MILTON ROY

The force in pump technology

INSTRUCTION MANUAL

FOR INSTALLATION,
OPERATING, AND
MAINTENANCE

PRIMEROY® LIQUID END GSD

Instruction manual

This manual should be made available to the person responsible for installation, operating, and maintenance

DATE: 09/18/2020 *PN: 57218* *REV: 04*

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PART I – DESCRIPTION

I – 1. UNPACKING AND STORAGE

UNPACKING

The packaging must be carefully examined on receipt in order to ensure that the contents have not sustained any obvious damage. Precautions must be taken when opening the packaging to avoid damaging accessories which may be secured inside the packaging. Examine the contents and check them off against the delivery note.

STORAGE PRECAUTIONS

- Storage for less than six months

  Equipment shall preferably be stored in its original packaging and protected from adverse weather conditions.

- Storage for more than six months

  - Grease all visible unpainted sections. Rubber parts (such as semi-flexible couplings) must be protected from sunlight and sudden temperature changes.
  - Store the pump in its original packaging. In addition, packaging in heat-sealing plastic cover and desiccant bags must be provided for. The quantity of desiccant bags should be adapted to the storage period and to the packaging volume.
  - Store protected from adverse weather conditions.

I – 2. DESCRIPTION

The PRIMEROYAL Pump is a compact electro-mechanical metering pump, oil-lubricated with a sealed housing, allowing adjustment of its capacity when stopped or in operation. It is designed for industrial operation in continuous mode. It is made up of the following items:

- a driving device consisting of a motor
- a mechanical assembly
- a liquid end assembly

I – 3. SAFETY AND HEALTH INSTRUCTIONS

The personnel responsible for installing, operating and maintaining this equipment must become acquainted with, assimilate and comply with the contents of this manual in order to:

- avoid any possible risk to themselves or to third parties
- ensure the reliability of the equipment
- avoid any error or pollution due to incorrect operation

Any servicing on this equipment must be carried out when it is stopped. Any accidental start-up must be prevented (either by locking the switch or removing the fuse on the power supply line). A notice must be attached to the location of the switch to warn that servicing is being carried out on the equipment.

During oil changing operations, the waste oil must be collected in a suitable receptacle. Any overflow of oil which may result must be removed using a degreasing agent suitable for the operating conditions.

Soiled cleaning cloths must be stored in suitable receptacles. The oil, degreasing agent and cleaning cloths must be stored in accordance with the rules on pollution.

Switch off the power supply as soon as any fault is detected during operation: abnormal heating or unusual noise.

Special care has to be taken for chemicals used in the process (acids, bases, oxidizing/reducing solutions, etc).

PART II – INSTALLATION

II – 1. HYDRAULIC INSTALLATION

GENERAL

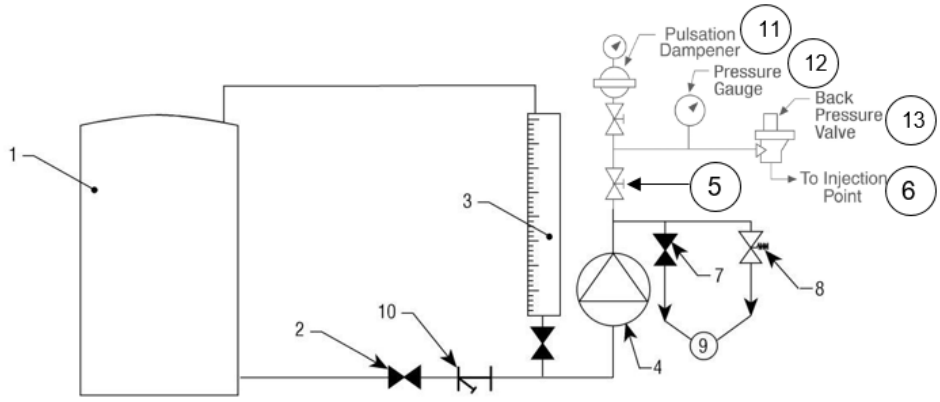
- Piping layout
  - There must be no swan-necks or stagnant volumes which can trap air or gas
  - Stresses due to incorrect alignment of piping with respect to the centerline of valves must be avoided as far as possible
- Remove burrs and clean the piping before fitting
- It is advisable to provide for a calibrating chamber in order to calibrate the pump in service conditions

PIPING ON THE SUCTION CIRCUIT

- Provide for a filter with suitable mesh size upstream of the pump
- Check whether the diameter and length of pipe are compatible with the pump's maximum capacity

PIPING ON THE DISCHARGE CIRCUIT

- Provide for a safety valve on the discharge pipe, designed to protect the installation
- It is advisable to install a priming valve on the discharge circuit in order to make starting and maintenance of the pump easier



1	Tank	7	Priming valve
2	Suction piping isolating valve	8	Safety valve
3	Calibrating chamber	9	Return
4	Pump	10	Filter
5	Discharge piping isolating valve	11	Discharge Pulsation Dampener
6	Utilization	12	Pressure Gauge with diaphragm seal
		13	Backpressure / Anti-siphoning Valve

Fig. 1: Installation example

II – 2. DRIP COLLECTION

- It is recommended to install a drain system to collect the leakage and the drip, especially if the liquid pumped is harmful

PART III – START UP

III – 1. PROCEDURES BEFORE START UP

Special care has to be taken for chemicals product used in the process
(acids, bases, oxidizing / reducing solutions, etc.).

- Check the opening of all isolating valves installed on the suction and discharge circuits. Disconnect discharge circuit (caution to the liquid pumped). This procedure is to verify that there is liquid present (pump is installed in flooded suction), or to prime the pump (pump installed in suction lift)
- Check that the pump capacity is set to "0%" (hand-knob)

III – 2. START UP

- Once all the checks and procedures described in the previous section have been carried out, start up the pump
- Check visually and by listening. (check that there are no suspicious noises)
- Make sure that the hand-knob is unlocked
- Proceed to the degassing (pump with diaphragm liquid end only)
  (Part VI - Servicing the liquid end)
- Adjust the pump capacity gradually from 0 % to 100% and control the liquid output at priming valve
- As soon as the liquid to be pumped flows out of the priming valve, priming on the process side has been achieved. Close the priming valve or reconnect the discharge pipe, as applicable.
- Once the priming is obtained, adjust the pump to the desired capacity.
- Lock the hand-knob with the locking screw

III – 3. FAILURE ON START UP

The flow rate is lower than desired

- The pump capacity is incorrectly adjusted:
  - adjust the capacity to the desired value and lock the hand-knob
- The suction power is insufficient (pipe cross-section too small or pipe too long):
  - replace the pipe with ones that have a larger cross-section or install the pump in flooded suction
- The leak-tightness of suction pipe is unsatisfactory
- The viscosity of the liquid is incompatible with the pump's capabilities

The capacity is greater than desired

- The stroke adjustment of debit of the pump is incorrect
  - to adjust the debit to the wanted value
- A syphoning phenomenon is observed:
  - check if the suction pressure is not superior to the discharge pressure. If so, it is necessary to place a back-pressure valve on the discharge line.

The capacity is variable

- This problem may be due to particles from the piping which interfere with the operation of the valve assemblies
  - clean the piping and the valve assemblies (by checking the assembly sequence of different components

III – 4. SCHEDULE FOR CHECKS AND MAINTENANCE OPERATIONS

The program of checks and maintenance operations depends on the conditions in which the equipment is used. For this reason, the following frequencies are given as an example only. Individual users should adapt these frequencies to their own specific operating conditions.

When?	Check	Maintenance	Reference
After first 2000 hours		Change lubricating oil (mechanical and hydraulic oil)	Chapter IV-1
Every month	Check the oil level of the housing and the spacer -if incorrect →	Trace lubricating oil leak	
Every 3 months	Check the oil temperature if > 167°F (75°C) →	Verify -the date of the last oil change -the oil contamination -the equipment operating conditions	
Every 8 000 hours or 1 year		Change lubricating oil (mechanical and hydraulic) Change the filter	Chapter IV-1
Frequency to be defined according to process	Check conformity of capacity	Check the pump capacity	Chapter IV-2

MAINTENANCE SHEET

Pump Code:

Contract Number:

Liquid Pumped:

Intervention	Date	Functioning hours	Comments

PART IV – ROUTINE MAINTENANCE

IV – 1. OIL CHANGE

To avoid any risk of burning by the hot oil, protective gloves must be used

1. Perform the first oil change after 2000 hours of operation. Subsequent oil changes will be carried out every 8000 hours operation or every 1 year
2. Disconnect the pump electrically, check that the equipment cannot be switched on accidentally. Put a notice at the location of the switch

LIQUID END OIL CHANGE

1. Unscrew the hydraulic oil plug and drain the oil into a tray.
2. Remove any overflow of oil immediately with a suitable degreasing agent for the operating conditions
3. Replace the filter
4. Degrease and fit the plug
5. Fill up the housing to the middle of the oil level indicator with a mechanical oil.

