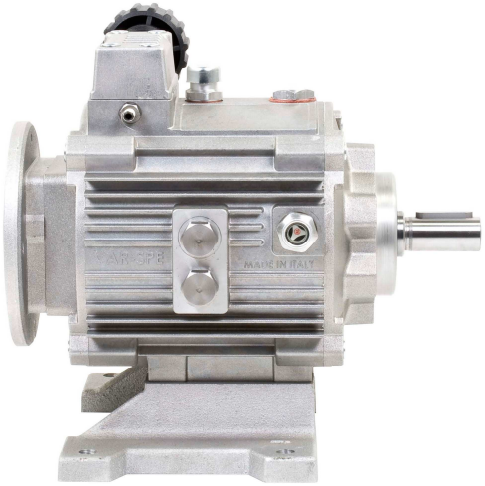
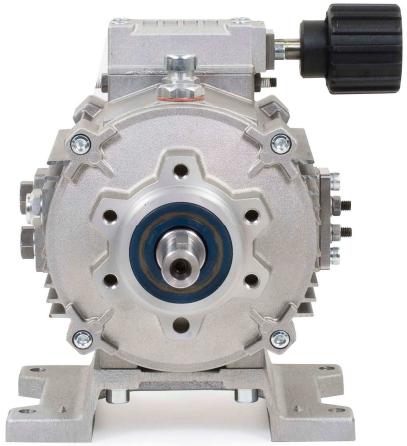
VAR-SPE

VARIATORI OLEODINAMICI DI VELOCITÀ



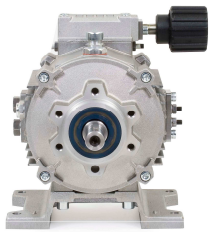


VAR-SPE SPEED VARIATORS:
TORQUE-SPEED REGULATORS

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

VAR-SPE VARIATORS

HOW CAN WE SEE THE VAR-SPE VARIATOR?



AS A SIMPLE VARIATOR, LIKE MECHANICAL ONE, FOR MOST APPLICATIONS (MANUFACTURING MACHINE)

AS AN AUTOMATION SYSTEM, LIKE INVERTER, BUT FOR HEAVY AND DIFFICULT APPLICATIONS

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

VAR-SPE AS SIMPLE VARIATOR

- SIMPLE metric INPUT/OUTPUT FLANGE (available also for Nema)
- FLEXIBLE: 3 modular sizes (0,37-4 kW) for K series
- SIMPLE SPEED CONTROLS

THE REASONS TO PREFER VAR-SPE

BETTER PERFORMANCES THAN MECHANICAL

- WIDE SPEED RANGE (HIGH SPEED RANGE 1/30 INSTEAD OF 1/6)
- VERY LOW SPEED (50 RPM) WITH TORQUE
- ZEROING WITH MOTOR ON
- SIMPLE TORQUE LIMITER (TORQUE-PRESSURE SEE IN NEXT PAGES)
- SPEED ADJUSTMENT WITH MOTOR OFF
- BOTH OUTPUT DIRECTIONS; ALSO ON INPUT FOR K SERIES
- FINE SPEED ADJUSTMENT IN THE TIME

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

VAR-SPE CATALOGUES

K2-K4-K5 variators 0,37 - 4 kW

15-17B variators 4 - 22 kW

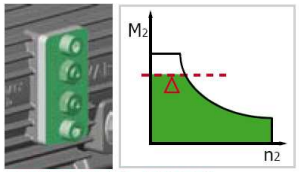
Pumps and Motors 0,37 - 4 kW

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

Technical features

1450-0-1450 rpm

USCITA/OUTPUT
Bidirezionale
Disponibili Flange B5
Both directions
B5 available flanges



CONTROLLO COPPIA
TORQUE CONTROL
Regolabile
Adjustable

ENTRATA/INPUT
Rotazione bidirezionale
Disponibili flange B5 e B14.
Rotation on both directions.
B5 and B14 available flanges.

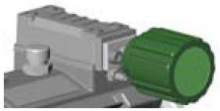
ATEX
Gruppo II
Group II

INDICATORE VELOCITA'
SPEED INDICATOR
Disponibile
Available

PIEDINI / FEET
Removibili
Removable

Adaptable to mechanical variator
Adattabile ai variatori meccanici

- **Zero output rpm with motor rotating at 1400 rpm.**
- **Fine adjustment of speed, even after long running life.**
- **Speed setting is possible with motor off.**



CONTROLLO VELOCITA'
SPEED CONTROL
Ampia varietà di comandi, vedere catalogo applicazioni
Wide range of controls, see the applications catalogue

B3-B6-B7
V5-V6

POSIZIONE MONTAGGIO
MOUNTING POSITION
Universale
Universal

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

THE CATALOGUE

Different colour for each size

MOTOR POWER

SIZE

SELEZIONE / SELECTION

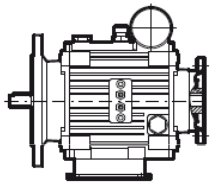
0.37kW K2

Variator size K2
Variatore tipo K2

Input/Entrata	71 B14	71 B5
Output/Uscita	-	71 B5

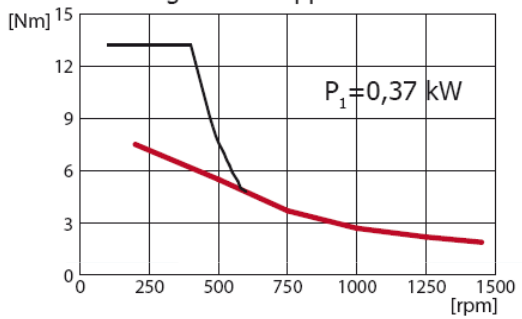
Oil q.ty/Q.tà olio: 0,5 lt. (position V5: 0,7 lt)

Weight/Peso	Kg	lbs
Without motor/Senza motore	9.4	20.7
With motor/Con motore 0.37 kW	15.4	34



For dimensions, see pag.23/Per le dimensioni, vedi pag.23

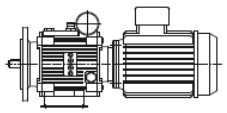
Torque-speed diagram
Diagramma coppia-velocità



Torque available for continuous duty
Coppia nominale per funzionamento continuo

Starting torque for very intermittent use, as motor is loaded with 200% Ampere. Warning: not to burn the motor.
Coppia di spunto per uso intermittente, il motore assorbe il 200% degli Ampere. Attenzione a non bruciare il motore.

