

# **SERVICE REPAIR**

# **MANUAL**

Hyster D456 (S1.0 - S1.2, S1.4 - S1.6) Forklift  
Service Repair Manual

# ***HYSTER***

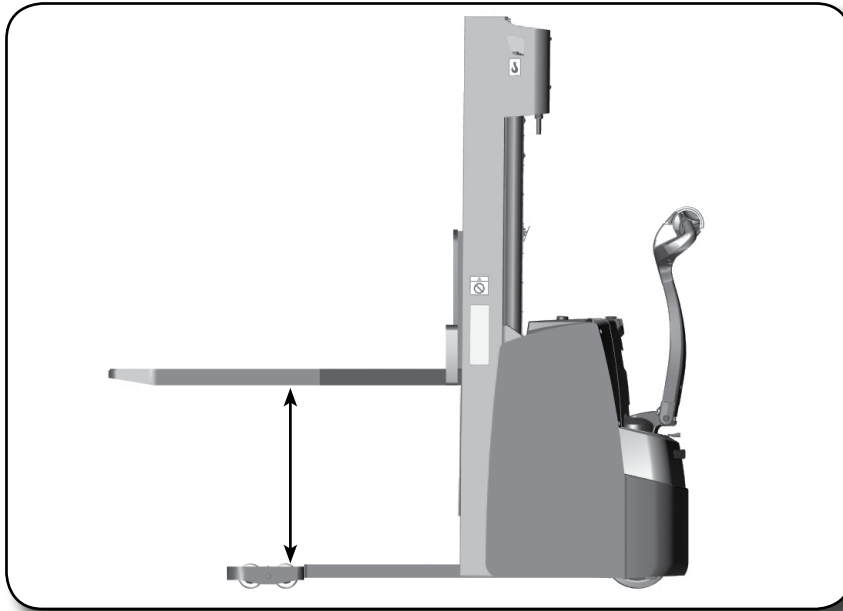
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## HYDRAULIC FUNCTIONS

- Forks lifting
- Forks lowering



### FORK LIFTING/LOWERING

The fork lifting speed is determined by the rpm at which the pump motor transmits drive to the pump drive shaft.

In the lowering stage the check valve prevents the flow of oil through the pump and the oil returns to the reservoir through the flow control valve.

The proportionality of the lowering phase is handled by the Q\_D proportional solenoid valve.

## HYDRAULIC CIRCUIT POWER SUPPLY

### Fixed cylinder capacity pumps

With fixed capacity cylinders, the oil flow is constant, providing the speed of crank shaft rotation remains unchanged.

A reduction in the drive shaft revs lowers the load capacity: if the revs are reduced so is the flow and vice versa; the pressure, providing the load is unchanged, remains constant.

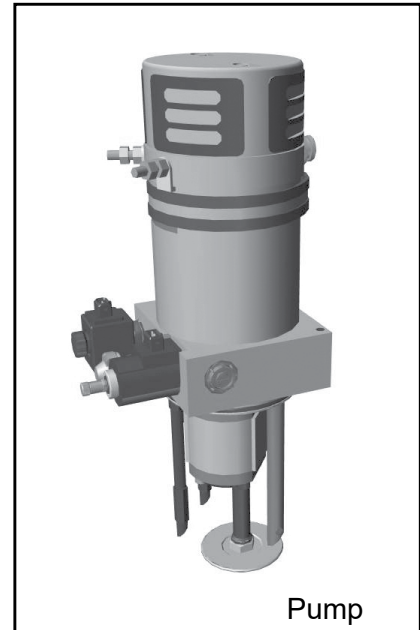
## PRESSURE REGULATING VALVES

### Pressure limiting valves

The "pressure limiting" or "pressure relief" valves are mainly used to guarantee the maximum pressure admitted into the system and to protect the pump from experiencing pressure that might exceed its own structural specifications.

The use of pressure limiting devices is not restricted to the functions described above, but they are commonly used in many devices where it is crucial to prevent pressure build ups. An example are anti-shock and anti-knock valves.

As long as the circuit is not subjected to excess pressure conditions, the pressure limiting device remains in the closed position: the force exerted by the pressurised oil is lower than that exerted by the opposing spring. With the piston at its maximum extension or if an abnormal situation may arise which requires an effort in excess of the set level (for example with a load in excess of the load capacity), the over pressured oil overcomes the force of the spring and flows towards the oil outlet.

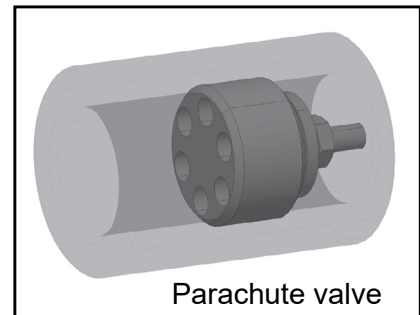


Pump

### Parachute valves (LB)

These are blocking valves fixed directly onto the lift cylinders and are designed to stop an uncontrolled lowering of the load in the event of a pipe subject to high pressure should break.

If the flow rate exceeds the set value (80 litres/min) a plate, which is lifted through elastic reaction from the seat of the valve, is pressed by the electrodynamic forces involved, against the valve chassis, leading to the closure of the valve itself. They are equipped with a draining hole.

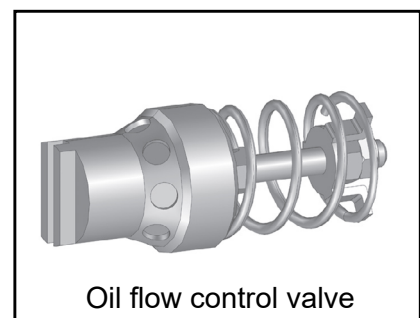


Parachute valve

### Oil flow control valves (SB)

The regulator valves are used as braking valves during the lowering of the cylinders to assure constant lowering speed, almost independently of the load weight.

They are comprised of a sliding cylinder (B), complete with spool (C) and spring (D), and diaphragm bushing (A).



Oil flow control valve

**Thanks very much for your reading,  
Want to get more information,  
Please click here, Then get the complete  
manual**

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**Have any questions please write to me:  
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## DIRECTIONAL VALVES

### One-directional and restraining valves.

The function of "one-directional" or "non-return" valves is to allow the oil to flow in one direction only, while the flow in the opposite direction is not permitted.

They are essentially comprised of a fixed part connected to the end of the pipe; in the appropriate inner housing runs the moving element which might be a bearing or a conical plug.

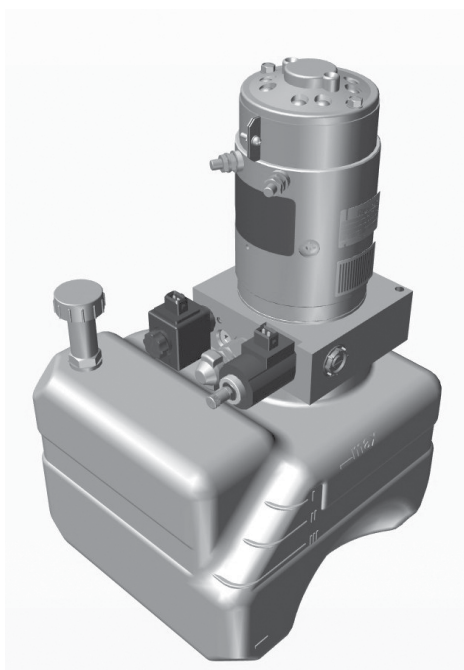
Check valves instead have an opposing spring. In the direction of free flow, the oil pressure must exceed the force exerted by the spring.

