HYDRAULIC DIAPHRAGM **METERING PUMPS**

POSITIVE RETURN



		JOB N°	
	IMPORTANT NOTICE CAUTION: Industrial pump for professional use only. These instruction are for skilled personnel only.	PUMP TYPE	
		ELECTRIC ACTUATOR TYPE	
		OVERALL DIMENSIONS	
	*	SECTIONAL DRAWING	
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CAUTION!

For safety reasons whoever will send the pump **must always contact** OBL Technical Service (tel. +39 02 269191, e-mail: service@obl.it) **BEFORE** sending the pump in order to receive:

•

RA number (**Authorized Return**), to be clearly placed onto shipping documents and package; Detailed information regarding returning goods to OBL plant.

MANDATORY CONDITIONS TO ACCEPT GOODS



- EACH item MUST be cleaned and sent with relevant declaration stating pumped chemical
- PUMPS: DISASSEMBLE both valve units and fix them to the pump (see on p. 4.1.1)
- Goods shall be sent to OBL DDU/DDP with relevant shipping note
- Pack goods properly to avoid damage in transit
- State the following: brief mis-functioning description; contact person, direct phone number and e-mail address



WARNING: It is customer's/end-user's responsibility to comply with safety at work standards and local laws. **GOODS CLEANING:** Cleaning operator must be given all necessary means and facilities for safe operation and goods preservation. When pumps are being used for dangerous chemicals (e.g. acids) select accordingly cleaning fluid.

These directions do not replace standards and laws for safety at work. OBL takes no responsibility whatsoever for damages to goods or human beings. CE



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HYDRAULIC DIAPHRAGM METERING PUMPS

TECHNICAL DATA

	-	≥_		MAX	PRE	SSURE	BAR	1		ONNECTION	~
ш	KES	PLO H	0,7	75 kW	١,	5 kW	2,	2 kW	FLANGED	ONNECTIOS	H
ГYР	TRO	ATI ATI	ORKING	BUILT-IN RELIEF VALVE	ORKING	BUILT-IN RELIEF VALVE	ORKING	BUILT-IN RELIEF VALVE	UNI	ANSI	Z
50 Hz			5		\$		5				
XLC-A	40	350	П	14	16	20	16	20	DN25	١"	6
XLC-A	60	550	8	10	16	20	16	20	DN25	١"	6
XLC-A	82	750	6	8	14	17	16	20	DN40	 " ¹ / ₂	6
XLC-A	100	920	4,5	6	10	12	15	18	DN40	 " ¹ / ₂	6
XLC-A	123	1150	-	-	8	10	13	16	DN40	 " ¹ / ₂	7
XLC-A	140	1300	-	-	6,5	8	П	13	DN40	 " ¹ / ₂	7
XLC-P	40	350	10	12	10	12	-	-	DN25	1"	6
XLC-P	60	550	8	10	10	12	-	-	DN25	1"	6
XLC-P	82	750	6	8	10	12	-	-	DN40	2"	6
XLC-P	100	920	4,5	6	10	12	10	12	DN40	2"	6
XLC-P	123	1150	-	-	8	10	10	12	DN40	2"	7
XLC-P	140	1300	-	-	6,5	8	10	12	DN40	2"	7
XLC-S	40	350	П	14	15	18,5	-	-	DN25	١"	6
XLC-S	60	550	8	10	15	18,5	-	-	DN25	۱"	6
XLC-S	82	750	6	8	14	17	16	18,5	DN40	2"	6
XLC-S	100	920	4,5	6	10	12	15	18	DN40	2"	6
XLC-S	123	1150	-	-	8	10	13	16	DN40	2"	7
XLC-S	140	1300	-	-	6,5	8	Ш	13	DN40	2"	7
60 Hz											