Use mechanical oil suitable for diaphragm liquid end service conditions.
Quantities listed in the table below

PUMP MODEL	QUANTITY (HOUSING)
PK	2 Gallons (7.6 Liters)
PL	3.5 Gallons (13.2 Liters)

IV – 2. OTHER MAINTENANCE OPERATIONS

CHECKING THE PUMP CAPACITY

This is a question of determining the straight line representing the pump's capacity according to its adjustment. Four measurements are sufficient (adjustment at 100%, 75%, 50% and 25%).
There are two possible methods:

1. **If the pump is installed in pressurizing mode**

   Measure the volume of pumped liquid in a calibrating chamber for a given period.
   It may be necessary to reproduce actual operating conditions (suction pressure).

2. **If the pump is installed in suction mode**

   Measure the volume of discharged liquid. It may be necessary to reduce actual operating conditions (discharge pressure).

The first method is recommended. In addition, this method avoids placing the operator in contact with the liquid, which is important if the pumped liquid is hazardous. For a precise check, it may be necessary to use an electromagnetic flow-meter.

IV – 3. TRACING CAUSES OF FAILURE

THE PUMP PRODUCES NO FLOW

- The pump capacity is adjusted to « 0 % »
  - Adjust the capacity to the desired value and lock the hand-knob.
- Check the leak-tightness of the piping safety valve
- The liquid end is not primed
  - release the pressure on the discharge pipe and prime the liquid end, or check the leak-tightness of the suction circuit
- The balls of the valve assemblies are blocked by particles
  - clean or replace the valve assemblies
    - First, check whether the presence of the particles in the valve assemblies is normal and take corrective action if necessary

If the problem is not solved check the mechanical assembly and liquid end functioning

THE PUMP DOES NOT PROVIDE THE REQUIRED FLOW RATE

- The pump capacity is incorrectly adjusted
  - adjust the capacity to the desired value and lock the hand-knob
- The valve assemblies are blocked by particles
  - clean or replace the valve assemblies
- The suction circuit leak-tightness is unsatisfactory

IV – 4. ORDERING SPARE PARTS

To make it easier to register your order for spare parts and ensure a quick delivery, please provide us the following details:

- Information on the pump: type and contract number. These two items of information are shown on the identification plate mounted on the pump
- Information on the spare part: reference, description and quantity. These items of information are specified in the spare parts list supplied with the pump

PART V – PREVENTATIVE MAINTENANCE

V – 1. GENERALITIES

The preventive maintenance consists in replacing the wear parts included in a "spare parts kit". These kits are available on request from the spare part department

The corresponding action is detailed in the chapter VI: Servicing the liquid end assembly

V – 2. LIQUID END ASSEMBLY PREVENTIVE MAINTENANCE

Renewal	Frequency* (hours)
Plunger and plunger connection	15,000
Diaphragm (for the diaphragm liquid end))	15,000
Check valves	8,000

* Approximate hours number when operating under max performances and normal using conditions

V – 3. MECHANICAL OIL CHARACTERISTICS

PUMP MODEL	OIL TYPE	REFERENCE	QUANTITY	MOBIL OIL	TEMPERATURE MINIMUM	TEMPERATURE MAXIMUM	EQUIVALENCY
PK	Standard	56976	8qt. (7.6L)	600 XP 150	-11.2°F (-24°C)	176°F (80°C)	Shell Omala S4 GX 150
PL			14qt. (13.2L)				
PK	Food Grade	57870	8qt. (7.6L)	SHC CIBUS 150			OPTILEB GT 150
PL			14qt. (13.2L)				

PART VI – SERVICING THE LIQUID END ASSEMBLY

VI – 1. GENERAL

REMARKS

- By measure of simplification, the described procedures do not mention the washers fitted with fasteners (such as screws and nuts) and the magnet

  Do not to forget to assemble the washers behind the screw and nuts

- Some parts have been bonded during the workshop assembly. Clean the residual glue before a second assembly
- Replace the seal at each servicing

PRECAUTION

- Special care must be taken for chemicals used in the process
  - acids, bases, oxidizing/reducing solutions, etc.
- Provide for the rinsing of the liquid end, if necessary, and provide for appropriate protective equipment
- Check that there is no pressure and the temperature of components before starting to dismantle. Before all servicing perform the following operations:
  - Adjust the pump capacity at « 0% »
  - Disconnect the electrical power Any accidental start-up must be prevented. position a notice at the switch location to avoid start up.
  - Disconnect the hydraulic power if used
- Drain the oil from the housing (refer to chapter IV-1 oil change)

DEGASSING

Pressurize the displacement chamber

Pressurize the return circuit (if necessary by closing the return circuit valve, to force the safety valve to release any air contained in the displacement chamber). Gradually increase the pump flow until the safety valve begins to clear oil in the lantern.

Degassing the double diaphragm (liquid end with double diaphragm)

Stop the pump (if it is running). Adjust the pump capacity to 10 or 20 %. Open the bleed **[022]**. (refer chapter Assembly/disassembly of the detection). Start the pump. Wait about 15 minutes and adjust the pump to the desired capacity. Close the bleed **[022]** when the required flow rate has been reached (after about 1 hour in operation).

VI – 2. PRINCIPLE OF THE LIQUID END

Liquid end with single diaphragm

During the suction phase, the displacement of the piston creates a partial vacuum in the displacement chamber. The diaphragm is hydraulically coupled to the piston and will suck a set volume (capacity) of fluid through the valve box and into the feed unit body. The other valve box seals off the return circuit.

The process is then inverted and the return phase begins. The piston compresses the hydraulic oil. The oil then exerts pressure on the diaphragm, thus forcing the liquid through the valve box. The other valve box seals off the suction circuit.

Liquid end with double diaphragm

During the suction phase, the displacement of the piston creates a partial vacuum in the displacement chamber. The first diaphragm is hydraulically coupled to the piston; the second diaphragm, being "bound" to the first, will suck a set volume (capacity) of fluid through the valve box and into the feed unit body. The other valve box seals off the return circuit.

The process is then inverted and the return phase begins. The piston compresses the hydraulic oil. The oil then exerts pressure on the diaphragm pair, thus forcing the liquid through the valve box. The other valve box seals off the suction circuit.

Operating principle of the diaphragm rupture detection:

- When one of the two diaphragms ruptures, pressure is exerted between the two diaphragms and is indicated on the detection system.

Safety valve: over pressure visualization

A translucent indicator allows the pump operator to check the safety valve functionality when it exhaust over pressure.

VI – 3.1 DISPLACEMENT CHAMBER ASSEMBLY / DISASSEMBLY 145

DRAWING: 7770000139

DISASSEMBLY	ASSEMBLY	
	Position	**Torque**
	[012]	**50 N.m**
	[435B]	**45 N.m**
	[435C]	**120 N.m**

DISASSEMBLY

1. Remove filter **[433]**
2. Remove valve **[012]**
3. Remove O-Ring **[438]**
4. Remove retaining ring **[434],** spring **[080]** and ball **[437A]**

   « Pilot » removal

5. Unscrew screws **[435C]**
6. Remove the chamber assembly

   ⚠ Protect plunger **[012C]** with a cloth

7. Unscrew screws **[435A]**
8. Remove cylinder **[037]**
9. Remove O-ring **[438A], [438B]** for replacement
10. Remove retaining ring **[434C]**
11. Remove the « pilot » assembly **[012A], [080B], [012B] & [435A]**