Motor-Variator
Moto-Variatore



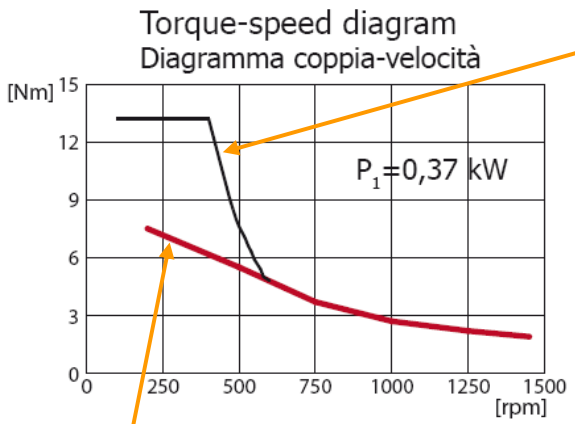
P_1= 0,37 kW n_1=1430 min^{-1}

Speed range	M_2	M_s	n_{2min}	Gear box size	Gear box type	i	f_s	Atex Cat.	Ø	Variator Input Flange		Output flange	Weight Peso	Dimens.
[rpm]	[Nm]	[Nm]	[rpm]						[mm]	71 B5	71 B14	71 B5	kg/lbs	Pag.
0-1430	1.9	13.2	50	-	-	-	-	2/3	14	•	•	•	15.4/34	23

Torque at starting

Torque at max speed

THE CATALOGUE



starting torque

TORQUE-SPEED diagram

working torque

WE CAN SEE:

• THE WORKING TORQUE INCREASES WHILE THE SPEED GOES DOWN => VERY IMPORTANT TO SELECT RIGHT SIZE

• STARTING TORQUE: 2-3 TIMES NOMINAL TORQUE

LESS POWER INSTALLED THAN INVERTER

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

THE CATALOGUE: variator with gearbox

Motor Data
Dati motore

Gear box type
Tipologia riduttore

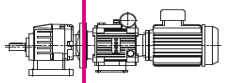
Atex Category
Categoria Atex
2=> Cat.2 (zone 1 or 21)
3=> Cat.3 (zone 2 or 22)

For Atex zone/Per ambienti Atex
If the unit is not available for Atex, select the greater size of the same gearbox.
Se l'unità selezionata non è disponibile in versione Atex, selezionare la taglia superiore dello stesso tipo di riduttore.

With gear box
Con riduttore

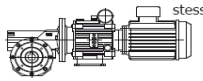
P_1= 0,37 kW n_1=1430 min^{-1}

C



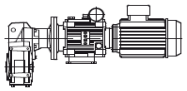
Coaxial / Coassiale

V



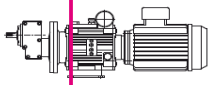
Worm / Vite senza fine

A



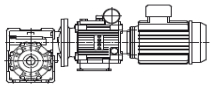
Shaft mounted / Assi paralleli

M



Single stage / Monostadio

Q



Square worm / V.s.f. quadrato

Speed range	M_2	M_s	n_{2min}	Gear box size	Gear box type	i	f_s	Atex Cat.	Ø	Variator Input Flange		Reducer input flange	Weight Peso	Dimens.
[rpm]	[Nm]	[Nm]	[rpm]						[mm]	71 B5	71 B14	71 B5	kg/lbs	Pag.
0-1100	2.4	18	38	402A	C	**1,3**	2	2/3	28	•	•	•	27/60	20
0-911	2.9	21	32	311	M	**1,57**	2	2/3	14	•	•	•	25/55	20
0-584	4.6	34	20	511	M	**2,45**	2	3	28	•	•	•	27/60	20
0-503	5.3	39	18	311	M	**2,84**	2	2/3	14	•	•	•	25/55	20
0-435	6.1	45	15	311	M	**3,29**	2	3	14	•	•	•	25/55	20

Speed range
Range di velocità

Output torque at max speed
Coppia uscita alla max velocità

Starting torque
Coppia allo spunto

Minimum speed with stable torque
Minima velocità con coppia stabile

Gear box size
Taglia riduttore

Gear box ratio
Rapporto riduttore

Gear box service factor
Fattore di servizio del riduttore

Diameter of output shaft
Diametro albero uscita

Input flange of variator
Flangia entrata variatore

Input flange of reducer
Flangia entrata riduttore

Weight
Peso

Page with dimensions
Pagina con dimensioni

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

HOW TO SELECT A VARIATOR

The best it's to have torque and speed values (M and n)

For ex. **8 Nm @ 260 rpm**

- if the **maximum speed** is low, if the requested torque is high it's necessary to add a gearbox; we can use only the variator if the max speed is a middle value (600-700 rpm) but the torque is low.