48	420	10	13	16	20	16	20	DN25	١"	6
72	660	8	10	14	17	16	20	DN25	١"	6
96	900	4,5	6	10	12	15	18	DN40	I " ¹ / ₂	6
121	1150	-	-	8	10	13	16	DN40	I " ¹ / ₂	7
144	I 300	-	-	6,5	8	11	13	DN40	 " ¹ / ₂	7
48	420	10	12	10	12	-	-	DN25	1"	6
72	660	8	10	10	12	-	-	DN25	١"	6
96	900	4,5	6	10	12	-	-	DN40	2"	6
121	1150	-	-	8	10	10	12	DN40	2"	7
144	I 300	-	-	6,5	8	10	12	DN40	2"	7
48	420	10	12	15	18,5	-	-	DN25	1"	6
72	660	8	10	15	18,5	-	-	DN25	1"	6
96	900	4,5	6	10	12	15	18	DN40	2"	6
121	50	-	-	8	10	13	16	DN40	2"	7
144	1300	-	-	6,5	8	Ш	13	DN40	2"	7
	48 72 96 121 144 48 72 96 121 144 48 72 96 121 144	48 420 72 660 90 900 121 150 144 300 48 420 72 660 90 1150 144 1300 48 420 72 660 94 1300 48 420 72 660 96 900 121 150 144 1300	420 10 72 660 8 96 900 4,5 121 1150 - 144 1300 - 48 420 10 72 660 8 96 900 4,5 121 1150 - 48 420 10 72 660 8 96 900 4,5 124 1300 - 48 420 10 72 660 8 96 900 4,5 96 900 4,5 96 900 4,5 91 1150 - 124 1300 -	48 420 10 13 72 660 8 10 96 900 4,5 6 121 1150 - - 144 1300 - - 48 420 10 12 72 660 8 10 96 900 4,5 6 121 1150 - - 144 1300 - - 96 900 4,5 6 121 1150 - - 144 1300 - - 96 900 4,5 6 91 900 4,5 6 92 900 4,5 6 121 1150 - - 144 1300 - -	420 10 13 16 72 660 8 10 14 96 900 4,5 6 10 121 1150 - - 6,5 48 420 10 12 10 72 660 8 10 10 96 900 4,5 6 10 121 1150 - - 6,5 48 420 10 12 10 96 900 4,5 6 10 121 1150 - - 6,5 48 420 10 12 15 94 1300 - - 6,5 94 900 4,5 6 10 121 1150 - - 8 144 1300 - - -	420 10 13 64 20 72 660 8 10 14 17 96 900 4,5 6 10 12 121 1150 - - 6,5 8 144 1300 - - 6,5 8 48 420 10 12 10 12 72 660 8 10 10 12 96 900 4,5 6 10 12 121 1150 - - 8 10 124 300 - - 8 10 125 660 8 10 12 15 14 1300 - - 6,5 8 48 420 10 12 15 18,5 72 660 8 10 15 18,5 96 900 4,5 6 10 <th>48 420 10 13 16 20 16 72 660 8 10 14 17 16 96 900 4,5 6 10 12 15 121 1150 - - 8 10 13 144 1300 - - 6,5 8 11 48 420 10 12 10 12 - 72 660 8 10 10 12 - 96 900 4,5 6 10 12 - 121 1150 - - 8 10 10 144 1300 - - 6,5 8 10 144 1300 - - 6,5 8 10 48 420 10 12 15 18,5 - 72 660 8 10 15 18,5</th> <th>48 420 10 13 16 20 16 20 72 660 8 10 14 17 16 20 96 900 4,5 6 10 12 15 18 121 1150 - - 8 10 13 16 144 1300 - - 6,5 8 11 13 48 420 10 12 10 12 - - 72 660 8 10 10 12 - - 96 900 4,5 6 10 12 - - 121 1150 - - 8 10 10 12 144 1300 - - 8,5 8 10 12 1 144 1300 - - 6,5 8 10 12 144 1300</th> <th>48 420 10 13 16 20 16 20 DN25 72 660 8 10 14 17 16 20 DN25 96 900 4,5 6 10 12 15 18 DN40 121 150 - - 8 10 13 16 DN40 144 1300 - - 6,5 8 11 13 DN40 144 1300 - - 6,5 8 11 13 DN40 144 1300 - - 6,5 8 11 13 DN40 144 1300 - - 6,5 8 10 12 DN40 121 150 - 8 10 10 12 DN40 121 150 - 8 10 10 12 DN40 144 1300 -<th>48 420 10 13 16 20 16 20 DN25 1" 72 660 8 10 14 17 16 20 DN25 1" 96 900 4,5 6 10 12 15 18 DN40 1"'12 111 150 - - 8 10 13 16 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 48 420 10 12 10 12 - DN25 1" 96 900 4,5 6 10 12 DN40 2" 144 1300 - -</th></th>	48 420 10 13 16 20 16 72 660 8 10 14 17 16 96 900 4,5 6 10 12 15 121 1150 - - 8 10 13 144 1300 - - 6,5 8 11 48 420 10 12 10 12 - 72 660 8 10 10 12 - 96 900 4,5 6 10 12 - 121 1150 - - 8 10 10 144 1300 - - 6,5 8 10 144 1300 - - 6,5 8 10 48 420 10 12 15 18,5 - 72 660 8 10 15 18,5	48 420 10 13 16 20 16 20 72 660 8 10 14 17 16 20 96 900 4,5 6 10 12 15 18 121 1150 - - 8 10 13 16 144 1300 - - 6,5 8 11 13 48 420 10 12 10 12 - - 72 660 8 10 10 12 - - 96 900 4,5 6 10 12 - - 121 1150 - - 8 10 10 12 144 1300 - - 8,5 8 10 12 1 144 1300 - - 6,5 8 10 12 144 1300	48 420 10 13 16 20 16 20 DN25 72 660 8 10 14 17 16 20 DN25 96 900 4,5 6 10 12 15 18 DN40 121 150 - - 8 10 13 16 DN40 144 1300 - - 6,5 8 11 13 DN40 144 1300 - - 6,5 8 11 13 DN40 144 1300 - - 6,5 8 11 13 DN40 144 1300 - - 6,5 8 10 12 DN40 121 150 - 8 10 10 12 DN40 121 150 - 8 10 10 12 DN40 144 1300 - <th>48 420 10 13 16 20 16 20 DN25 1" 72 660 8 10 14 17 16 20 DN25 1" 96 900 4,5 6 10 12 15 18 DN40 1"'12 111 150 - - 8 10 13 16 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 48 420 10 12 10 12 - DN25 1" 96 900 4,5 6 10 12 DN40 2" 144 1300 - -</th>	48 420 10 13 16 20 16 20 DN25 1" 72 660 8 10 14 17 16 20 DN25 1" 96 900 4,5 6 10 12 15 18 DN40 1"'12 111 150 - - 8 10 13 16 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 144 1300 - - 6,5 8 11 13 DN40 1"'12 48 420 10 12 10 12 - DN25 1" 96 900 4,5 6 10 12 DN40 2" 144 1300 - -

Hydraulic diaphragm dosing pump with: Built-in variable setting relief valve Purge and mechanical oil replenisher:

Plunger Stroke: 44,5 mm Plunger: Ø 69 mm. Motors: 230-400 V - 50 Hz -4 poles - IEC34-1 Motors: 440-480 V - 60 Hz - 4 poles - IEC34-1 kW 0,75 - GR 80 - B5 - Standard kW 1,5 - GR 90 - B5 - Standard kW 2,2 - GR 100 - B5 - Standard



API 675

• XLC hydraulic diaphragm dosing pump with AISI 316L pump head.

\triangle **CAUTION!** THIS PUMP IS FILLED UP WITH OIL.