ASSEMBLY

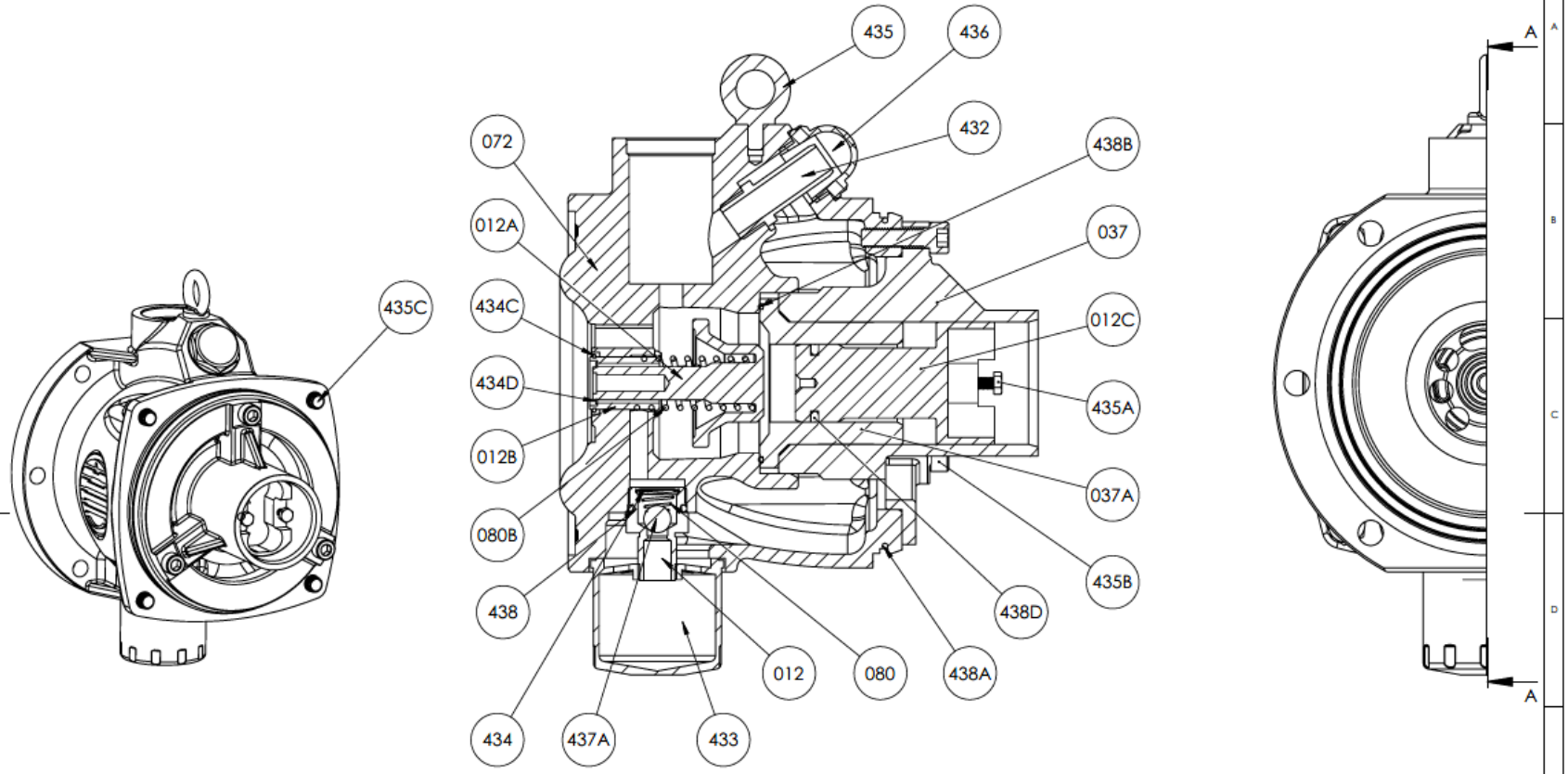
1. Insert the « pilot » assembly **[012A] + [080B] + [012B] + [435A]** into the displacement chamber **[072]**

   ⚠ the anti-rotation pin must be placed in the hole of the top

2. Fit retaining ring **[434C]**
3. Fit ball **[437A]**, spring **[080]** and retaining ring **[434]** into valve **[012].**
4. Fit O-Ring **[438]**
5. Screw the valve assembly into the displacement chamber **[072].**
6. Fit O-Ring **[438B]** on cylinder **[037]**
7. Insert the cylinder **[037]** into the displacement chamber **[072]**
8. Tighten the screws **[435A]**
9. Fit the O-Ring **[438A]**
10. Oil the cylinder **[037]** and position the displacement chamber assembly to mechanical assembly

    ⚠ Mechanical assembly set to 100% and
    plunger in front neutral position.

11. Tighten the screws **[435C]**
12. Screw the indicator **[436]** and the filter **[433]**



REVISION HISTORY					
DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked -Vérifié / Visa	REV
8/14/2020	25525	ADDED ADDITIONAL PLUNGER OPTIONS ALONG WITH PLUNGER BUBBLE NUMBERS.	RCA	TCK	01
12/10/2019	24613	INITIAL	RCA	CJK	00

GENERAL TOLERANCES	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	⫽	∠
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125 µin	0.4 [0.016]	0.6 [0.024]	0.2 [0.079]

DESCRIPTION

PRIMEROYAL K/L GSD
DISPLACEMENT CHAMBER ∅145

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE		DRAWING NUMBER - PLAN N°	REV
A3		2 / 6	DO NOT SCALE DRAWING DESSIN SANS ECHELLE	777000139	01

3051253012F-X0				
PRIMEROYAL K/L GSD DISPLACEMENT CHAMBER ∅145				
Bubble #	**Part #**	**Description**	**Drawing #**	**Qty**
012	01203770011N	SUCTION VALVE GSD	01203770YYY	1
012A	01203880301N	REAR POPPET GSD145	01203880YYY	1
012B	01203870085N	CONTROLLER POPPET GSD145	01203870YYY	1
072	07205410361N	CHAMBER GSD145	07205410YYY	1
080	08002010101N	SUCTION SPRING GSD	08002010YYY	1
080B	0800110006N	COMPRESSION SPRING	0800110006	1
432	4320297071N	SPLINED SOCKET R1/2	SP	1
433	4330009000N	OIL FILTER GSD	4330009YYY	1
434	4340027031N	SELF LOCKING RETAINING RING	SP	1
434C	4340065001N	SHAFT RETAINER RING D28	SP	1
434D	4340052010N	INVERTED EXT RET RING D17 X 1	SP	1
435	4350085082N	LIFTING EYE BOLT M8X13 ECO	4350085XXY	1
435C	4350119261N	HEX SCREW SERRATED FLNG M12X30		4
436	4360377000N	PILOT LIGHT WITH END CAP R1	SP	1
437A	4370000144N	BALL DIAMETER 14MM		1
438	4380006201N	O-RING 23 X 3.6 (R18)		1
438A	4380019391N	O-RING 164.5X3		1

VI – 3.2 DISPLACEMENT CHAMBER ASSEMBLY / DISASSEMBLY 225

DRAWING: 777000076

DISASSEMBLY	ASSEMBLY	
	Position	**Torque**
	[012]	**50 N.m**
	[435B]	**70 N.m**
	[435C]	**120 N.m**

12. Remove filter **[433]**
13. Remove valve **[012]**
14. Remove O-ring **[438]**
15. Remove retaining ring **[434],** spring **[080]** and ball **[437A]**

    « Pilot » removal

16. Unscrew screws **[435C]**
17. Remove the chamber assembly

⚠ Protect plunger **[012C]** with a cloth

18. Unscrew screws **[435D]**
19. Remove cylinder **[037]**
20. Remove O-ring **[438A], [438C]** for replacement
21. Remove retaining ring **[434C]**
22. Remove the « pilot » assembly **[012A], [080B], [012B] & [435A]**

