change.
At equal volume flows, the speeds of the hydraulic cylinders are also constant.

When the flow direction is reversed (from P2 and P3 to P1), the two volume flows are combined into one total volume flow.

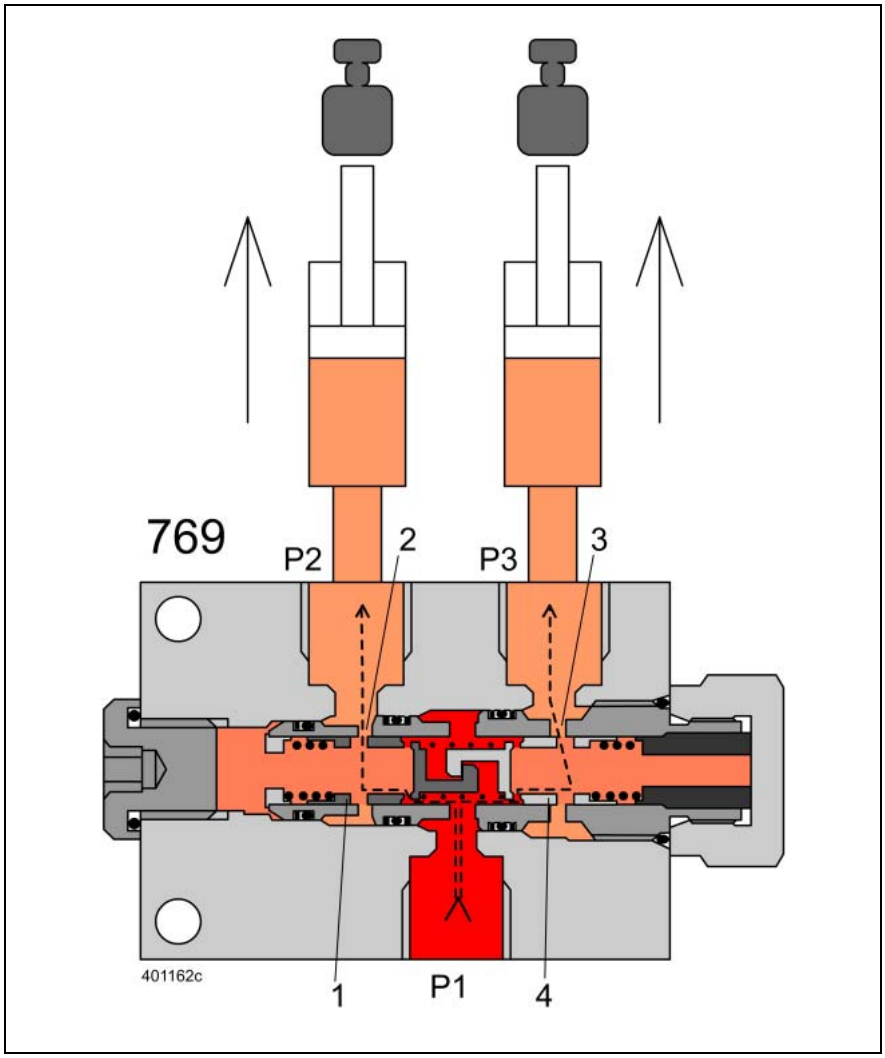
Design



Item	Designation	Remark
1	Control ram	• Controls the opening cross-section of bore (2) • Is mechanically connected with the control ram (4)
2	Bore	The opening cross-section of the bore determines the partial volume flow at port (P2)
3	Bore	The opening cross-section of the bore determines the partial volume flow at port (P3)
4	Control ram	• Controls the opening cross-section of bore (3) • Is mechanically connected with the control ram (1)
F2	Compression spring	Loads control ram (1)
F3	Compression spring	Loads control ram (4)
F4	Compression spring	Loads both control rams (1, 4) so that they are mechanically connected
P1	Port	Total volume flow
P2	Port	Partial volume flow
P3	Port	Partial volume flow

