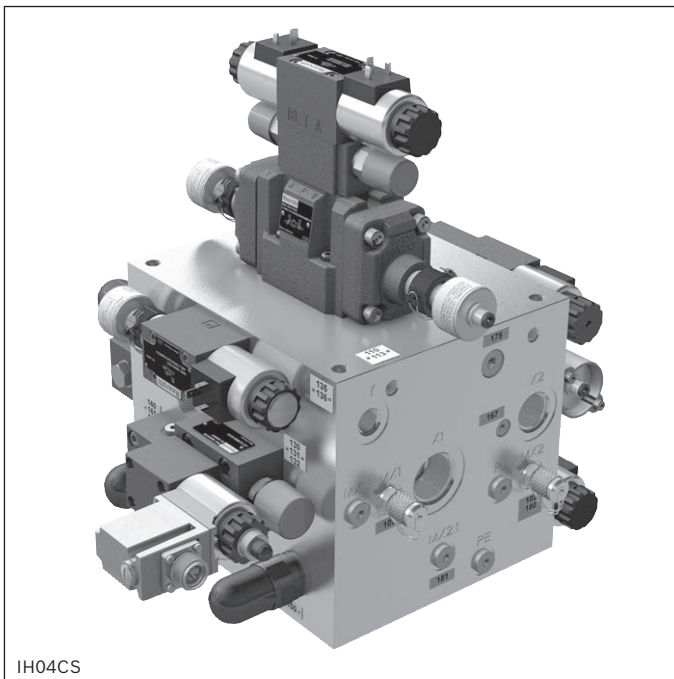


Press module for hydraulic presses

Type IH04C



- Size 10, 16, 25, 32, 35
- Component series 7X
- Maximum operating pressure 350 bar
- Maximum flow 2,000 l/min
- Hydraulic control with pilot-operated valves for upper piston

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Features

- Hydraulic control for machine types according to ISO 16092-3 and EN 289
- EC type examination certificate HSM20005.
The basic module 100 comprises all safety-related functions according to category 4 of DIN EN ISO 13849-1.
- The extension modules 200 include all common circuits for hydraulic presses.
- Suitable for
 - pressure/position controls
 - open circuit
- Modular design
- Supply connections lateral and at the bottom
- Thick film passivated (free from chromium(VI))

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14
IH04	C		-	7X	/				-		-		-

Machine function

01	Upper piston	C
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Safety category

02	According to ISO 13849, category 4, with type-examination procedure	S
	According to ISO 13849, category 1	N

Component series

03	Component series 70 ... 79 (unchanged installation and connection dimensions)	7X
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Size

04	10, 16, 25, 32, 35	10 ... 35
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Operating pressure

05	315 bar	G
	350 bar	S

Number of mounted modules (version-dependent)

06	Basic module 100	1
	Basic module 100 with one extension module 200	2
	Basic module 100 with two extension modules 200	3

Pump pressure limitation – Item 120

07	With manual pressure adjustment ¹⁾	B
	With proportional pressure adjustment and decompression	E
	With manual pressure adjustment and depressurized circulation	W

Press force adjustment in the piston chamber – item 130

08	With manual pressure adjustment	B
	With proportional pressure adjustment and decompression	E
	With manual pressure adjustment and piston chamber preloading	U

Load holding – Item 160

09	In the T channel of item 110 and with manual pressure adjustment	0
	In the T channel of item 110 and with manual pressure adjustment and switchable rapid traverse by own weight with prefill valve	1
	In the B channel of item 110 and with manual pressure adjustment ²⁾	2
	In the B channel of item 110 and with manual pressure adjustment and switchable rapid traverse by own weight with prefill valve ²⁾	3

Safe reduced velocity (< 10 mm/s) according to ISO 16092-3, section 5.3.2.16 - Item 170

10	Without	N
	Safe reduced velocity	D
	Safe reduced velocity and testing of the restraint device	P

¹⁾ With load sensing

²⁾ Upon request. Suitable for powder presses, synchronization control, set-up with two-hand operation, closing velocities below 10% of the maximum closing velocity, presses with small annulus areas.

Ordering code

	01	02	03	04	05	06	07	08	09	10	11	12	13	14
IH04	C		-	7X	/				-			-		-

Directional valve – Item 110

11	5-4WEH10E5X/EG24K4QS0G24W/M	IH04C-7X/10	WE-000E
	H-4WEH10E4X/6EG24SK4QM0G24		WEH000E
	4WRDE10V100L-5X/6L24K9/MR		RDE100V
	4WREEM10E75-2X/G24K34/B6V ¹⁾		EEM075E
	4WREE10V75-2X/G24K31/A1V ¹⁾		REE075V
	H-4WEH16E7X/6EG24SK4QM0G24	IH04C-7X/16	WEH000E
	4WRTEM16E220L-4X/6EG24K31/A1M		TEM220E
	4WRDE16V220L-6X/MXY/24A1		RDE220V
	H-4WEH25E6X/6EG24SK4QM0G24	IH04C-7X/25	WEH000E
	4WRTEM25E350L-4X/6EG24K31/A1M		TEM350E
	4WRDE25V350L-6X/MXY/24A1		RDE350V
	H-4WEH32E6X/6EG24SK4QM0G24	IH04C-7X/32	WEH000E
	4WRTEM32E600L-4X/6EG24K31/A1M		TEM600E
	4WRDE32V600L-5X/6L24K9/MR		RDE600V
	4WRTEM35E1300L-4X/6EG24K31/A1M	IH04C-7X/35	TEM1K3E
	4WRDE35V1000L-5X/6L24K9/MR		RDE1K0V
	Other valves upon request		

Extension modules – Item 200

12	None	NN
	With rapid traverse cylinder	EN
	With rapid traverse cylinder and load-sensing	EL
	With rapid traverse cylinder and high-response valve with zero overlap	ER
	With rapid traverse cylinder and pressure holding on the piston chamber side	EX
	With rapid traverse cylinder and accumulator operation	ES
	With differential circuit ²⁾	DN
	With differential circuit and pressure holding on the piston chamber side ²⁾	DX
	With high-pressure and low-pressure pumps ²⁾	HN
	With high-pressure and low-pressure pumps and pressure holding on the piston chamber side ²⁾	HX
	With load sensing	LN
	With load sensing and pressure holding on the piston chamber side	LX
	With high-response valve with zero overlap	RN
	With high-response valve with zero overlap and pressure holding on the piston chamber side	RX
	With pressure holding on the piston chamber side	XN
	With pressure holding on the piston chamber side and accumulator operation	XS
	With accumulator operation	SN
	With slide cushion	ZN

Voltage

13	DC voltage 24V	G24
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Additional version (optional)

14	Without	
	Directional valve item 110 with asymmetric spool P→A: q _v ; P→B: q _v /2	001
	Set-up by own weight (> 10 mm/s)	002

¹⁾ Up to 315 bar only, otherwise on request²⁾ Up to NG 25 only

Function

The press module type C is a hydraulic control for the installation in hydraulic presses according to EN ISO 16092-3 or plastic and rubber machines as well as upholding equipment according to EN 289 and – according to DIN EN ISO 13849-1 – is regarded as a "safety-related component of control systems". The industrial area of application is extended to all machine types which require the safety requirements of the above-specified standards.

The press module type C allows the user to design, construct, and/or modify their upper piston functions such as press ram, blank pressure pad, and slide cushion according to the general safety requirements. In connection with a suitable electrical control, the following performance levels and categories can be achieved:

Safety measures for the hazard type	Extract from standard	Performance level (PL)	Safety category
Avoiding the unintended lowering under own weight	ISO 16092-3 section 5.3.7.2	e	4
Avoiding the unintended start-up from the rest position	ISO 16092-1 section 5.4.1.1.4a)	e	4
Stopping of the dangerous closing movement	ISO 16092-1 section 5.4.1.1.4c)	e	4
Safe reduced velocity below 10 mm/s with hold-to-run device	ISO 16092-3 section 5.3.2	d	3

The EC type examination certificate HSM20005 has been granted. The tested type complies with the relevant provisions of Directive 2006/42/EC (Machinery). Additionally to ISO 16092-3, section 5.3.7.3, unintended lowering under own weight during the retraction of the

hydraulic upholding equipment item 140 is safely prevented. During muting, errors can be recognized in time by analysis of the end-switch signal S14.

Basic module 100

A complete press module type C consists at least of the basic module item 100 and the directional valve item 110. The safety-related functions (cat. 1 or 4) are part of the basic design and do not influence the set-up of the additional extension modules item 200 ¹⁾.

The pump and tank connections are arranged laterally and at the bottom and allow for optimal installation into the press on ²⁾. All other actuator ports are arranged laterally²⁾. All measuring points are provided with two connections.

Safety-related hydraulic control according to category 4 of ISO 13849	Directional valve with position monitoring (channel 1)	Item 110
	Pump pressure limitation	Items 120 ... 122
	Protection against unwanted pressure build-up on the piston chamber side (channel 2)	Items 130/131/135
	Restraint device on the annulus area side (channel 2)	Items 140/145
	Pressure limitation on the annulus area side against pressure intensification	Items 150/151
	Safe reduced velocity below 10 mm/s according to ISO 16092-3, section 5.3.2	Items 170 ... 175
Basic functions	Press force adjustment	Items 130 ... 132
	Load holding	Items 160 ... 165
Additional function	Rapid traverse due to own weight via prefill valve	Item 166

¹⁾ With exception, high-response valves with zero overlap → Prerequisite RN and slide cushion ZN
²⁾ From NG35, only the tank port T1.1 arranged at the bottom is available

Function

Extension modules 200

With the extension modules item 200, further common variants are available for selection. The extension modules item 200 are installed between the basic module item 100 and the directional valve item 110 and their port pattern corresponds to the port pattern of the directional

valve item 110. When the extension modules item 200 are used, the safety of the hydraulic control is maintained. All actuator ports are arranged laterally. All measuring points are provided with two connections.

Variants	Rapid traverse due to rapid traverse cylinder	Item 210
	Operation with high-pressure and low-pressure pumps	Item 220
	Rapid traverse with differential circuit	Item 230
	Accumulator operation	Item 240
	Slide cushion	Item 250
	Set-up by own weight (> 10 mm/s)	Item 260
	Load-sensing	Item 270
	Pressure holding on the piston chamber side	Item 280
	High-response valve with zero overlap without detection of direction	Item 290
	<ul style="list-style-type: none"> – Energy separation on the piston chamber side (channel 1) – Blocking of the annulus side (channel 1) 	

Installation

The pipelines must permanently withstand the maximum operating pressures and comply with the safety requirements according to ISO 16092-1, section 5.2.1 and section 5.2.3 as well as ISO 16092-3, section 5.2.3. Additionally it must be ensured that the

pipeline between the press module type "C" (port X2) and the annulus area is designed for the max. set pressure of the pressure relief valves (items 150/151). The pipeline design must be as short as possible.

Technical data

(For applications outside these values, please consult us!)

General		
Installation position		Vertical with directional valve item 110 on top
Safety-relevant on/off valves		Without manual override
Coating		Galvanic coating DIN EN ISO 19598 – Fe/Zn8//Cn/T0
Labelling	► Technical items	Aluminum, riveted
	► Outputs	Engraved
Ambient temperature range	°C	-20 ... +50
Storage temperature range	°C	+10 ... +40
Storage time more than 6 months		Specify in plain text when ordering

Hydraulic		
Maximum operating pressure	► Ports ¹⁾ P1.1 ... P1.7, X1, X11, X12, PL, PE, HD, S, LS1, MX12.1	bar
	► Connection ¹⁾ X2	bar
	► Port ¹⁾ T1.1, T1.2	bar
Maximum return flow pressure	► Connection Y	bar
		Separately at zero pressure to the tank
Recommended pilot pressure		30 ... 200
Recommended load pressure	bar	20 ... 115 (further load pressures on request)
Measuring ports		Including measuring couplings
Operating medium ²⁾		Mineral oil (HL, HLP) according to DIN 51524-1, other hydraulic fluids on request
Temperature range of the hydraulic fluid	°C	-20 ... +80, preferably +40 ... +50
Viscosity range of the hydraulic fluid	mm ² /s	10 ... 500, preferably 30 ... 46
Maximum admissible degree of contamination of the hydraulic fluid		Cleanliness class 18/16/13 according to ISO 4406 (c) ³⁾ Cleanliness class 17/15/12 according to ISO 4406 (c) for the pilot valve ⁴⁾ of 4WRDE
Seal material		NBR, others upon request

Sizes			10	16	25	32	35
Nominal flow ⁵⁾	► P1	l/min	140 ⁸⁾	300 ⁸⁾	600	1000	2000
	► HD	l/min	70	130	260	–	–
	► X1→T	l/min	250	500	700	1200	2100
	► X2→T1 ⁶⁾	l/min	140	300	600	1000	2000
Recommended pump equipment ⁷⁾		cm ³	100	210	355	2 x 355	4 x 355

¹⁾ Order connection flanges separately, see page 41.

²⁾ The ignition temperature of the operating medium used must be higher than the maximum coil temperature of the valves. See data sheets of the components used.

³⁾ Effective filtration is to be provided separately. This prevents faults and simultaneously extends the life cycle of the components. See data sheets of the components used.

⁴⁾ Flushing element to be ordered separately, HSA06A012-4X/V00 (R901092348) or 4WE6J6X/EG24N9K4 (R900561288).

⁵⁾ The maximum flow and the maximum hydraulic power of the press module are determined by the directional valve item 110.

⁶⁾ Design the rapid traverse due to own weight with prefill valve with at least 25 bar load holding pressure. Below 25 bar upon request.

⁷⁾ For recommended pump versions, see pages 43 and 44.

⁸⁾ Extension module "SN": For sizes 10 and 16, verification is required according to the applicable valve data sheets that the safety valve .246 is sufficient for the maximum pump volume.

The maximum flow rate of the safety valves is only valid for a counter pressure of 0 bar in the discharge line. At higher counter pressures, the maximum flow is reduced according to the specifications in the applicable valve data sheets.

NG	Nominal flow	Item 246	Data sheet
IH04			
10	140 l/min	R900769372 (DBDH10K1X/330)	25402
16	300 l/min	R901265679 (DB20K1-1X/330YE)	25818

**Notice:**

In the as-delivered state, the mechanical adjusters of the pressure relief valves (items 121, 131, 150/151, 165) and the stroke limitations (items 140 and 161) are completely screwed-out.

In the as-delivered state, the type-examination tested safety valve item 246 (only available with accumulator operation) is set and sealed according to the Pressure Equipment Directive 2014/68/EU.

Technical data

(For applications outside these values, please consult us!)

Electrical		
Voltage type		Direct voltage
Duty cycle	%	100
Protection class according to DIN EN 60529		IP65 with mating connector mounted and locked ¹⁾
Maximum surface temperature of the coil ²⁾	°C	150
Voltage	V	24 +/- 10%



Notice:

With the electrical connection "K4", the protective grounding conductor (PE) must be connected properly.

High-response valves ³⁾		
Voltage	V	24 +/- 10%
Command value input	V	+/- 10%
Control electronics		On Board Electronic (OBE)

- 1) Mating connectors are not included in the scope of delivery and must be ordered separately. See data sheet 08006.
- 2) Due to the temperatures occurring at the surfaces of the solenoid coils, the standards ISO 13732-1 and EN ISO 4413 must be observed.
- 3) See the data sheet of the component being used for the functionality, technical data, integrated control electronics, performance limits, characteristic curves, and general information.



Notice:

For the environment simulation testing for EMC (electro-magnetic compatibility), climate and mechanical load, see data sheet of the component used.

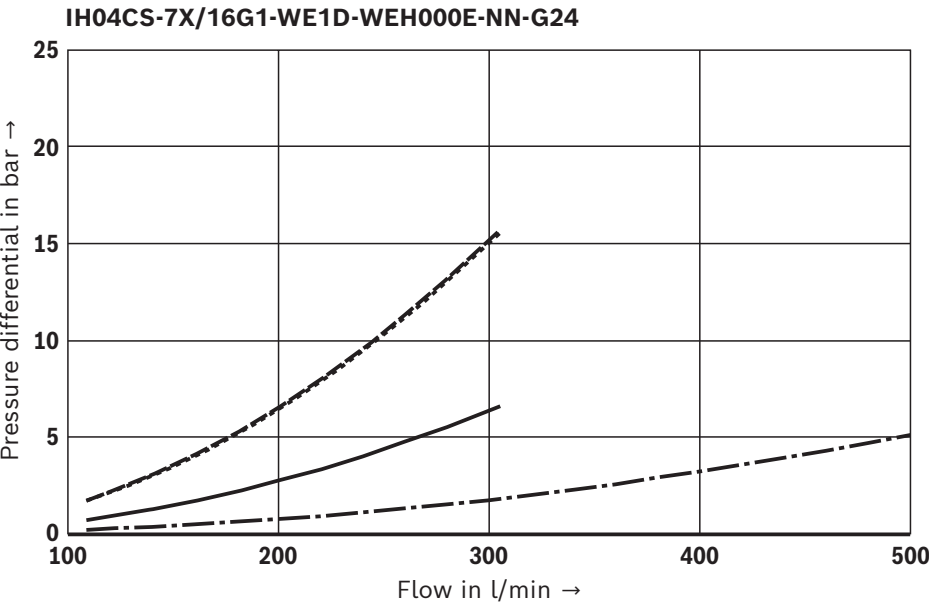
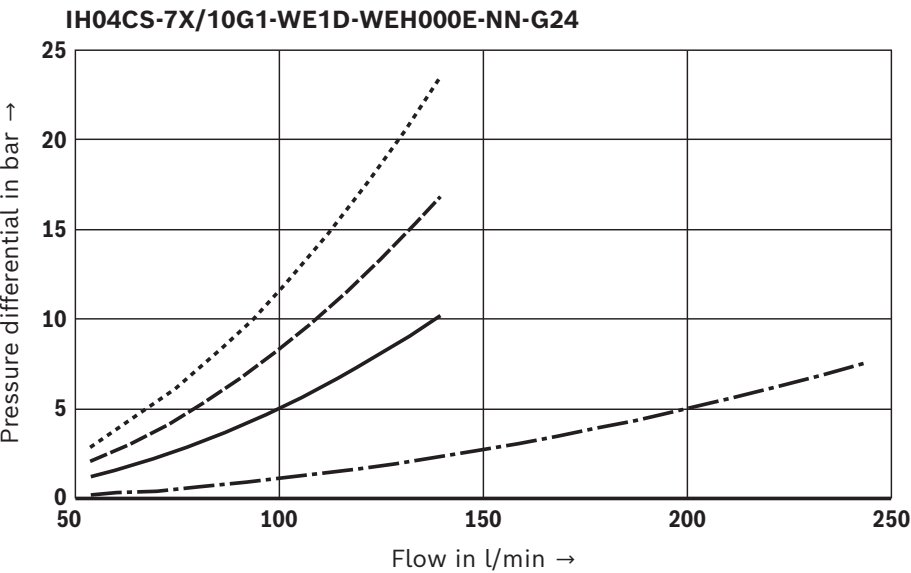
Safety-relevant components