- check the output power P=M*n (ex. 0,22 kW)=> this is the output, considering efficiency of reducer and variator => 0.3 kW input power => size K2

- on the table look at max speed 260 rpm; you can find 0-262 rpm for 202A reducer, check the torque: 9,9 Nm=> it's ok

Speed range	M_2	M_S	n_{2min}	Gear box size	Gear box type	i	f_s	Atex Cat.	Ø	Variator Input Flange		Reducer input flange	Weight Peso	Dimens.
[rpm]	[Nm]	[Nm]	[rpm]						[mm]	71 B5	71 B14	71 B5	kg/lbs	Pag.
0-285	9.1	68	10	452A	C	**5.01**	2	2/3	30	•	•	•	24/53	26
0-285	9.1	68	10	502A	C	**5.01**	2	2/3	30	•	•	•	27/59	27
0-271	9.8	73	9.5	511	M	**5.27**	2	2/3	28	•	•	•	20/45	25
0-262	9.9	74	9.2	202A	C	**5.45**	2	2/3	16	•	•	•	19/42	26
0-257	10.1	75	9.0	402A	C	**5.55**	2	2/3	25	•	•	•	21/46	27
0-235	11.1	82	8.2	452A	C	**6.07**	2	2/3	30	•	•	•	24/53	26
0-235	11.1	82	8.2	502A	C	**6.07**	2	2/3	30	•	•	•	27/59	27
0-230	11.3	84	8.1	F62C	A	**6.21**	2	2/3	40	•	•	•	37/82	31

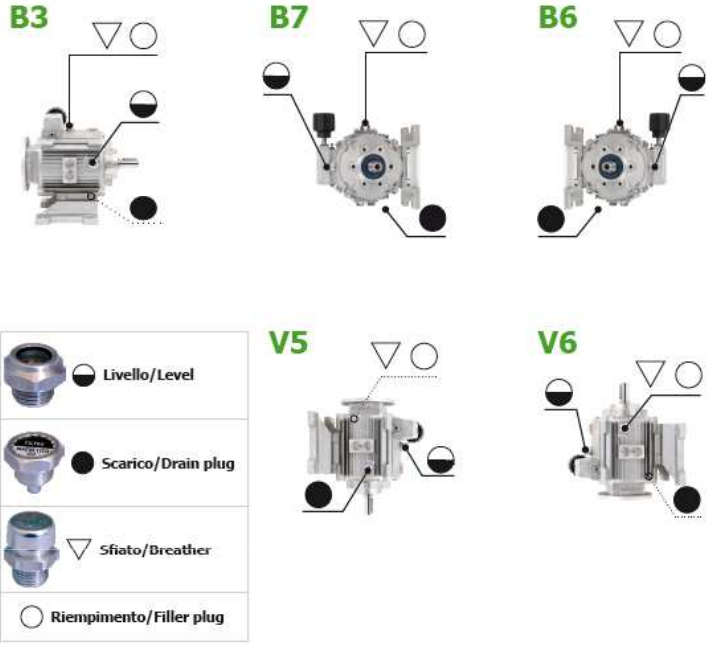
HOW TO SELECT A VARIATOR

VARIATOR + GEARBOX

IMPORTANT: if toghether with the variator you select a gearbox not of ours, please check if it can resist to max torque of variator at starting (multiply variator torque for ratio and efficiency)

Pay attention to the rotation: the reducer can reverse or not the sense of rotation of the variator (it depends on the number of stage); this is important with single-direction application or speed control

INSTALLATION



• The plugs depends on the working position

•The breather plug is important: it's on the top, it avoids the seal getting off

IMPORTANT the position with foot on the ceiling is not possible

Pay attention not to put water on the breather plug, for ex. to cool the variator

VARIATOR TEMPERATURE: the housing can reach 60°C + ambient temperature (you cannot keep there you hand)

AMBIENT TEMPERATURE is important (concerning oil)

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

LUBRICATION

OIL HAS TWO FUNCTIONS

- **lubrication**
- **the means for power transmission**

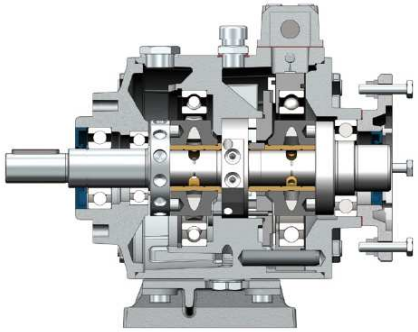
Type of oil → depends on the VARIATOR SIZE and **AMBIENT TEMPERATURE**

The viscosity must be constant when the ambient temperature changes; it's possible to use synthetic car engine oil, like ex. 5w40

For **high temperature** (more than 40°C) => OIL COOLER (code R + oil cooler), check with var-Spe Technical Dept.

For **low temperature** (less than -15°C) => pre-heater (code P) or special oil

Working principle



Var-Spe infinitely variable hydraulic gears work according to the principle of hydrostatic transmission. They essentially consist of an hydraulic, radial piston variable displacement pump (primary pump) and a constant displacement pump (secondary pump).

Both units, primary and secondary, are housed in the same case, and they are mounted on a fixed shaft. The latter ser-ves as a distributor of the fluid, there are some lines (pressure line and return line), for the flow from the primary unit to the secondary and vice versa, forming a closed circuit.
An auxiliary pump is connected to the primary pump, and supply oil (from oil reservoir) to the hydraulic circuit, through some valves. The variator transmits mechanical power from the driving motor, allowing it to rotate always at the max speed, whi-le the output shaft can be adjusted from max speed to zero rpm, for both output directions.

