VLT® HVAC Basic Drive

Efficient, basic control of fans and pumps in HVAC applications

Optimized for basic operation of pumps and fans, the VLT® HVAC Basic Drive is supplied with built-in functions that reduce initial costs and increase productivity.

The drive is the most compact unit in its class. Integrated DC coils reduce harmonics to an absolute minimum, and the Automatic Energy Optimizer saves 15-25% energy from the second you turn the it on.

Product range:
3 x 200 – 240 V.....0.25 – 45 kW
3 x 380 – 480 V.....0.37 – 90 kW
3 x 525 – 600 V..... 2.2 – 90 kW

Available enclosure ratings:
- IP 20
- IP 21/NEMA UL Type 1 *(separate option kit)*
- IP 54

Feature	Benefit
All built-in – low investment	
Flying Start	Reduced mechanical wear on equipment
Most common HVAC protocols for BMS controller connectivity are embedded	Fewer extra gateway solutions needed
Built-in PI controller	No external PI controller required
Smart Logic Controller	Often makes PLC unnecessary
Integrated fan and pump functionality	Saves external control and conversion equipment
Fire Override Mode	Enhanced safety
Save energy – less operation cost	
Automatic Energy Optimizer function	Saves additional 5 – 15% energy
PM motor control in open loop	Increased efficiency especially at part load
Sleep mode	Saves energy and extends lifetime
Unequalled robustness – maximum uptime	
IP 20/IP 21/Type 1/IP 54	Enclosures to fit your needs up to 90 kW
Robust single enclosure	Maintenance-free
Unique cooling concept with no forced air flow over electronics	Problem-free operation in harsh environments
Max ambient temp. up to 50˚ C	No external cooling
User friendly – save commissioning and operating cost	
Operate both PM and asynchronous motors	Versatile, only one drive type required
Easy connectability	Effective commissioning and operation
Display in engineering units	Alpha numeric display/improved HMI
Start up wizard	Drive set-up fast and easy
Auto restart	Saves time and money
Bypass frequencies	Less noise and vibrations/resonances
Global HVAC support organization	Local service – globally
Built-in DC coils and EMC filters – no harmonic concerns	
Built-in EMC filter	Meets protection class C1, C2 or C3
Integrated DC Choke	Small power cables. Meets EN 61000-3-12
Thermistor input	Prevents motor overheating

PM
motor control
- asynchronous motor control as standard
- Increase flexibility and efficiency

Easy to configure

- Start up with a configuration wizard
- Easy to program parameters
- Alphanumeric display
- Hand – Off – Auto keys
- Status LCDs
- Easy to install
- Easy to wire up
- 7 languages and numeric programming

Choice made simple

- Enclosures: IP 20/Chassis or IP 21/NEMA UL Type 1 or IP 54
- Harmonic filters
- Minimum 25 m C3 as standard built-in Optional: C1/C2 filters
- Voltage: 208/230/460/575

Specifications

Mains supply (L1, L2, L3)	
Supply voltage	200–240 V ±10%
Supply voltage	380–480 V ±10%
Supply voltage	525–600 V ±10%
Supply frequency	50/60 Hz
Displacement Power Factor (cos φ) near unity	(> 0.98)
Switching on input supply L1, L2, L3	1 time/minute max.
Output data (U, V, W)	
Output voltage	0 – 100% of supply voltage
Switching on output	Unlimited
Ramp times	1–3600 sec.
Open/Closed loop	0–400 Hz
Digital inputs	
Programmable digital inputs	4
Logic	PNP or NPN
Voltage level	0 – 24 VDC
Analog input	
Analog inputs	2
Modes	Voltage or current
Voltage level	0 V to +10 V (scaleable)
Current level	0/4 to 20 mA (scaleable)
Analog output *(can be used as digital output)*	
Programmable analog outputs	2
Current range at analog output	0/4 – 20 mA
Relay outputs	
Programmable relay outputs	2 (240 VAC, 2 A and 400 VAC, 2 A)
Fieldbus communication	
Standard built-in: BACnet mstp FC Protocol	N2 Metasys FLN Apogee Modbus RTU