## HYDRAULIC CONTROL UNITS CONFIGURATION

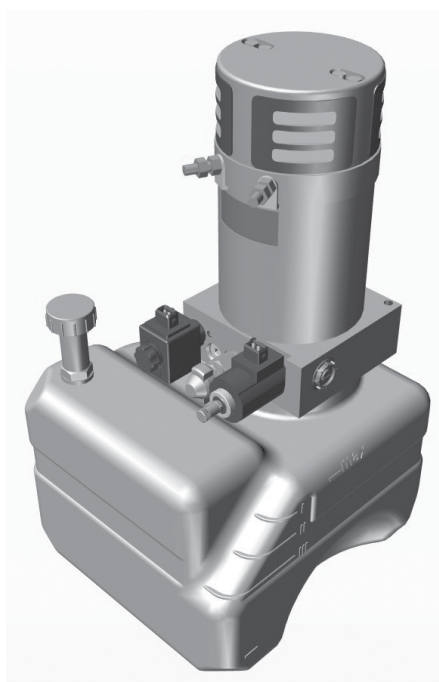
The trucks can be equipped with different hydraulic control units depending on the model and load capacity as indicated in the plate underneath.



**On the truck equipped with duplex mast FFL, the hydraulic control unit is equipped with a balancer valve which allows to maintain the same lowering speed of the forks regardless of the load.**