For information on the electrical characteristics of the inductive position switches such as connection voltage,

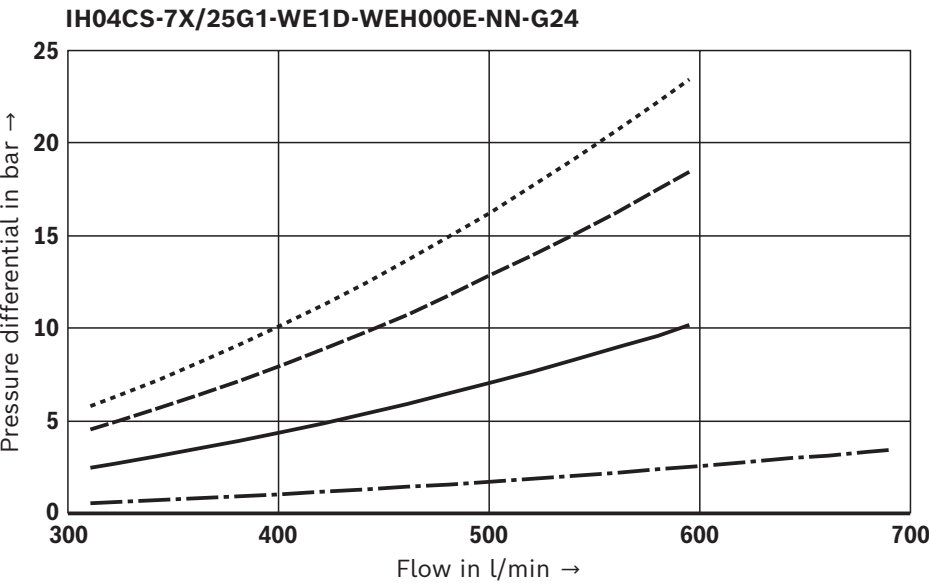
load capacity, admissible residual ripple, switching outputs, and pinout please refer to the data sheets listed in the following table:

Technical item	Type designation	IH04C-7X	Limit switch designation	Data sheet
Item 110	5-4WE10...QS0	NG10	S11a, S11b, S12, S23	24830
	H-4WEH...QM0	NG10-32		
	4WREEM	NG10		29064
	4WRTEM	NG10-35	S11	29083
Items 135, 260, 292, 297	4WE6...QMB	NG10-32	S13, S26, S29.2, S29.7	24830
	5-4WE10...QMB	NG35		
Item 140	LFA...E...QM	NG10-35	S14	21015
Item 250	H-3WEH...QMB	NG10-35	S25	24830
Items 290, 295	LC2A...B...Q7	NG10-35	S29.0, S29.5	21040

Characteristic curves

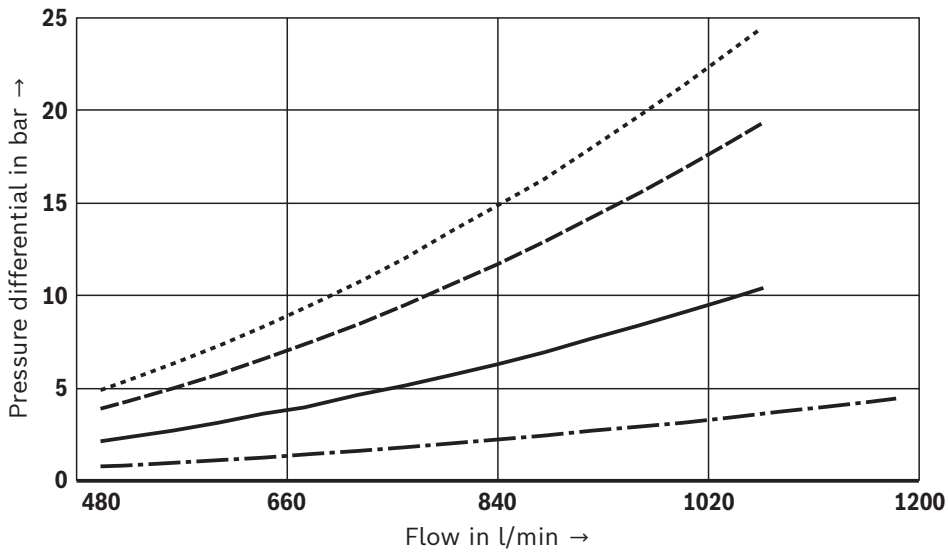


- P1 → X2
- - - P1 → X2
- · - X1 → T1.1
- X2 → T1.1

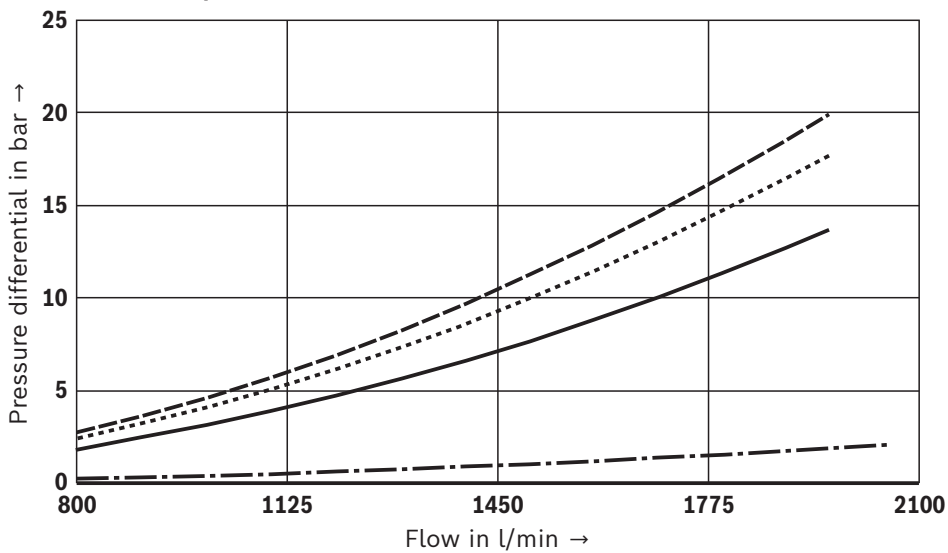


Characteristic curves

IH04CS-7X/32G1-WE1D-WEH000E-NN-G24



IH04CS-7X/35G1-WE1D-TEM1K3E-NN-G24



- P1 → X2
- - - P1 → X2
- · - X1 → T1.1
- X2 → T1.1

Basic functions according to safety category 4 (ISO 13849-PLe): IH04CS-7X/...1-WE0N-WEH000E-NN-G24

The following description is based on a cyclic control and position monitoring of the valves.

- ▶ Failure of any of the position-monitored valves must be detected by an external safety PLC and the start of the next dangerous movement after an error has to be prevented. Direction error immediate stop.
- ▶ The load holding pressure is the total of slide weight and weight of the top tool part acting on the effective annulus area.
- ▶ During muting (e.g. during retraction), the solenoids Y13 (S13) and Y14 (S14) must be switched-off.

Option W – Item 120

The pressure relief valve item 120/121 limits the pressure of the motor pump station. At the pressure relief valve item 121, the maximum operating pressure is set. The on/off valve item 122 provides pilot control for the pressure relief valve item 120/121. The pressure relief valve item 120/121 is switched to depressurized circulation in the basic position. Energization of the solenoid Y12 causes the pressure set at the pressure relief valve item 120 to become effective.

Option WEH000E – Item 110

The movement direction of the cylinder piston is determined by the directional valve item 110:

- ▶ The cylinder piston is extended with the control signal Y11b.
- ▶ The cylinder piston is retracted with the control signal Y11a.

By means of the position monitoring S11a and S11b, it is monitored whether

- ▶ the closed central position is reached in every pressing cycle.
- ▶ the movement direction is correct.

Option E – Item 130

The pressure relief valve item 130/131 serves for pressure limitation on the piston chamber side of the cylinder. At the pressure relief valve item 131, the maximum press pressure is set. The proportional pressure relief valve item 132 provides pilot control of the pressure relief valve item 130/131 and determines the press pressure by means of the control signal Y13.1 (e.g. press capacity, decompression, preload during retraction):

- ▶ When the set pressure is exceeded, the pressure relief valve item 130 will open to the tank.
- ▶ When the set pressure is no longer reached, the pressure relief valve item 130 will close.

Functional safety item 135

Protection against unwanted pressure build-up on the piston chamber side is realized by the directional valve item 135. In its basic position, the pressure relief valve item 130/131 is switched to depressurized circulation. By means of the electrical position monitoring S13 it can be monitored whether the basic position is reached in every pressing cycle. Energization of the solenoid Y13 causes the pressure set at the pressure relief valve item 132 to become effective.

Functional safety item 140

The 2-way cartridge valve in item 140 holds the cylinder piston in position (EN ISO 16092-3 section 5.3.7.2). During load holding/retraction, the valve item 140 acts as a check valve and during extension as a switchable isolator valve. By means of the position monitoring S14 it is monitored whether the basic position is reached in every pressing cycle. The seat valve item 145 unlocks the 2-way cartridge valve item 140 during extension.

Functional safety item 150

The pressure relief valves items 150/151 serve as protection against pressure intensification in the annulus area of the cylinder. According to DIN ISO 16092-3 section 5.2.3.3, they must be set to at least 10% above the maximum operating pressure item 120 and sealed.

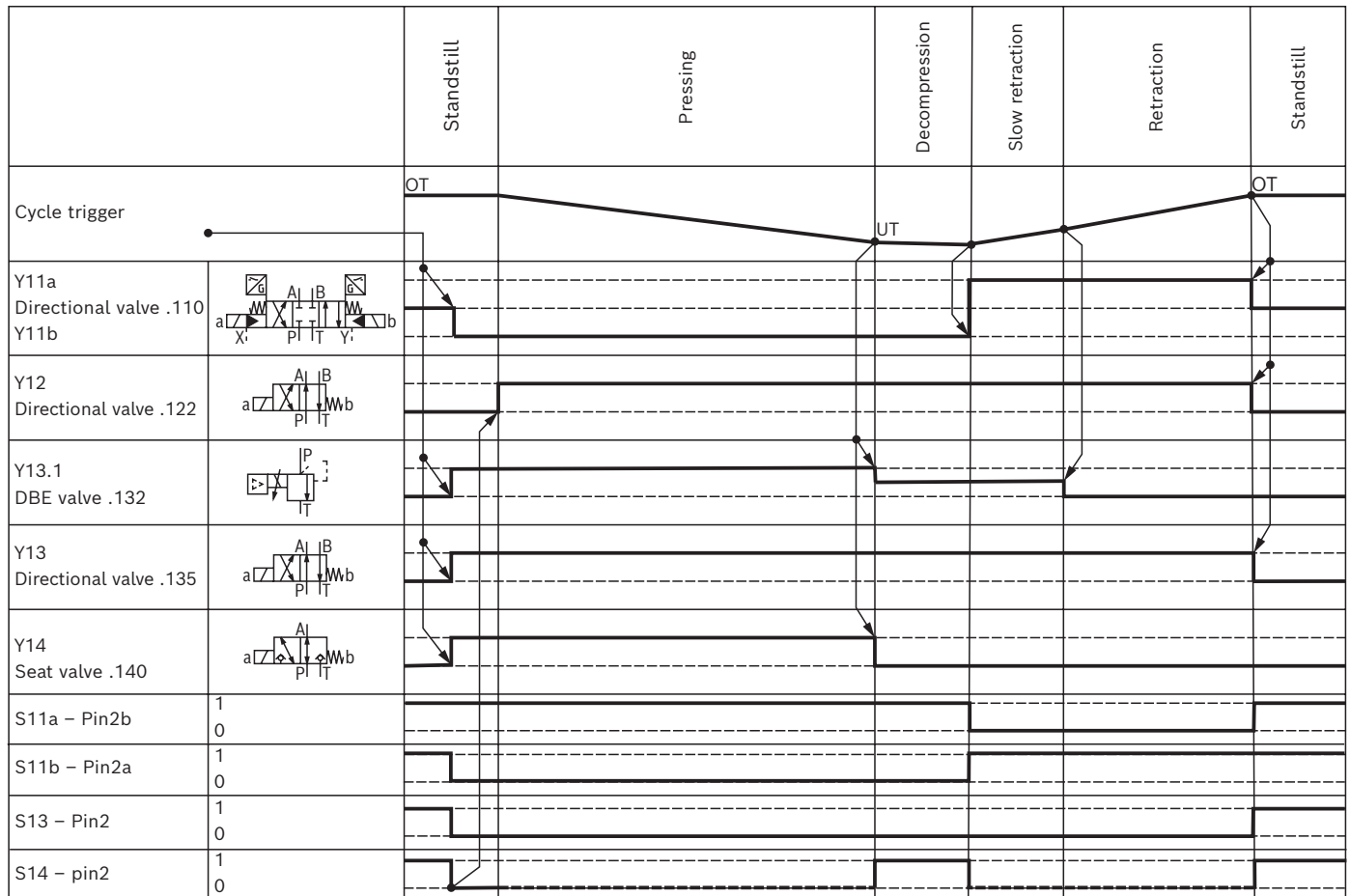
Option 0 – Item 160

During the pressing process, the pressure relief valve consisting of items 160/161/165 compensates the load holding pressure on the annulus area side. The pressure relief valve item 165 is to be set so that the cylinder piston does not drop during standstill:

- ▶ When the set pressure is exceeded, the pressure relief valve item 160 will open to the tank.
- ▶ When the set pressure is no longer reached, the pressure relief valve item 160 will close.

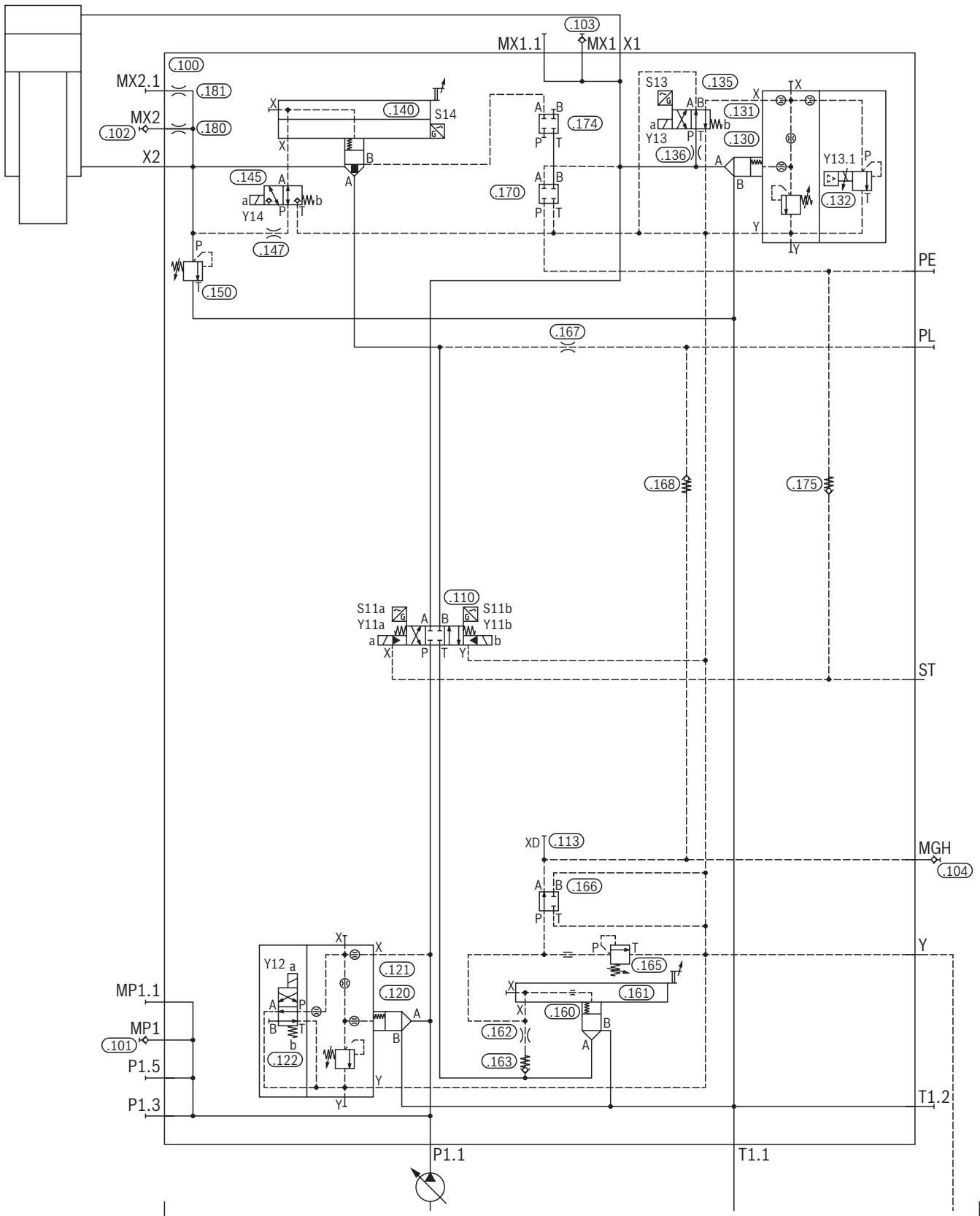
Basic functions according to safety category 4 (ISO 13849-PLe):

IH04CS-7X/...1-WE0N-WEH000E-NN-G24



Basic functions according to safety category 4 (ISO 13849-PLe):

IH04CS-7X/...1-WE0N-WEH000E-NN-G24



Rapid traverse due to own weight via prefill valve: IH04CS-7X/...1-WE1N-WEH000E-NN-G24