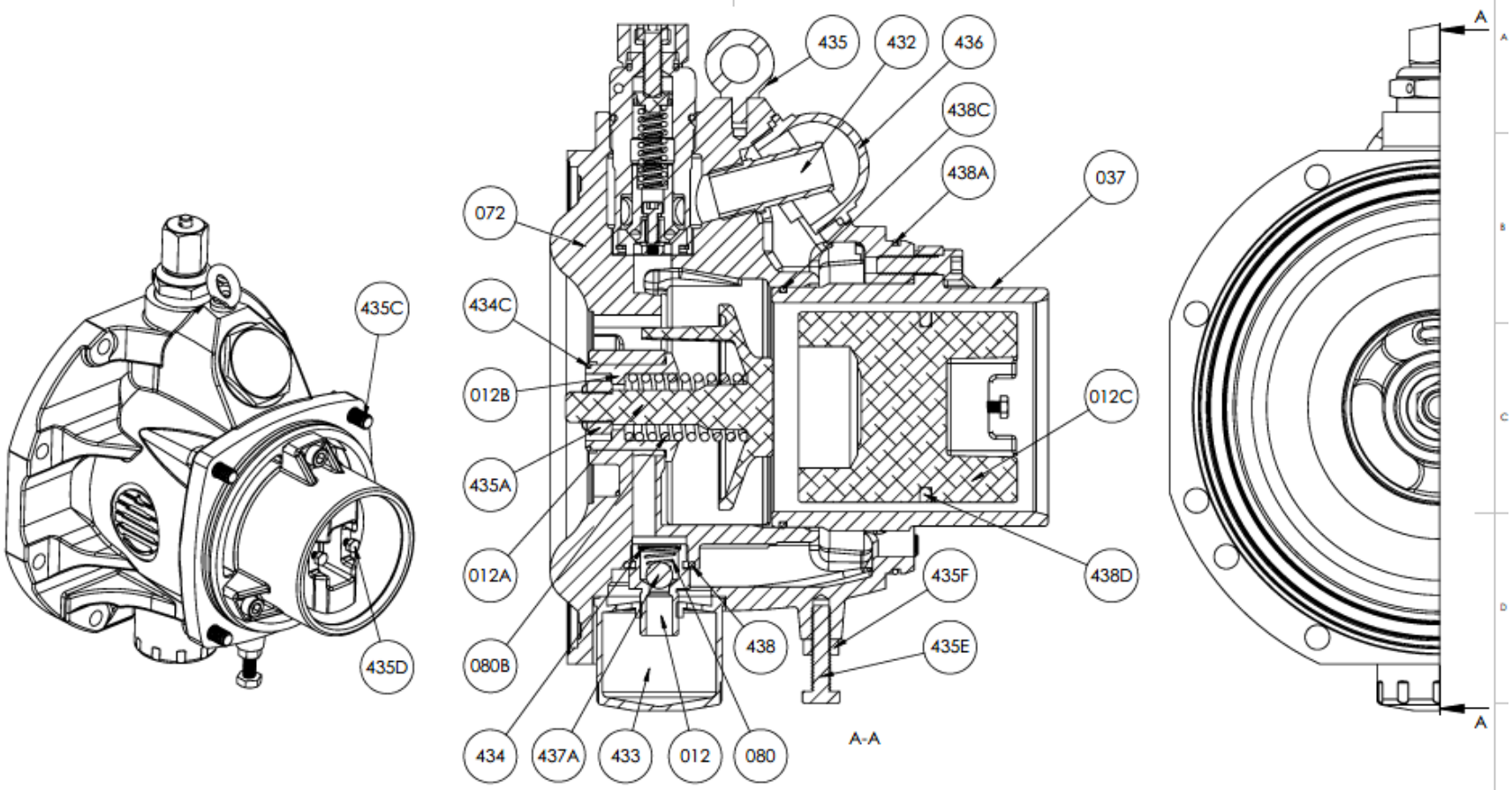
1. Insert the « pilot » assembly **[012A] + [080B] + [012B] + [435A]** into the displacement chamber **[072]**

⚠ the anti-rotation pin must be placed in the hole of the top

2. Fit retaining ring **[434C]**
3. Fit ball **[437A]**, spring **[080]** and retaining ring **[434]** into valve **[012].**
4. Fit O-ring **[438]**
5. Screw the valve assembly into the displacement chamber **[072].**
6. Fit O-ring **[438C]** on cylinder **[037]**
7. Insert the cylinder **[037]** into the displacement chamber **[072]**
8. Tighten the screws **[435D]**
9. Fit the O-ring **[438A]**
10. Oil the cylinder **[037]** and position the displacement chamber assembly to mechanical assembly

⚠ Mechanical assembly set to 100% and plunger in front neutral position.

11. Tighten the screws **[435C]**
12. Screw the indicator **[436]** and the filter **[433]**



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GENERAL TOLERANCES	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	=	/
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125	0.4 [0.016]	0.6 [0.024]	0.2 [0.079]

DESCRIPTION

PRIMEROYAL K/L GSD
DISPLACEMENT CHAMBER ∅225

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING	DRAWING NUMBER - PLAN N°	REV
A3		2 / 3	DESSIN SANS ÉCHELLE	777000076	A

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REVISION HISTORY

DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked - Vérifié / Visa	REV
12/10/2019	24613	INITIAL	RCA	CJK	00

3051253011F-X0				
PRIMEROYAL K/L GSD DISPLACEMENT CHAMBER ∅225				
Bubble #	**Part #**	**Description**	**Drawing #**	**Qty**
012	01203770011N	SUCTION VALVE GSD	01203770YYY	1
012A	01203670302N	REAR VALVE GSD225	01203670YYY	1
012B	01203750085N	CONTROLLER POPPET GSD225	01203750YYY	1
012C	01203680300N	PISTON GSD225	0120368XYYY	1
037	03701670361N	LINER GSD225	0370167XYYY	1
072	07205350361N	CHAMBER GSD225	07205350YYY	1
080	08002010101N	SUCTION SPRING GSD	08002010YYY	1
080B	08002000101N	DIAPGRAGM SPRING GSD225	08002000YYY	1
432	4320297081N	SPLINED SOCKET R3/4	SP	1
433	4330009000N	OIL FILTER GSD	4330009YYY	1
434	4340027031N	SELF LOCKING RETAINING RING	SP	1
434C	4340065011N	SHAFT RETAINER RING D45	SP	1
435	4350085082N	LIFTING EYE BOLT M8X13	4350085XXY	1
435A	4350010109N	HMZ LOCKNUT M16X1.5	SP	1
435C	4350119280N	HEX SCREW SERRATED FLNG M12X35		4
435D	4350003377N	HCS M6X16 ECO		2
435E	4350035725N	HEX HD SCREW M10X45 THREAD 26		1
435F	4350000065N	HEX NUT M10		1
436	4360378000N	PILOT LIGHT WITH END CAP R2 N	SP	1
437A	4370000144N	BALL DIAMETER 14MM		1
438	4380006201N	O-RING 23 X 3.6 (R18)		1
438A	4380019391N	O-RING 164.5X3		1
438C	4380065222N	O-RING 110.7X3.53	4380065XXY	1
438D	4380233180N	PLUNGER RING	4380233XX0	1

VI – 4.1 SAFETY VALVE ASSEMBLY / DISASSEMBLY

DRAWING: 777000056

DISASSEMBLY	ASSEMBLY	
	Position	**Torque**
	[435]	**20 N.m**
	225 LE Only [435B]	**2 N.m**
	[022]	**70 N.m**

DISASSEMBLY

1. Unscrew part **[022]** to remove the safety valve
2. Remove sealing
3. Unscrew cap **[008]**
4. Mark the position of screw **[435A]** with the valve body **[022]**
5. Unscrew nut **[435]**
6. Unscrew screw **[435A]** and calculate the number of turns
7. Remove retaining ring **[434]**
8. Remove seat **[024A]**
9. Remove the valve assembly **[012], [024]** and **[080A]**
10. Clean all parts with a cleaning solution

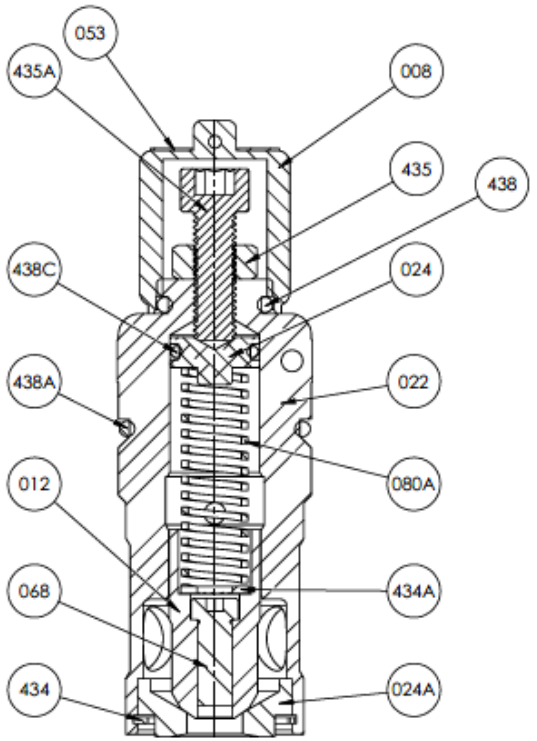
ASSEMBLY

1. Fit O-ring **[438C]** on the spring seat **[024]**
2. Position spring seat **[024]** into the valve body **[022]**
3. Position spring **[080A]** into the valve body **[022]**
4. Position the valve assembly **[012], [068], [434A]** into the valve body **[022]**
5. Position seat **[024A]** into the valve body **[022]**
6. Fit retaining ring **[434]**
7. Fit O-ring **[438A]** and **[438]**
8. Tighten screw **[435A]** (respect the position and the number of turns)
9. Maintain screw **[435A]** and tighten the nut **[435]**
10. Tighten cap **[008]**
11. Screw the valve body **[022]** in the displacement chamber

CLEANING THE AIR BLEED BUILT INTO THE SAFETY VALVE

CAUTION: Do not carry out this operation unless particles have blocked the air bleed impeding its operation.