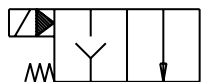
2.2KW



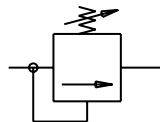
3KW

## HYDRAULIC PLANS

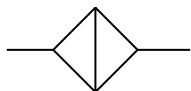
## SYMBOLS



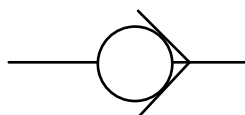
TWO POSITION SOLENOID VALVE



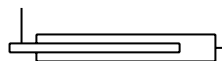
PRESSURE RELIEF VALVE



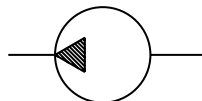
FILTER



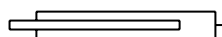
ONE-WAY VALVE



CYLINDER WITH ROD



PUMP



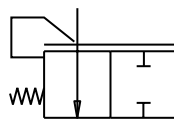
SINGLE ACTING CYLINDER



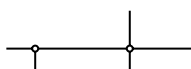
ELECTRIC MOTOR



RESERVOIR



BALANCER

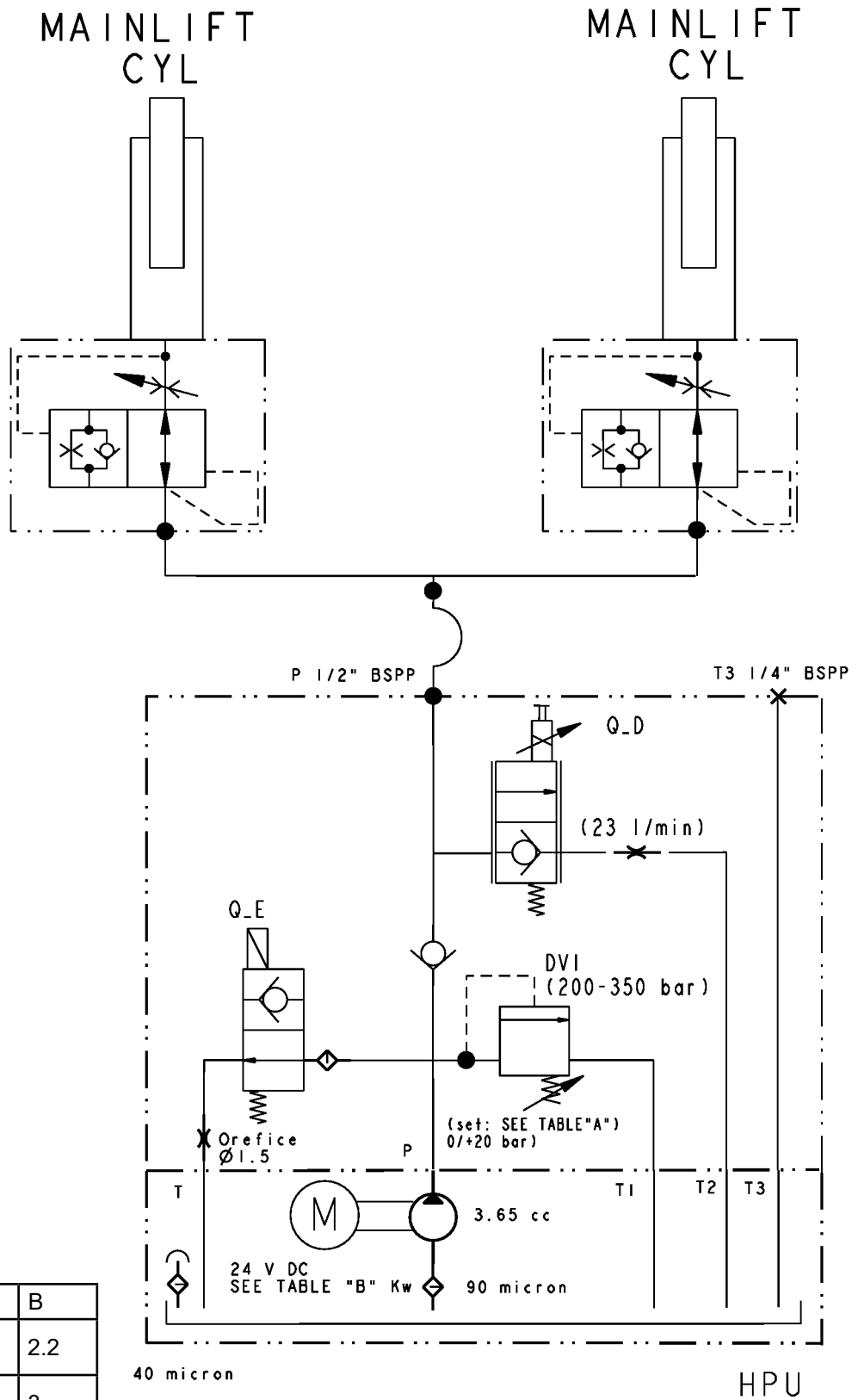


LINE CONNECTION



