



Collection of Instructions

Instructions for Danfoss

Refrigeration & Air conditioning Controls



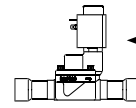
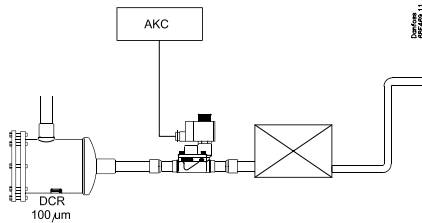
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Electrically operated expansion valve

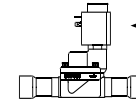
AKV/ AKVA 15



Ambient temperature range:

$$-40^{\circ}\text{C} < t_{\text{amb}} < 50^{\circ}\text{C}$$

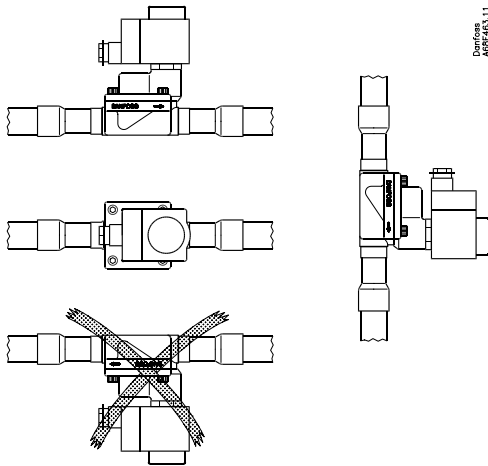
$$-58^{\circ}\text{F} < t_{\text{amb}} < 120^{\circ}\text{F}$$



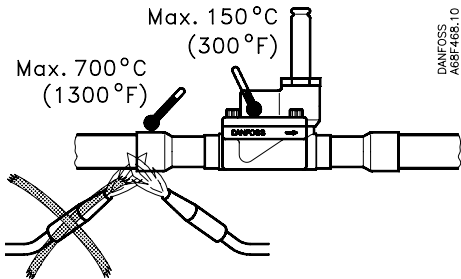
Media temperature range:

$$-50^{\circ}\text{C} < t_{\text{media}} < 60^{\circ}\text{C}$$

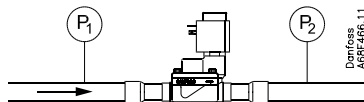
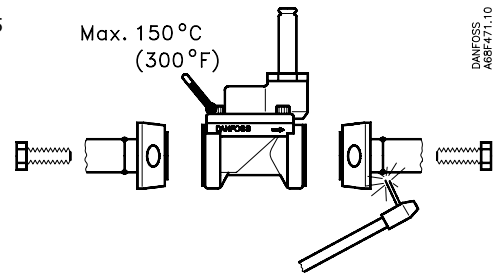
$$-58^{\circ}\text{F} < t_{\text{media}} < 140^{\circ}\text{F}$$



AKV 15



AKVA 15



Media:

AKV 15: HCFC, HFC, R744

AKVA15: R717, R744, HCFC, HFC

Max working pressure P_s / MWP:

AKV 15-1, 2, 3: 42 barg / 610 psig

AKV 15-4: 28 barg / 406 psig

AKVA 15: 42 barg / 610 psig

Max test pressure P_T :

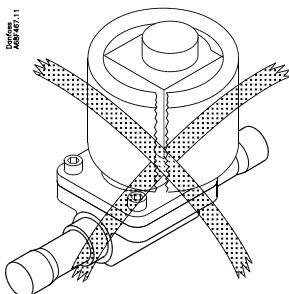
AKV 15-1, 2, 3: 47 barg / 680 psig

AKV 15-4: 31 barg / 450 psig

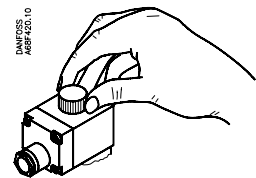
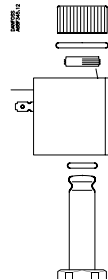
AKVA 15: 47 barg / 680 psig

Max differential pressure:

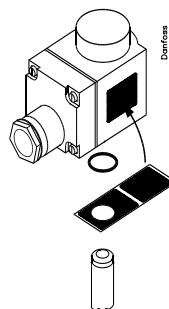
$$\text{MOPDmax} = P_1 - P_2 = 20 \text{ bar} / 290 \text{ psi}$$



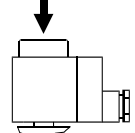
Do not insulate.



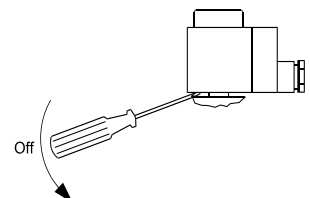
Clip-on coil



On



Off



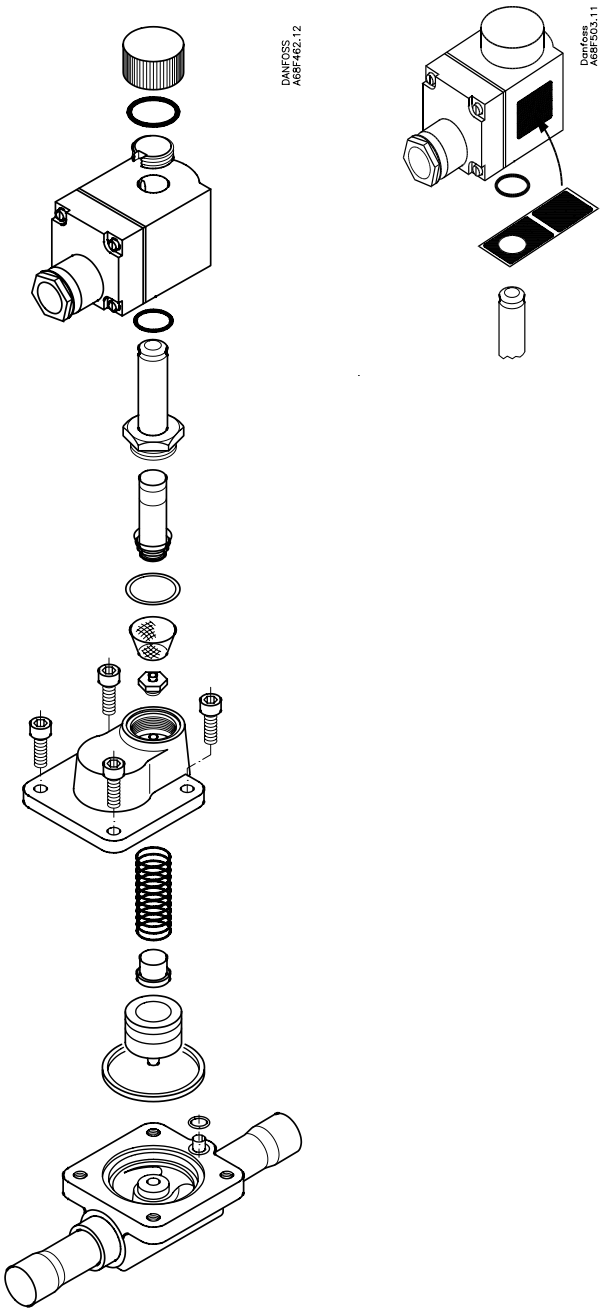
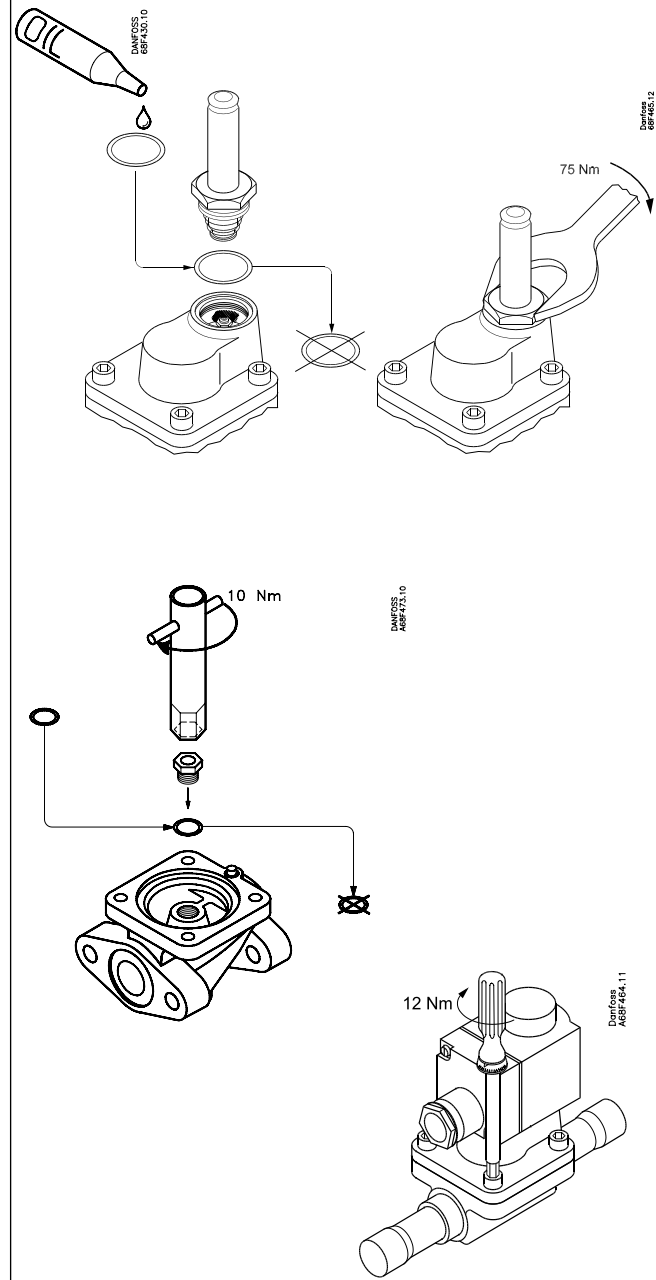
Pakningen skal skiftes, hvis ventilen adskilles.

The gasket must be exchanged, if the valve is dismantled.

Bei Zerlegung des Ventils muß die Dichtung ausgewechselt werden.

Changer le joint chaque fois que la vanne est démontée.

