



U-3ARC TRAINING WEBINAR #18

MODULATING REGULATORS 1st part

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February 25, 2023

SUMMARY



- 1- PRESSURE REGULATION
- 2- **"A8.."** STANDARD COMPACT MODULATING REGULATORS
- 3- DERIVATIVE MODULATING REGULATORS **"A8. B", "A8. S", "AT 8. L", "A8. BL", "A8. OE", "A8.OSE"**
- 4- **"A9E", "A9SE"**, HOT GAS INJECTION REGULATORS
- 5- **"A4A"** STANDARD MODULATING REGULATORS
- 6- **"A4A - SINGLE DRIVER"** STANDARD MODULATING REGULATORS
- 7- **"A4A - MULTI PILOT"** MODULATING DERIVATIVE REGULATORS
- 8- DERIVED MODULATING REGULATORS **"A4A - KITS FOR PILOT VERSIONS"**
- 9- **"A4AB"** DUAL FUNCTION MODULATING REGULATORS
- 10- **"DOWNSTREAM"** CONTROL MODULATING REGULATORS
- 11- **"A4AS"** DUAL FUNCTION MODULATING REGULATORS

1 – PRESSURE REGULATION



- Pressure regulation in an individual or centralized refrigeration plant can be summarized in the following table:

	AMONT	AVAL
B.P	Pression d'évaporation	Pression d'aspiration (régulation de démarrage)
H.P	Pression de condensation	Pression réservoir liquide

**NB: The various pressure/temperature regulation systems are treated by modulating regulators used in the field of commercial refrigeration.
"Medium and Large Sizes"**

A8.

STANDARD

2 - COMPACT MODULATING REGULATORS "STANDARD VERSIONS"



2-1: STANDARD & ADJUSTABLE "UPSTREAM" MODULATING REGULATOR TYPE **A8, A81, A82**

□ APPLICATIONS:

- Genuine "CONSTANT PRESSURE VALVE" servo-controlled, proportional.

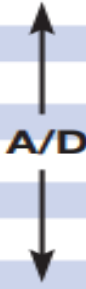
It is a **BASIC STANDARD REGULATOR** for an adjustable control of the "UPWARD" pressure, High or Low pressure, (on HP Gas, Liquid, Suction, Vapours).

□ REFRIGERANTS:

HCFCs, HFCs and all their specific OILS



TYPES DANS LA VERSION STANDARD DE BASE

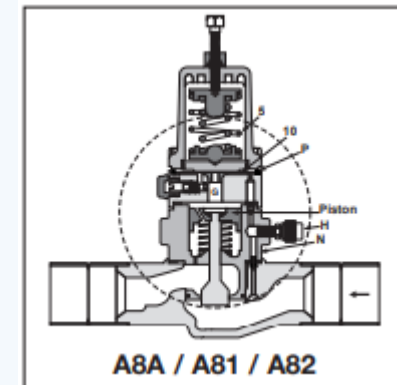
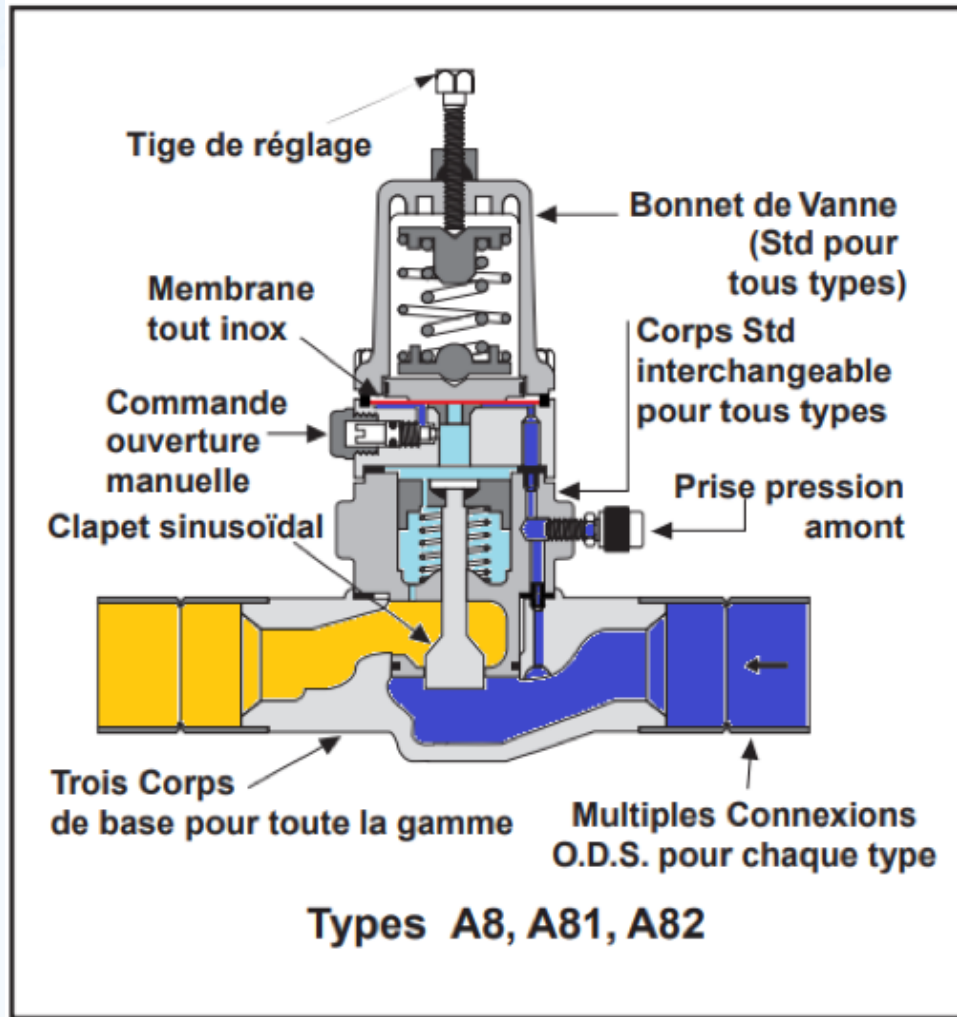
REFERENCE	ORIFICE	CONNEXIONS	PLAGE	Coeff. "KV"
A8A	3/8"	5/8", 7/8", 1 1/8"		1.28
A8A	5/8"	5/8", 7/8", 1 1/8"		2.82
A8A	7/8"	7/8", 1 1/8"		4.37
A81	1 1/8"	1 1/8", 1 3/8", 1 5/8"		6.93
A81	1 3/8"	1 3/8", 1 5/8"		9.67
A82	1 5/8"	1 5/8", 2 1/8"		15.43
A82	2 1/8"	2 1/8", 2 5/8"		23.15
A82	2 5/8"	2 5/8", 2 1/8"		30.87



2 - COMPACT MODULATING REGULATORS "STANDARD VERSIONS"

A8.

STANDARD



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"



A8.
B

A8 & DERIVES

3-1: MODULATING REGULATOR + FORCED OPENING, TYPE **A8AB, A81B, A82B**

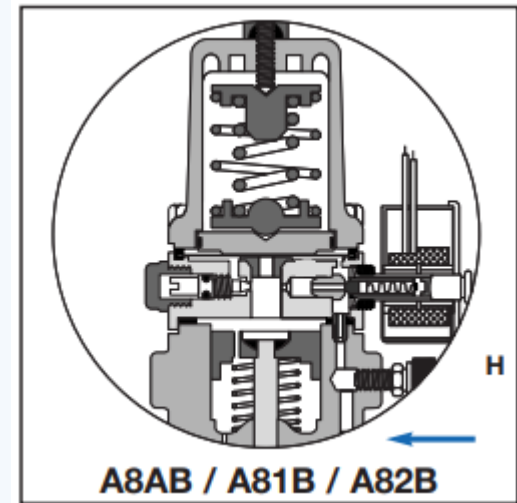
□ APPLICATIONS:

Always checks “UPPER” PRESSURES HP or LP but with electric pilot for “FORCED OPENING”:

- Pressure switch regulation on Discharge line, Reservoir, Condenser, Liquid line.
- Calorie Recovery, Hot Gas Defrost, Discharge, Evaporators, Suction



Type A81B





3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"

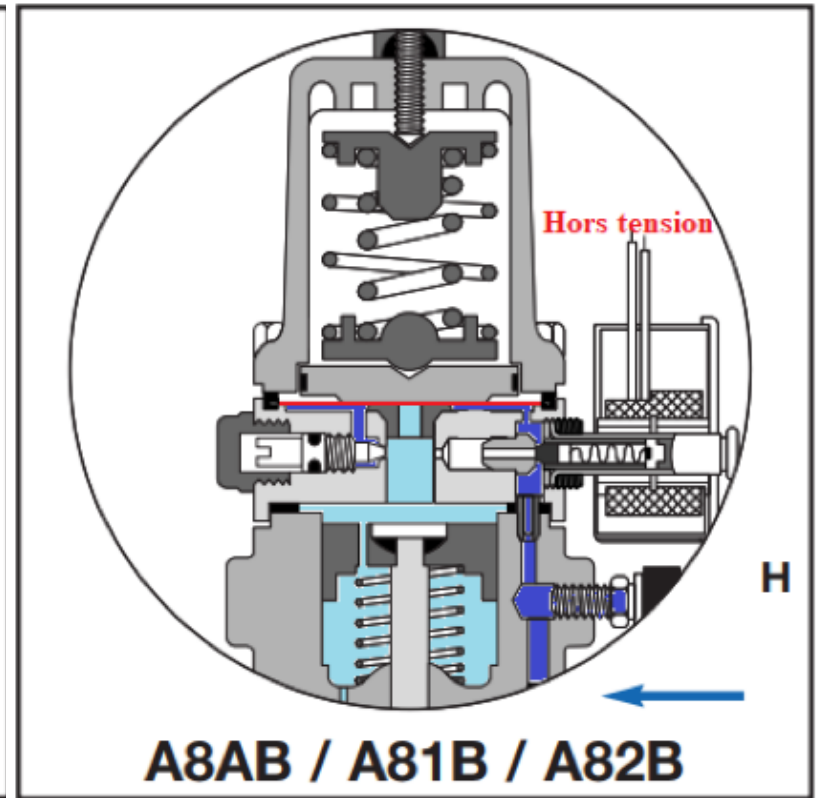
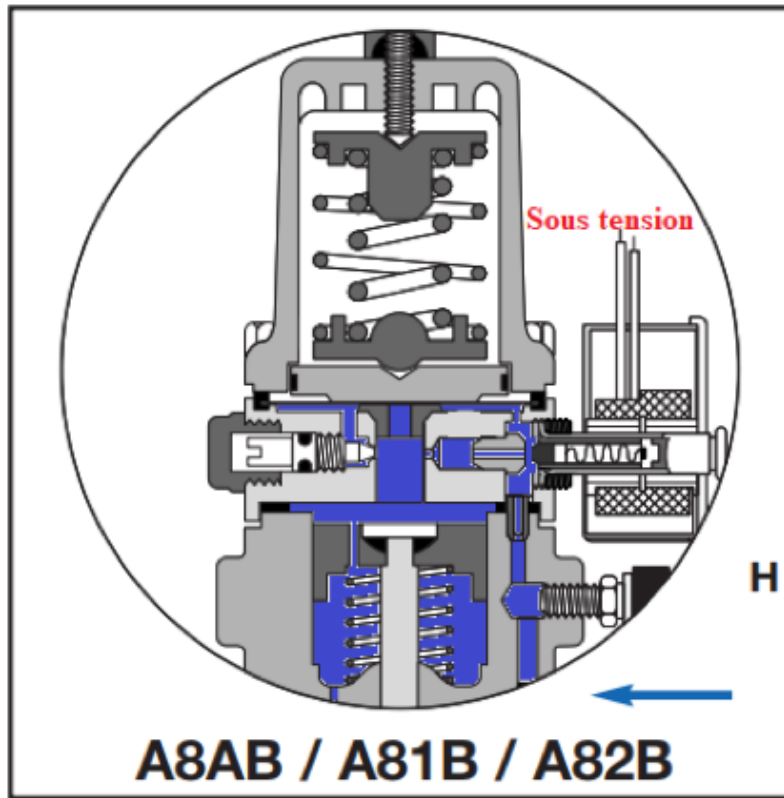
A8.
B