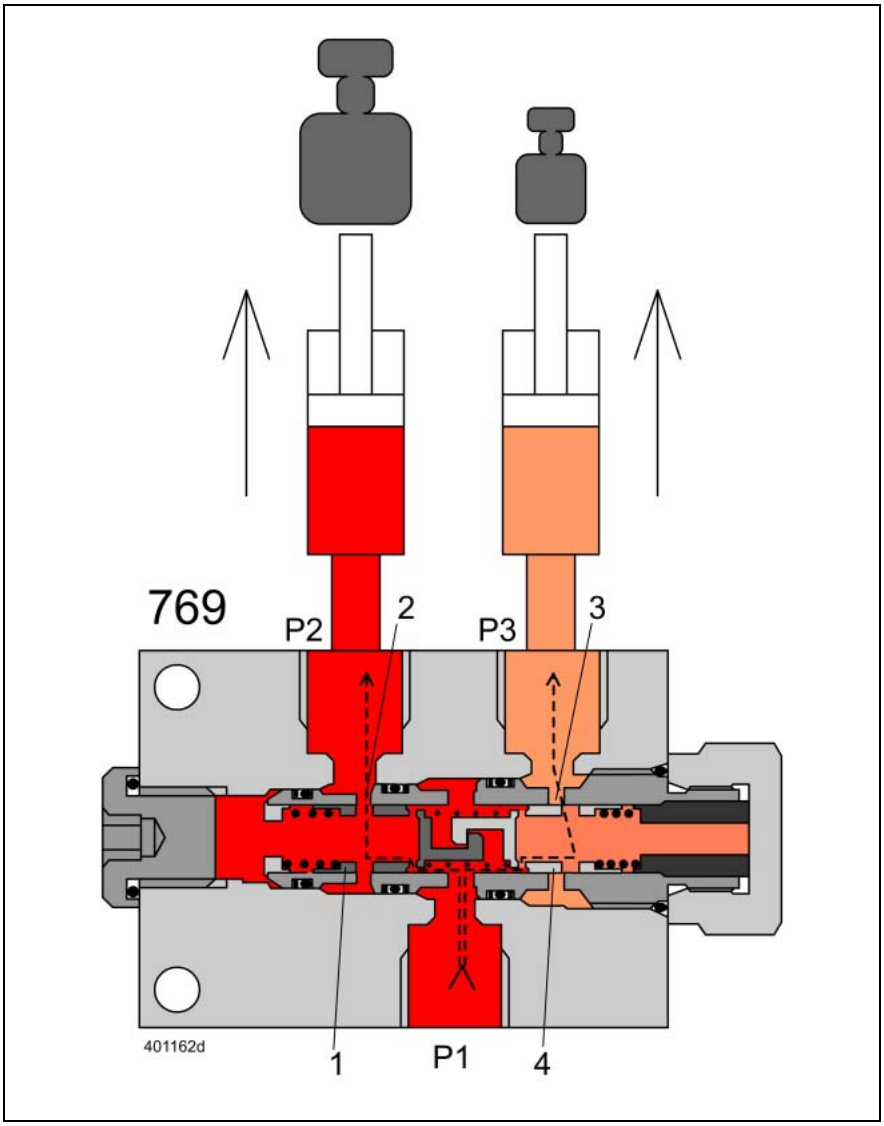
Function

Open film cutters while load on hydraulic cylinders is identical



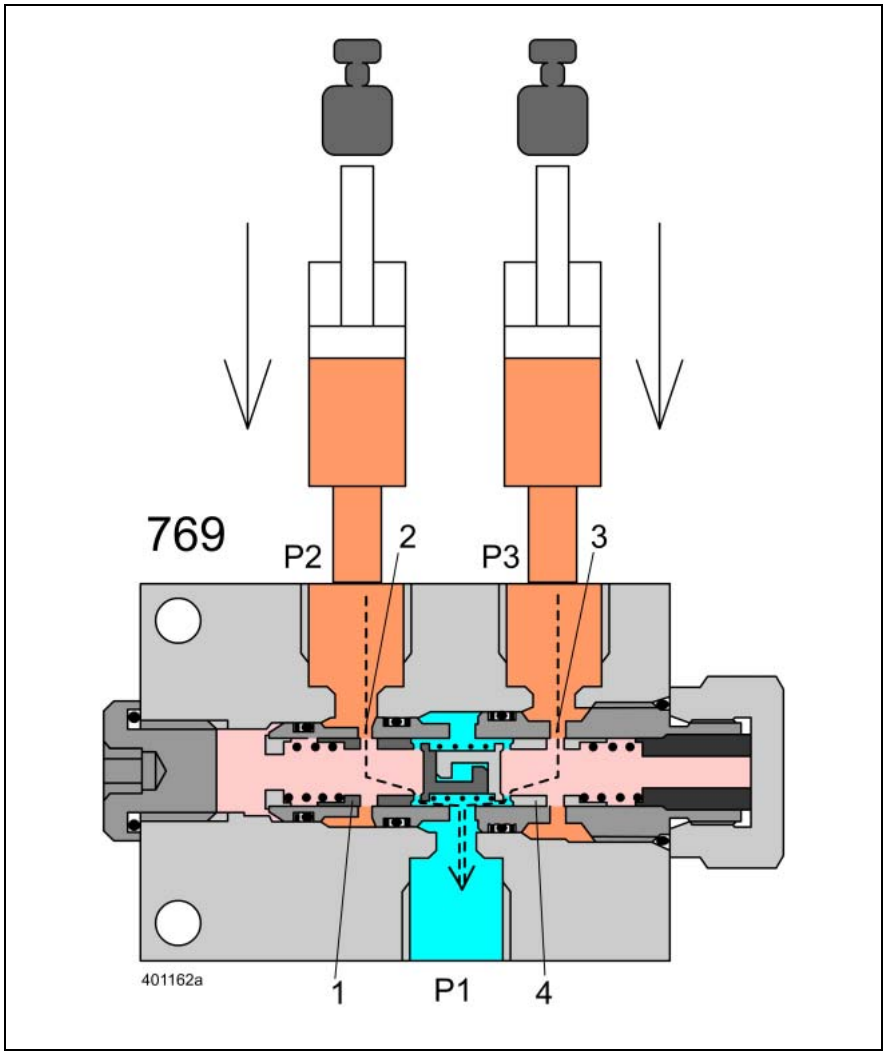
When the load on the hydraulic cylinders is identical, the control rams (1, 4) are subject to equal loads.
The compression springs position the two control rams so that the opening cross-sections of the bores (2, 3) are identical.
The total volume flow enters the flow divider via port (P1).
Due to the identical opening cross-sections of bores (2, 3), the total volume flow is divided into two equal volume flows which extend the hydraulic cylinders via ports (P2, P3).
The film cutters open with the same speed.

Open film cutters while load on hydraulic cylinders is not identical



When the load on the hydraulic cylinders is not identical, the control rams (1, 4) are subject to different loads. In the case shown here, the higher load pressure exists at port (P2).
Without any control function, the hydraulic cylinder subject to the smaller load (port P3) would extend first since the volume flow always flows where resistance is the lowest.
Due to the control function, the load pressure in port (P2) moves the control ram (1) to the right. This enlarges the opening cross-section of bore (2).
The control ram (4) follows this movement so that the opening cross-section of bore (2) is reduced.
Due to the unequal opening cross-sections of bores (2, 3), the same pressure drop is generated at each opening cross-section.
The total volume flow (port P1) is divided into two equal volume flows (ports P2, P3). The hydraulic cylinders extend with the same speed despite a different load.

