

nPR+

Divider

“nano Progressive Replaceable”

**User operation and Maintenance
manual**

Original instruction

INDEX

1. INTRODUCTION
2. GENERAL DESCRIPTION
3. TECHNICAL CHARACTERISTICS
4. DIVIDER BLOCKS AND LABELLING
5. CYCLE MONITORING DEVICES
6. PRESSURE INDICATOR
7. TUBES, FITTINGS AND VALVES
8. DIVIDERS ASSEMBLY
9. ORDERING INFORMATION
10. DIMENSIONS
11. TROUBLESHOOTING
12. MAINTENANCE PROCEDURE
13. DISPOSAL
14. HANDLING AND TRANSPORTATION
15. PRECAUTIONS
16. OPERATING HAZARDS

C22201E – WK 41/16

1. INTRODUCTION

This operation and maintenance manual refers to “nPR+ – nano Progressive Replaceable”.

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

nPR++ 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 (nPR+ 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. nPR+ uses an innovative rail & lock concept to allow the element to be replaced or re-organized without the need to completely dismantle the assembly. This is an industry first for segmented progressive dividers allowing quick easy modification or replacement of an assembly element without the cost of a separate base porting module. The nPR++ surface is subjected to a treatment with Zinc-nickel alloy, which provides high resistance to corrosion and allows an outdoor use.

3. CARATTERISTICHE TECNICHE

“nPR++ – nano Progressive Replaceable” 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 (0,025cm ³ - 0,045cm ³ - 0,075cm ³ - 0,105cm ³)
Number of divider elements	3 ÷ 12
Working pressure	15bar (218psi) ÷ 300bar (4350psi)
Working temperature	-20°C ÷ +80°C
Material	Zinc-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.

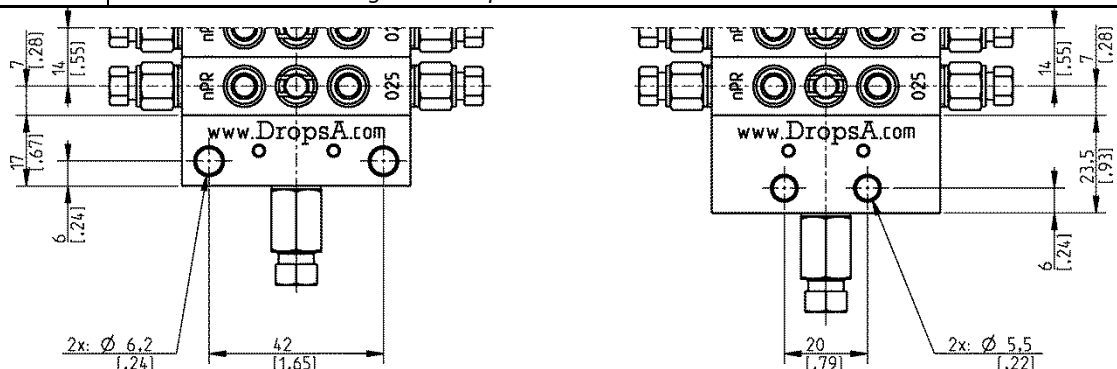
4. DIVIDER BLOCKS AND LABELLING

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 centres in order to allow easy interchangeable with existing models.

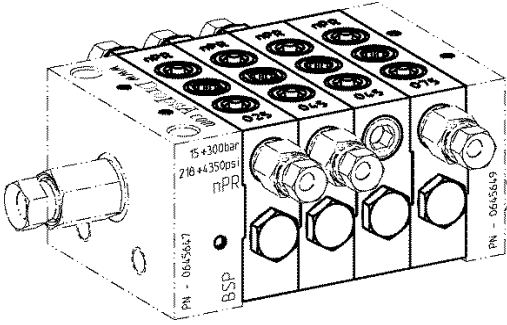
PART NUMBER	DESCRIPTION
0645647	INLET nPR+ - "nano Progressive Replaceable"
0645648	INLET nPR+ - "nano Progressive Replaceable" S - 20mm wheelbase reduced



