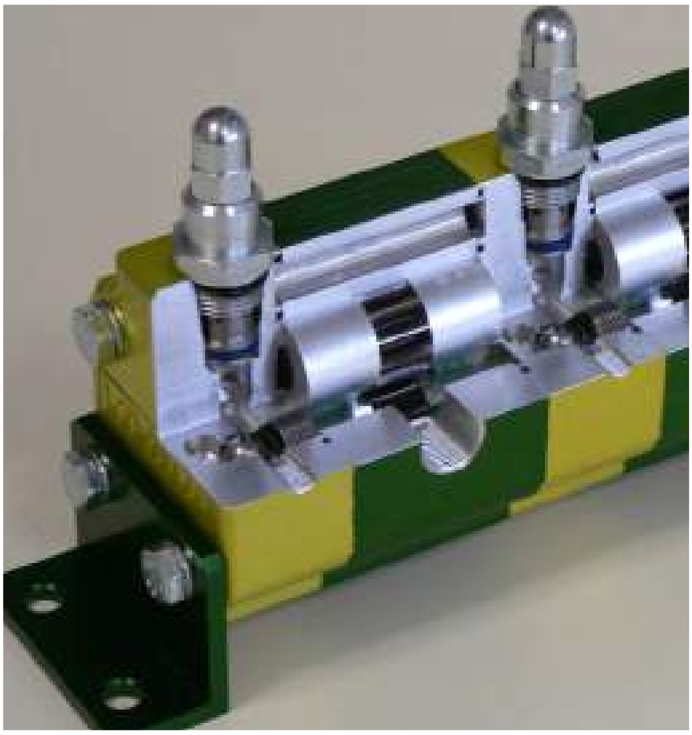
EUROPA

ViVoil ViVolo
oleodinamica
1985

FLOW DIVIDERS " RV Series "



ENGLISH

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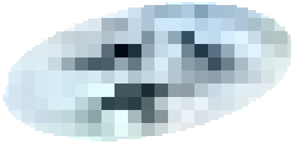
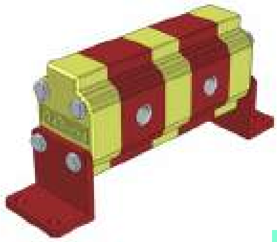


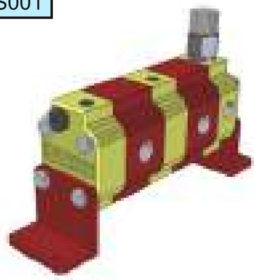
GROUP "0"

RIF. RD001



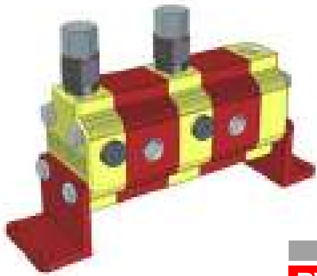
RV-0D

RIF. RS001



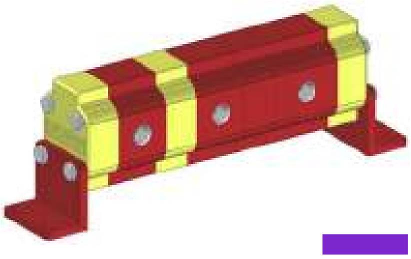
RV-0S

RIF. RV001



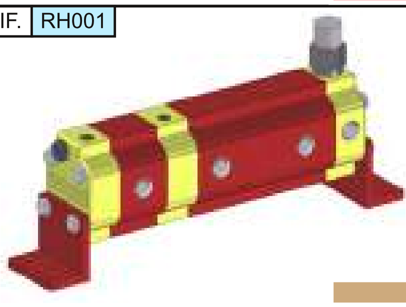
RV-0V

RIF. RG001



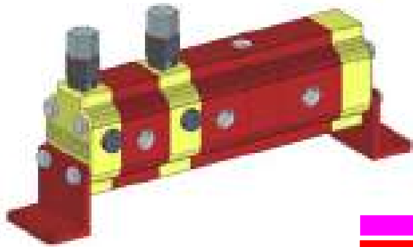
RV-0G

RIF. RH001



RV-0H

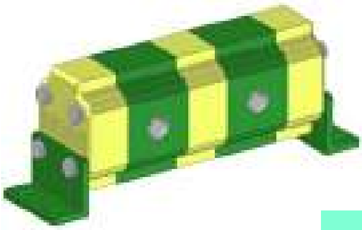
RIF. RN001



RV-0N

GROUP "1"

RIF. RD101

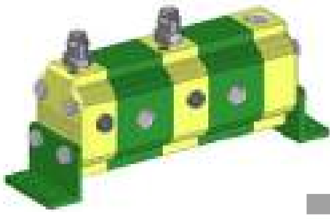


RV-1D

RIF. RS101

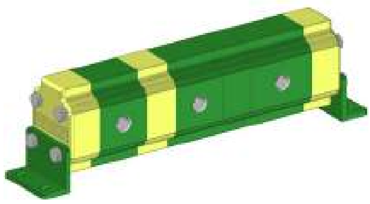
RV-1S

RIF. RV101



RV-1V

RIF. RG101

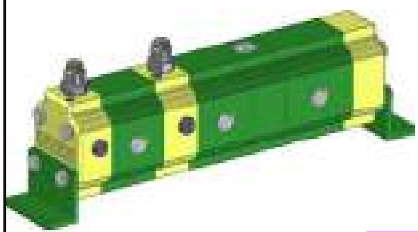


RV-1G

RIF. RH101

RV-1H

RIF. RN101



RV-1N

Vivoil Oleodinamica Vivolo s.r.l. - Società a Socio Unico - via Leone Gingburg 2-4 40054 Budrio (BO) Italy tel: +39 051 803689 fax: +39 051 800061

A flow divider is made up of two or more modular elements (sections) with gears mechanically linked by an internal shaft that causes them to turn at the same speed.
Unlike multiple pumps, in which the input power is mechanical (shaft connected to a motor), in a flow divider the input power is of a fluid-mechanical nature, i.e. a flow of oil under pressure parallelly supplies the modular elements, which are in turn connected to the hydraulic circuits serving the users.

The portion of flow utilized by each element is solely determined by its nominal flow rate. Therefore, unlike standard static dividers with variable ports, the flow dividers do not cause dissipation and are also much more precise.
The use of flow dividers in a system reduces the number of pumps necessary as well as the associated individual mechanical power takeoffs and complex mechanical couplers (with greater losses).
Leaving aside small losses for the time being, at any given moment the total input power is equal to the sum of the powers supplied by all elements making up the flow divider.

Therefore, if in an interval of time the power required by a hydraulic circuit is equal to zero (inactive drained circuit), the power supplied by the element feeding that circuit becomes available for the other elements, which may use it in their own circuits, also operating at higher pressures than the intake pressure.

Most frequent applications of flow dividers

Supply of two or more independent hydraulic circuits by means of a single pump, with an overall flow rate equal to the sum of the flow rates.

Examples of this kind of application:
- lifting platforms and bridges;
- hydraulic bending presses and shearing machines;
- hoisting of freight containers;
- lubrication systems;
- hydraulic opening / closing of gates;
- automatic hydraulically-driven machines;
- actuation of formwork for construction;
- wood processing machinery;
- conveyance of trolleys driven by hydraulic cylinders or motors;
- equipment for the food industry;
- military installations.

Pressure amplifiers.
When in a hydraulic system one user requires a much higher operating or peak pressure than all the others, it is more convenient to supply it by means of a flow divider than to upgrade the whole system to work with higher pressure.
With a two-element flow divider flow may be discharged from the outlet of one element so that the pressure in the other will become much higher than that of the pump supplying the system.

Examples of this kind of application:
- presses with rapid approach
- machine tools

Constructive features

FLOW DIVIDER BODY FLANGE AND COVER	Extruded alloy Serie 7000, heat treated and anodised	Rp=345 N/mm2 (Yield Strength) Rm=382 N/mm2 (Breaking Strength)
GEAR BUSH BEARINGS	Special Heat Treated tin alloy with excellent mechanical features and high anti-friction capacity. Self-lubricating bushes DU	Rp=350 N/mm2 (Yield Strength) Rm=390 N/mm2 (Breaking Strength)
GEARS	Steel UNI 7846	Rs=980 N/mm2 (Yield Strength) Rm=1270÷1570 N/mm2 (Breaking Strength)
SEALS	A 727 Acrolonitrile Standard F 975 Viton FKM	90 Shore, resistenza termica 120°C 80 Shore, resistenza termica 200°C

VERSION DESCRIPTION

RV-D FLOW DIVIDER

This is the flow divider standard version, it simply divide the incoming flow without allowing the phase correction

RV-S FLOW DIVIDER with single phase correction valve

This version has just one phase correction valve for all the elements, it can obviously divide the flow and allow the phase correction, but only in the direction of flow division.

RV-V FLOW DIVIDER with phase correction and anticavitation valves

In this version the flow divider has one phase correction and anticavitation valve for each element, this allow a flow correction in both direction (flow division and flow unification). In addition it can adjust the relief pressure to a different value for each element.

RV-G FLOW DIVIDER + MOTOR

The RV-G typology is the motorized version of the RV-D divider.
It has a motor conneted to the flow divider elements. This solution is important when the incoming and/or outgoing pressure is below the minimum pressure required to start. Giving flow to the motor, help the flow divider rotation start. Typical use: plants with single effects hydraulic jack.

RV-H FLOW DIVIDER with single phase correction valve + MOTOR

This is the motorized version of the RV-S divider.
The motor has the same funcion that is described for the RV-G divider.

RV-N FLOW DIVIDER with phase correction and anticavitation valve + MOTOR

This is the motorized version of the RV-V divider.
The motor has the same funcion that is described for the RV-G divider.

The flow division error is lower than ± 1.5% with a pressure difference between one element and another until 30 Bars. For bigger differences we can approximate an error increase of 1 % for each 10 additional bars.

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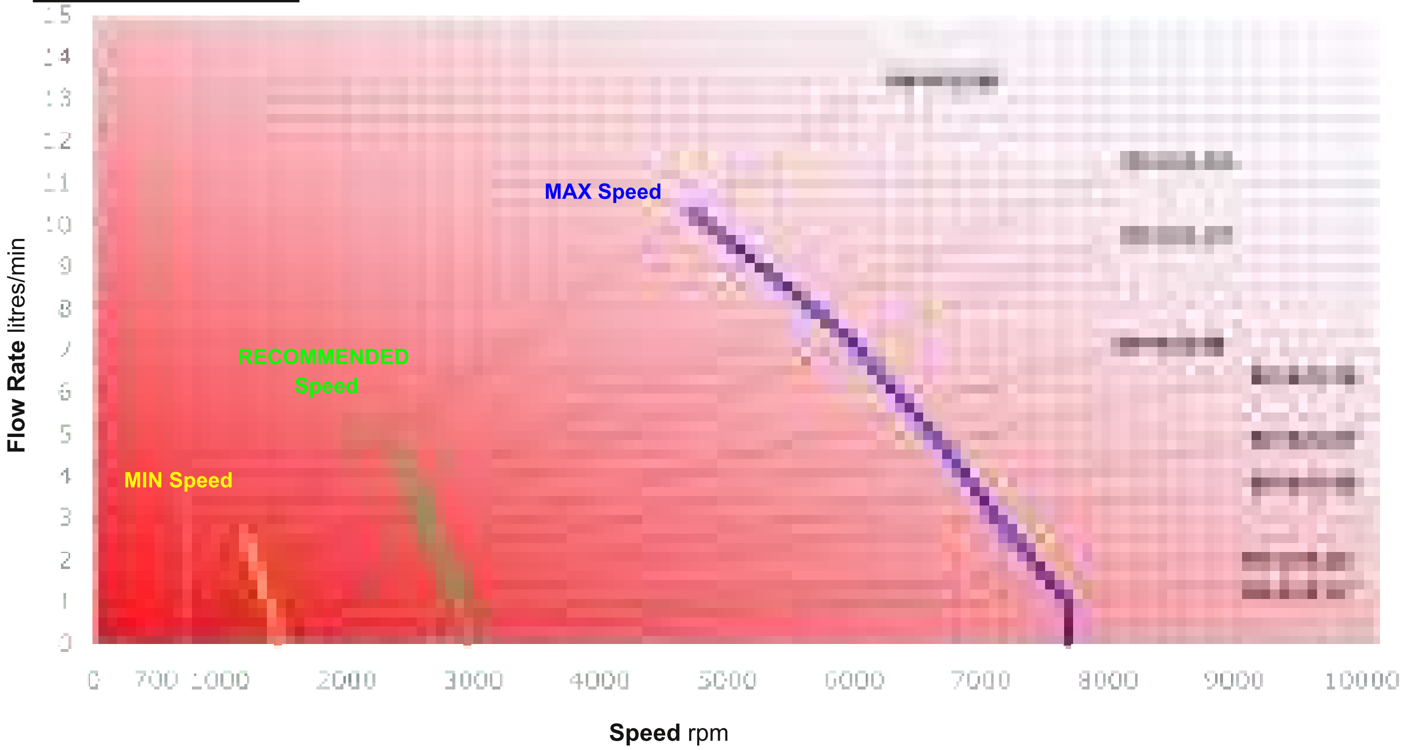
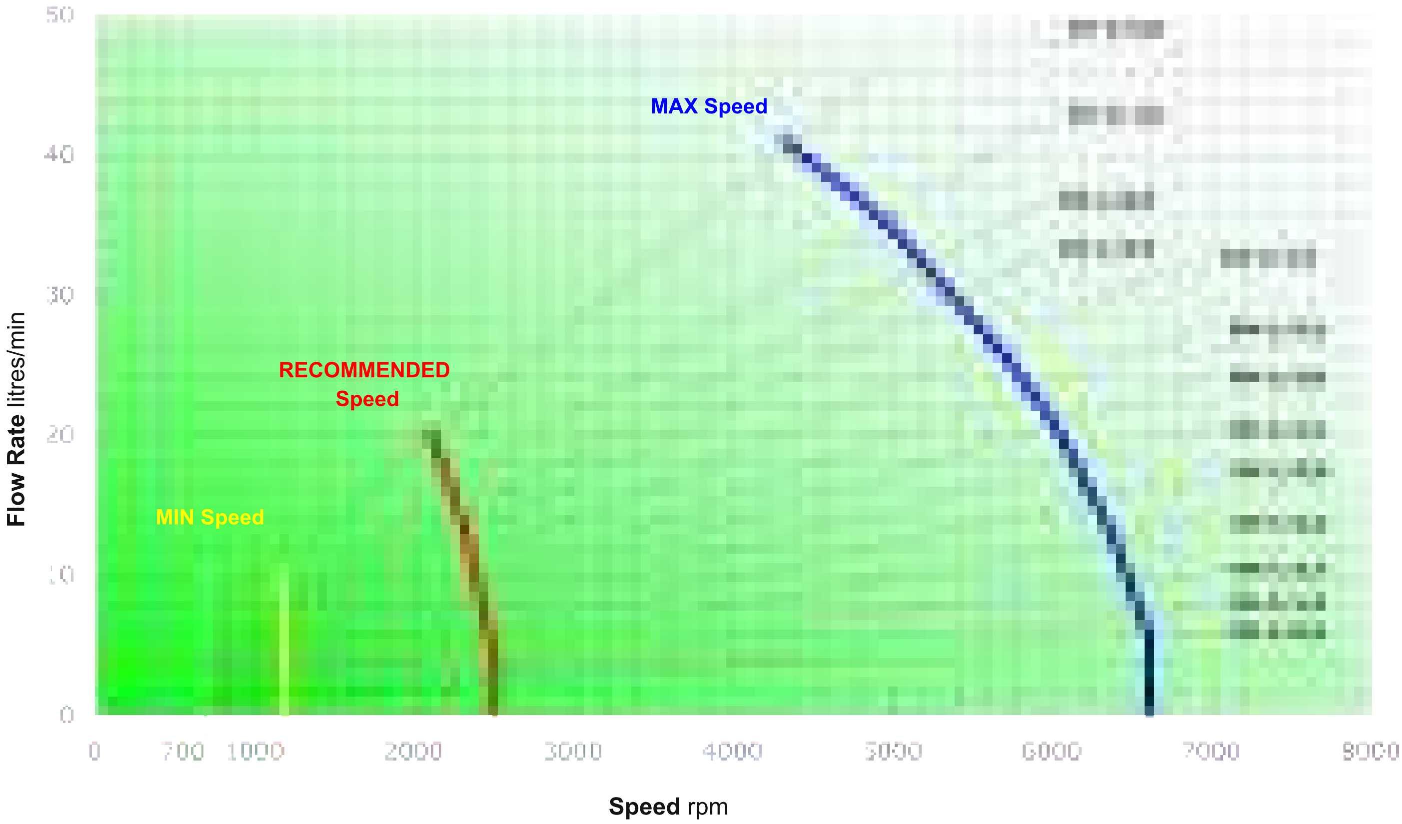
RV-0



RV-1



NOTE: the flow divider can work even below the minimum speed, but it's efficiency will be lower
the flow divider can work even over the maximum speed, but it will increase the noise and loss of load

Flow divider (Standard Version)

Code:

9RD	NN	CC

9RD	Flow Divider Typology
NN	Number of elements
CC	Displacement Code

Example: Flow divider with two elements (same displacement):
RV-0D / 0,57 x 2

9RD	02	05

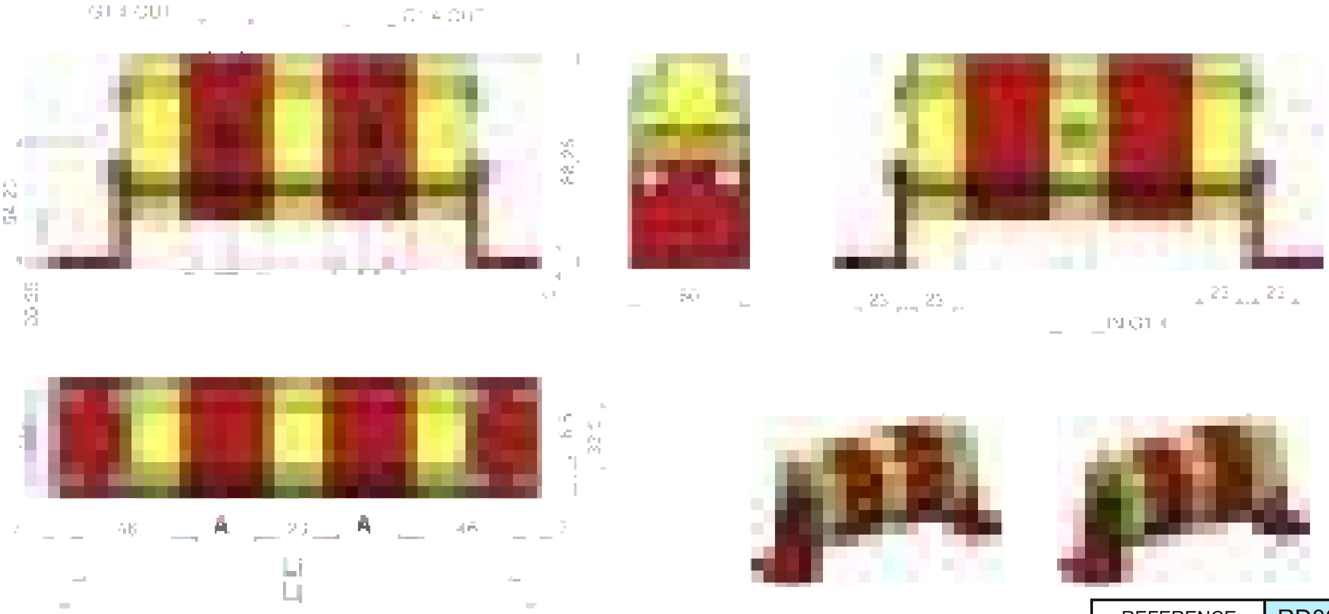
Example: Flow Divider with 4 elements (with different displacement - max 7):
RV-0D / 0,57+0,76+0,98+1,52

9RD	04	05	06	07	11

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm^3/rev	Code		MIN	RECOMMENDED	MAX
0,17	01	210	0,2	0,4	1,2
0,25	02	210	0,3	0,7	1,8
0,45	04	210	0,6	1,2	3
0.57	05	210	0,8	1,5	3,8
0,76	06	210	1	2	4,8
0,98	07	210	1,2	2,3	5,6
1,27	09	210	1,5	3	7,2
1,52	11	210	1,9	3,5	8
2,30	13	210	2,6	5	10,3



REFERENCE: RD001

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm^3/giro	A	Number of elements: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,17	**29,3**	174,8	227,7	280,6	333,5	386,4	439,3	492,5	545,1	598	650,9	703,8	756,7	809,6	862,5	915,4
0,25	**29,9**	178	232,5	287	341,5	396	450,5	505	559,5	614	668,5	723	777,5	832	886,5	941
0,45	**31,5**	180	235,5	291	346,5	402	457,5	513	568,5	624	679,5	735	790,5	846	901,5	957
0,76	**34**	183	240	297	354	411	468	525	582	639	696	753	810	867	924	981
0,98	**35,5**	186	244,5	303	361,5	420	478,5	537	595,5	654	712,5	771	829,5	888	946,5	1005
1,27	**38**	191	252	313	374	435	496	557	618	679	740	801	862	923	984	1045
1,52	**40**	195	258	321	384	447	510	573	636	699	762	825	888	951	1014	1077
2,30	**46**	207	276	345	414	483	552	621	690	759	828	897	966	1035	1104	1173

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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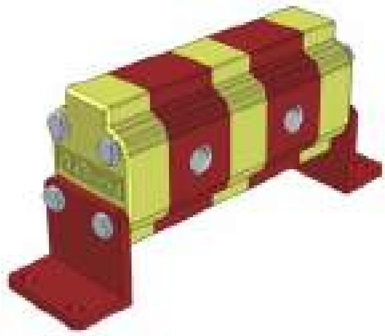
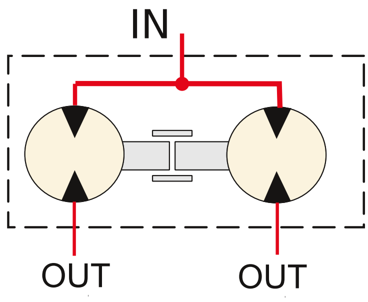
INTERNAL DRAIN





In **table 1** the functioning range of single flow divider elements is indicated.

The higher is the feeding capacity (q), the higher is the precision of flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column "**RECOMMENDED**".

Remember to verify the capacities even in phase of flow reunion.

The pressures indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20% superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 23] + 92+ (A1 + A2 + A3 +…….)

92 = 46 + 46

n = Number of elements of flow divider

A1... An = heights of elements of flow divider

Lt = Li + 14

14 = 7+ 7

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-0D 0,98 + 0,76 +1,27**

Distance between fixing hole centres **Li** = [(3-1) x 23] + 92 + 35,5 + 34 + 38 =245,5 mm

Total Lenght **Lt** = 245,5 + 14 = 259,5

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **15** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-0S

Flow divider with **single phase correction valve** common to all the elements

Code:

9RS	NN	M	CC

9RD	Flow Divider Typology
NN	Number of elements
M	Code of setting range of the valves
CC	Displacement Code

TABLE "M"	
D	20 ÷ 140 bar
E	70÷ 315 bar

Example: Flow divider with two elements (same displacement)
RV-0D / 0,57 x 2 with valve 20 ÷ 140 bar

9RS	02	D	05

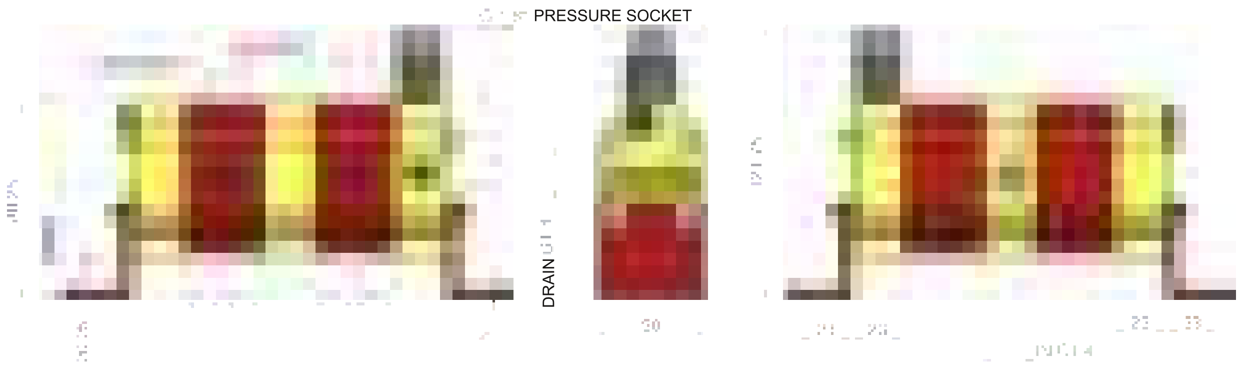
Example: Flow Divider with 4 elements (with different displacement - max 7):
RV-0S / 0,57+0,76+0,98+1,52 with valve 70 ÷ 315 bar

9RS	04	E	05	06	07	11

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem. Cm^3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,17	01	210	0,2	0,4	1,2
0,25	02	210	0,3	0,7	1,8
0,45	04	210	0,6	1,2	3
0.57	05	210	0,8	1,5	3,8
0,76	06	210	1	2	4,8
0,98	07	210	1,2	2,3	5,6
1,27	09	210	1,5	3	7,2
1,52	11	210	1,9	3,5	8
2,30	13	210	2,6	5	10,3



REREFENCE: RS001

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm^3/rev	A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Number of elements														
0,17	29,3	174,8	227,7	280,6	333,5	386,4	439,3	492,5	545,1	598	650,9	703,8	756,7	809,6	862,5	915,4
0,25	29,9	178	232,5	287	341,5	396	450,5	505	559,5	614	668,5	723	777,5	832	886,5	941
0,45	31,5	180	235,5	291	346,5	402	457,5	513	568,5	624	679,5	735	790,5	846	901,5	957
0,76	34	183	240	297	354	411	468	525	582	639	696	753	810	867	924	981
0,98	35,5	186	244,5	303	361,5	420	478,5	537	595,5	654	712,5	771	829,5	888	946,5	1005
1,27	38	191	252	313	374	435	496	557	618	679	740	801	862	923	984	1045
1,52	40	195	258	321	384	447	510	573	636	699	762	825	888	951	1014	1077
2,30	46	207	276	345	414	483	552	621	690	759	828	897	966	1035	1104	1173

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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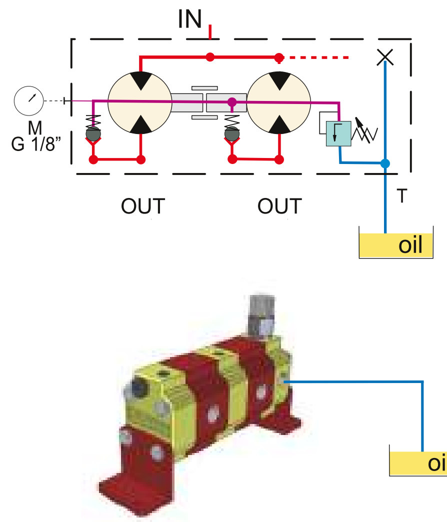
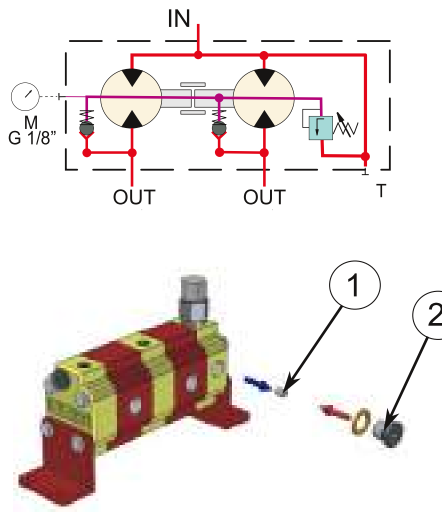
Flow divider with **single phase correction valve** common to all the elements

EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
Connect the drain port (T) to the tank	To predispose the divider to the internal drain, execute following operations: 1. remove the M6 dowel inside the drain port 2. with a 1/4 G plug, plug the drain port (T)





In **table 1** the functing range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 23] + 92+ (A1 + A2 + A3 +…….)

