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ZF - REVERSING GEAR

6 WG-200

**DESCRIPTION
INSTALLATION INSTRUCTIONS
OPERATION
MAINTENANCE**



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With the reserve of modifications!

TECHNICAL DATA

Engine power :	Max. KW	220*
Turbine moment:	Max. Nm	1450*
Engine speed :	Max. min ⁻¹	2500*
Mass (without oil):	kg	ca. 500 to 900**

* = dependent on vehicle type and use

** = dependent on the transmission Version

Description:

The ZF-Hydromedia Transmission 6 WG-200 is composed of a hydrodynamic torque converter and a rear-mounted multi-speed Powershift reversing transmission with integrated transfer case - see Table 1 and 2 -.

The torque converter is a wear-free start-up device, which is adapting itself infinitely variable to the required situations (required driving torque).

A lockup clutch, installed in the converter, realizes after the starting phase a mechanical connection between engine and countershaft gear.

Drive by direct mounting on the engine, through membrane for engine connection SAE 1, 2 and 3, or separate installation (drive through universal shaft) with DIN, Mechanic or Spicer drive flange.

The signals for the gear shiftings are issued, according to the design of the vehicle by the following ZF-Control units:

- Power-shift
- Semi-automatic control EST-17 T (24 V),
- Semi-automatic control EST-19 T (12 V),
- Fully-automatic control EST-2 resp. the succeeding generations
- Fully-automatic control EST-25 (24 V),
- Fully-automatic control EST-26 (12 V).

Torque converter:

Different Versions:

Unit Size W 320 to W 350 with torque increase according to the Version (starting conversion 1,5 to 2,5) and the converter lockup clutch (WK).

All Converter Versions can be optionally equipped with a stator free wheel or resp. and with a sprag pack.

Powershift - Reversing transmission:

6 Forward speeds and 3 Reverse speeds.

Output:

Through integrated transfer case with following center distances of 400, 500 and 555 mm.

Power take-off:

Up to 2 engine-dependent power take-offs $i = 1,0$ for hydraulic pumps, optionally also disengageable.

Pump connections SAE B and C.

Transmission accessories:

Electric or mechanical Speedometer sensor, Axle declutch, Emergency steering pump, Differential, Retarder Crawler speed Axle drive APG-8/HK or DK-7 etc. upon request.

Transmission ratio (mechanical)*

	<u>6-Speed</u>
1st-Speed Forward	6,069
2nd-Speed Forward	3,934
3rd-Speed Forward	2,630
4th-Speed Forward	1,705
5th-Speed Forward	1,194
6th-Speed Forward	0,774
1st-Speed Reverse	6,069
2nd-Speed Reverse	2,630
3rd-Speed Reverse	1,194

* = According to the Transmission Version, also other ratios are possible.

IMPORTANT INFORMATIONS

Carry out transmission oil-level check at engine idle run (about 1000 min⁻¹) and at operating temperature of the transmission.

For temperatures of about 40° C, the lower mark on the oil dipstick is valid.
For temperatures of about 80° C, the upper mark on the oil dipstick is valid.

ATTENTION: At standing engine, the oil level in the transmission can rise essentially, according to the installation conditions!

Respect the oil change intervals with simultaneous filter cleaning resp. filter replacement.

At the engine start, place the Controller always to the Neutral position.

Release the parking brake each time before driving off.

At the reversing, reduce the engine speed, reverse in the 1st Speed only.

Avoid to skip speeds during the drive.

The engaged speed has no effect at stopped engine.

Before leaving the vehicle, secure it additionally by brake blocks.

The towing speed must under no condition be higher than 10 km/h, the towing distance not longer than 10 km (without secondary pump).

Operating temperature 80° C - 100° C, a short-time increase up to max. 120° C is permitted.

Pay attention to the control pressure.

In case of irregularities on the transmission, immobilize the vehicle, ask for trained personnel.

I. DESCRIPTION

1.1 Function of the converter:

The converter works according to the Trilok-System, i.e. it assumes at a high turbine speed the characteristics, and with it the favourable efficiency of a fluid clutch.

The converter is designed according to the engine power so that the most favourable operating conditions for each installation purpose are existing.

The torque converter is composed of 3 main components:

Pump wheel - Turbine wheel - Stator (Reaction member)

These 3 impeller wheels are arranged in such a ring-shape system that the fluid is flowing through the circuit components in the indicated order.

The ZF-Converter and control pump is constantly pumping pressure oil through the converter. In this way, the converter can fulfill its task, to multiply the torque of the engine, and at the same time, the heat created in the converter is eliminated by the escaping oil.

The oil escaping out of the pump wheel, enters the turbine wheel and is there inverted in the direction of flow.

According to the rate of inversion, the turbine wheel and with it also the output shaft receives a more or less high reaction moment. The stator (reaction member), following the turbine, has the task to invert the oil, which is streaming out of the turbine, again and to deliver it under the suitable discharge direction to the pump wheel.

Due to the inversion, the stator receives a reaction moment.

The relation turbine moment/pump moment is called torque conversion. This is the higher, the greater the speed difference of pump wheel and turbine wheel will be.

Therefore, the max. conversion is created at standing turbine wheel.

With increasing output speed, the torque conversion is decreasing. The adaptation of the output speed to a certain required output moment is infinitely variable and automatically achieved by the torque converter.

If the turbine speed is reaching about 80% of the pump speed, the conversion becomes 1,0, i.e. the turbine moment becomes equal to that of the pump moment.

From this point on, the converter is working similar to a fluid clutch.

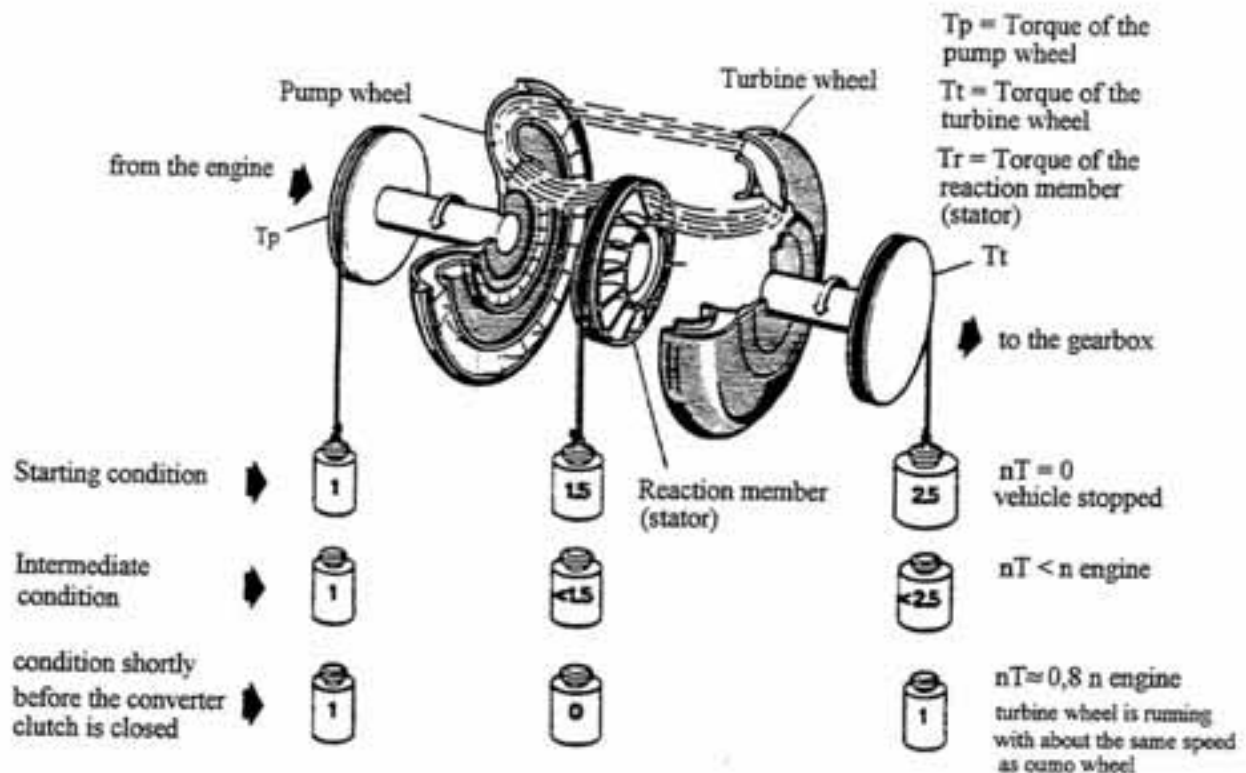
A stator free wheel serves to improve the efficiency in the upper driving range, in the conversion range, it backs up the moment upon the housing and is released in the coupling range. In this way, the stator can rotate freely.

An installed sprag pack has the purpose to connect at overrunning vehicle the drive shaft and turbine shaft (converter output) frictionally with each other.

This condition appears for example at downhill driving. In this case, the braking effect of the engine can be utilized.

The converter lockup clutch (WK), if installed, will be automatically closed at the point at which - at increasing driving speed - the conversion has dropped to about 1, and the further driving with the open converter brings no more traction force increase.

At closed converter lockup clutch (WK) the slip between pump wheel and turbine wheel, and with it the hydraulic loss in the converter is equal to „Zero“.



1.2 Powershift transmission:

The multi-speed reversing transmission in layshaft design is engageable under load by hydraulically controlled multi-disk clutches.

All gear wheels are constantly meshed and running in antifriction bearings.

The gear wheels, bearings and clutches are lubricated with cooled oil.

The 6-Speed Reversing transmission is equipped with 6 multi-disk clutches.

At the shifting, the corresponding plate pack is compressed by a piston, movable in axial direction, which is pressurized with pressure oil.

A compression spring is pushing back the piston, thus releasing the plate pack. As to the Layout of the transmission as well as the indication of the closed clutches in the single speeds, see Table 1, 2, 16, 17, 18 and 19.

1.3 Transmission control:

Transmission control see Oil circulation diagram, Table 20, 21, 22 and 23.

The converter charge and control pump, necessary for the oil supply of the converter and the transmission control, is located in the transmission upon the engine-dependent drive shaft.

The feed rate of the pump is $Q = 80 \text{ l/min}$, at $n_{\text{Engine}} = 2000 \text{ min}^{-1}$.

This pump is sucking the oil through the coarse filter out of the oil sump - the filter can be also fitted externally from the transmission - and delivers the oil through the ZF-Fine filter - this one is externally fitted from the transmission - to the control pressure valve.

Grade of filtration $\beta_{30} \geq 20 \mu\text{m}$ $\beta_{10} \geq 1,5 \mu\text{m}$

Filter area 3500 cm^2

The pressure oil is delivered by the pump to the control pressure valve.

According to the Version, there are from here on two possibilities:

A - STANDARD - VERSION

see Oil circulation diagram Table 21 and 23 as well as Aluminum die-casting shift control Table 25.

The oil, pressurized by the control pressure valve, is delivered through the pressure control valve to the shift valves 1, 2, 3, 4 and 5 of the multi-disk clutches.

During the shifting procedure, the pressure control valve regulates the pressure build-up in the clutches.

At the change-over, the pressure is dropping for a short time and is increasing again to 16^{-2} bar after the completed shifting operation.

The Signals for the gear shiftings are issued, according to the Version of the vehicle, by the following ZF-control units:

- Power-shift - see Table 26, 27 and 28
- Semi-automatic control EST-17 T (24 V), - see Table 29, 30, 31 and 32
- Semi-automatic control EST-19 T (12 V),
- Fully-automatic control EST-2 resp. the succeeding generations
- Fully-automatic control EST-25 (24 V),
- Fully-automatic control EST-26 (12 V).

The reset valve resets the pressure control valve to its initial position, as soon as the speed has been engaged, so that the spool is ready for the next gear change.

B - VERSION WITH VARIOVALVE

see Oil circulation diagram Table 20 and 22 as well as Aluminum die-casting shift control Page 24.

The Oil, pressurized by the control pressure valve, is directed through the 2-stage pressure control valve with bleeder valve and variovalve to the shift valves 1, 2, 3, 4 and 5 of the multi-disk clutches.

The pressure control valve regulates during the shifting procedure the pressure build-up in the clutches. At the change-over, the pressure is dropping for a short time and is increasing again to 16^{-2} bar after the completed shifting operation.

The pressure control can be „Soft“ or „Fast“, namely as follows:

The Signals for the gear shiftings are issued, according to the Version of the vehicle, by the following ZF-Control units:

- Power-shift - see Table 26, 27 and 28
- Semi-automatic control EST-17 T (24 V), - see Table 29, 30, 31 and 32
- Semi-automatic control EST-19 T (12 V),
- Fully-automatic control EST-2 resp. the succeeding generations
- Fully-automatic control EST-25 (24 V),
- Fully-automatic control EST-26 (26 V).

According to the vehicle version, the variovalve (M7) can be gear-dependently activated, thus creating 2 different pressure control curves.

„Soft Shifting“

At shiftings at which the respective variovalve (M7) is activated, the pressure control begins at a low starting pressure.

The 2-stage valve is regulated, through the pump pressure, by the variovalve (M7) to the stop. This is leading to a „Soft shifting“.

„Fast Shifting“

At shiftings at which the variovalve (M7) is not activated, the pressure control begins at a higher starting pressure.

The 2-stage valve is pushing the pressurizing spool of the pressure control valve to the left. This is leading to a „Fast Shifting“.

The bleeder valve has the task to ventilate the pressure chamber behind the pressure control valve for a longer time.

The reset valve resets the pressure control valve into its initial position, as soon as the speed has been engaged, so that the spool is ready for the next shifting.

These shifting operations are exactly coordinated with the different models and types of vehicle.

From here on, the Description is applicable again for both Versions:

The pilot pressure for the control of the shift valves is reduced by the reducing valve to 10 bar and is delivered to them through the solenoid valves M1, M2, M3, M4 and M5.

The control pressure valve is limiting the max. control pressure and releases the main stream to the converter and lubricating circuit.

A safety valve is installed in the inlet to the converter, which protects the converter against high internal pressures (Opening pressure 8,5 bar).

Within the converter, the oil serves as power transmission according to the well-known hydrodynamic principle (see Chapter Torque converter).

To avoid cavitation, the converter must be always completely filled with oil.
This is achieved by a converter pressure holding valve, rear-mounted to the converter with an opening pressure of about 2,5 bar.
The oil which is escaping from the converter is directed to a heat exchanger (oil-water resp. oil-air).

At water-cooled engines, the heat exchanger has to be arranged in the cooling-water stream which is delivered to the engine.

An oil-air cooler can be also used. At air-cooled engines, the heat exchanger must be arranged in the cold-air stream of the cooling fan.

The heat exchanger has to be connected according to the counterflow principle.

These units are not delivered by the **Zahnradfabrik Passau GmbH**.

For the safety of the oil cooler, a bypass valve has to be planned which is reacting in case of cold oil or a clogged oil cooler.

From the oil cooler, the oil is delivered to the transmission and from there to the lubricating-oil circuit so that all lubricating points are supplied with cooled lubricating oil.

Five (5) solenoid valves are installed in the control unit - see Table 24 and 25.

The allocation of the solenoid valves - shifting positions - to the single speeds can be taken from the Tables 16, 17, 18, 19, 20, 21, 22 and 23.

The selection of the magnets is differently combined, according to the gear.

These combinations are called coding.

The electric shift control offers the advantage of an easy and exact operation.

It is an essential advantage that there are no installation problems because of the electric cable connection.

At Converter Versions with converter lockup clutch (WK), the clutch will be automatically engaged.

The opening and closing of the WK is realized through a solenoid shift valve. The speed is picked up on the turbine side by an inductive transmitter.

1.4 Electronic control units for ZF-Powershift transmissions:

General

Because of the different design of the electronic transmission control units at the different vehicles, the corresponding documentation must be taken from the Operating Instructions of the Vehicle Manufacturer or from the Technical Fly leaves of the relative Parts-List Versions.

In these, the corresponding wiring and connection diagrams are laid down, (see Samples, Tables 26, 27, 28, 29, 30, 31, 32 und 33).

These Informations can be requested from ZF-Passau.

Besides, a separate Description of these Control units is existing.

According to the type of vehicle, the wiring is executed on the base of the wiring diagrams.

Variations as double-control platform operation (e.g. RT-Crane-Vehicles) are available.

The corresponding electric wiring diagrams are available upon request.

Upon request, the wiring can be also delivered by ZF:

If the wiring is executed by the Vehicle Manufacturer, it should comply with our conditions.

The Powershift transmissions are mostly equipped with the following ZF-Control units, developed for them:

- Power-shift
- Semi-automatic control EST-17 T (24 V),
- Semi-automatic control EST-19 T (12 V),
- Fully-automatic control EST-2 resp. the succeeding generations
- Fully-automatic control EST-25 (24 V),
- Fully-automatic control EST-26 (12 V).

1.4.1 Power-shift:

see Sample, Circuit diagram Table 26, 27 and 28.

In principle, the layout of the electric shift control is designed as follows:

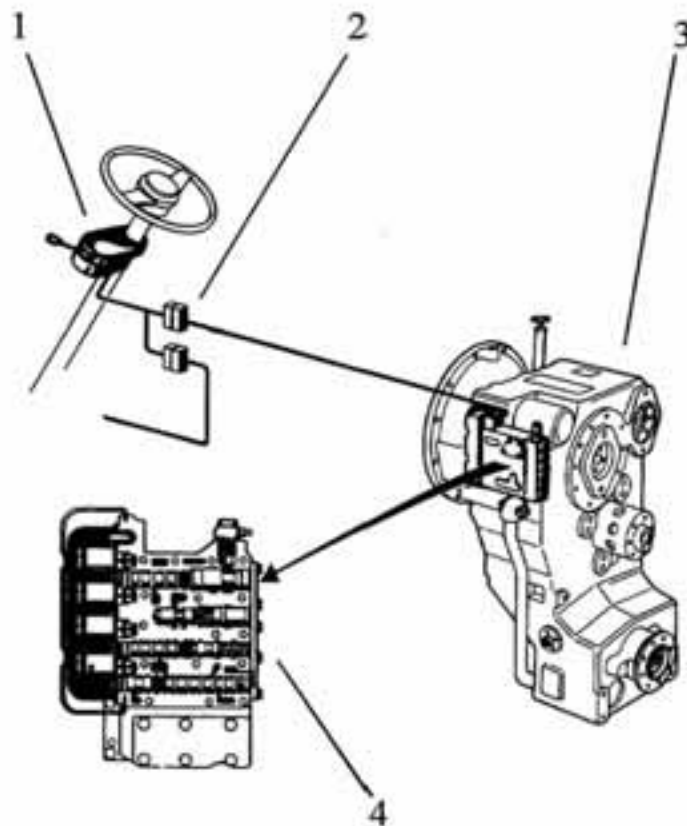
From the supply system, the current supply is led through a separation point or distributing box - in most cases fitted under the dashboard - to the Controller, and from there to the control unit on the transmission.

The Controller is designed as central selector switch for LH- or RH-Installation.

Reversing is only possible in the 1st Speed.

We recommend to reduce the engine speed at reversing operations.

The Controller is equipped with different ancillaries as Change-back lock, Control of the Converter lockup clutch (WK) and of the Retarder etc.

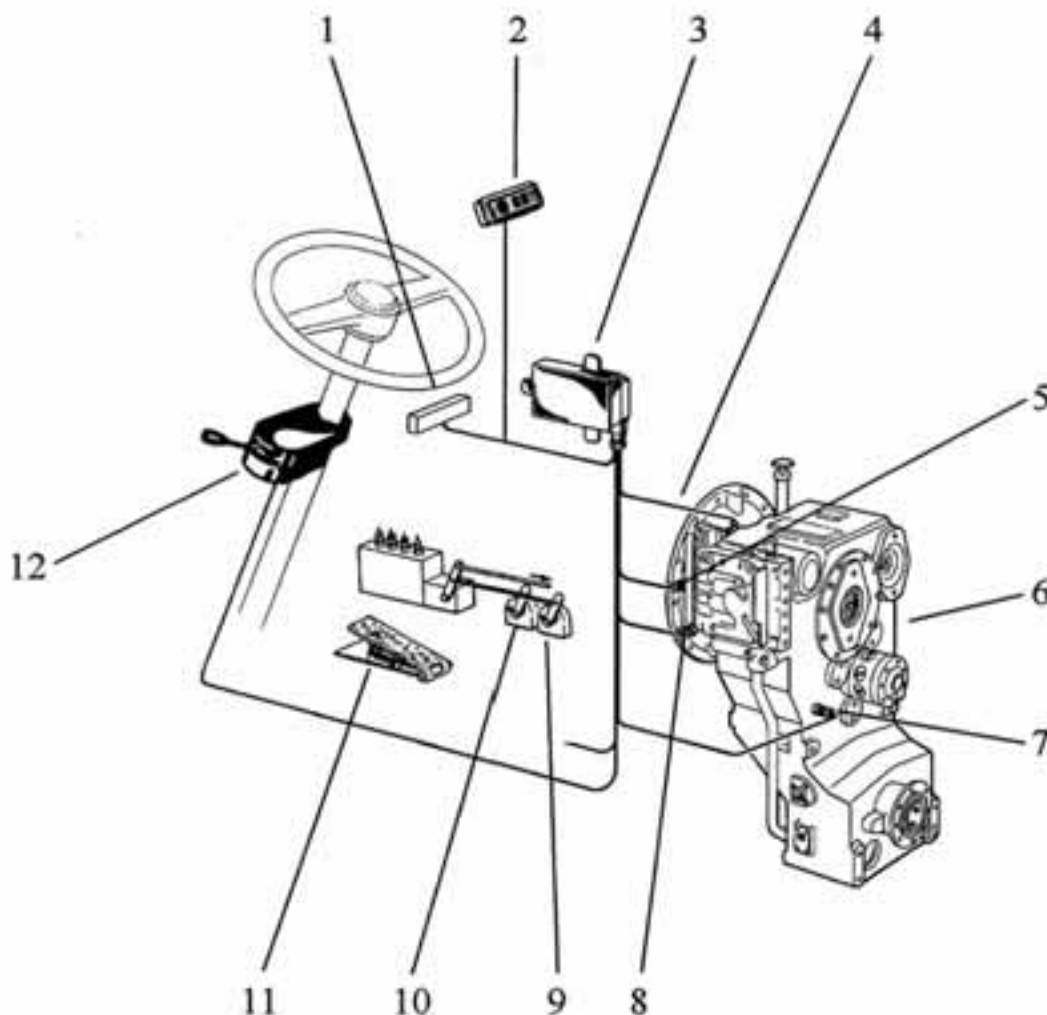


- 1 = Controller
- 2 = Cable-connection plug
Controller - Transmission - Supply system
- 3 = Hydromedia Reversing transmission
- 4 = elektro hydraulic shift control

1.4.2 EST-Family package:

- see Sample Circuit diagram Table 29, 30, 31, 32 and 33.

EST-25-Family package
(Example Transmission WG-200, Maximum System*)



- 1 Supply-system connection
- 2 Display
- 3 EST-25 Transmission control
- 4 Cable to the Speed-Solenoid valves
- 5 Cable to the WK (Converter lockup clutch)
- 6 Transmission of the WG-Series
- 7 Cable to the Inductive transmitter - Output
- 8 Cable to the Inductive transmitter - Turbine
- 9 Idle switch
- 10 Load cell
- 11 Kick-Down switch
- 12 Controller

Test of the electronic Transmission control:

The different ZF-Control units can be tested with the Testers PR-47 and PR-78 A + B (see Table 35, 36, 37, 38, 39, 40, 41 and 42) in connection with the special equipment of the actually installed Automatic shift control.

The relative Operating Instructions are delivered together with the corresponding Tester.

These Testing Instructions can be requested from the Service Dept. of the ZF-Passau against a fee of DM 15,--.

1.5 Retarder:

see Table 3, 13A, 13B, and 13C.

The hydrodynamic retarder (hydraulic retarder), installed upon request, is arranged between engine end torque converter, thus achieving a good braking action in all speeds.

The retarder is a wear-free, gear-dependently acting hydrodynamic brake.

Therefore, the application of the retarder is especially recommended at longer downhill drivings or to brake down from high driving speeds, because herewith the service brake is saved, and in an emergency, the full braking effect (no fading) of the service brake is at disposal.

In this case, it is the question of a so-called primary retarder, i.e. it is frictionally connected with the engine.

Therefore, higher braking torques can be achieved in the lower gear than in the relative higher gears.

Because of this fact, it is necessary that the installed converter lockup clutch must be closed by a control unit, delivered by ZF, so that the full retarder moment can become effective.

1.5.1 Layout and Function of the Retarder:

The retarder is composed in its functional parts (see Draft) of the rotor, the stator and the controlling device. The rotor (the rotating part of the retarder) is driven by the overrunning vehicle through axle, universal shaft, transmission and shift clutch.

The divided stator is composed of the real stator, which is rigidly connected with the transmission case, and the stator ring. This stator ring is a barrier screen, located between rotor and stationary stator, serving for the reduction of the idle losses.

The controlling device is a valve block, governed by means of air pressure.

In shut-off condition, i.e. without oil filling, the stator ring is hold by elastic force in a position, by which the short-circuit channels between rotor blading and stator blading are created.

In retarder operation, i.e. with oil filling, the stator ring is displaced through the circulating oil, by overcoming the elastic forces, up to a stop.

In this position, it is forming together with the stationary part of the stator a closed blade grid, „contra-rotating“ to the rotor.

The braking procedure itself is started through a hand-operated or foot-operated control valve. With this valve, it is possible to adjust a determined air pressure, and with it the desired braking power infinitely variable. In this situation, the possible air-pressure value is lying between 3,5 and 8 bar, because the existing pressurization of the cooling circuit is overcome only from about 3 bar on.

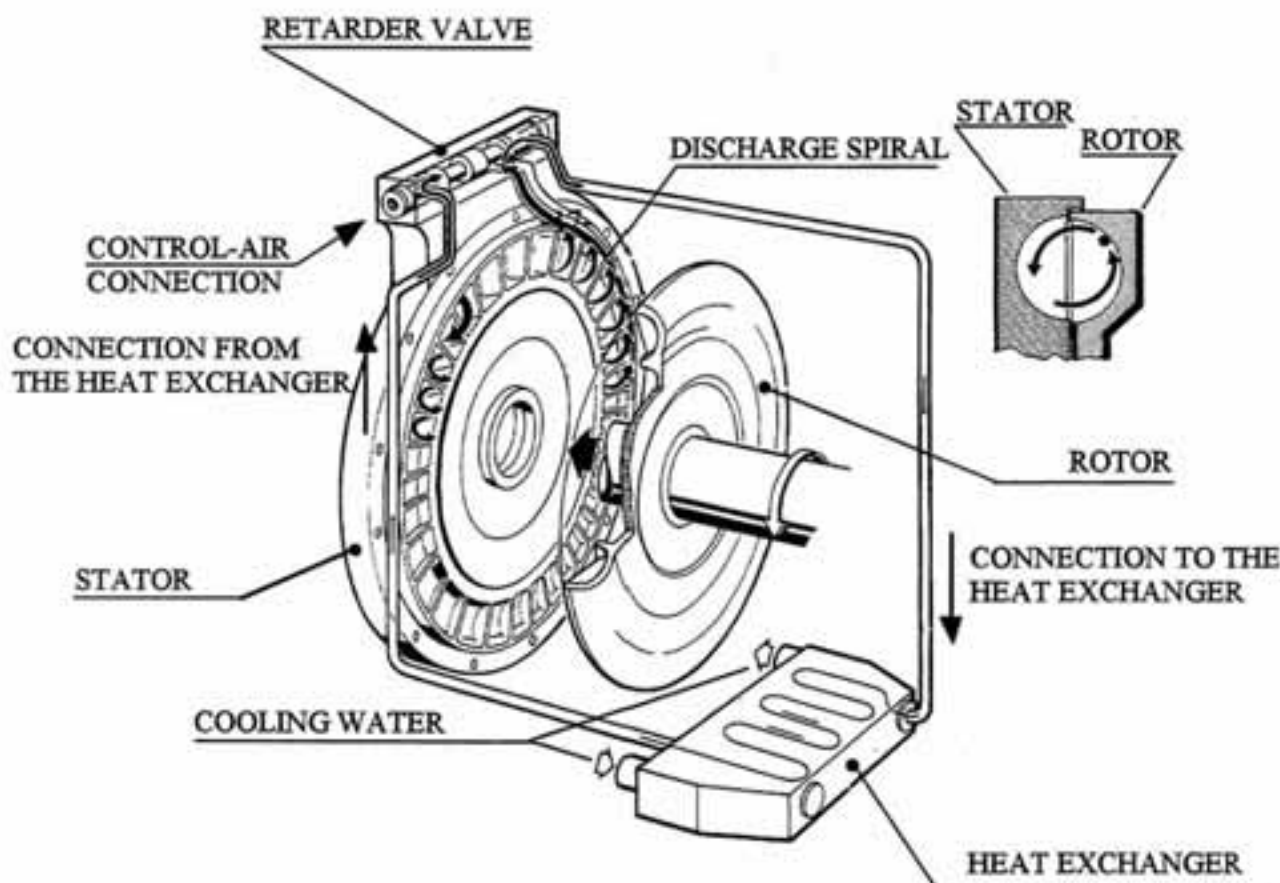
The retarder control valve, which is pressurized by this air pressure, releases in this way the corresponding oil stream into the retarder circuit

Because of the rotation and the blade shape of the rotor, the oil is inversed into the stator, and comes from there back again to the rotor in order to start the circuit anew (see Draft).

Due to the respective inversions, the rotary motion of the rotor and with it the speed of the vehicle will be decelerated.

This energy, transformed in this way from driving speed into pressure, is finally converted by fluid friction into thermal energy and then delivered through a heat exchanger to the cooling water.

If during the retarder operation the shift clutch will be applied, a 3/2-Directional control valve blocks the air-pressure supply to the control valve. In this way, the retarder is shut off and with it, the shift clutch will be saved.



1.6 Interaxle differential (length-compensating differential):

- see Table 5 .

1.6.1 Description:

The differential, installed in the final drive, has the task to transmit different torques upon the vehicle axles and to act as intermediate compensation in the driving direction (longitudinal direction of the vehicle).

Due to the existing differential lock, both functions can be put out of service, and a rigid connection between the axles can be realized.

1.6.2 Function:

The planetary-gear drive (differential) is designed in such a way that the outboard internal gear is driven.

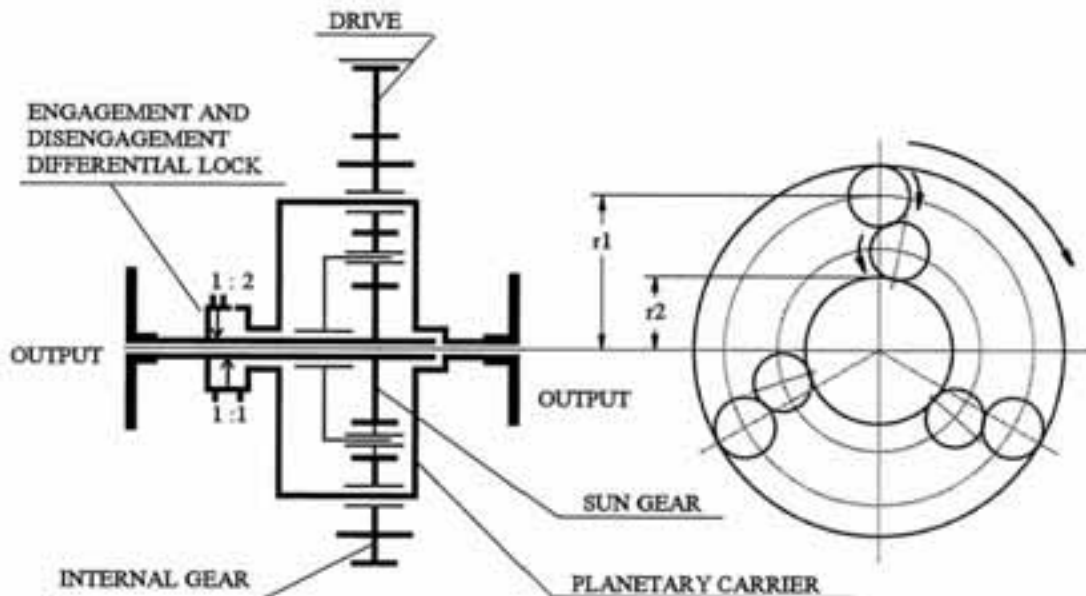
The drive is realized through the planetary carrier (long lever arm) and through the inboard sun gear (short lever arm).

Since different diameters (lever arm) of planetary carrier (r_1) and sun gear (r_2) become effective, a torque distribution of 2 : 1 is realized.

Because of the special arrangement of the planetary carriers (Ravignaux-System), the necessary reversion within the planetary-gear drive is realized so that both outputs (planetary carrier and sun gear) are running in the same sense of rotation.

If one axle of the vehicle is slipping, a rigid connection between the vehicle axles can be created through the differential lock.

In this condition, a torque output of 1 : 1 is realized.



1.7 Crawler speed:

- see Table 4 -.

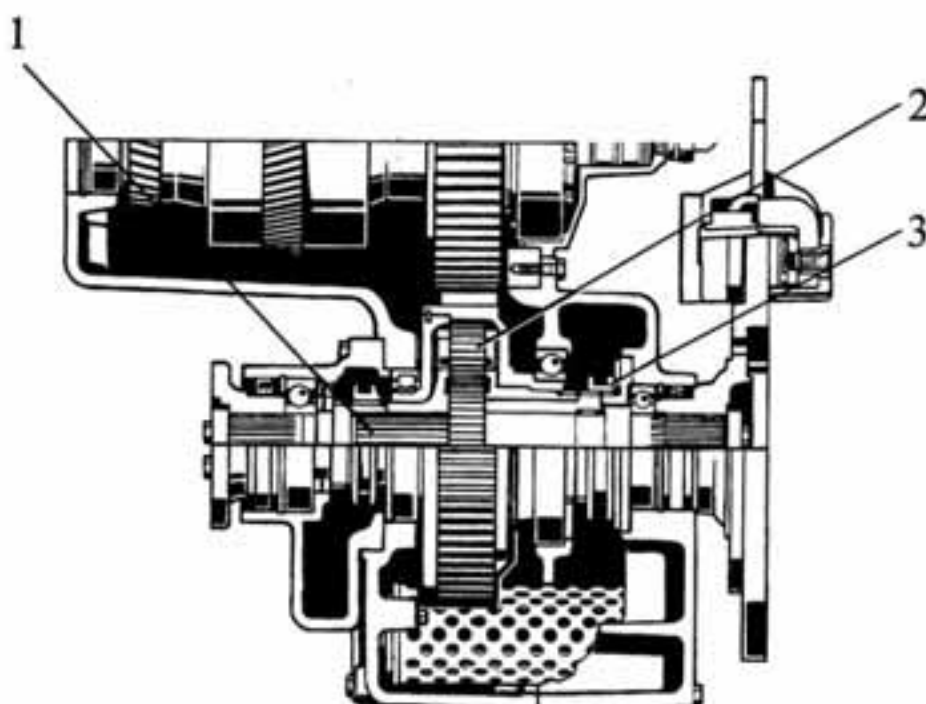
For the use in mobile cranes, the converter transmission can be additionally equipped with a crawler-speed stage. In this way, the torque on the transmission output and with it the traction force of the vehicle is increased for 50%, without an additional speed-increasing gear.

The Crawler speed should be used only for the speeds 1 and 2.

An electric control unit protects the function of the Crawler stage.

This unit, for example, takes care that the engagement and disengagement is carried out only at driving speeds below 1 km/h.

To save the driving axles, it is possible, at engaged Crawler, to drive in the 1st speed only with engaged front axle.



- 1 Engagement - Disengagement Front axle
- 2 Planetary speed reduction ($i = 1,5$)
- 3 Engagement - Disengagement Crawler speed

1.8 Power take-offs:

For the drive of outboard oil pressure pumps, up to 2 engine-dependent power take-offs can be planned, upon request with mechanical and pneumatic disengagement.

The mounting of the pumps with SAE B and C Connections is realized on the output side of the transmission.

1.9 Transmission output and Complementary units:

The output is realized through an integrated transfer case. According to the application, one axle can be disengaged. The control can be mechanical or pneumatic.

1.10 Emergency steering pump:

The attachment of an emergency steering pump is possible ($16 \text{ cm}^3/\text{rev.}$ or $32 \text{ cm}^3/\text{rev.}$).

Instead of an emergency steering pump, a secondary pump can be also mounted.

The secondary pump will be output-side driven, and has therefore always a constant delivery direction. At the towing of the vehicle, it supplies the transmission automatically with the necessary quantity of lubricating oil.

1.11 Speedometer drive

Electric Version

The signal necessary for the speedometer evaluation, is inductively picked-up on the output side.

Mechanical Version

The connection of the speedometer terminal is located on the output gear.

The sense of rotation is reversed if the driving direction is changed.

II. INSTALLATION INSTRUCTIONS

1. Preferred is an elastic 3-(4)-point transmission support.
Tensions in the vehicle frame should not be transmitted upon the transmission case.
2. At a direct mounting on the engine, the end play between converter pin and engine crank shaft, prescribed in the installation drawing, has to be met.
We want to point out that the converter is supporting itself axially upon the crankshaft with 2850 N, at a cold start for a short time up to 5100 N.
3. A torsional vibration damper is necessary if the transmission is separately installed from the engine.
4. Max. three-dimensional working angle of the drive-universal shaft 7°
Max. three-dimensional working angle of the output-universal shaft 10°
Shift angles are not permitted!
5. The universal shafts have to be equipped with length compensation, lubrication and shield tube. At movable axles and on the buckling joint, the universal shafts must be equipped in addition with a profile coating and ventilation.
6. The installation position of the joint yokes must be conform with the Catalogue of the Vehicle Manufacturer.
7. Connect the starter interlock.
8. The pressure cut-off of the transmission must become effective only at 30% of the max. brake pressure (air or oil).
9. Cable harness installation with sufficient bending radii and abrasion-proof.
The plug-and-socket connections should be moisture-proof.
10. Controllable power take-off.
The Gearshift lever must not be under preload in engaged or disengaged condition, the stop must be in the operating mechanism or in the cylinder.
11. At a separate filter installation, the ZF-Filter head has to be used.
As to the filter area or the grade of filtration, the ZF-Recommendation must be observed.
The nominal filter flow rate should be about 150 dm^3 .
The line guidance to the external filter must be on the same level or lower than the line connection on the transmission case.
12. If during the use of the vehicle inclined positions greater than 30° in the longitudinal axis and 15° in the transverse axis are required, please ask for Information.

13. The required cooling capacity is based on a normal outside temperature of max. 30° C. The relation of the cooling capacity to the max. converter power (mostly about 80 - 100% of the nominal engine power) should be at the minimum:

Caterpillars, Dozers, Wheel loaders, Scrapers	
Graders, RT-Cranes, Dumpers	= 35 - 40%
Lift trucks, Road vehicles, Trucks	
Vehicles with WK in all speeds	= 30 - 35%
14. At the cooler calculation, corresponding supply-air temperature values must serve as the base for the operation in hot countries.
15. The transmission cooler should be located on the cold-water side of the cooling circuit. If a retarder is used, the total cooling-water quantity must flow through the transmission cooler also at closed thermostatic valve.
16. Cleaning of the lines, filters and cooling system from original dirt (also after a transmission replacement).
17. Internal width of the cooler resp. filter lines and screw connections is at the minimum 32 mm. For line lengths > 1 m, the nominal width must be + 20%.
18. Easy accessibility to the oil filter, oil dipstick and oil filler neck.
19. Monitoring of the control pressure (Measuring point 65) and of the oil temperature (Measuring point 63) in the driver's cab.
20. Use oils according to the ZF-List of lubricants (Oil-level check, see Operating Instructions).
21. It must be possible, to remove the transmission control unit without removal of the transmission.
22. At welding operations on the vehicle, separate electric or electronic parts from the supply system.
23. Separate ground connections for transmission, control unit and battery must be planned.
24. Pay attention to the specific ZF-Plug assignment, because only then, the use of ZF-Testers will be possible.
25. Connect backup lamps, resp. alarm only through relay.