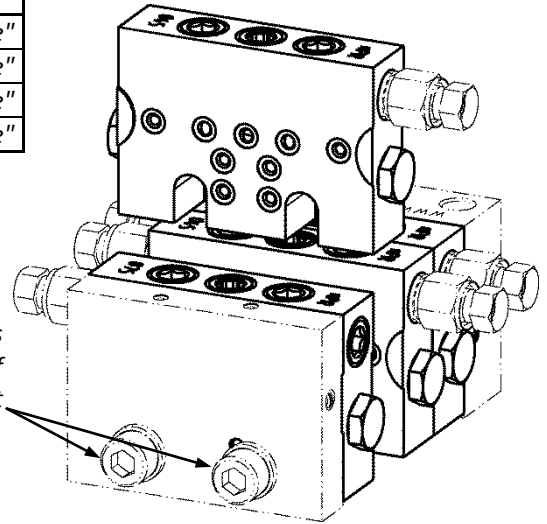
4.2 METERING ELEMENT

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

Q. cm ³	Part No.	DESCRIPTION
0,025	0645650	nPR+ 025-DOSATORE "nano Progressive Replaceable"
0,045	0645651	nPR+ 045-DOSATORE "nano Progressive Replaceable"
0,075	0645652	nPR+ 075-DOSATORE "nano Progressive Replaceable"
0,105	0645653	nPR+ 105-DOSATORE "nano Progressive Replaceable"

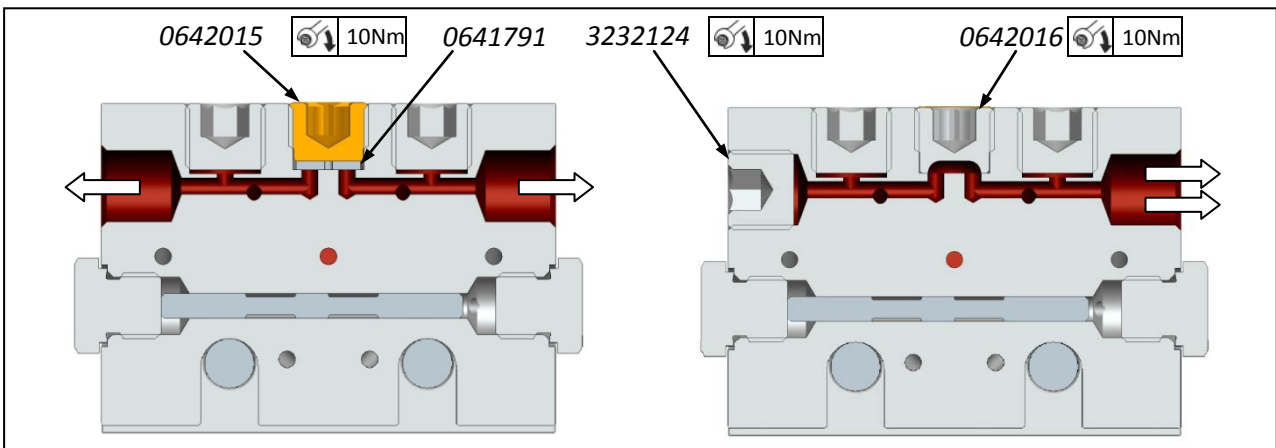


Unscrew only 2 turns
to replacement
of element



It's possible to combine the outlets into a single outlet by element replacing the yellow adaptor (Part number 0642015+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 3232124).



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
nPR+ 025 L	0645654	nPR+ 025 R	0645658	nPR+ 025 LR	0645662
nPR+ 045 L	0645655	nPR+ 045 R	0645659	nPR+ 045 LR	0645663
nPR+ 075 L	0645656	nPR+ 075 R	0645660	nPR+ 075 LR	0645664
nPR+ 105 L	0645657	nPR+ 105 R	0645661	nPR+ 105 LR	0645665

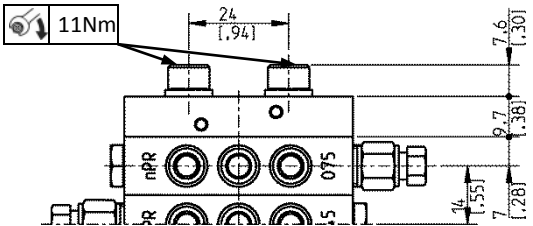
Each metering device is identified with appropriate marking that shows the output per cycle, for example: "nPR+ 075" corresponds to 0.075 cm³ output per cycle per outlet.