A8 & DERIVES

❑ ELECTRIC PILOT:

Under Voltage: The regulator cancels its "set point" and placed in total "FORCED OPENING" and under " ΔP " minimum and economical

Off: The regulator modulates and maintains the desired and adjustable "UPWARD" pressure



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"

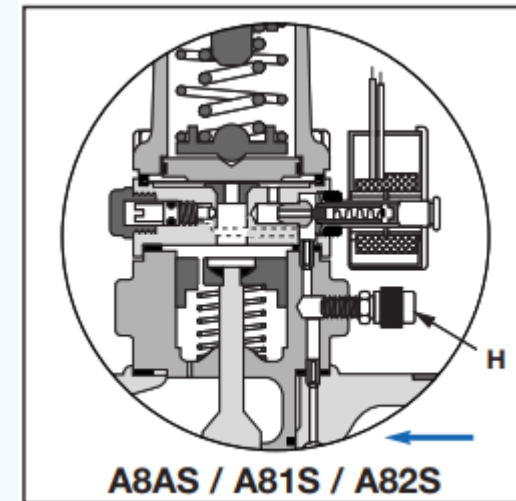


3-2 : MODULATING REGULATOR + MANDATORY CLOSING, TYPE **A8AS, A81S, A82S**

□ APPLICATIONS:

Controls the “UPWARD” PRESSURES HP or LP but with electric pilot for “MUST CLOSURE”:

- Pressostatic Regulation for Condenser Liquid Line, Calorie Recovery by “By-pass”,
- Defrosting by Hot Gases of Evaporators, Suction.



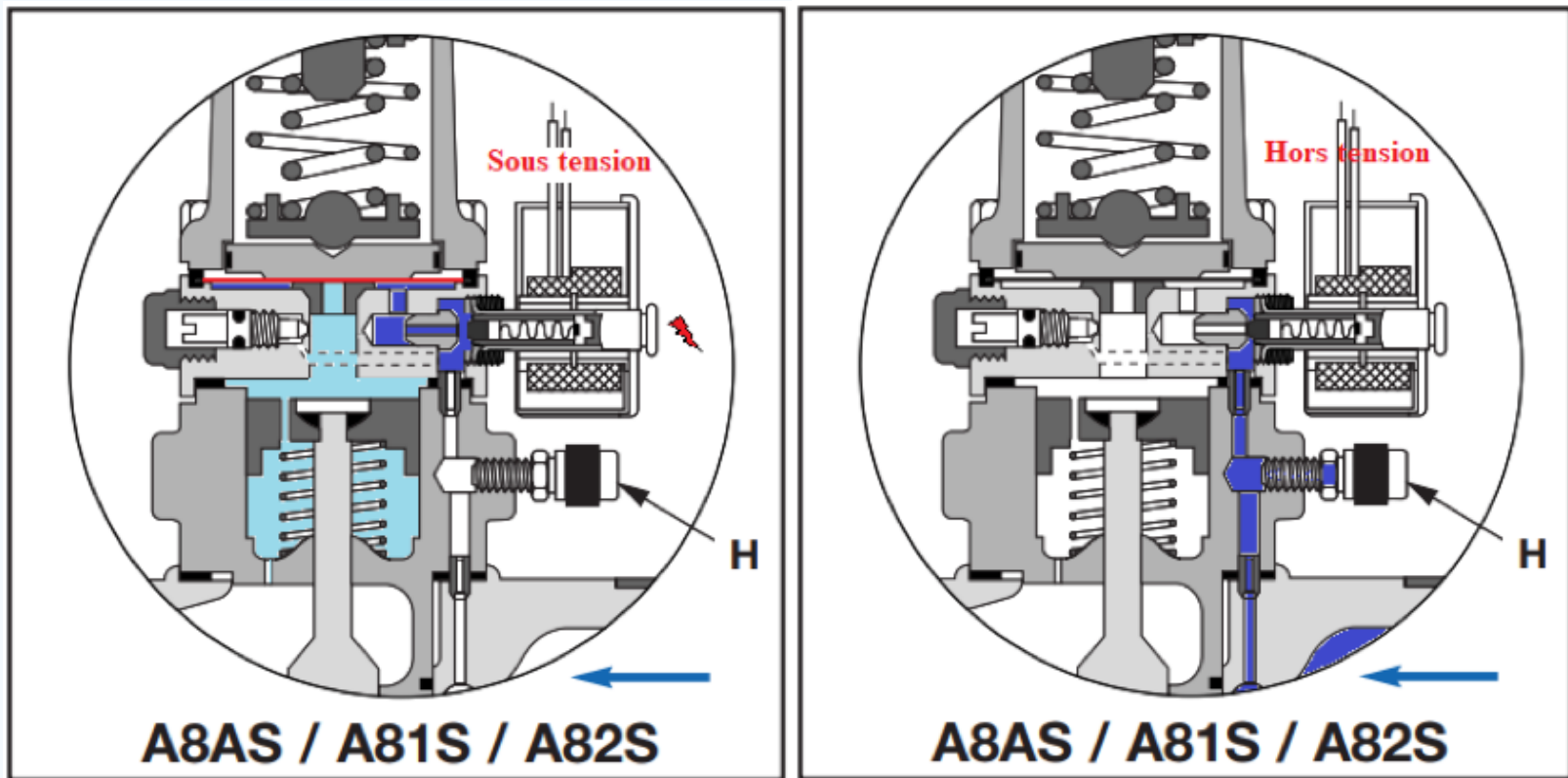
3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"



□ ELECTRIC PILOT:

Under Voltage: Regulator placed in "Upstream Pressure Modulation" and adjustable (cold production of evapo, discharge, etc...)

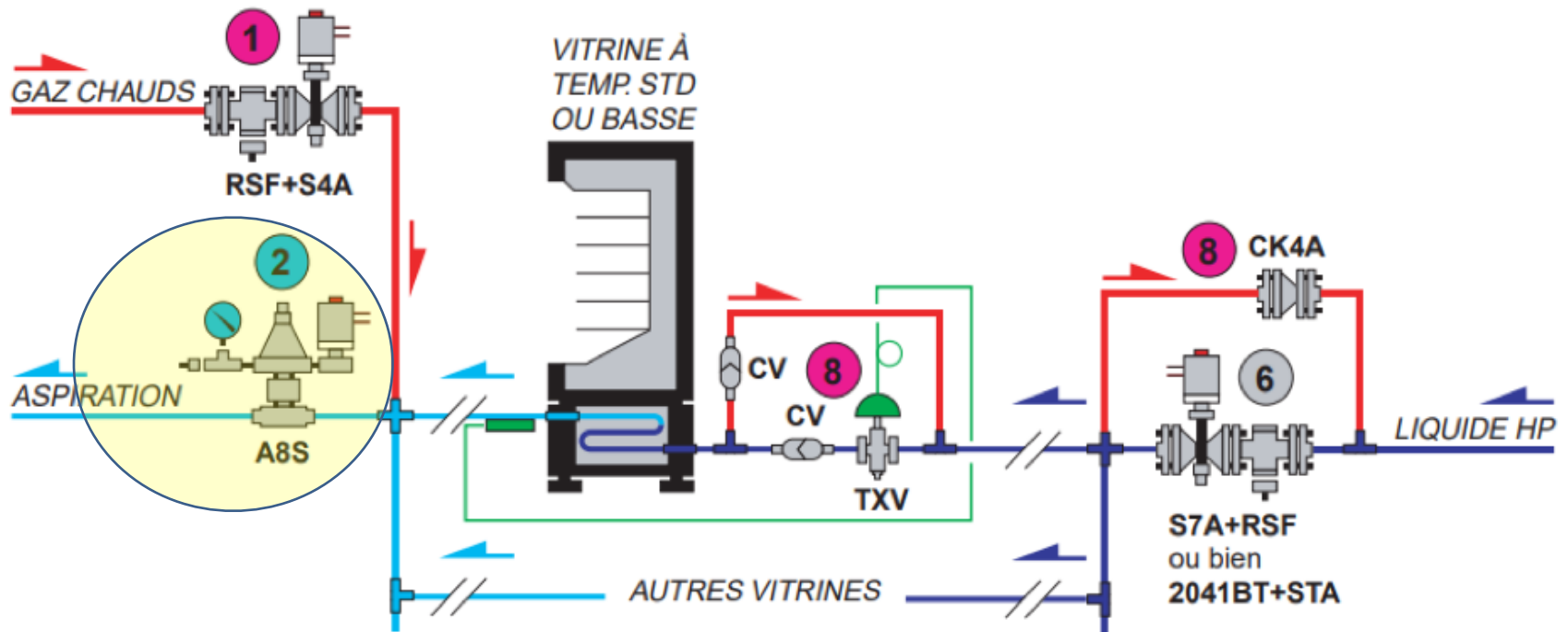
Off: The Regulator is then "imperatively closed", like a solenoid valve.



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"



- ❑ SUPERMARKET DISPLAYS AT STD TEMPERATURES. AND/OR BASES WITH AUTOMATIC HOT GAS DEFROST SYSTEM



- ② Modulating regulator with imperative closing pilot A8S
 - VEM under voltage: regulation of the evaporation pressure
 - VEM off: forced closing of A8S

3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"

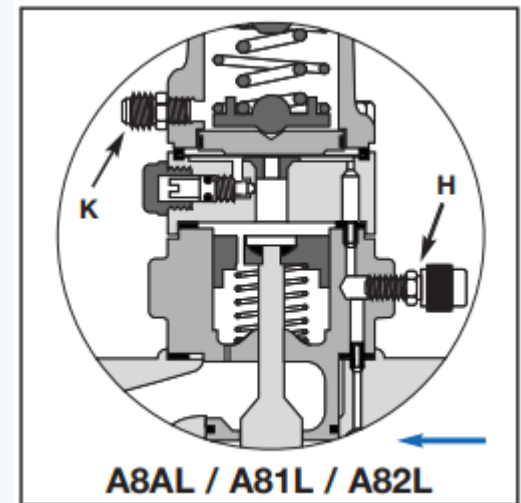


3-3: REGULATOR WITH ADJUSTABLE CONSTANT DIFFERENTIAL, TYPE A8AL, A81L,

A82L

□ APPLICATIONS:

.Maintains a **"CONSTANT PRESSURE DIFFERENTIAL"**, HP or LP and adjustable between **"UPSTREAM"** and **"DOWNSTREAM"**. . Differential maintained in a given pipe or between two pressure zones (Gas, Liquid, Steam). . Ideal for Constant Pressure Differential on Discharge (for oil return on screw compressors,) Condenser Control, "By-pass" for Calorie Recovery, "Discharge" on discharge of liquid from a Recirculation pump to the B.P. zone, avoiding depriming and cavitation, etc... . **"CONSTANT DIFFERENTIAL"** between Reservoir and Evapos (for re-injection of defrosting condensates from defrosted Evapos into the main liquid line , to the other Evapos in service).