NOTE:

The correct installation is the Vehicle Manufacturer's duty!

III. OPERATION

3.1 Driving preparations and Maintenance:

Before the transmission is put into service, take care that the prescribed oil quality is filled in with the correct capacity. At the initial filling of the transmission has to be considered that the oil cooler, the pressure filter as well as the pipes must get filled with oil.

According to these cavities, the oil capacity to be filled in is greater as at the later oil fillings in the course of the usual maintenance program.

Since the converter and also the oil cooler, installed in the vehicle, as well as the pipes can discharge themselves at standstill into the transmission, the **Oil-level check must be carried out at engine idle run and operating temperature of the transmission.**

Permitted Transmission oils, see ZF-List of lubricants TE-ML 03, see Table 43!

At the oil-level check, the prescribed Safety Regulations according to § 6 of the Rules for Accident prevention of power plants in Germany, and in all other countries the respective Country Rules, have to be absolutely respected.

For example, the vehicle must be secured against rolling away with blocks, articulated vehicles must be additionally secured against inadvertent turning-in.

The test has to be carried out at NEUTRAL POSITION of the Controller.

The oil level must be at 80° C on the upper mark, up to 40° C on the lower mark of the oil dipstick. At the oil-level check, the oil dipstick has to be inserted into the oil-level pipe until contact is obtained. At the oil drain must be considered that only the quantities of oil within the transmission and the upper part of the converter can be drained on the oil drain plug.

At the cleaning of the pressure filter in the main oil stream, pay attention that no dirt or oil sludge can enter into the circuit. Besides, a cover plate has to be planned to protect the output shaft against oil wetting.

At the insertion of the filter, every kind of force has to be avoided.

3.2 Driving and Shifting:

The starting of the engine has to be always carried out in the NEUTRAL POSITION of the Controller.

For safety reasons, it is recommended to brake the vehicle always securely in position with the parking brake prior to start the engine.

After the starting of the engine and the preselection of the driving direction and the gear, the vehicle can be put into motion by acceleration.

At the drive off, the converter takes over the function of a main clutch.

On a level road, it is possible to drive off also in higher gears.

The acceleration will be only lower.

If the vehicle is stopped and standing with running engine and engaged transmission, the engine cannot be stalled. On a level and horizontal roadway it is possible that the vehicle begins to creep, because the engine is creating through the converter a slight drag torque.

It is advisable to brake the vehicle at every stop securely in position with the parking brake.

At longer standstills, the Controller must be shifted to the NEUTRAL POSITION:

At the drive off, the parking brake must be released. We know by experience that you do not immediately note, in case of a converter transmission, to have forgotten this quite normal operating procedure, because a converter, due to its high ratio, can easily overcome the braking torque of the parking brake.

Temperature increases in the converter oil as well as overheated brakes would be the consequences found out later.

We want to point out that the engine speed, due to the braking effect of the converter, is jumping up if speeds are shifted down, especially if one speed is skipped, and can reach in this condition (especially at converters with converter lockup clutch) speeds which are dangerous to the engine. Shifting should be carried out only if the top speed of the lower gear is reached.

If necessary, the vehicle must be braked down to this speed with the foot brake.

This must be also considered at NEUTRAL POSITION of the Controller to avoid a dangerous speed of the manual transmission.

The change-over from NEUTRAL to Reverse, Reverse to Forward or vice versa must be carried out only at vehicle standstill, applied hand brake and at idling speed!

3.3 Transmission control with electronic automatic unit:

Exact Informations about the design of the Controllers as well as about the engaged speeds in the single driving ranges have to be taken from the Operating Instructions belonging to the vehicle.

A manual intervention into the automatic shifting procedure (shift through of the driving ranges) is not practical.

In extreme driving situations, e.g. drive off on upgrades, a lower driving range can be preselected and at standstill or after the rolling away of the vehicle immediately shifted in higher driving ranges. This causes the utilization of the lower starting gear without afterward blocking the upshifting in higher gears. If necessary, all speeds of the transmission can be automatically shifted through with this measure (Details, see Operating Instructions).

On certain upgrades, up- and downshiftings may occur in short intervals, namely then if the traction force in the fast gear is too low, however in the slow gear too great for the upgrade.

This shift swinging can be prevented by accelerator throttling or by selection of a lower driving range.

At downhill driving, an unwanted upshifting will be prevented by selection of a lower driving range.

If for the reason of acceleration or at uphill driving the next lower gear shall be engaged, this can be realized by the kick-down position of the accelerator pedal.

This pedal position is causing the earliest possible downshifting in the lower gear.

3.4 Control of the transmission output and the various Complementary units:

Interaxle differential:

The engagement and disengagement of the differential lock must be carried out at the standing vehicle only.

Axle declutch:

The engagement and disengagement of the front-axle drive must be carried out at the standing vehicle only.

Axle drive APG-8 HK:

The engagement and disengagement of the front-axle drive must be carried out at the standing vehicle only.

Axle drive DK-7:

Engage front-axle drive

The engagement and disengagement of the 1st and 2nd axle must be carried out at the standing vehicle only.

- Engage axle differential.

If the engagement of the drive of the 1st and 2nd axle is not sufficient to prevent a wheel spinning, the axle differential can be engaged.

ATTENTION: The engagement must be carried out only at the standing vehicle and the NEUTRAL Position of the gear-selector switch!

- Disengage axle differential:

ATTENTION: As soon as the axle-differential locks as well as the drive of the front axle(s) are no more absolutely necessary for further driving,(solid, antiskid ground), these devices must be immediately disengaged again! At the driving on solid, antiskid ground with engaged front-axle drive or engaged axle-differential locks, considerable defects can occur on the drive axles as well as in the entire drive train.

Crawler speed:

At the engagement and disengagement of the crawler speed, the following conditions must be considered:

- Version without Front-axle engagement
Engagement and Disengagement
- Neutral
- < 1 km/h

- Version with Front-axle declutch
Engagement
- Front-axle drive must be engaged
- Neutral
- < 1 km/h

Disengagement Crawler speed

- Neutral
- < 1 km/h

Disengagement Front-axle drive

- Crawler speed out

3.5 Stopping and Parking:

Since due to the converter there is no rigid connection existing from engine to axle, we recommend to secure the vehicle on upgrades, resp. downgrades against inadvertent rolling away not only by application of the parking brake but additionally by a brake block on the wheel, if the driver has the intention to leave the vehicle.

3.6 Towing:

The towing speed at Transmission Versions without secondary pump must be maximally 10km/h, and the towing distance not longer than 10 km.

At Transmission Versions with secondary pump, a towing at max. 30 km/h up to a distance of 50 km is possible.

These Instructions must be absolutely respected because otherwise the Transmission becomes defective because of insufficient oil supply!

In case of a longer distance, the defective vehicle must be transported.

3.7 Oil temperature:

The oil temperature of the transmission must be controlled by a temperature sensor.

A max. temperature of 120° C on the converter exit must not be exceeded.

At a trouble-free unit and an adequate driving style, a higher temperature will not appear. If the temperature is increasing above 120° C, the vehicle has to be stopped and must be controlled for external oil loss, whilst the engine should be running with a speed of 1200 - 1500 min⁻¹ at the NEUTRAL POSITION of the transmission.

Now, the temperature must drop quickly (in about 2 - 3 minutes) to normal values.

If this is not the case, a trouble is existing which must be eliminated prior to continue working.

Control pressure:

For the supervision of the control pressure, a manometer or a pressure monitor has to be installed. If this pressure is dropping at engaged clutch below the prescribed minimum pressure (at the shifting itself, the pressure will drop for a short time), the reason for the pressure drop must be eliminated. The consequences of a too low control pressure are damages of the clutches which are constantly slipping because of a too low contact force, and are therefore damaged by overheating. On the Schedule of measuring points and the oil circulation diagrams, the measuring points of the single speeds, the converter pressures and the lubricating pressure can be seen (see Table 16, 17, 18, 19, 20, 21, 22, 23).

IV. MAINTENANCE

4.1 Transmission 6 WG-200:

4.1.1 Oil quality:

Permitted for the Powershift transmissions WG-200 are oils according to the ZF-List of lubricants TE-ML 03.

This List of lubricants can be requested from all ZF-Service Stations.

4.1.2 Oil-level check:

Oil-level check (weekly)

- At horizontally standing vehicle
- Transmission in Neutral position „N“
- Operating temperature of the transmission
- at engine idle run, about 1000 min^{-1}
- loosen oil dipstick by anticlockwise rotation, remove and clean it
- insert oil dipstick into the oil level pipe until contact is obtained and take it out (at least 2x)
- Oil level at 80° C on the upper mark: „HOT“
- Oil level at 40° C on the lower mark: „COLD“

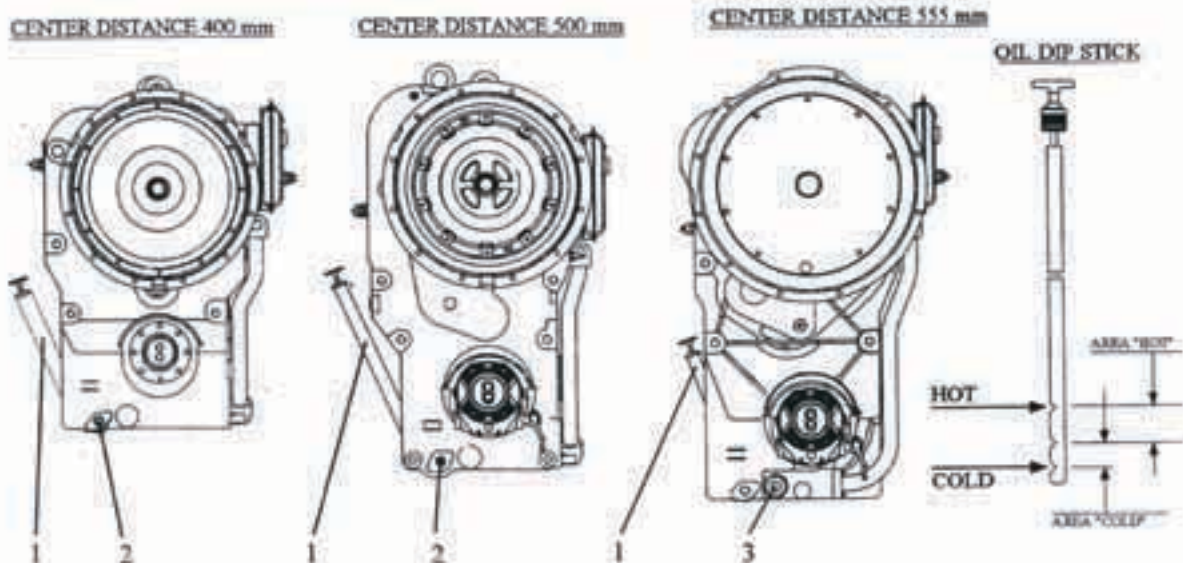
ATTENTION:

If the oil level has dropped below the Min-Zone, in relation to its condition, it is absolutely necessary to top up oil according to the ZF-List of lubricants, until the oil level is lying between the corresponding temperature marking - see Draft -

NOTE:

According to the Transmission Version, the oil dipstick and the oil filler pipe can have different lengths and shapes. Besides, the fitting on the transmission can be optionally realized on the converter side or on the output side. (The Illustration shows the fitting of the oil dipstick on the output side)!

- Insert the oil dipstick again and tighten it by clockwise rotation.



LEGEND:

- 1 = OIL FILLER PIPE WITH OIL DIPSTICK
- 2 = OIL DRAIN PLUG M22x1,5
- 3 = OIL DRAIN PLUG M38x1,5

4.1.3 Oil change and oil filling capacity:

First oil change after 100 operating hours in action.

Every further oil change after 1000 operating hours in action , however at least once a year!

The oil change must be carried out as follows:

- At operating temperature of the transmission, horizontally standing vehicle, open the oil drain plug along with sealing ring and drain the used oil.

NOTE:

Only the quantities of oil in the transmission and the upper part of the converter can be drained.

- Clean the oil drain plug and the sealing surface on the housing, install it again along with new O-Ring.
- Fill in oil according to the ZF-List of lubricants.
(about 28 liters, sump capacity, external oil quantities, e.g. in the cooler, in the lines etc. are dependent on the vehicle).

The indicated value is a guide value.

Please pay attention for absolute cleanness of oil and filter!

Binding is at any rate the marking on the oil dipstick!

- start the engine, idle speed
- Transmission in Neutral position „N“
- top up oil up to the upper marking of the Zone „COLD“
- brake the vehicle securely in position
- shift all selector switch positions through
- check oil level again, and top up oil again if necessary
Oil level at 80° C on the upper marking „HOT“
Oil level at 40° C on the lower marking „COLD“, on the oil dipstick.

4.1.4 Filter replacement:

The ZF-Fine filter (pressure filter) has to be replaced at every oil change.

Handle the filter with care at the installation, the transportation and the storage!

Damaged filters must no more be installed!

The installation of the filter must be carried out as follows:

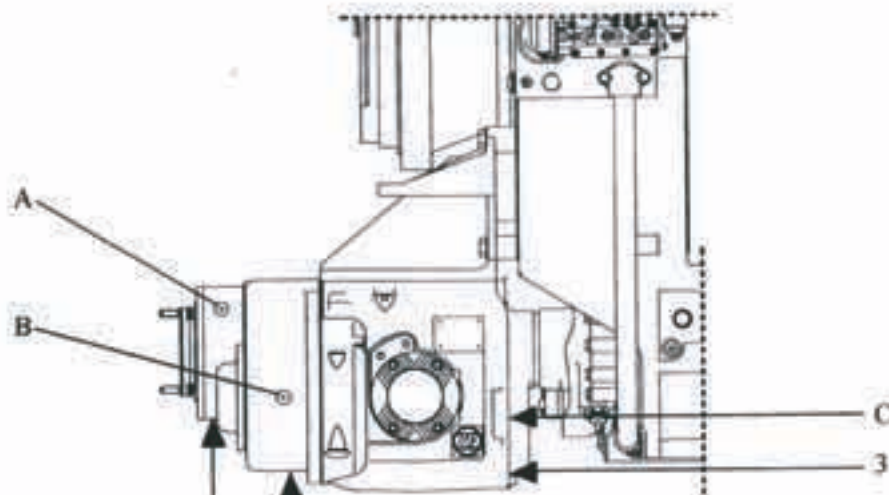
- cover the gasket with a small amount of oil
- Screw the filter in until contact with the sealing surface is obtained and tighten it subsequently by hand 1/3 to 1/2 turn.
- fill in oil
- start the engine
- carry out the transmission oil-level check at the idling engine (about 1000 min⁻¹) and at operating temperature of the transmission.:
Oil level at 80° C on the upper marking „HOT“
Oil level at 40° C on the lower marking „COLD“, on the oil dipstick.
- check tightness, if necessary tighten by hand again.

4.2 Axle drive DK7:

4.2.1 Oil quality:

Permitted are oils according to the ZF-List of lubricants TE-ML 05, see Table 44.

This List of lubricants can be requested from all ZF-Service Stations.



LEGEND:

- A = Oil filler screw M24x1,5
- B = Oil filler screw M24x1,5
- C = Oil filler screw and oil-level check M36x1,5
- 1 = Oil drain plug M24x1,5
- 2 = Oil drain plug M24x1,5
- 3 = Oil drain plug M24x1,5

4.2.2 Oil-level check (weekly):

- At horizontally standing vehicle, open the screw plug (C) on the transmission. the oil level must reach up to the lower edge of the check hole (C).
If necessary, top up oil according to the ZF-List of lubricants TE-ML 05.

ATTENTION:

The operating oil level is located at (C).
If the oil level has fallen, it is absolutely necessary to top up oil, according to the ZF-List of lubricants, up to the overflow on the oil-level check hole (C).
If no oil is replenished, there is a danger of a transmission defect!

- Clean the sealing surfaces on the housing and on the screw plug.
- Screw the screw plug, equipped with new O-Ring, again into the oil-level check hole (C) and tighten.

4.2.3 Oil change:

ATTENTION:

At all kinds of work, employ utmost cleanliness so that no dirt can penetrate into the transmission interior!

- At horizontally standing vehicle, open the screw plugs (1, 2, 3) and drain the used oil. Clean screw plugs (1, 2, 3) and sealing surfaces on the housing, install screw plugs equipped with new O-Rings again and tighten.
- Open screw plugs (A, B, C) and clean sealing surfaces.
- Fill in oil according to the ZF-List of lubricants TE-ML 05 at (A and B) until it begins to overflow on the oil-level check hole (C).

NOTE:

At the filling, the following order must be observed:

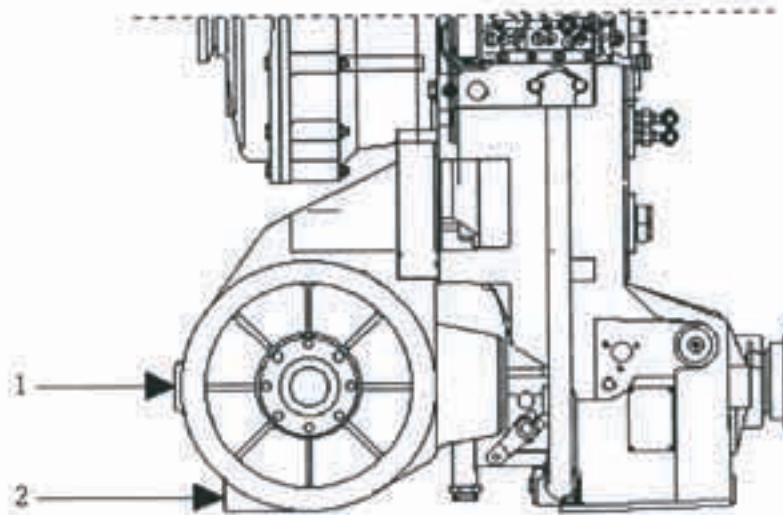
1. Oil filling (A)
2. Oil filling (B)

- Install screw plugs (A, B, C) equipped with new O-Rings again and tighten.

4.3 Axle drive APG-8/HK:

4.3.1 Oil quality:

Permitted are oils according to the ZF-List of lubricants TE-ML 05.
This List of lubricants can be requested from all ZF-Service Stations.



LEGEND

- 1 = Oil filler plug and oil-level check M42x1,5
- 2 = Oil drain plug M24x1,5

4.3.2 Oil-level check (weekly)

- At horizontally standing vehicle, open the screw plug (1) on the transmission, the oil level must reach up to the lower edge of the check hole.
If necessary, top up oil according to the ZF-List of lubricants TE-ML 05.
- Clean sealing surfaces on the housing and on the screw plug.
- Install screw plug, equipped with new O-Ring again into the oil-level check hole and tighten.

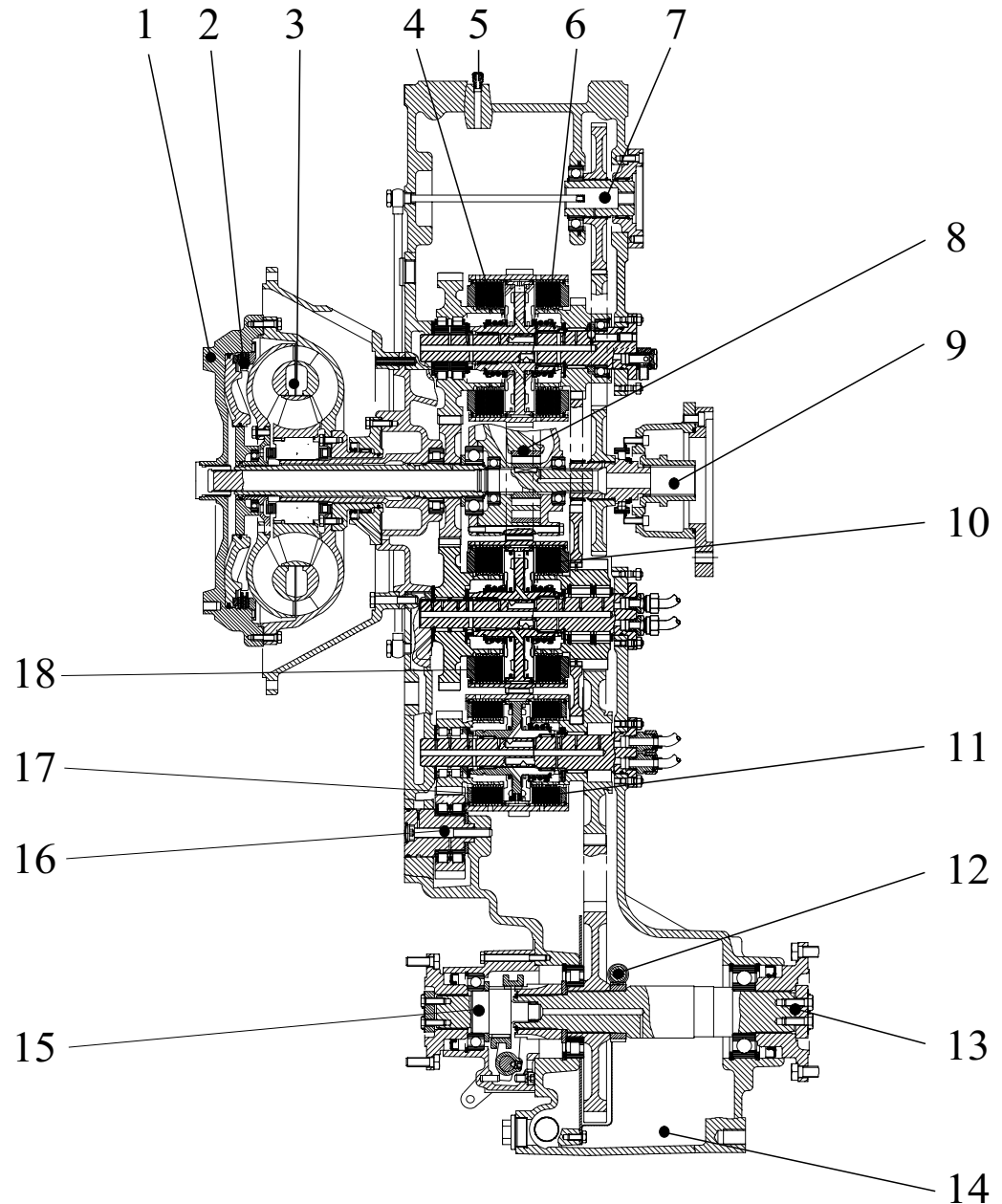
4.3.3 Oil change on the Axle drive:

ATTENTION: At all kinds of work, employ utmost cleanliness, so that no dirt can penetrate into the transmission interior!

- At horizontally standing vehicle, open the screw plug (2) and drain the used oil.
- Clean screw plug and sealing surfaces on the housing, install screw plug equipped with new O-Ring again and tighten.
- Open screw plug (1) and clean sealing surfaces.
- Fill in oil according to the ZF-List of lubricants TE-ML 05, until it begins to overflow on the oil-level check hole.
- Install screw plug (1) equipped with new O-Ring again and tighten.

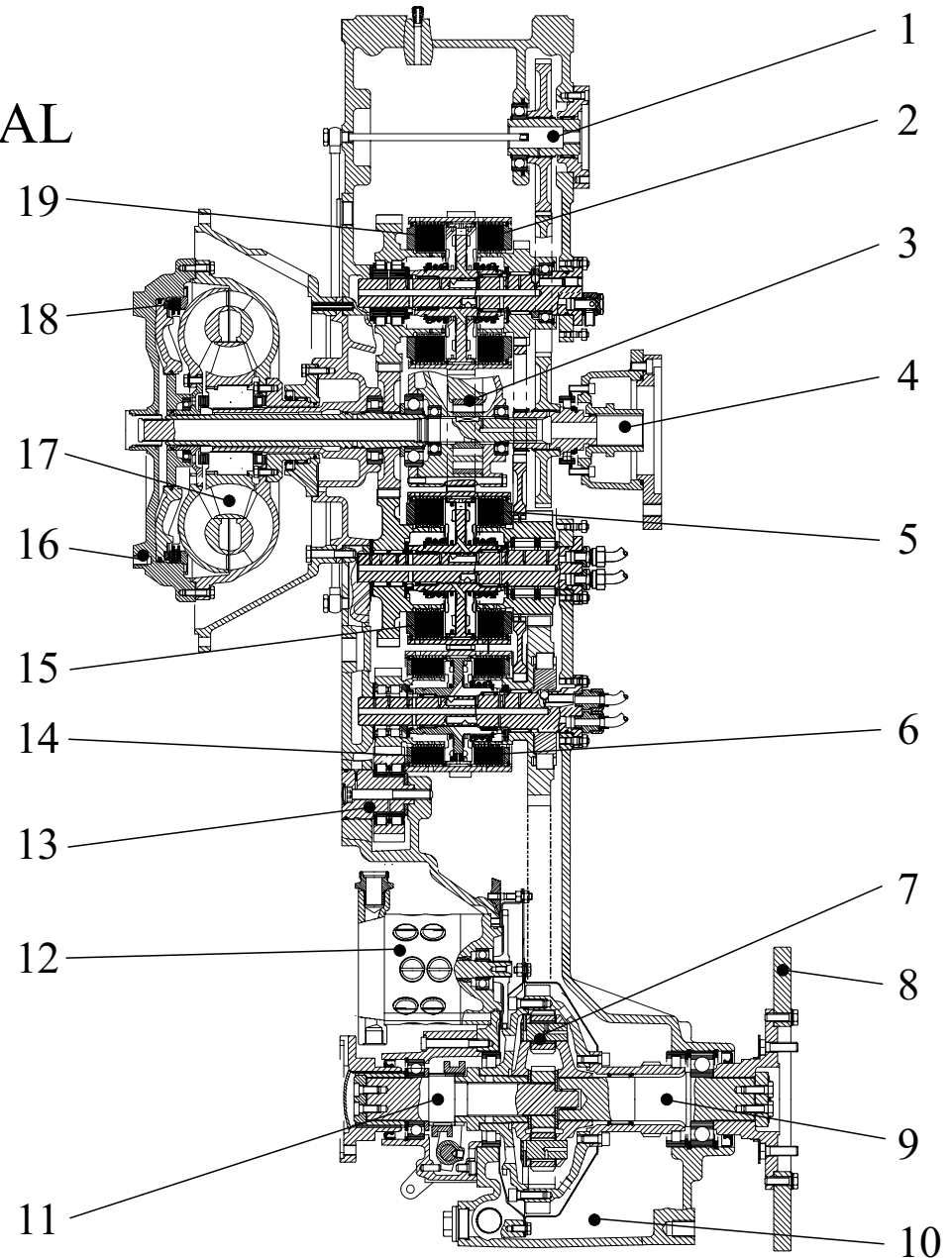
LAYOUT 6 WG-200 WITH AXLE DECLUTCH TABLE - 1

- 1 = ENGINE CONNECTION
- 2 = WK
- 3 = CONVERTER
- 4 = CLUTCH KV
- 5 = BLEEDER
- 6 = CLUTCH K1
- 7 = 2nd POWER TAKE-OFF
- 8 = CONVERTER CHARGE AND CONTROL
PRESSURE PUMP
- 9 = 1st POWER TAKE-OFF
- 10 = CLUTCH K2
- 11 = CLUTCH K3
- 12 = SPEEDOMETER DRIVE
- 13 = OUTPUT - REAR AXLE
- 14 = OIL SUMP
- 15 = AXLE DECLUTCH - FRONT AXLE
- 16 = LAYSHAFT
- 17 = CLUTCH K4
- 18 = CLUTCH KR



LAYOUT 6 WG-200 WITH INTERAXLE DIFFERENTIAL TABLE - 2

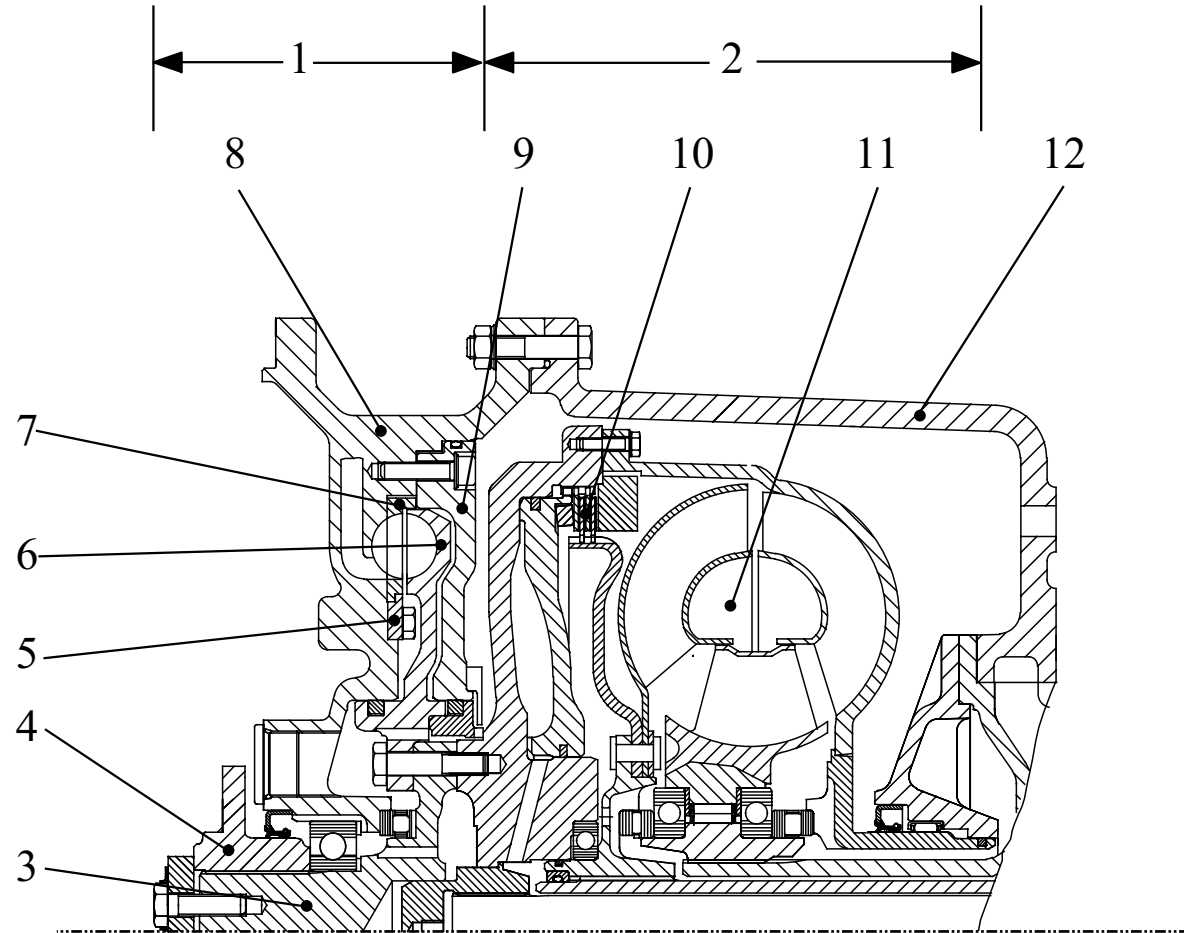
- 1 = 2nd POWER TAKE-OFF
- 2 = CLUTCH K1
- 3 = CONVERTER CHARGE AND CONTROL
PRESSURE PUMP
- 4 = 1st POWER TAKE-OFF
- 5 = CLUTCH K2
- 6 = CLUTCH K3
- 7 = INTERAXLE DIFFERENTIAL
- 8 = BRAKE DISK
- 9 = OUTPUT - REAR AXLE
- 10 = OIL SUMP
- 11 = ENGAGEMENT AND DISENGAGEMENT
DIFFERENTIAL LOCK
- 12 = EMERGENCY STEERING PUMP
- 13 = LAYSHAFT
- 14 = CLUTCH K4
- 15 = CLUTCH KR
- 16 = ENGINE CONNECTION
- 17 = CONVERTER
- 18 = WK
- 19 = CLUTCH KV



RETARDER 6 WG-200

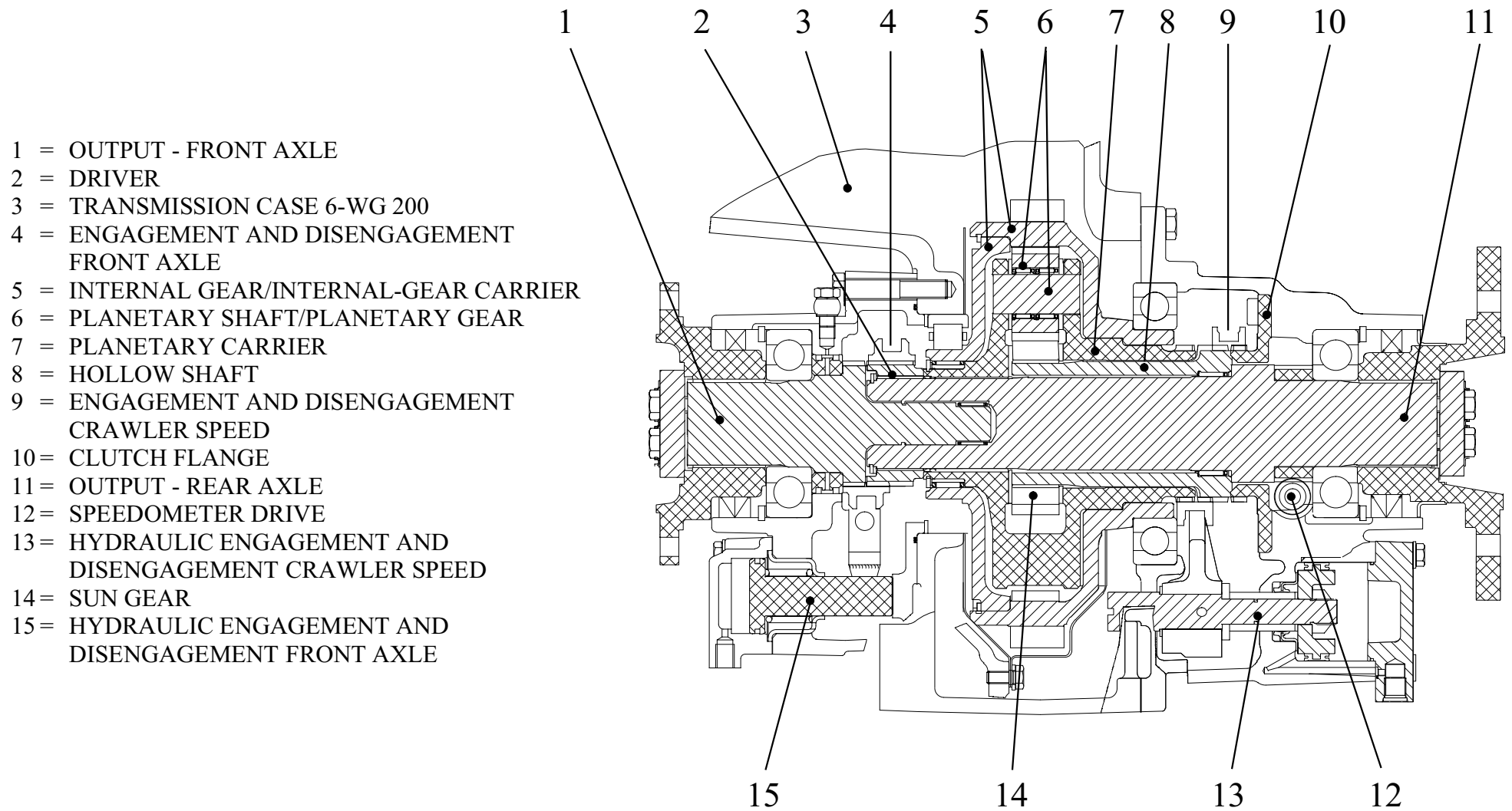
TABLE - 3

- 1 = RETARDER
- 2 = CONVERTER WITH WK
- 3 = DRIVE SHAFT
- 4 = DRIVE FLANGE
- 5 = THRUST RING
- 6 = ROTOR
- 7 = STATOR RING
- 8 = STATOR
- 9 = COVER
- 10 = WK
- 11 = CONVERTER
- 12 = CONVERTER HOUSING COVER



CRAWLER SPEED 6 WG-200

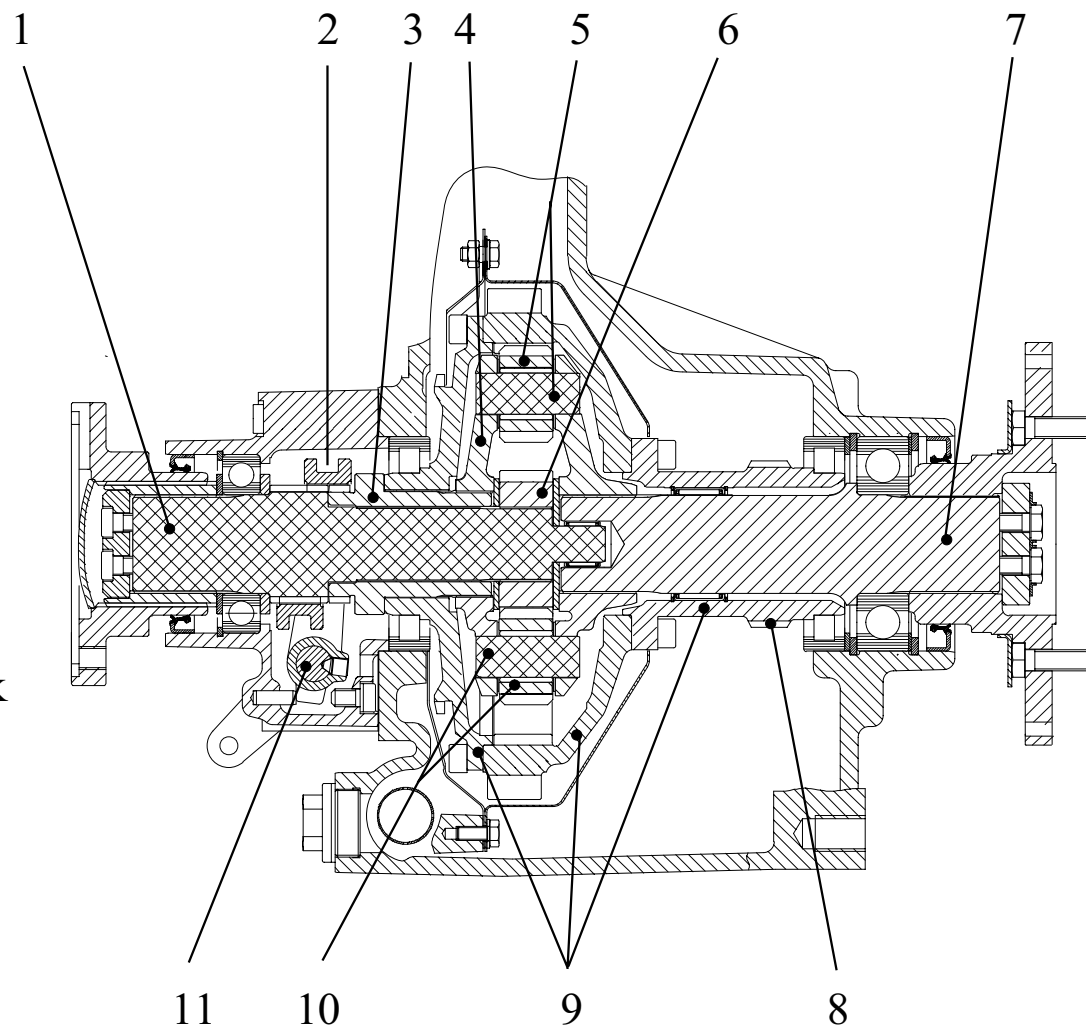
TABLE - 4



INTERAXLE DIFFERENTIAL 6 WG-200

TABLE - 5

- 1 = OUTPUT - FRONT AXLE
- 2 = ENGAGEMENT AND DISENGAGEMENT DIFFERENTIAL LOCK FRONT AXLE
- 3 = HOLLOW SHAFT
- 4 = PLANETARY CARRIER
- 5 = PLANETARY SHAFT/PLANETARY GEAR (RAVIGNAUX-SYSTEM OUTER HOLE CIRCLE)
- 6 = SUN GEAR
- 7 = OUTPUT - REAR AXLE
- 8 = ATTACHMENT POSSIBILITY SPEEDOMETER
- 9 = SUPPORTING PLATE/DRIVE GEAR/SUPPORTING TUBE
- 10 = PLANETARY SHAFT/PLANETARY GEAR (RAVIGNAUX-SYSTEM INNER HOLE CIRCLE)
- 11 = MECHANICAL ENGAGEMENT AND DISENGAGEMENT OF THE DIFFERENTIAL LOCK