92 = 46 + 46
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 14

14 = 7+ 7

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-0S 0,98 + 0,76 +1,27**

Distance between fixing hole centres	**Li** = [(3-1) x 23] + 92 + 35,5 + 34 + 38 =245,5 mm
Total Lenght	**Lt** = 245,5 + 14 = 259,5

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **15** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

Flow divider with independent **phase correction and anticavitation** valves for each element

Code:

9RV	NN	M	CC

9RV	Flow Divider Typology
NN	Number of elements
M	Code of setting range of the valves
CC	Displacement Code

TABLE "M"	
A	7÷ 70 bar
B	35÷ 175 bar
C	70÷ 350 bar

Example: Flow divider with two elements (same displacement)
RV-0V / 0,57 x 2 with valve 7 ÷ 70 bar

9RV	02	A	05

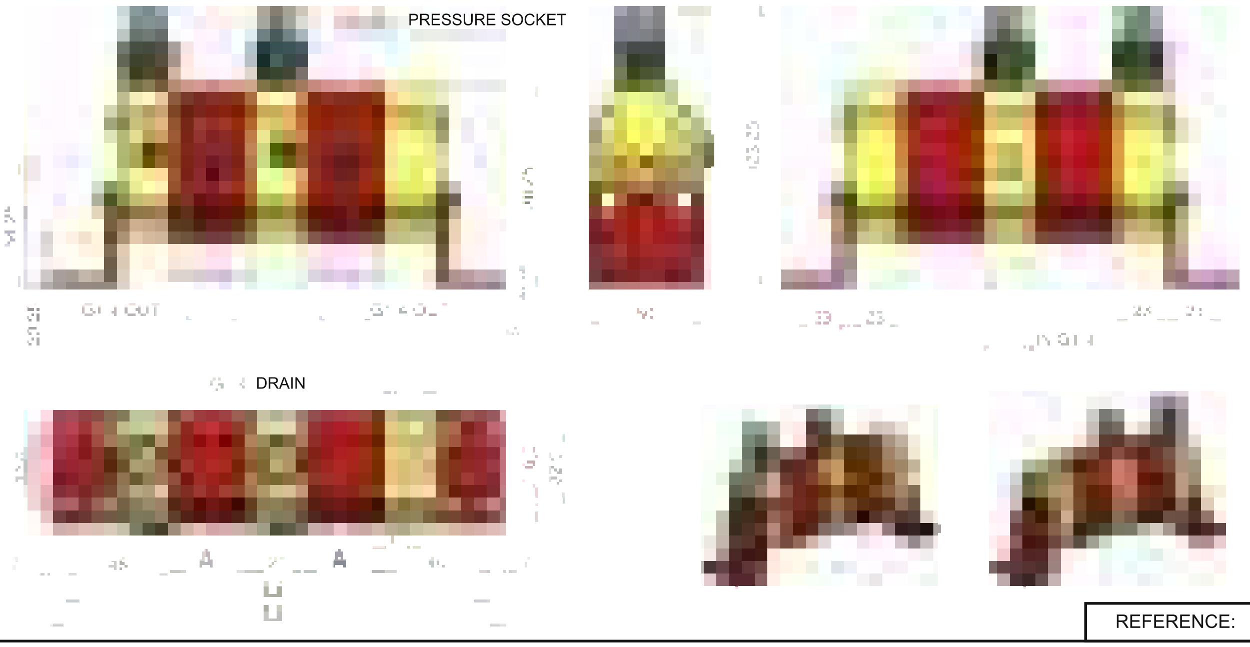
Example: Flow Divider with 4 elements (with different displacement - max 7):
RV-0V / 0,57+0,76+0,98+1,52 with valve 35 ÷ 175 bar

9RV	04	B	05	06	07	11

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem. Cm^3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,17	01	210	0,2	0,4	1,2
0,25	02	210	0,3	0,7	1,8
0,45	04	210	0,6	1,2	3
0.57	05	210	0,8	1,5	3,8
0,76	06	210	1	2	4,8
0,98	07	210	1,2	2,3	5,6
1,27	09	210	1,5	3	7,2
1,52	11	210	1,9	3,5	8
2,30	13	210	2,6	5	10,3



REFERENCE: RV001

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm^3/rev	A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,17	29,3	174,8	227,7	280,6	333,5	386,4	439,3	492,5	545,1	598	650,9	703,8	756,7	809,6	862,5	915,4
0,25	29,9	178	232,5	287	341,5	396	450,5	505	559,5	614	668,5	723	777,5	832	886,5	941
0,45	31,5	180	235,5	291	346,5	402	457,5	513	568,5	624	679,5	735	790,5	846	901,5	957
0,76	34	183	240	297	354	411	468	525	582	639	696	753	810	867	924	981
0,98	35,5	186	244,5	303	361,5	420	478,5	537	595,5	654	712,5	771	829,5	888	946,5	1005
1,27	38	191	252	313	374	435	496	557	618	679	740	801	862	923	984	1045
1,52	40	195	258	321	384	447	510	573	636	699	762	825	888	951	1014	1077
2,30	46	207	276	345	414	483	552	621	690	759	828	897	966	1035	1104	1173

(Columns 2–16: Number of elements)

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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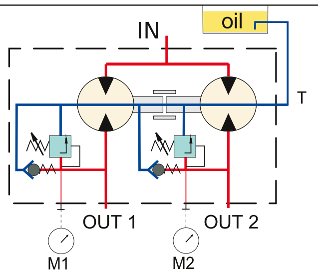
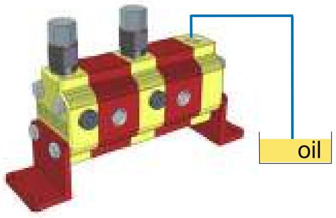
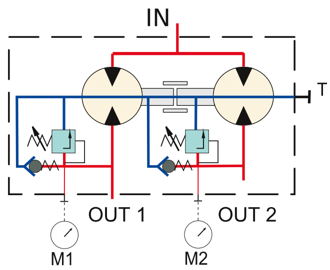
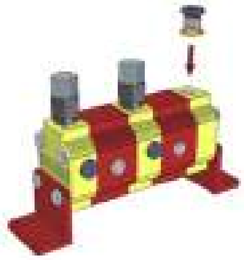
EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
For the correct functioning of the flow divider, it has to be installed *under the oil level*. The drain tube has to pick up under the oil level and it has not to aspire air.	To predispose the divider to the internal drain, plug the 1/4 G drain port (T) **Note**: with this configuration the function of anticavitation valves is annulled
 	 

In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

From **table 2** it is possible to obtain the “Li” measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and “Lt” measure have to be calculated by the following formula:

Li = [(n-1) x 23] + 92+ (A1 + A2 + A3 +…….)

92 = 46 + 46
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 14

14 = 7+ 7

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-0V 0,98 + 0,76 +1,27**

Distance between fixing hole centres	**Li** = [(3-1) x 23] + 92 + 35,5 + 34 + 38 =245,5 mm
Total Lenght	**Lt** = 245,5 + 14 = 259,5

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **15** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-0G

Flow Divider with MOTOR

Code:

9RG	NN	O	CC	CC

9RG	Flow Divider Typology
NN	Number of flow divider elements
O	Number of motor elements
CC	Motor Displacement Code
CC	Flow Divider Displacement Code

Example: Flow divider with two elements (same displacement) and Motor RV-0G / 0,76 x 2 + 1 Motor 1.52

9RG	02	1	11	06

Example: Flow Divider 4 elements (different displacement - max 6) and Motor: RV-0G / 0,57+0,76+1.27+0.45 + 1 Motor 2.30

9RG	04	1	13	05	06	09	04

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem. Cm³/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,17	01	210	0,2	0,4	1,2
0,25	02	210	0,3	0,7	1,8
0,45	04	210	0,6	1,2	3
0.57	05	210	0,8	1,5	3,8
0,76	06	210	1	2	4,8
0,98	07	210	1,2	2,3	5,6
1,27	09	210	1,5	3	7,2
1,52	11	210	1,9	3,5	8
2,30	13	210	2,6	5	10,3

REFERENCE: RG001

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm³/rev	A-M	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Number of elements														
0,17	29,3	174,8	227,7	280,6	333,5	386,4	439,3	492,5	545,1	598	650,9	703,8	756,7	809,6	862,5	915,4
0,25	29,9	178	232,5	287	341,5	396	450,5	505	559,5	614	668,5	723	777,5	832	886,5	941
0,45	31,5	180	235,5	291	346,5	402	457,5	513	568,5	624	679,5	735	790,5	846	901,5	957
0,76	34	183	240	297	354	411	468	525	582	639	696	753	810	867	924	981
0,98	35,5	186	244,5	303	361,5	420	478,5	537	595,5	654	712,5	771	829,5	888	946,5	1005
1,27	38	191	252	313	374	435	496	557	618	679	740	801	862	923	984	1045
1,52	40	195	258	321	384	447	510	573	636	699	762	825	888	951	1014	1077
2,30	46	207	276	345	414	483	552	621	690	759	828	897	966	1035	1104	1173

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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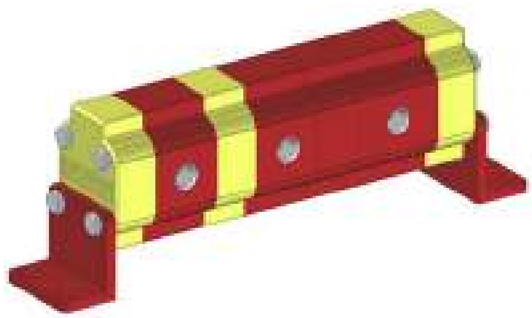
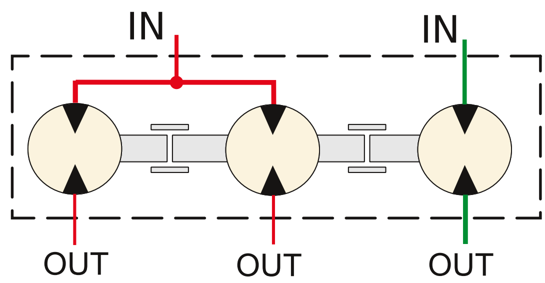
INTERNAL DRAIN





In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 23] + 92+ (A1 + A2 + A3 +…….)

92 = 46 + 46
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 14

14 = 7+ 7

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-0G / 0,98 x 2+ 1 MOTOR 2,30**

Distance between fixing hole centres **Li** = [(3-1) x 23] + 92 + 35,5 + 35,5 + 46 =255 mm

Total Lenght **Lt** = 245,5 + 14 = 269

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **15** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-0H

Flow divider with **single phase correction valve** common to all the elements and MOTOR

Code:

9RN	NN	M	O	CC	CC

9RN	Flow Divider Typology
NN	Number of flow divider elements
M	Code of setting range of the valves
O	Number of motor elements
CC	Motor Displacement Code
CC	Flow Divider Displacement Code

TABLE "M"	
D	20 ÷ 140 bar
E	70÷ 315 bar

Example: Flow divider with two elements (same displacement) and Motor
RV-0H / 0,76 x 2 with valve 20 ÷ 140 bar + 1 Motor 1.52

9RH	02	D	1	11	06

Example: Flow Divider 4 elements (different displacement - max 6) and Motor:
RV-0H / 2.30+0,57+0,76+0,45 with valve 70 ÷ 315 bar + 1 Motor 2.30

9RH	03	E	1	13	05	06	04

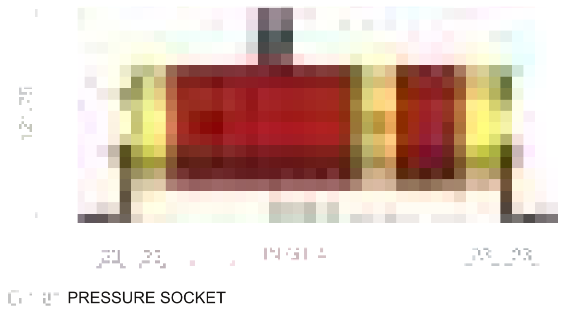
NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

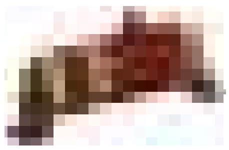
Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm^3/rev	Code		MIN	RECOMMENDED	MAX
0,17	01	210	0,2	0,4	1,2
0,25	02	210	0,3	0,7	1,8
0,45	04	210	0,6	1,2	3
0.57	05	210	0,8	1,5	3,8
0,76	06	210	1	2	4,8
0,98	07	210	1,2	2,3	5,6
1,27	09	210	1,5	3	7,2
1,52	11	210	1,9	3,5	8
2,30	13	210	2,6	5	10,3

FLOW DIVIDER ELEMENTS MOTOR ELEMENT

MOTOR ELEMENT FLOW DIVIDER ELEMENTS





REFERENCE: RH001

Table: 2

Cm^3/rev	A-M	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Li = Distance between fixing hole centres (single displacement flow divider) — Number of elements														
0,17	29,3	174,8	227,7	280,6	333,5	386,4	439,3	492,5	545,1	598	650,9	703,8	756,7	809,6	862,5	915,4
0,25	29,9	178	232,5	287	341,5	396	450,5	505	559,5	614	668,5	723	777,5	832	886,5	941
0,45	31,5	180	235,5	291	346,5	402	457,5	513	568,5	624	679,5	735	790,5	846	901,5	957
0,76	34	183	240	297	354	411	468	525	582	639	696	753	810	867	924	981
0,98	35,5	186	244,5	303	361,5	420	478,5	537	595,5	654	712,5	771	829,5	888	946,5	1005
1,27	38	191	252	313	374	435	496	557	618	679	740	801	862	923	984	1045
1,52	40	195	258	321	384	447	510	573	636	699	762	825	888	951	1014	1077
2,30	46	207	276	345	414	483	552	621	690	759	828	897	966	1035	1104	1173

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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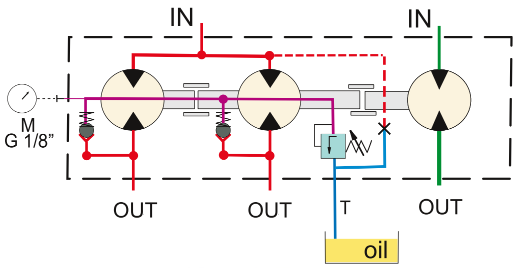
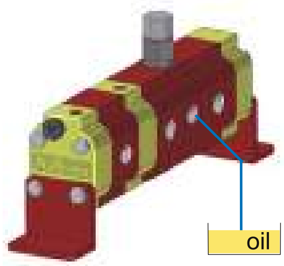
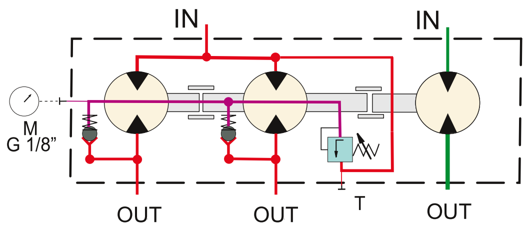
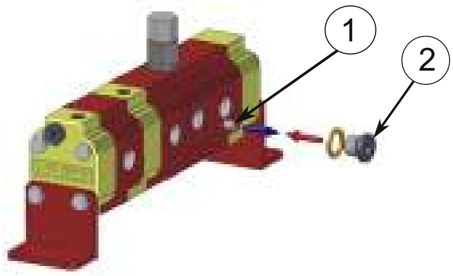
EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
Connect the drain port (T) to the tank	To predispose the divider to the internal drain, execute following operations: 1. remove the M6 dowel inside the drain port 2. with a 1/4 G plug, plug the drain port (T)









In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

From **table 2** it is possible to obtain the “Li” measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and “Lt” measure have to be calculated by the following formula:

Li = [(n-1) x 23] + 92+ (A1 + A2 + A3 +…….)

92 = 46 + 46
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 14

14 = 7+ 7

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-0H 0,98 x 2 + 1 Motor 2.30**

Distance between fixing hole centres **Li** = [(3-1) x 23] + 92 + 35,5 + 35,5 + 46 =255 mm

Total Lenght **Lt** = 255 + 14 = 269 mm

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **15** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 μ

FLOW DIVIDER "RV" Series Swallow Line

RV-0N

Flow divider with independent **phase correction and anticavitation** valves for each element with MOTOR

Code:

9RN	NN	M	O	CC	CC

9RN	Flow Divider Typology
NN	Number of flow divider elements
M	Code of setting range of the valves
O	Number of motor elements
CC	Motor Displacement Code
CC	Flow Divider Displacement Code

TABLE "M"	
A	7 ÷ 70 bar
B	35÷ 175 bar
C	70÷ 350 bar

Example: Flow divider with two elements (same displacement) and Motor RV-0N / 0,76 x 2 with valve 7 ÷ 70 bar + 1 Motor 1.52

9RN	02	A	1	11	06

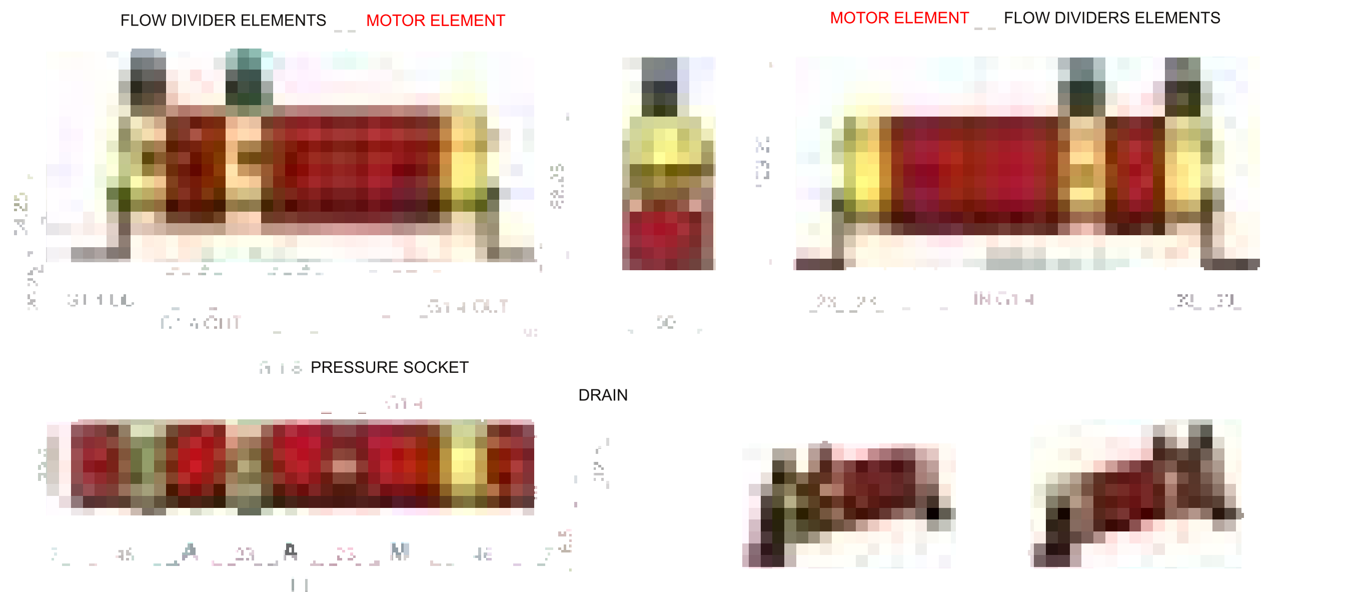
Example: Flow Divider 4 elements (different displacement - max 6) and Motor: RV-0N / 2.30+0,57+0,76+1,27 with valve 35 ÷ 175 bar + 1 Motor 2.30

9RN	03	B	1	13	05	06	09

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm^3/rev	Code		MIN	RECOMMENDED	MAX
0,17	01	210	0,2	0,4	1,2
0,25	02	210	0,3	0,7	1,8
0,45	04	210	0,6	1,2	3
0.57	05	210	0,8	1,5	3,8
0,76	06	210	1	2	4,8
0,98	07	210	1,2	2,3	5,6
1,27	09	210	1,5	3	7,2
1,52	11	210	1,9	3,5	8
2,30	13	210	2,6	5	10,3



REFERENCE: RN001

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm^3/rev	A-M	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Number of elements														
0,17	29,3	174,8	227,7	280,6	333,5	386,4	439,3	492,5	545,1	598	650,9	703,8	756,7	809,6	862,5	915,4
0,25	29,9	178	232,5	287	341,5	396	450,5	505	559,5	614	668,5	723	777,5	832	886,5	941
0,45	31,5	180	235,5	291	346,5	402	457,5	513	568,5	624	679,5	735	790,5	846	901,5	957
0,76	34	183	240	297	354	411	468	525	582	639	696	753	810	867	924	981
0,98	35,5	186	244,5	303	361,5	420	478,5	537	595,5	654	712,5	771	829,5	888	946,5	1005
1,27	38	191	252	313	374	435	496	557	618	679	740	801	862	923	984	1045
1,52	40	195	258	321	384	447	510	573	636	699	762	825	888	951	1014	1077
2,30	46	207	276	345	414	483	552	621	690	759	828	897	966	1035	1104	1173

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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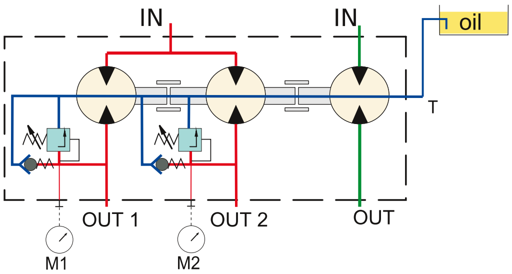
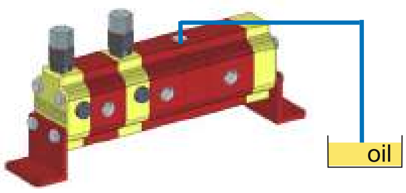
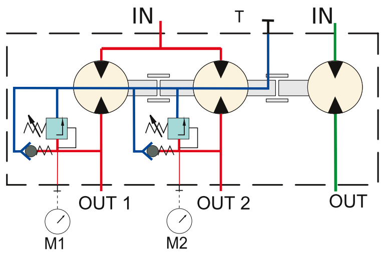
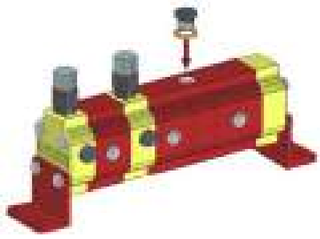
FLOW DIVIDER "RV" Series Swallow Line

RV-0N

Flow divider with independent **phase correction and anticavitation** valves for each element with MOTOR

EXTERNAL DRAIN *STANDARD SETUP*	INTERNAL DRAIN
For the correct functioning of the flow divider, it has to be installed *under the oil level*. The drain tube has to pick up under the oil level and it has not to aspire air.	To predispose the divider to the internal drain, plug the 1/4 G drain port (T) **Note**: with this configuration the function of anticavitation valves is annulled
 	 

In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

From **table 2** it is possible to obtain the “Li” measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and “Lt” measure have to be calculated by the following formula:

Li = [(n-1) x 23] + 92+ (A1 + A2 + A3 +…….)

92 = 46 + 46

n = Number of elements of flow divider

A1... An = heights of elements of flow divider

Lt = Li + 14

14 = 7+ 7

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-NG / 0,98 x 2+ 1 MOTOR 2,30**

Distance between fixing hole centres	**Li** = [(3-1) x 23] + 92 + 35,5 + 35,5 + 46 =255 mm
Total Lenght	**Lt** = 255 + 14 = 269 mm

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **15** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar.** To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-1D

Flow divider (Standard Version)

Code:

9RD	NN	CC

9RD	Flow Divider Typology
NN	Number of elements
CC	Displacement Code

Example: Flow divider with two elements (same displacement)
RV-1D / 3.8 x 2

9RD	02	25

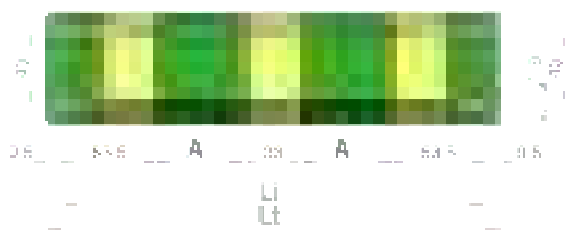
Example: Flow Divider with 4 elements (with different displacement - max 7):
RV-1D / 3,8+4,9+4,9+6,5

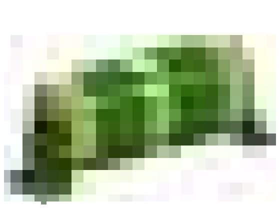
9RD	04	25	29	29	32

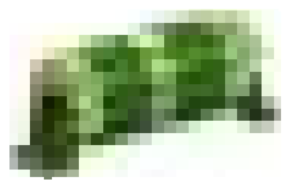
NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem. Cm³/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41







REFERENCE: RD101

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm³/rev	A	Number of elements: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,9	**41,5**	223	297,5	372	446,5	521	595,5	670	744,5	819	893,5	968	1042,5	1117	1191,5	1266
1,2	**42,5**	225	300,5	376	451,5	527	602,5	678	753,5	829	904,5	980	1055,5	1131	1206,5	1282
1,7	**44**	228	305	382	459	536	613	690	767	844	921	998	1075	1152	1229	1306
2,2	**46**	232	311	390	469	548	627	706	785	864	943	1022	1101	1180	1259	1338
2,6	**48**	236	317	398	479	560	641	722	803	884	965	1046	1127	1208	1289	1370
3,2	**50**	240	323	406	489	572	655	738	821	904	987	1070	1153	1236	1319	1402
3,8	**52**	244	329	414	499	584	669	754	839	924	1009	1094	1179	1264	1349	1434
4,3	**54**	248	335	422	509	596	683	770	857	944	1031	1118	1205	1292	1379	1466
4,9	**57**	254	344	434	524	614	704	794	884	974	1064	1154	1244	1334	1424	1514
5,9	**60,5**	261	354,5	448	541,5	635	728,5	822	915,5	1009	1103	1196	1289,5	1383	1476,5	1570
6,5	**63**	266	362	458	554	650	746	842	938	1034	1130	1226	1322	1418	1514	1610
7,8	**67**	274	374	474	574	674	774	874	974	1074	1174	1274	1374	1474	1574	1674
9,8	**76**	292	401	510	619	728	837	946	1055	1164	1273	1382	1491	1600	1709	1818

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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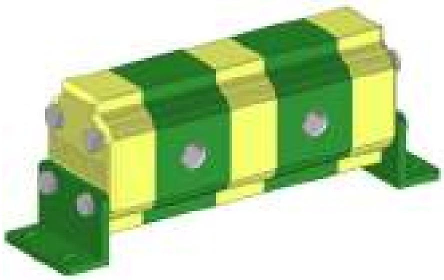
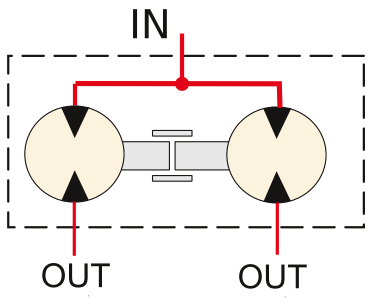
INTERNAL DRAIN





In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

From **table 2** it is possible to obtain the “Li” measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and “Lt” measure have to be calculated by the following formula:

Li = [(n-1) x 33] + 107 + (A1 + A2 + A3 +…….)

