nP

Divider
“nano Progressive”

User operation and Maintenance manual

Original instruction

INDEX

C2213IE – WK 31/20

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1. INTRODUCTION

This operation and maintenance manual refers to "**nP – nano Progressive**".
This divider allows lubrication systems to distribute oil and grease with working pressure up to 300bar (4350psi).
You can obtain the latest release of this document by contacting a Dropsa sales office or distributor or by visiting us on the World Wide Web at http://www.dropsa.com.
The installation and use of this product must be qualified staff with basic hydraulics and (in the case of sensor devices) electrical knowledge.
This manual contains important information on health and safety issues for the personnel. It is recommended to attentively read this manual and carefully keep it in good condition so that it is always available to personnel requiring to consult it.

2. GENERAL DESCRIPTION

nanoP (nP) is a oil or grease divider valve that allows, through the progressive movement of spools, partition the inlet flow in precise quantities to a number of different outputs available.

The lubrication cycle can be controlled and monitored by a single sensor (nP is prepared for the use of various types of sensors) mounted on any metering elements.

These metering elements may be used in different system configurations and have different working configurations that make them flexible for use in multiple applications. The compactness makes them particularly suitable for use in small areas.

3. TECHNICAL CHARACTERISTICS

"**nP – nano Progressive**" product has the following general characteristics:

Single outlet flow rate	0.0015 cu.inch – 0.0027 cu.inch – 0.0045 cu.inch - 0.0064 cu.inch (0,025cm³ - 0,045cm³ - 0,075cm³ - 0,105cm³)
Number of divider elements	3 ÷ 12
Working pressure	15bar (218psi) ÷ 300bar (4350psi)
Working temperature	-20°C ÷ +80°C
Material	Nickel-plated steel
Number of inversion at minute	200 max.
Inlet thread	G1/8" – UNI ISO 228/1
Outlet thread	G1/8" – UNI ISO 228/1
Lubricants	Oil min. 32 cSt – grease max. 2 NLGI

N.B.: The pressure is directly proportional to the number of cycles.
The oil and grease viscosity values must always refer to the equivalent viscosity at operating temperature.

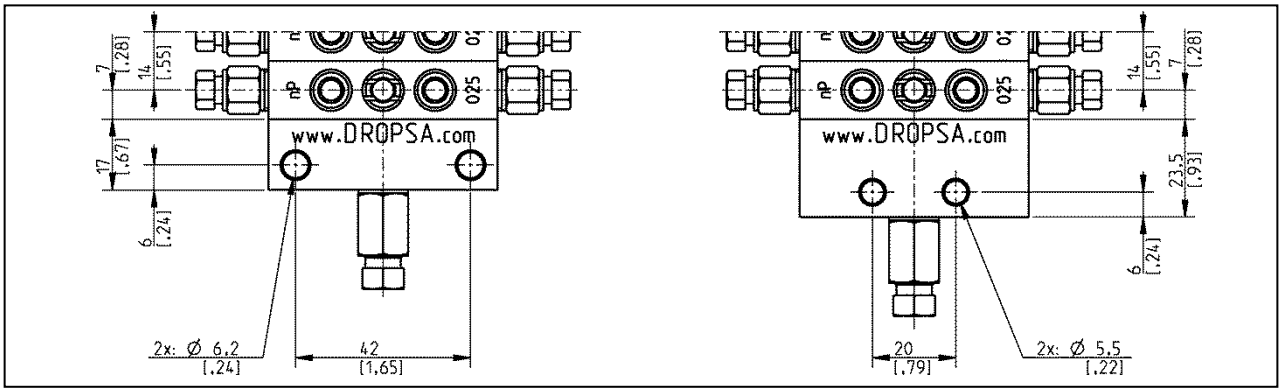
4. DIVIDER BLOCKS AND LABELLING

Each divider is composed of a minimum of 3 elements up to a maximum of 12. At the metering elements must be added the initial and the end elements with fixing screws. Besides there are different necessary components for cycle monitoring, for merge or to separate the outputs of dividers, to specify working pressure etc.

4.1 INLET ELEMENT

The Inlet element is available with two different fixing hole centers in order to allow easy interchangeability with existing models.