Dimensions

		Power (kW/HP)			Height (mm/inch)		Width (mm/inch)	Depth (mm/inch)
Frame	IP Class	3 x 200–240 V	3 x 380–480 V	3 x 525–600 V		Incl. decoupling plate		
H1	IP 20	0.25–1.5 kW/0.3–2 HP	0.37–1.5 kW/0.5–2 HP	–	195/7.7	273/10.7	75/2.9	168/6.6
H2	IP 20	2.2 kW/3 HP	2.2–4 kW/3–5.4 HP	–	227/8.9	303/11.9	90/3.5	190/7.5
H3	IP 20	3.7 kW/5 HP	5.5–7.5 kW/7.5–10 HP	–	255/10.0	329/13.0	100/3.9	206/8.1
H4	IP 20	5.5–7.5 kW/7.5–10 HP	11–15 kW/15–20 HP	–	296/11.7	359/14.1	135/5.3	241/9.5
H5	IP 20	11 kW/15 HP	18.5–22 kW/25–30 HP	–	334/13.1	402/15.8	150/5.9	255/10.0
H6	IP 20	15–18.5 kW/20–25 HP	30–45 kW/40–60 HP	18.5–30 kW/25–40 HP	518/20.4	595/23.4–635/25.0	239/9.4	242/9.5
H7	IP 20	22–30 kW/30–40 HP	55–75 kW/75–100 HP	37–55 kW/50–75 HP	550/21.7	630/24.8–690/27.2	313/12.3	335/13.2
H8	IP 20	37–45 kW/50–60 HP	90 kW/125 HP	75–90 kW/100–125 HP	660/26.0	800/31.5	375/14.8	335/13.2
H9	IP 20	–	–	2.2–7.5 kW/3–10 HP	372/14.6	374/14.7	130/5.1	205/8.0
H10	IP 20	–	–	11–15 kW/15–20 HP	475/18.7	419/16.5	165/6.5	249/9.8
I2	IP 54	–	0.75–4 kW/1–5.4 HP	–	332/13.1	–	115/4.5	225/8.8
I3	IP 54	–	5.5–7.5 kW/7.5–10 HP	–	368/14.5	–	135/5.3	237/9.3
I4	IP 54	–	11–18.5 kW/15–25 HP	–	476/18.7	–	180/7.1	290/11.4
I6	IP 54	–	22–37 kW/30–50 HP	–	650/25.6	–	242/9.5	260/10.2
I7	IP 54	–	45–55 kW/60–75 HP	–	680/26.8	–	308/12.1	310/12.2
I8	IP 54	–	75–90 kW/100–125 HP	–	770/30.3	–	370/14.6	335/13.2

Danfoss VLT Drives

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Danfoss VLT Drives

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Pressure transmitter for general purpose

Type MBS 1700

Technical brochure

Features

- Enslosure and wetted parts of acid-resistant stainless steel (AISI 316L)
- Pressure ranges in relative (gauge) from 0 to 25 bar
- Output signal: 4 - 20 mA
- Pressure connections: G1/4 A, G1/2 A (EN837)
- Temperature compensated and laser calibrated

Description

The compact pressure transmitter MBS 1700 is designed for use as a general purpose transmitter, and offers a reliable pressure measurement, even under harsh environmental conditions.

Excellent vibration stability, robust construction, and a high degree of EMC/EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

Ordering

Measuring range P_e [1] [bar]	Output signal	Pressure connection	Code No.
0 - 6	4 - 20 mA	G 1/4 EN 837	**060G6100**
0 - 10			**060G6101**
0 - 16			**060G6102**
0 - 25			**060G6103**
0 - 6		G 1/2 EN 837	**060G6104**
0 - 10			**060G6105**
0 - 16			**060G6106**
0 - 25			**060G6107**

[1] Relative / gauge
Plug: Pg 9 (EN 175301-803-A)

Technical data

Performance (EN 60770)