MODEL NUMBER



ELECTRIC ACTUATOR W BAR PNEUMATIC ACTUATOR

ANSI FLANGED CONNECTIONS

PUMP HEAD MATERIAL CONSTRUCTION

PARTS	А	Р	S
LIQUID END	AISI-316L	PVC	PVDF
DIAPHRAGM	PTFE	PFTE	PTFE
VALVE SEAT	AISI-316L	PVC	PVDF
VALVE GUIDE	AISI-316L	PP	PVDF
VALVE	AISI-316L	PIREX	PIREX
VALVE HOUSING	-	PVC	PVDF
VALVE SEAL	FPM	FPM	FPM
FLANGE	AISI-316L	PVC	PVDF

GENERAL CHARACTERISTICS

1.1 PUMP DESCRIPTION

The XLC series OBL's metering pumps are controlled volume reciprocating pumps (fig. 1). The oil-splash lubricated gearbox (endless screw-worm wheel type) is driven by a 4 poles electric motor and this sets the diaphragm stroke rate. The diaphragm is protected by the built-in relief valve and mechanically actuated oil replenisher (smart diaphragm), from possible errors that may occur both on suction and discharge side.

- Gearbox is composed of eccentric slow shaft, connecting rod and hollow plunger.
- Fixed-stroke hollow plunger.
- Flow rate adjustment is by controlled by-pass of the hydraulic oil.

With by-pass positioned to 100% hollow plunger is made "solid" for its entire stroke length (maximum flow rate); with by-pass positioned to 0%, plunger il hollow for its entire stroke length ("0" flow rate).



Advantages:

• Minimum maintenance is required:

Sealless oil-bathed plunger maintains as-new volumetric efficiency even after 50,000 working hours. Diaphragm, protected by the built-in relief and the mechanically actuated replenisher valves, has a self-controlled maximum deformation, and with no-solidifying and non crystallising media, has a working life in excess of 50,000 hours.

• Easy installation:

The inclusion of an integral relief valve results in some 50% cost saving on the installation. For pumps with no built-in relief valve, the cost of external pressure relief valve, relevant fittings, installation, handling and maintenance are to be considered.

• Safety in conformity with the "EU" regulation:

The monobloc construction, without moving external parts, together with built-in relief valve, makes the pump compliant with the European safety regulations.

GENERAL CHARACTERISTICS

FLOW RATE 1.2

The reciprocating motion of the diaphragm determines the flow thanks to the inlet and outlet check valves of the pump head (fig. 2).

During the suction stage the inlet valve opens because of the *A*-pressure created by the diaphragm while the outlet valve remains closed. The product enters the pump head and goes out throught the outlet valve when pushed by the diaphragm during the discharge stage.



Theoretical flow rate

The theoretical flow rate corresponds exactly to the volume displaced by the diaphragm during its motion. Its graphic representation is a diagonal straight line whose progression is determined by the diaph-



Actual flow rate

The actual flow rate is inevitably less than the theoretical flow rate because of the losses due to the reaction time of the valves. The ratio between these two flow rates determines the volumetric efficiency of the pump.



The efficiency depends on pump size, pump head type, liquid to be pumped, viscosity of the liquid, working pressure, etc. (fig. 4)

MANUAL ADJUSTMENT 1.3

FLOW RATE MANUAL ADJUSTMENT WITH MICROMETER CONTROL READING 0-100%, IN 0,1% STEPS.

Micrometer reading is installed into the adjustment knob support. Adjustment percentage reading through sealed magnifying lens (fig. 5).

Swept volume adjustment (flow rate) is by controlled bypass of the

Table A		
Flow rate	By-Pass position	Actual flow rate
100%	Fully extended by-pass	Max
50%	1/2 displacement	$\leq 1/2$ Max flow
0%	Fully retracted by-pass	0



2.1 INSTRUCTIONS FOR A PROPER INSTALLATION

• Provide with adequate clearance areas and safe access for operation and maintenance, in particular in front of the hydraulic side and of the adjustment knob (fig. **6**).

• If the pump is installed outdoors, a shelter is recommended, especially when the pump is equipped with electric actuators or other delicate devices.

• **PVC** pump heads can work properly only at ambient temperature and metered liquid temperatures below **40** °C. If necessary, provide suitable protection from sun rays and check the temperature of the metered liquid.

• Fit adequate drains on the discharge piping, close to the pump head, so as to improve the ease of disconnection of the pump from the plant . With flanged connections fit also a removable joint (fig. **7**).





2.2 FIXING OF THE PUMP

• Make sure that the baseplate is made of steel, stable and even. Do not install the pump directly on a concrete foundation.

• Fix the pump to the baseplate using the specific anchor holes integrally cast with pump casing.

• Make sure that the pump valve axis is perfectly upright.

Before connecting the piping to the pump, it is absolutely necessary to flush the pipelines with water, especially the suction line and relevant feed tank. This preliminary flushing is often underestimated by the installator; if this operation is not properly carried out, the pump will become a collector of all foreing matters contained in the pipeline and tank, such as weld drops, gasket scraps, soil and other stuff.

• The pipelines must be independently supported, so as to prevent stresses on the pumphead. Therefore, besides the baseplate, the pump needs a supporting framework for both suction and discharge pipelines.

• It is advisable to fit a cross after the discharge flange. This fitting will facilitate the removal of the pump from the baseplate and can be used for the installation of pressure gauges, safety valves and dampeners.

• Make sure that the pipeline fittings and flanges are perfectly tight and in particular that no air enters the suction line, as this would hinder the priming of the pump.

NPSH R

6

6

7 7

STROKES/m

40-62

82-100

121-123

140-144

2.3 NPSH (Net Positive Suction Head)

Metering pumps are "self-priming" and have variable suction lift. However is always recommended to install them with flooded suction (0,5-1 metres) to improve metering accuracy, volumetric efficiency, and ease of start-up.

When media have vapour tension in excess of 2 metres, it necessary to install the pump with flooded suction.

Following condition is vital for the proper metering pump running:

NPSH A available (plant) > NPSH R required (pumps).

• NPSHr values of XLC pumps are indicated in the table B. Values are indicative.