1. Proceed with removal of the safety valve. The ball stop and ball should only be removed if they are to be replaced
2. Soak the valve in a cleansing solution and press on the nut of the calibrating valve by hand to check that the valve stem operates correctly
3. Clean the valve with compressed air
4. Proceed with reinstallation of the safety valve



12/16/19	24620	INITIAL	TCK	CJK	00
DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked -Vérifié / Visa	REV

REVISION HISTORY

GENERAL TOLERANCES	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	=	∠
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125/ISO7	0.4 [0.016]	0.6 [0.024]	0.2 [0.079]

DESCRIPTION

GSD LIQUID END 145

SAFETY RELIEF VALVE ASSEMBLY

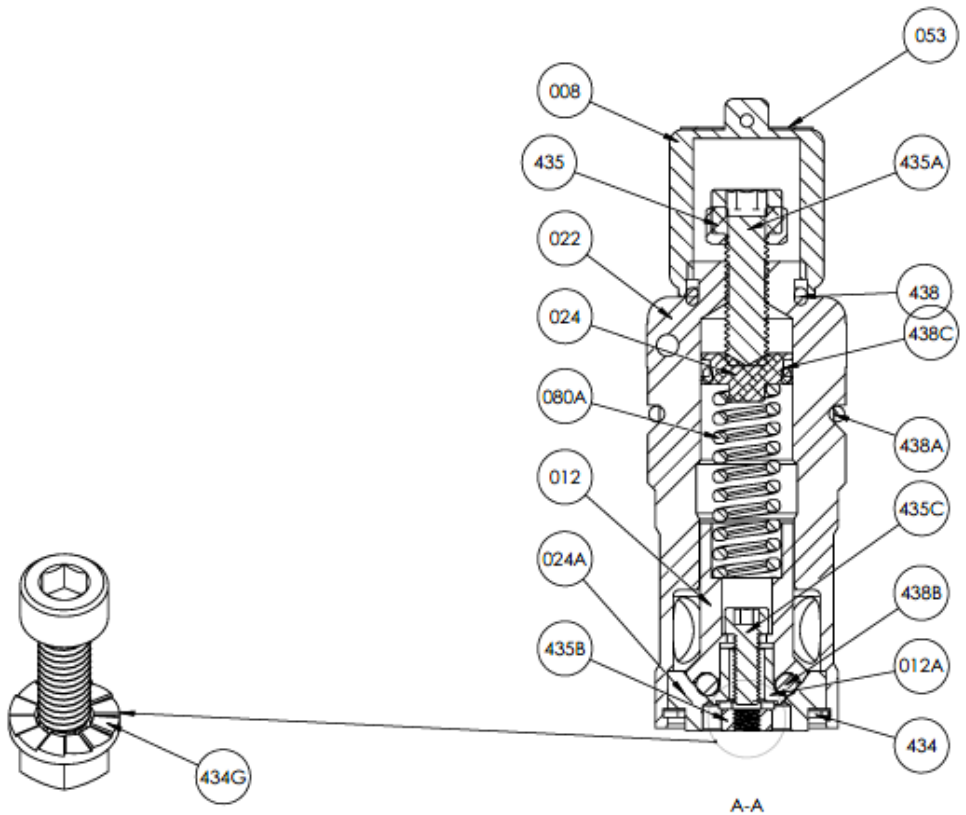
MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING	DRAWING NUMBER - PLAN N°	REV
A3		2 / 4	DESSIN SANS ECHELLE	777000058	00

P/N: 57218

3060065191F-X0				
PrimeRoyal Safety Relief Valve (145: 0-19)				
Bubble #	Part #	Description	Drawing #	Qty
008	0080068006N	RELIEF VALVE CAP	0080068006	1
012	01204010192N	VALVE FLAP GSD	01204010YYY	1
022	02200410011N	VALVE BODY GSD	02200410YYY	1
024	02401990071N	SPRING PUSHER	02401990YYY	1
024A	02402110015N	VALVE SEAT GSD	02402110YYY	1
053	05302276025N	NAMEPLATE	0530227XYYY	1
068	06802490192N	VALVE BLEED PIN	06802490YYY	1
080A	0800112006N	RELIEF VALVE SPRING		1
434	4340067001N	INVERTED INTERNAL RET RING D36	SP	1
434A	4340068002N	LARGE SAFETY WASHER D8	SP	1
435	4350000062N	ECO HEX NUT M10		1
435A	4350068312N	SHCS M10X45	4350068XXY	1
438	4380006181N	O-RING 19.8 X 3.6 (R16)		1
438A	4380006291N	O-RING 37.3 X 3.6 (R27)		1
438C	4380006141N	O-RING 15,1 X 2,7 (WR12)		1

3060065190F-X0				
PrimeRoyal Safety Relief Valve (145:19-52)				
Bubble #	Part #	Description	Drawing #	Qty
008	0080068006N	RELIEF VALVE CAP	0080068006	1
012	01204010192N	VALVE FLAP GSD	01204010YYY	1
022	02200410011N	VALVE BODY GSD	02200410YYY	1
024	02401990071N	SPRING PUSHER	02401990YYY	1
024A	02402110015N	VALVE SEAT GSD	02402110YYY	1
053	05302276025N	NAMEPLATE	0530227XYYY	1
068	06802490192N	VALVE BLEED PIN	06802490YYY	1
080A	0800124006N	RELIEF VALVE SPRING		1
434	4340067001N	INVERTED INTERNAL RET RING D36	SP	1
434A	4340068002N	LARGE SAFETY WASHER D8	SP	1
435	4350000062N	ECO HEX NUT M10		1
435A	4350068312N	SHCS M10X45	4350068XXY	1
438	4380006181N	O-RING 19.8 X 3.6 (R16)		1
438A	4380006291N	O-RING 37.3 X 3.6 (R27)		1
438C	4380006141N	O-RING 15,1 X 2,7 (WR12)		1



A-A

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GENERAL TOLERANCES	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	=	⟋
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125 RMS	0.4 [0.016]	0.4 [0.024]	0.2 [0.079]

DESCRIPTION

GSD LIQUID END 225

SAFETY RELIEF VALVE

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING	DRAWING NUMBER - PLAN N°	REV
A3		2 / 4	DESSIN SANS ÉCHELLE	777000056	00

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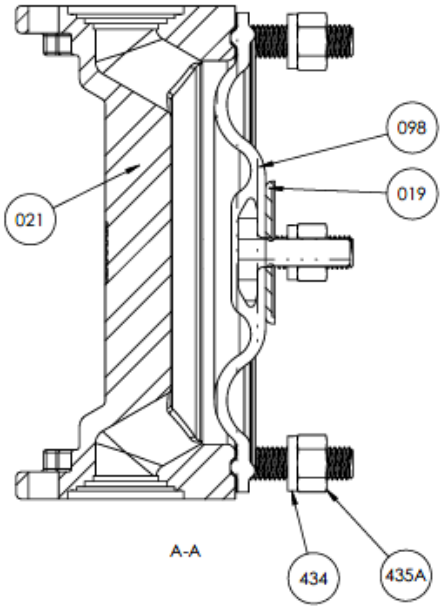
REVISION HISTORY

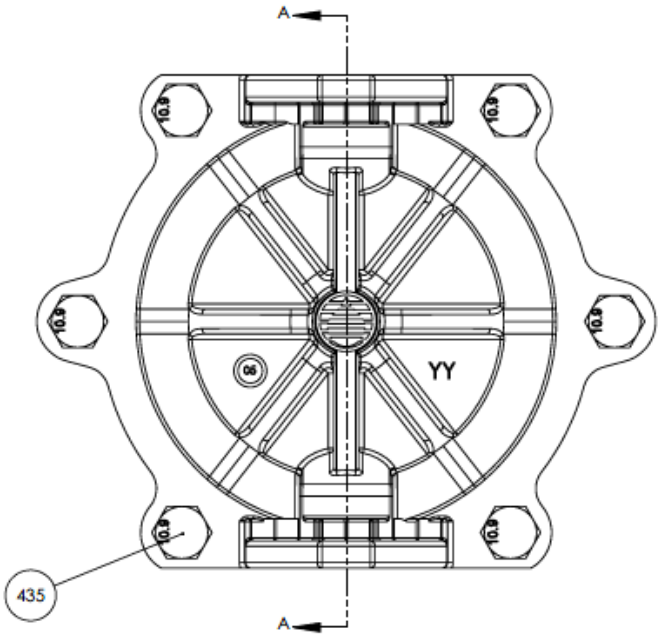
DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked -Vérifié / Visa	REV
12/16/19	24620	INITIAL	TCK	CJK	00