Accuracy (incl. non-linearity, hysteresis and repeatability)	±0.5% FS (typ.) ±1% FS (max.)
Non-linearity BFSL (conformity)	≤ ±0.2% FS
Hysteresis and repeatability	≤ ±0.1% FS
Thermal zero point shift	≤ ±0.1% FS/10K (typ.) ≤ ±0.2% FS/10K (max.)
Thermal sensitivity (span) shift	≤ ±0.1% FS/10K (typ.) ≤ ±0.2% FS/10K (max.)
Response time	< 4 ms
Overload pressure (static)	6 × FS (max. 1500 bar)
Burst pressure	> 6 × FS (max. 2000 bar)
Durability, P: 10-90% FS	>10×10^6 cycles

Electrical specifications

Nom. output signal (short-circuit protected)	4 – 20 mA
Supply voltage [U_B], polarity protected	9 → 32 V
Supply - current consumption	–
Supply voltage dependency	≤ ±0.05% FS/10 V
Current limitation	28 mA (typ.)
Output impedance	–
Load [R_L] (load connected to 0V)	$R_L \leq (U_B\text{-}9V)/0.02$ A

Environmental conditions

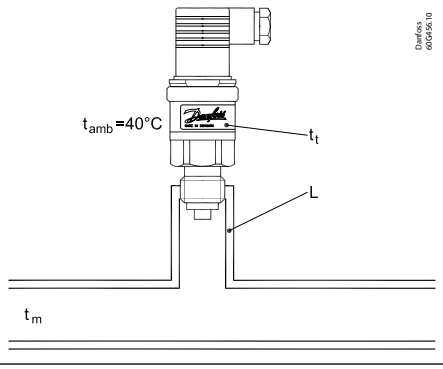
Media temperature range			−40 → +85°C
Ambient temperature range			−40 → + 85 °C
Compensated temperature range			0 → +80°C
Transport temperature range			−50 → +85°C
EMC - Emission			EN 61000-6-3
EMC Immunity			EN 61000-6-2
Insulation resistance			> 100 MΩ at 100 V
Mains frequency test			SEN 361503
Vibration stability	Sinusoidal	15.9 mm-pp, 5 Hz-25 Hz	IEC 60068-2-6
		20 g, 25 Hz - 2 kHz	
	Random	7.5 g_{rms},5 Hz - 1 kHz	IEC 60068-2-64
Shock resistance	Shock	500 g / 1 ms	IEC 60068 - 2 - 27
	Free fall		IEC 60068 - 2 - 32
Enclosure			IP 65

Mechanical characteristics

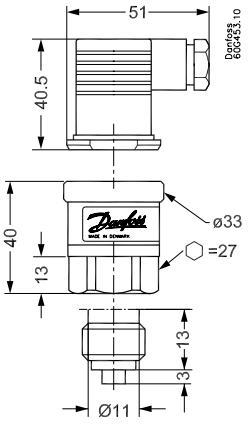
Materials	Wetted parts	EN 10088-1; 1.4404 (AISI 316 L)
	Enclosure	EN 10088-1; 1.4404 (AISI 316 L)
	Electrical connections	Glass filled polyamid, PA 6.6
Weight		0.25 kg

Guideline for temperature influence

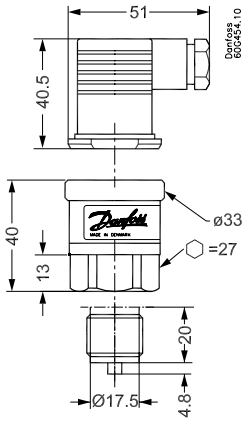
Medium temperature (t_m), [°C]	Heat isolator (L), [cm]	Transmitter temperature (t_t), [°C]
120	2	85
	5	75
	10	70
100	2	75
	5	65
	10	60



Dimensions



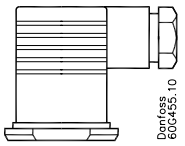
G¼ A
(EN 837)



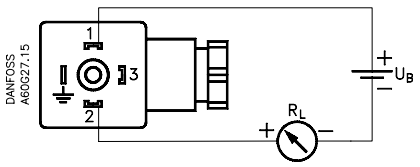
G ½ A
(EN 837)

Recommended torque = 30-35 Nm (Depends of different parameters as packing material, mating material, thread lubrication and pressure level.)