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"



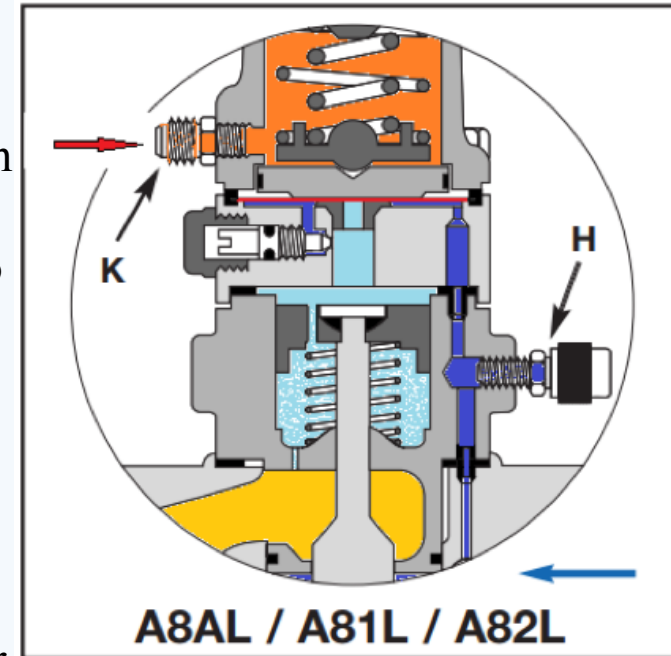
3-3: REGULATOR WITH ADJUSTABLE CONSTANT DIFFERENTIAL, TYPE A8AL, A81L and A82L

□ APPLICATIONS:

.Maintains a **"CONSTANT PRESSURE DIFFERENTIAL"**, HP or LP and adjustable between **"UPSTREAM"** and **"DOWNSTREAM"**. .

Differential maintained in a given pipe or between two pressure zones (Gas, Liquid, Steam). . Ideal for Constant Pressure Differential on Discharge (for oil return on screw compressors,) Condenser Control, "By-pass" for Calorie Recovery, "Discharge" on discharge of liquid from a recirculation Pump to the L.P. zone. , avoiding defusing and cavitation, etc... .

"CONSTANT DIFFERENTIAL" between Reservoir and Evapos (for re-injection of defrosting condensates from defrosted Evapos into the main liquid line , to the other Evapos in service). **REGULATOR WITH ADJUSTABLE CONSTANT DIFFERENTIAL, TYPE A8AL, A81L and A82L**



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"

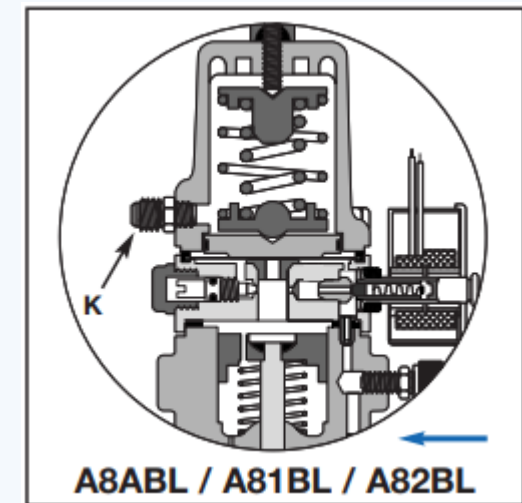


3-4: REGULATOR A "ΔP" CONSTANT + FORCED OPENING, TYPE A8ABL, A81BL and A82BL

□ APPLICATIONS:

Maintains a "CONSTANT PRESSURE DIFFERENTIAL", HP or LP and adjustable between "UPSTREAM" and "DOWNSTREAM" plus an alternative "FORCED OPENING".

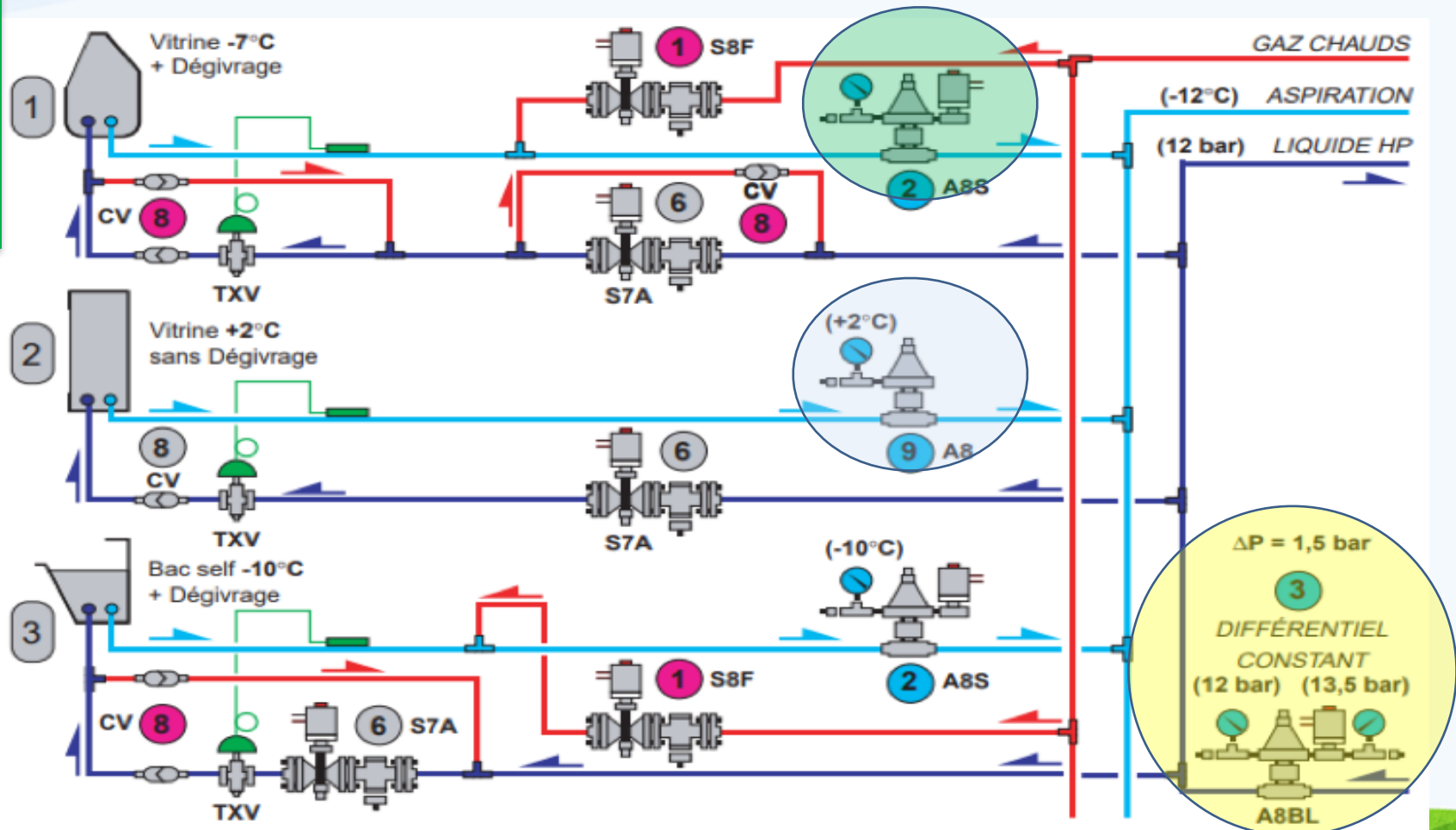
. "CONSTANT DIFFERENTIAL" built between Reservoir and Evapos for re-injection of condensates from defrosting the evapos into the main liquid line (Otherwise, the defrosting condensates re-injected into this liquid H.P., cause "flash-gas", rise towards tank, block the liquid supply to the other evapo in service, hence "flashing" through the thermostatic expansion valves. Finally, without the A8BL, the hot gases coming from an H.P. zone and pushed towards another H.P. zone cause rapid "pressure equalization", then stopping the circulation of the defrost gases in the evaporator. The defrost remains incomplete). Then, at the end of defrosting, the "FORCED OPENING" of the A8BL is caused in the HP liquid line and to return to "normal cold production".



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"



- ❑ MULTI-FUNCTION DISPLAYS (-7°C,+2°C,-10°C) CONNECTED TO A COMMON EXHAUST (at -12°C) PLUS DEFROST BY HOT GAS



3 - COMPACT MODULATING REGULATORS "DERIVATIVE VERSIONS"



3-5: REGULATEUR MODULANT "AVAL" (Dérivé du "A8"), TYPE **A8AOE, A81OE et A82OE**

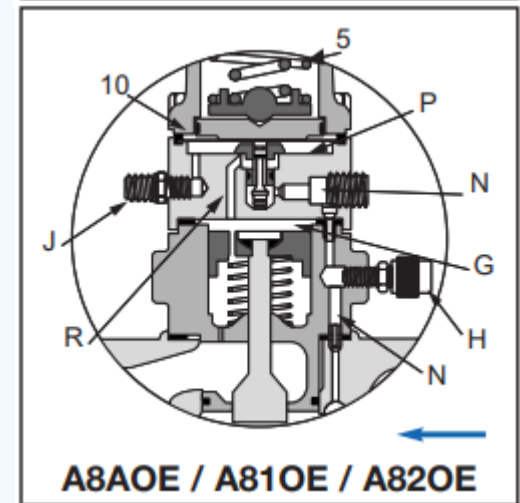
□ APPLICATIONS:

The "A8-0E" controls the pressure "DOWNSTREAM" by itself (outlet) and thus protects the Compressors and the Centrals against any "Overloads" at start-up.

□ REFRIGERANTS:

HCFCs, HFCs and all their specific OILS

The "A8-0E" is a simple Regulator with Adjustable "DOWNSTREAM" Modulation and WITHOUT Mandatory Closing Pilot





3-6: A8-OE MODULATING REGULATOR + "MUST CLOSURE" PILOT

TYPE **A8AOES, A81OES and A82OES**

□ APPLICATIONS:

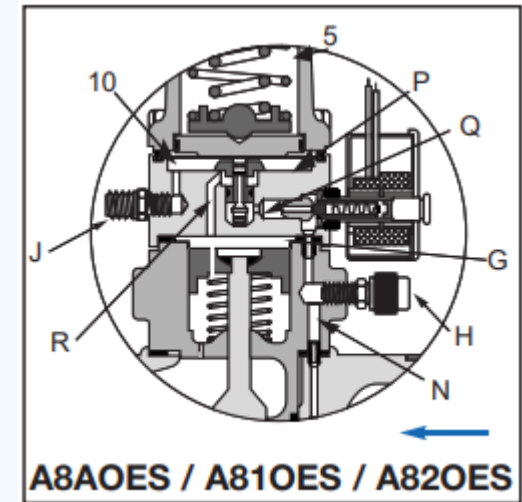
. A8-OSE "Power On":

"Downstream pressure modulation" adjustable. It is a "start valve".