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.

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.

CODICE	DESCRIZIONE
0645649	nPR+-FINALE "nano Progressive Replaceable"



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
0016050	3	0014301	5	0014303	7	0014305	9	0014307	11	0014309
	4	0014302	6	0014304	8	0014306	10	0014308	12	0014310

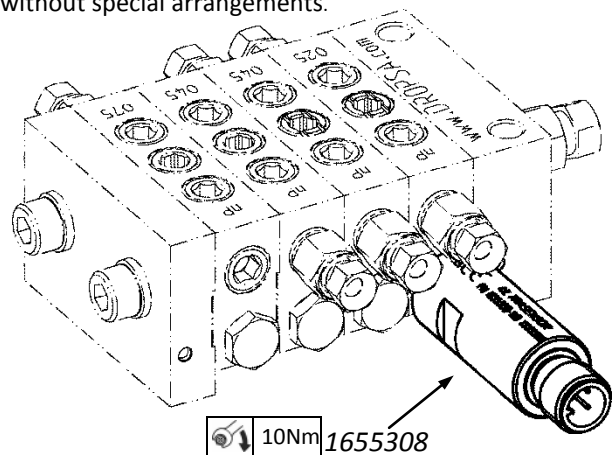
5. CYCLE CONTROL DEVICES

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.

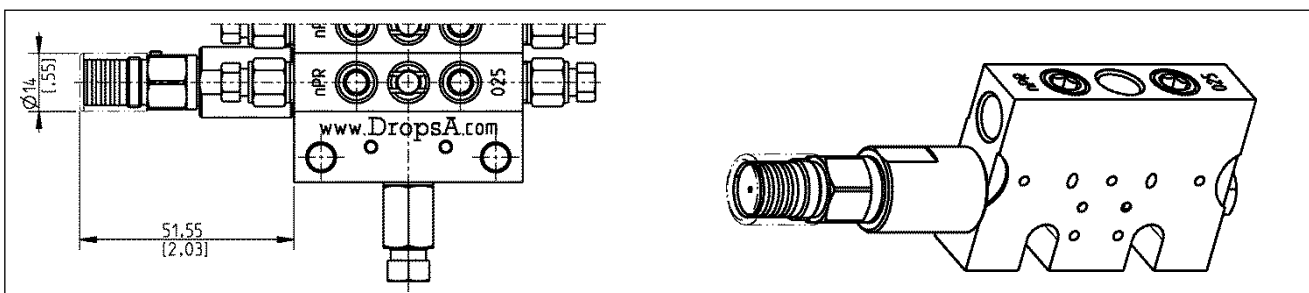
"ULTRASENSOR"	
PART NUMBER	1655308

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.

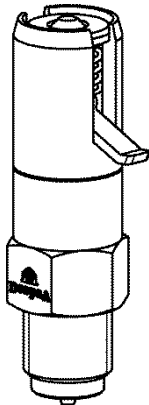

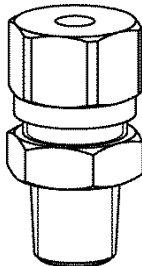
DIVIDER with colour strip visual indicator		
Q. cm ³	PAR NUMBER	DESCRIPTION
0,025	0645678	VISUAL INDICATOR nPR+ 025 "nano Progressive Replaceable"
0,045	0645679	VISUAL INDICATOR nPR+ 045 "nano Progressive Replaceable"
0,075	0645680	VISUAL INDICATOR nPR+ 075 "nano Progressive Replaceable"
0,105	0645681	VISUAL INDICATOR nPR+ 105 "nano Progressive Replaceable"



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 nPR+ 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 compression 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.