Electrical connection



EN 175301-803-A, Pg 9



4 - 20 mA output (2 wire)
Pin1: + supply
Pin 2: ÷ supply
Pin 3: Not used
Earth: Connected to MBS enclosure

Data sheet

Pressure switches and thermostats, types KP and KPI

Contents

ISO 9001 quality approval

Danfoss A/S is certificated by BSI in accordance with international standard ISO 9001. This means that Danfoss fulfils the international standard in respect of product development, design, production and sale. BSI exercises continuous inspection to ensure that Danfoss observes the requirements of the standard and that Danfoss' own quality assurance system is maintained at the required level.

Features

KP/KPI
illustrated is KPI 35
with top cover

- Wide regulating range
- Can be used for pumps and compressors
- Small dimensions.
  Space-saving – easy to install in panels
- Shock and impact resistant
- Ultra-short bounce times.
  Limits wear to an absolute minimum and increases reliability
- Electrical connection from front of unit. Makes rack mounting easier and also saves space
- Suitable for both alternating current and direct current
- Cable entry for 6-14 mm diameter cables
- Screwed cable entry makes rewiring easy.
  Standard screwed cable entry
  Pg 13.5 and Pg 16

Description

Danfoss KP/KPI pressure switches are used for regulating, monitoring and alarm systems in industry.
KP pressure switches are recommended for gaseous media (also water, but only when mounted directly on the pipe - do not use capillary tube mounting).

KPI pressure switches are suitable for plant in connection with liquid and gaseous media.
The pressure switches are fitted with a single-pole switch changeover (SPDT). The position of the switch depends on the setting of the pressure control and the pressure in the connector.

Definitions

Range setting
The pressure range within which the unit will give a signal (contact changeover).

Differential
The difference between contact changeover on rising and falling pressure.
The differential is a condition for stable automatic plant operation.

Automatic reset
Units with automatic reset restart automatically after stop.
Min. reset units will restart after the pressure **has risen** by a value greater than that of the fixed differential.
Max. reset units will restart after the pressure **has fallen** by a value greater than that of the fixed differential

Permissible operating pressure
The highest permissible constant pressure or pressure variation the unit can be exposed to.

Ordering

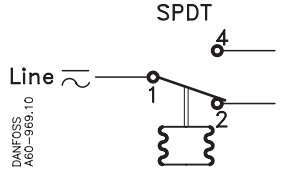
Pressure switches type **KP 35 and 36**

Setting range p_e [bar]	Differential [bar]	Permissible operating pressure p_e [bar]	Max. test pressure [bar]	Pressure connection	Contact material	**Code no.**	Type
−0.2 → 7.5	0.7 → 4	17	22	G ¼ A	Ag	**060-113366**	KP 35
					Au	**060-504766**	
2 → 14	0.7 → 4	17	22	G ¼ A	Ag	**060-110866**	KP 36
					Au	**060-113766**	
4 → 12	0.5 → 1.6	17	22	G ¼ A	Ag	**060-122166**	KP 36
					Au	**060-114466**	

Pressure switches **type KPI 35 - 38**

Setting range p_e [bar]	Differential [bar]	Permissible operating pressure p_e [bar]	Max. test pressure [bar]	Pressure connection	Contact material	**Code no.**	Type
−0.2 → 8	0.4 → 1.5	18	18	G ¼ A	Ag	**060-121766**	KPI 35
					Au	**060-316466**	
−0.2 → 8	0.5 → 2	18	18	G ¼ A	Ag	**060-121966**	KPI 35
4 → 12	0.5 → 1.6	18	18	G ¼ A	Ag	**060-118966**	KPI 36
					Au	**060-113866**	
2 → 12	0.5 → 1.6	18	18	G ¼ A	Ag	**060-316966**	KPI 36
8 → 28	1.8 → 6	30	30	G ¼ A	Ag	**060-508166**	KPI 38