## OVERALL HYDRAULIC DIAGRAM

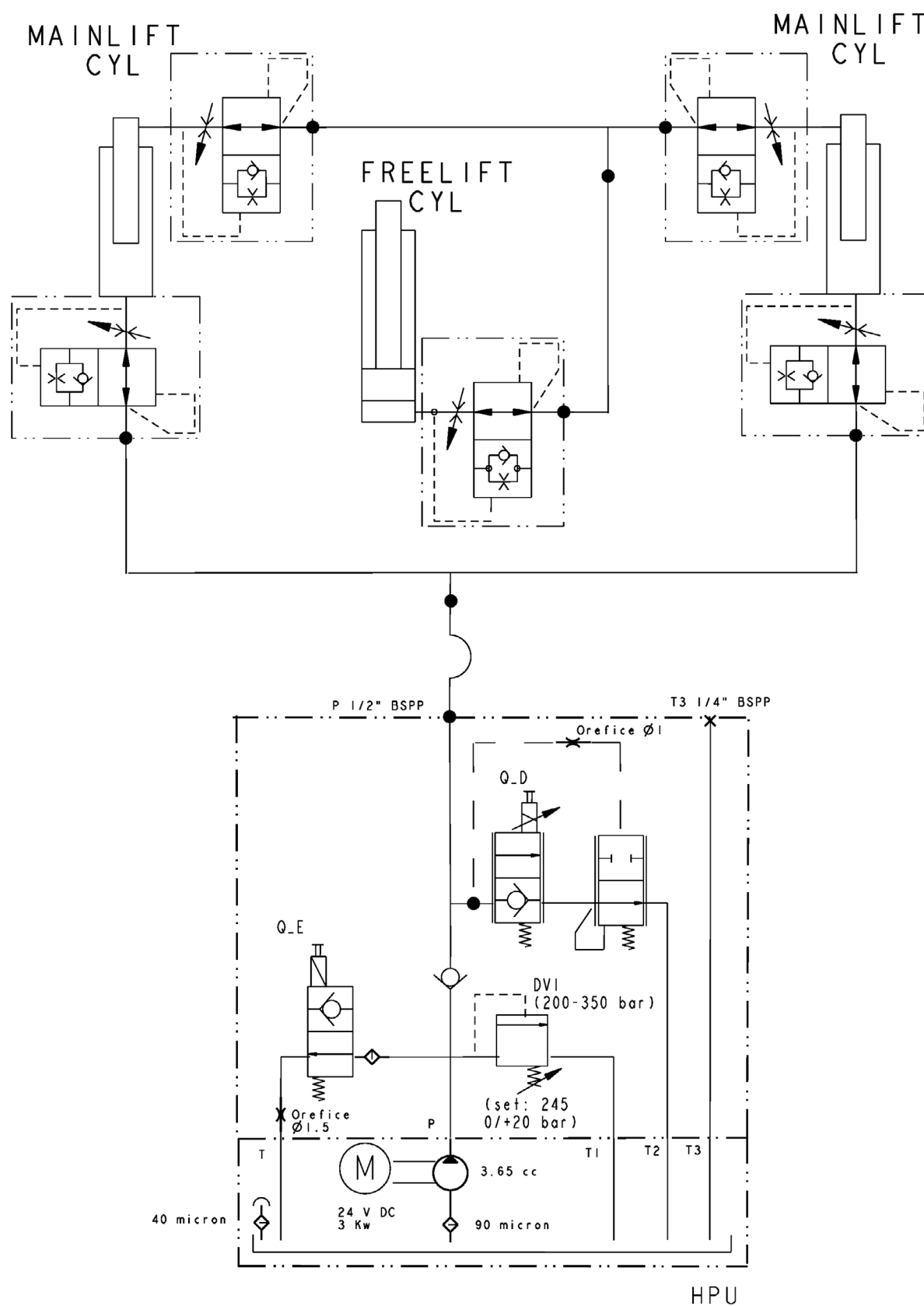
## TWO STAGE NFL MAST



	A	B
2 KW	210	2.2
3 KW	245	3

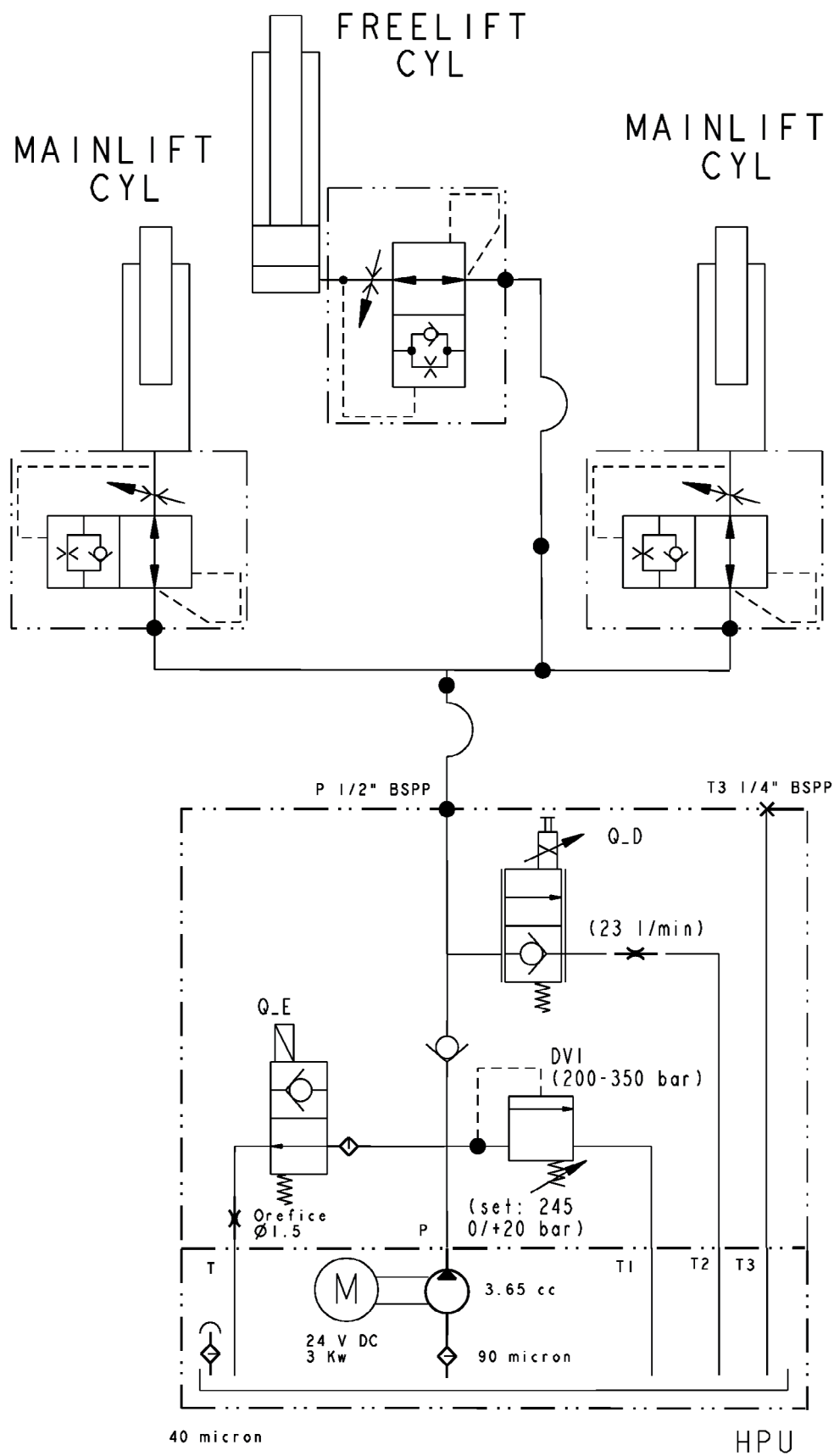
## OVERALL HYDRAULIC DIAGRAM

## TWO STAGE FFL MAST



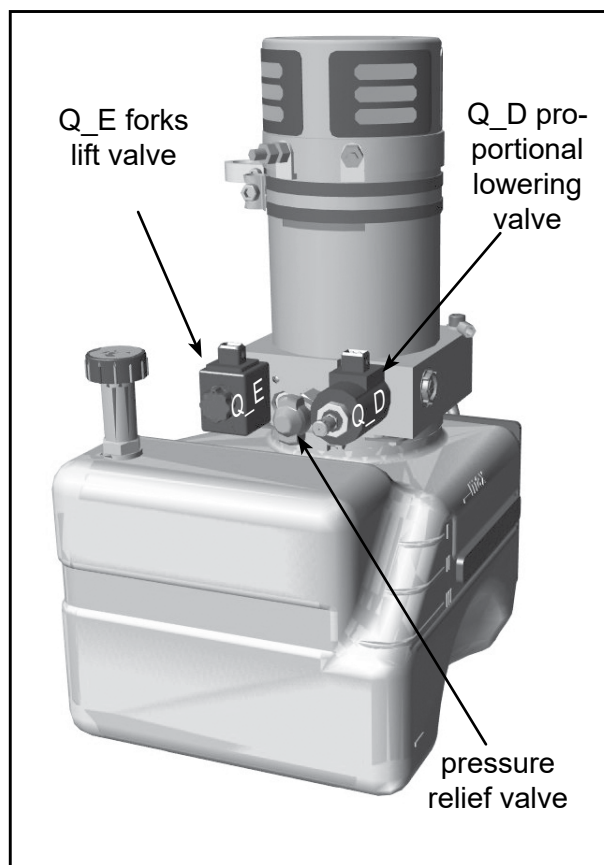
**OVERALL HYDRAULIC DIAGRAM**

## THREE STAGE FFL MAST



## HYDRAULIC DIAGRAMS FOR VARIOUS FUNCTIONS

- Fork Lifting
- Fork Lowering
- Oil release through the pressure relief valve



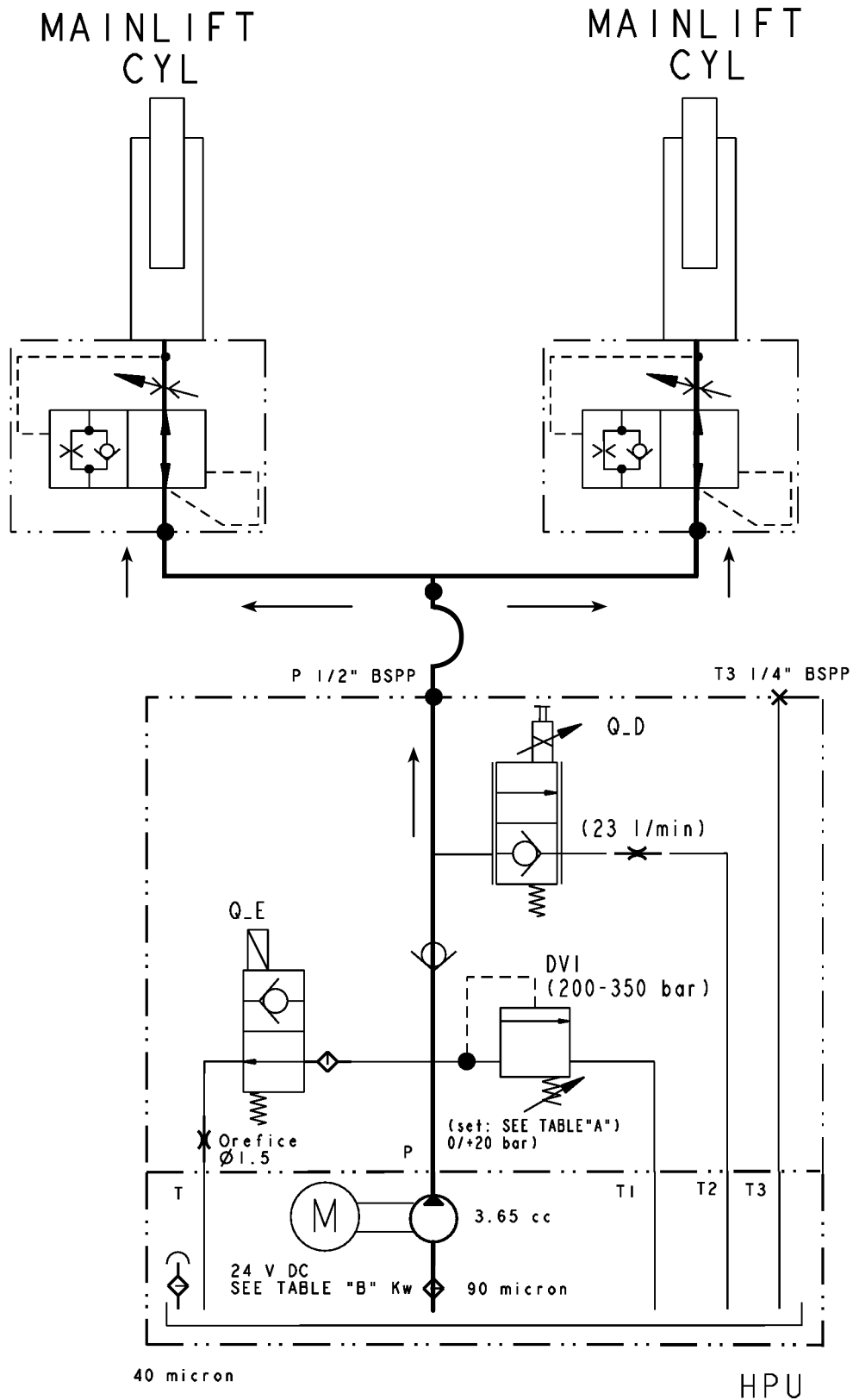
## SOLENOID VALVE OPERATION CHART

Function	Pump	Q_D	Q_E
Fork Lifting	↻	-	⚡
Slow fork lowering	-	⚡	-
Oil release through the pressure relief valve	↻	-	⚡