3060065200F-X0				
PrimeRoyal Safety Relief Valve (225: 14-27)				
Bubble #	Part #	Description	Drawing #	Qty
008	0080068006N	RELIEF VALVE CAP	0080068006	1.000
012	01203760036N	CHECK VALVE POPPET GSD225	01203760YYY	1.000
012A	01203990015N	SHOCK ABSORBER PUSHBUTTON	01203990YYY	1.000
022	02200410011N	VALVE BODY GSD	02200410YYY	1.000
024	02401990071N	SPRING PUSHER	02401990YYY	1.000
024A	02402090015N	VALVE SEAT GSD225	02402090YYY	1.000
053	05302276025N	NAMEPLATE	0530227XYYY	1.000
080A	08002100101N	RELIEF VALVE SPRING		1.000
434	4340067001N	INVERTED INTERNAL RET RING D36	SP	1.000
434G	4340066002N	LARGE SAFETY WASHER D6	SP	1.000
435	4350000062N	ECO HEX NUT M10		1.000
435A	4350068312N	SHCS M10X45	4350068XXY	1.000
435B	4350076046N	ECROU FREIN M6 DIN985 NYLSTOP	SP	1.000
435C	4390046050N	WASHER HEAD SCREW M6X16	SP	1.000
438	4380006181N	O-RING 19.8 X 3.6 (R16)		1.000
438A	4380006291N	O-RING 37.3 X 3.6 (R27)		1.000
438B	4380069131N	O-RING 13X5 70SHORE	SP	1.000
438C	4380006141N	O-RING 15,1 X 2,7 (WR12)		1.000

3060065190F-X0				
PrimeRoyal Safety Relief Valve (225: 0-14)				
Bubble #	Part #	Description	Drawing #	Qty
008	0080068006N	RELIEF VALVE CAP	0080068006	1
012	01203760036N	CHECK VALVE POPPET GSD225	01203760YYY	1
012A	01203990015N	SHOCK ABSORBER PUSHBUTTON	01203990YYY	1
022	02200410011N	VALVE BODY GSD	02200410YYY	1
024	02401990071N	SPRING PUSHER	02401990YYY	1
024A	02402090015N	VALVE SEAT GSD225	02402090YYY	1
053	05302276025N	NAMEPLATE	0530227XYYY	1
080A	0800124006N	RELIEF VALVE SPRING		1
434	4340067001N	INVERTED INTERNAL RET RING D36	SP	1
434G	4340066002N	LARGE SAFETY WASHER D6	SP	1
435	4350000062N	ECO HEX NUT M10		1
435A	4350068312N	SHCS M10X45	4350068XXY	1
435B	4350076046N	ECROU FREIN M6 DIN985 NYLSTOP	SP	1
435C	4390046050N	WASHER HEAD SCREW M6X16	SP	1
438	4380006181N	O-RING 19.8 X 3.6 (R16)		1
438A	4380006291N	O-RING 37.3 X 3.6 (R27)		1
438B	4380069131N	O-RING 13X5 70SHORE	SP	1
438C	4380006141N	O-RING 15,1 X 2,7 (WR12)		1

VI – 5.1 LIQUID END ASSEMBLY / DISASSEMBLY 145 15.9/25		
DRAWING: 777000000		
	Position	**Torque**
	[435A]	**50 N.m**
1. Remove the screws **[435A]** 2. Remove the liquid end body **[021]** 3. Remove the diaphragm **[098]**	1. Insert the diaphragm **[098]** (mechanical stop) 2. Turn the diaphragm 20° (counter-clockwise) to center the pin into the hole on the displacement chamber 3. Fit the diaphragm **[021]** into the displacement chamber 4. Tighten the screws **[435A]** in opposition	





12/10/19	24614	INITIAL	TCK	CJK	00
DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked -Vérifié / Visa	REV

REVISION HISTORY

GENERAL TOLERANCES	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	⌭	⟋
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125 µin	0.4 [0.016]	0.4 [0.024]	0.2 [0.079]

DESCRIPTION

GSD LIQUID END NON LEAK DETECTION

145 15.9/25MM BALL

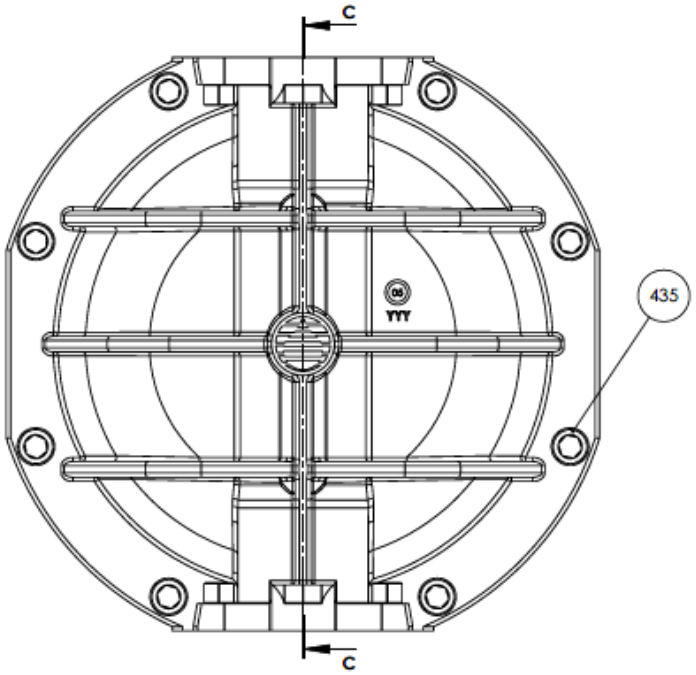
MILTON ROY

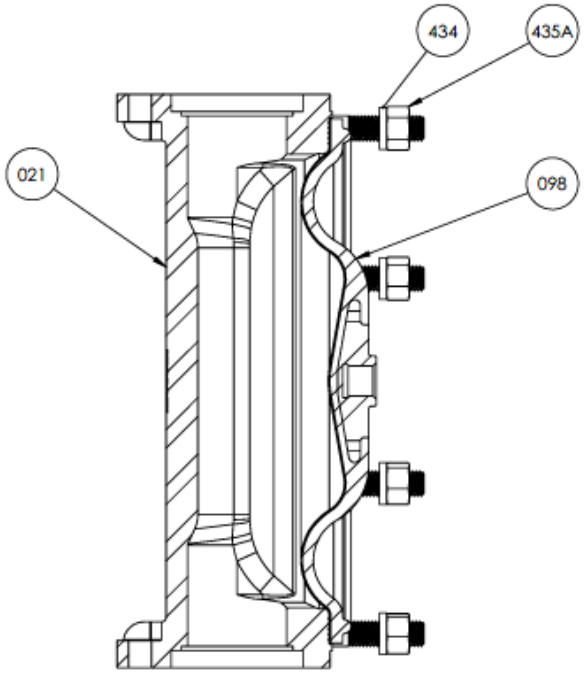
FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING	DRAWING NUMBER - PLAN N°	REV
A3		2 / 4	DESSIN SANS ECHELLE	777000000	00

3050644032F-X0				
PrimeRoyal Liquid End 145 Diaphragm 25 CV Ball 316 SS				
Bubble #	Part #	Description	Drawing #	Qty
019	0190268006N	WASHER	0190268006	1
021	0210594016N	LIQUID END 145 FOR CHECK VALVE 25	02105940YY	1
098	0980241399N	DIAPHRAGM D145 PTFE/NITR	0980241X99	1
434	4340009095N	SPRING LOCKWASHER D.12		6
435A	4350000083N	HEX NUT M12		6
435	4350126030N	HEX HEAD SCREW M12X60 FULL THR		6

3051253322F-X0				
PrimeRoyal Liquid End 145 Diaphragm 15.9 CV Ball 316 SS				
Bubble #	Part #	Description	Drawing #	Qty
019	0190268006N	WASHER	0190268006	1
021	02108830025N	LIQUID END 145 FOR CHECK VALVE 15.9	02108830YYY	1
098	0980241399N	DIAPHRAGM D145 PTFE/NITR	0980241X99	1
434	4340009095N	SPRING LOCKWASHER D.12		6
435A	4350000083N	HEX NUT M12		6
435	4350126030N	HEX HEAD SCREW M12X60 FULL THR		6