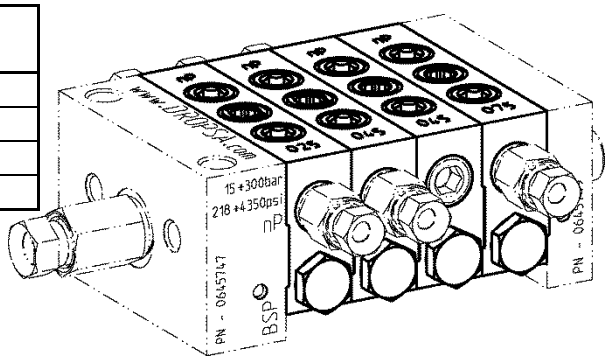
PART NUMBER	DESCRIPTION
0645747	***INLET nP*** *"nano Progressive"*
0645748	***INLET nP*** *"nano Progressive" S* - 20mm wheelbase reduced



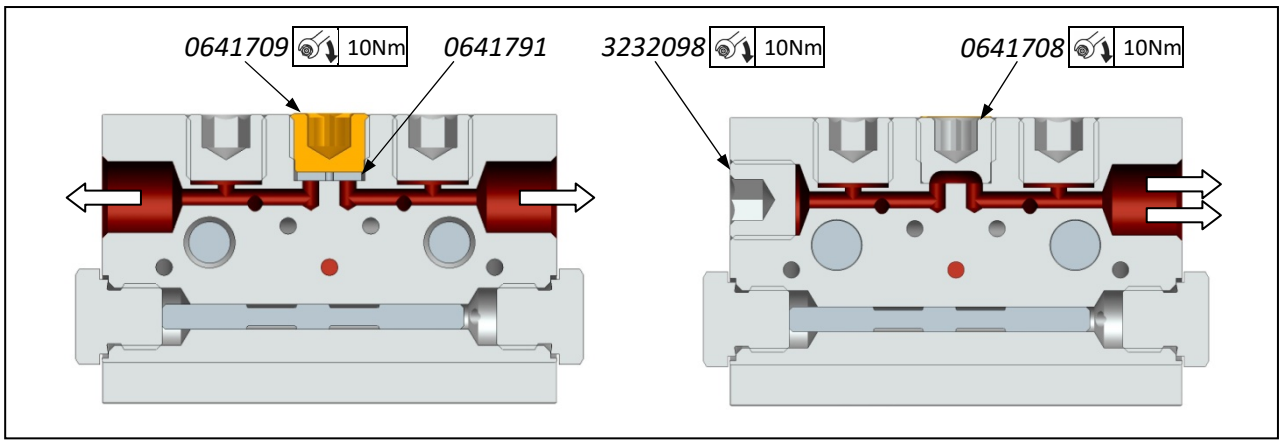
4.2 METERING ELEMENT

Metering elements are available with 4 different flow rates. Each nP- Nano Progressive can be assembled with a minimum of 3 elements and maximum of 12.

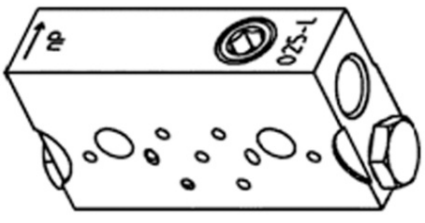
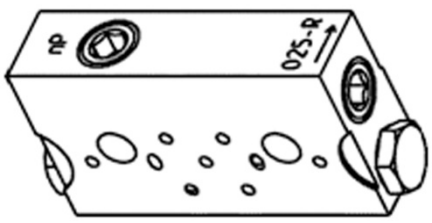
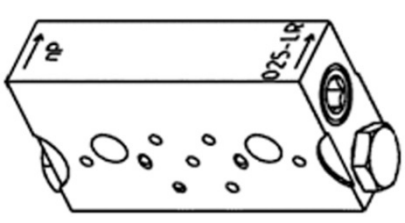
Q. cm³	PART NUMBER	DESCRIPTION
0,025	*0645750*	*nP 025-DIVIDERS "nano Progressive"*
0,045	*0645751*	*nP 045- DIVIDERS "nano Progressive"*
0,075	*0645752*	*nP 075- DIVIDERS "nano Progressive"*
0,105	*0645753*	*nP 105- DIVIDERS "nano Progressive"*



It's possible to combine the outlets into a single outlet by element replacing the yellow adaptor (Part number 0641709+0641791) with the white one as shown in the drawing below.
When two outputs are ported internally. Remember to plug the unused port (Part number 3232098).