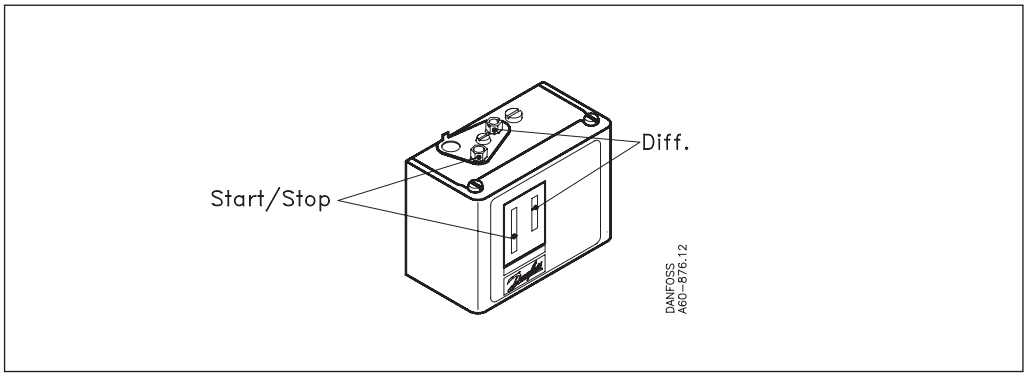
Technical data

Description		KP 35, 36	KPI 35, 36	KPI 38
Ambient temperature°C		−40 °C - +65 °C (for short periods up to +80 °C)		
Media temperature °C		−40 °C - +100 °C		
Media		Gaseous media (also water, but only when mounted directly on the pipe - do not use capillary tube mounting).	Gaseous media and liquids	
Parts in contact with medium	Bellows	Tinbronze W.no. 2.1020 to DIN 17662	Tinbronze W.no. 2.1020 to DIN 17662	
	Pressure connector	Free-cutting steel (nickel plated) W. no. 1.0737 to EN 10277-3	Brass W. no. 2.0401 to DIN 17660	Free-cutting steel (nickel plated) W. no. 1.0737 to EN 10277-3
Contact system		Single-pole changeover switch (SPDT) 		
Contact load, Ag contact set Contact material AgCdO		**Alternting current:** AC-1: 16 A, 400 V AC-3: 16 A, 400 V AC-15: 10 A, 400 V **Direct current:** DC-13 12 W, 220 V	**Alternating current:** AC-1: 10 A, 440 V AC-3: 6 A, 440 V AC-15: 4 A, 440 V **Direct current:** DC-13 12 W, 220 V	
Contact load, Au contact set		See information page 4		
Enclosure, IP 33 grade		Unit must be mounted on a flat surface/ a flat fitting and all unused holes covered		
Enclosure, IP 44 grade		Mounted as IP 33 plus fitting of top cover, code no. **060-109766**		
Cable connection		Entry for 6-14 mm diameter cables		
Mounted on back plate/ wall bracket		Vibration proof in the range 0 to 1000 Hz, 4 g (1 g = 9.81 m/s^2)		
Mounted on angle bracket		Not recommended in areas where vibrations occur		
Approvals		EN 60 947-4,5 RINA, Registro Italiano Navale RMRS, Maritime Reg. of Shipping, Russia UL approved version are available CCC, China Compulsory Certificate	EN 60 947-4,5	

Setting

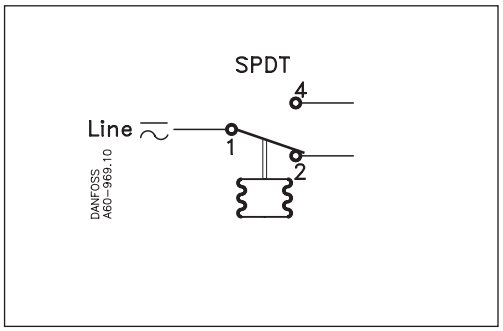
KP/KPI pressure switches with automatic reset:
Set the upper limit pressure on the range scale

Then set the lower limit pressure on the DIFF scale (the upper limit minus the differential).



