Indexina

Metallic wiper



Swing Clamps with Sturdy Swing Mechanism

Bottom flange type, with optional position monitoring, double acting, max. operating pressure 350 bar



Application

Hydraulic swing clamps are used for clamping of workpieces, when it is essential to keep the clamping area free of straps and clamping components for unrestricted workpiece loading and unloading.

Due to the sturdy swing mechanism and the manifold possibilities of position monitoring these swing clamps are particularly suited for

- Automatic manufacturing systems
- Clamping fixtures with workpiece loading via handling systems
- Transfer lines
- Test systems for motors, gears and axes
- Assembly lines
- Special machine tools

Description

The hydraulic swing clamp is a pull-type cylinder where a part of the total stroke is used to swing the piston.

The favourable area ratio (piston/piston rod) allows high clamping forces already at relatively low oil pressures.

Due to the sturdy swing mechanism the angle position of the clamping arm remains the same after a slight collision with the workpiece during loading or unloading. Also a collision during the clamping process is not critical.

When using high flow rates the swing speed is limited by installed throttle points.

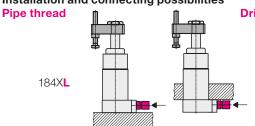
The FKM wiper at the piston rod can be protected against coarse and hot swarf by an optionally available metallic wiper (see page 6). The different possibilities of the position monitoring are presented at the side.

Important notes see page 6.

Advantages

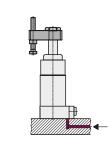
- 4 sizes available
- Compact design partially recessible
- High clamping force at low pressures
- Sturdy swing mechanism
- Insensitive against high flow rates
- Indexing of the clamping arm in a specified position is possible
- Special swing angle easily realizable
- Standard FKM wiper
- Metallic wiper optional
- Screw counterbores coverable
- Position monitoring available in six variants
- Hydraulic and pneumatic ports integrated in
- Mounting position: any

Installation and connecting possibilities

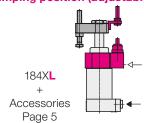


Drilled channels

184XL



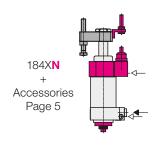
Pneumatic position monitoring Monitoring of the clamping arm in clamping position (adjustable)



Monitoring of the piston in unclamping position



Both controls combined



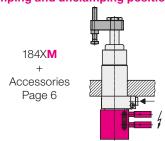
Position monitoring as accessories Switch rod for external sensors



Pneumatic position monitoring in clamping and unclamping position



Electrical position monitoring in clamping and unclamping position



Versions: Code letters L, M, N Dimensions • Swing angles

M (with switch rod)

(without monitoring) For indexing a pin 3m6x6 (3301-281) can be inserted. (Not included in the delivery). g Swing stroke Option: Metallic Ød1 Ød wiper Ød2 ليلي Clamping stroke Ø r-0 2

A = Clamping

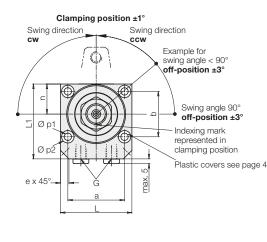
B = Unclamping

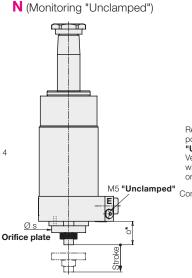
E = Unclamped (pneumatic)

S = Clamped (pneumatic)

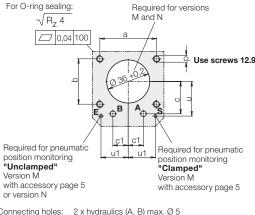
View X Nut included in the delivery. Spare nut see page 4. X Pneumatic position monitoring "Clamped" Pneumatic position Plastic covers monitoring "Unclamped see accessories Version M Version M page 4 with accessory page 5 with accessory page 5 or version N Ød3 Ø 36 f7 M5 x 10 deep Screw plugs and Accessories: O-rings are included in the delivery position monitorings