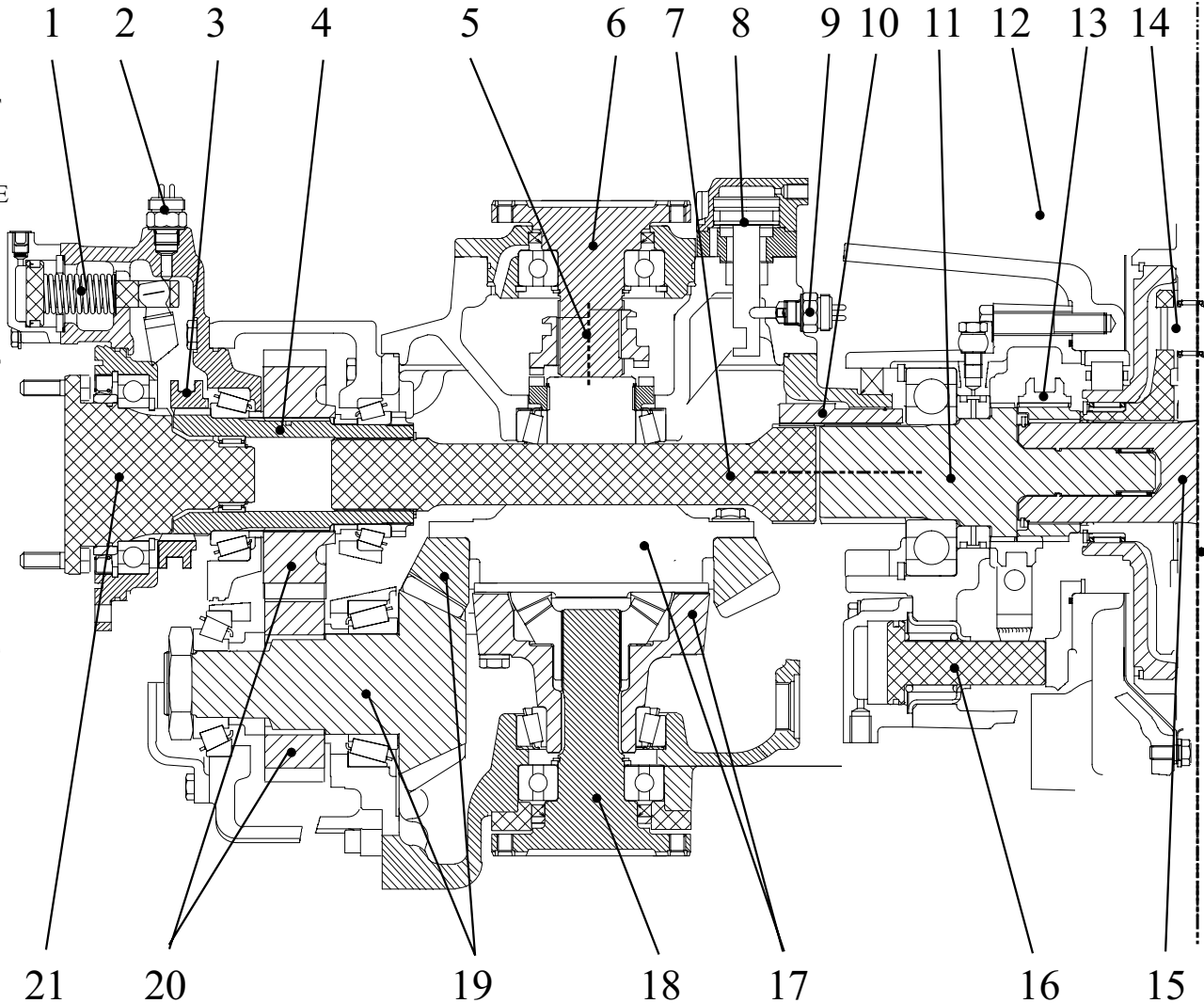


AXLE DRIVE DK-7 FLANGE-MOUNTED ON 6 WG-200

TABLE - 6

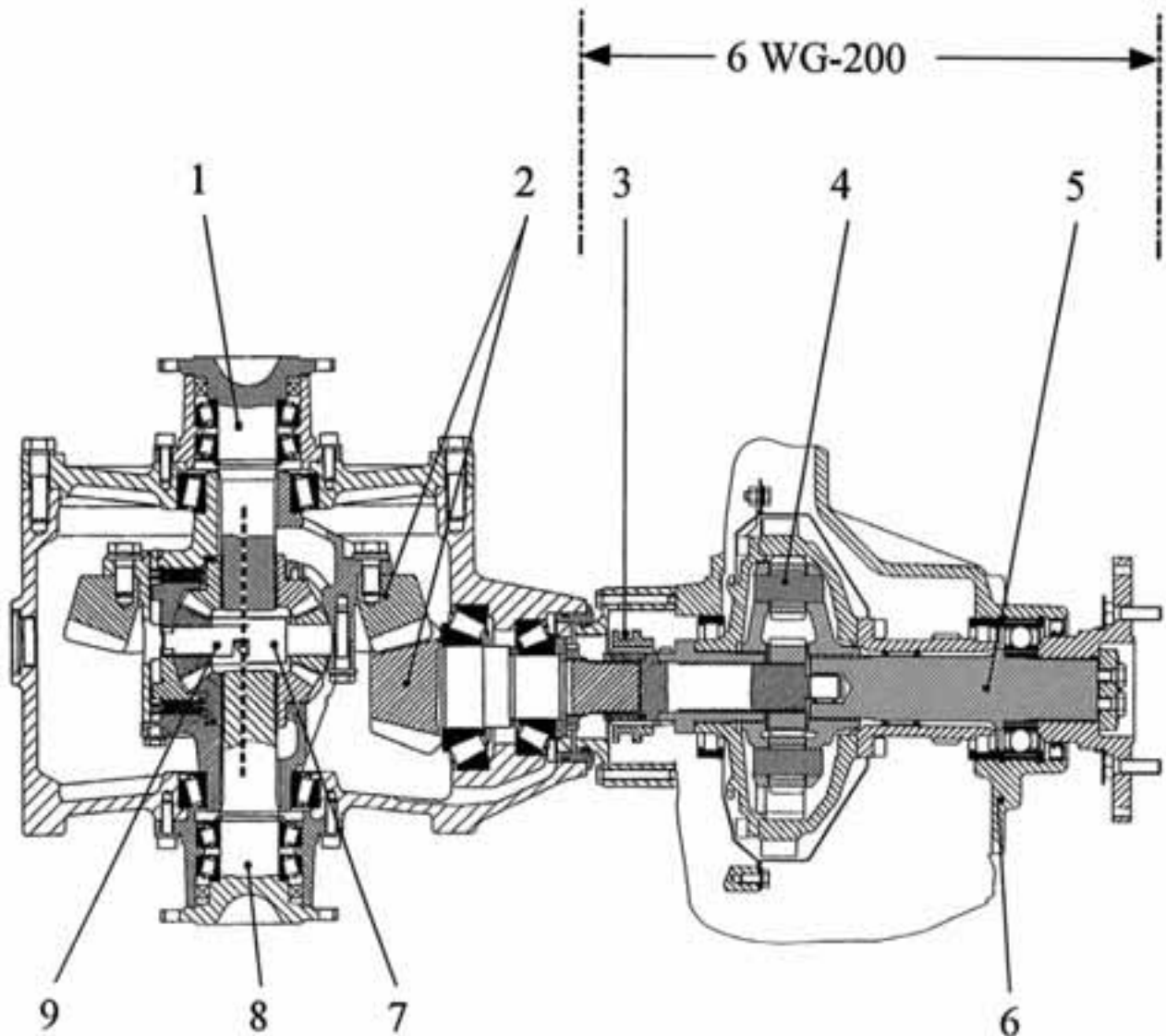
← 6 WG-200 →

- 1 = HYDRAULIC ENGAGEMENT AND DISENGAGEMENT OF THE FRONT AXLE
- 2 = SWITCH DISPLAY DISENGAGEMENT FRONT AXLE
- 3 = ENGAGEMENT AND DISENGAGEMENT FRONT AXLE
- 4 = HOLLOW SHAFT
- 5 = ENGAGEMENT AND DISENGAGEMENT AXLE DIFFERENTIAL
- 6 = OUTPUT TO THE CENTER AXLE - RIGHT
- 7 = DRIVE SHAFT
- 8 = HYDRAULIC ENGAGEMENT AND DISENGAGEMENT OF THE AXLE DIFFERENTIAL
- 9 = SWITCH DISPLAY DIFFERENTIAL LOCK
- 10 = ADAPTER TRANSMISSION/AXLE DRIVE DK-7
- 11 = OUTPUT SHAFT
- 12 = TRANSMISSION CASE 6 WG-200
- 13 = ENGAGEMENT AND DISENGAGEMENT FRONT AND CENTER AXLE
- 14 = CRAWLER SPEED
- 15 = OUTPUT SHAFT TO THE REAR AXLE
- 16 = HYDRAULIC ENGAGEMENT AND DISENGAGEMENT OF THE FRONT AND CENTER AXLE
- 17 = DIFFERENTIAL - CENTER AXLE
- 18 = OUTPUT TO THE CENTER AXLE - LEFT
- 19 = BEVEL-GEAR SET - DRIVE CENTER AXLE
- 20 = SPUR-GEAR DRIVE - CENTER AXLE
- 21 = OUTPUT TO THE FRONT AXLE



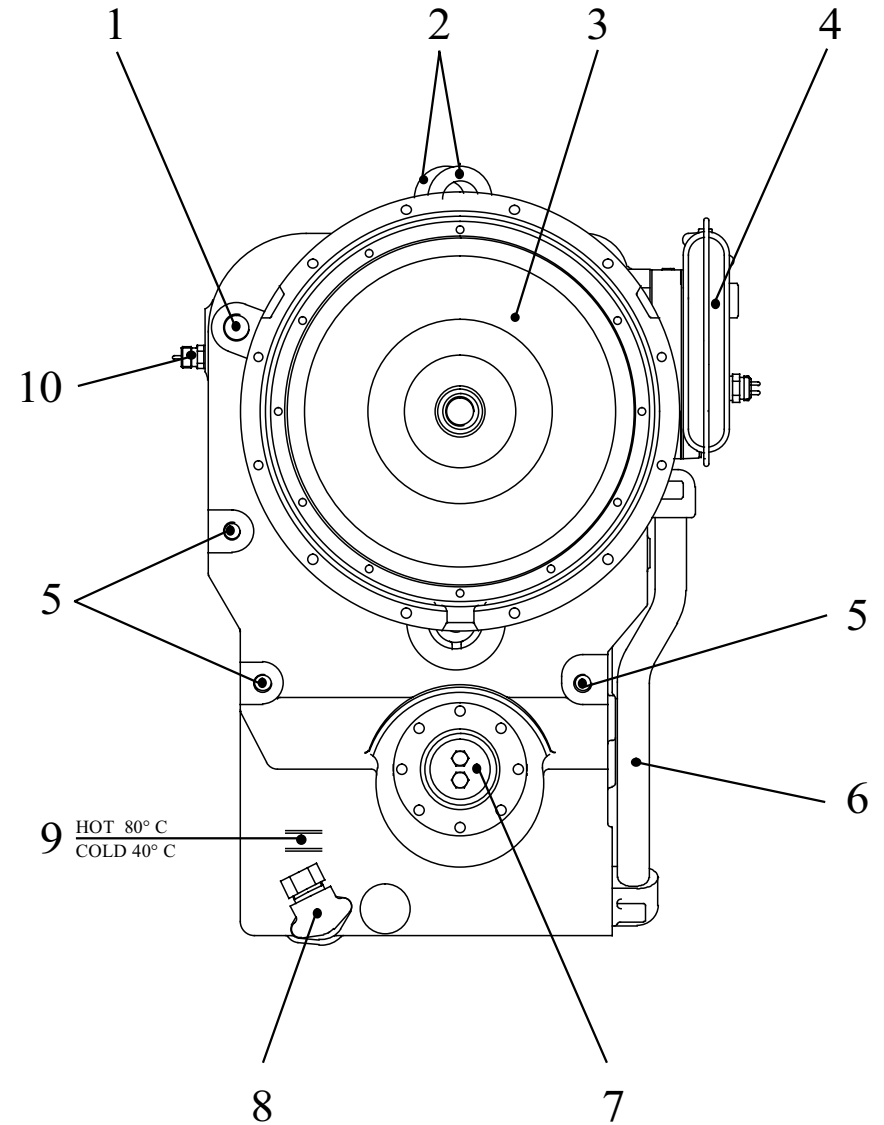
**AXLE DRIVE APG-8/HK
FLANGE-MOUNTED ON 6 WG-200
TABLE - 7**

- 1 = OUTPUT FRONT AXLE - RIGHT
- 2 = BEVEL-GEAR SET
- 3 = ENGAGEMENT AND DISENGAGEMENT OF THE INTERAXLE DIFFERENTIAL
- 4 = INTERAXLE DIFFERENTIAL
- 5 = OUTPUT REAR AXLE
- 6 = TRANSMISSION CASE 6 WG-200
- 7 = VERSION WITHOUT MULTI-DISK SELF-LOCKING DIFFERENTIAL
- 8 = OUTPUT FRONT AXLE - LEFT
- 9 = VERSION WITH MULTI-DISK SELF-LOCKING DIFFERENTIAL



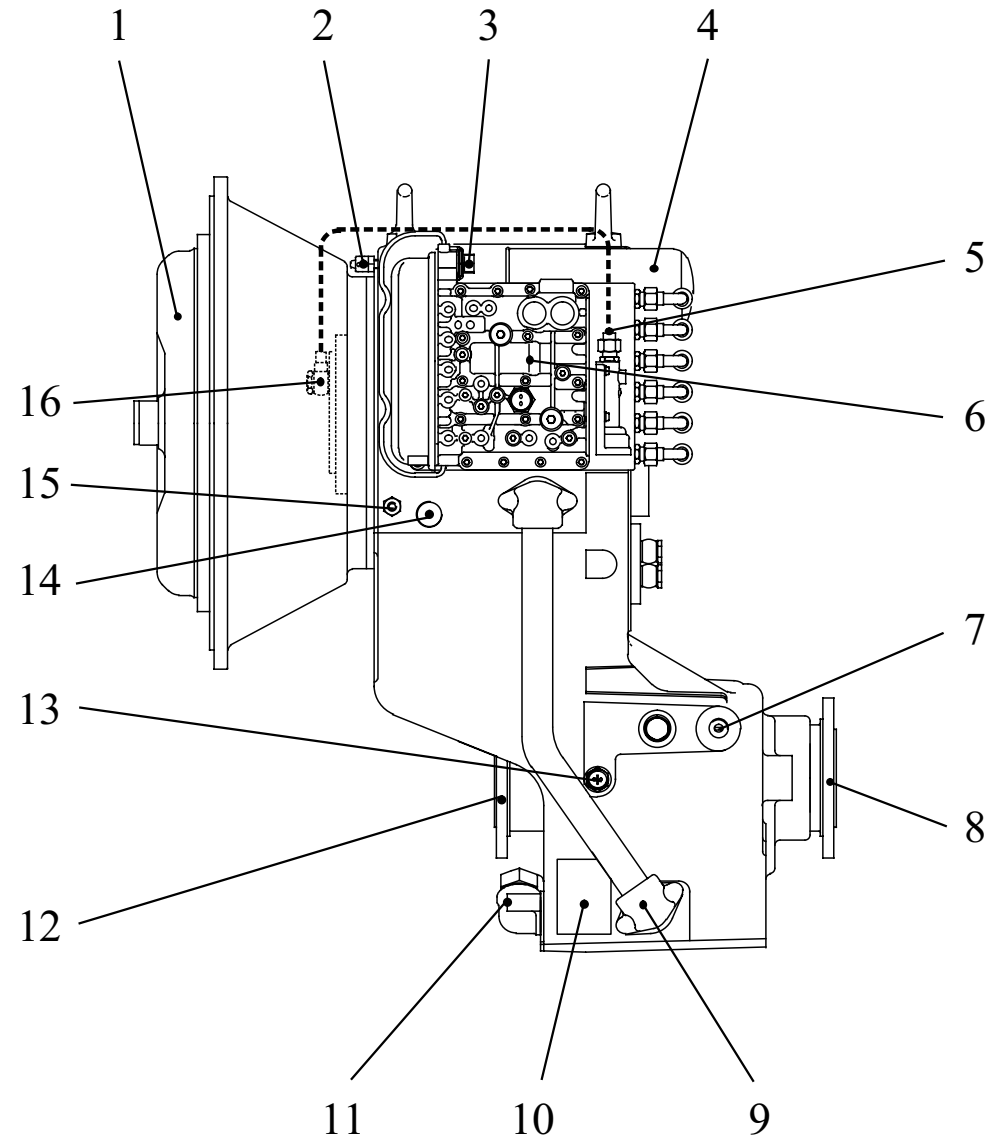
INSTALLATION VIEW 6WG-200
CENTER DISTANCE 400 MM
FRONT VIEW
TABLE - 8A

- 1 = CONNECTION FROM HEAT EXCHANGER
- 2 = LIFTING LUGS
- 3 = ENGINE CONNECTION - DIRECT MOUNTING
- 4 = ELECTRIC SHIFT CONTROL
- 5 = TRANSMISSION SUSPENSION POINTS
- 6 = OIL SUCTION TUBE
- 7 = OUTPUT - FRONT AXLE
- 8 = ATTACHMENT POSSIBILITY FOR OIL-LEVEL PIPE - WITH OIL DIPSTICK
- 9 = MARKING OIL LEVEL
- 10 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED



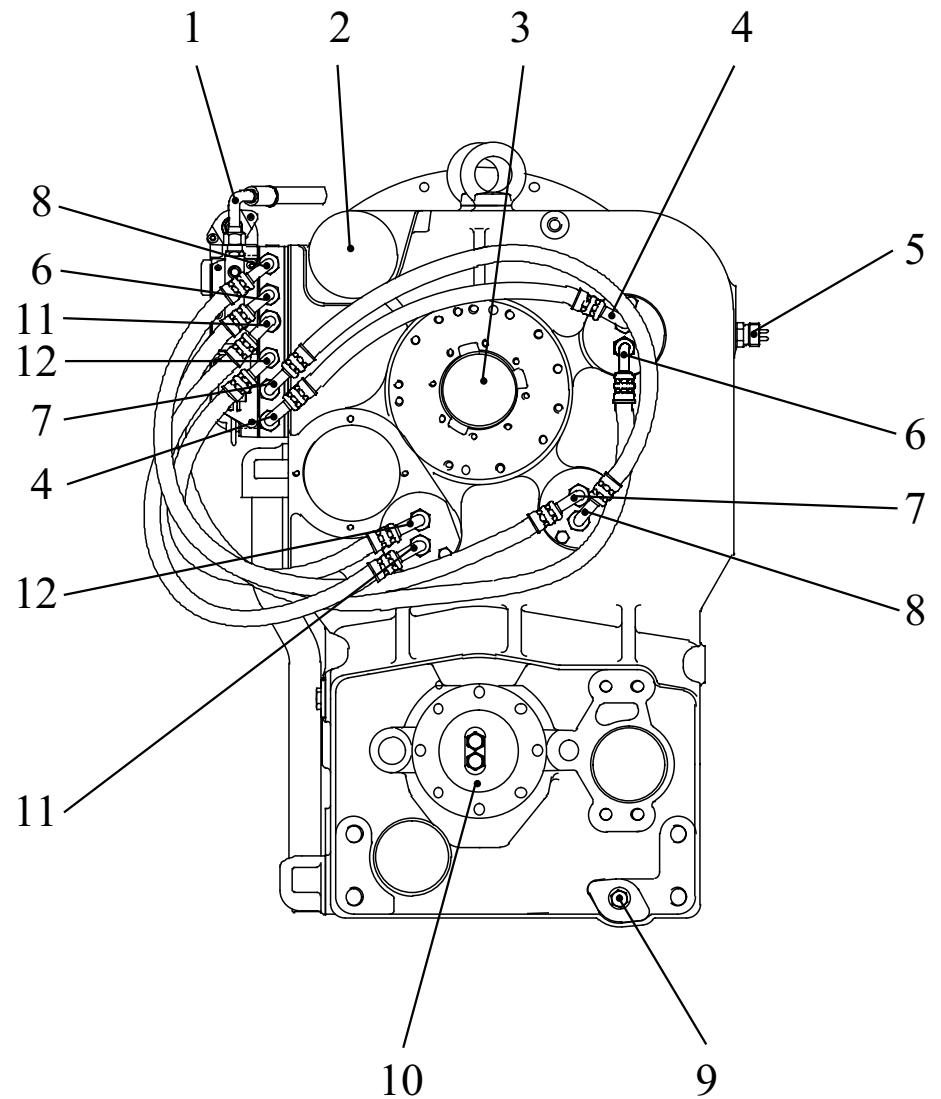
INSTALLATION VIEW 6WG-200
 CENTER DISTANCE 400 MM
 SIDE VIEW
 TABLE - 8B

- 1 = ENGINE CONNECTION DIRECT MOUNTING
- 2 = BLEEDER
- 3 = PLUG CONNECTION - CANNON
- 4 = BOX FILTER
- 5 WK HOSE LINE - CONNECTION ON WK-VALVE
- 6 = ELECTRIC SHIFT CONTROL
- 7 = SPEEDOMETER - MECHANICAL
- 8 = OUTPUT REAR AXLE
- 9 = OIL SUCTION PIPE
- 10= MODEL IDENTIFICATION PLATE
- 11= ATTACHMENT POSSIBILITY FOR OIL FILLER PIPE WITH OIL DIPSTICK
- 12= OUTPUT - FRONT AXLE
- 13= SPEEDOMETER - ELECTRONIC
- 14= CONNECTION TO HEAT EXCHANGER
- 15= TEMPERATURE SWITCH MEASURING POINT BEHIND THE CONVERTER
- 16= WK HOSE LINE - CONNECTION ON OIL SUPPLY FLANGE



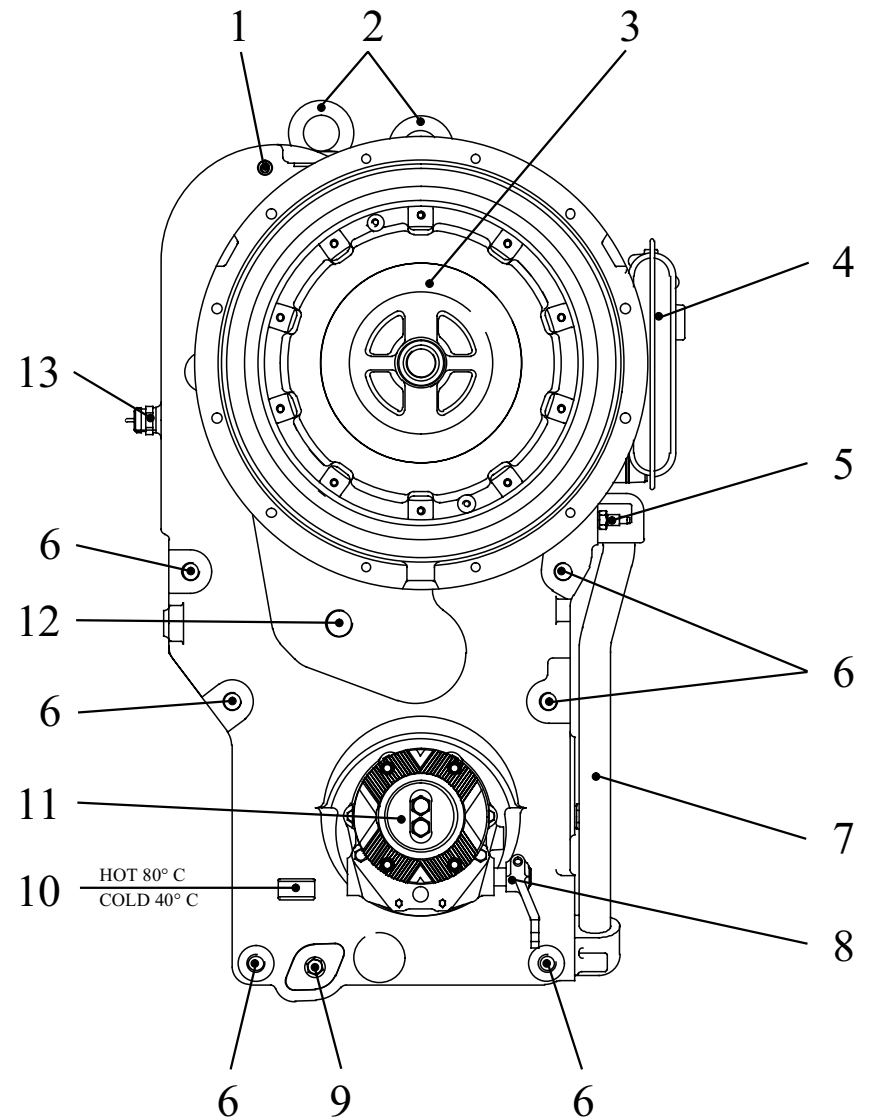
INSTALLATION VIEW 6 WG-200
 CENTER DISTANCE 400 MM
 REAR VIEW
 TABLE - 8C

- 1 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 2 = BOX FILTER
- 3 = 1st POWER TAKE-OFF
- 4 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 5 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 6 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 7 = HOSE LINE KR
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 8 = HOSE LINE K2
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 9 = OIL DRAIN PLUG
- 10 = OUTPUT - REAR AXLE
- 11 = HOSE LINE K3
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 12 = HOSE LINE K4
(CONNECTION ON AXLE AND CHANNEL PLATE)



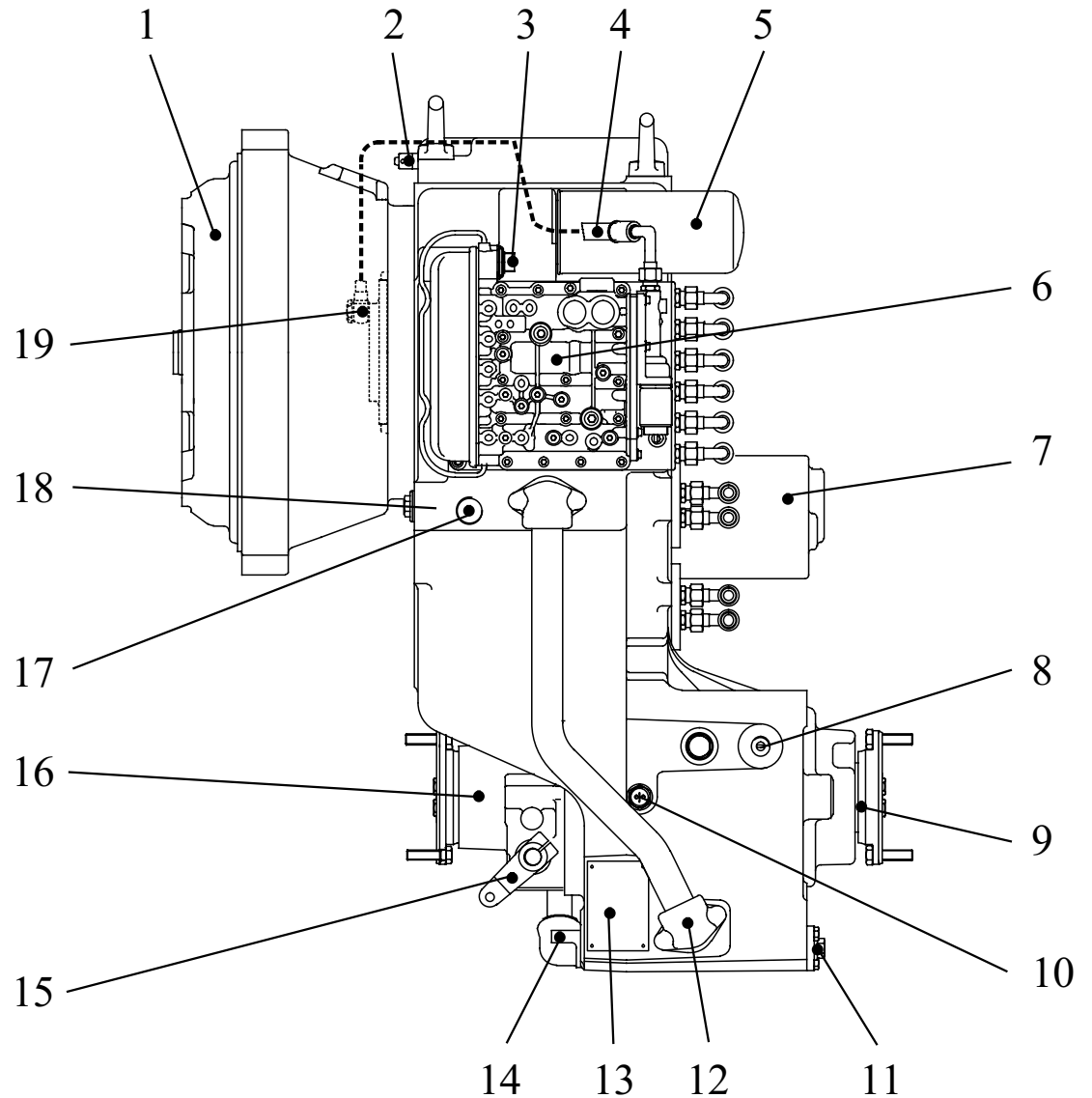
INSTALLATION VIEW 6 WG-200
 CENTER DISTANCE 500 MM
 FRONT VIEW
 TAFEL - 9A

- 1 = BLEEDER
- 2 = LIFTING LUGS
- 3 = ENGINE CONNECTION DIRECT MOUNTING
- 4 = ELECTRIC SHIFT CONTROL
- 5 = TEMPERATURE SWITCH (MEASURING POINT
BEHIND THE CONVERTER)
- 6 = TRANSMISSION SUSPENSION POINTS
- 7 = OIL SUCTION PIPE
- 8 = AXLE DECLUTCH - FRONT AXLE
- 9 = OIL DRAIN PLUG
- 10 = MARKING OIL LEVEL
- 11 = OUTPUT - FRONT AXLE
- 12 = CONNECTION FROM HEAT EXCHANGER
- 13 = INDUCTIVE TRANSMITTER TURBINE SPEED



INSTALLATION VIEW 6 WG-200
 CENTER DISTANCE 500 MM
 SIDE VIEW
 TABLE - 9B

- 1 = ENGINE CONNECTION - DIRECT MOUNTING
- 2 = BLEEDER
- 3 = PLUG CONNECTION - CANNON
- 4 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 5 = BOX FILTER
- 6 = ELECTRIC SHIFT CONTROL
- 7 = EMERGENCY STEERING PUMP
- 8 = SPEEDOMETER - MECHANICAL
- 9 = OUTPUT - REAR AXLE
- 10 = SPEEDOMETER - ELECTRONIC
- 11 = OIL DRAIN PLUG
- 12 = OIL SUCTION PIPE
- 13 = MODEL IDENTIFICATION PLATE
- 14 = ATTACHMENT POSSIBILITY FOR OIL FILLER PIPE WITH OIL DIPSTICK
- 15 = AXLE DECLUTCH - FRONT AXLE
- 16 = OUTPUT FRONT AXLE
- 17 = CONNECTION TO HEAT EXCHANGER
- 18 = TEMPERATURE SWITCH MEASURING POINT BEHIND THE CONVERTER
- 19 = WK HOSE LINE - CONNECTION ON OIL SUPPLY FLANGE



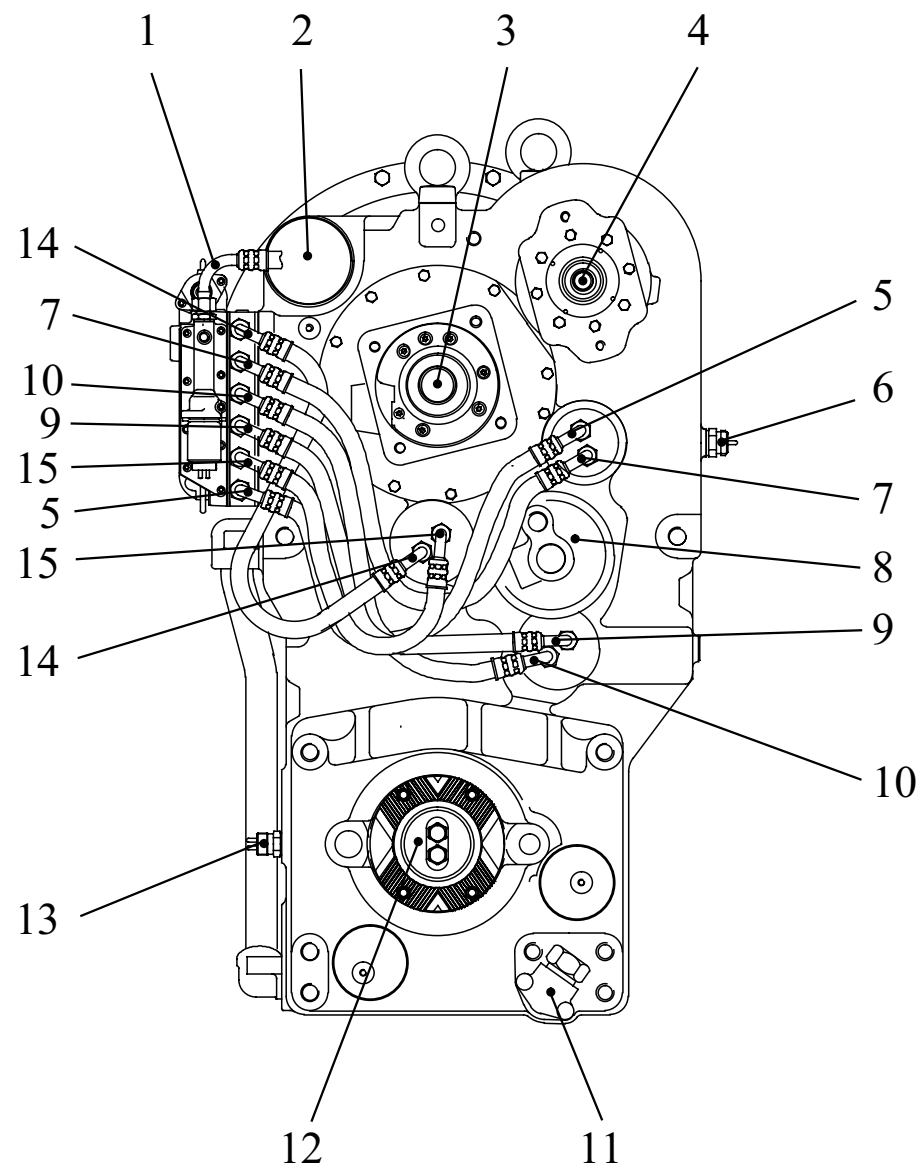
INSTALLATION VIEW 6 WG-200

CENTER DISTANCE 500 MM

REAR VIEW

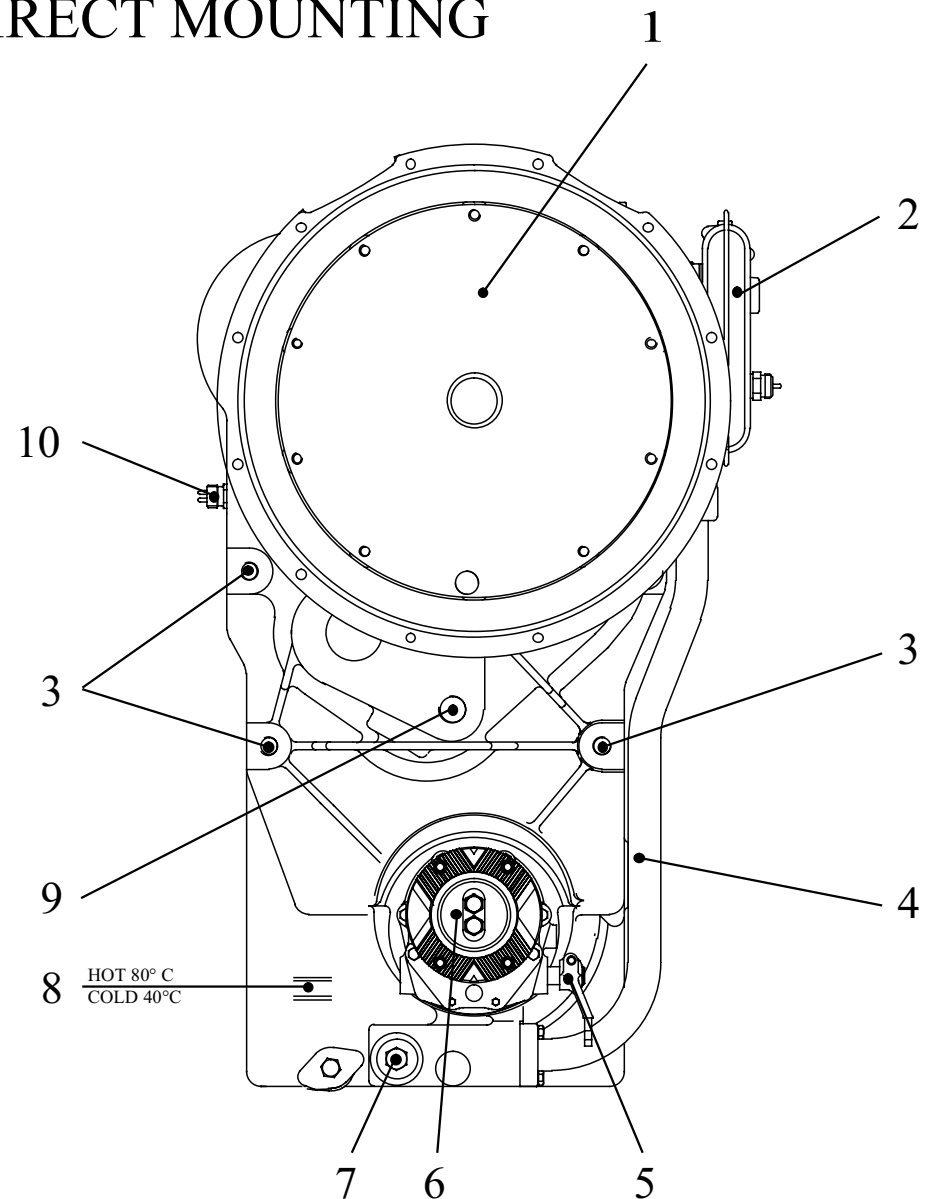
TABLE - 9C

- 1 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 2 = BOX FILTER
- 3 = 1st POWER TAKE-OFF
- 4 = 2nd POWER TAKE-OFF
- 5 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 6 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 7 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 8 = EMERGENCY STEERING PUMP
- 9 = HOSE LINE K4
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 10 = HOSE LINE K3
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 11 = ATTACHMENT POSSIBILITY FOR OIL-LEVEL PIPE
WITH OIL DIPSTICK
- 12 = OUTPUT REAR AXLE
- 13 = INDUCTIVE TRANSMITTER FOR OUTPUT SPEED
(SPEEDOMETER)
- 14 = HOSE LINE K2
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 15 = HOSE LINE KR
(CONNECTION ON AXLE AND CHANNEL PLATE)



INSTALLATION VIEW 6 WG-200 DIRECT MOUNTING
CENTER DISTANCE 555 MM
FRONT VIEW
TABLE - 10A

- 1 = ENGINE CONNECTION - DIRECT MOUNTING
- 2 = ELECTRIC SHIFT CONTROL
- 3 = TRANSMISSION SUSPENSION POINTS
- 4 = OIL SUCTION PIPE
- 5 = AXLE DECLUTCH - FRONT AXLE
- 6 = OUTPUT - FRONT AXLE
- 7 = OIL DRAIN PLUG
- 8 = MARKING OIL LEVEL
- 9 = CONNECTION FROM HEAT EXCHANGER
- 10 = INDUCTIVE TRANSMITTER TURBINE SPEED