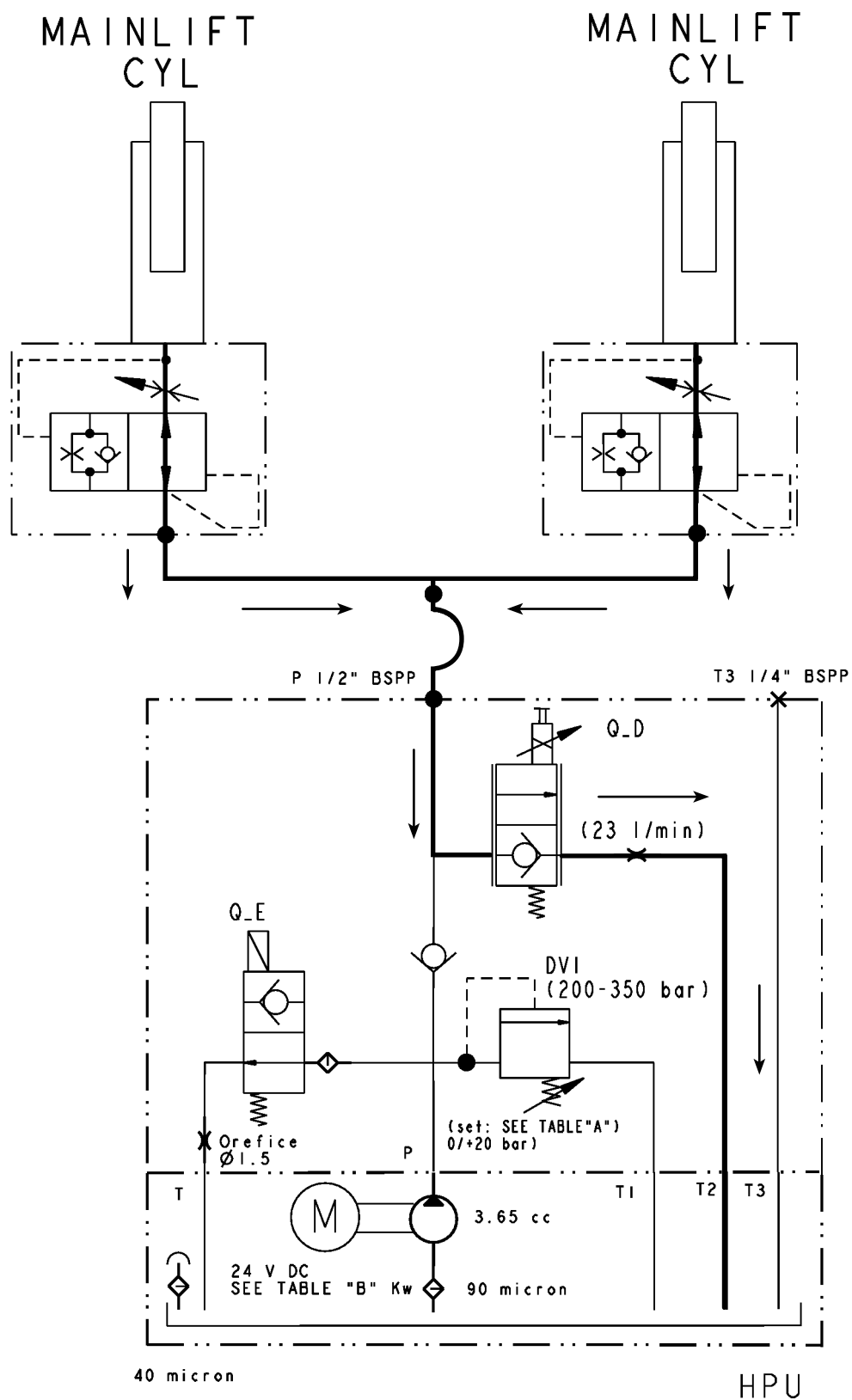
↻ = pump in operation

⚡ = solenoid valve coil powered

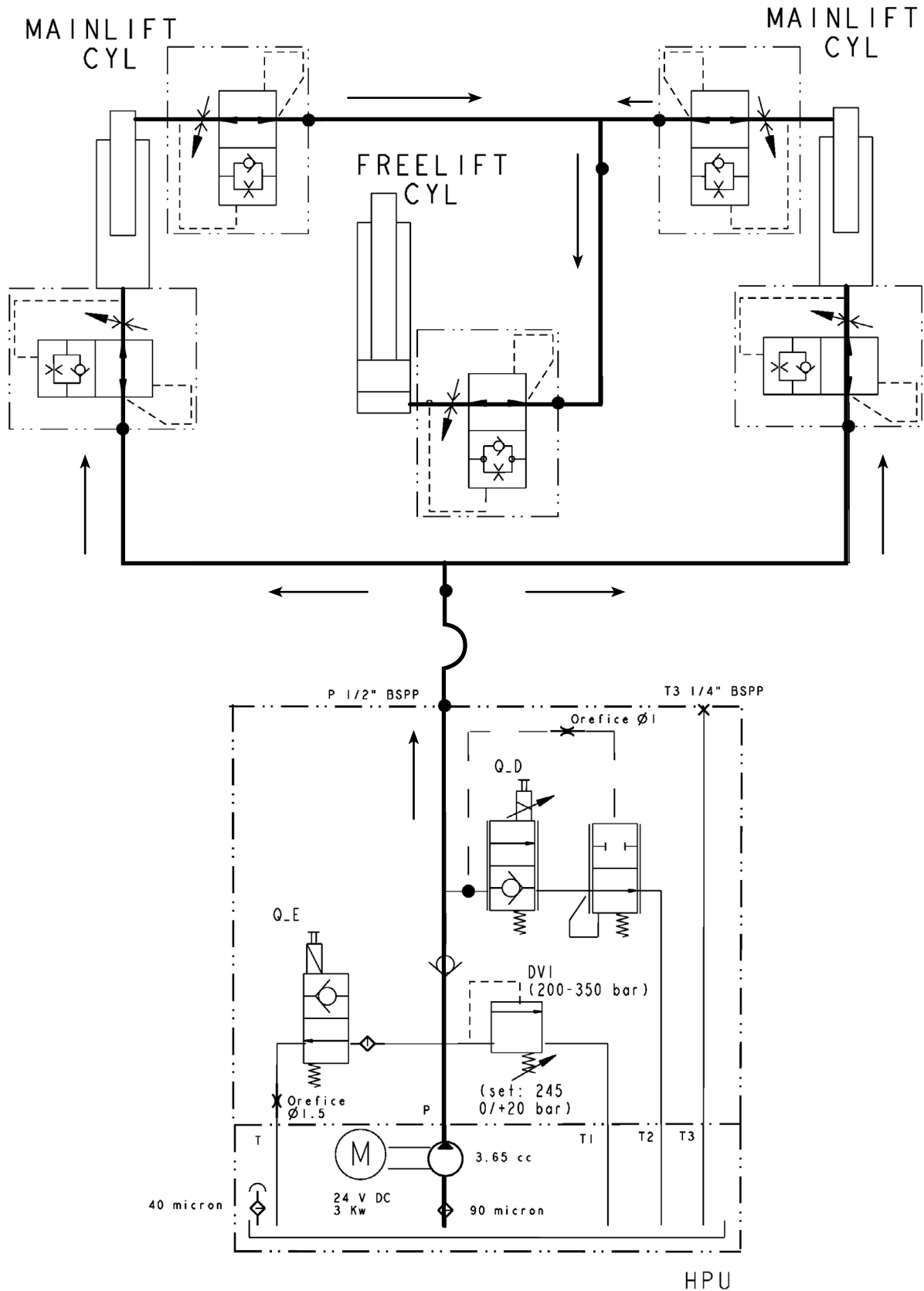
## HYDRAULIC DIAGRAM FOR THE TWO STAGE NFL FORKS LIFTING