107 = 53,5 + 53,5
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 19

19 = 9,5 + 9,5

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-1D 4.3 + 2,2 +0,9**

Distance between fixing hole centres **Li** = [(3-1) x 33] + 107 + 54 + 46 + 41,5 =314,5 mm

Total Lenght **Lt** = 314,5 + 19 = 333,5

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals
- Oil filtering 10 ÷ 25 µ

Oil temperature: +30°c ÷ +60°c
Oil Viscosity 20 ÷ 40 cSt

FLOW DIVIDER "RV" Series Swallow Line

RV-1S

Flow divider with **single phase correction valve** common to all the elements

Code:

9RS	NN	M	CC

9RD	Flow Divider Typology
NN	Number of elements
M	Code of setting range of the valves
CC	Displacement Code

TABLE "M"	
C	10 ÷ 105 bar
D	70÷ 210 bar
E	140 ÷ 350 bar

Example: Flow divider with two elements (same displacement)
RV-1S / 3,8 x 2 with valve 10 ÷ 105 bar

9RS	02	C	25

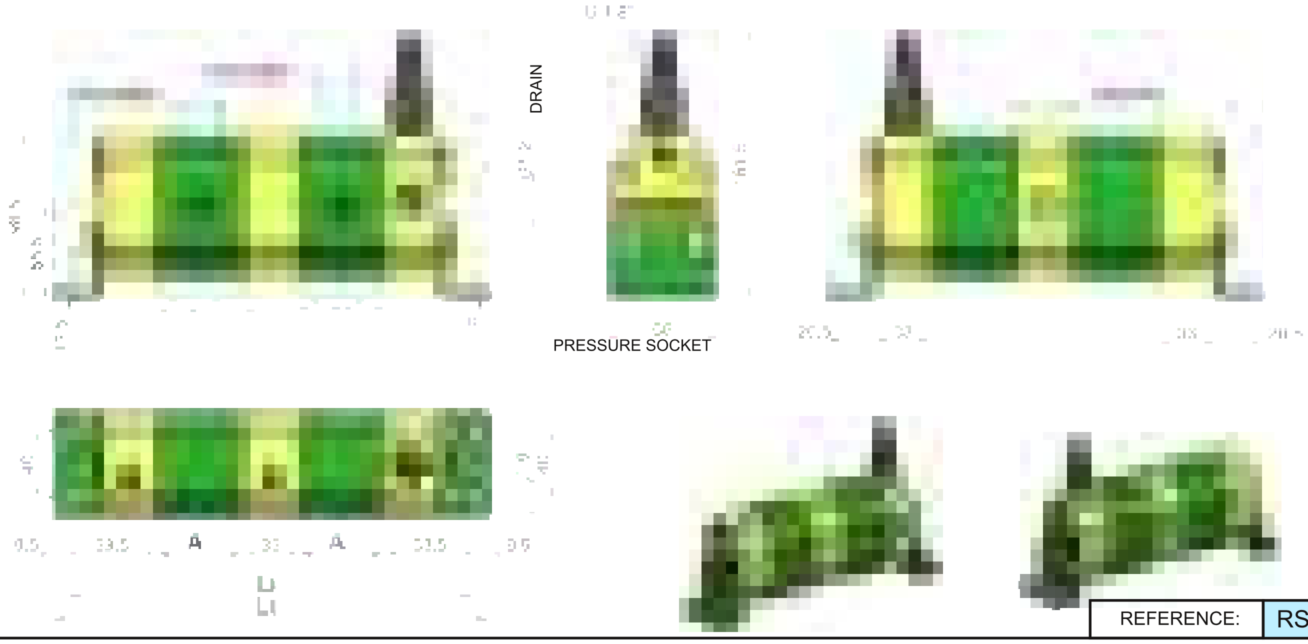
Example: Flow Divider with 4 elements (with different displacement - max 7):
RV-1S / 3,8+4,9+4,9+6,5 with valve 70 ÷ 210 bar

9RS	04	D	25	29	29	32

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem. Cm³/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



REFERENCE: RS101

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm³/rev	A	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Number of elements														
0,9	**41,5**	223	297,5	372	446,5	521	595,5	670	744,5	819	893,5	968	1042,5	1117	1191,5	1266
1,2	**42,5**	225	300,5	376	451,5	527	602,5	678	753,5	829	904,5	980	1055,5	1131	1206,5	1282
1,7	**44**	228	305	382	459	536	613	690	767	844	921	998	1075	1152	1229	1306
2,2	**46**	232	311	390	469	548	627	706	785	864	943	1022	1101	1180	1259	1338
2,6	**48**	236	317	398	479	560	641	722	803	884	965	1046	1127	1208	1289	1370
3,2	**50**	240	323	406	489	572	655	738	821	904	987	1070	1153	1236	1319	1402
3,8	**52**	244	329	414	499	584	669	754	839	924	1009	1094	1179	1264	1349	1434
4,3	**54**	248	335	422	509	596	683	770	857	944	1031	1118	1205	1292	1379	1466
4,9	**57**	254	344	434	524	614	704	794	884	974	1064	1154	1244	1334	1424	1514
5,9	**60,5**	261	354,5	448	541,5	635	728,5	822	915,5	1009	1103	1196	1289,5	1383	1476,5	1570
6,5	**63**	266	362	458	554	650	746	842	938	1034	1130	1226	1322	1418	1514	1610
7,8	**67**	274	374	474	574	674	774	874	974	1074	1174	1274	1374	1474	1574	1674
9,8	**76**	292	401	510	619	728	837	946	1055	1164	1273	1382	1491	1600	1709	1818

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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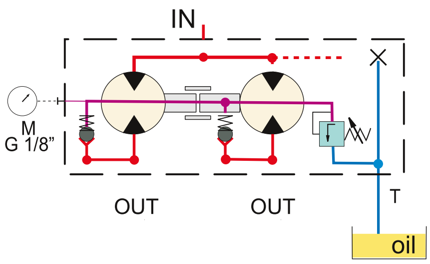
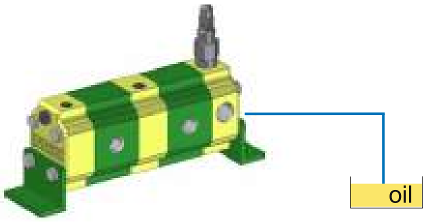
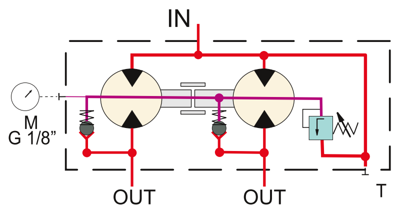
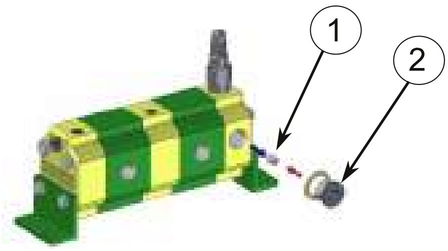
Flow divider with **single phase correction valve** common to all the elements

EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
Connect the drain port (T) to the tank	To predispose the divider to the internal drain, execute following operations: 1. remove the G 1/8 dowel inside the drain port 2. with a 1/2 G plug, plug the drain port (T)









In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

From **table 2** it is possible to obtain the “Li” measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and “Lt” measure have to be calculated by the following formula:

Li = [(n-1) x 33] + 107 + (A1 + A2 + A3 +…….)

107 = 53,5 + 53,5
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 19

19 = 9,5 + 9,5

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-1S 4.3 + 2,2 +0,9**

Distance between fixing hole centres	**Li** = [(3-1) x 33] + 107 + 54 + 46 + 41,5 =314,5 mm
Total Lenght	**Lt** = 314,5 + 19 = 333,5

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 μ

FLOW DIVIDER "RV" Series Swallow Line

RV-1V

Flow divider with independent **phase correction and anticavitation** valves for each element

Code:

9RV	NN	M	CC

9RV	Flow Divider Typology
NN	Number of elements
M	Code of setting range of the valves
CC	Displacement Code

TABLE "M"	
A	7÷ 210 bar
B	105÷ 420 bar

Example: Flow divider with two elements (same displacement)
RV-1V / 3,8 x 2 with valve 7 ÷ 210 bar

9RV	02	A	25

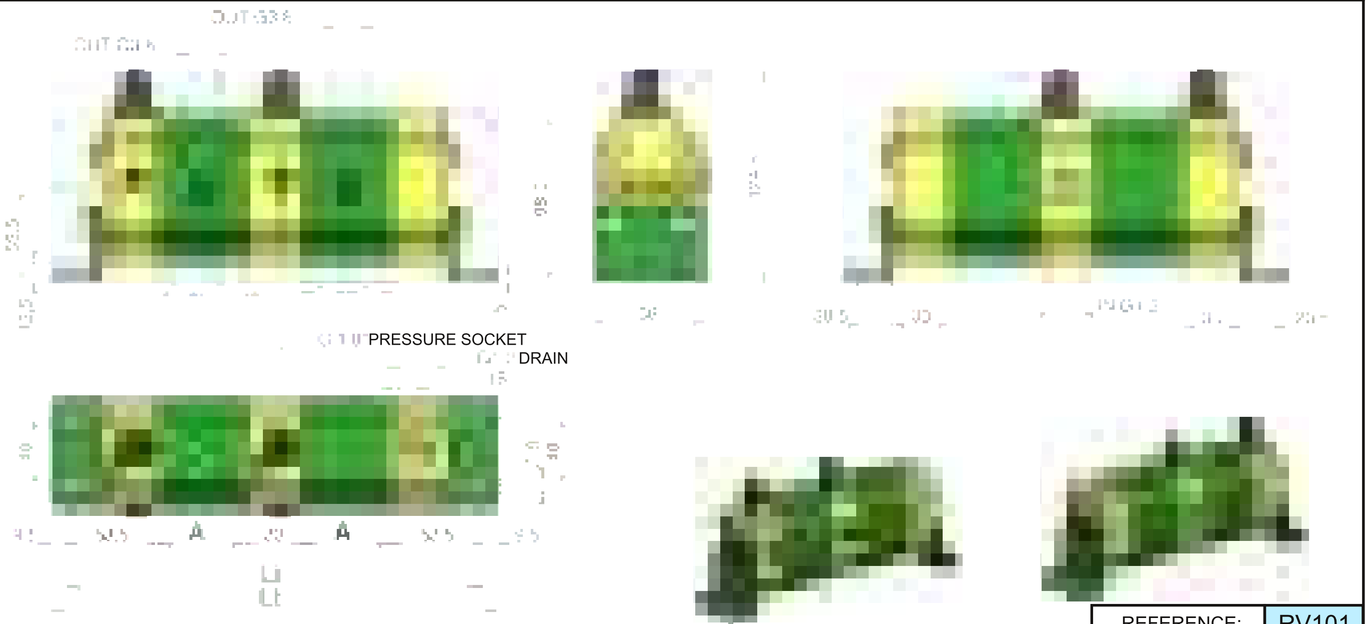
Example: Flow Divider with 4 elements (with different displacement - max 7):
RV-1V /3,8+4,9+4,9+6,5 with valve 105 ÷ 420 bar

9RV	04	B	25	29	29	32

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm^3/rev	Code		MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



REFERENCE: RV101

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm^3/rev	A	Number of elements: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,9	**41,5**	223	297,5	372	446,5	521	595,5	670	744,5	819	893,5	968	1042,5	1117	1191,5	1266
1,2	**42,5**	225	300,5	376	451,5	527	602,5	678	753,5	829	904,5	980	1055,5	1131	1206,5	1282
1,7	**44**	228	305	382	459	536	613	690	767	844	921	998	1075	1152	1229	1306
2,2	**46**	232	311	390	469	548	627	706	785	864	943	1022	1101	1180	1259	1338
2,6	**48**	236	317	398	479	560	641	722	803	884	965	1046	1127	1208	1289	1370
3,2	**50**	240	323	406	489	572	655	738	821	904	987	1070	1153	1236	1319	1402
3,8	**52**	244	329	414	499	584	669	754	839	924	1009	1094	1179	1264	1349	1434
4,3	**54**	248	335	422	509	596	683	770	857	944	1031	1118	1205	1292	1379	1466
4,9	**57**	254	344	434	524	614	704	794	884	974	1064	1154	1244	1334	1424	1514
5,9	**60,5**	261	354,5	448	541,5	635	728,5	822	915,5	1009	1103	1196	1289,5	1383	1476,5	1570
6,5	**63**	266	362	458	554	650	746	842	938	1034	1130	1226	1322	1418	1514	1610
7,8	**67**	274	374	474	574	674	774	874	974	1074	1174	1274	1374	1474	1574	1674
9,8	**76**	292	401	510	619	728	837	946	1055	1164	1273	1382	1491	1600	1709	1818

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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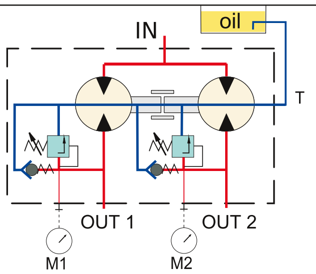
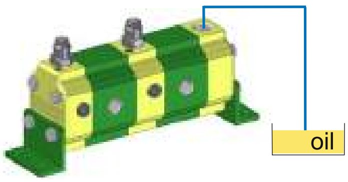
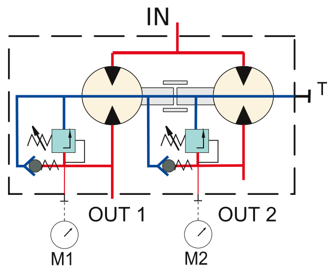
EXTERNAL DRAIN *STANDARD SETUP*	INTERNAL DRAIN
For the correct functioning of the flow divider, it has to be installed *under the oil level*. The drain tube has to pick up under the oil level and it has not to aspire air.	To predispose the divider to the internal drain, plug the 1/2 G drain port (T) **Note**: with this configuration the function of anticavitation valves is annulled
 	 

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Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 33] + 107 + (A1 + A2 + A3 +…….)

107 = 53,5 + 53,5
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 19

19 = 9,5 + 9,5

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-1V 4.3 + 2,2 +0,9**

Distance between fixing hole centres — **Li** = [(3-1) x 33] + 107 + 54 + 46 + 41,5 =314,5 mm

Total Lenght — **Lt** = 314,5 + 19 = 333,5

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

Flow Divider with MOTOR

Code:

9RG	NN	O	CC	CC

9RG	Flow Divider Typology
NN	Number of flow divider elements
O	Number of motor elements
CC	Motor Displacement Code
CC	Flow Divider Displacement Code

Example: Flow divider with two elements (same displacement) and Motor
RV-1G / 3,8 x 2 + 1 Motor 7.8

9RG	02	1	34	25

Example: Flow Divider 4 elements (different displacement - max 6) and Motor:
RV-1G / 3,8+4,9+4,9+6,5 + 1 Motor 9,8

9RG	04	1	36	25	29	29	32

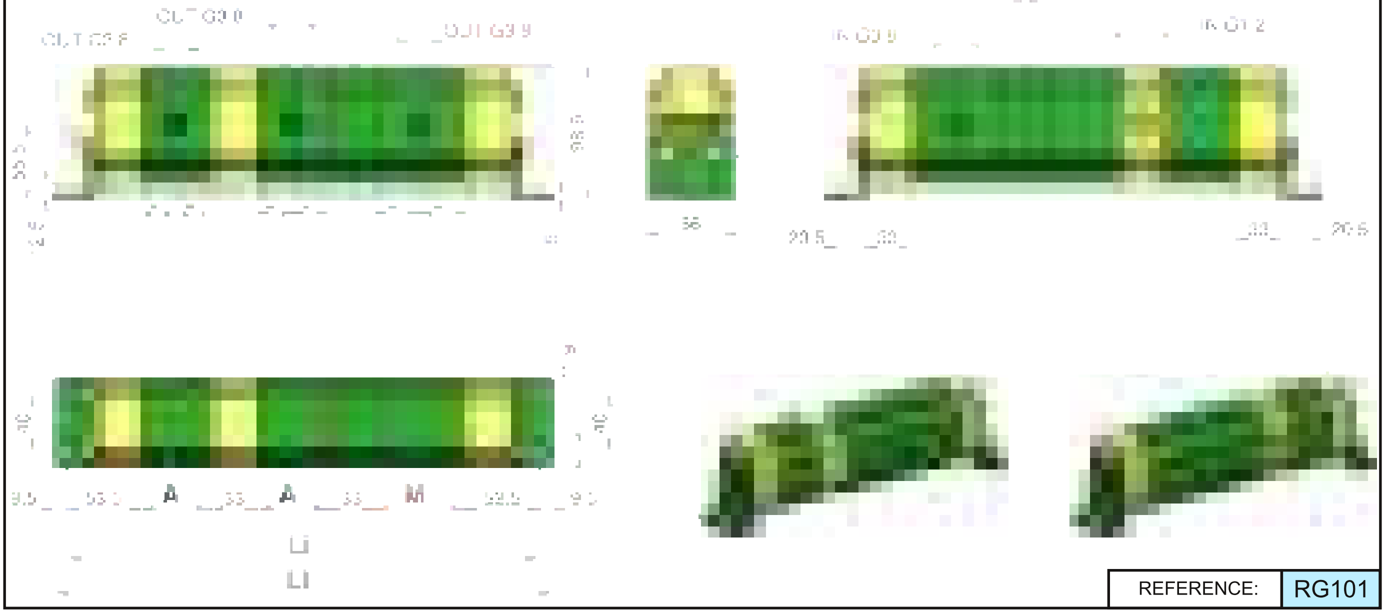
NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem. Cm^3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41

FLOW DIVIDERS ELEMENTS MOTOR ELEMENT

MOTOR ELEMENT FLOW DIVIDERS ELEMENTS



REFERENCE: RG101

Table: 2

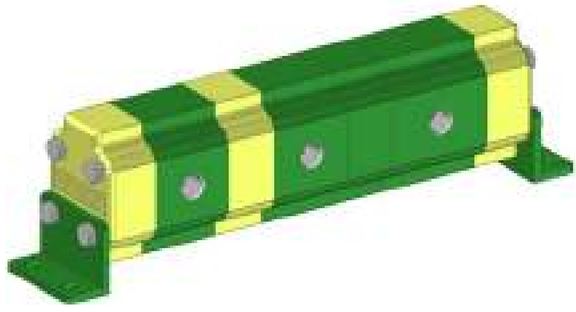
Li = Distance between fixing hole centres (single displacement flow divider)

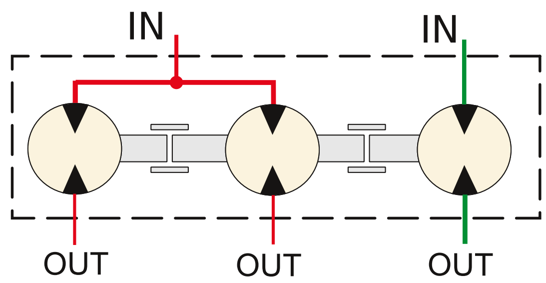
Cm^3/rev	A-M	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Number of elements														
0,9	41,5	223	297,5	372	446,5	521	595,5	670	744,5	819	893,5	968	1042,5	1117	1191,5	1266
1,2	42,5	225	300,5	376	451,5	527	602,5	678	753,5	829	904,5	980	1055,5	1131	1206,5	1282
1,7	44	228	305	382	459	536	613	690	767	844	921	998	1075	1152	1229	1306
2,2	46	232	311	390	469	548	627	706	785	864	943	1022	1101	1180	1259	1338
2,6	48	236	317	398	479	560	641	722	803	884	965	1046	1127	1208	1289	1370
3,2	50	240	323	406	489	572	655	738	821	904	987	1070	1153	1236	1319	1402
3,8	52	244	329	414	499	584	669	754	839	924	1009	1094	1179	1264	1349	1434
4,3	54	248	335	422	509	596	683	770	857	944	1031	1118	1205	1292	1379	1466
4,9	57	254	344	434	524	614	704	794	884	974	1064	1154	1244	1334	1424	1514
5,9	60,5	261	354,5	448	541,5	635	728,5	822	915,5	1009	1103	1196	1289,5	1383	1476,5	1570
6,5	63	266	362	458	554	650	746	842	938	1034	1130	1226	1322	1418	1514	1610
7,8	67	274	374	474	574	674	774	874	974	1074	1174	1274	1374	1474	1574	1674
9,8	76	292	401	510	619	728	837	946	1055	1164	1273	1382	1491	1600	1709	1818

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

INTERNAL DRAIN





In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 33] + 107 + (A1 + A2 + A3 +…….)

107 = 53,5 + 53,5
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 19

19 = 9,5 + 9,5

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-1G / 3,8 x 2+ 1 MOTOR 7,8**

Distance between fixing hole centres **Li** = [(3-1) x 33] + 107 + 52 + 52 + 67 =344 mm

Total Lenght **Lt** = 344 + 19 = 363

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 μ

FLOW DIVIDER "RV" Series Swallow Line

RV-1G

Flow divider + "Group 2" Motor

Code:

9RG	NN	O	CC	CC

9RG	Flow Divider Typology
NN	Number of flow divider elements
O	Number of motor elements
CM	Motor Displacement Code
CC	Flow Divider Displacement Code

Example: Flow divider with two elements (same displacement) and Motor RV-1G / 7,8 x 2 + 1 Motor 17 cc

9RG	02	1	51	34

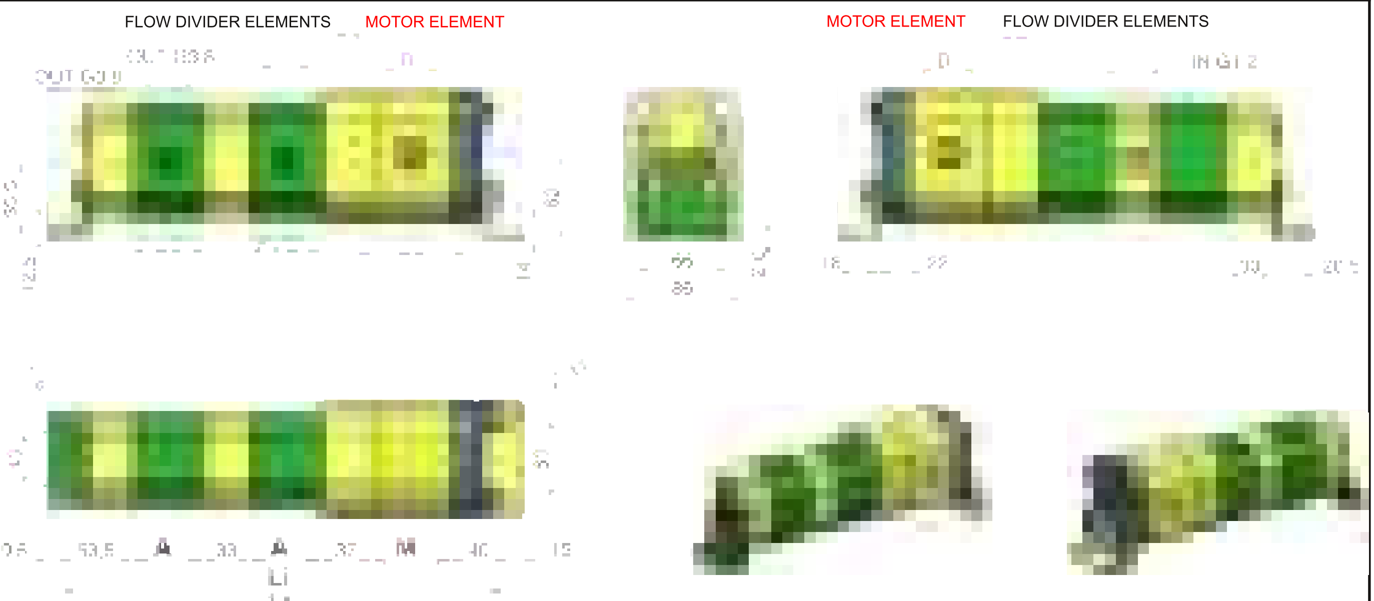
Example: Flow Divider 4 elements (different displacement max 6) and Motor RV-1G / 3,8+4,9+4,9+6,5+1 Motor 22 cc

9RG	04	1	55	25	29	29	32

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem. Cm^3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



REFERENCE: RG102

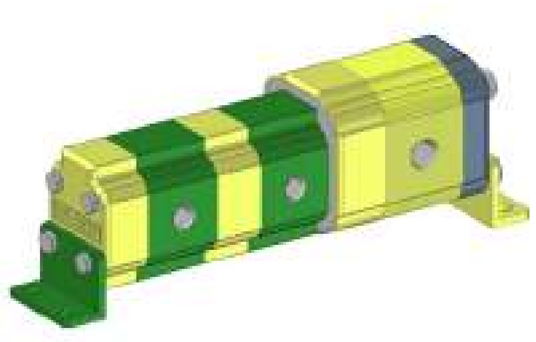
Cm^3/giro	A
0,9	41,5
1,2	42,5
1,7	44
2,2	46
2,6	48
3,2	50
3,8	52
4,3	54
4,9	57
5,9	60,5
6,5	63
7,8	67
9,8	76

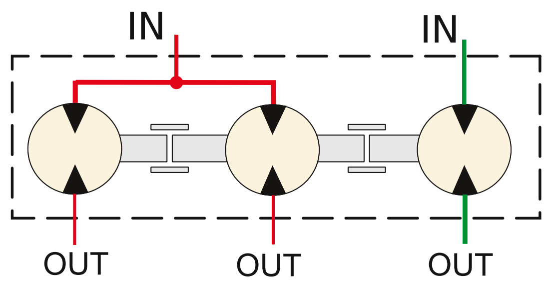
Cm^3/giro	CM	M	D
4	41	47	1/2" BSP
6	43	50	1/2" BSP
9	45	54	1/2" BSP
11	47	58	1/2" BSP
14	49	64	3/4" BSP
17	51	68	3/4" BSP
19	53	72	3/4" BSP
22	55	78	3/4" BSP
26	57	82	1" BSP
30	59	90	1" BSP
34	61	97	1" BSP
40	63	106	1" BSP

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

INTERNAL DRAIN





In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

Li = [(n-1) x 33] + 130,5 +(M1 + M2 + M3 +....) + (A1 + A2 + A3 +….)

130.5 = 53,5 + 37 + 40
n = Numero di elementi del divisore
A1... An = altezze elementi divisore
M1...Mn= altezze elementi motore

Lt = Li + 21,5

21,5 = 9,5 + 12

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-1G / 3,8 x 2+ 1 MOTOR 11**

Distance between fixing hole centres	Li = [(2-1) x 33] + 130,5+ 47 + 52 + 52 =314,5 mm
Total Lenght	Lt = 314,5 + 21,5 = 336

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 μ

FLOW DIVIDER "RV" Series Swallow Line

RV-1H

Flow divider with **single phase correction valve** common to all the elements and MOTOR

Code:

9RN	NN	M	O	CC	CC

9RN	Flow Divider Typology
NN	Number of flow divider elements
M	Code of setting range of the valves
O	Number of motor elements
CC	Motor Displacement Code
CC	Flow Divider Displacement Code

TABLE "M"	
C	10 ÷ 105 bar
D	70÷ 210 bar
E	140 ÷ 350 bar

Example: Flow divider with two elements (same displacement) and Motor
RV-1H / 3,8 x 2 with valve 10 ÷ 105 bar + 1 motor 7,8

9RH	02	C	1	34	25

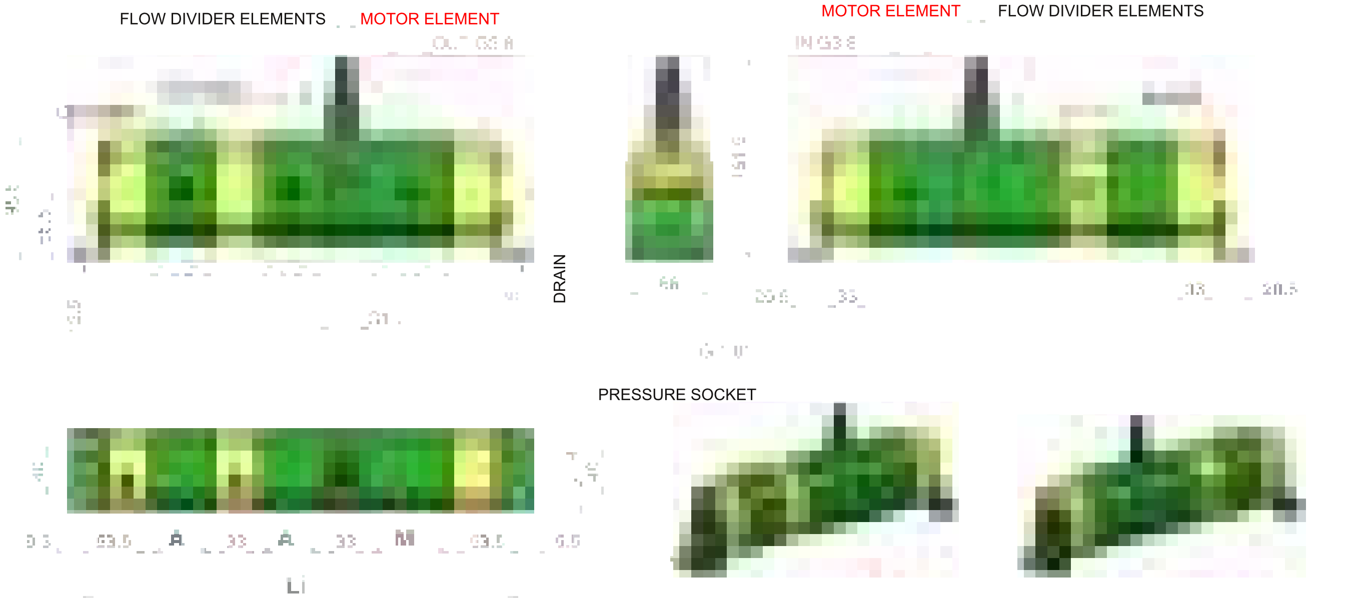
Example: Flow Divider 3 elements (different displacement - max 6) and Motor:
RV-1H / 3,8+4,9+4,9 with valve 70 ÷ 210 bar + 1 Motor 6.5

9RH	03	D	1	32	25	29	29

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem. Cm3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



REFERENCE: RH101

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

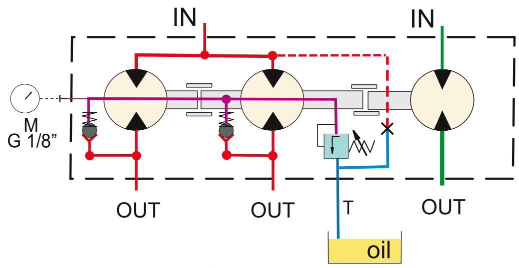
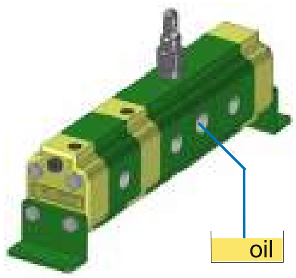
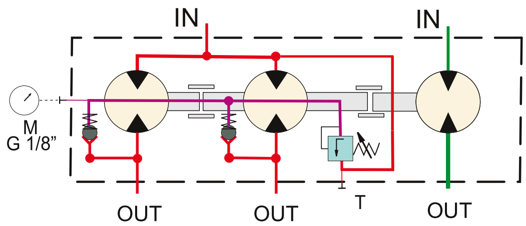
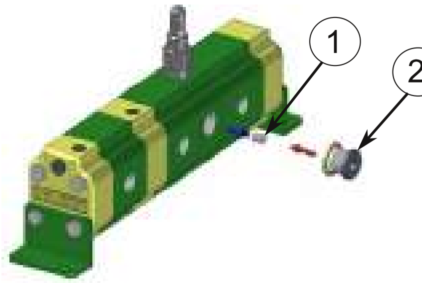
Cm3/rev	A-M	Number of elements: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,9	41,5	223	297,5	372	446,5	521	595,5	670	744,5	819	893,5	968	1042,5	1117	1191,5	1266
1,2	42,5	225	300,5	376	451,5	527	602,5	678	753,5	829	904,5	980	1055,5	1131	1206,5	1282
1,7	44	228	305	382	459	536	613	690	767	844	921	998	1075	1152	1229	1306
2,2	46	232	311	390	469	548	627	706	785	864	943	1022	1101	1180	1259	1338
2,6	48	236	317	398	479	560	641	722	803	884	965	1046	1127	1208	1289	1370
3,2	50	240	323	406	489	572	655	738	821	904	987	1070	1153	1236	1319	1402
3,8	52	244	329	414	499	584	669	754	839	924	1009	1094	1179	1264	1349	1434
4,3	54	248	335	422	509	596	683	770	857	944	1031	1118	1205	1292	1379	1466
4,9	57	254	344	434	524	614	704	794	884	974	1064	1154	1244	1334	1424	1514
5,9	60,5	261	354,5	448	541,5	635	728,5	822	915,5	1009	1103	1196	1289,5	1383	1476,5	1570
6,5	63	266	362	458	554	650	746	842	938	1034	1130	1226	1322	1418	1514	1610
7,8	67	274	374	474	574	674	774	874	974	1074	1174	1274	1374	1474	1574	1674
9,8	76	292	401	510	619	728	837	946	1055	1164	1273	1382	1491	1600	1709	1818

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

Vivoil Oleodinamica Vivolo s.r.l. - Società a Socio Unico - via Leone Gingburg 2-4 40054 Budrio (BO) Italy tel: +39 051 803689 fax: +39 051 800061

Flow divider with **single phase correction valve** common to all the elements and MOTOR

EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
Connect the drain port (T) to the tank	To predispose the divider to the internal drain, execute following operations: 1. remove the G 1/8 dowel inside the drain port 2. with a 1/2 G plug, plug the drain port (T)
	

In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 33] + 107 + (A1 + A2 + A3 +…….)