It is also possible to combine the flow rates of a metering element with the next metering element in the assembly by selecting an appropriate bridge metering element.

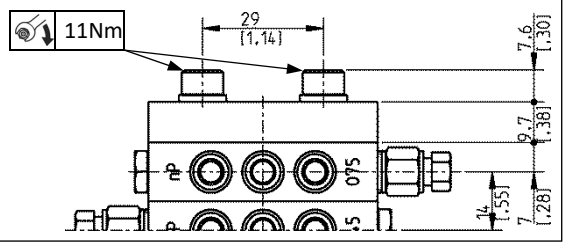
BRIDGE ELEMENT (The output flow rate is 'bridged' to next metering element as indicated by arrow)					
LEFT		RIGHT		LEFT / RIGHT	
CODE	PART NUMBER	CODE	PART NUMBER	CODE	PART NUMBER
nP 025 L	*0645754*	*nP 025 R*	*0645758*	*nP 025 LR*	*0645762*
nP 045 L	*0645755*	*nP 045 R*	*0645759*	*nP 045 LR*	*0645763*
nP 075 L	*0645756*	*nP 075 R*	*0645760*	*nP 075 LR*	*0645764*
nP 105 L	*0645757*	*nP 105 R*	*0645761*	*nP 105 LR*	*0645765*
					

Each metering device is identified with appropriate marking that shows the output per cycle, for example: "nP 075" corresponds to 0.075 cm³ output per cycle per outlet.
In the case of a bridge element, the bridging function is also indicated of outputs: "L" left bridge, "R" right bridge, "LR" left and right bridge.
On the "L" and "R" bridge dividers the outlet must not be closed.

4.3 END ELEMENT

The end element is used to terminate the dividers assembly. The tightening screws should be have the torque specified when completing the assembly.

PART NUMBER	DESCRIPTION
0645749	*END nP "nano Progressive"*



You can order the components of dividers block separately. Remember that washers and assemblies screws must be ordered separately also.

WASHERS	**SCREWS**									
PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER
0016047	*3*	*0014396*	*5*	*0014397*	*7*	*0014191*	*9*	*0014399*	*11*	*0014401*
	4	*0014181*	*6*	*0014182*	*8*	*0014398*	*10*	*0014400*	*12*	*0014402*

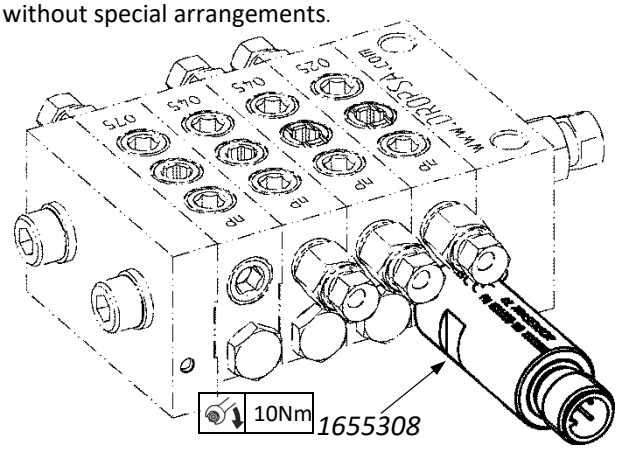
5. CYCLE CONTROL DEVICES

You can control the lubrication cycle installing a device that can be electric (Hall Effect sensor) or just a mechanical visual sensor (with colour strip) that indicates the internal movement of the spool during the lubrication cycle. It is recommended to install them on both master and secondary dividers on the secondary master in order to have rapid feedback of any blockages or failures in the lubrication system and for ease of troubleshooting.

A) The Ultrasensor can be directly assembled on any divider without special arrangements.