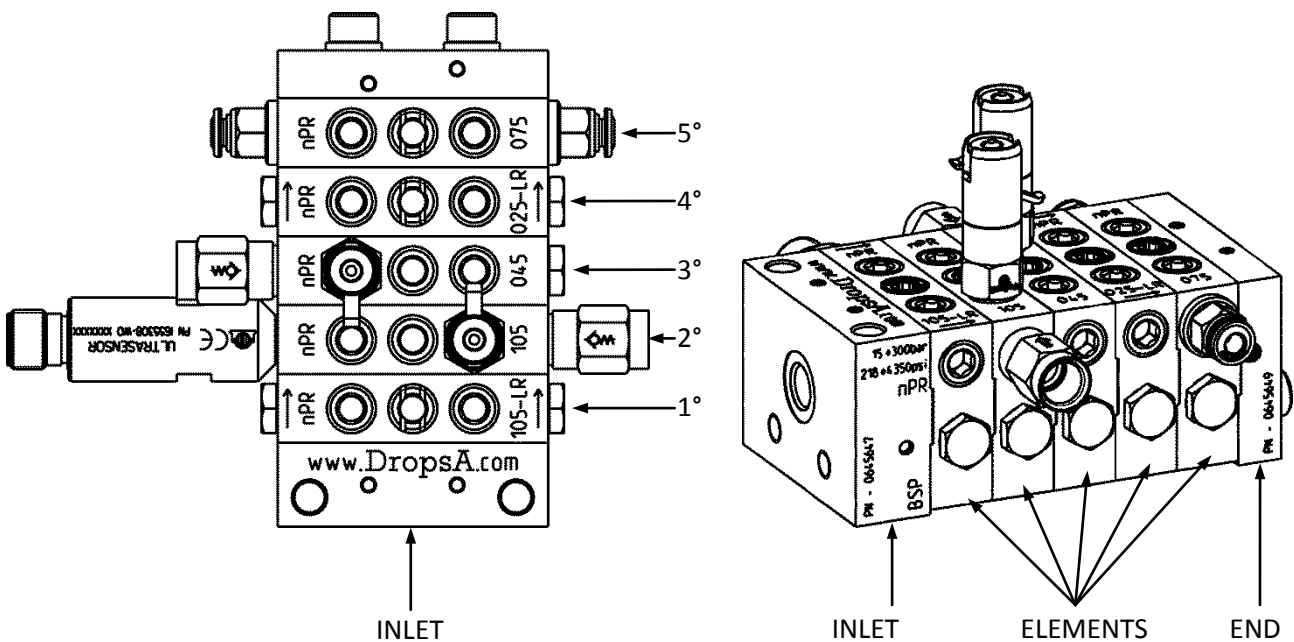
INLET Config. and PACK			ELEMENT configuration (repeat for N° element)						
TYPE	INLET	N° ELEMENTS	FLOWRATE [cm ³]	OUTLET	CYCLE CONTROL	PRESSURE CONTROL			OUTLET FITTINGS
						TYPE	PRESSURE [bar]	POSITION	
nPR+	Empty Standard Hole centers 42mm	3÷12	025 0,025	Empty both	US Ultrasensor right side	M with memory pin	30-50-75 100-150-200 250-300	L left	OP4 Ø4 Push- in
	5 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
				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:

- **nPR+ 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
0645647	INLET nPR+	0645648	INLET nPR+ -S 20mm reduced hole centers

METERING ELEMENT					
Q.cm ³	PART NUMBER	DESCRIPTION	Q.cm ³	PART NUMBER	DESCRIPTION
0,025	0645650	nPR+ 025- DIVIDER	0,075	0645652	nPR+ 075- DIVIDER
0,045	0645651	nPR+ 045- DIVIDER	0,105	0645653	nPR+ 105- DIVIDER

RBIDGE METERING ELEMENT					
LEFT		RIGHT		LEFT / RIGHT	
PART NUMBER	CODE	PART NUMBER	CODE	PART NUMBER	CODE
0645654	nPR+ 025 L	0645658	nPR+ 025 R	0645662	nPR+ 025 LR
0645655	nPR+ 045 L	0645659	nPR+ 045 R	0645663	nPR+ 045 LR
0645656	nPR+ 075 L	0645660	nPR+ 075 R	0645664	nPR+ 075 LR
0645657	nPR+ 105 L	0645661	nPR+ 105 R	0645665	nPR+ 105 LR