Option 1 – Item 160

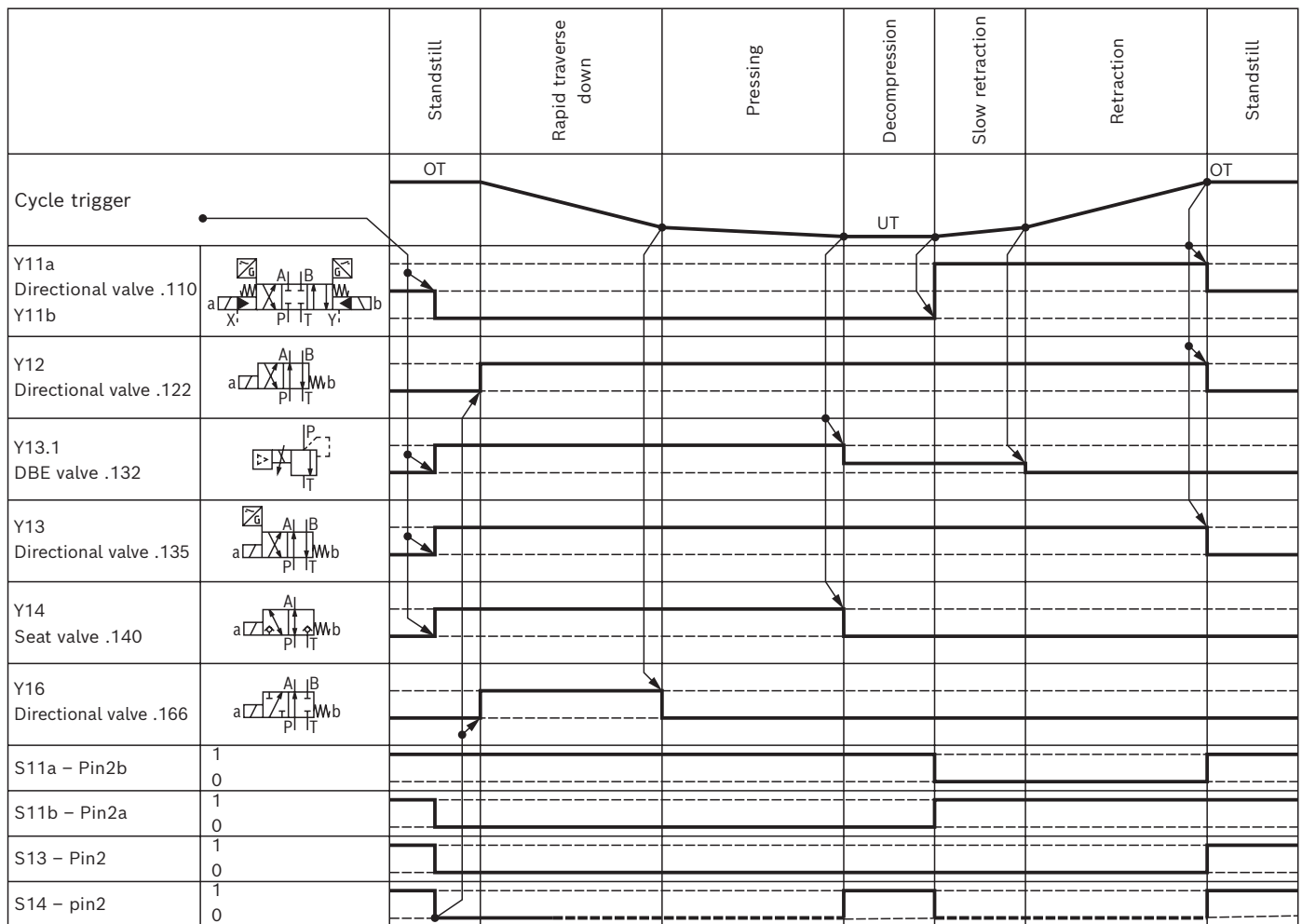
During the pressing process, the pressure relief valve consisting of items 160/161/165 compensates the load holding pressure on the annulus area side. The pressure relief valve item 165 is to be set so that the cylinder piston does not drop during standstill:

- ▶ When the set pressure is exceeded, the pressure relief valve item 160/161 will open to the tank.
- ▶ When the set pressure is no longer reached, the pressure relief valve item 160/161 will close.

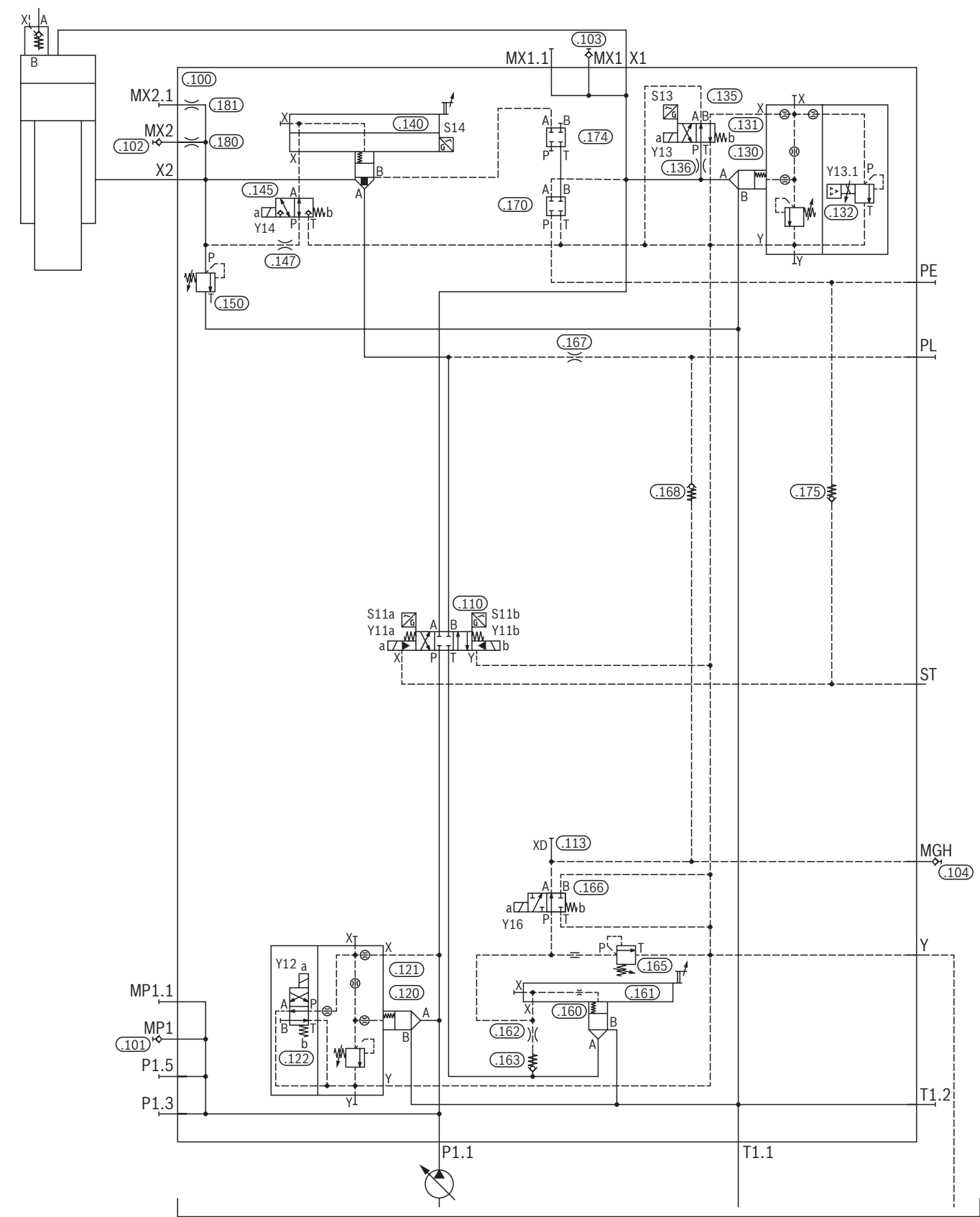
The valve item 166 provides pilot control for the rapid traverse phase and the load-holding pressure compensation:

- ▶ In basic position (Y16 – OFF) the load holding pressure compensation takes effect
- ▶ With energization of the solenoid (Y16 – ON), the rapid traverse phase without load holding pressure compensation takes effect.

Using the stroke limitation at the logic cover item 161, the maximum rapid traverse velocity is set.



Rapid traverse due to own weight via prefill valve: IH04CS-7X/...1-WE1N-WEH000E-NN-G24

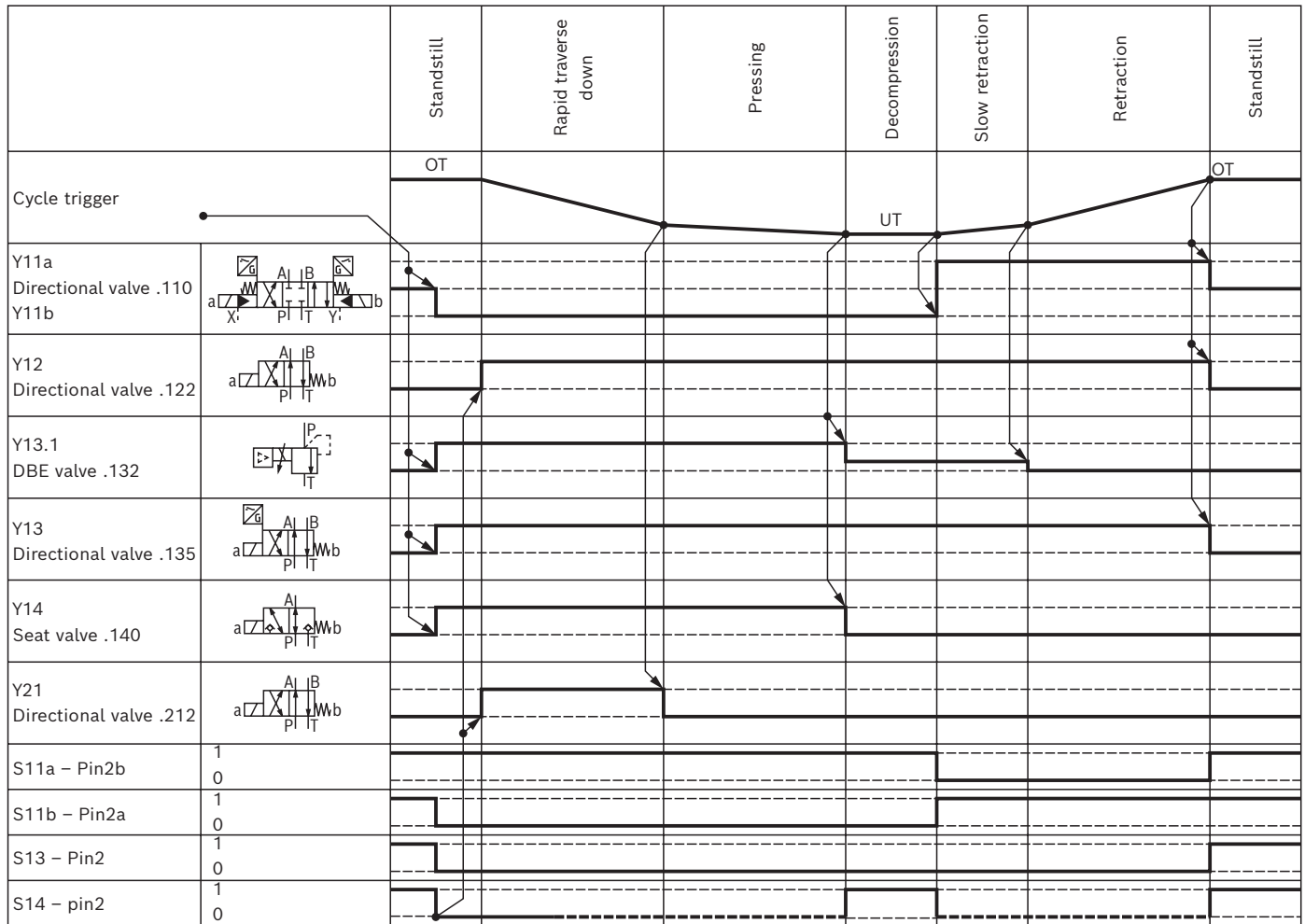


Rapid traverse due to rapid traverse cylinder: IH04CS-7X/...2-WE0N-WEH000E-EN-G24

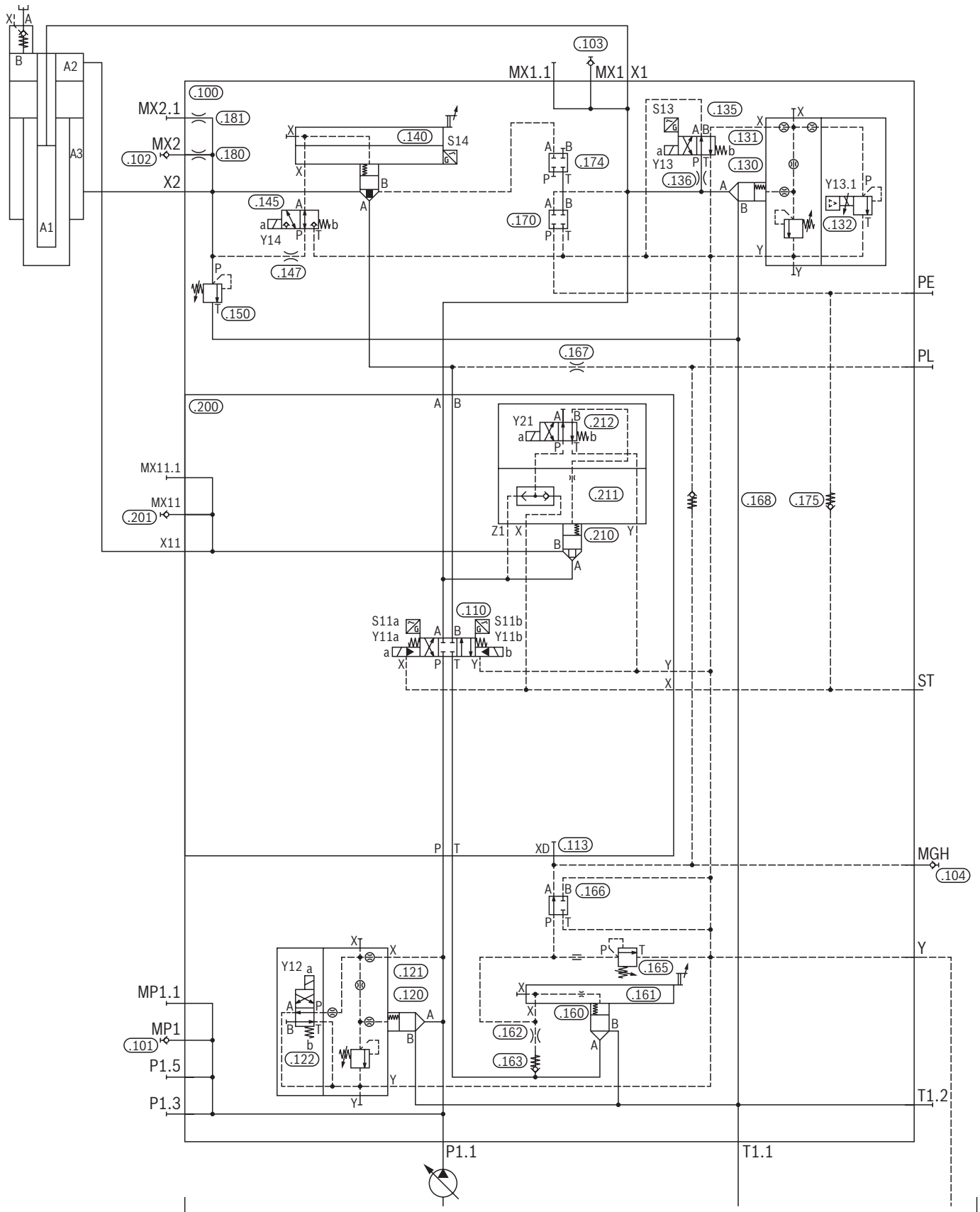
Option 1 – Item 210

The 2-way cartridge valve consisting of item 210/211 separates the rapid traverse piston chamber from the pressing piston chamber. With energization of the solenoid (Y21 – ON), the cartridge valve item 210/211 closes. The rapid traverse phase takes effect. At the end of rapid traverse, valve item 212 is de-energized, the 2-way cartridge valve item 210/211 opens.

The hydraulic is applied to both piston areas. The end of the pressing process is followed by joint decompression. During retraction, the oil volume flows from the rapid traverse piston chamber via the 2-way cartridge valve item 210/211 to the pressing piston chamber and via the prefill valve to the tank.



Rapid traverse due to rapid traverse cylinder: IH04CS-7X/...2-WE0N-WEH000E-EN-G24



Rapid traverse due to differential circuit: H04CS-7X/...2-WE0N-WEH000E-DN-G24

Option 0 – Item 165

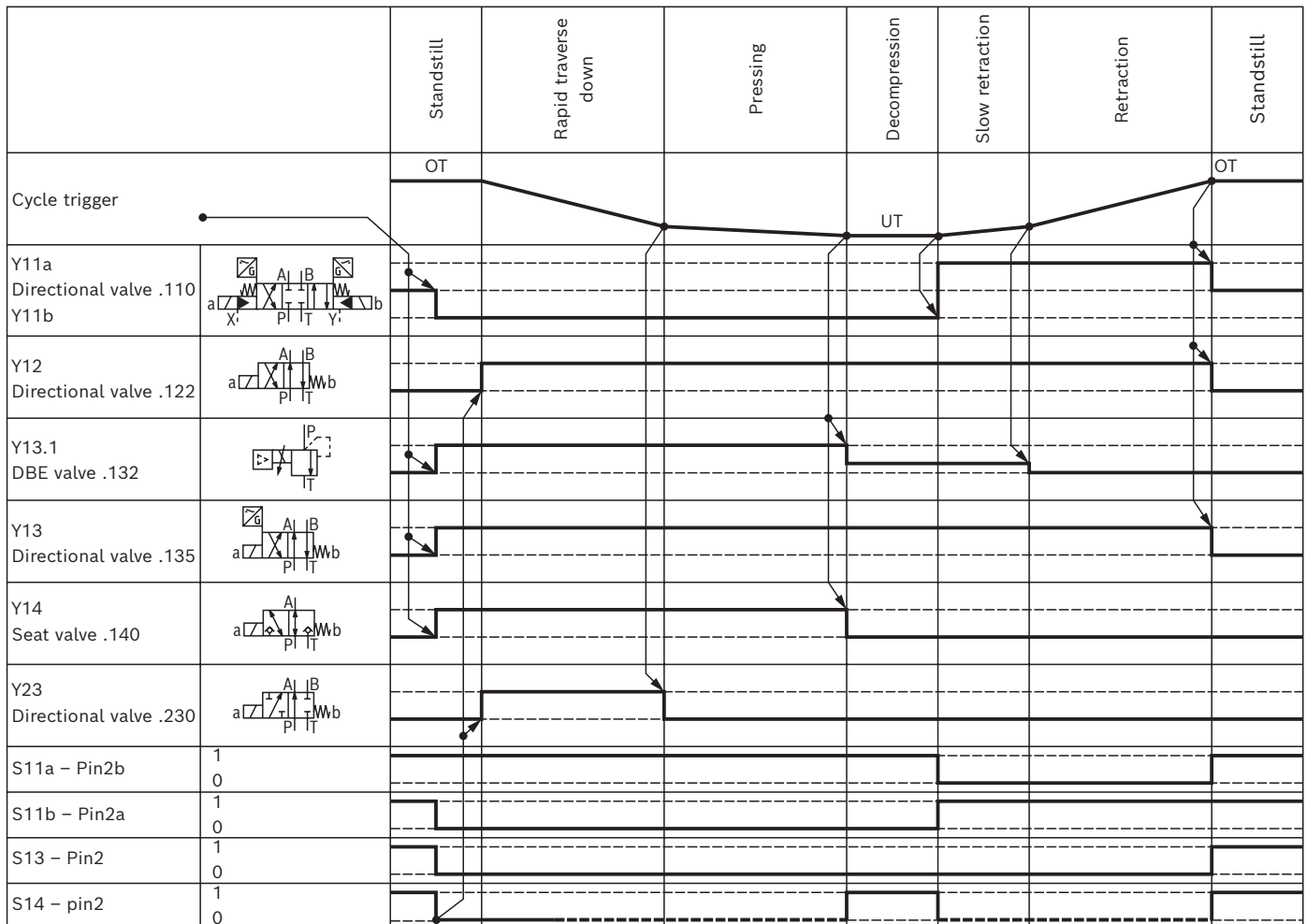
The pressure relief valve item 165 limits the pressure of the tank line item 110 and is to be set to the maximum pressure rating.