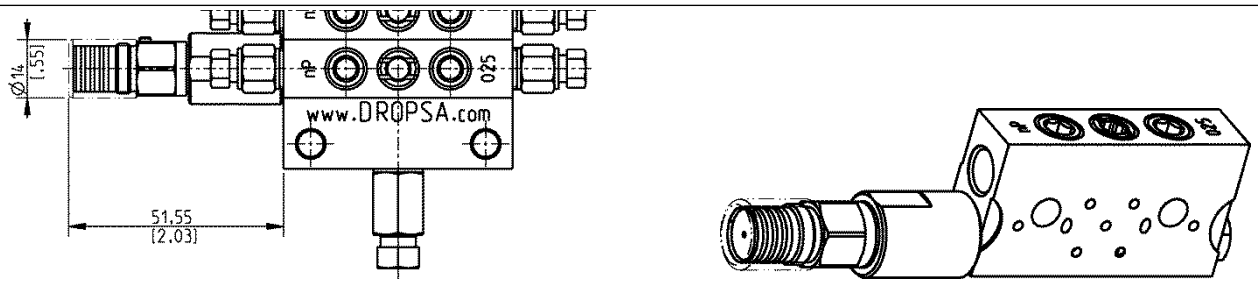
"ULTRASENSOR"	
PART NUMBER	*1655308*

ELECTRICAL CHARACTERISTICS	
Max output power	2A – NPN 0,7A – PNP
Power supply	8 ÷ 28 VDC
Contact	NPN (NO) PNP (NO)



B) Visual monitoring pin with colour strip. This must be ordered with the divider element.

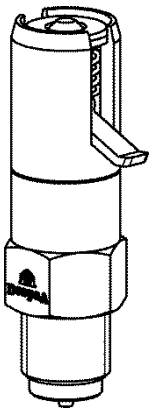
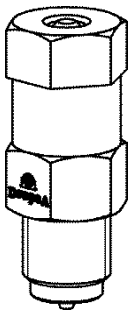
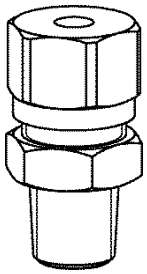
DIVIDER with colour strip **visual** indicator		
Q. cm³	PAR NUMBER	DESCRIPTION
0,025	*0645778*	*VISUAL INDICATOR nP 025 "nano Progressive"*
0,045	*0645779*	*VISUAL INDICATOR nP 045 "nano Progressive"*
0,075	*0645780*	*VISUAL INDICATOR nP 075 "nano Progressive"*
0,105	*0645781*	*VISUAL INDICATOR nP 105 "nano Progressive"*



6. OVER-PRESSURE INDICATOR

Pressure indicators are used to control pressure in main or secondary tubing. They can be applied directly on the alternate outlet/indicator port that is standard on all nP divider elements. There are three types of indicators that give a different visual indication linked to the pressure set on the device. Below are shown the characteristics of each pressure indicator and the part number.

The burst indicator must be replaced on each overpressure event. The lubricant will be discharged to atmosphere.

Indicator with pin and memory ***(M)***		Indicator with pin ***(P)***		Burst membrane indicator ***(B)***	
Pressure [bar]	PART NUMBER	Pressure [bar]	PART NUMBER	Pressure [bar]	PART NUMBER
30	*3290000*	*20*	*3290019*	*30*	*3290012*
50	*3290001*	*30*	*3290006*	*50*	*3290013*
75	*3290022*	*50*	*3290007*	*100*	*3290014*
100	*3290002*	*100*	*3290008*	*150*	*3290015*
150	*3290003*	*150*	*3290009*	*200*	*3290016*
200	*3290004*	*200*	*3290010*	*250*	*3290017*
250	*3290005*	*250*	*3290011*		
300	*3290021*				
					
(The pin remains locked in position until reset manually for ease of troubleshooting).		The Pin retracts once the pressure drops back under the indicator limit.		*In this type the membrane breaks in case the pressure overcome the set pressure.*	

7. TUBING, FITTINGS AND VALVES

Tubing, fittings and valves used in conjunction with the divider must be rated at the max pressure which the system can operate at. Below a selection of components that you can be useful to assembly the divider blocks.

PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
0092335	*1/8" valved fitting for OUTLETS*	*5119812*	*Ø6x1 Drawn steel tube (400bar)*
0092555	*1/8" valved fitting for INLET*	*5119832*	*Ø4x1 Drawn steel tube (500bar)*
0092080	*Ø6 comrpession fitting (150bar)*	*5118001*	*ASTM Ø6x0,71 Copper steel tube (310bar)*
0092069	*Ø4 bicone fitting (150bar)*	*5118000*	*ASTM Ø4x0,71 Copper steel tube (500bar)*
0091942	*Ø4 bicone fitting (250bar)*	*5501201*	*Ø4x0,5 Annealed copper tube (133bar)*
3084577	*Push-in Ø4 (65bar)*	*5501203*	*Ø6x1 Annealed copper tube (200bar)*
3084578	*Push-in Ø6 (65bar)*	*5717202*	*PA Ø4xØ2,5 Tube (60bar)*
3084695	*Swivel Push-in 90° Ø6 (150bar)*	*5717203*	*PA Ø6xØ4 Tube (50bar)*
3084696	*Swivel Push-in 90° Ø4 (150bar)*		

8. DIVIDER BLOCKS ASSEMBLY

To order a Pre-assembled Assembly the following 'string' formation is used to identify the sequencing of the elements and the order of assembly.

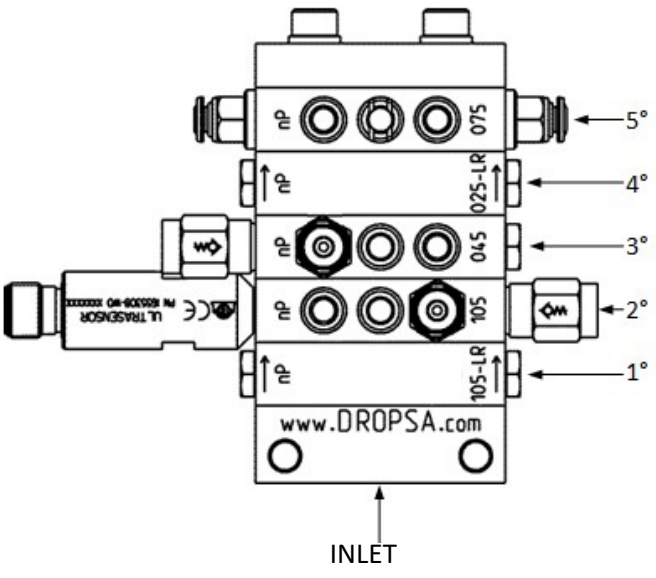
INLET Config. and PACK			*	ELEMENT configuration (repeat for N° element)							
TYPE	INLET	N° ELEMENTS		FLOWRATE [cm³]	OUTLET	CYCLE CONTROL	PRESSURE COTROL			OUTLET FITTINGS
							TYPE	PRESSURE [bar]	POSITION	
nP	***Empty*** Standard Hole centers 42mm	***3÷12***		***025*** 0,025	***Empty*** both	***US*** Ultrasensor right side	***M*** with memory pin	***30-50-75 100-150-200 250-300***	***L*** left	***OP4*** Ø4 Push-in
	S Reduced Hole center 20mm			***045*** 0,045	***SL*** single left	***USL*** Ultrasensor left side	***P*** with rod	***20-30-50 100-150 200-250***	***R*** right	***OP6*** Ø6 Push-in
				075 0,075	***SR*** single right	***V*** visual right side	***B*** with membrane	***30-50 100-150 200-250***	***LR*** let right	***OC8BK*** 1/8" BSP valved
				105 0,105	***BL*** bridge left	***VL*** visual left side			***UL*** *Single left upper*	***OC8NK*** 1/8" NPT valved
					BR bridge right				***UR*** *Single right upper*	
					BLR bridge left & right				***URL*** *Single right & left upper*	
					U Both Upper					
					UL Single left upper					
					UR *Single right upper*					