. Injection of hot gases into an Evapo to be defrosted, Pressure maintenance in a recovery condenser, Power reduction, etc...

. A8-OSE "Power Off":

"Imperative closing", like a solenoid valve. It is first the "start valve" on the suction, then a Vem of "Closing" and isolation of the evapo for the Defrost cycle by hot gases for example, etc...



**The "A8-0SE" is an
"A 8 - 0 E" WITH
Mandatory Closing Pilot**

4 - "DOWNSTREAM" HOT GAS INJECTION REGULATOR



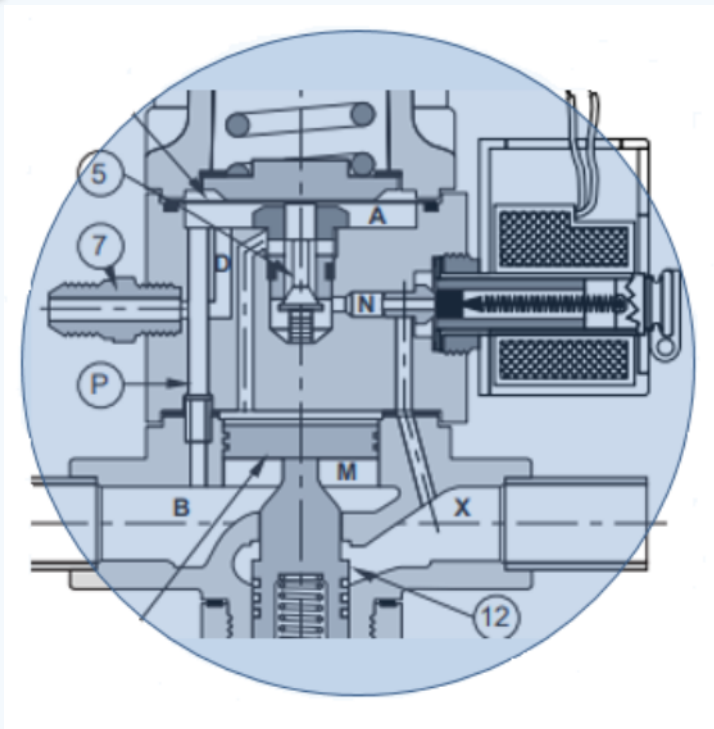
- ❑ The small **A9E Hot Gas Injection Regulator** allows an adjustable and linear maintenance of the "DOWNSTREAM" Pressure (outlet side) from 100% of the power down to 0% and vice versa (in Cooling or Air Conditioning).
- ❑ **On the BP:** Compressor Power Reduction, including and above all, on the last stage. Anti-pumping system on booster, De-icing or Recovery systems, etc... Protection against BP cuts, Winter starts, etc...
- ❑ **On HP:** For "All Weather" Condensation Pressure Control. Starts. Protection of the TXVs by Control of the H.P. of the liquid tank. Liquid pressure control, Hot gas defrosting, Prevention of BP cutouts





A9SE: "A9E" REGULATOR WITH ELECTRIC PILOT FOR "MANDATORY CLOSING"

. The A9SE type, derived from the A9E, is equipped with a very practical mandatory closing electric pilot (for closing the injection "by-pass", in normal operation, for compressor stops, for vacuum down", for maintenance, etc.).



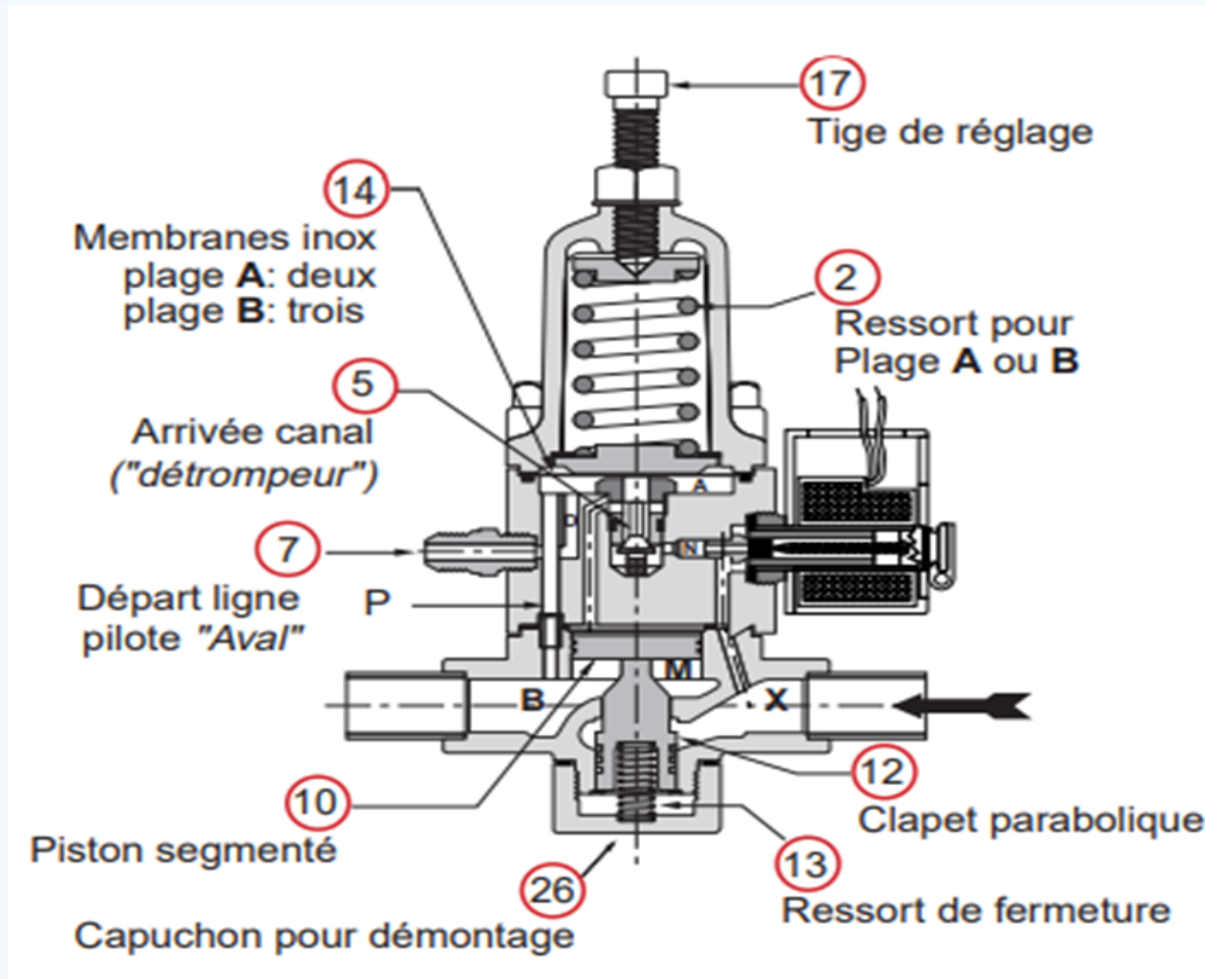
A9E
A9S
E

A9E & A9ES



4 - "DOWNSTREAM" HOT GAS INJECTION REGULATOR

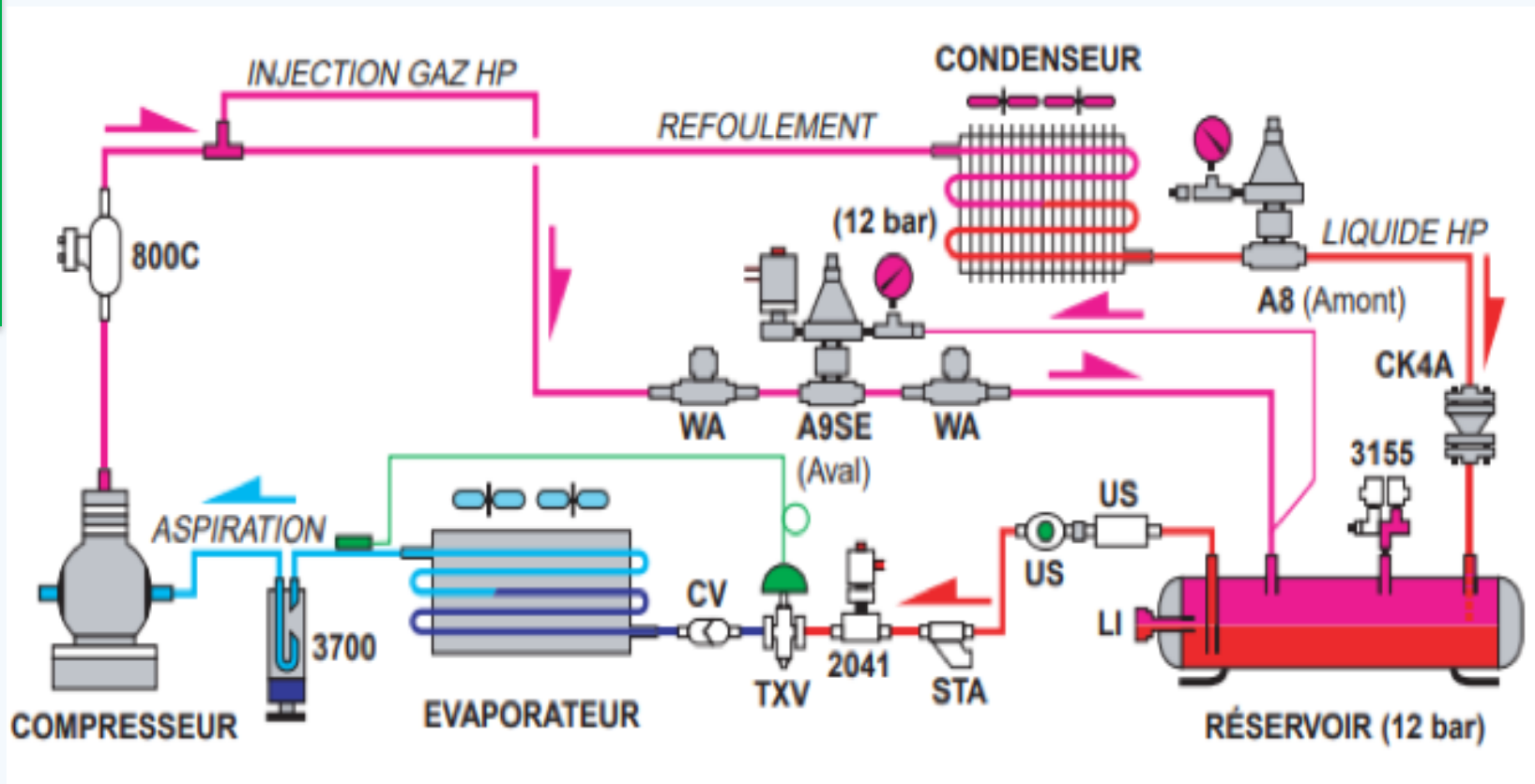
A9SE: "A9E" REGULATOR WITH ELECTRIC PILOT FOR "MANDATORY CLOSING"