Speed regulation is accomplished by adjusting the eccentricity of the primary unit and, therefore, the oil flow sent to secon-day unit. The latter, connected to the ou-tput shaft, will drive a speed directly pro-portional to the received oil flow.
The maximum eccentricity of the primary pump, will correspond to the output shaft max speed, and a smaller eccentricity will correspond to a lower output speed.
When the primary pump eccentricity is nil, the output shaft will be at zero rpm.

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

WORKING PRINCIPLE

INTO the VARIATOR → 2 CIRCUITS → MAIN CIRCUIT

2 CIRCUITS → AUXILIARY CIRCUIT

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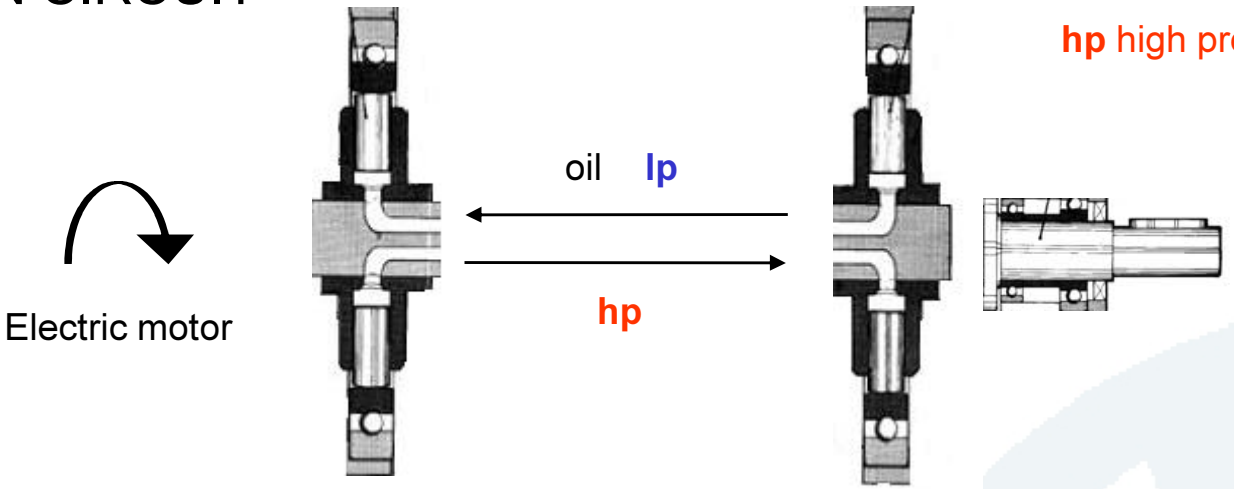
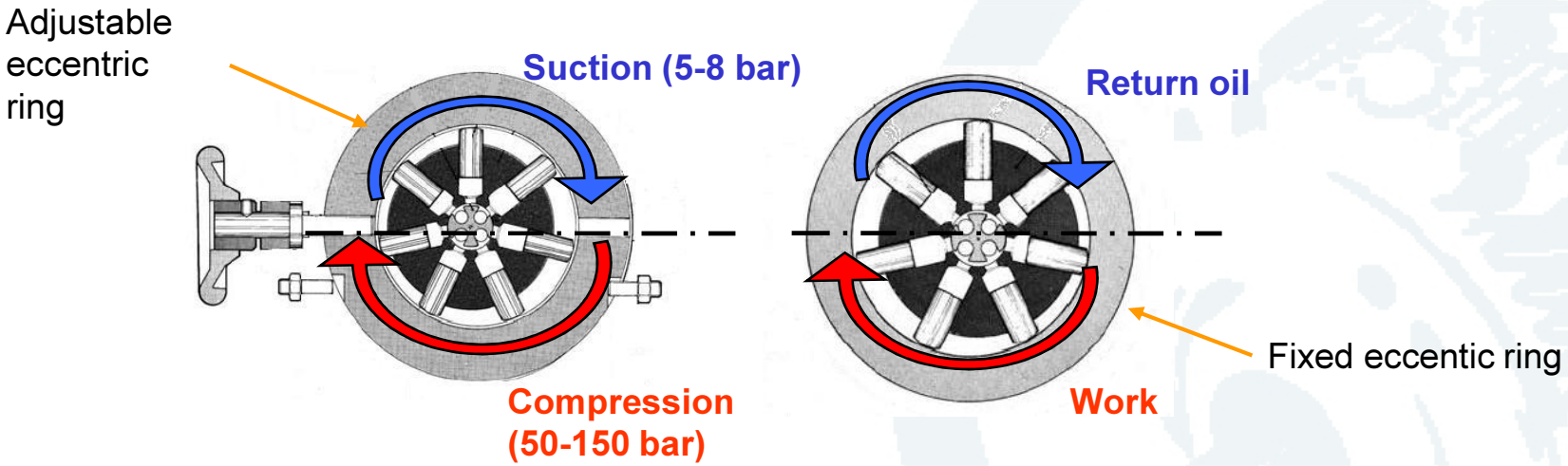
MAIN CIRCUIT