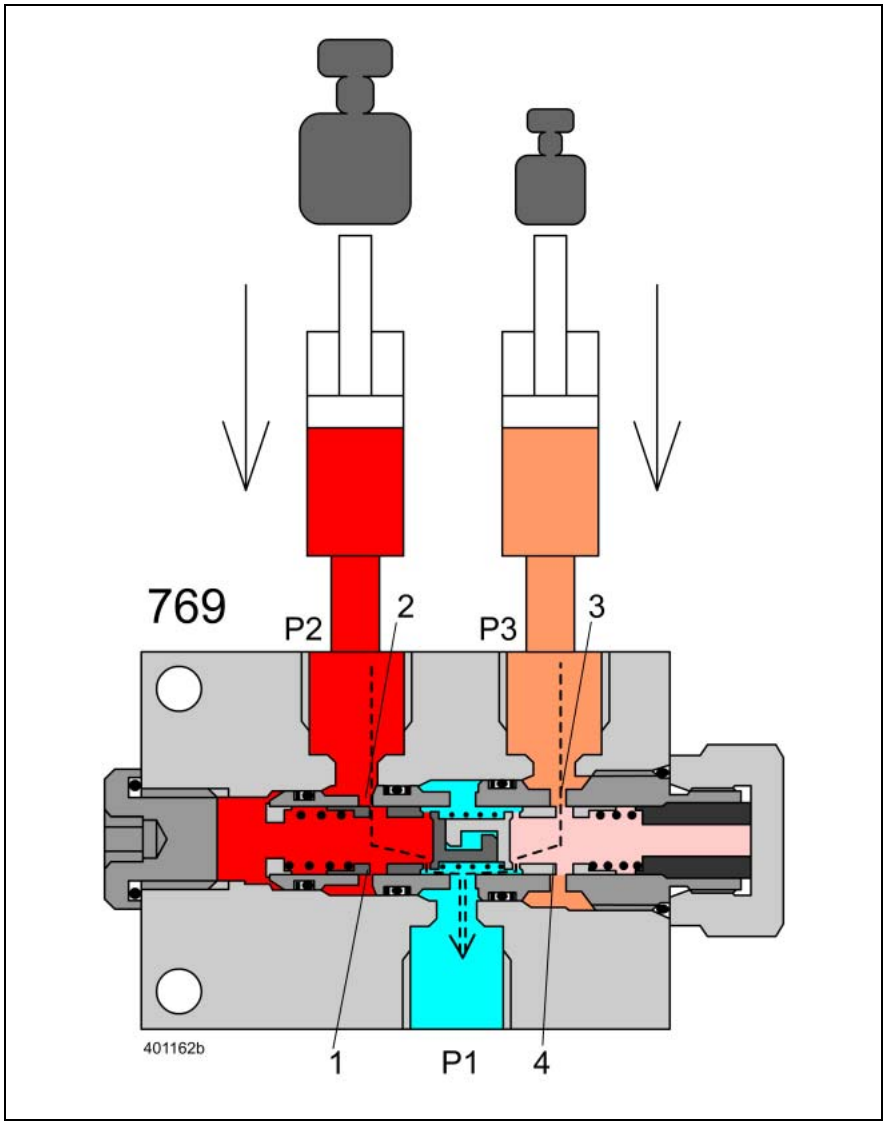
Close film cutters while load on hydraulic cylinders is identical



When the load on the hydraulic cylinders is identical, the control rams (1, 4) are subject to equal loads.
The compression springs position the two control