Connecting scheme





see page 5 and 6



Connecting holes:

2 x hydraulics (A, B) max. Ø 5 Spare O-ring 8x1,5 Part no. 3000-343 2 x pneumatics (E, S) max. Ø 2.5 (only as required) Spare O-ring 3.68x1.78 Part no. 3000-334

Swing angle

1. Swing angle 90° (standard)

Part no. 90° cw 184X-X090-RXX 90° ccw 184X-X090-LXX 0° 184X-X000-0XX

2. Swing angle α < 90°

α = 15° to 75° in gradation of 5°

By insertion of a distance plate the return stroke of the piston is reduced and thus the swing angle is reduced.

Clamping stroke and clamping position remain the same. The swing stroke and the dimensions h, h1, and m are reduced by y:

 $y = (90^{\circ} - \alpha^{\circ}) * k$ (k see chart page 3)

Dimensions 3 ± 0.5 and o of the switch rod are lengthened by the value y.

Example:

Swing clamp 1845-L090-L30 Desired swing angle 45° ccw Part no. 1845-L045-L30

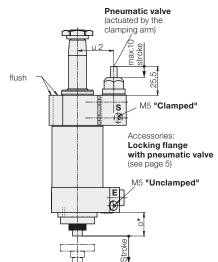
Shortening:

 $y = (90^{\circ} - 45^{\circ}) * 0.12 \text{ mm/}^{\circ} = 5.4 \text{ mm}$

3. Swing angle > 90°

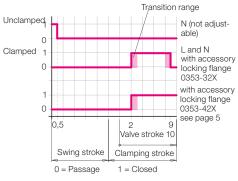
Available on request!

N (Monitoring "Unclamped" and "Clamped")



* see swing angle $\alpha < 90^{\circ}$

Pneumatic position monitoring for versions L and N with accessory locking flange



Attention danger of collision!

The contact bolt for the actuation of the pneumatic valve must be completely screwed into the angle bracket for start up (see page 4 dimension 3.5 mm)

The adjustment is made with clamped workpiece to approx. 5 mm valve stroke

Important note!

The lower part of the swing clamp must be protected against swarf and dirt for trouble-free functioning of the orifice plate.