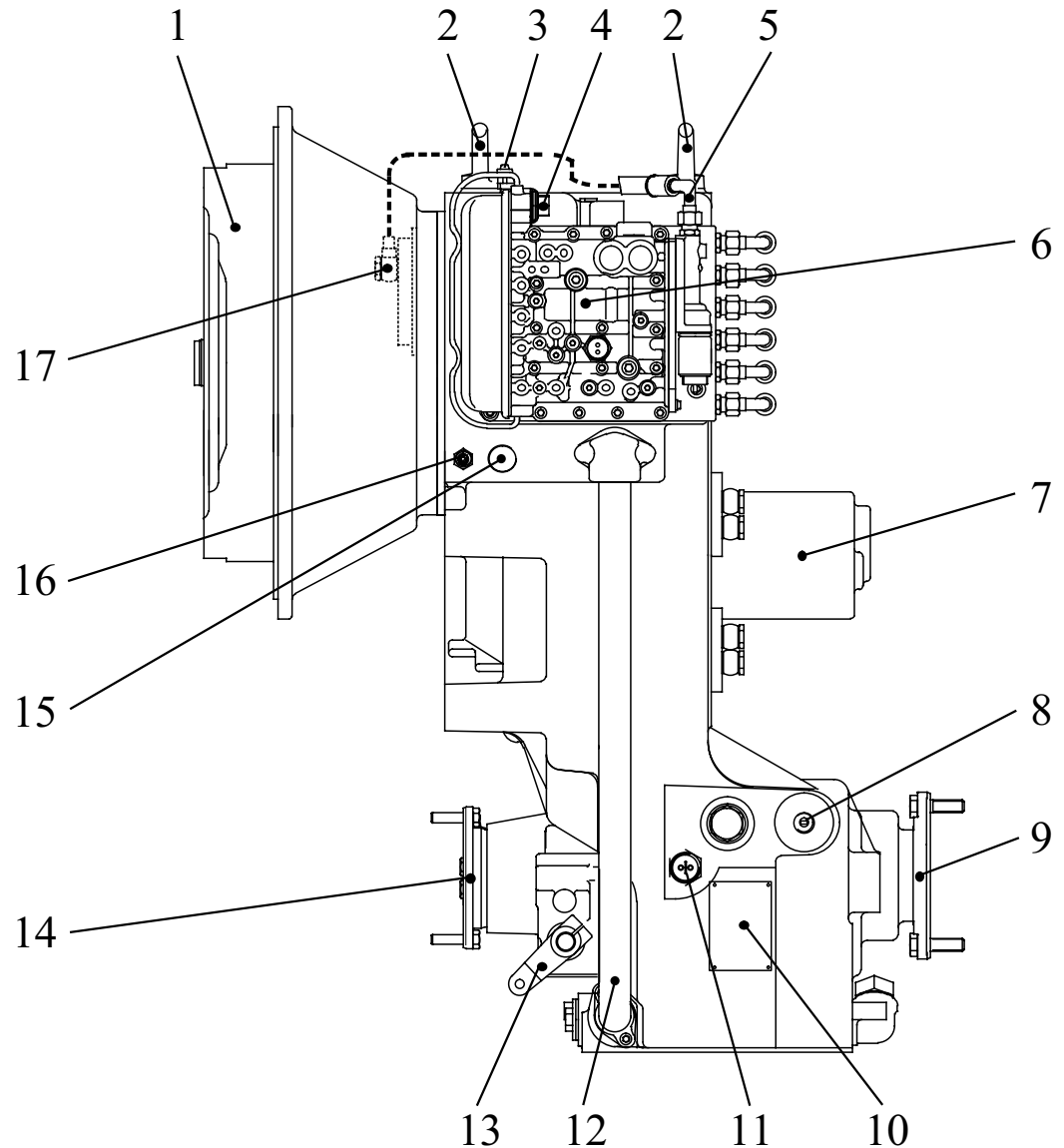
INSTALLATION VIEW 6 WG-200 DIRECT MOUNTING

CENTER DISTANCE 555 MM

SIDE VIEW

TABLE - 10B

- 1 = ENGINE CONNECTION - DIRECT MOUNTING
- 2 = LIFTING LUGS
- 3 = BLEEDER
- 4 = PLUG CONNECTION - CANNON
- 5 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 6 = ELECTRIC SHIFT CONTROL
- 7 = EMERGENCY STEERING PUMP
- 8 = SPEEDOMETER - MECHANICAL
- 9 = OUTPUT - REAR AXLE
- 10 = MODEL IDENTIFICATION PLATE
- 11 = SPEEDOMETER - ELECTRONIC
- 12 = OIL SUCTION PIPE
- 13 = AXLE DECLUTCH - FRONT AXLE
- 14 = OUTPUT - FRONT AXLE
- 15 = CONNECTION TO HEAT EXCHANGER
- 16 = TEMPERATURE SWITCH MEASURING POINT BEHIND THE CONVERTER
- 17 = WK HOSE LINE - CONNECTION ON OIL SUPPLY FLANGE



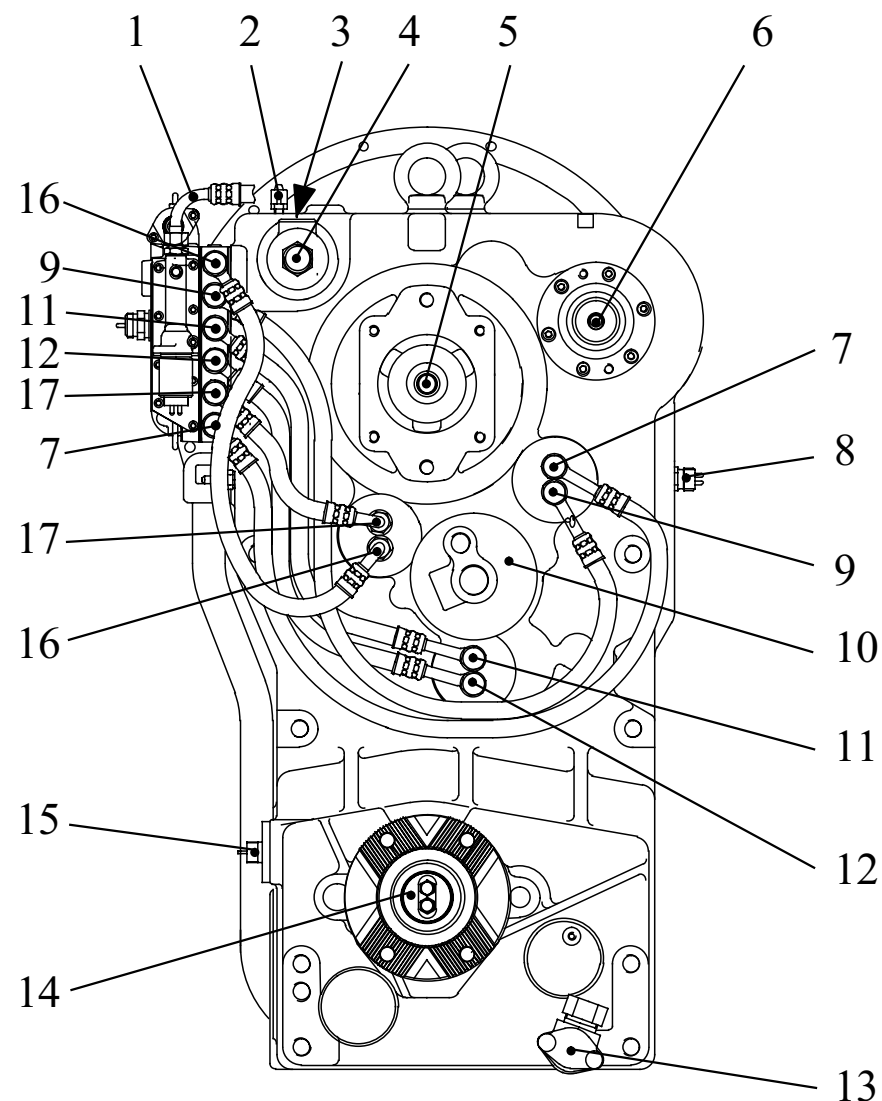
INSTALLATION VIEW 6 WG-200 DIRECT MOUNTING

CENTER DISTANCE 555 MM

REAR VIEW

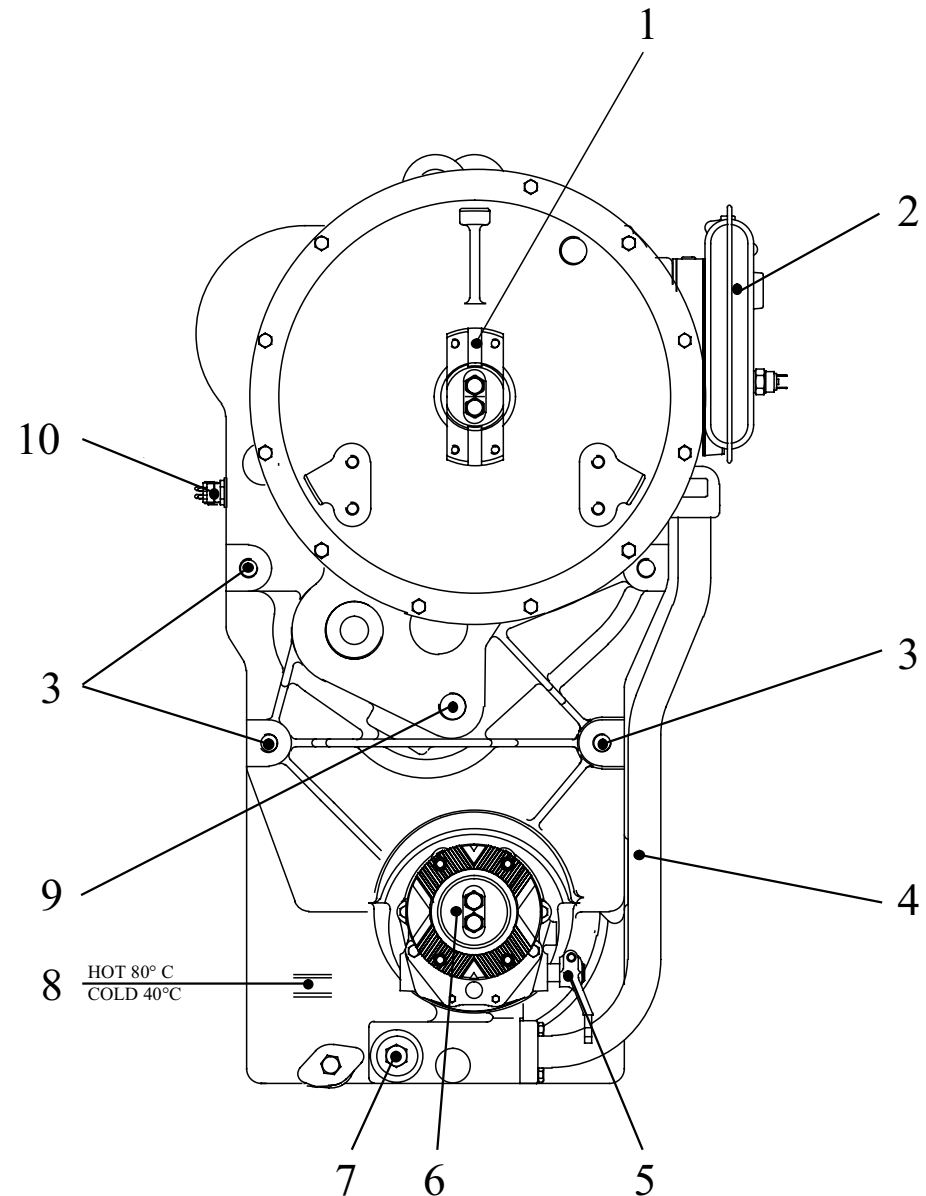
TABLE - 10C

- 1 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 2 = BLEEDER
- 3 = CONNECTION TO BOX FILTER - SEPARATE INSTALLATION
- 4 = CONNECTION FROM BOX FILTER - SEPARATE INSTALLATION
- 5 = 1st POWER TAKE-OFF
- 6 = 2nd POWER TAKE-OFF
- 7 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 8 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 9 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 10 = EMERGENCY STEERING PUMP
- 11 = HOSE LINE K3
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 12 = HOSE LINE K4
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 13 = ATTACHMENT POSSIBILITY FOR OIL-LEVEL PIPE
WITH OIL DIPSTICK
- 14 = OUTPUT - REAR AXLE
- 15 = SPEEDOMETER DRIVE - MECHANICAL
- 16 = HOSE LINE K2
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 17 = HOSE LINE KR
(CONNECTION ON AXLE AND CHANNEL PLATE)



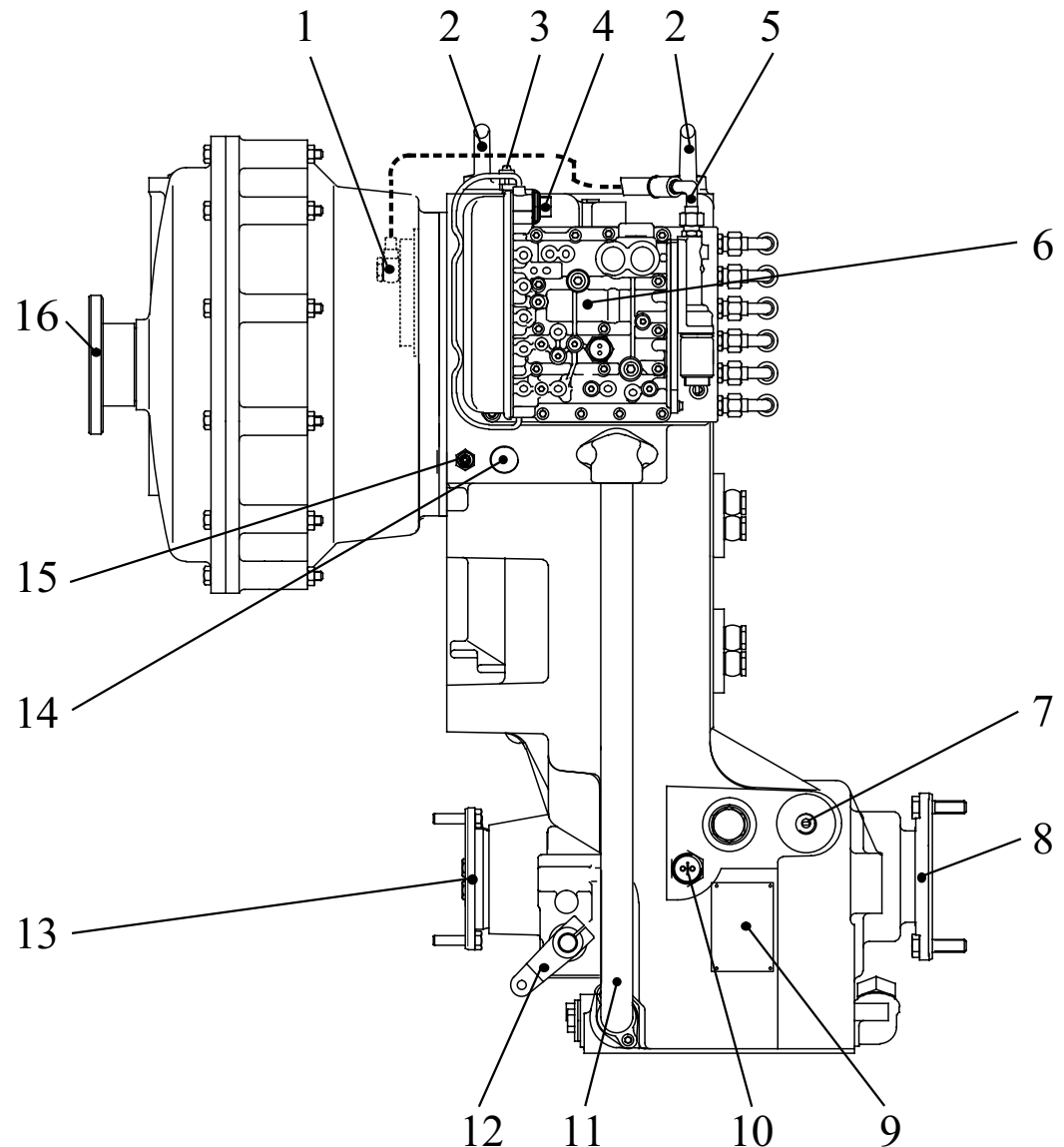
INSTALLATION VIEW 6 WG-200 SEPARATE INSTALLATION
CENTER DISTANCE 555 MM
FRONT VIEW
TABLE - 11A

- 1 = DRIVE FLANGE - DRIVE THROUGH
UNIVERSAL SHAFT
- 2 = ELECTRIC SHIFT CONTROL
- 3 = TRANSMISSION SUSPENSION POINTS
- 4 = OIL SUCTION PIPE
- 5 = ENGAGEMENT AND DISENGAGEMENT INTERAXLE
DIFFERENTIAL
- 6 = OUTPUT - FRONT AXLE
- 7 = OIL DRAIN PLUG
- 8 = MARKING OIL LEVEL
- 9 = CONNECTION FROM HEAT EXCHANGER
- 10 = INDUCTIVE TRANSMITTER TURBINE SPEED



INSTALLATION VIEW 6 WG-200 SEPARATE INSTALLATION
 CENTER DISTANCE 555 MM
 SIDE VIEW
 TABLE - 11B

- 1 = WK HOSE LINE - CONNECTION
ON OIL SUPPLY FLANGE
- 2 = LIFTING LUGS
- 3 = BLEEDER
- 4 = PLUG CONNECTION - CANNON
- 5 = WK HOSE LINE - CONNECTION ON
WK-VALVE
- 6 = ELECTRIC SHIFT CONTROL
- 7 = SPEEDOMETER - MECHANICAL
- 8 = OUTPUT - REAR AXLE
- 9 = MODEL IDENTIFICATION PLATE
- 10 = SPEEDOMETER - ELECTRONIC
- 11 = OIL SUCTION PIPE
- 12 = ENGAGEMENT AND DISENGAGEMENT
INTERAXLE DIFFERENTIAL
- 13 = OUTPUT - FRONT AXLE
- 14 = CONNECTION TO HEAT EXCHANGER
- 15 = TEMPERATURE SWITCH MEASURING
POINT BEHIND THE CONVERTER
- 16 = DRIVE FLANGE - DRIVE THROUGH
UNIVERSAL SHAFT



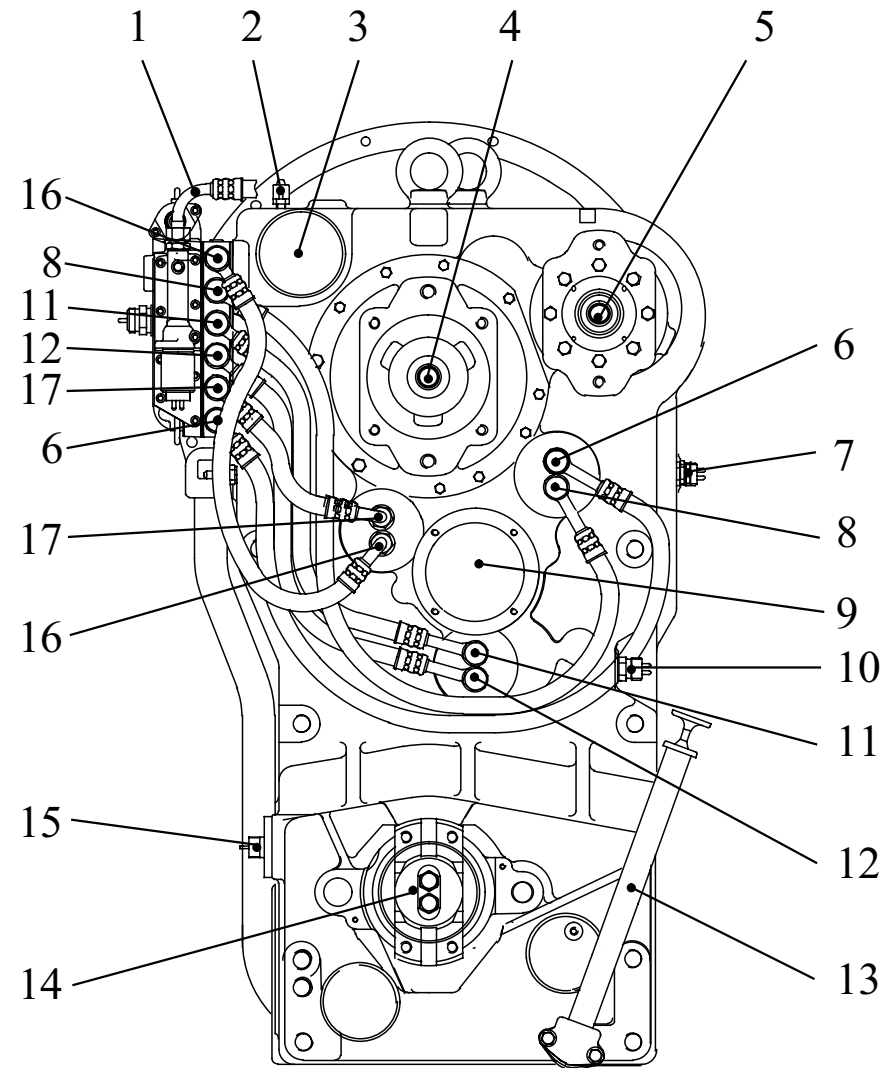
INSTALLATION VIEW 6 WG-200 SEPARATE INSTALLATION

CENTER DISTANCE 555 MM

REAR VIEW

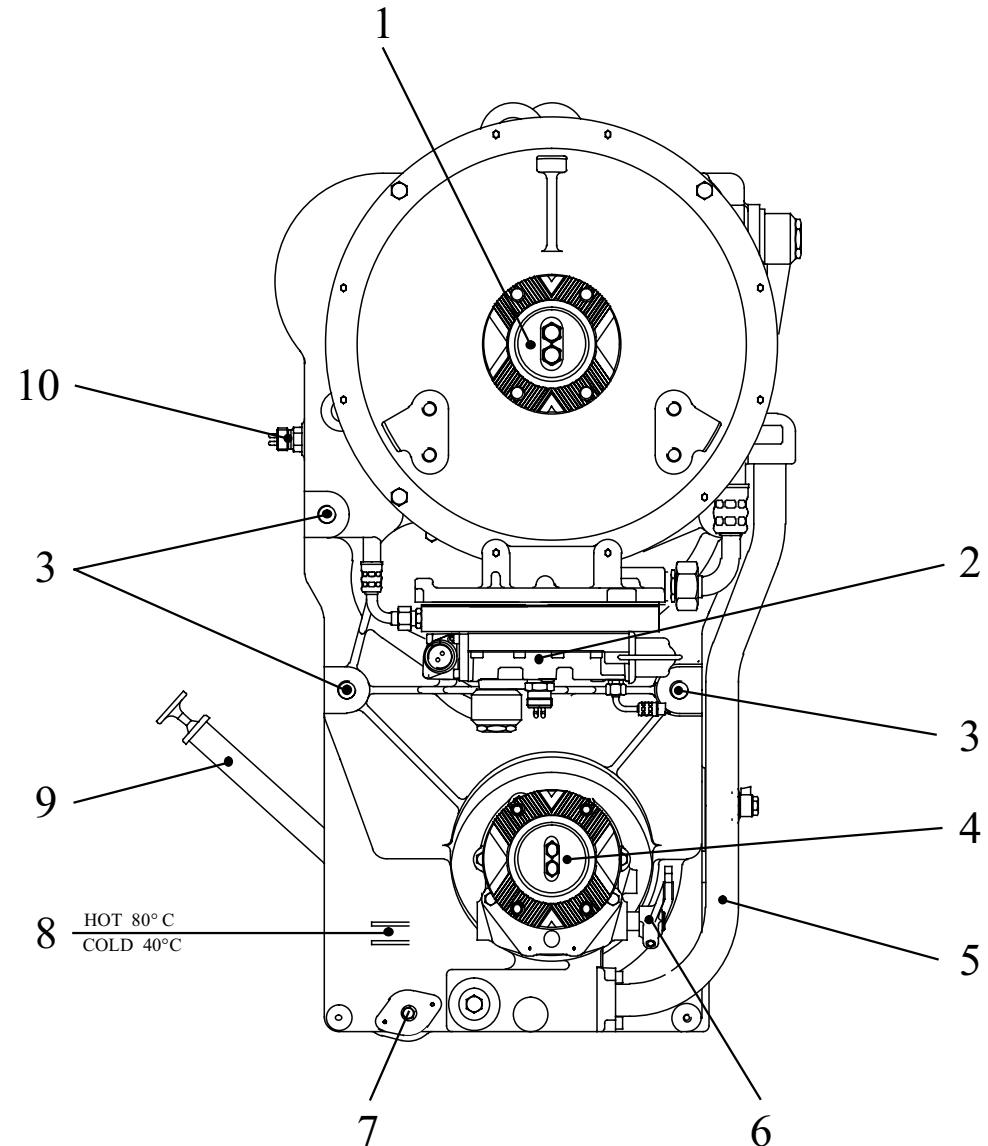
TABLE - 11C

- 1 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 2 = BLEEDER
- 3 = BOX FILTER
- 4 = 1st POWER TAKE-OFF
- 5 = 2nd POWER TAKE-OFF
- 6 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 7 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 8 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 9 = ATTACHMENT POSSIBILITY FOR EMERGENCY
STEERING PUMP
- 10 = INDUCTIVE TRANSMITTER FOR OUTPUT SPEED
- 11 = HOSE LINE K3
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 12 = HOSE LINE K4
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 13 = OIL FILLER PIPE WITH OIL DIPSTICK
- 14 = OUTPUT - REAR AXLE
- 15 = SPEEDOMETER DRIVE - MECHANICAL
- 16 = HOSE LINE K2
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 17 = HOSE LINE KR
(CONNECTION ON AXLE AND CHANNEL PLATE)



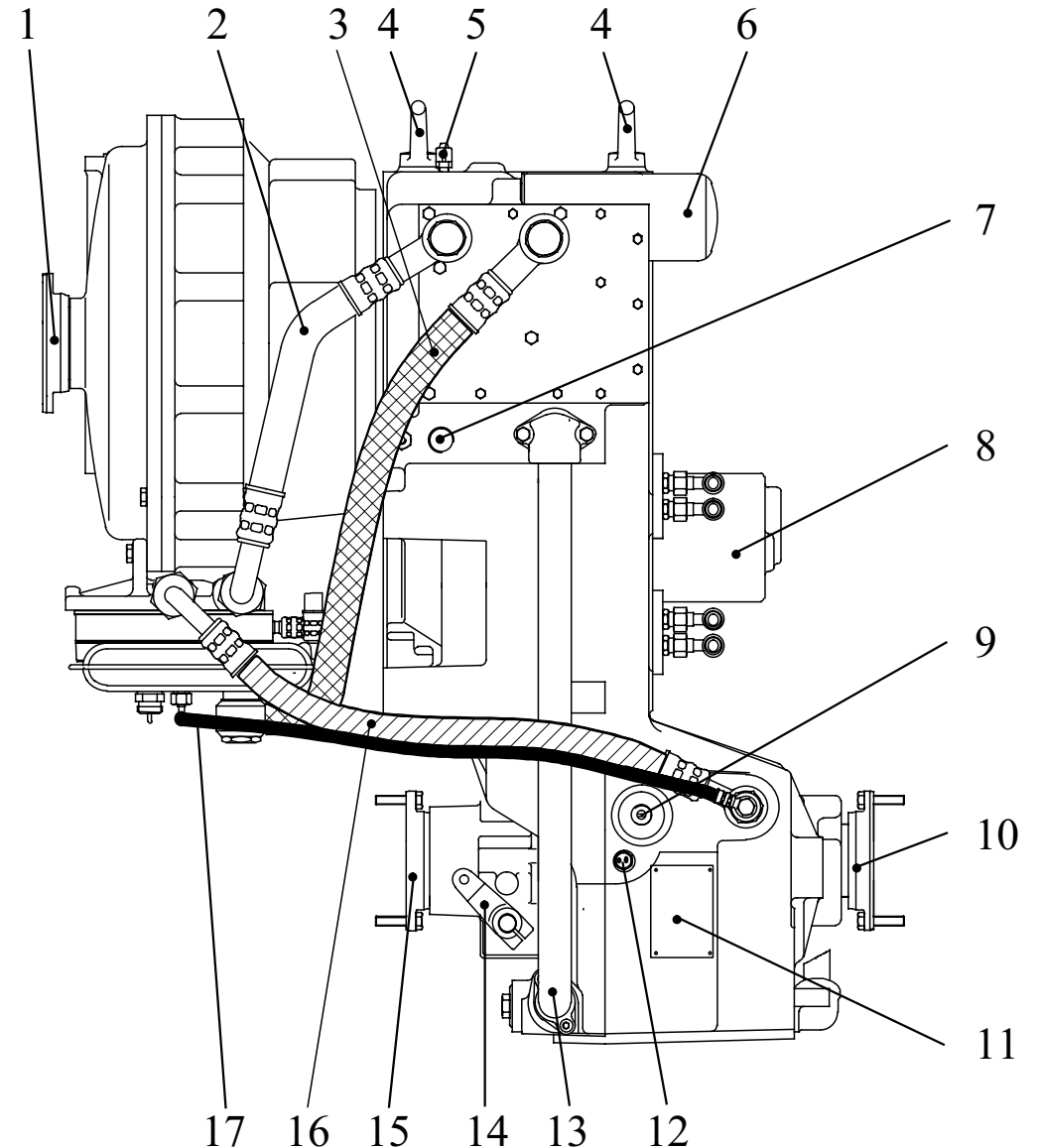
INSTALLATION VIEW 6 WG-200 SHIFT CONTROL LOWER POSITION
CENTER DISTANCE 555 MM
FRONT VIEW
TABLE - 12A

- 1 = DRIVE FLANGE - DRIVE THROUGH
UNIVERSAL SHAFT
- 2 = ELECTRIC SHIFT CONTROL
- 3 = TRANSMISSION SUSPENSION POINTS
- 4 = OUTPUT - FRONT AXLE
- 5 = OIL SUCTION PIPE
- 6 = AXLE DECLUTCH - FRONT AXLE
- 7 = OIL DRAIN PLUG
- 8 = MARKING OIL LEVEL
- 9 = OIL FILLING PIPE WITH OIL DIPSTICK
- 10 = INDUCTIVE TRANSMITTER TURBINE SPEED



INSTALLATION VIEW 6 WG-200 SHIFT CONTROL LOWER POSITION
 CENTER DISTANCE 555 MM
 SIDE VIEW
 TABLE - 12B

- 1 = DRIVE FLANGE - DRIVE THROUGH UNIVERSAL SHAFT
- 2 = HOSE LINE - FROM SHIFT CONTROL TO CONVERTER
- 3 = HOSE LINE - FROM BOX FILTER TO SHIFT CONTROL
- 4 = LIFTING LUGS
- 5 = BLEEDER
- 6 = BOX FILTER
- 7 = CONNECTION TO HEAT EXCHANGER
- 8 = EMERGENCY STEERING PUMP
- 9 = SPEEDOMETER - MECHANICAL
- 10 = OUTPUT - REAR AXLE
- 11 = MODEL IDENTIFICATION PLATE
- 12 = SPEEDOMETER - ELECTRONIC
- 13 = OIL SUCTION PIPE
- 14 = AXLE DECLUTCH - FRONT AXLE
- 15 = OUTPUT - FRONT AXLE
- 16 = HOSE LINE - FROM THE SHIFT CONTROL TO THE SUMP
- 17 = HOSE LINE - FROM SHIFT CONTROL HOUSING COVER TO THE SUMP (VENTILATION)

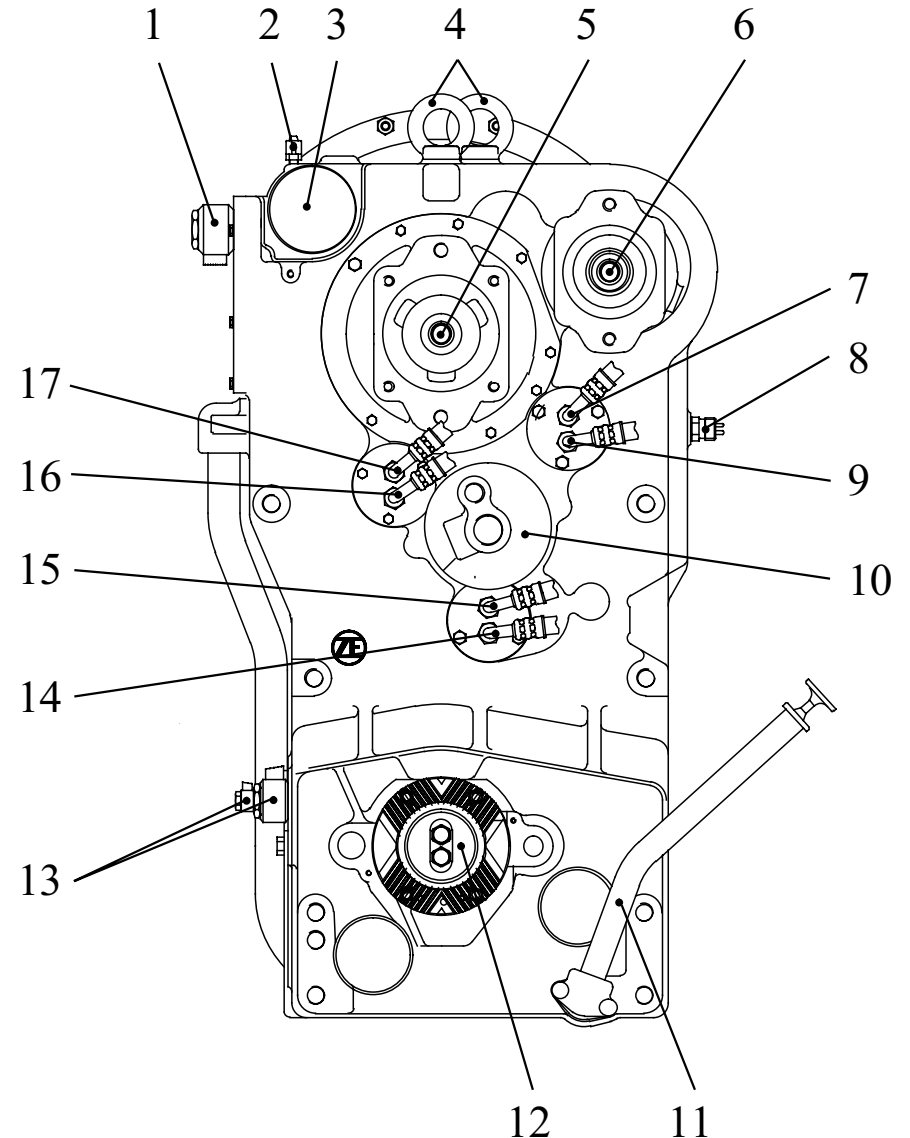


INSTALLATION VIEW 6 WG-200 SHIFT CONTROL LOWER POSITION CENTER DISTANCE 555 MM

REAR VIEW

TABLE - 12C

- 1 = CONNECTION - HOSE LINE FROM BOX FILTER TO SHIFT CONTROL
- 2 = BLEEDER
- 3 = BOX FILTER
- 4 = LIFTING LUGS
- 5 = 1st POWER TAKE-OFF
- 6 = 2nd POWER TAKE-OFF
- 7 = HOSE LINE KV
- 8 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 9 = HOSE LINE K1
- 10 = EMERGENCY STEERING PUMP
- 11 = OIL FILLER PIPE WITH OIL DIPSTICK
- 12 = OUTPUT - REAR AXLE
- 13 = CONNECTION OF THE HOSE LINES FROM THE SHIFT CONTROL AND SHIFT CONTROL HOUSING COVER TO SUMP
- 14 = HOSE LINE K4
- 15 = HOSE LINE K3
- 16 = HOSE LINE K2
- 17 = HOSE LINE KR



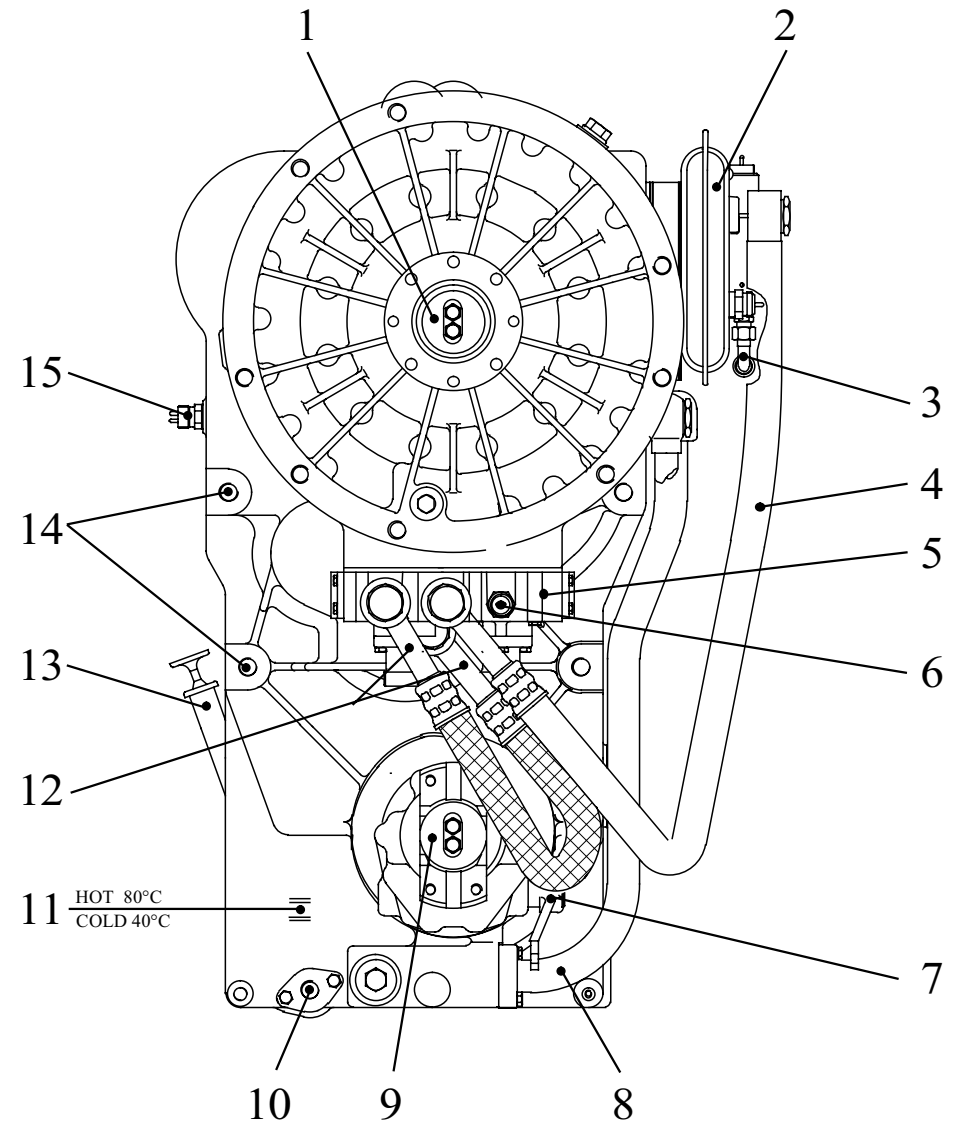
INSTALLATION VIEW 6 WG-200 WITH RETARDER