rams so that the opening cross-sections of the bores (2, 3) are identical.
The equal partial volume flows (ports P2, P3) are combined into one total volume flow (port P1).

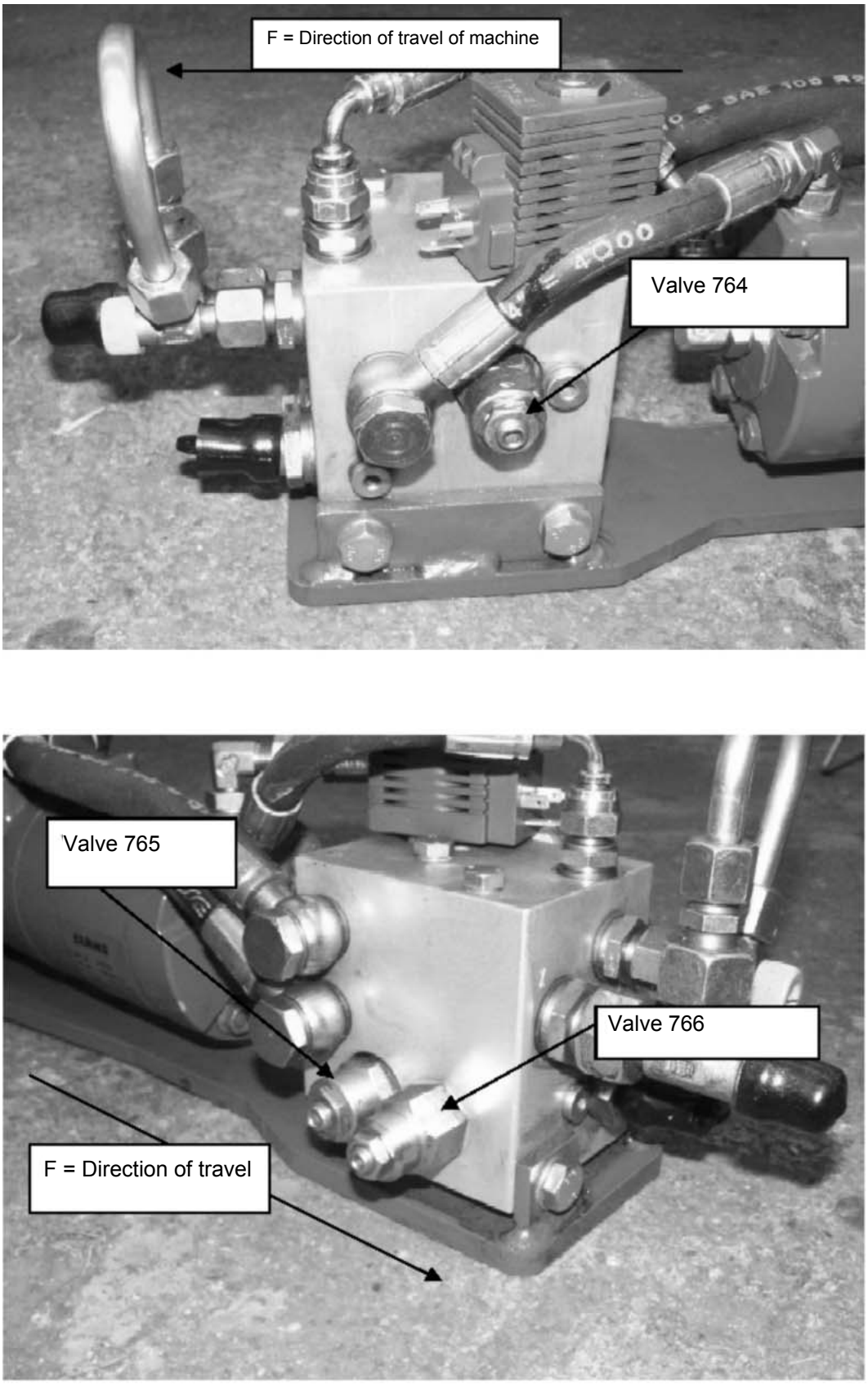
The film cutters close with the same speed.