NPSH available of the dosing skid, is to be calculated by purchaser, at the rated capacity and normal pumping temperature.

± L' NPSH could be calculated with the following formula: NPSH = Pb ± $\frac{Pc}{\gamma}$ - Tv - Pt:

- **Pb** = Barometric pressure in metres.
- **Pc** = Liquid column pressure in metres:
 - (+) with flooded suction
 - () with negative hydrostatic head
- γ = Liquid specific gravity
- $\mathbf{Tv} =$ Liquid vapour tension in metres.
- **Pt** = Pressure losses on suction side in metres.

XLC metering pumps can also work when NPSHa values are higher than NPSHr values indicated in table B. Volumetric efficiency will be lower, and therefore flow rates will be lower than those indicated on pump nameplate.

TablE B

FLOW RATE L/h

350-660

750-920

1150

1300

2.4 SUCTION LINE

• A proper installation and sizing of the suction line are of particular importance for a correct operation of the pump:

 Flooded suction installation Ø 	Table C			Table D	Table D				
Pipe inner diameter	Р	VC/PVDF Pump h	ead	AISI 316L Pump head					
according to the pump flow rate	FLOW RATE L/h	FLANGED UNI	FLANGED ANSI	FLOW RATE L/h	Flanged Pipe Uni	FLANGED PIPE ANSI			
(see fable C/D).	350-660	DN25	1″	350-660	DN25	1″			
	660-1300	DN40	2″	660-750	DN40	1″			
				750-1300	DN40	1″ 1/2			

• Length of the piping

Suction piping is to be as short as possible:

Max suction 2 metres over hydrostatic head (fig. 8) Max length 3 metres under hydrostatic head (fig. 9)



• Arrangement of the suction line

For the arrangement of the suction line see fig. 10.



2.5 SUCTION SIDE FILTER

• The installation of a filter on the suction side is always recommended, particularly when the liquid to be metered contains suspended particles.



CAUTION ! A small-sized filter hinders suction side flow till clogging pipeline; Use Y -filters with a size larger than the suction pipe diameter.

• The characteristics of the filter screen depend on the kind of liquid and pump flowrate. For liquids with viscosity not exceeding 200 cps see table **F**.

• To avoid sucking solid content, especially when dosing chemicals with suspension, do not suck from tank bottom; suction point is to be at least 10 cms. from tank bottom (fig. **10**/ **a**).

Table E		Table F	
Suction pump	Y- filter dimension	Low rate L/h	Mesch
1″	11/2″	350÷1000	30
11/2″	2″	1000÷1500	20



2.6 SUCTION PIPING FOR VISCOUS LIQUIDS

• Specific technical information is required for the installation of pumps intended for metering viscous liquids.

• For this kind of application we recommend P11 or stainless steel pumpheads.

• The suction piping must have an adequate diameter; as a rule, for high-viscosity liquids (2000 cps), select the size immediately above the diameter of the pump suction connections.

• In any case, when viscous liquids are to be metered choose for the pipe at least the same size as that of the pump connections.

Table G	
Strokes/1'	cp max esecution "A"
40-48	1500
60-72	1000
82-96	600
96-100	300
121-123	150
140-144	100

Relationship between strokes per minute "SPM" and viscosity of the liquid "cp" (P11 or stainless steel pump head).

Examples of installation for viscous liquids



2.7 DISCHARGE LINE

CAUTION ! We recommend to instal a pressure gauge on discharge side.

• It is up to end user/skid manufacture decision about pressure gauge installation .

• To extend metering pump durability and reduce maintenance cost avoid installation of piping above the pump.

• When the free surface of the liquid in the suction side tank is above discharge-side tank level, an uncontrollable flow from the suction side tank to the discharge side tank will occur.

To prevent this natural passage of liquid, the discharge pressure must always be at least 0,3 Kg/cm², higher than the suction pressure, in case of small flow rates 0,5 Kg/cm².

1 If for any reason this condition cannot be complied with the plant it is necessary to create a backpressure by means of a suitable valve, or better to highten the discharge pipe so as to prevent the siphoning effect (fig. 13 right).



2.8 EXTERNAL SAFETY VALVE

CAUTION ! Safety valve installation is not strictly necessary on XLC pumps, since it is with built-in relief valve. However, if an external pressure relief valve is to be installed, read the following indications:

• The safety valve has to be installed immediately after the discharge connection, anyhow before the on-off valve (fig.14).

• The safety valve setting (opening pressure) has to be lower than the internal PSV setting indicated on the pump plate.

• To properly designing the dosing skid, please refer to Table H/I.

Table H with	OUT EXTERNAL PSV (bar)	Table I	WITH EXTERNAL PSV	/ (bar)
Working P max	Internal PSV setting	Working P max	External PSV setting	Internal PSV setting
4,5	6	3	6	8
6	8	5	8	10
8	10	8	10	13
11	13	10	12	15
13	16	12	14	16
15	18	15	18	20
16	20			



2 INSTALLATION

2.8.1 INTERNAL PSV SETTING RE-SETTING



CAUTION Internal PSV is sealed in OBL after test.

Don't remove seal, don't dismantle, tamper or operate onto the internal PSV. Such operations can compromise the safety of the plant and of the operators and void the warranty!

Re-setting the internal PSV setting requires a skilled technical knowledge, for this reason such operations has to be carried out only by skilled personnel. Without this knowledge we always suggest to send back the pump to OBL factory (see indications at pag.1) if this modification should be required.

CAUTION ! OBL declines any responsibility for eventual damages due to user modifications onto the internal PSV. Before tampering with internal PSV, user must contact OBL technical service to define the new working limits which will be guaranteed only after the fitting of a new plate on the pump.

• Internal PSV is setted in OBL during final testing and then sealed. Its value is indicated in the data plate.