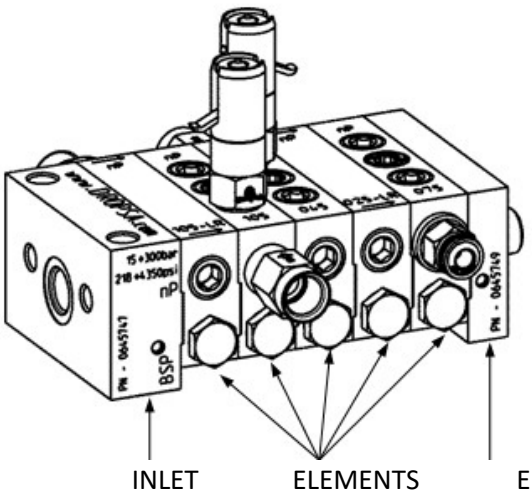
Specify the full string of dividers block as in following example below:

- nP 5 (105 BLR – 105 SR USL M 75 UR OC8BK – 045 SL M 100 UL OC8BK – 025 BLR – 075 OP4)

1° 2° 3° 4° 5°

Please note that LEFT and RIGHT are defined relative to the INLET element when viewed vertically from the bottom-up as shown below.





9. ORDERING INFORMATIONS

INLET ELEMENT			
PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
0645747	***INLET - nP***	*0645748*	***INLET - nP*** *"nano Progressive" S* - 20mm reduced hole centers

METERING ELEMENT					
Q.cm³	PART NUMBER	DESCRIPTION	Q.cm³	PART NUMBER	DESCRIPTION
0,025	*0645750*	*nP 025-DIVIDER*	*0,075*	*0645752*	*nP 075- DIVIDER*
0,045	*0645751*	*nP 045- DIVIDER*	*0,105*	*0645753*	*nP 105- DIVIDER*

RBIDGE METERING ELEMENT					
LEFT		**RIGHT**		**LEFT / RIGHT**	
PART NUMBER	CODE	PART NUMBER	CODE	PART NUMBER	CODE
0645754	*nP 025 L*	*0645758*	*nP 025 R*	*0645762*	*nP 025 LR*
0645755	*nP 045 L*	*0645759*	*nP 045 R*	*0645763*	*nP 045 LR*
0645756	*nP 075 L*	*0645760*	*nP 075 R*	*0645764*	*nP 075 LR*
0645757	*nP 105 L*	*0645761*	*nP 105 R*	*0645765*	*nP 105 LR*

END METERING ELEMENT AND SCREWS									
PART NUMBER	DESCRIPTION			PART NUMBER	DESCRIPTION				
0645749	*END -nP "nano Progressive"*			*0016047*	*Ø6* WASHER *(*order 2 per assembly*)*				
M6 **SCREWS** *(2 per divider block)*									
N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER
3	*0014396*	*5*	*0014397*	*7*	*0014191*	*9*	*0014399*	*11*	*0014401*
4	*0014181*	*6*	*0014182*	*8*	*0014398*	*10*	*0014400*	*12*	*0014402*

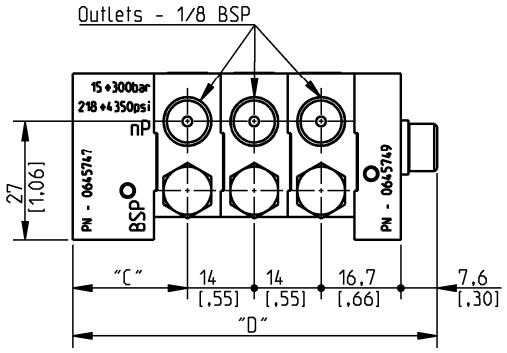
METERING ELEMENT WHIT VISUAL CYCLE INDICATOR					
Q.cm³	PART NUMBER	DESCRIPTION	Q.cm³	PART NUMBER	DESCRIPTION
0,025	*0645778*	Element with visual indicator- *nP 025*	*0,075*	*0645780*	Element with visual indicator *-nP 075*
0,045	*0645779*	Element with visual indicator- *nP 045*	*0,105*	*0645781*	Element with visual indicator *-nP 105*