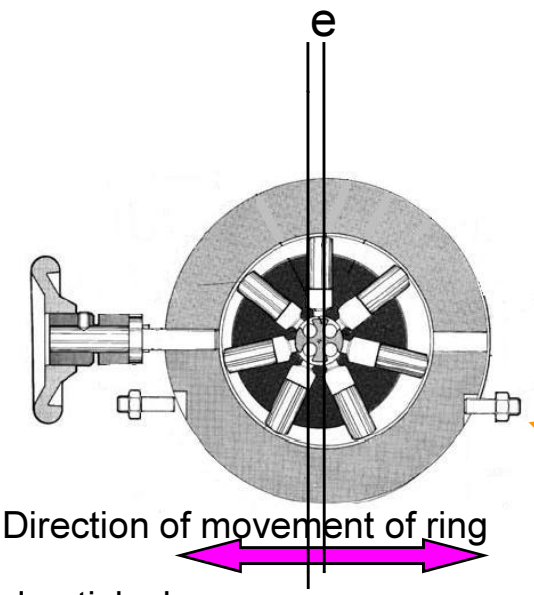
lp low pressure

hp high pressure





MAIN CIRCUIT



mechanical stop

you can limit the movement of ring, so you limit the speed

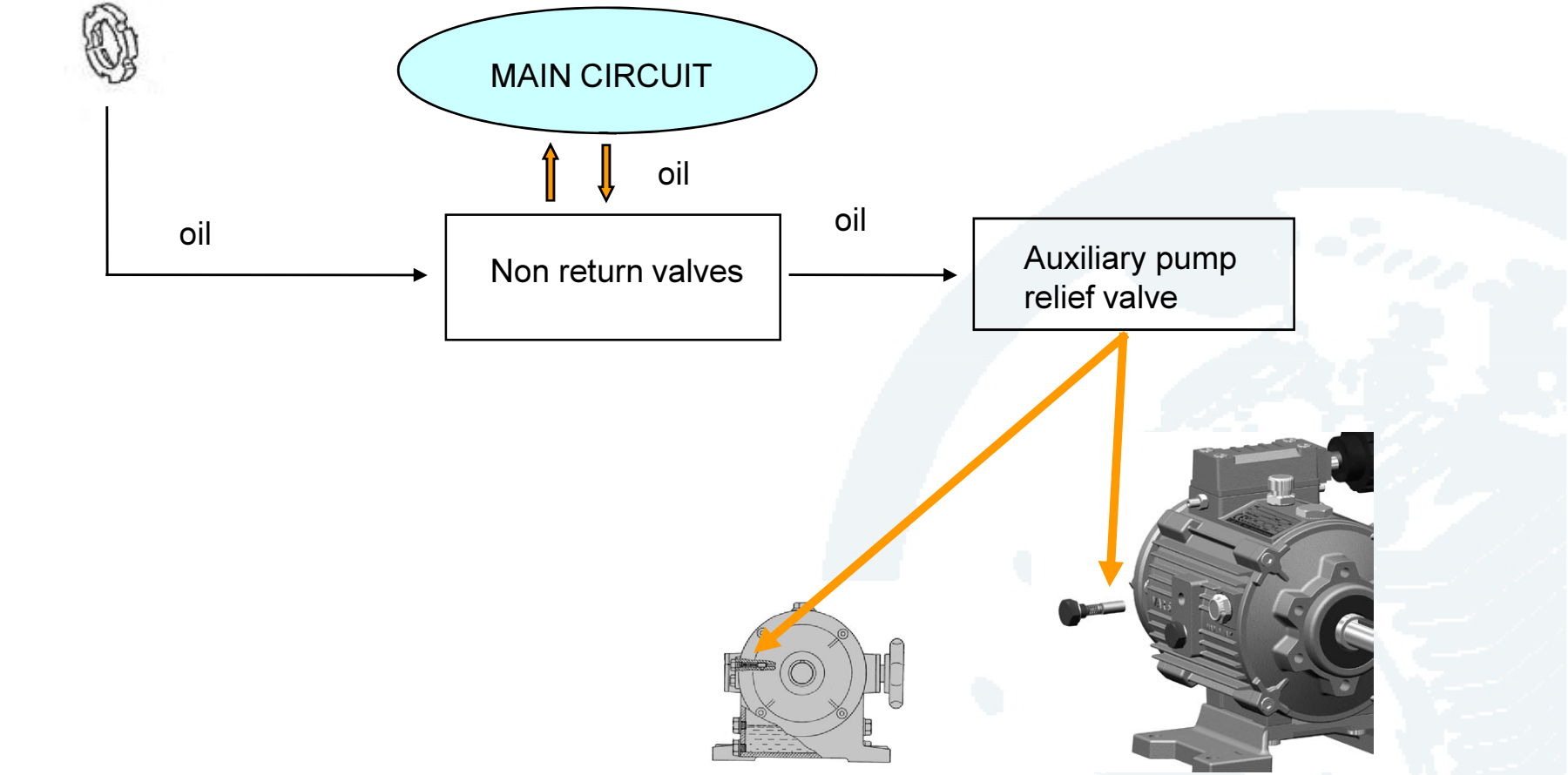
- increasing e, we increase piston stroke => more oil suction, more oil sending => speed increasing
- with e=zero, no oil suction, no oil sending => no output speed

TO ADJUST SPEED => MOVE THE RING=> you can move it in different way, with manual control or by remote system

AUXILIARY CIRCUIT

There is a secondary circuit, with a feed pump (auxiliary pump)=> it supplies oil to the main circuit

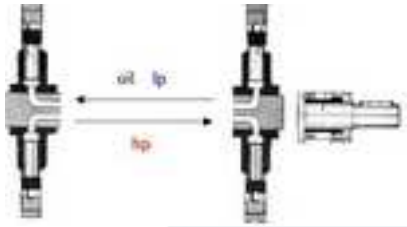
FEEDER PUMP



SYNTHESIS OF CIRCUITS

MAIN CIRCUIT: (p=50 bar)

• oil gets power transmission, p=50 bar at max speed; p=150 bar at starting



AUXILIARY CIRCUIT: (p=5 - 8 bar)

• Oil suction for starting

• It keeps full of oil the internal pipings of main circuit

• supply oil to hydraulic speed control (when there are)