Option DN – Item 230

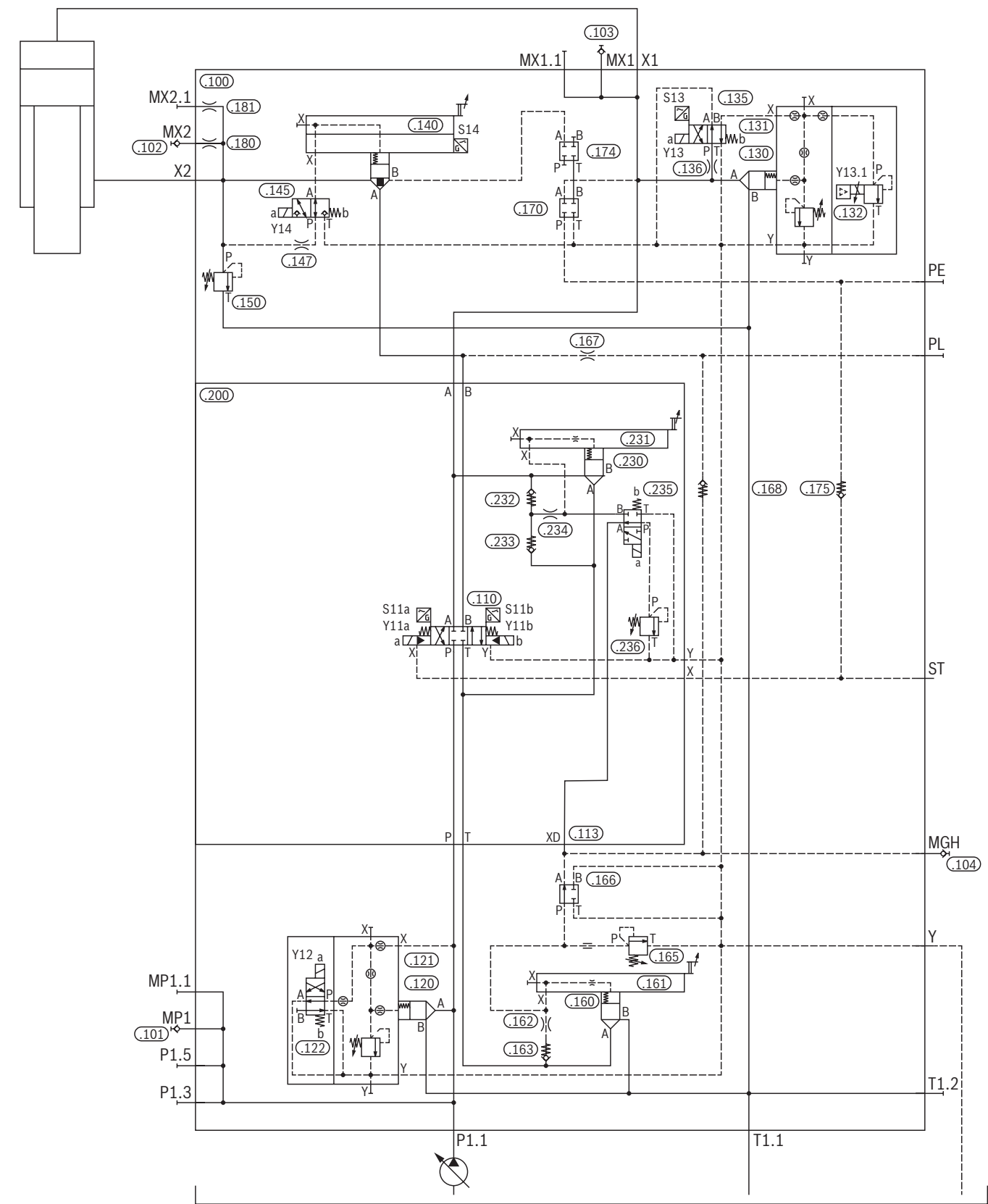
During the rapid traverse phase, the 2-way cartridge valve consisting of the items 230/231 compensates the load holding pressure. The pressure relief valve item 236 is to be set so that the cylinder piston does not drop during standstill.

The valve item 235 provides pilot control for the rapid traverse and the pressing process:

- ▶ With energization of the solenoid (Y23 – ON), the load holding pressure compensation takes effect during the rapid traverse via the pressure relief valve item 230/231/236 from the annulus area to the piston chamber.
- ▶ In basic position (Y23 – OFF), the load holding pressure compensation takes effect during the pressing process via the pressure relief valve item 160/161/236 from the annulus area to the tank.



Rapid traverse due to differential circuit: H04CS-7X/...2-WE0N-WEH000E-DN-G24



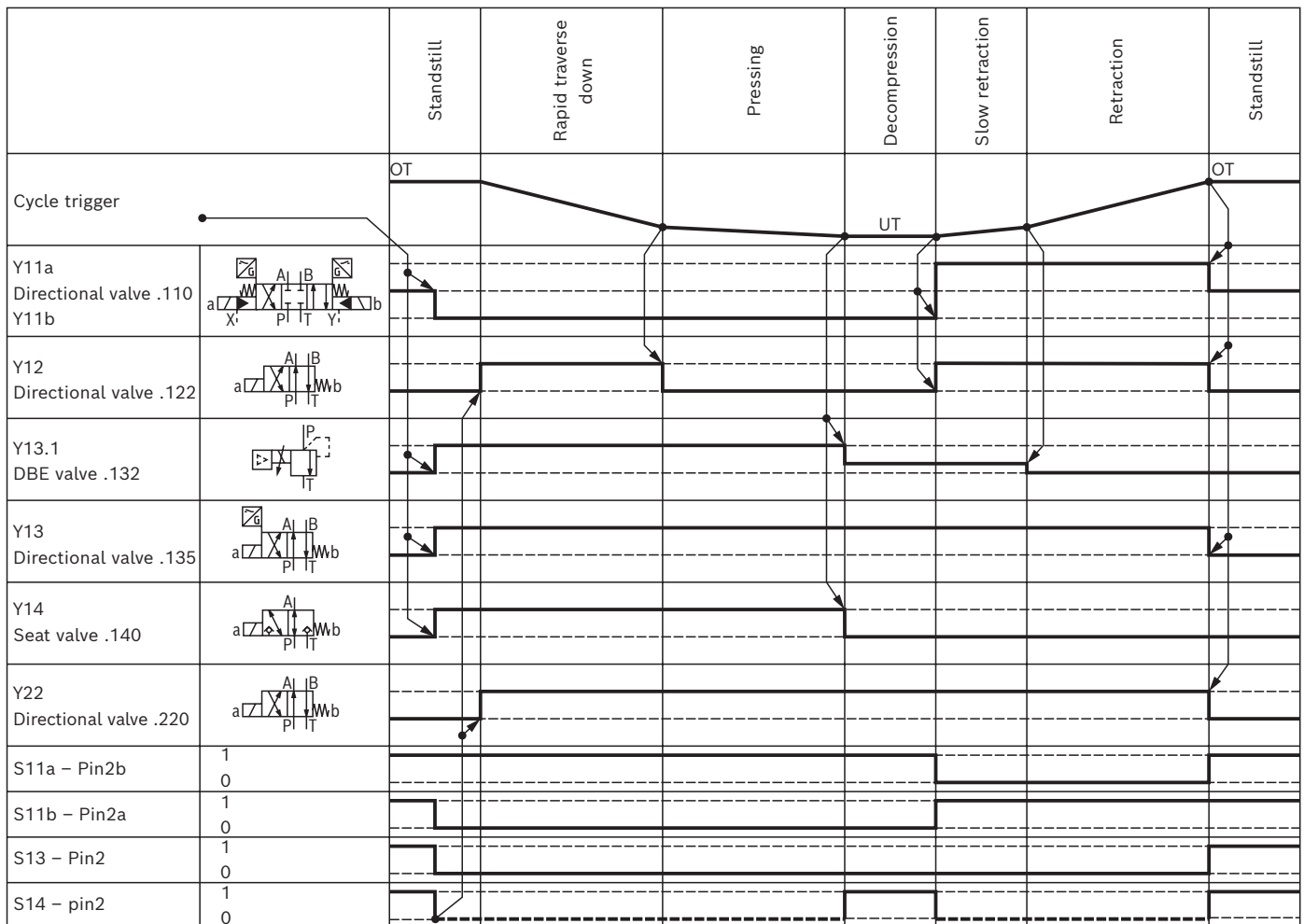
Operation with high- and low-pressure pumps: IH04CS-7X/...2-WE0N-WEH000E-HN-G24

Option W – Item 120

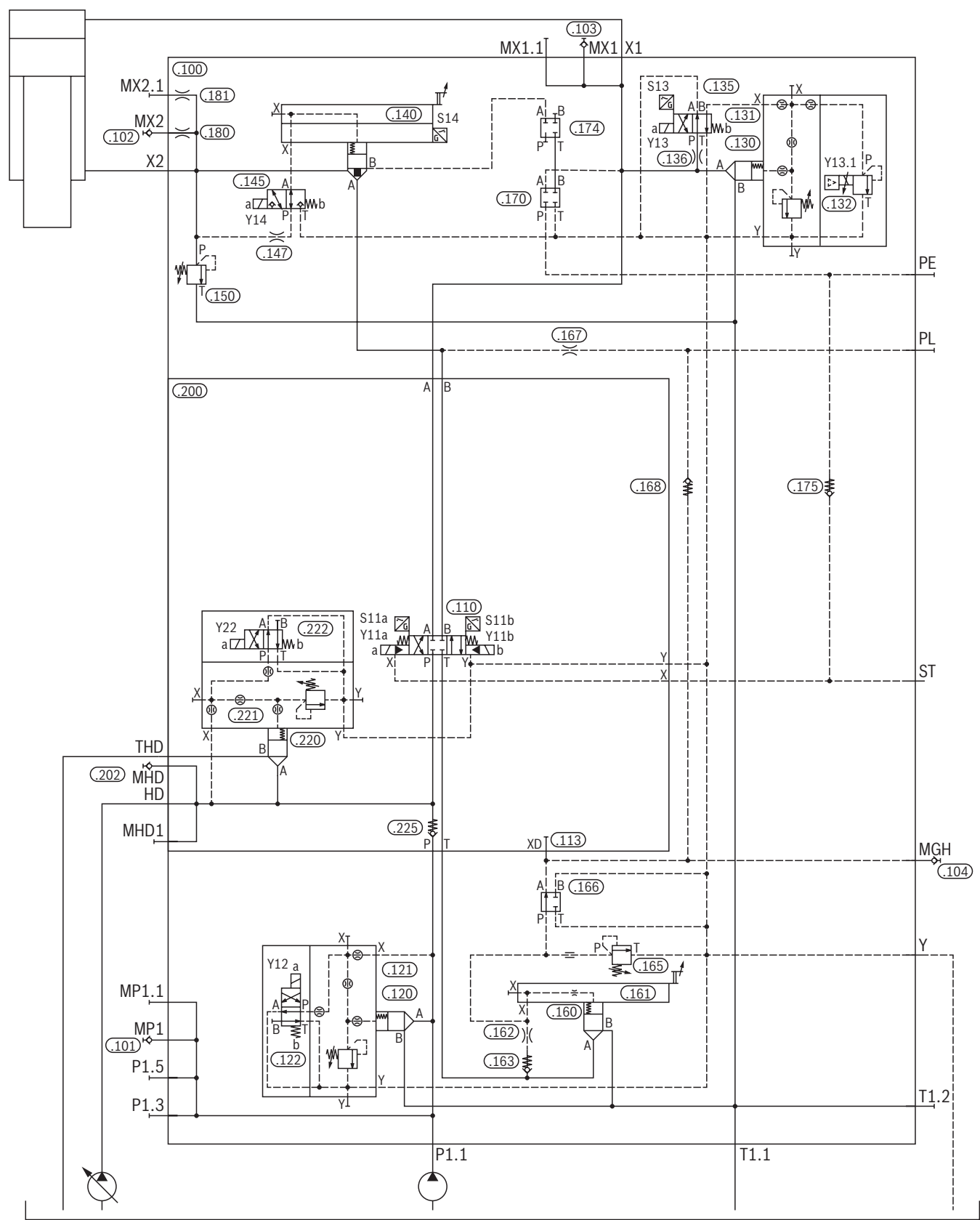
The pressure relief valve item 120/121 limits the pressure of the low-pressure motor pump station (hydraulic energy supply). At the pressure relief valve item 121, the maximum operating low-pressure is set. The on/off valve item 122 provides pilot control of the pressure relief valve item 120/121. In its basic position, the pressure relief valve item 120/121 is switched to depressurized circulation. Energization of the solenoid Y12 causes the pressure set at the pressure relief valve item 121 to become effective.

Option HN – Item 220

The pressure relief valve consisting of the items 220/221 limits the pressure of the high-pressure motor pump station (hydraulic energy supply). The maximum operating high pressure is set at the pressure relief valve item 221. The on/off valve item 222 provides pilot control for the pressure relief valve item 220/221. The pressure relief valve item 220/221 is switched to depressurized circulation in the basic position. Energization of the solenoid Y22 causes the pressure set at the pressure relief valve item 122 to become effective. The check valve item 225 separates the high-pressure and low-pressure circuits



Operation with high- and low-pressure pumps: IH04CS-7X/...2-WE0N-WEH000E-HN-G24



Load-sensing: IH04CS-7X/...2-BE0N-TEM...E-LN-G24

The load-sensing function is dependent on the flow controller of the pump.

Option B – Item 120

The pressure relief valve consisting of the items 120/121 provides pressure limitation for the motor pump station (hydraulic energy supply). At the pressure relief valve item 121, the maximum operating pressure is set.

Option LN – item 275 and 276

The valve item 276 determines the operating mode of the pump:

- ▶ In the standby basic position, the flow controller pressure is effective and can be set. Also the pump is swiveled in. A pressure of 22 ... 25 bar favors the control quality at smaller velocities and saves the installation of a pilot oil pump.
- ▶ With energization of the solenoid Y27.1-AN, the load sensing function becomes effective:

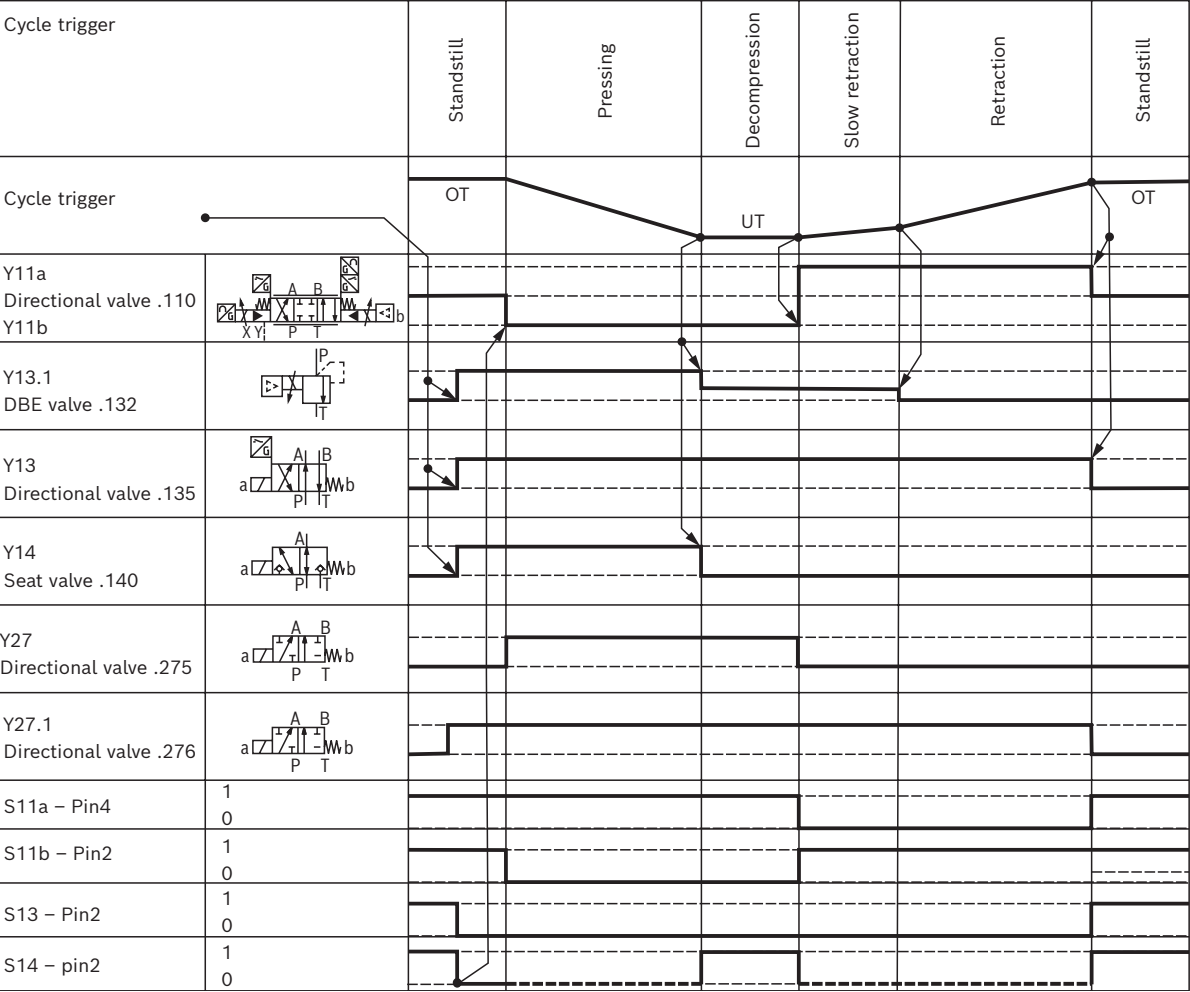
The effective pressure for load sensing selected with the valve item 275:

- Solenoid Y27 – OFF selects the pressure at port B of the proportional directional valve item 110.
- Solenoid Y27 – ON selects the pressure at port A of the proportional directional valve item 110.