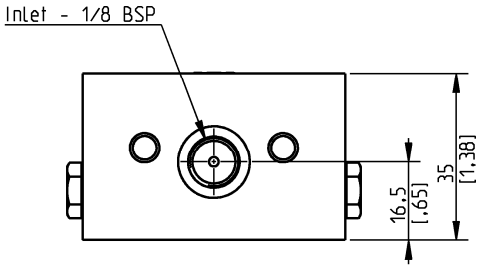
ELECTRIC CYCLE INDICATOR			
PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
1655308	*ULTRASENSOR*	*0039999*	*M12 connector (*without cable*)*

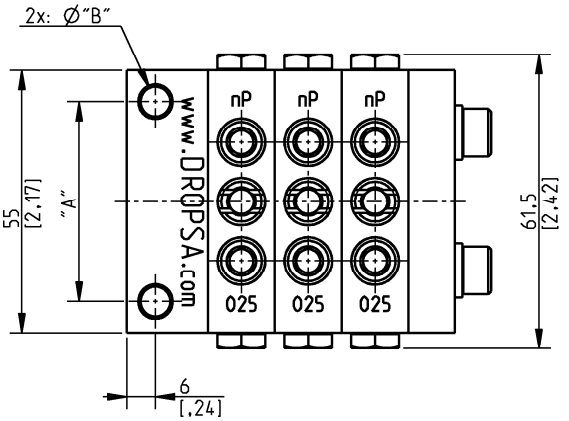
PRESSURE INDICATOR					
With pin memory ***(M)***		With pin ***(P)***		With Membrane ***(B)***	
PART NUMBER	Pressure [bar]	PART NUMBER	Pressure [bar]	PART NUMBER	Pressure [bar]
3290000	*30*	*3290019*	*20*	*3290012*	*30*
3290001	*50*	*3290006*	*30*	*3290013*	*50*
3290022	*75*	*3290007*	*50*	*3290014*	*100*
3290002	*100*	*3290008*	*100*	*3290015*	*150*
3290003	*150*	*3290009*	*150*	*3290016*	*200*
3290004	*200*	*3290010*	*200*	*3290017*	*250*
3290005	*250*	*3290011*	*250*		
3290021	*300*				

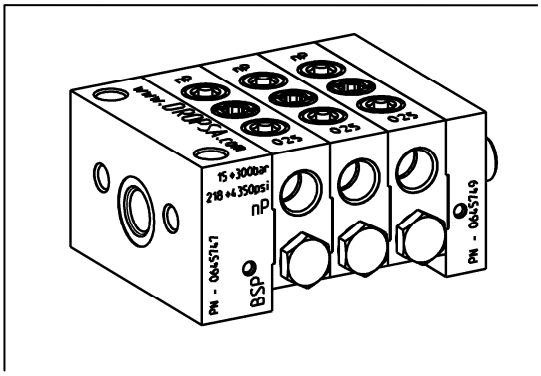
TUBING, FITTING AND VALVES			
PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
0092335	*1/8" valved fitting for OUTLETS*	*5119812*	*Ø6x1 Drawn steel tube (400bar)*
0092555	*1/8" valved fitting for INLET*	*5119832*	*Ø4x1 Drawn steel tube (500bar)*
0092080	Ø6 Compression Fittings (150bar)	*5118001*	*ASTM Ø6x0,71 Copper steel tube (310bar)*
0092069	Ø4 Compression Fittings (150bar)	*5118000*	*ASTM Ø4x0,71 Copper steel tube (500bar)*
0091942	Ø4 ring fitting (250bar)	*5501201*	*Ø4x0,5 Annealed copper tube (133bar)*
3084577	*Ø4Push-in (65bar)*	*5501203*	*Ø6x1 Annealed copper tube (200bar)*
3084578	*Ø6Push-in (65bar)*	*5717202*	*PA Ø4xØ2,5 Tube (60bar)*
3084695	*Swivel Push-in 90° Ø6 (150bar)*	*5717203*	*PA Ø6xØ4 Tube (50bar)*
3084696	*Swivel Push-in 90° Ø4 (150bar)*		