4 - "DOWNSTREAM" HOT GAS INJECTION REGULATOR



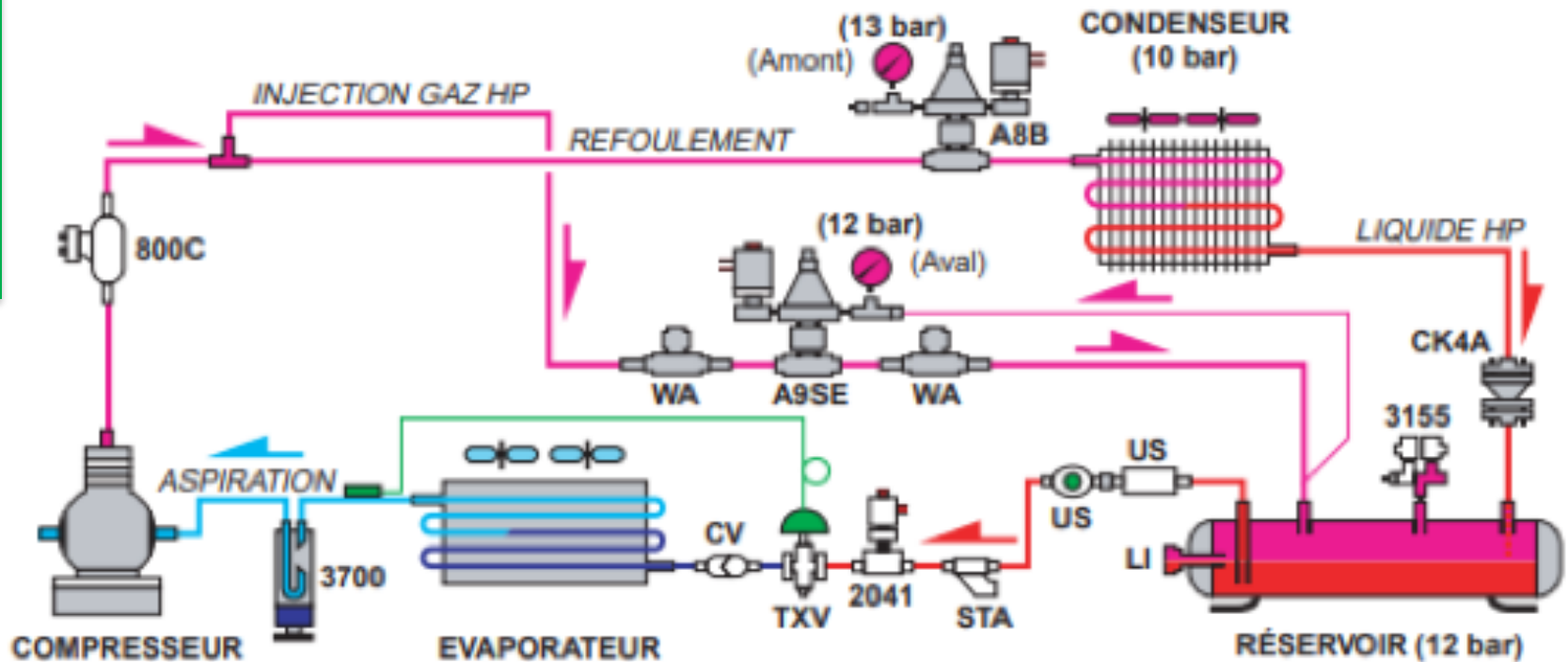
- CONDENSING PRESSURE CONTROL ON CONDENSER "LIQUID RETURN"



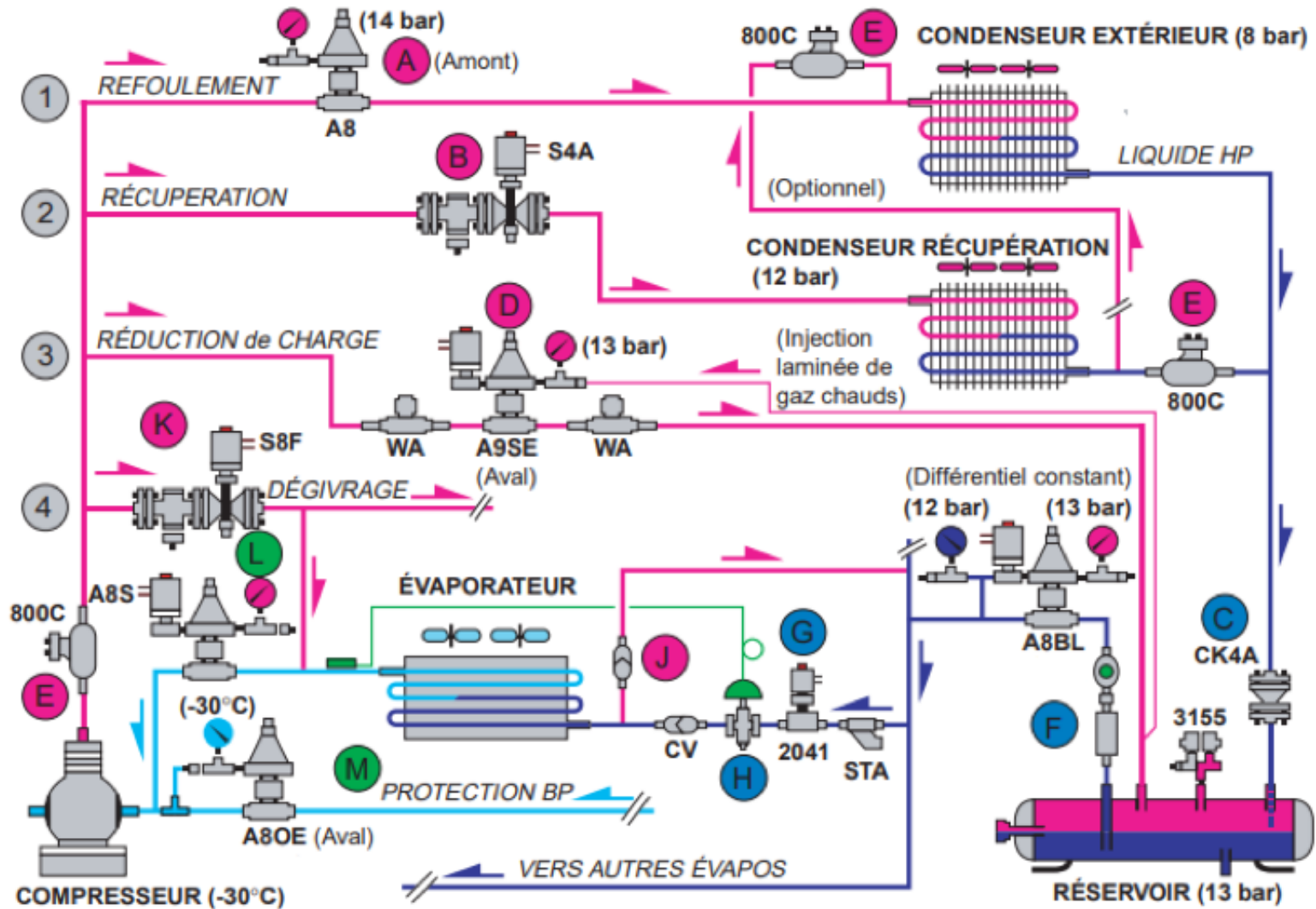
4 - "DOWNSTREAM" HOT GAS INJECTION REGULATOR



- ❑ CONDENSER PRESSURE CONTROL ON DISCHARGE "AT THE INLET" OF THE CONDENSER



4 - "DOWNSTREAM" HOT GAS INJECTION REGULATOR





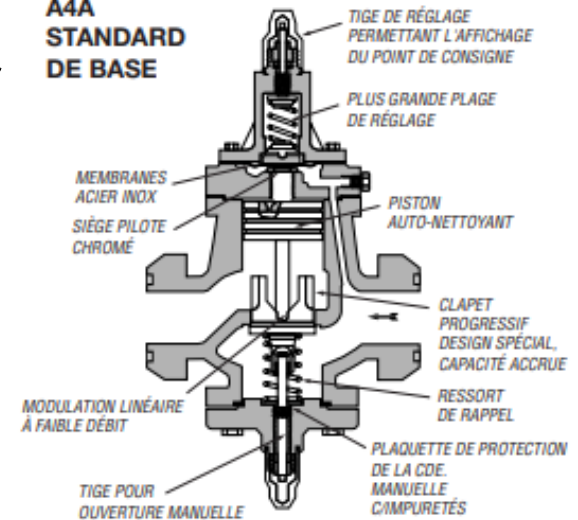
5-1: : STANDARD & ADJUSTABLE “UPSTREAM” MODULATING REGULATOR **TYPE A4A**

□ FUNCTIONS:

Controls, maintains and modulates a **CONSTANT, ADJUSTABLE and LINEAR “UPWARD” PRESSURE** ranging from 100% to 10% of its nominal capacity and vice versa. Control accuracy of $\pm 0.4^{\circ}\text{C}$ (For discharged HP gas, recirculated HP or LP liquid, suction & recirculated wet vapours)



**A4A
STANDARD
DE BASE**



□ REFRIGERANTS:

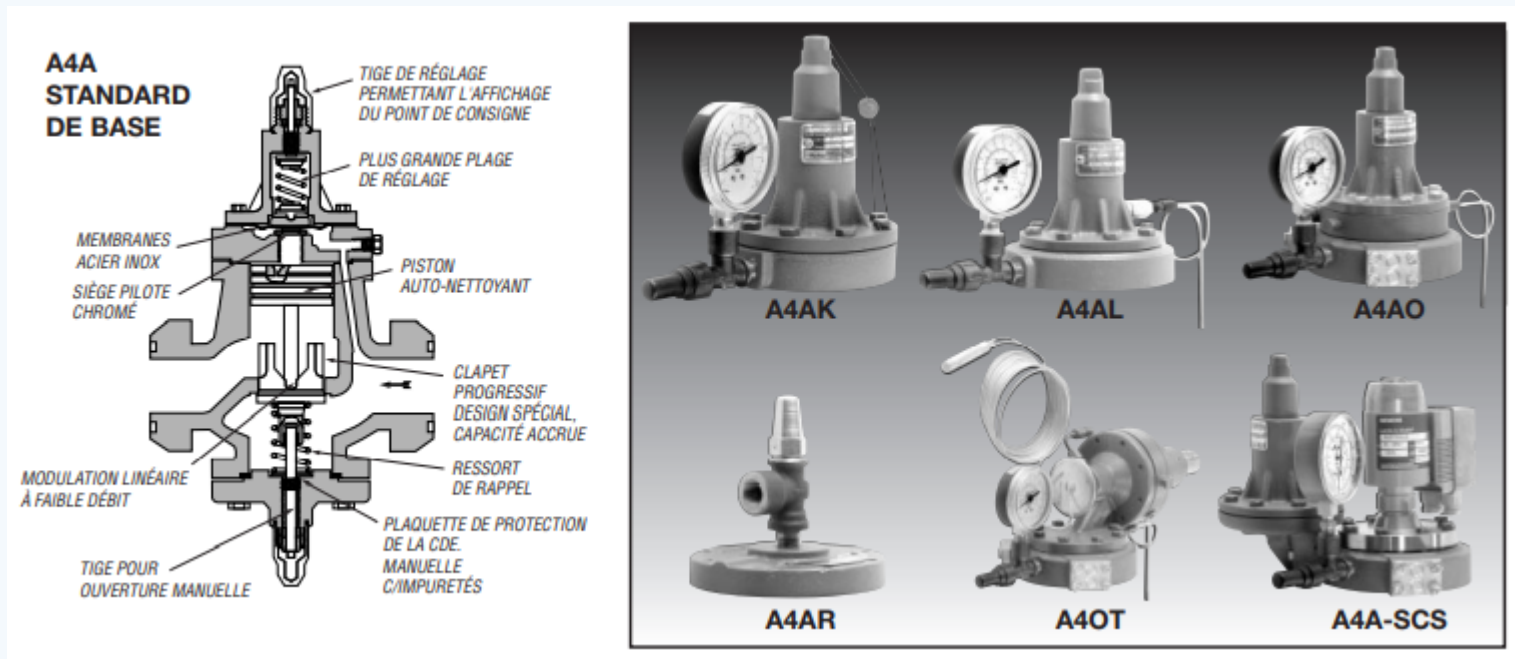
NH₃ (Ammonia), HCFCs, HFCs and their specific oils