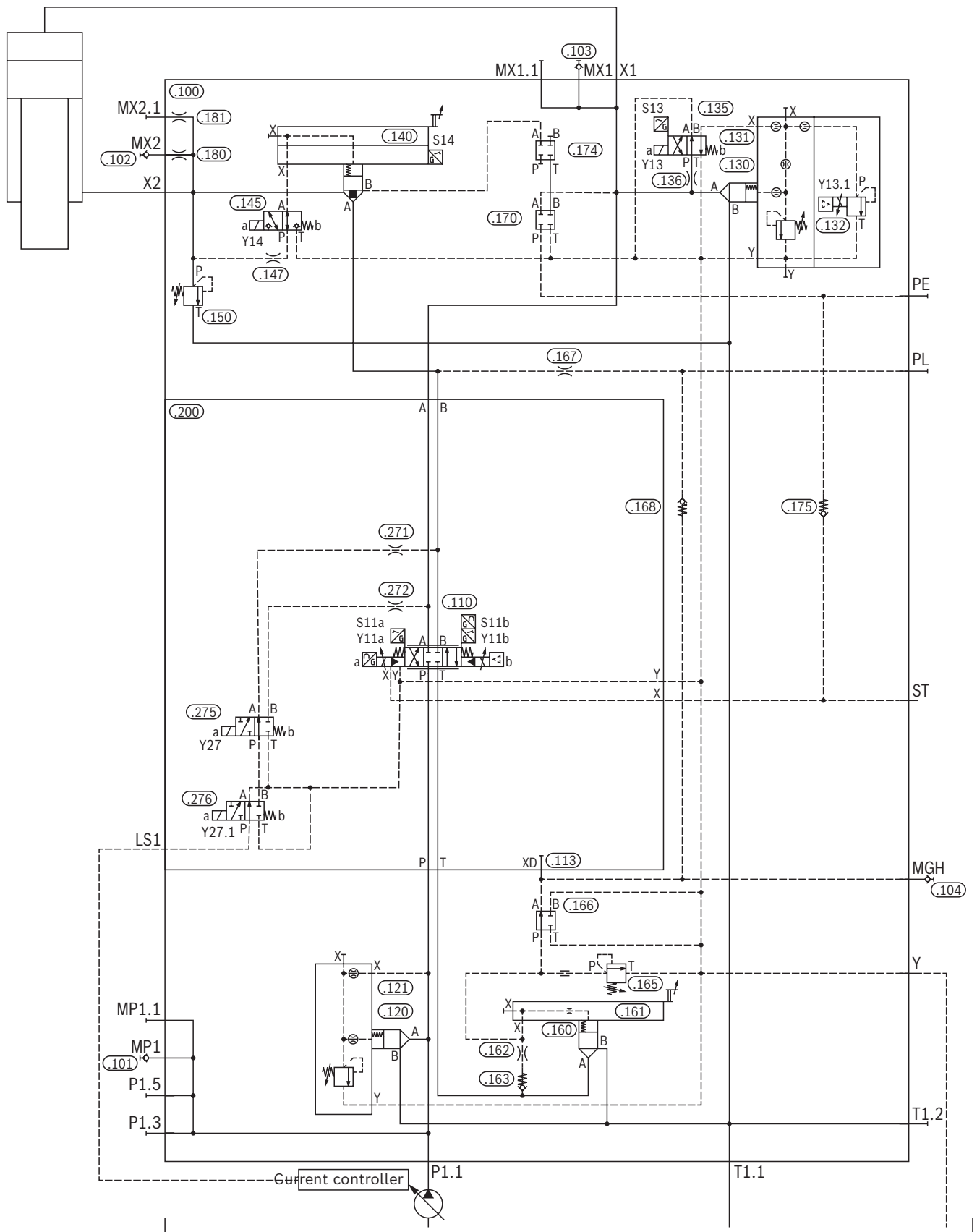
Option TEM...E – Item 110

The stepless flow adjustment of the pump and the movement direction of the cylinder piston are determined by the proportional directional valve item 110.

Load-sensing: IH04CS-7X/...2-BE0N-TEM...E-LN-G24



Load-sensing: IH04CS-7X/...2-BE0N-TEM...E-LN-G24



High-response valve with zero overlap: IH04CS-7X/...3-WE3N-RDE...V-RN-G24

Option RDE...V – Item 110

The stepless flow adjustment and the movement direction of the cylinder piston are determined by the high-response valve item 110. The highly dynamic high-response valve item 110 is recommended for alternating pressure, force, position and velocity controls and has a control spool with zero overlap.

Option 3 – Item 105

During the pressing process, the pressure relief valve item 195 compensates the load holding pressure on the annulus area side. The pressure relief valve item 195 is to be set so that the cylinder piston does not drop during standstill. The valve item 196 provides pilot control for the rapid traverse phase and the load-holding pressure compensation:

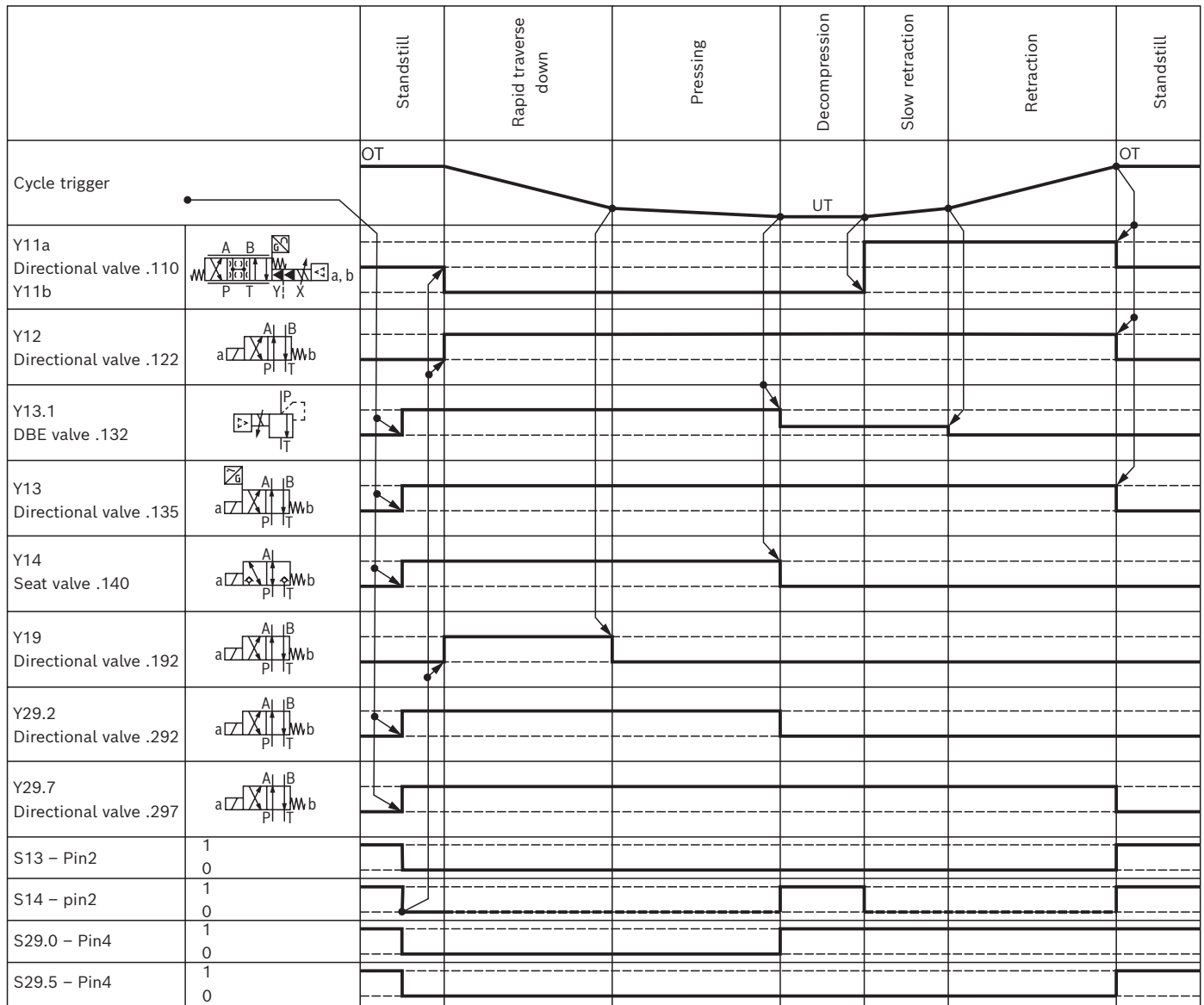
- In basic position (Y19-OFF), the load holding pressure compensation takes effect via the pressure relief valve item 195
- With energization of the solenoid (Y19-ON), the rapid traverse phase via the 2-way cartridge valve item 190/192 without load holding pressure compensation takes effect. Using the stroke limitation at the logic cover item 191, the maximum rapid traverse velocity is set. Retraction is realized via the check valve item 198.

Option RN – Item 290

The energy separation against unwanted pressure build-up on the piston chamber side is realized by the 2-way cartridge valve item 290. By means of the position monitoring S29.0 it is monitored whether the basic position is reached in every pressing cycle. The directional valve item 292 (Y29.2-ON) unlocks the 2-way cartridge valve item 290. In basic position, the directional cartridge valve item 290 is closed.

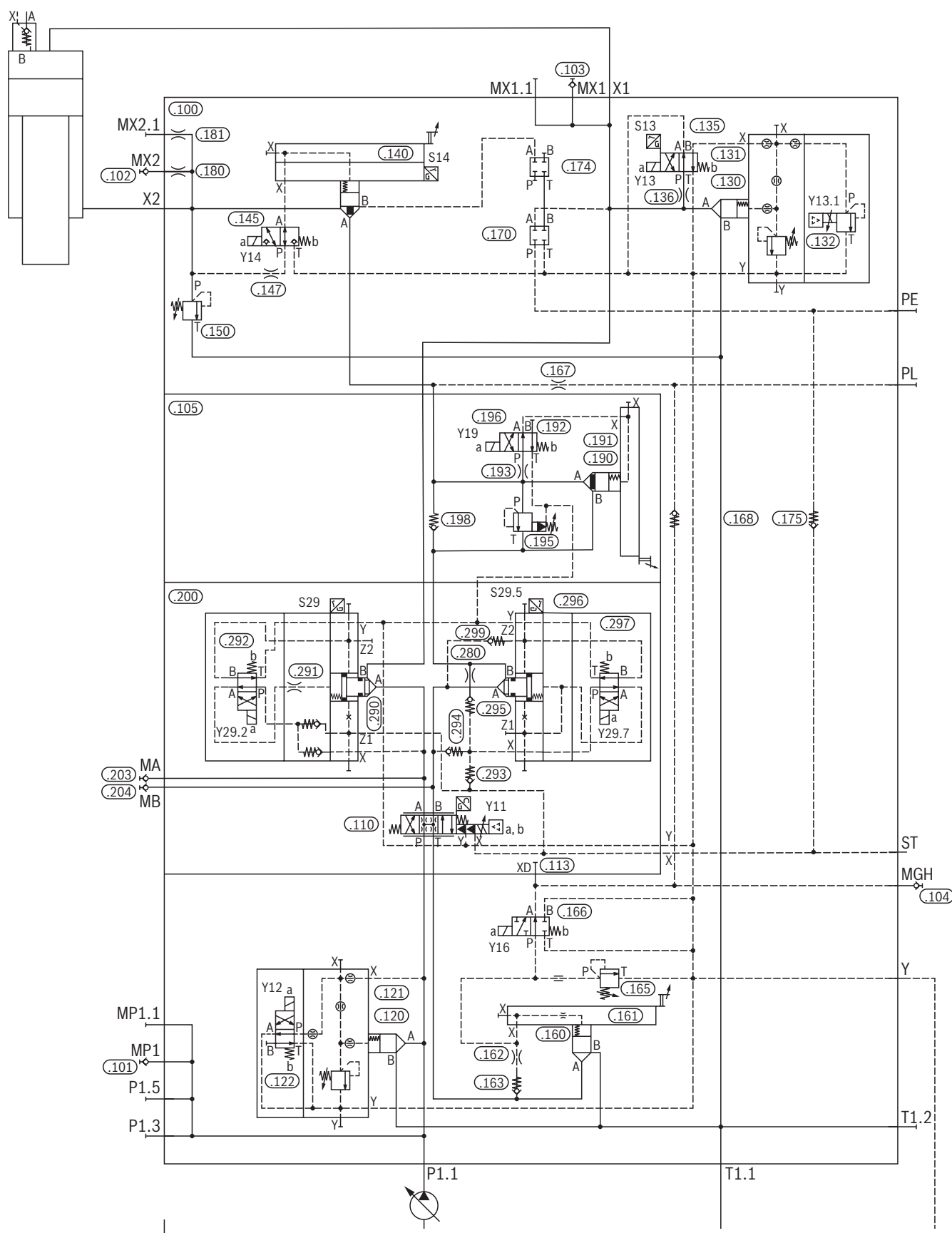
The 2-way cartridge valve item 295 holds the cylinder piston in position (see EN ISO 16092-3 section 5.3.7.2). By means of the position monitoring S29.5 it is monitored whether the basic position is reached in every pressing cycle. The directional valve item 297 (Y29.7-ON) unlocks the 2-way cartridge valve item 295. In basic position, the 2-way cartridge valve item 295 is closed.

High-response valve with zero overlap: IH04CS-7X/...3-WE3D-RDE...V-RN-G24



The solenoid Y16 is switched permanently

High-response valve with zero overlap: IH04CS-7X/...3-WE3N-RDE...V-RN-G24



Pressure holding on the piston chamber side: IH04CS-7X/...3-WE2N-WEH000E-XN-G24

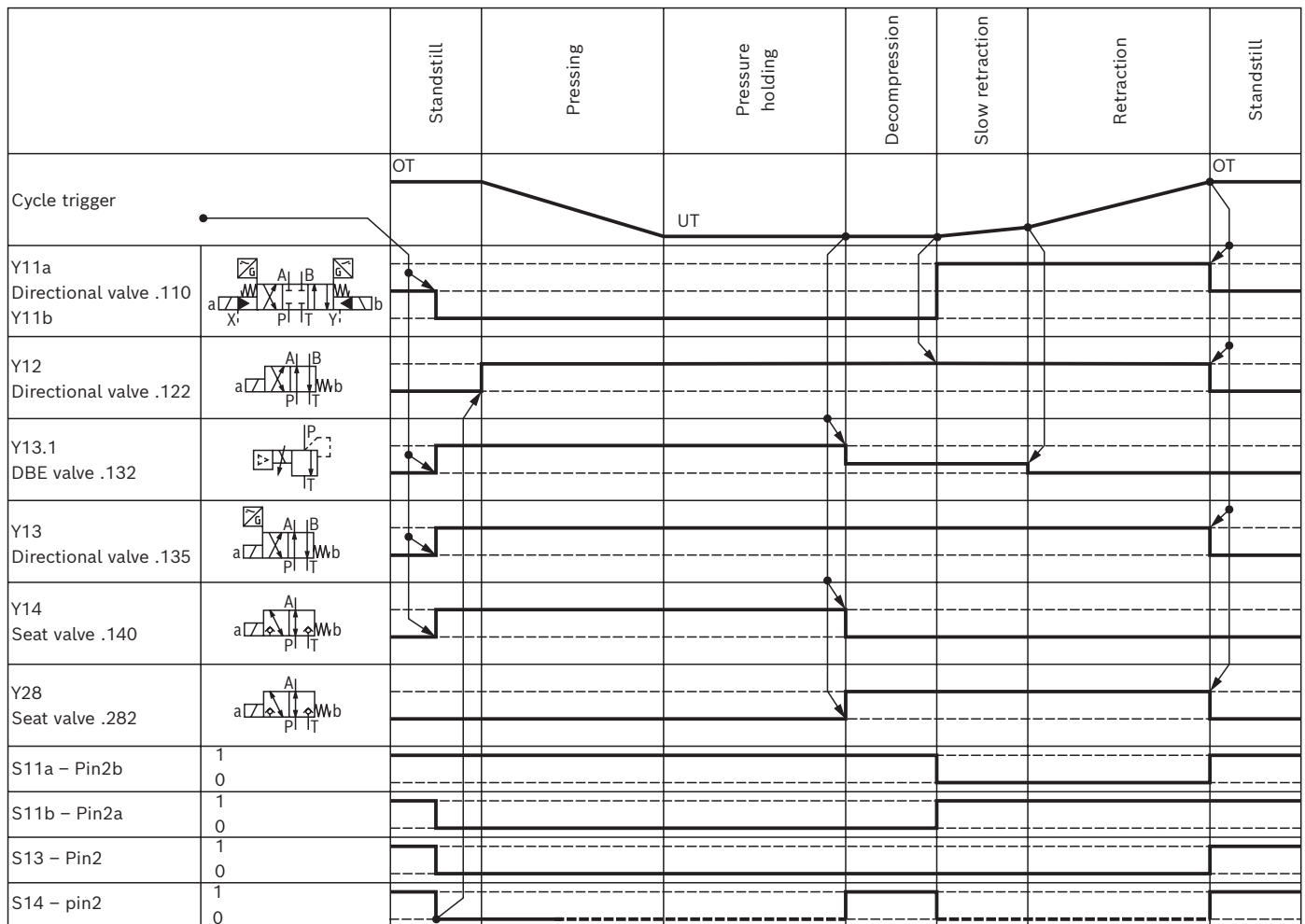
Option 2 – Item 105

During the pressing process, the pressure relief valve item 195 compensates the load holding pressure on the annulus area side. The valve item 195 is to be set so that the cylinder piston does not drop during standstill. Retraction is realized via the check valve item 198.