Close film cutters while load on hydraulic cylinders is not identical



When the load on the hydraulic cylinders is not identical, the control rams (1, 4) are subject to different loads. In the case shown here, the higher load pressure exists at port (P2).
Without any control function, the hydraulic cylinder subject to the higher load (port P2) would retract first.
Due to the control function, the load pressure in port (P2) moves the control ram (1) to the right. This reduces the opening cross-section of bore (2).
The load pressure moves the control ram (4) in the spring space to the right, thus enlarging the opening cross-section of bore (2).
Due to the unequal opening cross-sections of bores (2, 3), the same pressure drop is generated at each opening cross-section.
The two unequal partial volume flows are combined into one total volume flow (port P1). The hydraulic cylinders retract with the same speed despite a different load.

4.14 Wrapping arm motor valve block (4)



Key to diagram:

764	Wrapping arm motor drive pressure relief valve 115^{+10} bar
765	Wrapping arm motor brake pressure relief valve 115^{+10} bar
766	Brake valve
F	Direction of travel

Description of function:

Pressure relief valve (764)

The wrapping arm motor drive pressure relief valve (764) limits the oil pressure to the wrapping arm motor (234) and the wrapping table motor (drive) connected in series to 115^{+10} bar.

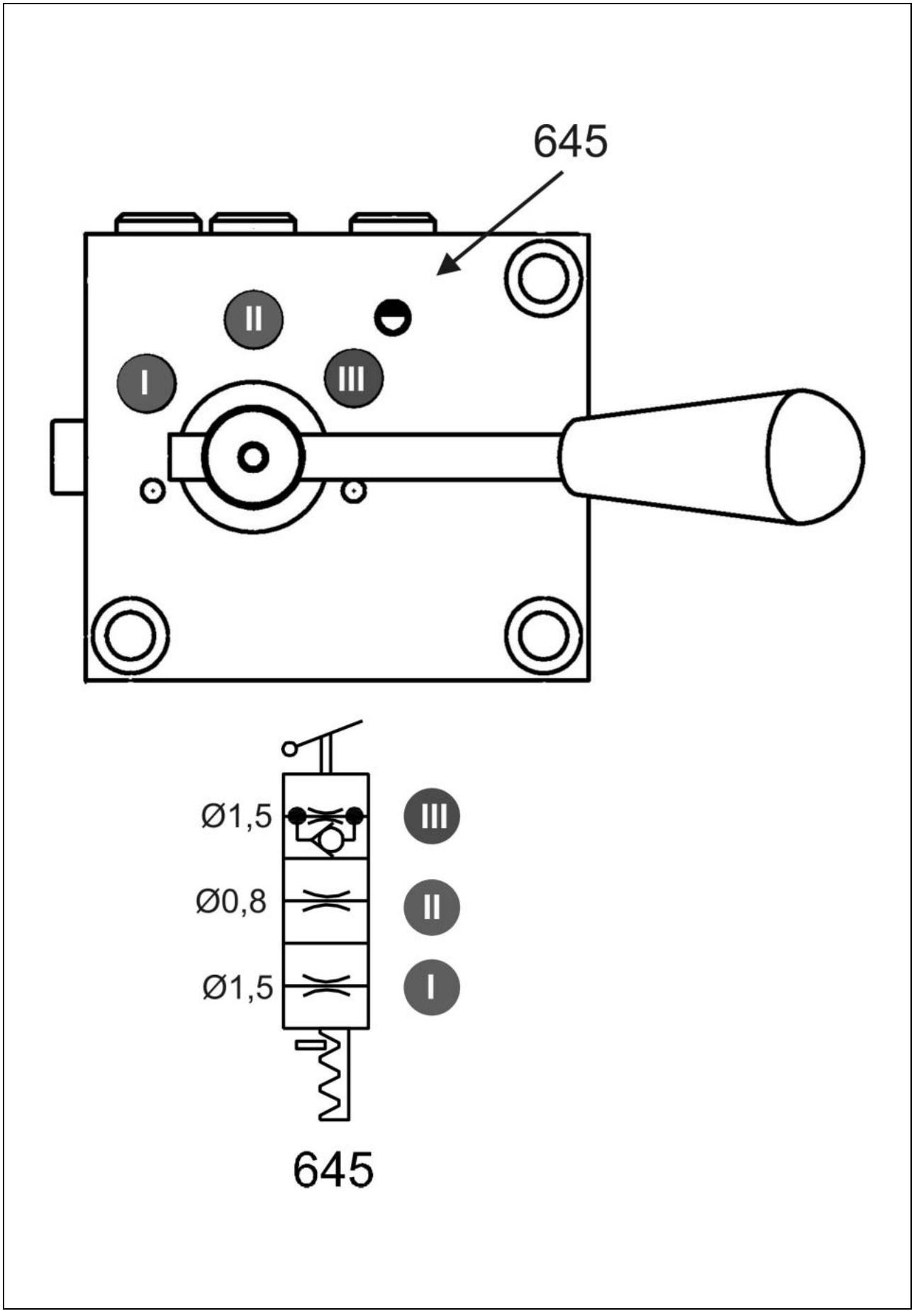
Pressure relief valve (765)

The wrapping arm motor brake pressure relief valve limits the pressure of the wrapping arm motor to 115^{+10} bar while braking.

Brake valve (766)

The brake valve (766) decelerates the wrapping arm motor hydraulically on both sides when the wrapping arm forward solenoid valve (Y133) is not actuated.

4.15 3-stage restrictor



Key to diagram:

645	3-stage restrictor
I	Valve position, restrictor Ø 1.5 mm
II	Valve position, restrictor Ø 0.8 mm
III	Valve position, restrictor Ø 1.5 mm

Description of function:

To enable raising and lowering the wrapping table at different speeds, the respective speed may be preselected using the 3-stage restrictor.

Valve position I

In valve position I (operation without bale rotating mechanism), the wrapping table is lowered and raised via a 1.5 mm orifice plate.