2

Technical data

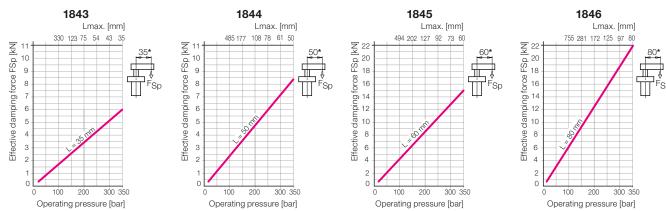
Max. pulling force (350 bar		7.5	10.5	18.4	27.
Effective clamping force	[kN]		page 3 or calculation		
Clamping stroke	[mm]	12	12 12	15 15	1 2
Swing stroke	[mm]	11 23	24	30	3
Total stroke ±0.2	[mm]	30	30	30	3
Min. operating pressure	[bar]				
Max. flow rate	Clamping [cm ³ /s]		14	32	5
(see page 4)	Unclamping [cm ³ /s]		28	60	11
Effective piston area	Clamping [cm ²]	2.14	3.01	5.27	7.8
0.1	Unclamping [cm ²]	4.15	6.15	10.17	15
Oil volume / stroke	[cm ³]	4.9	7.2	15.8	28
Oil to return	[cm ³]	9.6	14.8	30.5	57
Piston Ø	[mm]	23	28	36	4
a	[mm]	44	50	60	6
b	[mm]	35	40	46	6
C _	[mm]	26	28.5	28.5	35.
c1	[mm]	11	13.5	14	1
Ød	[mm]	16	20	25	3
Ø d1	[mm]	28	38	45	4
Ø d2	[mm]	33	42	54	54
Ø d3	[mm]	10	10	12	-
9	[mm]	8.5	7.5	9	8 x 50
⊘ f	[mm]	27	30	36	4
g G	[mm]	M14x1.5	M18x1.5	M20x1.5	M28x1
G		G 1/8	G 1/8	G 1/4	G 1,
h +0,4/-0,3 / h max. ¹⁾	[mm]	161 / 162.3	174 / 175.8	203 / 204.8	233.5 / 233
k	[mm/°]	0.091	0.093	0.12	0.15
L	[mm]	55	63	77	8
L1	[mm]	60	66	75	9
m +0.5/-0.8 ²⁾	[mm]	139.3	147.8	171.8	195
n	[mm]	23	26.5	31.5	39
0	[mm]	21	21	21	2
р	[mm]	M5	M6	M8	M
Ø p1	[mm]	5.5	6.5	9	
Ø p2 ^{H13}	[mm]	10	11	15	1
p3	[mm]	15	14	14	1
p4	[mm]	18	17	18	1
Ør	[mm]	45	52	60	7
Øs	[mm]	30	30	33	3
t	[mm]	7.5	9	10	1
U	[mm]	27	30.5	35	۷
u1	[mm]	21	24	29	32
u2	[mm]	32	36	41	4
V	[mm]	22	22	25	2
v v1	[mm]	108	115	132	15
v1 v2	[mm]	113	120	137	15
W.	[mm]	11	13.5	14	-
w1	[mm]	25	28.5	33.5	3
w1 w2	[mm]	6	6.5	7	
	[mm]	13	13.5	14	-
Z Mojaht approv	[mm] [kg]	1.7	2.3	3.4	5
Weight, approx.	[Ky]				
Part no.	Clockwise rotation 90°	1843-X090-R23M	1844-X090-R24M 1844-X090-L24M	1845-X090-R30M 1845-X090-L30M	1846-X090-R36 1846-X090-L36
	Swing direction 90° ccw	1843-X090-L23M			

Code letter \mathbf{X} see page 2. ¹⁾ h = upper edge piston / h max. = upper edge nut

²⁾ = lower edge clamping arm

M= Option metallic wiper (see also page 6)

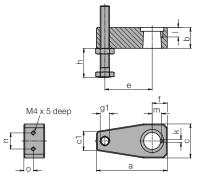
Effective clamping force with accessory clamping arm as a function of the oil pressure



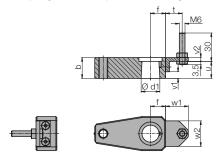
^{*} Clamping force for other lengths see page 4.

Accessories - Clamping arms • Plastic covers • Metallic wipers Calculation of the flow rate • Calculation of the clamping force

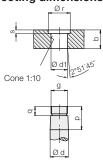
Clamping arm, max. 350 bar



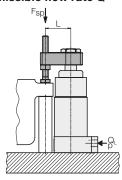
Clamping arm complete with angle



Special clamping arm 1. Connecting dimensions



2. Admissible flow rate Q*



In the chart on page 3, the admissible flow rates for clamping and unclamping with the clamping arms (accessories) are specified. Longer special clamping arms have a higher torque of inertia. To avoid an overload of the swing mechanism, the flow rate has to be reduced:

2.1 Moments of inertia are known

$$Q_{_L} = Q_{_\theta} * \sqrt{\frac{J_{_\theta}}{J_{_L}}} cm^3/s$$

Q₁ = Flow rate with special clamping arm

Q = Flow rate as per chart (page 3)

J_e = Moment of inertia of the clamping arm (accessory) with contact bolt (chart)

J₁ = Moment of inertia special clamping arm

* Only for vertical mounting position!