Es preciso cambiar la junta si se desmonta la válvula



AKV 15-n	k _v	R22		AKVA 15-n	k _v	R717	
	m ³ /h	kW	TR		m ³ /h	kW	TR
AKV 15-1	0,25	25	7	AKVA 15-1	0,25	125	35
AKV 15-2	0,4	40	11	AKVA 15-2	0,4	200	60
AKV 15-3	0,63	63	18	AKVA 15-3	0,63	300	90
AKV 15-4	1,0	100	28	AKVA 15-4	1,0	500	140

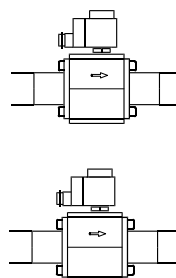
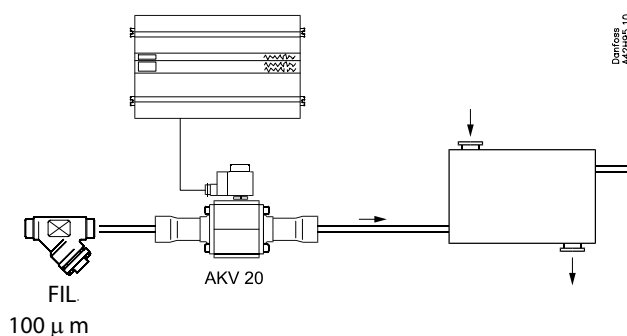
Instructions

068R9523

068R9523

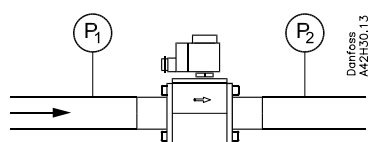
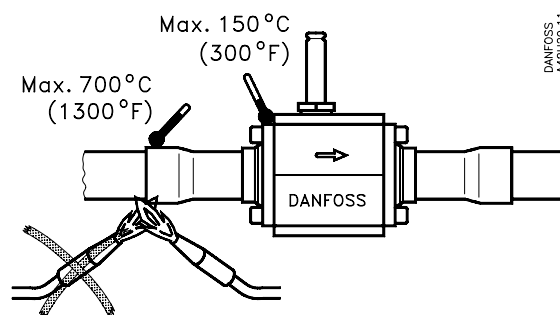
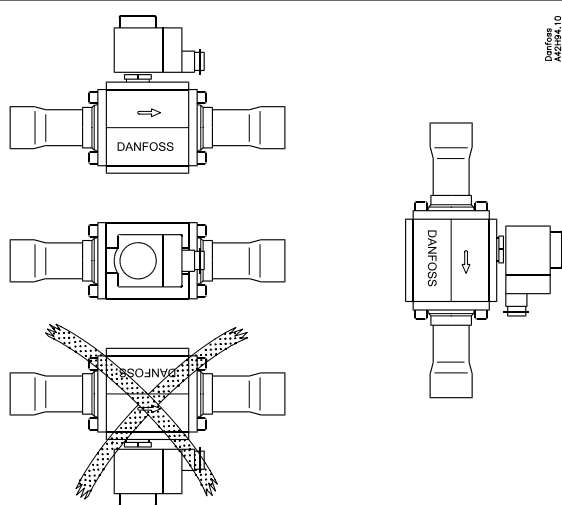
Electrically operated expansion valve

AKV 20



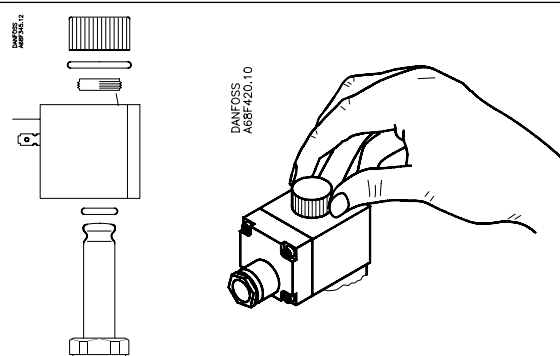
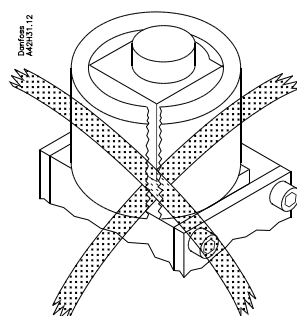
Ambient temperatur range:
-40°C < t_{amb} < 50°C
-40°F < t_{amb} < 120°F

Media temperatur range:
-40°C < t_{media} < 60°C
-40°F < t_{media} < 140°F

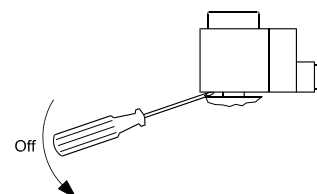
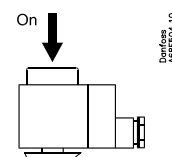
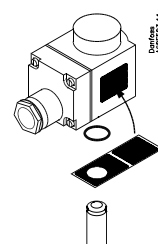


Media:
HCFC, HFC, R744
Max working pressure :
P_s 28 barg / MWP 400 psig
Max test pressure :
PT 31 barg / 260 psig
Max differential pressure:
MOPD_{max} = P₁-P₂ = 20 bar / 290 psi

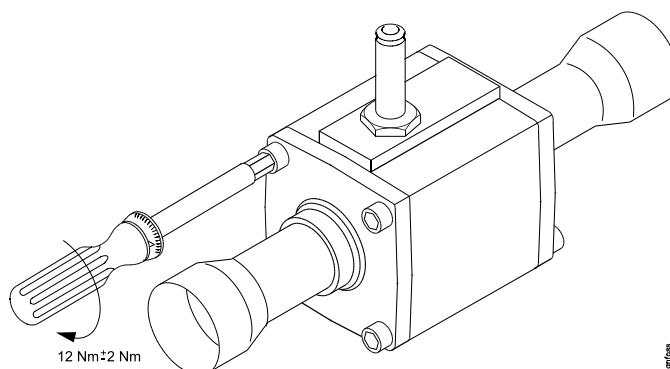
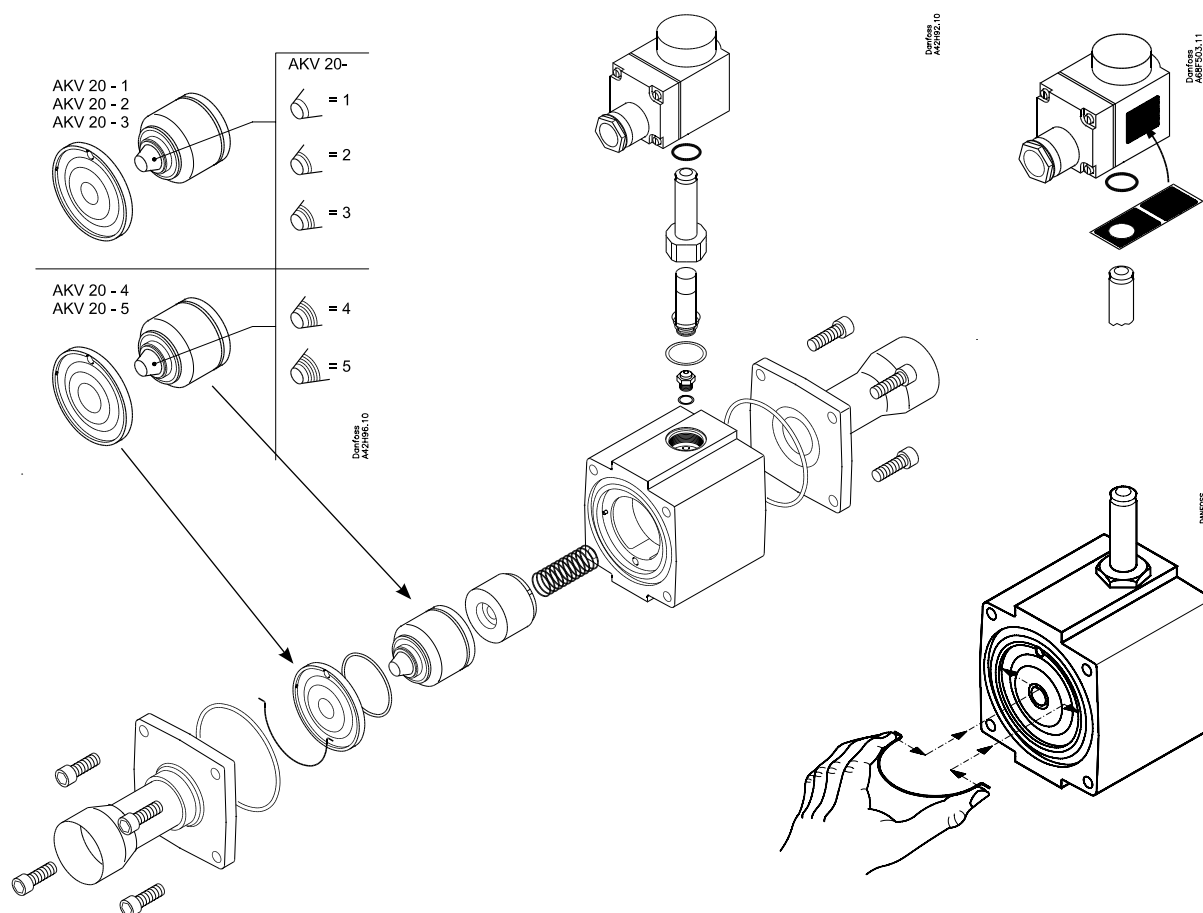
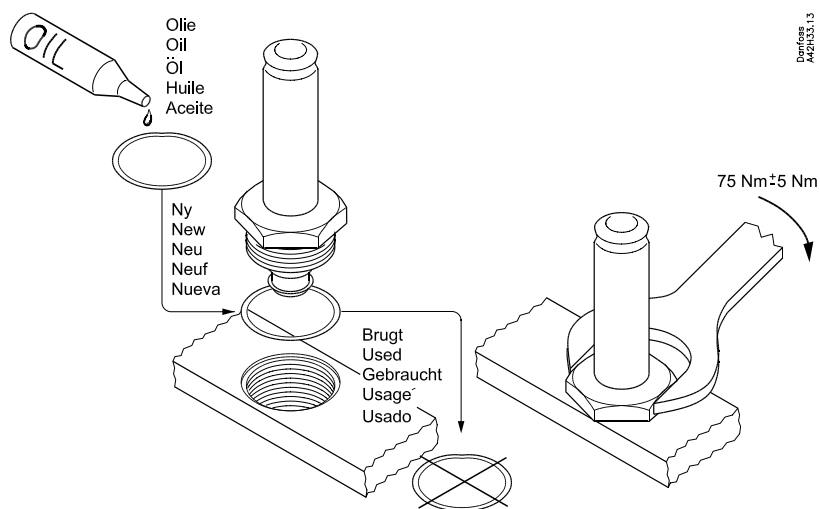
Do not insulate.



Clip-on coil

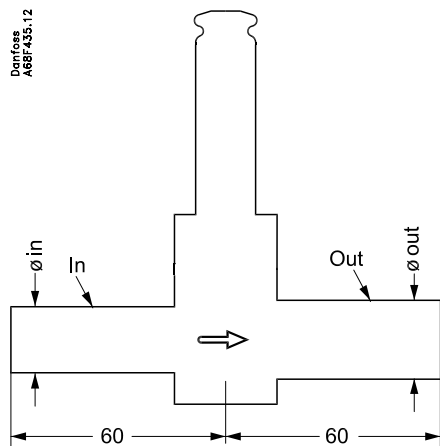


Es preciso cambiar la junta si se desmonta la válvula

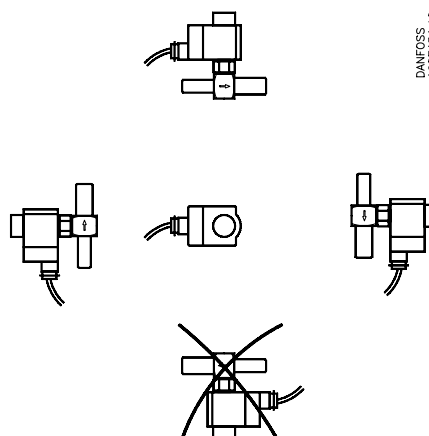
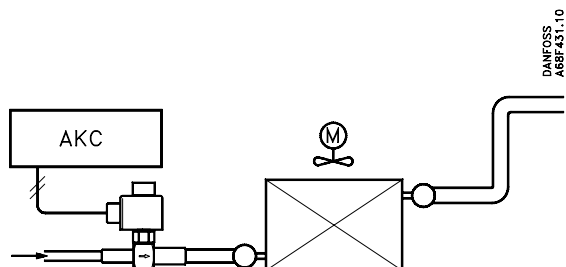