• If a modification of the PSV setting should be required, contact OBL technical service

(Tel. +39-02-26919.1- Fax +39-02-2133893 - e-mail: service@obl.it) reporting the following:

- Serial number and OBL job number
- PSV setting reported in data plate
- New PSV setting

2.9 INSTALLATION OF THE PULSATION DAMPENER

• The pulsation damper is an important element for a proper operation of the metering pumps.

The installation of a pulsation damper offers several advantages because this device:

- Protetects the metering pump against pressure peaks, thus increasing the duration of life of the pump.

- Prevents vibrations all along the discharge line.

- Pump noise level reduction.

- Makes the flow linear.

The pulsating flow, which is a negative characteristic of all metering pumps, can therefore be prevented by installing a pulsation damper on th discharge line (fig. **15**).

Examples of installation of the pulsation damper



Bladder type dampener

• The liquid is separed from the relieving chamber by a diaphragm.

• Dampener volume: about 8 times the pump swept volume.

Advantages:

Small volume.
No need for periodic inflation because the gas is contained in the bladder.

Disadvantages:

 It is necessary to know prior the working pressure in order to determine the damper precharge.

2.10 INSTALLATION OF THE PRESSURE GAUGE

• In order to check if the metering pump operates correctly, it is essential to install a pressure gauge on the discharge line (fig. 16).

• The pressure gauge shows the actual working pressure of the metering pump. This value must not exceed the max. allowed pressure of the pump.

2.11 STANDARD PLANT ARRANGEMENT

• Figure 17 shows the indications for a correct installation of the metering pumps.



Fig. 16

PRESSURE GAUGE

SAFETY VALVE

DRAIN VALVE

3

STARTUP

3.1 BEFORE THE STARTUP

BEFORE THE STARTUP VERIFY THE FOLLOWING CONDITIONS:

• Make sure that the baseplate is made of steel, stable and even. Do not install the pump directly on a concrete foundation.

• Fix the pump to the baseplate using the specific anchor holes in the pump feet.

Make sure that the pump valve axis is perfectly upright.

• Before connecting the piping to the pump, it is absolutely necessary to flush the pipelines with water, especially the suction line and relevant feed tank.



This preliminary flushing is often underestimated by the installator; if this operation is not properly carried out, the pump will become a collector of all foreing matters contained in the pipeline and tank, such as weld drops, gasket scraps, soil and other stuff.

• The pipelines must be independently supported, so as to prevent stresses on the pumphead. Therefore, besides the baseplate, the pump needs a supporting framework for both suction and discharge pipelines.

• It is advisable to fit a cross after the discharge flange. This fitting will facilitate the removal of the pump from the baseplate and can be used for the installation of pressure gauges, safety valves and dampers.

• Make sure that the pipeline fittings and flanges are perfectly tight and in particular that no air enters the suction line, as this would hinder the priming of the pump.

3.2 STARTUP

• Check the oil level through the oil window (fig. 18).

Pumps are usually supplied filled with oil, for oil replacement and following start-up have to be done as follows:

• The diaphragm hydraulic system and the thrust mechanism have the oil in common, each pump contains about 11lt of oil.

• With steady pump, pour oil from the oil filling plug, about 9,5lt of oil. Then pour oil from the top-up oil plug filling to the top with about 1,5lt (A *This procedure is imperative to allow the start-up of the pump*).

Start the pump.



• Make sure that the liquid to be metered has not solidified or frozen inside the piping.

• Carry out the first startup with discharge pressure as low as possible and with adjustment knob set to 20%; keep these conditions about **3-5** minutes. Increase gradually the flow rate up to the maximum value, then set the pump to the required working conditions (flow rate and pressure).

• During the first stage check the pump discharge pressure by means of the pressure gauge: the pressure value (max. oscillation of the pointer) must not exceed the max. pressure indicated on the pump rating plate.

Table L						
Oil type	Viscosity cts 40 °C	Viscosity index	Pour point °C	Flash point °C	Density Kg/dm^3	Notes
SHELL OMALA OIL 68	68	99	-24	190	0,887	Mineral oil for gears. XLC STD
ESSO SPARTAN EP 68	68	120	-36	205	0,885	Mineral oil for gears. XLC STD
FUCHS PLANTOFLUX AT 68-S	62	180	-18	280	0,927	Biodegradable oil on demand only
FUCHS RENOLIN FOOD CLP 220	214	96	-21	230	0,895	FDA oil on demand only

3.3 POSSIBLE TROUBLES DURING STARTUP

FLOW RATE IRREGULAR OR HIGHER THAN EXPECTED

↓ CAUSES	
• The suction hydrostatic head exceeds the discharge pressure:	Increase the discharge pressure by means of a back pressure valve. (OBL, series 400).
 Back pressure valve stuck in open position because of foreing matters, or pressure setting too low respect to the suction head: 	Check.
 Pump valves jammed in open position: 	Check.

FLOW RATE LOWER THAN EXPECTED

t	CAUSES	
• Air entering	the suction piping through the fittings:	Check.
• Air trapped	inside the pump:	Raise pump flow rate to maximum value, otherwise unscrew discharge valve housing (pos. 14) till the liquid arrives.
• Suction lift to	oo high:	Reduce it.
• The vapour p	pressure of the fluid is too high:	Increase the hydrostatic head on suction side.
 The viscosity 	of the liquid is too high:	Install a suction piping having a larger diameter. Increase the hydrostatic head on suction side.
 Suction pipir 	ng is clogged or its valves are shut:	Verify.
• Filter on suc	tion side is clogged:	Clean it.
 Pump valves coming from 	are stuck because of foreign matters a suction side:	Dismantle the valves and clean them carefully .
• Wrongly ass	sembled valve units:	See instructions on page 15 (Valves dismantling and reassembly).
• Feed tank he	ermetically sealed and with no vent:	Make a vent in the tank upper part.
 Safety valve 	setting pressure too low:	Check (see tab. H/I).