107 = 53,5 + 53,5
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 19

19 = 9,5 + 9,5

EXAMPLE: To obtain the measures Li and Lt of a flow divider with three elements (n=3), **RV-1H / 3,8 x 2+ 1 Motor 7,8 cc**

Distance between fixing hole centres	Li = [(3-1) x 33] + 107 + 52 + 52 + 67 =344 mm
Total Lenght	Lt = 344 + 19 = 363

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-1H

Flow divider with **single phase correction valve** common to all the elements and "Group 2" MOTOR

Code:

9RN	NN	M	O	CC	CC

9RN	Flow Divider Typology
NN	Number of Flow Divider Elements
M	Code of setting range of the valves
O	Number of motor elements
CM	Motor displacement code
CC	Flow Divider displacement code

TABLE "M"	
C	10 ÷ 105 bar
D	70÷ 210 bar
E	140 ÷ 350 bar

Example: Flow divider with two elements (same displacement) and Motor RV-1H / 7,8 x 2 with valve 10 ÷ 105 bar + 1 Motor 17

9RH	02	C	1	51	34

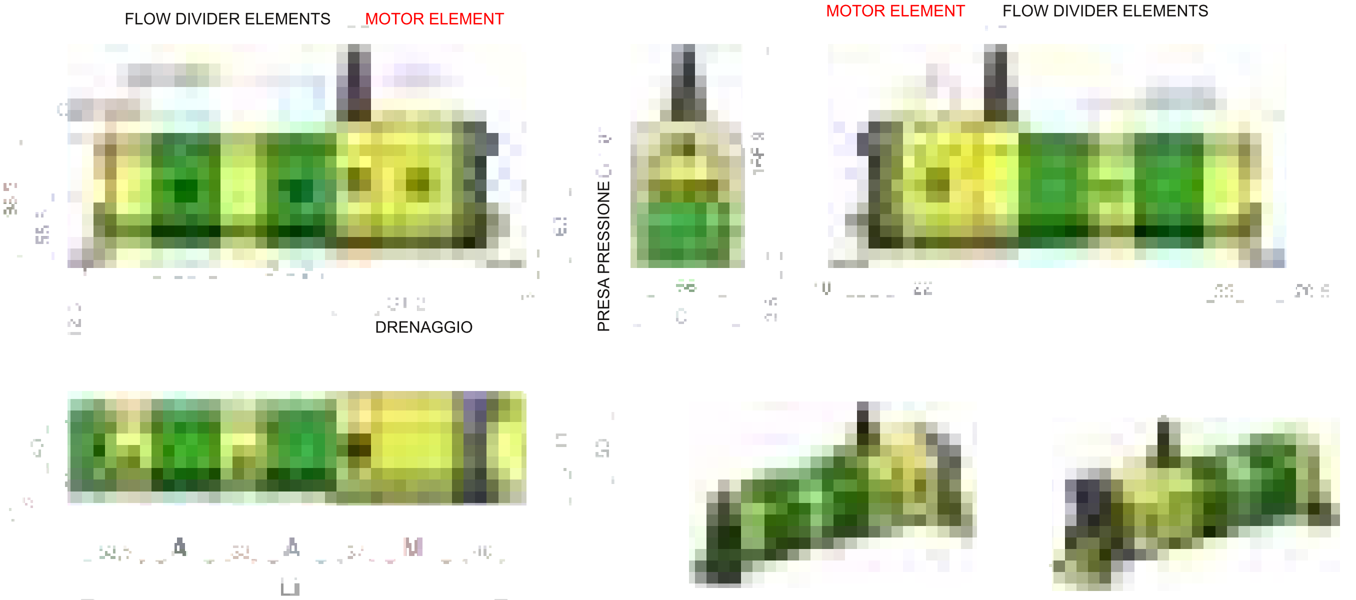
Example: Flow Divider 3 elements (different displacement - max 6) and Motor: RV-1H / 3,8+4,9+4,9 with valve 70 ÷ 210 bar + 1 motor 14

9RH	03	D	1	49	25	29	29

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem. Cm³/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



REFERENCE: RH102

Cm³/rev	A
0,9	41,5
1,2	42,5
1,7	44
2,2	46
2,6	48
3,2	50
3,8	52
4,3	54
4,9	57
5,9	60,5
6,5	63
7,8	67
9,8	76

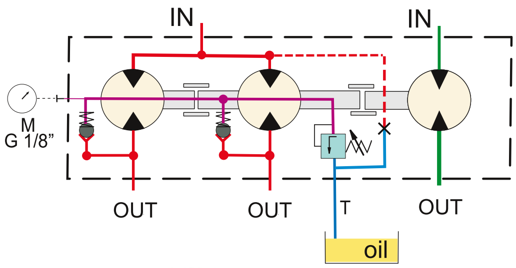
Cm³/rev	CM	M	D
4	41	47	1/2" BSP
6	43	50	1/2" BSP
9	45	54	1/2" BSP
11	47	58	1/2" BSP
14	49	64	3/4" BSP
17	51	68	3/4" BSP
19	53	72	3/4" BSP
22	55	78	3/4" BSP
26	57	82	1" BSP
30	59	90	1" BSP
34	61	97	1" BSP
40	63	106	1" BSP

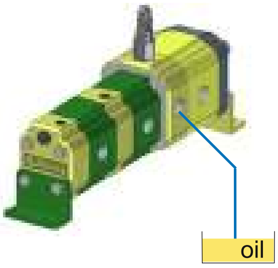
Table: 3 in this table the number of inlets in function of the number of elements are indicated.

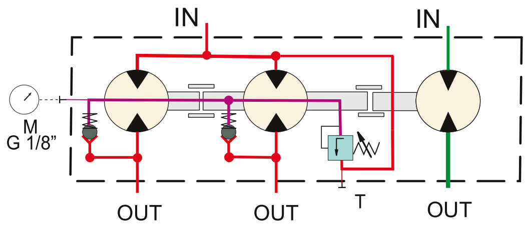
Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

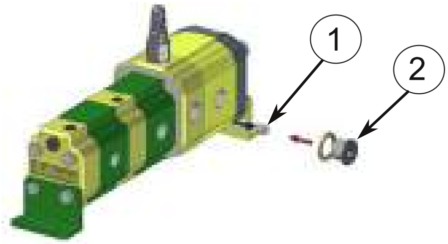
Flow divider with **single phase correction valve** common to all the elements and "Group 2" MOTOR

EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
Connect the drain port (T) to the tank	To predispose the divider to the internal drain, execute following operations: 1. remove the G 1/8 dowel inside the drain port 2. with a 1/2 G plug, plug the drain port (T)









In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

Li = [(n-1) x 33] + 130,5 +(M1 + M2 + M3 +....) + (A1 + A2 + A3 +….)

130.5 = 53,5 + 37 + 40
n = Number of elements of flow divider
A1... An = heights of elements of flow divider
M1...Mn= heights of motor elements

Lt = Li + 21,5

21,5 = 9,5 + 12

EXAMPLE: To obtain the measures Li and Lt of a flow divider with three elements (n=2) **RV-1H / 3,8 x 2 + 1 Motor 11**

Distance between fixing hole centres	Li = [(2-1) x 33] + 130,5+ 47 + 52 + 52 =314,5 mm
Total Lenght	Lt = 314,5 + 21,5 = 336

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

Flow divider with independent **phase correction and anticavitation** valves for each element with MOTOR

Code:

9RN	NN	M	O	CC	CC

9RN	Flow Divider Typology
NN	Number of flow divider elements
M	Code of setting range of the valves
O	Number of motor elements
CC	Motor Displacement Code
CC	Flow Divider Displacement Code

	TABLE "M"
A	7 ÷ 210 bar
B	105÷ 420 bar

Example: Flow divider with two elements (same displacement) with motor RV-1N/ 3,8 x 2 with valve 7 ÷ 210 bar + 1 Motor 7,8

9RN	02	A	1	34	25

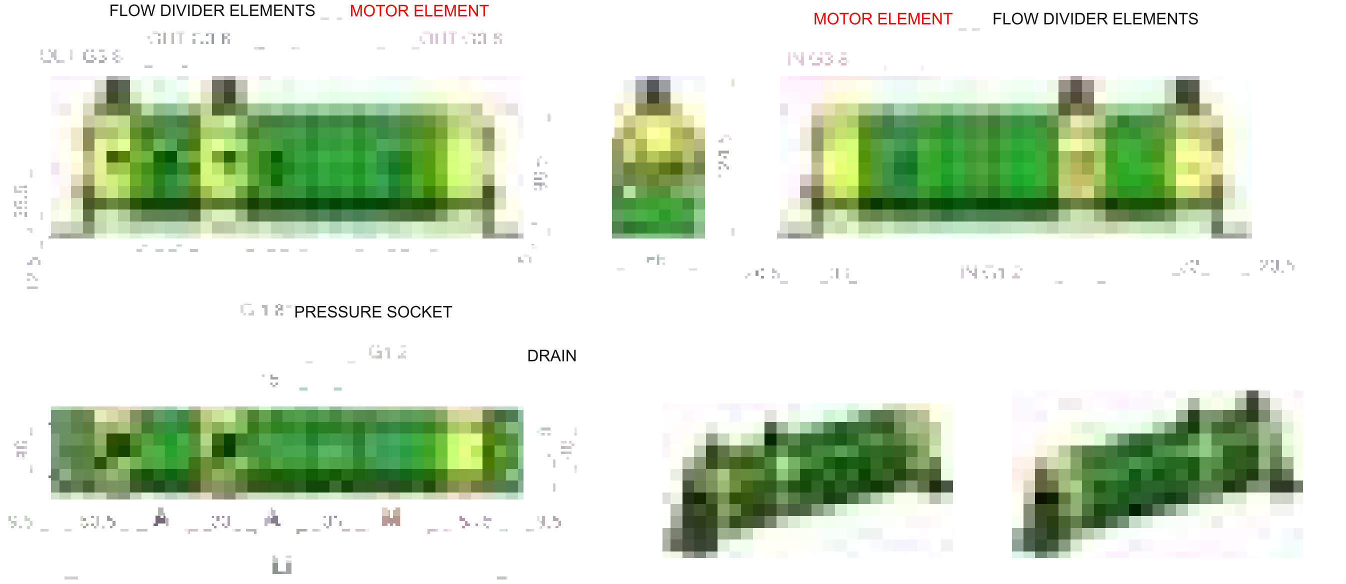
Example: Flow Divider 3 elements (different displacement - max 6) and Motor: RV-1N / 3,8+4,9+4,9 with valve 105 ÷ 420 bar + 1 Motor 6.5

9RN	03	B	1	32	25	29	29

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem. Cm^3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



REFERENCE: RN101

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm^3/rev	A-M	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		Number of elements														
0,9	41,5	223	297,5	372	446,5	521	595,5	670	744,5	819	893,5	968	1042,5	1117	1191,5	1266
1,2	42,5	225	300,5	376	451,5	527	602,5	678	753,5	829	904,5	980	1055,5	1131	1206,5	1282
1,7	44	228	305	382	459	536	613	690	767	844	921	998	1075	1152	1229	1306
2,2	46	232	311	390	469	548	627	706	785	864	943	1022	1101	1180	1259	1338
2,6	48	236	317	398	479	560	641	722	803	884	965	1046	1127	1208	1289	1370
3,2	50	240	323	406	489	572	655	738	821	904	987	1070	1153	1236	1319	1402
3,8	52	244	329	414	499	584	669	754	839	924	1009	1094	1179	1264	1349	1434
4,3	54	248	335	422	509	596	683	770	857	944	1031	1118	1205	1292	1379	1466
4,9	57	254	344	434	524	614	704	794	884	974	1064	1154	1244	1334	1424	1514
5,9	60,5	261	354,5	448	541,5	635	728,5	822	915,5	1009	1103	1196	1289,5	1383	1476,5	1570
6,5	63	266	362	458	554	650	746	842	938	1034	1130	1226	1322	1418	1514	1610
7,8	67	274	374	474	574	674	774	874	974	1074	1174	1274	1374	1474	1574	1674
9,8	76	292	401	510	619	728	837	946	1055	1164	1273	1382	1491	1600	1709	1818

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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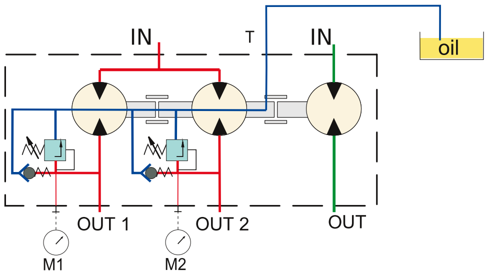
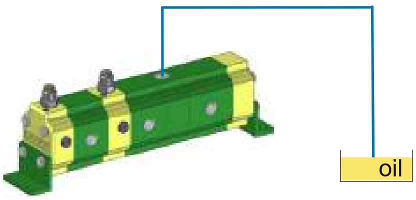
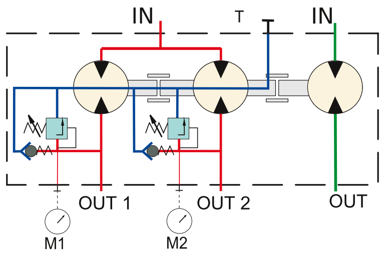
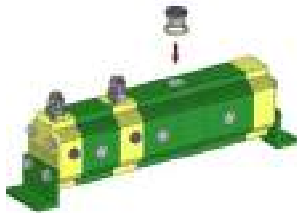
Flow divider with independent **phase correction and anticavitation** valves for each element with MOTOR

EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
For the correct functioning of the flow divider, it has to be installed *under the oil level*. The drain tube has to pick up under the oil level and it has not to aspire air.	To predispose the divider to the internal drain, plug the 1/2 G drain port (T) **Note**: with this configuration the function of anticavitation valves is annulled









In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

From **table 2** it is possible to obtain the “Li” measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and “Lt” measure have to be calculated by the following formula:

Li = [(n-1) x 33] + 107 + (A1 + A2 + A3 +…….)

107 = 53,5 + 53,5
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 19

19 = 9,5 + 9,5

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-1N / 3,8 x 2+ 1 MOTOR 7,8**

Distance between fixing hole centres	Li = [(3-1) x 33] + 107 + 52 + 52 + 67 =344 mm
Total Lenght	Lt = 344 + 19 = 363

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-1N

Flow divider with independent **phase correction and anticavitation** valves for each element with "Group 2" MOTOR

Code:

9RN	NN	M	O	CC	CC

9RN	Flow Divider Typology
NN	Number of flow divider elements
M	Code of setting range of the valves
O	Number of motor elements
CM	Motor Displacement Code
CC	Flow Divider Displacement Code

	TABLE "M"
A	7 ÷ 210 bar
B	105÷ 420 bar

Example: Flow divider 2 elements (same displacement) and motor:
RV-1N/ 7,8 x 2 with valve 7 ÷ 210 bar + 1 motor 17 cc

9RN	02	A	1	51	34

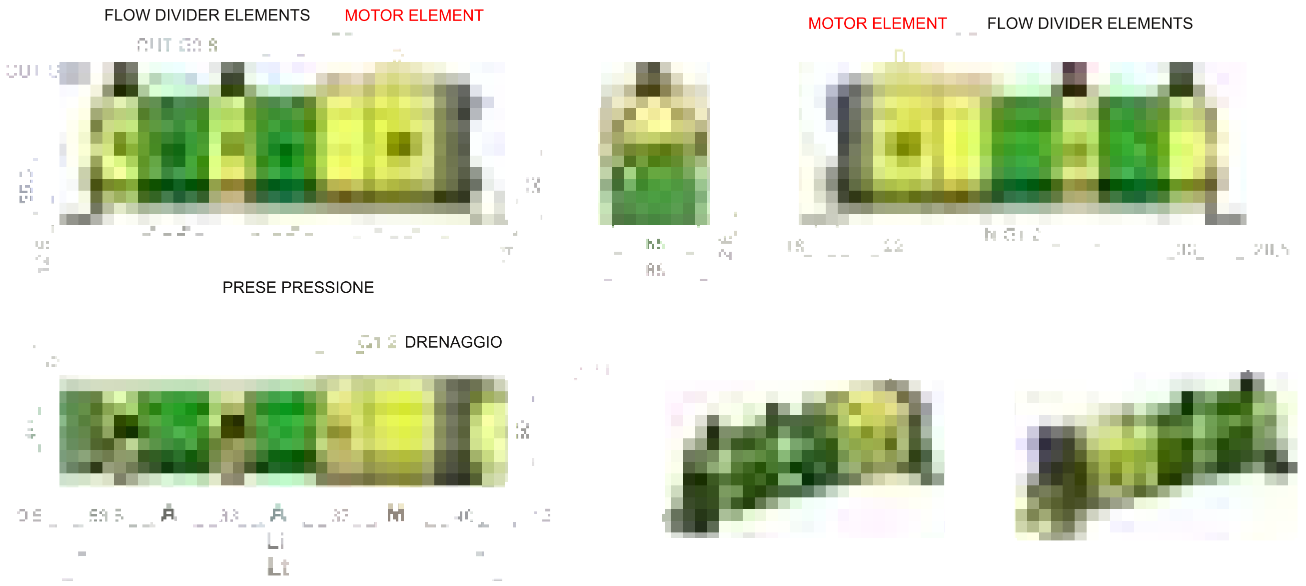
Example: Flow divider 4 elements (different displacement - max 6) and motor:
RV-1N / 3,8+4,9+4,9 with valve 105 ÷ 420 bar + 1 motor 14 cc

9RN	03	B	1	49	25	29	29

NOTE: to define codes for flow dividers with more than 6 different displacement, please contact our sales department.

Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm³/rev	Code		MIN	RECOMMENDED	MAX
0,9	16	220	1	2	6
1,2	17	220	1,5	3	7
1,7	18	220	2	4	9
2,2	20	220	2,5	5	13
2,6	21	220	3	6	15,5
3,2	23	220	3,5	7,5	18
3,8	25	220	4	8,5	21
4,3	27	220	4,5	9,5	23
4,9	29	220	5,5	11	27
5,9	31	220	6,5	13	30
6,5	32	220	7,5	14	32
7,8	34	210	8,5	16	35,5
9,8	36	200	11	20	41



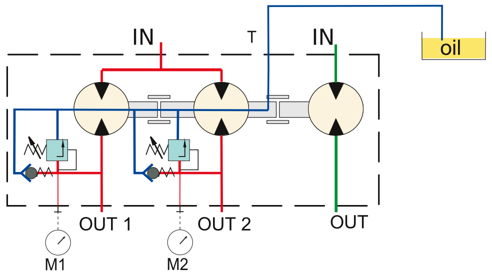
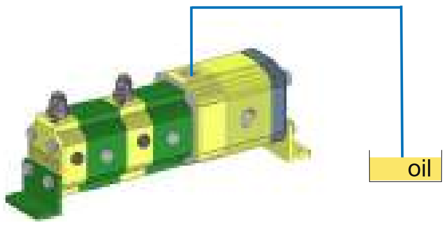
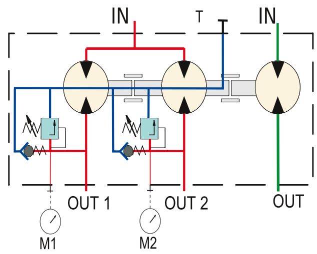
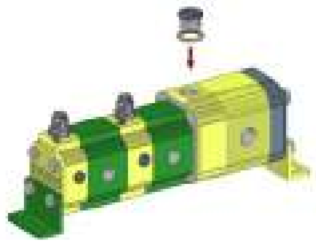
REFERENCE: RN102

Cm³/rev	A
0,9	41,5
1,2	42,5
1,7	44
2,2	46
2,6	48
3,2	50
3,8	52
4,3	54
4,9	57
5,9	60,5
6,5	63
7,8	67
9,8	76

Cm³/rev	CM	M	D
4	41	47	1/2" BSP
6	43	50	1/2" BSP
9	45	54	1/2" BSP
11	47	58	1/2" BSP
14	49	64	3/4" BSP
17	51	68	3/4" BSP
19	53	72	3/4" BSP
22	55	78	3/4" BSP
26	57	82	1" BSP
30	59	90	1" BSP
34	61	97	1" BSP
40	63	106	1" BSP

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
For the correct functioning of the flow divider, it has to be installed *under the oil level*. The drain tube has to pick up under the oil level and it has not to aspire air.	To predispose the divider to the internal drain, plug the 1/2 G drain port (T) **Note**: with this configuration the function of anticavitation valves is annulled
 	 

In **table 1** the functining range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of the flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column **"RECOMMENDED"**.
Remember to verify the capacities even in phase of flow reunion.
The pressure indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20 % superior.

How to calculate the "Li" and “Lt” measures of flow dividers:

Li = [(n-1) x 33] + 130,5 +(M1 + M2 + M3 +....) + (A1 + A2 + A3 +….)

130.5 = 53,5 + 37 + 40
n = Number of elements of flow divider
A1... An = heights of elements of flow divider
M1...Mn= heights of elements of motor

Lt = Li + 21,5

21,5 = 9,5 + 12

EXAMPLE: To obtain the measures Li and Lt of a flow divider with three elements (n=2), **RV-1N / 3,8 x 2+ 1 Motor 11 cc**

Distance between fixing hole centres	Li = [(2-1) x 33] + 130,5+ 47 + 52 + 52 =314,5 mm
Total Lenght	Lt = 314,5 + 21,5 = 336

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to make full us at least of **1** inlet every **40** l/min capacity.

To obtain errors of division **inferior to 3%** there must be no difference of pressure between the elements superior to **30 bar**. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

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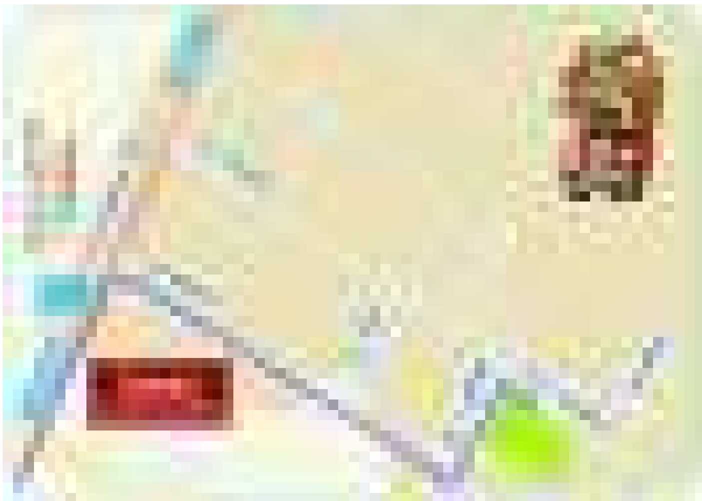
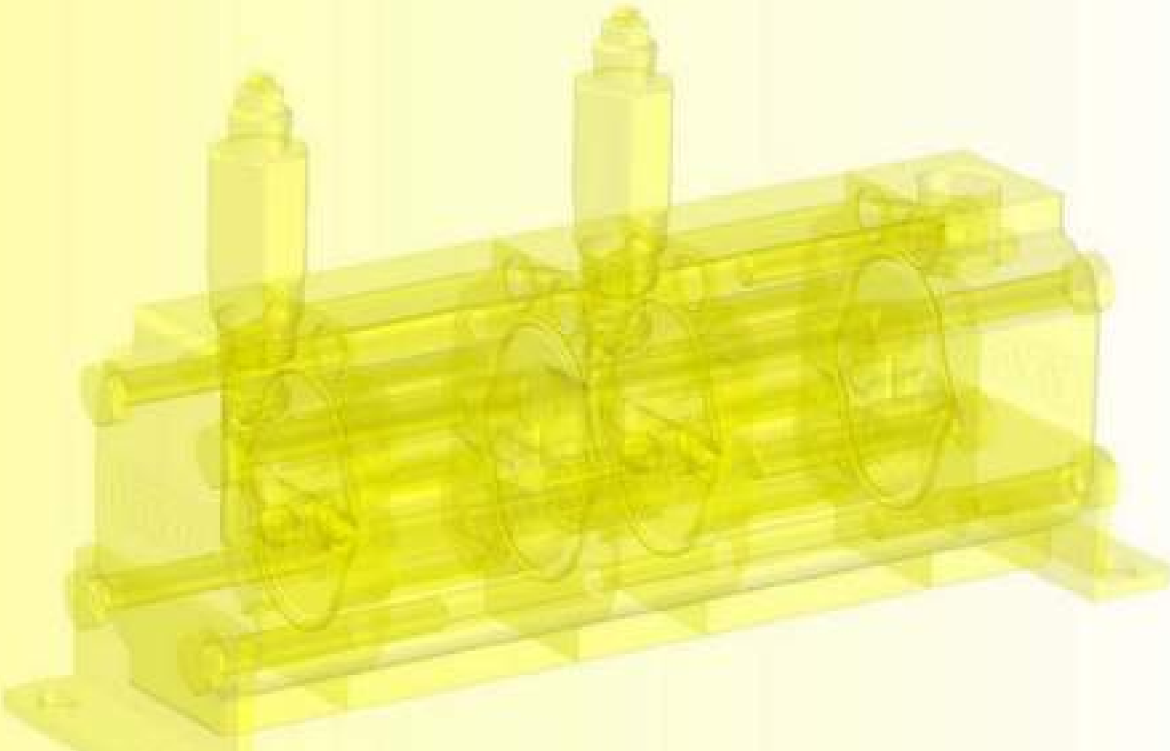


VIVOIL OLEODINAMICA VIVOLO

FLOW DIVIDERS
"RV-2 serie"

ENGLISH

VERS:26-03-2010



RV-D FLOW DIVIDER

This is the flow divider standard version, it simply divide the incoming flow without allowing the phase correction

RV-V FLOW DIVIDER with phase correction and anticavitation valves

In this version the flow divider has one phase correction and anticavitation valve for each element, this allow a flow correction in both direction (flow division and flow unification). In addition it can adjust the relief pressure to a different value for each element.

RV-G FLOW DIVIDER + MOTOR

The RV-G typology is the motorized version of the RV-D divider.
It has a motor conneted to the flow divider elements. This solution is important when the incoming and/or outgoing pressure is below the minimum pressure required to start. Giving flow to the motor, help the flow divider rotation start. Typical use: plants with single effects hydraulic jack.

RV-N FLOW DIVIDER with phase correction and anticavitation valves + MOTOR

This is the motorized version of the RV-V divider.
The motor has the same funcion that is described for the RV-G divider.

The flow division error is lower than ± 1.5% with a pressure difference between one element and another until 30 Bars. For bigger differences we can approximate an error increase of 1 % for each 10 additional bars.

A flow divider is made up of two or more modular elements (sections) with gears mechanically linked by an internal shaft that causes them to turn at the same speed.
Unlike multiple pumps, in which the input power is mechanical (shaft connected to a motor), in a flow divider the input power is of a fluid-mechanical nature, i.e. a flow of oil under pressure parallelly supplies the modular elements, which are in turn connected to the hydraulic circuits serving the users.
The portion of flow utilized by each element is solely determined by its nominal flow rate. Therefore, unlike standard static dividers with variable ports, the flow dividers do not cause dissipation and are also much more precise.
The use of flow dividers in a system reduces the number of pumps necessary as well as the associated individual mechanical power takeoffs and complex mechanical couplers (with greater losses).
Leaving aside small losses for the time being, at any given moment the total input power is equal to the sum of the powers supplied by all elements making up the flow divider.
Therefore, if in an interval of time the power required by a hydraulic circuit is equal to zero (inactive drained circuit), the power supplied by the element feeding that circuit becomes available for the other elements, which may use it in their own circuits, also operating at higher pressures than the intake pressure.