Electrically operated expansion valve

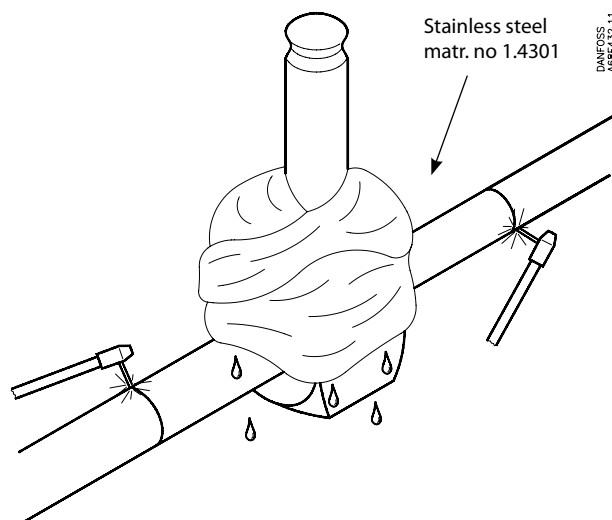
AKVA 10-n (n= 1-8)



AKVA 10 -	1, 2, 3, 4, 5, 6	7,8
In	$\frac{3}{8}"$ ($\varnothing_{in} = 17.2$ mm)	$\frac{1}{2}"$ ($\varnothing_{in} = 21.3$ mm)
Out	$\frac{1}{2}"$ ($\varnothing_{out} = 21.3$ mm)	$\frac{3}{4}"$ ($\varnothing_{out} = 26.9$ mm)



Dyse, Düse, Orifice, Orificio		kW	TR
n	Best.nr. Code no. Bestell-Nr. N° de code Núm. de código		
1	068F0526	4.0	1.1
2	068F0527	6.3	1.8
3	068F0528	10.0	2.8
4	068F0529	16.0	4.5
5	068F0530	25.0	7.1
6	068F0531	40.0	11.4
7	068F0532	63.0	18.0
8	068F0533	100.0	



Ambient temperatur range:
 $-50^{\circ}\text{C} < t_{\text{amb}} < 50^{\circ}\text{C}$
 $-58^{\circ}\text{F} < t_{\text{amb}} < 120^{\circ}\text{F}$

Media temperatur range
 $-50^{\circ}\text{C} < t_{\text{media}} < 60^{\circ}\text{C}$
 $-58^{\circ}\text{F} < t_{\text{media}} < 140^{\circ}\text{F}$

Max Working pressure:
 $P_s = 42 \text{ barg} / \text{MWP} = 610 \text{ psig}$
 Max test pressure
 $PT = 46,2 \text{ barg} / 670 \text{ psig}$
 Max differential pressure
 $\text{MOPDmax} = (P_1 - P_2) = 18 \text{ bar (260 psi)}$
 Media R717, R744, HCFC, HFC

Do not insulate the valve.

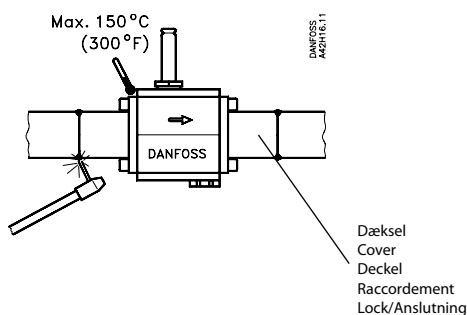
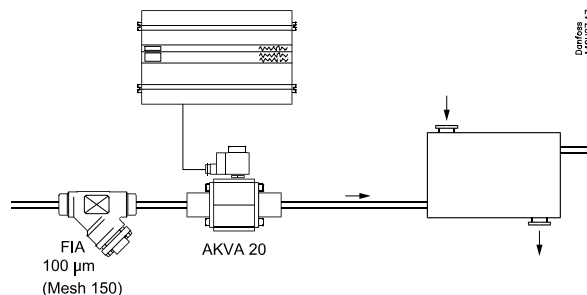
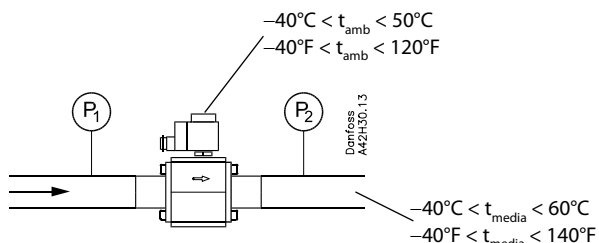
Clip-on coil

Pakningen <u>skal</u> skiftes, hvis ventilen adskilles	
The gasket <u>must</u> be exchanged, if the valve is dismantled	
Bei Zerlegung des Ventils <u>muß</u> die Dichtung ausgetauscht werden.	
Changer le joint <u>chaque fois</u> que la vanne est démontée	
Es <u>preciso</u> cambiar la junta si se desmonta la válvula	

Electrically operated expansion valve

AKVA 20

Kølemidler/ Refrigerants/ Kältemittel/ Réfrigérants/ Köldmedier: R717, HCFC, HFC
 MWP = PS 42 bar g (609 psi g)
 MOPD max. = (P1-P2)max. = 18 bar g (261 psi g)



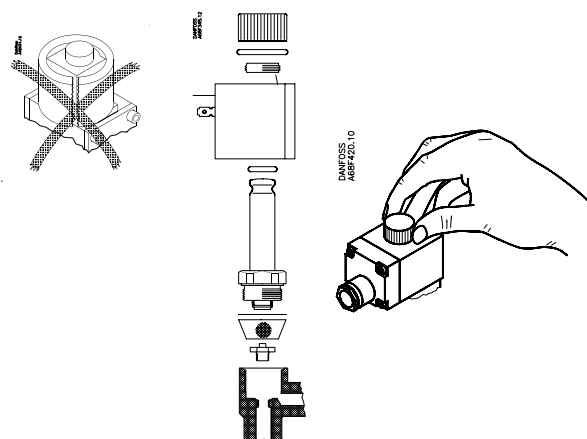
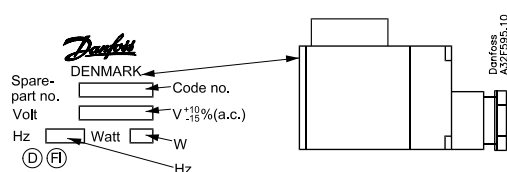
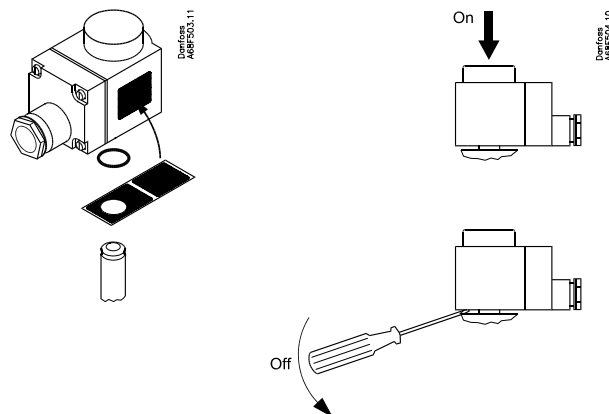
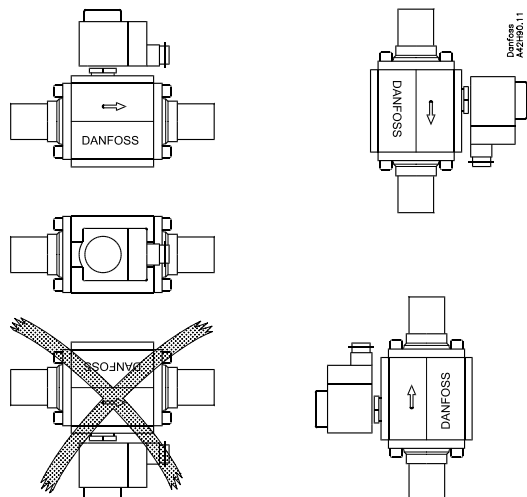
Dækselmateriale P285QH EN 10222-4. Ventilen skal indbygges spændingsløst i rørsystemet, og montagen må kun ske med kvalificeret personale og processer. Efter sammenføijningen bør ventilen overfladebehandles for at undgå korrosion.

Cover material P285QH EN 10222-4. Installation is to be carried out with qualified personnel and processes only. After welding, the valve should be surfaced to be corrosion-proof.

Deckelmaterial P285QH EN 10222-4. Der Einbau des Ventils muß im Leitungssystem spannungsfrei erfolgen und nur mit qualifiziertem Personal und Prozeß ausgeführt werden. Um Korrosion zu verhindern, ist nach dem Schweißen eine Oberflächenbehandlung auszuführen.

Les tubes de raccordement sont en acier type P 285 QH EN 10222-4. L'installation doit être réalisée suivant la procédure en vigueur, par du personnel quali-fié. Après soudage les raccords doivent être protégés contre la corrosion.

Lock/Anslutning, material P285QH EN 10222-4. Ventilen skall inmonteras i spänningslöst tillstånd i rørsystemet och monterat får endast ske av behörig personal enligt anvisningarna. Efter inmonteringen bör ventilen ytbehandlas för att skydda mot korrosion.



Pakning skal skiftes, hvis ventilen adskilles.

The gasket must be replaced if the valve is dismantled.

Bei der Demontage des Ventils, muß die Dichtung ausgewechselt werden.

Changer le joint chaque fois que la vanne est démontée.

Packning skall bytas om ventilen tas isär.

Hver linjemarkering indikerer ventilstørrelsen. Her er AKVA 20-3 vist.

Each line marking indicates size of valve. Here shown AKVA 20-3.

Jede Linienmarkierung zeigt die Ventilgröße an. Hier ist AKVA 20-3 abgebildet.

Le nombre de ligne sur le piston indique la taille de la vanne. Exemple 3 lignes veut dire AKVA 20-3.

Varje linjemarkering indikerar ventilstorleken. Här visas AKVA 20-3.

Antal linjer No of line marking Anzahl Linien Nombre de ligne Antal linjer	Type
1	AKVA 20-1
2	AKVA 20-2
3	AKVA 20-3
4	AKVA 20-4
5	AKVA 20-5

<p>Dansk</p> <p>Service på ventilen må ikke udføres, mens ventileren under tryk.</p> <p>Der bør kun anvendes originale Danfoss reservedele.</p> <p>Al service og montage må kun udføres af autoriseret personale</p>	<p>English</p> <p>Do not carry out service when internal pressure is present in the valve.</p> <p>Use only original Danfoss spare parts.</p> <p>Only authorized personnel is to carry out all service and installation</p>	<p>Deutsch</p> <p>Service darf nicht ausgeführt werden, wenn das Ventil unter Druck ist.</p> <p>Nur originale Danfoss Ersatzteile verwenden.</p> <p>Service und Installation darf nur von autorisiertem Personal ausgeführt werden.</p>	<p>Francais</p> <p>Ne pas démonter la vanne si celle-ci est sous pression</p> <p>Utiliser uniquement des pièces détachées Danfoss</p> <p>Ces vannes ne doivent être démontées que par du personnel autorisé.</p>	<p>Svenska</p> <p>Service på ventilen får inte utföras när ventilen är under tryck.</p> <p>Använd alltid Danfoss original reservdelar.</p> <p>All service och montage får endast utföras av be-hörig personal</p>
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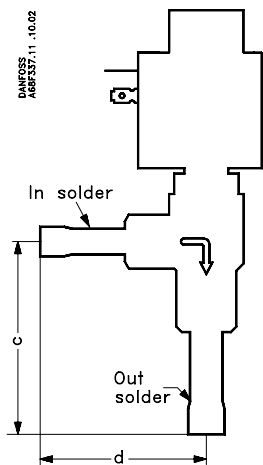
Instructions