6 - A4A – ONE DRIVER



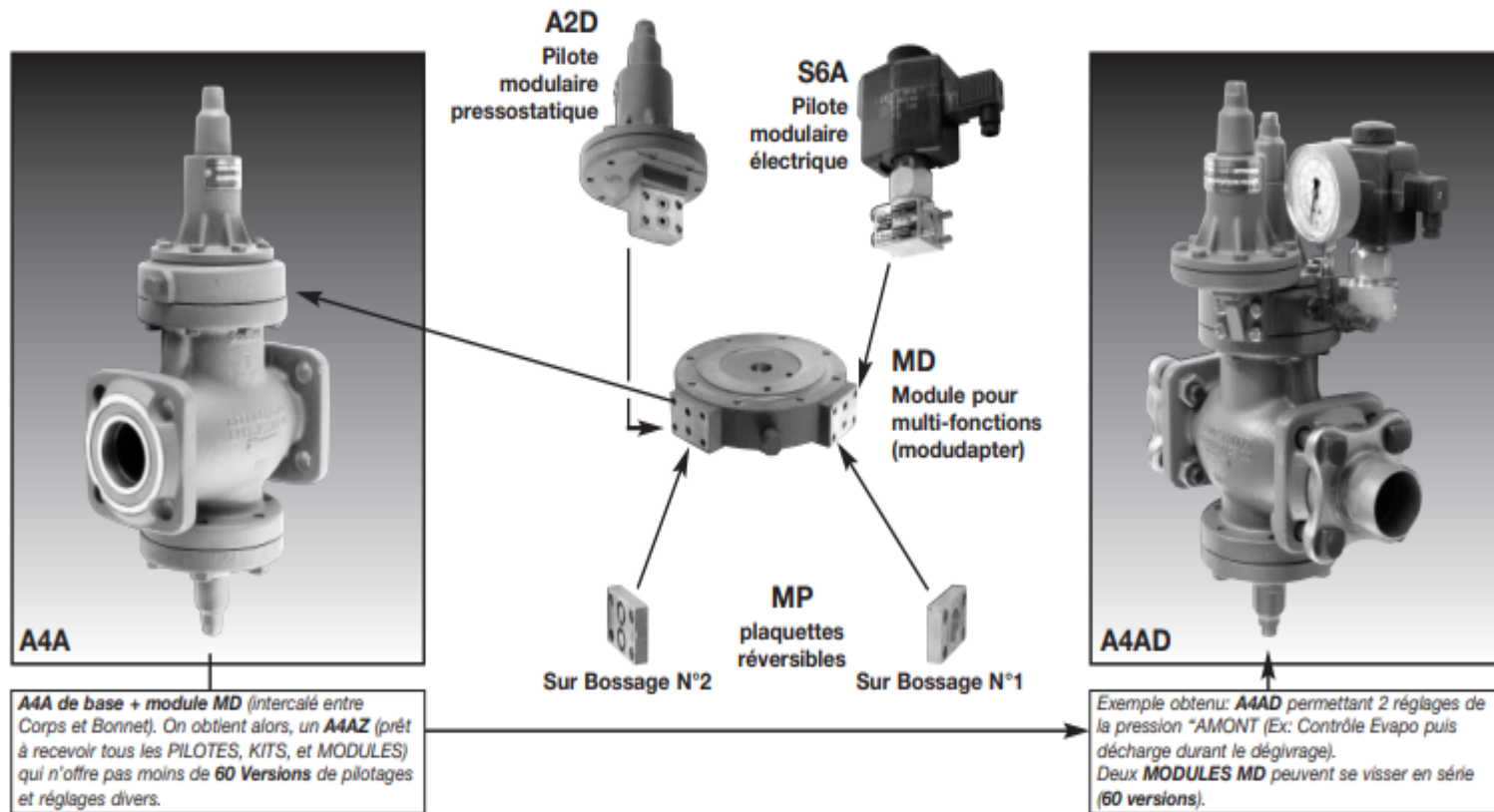
A4
A

The “**Basic A4A**” with linear modulation receives all “Std PILOTS” individually for specific and diverse functions (piloting pressure switch, thermostatic, electric, electronic, etc...)





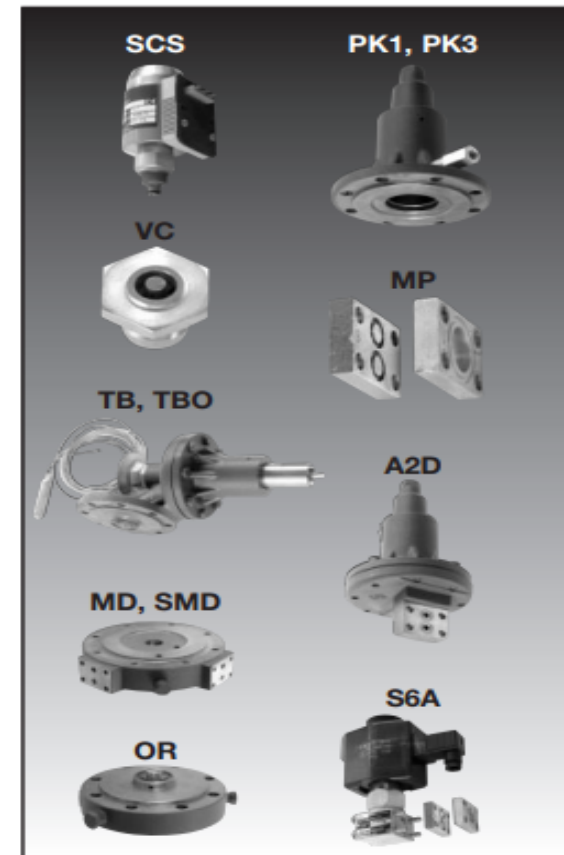
The “A4A” equipped with the “MD” MODULE becomes “A4AZ” The “A4AZ” receives multiple & combined PILOTS (ex: A4AB, A4AS, A4ABS, A4ABK, A4AD, A4AOSE ...)





□ **Drivers, Kits and Modules** are automatically adapted to ALL “A4” Regulators to obtain the desired VERSION, or on-site TRANSFORMATION (a simple dynamo key will suffice...!). No threaded or risky adaptations. Regulators for all refrigerants.

REFERENCE	DESIGNATION
Z-189-ALL M2-FP-03GX ZM-111 ZM-101 ZM-121	Module complet pour adaptation std. du Pilote Electronique Pilote Electronique SCS std. et adaptable sur Z189-ALL KIT SCS Electronique (0 à 20v, Hachage de phase) KIT SCS Electronique (0 à 10v, courant continu) KIT SCS Electronique (4 à 20 mA)
PK-1 (Prise ext.) PK-3 (Prise ext.) VC FTR-25 à 100	Tête Pilote Pneumatique std (modulation rapport 1:1) Tête Pilote Pneumatique std (modulation rapport 3:1) KIT Spécial pour obtenir une Plage “V” KITS pour obtenir les versions A4AOL, A4AL... (sans le “E”)
TB-50 (A4AT) TB-200 (A4AT) TBO-200 (A4AOT) EU	Pilote std pour Contrôle Thermostatique (corps 3/4” à 2”) Pilote std pour Contrôle Thermostatique (corps 2 1/2” à 8”) Pilote std pour tout Contrôle Thermostatique “AVAL” KIT pour pilotage Gaz Chauds (A4A & Versions à faible ΔP)
MD-25 MD-32 MD-50 MD-65 MD-75 MD-100 SMD-65 SMD-65 ou 100 MP (Plaque rect.) OR-50 OR-200 S6A A2D2 A2D	Module (corps A4AZ, 3/4” & 1”), pour fonctions combinées Module (corps A4AZ, 1 1/4”), pour fonctions combinées Module (corps A4AZ, 1 5/8” & 2”), pour fonctions combinées Module (corps A4AZ, 2 1/2”), fonctions combinées Module (corps A4AZ, 3”), pour fonctions combinées Module (corps A4AZ, 4”), pour fonctions combinées Module (corps A4WZ, 5”, 6” & 8”), pour Multi-fonctions Module DOUBLE (pour fixation de 3 ou 4 Pilotes) Moduplate REVERSIBLE pour TOUS “MD» ci-dessus Module Std. (pour corps 3/4” à 2”), Pilotage “AVAL» Module Std. (pour corps 2 1/2” à 8”), Pilotage “AVAL» Pilote Electrique Module (pour Fermeture ou Ouverture) Pilote Pressostatique Additionnel (3/4” à 2”),Plage A ou D Pilote Pressostatique Additionnel (2 1/2” à 8”),Plage A ou D





- Each SUFFIX indicates a particular control function. All the functions combine with each other and add up (Ex: A4AB, A4ABS, A4AOE, A4AOSE, A4AD, A4AK, A4AZBK, A4AL, A4ABKLE, A4ATSE, A4AOT, etc...). No less than **60 VERSIONS** with various and combined controls are offered.