The **OIL PRESSURE** (MAIN CIRCUIT) IS **PROPORTIONAL** TO the **LOAD** => we have a **SIMPLE TORQUE LIMITER,** or use a MANOMETER OR PRESSURE SWITCH (MOTOR OFF) OR PRESSURE GAUGE (SIGNAL)

p (bar) ≈ **M** (Nm) in main circuit

INSTALLATION

Before starting, **CHECK**:

- mounting position
- type and quantity of oil
- For 15-17B the motor rotation (see the arrow on input flange of variator); normal is clockwise

Minimum input speed 600-700 rpm (less rpm, no oil suction)

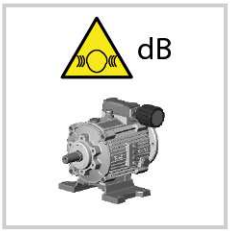
Maximum input speed: 2000 rpm

MOUNTING AFTER LONG STOCKING PERIOD

If you are mounting a variator that has been in stock for long time (more than 10 months), run the variator at low speed without load for half an hour.

Checking for selection

In case of high room temperature (more than +40°C) or low (less the -15°C), check the directions at pag 72 or contact Technical Dept. of Var-Spe



Specify in the order if levels for noiseless are particular demands. See the directions at pag.72.

DON'T use 2 poles motor.

If you need to use 60 Hz motor, contact Technical Dept. of Var-Spe to check service factor.

See other directions on the catalog

Starting

Fill with oil

The variator is supplied WITHOUT OIL; before running, fit to level using the recommended oil (for type and for quantity, referring to mounting position)

When starting a new variator (or a variator after a long stocking), run the unit for 15/20 minutes without load at low speed.

INPUT ROTATION
For K series: the input rotation can be clockwise and counter-clockwise.
For 15-17B the input rotation is clockwise (see the arrow on input flange)

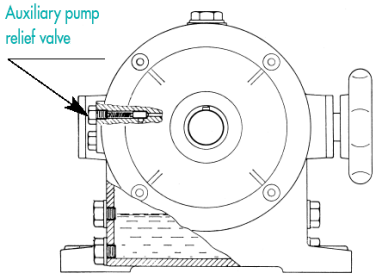
VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ

TROUBLESHOOTING

If there is a problem on starting a variator, first of all, check these simple points:

- type of oil
- quantity of oil, referring to the mounting position
- rotation of electric motor (only for for sizes 15-17B)
- check the ampere of motor: it's proportional to load, when the unit runs at middle-high output speed
- bleed the air in the circuit by unscrew relief valve plug, you will have nr.3 pcs. connected togheter: plug+spring+little hollow cylinder; clean the cylinder, screw all them on the variator without fixing; now switch on and off the motor 2-3 times to bleed the air, then fix the plug

Auxiliary pump relief valve



At the end try to separate the variator from the machine, <u>see if the problem exists also without load</u>

If all this points are right, **contact Var-Spe with type and serial number of the variator**.

CHANGING MOUNTING POSITION

If you need to change mounting position, it depends on type of variator:

- if it's a K series variator, you have only to change the position of the plugs (breather, oil, drain) according to the mounting position table; pay attention to the vertical positions, you have to use an oil charging piping

- for 15-17B it's necessary to order the units for the right mounting position, as the changing needs to open the variator

Pay attention to the quantity of oil when change the mounting position.

Maintenance

Check periodically the oil level, eventually refill with prescribed oil types.
Don't mix synthetic and mineral lubricants.

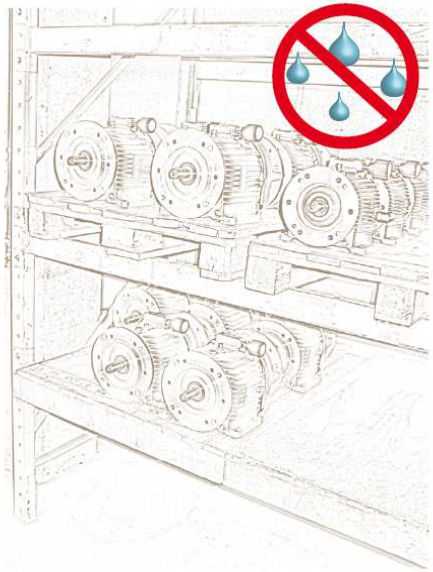
First change of oil.
The first time, change the oil after 200 operating hours.

Change of oil.
After the first change, every 2000 operating hours for mineral oils, 4000 for synthetic ones.

Filters.
With oil changing, replace existing filters on speed controls:
•type Fran 2839 for speed control cod.37
•type 50301 at draw. 95.00267 for other hydraulic speed controls (31, 67).

Cleaning.
Check that the fan cowl of variator and motor are not clogged with dust, fibres or other.

STOCKING



In order to preserve the efficiency of the variators in stock, it's necessary to observe the following indications for stocking:

•Stock the variators in appropriate envinroments with a low humidity level.

•Place them possibly onto shelves.

•For extended stocking periods (more then 2-3 months), lubricate the external parts which could be subjected to oxidation (shafts and machined parts).

•The variators SHOULD BE COMPLETELY FILLED UP WITH OIL (to avoid internal rust); reset the level oil during installation.

•When installing after long stocking period, run the variator at low speed without load for half an hour.

REPAIRING

Here is how we usually proceed with the repairing of a variator:

• 0-4 years old: only what it’s necessary

• 5-8 years old: all bearings, seals, gaskets

• 9-x years old: hydraulic units, all bearings, seals, gaskets

This way let us to make a preventive offer before receiving the variator (a lot of customer need it); naturally, what is extra (ex shafts, flange damaged), is not foreseeable, so this will appear in the definitive final balance offer.