Swing clamps		1843	1844	1845	1846
a	[mm]	58	75	93	120
b	[mm]	17	22	26	32
C	[mm]	28	36	45	60
c1	[mm]	14	20	23	28
Ød f7	[mm]	16	20	25	32
Ød1 +0.1/+0.05	[mm]	15.8	19.8	24.8	31.8
е	[mm]	35	50	60	80
f	[mm]	16	16	22	26
g	[mm]	M14x1.5	M18x1.5	M20x1.5	M28x1.5
g1	[mm]	M8	M10	M12	M16
h min/max	[mm]	5/45	6/64	7/70	9/85
Ø k +0.1	[mm]	3	3	3	3
I +0.5	[mm]	9.5	11	11	11.5
m ±0.05	[mm]	7.8	9.8	12	15
n	[mm]	11	17	20	20
0	[mm]	6	10	12	20
р	[mm]	22.5	27	32	39
q	[mm]	9	10	11	12.7
Ør	[mm]	20	24.5	31	34.5
S	[mm]	2.5	4	4	4.5
t	[mm]	11	17.5	19	19
u	[mm]	17	18	21	19
v1	[mm]	6	7	8	6
v2	[mm]	4	4	5	5
w1	[mm]	18	24	26	26
w2	[mm]	21	27	30	30
Part no. Clamping arm					
 with contact bolt 		0354-152	0354-153	0354-154	0354-155
Weight, approx.	[kq]	0.19	0.39	0.69	1.43

0.00011

0.00007

0354-156

0184-003

3300-686

0341-104

3527-092

0.16

3548-660

Tightening torque Special clamping arm

Moment of inertia of J_e

Moment of inertia of Je

- complete with angle

Angle bracket complete

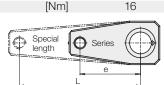
- without thread g1

Weight, approx.

Plastic cover*

Metallic wiper

Spare nut



[kgm²]

[kgm²]

[kg]

**Order 4 off swing clamps

0.0011

0.62

3548-803

0.00084

0354-158

0184-005

3300-684

0341-105

3527-099

0.00398

0.00298

0354-159

0184-005

3300-684

0341-100

3527-015

3548-804

2.2 Moments of inertia not known

This simplified calculation is only applicable for clamping arms of the above shape.

Example: Swing clamps 1843

L = 70 mm

e = 35 mm as per above chart

Q_a = 10 cm³/s (as per chart page 3)

 $\frac{x}{e} = \frac{L}{e} = \frac{70 \text{ mm}}{35 \text{ mm}} = 2$ 1. Extension factor

2. Flow rate factor

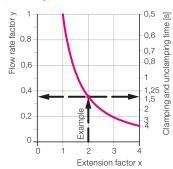
as per diagram \rightarrow y = 0.35

3. Max. flow rate

 $Q_{L} = y * Q_{e} = 0.35 * 10 cm^{3}/s = 3.5 cm^{3}/s$

4. Min. clamping time

→ approx. 1.4 s as per diagram



Adm. flow rate and clamping time as a function of the clamping arm extension

Clamping force and admissible operating pressure

Effective clamping force (general)

$$F_{Sp} = \frac{p}{A + (B * L)} \le F_{adm.}$$
 [kN]

Admissible clamping force

0.00046

0.00033

0354-157

0184-004

3300-685

0341-107

3527-014

3548-661

$$F_{adm} = \frac{C}{I}$$
 [kN]

Admissible operating pressure
$$p_{adm} = \frac{D}{L} + E \le 350 \hspace{1cm} [bar] \label{eq:padm}$$

L = special length [mm] p = pressure [bar]

A, B, C, D, E = constants as per chart

Constant	1843	1844	1845	1846
Α	46.64	33.15	18.98	12.72
В	0.335	0.17	0.073	0.04
С	210	420	900	1760
D	9795	13926	17078	22386
F	70.26	71.33	65.44	70.36

Example: Swing clamps 1843

L = 70 mm

1. Admissible clamping force
$$F_{adm} = \frac{C}{L} = \frac{210}{70} = 3 \text{ kN}$$

2. Admissible operating pressure

$$p_{adm} = \frac{D}{L} + E = \frac{9795}{70} + 70.26 = 210 \text{ bar}$$

Accessory for 184XM0XX • Pneumatic position monitoring (not adjustable) Locking flange (adjustable)

Application

A prerequisite for automated processes of workpiece clamping are hydraulic clamping elements whose position can be monitored at anv time.