Option XN – Item 280

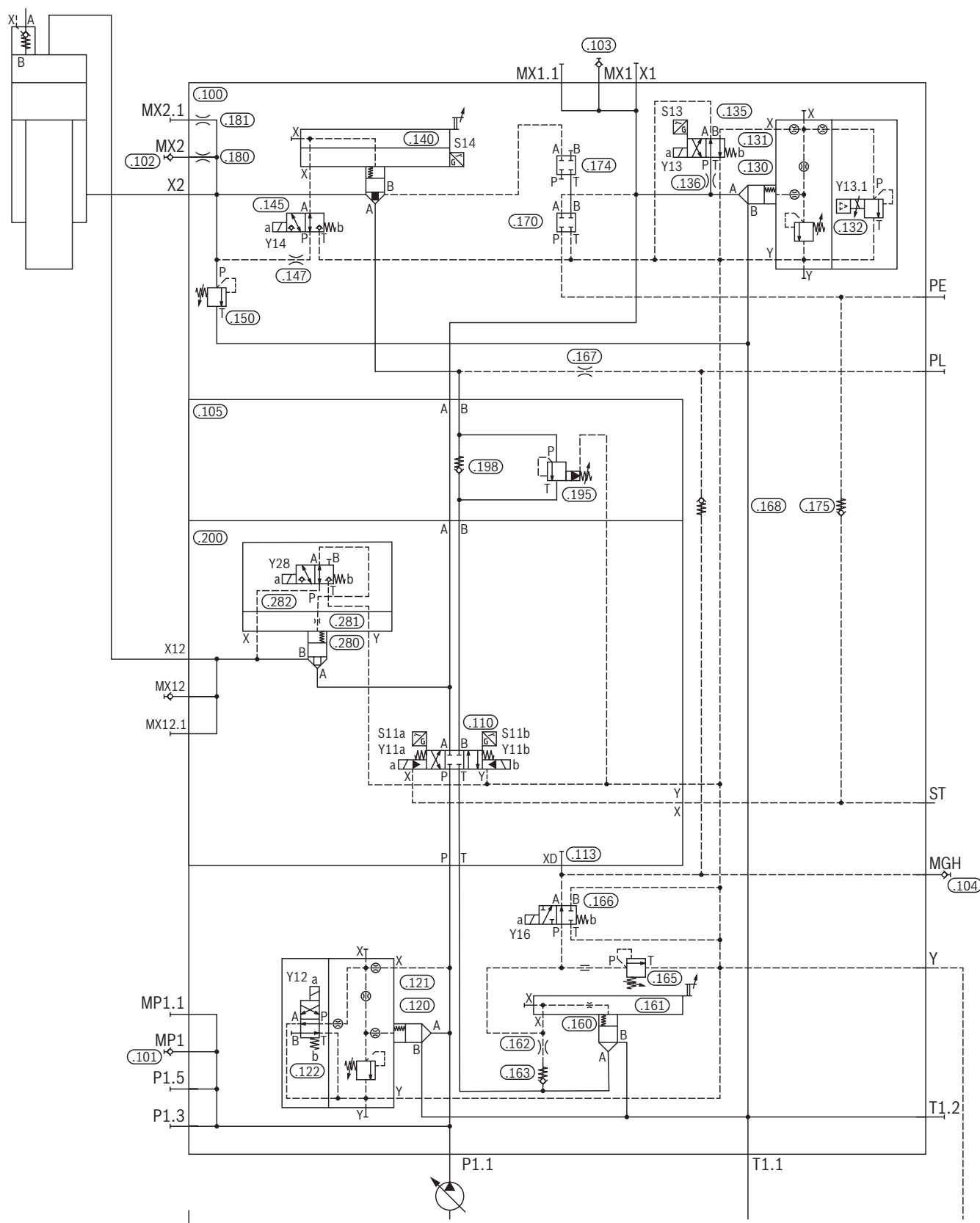
In the basic position, the 2-way cartridge valve consisting of the items 280/281 acts as a check valve. The pressure is built up on the piston chamber side by the cylinder up to the system pressure and then maintained in a leakage-free manner.

Energization of the solenoid (Y28-ON) unlocks the 2-way cartridge valve item 280/281 at the valve item 282 and triggers the decompression.



Except for during decompression and slow retraction, the solenoid Y16 is switched permanently

Pressure holding on the piston chamber side: IH04CS-7X/...3-WE2N-WEH000E-XN-G24



Accumulator operation: IH04CS-7X/...2-WE0N-TEM...E-SN-G24

Option SN – Item 240

The on/off valve item 240 selects between pump operation (Y24 - OFF) and accumulator operation (Y24 - ON).

The 2-way cartridge valve consisting of item 243/244 shuts off the accumulator circuit. The seat valve item 245 provides pilot control of the 2-way directional valve item 243/244:

- In basic position (Y24.1 - OFF), the blocking is effective in both directions;
- With energization of the solenoid (Y24.1 – ON), the accumulator circuit takes effect.

The stroke limitation at the logic cover item 242 limits flow at the accumulator. Stepless flow adjustment is achieved via the proportional valve item 110.

The assembly item 246 to item 248 comprises all the equipment required according to EN 14359 for the safety of accumulators:

- The maximum pressure limitation is achieved by the type-examination tested pressure relief valve item 246
- The manual unloading is achieved using the rotary knob at the pressure relief valve item 246.
- The electrical unloading is achieved using the orifice

and the seat valve item 247. In energized condition (Y24.2 - ON), the pressure set at the pressure relief valve item 121 takes effect.

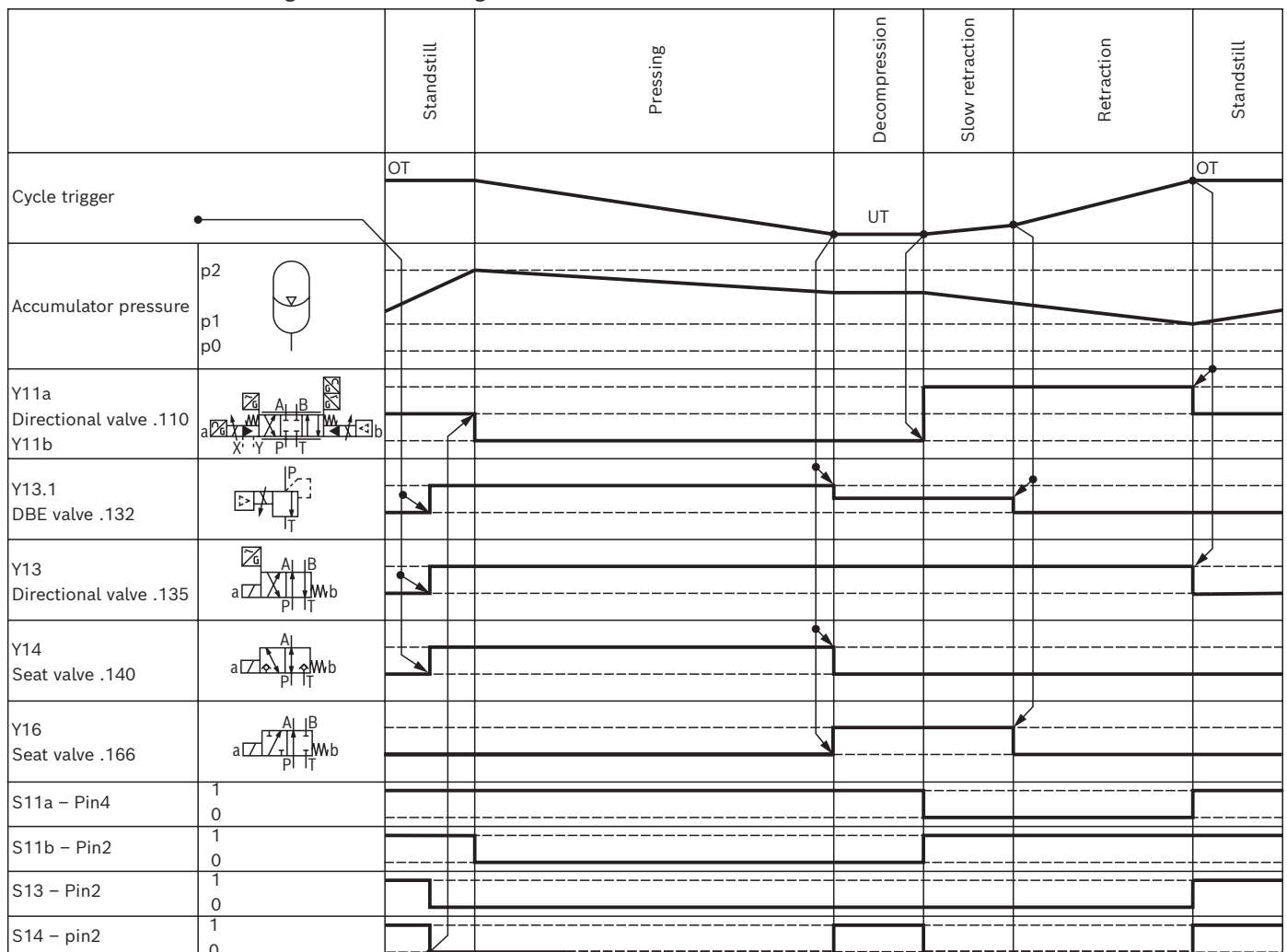
- The charge state of the accumulator is visually indicated by the pressure gauge item 248 with red marking of the relief pressure.

Notice:

In the case of sizes 10 and 16, the adequacy of the accumulator safety valve item 246 for the maximum pump volume must be checked based on the applicable valve data sheets.

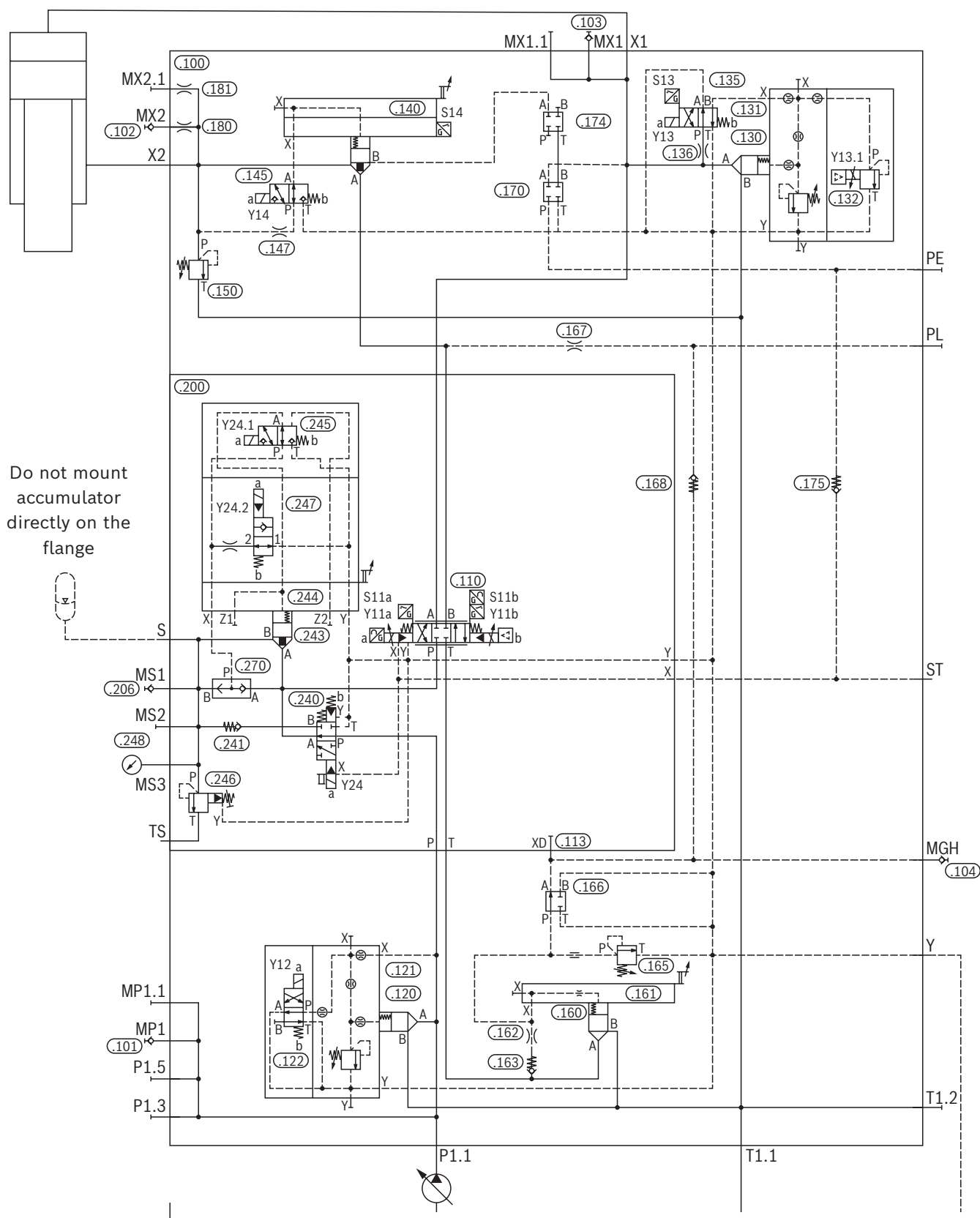
The maximum flow of the accumulator safety valves is only valid for a counter pressure of 0 bar in the discharge line. At higher counter pressures, the maximum flow is reduced according to the specifications in the applicable valve data sheets.

NG IH04	Nominal flow	Item 246	Data sheet
10	140 l/min	R900769372 (DBDH10K1X/330)	25402
16	300 l/min	R901265679 (DB20K1-1X/330YE)	25818



The solenoids Y12, Y24, Y24.1 and Y24.2 are permanently switched.

Accumulator operation: IH04CS-7X/...2-WE0N-TEM...E-SN-G24

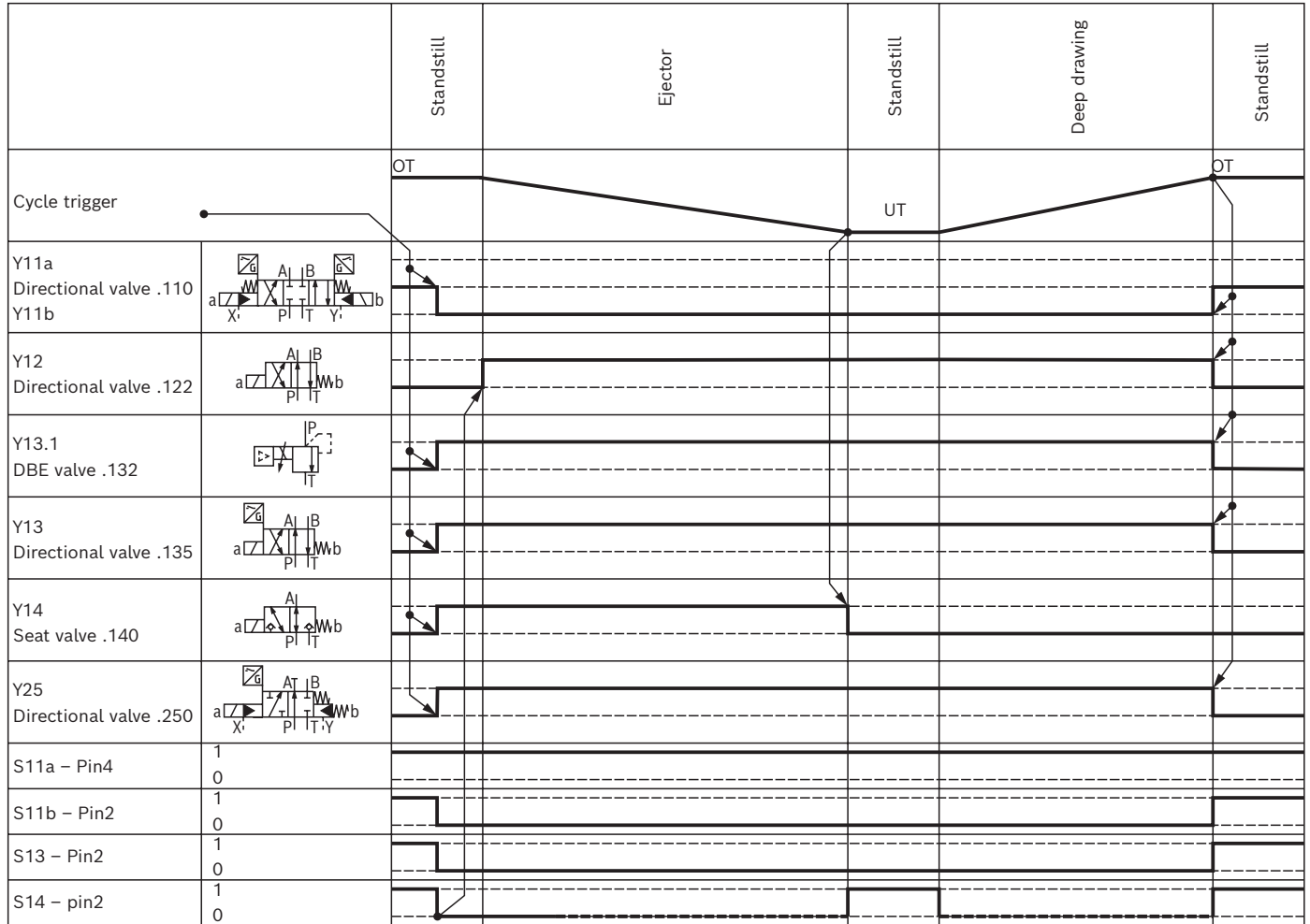


Slide cushion: IH04CS-7X/...2-WE0N-WEH000E-ZN-G24**Option ZN – Item 250**

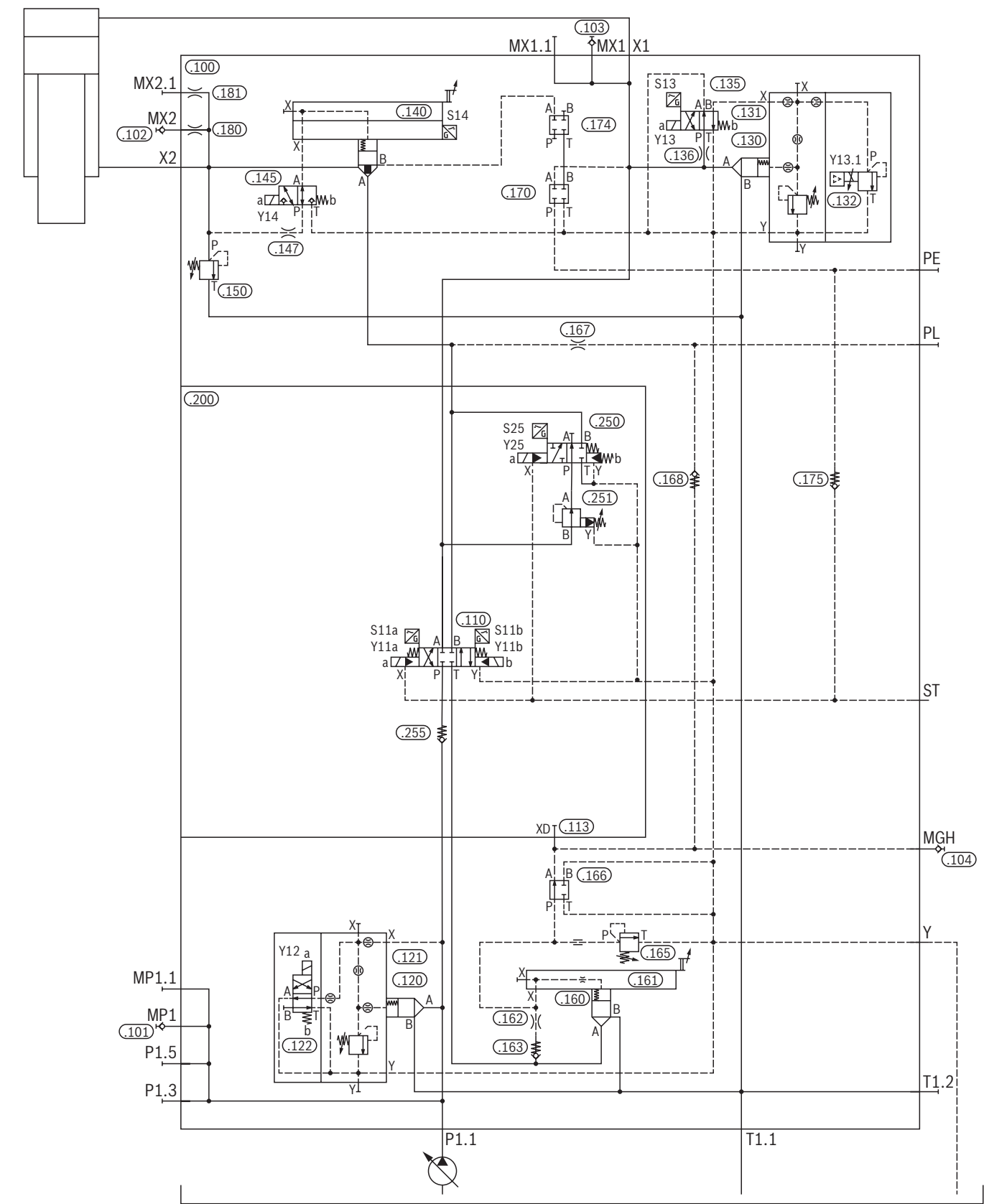
The slide cushion function is always performed when the directional valve item 110 is switched in parallel. The on/off valve item 250 (Y25-ON) controls the connection between piston chamber and annulus chamber continuously during the drawing process and refills the annulus chamber.