VAR-SPE AS AUTOMATION SYSTEM

Starting torque: VAR-SPE is able to supply – for the time required by the application – a starting torque which is about **250% higher than** the nominal one

In a lot of cases, if you use an inverter type V/Hz this must be oversized to get enough starting torque.

Speed range: VAR-SPE speed range is 1/35. This wide speed range is fully exploited by the VAR-SPE drive and cannot be covered by an similar power inverter, even though used till frequency of 100 Hz! (and only in such speed range is 1/10).

Dynamic Braking: A further advantage of VAR-SPE variator is the capacity of developing a dynamic braking. Every inverter didn't have it, unless it integrates the apparatus with a resistive net of dissipation => added cost.

Envinroment. In inverter catalogues, the manufacturers themselves, advice against the use (or limit it) of their products in following conditions:

-In the environments with high temperature

-In wet environments

-In dusty environments

-In brackish environments

Electromagnetic Compatibility. With inverter to avoid it, it's necessary to install some devices (screened cables, dynamic filter, etc) that increase cost of machine. Often, customers look at cost of inverter forgetting cost of this devices.

Vibes. Electronics, being installed directly on the motor, is subject to more mechanical stress (vibes), deleterious for reliability

Technical comparison between Var-spe variator, mechanical variator and frequency inverter.

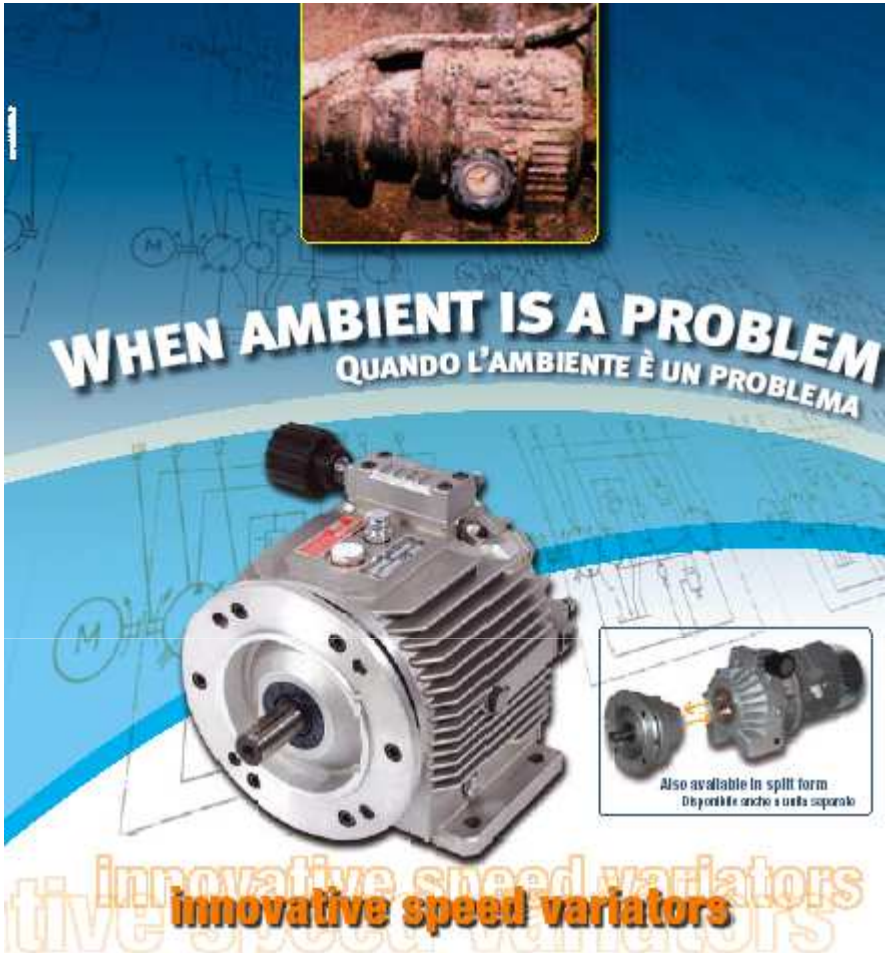
	Var-Spe K variator	Mechanical variator	Frequency inverter
Speed range	High 1/35	Low 1/6	Low
Zeroing	Yes	Only with differential	Only with motor off
Torque at low speed	High torque	High torque	Low torque
Fast reverse	Yes	No	No
Torque limiter	Yes	No	No
Adjustment with motor off	Yes	No	Yes
Starting with load from 0 rpm	Yes	No	No
Bi-directional output	Yes	No	Yes
Suitable for explosion proof environment (Atex)	Yes	No	No on standard inverter
Fine speed adjustment after long time	Yes	No	Yes
Suitable for dusty/dirty agressive environment	Yes - superior	Yes	No
Life and reliability	High	Low	Medium
Suitable for wash down envinroment (IP65 rated)	Yes - superior	Low level	No
Ease of maintenance	Yes - superior	Yes	No
Level required of technical expertise for installation	Low	Medium	High
Ease of replacement if failure occurs	Easy	Easy	Difficult
Resilience to over load	Very resilient	Low	Medium
Load monitoring	Yes	No	No
Close feed back loop speed control	Yes	No	No
Remote control away from drive	Yes	Minimal	Yes
Speed indicator	Yes	Minimal	Yes

WHEN CAN WE BE SURE VAR-SPE IS REALLY COMPETITIVE?