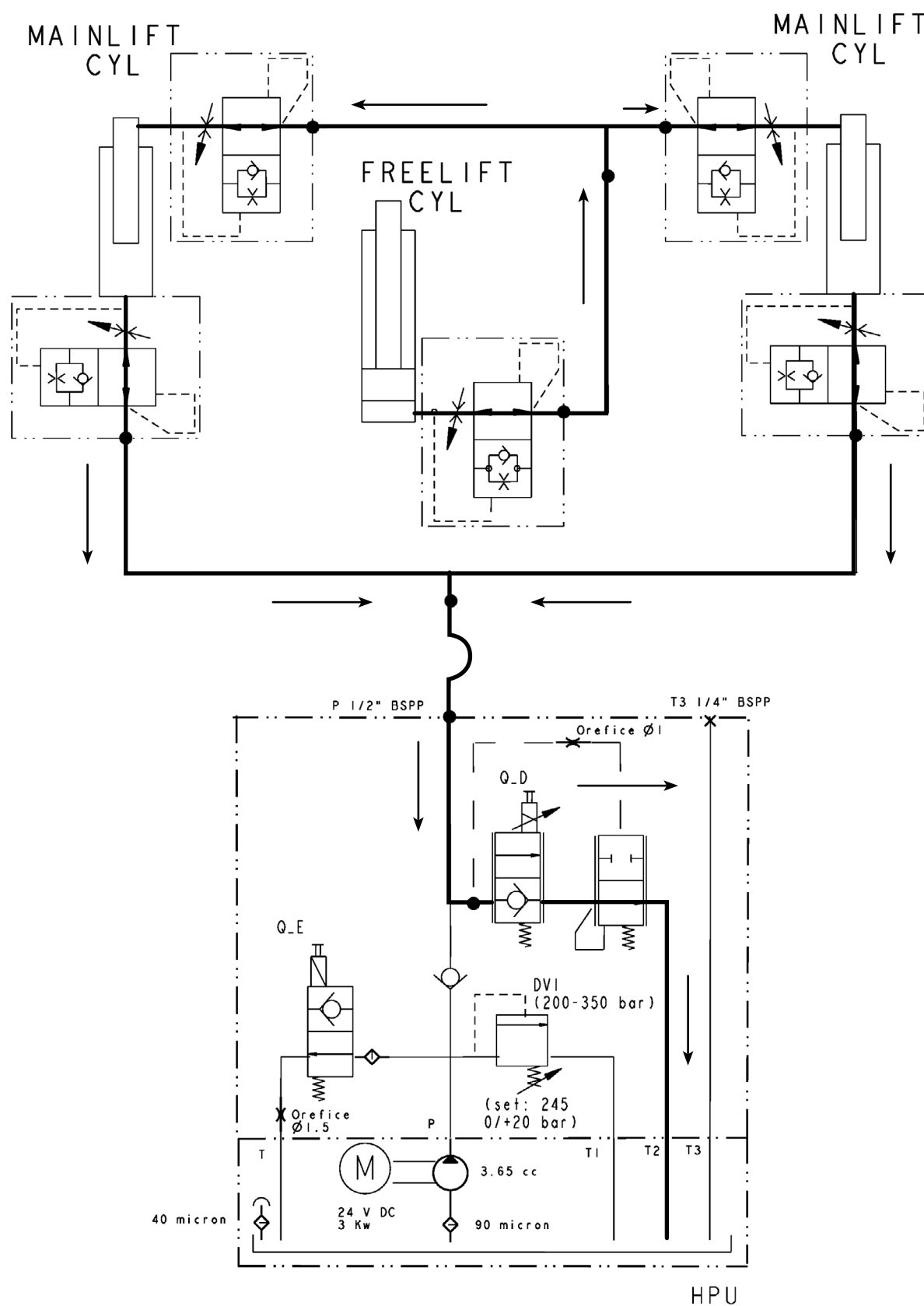
## HYDRAULIC DIAGRAM FOR THE TWO STAGE NFL FORKS LOWERING