The pneumatic position monitorings signal the following conditions by closing two bore holes:

- 1. Piston extended, clamping arm in offposition.
- 2. Piston in clamping area, clamping arm in clamping position.

By the pressure increase in the pneumatic line an electro-pneumatic pressure switch or a differential pressure switch can be actuated.

The electrical switching devices are integrated in the electric control so that on the clamping fixture no electricity is required.

Description

The pneumatic position monitoring consists of the stainless control housing with fit signal sleeve, to be connected to the switch rod of the swing clamp by means of the delivered screw. Four fixing screws are included in our delivery.

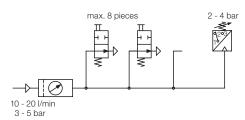
Pneumatic port **Drilled channels**

The swing clamp with the mounted position monitoring is inserted into the location hole and is immediately ready for use with the mounted O-rings.

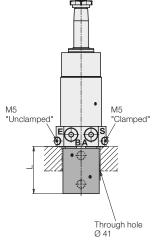
Hose connection

Remove the plugs M5 and screw-in connecting nipple M5 (accessory) Sealing to the flange area is made by the two O-rings.

Monitoring by pneumatic pressure switch



For the evaluation of the pneumatic pressure built-up standard pneumatic pressure switches can be used. It is possible to monitor with one pressure switch up to 8 position monitorings connected in series (see circuit diagram). It has to be considered that process-safe functioning of pneumatic position monitorings is only guaranteed with throttled air and system pressure. The nominal values are indicated below technical data.



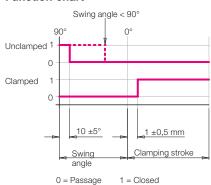
O-rings and are included in the delivery Ø 40 Outlet air via Connecting dimensions air filter G1/8 see page 2 **Function chart**

Technical data

Part no.

Connection		O-ring or thread M5			
Nominal diameter	[mm]	2			
Max. air pressure	[bar]	10			
Range of operating pressure	[bar]	35			
Differential pressure*) at					
3 bar system pressure	[bar]	min. 1.5			
5 bar system pressure	[bar]	min. 3.5			
Air flow rate **)	[l/min]	1020			

- Required pressure drop if one or several position monitorings are not operated.
- For measuring of the flow rate appropriate



, i or modeling of the new rate appropriate
devices are available. Please contact us.

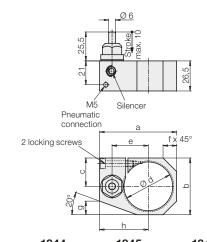
Swing clamps		1843M0XX	1844M0XX	1845M0XX	1846M0XX
L	[mm]	52	52	75	75
L1	[mm]	50	50	73	73
Swing angle (see page 2)					
0 or 90°		0353-913	0353-913	0353-914	0353-916
15 to $75^{\circ} = XX$		0353-913-0XX	0353-913-0XX	0353-914-0XX	0353-916-0XX

Locking flange with pneumatic valve

With the integrated pneumatic valve the clamping position can be monitored directly at the clamping arm.

The fixing at the swing is made by tightening both locking screws.

The precise adjustment is made in clamping position with clamped workpiece. The valve tappet has to be pushed by approx. 5 mm (function chart see page 2).



Swing clamps		1843	1844	1845	1846		
a	[mm]	68	76	85.5	100		
b	[mm]	50	58	66	82		
С	[mm]	25	29	33	41		
Ød	[mm]	43	50	58	74		
е	[mm]	32	36	41.5	48		
f	[mm]	12	16	18	22		
g	[mm]	12	14	16	18		
ĥ	[mm]	43	47	52.5	89		
Switching area 2 ÷ 9 mm							
Part no. complete		0353-320	0353-321	0353-322	0353-323		
Pneumatic valve*		0353-933	0353-933	0353-933	0353-933		
Switching area 2 ÷ 10) mm						
Part no. complete		0353-420	0353-421	0353-422	0353-423		
Pneumatic valve*		0353-934	0353-934	0353-934	0353-934		
* lastallation discounting of a grant state of D4 050 and 5							