068R9514

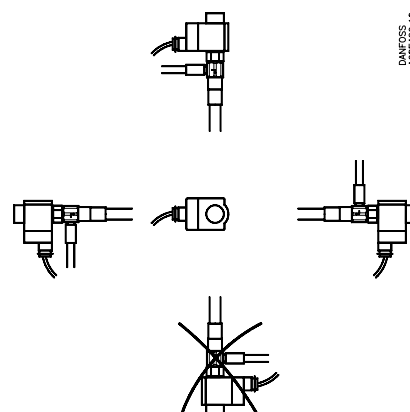
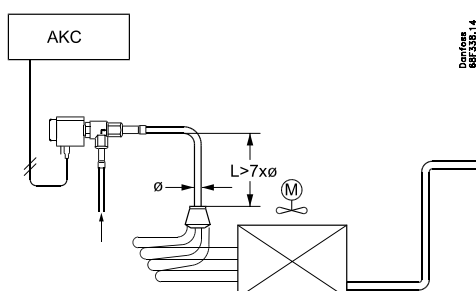
068R9514

Electrically operated expansion valve

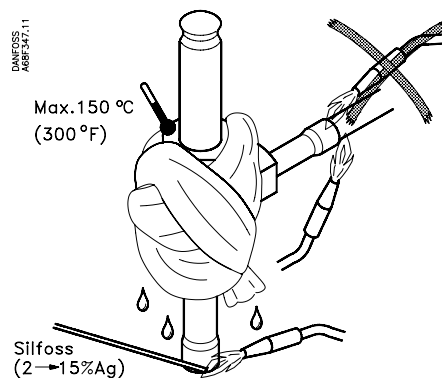
AKV 10-n (n= 1-7)



AKV 10 -	1, 2, 3, 4, 5, 6	7
c	75	73
d	67	75
In solder	3/8" / 10 mm	1/2" / 12 mm
Out solder	1/2" / 12 mm	5/8" / 16 mm

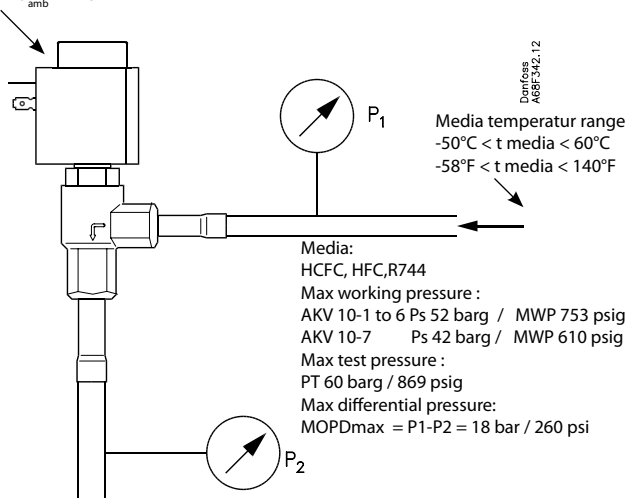


Dyse, Düse, Orifice, Orificio		R 22	R 134a	R404A R507	R407C
n	Best.nr. Code no. Bestell-Nr. N° de code Núm. de código	kW	kW	kW	kW
1	068F0506	1.0	0.9	0.8	1.1
2	068F0507	1.6	1.4	1.3	1.7
3	068F0508	2.6	2.1	2.0	2.5
4	068F0509	4.1	3.4	3.1	4.0
5	068F0510	6.4	5.3	4.9	6.4
6	068F0511	10.2	8.5	7.8	10.1
7	068F0512	16.3	13.5	12.5	17.0

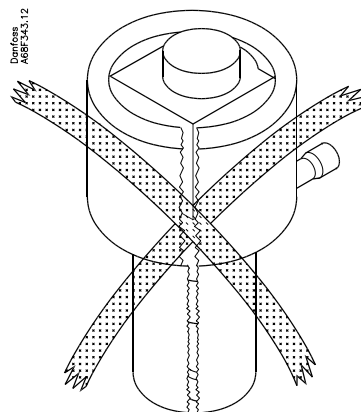


Ambient temperatur range:

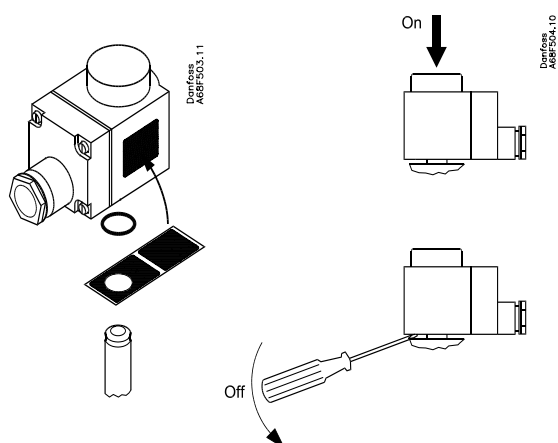
$-50^{\circ}\text{C} < t_{\text{amb}} < 50^{\circ}\text{C}$
 $-58^{\circ}\text{F} < t_{\text{amb}} < 120^{\circ}\text{F}$



Do not insulate



Clip-on coil



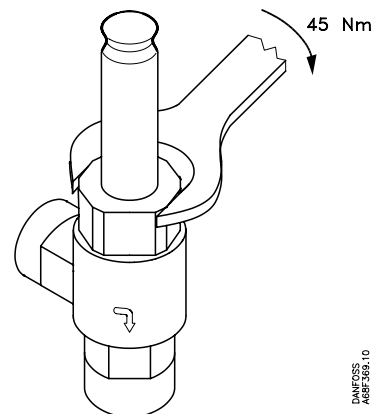
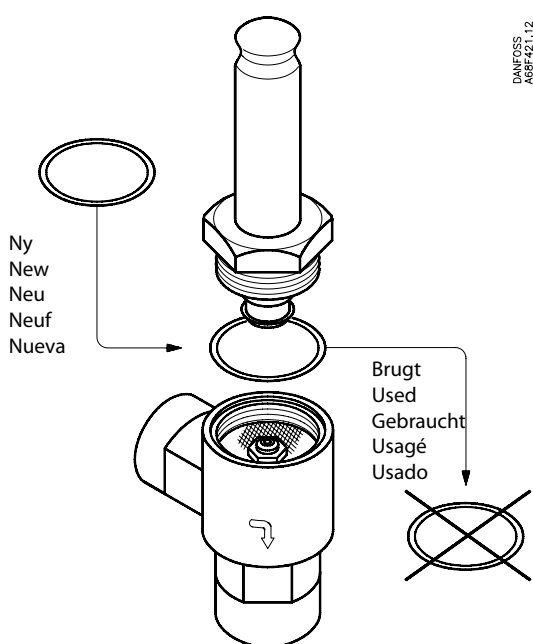
Pakningen skal skiftes, hvis ventilen adskilles

The gasket must be exchanged, if the valve is dismantled

Bei Zerlegung des Ventils muß die Dichtung ausgetauscht werden.

Changer le joint chaque fois que la vanne est démontée

Es preciso cambiar la junta si se desmonta la válvula



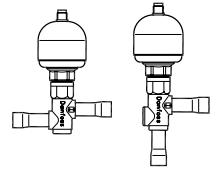
Instruction



034R9527

034R9527

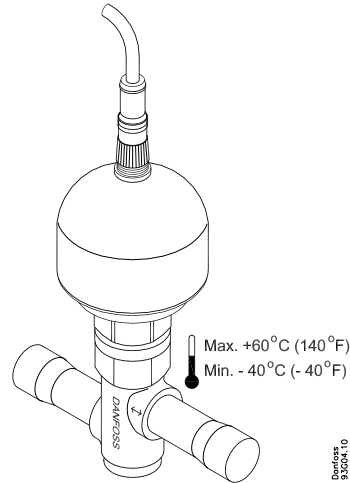
ETS 12½, ETS 25 & KVS 15



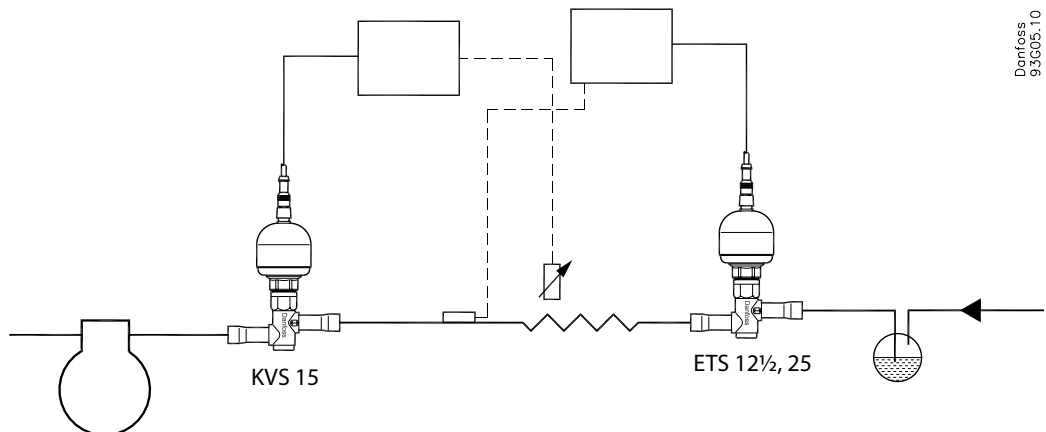
Tilladt omgivelsestemperatur
Allowable ambient temperature
Zulässige Umgebungstemperatur
Température ambiante admissible
Temperatura ambiente permisible

ETS 12½, 25 & KVS 15

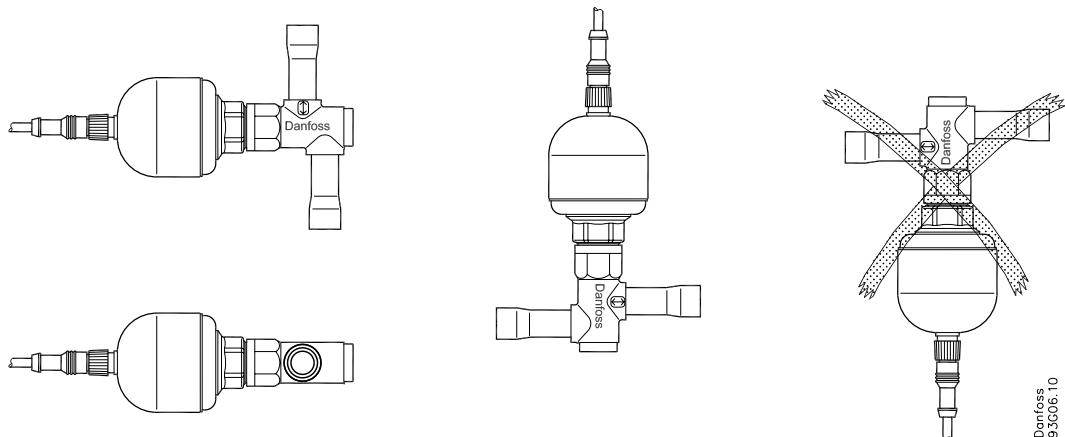
PS/ MWP = 45.5 bar (659.9 psig)



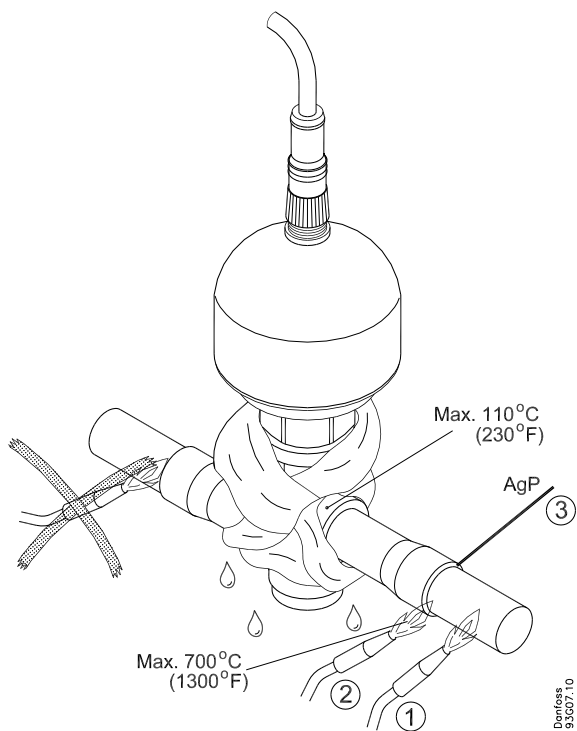
Anvendelse
Application
Anwendung
Application
Aplicación