## HYDRAULIC DIAGRAM FOR THE TWO STAGE FFL FORKS LIFTING

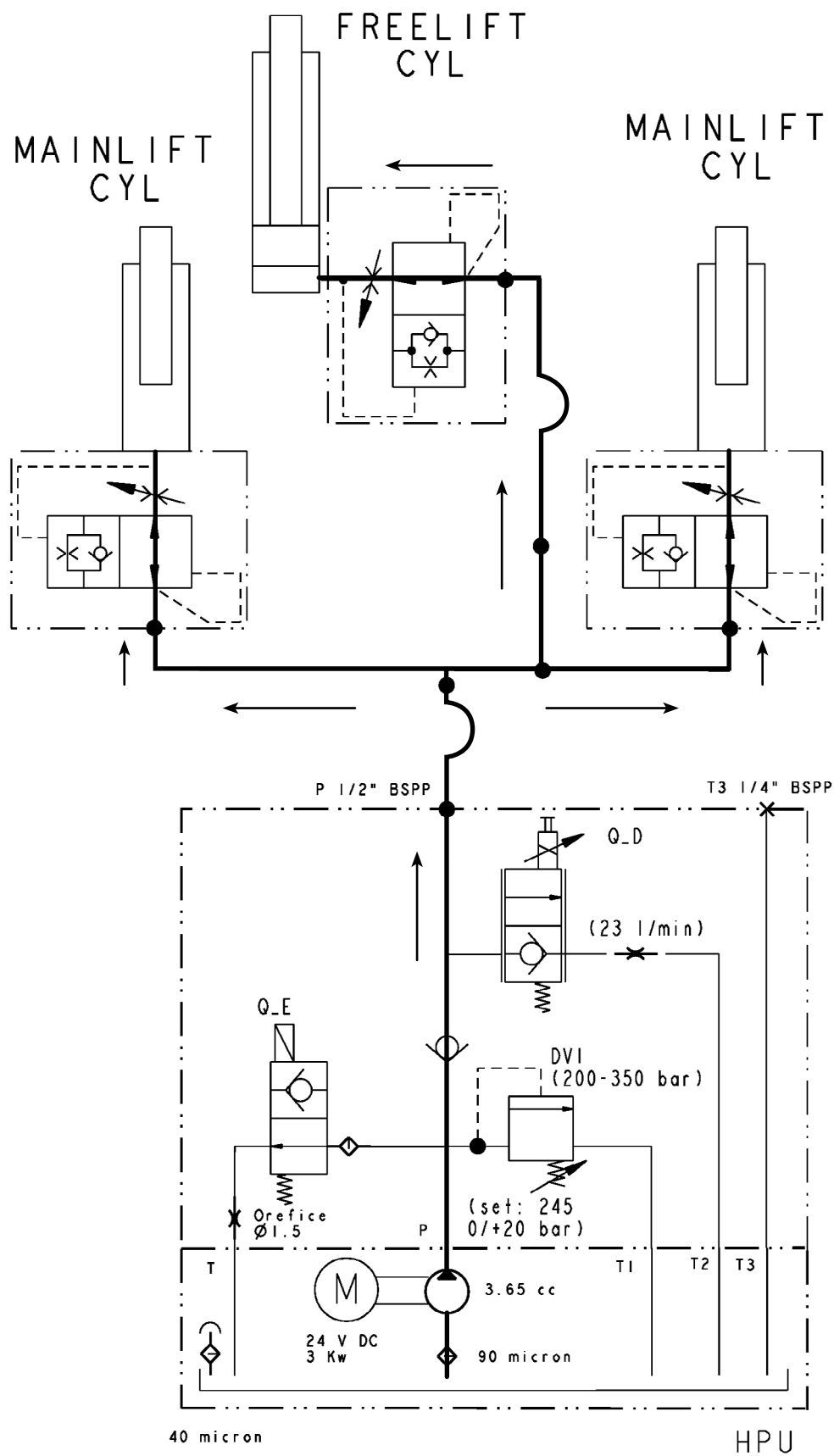


## HYDRAULIC DIAGRAM FOR THE TWO STAGE FFL FORKS LOWERING

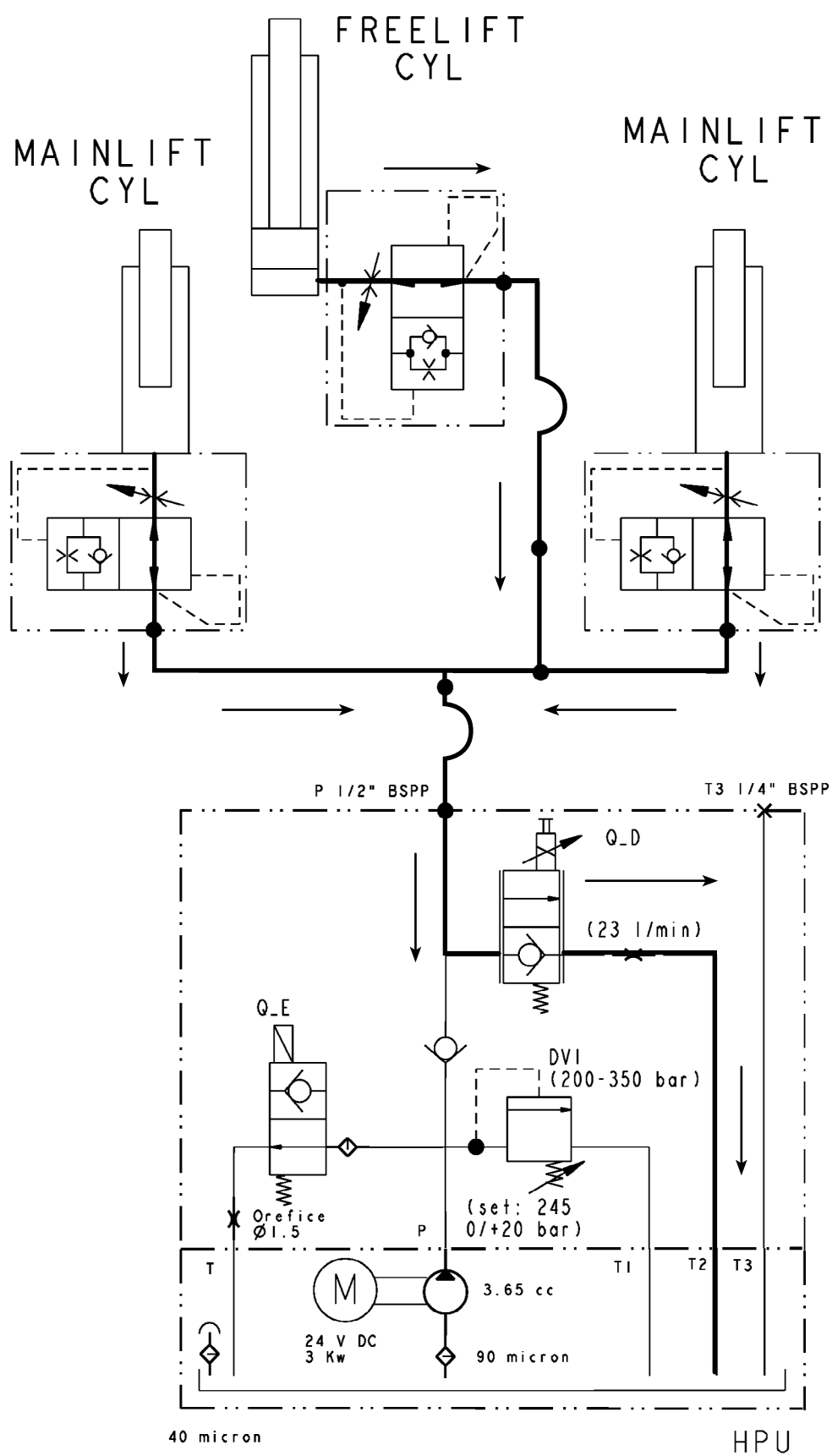




HYDRAULIC DIAGRAM FOR THE THREE STAGE FFL FORKS LIFTING



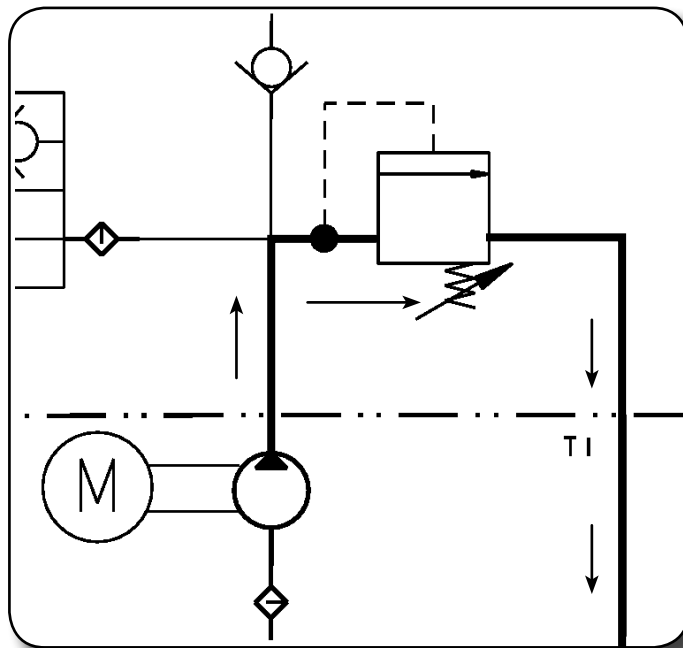
### HYDRAULIC DIAGRAM FOR THE THREE STAGE FFL FORKS LOWERING