CENTER DISTANCE 555 MM

FRONT VIEW

TABLE - 13A

- 1 = DRIVE FLANGE - DRIVE THROUGH
UNIVERSAL SHAFT
- 2 = ELECTRIC SHIFT CONTROL
- 3 = WK-HOSE LINE - CONNECTION ON WK-VALVE
- 4 = OIL LINE FROM - IN FRONT OF THE CONVERTER -
TO THE RETARDER VALVE
- 5 = RETARDER VALVE
- 6 = TEMPERATURE SWITCH - MEASURING POINT
BEHIND THE CONVERTER
- 7 = ENGAGEMENT AND DISENGAGEMENT INTERAXLE
DIFFERENTIAL
- 8 = OIL SUCTION PIPE
- 9 = OUTPUT - FRONT AXLE
- 10 = OIL DRAIN PLUG
- 11 = MARKING OIL LEVEL
- 12 = OIL LINE FROM THE HEAT EXCHANGER TO THE
LUBRICATION
- 13 = OIL FILLER PIPE WITH OIL DIPSTICK
- 14 = TRANSMISSION SUSPENSION POINTS
- 15 = INDUCTIVE TRANSMITTER TURBINE SPEED



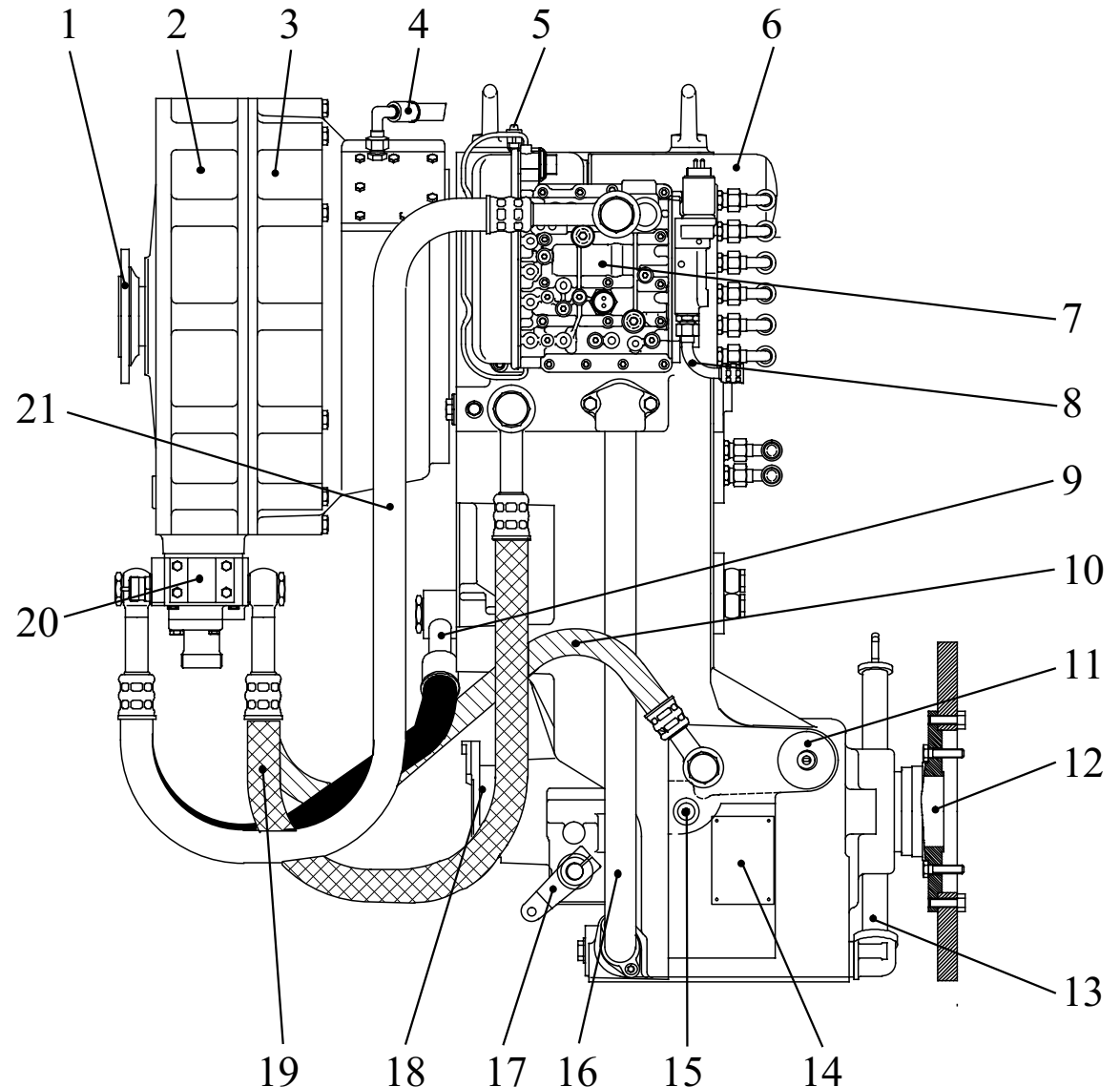
INSTALLATION VIEW 6 WG-200 WITH RETARDER

CENTER DISTANCE 555 MM

SIDE VIEW

TABLE - 13B

- 1 = DRIVE FLANGE - DRIVE THROUGH UNIVERSAL SHAFT
- 2 = STATOR
- 3 = CONVERTER HOUSING COVER
- 4 = WK-HOSE LINE - TO OIL SUPPLY FLANGE
- 5 = BLEEDER
- 6 = BOX FILTER
- 7 = ELECTRIC SHIFT CONTROL
- 8 = WK-HOSE LINE - CONNECTION ON WK-VALVE
- 9 = HOSE LINE FROM HEAT EXCHANGER TO LUBRICATION
- 10 = HOSE LINE - FROM SHIFT CONTROL TO SUMP
- 11 = SPEEDOMETER - MECHANICAL
- 12 = OUTPUT - REAR AXLE WITH BRAKE DISK
- 13 = OIL FILLER AND CHECK PIPE
- 14 = MODEL IDENTIFICATION PLATE
- 15 = SPEEDOMETER - ELECTRONIC
- 16 = OIL SUCTION PIPE
- 17 = ENGAGEMENT AND DISENGAGEMENT INTERAXLE DIFFERENTIAL
- 18 = OUTPUT - FRONT AXLE
- 19 = HOSE LINE FROM - BEHIND THE CONVERTER - TO THE RETARDER VALVE
- 20 = RETARDER VALVE
- 21 = HOSE LINE FROM - IN FRONT OF THE CONVERTER - TO THE RETARDER VALVE



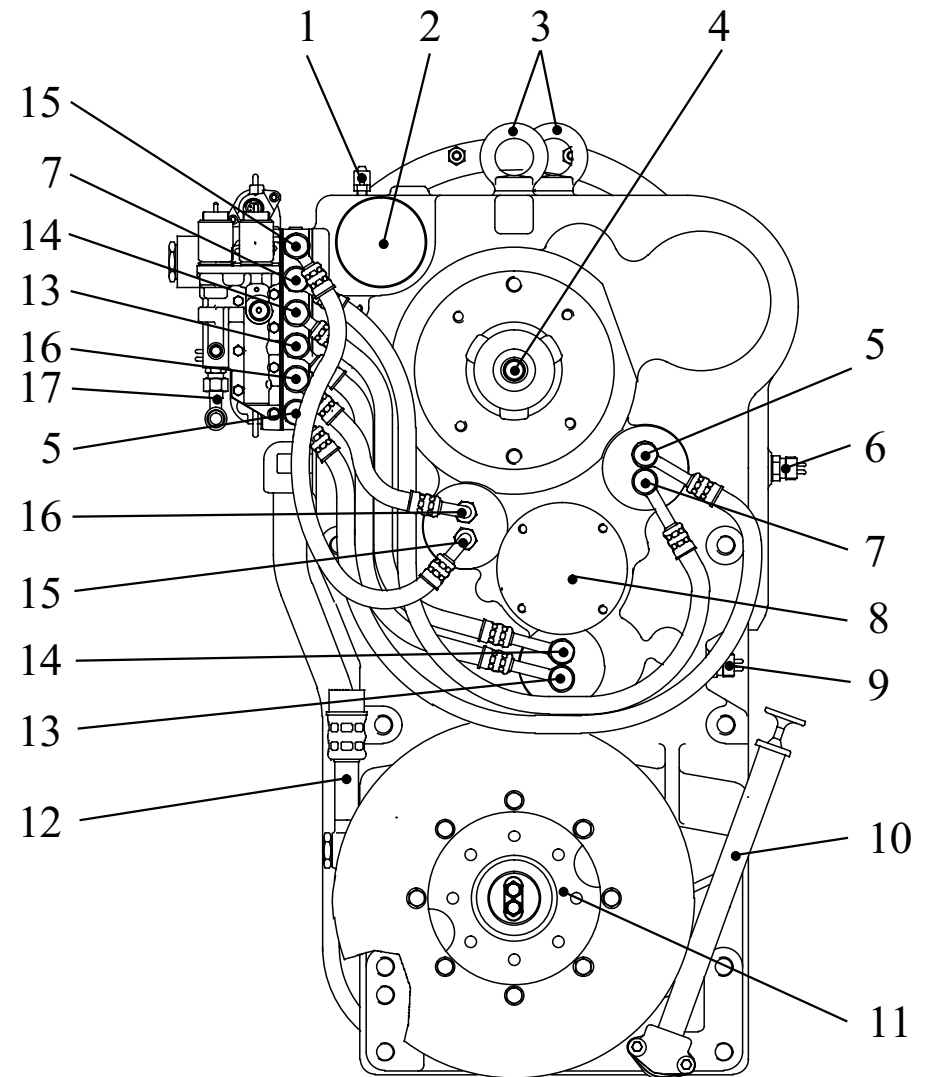
INSTALLATION VIEW 6 WG-200 WITH RETARDER

CENTER DISTANCE 555 MM

REAR VIEW

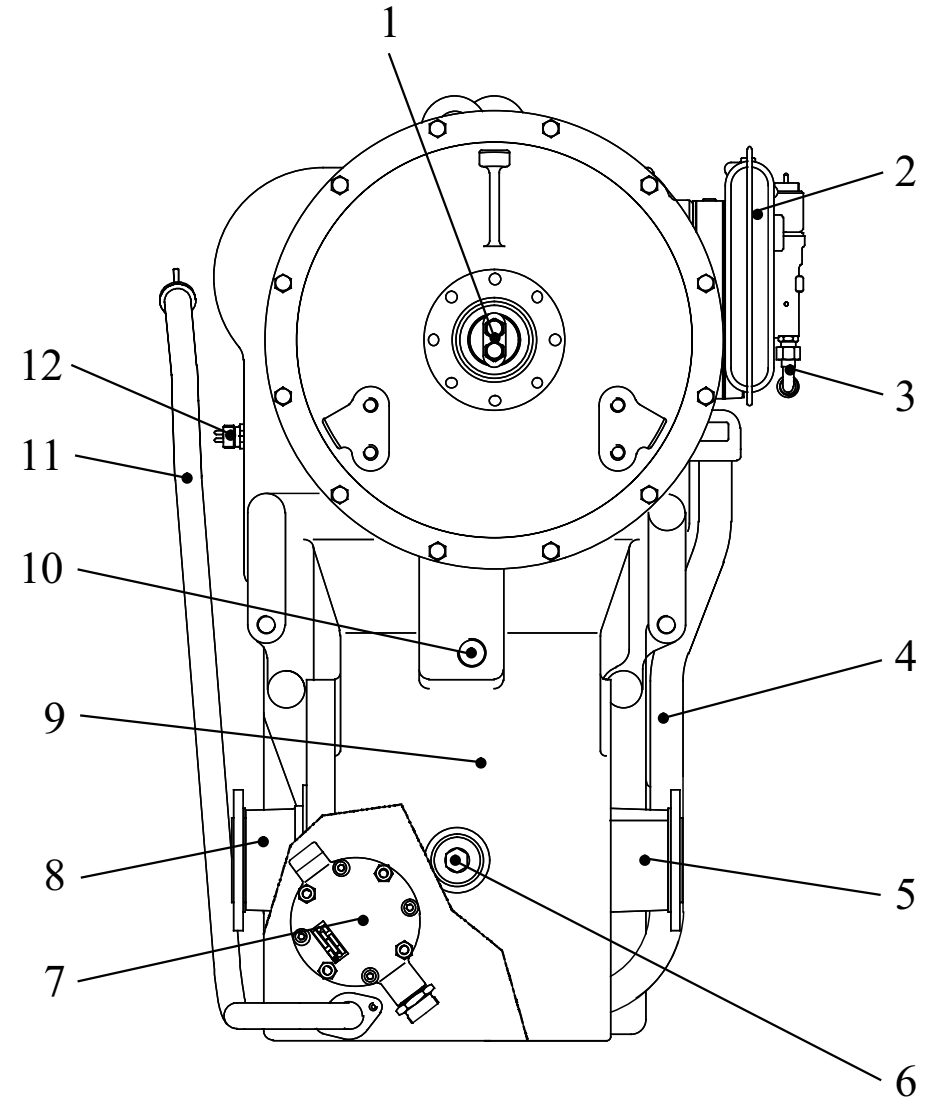
TABLE - 13C

- 1 = BLEEDER
- 2 = BOX FILTER
- 3 = LIFTING LUGS
- 4 = 1st POWER TAKE-OFF
- 5 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 6 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 7 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 8 = ATTACHMENT POSSIBILITY FOR EMERGENCY
STEERING PUMP
- 9 = INDUCTIVE TRANSMITTER FOR OUTPUT SPEED
- 10 = OIL FILLER PIPE WITH OIL DIPSTICK
- 11 = OUTPUT - REAR AXLE WITH BRAKE DISK
- 12 = HOSE LINE - LEAK OIL
- 13 = HOSE LINE K4
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 14 = HOSE LINE K3
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 15 = HOSE LINE K2
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 16 = HOSE LINE KR
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 17 = WK HOSE LINE - CONNECTION ON WK-VALVE



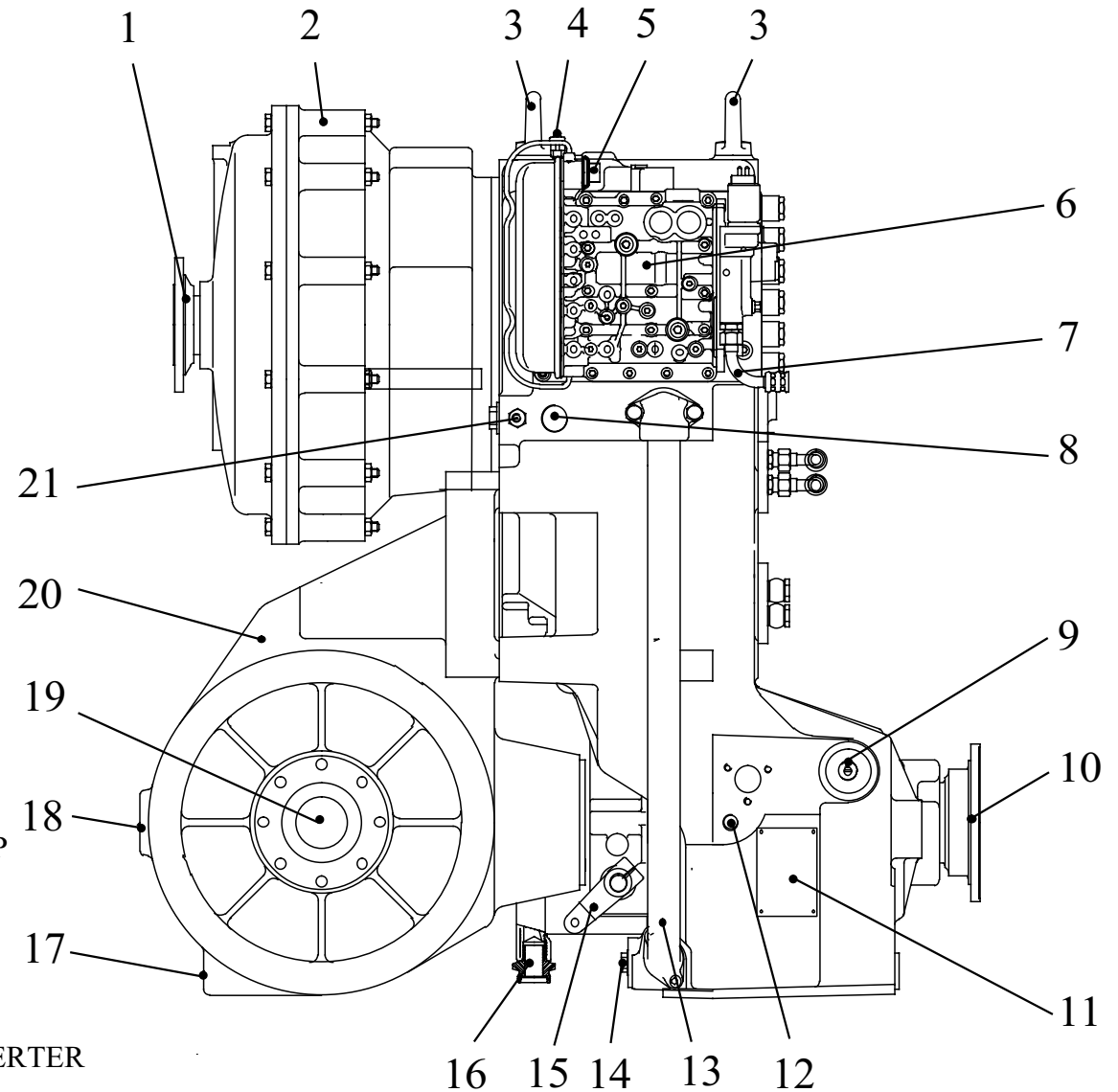
INSTALLATION VIEW 6 WG-200 WITH AXLE DRIVE APG-8/HK
 CENTER DISTANCE 555 MM
 FRONT VIEW
 TABLE - 14A

- 1 = DRIVE FLANGE - DRIVE THROUGH UNIVERSAL SHAFT
- 2 = ELECTRIC SHIFT CONTROL
- 3 = WK-HOSE LINE - CONNECTION ON WK-VALVE
- 4 = OIL SUCTION PIPE
- 5 = OUTPUT - FRONT AXLE LEFT
- 6 = OIL FILLER AND OIL-LEVEL CHECK PLUG AXLE DRIVE APG-8/HK
- 7 = EMERGENCY STEERING PUMP
- 8 = OUTPUT - FRONT AXLE RIGHT
- 9 = AXLE DRIVE - APG-8/HK
- 10 = CONNECTION FROM HEAT EXCHANGER
- 11 = OIL FILLER PIPE WITH OIL DIPSTICK FOR THE TRANSMISSION 6 WG-200
- 12 = INDUCTIVE TRANSMITTER TURBINE SPEED



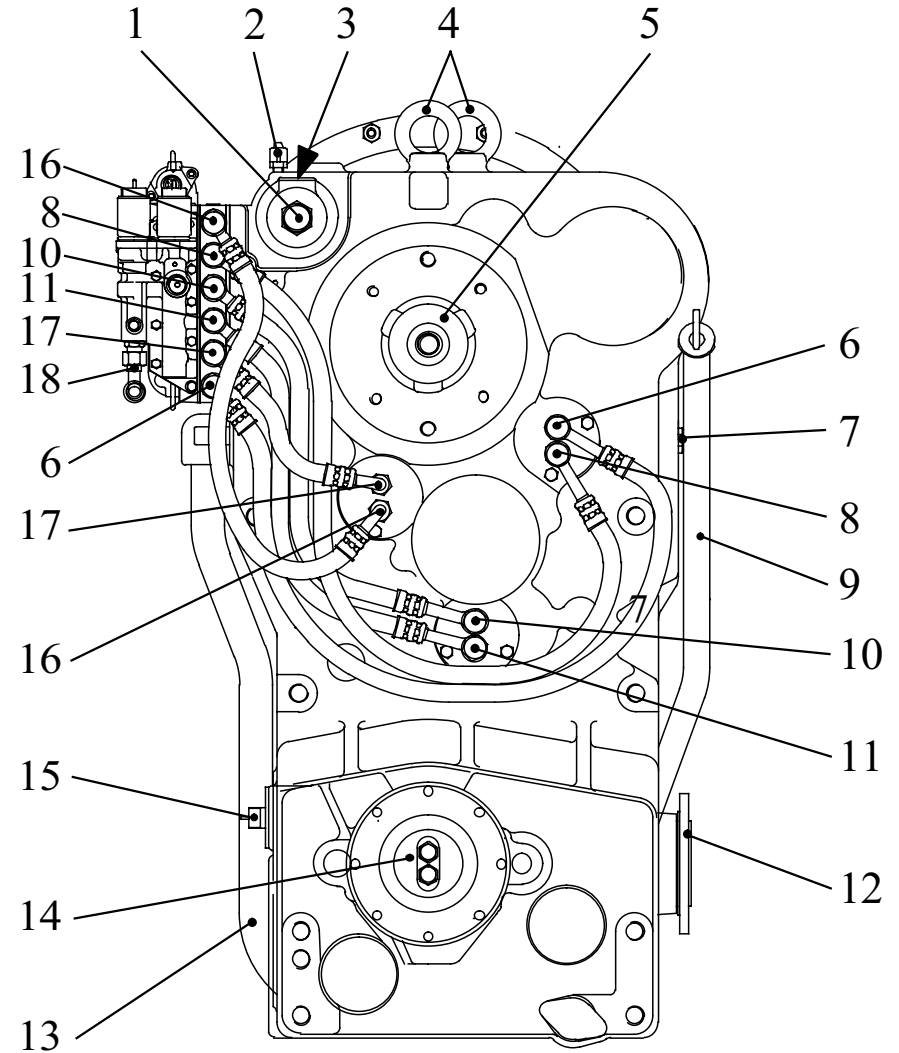
INSTALLATION VIEW 6 WG-200 WITH AXLE DRIVE APG-8/HK
 CENTER DISTANCE 555 MM
 SIDE VIEW
 TABLE - 14B

- 1 = DRIVE FLANGE - DRIVE THROUGH UNIVERSAL SHAFT
- 2 = CONVERTER HOUSING COVER
- 3 = LIFTING LUGS
- 4 = BLEEDER
- 5 = PLUG CONNECTION - CANNON
- 6 = ELECTRIC SHIFT CONTROL
- 7 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 8 = CONNECTION TO THE HEAT EXCHANGER
- 9 = SPEEDOMETER - MECHANICAL
- 10 = OUTPUT REAR AXLE
- 11 = MODEL IDENTIFICATION PLATE
- 12 = SPEEDOMETER - ELECTRONIC
- 13 = OIL SUCTION PIPE
- 14 = OIL DRAIN PLUG TRANSMISSION
- 15 = ENGAGEMENT/DISENGAGEMENT INTERAXLE DIFF.
- 16 = CONN. SUCTION LINE EMERGENCY STEERING PUMP
- 17 = OIL DRAIN PLUG - AXLE DRIVE APG-8/HK
- 18 = OIL FILLER AND OIL-LEVEL CHECK PLUG AXLE DRIVE APG-8/HK
- 19 = OUTPUT - FRONT AXLE LEFT
- 20 = AXLE DRIVE APG-8/HK
- 21 = TEMP. SWITCH MEASURING POINTS BEHIND CONVERTER



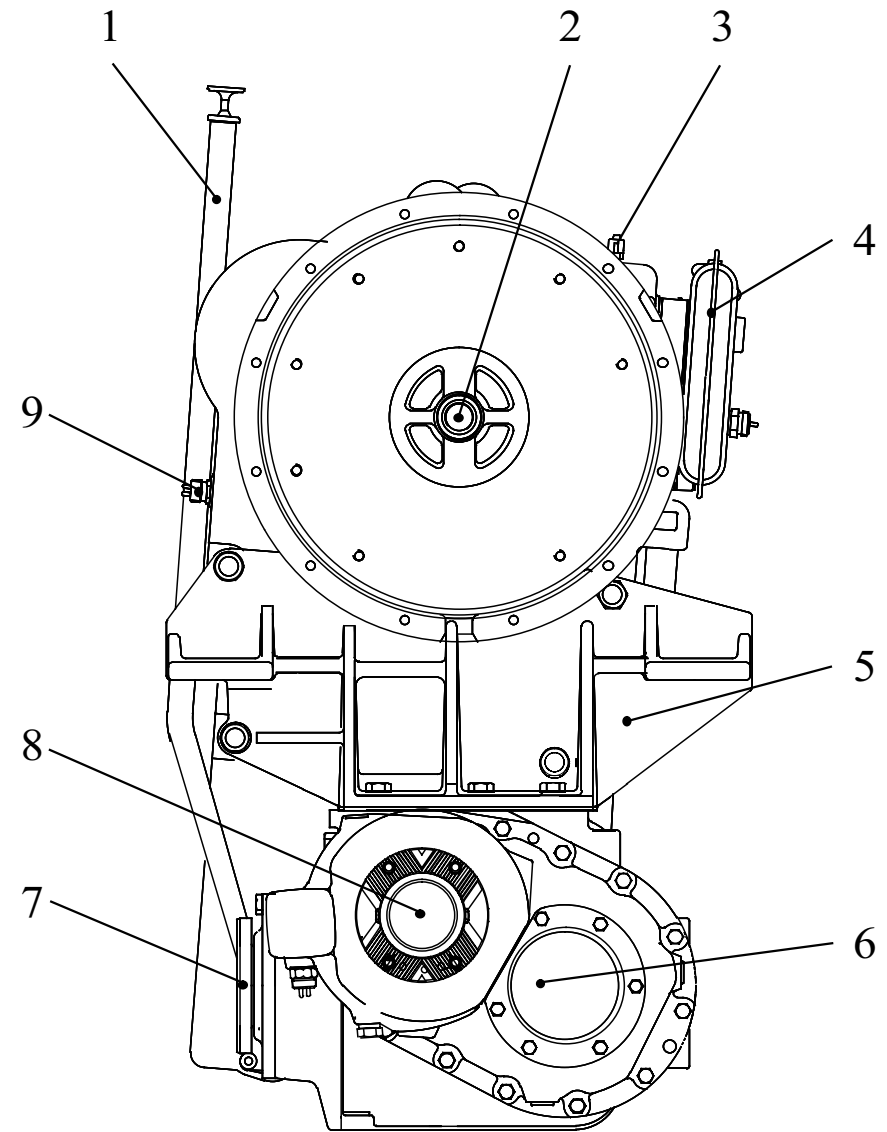
INSTALLATION VIEW 6 WG-200 WITH AXLE DRIVE APG-8/HK CENTER DISTANCE 555 MM REAR VIEW TABLE - 14C

- 1 = CONNECTION TO BOX FILTER - SEPARATE INSTALLTION
- 2 = BLEEDER
- 3 = CONNECTION FROM BOX FILTER - SEPARATE INSTALLATION
- 4 = LIFTING LUGS
- 5 = 1st POWER TAKE-OFF
- 6 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 7 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 8 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 9 = OIL FILLER PIPE WITH OIL DIPSTICK FOR
THE TRANSMISSION 6 WG-200
- 10 = HOSE LINE K3
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 11 = HOSE LINE K4
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 12 = OUTPUT - FRONT AXLE RIGHT
- 13 = OUTPUT - REAR AXLE
- 14 = SPEEDOMETER - MECHANICAL
- 15 = HOSE LINE K2
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 16 = HOSE LINE KR
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 17 = WK HOSE LINE - CONNECTION ON WK-VALVE



INSTALLATION VIEW 6 WG-200 WITH AXLE DRIVE DK-7 AND
CRAWLER SPEED
CENTER DISTANCE 555 MM
FRONT VIEW
TABLE - 15A

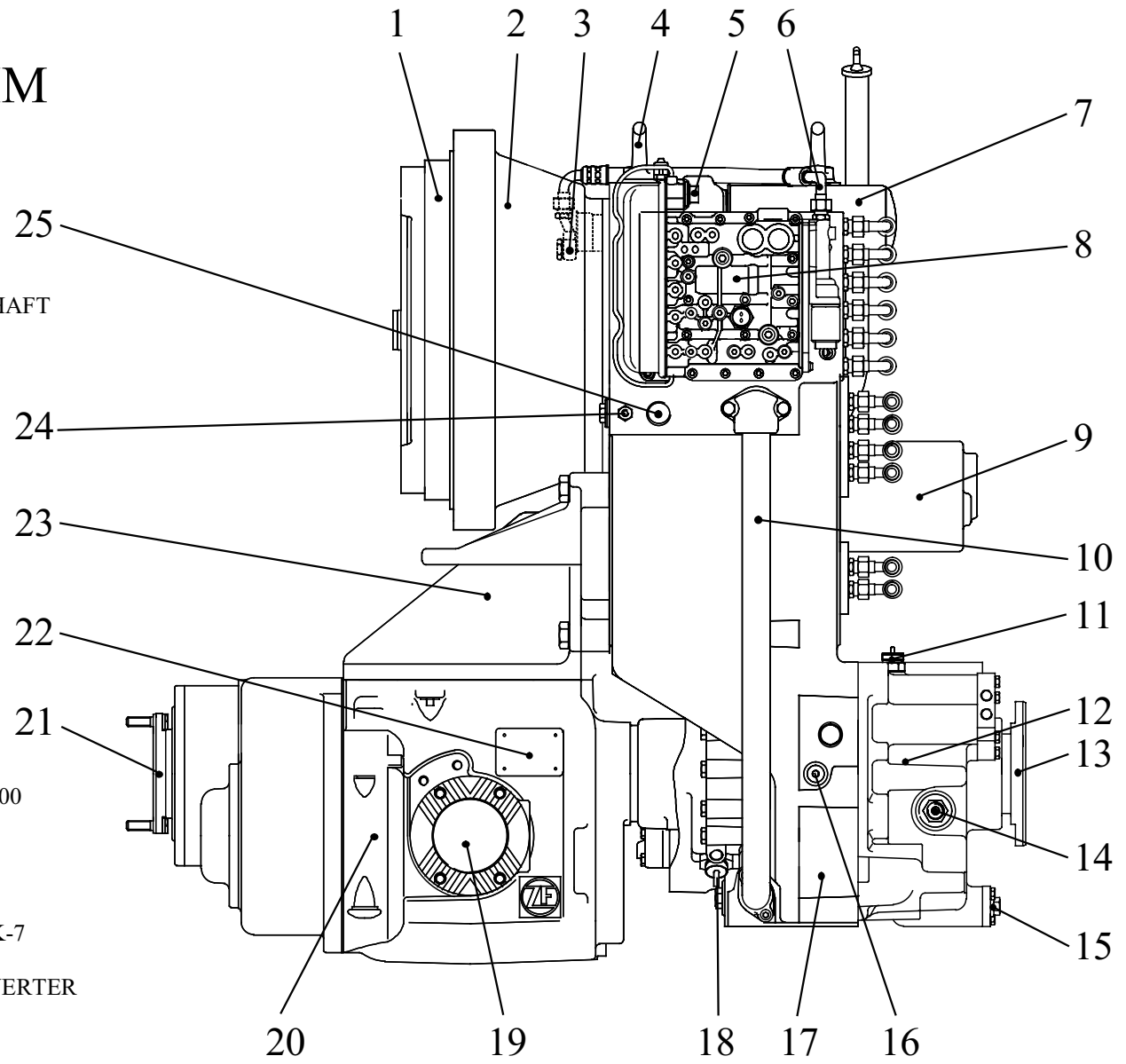
- 1 = OIL FILLER PIPE WITH OIL DIPSTICK
FOR THE TRANSMISSION 6 WG-200
- 2 = DRIVE FLANGE - DRIVE THROUGH
UNIVERSAL SHAFT
- 3 = BLEEDER
- 4 = ELECTRIC SHFT CONTROL
- 5 = CONSOLE
- 6 = AXLE DRIVE DK-7
- 7 = OUTPUT - CENTER AXLE RIGHT
- 8 = OUTPUT - FRONT AXLE
- 9 = INDUCTIVE TRANSMITTER TURBINE SPEED



INSTALLATION VIEW 6 WG-200 WITH AXLE DRIVE DK-7 AND CRAWLER SPEED CENTER DISTANCE 555 MM SIDE VIEW

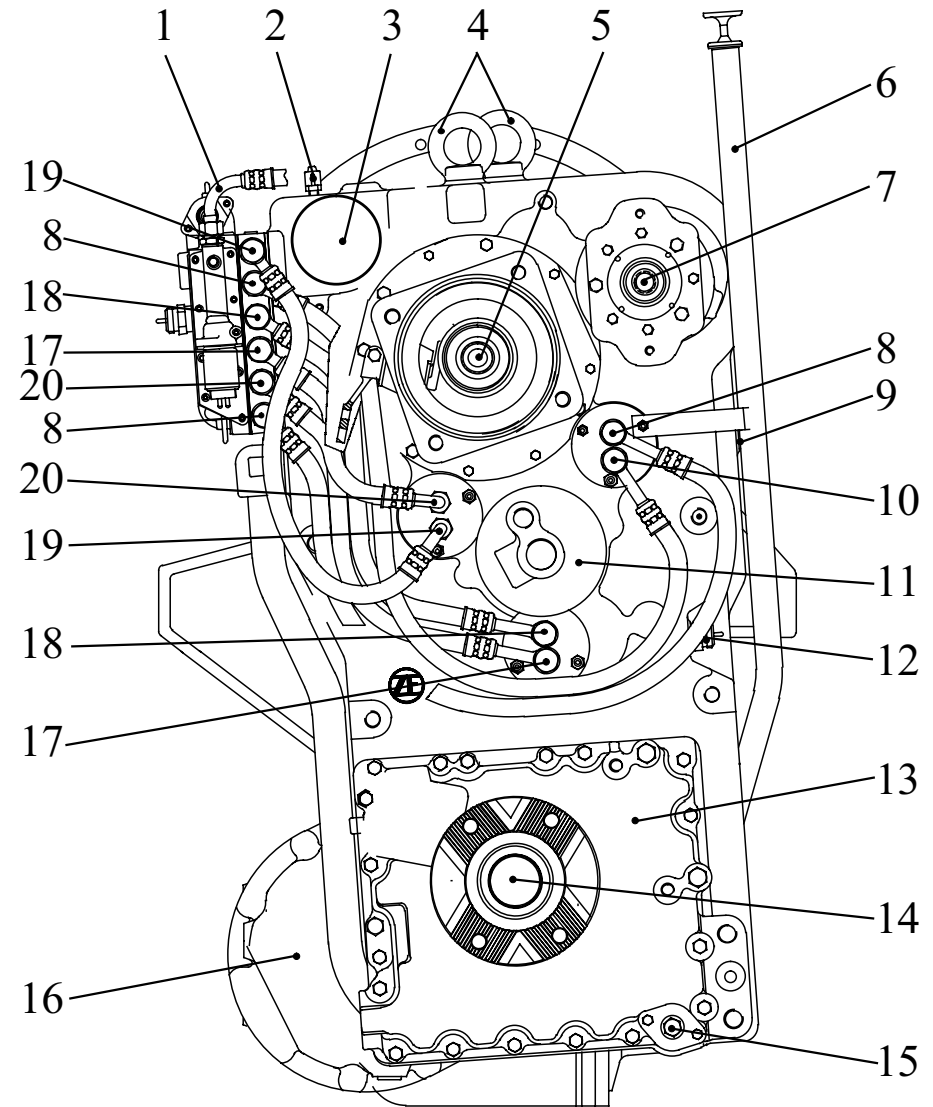
TABLE - 15B

- 1 = DRIVE FLANGE - DRIVE THROUGH UNIVERSAL SHAFT
- 2 = CONVERTER HOUSING COVER
- 3 = WK HOSE LINE - CONNECTION ON OIL SUPPLY FLANGE
- 4 = LIFTING LUGS
- 5 = PLUG CONNECTION - CANNON
- 6 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 7 = BOX FILTER
- 8 = ELECTRIC SHIFT CONTROL
- 9 = EMERGENCY STEERING PUMP
- 10 = OIL SUCTION PIPE
- 11 = CONNECTION CRAWLER SPEED DISPLAY
- 12 = CRAWLER SPEED
- 13 = OUTPUT - REAR AXLE
- 14 = SPEEDOMETER - MECHANICAL
- 15 = OIL DRAIN PLUG TRANSMISSION 6 WG-200
- 16 = SPEEDOMETER - ELECTRONIC
- 17 = MODEL IDENTIFICATION PLATE TRANSM. 6 WG-200
- 18 = CONNECTION - AXLE DECLUTCH DISPLAY
- 19 = OUTPUT - CENTER AXLE LEFT
- 20 = AXLE DRIVE DK-7
- 21 = DRIVE - FRONT AXLE
- 22 = MODEL IDENTIFICATION PLATE - AXLE DRIVE DK-7
- 23 = CONSOLE
- 24 = TEMP. SWITCH MEASURING POINT BEHIND CONVERTER



INSTALLATION VIEW 6 WG-200 WITH AXLE DRIVE DK-7 AND
 CRAWLER SPEED
 CENTER DISTANCE 555 MM
 REAR VIEW
 TABLE - 15C

- 1 = WK HOSE LINE - CONNECTION ON WK-VALVE
- 2 = BLEEDER
- 3 = BOX FILTER
- 4 = LIFTING LUGS
- 5 = 1st POWER TAKE-OFF WITH DISENGAGEMENT
- 6 = OIL FILLER PIPE WITH OIL DIPSTICK FOR TRANSM. 6 WG-200
- 7 = 2nd POWER TAKE-OFF
- 8 = HOSE LINE KV
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 9 = INDUCTIVE TRANSMITTER FOR TURBINE SPEED
- 10 = HOSE LINE K1
(CONNECTION ON AXLE AND CHANNEL PLATE)
- 11 = EMERGENCY STEERING PUMP
- 12 = INDUCTIVE TRANSMITTER FOR OUTPUT SPEED
- 13 = CRAWLER SPEED
- 14 = OUTPUT - REAR AXLE
- 15 = OIL DRAIN PLUG TRANSMISSION 6 WG-200
- 16 = AXLE DRIVE DK-7
- 17 = HOSE LINE K4 (CONNECTION ON AXLE AND CHANNEL PLATE)
- 18 = HOSE LINE K3 (CONNECTION ON AXLE AND CHANNEL PLATE)
- 19 = HOSE LINE K2 (CONNECTION ON AXLE AND CHANNEL PLATE)
- 20 = HOSE LINE KR (CONNECTION ON AXLE AND CHANNEL PLATE)



SCHEDULE OF MEASURING POINTS 6 WG-200 WITH ALUMINUM DIE-CASTING SHIFT CONTROL; WK-VALVE AND VARIOVALVE

TABLE - 16

THE MARKED POSITIONS (e.g. 53) CORRESPOND WITH THE POSITIONS ON TABLE 20 !!
 THE MEASUREMENTS HAVE TO BE CARRIED OUT AT HOT TRANSMISSION (ABOUT 80° - 95° C) !