In this cases:

- when a wide speed range is needed
- in hard envinroment
- when high torque at starting is needed, and you must adjust the speed with motor off
- when a simple torque control is needed
- when electronics cannot be used
- when space is a problem
- when you need an Atex (Ex-proof) solution

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ



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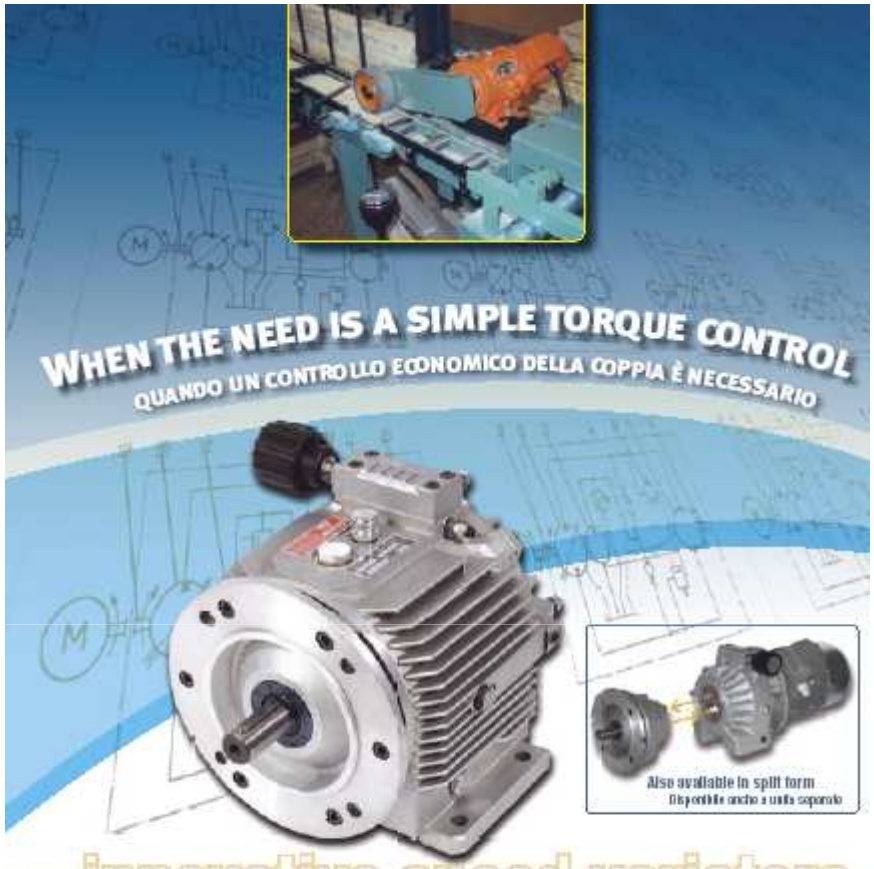
www.varspe.com - info@varspe.com - marketing@varspe.com

VAR-SPE
VARIATORI OLEODINAMICI DI VELOCITÀ



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innovative split speed variator

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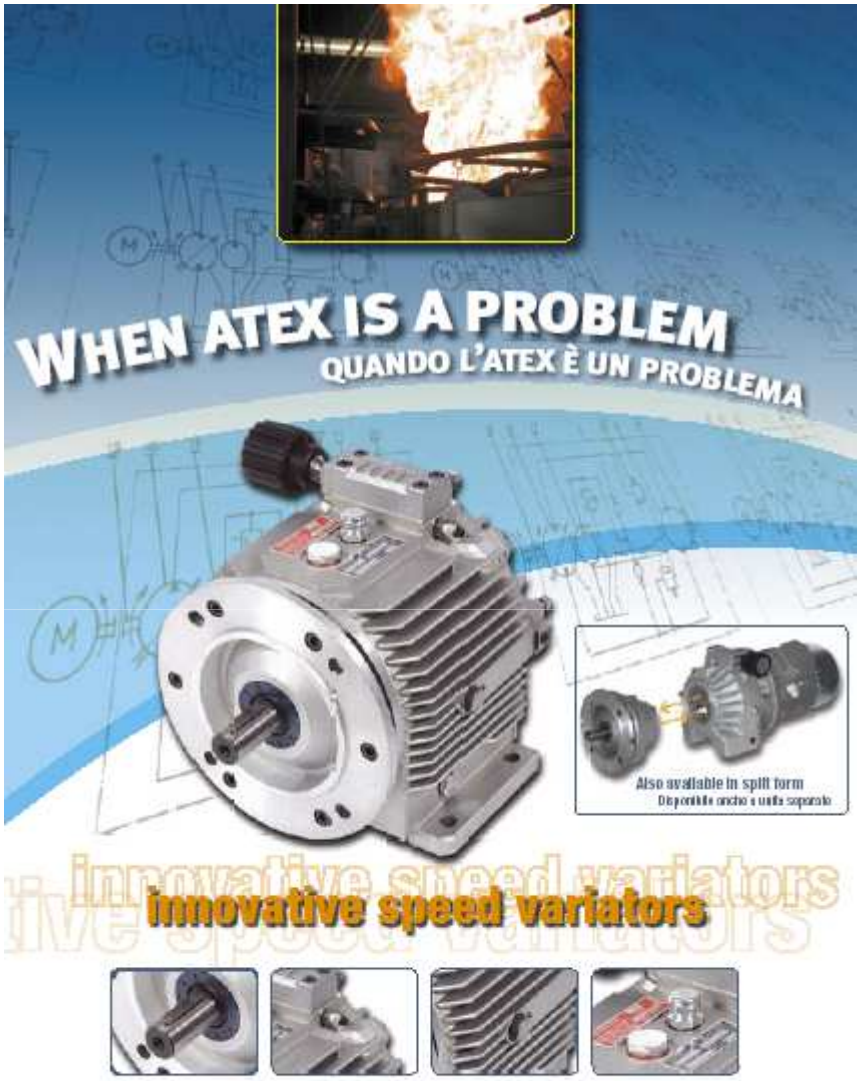

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