Most frequent applications of flow dividers

Supply of two or more independent hydraulic circuits by means of a single pump, with an overall flow rate equal to the sum of the flow rates.

Examples of this kind of application:
- lifting platforms and bridges;
- hydraulic bending presses and shearing machines;
- hoisting of freight containers;
- lubrication systems;
- hydraulic opening / closing of gates;
- automatic hydraulically-driven machines;
- actuation of formwork for construction;
- wood processing machinery;
- conveyance of trolleys driven by hydraulic cylinders or motors;
- equipment for the food industry;
- military installations.

Pressure amplifiers.
When in a hydraulic system one user requires a much higher operating or peak pressure than all the others, it is more convenient to supply it by means of a flow divider than to upgrade the whole system to work with higher pressure.
With a two-element flow divider flow may be discharged from the outlet of one element so that the pressure in the other will become much higher than that of the pump supplying the system.

Examples of this kind of application:
- presses with rapid approach
- machine tools

Constructive features

FLOW DIVIDER BODY FLANGE AND COVER	Extruded alloy Serie 7000, heat treated and anodised	Rp=345 N/mm^2 (Yield Strength) Rm=382 N/mm^2 (Breaking Strength)
GEAR BUSH BEARINGS	Special Heat Treated tin alloy with excellent mechanical features and high anti-friction capacity. Self-lubricating bushes DU	Rp=350 N/mm^2 (Yield Strength) Rm=390 N/mm^2 (Breaking Strength)
GEARS	Steel UNI 7846	Rs=980 N/mm^2 (Yield Strength) Rm=1270÷1570 N/mm^2 (Breaking Strength)
GASKET	A 727 Acrolonitrile Standard F 975 Viton FKM	90 Shore, thermal resistance 120°C 80 Shore, thermal resistance 200°C

FLOW DIVIDER "RV" Series Swallow Line

RV-2D

Flow divider (Standard Version)

Code:

9RD	NN	CC

9RD	Flow Divider Typology
NN	Number of elements
CC	Displacement Code

Example: Flow divider with two elements (same displacement):
RV-2D / 11 x 2

9RD	02	47

Example: Flow Divider with 4 elements with different displacement (max 7):
RV-2D / 9+14+14+22

9RD	04	45	49	49	55

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm^3/rev	Code		MIN	RECOMMENDED	MAX
4	41	210	4,8	7,6	10
6	43	210	7,2	10,8	15
9	45	210	10,8	15,1	22,5
11	47	210	13,2	19,4	27,5
14	49	200	16,8	25,9	35
17	51	200	20,4	30,2	42,5
19	53	190	22,8	34,6	47,5
22	55	180	26,4	41	55
26	57	160	31,2	45,4	65
30	59	160	36	54	75
34	61	140	40,8	61,6	85
40	63	130	48	71,3	100

REFERENCES: RD201

Table: 2

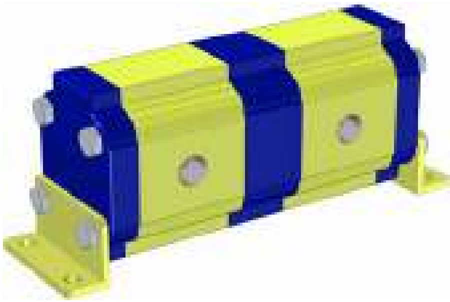
Li = Distance between fixing hole centres (single displacement flow divider)

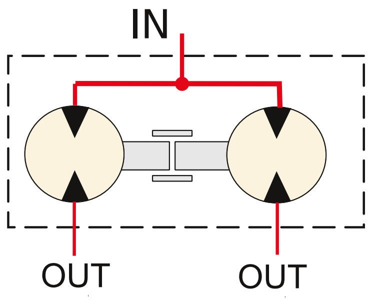
Cm^3/rev	A	IN	OUT	Number of elements: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4	47	3/4 BSP	1/2 BSP	218	309	400	491	582	673	764	855	946	1037	1128	1219	1310	1401	1492
6	50	3/4 BSP	1/2 BSP	224	318	412	506	600	694	788	882	976	1070	1164	1258	1352	1446	1540
9	54	3/4 BSP	1/2 BSP	232	330	428	526	624	722	820	918	1016	1114	1212	1310	1408	1506	1604
11	58	3/4 BSP	1/2 BSP	240	342	444	546	648	750	852	954	1056	1158	1260	1362	1464	1566	1668
14	64	3/4 BSP	1/2 BSP	252	360	468	576	684	792	900	1008	1116	1224	1332	1440	1548	1656	1764
17	68	3/4 BSP	1/2 BSP	260	372	484	596	708	820	932	1044	1156	1268	1380	1492	1604	1716	1828
19	72	3/4 BSP	1/2 BSP	268	384	500	616	732	848	964	1080	1196	1312	1428	1544	1660	1776	1892
22	78	3/4 BSP	1/2 BSP	280	402	524	646	768	890	1012	1134	1256	1378	1500	1622	1744	1866	1988
26	82	1 BSP	3/4 BSP	288	414	540	666	792	918	1044	1170	1296	1422	1548	1674	1800	1926	2052
30	90	1 BSP	3/4 BSP	304	438	572	706	840	974	1108	1242	1376	1510	1644	1778	1912	2046	2180
34	97	1 BSP	3/4 BSP	318	459	600	741	882	1023	1164	1305	1446	1587	1728	1869	2010	2151	2292
40	106	1 BSP	3/4 BSP	336	486	636	786	936	1086	1236	1386	1536	1686	1836	1986	2136	2286	2436

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

INTERNAL DRAIN





In **table 1** the functioning range of single flow divider elements is indicated.

The higher is the feeding capacity (q), the higher is the precision of flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column "**RECOMMENDED**".

It's important remember to verify the capacities even in phase of flow reunion.

The pressures indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20% superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 44] + 80 + (A1 + A2 + A3 +…….)

80 = 40 + 40

n = Number of elements of flow divider

A1... An = heights of elements of flow divider

Lt = Li + 24

24 = 12 + 12

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-2D 19 + 11 +9**

Distance between fixing hole centres **Li** = [(3-1) x 44] + 80 + 72 + 58 + 54 =352 mm

Total Lenght **Lt** = 352 + 24 = 376 mm

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to use at least one **3/4" BSP** inlet every **80 l/min** capacity and at least one **1" BSP** inlet every **120 l/min** capacity

To obtain errors of division inferior to 3% there must be no difference of pressure between the elements superior to 30 bar. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

FLOW DIVIDER "RV" Series Swallow Line

RV-2V

Flow divider with independent **phase correction and anticavitation** valves for each element

Codice:

9RV	NN	M	CC

9RV	Flow Divider Typology
NN	Number of elements
M	Code of setting range of the valves
CC	Displacement Code

TABELLA "M"	
A	10÷ 105 bar
B	70÷ 210 bar
C	140÷ 350 bar

Example: Flow divider with two elements (same displacement): :
RV-2V / 11 x 2 with valve 10 ÷ 105 bar

9RV	02	A	47

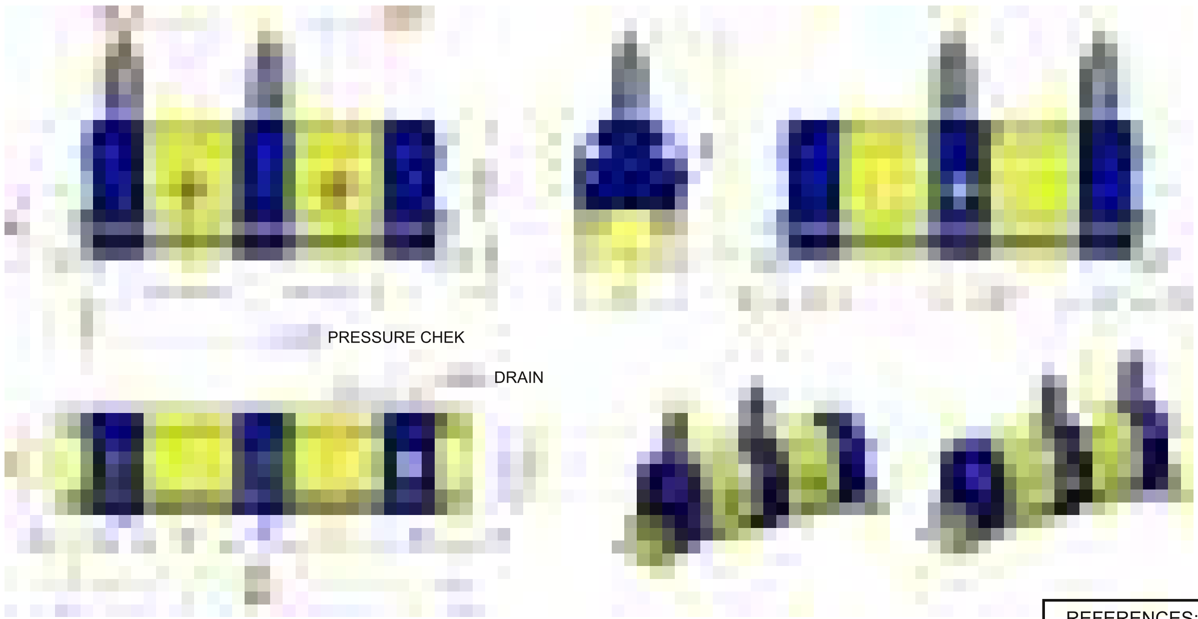
Example: Flow Divider with 4 elements with different displacement (max 7):
RV-2V / 9+14+14+22 with valve 70 ÷ 210 bar

9RV	04	B	45	49	49	55

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem.	CC	Max Pressure bar	One element flow rate l/min		
Cm³/rev	Code		MIN	RECOMMENDED	MAX
4	41	210	4,8	7,6	10
6	43	210	7,2	10,8	15
9	45	210	10,8	15,1	22,5
11	47	210	13,2	19,4	27,5
14	49	200	16,8	25,9	35
17	51	200	20,4	30,2	42,5
19	53	190	22,8	34,6	47,5
22	55	180	26,4	41	55
26	57	160	31,2	45,4	65
30	59	160	36	54	75
34	61	140	40,8	61,6	85
40	63	130	48	71,3	100



REFERENCES: RV201

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

Cm³/rev	A	IN	OUT	Number of elements: 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4	47	3/4 BSP	1/2 BSP	262	353	444	535	626	717	808	899	990	1081	1172	1263	1354	1445	1536
6	50	3/4 BSP	1/2 BSP	268	362	456	550	644	738	832	926	1020	1114	1208	1302	1396	1490	1584
9	54	3/4 BSP	1/2 BSP	276	374	472	570	668	766	864	962	1060	1158	1256	1354	1452	1550	1648
11	58	3/4 BSP	1/2 BSP	284	386	488	590	692	794	896	998	1100	1202	1304	1406	1508	1610	1712
14	64	3/4 BSP	1/2 BSP	296	404	512	620	728	836	944	1052	1160	1268	1376	1484	1592	1700	1808
17	68	3/4 BSP	1/2 BSP	304	416	528	640	752	864	976	1088	1200	1312	1424	1536	1648	1760	1872
19	72	3/4 BSP	1/2 BSP	312	428	544	660	776	892	1008	1124	1240	1356	1472	1588	1704	1820	1936
22	78	3/4 BSP	1/2 BSP	324	446	568	690	812	934	1056	1178	1300	1422	1544	1666	1788	1910	2032
26	82	1 BSP	3/4 BSP	332	458	584	710	836	962	1088	1214	1340	1466	1592	1718	1844	1970	2096
30	90	1 BSP	3/4 BSP	348	482	616	750	884	1018	1152	1286	1420	1554	1688	1822	1956	2090	2224
34	97	1 BSP	3/4 BSP	362	503	644	785	926	1067	1208	1349	1490	1631	1772	1913	2054	2195	2336
40	106	1 BSP	3/4 BSP	380	530	680	830	980	1130	1280	1430	1580	1730	1880	2030	2180	2330	2480

Table: 3 in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8

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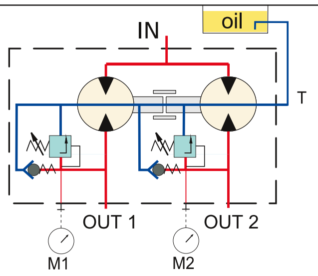
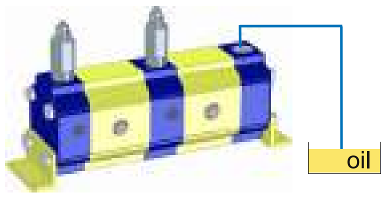
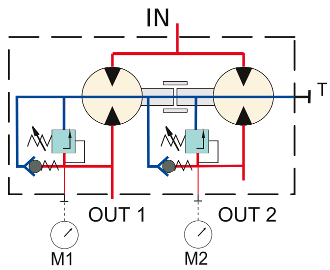
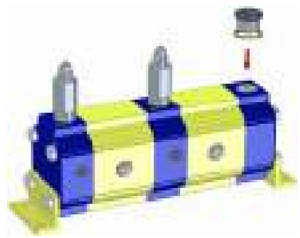
EXTERNAL DRAIN *STANDARD SETUP*	**INTERNAL DRAIN**
For the correct functioning of the flow divider, it has to be installed *under the oil level*. The drain tube has to pick up under the oil level and it has not to aspire air.	To predispose the divider to the internal drain, plug the 3/4" G drain port (T) **Note**: with this configuration the function of anticavitation valves is annulled









In **table 1** the functioning range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column "**RECOMMENDED**".
It's important remember to verify the capacities even in phase of flow reunion.
The pressures indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20% superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 44] + 124 + (A1 + A2 + A3 +…….)

124 = 62 + 62
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 24

24 = 12 + 12

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **RV-2V 19 + 11 +9**

Distance between fixing hole centres	**Li** = [(3-1) x 44] + 124 + 72 + 58 + 54 =396 mm
Total Lenght	**Lt** = 396 + 24 = 420 mm

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to use at least one **3/4" BSP** inlet every **80 l/min** capacity and at least one **1" BSP** inlet every **120 l/min** capacity

To obtain errors of division inferior to 3% there must be no difference of pressure between the elements superior to 30 bar. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 µ

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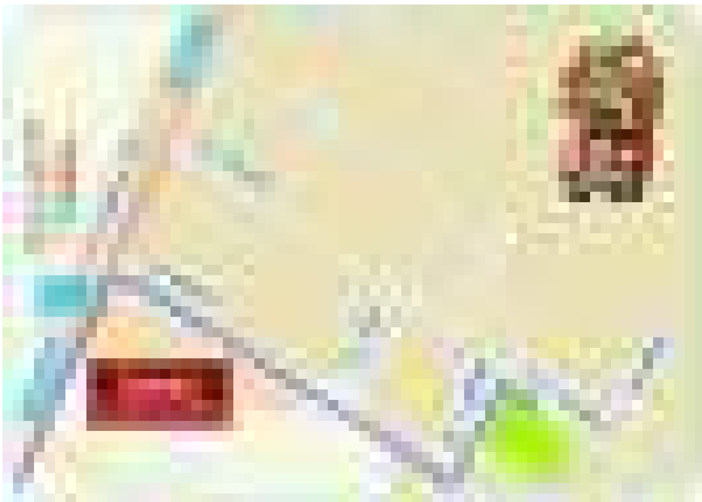

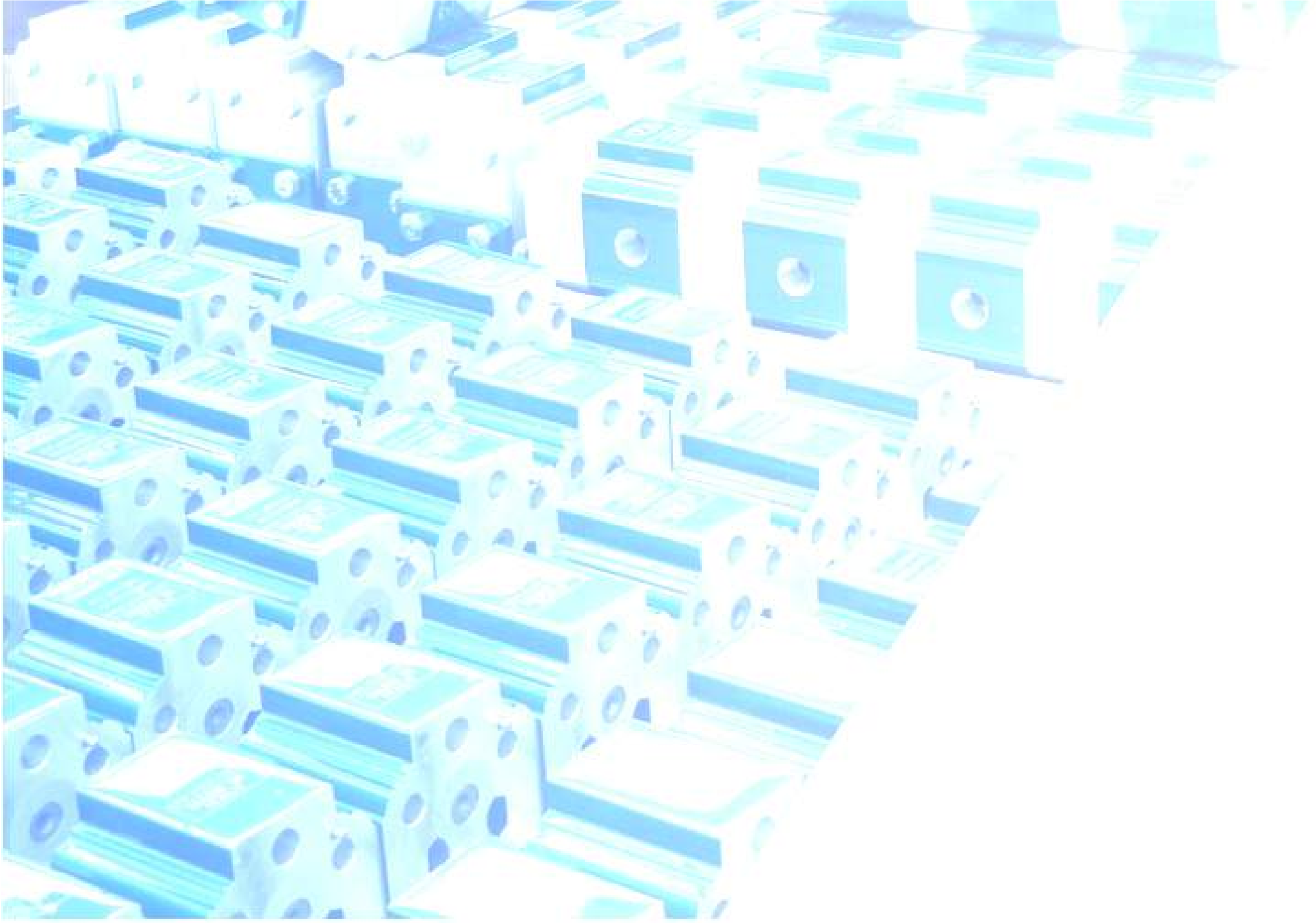

VIVOIL OLEODINAMICA VIVOLO

FLOW DIVIDERS "XV-3 serie"

ENGLISH

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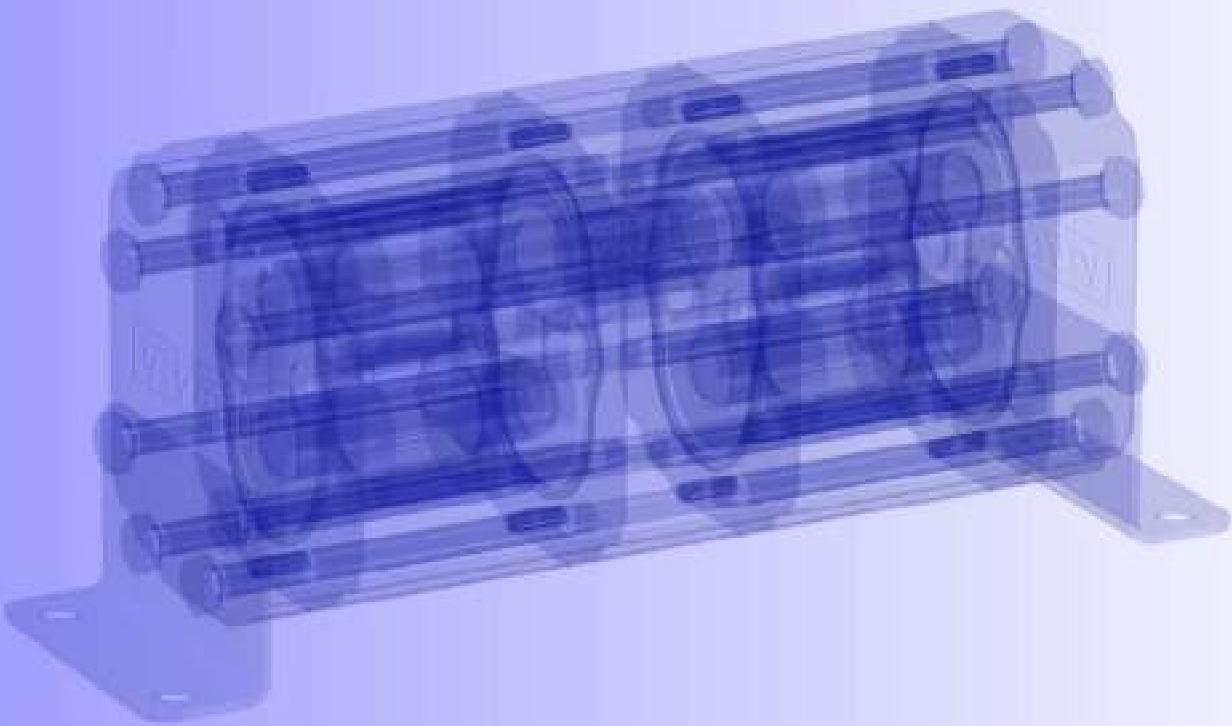


XV-D FLOW DIVIDER

This is the flow divider standard version, it simply divide the incoming flow without allowing the phase correction

XV-G FLOW DIVIDER + MOTOR

The XV-G typology is the motorized version of the XV-D divider.
It has a motor conneted to the flow divider elements. This solution is important when the incoming and/or outgoing pressure is below the minimum pressure required to start. Giving flow to the motor, help the flow divider rotation start. Typical use: plants with single effects hydraulic jack.

The flow division error is lower than ± 1.5% with a pressure difference between one element and another until 30 Bars. For bigger differences we can approximate an error increase of 1 % for each 10 additional bars.

A flow divider is made up of two or more modular elements (sections) with gears mechanically linked by an internal shaft that causes them to turn at the same speed.
Unlike multiple pumps, in which the input power is mechanical (shaft connected to a motor), in a flow divider the input power is of a fluid-mechanical nature, i.e. a flow of oil under pressure parallelly supplies the modular elements, which are in turn connected to the hydraulic circuits serving the users.
The portion of flow utilized by each element is solely determined by its nominal flow rate. Therefore, unlike standard static dividers with variable ports, the flow dividers do not cause dissipation and are also much more precise.
The use of flow dividers in a system reduces the number of pumps necessary as well as the associated individual mechanical power takeoffs and complex mechanical couplers (with greater losses).
Leaving aside small losses for the time being, at any given moment the total input power is equal to the sum of the powers supplied by all elements making up the flow divider.
Therefore, if in an interval of time the power required by a hydraulic circuit is equal to zero (inactive drained circuit), the power supplied by the element feeding that circuit becomes available for the other elements, which may use it in their own circuits, also operating at higher pressures than the intake pressure.

Most frequent applications of flow dividers

Supply of two or more independent hydraulic circuits by means of a single pump, with an overall flow rate equal to the sum of the flow rates.

Examples of this kind of application:

- lifting platforms and bridges;
- hydraulic bending presses and shearing machines;
- hoisting of freight containers;
- lubrication systems;
- hydraulic opening / closing of gates;
- automatic hydraulically-driven machines;
- actuation of formwork for construction;
- wood processing machinery;
- conveyance of trolleys driven by hydraulic cylinders or motors;
- equipment for the food industry;
- military installations.

Pressure amplifiers.
When in a hydraulic system one user requires a much higher operating or peak pressure than all the others, it is more convenient to supply it by means of a flow divider than to upgrade the whole system to work with higher pressure.
With a two-element flow divider flow may be discharged from the outlet of one element so that the pressure in the other will become much higher than that of the pump supplying the system.

Examples of this kind of application:

- presses with rapid approach
- machine tools

Constructive features

FLOW DIVIDER BODY FLANGE AND COVER	Extruded alloy Serie 7000, heat treated and anodised	Rp=345 N/mm^2 (Yield Strength) Rm=382 N/mm^2 (Breaking Strength)
GEAR BUSH BEARINGS	Special Heat Treated tin alloy with excellent mechanical features and high anti-friction capacity. Self-lubricating bushes DU	Rp=350 N/mm^2 (Yield Strength) Rm=390 N/mm^2 (Breaking Strength)
GEARS	Steel UNI 7846	Rs=980 N/mm^2 (Yield Strength) Rm=1270÷1570 N/mm^2 (Breaking Strength)
GASKET	A 727 Acrolonitrile Standard F 975 Viton FKM	90 Shore, thermal resistance 120°C 80 Shore, thermal resistance 200°C

Code:

9D	NN	CC

9D	Flow Divider Typology
NN	Number of elements
CC	Displacement Code

Example: Flow divider with two elements (same displacement):
XV-3D / 38 x 2

9D	02	78

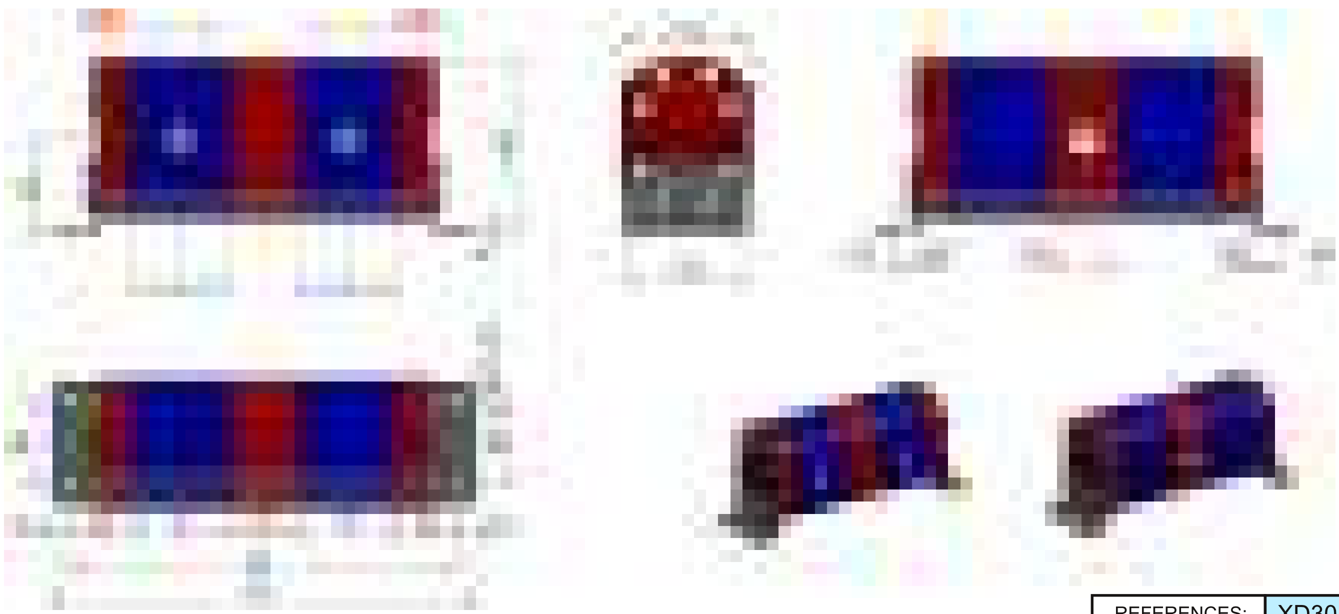
Example: Flow Divider with 4 elements with different displacement (max 7):
XV-3D / 21+51+51+70

9D	04	70	81	81	86

NOTE: to define codes for flow dividers with more than 7 different displacement, please contact our sales department.