SUFFIXE	FONCTIONS ADDITIONNEES et REGLABLES	APPLICATIONS SIMPLES ou COMBINEES
Sans	Le A4A contrôle une pression "AMONT"	Tous contrôles GAZ, LIQUIDE, ASPIRATION, etc...
S	Plus Fermeture électrique impérative	Evaporateur, Condenseur, Tous contrôles "AMONT"
B	Plus Ouverture électrique forcée	Revolvements & Récupération, Dégivrage Gaz chauds
D	Double contrôle de pressions "AMONT"	Dégivrage/Décharge, Sécurité, Congélation/Stockage
K	Décharge de pression au "point de consigne"	Dégivrage, Protection HP, Décharge HP/IMP ou BP
O	Contrôle de pression "AVAL" (insensible Amont)	Vanne de démarrage, By-pass gaz chauds, Booster
L	Contrôle un "DIFFERENTIEL" de pression	Décharge/protection pompes, Abaissement pression
SCS	Contrôles Electroniques pression, température...	+/- 1/10ème de °C. Chillers, Compensation de charge...
P & 3P	Contrôle pression, température par pneumatique	Précision de contrôle dans un rapport de 1:1 & 3:1
T	Contrôle une Température d'entrée ou de sortie	Bulbe thermostatique tous média. Chillers, Récup...
E	Attaque de tous corps A4 par pression externe	Pilotes additionnels divers, réglage salle des machines,
R	Corps modulant de A4. Reçoit tous pilotes extér...	Pour automates, LPD, contrôles extérieurs et éloignés.
Z	A4A std. prêt à recevoir tous Pilotes additionnels	Le A4AZ permet toutes les VERSIONS COMBINEES.
LPD	Systèmes adaptables sur A4AR (Complets)	Réduit le Δ P de tous A4 & VERSION à 0,035 bar

9 - DUAL FUNCTION MODULATING REGULATOR (A4AB)



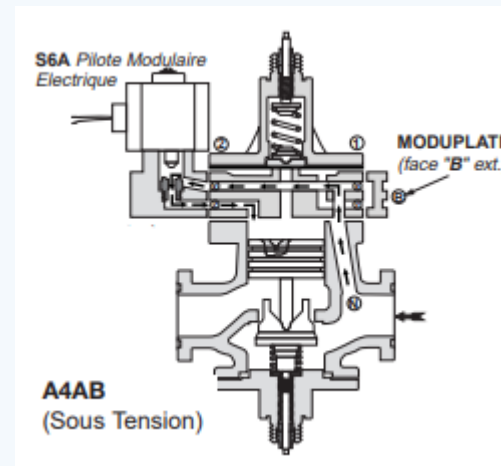
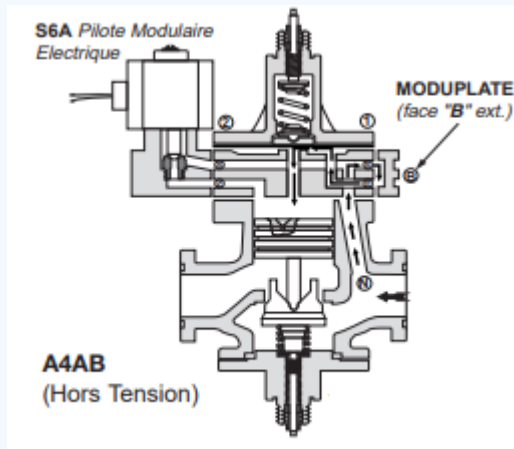
❑ Functions:

. **OFF VOLTAGE:** Controls and maintains a **CONSTANT AND LINEAR “UPWARD” PRESSURE**

. **ENERGIZED:** The Electric Pilot cancels all settings and “set point” and places the “valve” in the **FULL AND FORCED OPEN** position

❑ Refrigerants:

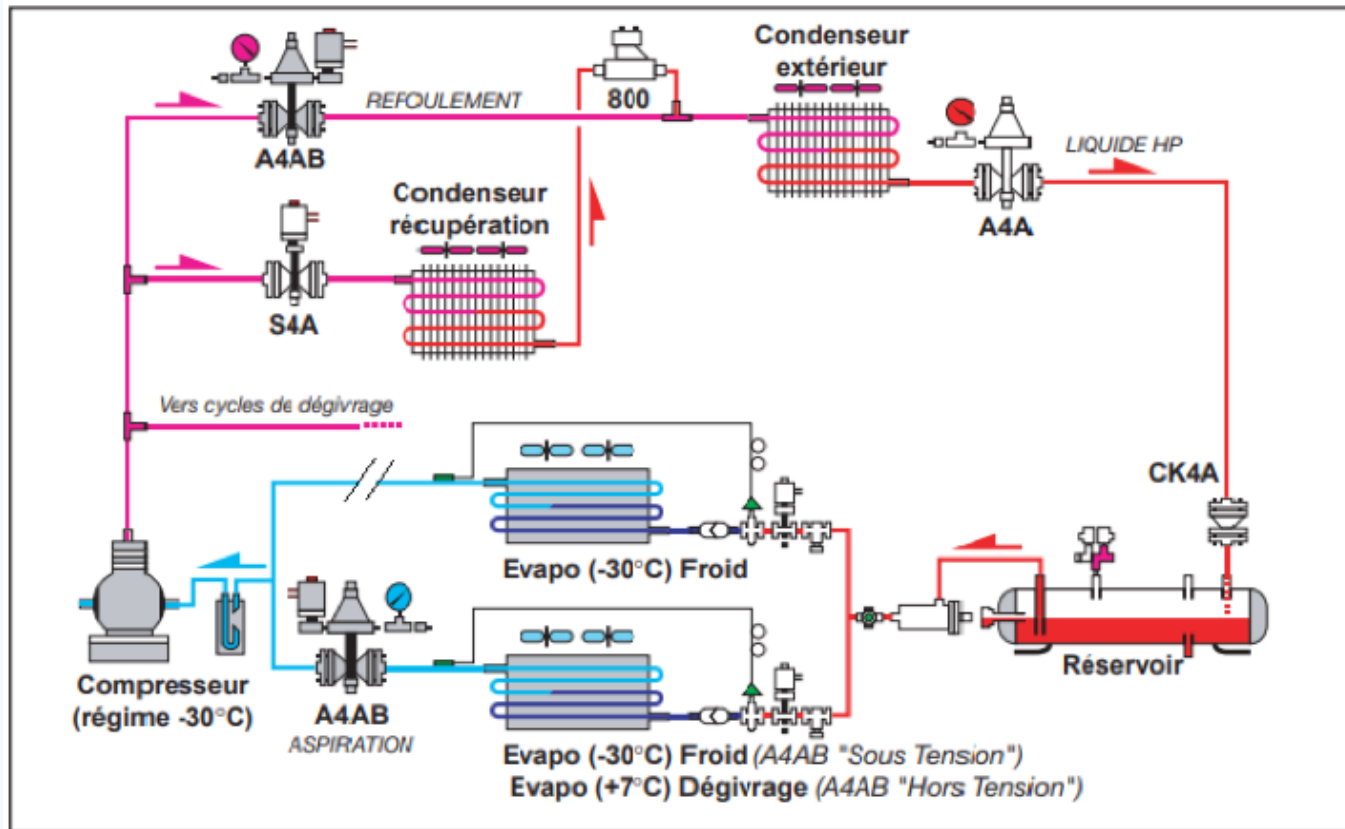
NH₃ (Ammonia), HCFCs, HFCs and their specific oils



9 - DUAL FUNCTION MODULATING REGULATOR (A4AB)



- ❑ APPLICATION WITH “A4AB” (1- Power off: Modulation, 2- Power on: Forced opening).
- ❑ “A4AB” SUR GAZ HP
- ❑ “A4A” SUR LIQUIDE
- ❑ “A4AB” ON SIDE BP





□ Functions:

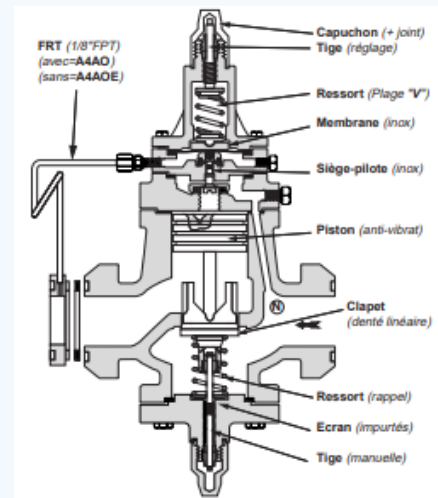
- Controls and maintains a **CONSTANT, ADJUSTABLE** and **LINEAR** "DOWNSTREAM" **PRESSURE**

□ Refrigerants:

NH₃ (Ammoniac), HCFC, HFC and their specific oils

"A4A0" ON LP SIDE (Suction), EVAPORATION, WET VAPOR (Recirculation) or FLOODED (by gravity): . It is the ideal **"START-UP VALVE"**: Permanent protection of compressor suction against any "overload" at start-up and at the precise height of the set "set point". Thrust "DOWNSTREAM" linear lamination. . The "UPWARD overloads", affecting the suction of the compressor, generally come from:

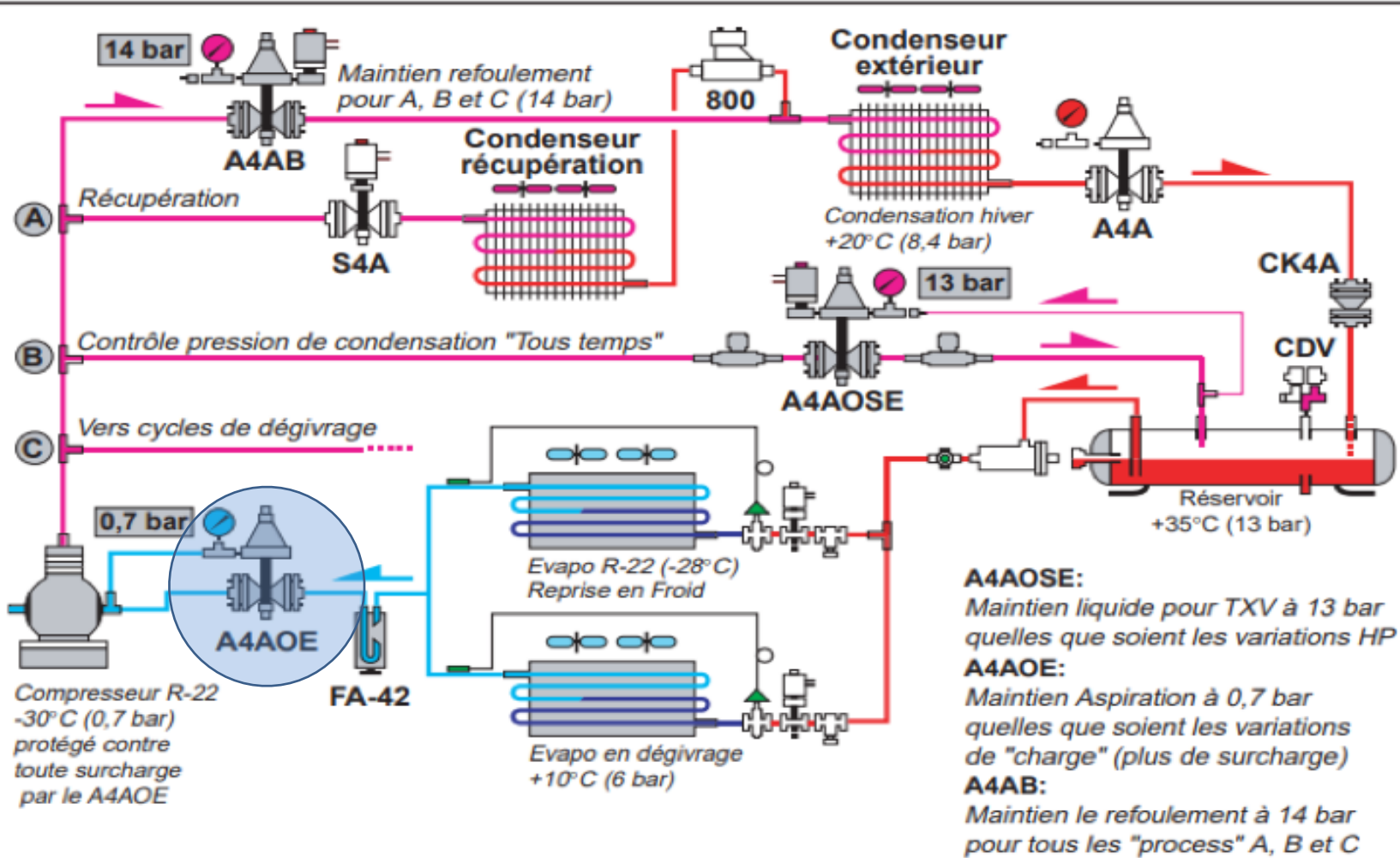
- A "restart" after stopping the installation.
- A "cold recovery" of an Evapo after a defrost cycle (or of certain Evapos on an Evapos shelf).
- A "discharge" of condensate during a defrost cycle.
- A punctual "loading" of the cold room with hot foodstuffs, evolution of the "cold load", etc...