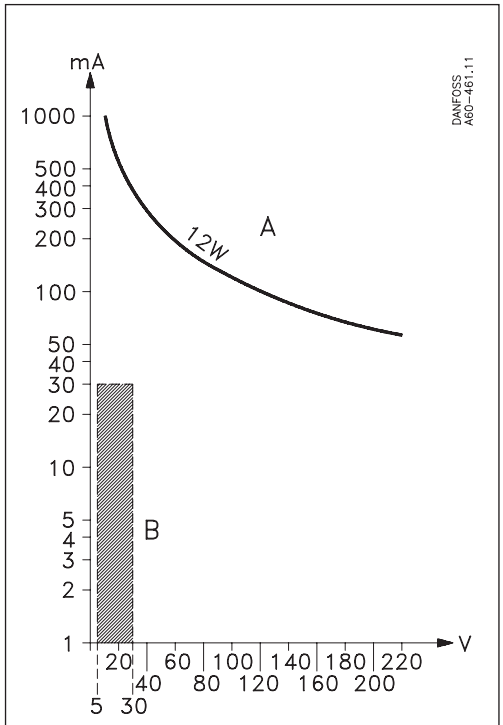
Gold contacts

Contact system
Single-pole changeover switch (SPDT) Contact material: Gold-plated silver



Contact load (when Au surface is burnt away)
Alternating current:
Ohmic load: AC-1: 10 A, 440 V
Inductive load: AC-3: 6 A, 440 V
AC-15: 4 A, 440 V

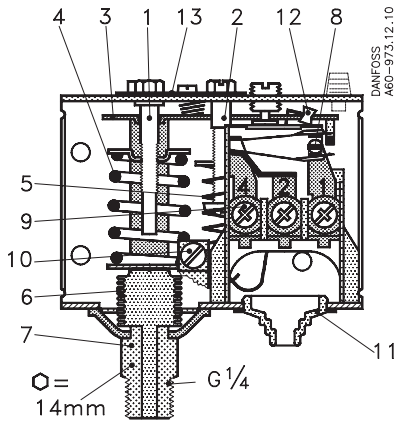
Direct current: DC-13 12 W, 220 V,



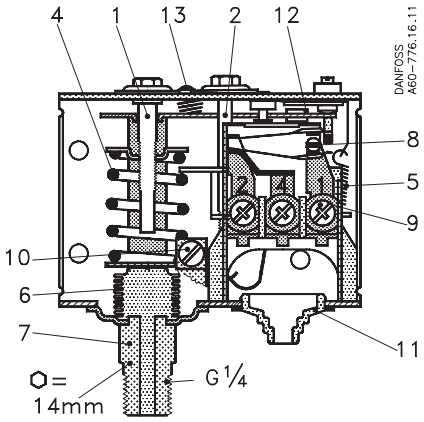
Curve A gives the maximum load.
Hatched area B: Acceptable load for the gold plating of the contact.

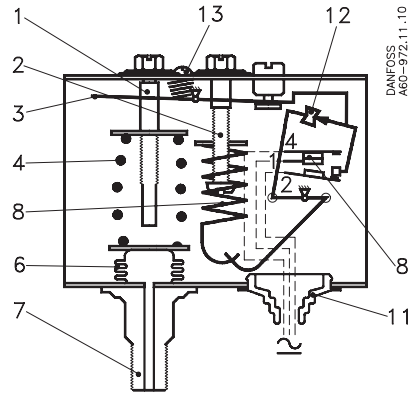
Design and function

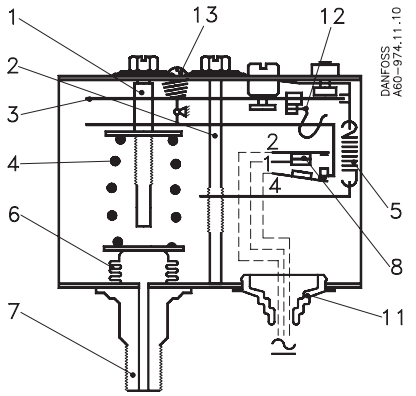
Drawing showing principle of **KP** pressure switches



Drawing showing principle of **KPI** pressure switches







1. Setting spindle
2. Differential setting spindle
3. Main arm
4. Main spring
5. Differential spring
6. Bellows
7. Connector
8. Contact system
9. Connection terminals
10. Earth terminal
11. Cable entry
12. Omega spring (KPI)
12. Tumbler (KP)
13. Locking screw (KPI)
13. Locking plate (KP)

KP features

The contact system in KP pressure switches has a snap function. This means that the bellows is active only when the cut-in or cut-out value is reached.
The bellows is connected to the pressure of the controlled plant via the connector (7).