MAINTENANCE

4.1 ROUTINE MAINTENANCE

• Check the oil level periodically as shown in fig. 19.



In case of misfuction, before dismantling the hydraulic system, check only the directional valves of the pumping head (see fig. 20).

• The impurities which can clog and soil the valve guides (see section pos. **6**) are the most frequent reason for dosing misfunctions. For a correct inspection follow **4.1.1**.



AISI 316L

PVC

4.1.1 VALVES DISMANTLING (AND REASSEMLY)

For XLC pumps "A"

Dismantle discharge and suction piping.

• Unscrew the tension rods (pos. 23) and put aside carefully.

• Carefully dismantle suction and discharge valve groups once at a time (pos. **19**, **20**, **6**, **15**, **7** and **5**), put them aside without damaging or exposing to possible oxidation.

- Check their integrity and eventual presence of foreign particles.
- Carefully clean (pos. 6, 5 and 15) with a soft cloth.
- Replace (pos. 6, 5, 7 e 15) if damaged.

Re-assemble the valve groups paying attention to the orientation of the components as shown in fig. 20.

• Tighten the tension rods (pos. 23) (Tightening torque = 35Nm).

For XLC pumps "P"

- Dismantle discharge and suction piping.
- Unscrew the nut and the lock nut (pos. 28), unthread the tension rods (pos. 23) and put aside the washers (pos. 44).
- Remove one valve group at a time extracting pos. 19 and 20.

• Pushing with a non-pointed item, extract the contents of pos. **19** and **20** pos. **6**, **15**, **8** and **5**), put them aside without damaging.

- Check their integrity and eventual presence of foreign particles.
- Carefully clean (pos. 6, 5 and 15) with a soft cloth.
- Replace (pos. 6, 5, 8, 9 and 15) if damaged.

Re-assemble the valve groups paying attention to the orientation of the components as shown in fig. 21. CAUTION! Position 19 and 20 are different.

• Re-assemble pos. 19 and 20 complete with all their own inner components.

• Put the tightening rod (pos. 23) and tighten them by nut and lock-nut (pos. 28).





4

4.2 PREVENTIVE MAINTENANCE

• We recommend to keep in stock a number of specific essential to preventive maintenance of the diaphragm pump head, the purchasing of items listed in table **M** (*for positions see sections*).

Table M	SUGGESTED MATERIAL			
	EXECUTION (HEAD BODY MATERIAL)			
DENOMINATION	MINATION (P) PVC		(A) AISI 316L	
	POSITION	PIECES NO. (*VS)	POSITION	PIECES NO. (*VS)
DIAPHRAGM	48	1	48	1
VALVE SEAT	5	2	5	2
VALVE GUIDE	6	2	6	2
VALVE	15	2	15	2
VALVE SEAL	8	2	7	,
	9	2	/	0

* Single valve balls (STD version).

4.2.1 DIAPHRAGM REPLACEMENT AND OIL CHANGE SCHEDULE

• After working hours indicated in table N, it is recommended diaphragm and oil replacement.

	Table N SCHED	N SCHEDULED SERVICING	
	Strokes/1'	Working hours	
	40÷48	35.000	
	60	30.000	
Exemple of pump model number	72÷82	25.000	
	96÷100	20.000	
XLC P 1 20	→ 120÷121	15.000	
	140÷144	13.000	

4.2.2 SANDWICH DIAPHRAGM REPLACEMENT

• Set the pump adjustment to 0%, shut down the motor, dismantle diaphragm rupture detector and remove the pump head (pos.21).

CAUTION ! Protect yourself during this operation from possible oil / chemical leakage due to pressure.

• Extract the diaphragm (pos.48) starting from its lower side using a blunt screwdriver (to avoid damages to the diaphragms groove).

• Check the detector shutter (pos.98) free movement introducing compressed air from relevant hole on pump head.



• Check diaphragm chamber status and replenishing disk (pos. **38**) that is to be as new and free to move. Insert the new sandwich diaphragm (pos. **48**)



• Insert in sequence first process diaphragm with hole product side (C1), then metallic ring (C2), then hydraulic diaphragm oil side (C3).

WARNING ! The right assembly of diaphragms and metallic ring is guided by the loops of the head.



- See following pictures to make sure sandwich diaphragm (pos.48) components are properly assembled.
- Assemble the pump head and tighten the screws with a torque wrench whose settings are indicated in table **O**.
- Seal hermetically discharge valve unit. Through suction port, apply compressed air into pump head (6-10 bar g). Pressure will free diaphragms from air trapped between them.
- Apply compressed air for at least 5 minutes. Then reassemble diaphragm rupture detector onto pump head.
- Set the adjustment to 100% and wait / check the oil level decreasing, due to the oil transfer from mechanism to the hydraulic system.
- Gradually top up oil till its level is slightly over half level of the oil windows (pos. 120).
- Check this condition for about 10 minutes to make sure oil level is stable. Then connect pump to piping.
- Pump is now ready to work.

CAUTION ! Pump before reaching its best working status has to eliminate air trapped into hydraulic oil through air-bleed valve (pos.88) and become homogeneous (slowly top up hydraulic oil into upper reservoir).