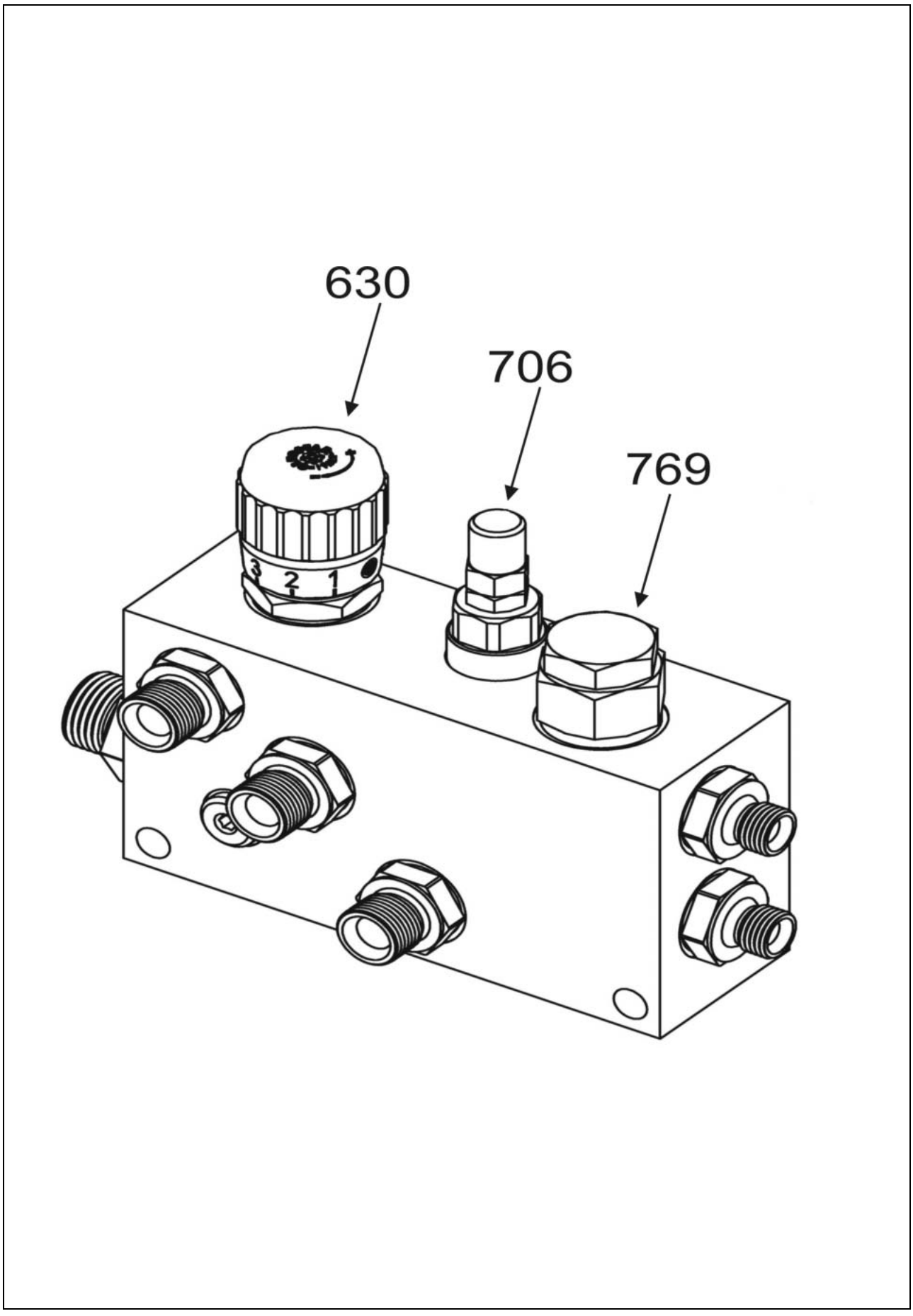
Valve position II

In valve position II, raising and lowering of the wrapping table is via a 0.8 mm orifice plate.
This function is necessary in order to keep the bale rotating mechanism from hitting the wrapping arm gearbox at high speed while swinging to transport position.

Valve position III

In valve position III (operation with bale rotating mechanism), the wrapping table is raised via a 1.5 mm orifice plate.
Lowering the table is without any orifice plate (via the non-return valve) in order to obtain a safe transfer of the bale onto the bale rotating mechanism.

4.16 Valve combination (7)



Key to diagram:

630	Wrapping table flow control valve
706	Pressure relief valve
769	Film clamping cutters flow divider

Description of function:

The valve combination (7) combines the components (630, 706 and 769).