MEASURING POINTS FOR PRESSURE OIL AND TEMPERATURE

51 = IN FRONT OF THE CONVERTER	M10x1
OPENING PRESSURE 8,5 bar	
53 = CLUTCH FORWARD	KV M10x1
55 = CLUTCH REVERSE	KR M10x1
56 = CLUTCH	K1 M10x1
57 = CLUTCH	K2 M10x1
58 = CLUTCH	K3 M10x1
60 = CLUTCH	K4 M10x1
63 = BEHIND THE CONVERTER	M14x1,5
TEMPERATURE (100° C, SHORT-TIME 120° C)	
AND	
OPENING PRESSURE 2,5 bar	
65 = SYSTEM PRESSURE 16 +2 bar	M10x1
66 = REDUCING VALVE 10 bar	M10x1
67 = WK CONTROL PRESSURE 13 ± 1 bar	M10x1

MEASURING POINTS FOR DELIVERY RATES

15 = CONNECTION TO HEAT EXCHANGER	M26x1,5
16 = CONNECTION FROM HEAT EXCHANGER	M26x1,5

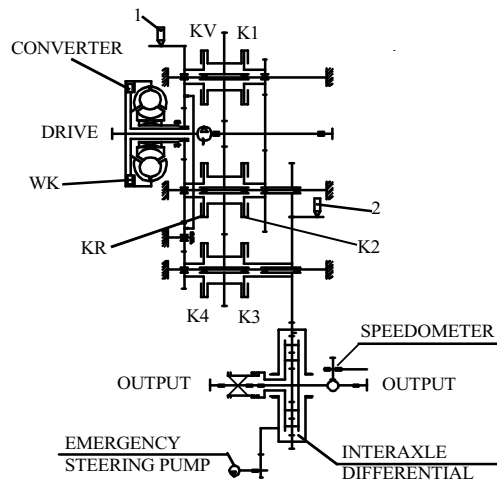
INDUCTIVE TRANSMITTER

1 = INDUCTIVE TRANSMITTER TURBINE SPEED	M18x1,5
2 = INDUCTIVE TRANSMITTER OUTPUT SPEED	M18x1,5

SOLENOID VALVES

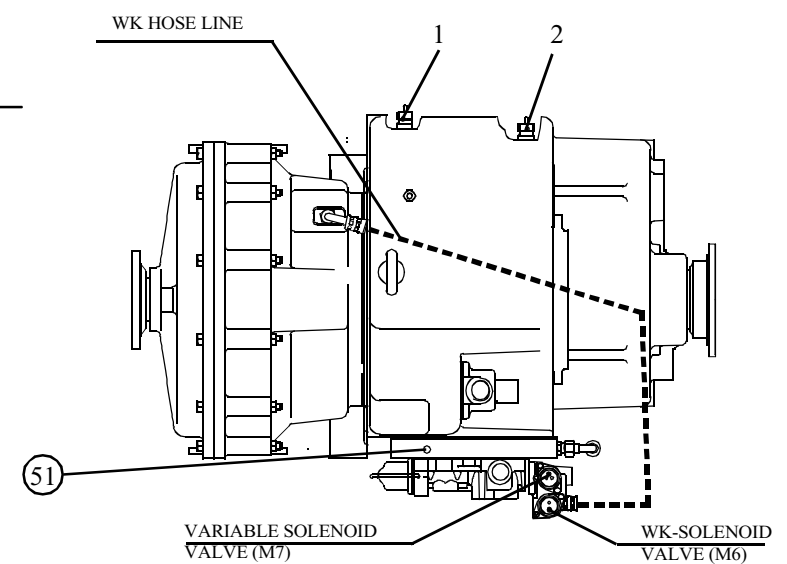
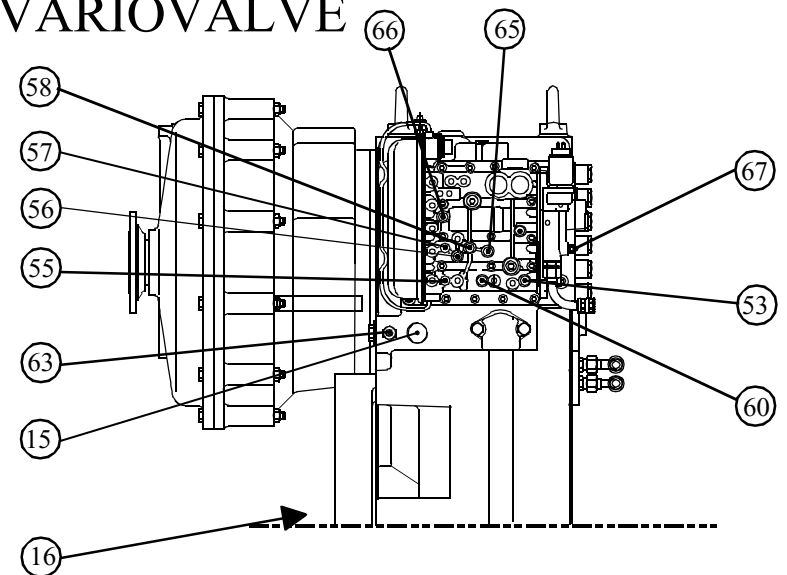
M6 = WK-VALVE
M7 = VARIOVALVE

TRANSMISSION DIAGRAM



SCHEME CODE "H" 6-SPEED VERSION

GANG	• MAGNET UNDER VOLTAGE									
	FORWARD						REVERSE			NEUTRAL
	1	2	3	4	5	6	1	2	3	
M1							•	•	•	
M2	•	•					•			
M3	•		•		•					
M4	•	•	•	•			•	•		
M5						•				
CLUTCH	KV K1	K4 K1	KV K2	K4 K2	KV K3	K4 K3	KR K1	KR K2	KR K3	K3



SCHEDULE OF MEASURING POINTS 6 WG-200 WITH ALUMINUM DIE-CASTING SHIFT CONTROL AND WK-VALVE

TABLE - 17

THE MEASUREMENTS HAVE TO BE CARRIED OUT AT HOT TRANSMISSION (ABOUT. 80° - 95° C)
 THE MARKED POSITIONS (e.g. 53) CORRESPOND WITH THE POSITIONS ON TABLE 21 !!

MESASURING POINTS FOR PRESSURE OIL AND TEMPERATURE

- | | | |
|---|----|---------|
| 51 = IN FRONT OF THE CONVERTER | | M10x1 |
| OPENING PRESSURE 8,5 bar | | |
| 53 = CLUTCH FORWARD | KV | M10x1 |
| 55 = CLUTCH REVERSE | KR | M10x1 |
| 56 = CLUTCH | K1 | M10x1 |
| 57 = CLUTCH | K2 | M10x1 |
| 58 = CLUTCH | K3 | M10x1 |
| 60 = CLUTCH | K4 | M10x1 |
| 63 = BEHIND THE CONVERTER | | M14x1,5 |
| TEMPERATURE (100° C, SHORT-TIME 120° C) | | |
| AND | | |
| OPENING PRESSURE 2,5 bar | | |
| 65 = SYSTEM PRESSURE 16 +2 bar | | M10x1 |
| 66 = REDUCING VALVE 10 bar | | M10x1 |
| 67 = WK CONTROL PRESSURE 13 ± 1 bar | | M10x1 |

MEASURING POINTS FOR DELIVERY RATES

- | | |
|-------------------------------------|---------|
| 15 = CONNECTION TO HEAT EXCHANGER | M26x1,5 |
| 16 = CONNECTION FROM HEAT EXCHANGER | M26x1,5 |

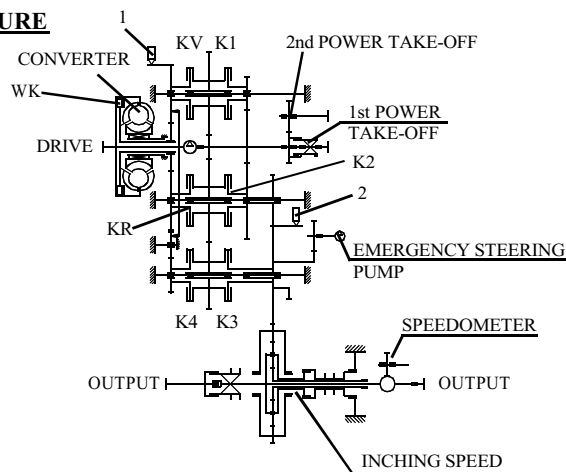
INDUCTIVE TRANSMITTER

- | | |
|---|---------|
| 1 = INDUCTIVE TRANSMITTER TURBINE SPEED | M18x1,5 |
| 2 = INDUCTIVE TRANSMITTER OUTPUT SPEED | M18x1,5 |

SOLENOID VALVES

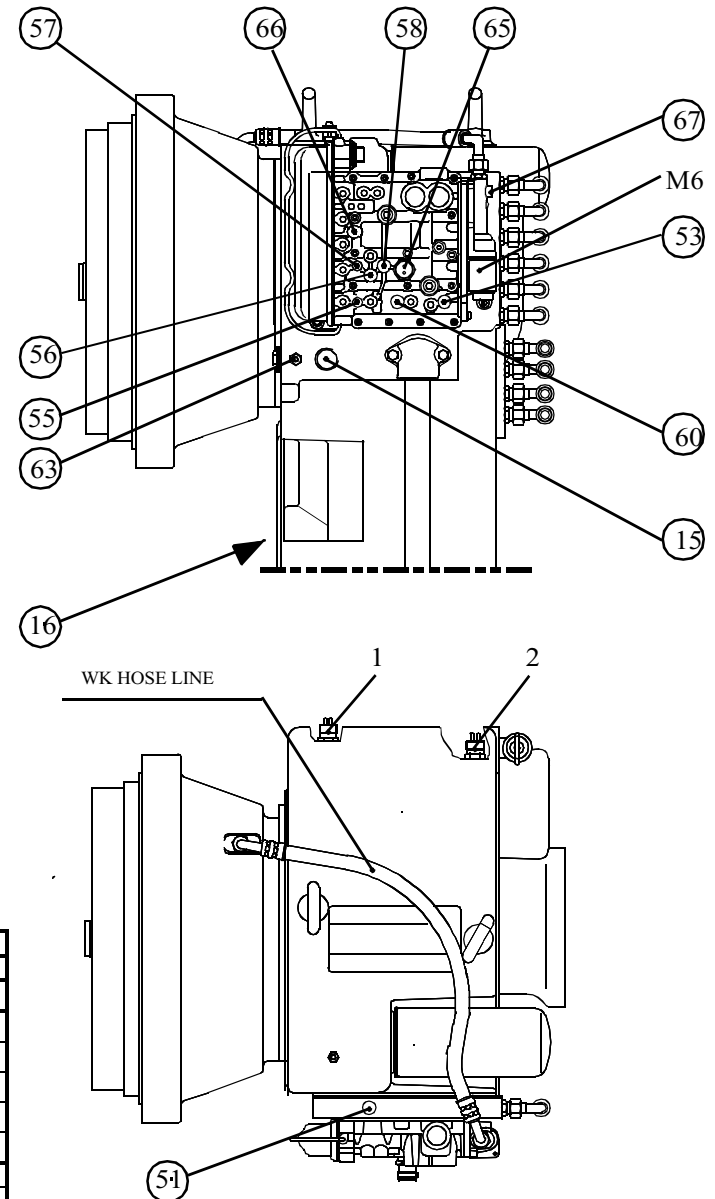
M6 = WK-VALVE

TRANSMISSION DIAGRAM



SCHEMA CODE "H" 6 SPEED VERSION

SPEED	• MAGNET UNDER VOLTAGE									
	FORWARD						REVERSE			NEUTRAL
	1	2	3	4	5	6	1	2	3	
M1							•	•	•	
M2	•	•					•			
M3	•		•		•					
M4	•	•	•	•			•	•		
M5		•		•		•				
CLUTCH	KV K1	K4 K1	KV K2	K4 K2	KV K3	K4 K3	KR K1	KR K2	KR K3	K3



SCHEDULE OF MEASURING POINTS 6 WG-200 WITH ALUMINUM DIE-CASTING SHIFT CONTROL, WK-VALVE, VARIOVALVE AND RETARDER

TABLE - 18

THE MARKED POSITIONS (e.g. 53) CORRESPOND WITH THE POSITIONS ON TABLE 22!!

THE MEASUREMENTS HAVE TO BE CARRIED OUT AT HOT TRANSMISSION (ABOUT 80° C - 95° C)!

MEASURING POINTS FOR PRESSURE OIL AND TEMPERATURE

51 = IN FRONT OF CONVERTER OPENING PRESSURE 8,5 bar	M10x1
53 = CLUTCH FORWARD KV	M10x1
55 = CLUTCH REVERSE KR	M10x1
56 = CLUTCH K1	M10x1
57 = CLUTCH K2	M10x1
58 = CLUTCH K3	M10x1
60 = CLUTCH K4	M10x1
63 = BEHIND THE CONVERTER	M14x1,5
TEMPERATURE (100° C, SHORT-TIME 120° C) AND	
OPENING PRESSURE 2,5 bar	
65 = SYSTEM PRESSURE 16 +2 bar	M10x1
66 = REDUCING VALVE 10 bar	M10x1
67 = WK CONTROL PRESSURE 13 ± 1 bar	M10x1

MEASURING POINTS FOR DELIVERY RATES

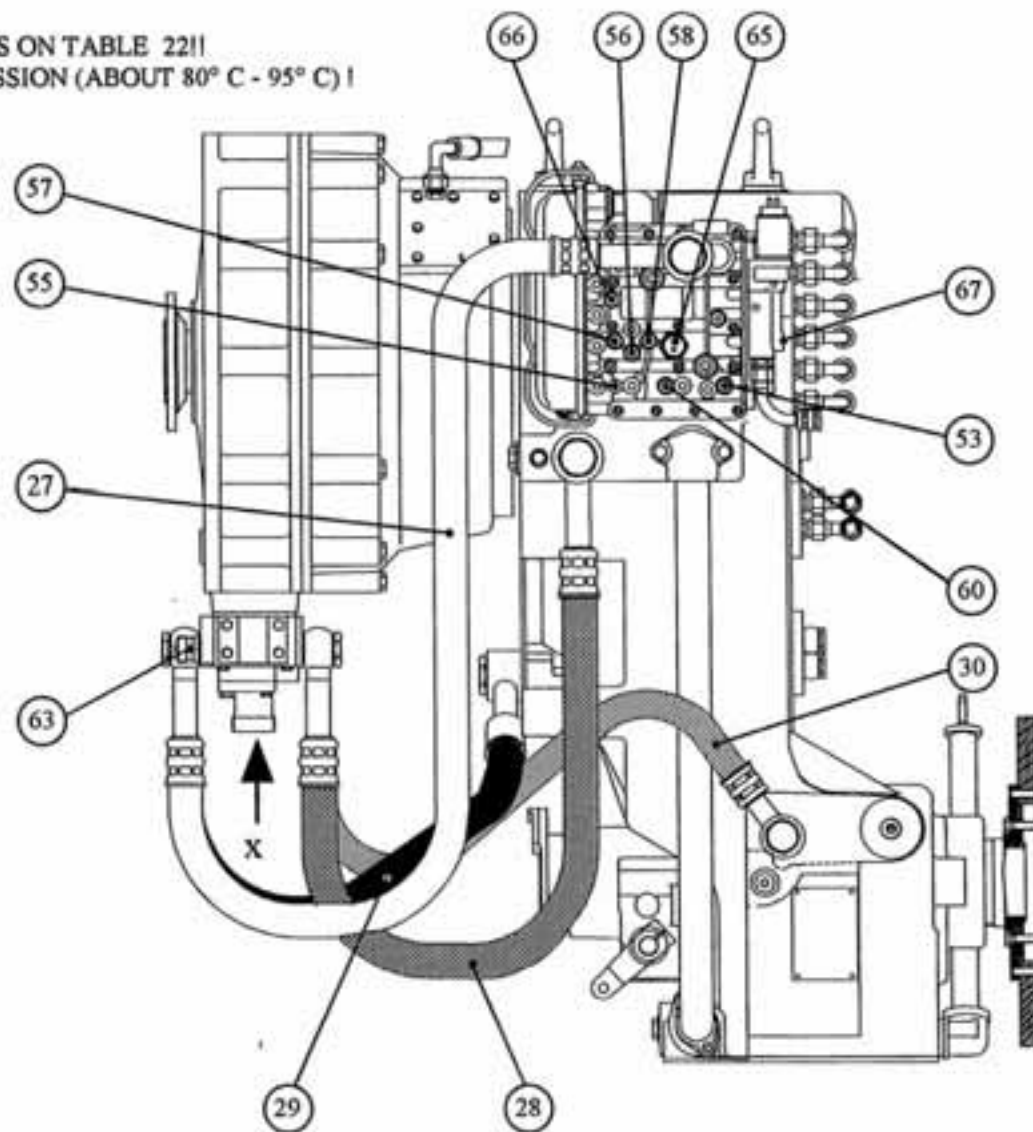
15 = CONNECTION TO HEAT EXCHANGER	M45x2
16 = CONNECTION FROM HEAT EXCHANGER	M45x2
27 = CONNECTION IN FRONT OF CONVERTER TO HEAT EXCHANGER (THROUGH RETARDER VALVE)	M26x1,5
28 = CONNECTION BEHIND CONVERTER TO HEAT EXCHANGER (THROUGH RETARDER VALVE)	M26x1,5
29 = CONNECTION FROM HEAT EXCHANGER TO LUBRICATION (THROUGH RETARDER VALVE)	M26x1,5
30 = CONNECTION RETURN FLOW INTO SUMP	M26x1,5

INDUCTIVE TRANSMITTER

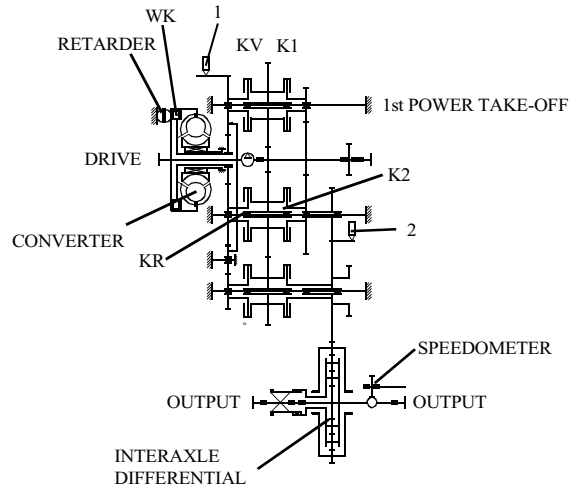
1 = INDUCTIVE TRANSMITTER TURBINE SPEED	M18x1,5
2 = INDUCTIVE TRANSMITTER OUTPUT SPEED	M18x1,5

SOLENOID VALVES

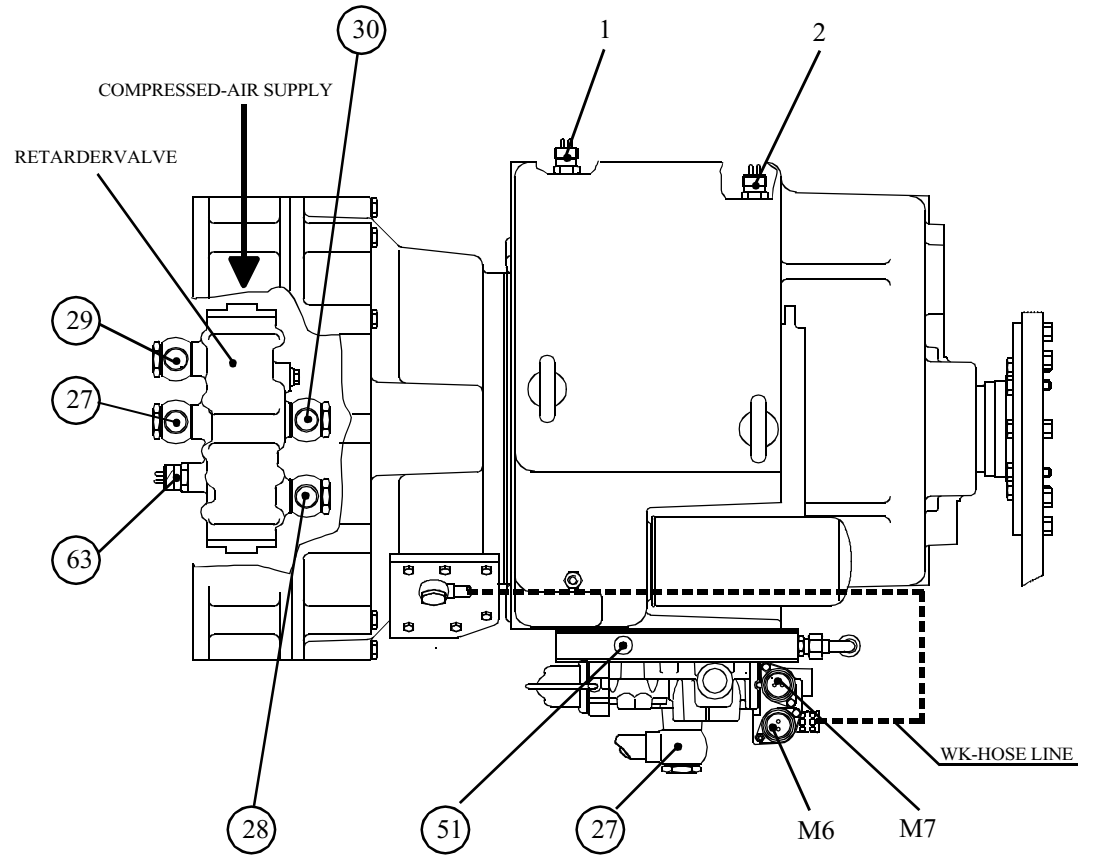
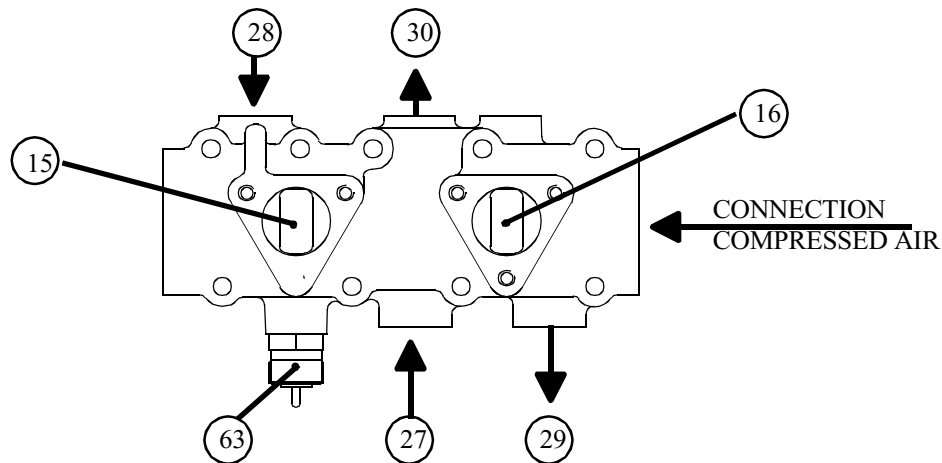
M6 = WK-VALVE
M7 = VARIOVALVE



TRANSMISSION DIAGRAM



VIEW "X"
RETARDER VALVE
(ILLUSTRATED AT A 90° - TURN)



SCHEMA CODE "H"
6-SPEED VERSION

SPEED	● MAGNET UNDER VOLTAGE									
	FORWARD						REVERSE			NEUTRAL
	1	2	3	4	5	6	1	2	3	
M1							•	•	•	
M2	•	•					•			
M3	•		•		•					
M4	•	•	•	•			•	•		
M5		•		•		•				
CLUTCH	KV	K4	KV	K4	KV	K4	KR	KR	KR	K3
	K1	K1	K2	K2	K3	K3	K1	K2	K3	

SCHEDULE OF MEASURING POINTS 6 WG-200 WITH ALUMINUM DIE-CASTING SHIFT CONTROL, WK-VALVE, AND RETARDER

TABLE - 19

THE MARKED POSITIONS (e.g. 53) CORRESPOND WITH THE POSITIONS ON TABLE 23!!
 THE MEASUREMENTS HAVE TO BE CARRIED OUT AT HOT TRANSMISSION (ABOUT 80° C - 95° C) !

MEASURING POINTS FOR PRESSURE OIL AND TEMPERATURE

51 =	IN FRONT OF CONVERTER OPENING PRESSURE 8,5 bar	M10x1
53 =	CLUTCH FORWARD KV	M10x1
55 =	CLUTCH REVERSE KR	M10x1
56 =	CLUTCH K1	M10x1
57 =	CLUTCH K2	M10x1
58 =	CLUTCH K3	M10x1
60 =	CLUTCH K4	M10x1
63 =	BEHIND THE CONVERTER	M14x1,5
	TEMPERATURE (100° C, SHORT-TIME 120° C) AND	
	OPENING PRESSURE 2,5 bar	
65 =	SYSTEM PRESSURE 16 +2 bar	M10x1
66 =	REDUCING VALVE 10 bar	M10x1
67 =	WK CONTROL PRESSURE 13 1 bar	M10x1

MEASURING POINTS FOR DELIVERY RATES

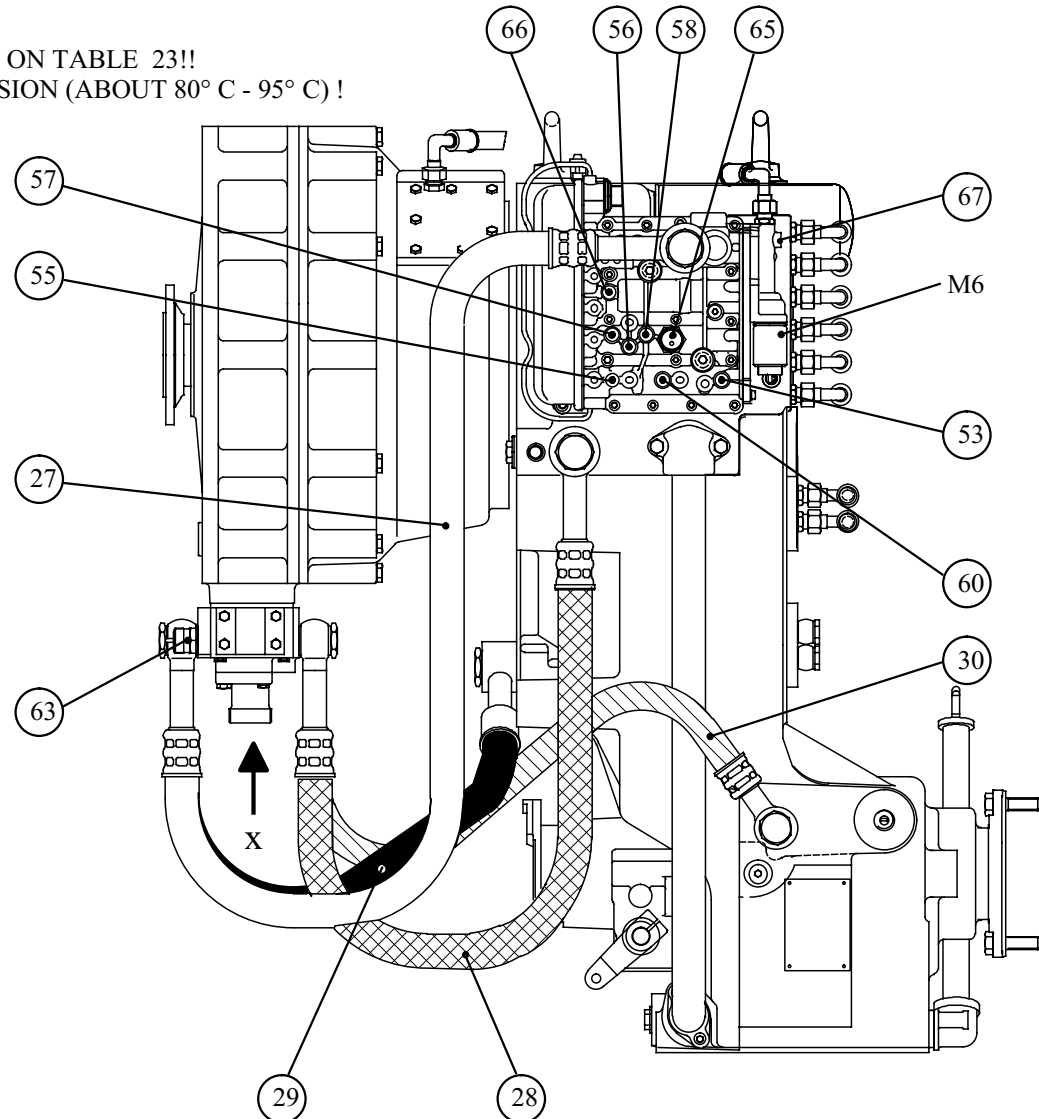
15 =	CONNECTION TO HEAT EXCHANGER	M45x2
16 =	CONNECTION FROM HEAT EXCHANGER	M45x2
27 =	CONNECTION IN FRONT OF CONVERTER TO HEAT EXCHANGER (THROUGH RETARDER VALVE)	M26x1,5
28 =	CONNECTION BEHIND CONVERTER TO HEAT EXCHANGER (THROUGH RETARDER VALVE)	M26x1,5
29 =	CONNECTION FROM HEAT EXCHANGER TO LUBRICATION (THROUGH RETARDER VALVE)	M26x1,5
30 =	CONNECTION RETURN FLOW INTO SUMP	M26x1,5

INDUCTIVE TRANSMITTER

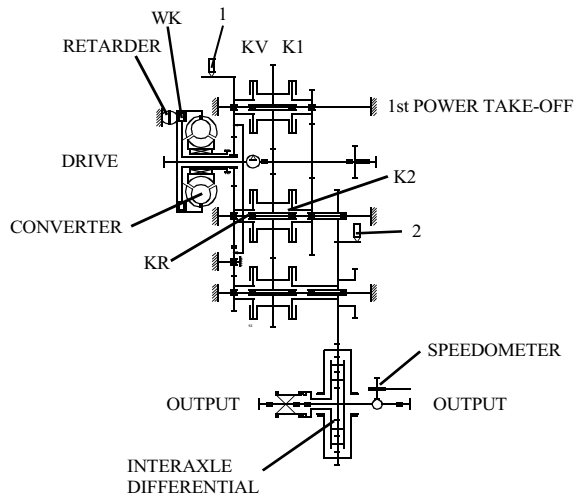
1 =	INDUCTIVE TRANSMITTER TURBINE SPEED	M18x1,5
2 =	INDUCTIVE TRANSMITTER OUTPUT SPEED	M18x1,5

SOLENOID VALVES

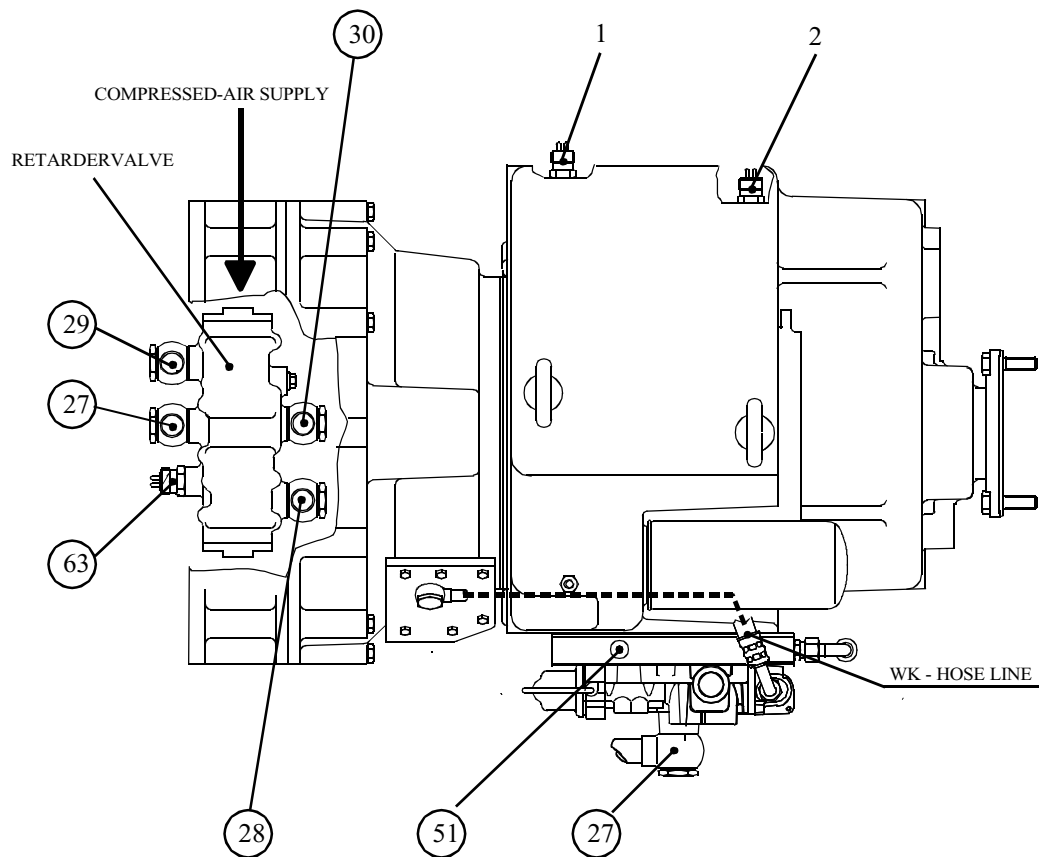
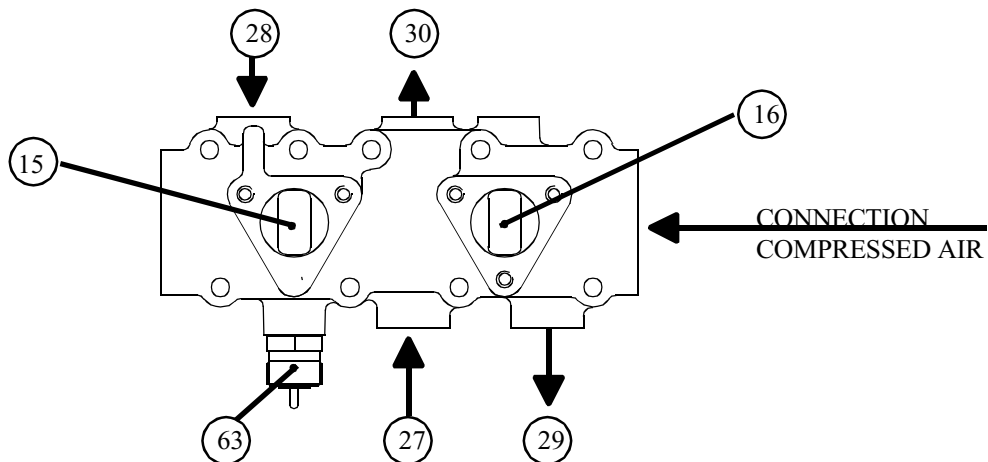
M6 = WK-VALVE



TRANSMISSION DIAGRAM



**VIEW "X"
RETARDER VALVE
(ILLUSTRATED AT A 90° - TURN)**

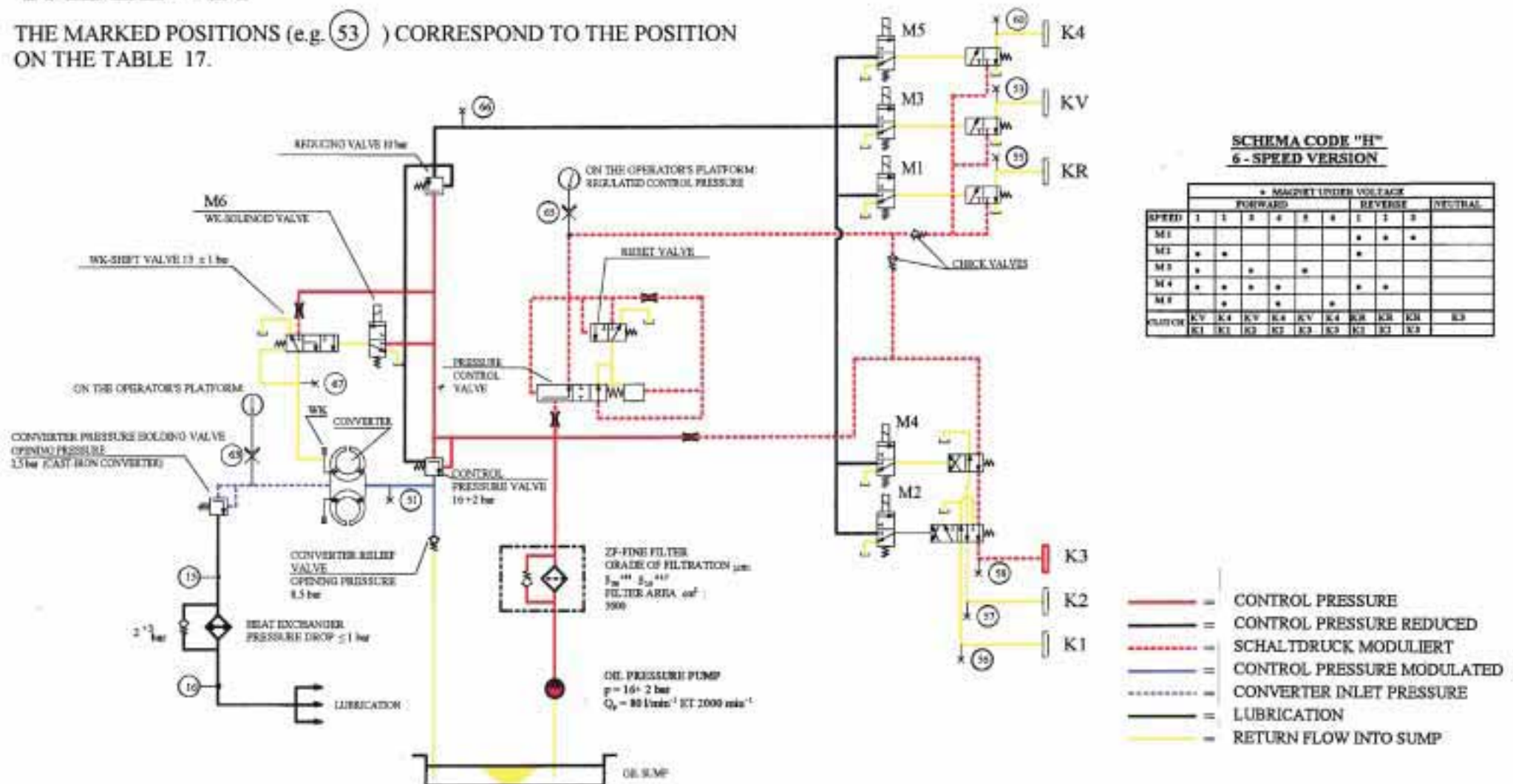


**SCHEME CODE "H"
6-SPEED VERSION**

SPEED	MAGNET UNDER VOLTAGE						NEUTRAL		
	FORWARD			REVERSE			NEUTRAL		
	1	2	3	4	5	6	1	2	3
M1							•	•	•
M2	•	•					•		
M3	•		•		•				
M4	•	•	•	•			•	•	
M5			•	•		•			
CLUTCH	KV	K4	KV	K4	KV	K4	KR	KR	KR
	K1	K1	K2	K2	K3	K3	K1	K2	K3

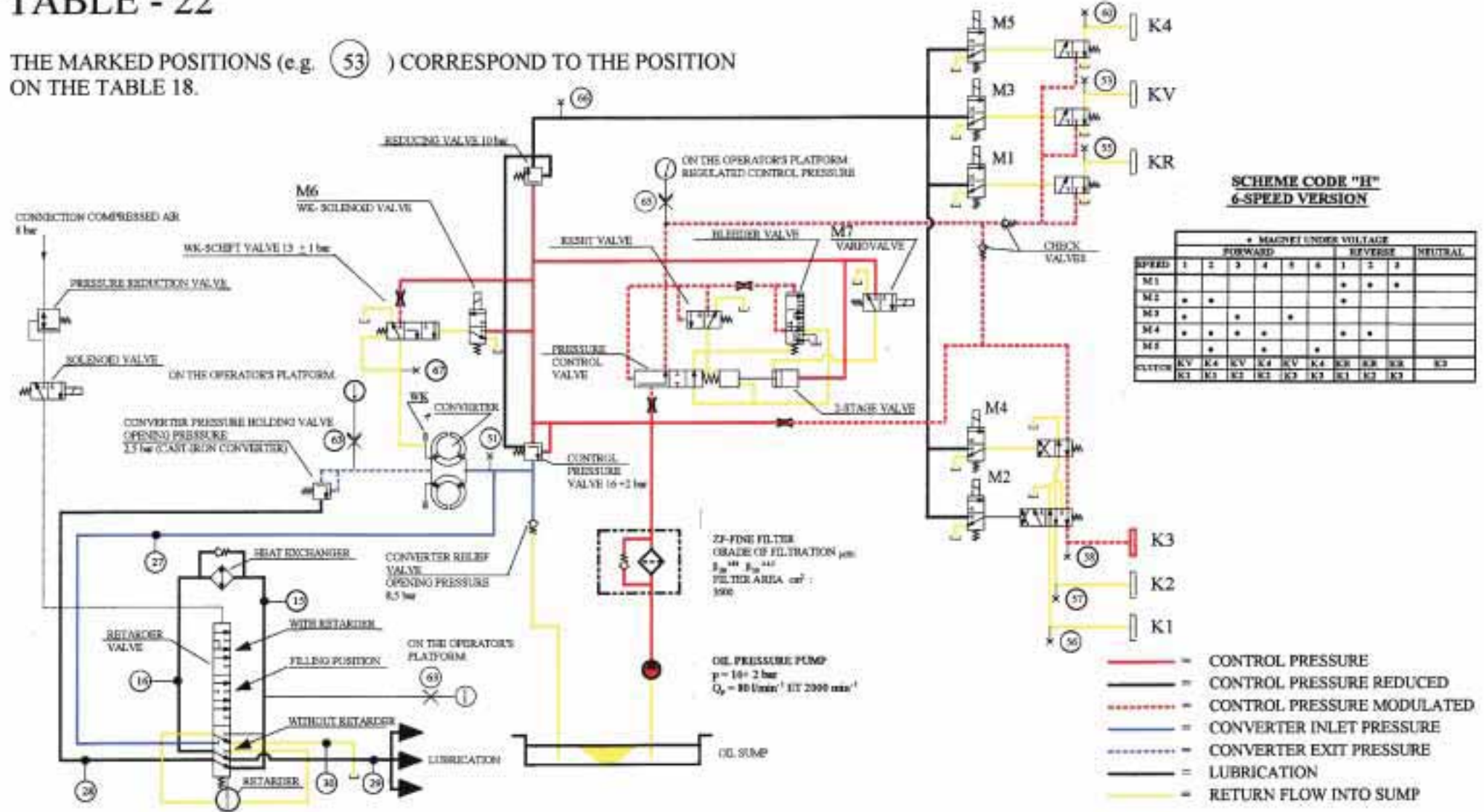
OIL CIRCULATION DIAGRAM 6 WG-200 WITH ELECTRIC SHIFT CONTROL AND WK - N EURTAL - TABLE - 21

THE MARKED POSITIONS (e.g. 53)) CORRESPOND TO THE POSITION ON THE TABLE 17.