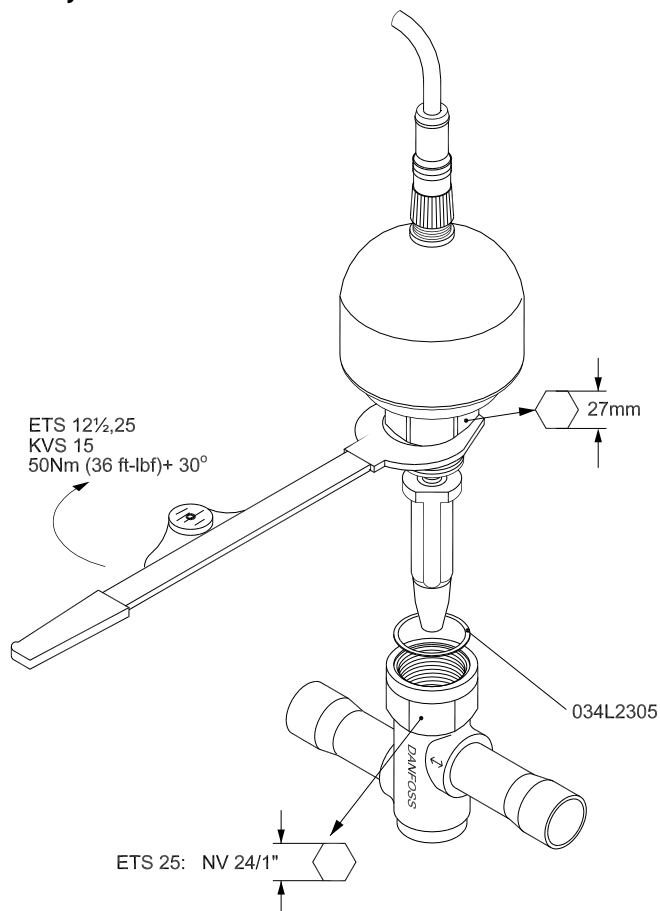
Montage
Mounting
Einbau
Montage
Instalación



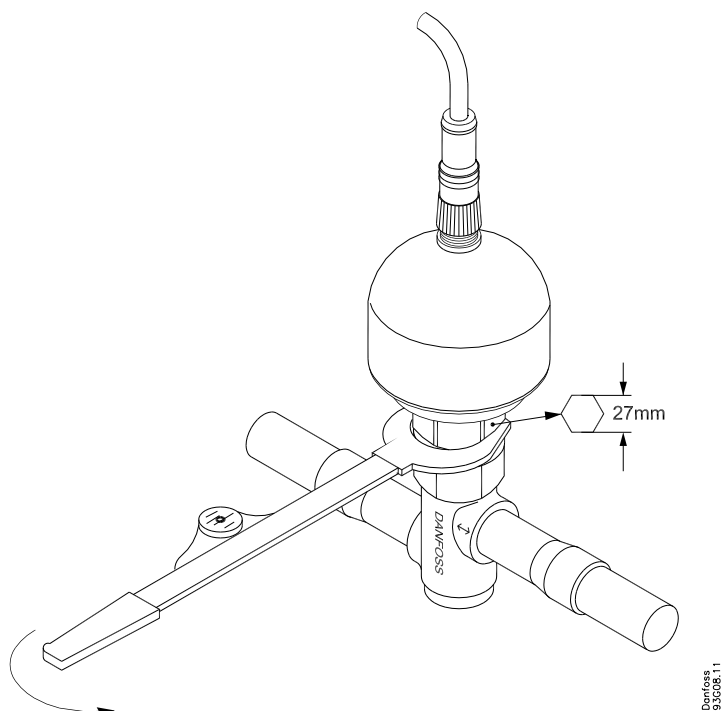
**Lodning
Brazing
Löten
Soudure
Soldadura**

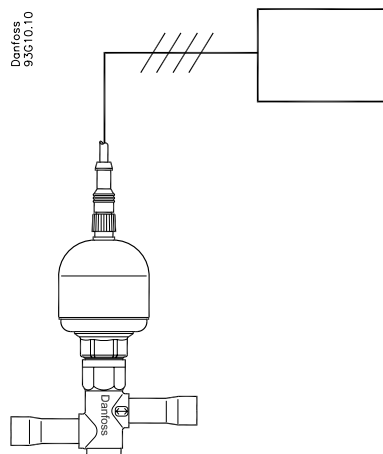


**Samling
Assembling
Zusammenbau
Assemblage
Montaje**



**Adskillelse
Disassembling
Auseinanderbauen
Désassemblage
Desmontaje**





AST / ETS		Connector	
	4	Black	4
	3	White	3
	2	Green	2
	1	Red	1
	Conn.1	Wire Color	Conn.2
		Pin Out	

Stepper motor switch sequence:

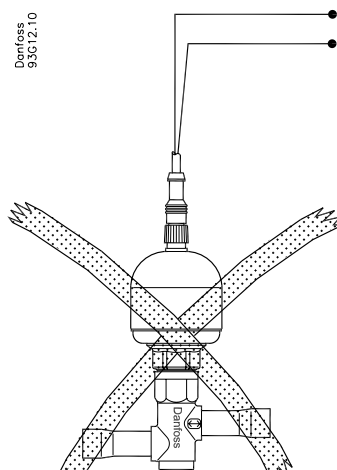
↑ CLOSING ↑	STEP	Coil I		Coil II		↓ OPENING ↓
		Red	Green	White	Black	
	1	+	-	+	-	
	2	+	-	-	+	
	3	-	+	-	+	
	4	-	+	+	-	
	1	+	-	+	-	

Electrical specifications

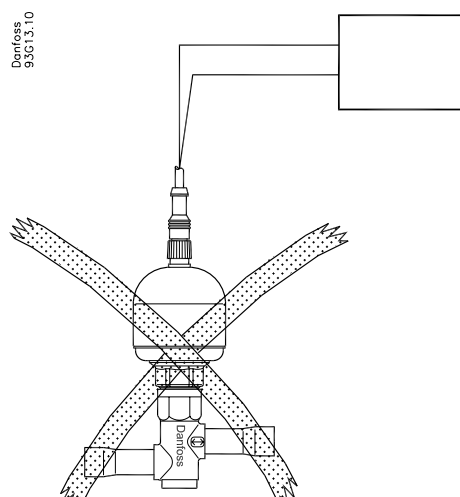
Parameter	ETS 12½, ETS 25 & KVS 15
Stepper motor type	Bi-polar - permanent magnet
Step mode	2 phase full step
Phase resistance	52Ω ±10%
Phase inductance	85 mH
Holding current	Depends on application. Full current allowed (100% duty cycle)
Step angle	7.5° (motor), 0.9° (lead screw), Gearing ration 8.5:1. (38/13)²:1
Nominal voltage	(Constant voltage drive) 12 V dc -4% +15%
Phase current	(Using chopper drive) 100 mA RMS -4% +15%,
Max. total power	Voltage / current drive: 5.5 / 1.3 W (UL: NEC class 2)
Step rate	150 steps/sec. (constant voltage drive) 0-300 steps/sec. 300 recommended (chopper current drive)
Total steps	2625 [+160 / -0] steps
Full travel time	17 / 8.5 sec. (voltage / current)
Reference position	Overdriving against the full close position
Electrical connection	M12 connector



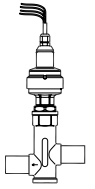
Advarsel!
Warning!
Achtung!
Attention !
Advertencia



Ventilen må ikke tilsluttes direkte.
Do not apply power directly to valve.
Das Ventil darf nicht direkt angeschlossen werden.
Ne pas raccorder l'alimentation électrique directement sur la vanne
No aplicar tensión directamente a la válvula



Tilslut aldrig spænding til en usamlert ventil.
Do not apply power to unassembled valve.
Das Ventil darf nur wenn komplett zusammengebaut angeschlossen werden.
Ne pas raccorder l'alimentation électrique sur une vanne non assemblée.
No aplicar tensión a la válvula desmontada.

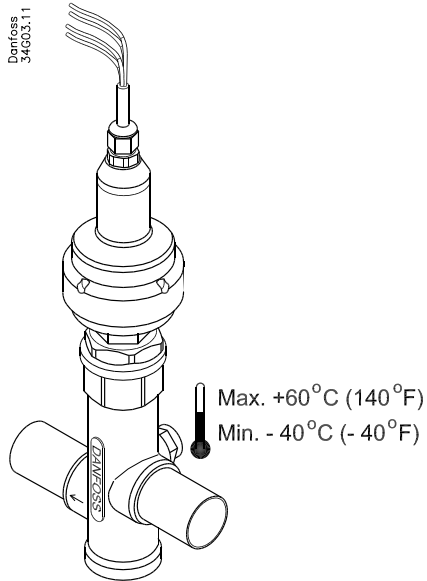


034R9510

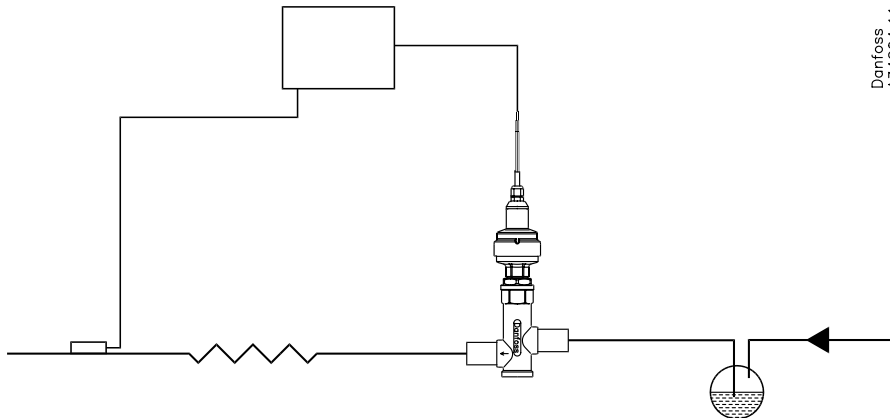
034R9510

Tilladt omgivelsestemperatur
Allowable ambient temperature
Zulässige Umgebungstemperatur
Température ambiante admissible
Temperatura ambiente permisible

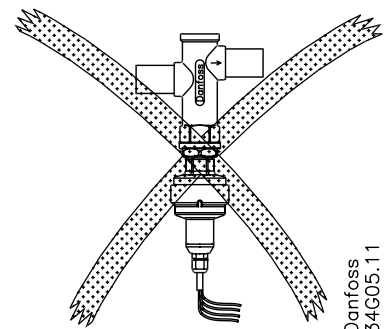
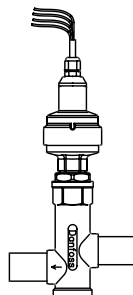
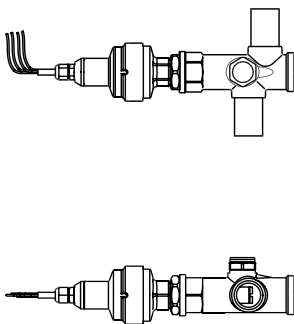
ETS 25, biflow
 ETS 50, biflow
 ETS 100, biflow



Anvendelse
Application
Anwendung
Application
Aplicación

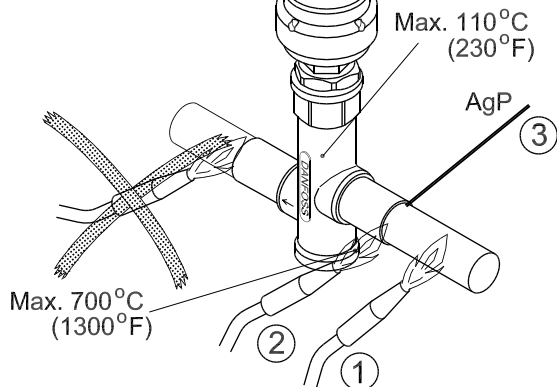


Montage
Mounting
Einbau
Montage
Instalación



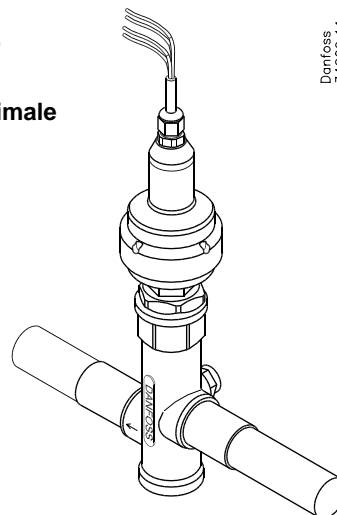
Lodning
Brazing
Löten
Soudure
Soldadura

Danfoss
34G06.11



Max. tryk
Max. pressure
Max. Druck
Pression maximale
Presión máx.