In this way, cavitation of the annulus chamber is actively prevented. By means of the electric position monitoring S25 it can be monitored whether the basic position is reached.

The pressure reducing valve item 251 serves as maximum pressure adjustment for refilling of the annulus chamber (e.g. 10 bar).



Slide cushion: IH04CS-7X/...2-WE0N-WEH000E-ZN-G24



Set-up by own weight via prefill valve (> 10 mm/s): IH04CS-7X/...2-EB1N -WEH000E-NN-G24-002

Option E – Item 120

The pressure relief valve consisting of the items 120/121 provides pressure limitation for the motor pump station (hydraulic energy supply). At the pressure relief valve item 121, the maximum operating pressure is set. The proportional pressure relief valve item 122 provides pilot control of the pressure relief valve item 120/121 and determines the system pressure (e.g. press force, decompression):

- When the set pressure is exceeded, the pressure relief valve item 120/121 will open to the tank.
- When the set pressure is no longer reached, the pressure relief valve item 120/121 will close.

With a control signal (Y12) of 0V at the proportional pressure relief valve item 122, the pressure relief valve item 120/121 will switch to depressurized circulation.

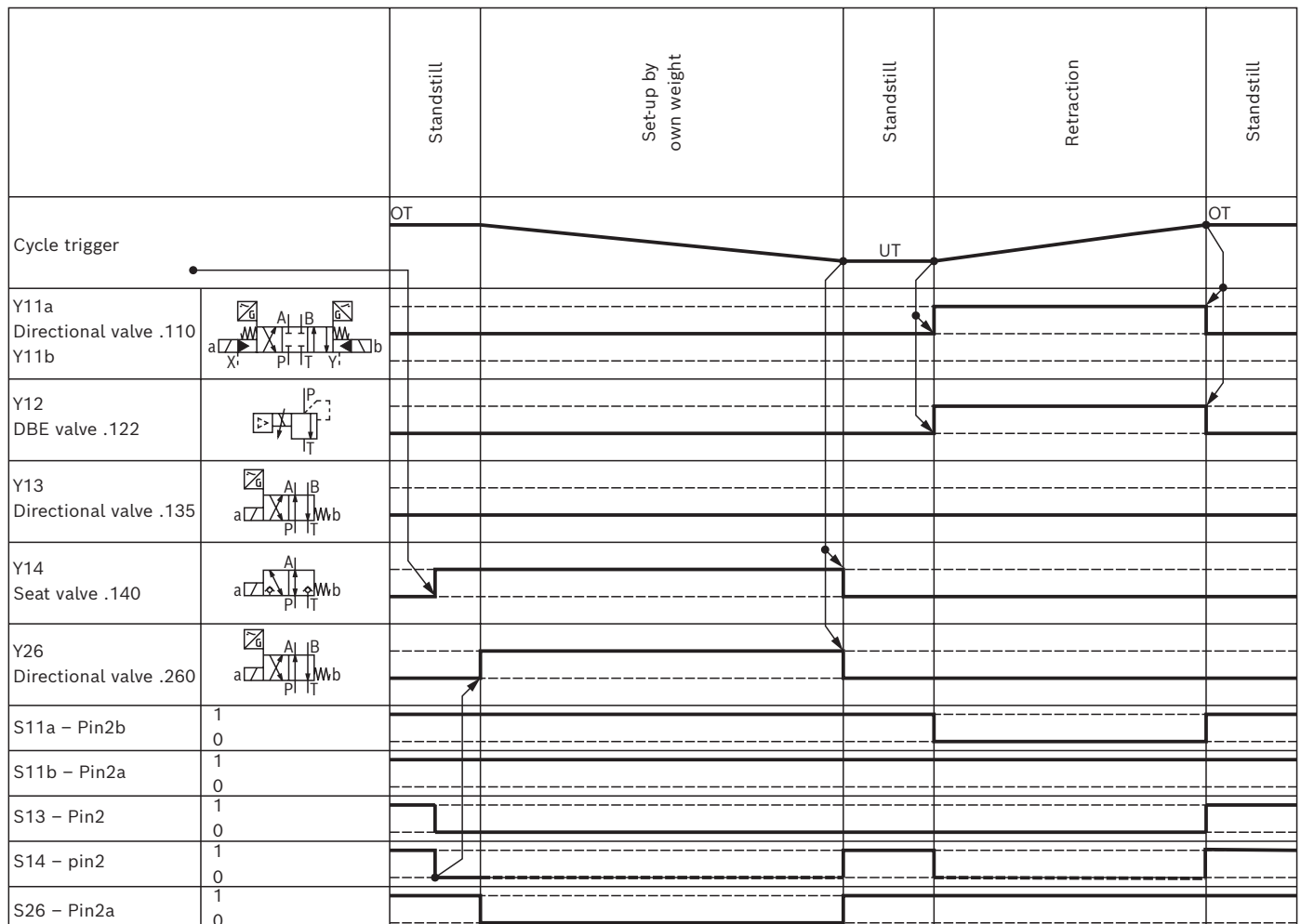
Option B – Item 130

The pressure relief valve consisting of the items 130/131 limits the pressure on the piston chamber side of the cylinder. At the pressure relief valve item 131, the maximum system pressure is set.

Option 002 – Item 260

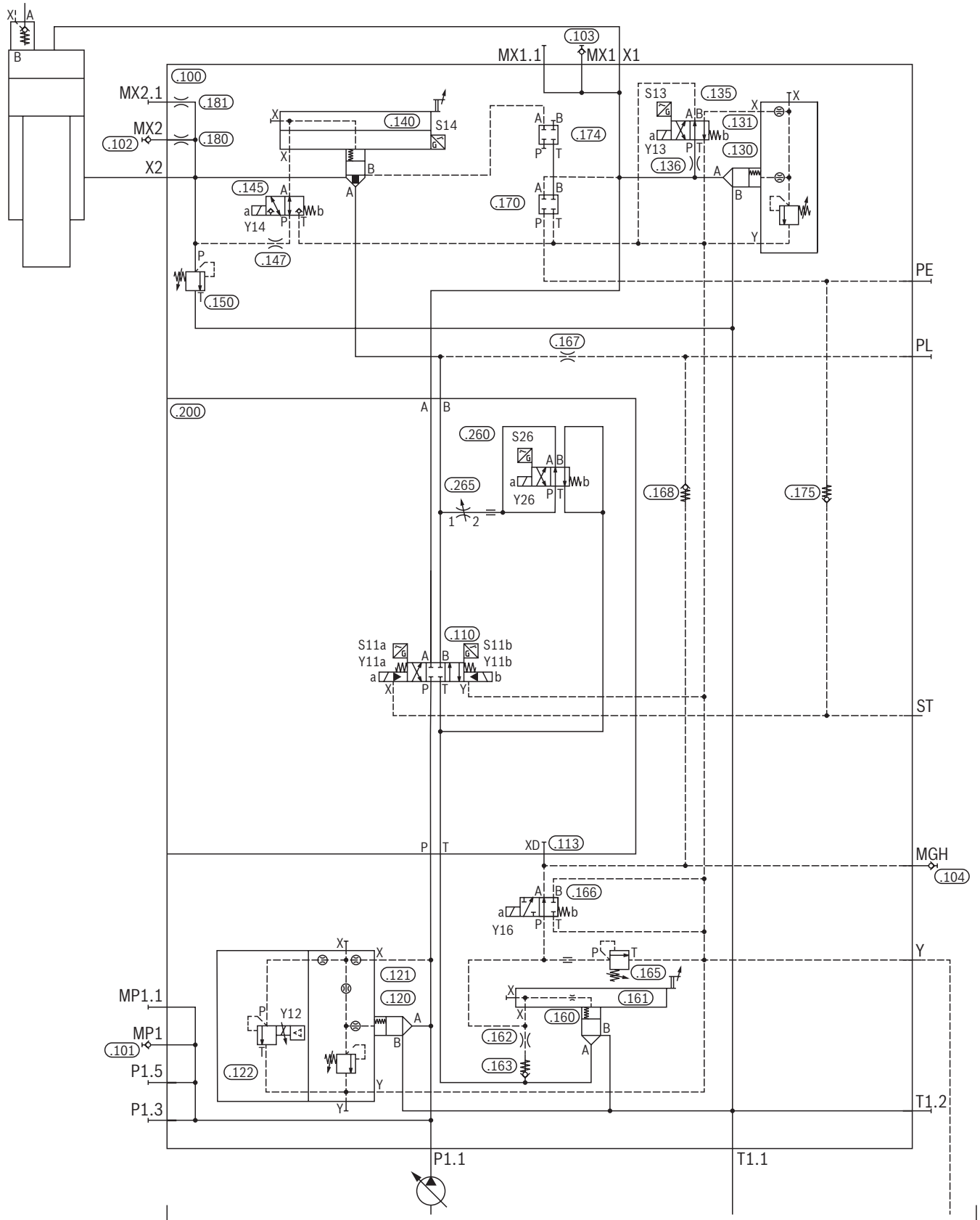
The on/off valve item 260 initiates the closing movement by own weight. Set-up is achieved by means of a hold-to-run control device and in creep speed by own weight. Thereby, the oil is sucked in via the prefill valve from the tank into the piston chamber. By means of the position monitoring S26 it is monitored whether the basic position is reached at the end of the closing movement.

The manually adjustable throttle valve item 265 determines the closing speed.



Set-up by own weight via prefill valve (> 10 mm/s):

IH04CS-6X/...2-EB1N-WEH000E-NN-G24-002



Basic functions according to safety category 1 (ISO 13849 – PLc):
 IH04CN-7X/...1-WU0N-WEH000E-NN-G24

Option WEH000E – Item 110

The movement direction of the cylinder piston is determined by the directional valve item 110:

- ▶ The cylinder piston is extended with the control signal Y11b.
- ▶ The cylinder piston is retracted with the control signal Y11a.

Option U – Item 130

The pressure relief valve consisting of the items 130/131 limits the pressure on the piston chamber side of the cylinder. The on/off valve item 132 with the control signal Y13.1 provides pilot control of the pressure relief valve item 130/131:

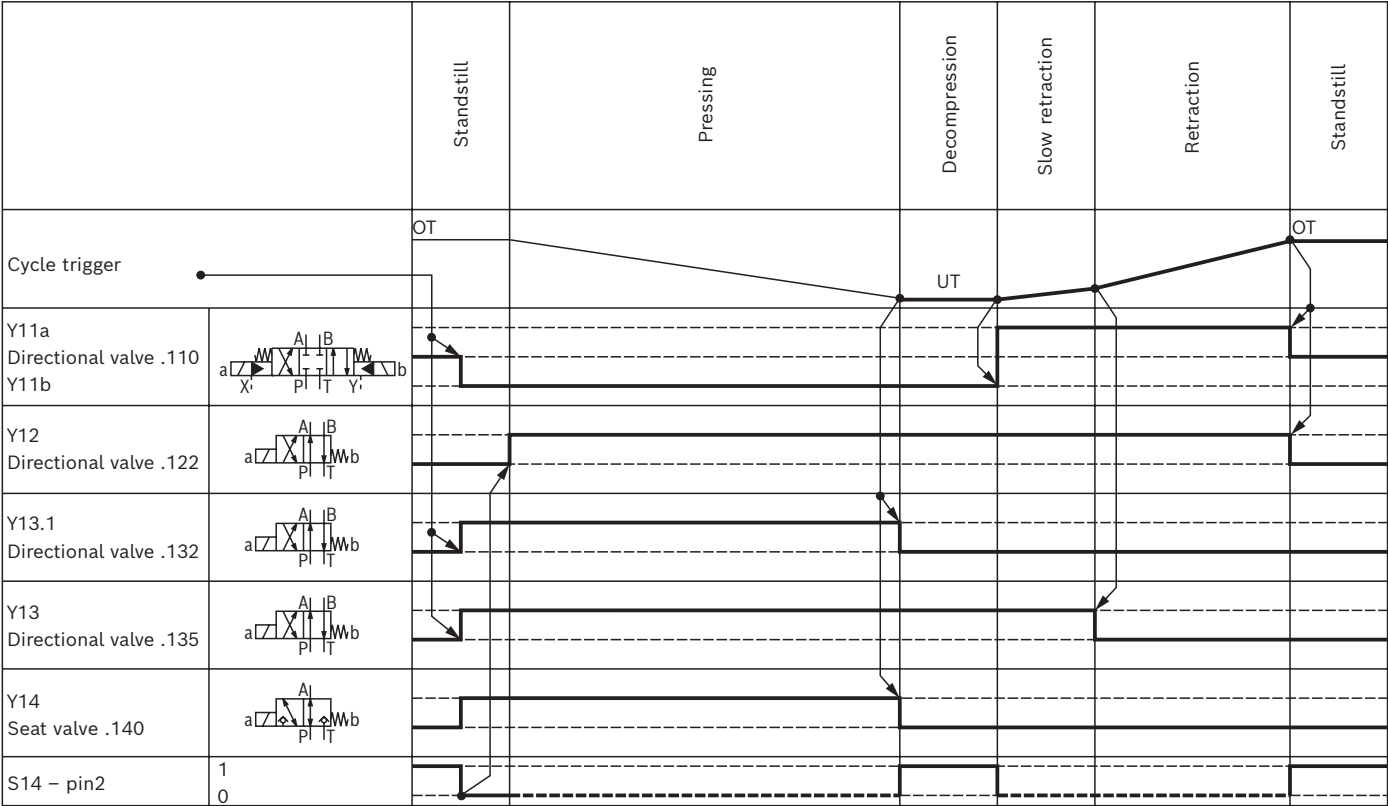
- ▶ In basic position, the piston chamber preload DB2 set at the pressure relief valve item 131 takes effect (e.g. during slow retraction with spring tool or decompression).
- ▶ Energization of the solenoid Y13.1 causes the system pressure DB1 set at the pressure relief valve item 131 to become effective.

Depressurized circulation in the piston chamber – Item 135

In its basic position, the pressure relief valve item 130/131 switches to depressurized circulation. Energization of the solenoid Y13 causes the pressure stage selected at the on/off valve item 132 to become effective.

Restraint valve in the annulus area – Item 140

The 2-way cartridge valve item 140 holds the cylinder piston in position (see EN ISO 16092-3 section 5.3.7.2). During load holding/retraction, the valve item 140 acts as a check valve and during extension as a switchable isolator valve. By means of the position monitoring S14 it is monitored whether the basic position is reached in every pressing cycle. Item 145 unlocks the 2-way cartridge valve item 140 during extension. By means of the electric position monitoring S14, opening of the 2-way cartridge valve item 140 at the beginning of rapid traverse is monitored to prevent pressure intensification in the annulus area.



Safe reduced velocity < 10 mm/s (ISO 13849-PLd):

IH04CS-7X/...1-WE0D-WEH000E-NN-G24

- ▶ NG10 ... NG35
- ▶ Set-up with reduced velocity (< 10 mm/s) is achieved by means of a hold-to-run control device (ISO 6092-1 section 5.3.2.1 h, ISO 16092-3, section 5.3.2) and fixed orifice (item 172) (0.8 mm at the factory).

Option D – Item 170

The seat valve item 174 (Y17) ensures safe opening from the annulus area to the tank. By means of the electric position monitoring S17 it can be monitored whether the basic position is reached.

The movement direction of the cylinder piston is determined by the directional valve item 170.

The cylinder piston is extended with the control signal Y17b. Lowering is effected by own weight via a fixed orifice item 172. The orifice item 172 has to be adjusted to the load holding pressure and the closing spring (at the factory 2 bar) of the installation kit item 130 so that the closing velocity is limited to a maximum of 10 mm/s. Simultaneously, the piston chamber is filled with oil by the pilot oil circuit or externally, via port PE.