Table: 1

Displacem. Cm^3/rev	CC Code	Max Pressure bar	One element flow rate l/min MIN	RECOMMENDED	MAX
15	66	300	18	27	37,5
18	68	300	21,5	32,5	45
21	70	280	25	38	52,5
27	72	250	32,5	48	67,5
32	74	250	38	57	80
38	78	250	41	60	91
43	79	250	43	64,5	99
47	80	230	47	70,5	108
51	81	230	51	76,5	117
54	82	230	54	81	124
61	83	230	56	82	126
64	85	210	57	83	128
70	86	200	63	91	140
74	87	180	66,5	96	148
90	89	150	81	117	180



REFERENCES: XD301

Table: 2

Li = Distance between fixing hole centres (single displacement flow divider)

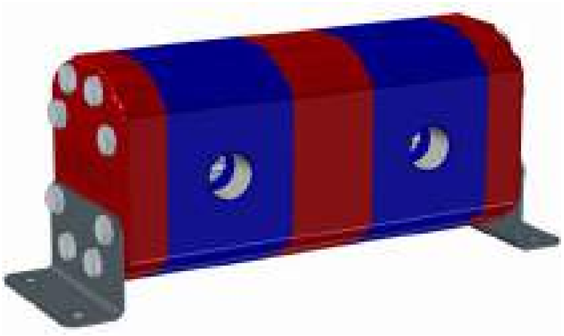
Cm^3/rev	A	IN	OUT	Number of elements 2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
15	66	1" BSP	1/2 BSP	302	428	554	680	806	932	1058	1184	1310	1436	1562	1688	1814	1940	2066
18	68	1" BSP	1/2 BSP	306	434	562	690	818	946	1074	1202	1330	1458	1586	1714	1842	1970	2098
21	71	1" BSP	1/2 BSP	312	443	574	705	836	967	1098	1229	1360	1491	1622	1753	1884	2015	2146
27	75	1" BSP	3/4 BSP	320	455	590	725	860	995	1130	1265	1400	1535	1670	1805	1940	2075	2210
32	80	1" BSP	3/4 BSP	330	470	610	750	890	1030	1170	1310	1450	1590	1730	1870	2010	2150	2290
38	85	1" BSP	3/4 BSP	340	485	630	775	920	1065	1210	1355	1500	1645	1790	1935	2080	2225	2370
43	89	1" BSP	1" BSP	348	497	646	795	944	1093	1242	1391	1540	1689	1838	1987	2136	2285	2434
47	92	1-1/4 BSP	1" BSP	354	506	658	810	962	1114	1266	1418	1570	1722	1874	2026	2178	2330	2482
51	95	1-1/4 BSP	1" BSP	360	515	670	825	980	1135	1290	1445	1600	1755	1910	2065	2220	2375	2530
54	98	1-1/4 BSP	1" BSP	366	524	682	840	998	1156	1314	1472	1630	1788	1946	2104	2262	2420	2578
61	103	1-1/4 BSP	1" BSP	376	539	702	865	1028	1191	1354	1517	1680	1843	2006	2169	2332	2495	2658
64	106	1-1/4 BSP	1" BSP	382	548	714	880	1046	1212	1378	1544	1710	1876	2042	2208	2374	2540	2706
70	111	1-1/4 BSP	1" BSP	392	563	734	905	1076	1247	1418	1589	1760	1931	2102	2273	2444	2615	2786
74	114	1-1/4 BSP	1" BSP	398	572	746	920	1094	1268	1442	1616	1790	1964	2138	2312	2486	2660	2834
90	124	1-1/4 BSP	1-1/4 BSP	418	602	786	970	1154	1338	1522	1706	1890	2074	2258	2442	2626	2810	2994

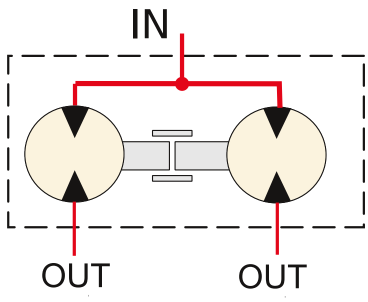
Table: 3

in this table the number of inlets in function of the number of elements are indicated.

Number of elements	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
"IN" Number of inlets	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8

INTERNAL DRAIN





In **table 1** the functioning range of single flow divider elements is indicated.
The higher is the feeding capacity (q), the higher is the precision of flow division, but in opposition there are losses of loading and higher noise. Therefore we suggest to feed the elements with capacities equal or a few superior to the ones indicated in the column "**RECOMMENDED**".
It's important remember to verify the capacities even in phase of flow reunion.
The pressures indicated are to be considered as maximum of functioning, the flow divider is able to bear peaks of pressure 20% superior.

How to calculate the "Li" and "Lt" measures of flow dividers:

From **table 2** it is possible to obtain the "Li" measure for flow dividers up to 16 elements with equal displacements; for flow dividers with different elements or with more than 16 elements the "Li" and "Lt" measure have to be calculated by the following formula:

Li = [(n-1) x 60] + 110 + (A1 + A2 + A3 +…….)

110 = 55 + 55
n = Number of elements of flow divider
A1... An = heights of elements of flow divider

Lt = Li + 30

30 = 15 + 15

EXAMPLE: To obtain the measures **Li** and **Lt** of a flow divider with three elements (n=3), **XV-3D 27 + 38 + 54**

Distance between fixing hole centres **Li** = [(3-1) x 60] + 110 + 75 + 85 + 98 =488 mm

Total Lenght **Lt** = 488 + 30 = 518 mm

In **table 3** the number of inlets in fuction of the number of elements are indicated.
For flow dividers with many inlets, as they are all communicating it is even possible to use only one of them, by plugging the other ones. We suggest to use at least one **1" BSP** inlet every **200 l/min** capacity and at least one **1-1/4" BSP** inlet every **360 l/min** capacity

To obtain errors of division inferior to 3% there must be no difference of pressure between the elements superior to 30 bar. To obtain high precisions the respect of the following parametres is also important:

- Enviroment temperature: -10°c ÷ +60°c — Oil temperature: +30°c ÷ +60°c
- Hydraulic oil based on hlp, hv (din 51524) minerals — Oil Viscosity 20 ÷ 40 cSt
- Oil filtering 10 ÷ 25 μ

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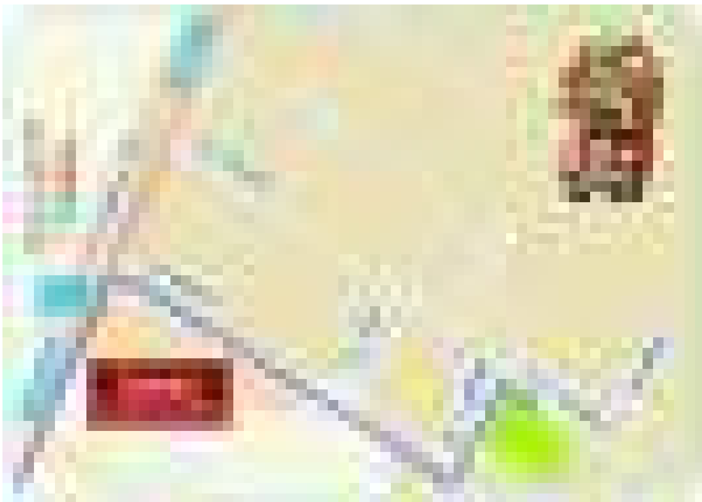


Flow Divider

Durability. Reliability. Efficiency. Performance

MIA - FD series

MANIFOLD
INSTANTANEOUS
AUTO-COMPENSATING
FLOW
DIVIDER

VIVOLO®
VIVOIL OLEODINAMICA VIVOLO

ENGLISH

SUMMARY

GENERAL DESCRIPTION

MIA-FD is the acronym for Manifold Instantaneous Auto-compensating Flow Divider. The VIVOIL MIA-FD flow divider is the answer to the market request for continuous improvement of:

- **Precision:** All components has been re-engineered to allow for a tolerance constructive reduction and to reach a higher uniformity between elements. In addition we have included an internal auto-compensating system that removes the dependency from the pressure diffence between elements.
- **Modular:** each element is a single independent unit
- **Configurable:** each element can have added valves and other modular elements with CETOP NG6 , ISO 4401-03-02-0-05.
- **Expandable:** the system can be improved by adding new divider elements on to an existing flow divider.
- **Simple:** the completed flow divider is a real compact manifold system and is easy to install.

The MIA-FD FLOW DIVIDER is not only a simple flow divider and combiner, but it is a system to distribute and feed with constant and independent flow rates for the various circuit branches. The open architecture of the MIA-FD has been developed to be integrated into different functionality that will follow the customers requirements.

TECHNICAL INFORMATION

Attention:
Please carefully read the following instructions before installing the MIA-FD flow divider. All installation activities must be executed by specialized and qualified persons.

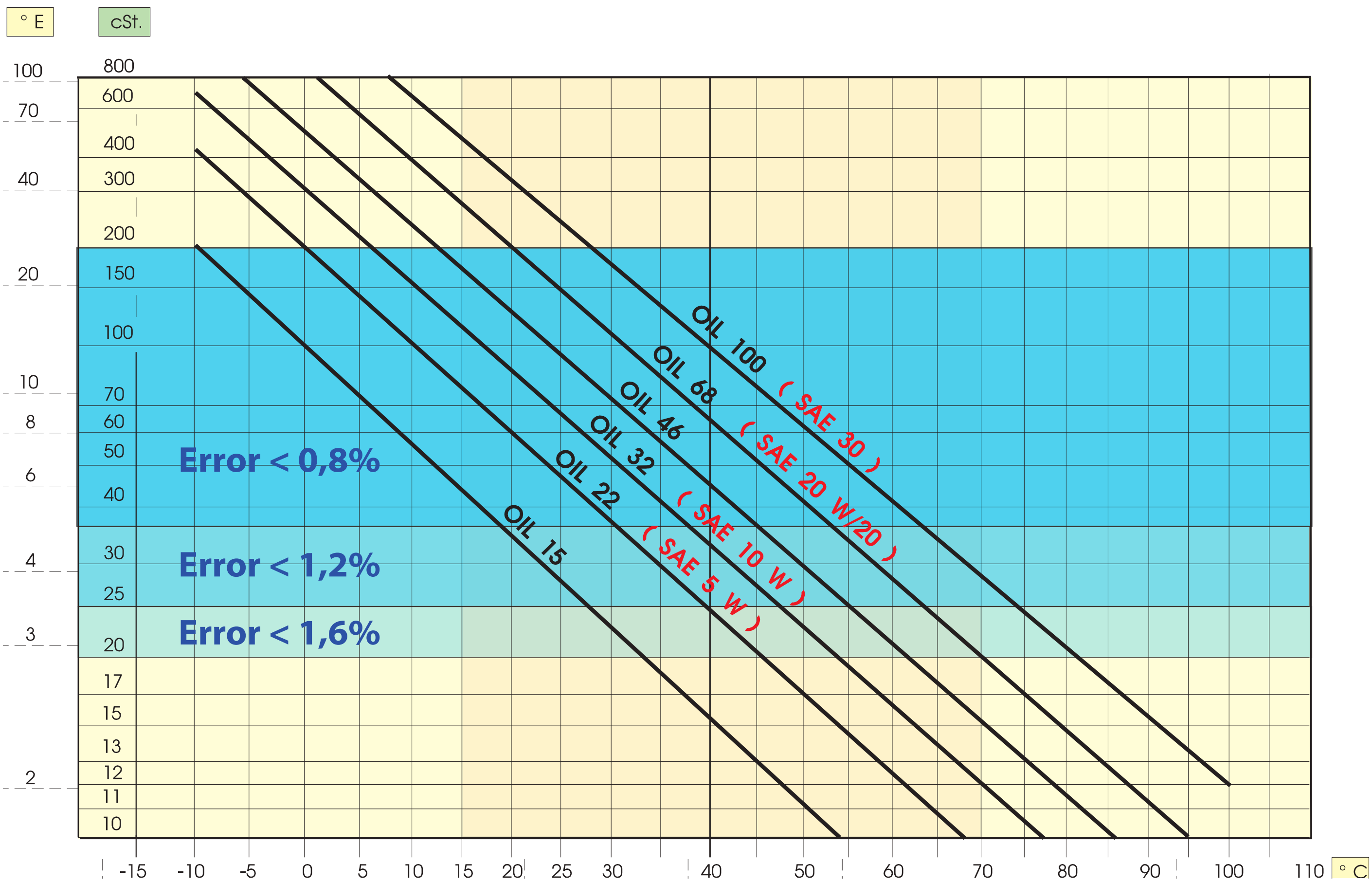
HYDRAULIC FLUID	MINERAL OIL HL, HLP DIN 51524
FLUID CONTAMINATION (filter: ß5 >= 75)	ISO 4406:1999 CLASS 19/17/14 (NAS 1638 class 8)
SUGGESTED VISCOSITY	20 ÷ 200 cSt
ALLOWED VISCOSITY	12 ÷ 500 cSt
ROOM TEMPERATURE	-20° C ÷ 80°C
NBR SEALS FLUID TEMPERATURE ALLOWED	-15° C ÷ 75°C

PRECISION GRADE

FLOW DIVISION ERROR < 1,6%

PRESSURE DIFFERENCE CONSIDERED 170 BAR

(oli VG 46 c fluid and flow divider temperature< 60°)



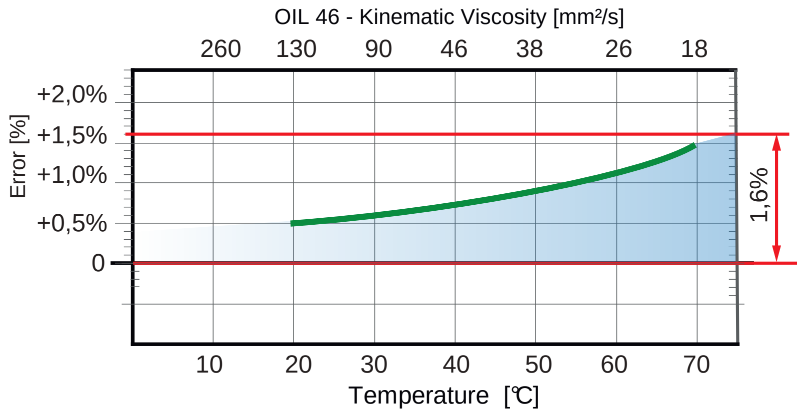
** Values in the blue area have been calculated by interpolation, starting with many experimental tests.*
For additional information, please contact our technical service.

DEPENDENCE OF THE ERROR TREND FROM TEMPERATURE/VISCOSITY

The below graph shows the typical trend of the error captured during experimental tests:
The green line represents the maximum real error measured during the tests.
With oil temperatures up to 45 °C the absolute error between elements is < 0.8 % (with a pressure difference from 0 to 180 bar)

Note: All products were tested after assembly and an initial run time to adapt the parts to each other. The complete adjustment requires several hours.

Test details:
MIA-FD 6 l/min x 3 elements
Max pressure difference between elements 170 bar
Oil Schell Tellus T 46
Oil temperature from 15°C to 75°C
Inlet flow rate18 l/min
Flexible pipes EN 853/2SN 3/8 GAS L=2000 mm
Cylinder bore ø100 mm - Cylinder rod ø50 mm - 1000 mm stroke.



FLOW DIVISION PRECISION DEFINITION:

We define the flow division error as the difference between the maximum and the minimum volume of flow on the outlet of the flow divider (expressed in a percentage).

Example: One 4 element flow divider feeds 4 equal cylinders with a 1000 mm stroke.

When the first cylinder C1 reaches the end of the stroke at 1000 mm, the other cylinders will have different strokes, because of the error flow division.

The difference between the maximum stroke on C1 and minimum stroke on C3 is:

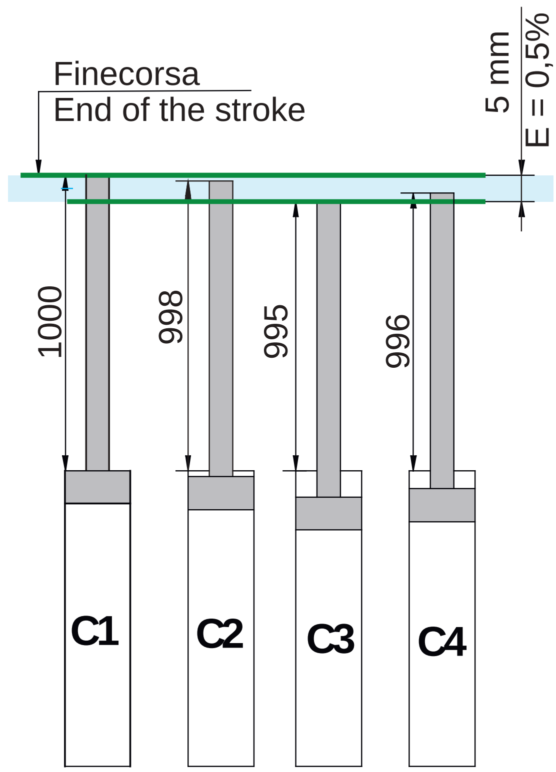
1000 - 995 = 5 mm

Therefore the absolute flow division error is:

(5/1000)*100 = 0,5%

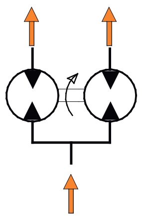
Attention! In order to express the error as a percentage, you must calculate the maximum misalignment between all stroke positions.

Please remember that the final error rate is made of the flow divider error, the oil compressibility, the pipes, seals and cylinders elasticity, in addition to the volumetric efficiency of the final uses (such as motors).

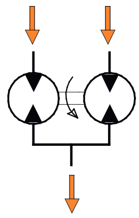


HOW IT WORKS GENERAL INFORMATION

The flow divider is made up of two or more elements (sections). Inside each element there are a couple of gears that determine the quantity of oil that goes from the inlet to the outlet. The gear couples are connected mechanically so that all of them haves a synchronized rotation.
For this reason, the flow rate that passes through each element has a constant ratio determined by the displacement of each element.
Gears can rotate in both directions, making the flow divider reversible.



• Flow division



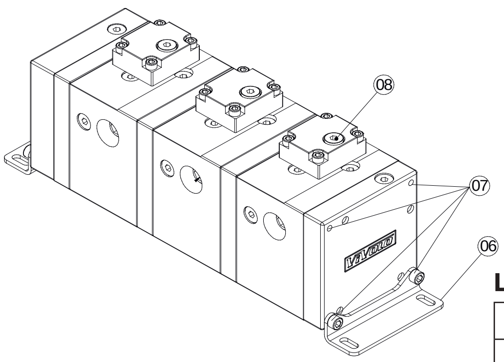
• Flow combiner

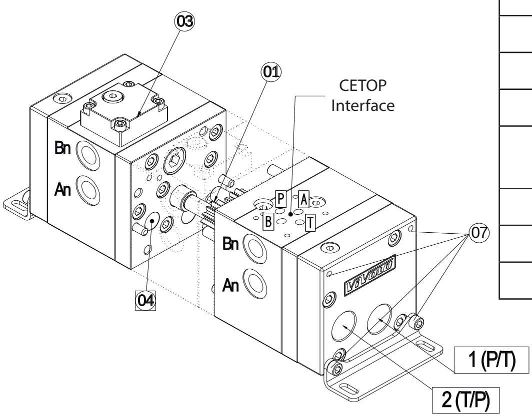
MIA-FD FLOW DIVIDER

An auto-compensating system has been added inside of the MIA-FD making the flow division does not depends on the pressure applied on each of the elements. **This system does not require any adjustments.**

With this type of flow divider there is no pressure amplifier effect, and therefore there is no risk of making the safety valve, that is positioned before the flow divider ineffective.

Due to the higher precision of this solution, no relief valve is necessary in the main part of the applications. Relief valves can be installed at any time and only in the elements that need them. This is accomplished by using a CETOP connection on top of each element.





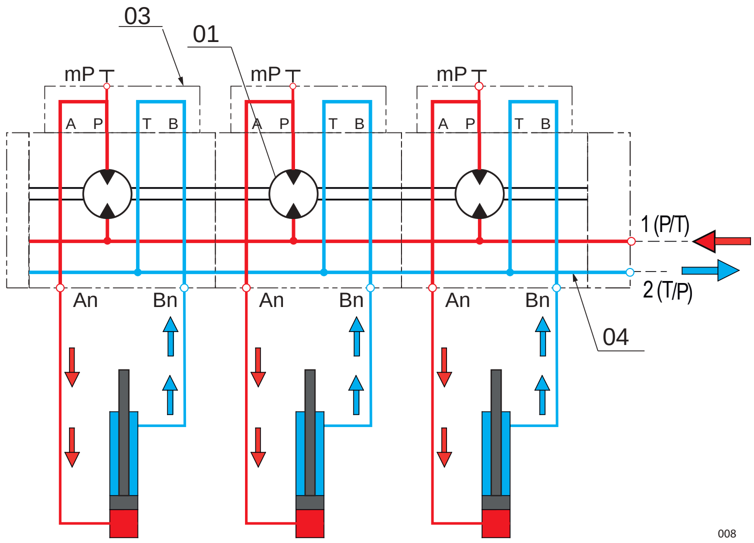
Legend:

1(P/T) 2(T/P)	CONNECTION PORTS
01	GEARS
03	CETOP CLOSING PLATE
04	INTERNAL FLOW PIPE (COLLECTOR)
An Bn	IN and OUT CONNECTIONS
P T A B	CETOP CONNECTING INTERFACE ON EACH ELEMENT (CONNECTING PORTS)
06	FIXING L-SHAPE
07	M6 FIXING HOLES
08	PLUG GAUGE G1/8 (P connection)

Flow division modality

Inlet from 1 (P/T) to An: The flow is sent to the gear element (01) that divides it into independent flow rates. The fluid goes through the compensation system and feeds the P from the CETOP connection on each element.
The CETOP closing plate (03) connects P with A which is communicating with An.

The Bn connection is communicating with the B port on the CETOP interface on each element.
The CETOP closing plate (03) connects B with T and consequently is communicating with the common line (04) and connection 2(T/P)
The Bn connection can be used for the backline from the actuators.



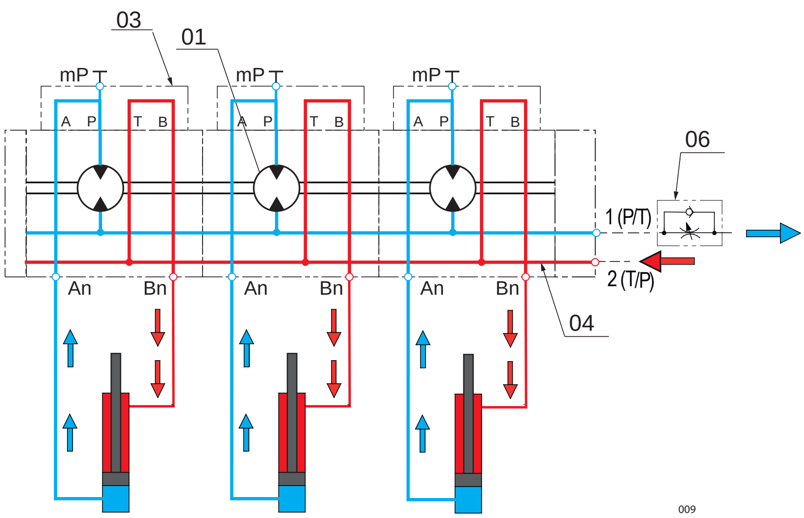
Scheme 1
How it works as a flow divider

Flow combiner modality

Inlet form An to 1(P/T): the different flow rate gets in from the An connections that are all communicating with the A port in the CETOP interface of each element.
The CETOP closing plate (03) connects A with P, then feeds the gears (01)

With this working method it is recommended that you insert an adjustable flow regulator (06) and assemble it (as per the scheme 2) on the flow divider outlet in order top increase the precision. This will slow down the descending phase and consequently give to the gears a counterpressure.

Bn connections, can be used to send oil ot the actuators, because they are directly communicating through the common line (04) to the 2 connection (T/P) .



Scheme 2
How it works as a flow combiner

CETOP connection interface use on the flow divider stages:

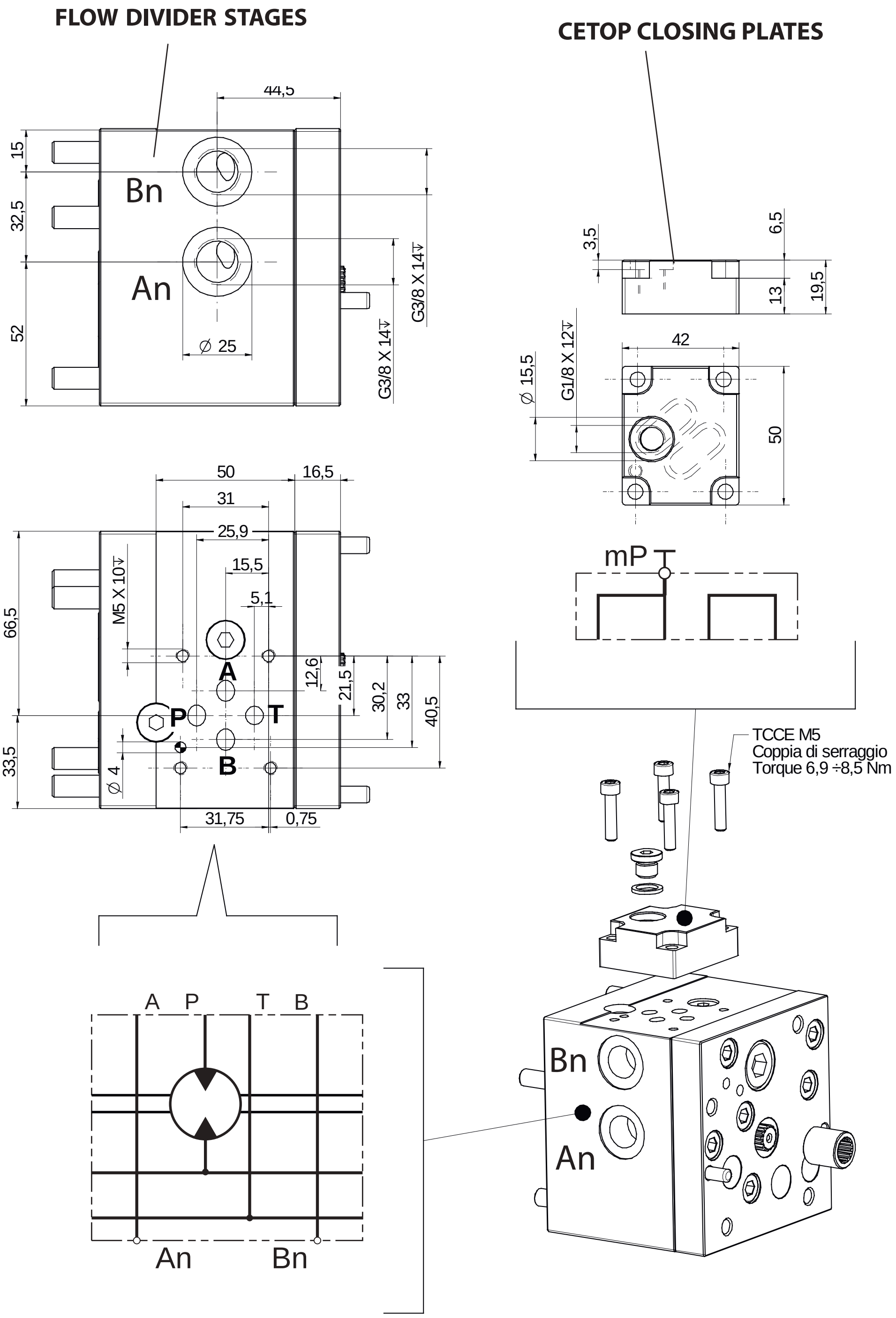
From the above schemes :

- When the oil works as in *Scheme 1* the **P** connection on the CETOP interface is the outlet and **T** is the back line.
- When the oil works as in *Scheme 2,* the **P** connection on the CETOP interface is the back line and **T** is the outlet.

This is really important when you are considering the use of CETOP components on top of each element.

***CETOP* INTERFACE ON THE FLOW DIVIDER STAGES:**

Valves and modular command elements can be installed on each flow divider element.
CETOP 3 NG6 , ISO 4401-03-02-0-05.
To allow this, it is necessary to remove the CETOP closing plates.



When a CETOP element is installed, you should always check that its characteristics and use limits are appropriate to the actual use.
You must respect all of the indications and instructions provided by the manufacturer (ie: assembling, use, installation, safety, torque couples).

The CETOP component can effect on the final precision, becuase it acts after the flow compensating system, . (As an example, the error can drastically improve because of internal leakage on an installed CETOP component)

Vivoil Oleodinamica Vivolo declines all possible responsibility for bad functionality of the flow divider that is generated from equipment, valves, commands and any other possible element that has been installed on the flow divider or is outside the flow divider.

GENERAL INSTRUCTION

FLOW RATE DEFINITION

The table shows the operating range of the individual elements of the flow divider.
Higher flow rates with the same gear displacement, improve the precision, but cause a higher pressure loss and higher noise levels. For this reason we suggest, whenever it is possible, the use of a flow rate close to the optimal value defined in the table.
It's important to check the flow rate for each element, even for the combining phase.
Working pressures indicated must be considered maximum continuous values.
Pressure peaks of approximately 10 percent are allowed.

Displac. cm³/rev	P.max bar	WORKING RANGE Flow Rate per element [l/min]		
		Min.	Optimal	Max
0,9	250	1	2	6
1,2	250	1,5	3	7
1,7	250	2	4	9,5
2,2	250	2,5	5	13
2,6	250	3	6	16
3,2	250	3,5	7	19
3,8	250	4,5	8	22,5
4,3	250	5	9	26
4,9	250	5,5	11	29
5,9	220	6,5	13	30
6,5	220	7,5	14	33
7,8	210	8,5	17	38
9,8	200	11	22	38

INLET NUMBER DEFINITION

With inlet flow rates of over 80÷90 l/min, we suggest you to contact our technical service to evaluate additional inlet port addition.