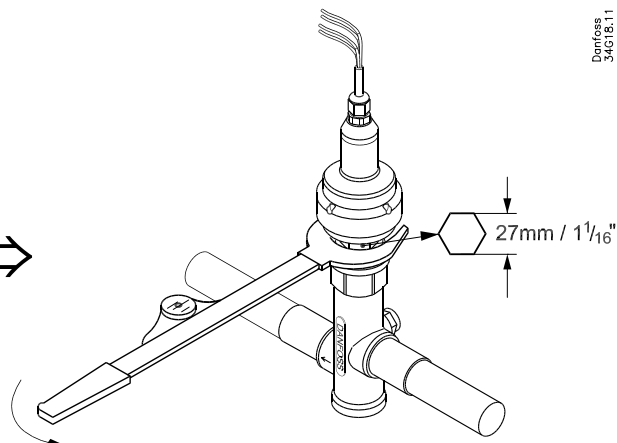
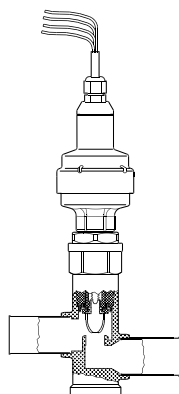
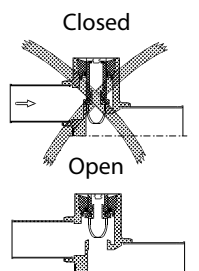
Danfoss
34G09.11



PS/MWP = 45 bar (650 psig)
PT = 65 bar (940 psig)

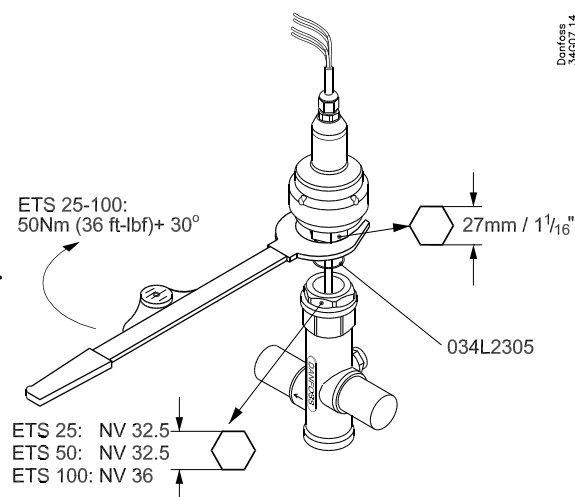
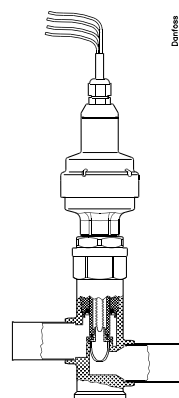
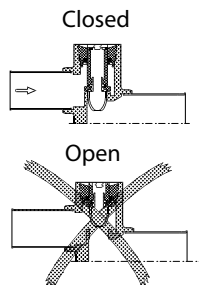
Adskillelse
Disassembling
Zerlegung
Désassemblage
Desmontaje

Danfoss
34G17.11



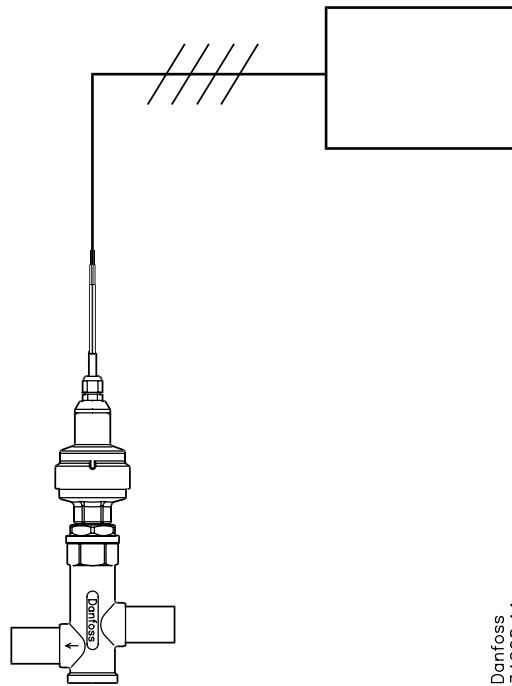
Danfoss
34G18.11

Samling
Assembling
Zusammenbau
Assemblage
Montaje



Danfoss
34G17.14

Tilslutning
Connection
Anschluss
Raccordement
Conexión



Stepper motor switch sequence:

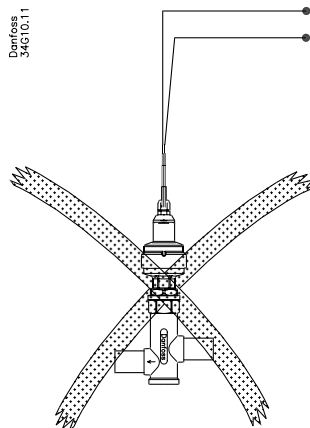
↑ CLOSING ↑	STEP	Coil I		Coil II		↓ OPENING ↓
		Red	Green	White	Black	
	1	+	-	+	-	
	2	+	-	-	+	
	3	-	+	-	+	
	4	-	+	+	-	
	1	+	-	+	-	

Electrical specifications

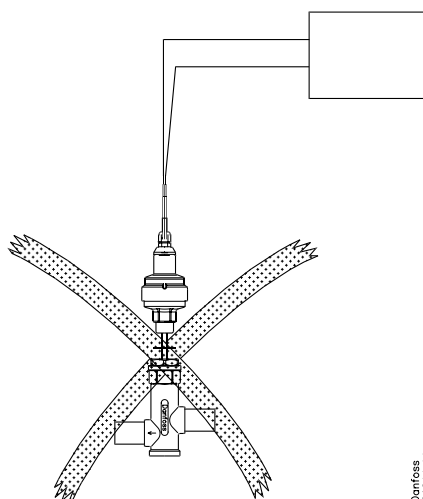
Parameter	ETS 50B / ETS 100B
Stepper motor type	Bi-polar - permanent magnet
Step mode	2 phase full step
Phase resistance	52Ω ±10%
Phase inductance	85 mH
Holding current	Depends on application. Full current allowed (100% duty cycle)
Step angle	7.5° (motor), 0.9° (lead screw), Gearing ration 8.5:1. (38/13) ² :1
Nominal voltage	(Constant voltage drive) 12 V dc -4% +15%, 150 steps/sec.
Phase current	(Using chopper drive) 100 mA RMS -4% +15%,
Max. total power	Voltage / current drive: 5.5 / 1.3 W (UL: NEC class 2)
Step rate	150 steps/sec. (constant voltage drive) 0-300 steps/sec. 300 recommended (chopper current drive)
Total steps	ETS 25: 2625 [+160 / -0] steps ETS 50: 2625 [+160 / -0] steps ETS 100: 3530 [+160 / -0] steps
Full travel time	ETS 50: 17 / 8.5 sec. (voltage / current) ETS 50: 17 / 8.5 sec. (voltage / current) ETS 100: 23 / 11.5 sec. (voltage / current)
Reference position	Overdriving against the full close position
Electrical connection	4 wire 0.5 mm ² (0.02 in ²), 2 m (6.5 ft) long cable



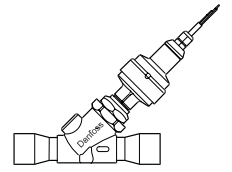
Advarsel!
Warning!
Achtung!
Attention !
Advertencia



Ventilen må ikke tilsluttes direkte.
Do not apply power directly to valve.
Das Ventil darf nicht direkt angeschlossen werden.
Ne pas raccorder l'alimentation électrique directement sur la vanne
No aplicar tensión directamente a la válvula



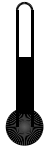
Tilslut aldrig spænding til en usamlet ventil.
Do not apply power to unassembled valve.
Das Ventil darf nur wenn komplett zusammengebaut angeschlossen werden.
Ne pas raccorder l'alimentation électrique sur une vanne non assemblée.
No aplicar tensión a la válvula desmontada.



034R9525

034R9525

Temperature range

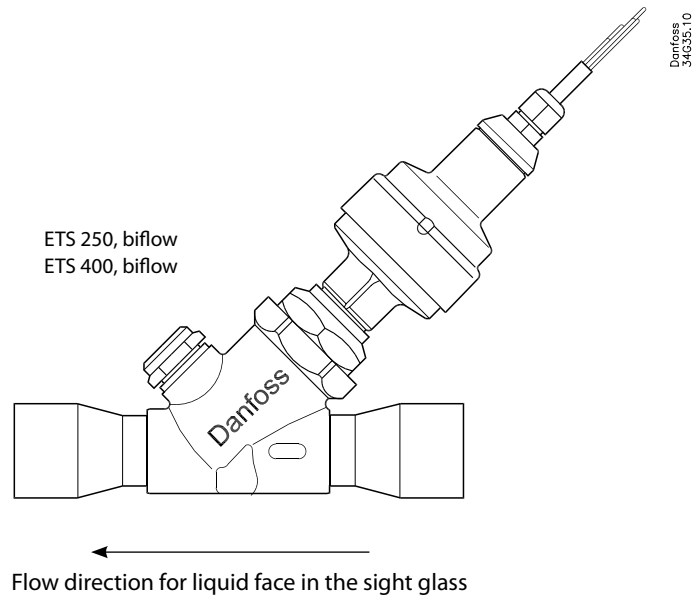


Max. +60°C (140°F)
Min. -40°C (-40°F)