END METERING ELEMENT AND SCREWS			
PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
0645649	END nPR+	0016050	Ø6 washer (order 2 per assembly)

SCREWS (order 2 per assembly)									
N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER	N° elem.	PART NUMBER
3	0014301	5	0014303	7	0014305	9	0014307	11	0014309
4	0014302	6	0014304	8	0014306	10	0014308	12	0014310

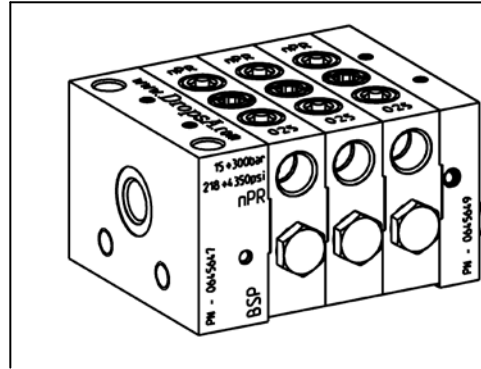
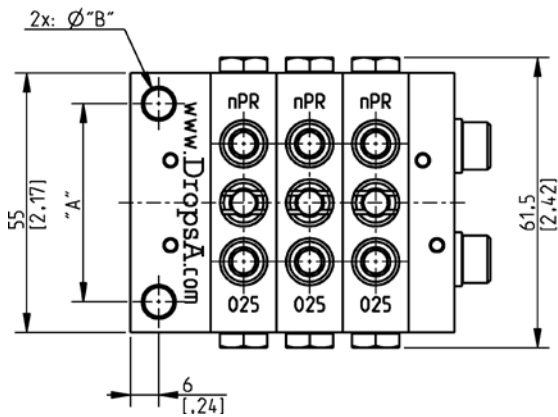
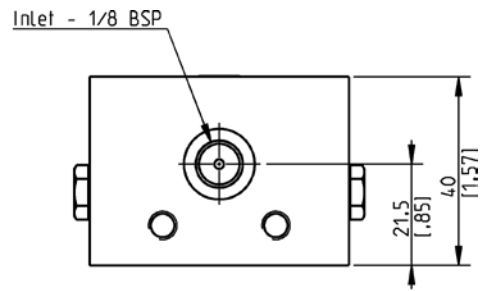
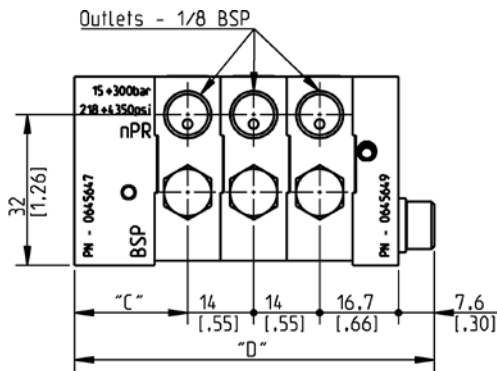
METERING ELEMENT WITH VISUAL CYCLE INDICATOR					
PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION	PART NUMBER	DESCRIPTION
0,025	0645678	nPR+ 025-DOSATORE VISIVO	0,075	0645680	nPR+ 075-DOSATORE VISIVO
0,045	0645679	nPR+ 045-DOSATORE VISIVO	0,105	0645681	nPR+ 105-DOSATORE VISIVO

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)
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3084696	Swivel Push-in 90° Ø4 (150bar)		

10. DIMENSIONS



0645747 - INLET nPR mm [inch]					0645748 - nPR-INIZIALE 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 ambient 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 EXPLICITLY NOT ALLOWED	
Fluid	Dangers
Lubricants with abrasive additives	Wear of the components inside the pump
Lubricants with silicone based additives	Pump seizure
Petrol – solvents – inflammable liquids	Fire – explosion – damage to the gaskets
Corrosive products	Pump corrosion - damage to people
Water	Pump oxidation
Food substances	They would be contaminated