* Installation dimensions for pneumatic valve see B1.853 page 5

Accessory for 184XM0XX • Electrical position monitoring (adjustable) Important notes • Wiper system • Throttling of flow rate

Application

Electrical position monitorings signal the following conditions due to damping of two inductive proximity switches:

- Piston extended, clamping arm in offposition.
- 2. Piston in clamping area, clamping arm in clamping position.
- 3. Piston in final position, no workpiece inserted. *)
- *) If this function is not desired, e.g. in setting mode, the proximity switch can be adjusted so that the switch is still damped at the stroke end (see function chart).

Description

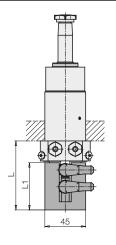
The electrical position monitoring consists of the housing with two adjustable inductive proximity switches and one switching cam fixed at the switch rod of the swing clamp.

The fixing screws are included in our delivery. The housing can also be mounted turned by 180°. The radial distance of the proximity switches to the switching cam should be 0.5 mm. It is secured by means of a set screw M4. After untightening of the locking screw M4 the proximity switches can be axially displaced.

Please note:

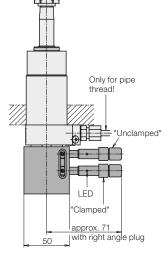
Careful design is required. According to the corresponding application conditions, safety measures have to be planned and checked later on.

Inductive position monitorings are not suitable for the use in coolant and swarf areas.

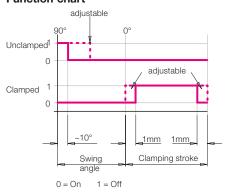


Technical data

Operating voltage	1030 V DC
Max. residual ripple	15 %
Max. constant current	200 mA
Switching function	interlock
Output	PNP
Body material	stainless steel
Thread	M 8 x 1
Code class	IP 67
Environmental temperature	-25+70 °C
LED Function display	yes
Protected against short circuits	yes
Connection type	Right angle plug
Length of cable	5 m



Function chart



Part no

i di tiloi					
Swing clamps		1843M0XX	1844M0XX	1845M0XX	1846M0XX
L	[mm]	76	76	100	100
L1	[mm]	52	52	73	73
With switch and plug		0353-905	0353-905	0353-915	0353-915
Without switch and plug		0353-906	0353-906	0353-917	0353-917

Important notes

Swing clamps must only be used for clamping of workpieces in industrial applications and may only be operated with hydraulic oil. They can generate very high forces. The workpiece, the fixture or the machine must be in the position to compensate these forces.

In the effective area of piston rod and clamping arm there is the danger of crushing. The manufacturer of the fixture or the machine is obliged to provide effective protection devices.

The swing clamp has no overload protection device. When mounting the clamping arm, the clamping arm or the hexagon socket in the piston have to be backed up for tightening and untightening the fixing nut. During loading and unloading of the fixture and during clamping a collision with the clamping arm has to be avoided

Remedy: Mount position adaptor.

Operating conditions, tolerances and other data see data sheet A 0.100.

Wiper system

The standard FKM wiper has a high chemical resistance against most cooling and cutting fluids

The optional metallic wiper protects the FKM wiper against mechanical damage due to big or hot swarf.

It consists of a radially floating wiping disk and a retaining disk.

The metallic wiper can be delivered already mounted ("M") or as an accessory for retrofitting (see page 4).

Attention!

The metallic wiper is not suitable for dry machining or minimum quantity lubrication. Also in applications with very little grinding swarf, the standard FKM wiper has a better protection effect.

If there is any danger that small particles stick to the piston rod, the metallic wiper disk can also be replaced by a hard plastic disk.

Throttling of the flow rate

A flow rate throttling always has to be effected in the supply line to the swing clamp. This avoids a pressure intensification and thereby pressures exceeding 350 bar.