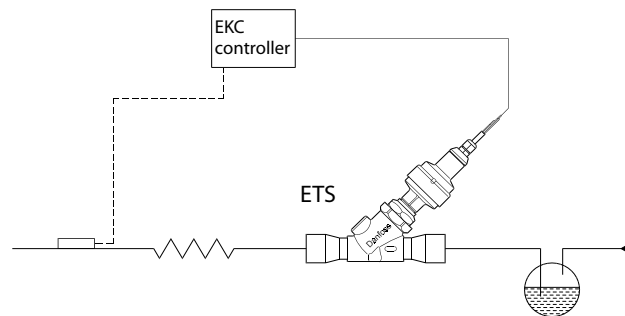
Max. pressure



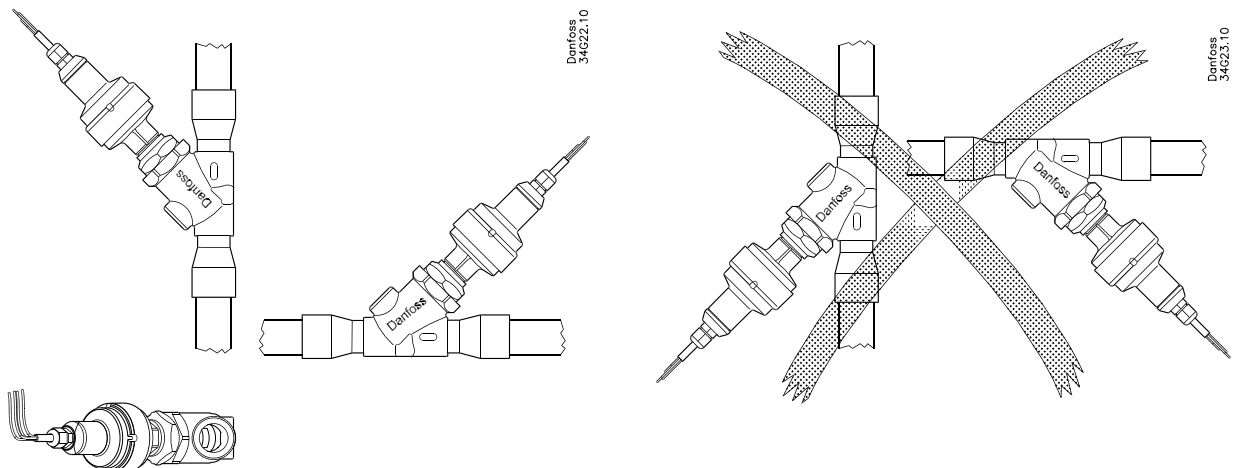
PS/MWP = 34 bar (493 psig)
PT = 49 bar (711 psig)



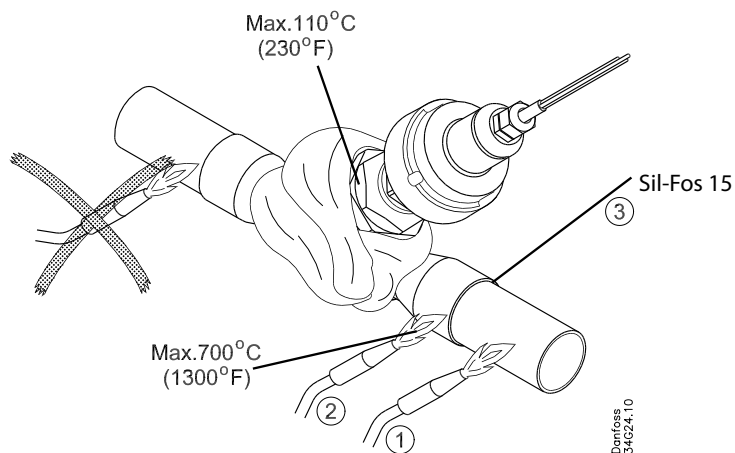
Application



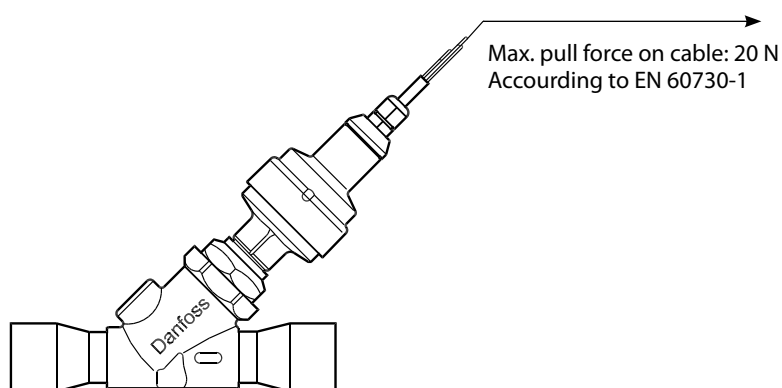
Mounting



Brazing



Electrical connection



Danfoss
34G28.10

Stepper motor switch sequence:

	STEP	Coil I		Coil II		
		Red	Green	White	Black	
↑ CLOSING ↑	1	+	-	+	-	↓ OPENING ↓
	2	+	-	-	+	
	3	-	+	-	+	
	4	-	+	+	-	
	1	+	-	+	-	



Advarsel!

Warning!

Achtung!

Attention !

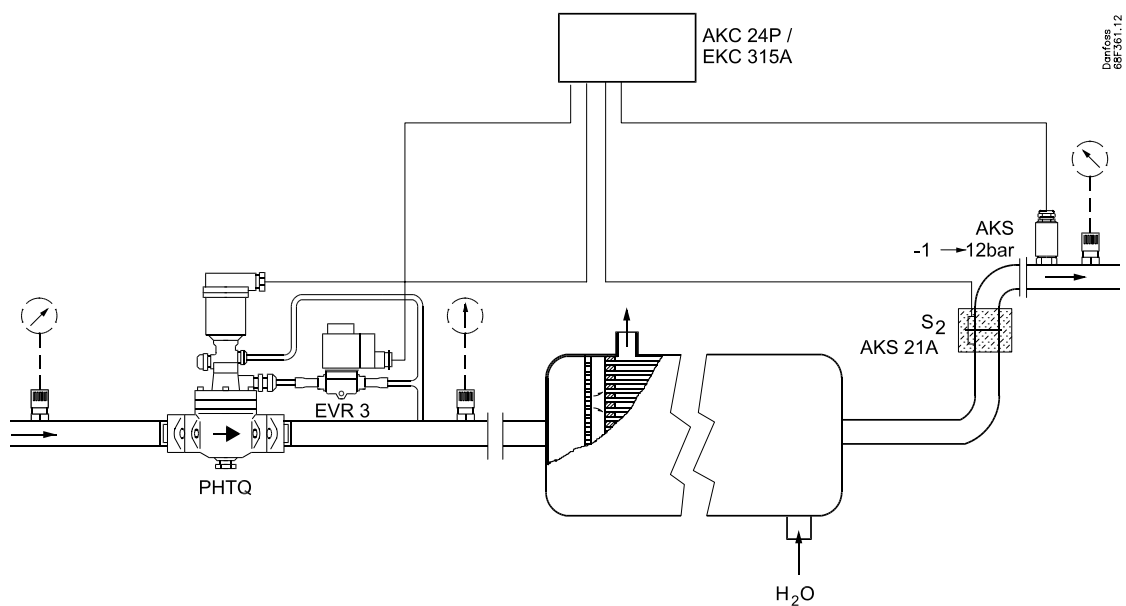
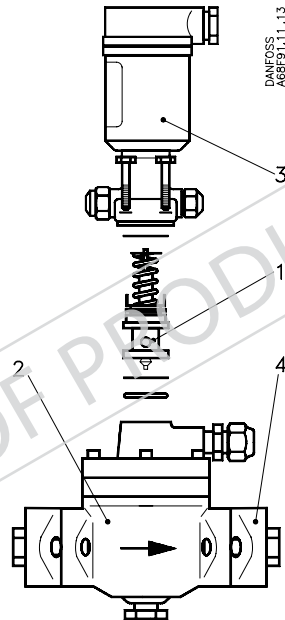
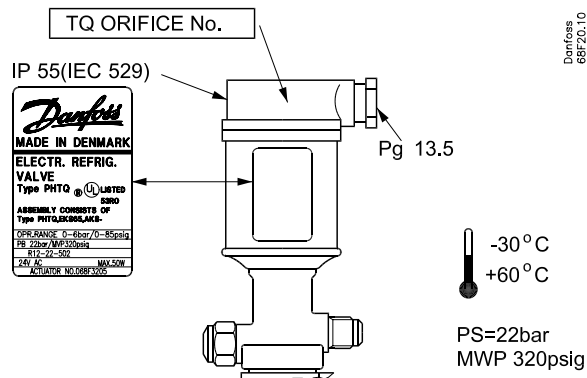
Advertencia

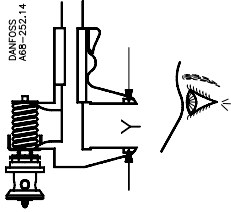
- Ventilen må ikke tilsluttes direkte.
- Do not apply power directly to valve.
- Das Ventil darf nicht direkt angeschlossen werden.
- Ne pas raccorder l'alimentation électrique directement sur la vanne.
- No aplicar tensión directamente a la válvula.

- Tilslut aldrig spænding til en usamlet ventil.
- Do not apply power to unassembled valve.
- Das Ventil darf nur wenn komplett zusammengebaut angeschlossen werden.
- Ne pas raccorder l'alimentation électrique sur une vanne non assemblée.
- No aplicar tensión a la válvula desmontada.

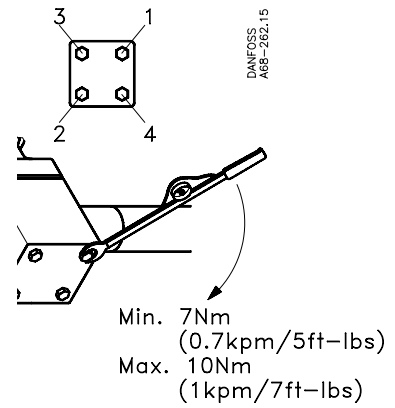
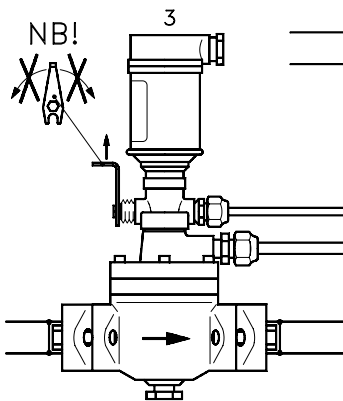
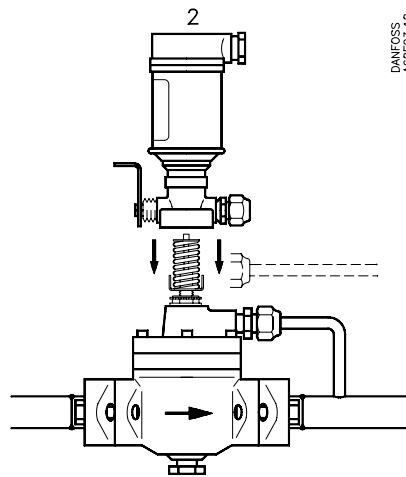
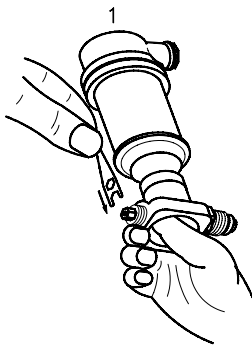
Instructions