Displac. cm³/rev	P.max bar	Optimal flow rate for an element [l/min]	TOTAL INLET FLOW RATE [l/min] ELEMENT NUMBER:								
			2	3	4	5	6	7	8	9	10
0,9	250	**2**	4	6	8	10	12	14	16	18	20
1,2	250	**3**	6	9	12	15	18	21	24	27	30
1,7	250	**4**	8	12	16	20	24	28	32	36	40
2,2	250	**5**	10	15	20	25	30	35	40	45	50
2,6	250	**6**	12	18	24	30	36	42	48	54	60
3,2	250	**7**	14	21	28	35	42	49	56	63	70
3,8	250	**8**	16	24	32	40	48	56	64	72	80
4,3	250	**9**	18	27	36	45	54	63	72	81	90
4,9	250	**11**	22	33	44	55	66	77	88	99	110
5,9	220	**13**	26	39	52	65	78	91	104	117	130
6,5	220	**14**	28	42	56	70	84	98	112	126	140
7,8	210	**17**	34	51	68	85	102	119	136	153	170
9,8	200	**22**	44	66	88	110	132	154	176	198	220

Legend

Total inlet flow rate [l/min]	Min. inlet number suggested
< 50	1
< 90	
> 90	2

Limit for MVE version (Flow divider with relief valbe, flow rate adjustment valve and cetop connection for command valve.)	
	< 50 lt/min

INSTALLATION

Installation, initial tests, commissioning and ordinary maintenance for the flow divider must be done only by qualified and experienced staff, who are properly equipped with the right tools and individual safety protection.

Check that the flow divider has not been damaged during the transport.
Pay close attention so you do not damage parts during the movement and assembling phases.

- Secure the flow divider on clean, flat surface.
- Secure the flow divider by using the mounting brackets supplied or the threaded holes on the products sides. Securing the flow divider incorrectly can compromise the proper functionality of the system.
- To prevent additional noise caused by acoustic resonance, you should consider the use of anti-vibration mounts.
- Only remove the plugs immediatly before you connect the pipes.
- Pay careful attention so you do not introduce dirt into the ports or the CETOP connections

- Use only cylindrical fittings BSPP suitable to the working pressure. **The use of conical fitting is absolutely not allowed.**
- Flexible or rigid pipes must conform to the maximum nominal pressures, respect minimal radii of curvature and be positioned so as not to transfer mechanical stress to the flow divider.

Commissioning

- Execute all of the proper connections
- Check that all of the valves that can influence the pressure are adjusted to the minimal values during the first start up.
- Check that no valves, taps, plugs, flow restrictors or other elements, that can obstruct or restrict the oil flow or improve the pressure, are present after the flow divider.
- Check the proper connection tightening and the proper circuit positioning
- **Always respect the recommendations and instructions from the machine builder, where the flow divider is installed, concerning safety and how to install pipes, valves, electrical connentions, etc.**
- Start the flow divider for a short period with no load on the uses
- Immediately stop the use if any strange noise, leakages, strange movements, etc. cause you to doubt or suspect there are issue with the proper functionality.
- Purge the air from the circuit. In order for the flow divider to work properly, no air should be present in the circuit (no foam in the tank).
- Perform many cycles without load on the uses.
- With all the actioning deactivated and no pressure on all the pipes, check that no leakage occurs and that all pipes, fittings and connections have been properly tightened
- Adjust the valves and perform some empty cycles.
- After all the steps before have been succesfully passed, start by gradually adding the load on the uses on step at a time.

Use

- The flow divider must be used within the limits provided by this catalogue.
- Use the type of oil suggested in this catalogue.
- Take care of the oil filtration because contamination can irreparably damage the flow dividers precision and cause a lifetime reduction.
- Do not exceed the temperature indicated in this catalogue
- Check that no air is in the circuit (no foam in the tank).
- If CETOP valves are applied on the flow divider, respect the user instructions from the manufacturer.
- **Always respect the recommendations and instructions from the machine builder where the flow divider is installed concerning safety.**

Maintenance

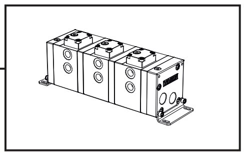
The user must periodically check:

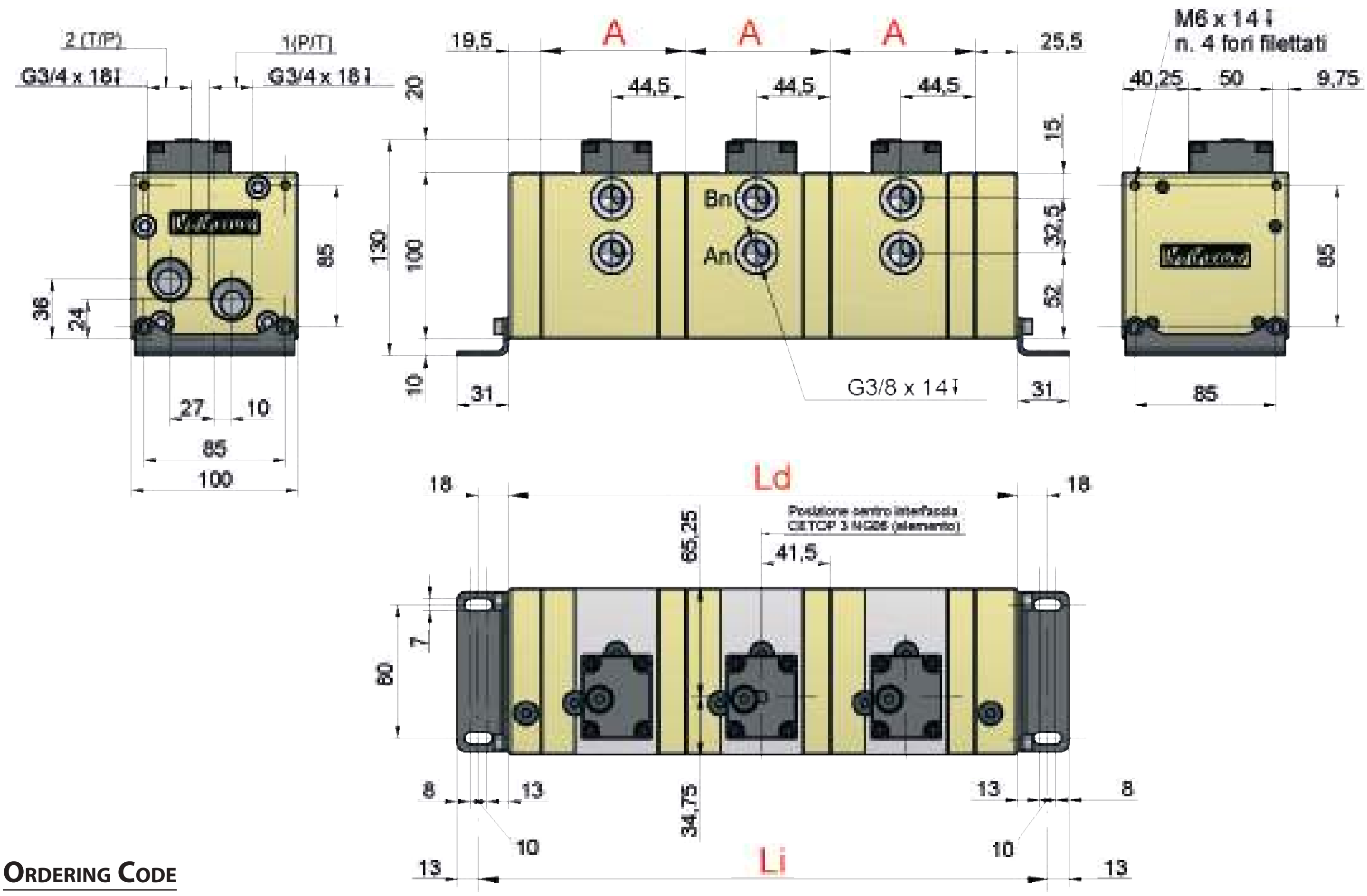
- No leakage should be present between the elements.
- Fittings and fixing screws should be properly tightened.
- Valves and plugs should be properly tightened.
- Never exceed the tightening torque values indicated in the catalogue and from the components manufacturers.

Note When leakage is found and the tightening is correct, do not tighten more, instead replace the seals. **This operation has to be done by qualified and experienced staff.**

MVA - STANDARD FLOW DIVIDER

Standard flow divider with 3/4 BSPP inlet and outlet ports





ORDERING CODE

FLOW DIVIDER WITH EQUAL DISPLACEMENTS:

MVA | NN | CC

TOTAL ELEMENT NUMBER

FLOW DIVIDER WITH DIFFERENT DISPLACEMENT ELEMENTS (MAX. 7*):

MVA | NN | CC | CC | CC | CC

TOTAL ELEMENT NUMBER

Right Cover Weight = 0,8 kg
Left Cover Weight = 0,6 kg

Displ. cm³/rev	Code CC	A	P.max bar	Flow Rate per element [l/min] Min.	Optimal	Max	Element weight kg
0,9	16	74,5	250	1	2	6	2,3
1,2	17	75,5	250	1,5	3	7	2,3
1,7	18	77	250	2	4	9,5	2,3
2,2	20	79	250	2,5	5	13	2,4
2,6	21	81	250	3	6	16	2,4
3,2	23	83	250	3,5	7	19	2,5
3,8	25	85	250	4,5	8	22,5	2,5
4,3	27	87	250	5	9	26	2,6
4,9	29	90	250	5,5	11	29	2,7
5,9	31	93,5	220	6,5	13	30	2,8
6,5	32	96	220	7,5	14	33	2,8
7,8	34	100	210	8,5	17	38	3,0
9,8	36	109	200	11	22	38	3,2

Example:
4 Element flow divider 3,8+4,9+4,9+6,5
cod. MVE 04 25 29 29 32

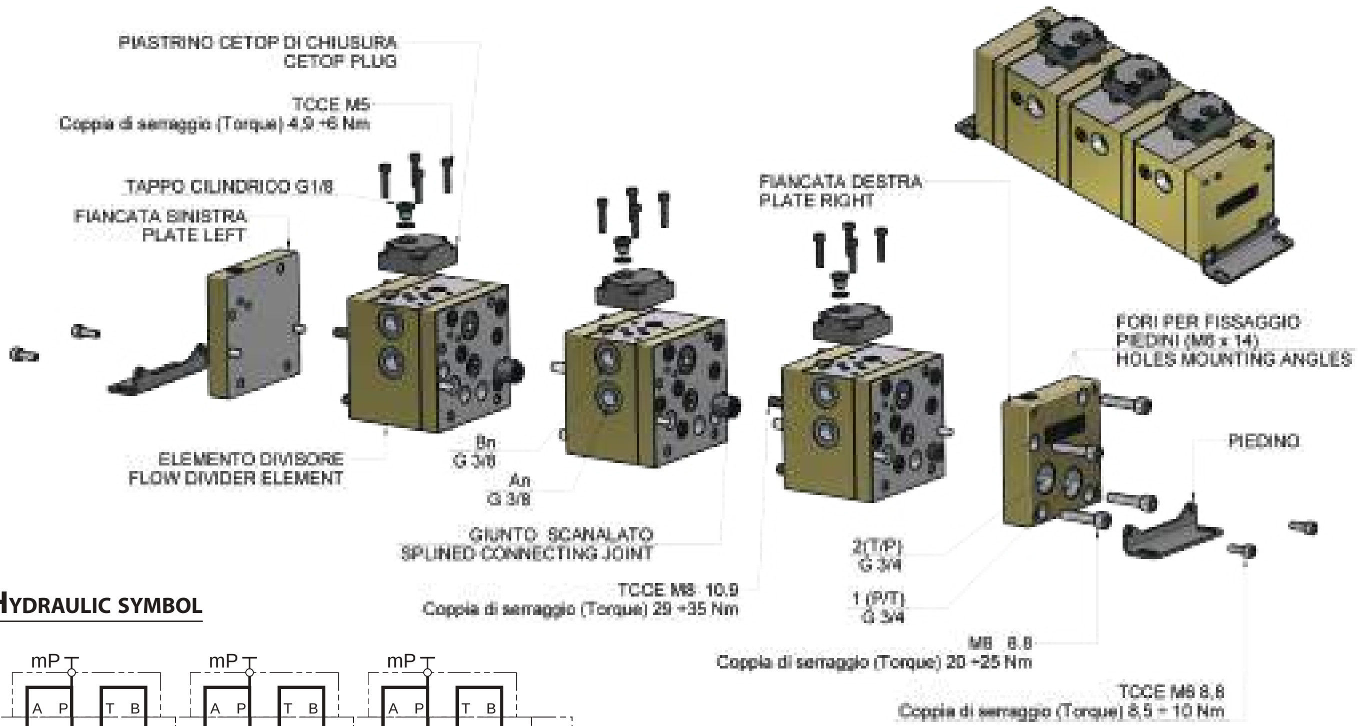
*** Note:** To define the code for different displacement version with more than 7 element please contact sales.

DIMENSIONS OF AN ASSEMBLED FLOW DIVIDER (FROM 2 TO 8 ELEMENTS)

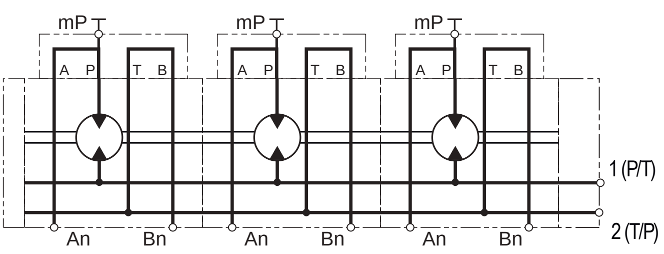
Displacement cm^3/rotation	Optimal single element flow rate	ELEMENT NUMBER																				
		2			3			4			5			6			7			8		
		Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg
0,9	2 l/min	194	230	5,9	268,5	304,5	8,2	343	379	10,4	417,5	453,5	12,7	492	528	14,9	566,5	602,5	17,2	641	677	19,4
1,2	3 l/min	196	232	6,0	271,5	307,5	8,2	347	383	10,5	422,5	458,5	12,8	498	534	15,1	573,5	609,5	17,3	649	685	19,6
1,7	4 l/min	199	235	6,0	276	312	8,4	353	389	10,7	430	466	13,0	507	543	15,3	584	620	17,6	661	697	20,0
2,2	5 l/min	203	239	6,2	282	318	8,5	361	397	10,9	440	476	13,3	519	555	15,7	598	634	18,0	677	713	20,4
2,6	6 l/min	207	243	6,3	288	324	8,7	369	405	11,1	450	486	13,6	531	567	16,0	612	648	18,4	693	729	20,8
3,2	7 l/min	211	247	6,4	294	330	8,9	377	413	11,3	460	496	13,8	543	579	16,3	626	662	18,8	709	745	21,3
3,8	8 l/min	215	251	6,5	300	336	9,0	385	421	11,6	470	506	14,1	555	591	16,7	640	676	19,2	725	761	21,7
4,3	9 l/min	219	255	6,6	306	342	9,2	393	429	11,8	480	516	14,4	567	603	17,0	654	690	19,6	741	777	22,2
4,9	11 l/min	225	261	6,8	315	351	9,4	405	441	12,1	495	531	14,8	585	621	17,5	675	711	20,2	765	801	22,8
5,9	13 l/min	232	268	7,0	325,5	361,5	9,7	419	455	12,5	512,5	548,5	15,3	606	642	18,1	699,5	735,5	20,8	793	829	23,6
6,5	14 l/min	237	273	7,1	333	369	9,9	429	465	12,8	525	561	15,6	621	657	18,5	717	753	21,3	813	849	24,2
7,8	17 l/min	245	281	7,3	345	381	10,3	445	481	13,2	545	581	16,2	645	681	19,1	745	781	22,1	845	881	25,1
9,8	22 l/min	263	299	7,8	372	408	11,0	481	517	14,2	590	626	17,4	699	735	20,6	808	844	23,8	917	953	27,1

Note:
- For flow dividers with more than 8 elements and/or global inlets of more than 90 l/min, we suggest you contact our technical deptartment to evaluate if an additional inlet or more than one is required.

EXPLODED VIEW WITH COUPLING TORQUE VALUES

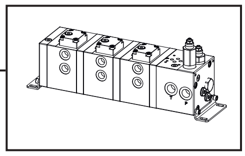


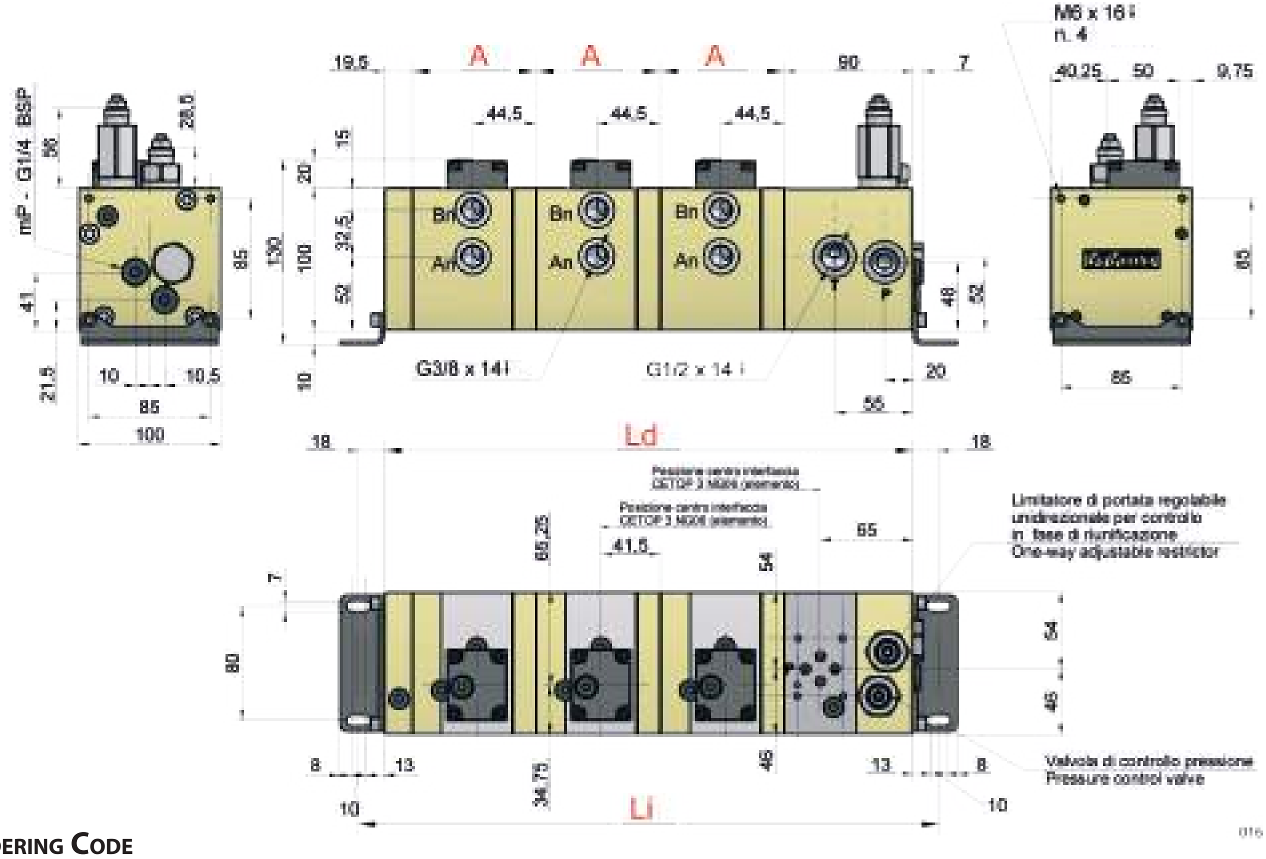
HYDRAULIC SYMBOL



MVE - FLOW DIVIDER WITH COMMAND CONNECTION (UP TO 50L/MIN)

Flow divider with command CETOP connection, relief valve, flow rate valve and unidirectional flow rate adjustment to lead the reunification phase.





Ordering Code

Flow divider with equal displacements:

MVE | NN | M | CC

TOTAL ELEMENT NUMBER

	Setting range of the valve
A	10 ÷ 105 bar
B	70 ÷ 210 bar
C	140 ÷ 350 bar

Flow divider with different displacement elements (max. 7*):

MVE | NN | M | CC | CC | CC | CC

TOTAL ELEMENT NUMBER

Right Cover Weight = 2,9 kg
Left Cover Weight = 0,6 kg

Displ. cm³/rev.	Code CC	A	P.max bar	Flow Rate per element [l/min] Min.	Optimal	Max	Element weight kg
0,9	16	74,5	250	1	2	6	2,3
1,2	17	75,5	250	1,5	3	7	2,3
1,7	18	77	250	2	4	9,5	2,3
2,2	20	79	250	2,5	5	13	2,4
2,6	21	81	250	3	6	16	2,4
3,2	23	83	250	3,5	7	19	2,5
3,8	25	85	250	4,5	8	22,5	2,5
4,3	27	87	250	5	9	26	2,6
4,9	29	90	250	5,5	11	29	2,7
5,9	31	93,5	220	6,5	13	30	2,8
6,5	32	96	220	7,5	14	33	2,8
7,8	34	100	210	8,5	17	38	3,0
9,8	36	109	200	11	22	38	3,2

Example:
4 Element flow divider 3,8+4,9+4,9+6,5
with relief valve 70÷210 bar
cod. MVE 04 B 25 29 29 32
*** Note:** To define the code for different displacement version with more than 7 element please contact sales.

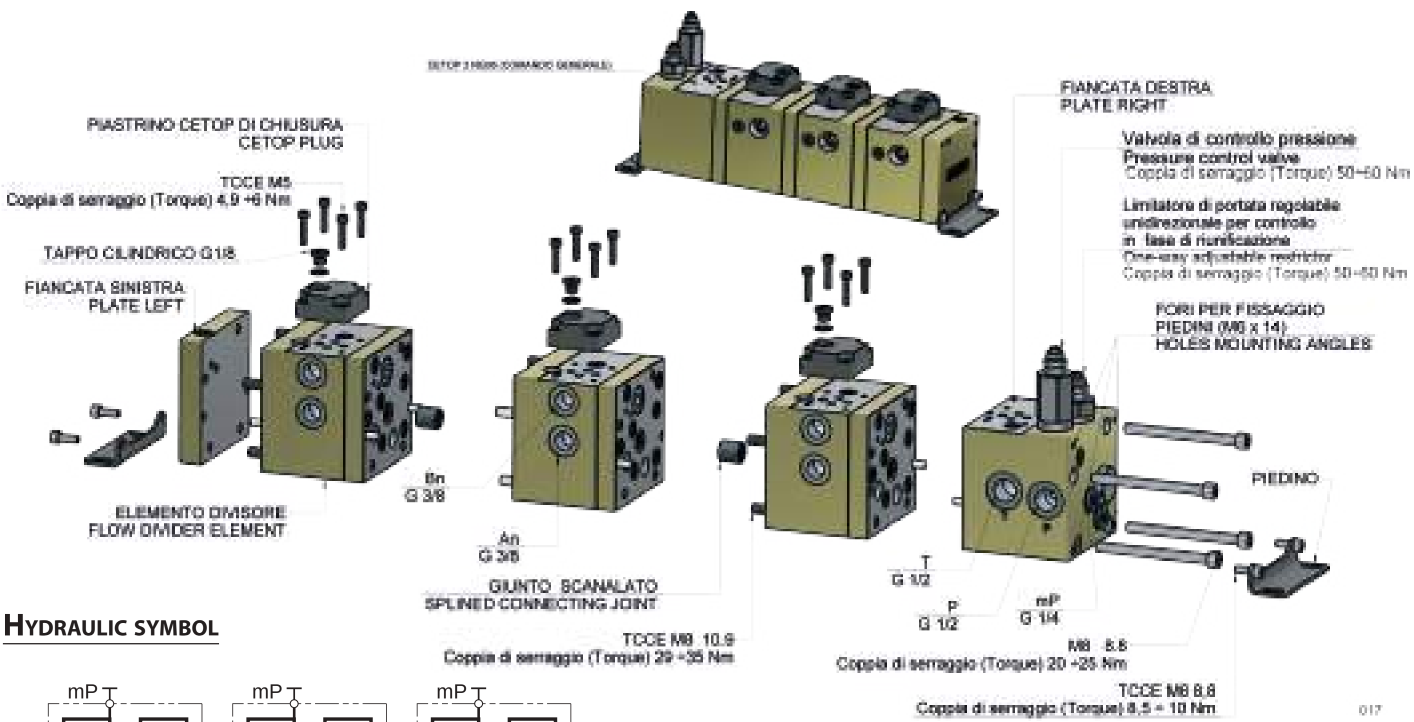
DIMENSIONS OF AN ASSEMBLED FLOW DIVIDER (FROM 2 TO 8 ELEMENTS)

Displacement cm³/rotation	Optimal single element flow rate	ELEMENT NUMBER 2			3			4			5			6			7			8		
		Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg	Ld	Li	kg
0,9	2 l/min	258,5	294,5	8,0	333	369	10,3	407,5	443,5	12,5	482	518	14,8	556,5	592,5	17,0	631	667	19,3	705,5	741,5	21,5
1,2	3 l/min	260,5	296,5	8,1	336	372	10,4	411,5	447,5	12,7	487	523	14,9	562,5	598,5	17,2	638	674	19,5	713,5	749,5	21,8
1,7	4 l/min	263,5	299,5	8,2	340,5	376,5	10,5	417,5	453,5	12,8	494,5	530,5	15,1	571,5	607,5	17,5	648,5	684,5	19,8	725,5	761,5	22,1
2,2	5 l/min	267,5	303,5	8,3	346,5	382,5	10,7	425,5	461,5	13,0	504,5	540,5	15,4	583,5	619,5	17,8	662,5	698,5	20,2	741,5	777,5	22,5
2,6	6 l/min	271,5	307,5	8,4	352,5	388,5	10,8	433,5	469,5	13,3	514,5	550,5	15,7	595,5	631,5	18,1	676,5	712,5	20,6	757,5	793,5	23,0
3,2	7 l/min	275,5	311,5	8,5	358,5	394,5	11,0	441,5	477,5	13,5	524,5	560,5	16,0	607,5	643,5	18,5	690,5	726,5	20,9	773,5	809,5	23,4
3,8	8 l/min	279,5	315,5	8,6	364,5	400,5	11,2	449,5	485,5	13,7	534,5	570,5	16,3	619,5	655,5	18,8	704,5	740,5	21,3	789,5	825,5	23,9
4,3	9 l/min	283,5	319,5	8,7	370,5	406,5	11,3	457,5	493,5	13,9	544,5	580,5	16,5	631,5	667,5	19,1	718,5	754,5	21,7	805,5	841,5	24,3
4,9	11 l/min	289,5	325,5	8,9	379,5	415,5	11,6	469,5	505,5	14,3	559,5	595,5	16,9	649,5	685,5	19,6	739,5	775,5	22,3	829,5	865,5	25,0
5,9	13 l/min	296,5	332,5	9,1	390	426	11,9	483,5	519,5	14,7	577	613	17,4	670,5	706,5	20,2	764	800	23,0	857,5	893,5	25,8
6,5	14 l/min	301,5	337,5	9,2	397,5	433,5	12,1	493,5	529,5	14,9	589,5	625,5	17,8	685,5	721,5	20,6	781,5	817,5	23,5	877,5	913,5	26,3
7,8	17 l/min	309,5	345,5	9,5	409,5	445,5	12,4	509,5	545,5	15,4	609,5	645,5	18,3	709,5	745,5	21,3	809,5	845,5	24,2	909,5	945,5	27,2
9,8	22 l/min	327,5	363,5	10,0	436,5	472,5	13,2	545,5	581,5	16,4	654,5	690,5	19,6	763,5	799,5	22,8	872,5	908,5	26,0	981,5	1017,5	29,2

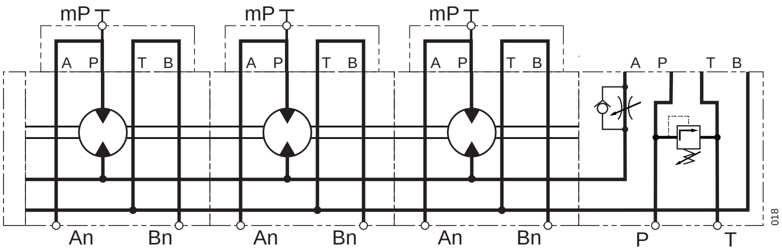
Note:

- For flow dividers with more than 8 elements and/or global inlets of more than 90 l/min, we suggest you contact our technical deptartment to evaluate if an additional inlet or more than one is required.