VI – 5.2 LIQUID END ASSEMBLY / DISASSEMBLY 225		
DRAWING: 777000001		
	Position	**Torque**
	[435A]	**150 N.m**
4. Remove the screws **[435A]** 5. Remove the liquid end body **[021]** 6. Remove the diaphragm **[098]**	5. Insert the diaphragm **[098]** (mechanical stop) 6. Turn the diaphragm 20° (counter-clockwise) to center the pin into the hole on the displacement chamber 7. Fit the diaphragm **[021]** into the displacement chamber 8. Tighten the screws **[435A]** in opposition	





C-C

DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked -Vérifié / Visa	REV
12/10/19	24614	INITIAL RELEASE	TCK	CJK	00

REVISION HISTORY

PROPRIETARY NOTICE

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GENERAL TOLERANCES	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	=	/
TOLERANCES mm[INCHES]	±0.1 [.004]	±0.2 [.008]	±0.3 [.012]	±0.5 [.020]	±0.8 [.031]	±1.2 [.047]	±2 [.079]	125 µIN	0.4 [0.014]	0.6 [0.024]	0.2 [0.079]

DESCRIPTION

GSD LIQUID END NON LEAK DETECTION

225 40 MM CV BALL

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING DESSIN SANS ÉCHELLE	DRAWING NUMBER - PLAN N°	REV
A3		2 / 3		777000001	00

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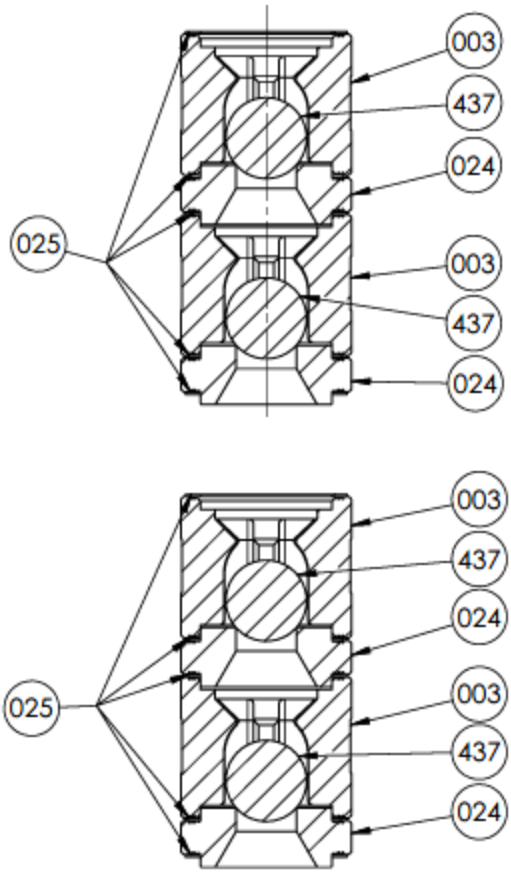
3051253300F-X0				
PrimeRoyal Liquid End 225 Diaphragm 40 CV Ball 316 SS				
Bubble #	Part #	Description	Drawing #	Qty
021	02108530029N	LIQUID END BODY GSD225	02108530YYY	1
098	09804120056N	DIAPHRAGM 225 GSD PTFE/NITRILE	09804120YYY	1
434	4340009096N	ECO SPRING LOCKWASHER D.12		8
435A	4350000080N	HEX NUT M12		8
435	4350047937N	HCS M12X60 THREAD 30 ECO		8

VI – 6.1 CHECK VALVE ASSEMBLY / DISASSEMBLY DOUBLE BALL	
DRAWING: 777000123	
DISASSEMBLY	**ASSEMBLY**
1. Remove seal **[025],** ball guide **[003],** ball **[437]** and seat **[024]** equipped with two seals **[025].** 2. Clean ball guide **[003]** if it is not to be replaced.	1. Assembly the parts of the suction and discharge check valves (See drawing) 2. Fit this assembly into the liquid end body (don't forget the seals **[025]**) 3. Realize the procedure: Assembly/Disassembly of the connections



DATE	ECN	DESCRIPTION	Drawn - Dessiné / Visa	Checked -Vérifié / Visa	REV
12/11/2019	24626	INITIAL RELEASE	A.GARCIA	T.KUSTURISS	00

REVISION HISTORY

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GENERAL TOLERANCE — LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm(INCHES)

ISO2768-MK	0 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000
TOLERANCES mm(INCHES)	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]

Ra FINISH: <3.2; 125√Ra

GEOMETRIC TOLERANCES / TOLÉRANCES GÉOMÉTRIQUES: 0.4 [0.016] | 0.8 [0.324] | 0.2 [0.079]

DESCRIPTION

PRIMEROYAL
DOUBLE BALL CHECK VALVE

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING / DESSIN SANS ECHELLE	DRAWING NUMBER - PLAN N°	REV
A4		3 / 7		777000123	00

WARNING: THE EXPORT OR REEXPORT OF THIS DRAWING OR A PRODUCT PRODUCED BY THIS DRAWING IS SUBJECT TO U.S. EXPORT ADMINISTRATION REGULATIONS AND OTHER APPLICABLE GOVERNMENT RESTRICTIONS OR REGULATIONS

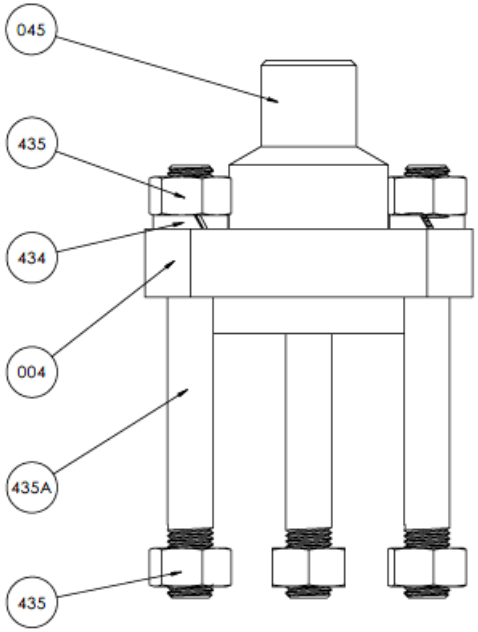
3050583202F-X0				
PRIMEROYAL SINGLE BALL CHECK VALVE 15.9mm 316SS				
BUBBLE #	PART #	DESCRIPTION	DRAWING #	QTY
003	0030067016N	BALL GUIDE D15.9	00300670YY	2
024	0240107016N	CHECK-VALVE SEAT	02401070YY	2
437	4070014172N	BALL D 15,9		2
025	0250109175N	CHECK VALVE GASKET	0250109XYY	6

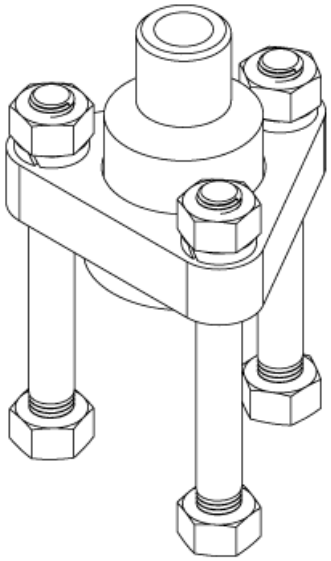
3050583222F-X0				
PRIMEROYAL SINGLE BALL CHECK VALVE 25mm 316SS				
BUBBLE #	PART #	DESCRIPTION	DRAWING #	QTY
003	0030068016N	BALL GUIDE D25	0030068XYY	2
024	0240108016N	CHECK VALVE SEAT	02401080YY	2
025	0250109275N	CHECK-VALVE GASKET	4370000XXY	6
437	4370000254N	BALL D 25	0250109XYY	2

3050583232F-X0				
PRIMEROYAL SINGLE BALL CHECK VALVE 40mm 316SS				
BUBBLE #	PART #	DESCRIPTION	DRAWING #	QTY
003	0030069016N	BALL GUIDE D40	0030069XYY	2
024	0240109016N	BALL SEAT D40	02401090YY	2
025	0250109375N	CHECK VALVE GASKET	0250109XYY	6
437	4370000404N	BALL D 40 316L	4370000XXY	2