PHTQ



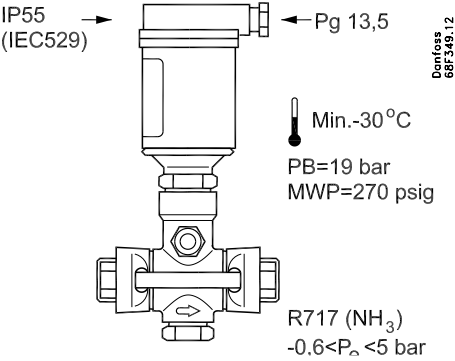


$Y = 27.5 \pm 0.5 \text{ mm}$

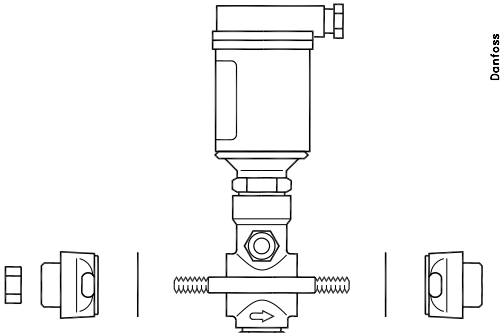
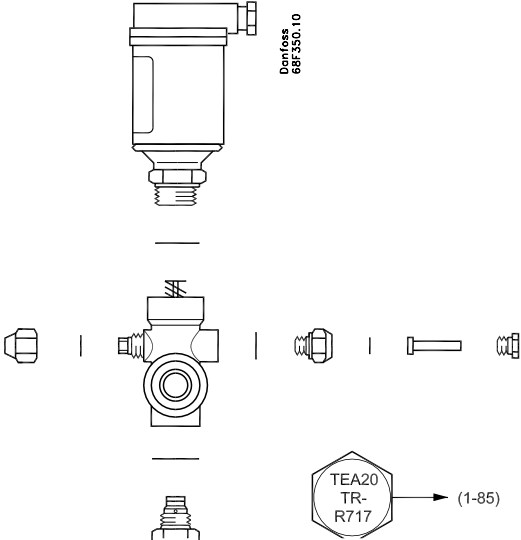


Instructions

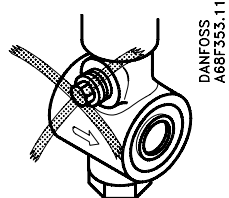
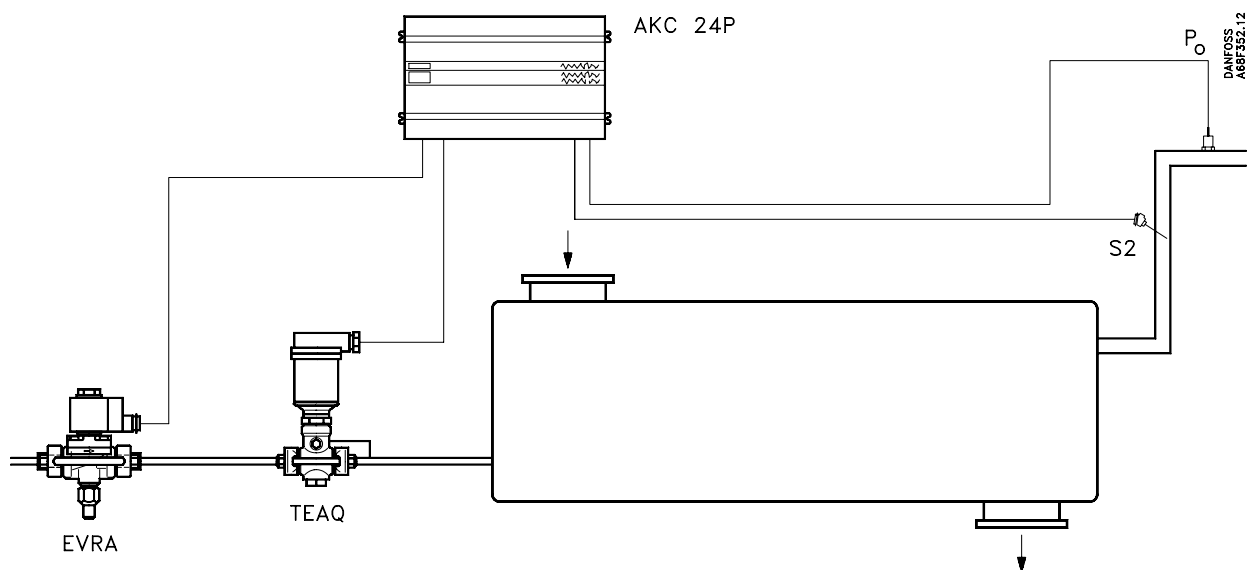
TEAQ



p _e Bar	t _{amb. max} °C
-0,6	25
0	35
1	50



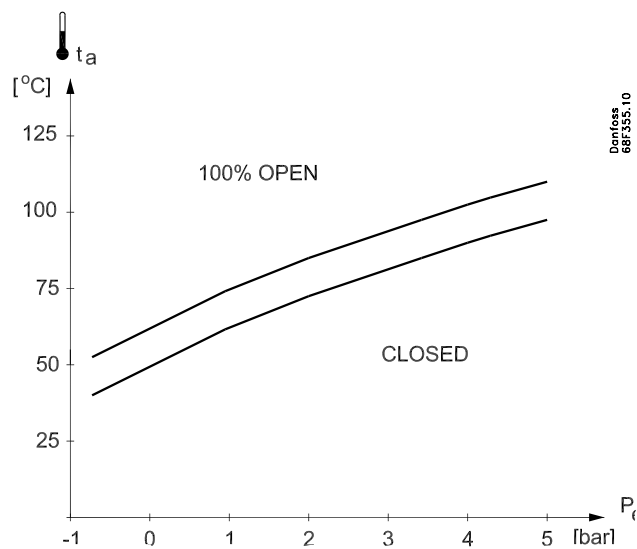
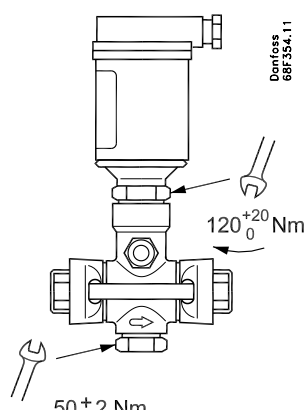
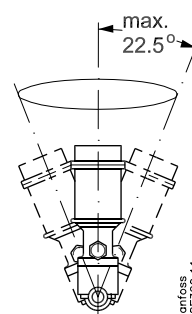
	TR (tons)	kW	Dyse, Düse, Orifice No,
TEA 20	1	3.5	068G2050
	2	7.0	068G2051
	3	10.5	068G2052
	5	17.5	068G2053
	8	28	068G2054
	12	42	068G2055
	20	70	068G2056
TEA 85	33	115	068G2057
	55	190	068G2058
	85	295	068G2059

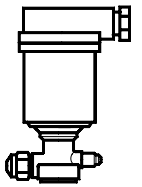


Fabriksindstilling:
Factory setting:
Werkseinstellung:
R glage d part usine:



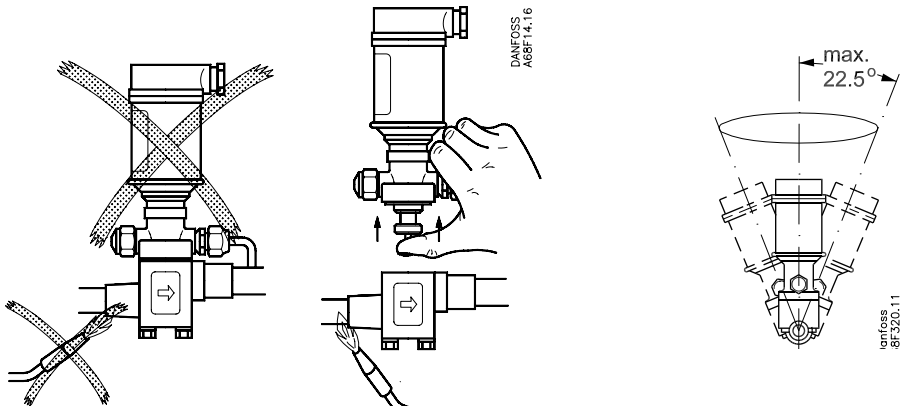
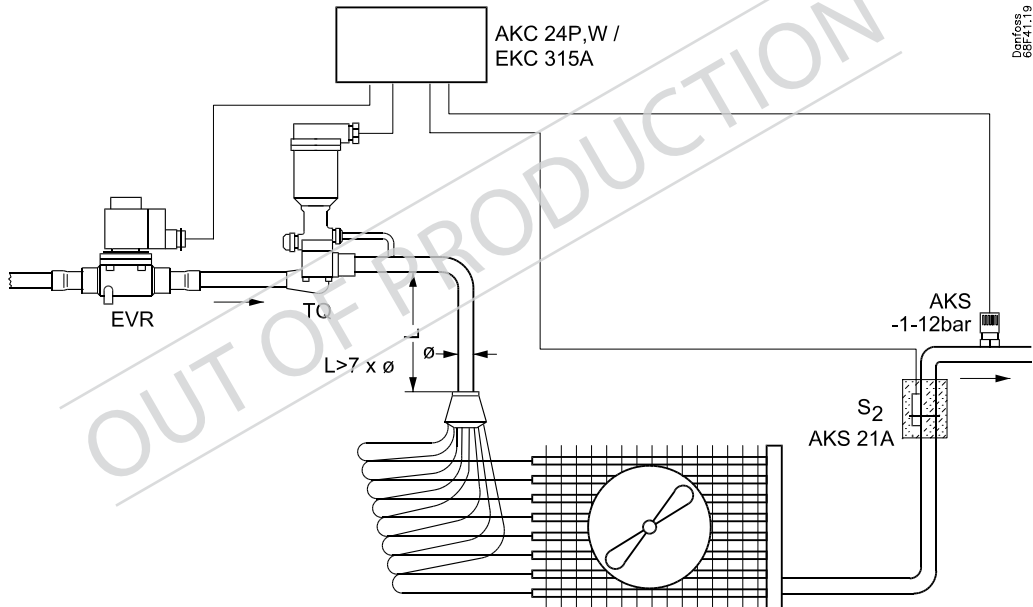
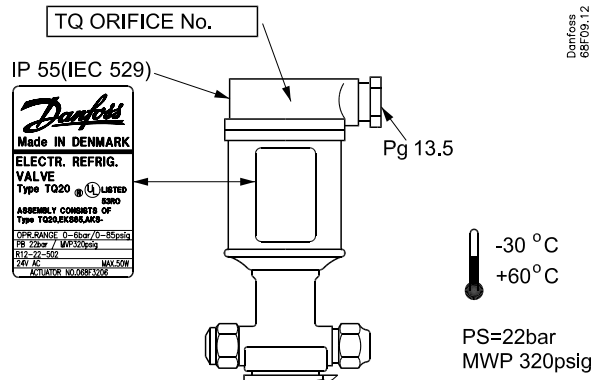
360° x 12

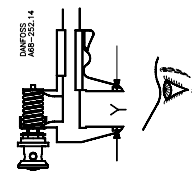




068R9648

068R9648





	Code no.	Type	Orifice	Y±0.5 mm	
				TQ	PHTQ
	068F2041	TQ 5	No.1	26.5	27.5
	068F2042	TQ 5	No.2	26.5	
	068F2043	TQ 5	No.3	27.0	
	068F2062	TQ 5	No.1	26.5	
	068F2063	TQ 5	No.2	26.5	
	068F2064	TQ 5	No.3	27.0	
	068F2033	TQ 20	No.1	33.0	
	068F2034	TQ 20	No.2	33.0	
	068F2035	TQ 20	No.3	33.0	
	068F2036	TQ 20	No.4	33.0	
	068F2037	TQ 20	No.5	33.0	
	068F2055	TQ 20	No.1	33.0	
	068F2056	TQ 20	No.2	33.0	
	068F2057	TQ 20	No.3	33.0	
	068F2058	TQ 20	No.4	33.0	
	068F2059	TQ 20	No.5	33.0	
	068F2045	TQ 55	No.03	33.0	
	068F2046	TQ 55	No.05	33.0	
	068F2047	TQ 55	No.07	33.0	
	068F2048	TQ 55	No.1	33.0	
	068F2049	TQ 55	No.2	33.0	