Table O HEAD LOCKING SCREW (POS.29): TORQUE WRENCH SETTINGS Nm						
Ambiente temperature Pump head material						
°C	°F	AISI-316L	PVDF	PVC	PTFE	PP
0÷30	32÷86	45	30	25	20	25
40	104	45	25	20	20	20
50	122	45	20	-	-	-
60	140	45	20	-	-	-

4.3 OPERATING TROUBLES

FLOW RATE LOWER THAN EXPECTED

↓ CAUSES				
• Low idraulic oil:	Check (see fig. 19).			
• Excessive suction head lift:	Reduce it.			
 Working pressure higher than the set pressure of the internal safety valve (rating plate): 	Check with a pressure gauge.			
• Air enters the suction piping through the fittings:	Check.			
• Air trapped inside the pump:	For a short while, keep flow rate to maximum.			
• Vapour pressure of the liquid too high:	Increase hydrostatic head on suction side.			
Pumping temperatures too high:	Increase hydrostatic head on suction side.			
• Viscosity of the liquid too high:	Install a suction piping of larger diameter. Increase hydrostatic head on suction side.			
 Feed tank hermetically sealed and with no vent: 	Make a vent in the tank upper part.			
 Suction piping clogged or valves shut 	Check.			
• Filter on suction side clogged:	Clean it.			
Pump valves jammed because of dirt:	Dismantle the valves and clean them carefully (see 4.1.1).			
 Safety valve setting pressure too low: 	Check.			

FLOW RATE IRREGULAR OR HIGHER THAN EXPECTED

• The suction hydrostatic head exceeds the discharge pressure:	Increase the discharge pressure by means of a back pressure valve. (OBL, series 300).
 Back pressure valve stuck in open position because of foreing matters, or pressure setting too low respect to the suction head: 	Check.
 Pump valves jammed in open position: 	Check.

OVERHEATING OF PUMP BODY AND MOTOR

 Incorrect wiring: 	Check.
• Overheating due to pump working pressure higher than allowed:	Check max. discharge pressure by means of a pressure gauge fitted on the discharge pipeline.
• Pressures higher than allowed:	(see max. pressure indicated on pump rating plate) reduce the discharge pressure or install a dampener in case of excessive narrowing on the discharge pipeline.
• Stresses on pump flanges:	Loosen the pipes connected to the pumphead and check.
• Discharge pipeline clogged or valve shut:	Check.
• Back pressure valve set to a pressure higher than allowed:	Check.
• Oil level in the gearbox is low:	Add suitable oil.

OVERALL DIMENSIONS

5.1 XLC - MANUAL ADJUSTMENT

4

340

5



140



POSIZIONE SEGNALATORE ROTTURA MEMBRANA SANDWICH SANDWICH DIAPHRAGM RUPTURE DETECTOR POSITION

Manometro inox Ø53

00

44.5 mm

170 Kg 🕧

PVC

ø

275

170 288

DN

ANSI

1"

2"

UNI

DN25

DN40

(1) +15Kg

160

A В

377

428

h

Ø53 inox pressure gauge

5.2 XLC - ELECTRIC ACTUATOR ADJUSTMENT

OVERALL DIME





SECTIONAL DRAWING

6

SECTIONAL DRAWING





SECTIONAL DRAWING

23



METERING PUMPS

CE

MACHINE DIRECTIVE

EUROPEAN COMMUNITY DIRECTIVE **98/37/CE** AND SUBSEQUENT MODIFICATIONS

GENERAL SAFETY NORMS

Please read and save these instructions.

INSTRUCTIONS ABOUT THE RESIDUAL RISKS ELIMINATION AND THE SAFETY AT WORK

1 - INSTALLATION

- The pump has to be installed on a basement ①. 4



- The basement has to be made of electric welded steel and fit for the pump dimensions, with leveled face(2).

- The pump has to be strongly fastened to the basement by clamping screws. - The basement has to have a frame to sup-

port the suction ③ and discharge ④ pipelines and possible accessories (pulsation dampeners, pressure gauges, valves) and not vibrate while the pump is working.

ATTENTION:

For pump lifting and moving use the MI6 eyebolt located on the pump body top part.



2 - OPERATOR PROTECTION

Protection against accidental leakages of aggressive pressurized fluids.



3 - ELECTRICAL CONNECTIONS

- For a proper connection of the electrical motor follow the illustrated instructions .
 - TERMINAL BOX DISPOSAL ACCORDING TO THE LINE VOLTAGE



 Protect the motor by installing a magnetothermic device, fit to the power input values of the motor, knowing that the motor, at start, absorbs at least four times the motor nominal power.

- Earth the terminal of the motor casing, using a cable with at least 6 mm^2 section (5). -Check the direction of rotation of the motor (see the arrow on the motor body); if the direction of rotation is not in accordance with the arrow, interchange two wires: 1 on 2, 2 on 1.

WARNING: Start the motor only when the terminal box is closed

4 - SETTING INTO OPERATION

Check the oil level.

- Open all the on-off valves both along the discharge and suction pipeline 6.



- Check the pressure gauge installation (essential to check the pump status).

- Check the pulsation dampener (9) (indispensable for flowrates above 100 L/h).

- Start the pump with adjustment set to 20 % increase gradually the flowrate (acting on the adjustment knob) and find the relevant pressure on the pressure gauge.

WARNING:

The working pressure must not exceed the rating plate value. It makes the pump break.

- Check during the first three working hours the pump body temperature (max 60°C) as well as the motor temperature (max 90°C).

5 - ROUTINE MAINTENANCE

- Check periodically the oil level through the oil-windows located on the pump body. First three months, once a month, afterwards once every four months.

- Check periodically (once every four months) the pump status:
 Pump body temperature (max 60°C).
 Motor body (max 90°C).

- Working pressure (must not exceed the rating plate value).

- Noise (within normal conditions must not exceed 85 dbA).

6 - PREVENTIVE MAINTENANCE

-Diaphragm replacement and oil filling up, see page 16.

- We recommend, for the preventive maintenance of the diaphragm pump head, the purchasing of items listed in table \mathbf{M} .

For pumphead disassembly and re-assembling see instructions at page 16.