**HYDRAULIC PLAN FOR OIL RELEASE INTO THE TANK THROUGH THE PRESSURE RELIEF VALVE**

The pressure relief or pressure limiting valves are used in hydraulic systems in order to guarantee the extreme pressures introduced into the system and to protect and safeguard the system against sudden pressure increases that could seriously damage the components. The pressure relief valve may come into operation in the following instances:

- Pressure regulation not suitable for the truck load capacity.
- Attempts to lift a load in excess of the truck's load capacity
- Blocked or faulty valve

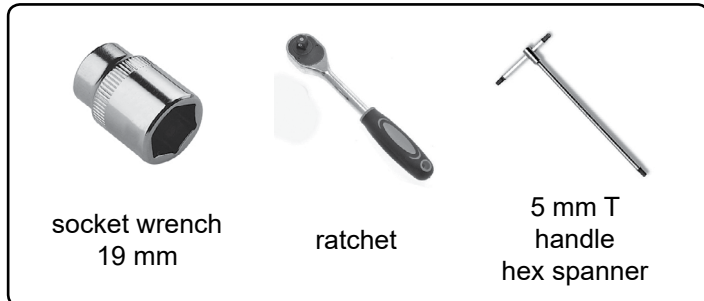


## HYDRAULIC COMPONENTS

### PRESSURE RELIEF VALVE CALIBRATION

The calibration of pressure relief valve is required following replacement.

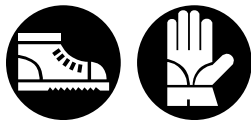
#### Equipment and tools



#### Procedure

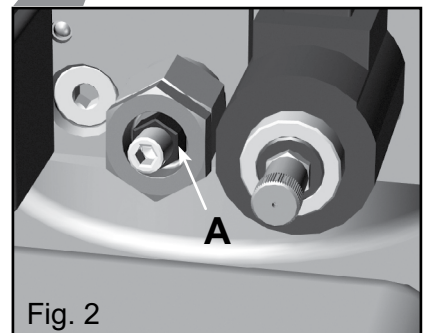
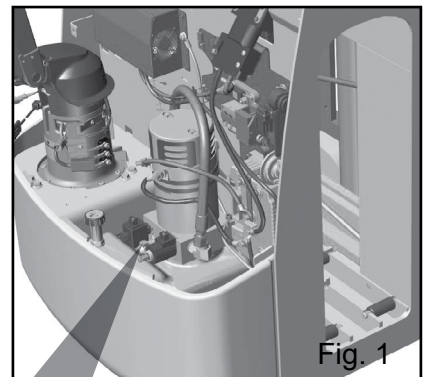


**Before starting work, ensure that you are wearing suitable protective clothing.**



#### Phase 1

Connect the battery and turn on the machine (ignition key to ON). Position a load equivalent to the truck's load capacity, printed on the truck's specification nameplate, on the truck's forks.

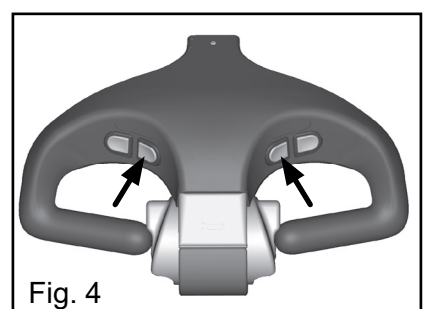
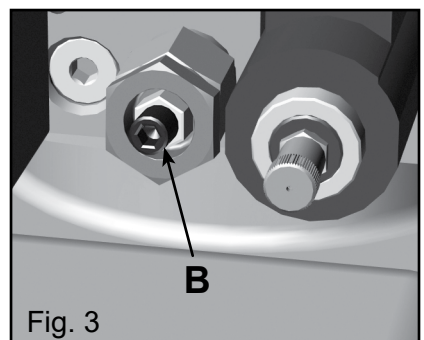


#### Phase 2

**RATCHET - 19 MM SOCKET WRENCH - 5 MM "T" HANDLE HEX WRENCH**

Using the socket wrench, loosen the lock nut (**ref A fig.2**). Using the hexagonal "T" section spanner loosen the adjusting screw (**ref B fig.3**) turning counter-clockwise until, while pressing one of the fork lifting keys on the tiller (**fig.4**), the pressure diminishes and the oil drains off back into the tank (the lifting action ceases). At this point change the direction of the rotation of the adjusting screw (clockwise) and tighten it until the forks resume their lifting action. Carry out a few trial lifts and lowering manoeuvres with the load on the forks, checking that the pressure setting is sufficient to cope with the pressure surge during the initial lifting stage. If this is not the case, tighten the screw by a further 1/4 turn.

Use the socket wrench to tighten the lock nut (**ref A fig.2**) to lock the adjusting screw in position.

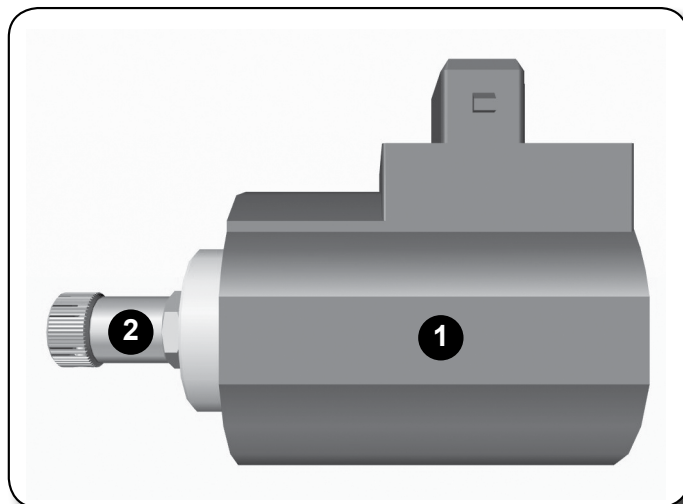


## CARTRIDGE SOLENOID VALVES

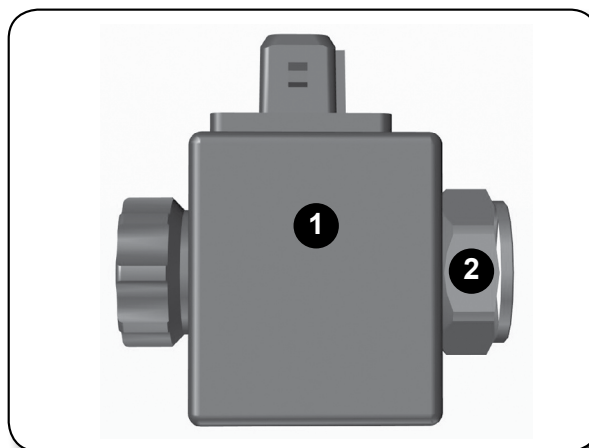
The distributor solenoid valves are of the screw on cartridge type.

This kind of valve is comprised of a chassis with a nut attached to the chassis, a threaded part, a range of static seal gaskets; inside a mobile element allows communication between the various holes.

### KEY TO CARTRIDGE SOLENOID VALVE COMPONENTS Q\_D



### KEY TO CARTRIDGE SOLENOID VALVE COMPONENTS Q\_E



Ref.	Description
1	Coil
2	Chassis valve