10 - MODULATING REGULATOR WITH "DOWNSTREAM" CONTROL



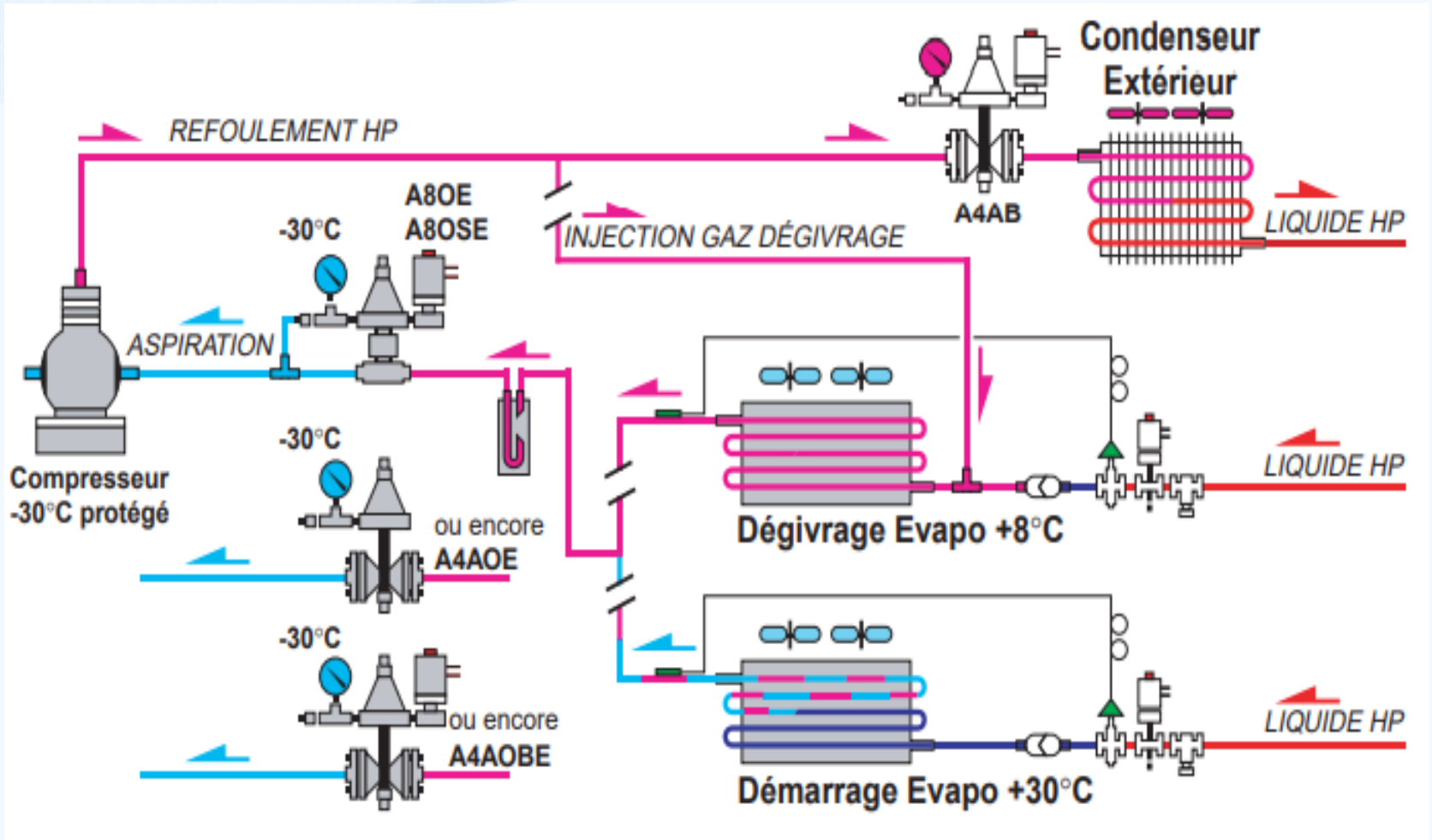
APPLICATION: 7



10 - MODULATING REGULATOR WITH "DOWNSTREAM" CONTROL



APPLICATION: 8



11 - DOUBLE FUNCTION MODULATING REGULATOR (A4AS)



❑ Functions:

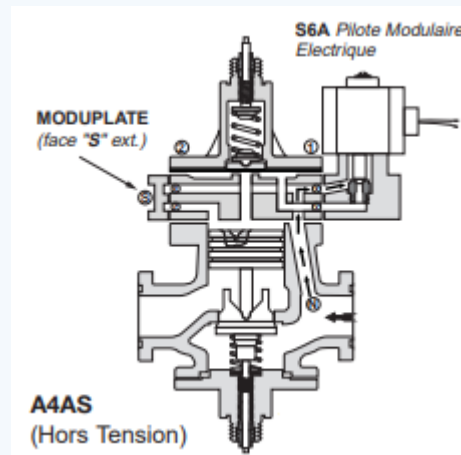
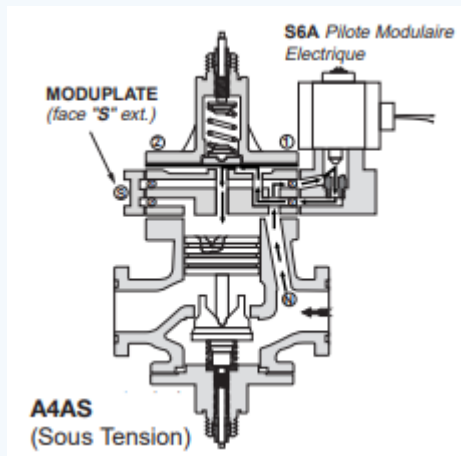
. **UNDER VOLTAGE:** Controls and maintains a **CONSTANT and LINEAR “UPWARD” PRESSURE**

. **POWER OFF:** The Electric Pilot overrides all adjustments and “setpoint” and places the “valve” in the off position.

IMPERATIVE CLOSURE.

❑ Réfrigérants:

NH₃ (Ammonia), HCFC, HFC and their specific oils

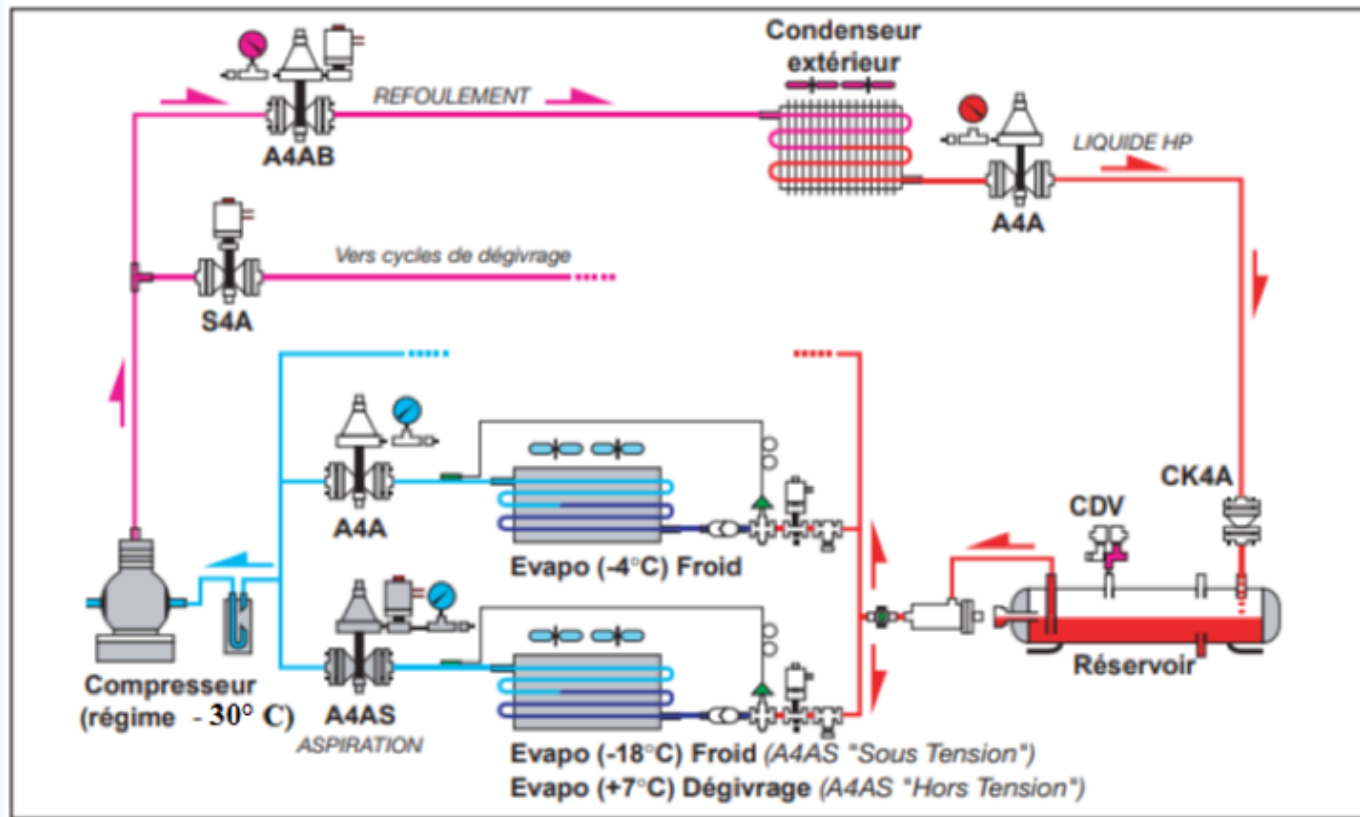


11 - REGULATEUR MODULANT A DOUBLE FONCTION (A4AS)



□ APPLICATION WITH “A4AS” (1- Powered on: Modulation, 2- Powered off: Closing imperative):

- “A4AB” ON GAS HP
- “A4A” ON HP LIQUID
- “A4A” ON BP’ SUCTION
- “A4AS” ON SIDE BP





شكرا

Merci
Thanks
Gracias
Obrigado



QUESTIONS
/ REPOONSES