OIL CIRCULATION DIAGRAM 6 WG-200 WITH ELECTRIC SHIFT CONTROL 2-STAGE BLEEDER VALVE; VARIOVALVE; WK AND RETARDER - NEUTRAL - TABLE - 22

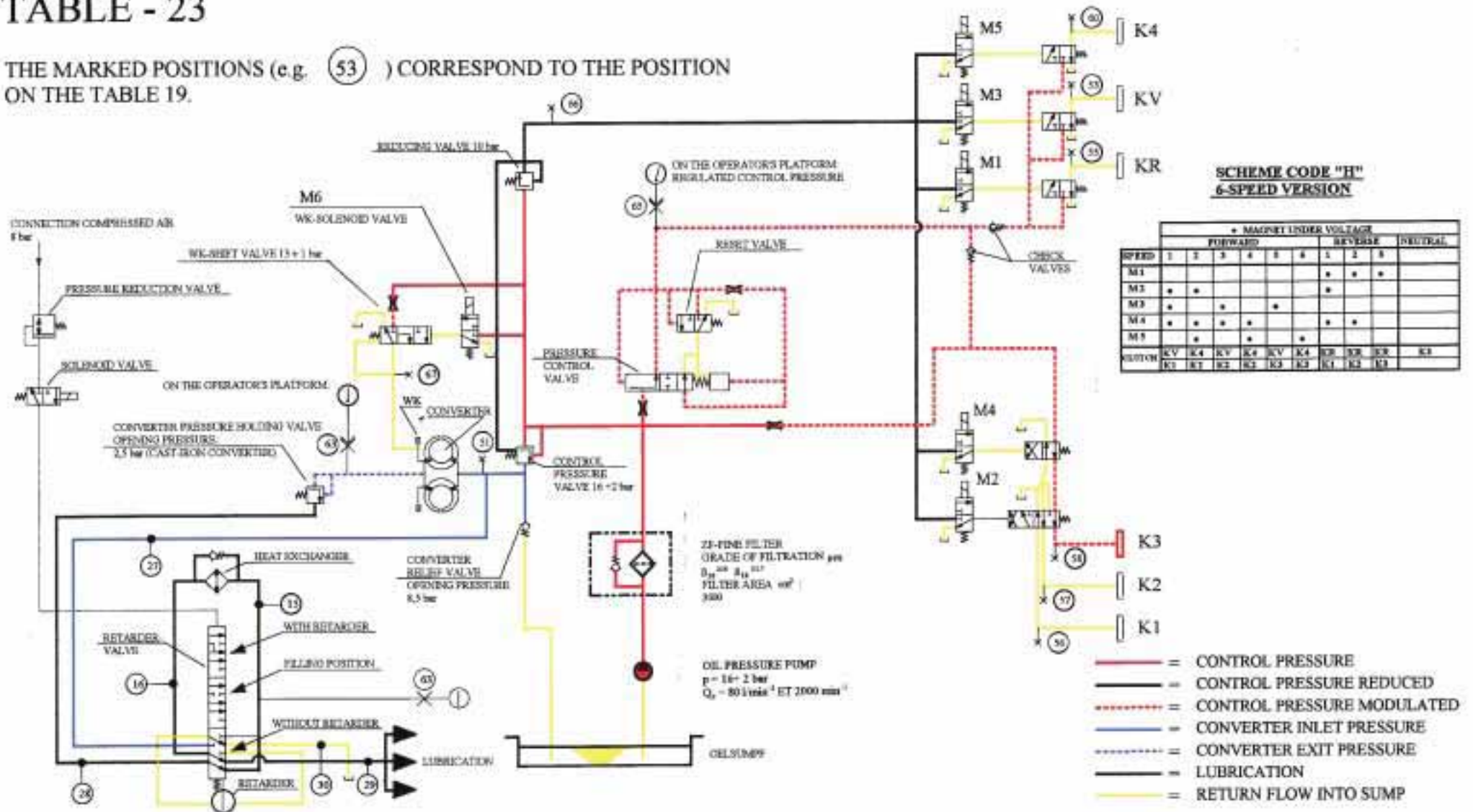
THE MARKED POSITIONS (e.g. 53) CORRESPOND TO THE POSITION ON THE TABLE 18.



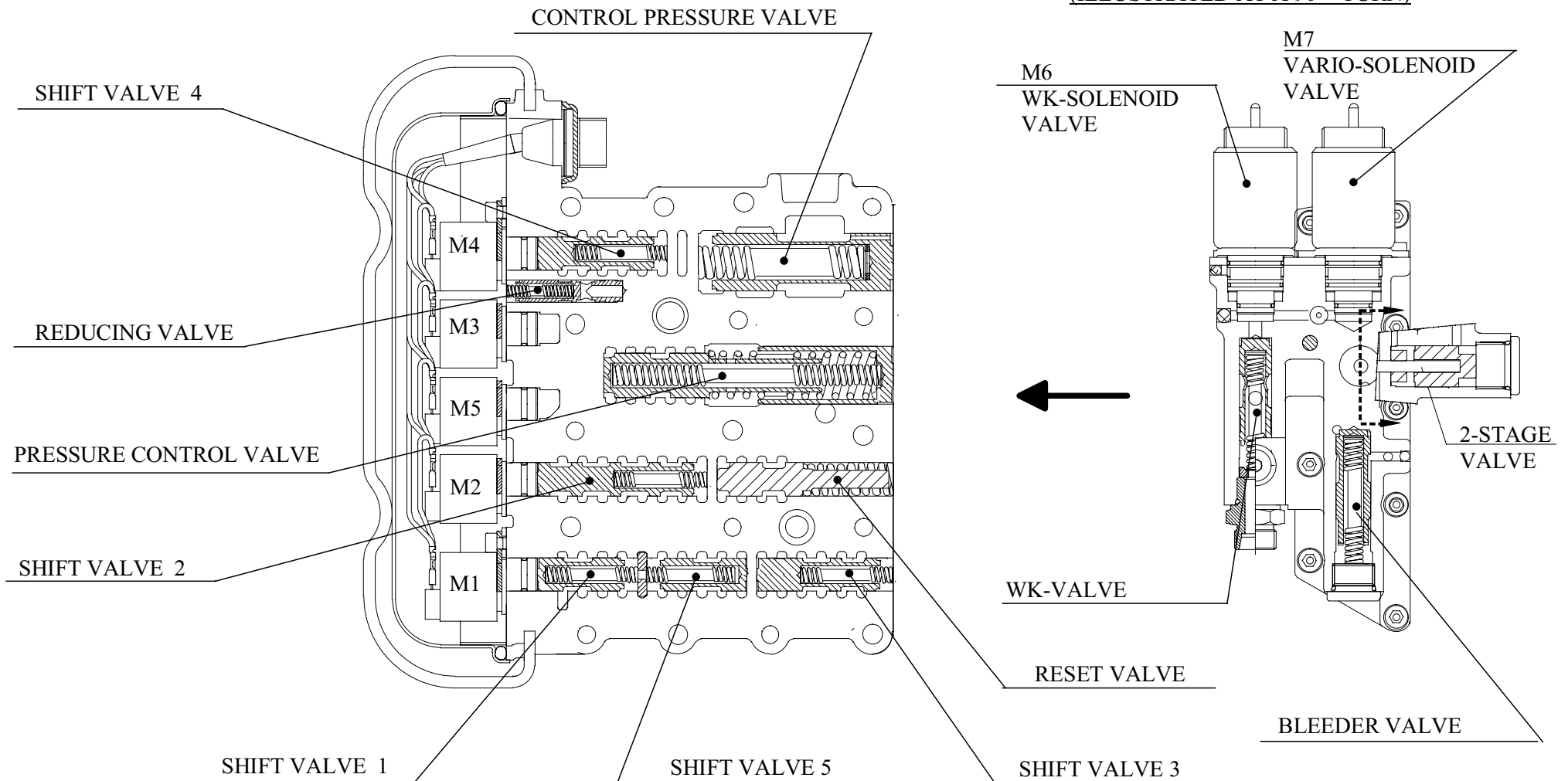
OIL CIRCULATION DIAGRAM 6 WG-200 WITH ELECTRIC SHIFT CONTROL AND WK - NEUTRAL

TABLE - 23

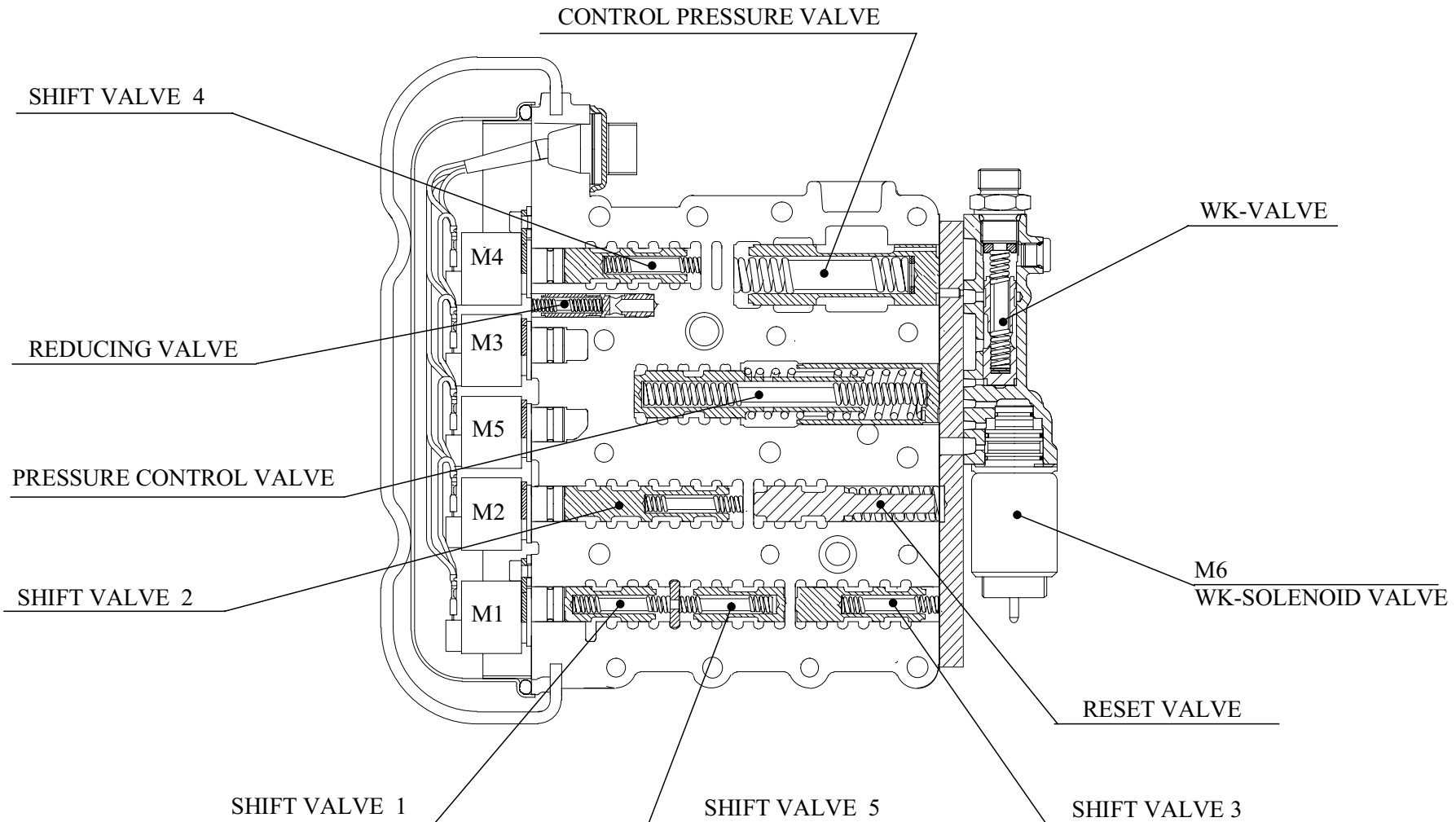
THE MARKED POSITIONS (e.g. 53) CORRESPOND TO THE POSITION ON THE TABLE 19.



ALUMINUM DIE-CAST SHIFT CONTROL - 5-MAGNET VERSION WITH 2-STAGE; VARIOVALVE AND WK TABLE - 24



ALUMINUM DIE-CAST SHIFT CONTROL 5-MAGNET VERSION WITH WK TABLE - 25

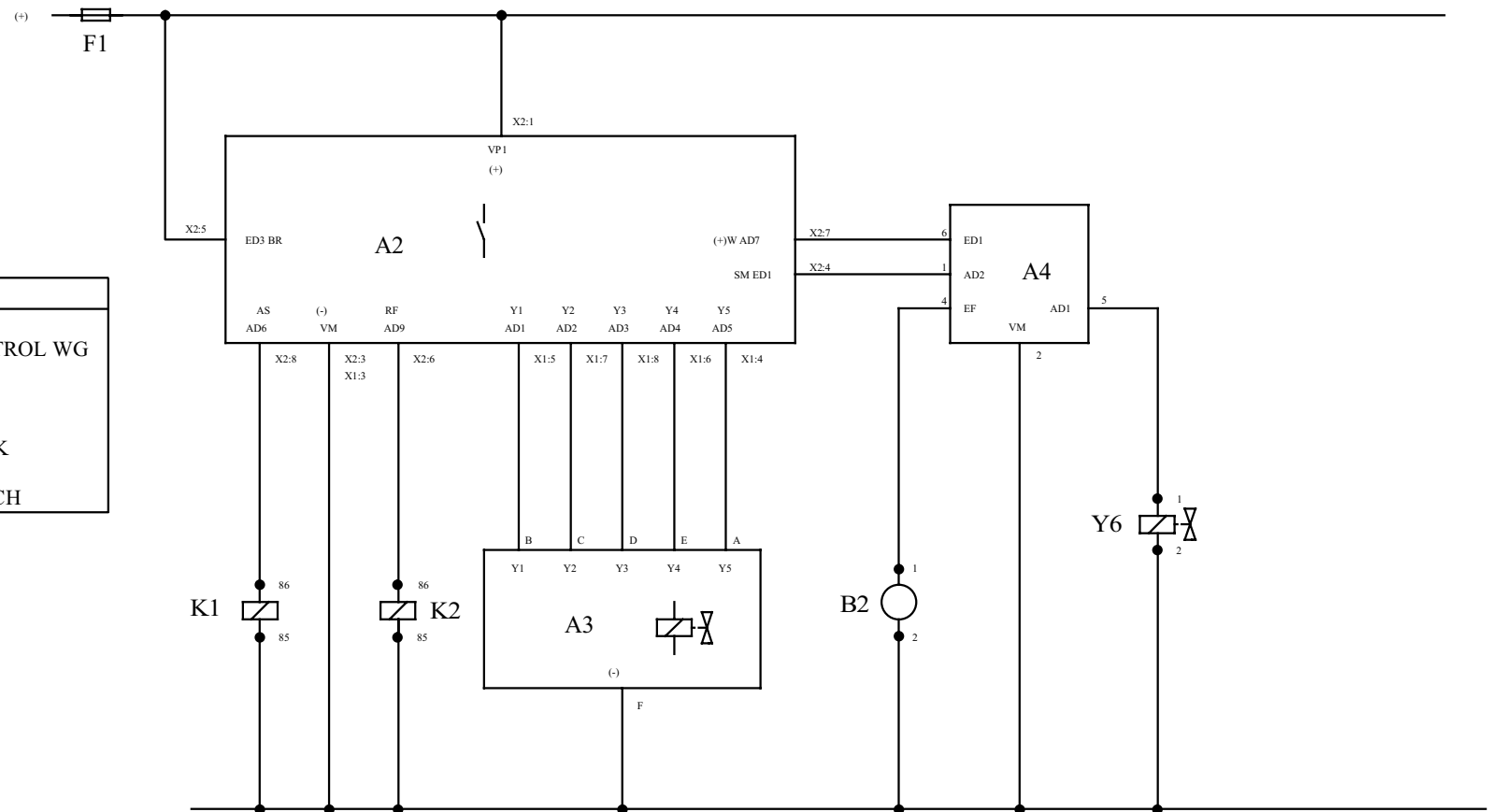


6 WG-200 POWER-SHIFT CIRCUIT DIAGRAM

6029 700 426 - SAMPLE - DUMPER „CODE H“

TABLE - 26

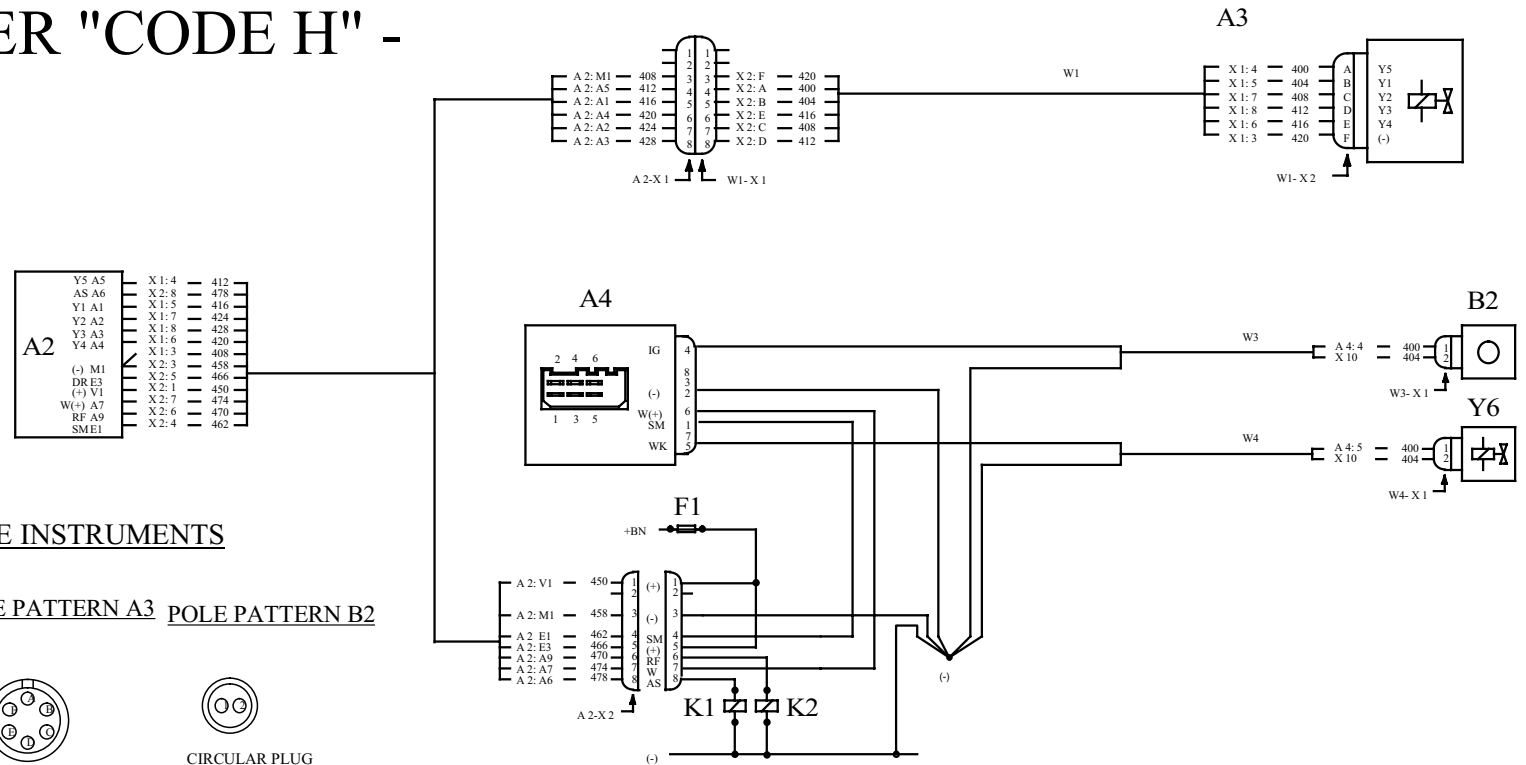
POS	LEGENDE
A2	CONTROLLER
A3	ELECTRO-HYDRAULIC CONTROL WG
A4	WK-MODULE
B2	SPEED SENSOR TURBINE
F1	FUSE 8A
K1	RELAY STARTER INTERLOCK
K2	RELAY BACKUP LAMP
Y6	CONVERTER LOCKUP CLUTCH



NOTE:

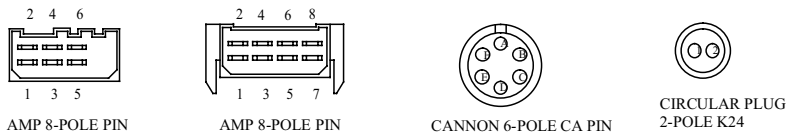
BINDING IS THE CORRESPONDING SPARE-PARTS LIST VERSION
 CONNECTION DIAGRAM - 6029 700 428 - SEE TABLE 27

6 WG-200 POWER SHIFT - CONNECTION DIAGRAM - 6029 700 428 - SAMPLE - DUMPER "CODE H" - TABLE - 27

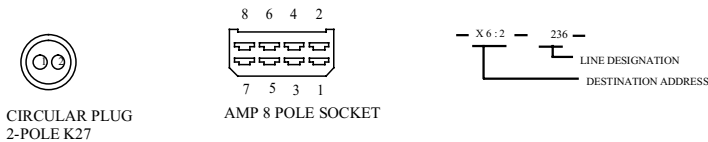


ILLUSTRATED POLE PATTERNS VIEW UPON PLUG-IN SIDE OF THE INSTRUMENTS

POLE PATTERN A4 POLE PATTERN A2-X2, W1-X1 POLE PATTERN A3 POLE PATTERN B2



POLE PATTERN Y6 POLE PATTERN A2-X1



NOTE:

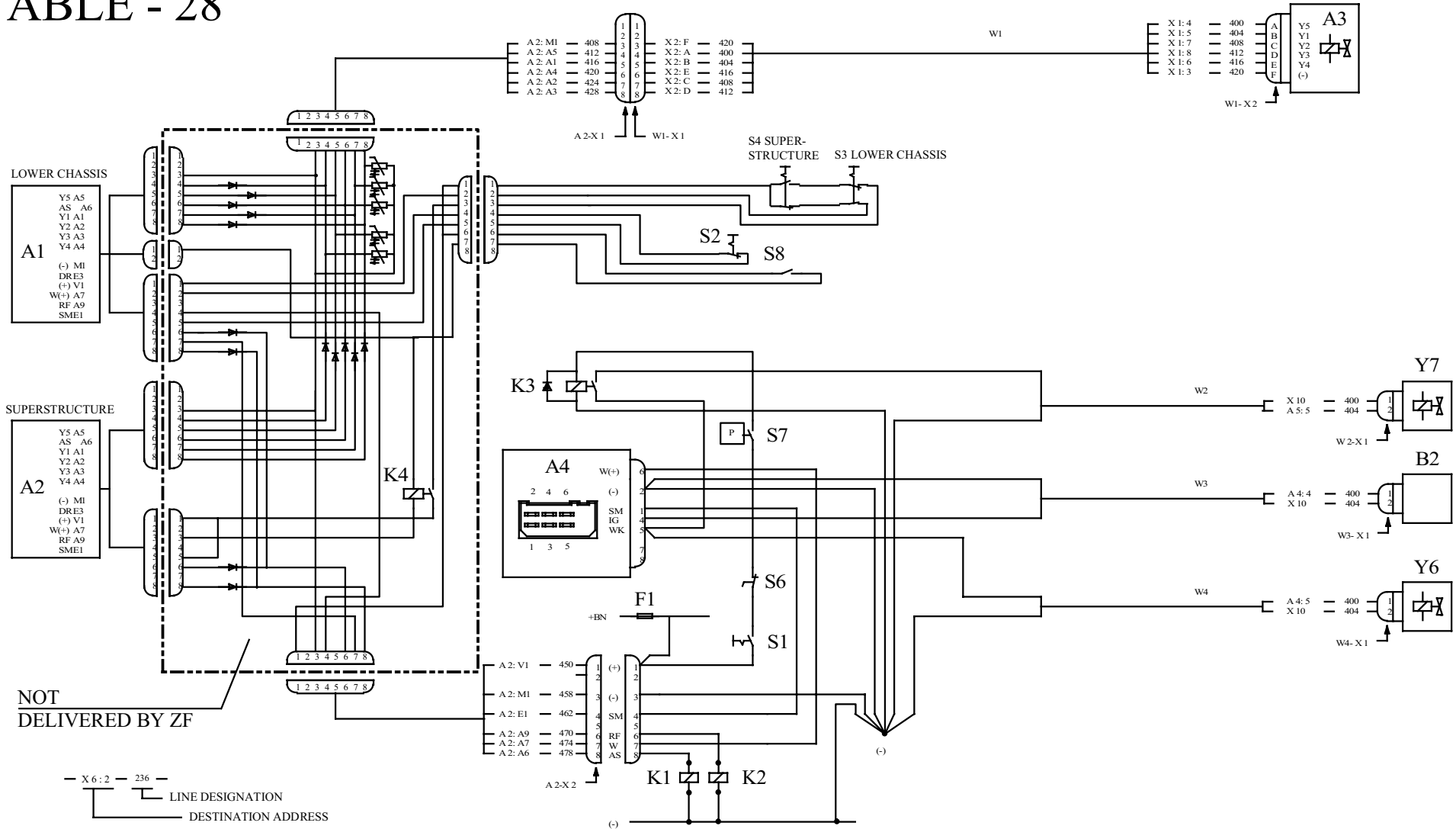
- BINDING IS THE CORRESPONDING SPARE-PARTS
VERSION CIRCUIT DIAGRAM - 6029 700 426 - SEE TABLE 26 -

POS	LEGEND
A2	CONTROLLER
A3	ELEKTRO-HYDR. CONTROL WG
A4	WK-MODULE
B2	SPEED SENSOR TURBINE
F1	FUSE 8A
K1	RELAY STARTER INTERLOCK
K2	RELAY BACKUP LAMP
Y6	CONVERTER LOCKUP CLUTCH

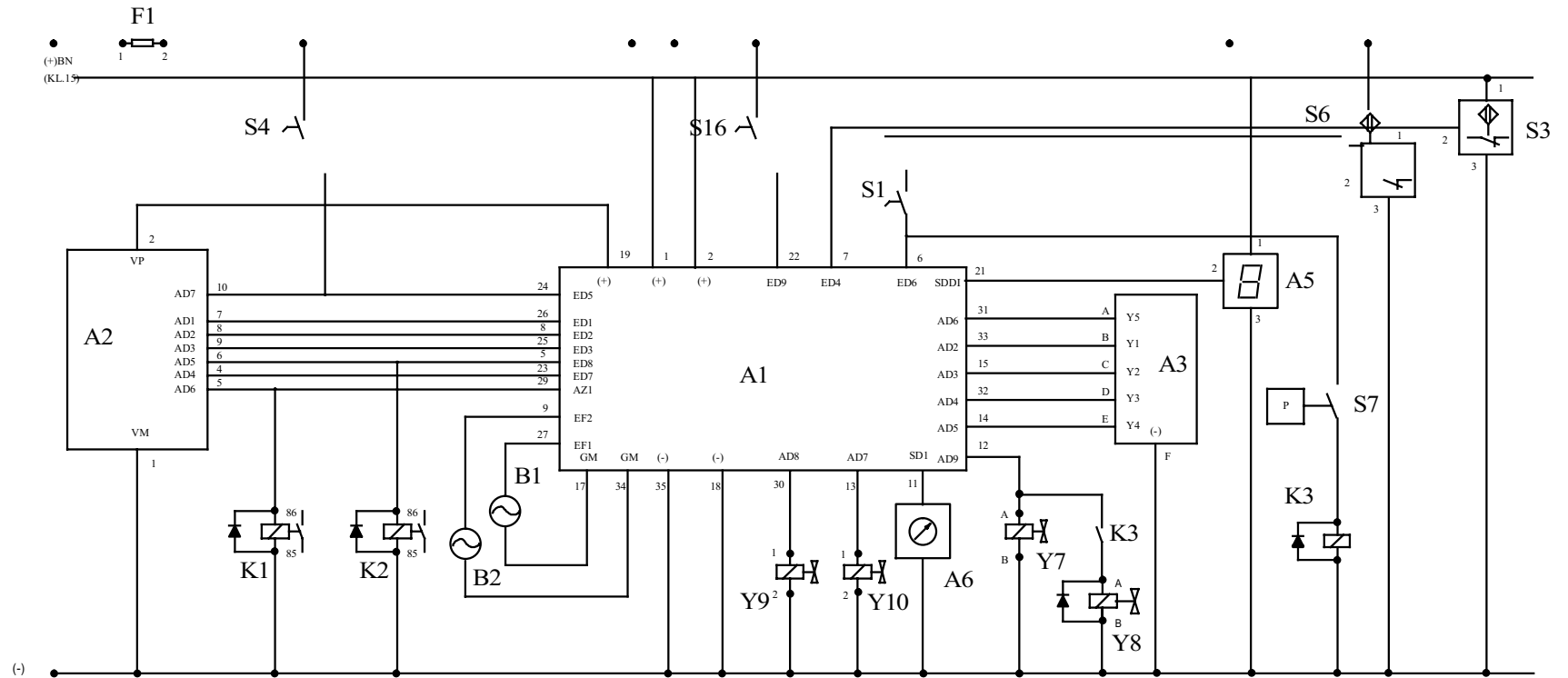
SUPPLY SYSTEM, VEHICLE INTERFACE	
1	CURRENT SUPPLY
2	
3	GROUND
4	SM-SIGNAL BLOCKS DOWNSHIFTING ON GEARSHIFT LEVER SPEED-DEPENDENTLY
5	CURRENT SUPPLY
6	● SM-SIGNAL BLOCKS DOWNSHIFTING ON GEARSHIFT LEVER IN "R" POSITION
7	● W-SIGNAL SWITCHES LOCKUP CLUTCH OFF AND PUTS RETARDER OUT OF SERVICE IF RETARDER SWITCH S1 IS ACTIVATED
8	● RELAY STARTER INTERLOCK ACTIVATED, IF GEARSHIFT LEVER IN "N" POSITION

| = INPUT ● = OUTPUT

6 WG-200 POWER-SHIFT CONNECTION DIAGRAM - 6029 700 616 - - SAMPLECRANE VEHICLE "CODE H" - TABLE - 28



6 WG-200 SEMI- AND FULLY-AUTOMATIC CONTROL CIRCUIT DIAGRAM - 6029 700 800 - SAMPLE DUMPER „ CODE H „ TABLE - 29



* PIN6 AND 7 ARE NOT CONNECTED
AT THE EST-17T

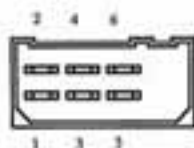
POS	LEGEND	POS	LEGEND
A1	ELECTRIC CONTROL EST-17T/EST-25	S1	SWITCH RETARDER
A2	CONTROLLER	S3	SWITCH PARTIAL LOAD
A3	ELECTRO-HYDR. SHIFT CONTROL	S4	SWITCH KICK-DOWN (OPTION)
A5	DISPLAY, DIAGNOSIS	S6	SWICH IDLE RUN
A6	SPEEDOMETER (OPTION)	S7	WK-PRESSURE SWITCH
B1	SPEED SENSOR OUTPUT	S16	SWICH AUTOMATIC/MANUAL
B2	SPEED SENSOR TURBINE	Y7	SOLENOID VALVE WK
F1	FUSE 8A	Y8	SOLENOID VALVE RETARDER
K1	RELAY STARTER INTERLOCK	Y9	SOLENOID VALVE (OPTION)
K2	RELAY BACKUP LAMP	Y10	THROTTLE-DOWN SIGNAL (OPTION)
K3	RELAY RETARDER (ENGINE BRAKE)		

NOTE:

- BINDING IS THE CORRESPONDING PARTS-LIST VERSION
CONNECTION DIAGRAM - 6029 700 789 - SEE TABLE 30.

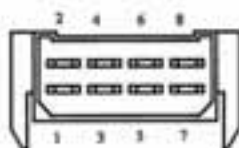
**ILLUSTRATED POLE PATTERNS:
VIEW UPON PLUG-IN SIDE OF INSTRUMENTS**

POLE PATTERN A4



AMP 8-POLE PIN

**POLE PATTERN
A2-X2, W1-X1**



AMP 8-POLE PIN

POLE PATTERN A3



CANNON 6-POL. CA PIN

POLE PATTERN B2



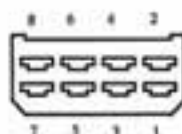
CIRCULAR PLUG
2-POLE K24

POLE PATTERN Y6, Y7



CIRCULAR PLUG
2-POLE K27

POLE PATTERN A2 - X1



AMP 8-POLE SOCKET

POS	LEGEND
A1	CONTROLLER LOWER CHASSIS
A2	CONTROLLER SUPERSTRUCTURE
A3	ELECTRO-HYDR. CONTROL WG
A4	WK-MODULE
B2	SPEED SENSOR TURBINE
F1	FUSE 8A
K1	RELAY STARTER INTERLOCK
K2	RELAY BACKUP LAMP
K3	RELAY RETARDER
K4	RELAY FRONT AXLE
S1	SWITCH RETARDER
S2	SWITCH PRESSURE CUT-OFF (ONLY AFTER AGREEMENT WITH ZF)
S3	SWITCH LOWER CHASSIS
S4	SWITCH SUPERSTRUCTURE
S6	SWITCH IDLE ACCELERATOR (CLOSED IN IDLE RUN)
S7	SWITCH PRESSURE (WK)
S8	SWITCH FRONT AXLE
Y6	CONVERTER LOCKUP CLUTCH
Y7	RETARDER

NOTE:

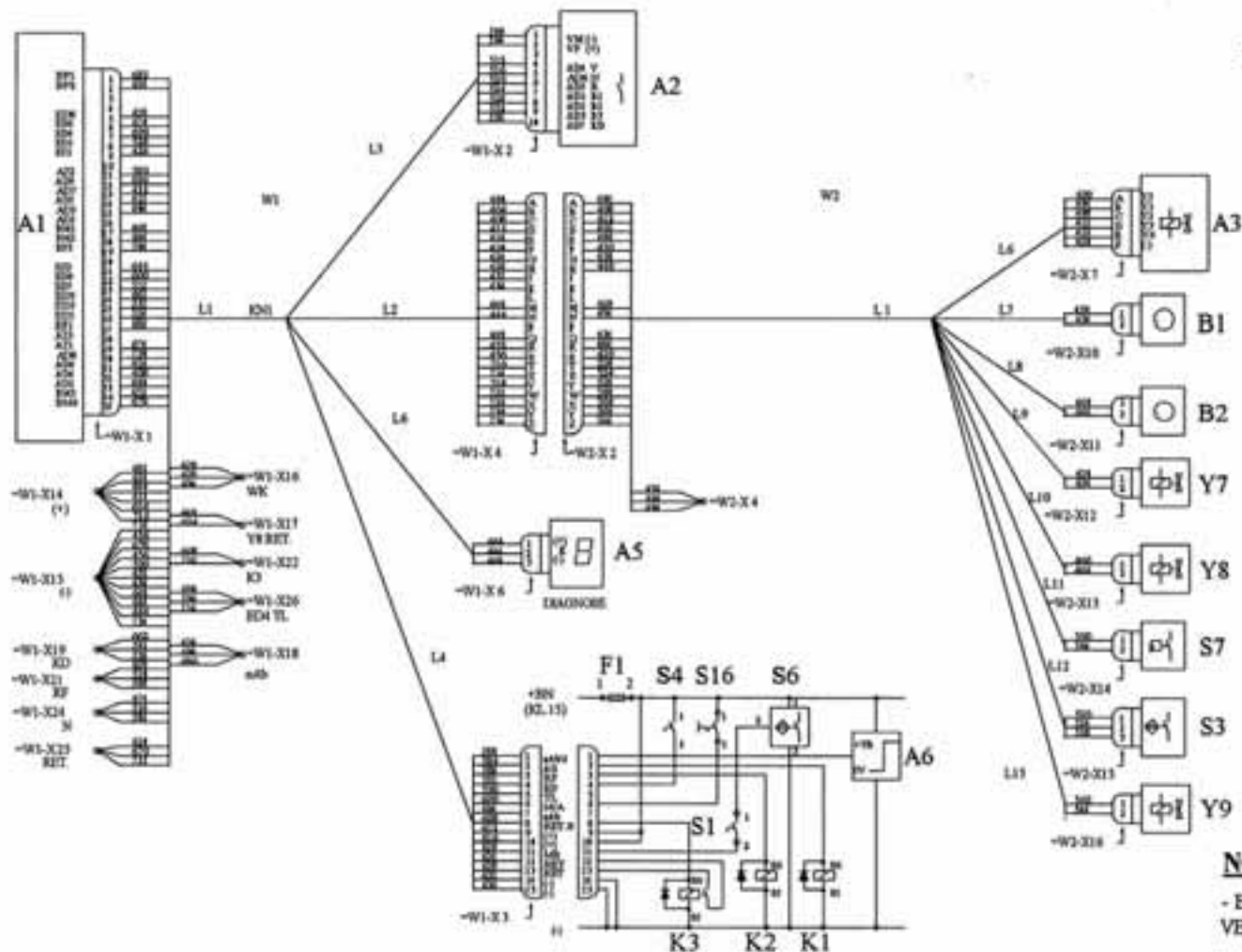
- BINDING IS THE CORRESPONDING PARTS-LIST VERSION.