VI – 7. CONNECTION ASSEMBLY / DISASSEMBLY 145 15.9/25mm CV Ball		
DRAWING: 777000295		
DISASSEMBLY	**ASSEMBLY**	
	Position	**Torque**
	[435]	**40 N.m**
1. Remove nuts **[435]** and washers **[434]** 2. Remove parts **[004]** and **[045]** (suction and discharge)	1. Fit parts **[045]** with the part **[004]** on the check valves (suction and discharge) 2. Tighten the nuts **[435]** ⚠ Part **[004]** must be perpendicular to the centerline of the valves	

REV	ECN	DESCRIPTION	DRAWN	CHECKED	DATE
00	25525	INITIAL	RCA	TCK	8/14/2020





GENERAL TOLERANCE	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	=	⟋
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125 RMS	0.4 [0.016]	0.6 [0.024]	0.2 [0.079]

DESCRIPTION

PRIMEROYAL
145mm GSD LIQUID END, DOUBLE BALL NPT CONNECTIONS
CROSS SECTION

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING DESSIN SANS ECHELLE	DRAWING NUMBER - PLAN N°	REV
A2		1 / 5		777000295	00

P/N: 57218

93657 & 3051211040F-X0				
MALE NPT CONNECTIONS FOR ∅145 METALLIC LIQUID END WITH DOUBLE BALL ∅15.9 CHECK VALVES				
BUBBLE #	**PART #**	**DESCRIPTION**	**DRAWING #**	**QTY**
004	0040215010N	CARTRIDGE CLAMP	00402150YY	1
045	0450212116N	THREADED CONNECTION 1/2NPT	0450212XYY	1
434	4340009015N	SPRING LOCKWASHER D.10		3
435	4350000065N	HEX NUT M10		6
435A	4350006843N	STUD M10X95 J=15 A4		3

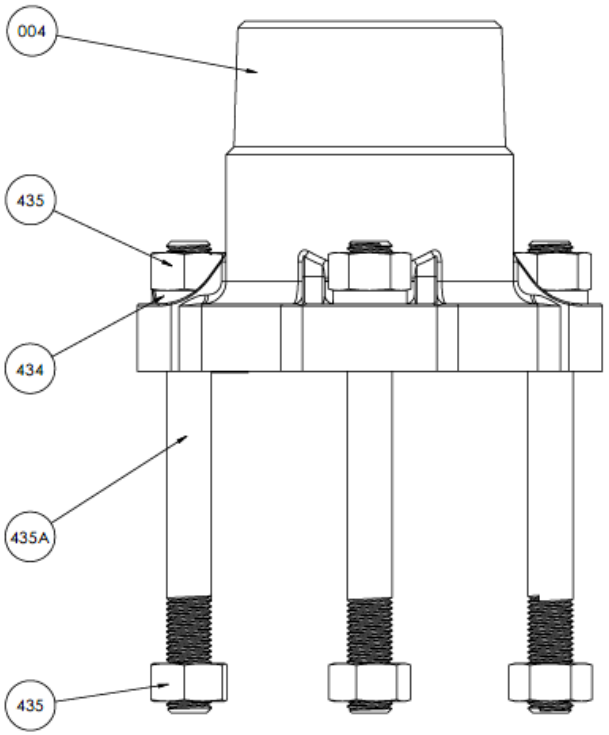
93669 & 3051254211F-X0				
MALE NPT CONNECTIONS FOR ∅145 METALLIC LIQUID END WITH DOUBLE BALL ∅25 CHECK VALVES				
BUBBLE #	**PART #**	**DESCRIPTION**	**DRAWING #**	**QTY**
004	0040215010N	CARTRIDGE CLAMP	00402150YY	1
045	0450128116N	THREADED SLEEVE 1" NPT	0450128XYY	1
434	4340009015N	SPRING LOCKWASHER D.10		3
435	4350000065N	HEX NUT M10		6
435A	4350109103N	STUD M10X120-26 J=15		3

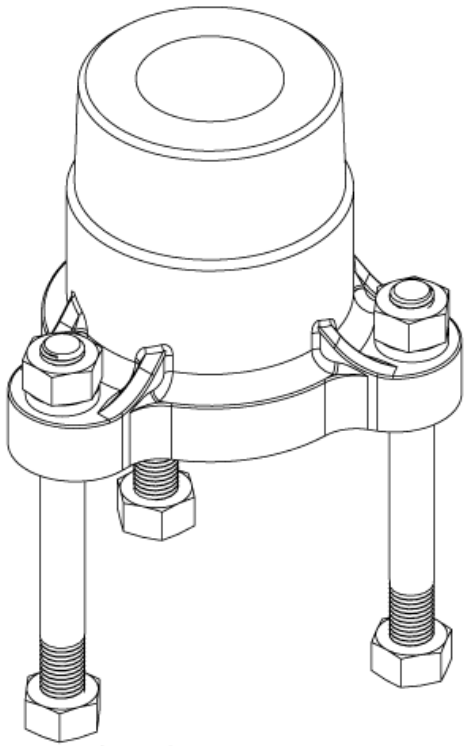
93672 & 3051211030F-X0				
MALE NPT CONNECTIONS FOR ∅145 METALLIC HIGH PRESSURE LIQUID END WITH DOUBLE BALL ∅25 CHECK VALVES				
BUBBLE #	**PART #**	**DESCRIPTION**	**DRAWING #**	**QTY**
004	0040215010N	CARTRIDGE CLAMP	00402150YY	1
045	0450128116N	THREADED SLEEVE 1" NPT	0450128XYY	1
434	4340009015N	SPRING LOCKWASHER D.10		3
435	4350000065N	HEX NUT M10		6
435A	4350006745N	STUD M10X110/45-J=15 CL.A4-70		3

93660 & 3051211047F-X0				
MALE NPT CONNECTIONS FOR ∅145 METALLIC HIGH PRESSURE LIQUID END WITH DOUBLE BALL ∅15.9 CHECK VALVES				
BUBBLE #	**PART #**	**DESCRIPTION**	**DRAWING #**	**QTY**
004	0040215010N	CARTRIDGE CLAMP	00402150YY	1
045	0450212116N	THREADED CONNECTION 1/2NPT	0450212XYY	1
434	4340009015N	SPRING LOCKWASHER D.10		3
435	4350000065N	HEX NUT M10		6
435A	4350006985N	STUD M10X80-15 A4	4350006XXY	3

VI – 7. CONNECTION ASSEMBLY / DISASSEMBLY 225 40mm CV Ball		
DRAWING: 777000296		
DISASSEMBLY	**ASSEMBLY**	
	Position	**Torque**
	[435]	**40 N.m**
3. Remove nuts **[435]** and washers **[434]** 4. Remove parts **[004]** and **[045]** (suction and discharge)	3. Fit parts **[045]** with the part **[004]** on the check valves (suction and discharge) 4. Tighten the nuts **[435]** ⚠ Part **[004]** must be perpendicular to the centerline of the valves	

REV	ECN	DESCRIPTION	DRAWN	CHECKED	DATE
00	25525	INITIAL	RCA	TCK	8/14/2020





GENERAL TOLERANCE	LINEAR DIMENSIONS - DIMENSIONS LINÉAIRES mm[INCHES]							Ra FINISH	GEOMETRIC TOLERANCES TOLÉRANCES GÉOMÉTRIQUES		
ISO 2768	.5 - 6	6 - 30	30 - 120	120 - 400	400 - 1000	1000 - 2000	2000 - 4000	<3.2	⊥	⫽	∠
TOLERANCES mm[INCHES]	±0.1[.004]	±0.2[.008]	±0.3[.012]	±0.5[.020]	±0.8[.031]	±1.2[.047]	±2[.079]	125 RMS	0.4 [0.016]	0.6 [0.024]	0.2 [0.079]

DESCRIPTION

PRIMEROYAL K
225mm GSD LIQUID END, DOUBLE BALL NPT CONNECTIONS
CROSS SECTION

MILTON ROY

FORMAT TAILLE	FIRST ANGLE PROJECTION	SHEET - FEUILLE	DO NOT SCALE DRAWING DESSIN SANS ECHELLE	DRAWING NUMBER - PLAN N°	REV
A2		1 / 2		777000296	00

93675 & 3051254220F-X0				
MALE NPT CONNECTION FOR ∅225 METALLIC LIQUID END WITH DOUBLE BALL ∅40 CHECK VALVES				
BUBBLE #	**PART #**	**DESCRIPTION**	**DRAWING #**	**QTY**
004	00405051029N	CONNECTING FLANCE GSD225 2	0040505XYYY	1
434	4340009015N	SPRING LOCKWASHER D.10		3
435	4350000065N	HEX NUT M10		6
435A	57602	STUD M10 X155- 1.5 A4	57602	3