EXPLODED VIEW WITH COUPLING TORQUE VALUES



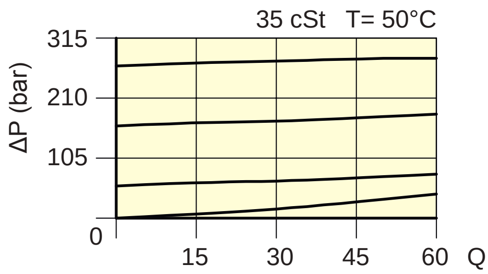
HYDRAULIC SYMBOL

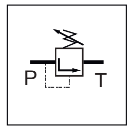


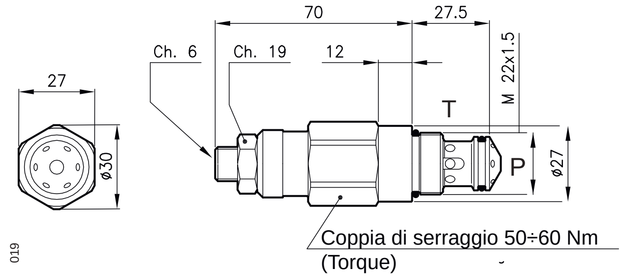
VALVES CHARACTERISTICS

RELIEF VALVE (50 L/MIN)

Max flow rate	50 l/min
Max pressure in P	350 bar
Max pressure in T	210 bar
Spring range 01	10÷105 bar
Spring range 02	70÷210 bar
Spring range 03	140÷350 bar
Filtering required	19/15 ISO 4466 (25 μm absolute)
Oil viscosity range allowed	2.8 ÷ 350 cSt
Temperature range	-20 +80 °C
Standard seals material	Poliuretan Buna N
Weight	0,270 kg
Percentage of the set value to open	95% (defined with 1 i/min)
Percentage of the set value to close	75% (defined with 1 i/min)
Hydraulic oil	Mineral oil HM e HV ISO 6074



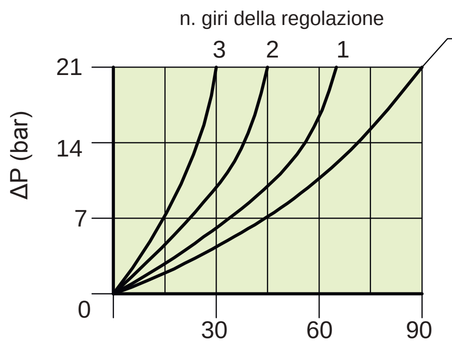


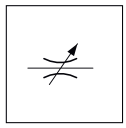


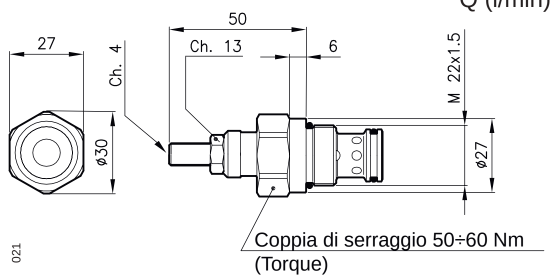
FLOW RATE ADJUSTMENT VALVE (50 L/MIN)

Max flow rate adjustable (Δp 7 bar)	0 ÷ 50 l/min
Max flow rate adjustable (Δp 14 bar)	0 ÷ 70 l/min
Max pressure	350 bar
Filtering required	19/15 ISO 4466 (25 μm absolute)
Oil viscosity range allowed	2.8 ÷ 350 cSt
Temperature range	-20 +80 °C
Standard seals material	Poliuretan Buna N
Weight	0,170 kg
Hydraulic oil	Mineral oil HM e HV ISO 6074

Note
Total valve regulation is done by 4 spin.



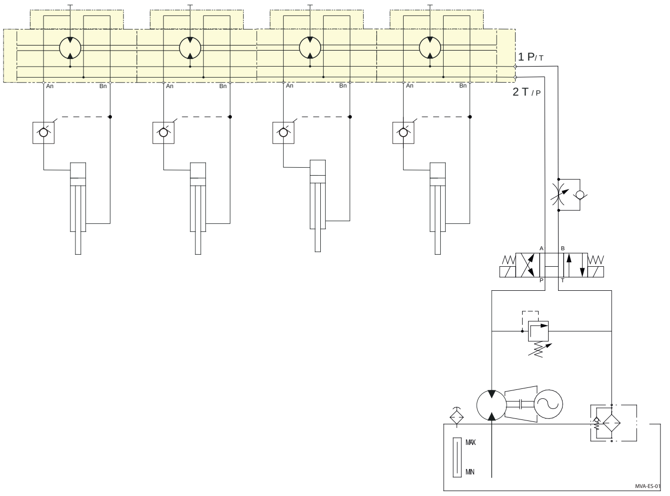




EXAMPLES

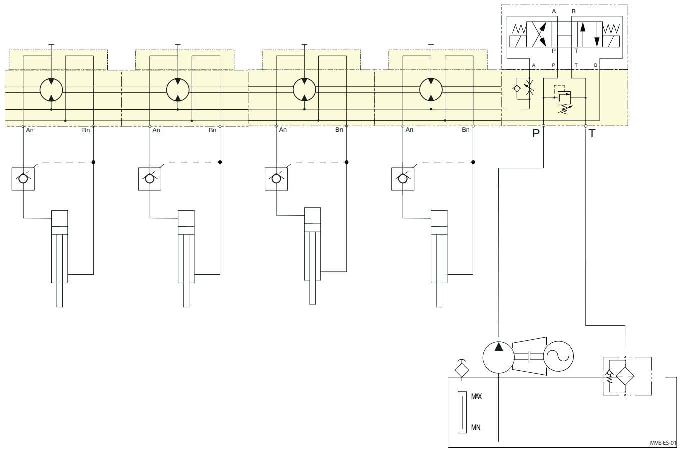
MVA

Standard 4 elements flow divider



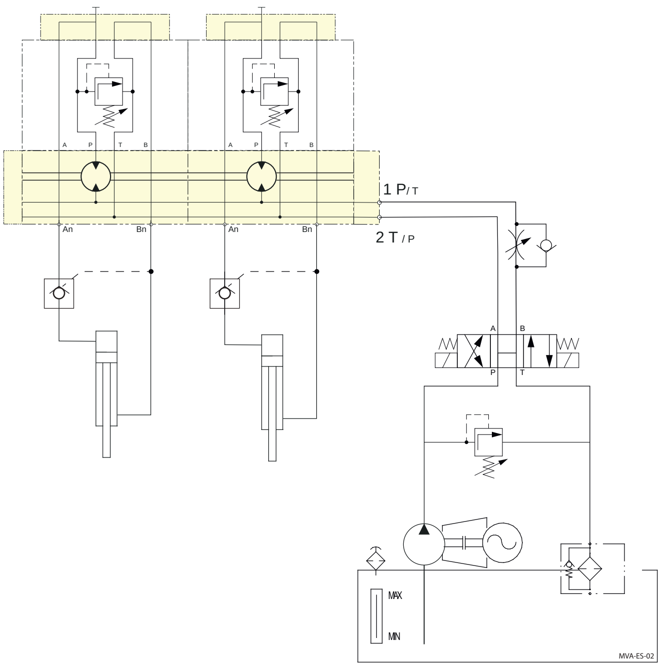
MVE

4 elements flow divider with integrated relief valve and flow rate regulator.
On the CETOP a command valve installed.



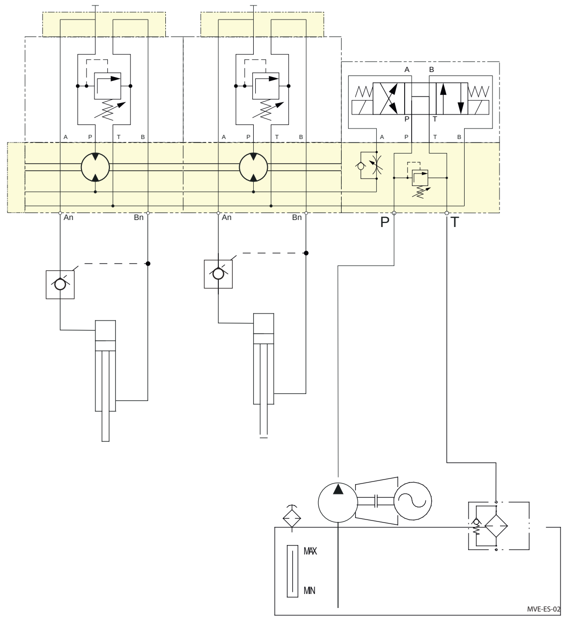
MVA

2 Elements Flow Divider
Relief valves installed on the elements CETOP to realign the actuators at the end of the stroke.



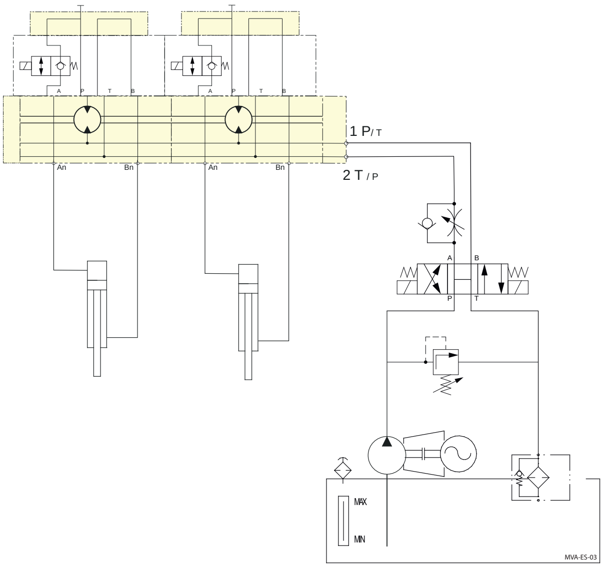
MVE

2 Elements flow divider with integrated relief valve and flow rate regulator. On the CETOP a command valve installed.
Relief valves installed on the elements CETOP to realign the actuators at the end of the stroke.



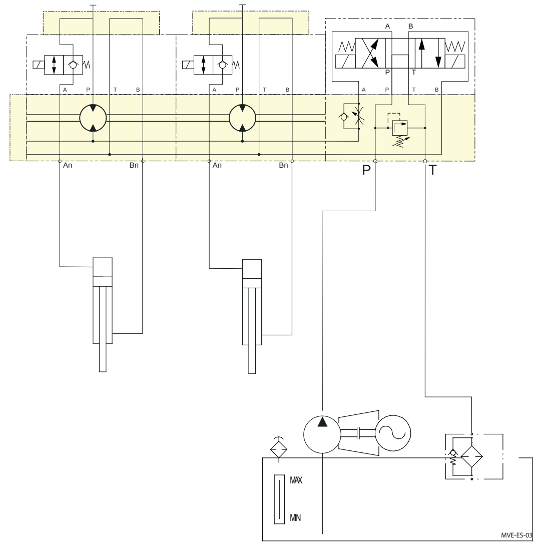
MVA

2 Elements Flow Divider with electrical check valves on each element CETOP interface

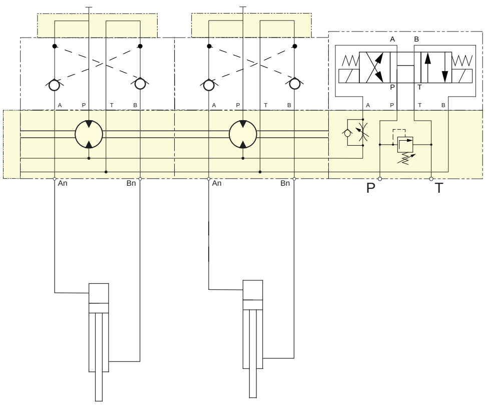


MVE

2 Elements flow divider with integrated relief valve and flow rate regulator. On the CETOP a command valve installed.
Relief valves installed on the elements CETOP to realign the actuators at the end of the stroke.
Electrical check valves on each element CETOP interface.



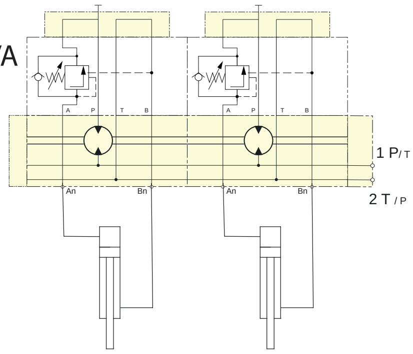
MVE



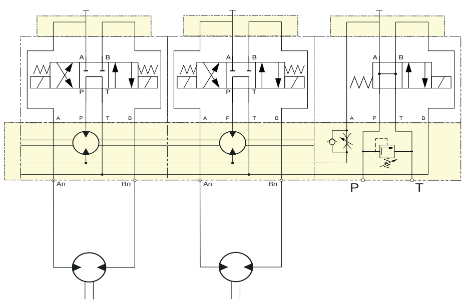
2 Elements flow divider with integrated relief valve and flow rate regulator. On the CETOP a command valve installed.
Relief valves installed on the elements CETOP to realign the actuators at the end of the stroke.
On the single elements CETOP, piloted nonreturn valves.

MVA

Flow divider with overcenter valves on each CETOP.



MVE



2 Elements flow divider with integrated relief valve and flow rate regulator. On the CETOP a command valve installed.
Relief valves installed on the elements CETOP to realign the actuators at the end of the stroke.
On the single element CETOP, independent 3 position controls.

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NET WEIGHT (Kg) TABLE FOR FLOW DIVIDERS
TABELLA DEL PESO NETTO (Kg) DEI DIVISORI

RV-0D

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,17	1,190	1,634	2,071	2,515	2,951	3,395	3,831	4,275	4,712	5,156	5,592	6,036	6,473	6,917	7,353
0,25	1,202	1,652	2,094	2,544	2,987	3,437	3,879	4,329	4,771	5,221	5,664	6,114	6,556	7,006	7,448
0,45	1,232	1,697	2,154	2,619	3,076	3,541	3,998	4,463	4,920	5,385	5,843	6,307	6,765	7,230	7,687
0,57	1,251	1,725	2,192	2,666	3,133	3,607	4,074	4,548	5,015	5,490	5,956	6,431	6,897	7,372	7,839
0,76	1,279	1,768	2,249	2,737	3,218	3,707	4,188	4,676	5,157	5,646	6,127	6,616	7,097	7,585	8,066
0,98	1,308	1,810	2,306	2,808	3,304	3,806	4,302	4,804	5,300	5,802	6,298	6,800	7,296	7,798	8,294
1,27	1,355	1,882	2,401	2,927	3,446	3,972	4,491	5,018	5,537	6,063	6,582	7,109	7,628	8,154	8,673
1,52	1,393	1,938	2,476	3,022	3,560	4,105	4,643	5,188	5,726	6,272	6,810	7,355	7,893	8,438	8,976
2,3	1,507	2,109	2,704	3,306	3,901	4,503	5,098	5,700	6,295	6,897	7,492	8,095	8,689	9,292	9,886

RV-0S

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,17	1,248	1,690	2,123	2,565	2,998	3,440	3,873	4,315	4,748	5,190	5,623	6,064	6,498	6,939	7,373
0,25	1,260	1,708	2,147	2,594	3,034	3,481	3,921	4,368	4,808	5,255	5,695	6,142	6,582	7,029	7,469
0,45	1,290	1,752	2,207	2,669	3,124	3,586	4,040	4,502	4,957	5,419	5,874	6,336	6,790	7,252	7,707
0,57	1,309	1,781	2,245	2,716	3,180	3,652	4,116	4,588	5,052	5,523	5,987	6,459	6,923	7,395	7,859
0,76	1,338	1,823	2,302	2,787	3,266	3,752	4,230	4,716	5,194	5,680	6,158	6,644	7,122	7,608	8,086
0,98	1,366	1,866	2,359	2,859	3,351	3,851	4,344	4,844	5,336	5,836	6,329	6,829	7,321	7,821	8,314
1,27	1,413	1,937	2,453	2,977	3,493	4,017	4,533	5,057	5,573	6,097	6,613	7,137	7,653	8,177	8,693
1,52	1,451	1,994	2,529	3,072	3,607	4,150	4,685	5,228	5,763	6,305	6,841	7,383	7,919	8,461	8,996
2,3	1,565	2,165	2,757	3,356	3,948	4,548	5,140	5,740	6,332	6,931	7,523	8,123	8,715	9,314	9,907

RV-0V

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,17	1,323	1,836	2,342	2,855	3,361	3,874	4,380	4,893	5,398	5,912	6,417	6,930	7,436	7,949	8,455
0,25	1,335	1,854	2,366	2,885	3,397	3,916	4,427	4,946	5,458	5,977	6,489	7,008	7,519	8,039	8,550
0,45	1,365	1,899	2,425	2,959	3,486	4,020	4,547	5,080	5,607	6,141	6,668	7,202	7,728	8,262	8,789
0,57	1,384	1,927	2,463	3,007	3,543	4,086	4,622	5,166	5,702	6,245	6,781	7,325	7,861	8,404	8,940
0,76	1,412	1,970	2,520	3,078	3,628	4,186	4,736	5,294	5,844	6,402	6,952	7,510	8,060	8,618	9,168
0,98	1,441	2,013	2,577	3,149	3,714	4,285	4,850	5,422	5,986	6,558	7,123	7,695	8,259	8,831	9,395
1,27	1,488	2,084	2,672	3,268	3,856	4,451	5,040	5,635	6,223	6,819	7,407	8,003	8,591	9,186	9,775
1,52	1,526	2,141	2,748	3,362	3,970	4,584	5,191	5,806	6,413	7,027	7,635	8,249	8,856	9,471	10,078
2,3	1,640	2,311	2,975	3,647	4,311	4,982	5,646	6,318	6,982	7,653	8,317	8,989	9,653	10,324	10,988

RV-1D

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,9	2,765	3,805	4,844	5,883	6,922	7,962	9,000	10,040	11,079	12,118	13,157	14,196	15,235	16,275	17,313
1,2	2,798	3,855	4,910	5,966	7,021	8,077	9,133	10,189	11,244	12,300	13,355	14,412	15,467	16,523	17,578
1,7	2,848	3,929	5,009	6,090	7,170	8,251	9,331	10,412	11,492	12,573	13,653	14,734	15,814	16,895	17,975
2,2	2,914	4,028	5,141	6,255	7,369	8,483	9,596	10,710	11,823	12,937	14,050	15,164	16,277	17,391	18,504
2,6	2,980	4,128	5,274	6,421	7,567	8,714	9,860	11,007	12,154	13,301	14,447	15,594	16,740	17,887	19,033
3,2	3,047	4,227	5,406	6,586	7,765	8,946	10,125	11,305	12,484	13,665	14,844	16,024	17,203	18,383	19,563
3,8	3,113	4,326	5,538	6,752	7,964	9,177	10,389	11,603	12,815	14,028	15,241	16,454	17,666	18,880	20,092
4,3	3,179	4,425	5,671	6,917	8,162	9,409	10,654	11,900	13,146	14,392	15,638	16,884	18,129	19,376	20,621
4,9	3,278	4,574	5,869	7,165	8,460	9,756	11,051	12,347	13,642	14,938	16,233	17,529	18,824	20,120	21,415
5,9	3,394	4,748	6,101	7,454	8,807	10,161	11,514	12,868	14,221	15,575	16,928	18,281	19,634	20,988	22,341
6,5	3,477	4,872	6,266	7,661	9,055	10,451	11,845	13,240	14,634	16,030	17,424	18,819	20,213	21,608	23,003
7,8	3,609	5,070	6,531	7,992	9,452	10,914	12,374	13,835	15,296	16,757	18,218	19,679	21,139	22,601	24,061
9,8	3,907	5,517	7,126	8,736	10,345	11,956	13,565	15,175	16,784	18,394	20,004	21,614	23,223	24,833	26,443

RV-1S

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,9	2,880	3,912	4,943	5,975	7,006	8,038	9,069	10,101	11,132	12,164	13,194	14,226	15,257	16,289	17,320
1,2	2,913	3,962	5,009	6,058	7,105	8,154	9,201	10,250	11,297	12,345	13,393	14,441	15,489	16,537	17,585
1,7	2,963	4,036	5,109	6,182	7,254	8,327	9,400	10,473	11,545	12,618	13,691	14,764	15,836	16,909	17,982
2,2	3,029	4,136	5,241	6,347	7,453	8,559	9,664	10,771	11,876	12,982	14,087	15,194	16,299	17,405	18,511
2,6	3,095	4,235	5,373	6,513	7,651	8,790	9,929	11,068	12,207	13,346	14,484	15,624	16,762	17,902	19,040
3,2	3,161	4,334	5,505	6,678	7,849	9,022	10,193	11,366	12,537	13,710	14,881	16,054	17,225	18,398	19,569
3,8	3,228	4,433	5,638	6,843	8,048	9,253	10,458	11,664	12,868	14,074	15,278	16,484	17,688	18,894	20,098
4,3	3,294	4,532	5,770	7,009	8,246	9,485	10,723	11,961	13,199	14,438	15,675	16,914	18,151	19,390	20,628
4,9	3,393	4,681	5,969	7,257	8,544	9,832	11,120	12,408	13,695	14,983	16,271	17,559	18,846	20,134	21,422
5,9	3,509	4,855	6,200	7,546	8,891	10,237	11,583	12,929	14,274	15,620	16,965	18,311	19,656	21,003	22,348
6,5	3,591	4,979	6,365	7,753	9,139	10,527	11,913	13,301	14,687	16,075	17,461	18,849	20,235	21,623	23,009
7,8	3,724	5,177	6,630	8,084	9,536	10,990	12,443	13,896	15,349	16,803	18,255	19,709	21,161	22,615	24,068
9,8	4,021	5,624	7,225	8,828	10,429	12,032	13,633	15,236	16,837	18,440	20,041	21,644	23,245	24,848	26,449

RV-1V

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
0,9	2,845	3,935	5,024	6,113	7,202	8,292	9,380	10,470	11,558	12,648	13,737	14,826	15,915	17,005	18,093
1,2	2,878	3,985	5,090	6,196	7,301	8,407	9,512	10,619	11,724	12,830	13,935	15,041	16,146	17,253	18,358
1,7	2,928	4,059	5,189	6,320	7,450	8,581	9,711	10,842	11,972	13,103	14,233	15,364	16,494	17,625	18,755
2,2	2,994	4,158	5,321	6,485	7,648	8,813	9,975	11,140	12,303	13,467	14,630	15,794	16,957	18,121	19,284
2,6	3,060	4,258	5,454	6,651	7,847	9,044	10,240	11,437	12,633	13,831	15,027	16,224	17,420	18,617	19,813
3,2	3,126	4,357	5,586	6,816	8,045	9,276	10,505	11,735	12,964	14,194	15,423	16,654	17,883	19,113	20,342
3,8	3,193	4,456	5,718	6,982	8,244	9,507	10,769	12,033	13,295	14,558	15,820	17,084	18,346	19,609	20,871
4,3	3,259	4,555	5,850	7,147	8,442	9,739	11,034	12,330	13,626	14,922	16,217	17,514	18,809	20,105	21,401
4,9	3,358	4,704	6,049	7,395	8,740	10,086	11,431	12,777	14,122	15,468	16,813	18,159	19,504	20,850	22,195
5,9	3,474	4,878	6,280	7,684	9,087	10,491	11,894	13,298	14,701	16,105	17,507	18,911	20,314	21,718	23,121
6,5	3,556	5,002	6,446	7,891	9,335	10,781	12,225	13,670	15,114	16,559	18,003	19,449	20,893	22,338	23,782
7,8	3,689	5,200	6,710	8,222	9,732	11,244	12,754	14,265	15,776	17,287	18,797	20,309	21,819	23,330	24,841
9,8	3,986	5,647	7,306	8,966	10,625	12,286	13,945	15,605	17,264	18,924	20,583	22,244	23,903	25,563	27,222

RV-2D

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4	4,862	7,135	9,440	11,713	14,018	16,291	18,595	20,868	23,173	25,446	27,751	30,024	32,329	34,602	36,907
6	5,040	7,402	9,796	12,158	14,552	16,914	19,307	21,669	24,063	26,425	28,819	31,181	33,575	35,937	38,331
9	5,277	7,758	10,270	12,751	15,264	17,744	20,257	22,738	25,250	27,731	30,243	32,724	35,237	37,717	40,230
11	5,514	8,114	10,745	13,344	15,976	18,575	21,206	23,806	26,437	29,036	31,667	34,267	36,898	39,497	42,129
14	5,870	8,648	11,457	14,234	17,044	19,821	22,630	25,408	28,217	30,994	33,803	36,581	39,390	42,168	44,977
17	6,108	9,004	11,932	14,828	17,756	20,652	23,580	26,476	29,404	32,300	35,228	38,124	41,052	43,948	46,875
19	6,345	9,360	12,406	15,421	18,468	21,483	24,529	27,544	30,590	33,605	36,652	39,666	42,713	45,728	48,774
22	6,701	9,894	13,118	16,311	19,536	22,729	25,953	29,146	32,370	35,563	38,788	41,981	45,205	48,398	51,622
26	6,917	10,218	13,550	16,851	20,183	23,484	26,816	30,117	33,449	36,750	40,082	43,383	46,715	50,016	53,348
30	7,392	10,930	14,499	18,037	21,607	25,145	28,715	32,253	35,823	39,361	42,930	46,468	50,038	53,576	57,146
34	7,807	11,553	15,330	19,076	22,853	26,599	30,376	34,122	37,899	41,645	45,423	49,168	52,946	56,691	60,469
40	8,341	12,354	16,398	20,411	24,455	28,468	32,512	36,525	40,570	44,582	48,627	52,639	56,684	60,697	64,741

RV-2V

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
4	6,466	9,069	11,661	14,263	16,855	19,458	22,050	24,653	27,245	29,848	32,440	35,043	37,635	40,237	42,829
6	6,644	9,336	12,017	14,708	17,389	20,081	22,762	25,454	28,135	30,827	33,508	36,200	38,881	41,573	44,254
9	6,881	9,692	12,491	15,302	18,101	20,912	23,712	26,522	29,322	32,132	34,932	37,742	40,542	43,353	46,152
11	7,119	10,048	12,966	15,895	18,814	21,743	24,661	27,590	30,509	33,438	36,356	39,285	42,204	45,133	48,051
14	7,475	10,582	13,678	16,785	19,882	22,989	26,085	29,192	32,289	35,396	38,492	41,599	44,696	47,803	50,899
17	7,712	10,938	14,153	17,379	20,594	23,819	27,035	30,260	33,475	36,701	39,916	43,142	46,357	49,583	52,798
19	7,949	11,294	14,627	17,972	21,306	24,650	27,984	31,328	34,662	38,007	41,340	44,685	48,019	51,363	54,697
22	8,305	11,828	15,339	18,862	22,374	25,896	29,408	32,930	36,442	39,965	43,476	46,999	50,511	54,033	57,545
26	8,521	12,151	15,771	19,401	23,021	26,651	30,271	33,901	37,521	41,151	44,771	48,401	52,021	55,651	59,271
30	8,996	12,863	16,720	20,588	24,445	28,313	32,170	36,038	39,894	43,762	47,619	51,487	55,344	59,212	63,069
34	9,411	13,486	17,551	21,627	25,691	29,767	33,831	37,907	41,971	46,047	50,111	54,187	58,251	62,327	66,391
40	9,945	14,288	18,619	22,962	27,293	31,636	35,967	40,310	44,641	48,984	53,315	57,658	61,990	66,332	70,664

XV-3D

Flow divider elements / Numero elementi nel divisore

Displacement/Cilindrata	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
15	11,527	17,153	22,785	28,412	34,044	39,671	45,303	50,929	56,561	62,188	67,820	73,446	79,078	84,705	90,337
18	11,725	17,451	23,182	28,908	34,639	40,365	46,096	51,822	57,553	63,279	69,010	74,735	80,467	86,192	91,923
21	12,023	17,897	23,777	29,652	35,531	41,406	47,286	53,160	59,040	64,915	70,794	76,669	82,549	88,423	94,303
27	12,393	18,452	24,517	30,577	36,642	42,702	48,766	54,826	60,891	66,951	73,016	79,075	85,140	91,200	97,265
32	12,888	19,196	25,509	31,816	38,129	44,437	50,750	57,057	63,370	69,678	75,990	82,298	88,611	94,918	101,231
38	13,346	19,882	26,423	32,960	39,501	46,037	52,579	59,115	65,656	72,193	78,734	85,270	91,812	98,348	104,889
43	13,736	20,467	27,203	33,934	40,671	47,402	54,138	60,870	67,606	74,337	81,074	87,805	94,541	101,272	108,009
47	14,033	20,913	27,798	34,678	41,563	48,443	55,328	62,208	69,093	75,973	82,858	89,738	96,623	103,503	110,389
51	14,331	21,359	28,393	35,422	42,456	49,484	56,518	63,547	70,581	77,609	84,643	91,672	98,706	105,734	112,768
54	14,628	21,806	28,988	36,166	43,348	50,526	57,708	64,885	72,068	79,245	86,428	93,605	100,788	107,965	115,148
61	15,124	22,549	29,980	37,405	44,835	52,261	59,691	67,117	74,547	81,972	89,403	96,828	104,259	111,684	119,114
64	15,421	22,995	30,575	38,149	45,728	53,302	60,881	68,455	76,034	83,608	91,188	98,762	106,341	113,915	121,494
70	15,917	23,739	31,566	39,388	47,215	55,037	62,864	70,686	78,513	86,335	94,162	101,984	109,811	117,633	125,460
74	16,215	24,185	32,161	40,132	48,108	56,078	64,054	72,025	80,001	87,971	95,947	103,918	111,894	119,864	127,840
90	17,119	25,543	33,971	42,394	50,822	59,245	67,673	76,096	84,525	92,948	101,376	109,799	118,227	126,650	135,079