The design of KP pressure switches gives the following advantages:

- High contact load
- Ultra-short bounce times
- Vibration-proof in the range 0-1000 Hz, 4 g (1 g = 9.81 m/s2)
- Long operating life
- High pulsation protection
- Small dimensions – Easy to mount in panels

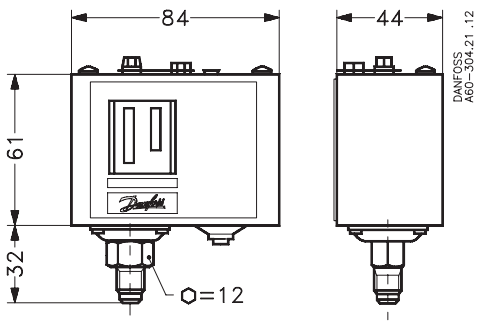
KPI features

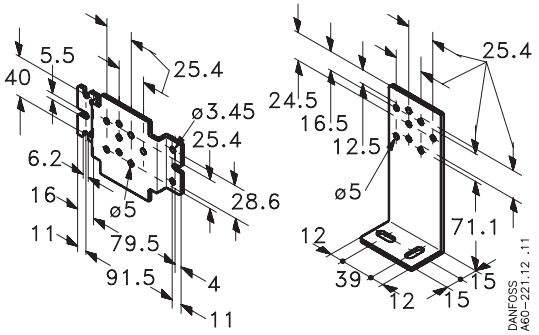
Danfoss KPI pressure switches are designed so that the bellows moves in the same proportion as the pressure change.
To ensure a snap function on contact change-over, an omega spring is located between bellows and contact system.

The design of KPI pressure switches gives the following advantages:

- High contact load
- Ultra-short bounce times
- Vibration-proof in the range 0-1000 Hz, 4 g (1 g = 9.81 m/s2)
- Long operating life
- Can be used for both liquids and gases
- Small dimensions – Easy to mount in panels

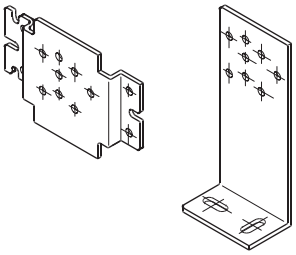
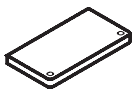
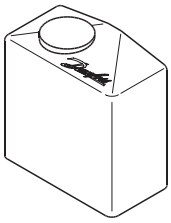
Dimensions and weights





Pressure switches KP 35, KP 36,
KPI 35, KPI 36 and KPI 38:
Weight approx. 0.3 kg

Accessories for KP/ KPI pressure switches

Part	Symbol	Description	Total	**Code no.**
Brackets with mounting screws and washers		Wall bracket	10	**060-105566**
		Angle bracket	10	**060-105666**
Screwed cable entry		Screwed cable entry Pg 13.5 with special nut for 6-14 mm cables A standard Pg 16 screwed cable entry can be used for 8-16 mm cables	5	**060-105966**
Sealing screw		For sealing the setting on KP	20	**060-105766**
Top cover		If a bracket is mounted on the bracketplate of the housing, the KP/KPI pressure switch will have an IP 44 grade of enclosure. The cover covers the setting spindles	10	**060-109766**
Protective cap		Protective cap for KP/KPI pressure switches. To protect the unit against rain and humidity. Grade of enclosure: IP 44 Material: Polyethylene Max. ambient temperature: 65°C Min. ambient temperature: –40°C	7	**060-003166**