Wrapping table flow control valve (630)

The wrapping table flow control valve supplies the hydraulic motor (235). This volume flow can be adjusted to up to 8 l/min. and changes the wrapping table motor / wrapping arm motor speed ratio and consequently the film layer overlaps.
- low speed = large film overlap;
- high speed = small film overlap

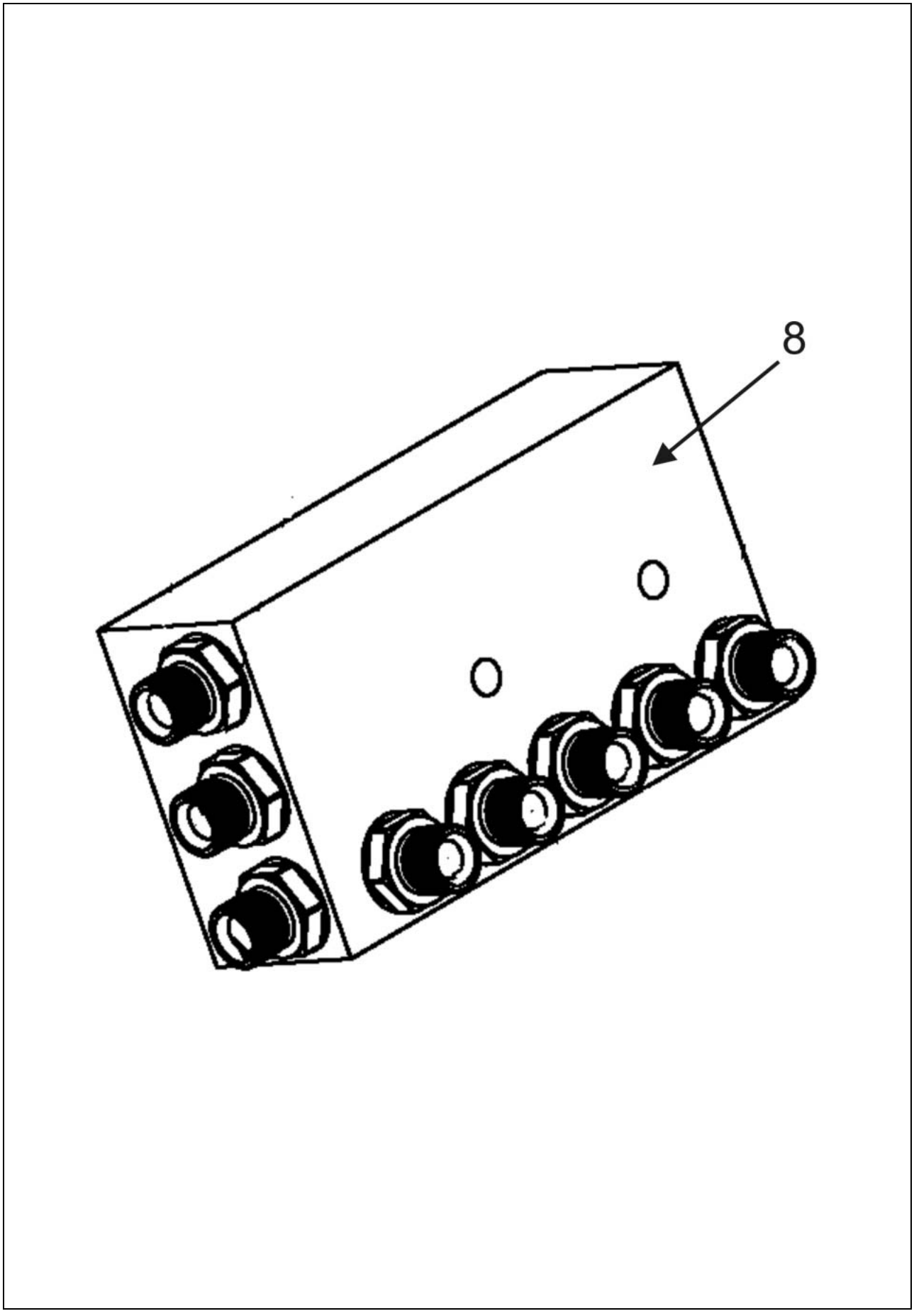
Pressure relief valve (706)

The pressure relief valve limits the pressure to 70 bar when lowering the tipping cradle hydraulic cylinders (375).

Film clamping cutters flow divider (769)

The flow divider divides the oil flows for opening and closing the film clamping cutters.

4.17 Manifold (8)



Key to diagram: 8 Manifold

Description of function:

The introduction of the manifold (8) simplifies the laying of lines on the UNIWRAP.

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