SUPPLY SYSTEM, VEHICLE INTERFACE

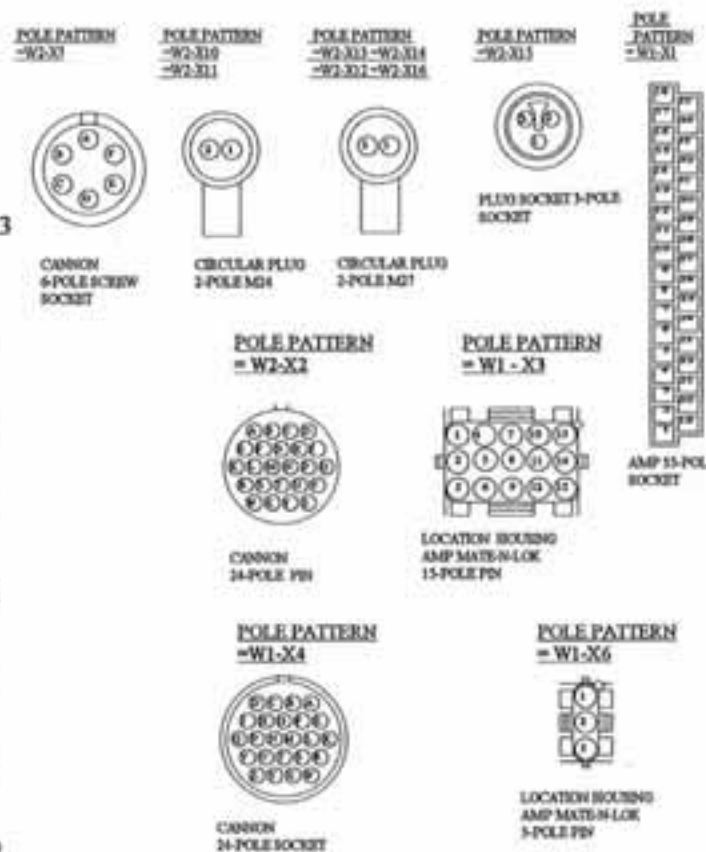
1		POWER SUPPLY
2		
3		GROUND
4		SM-SIGNAL BLOCKS DOWNSHIFTING ON GEARSHIFT LEVER SPEED-DEPENDENTLY
5		
6	●	SM-SIGNAL BLOCKS DOWNSHIFTING ON GEARSHIFT LEVER IN "R" POSITION
7	●	W-SIGNAL SWITCHES LOCKUP/CLUTCH OFF AND PUTS THE RETARDER OUT OF SERVICE IF RETARDER SWITCH S1 IS ACTIVATED
8	●	RELAY STARTER INTERLOCK ACTIVATED IF GEARSHIFT LEVER IN "N" POSITION

| = INPUT ● = OUTPUT

6 WG-200 SEMI- AND FULLY-AUTOMATIC CONTROL CONNECTION DIAGRAM - 6029 700 789 - SAMPLE - DUMPER "CODE H" TABLE - 30



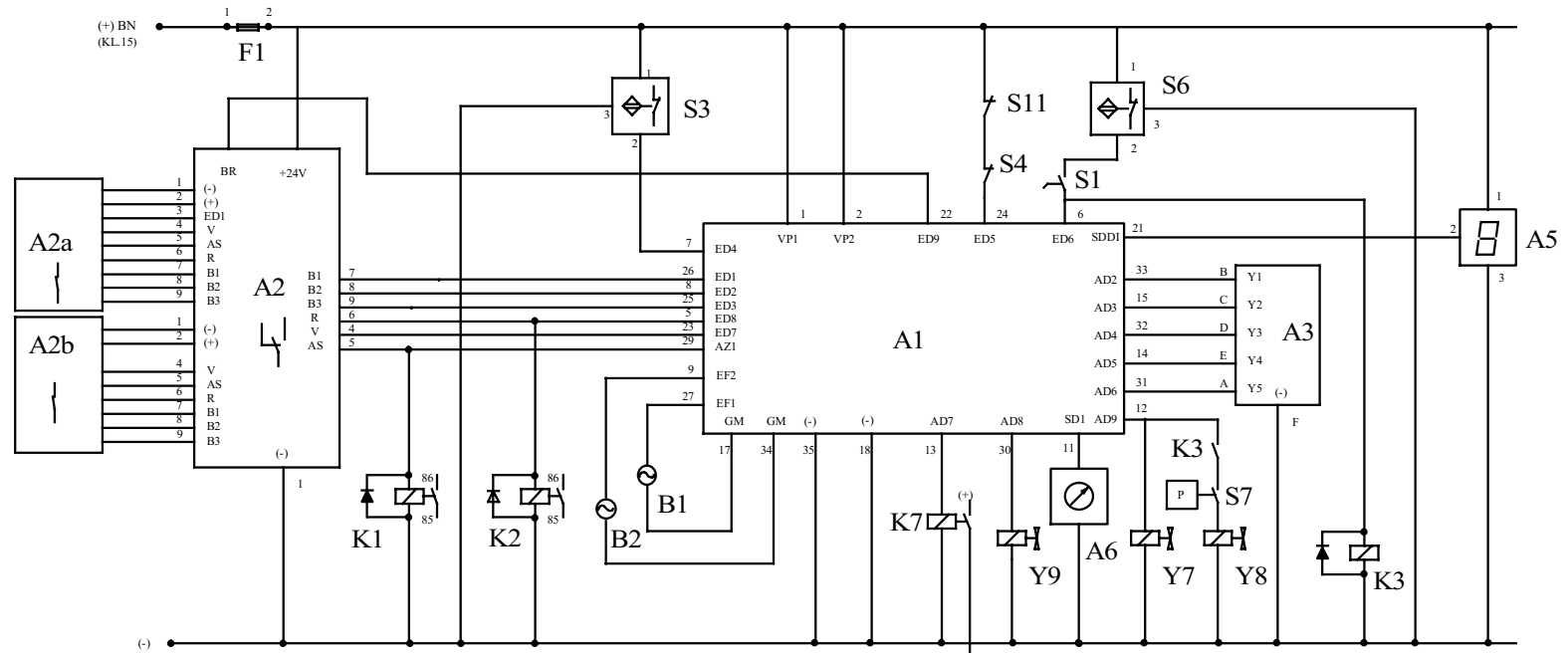
ILLUSTRATED POLE PATTERNS VIEW ON PLUG-IN SIDE OF THE INSTRUMENTS



NOTE:

- BINDING IS THE CORRESPONDING PARTS-LIST VERSION - CONNECTION DIAGRAM - 6029 700 800 - SEE TABLE 30.

6 WG-200 SEMI- AND FULLY-AUTOMATIC CONTROL CIRCUIT DIAGRAM - 6029 700 828 - SAMPLE CRANE VEHICLE "CODE H" TABLE - 31

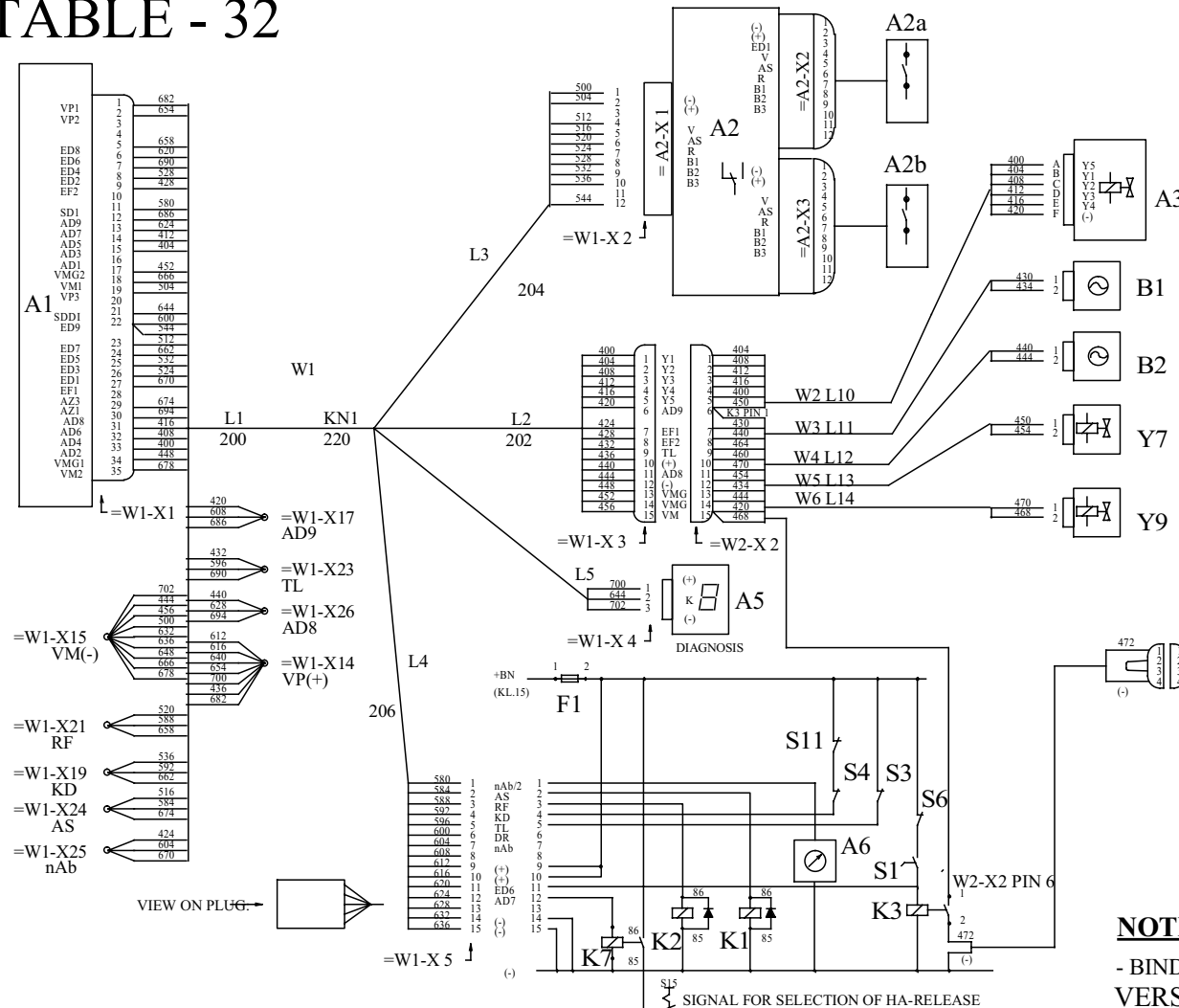


NOTE:

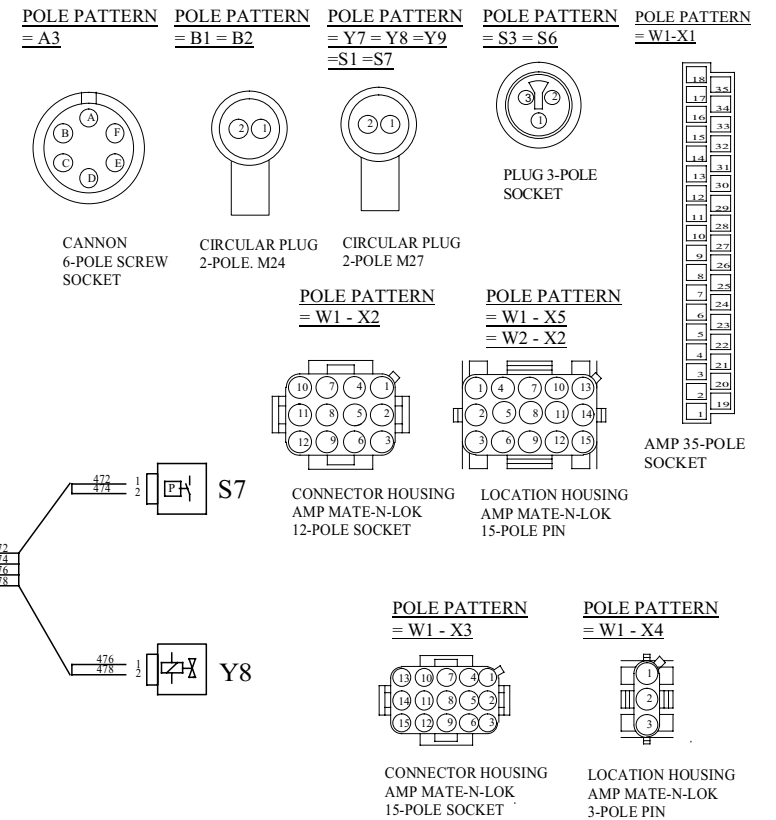
- BINDING IS THE CORRESPONDING PARTS-LIST
VERSION CONNECTION DIAGRAM - 6029 700 836 - SEE TABLE 32

POS	LEGEND	POS	LEGEND
A1	ELECTRIC CONTROL EST-17TE/EST-25E	S1	SWITCH RETARDER
A2	CONTROL PLATFORM SWITCH-OVER	S3	SWITCH PARTIAL LOAD
A2a/A2b	CONTROLLER	S4	SWITCH ALL-WHEEL STEERING (EXTREME CRAWLER SPEED)
A3	ELECTRO-HYDR. SHIFT CONTROL	S6	SWITCH IDLUE RUN
A5	DISPLAY, DIAGNOSIS	S7	BACKPRESSURE SWITCH
A6	SPEEDOMETER (OPTION)	S11	CRANE JIB
B1	SPEED SENSOR OUTPUT	S15	SWITCH HA-RELEASE
B2	SPEED SENSOR TURBINE	Y7	SOLENOID VALVE RETARDER
F1	FUSE 8A	Y8	RETARDER VALVE
K1	RELAY STARTER INTERLOCK	Y9	VARIOVALVE
K2	RELAY BACKUP LAMP		
K3	RELAY RETARDER ACTIVATION		
K7	RELAY SELECTION EXTREME CRAWLER SPEED (ALL-WHEEL STEERING)		

6 WG-200 SEMI- AND FULLY-AUTOMATIC CONTROL CONNECTION DIAGRAM - 6029 700 836 - SAMPLE - CRAN VEHICLE „ CODE H „ TABLE - 32



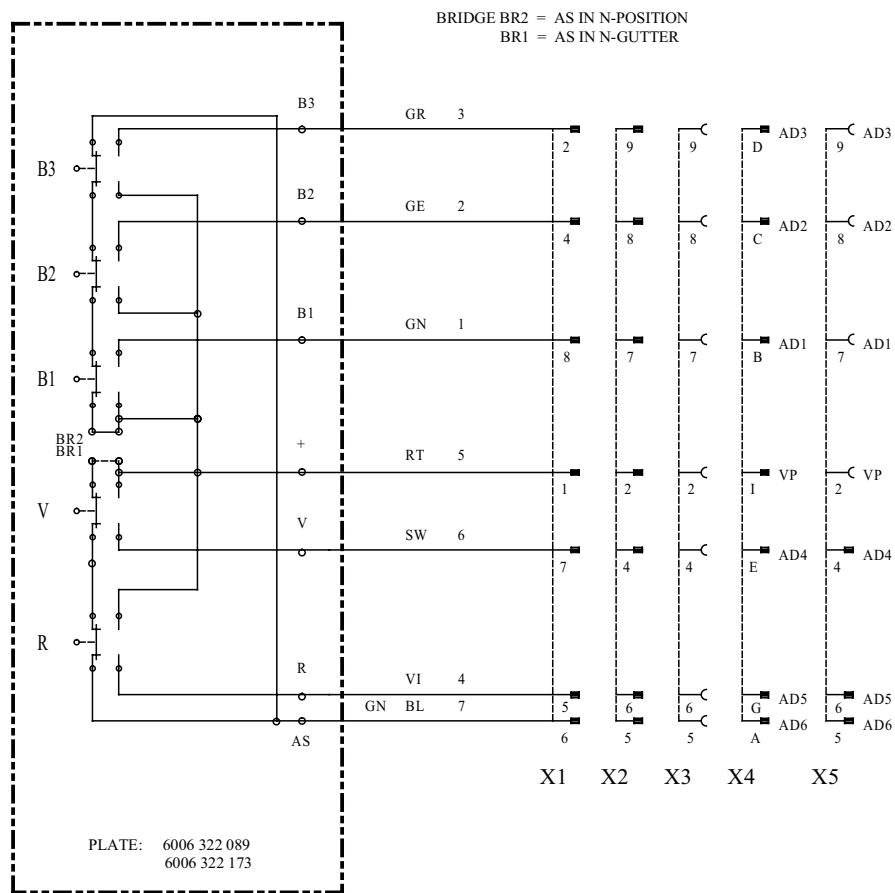
ILLUSTRATED POLE PATTERNS VIEW ON PLUG-IN SIDE OF THE INSTRUMENTS



NOTE:

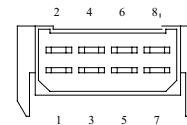
- BINDING IS THE CORRESPONDING PARTS-LIST
VERSION CIRCUIT DIAGRAM - 6029 700 828 - SEE TABLE 31.

6 WG-200 SEMI- AND FULLY-AUTOMATIC CONTROL CIRCUIT DIAGRAM CONTROLLER - 6006 700 197 - SAMPLE TABLE - 33



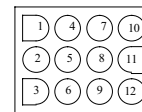
VIEW UPON PLUG SIDE

POLE PATTERN X1



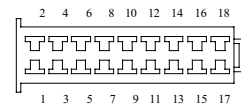
AMP 8-POLE PIN

POLE PATTERN X2



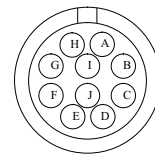
AMP MATE-N-LOK
12-POLE PIN
LOCATION HOUSING

POLE PATTERN X3



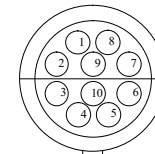
AMP JUNIOR-POWER-TIMER
18-POLE SOCKET
SOCKET BOX

POLE PATTERN X4



CANNON
10-POLE VG PIN

POLE PATTERN X5

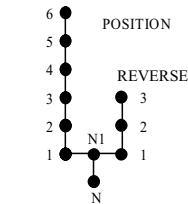


CANNON
10-POLE SS
SOCKET

CONTROLLER SG-6

GATE

FORWARD



		POSITION												
		1	2	3	4	5	6	V	N	N1	R			
OUTPUT	AD1	B1	●	●		●	●							
	AD2	B2		●	●	●	●							
	AD3	B3				●	●	●						
	AD4	V							●					
	AD5	R												●
	AD6	AS									●	●		

POS. 1 IS FIRST POSITION OUT FROM
NEUTRAL

LEGEND:

- AD1 - AD6 = OUTPUTS DIGITAL CONTROLLER
- B1 - B3 = CODING
- V = FORWARD
- R = REVERSE
- AS = STARTER INTERLOCK SIGNAL
- N = NEUTRAL
- N1 = NEUTRAL BETWEEN FORWARD/REVERSE
- 1 - 6 = SPEEDS FORWARD/REVERSE

INDUCTIVE TRANSMITTER AND ELECTRONIC MODULE

TABLE - 34

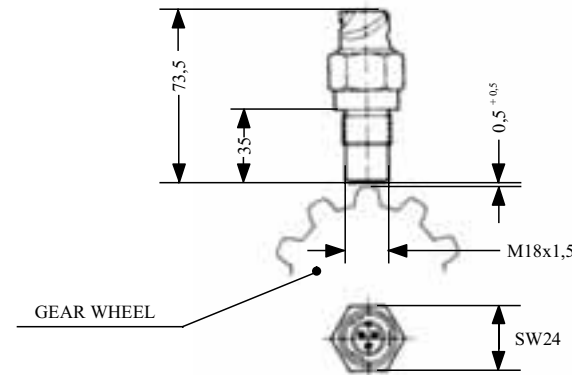
INDUCTIVE TRANSMITTER

The Inductive transmitter is recording the turbine speed for the control of the converter clutch and change-back lock. It is fitted accessibly on the transmission and is operating without mechanical wear. The transmitter is connected with the Electronic Module through a cable with 3-pole bayonet-plug.

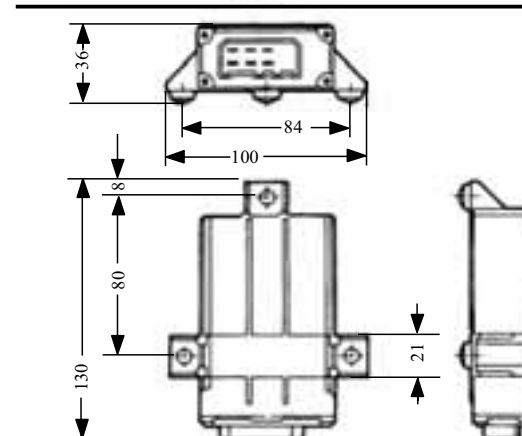
For the recording of the output speed at the speed-dependently operating automatic shift control as well as for the electric speedometer, an inductive transmitter is also used.

ELECTRONIC MODULE

The Electronic Module is converting the pulses issued by the inductive transmitter into switching points for the control of the converter clutch and the change-back lock. These switching points are determined according to the type of vehicle. The Electronic Module is of the splash-protected design and is connected through a 8-pole AMP-Flat-type connector.



INDUCTIVE TRANSMITTER



ELECTRONIC MODULE



TESTER

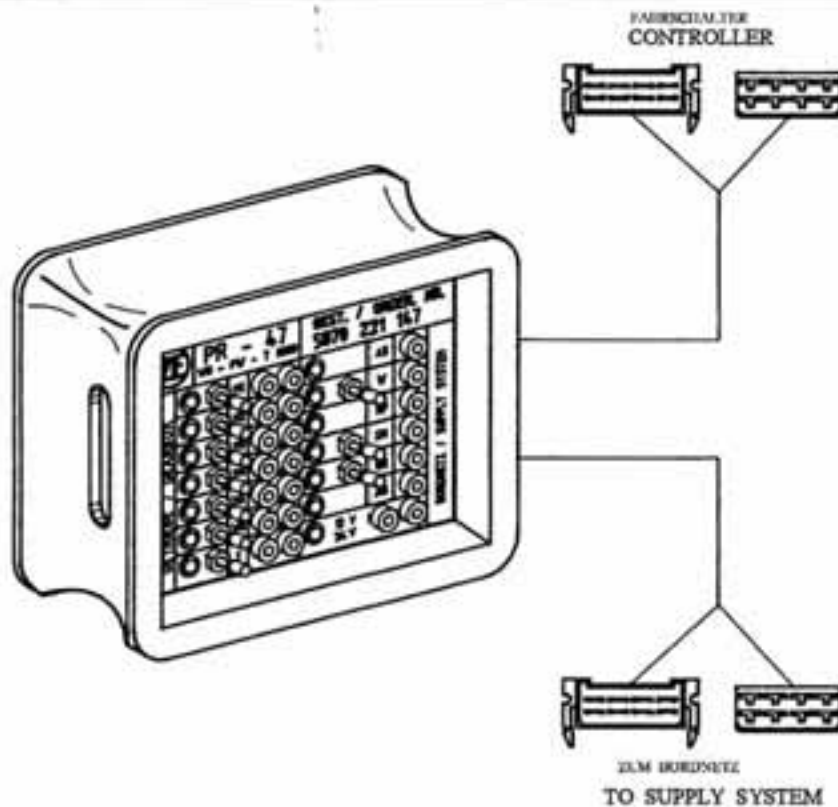
PR - 47

5870 221 147

- For the Test of electric transmission control units with 4 and 5 solenoid valves .
- For the Test of the Controllers SG - 4 ; SG - 6 and SG - 6s in and out of the vehicle.

Especially suitable for the Version with 8-pole AMP Supply system wiring .

Not suitable for the Test of electronic transmissions control units , as :
 EST - 2 / EST - 17 / EST - 17 T / EST - 19 / EST - 25 / EST - 26



To be used combined with : Digital - Multimeter 5870 221 129

Modifications reserved !



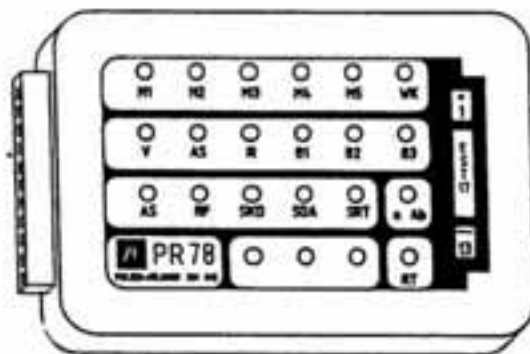
TESTER PR - 78 A

6008 001 001

The conception of the Tester generation PR-78 combines a high degree of flexibility with handiness and a universal range of applications.
It allows the testing of electric and electronic gearbox control units, developed by ZF.

EST-2 / EST-17 / EST-17 T / EST-19 T / EST-25 / EST-26
Controller DW-2 / SG-4 / SG-6s / SG-8s
Transmission with 4, 5 and 6 Solenoid valves

It allows the testing of electric and electronic gearbox control units, developed by ZF.



Because of the interchangeability of the connecting cables and Project Foils, the Tester can be adapted to the actual check problem.

Adapter cables are delivered together with the Test specifications.

Ancillary Instruments can be directly connected through the Tester PR-78 B, thus enlarging possibilities, as for example:

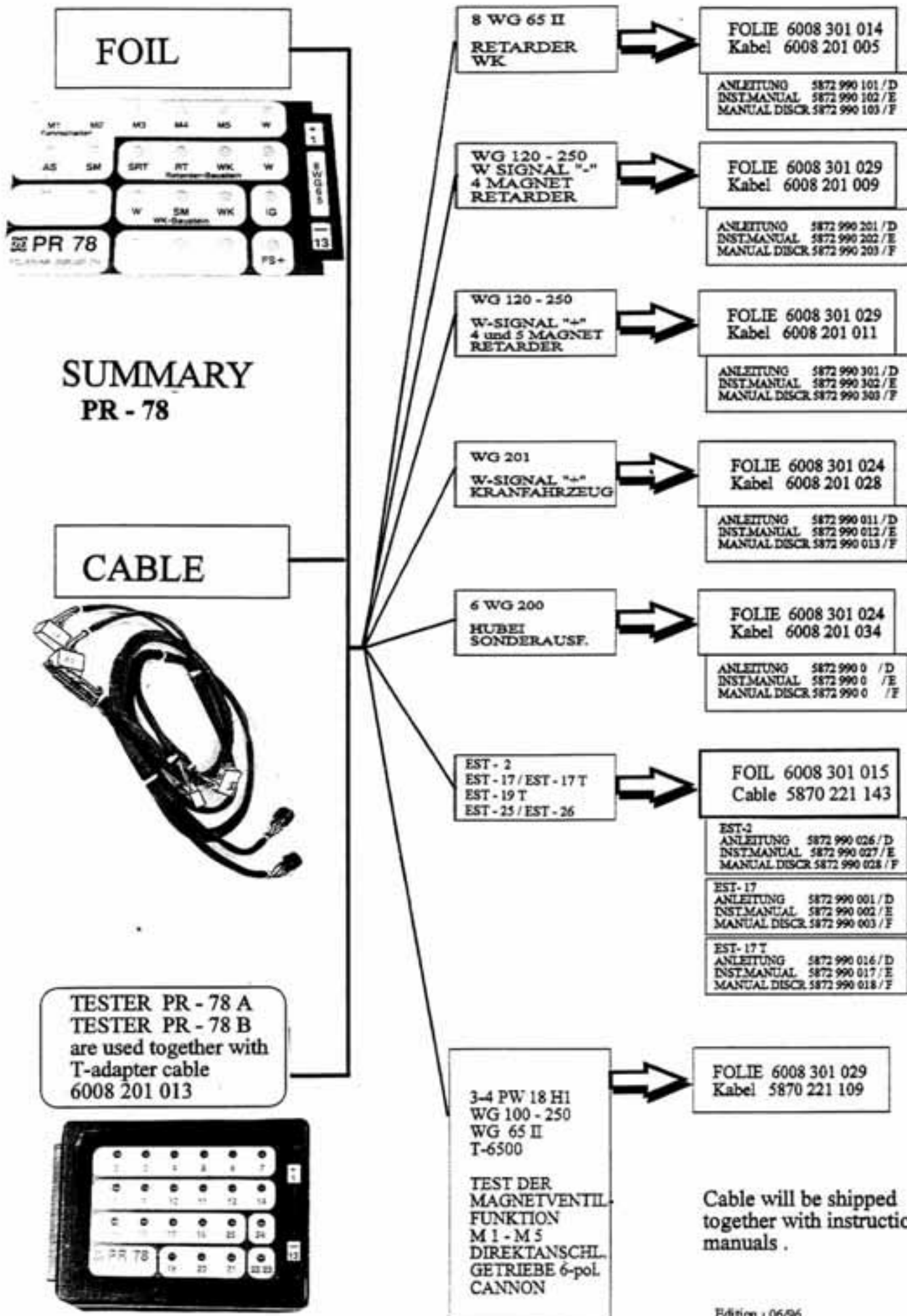
CURRENT - VOLTAGE - RESISTANCE - FREQUENCY

The Tester PR-78 A is equipped with a 22 LED display and represents therefore the ideal Instrument for the system and functional test.

The T-Adapter 6008 201 013 allows the combination of the Tester PR-78 A and PR-78 B to form a complete test unit.

The test can be carried out in the vehicle or in removed condition.

Table 37





**TESTER PR - 78 A + B
with Adaptercable**

5870 221 109

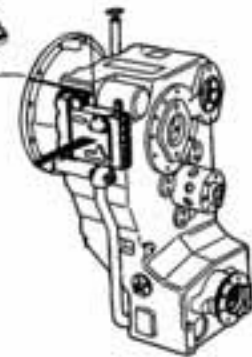


- 1) Gearselector SG-4
SG-6 / SG-6s
DW-2 / ERGO
- 2) SUPPLY SYSTEM

TRANSMISSION :

3-4 PW 18
3-4 PW 25
3-4 PW 45
3-4-5-6- WG 100
3-4-5-6- WG 120/121
3-4-5-6- WG 150
3-4-5-6- WG 180/181
3-4-5-6- WG 200/201
3-4-5-6- WG 250/251

Adaptercable
5870 221 109



PR - 78 A
6008 001 001

FOIL
6008 301 015
OR
6008 301 029

Test the output signals by 4 and 5 Solenoids together with some measuring devices

CURRENT - VOLTAGE - RESISTANCE - FREQUENCY

To be used together with Tester PR - 78 B 6008 001 002 and foil 6008 301 029
and T - Adaptercable 6008 201 013

Zusätzlich in Verbindung mit Multimeter 5870 221 103 oder 5870 221 129



TESTER PR - 78 A + B

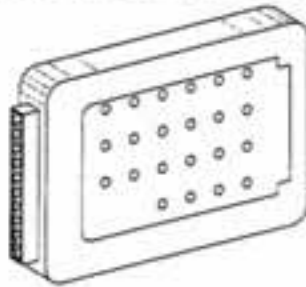
EST - 2
EST - 17 T
EST - 25 T

The Test - System PR - 78 A and PR - 78 B allows the testing of electronic gearboxcontrol
EST - 2 / EST - 17 T / EST - 17 TE / EST - 19 T / EST - 25 / EST - 25 E / EST - 26

In combination with different gearselectors like :

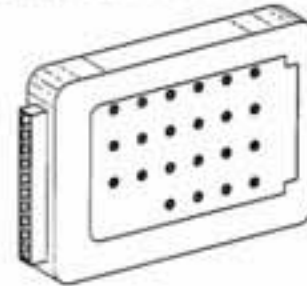
SG - 6 / SG - 6 S / SG - 8 S / DW - 2 / ERGO - II / push-button switches D-7 / D - 9

Tester PR - 78 A with LED displays
Order- No. 6008 001 001

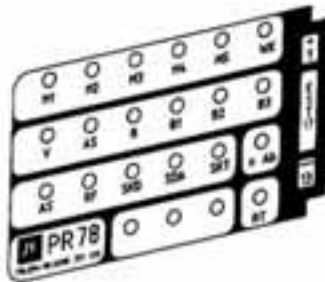


Foil 6008 301 015

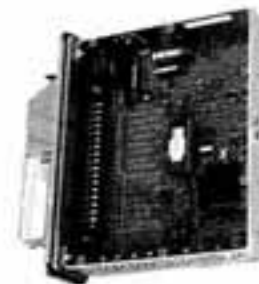
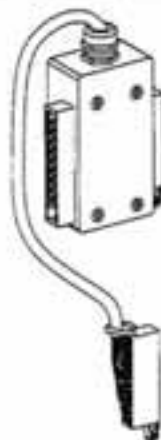
Tester PR - 78 B with socket bushes:
Order- No. 6008 001 002



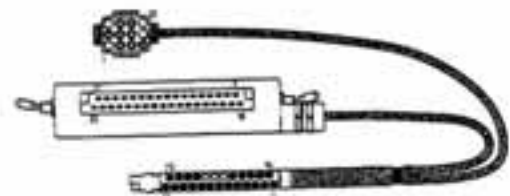
Electronic Control Unit EST - 2
EST - 17 / EST - 17 T / EST - 17 TE
EST - 19 T / EST - 25 / EST - 25 E / EST - 26



T - Adapter cable 6008 201 013 allows the combination of Tester PR - 78 A and PR- 78 B to form a complete test unit.



Adaptercable 5870 221 143



Ancillary Instruments can be directly connected through the Tester PR-78 B, thus enlarging possibilities as for example : CURRENT - VOLTAGE - RESISTANCE - FREQUENCY

Digital - Multimeter 5870 221 129 or 5870 221 103
Kableset 2x 5870 221 014



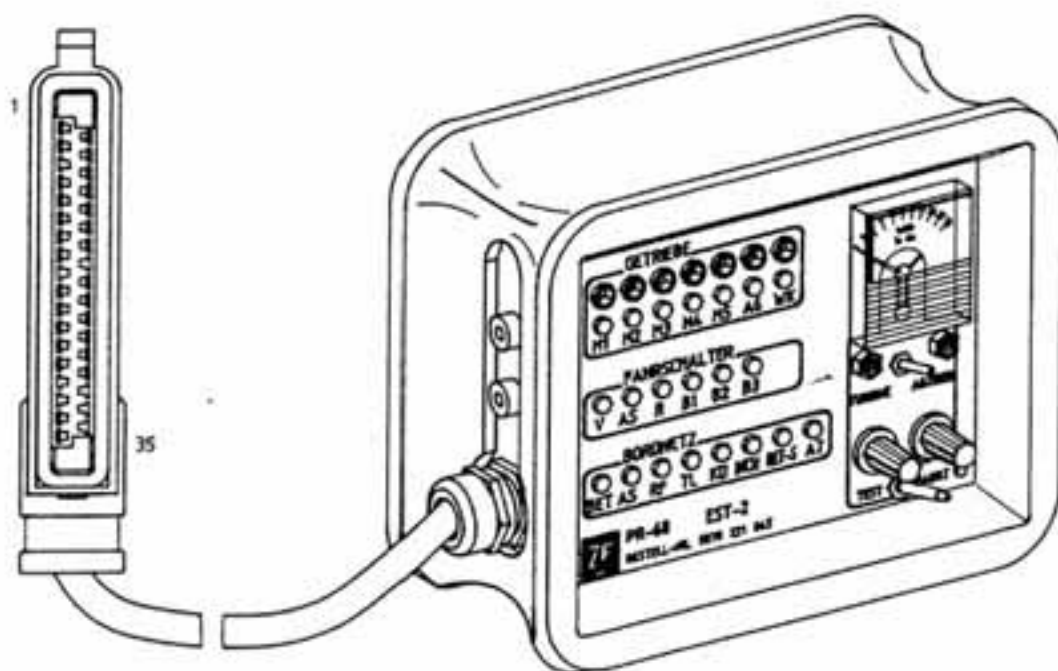
TESTER

5870 221 045

The Tester PR-68 allows the testing of electronic control units, developed by ZF.

EST - 2 / EST - 17 / EST - 17 T / EST - 19 T / EST - 25 / EST - 26

Transmissions with 4 - 5 - and 6 Solenoid valves .

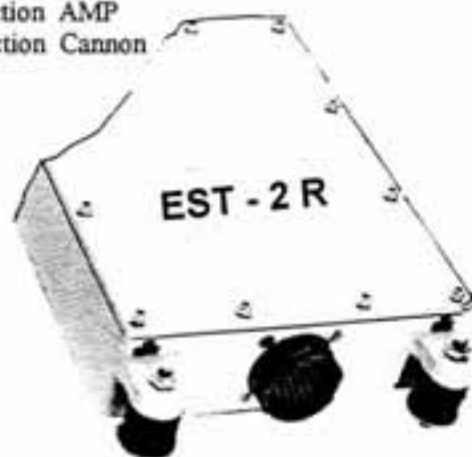


A major improvement of the tester PR - 68 is the compact construction as also integrated frequenz-generator . With the frequenz - generator it is possible to simulate the turbine- and output signal . Therefore a function test by vehicle stop can done !

NOTE :

There are two versions of tester PR - 68 aviable .

- | | | | |
|----|------------------|--------------|-----------------------------|
| 1: | Standard version | 5870 221 045 | 35 - pol. connection AMP |
| 2: | Rugged version | 5870 221 079 | 37 - pol. connection Cannon |



Data supply printer HP Deskjet 580 = 5870 221 240
 Data supply printer HP Deskjet 580 C = 5870 221 241
 Data supply printer HP Deskjet 580 D = 5870 221 242
 Data supply printer HP Deskjet 580 E = 5870 221 243

Multi - System 5000 (new) Order - No. 5870 221 250

Edition: 06/2000

- the one you can trust in every situation -

Automatical transfer of measuring values into helpful graphics

4 analog channels for standardized input signals, which can be defined freely:

0 to 20 mA and 4 to 20 mA, e.g.:

Pressure, pressure peaks, pressure differential, temperature and volume flow rate



Thermal printer DPU - 411 = 5870 221 230
 Thermal printer-paper = 5870 221 236



Connection to different printers via Centronics interface

PC-connection via RS 232 interface



Software support through HYDRComsys measuring value acquisition
 Software = 5870 221 285 / D
 5870 221 286 / E

External power supply 24 VDC

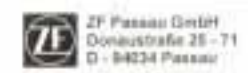


Vehicle connection cable = 5870 221 234

*5 = Communication cable = 5870 221 225 (Centronics)

*6 = Communication cable 8pole/8pole = 5870 221 231

Communication cable 25pole/9pole = 5870 221 232



Divider cable = 5870 221 259



Portable box (empty box) small for testers without printer = 5870 225 009

Portable box (empty box) big for testers and printer = 5870 225 012



Measuring box I with various sensor systems without printer = 5870 221 280 see parts list

Measuring box II with various sensor systems and printer HP 340HP 380 C = 5870 221 281 see parts list

Measuring box III with various sensor systems without printer with factory-calibration ISO = 5870 221 282 see parts list

Power-supply plug 220V = 5870 221 251
 Power-supply plug 115V = 5870 221 252

MK 01	Pressure p1 (pa, mbar, bar, psi) max. 4 measuring channels for pressure		MINRESS screw coupling M10x1 / 5870 950 100 M12x1,5 / 5870 950 101	- 1 bis + 6 bar 0 bis + 10 bar 0 bis + 60 bar 0 bis + 600 bar	5870 221 248 5870 221 242 5870 221 242 5870 221 249
MK 14	Pressure differential = p1-p2 (2 measuring channels necessary)			Pressure / Temperature 0- 60bar / 50-200°C 0-600bar / 50-200°C	Duo-Sensor 5870 221 256 5870 221 257
MK 01	PT 100-temperature-screw-in sensor		PT-screw-coupling M15x1 / 1 groove = 5870 221 213 M15x1 / 2 grooves = 5870 221 241	PT 100 / 2 grooves -50°C bis 200°C PT 100 / 1 groove -50°C bis 200°C	5870 221 284 5870 221 285
MK 01	Further measurable variables e.g.: direct current and direct voltage (V/A) force (kN) moment of force (kNm) Displacement (mm)			Voltage transformer ± 48V to check voltage-dependent processes Current transformer ± 2A to check proportional values	5870 221 283 5870 221 284

MK 01 = Measuring cable 2,5m = 5870 221 210 MK 14 = Measuring cable 6m = 5870 221 264 for Duo-Sensor

2 digital channels as frequency (pulses), which can be defined freely, e.g.:

Volume flow rate (l/min, ft³, gal/min)

MK 01		"I" G3/4" G1" G1 1/2"	Measuring turbine 7.5 - 75L/min Measuring turbine 15 - 300L/min Measuring turbine 25 - 600L/min	5870 950 132 5870 950 133 5870 950 134
		"A" M22x1,5 M26x2 M42 x 2	Measuring turbine 2 - 70L/min Measuring turbine 15 - 300L/min Measuring turbine 25 - 600L/min	5870 950 099 5870 950 087 5870 950 123

Rev. speed (min)

MK 01		"1" "2"	opto-electrical with reflection marking	5870 221 206 5870 221 214
		"3" "4"	inductive, scanning of gear wheels	5870 221 244 (PWVG) 5870 221 291 (ERGO-POWER) connection

Measuring box IV with various sensor systems hydraulic measuring tubes + current transformer = 5870 221 287 see parts list