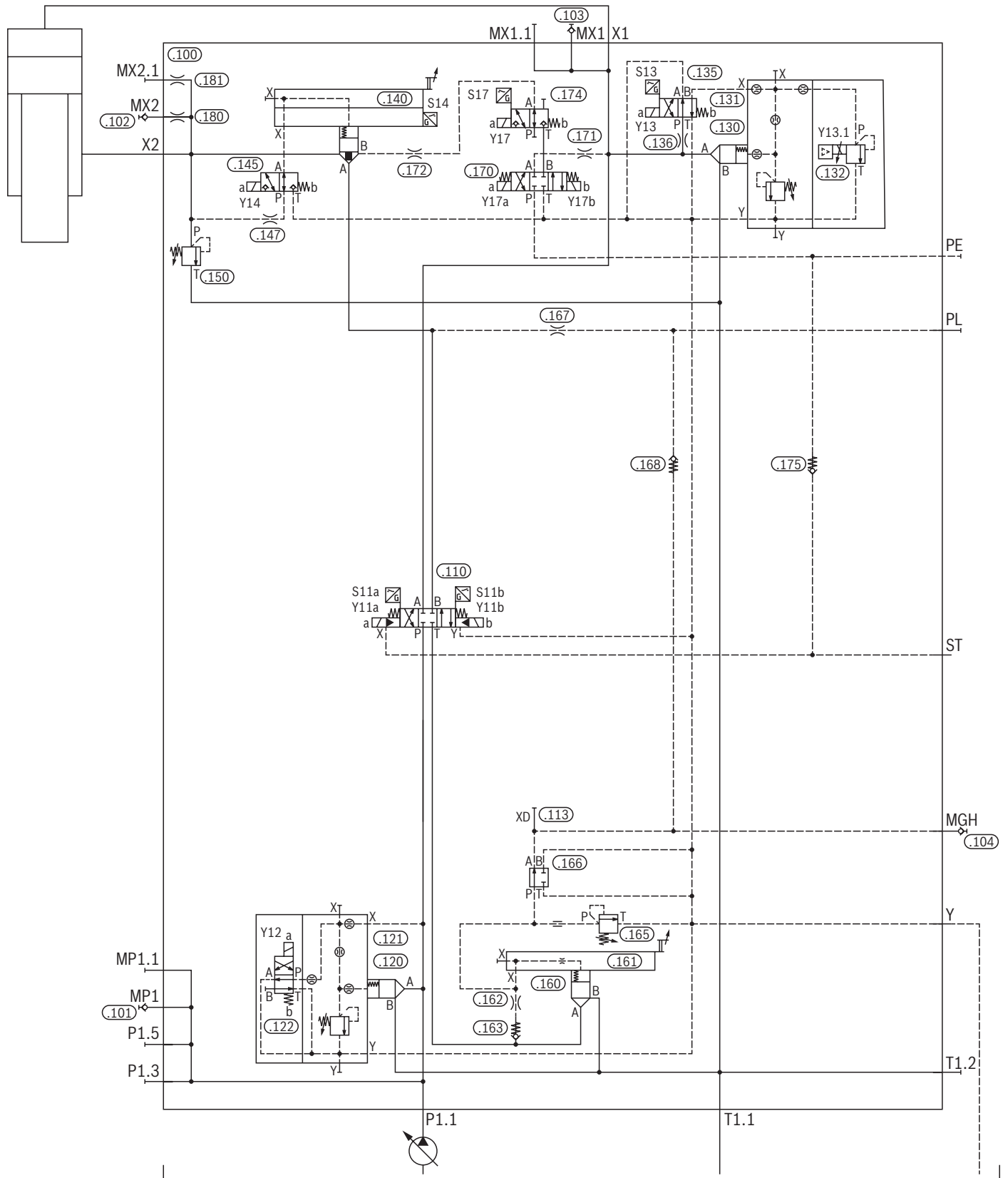
The closing spring of the pressure relief valve item 130/131 limits the pressure on the piston chamber side. Set-up under pressure without velocity limitation is only allowed after contact with the workpiece.

The pressure relief valve consisting of the items 130/131 serves the system pressure limitation on the piston chamber side. The proportional pressure relief valve item 132 provides pilot control of the pressure relief valve item 130/131.

The cylinder piston is retracted with the control signal Y17a. The oil supply is always available and is provided by the pilot oil circuit or externally, via port PE.

Safe reduced velocity < 10 mm/s (ISO 13849-PLd):

IH04CS-7X/...1-WE0D-WEH000E-NN-G24



Safe reduced velocity < 10 mm/s (ISO 13849-PLd) and checking the braking force of the fall protection: IH04CS-7X/...1-WE0P-WEH000E-NN-G24

- ▶ NG10 ... NG35
- ▶ The safe reduced velocity (< 10 mm/s) is achieved by means of a hold-to-run control device (ISO 16092-1 section 5.3.2.1 h, ISO 16092-3, section 5.3.2) and fixed orifice (item 172) (0.8 mm at the factory).
- ▶ The braking force of the restraint device is tested in a separate operating mode (with active guarding) and with active restraint device. The pressure in the piston chamber must be checked during testing.

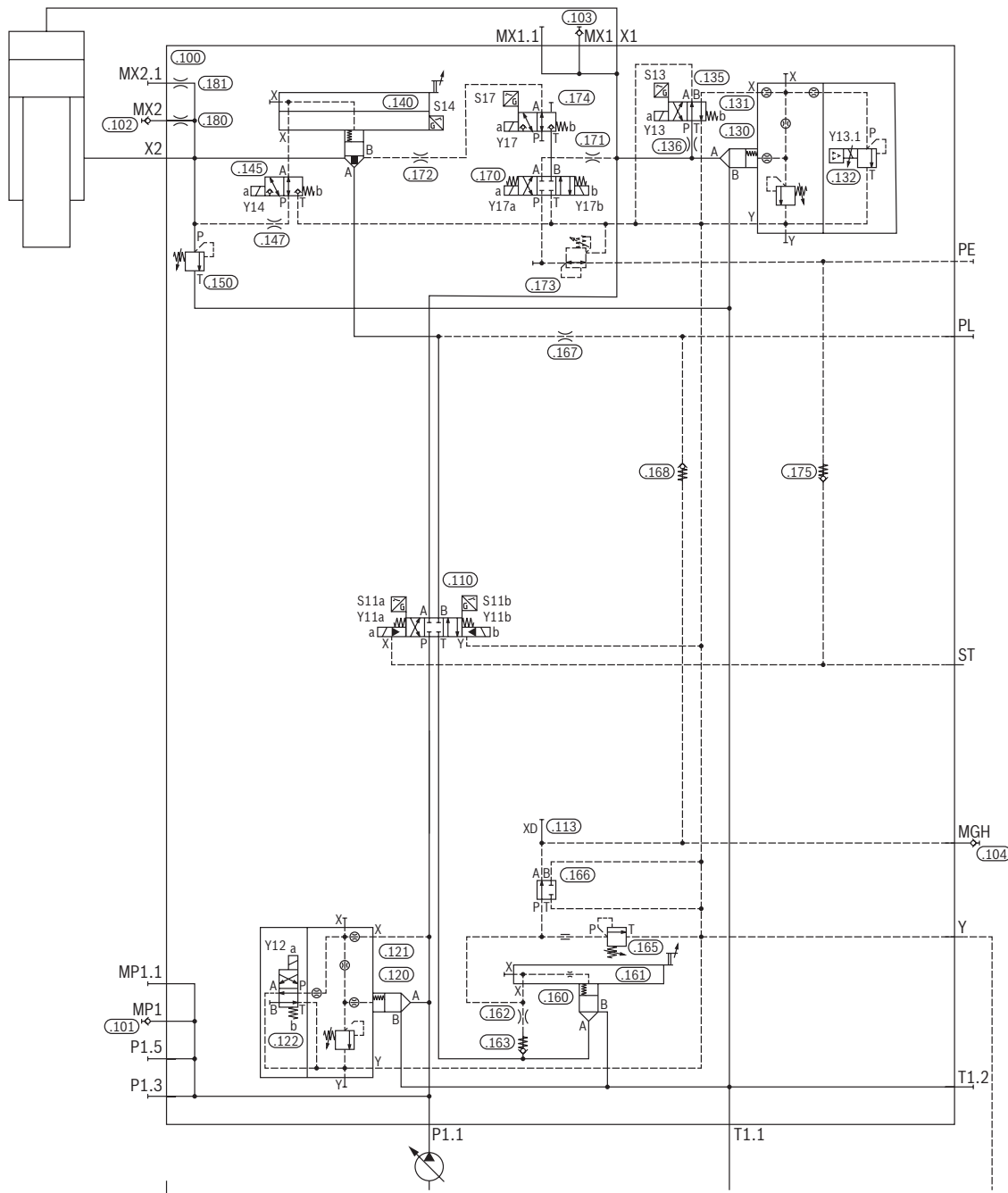
Option P – Item 173

See option D.

The pressure reducing valve item 173 with mechanically fixed setting is installed in the P-channel and provides pressure reduction for the piston chamber of the cylinder when fall protection is active.

The resulting force serves as reference braking force.

As standard, a pressure rating of 75 bar is supplied.



General information

Port sizes

Port	IH04C-7X/10	IH04C-7X/16	H04C-7X/25	IH04C-7X/32	IH04C-6X/35
P1.1 ... P1.4	G1	2 x SAE 1 ¼-6000	2 x SAE 1 ½-6000	4 x SAE 1 ½-6000	4 x SAE 1 ½-6000
P1.5, ST	G¾	G½	G½	G¾	G¾
P1.6, P1.7	-	-	-	-	2 x DN80
T1.1, T1.2	2 x G1 ½	2 x SAE 2-3000	2 x SAE 2 ½-3000	2 x SAE 3-3000	SAE 5-3000
X1, X11, X12	G1 ¼	SAE 1 ½-6000	SAE 2-6000	DN50	DN80
X2	G1	SAE 1 ¼-6000	SAE 1 ½-6000	DN50	DN80
Y	G½	G½	G½	G1	G1
PE	G¼	G¼	G¼	G¼	G¾
PL	G¼	G¼	G¼	G¼	G¾
HD	G¾	G1	G1 ½	-	-
THD	G1	G1 ¼	G1 ½	-	-
S	G1	SAE 1 ¼-6000	SAE 1 ½-6000	DN50	DN80
TS	G1 ½	SAE 2-3000	SAE 2 ½-3000	SAE 3-3000	SAE 4-3000
LS1	G¼	G¼	G¼	G¼	G¼
MX12	G¾	G¾	G¾	G¾	G½

Connection flanges

Port size	Material no.	Designation
SAE1 ¼ – 6000 psi	R900012346	FLANGE SAE11/4 H-38.0 X 6.0
SAE1 ½ – 6000 psi	R900015663	FLANGE SAE11/2 H-48.3 X 8.0
SAE2 – 6000 psi	R900012944	FLANGE SAE2 H-60.3 X 10.0
SAE2 – 3000 psi	R900012939	FLANGE SAE2 S-60.3 X 3.6
SAE2 ½ – 3000 psi	R900012336	FLANGE SAE21/2 S-76.1 X 3.6
SAE3 – 3000 psi	R900012940	FLANGE SAE3 S-88.9 X 3.6
SAE5 – 3000 psi	R900012338	FLANGE SAE5 S-139.7 X 4.0
DN50 – PN320	R900049122	FLANGE FA 50-4 / 76.1 X 12.5
DN50 – PN400	R900224176	FLANGE FA 50-5 / 76.1 X 14.2
DN80 – PN320	R900211240	FLANGE FA 80-4 / 114.3 X 17.5
DN80 – PN400	R900761506	FLANGE FA 80-5 / 133.0 X 25.0

Accessories

Pressure gauge

Designation	Material number	Data sheet
ABZMM 63- 160BAR/MPA-U/V-G	R900077650	50205
ABZMM 63- 250BAR/MPA-U/V-G	R900771208	
ABZMM 63- 400BAR/MPA-U/V-G	R900053460	

Measuring couplings, measuring hoses

Designation	Material number	Data sheet
MEASURING COUPLING MCS20-SDS-E-G1/4-ST3&	R900009090	–
MEASURING HOSE DN2-630/MCS20-MOS-G1&	R901360313	

Pressure sensors

Designation	Material number	Data sheet
HM 20-2X/160-C-K35-N	R901381345	30272
HM 20-2X/160-H-K35-N	R901381347	
HM 20-2X/400-C-K35-N	R901456334	
HM 20-2X/400-H-K35-N	R901466598	30277
HEDE10-3X/100/1/-GI-K35-0	R901425473	
HEDE10-3X/250/1/-GI-K35-0	R901425474	
HEDE10-3X/400/1/-GI-K35-0	R901425475	30340
HEDE12-1X/100-2-K35-V	R901507473	
HEDE12-1X/250-2-K35-V	R901507474	
HEDE12-1X/400-2-K35-V	R901507477	

Mating connectors

Designation	Material number	Data sheet
MATING CONNECTOR 3P Z5L1 M 24V SPEZ (K4 connector)	R901017026	08006
MATING CONNECTOR 7P Z31 BF6-3PG11KSPEZ (7-pole, 6+PE)	R900021267	
MATING CONNECTOR 4P Z24 STRAIGHT PG7 1& (M12, 4-pole)	R900773042	
HEDE10-3X/100/1/-GI-K35-0	R900752278	

Pipe check valve (mountable in T1.1/T1.2, flow direction discharge)

Designation	Material number	Data sheet
CHECK VALVE RV L28 G1 PE-0.5 &	R901115447	–
CHECK VALVE RV L42 G11/2 PE-0.5 &	R901115450	

Pipe check valve (mountable in X/ST, flow direction supply)

Designation	Material number	Data sheet
CHECK VALVE RZ S08 G 1/4 PE-0.5 &	R901115541	–
CHECK VALVE RZ S16 G 1/2 PE-0.5 &	R901115545	
CHECK VALVE RZ S20 G 3/4 PE-1.0 &	R901115556	

Plug screws

Designation	Material number	Data sheet
PLUG SCREW DCCS10001-G1/4A-ST+E&	R913011601	–
PLUG SCREW DCCS10001-G3/8A-ST+E&	R913011602	
PLUG SCREW DCCS10001-G1/2A-ST+E&	R913011603	
PLUG SCREW DCCS10001-G3/4A-ST+E&	R913011604	
PLUG SCREW DCCS10001-G1A-ST+EP-&	R913011605	
PLUG SCREW DCCS10001-G1 1/4A-ST&	R913011606	
PLUG SCREW DCCS10001-G1 1/2A-ST&	R913011607	

Recommended pump versions

IH04CS-6X/...-NN, EN, DN, HN, RN, XN up to IH04CS-6X/35

Pump version	Data sheet	Features
A4VSO...LR2	92050	With mechanical power limitation
A4VSO...LR2G	92064	With mechanical power limitation and remote-controlled pressure cut off ¹⁾
A4VSO...LR2D		With mechanical power limitation and manual pressure cut off
A4VSO...LR2N (up to 350 bar)		With mechanical power limitation and hydraulic stroke adjustment, proportional ²⁾
A4VSO...LR2NT (up to 355 ccm)		With mechanical power limitation and hydraulic stroke adjustment with integrated proportional valve ³⁾
A4VSO...HS5(P) ⁴⁾	92050	Power, pressure and flow control with servo valve
A4VSO...HS5(P)V ⁵⁾	92076	Power, pressure and flow control with servo valve and with internal set pressure supply
A4VSO...HS5(P)M		Power, pressure and flow control with servo valve and for use under fluid
A4VSO...HS5E(P) ⁴⁾ (up to 350 bar)		Power, pressure and flow control with servo valve and digital on-board electronics
A4VSO...HS5E(P)V ⁵⁾ (up to 355 ccm)		Power, pressure and flow control with servo valve, digital on-board electronics and internal set pressure supply
A15VSO...LR	92802	With mechanical power limitation
A15VSO...LRDRE2...A ⁶⁾		With mechanical power limitation and manual pressure cut off
A15VSO...LRDRE2...B ⁷⁾		With mechanical power limitation and manual pressure cut off
A15VSO...LRDGE2...A ⁶⁾ (up to 350 bar)		With mechanical power limitation and remote-controlled pressure cut off ¹⁾
A15VSO...LRDGE2...B ⁷⁾ (up to 280 ccm)		With mechanical power limitation and remote-controlled pressure cut off ¹⁾
SYHDFED ⁵⁾ (up to 280 bar) (up to 140 ccm)	30030	Power, pressure, and flow control with fieldbus interface and speed variability
SY(H)DFEF ⁵⁾ (up to 350 bar) (up to 355 ccm)	30035	Power, pressure, and flow control with fieldbus interface
HS5E(n) ⁵⁾ (up to 350(450) bar) (up to 1000 ccm)	92050	Power, pressure and flow control with field bus interface and speed variability
PGH	10227	Fixed displacement with speed variability ⁸⁾ Up to 350 bar and up to 250 ccm

¹⁾ Separate order DBETE (data sheet 29263)

²⁾ Separate order 3DREPE6A-2X/45...A1

³⁾ Only suitable for motor design B35

⁴⁾ External pilot oil supply required

⁵⁾ Internal pilot oil supply for pressure control above 20 bar, with preload block below 20 bar

⁶⁾ Electric stroke adjustment via integrated proportional valve. Internal pilot oil supply for an operating pressure of more than 20 bar.

⁷⁾ Electric stroke adjustment via integrated proportional valve. External pilot oil supply from 30 to 50 bar required for an operating pressure of less than 20 bar.

⁸⁾ Asynchronous motor MOT-FC and frequency converter EFC5610, instructions DE: R911369847, EN: R912005854

Recommended pump versions

Pump versions for IH04CS-7X/...TEM...E-LN

Pump version	Data sheet	Features
A4VSO...LR2S	92064	350 bar / up to 355 ccm
A15VSO...LRDRS0/10 A15VSO...LRDRS0/11	92800/ 92801	350 bar / up to 280 ccm
A10VSO...DFLR/31 ¹⁾	92711	280 bar / up to 140 ccm
A10VSO...LA...DS/32 ¹⁾	92714	280 bar / up to 180 ccm

The pumps are equipped with mechanical power limitation, load-sensing and remote-controlled pressure cut off.

¹⁾ With DFLR and LADS controllers, remove the orifice in the X adapter at the pump (flow controller).

Pump versions for IH04CS-7X/...SN – up to IH04CS-6X/35

Pump version	Data sheet	Features
A4VSO...DFR1 A4VSO...DP	92050/ 92060	350 bar / up to 355 ccm
A15VSO...DP/10 A15VSO...DP/11	92800/ 92801	350 bar / up to 280 ccm
A10VSO...DFR1/31	92711	280 bar / up to 140 ccm
A10VSO...DRS/32	92714	280 bar / up to 180 ccm

For the pressure remote control, separate order DBETE (data sheet 29263).



Notice:

These pump versions can be used for pressure holding on the piston chamber side without extension module **XN**.

Further information

▶ Mating connectors and cable sets for valves and sensors	Data sheet 08006
▶ On/off valves with spool position monitoring	Data sheet 24830
▶ 4/3 proportional directional control valves, direct operated, with integrated control electronics, electrical position feedback, and monitoring of the spool position, with type 4WREEM test certificate	Data sheet 29064
▶ 4/2, 4/3 proportional directional valve, pilot-operated, without electric position feedback, without/with integrated electronics (OBE), with spool position indicator	Data sheet 29117
▶ 2-way cartridge valves with spool position monitoring	Data sheet 21015
▶ Proportional pressure relief valve	Data sheet 29166
▶ Pressure relief valve, direct operated	Data sheet 25402
▶ Power regulators LR2, LR3 and LR2N for variable displacement pump A4VSO	Data sheet 92064
▶ Axial piston variable displacement pumps A15VSO, A15VLO, series 12	Data sheet 92802
▶ Axial piston variable displacement pump A10VO, series 52 and 53	Data sheet 92703
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▶ Control and adjustment systems HM, HS, HS5 and EO	Data sheet 92076
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