10. DIMENSIONS









*0645747 - **INLET nP** – standard version mm [inch]*					*0645748 - **INLET nP -S** 20mm reduced hole centers mm [inch]*				
"A"	"B"	"C"	"D"	N° elements	"A"	"B"	"C"	"D"	N° elements
42 [1.65]	*6.2 [.24]*	*24 [.94]*	*76.3 [3]*	*3*	*20 [.79]*	*5.5 [.22]*	*30.5 [1.2]*	*82.8 [3.26]*	*3*
			90.3 [3.55]	*4*				*96.8 [3.82]*	*4*
			104.3 [4.11]	*5*				*110.8 [4.36]*	*5*
			118.3 [4.66]	*6*				*124.8 [4.91]*	*6*
			132.3 [5.21]	*7*				*138.8 [5.46]*	*7*
			146.3 [5.76]	*8*				*152.8 [6.02]*	*8*
			160.3 [6.31]	*9*				*166.8 [6.57]*	*9*
			174.3 [6.86]	*10*				*180.8 [7.12]*	*10*
			188.3 [7.41]	*11*				*194.8 [7.67]*	*11*
			202.3 [7.96]	*12*				*208.8 [8.22]*	*12*

Dimension in *mm [in]*.

11. TROUBLESHOOTING

Below is a trouble shooting table to show possible problems and solutions.
If you are in any doubt about the correct solution to fixing a problem, do not dismantle parts of the Bravo but contact an Authorized Dropsa Sales and Service Point for technical assistance.

PROBLEM	POSSIBLE CAUSE	REMEDIAL ACTION
No Lubricant from outputs.	Spool seized up	Replace the divider with another one with same characteristics. It 's still appropriate make sure the metering have been installed correctly
	Blocked Tube	Unplug the outlet tubes and verify if the divider supply the lubricant.
	Line pressure is too low	Change the adjustment of the pressure control valve (bypass) or of the pressure switch control (end line).
	Dividers fitted for two outputs but used for only one output.	When is used only one output make sure the divider element is fitted the appropriate single outlet adaptor and the unused outlet is plugged.

12. MAINTENANCE PROCEDURE

Ensure you have necessary personal protection equipment and gloves to avoid contact with oils or greases that may cause skin irritation.
Dividers require no special servicing. However, every 1000h of operation it is recommended to check for correct supply of lubricant to the lubrication points.
Whenever you perform any servicing on system make sure that power and hydraulics supply are disconnected.

13. DISPOSAL

During maintenance or disposal of the machine care should be taken to properly dispose of environmentally sensitive items such as oils or other lubricants. Refer to local regulations in force in your area. When disposing of this unit, it is important to ensure that the identification label and all the other relative documents are also destroyed.

14. HANDLING AND TRANSPORTATION

Prior to shipping, the equipment is carefully packed in cardboard package. During carriage and storage the product can be exposed from -20 ° C to +90 ° C temperatures; however, it is necessary, in order to avoid damage, that the installation and operation occurs only in ambients with minimum temperature has reached +5 ° C.
On receipt check that package has not been damaged. Then, storage the machine in a dry location.

15. OPERATING HAZARDS

It is necessary to carefully read about the instructions and the risks involved in the use of lubrication machines. The operator must know the machine functioning through the User and Maintenance Manual.

16. PRECAUTIONS

Following is a list of dangers which have not been fully eliminated but which are considered acceptable:

- During installation there may be small low pressure oil seepage from the pump. Always use appropriate protective clothing, gloves and take all necessary safety precautions;
- Skin contact with oil -> see requirements for the use of appropriate PPE;
- Unsuitable Lubricant. →Lubricant characteristics are indicated on the pump and in this user manual. In any case contact a Dropsa Sales and Support engineer (if in any doubts, contact the Technical Department Dropsa SpA);
- Adequate protection of the unit from mechanical impacts or harmful mediums must be considered by the installation engineer or the systems integrator.

FLUIDS EXPLICITY NOT ALLOWED	
Fluid	**Dangers**
Lubricants with abrasive additives	Lubricants with abrasive additives
Lubricants with silicone based additives	Lubricants with silicone based additives
Petrol – solvents – inflammable liquids	Petrol – solvents – inflammable liquids
Corrosive products	Corrosive products
Water	Water
Food substances	Food substances