METERING PUMPS

CE CONFORMITY DECLARATION

OBL s.r.l. 20090 Segrate - MILANO - Via Kennedy, 12 - Tel. +39 02 269191 - Fax +39 2 2133893 - E mail: info@obl.it

Modello/Model/Modele/Modell/Modelo/Model/Model/Model/Model/Malli/Movτελο

HYDRAULIC DIAPHRAGM METERING PUMPS



I DICHIARAZIONE DI CONFORMITA' CE

Noi, **OBL**, s.r.l., **MILANO ITALIA**, dichiariamo sotto la nostra unica responsabilità che il prodotto cui questa dichiarazione si riferisce, è conforme alle seguenti Direttive e successive modifiche:

- Direttiva Macchine 98/37/CE
- Direttiva Bassa Tensione 73/23/CE
- Direttiva Compatibilità Elettromagnetica 89/336/CE

GB CE CONFORMITY DECLARATION

We, OBL, s.r.l., MILAN ITALY, declare under our sole responsibility that the product relevant to this declaration complies with the following directive and subsequents modifications:

- Machinery Directive 98/37/EEC
- Low Voltage Directive 73/23/EEC

- Electromagnetic Compatibility Directive 89/336/EEC

F DECLARATION DE CONFORMITE CE

Nous, **OBL** s.r.l., **MILAN ITALIE**, déclarons sous notre seule responsabilité que le produit auquel cette déclaration se rapporte, est conforme au suivantes directives et successives modifications:

- Directive Machines 98/37/CEE
- Directive Basse Tension 73/23/CEE
- Directive Compatibilité Electromagnétique 89/336/CEE

D EU-KONFORMITÄTSERKLÄRUNG

Wir **OBL** s.r.l. **MAILAND ITALIEN**, erklären unter unserer Verantwortung, dass unser Produkt, auf das sich diese Erklärung bezieht, den folgenden EU-Richtlinien und deren Anderungen entspricht:

- Maschinenrichtlinie 98/37/EWG
- Richtlinie über die Niederspannung 73/23/EWG

 Normen über die Elektromagnetische Verträglichkeit 89/336/EWG.

Nome e posizione del dichiarante / Name and charge of issuer / Nom et fonction de l'emetteur/ Name und position des erstellers / Nombre y cargo del expedidor / Nome e cargo do emissor / Naam en funktie van de uitgever / Udsteder, navn og stilling / Utsteders navn og stilling / Utfärdarens namn och befattning / Ilmoituksen antajan nimi ja asema / Ονομα και θεση εκδοτη

> Benito LEONETTI OBL Managing Director

E DECLARACIÓN DE CONFORMIDAD CE

La firma suscrita, **OBL** s.r.l., de **Milán**, **Italia**, declara bajo su propia responsabilidad que el producto al que se refiere esta declaración, cumple con las siguientes directivas y sucesivas modificaciones:

- Directiva de máquinas 98/37/CEE
- Directiva de baja tensión 73/23 CEE
- Directiva de compatibilidad electromagnética 89/336 CEE

P DECLARAÇÃO DE CONFORMIDADE CE

Nós, OBL s.r.l., MILÃO ITÁLIA, declaramos sob nossa inteira responsabilidade que o produto ao qual se refere esta declaração se encontra de acordo com as seguintes directivas e sucessivas modificações:

- Directivas máquinas 98/37/ÉEC
- Directivas Baixa Tensão 73/23/EEC
- Directivas Compatibilidade Electromagnética 89/336/EEC

NL EG-VERKLARING VAN OVEREENKOMST

Wij, OBL s.r.l., MILAAN ITALIË, verklaren voor onze uitsluitende verantwoordelijkheid dat het product waarop deze verklaring betrekking heeft, in overeenstemming is met de volgende richtlijnen en navolgende wijzigingen: - Machinerichtlijn 98/37/EEG

- Laagspanningsrichtlijn 73/23/EEG
- Richtlijn Bestendigheid tegen Elektromagnetische Storingen 89/336/EEG

DK CE OVERENSSTEMMELSES ERKLÆRING

Vi, OBL srl, MILANO ITALIEN, erklærer os ansvarlige for at produktet, som denne Erklæring henviser til, stemmer overens med følgende direktiver og påfølgende modificeringer: - Maskindirektiv 98/37/EEC

- Lavspændingsdirektiv 73/23/EEC
- Direktif for Elektromagnetisk Forenelighed 89/336/EEC

S EG ÖVERENSSTÄMMELSEFÖRKLARING

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- Norm för Maskiner 98/37/EEC
- Norm för Lågspänning 73/23/EEC
- Norm för Elektromagnetiks Förenlighet 89/336/EEC

N CE-OVERENSSTEMMELSESERKLÆRING

Vi, **OBL** s.r.l., **MILANO, ITALIA**, erklærer under eget ansvar at produktet som omfattes av denne erklæringen er i overensstemmelse med følgende direktiver og senere endringer:

- Maskindirektivet 98/37/EU
- Lavspenningsdirektivet 73/23/EU
- Direktivet vedr. elektromagnetisk kompatibilitet
- 89/336/EU.

FIN YHDENMUKAISUUSTODISTUS

OBL s.r.l., MILANO ITALIA, vakuuttaa omalla vastuullaan, että tässä todistuksessa mainittu tuote vastaa seuraavien direktiivien ja niihin tehtyjen muutosten vaatimuksia:

- EU- laitedirektiivi 98/37
- EU- pienjännitedirektiivi 73/23
- EU- direktiivi 89/336 joka käsittelee sähkömagneettista yhteensopivuutta

GR

Η υπογεγραμμενη εταιρεια OBL, s.r.l., MILANO-ITALIA, δηλωνει υπευθυνα οτι το εν λογω προιον ειναι κατασκευασμενο συμφωνα με τιζ παρακατω Οοηγιεζ

- και τιζ τροποποιησειζ αυτων
- Οδηγια περι Μηχανων **98/37/ΕΟΚ**
- Οδηγια περι Χαμηληζ **73/23/ΕΟΚ**
- Οδηγια περι Ηλεκτομαγ
νητικηζ Συμβατοτηταζ $\mathbf{89/336}/\mathsf{EOK}$

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Benito feoretti

> > > OBL_Metering Pumps

OB

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> OPERATING MANUAL

