



Electric Swing Clamps

Top flange, with position and clamping force monitoring,
 DC voltage 24 V, minimum energy demand



Application

Electric swing clamps are used for clamping or holding of workpieces

- where the use of hydraulic clamping elements is not possible
- where the clamping force must be maintained also after the separation from the energy supply
- if clamping elements have to be controlled individually.
- that require freely accessible clamping and holding points for material handling

Thus electric swing clamps are particularly suited for:

- Food industry
- Packaging industry
- Clean room area
- Test systems
- Special machines
- Assembly equipments and robotics
- Automatic manufacturing systems
- Clamping fixtures with workpiece loading via handling systems

Important notes!

Electric swing clamps are designed exclusively for clamping or holding of workpieces in industrial applications. They can generate very high clamping 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.

During loading and unloading of the fixture and during clamping a collision with the clamping arm has to be avoided.

If there is any danger that fluids penetrate into the electric swing clamp, the screw plug at the venting port G 1/8 has to be removed and a vent hose has to be connected. The other end of the hose has to be placed to an absolutely dry area.

It is recommended to connect positive air pressure protection with 0.2 bar.

Advantages

- High clamping force
- Adjustable clamping force
- Clamping force monitoring (error code output)
- Can be controlled individually or in common
- High operating safety by self-locking spindle drive
- Mechanical reclamping by Belleville springs
- Swing angle up to 180° available
- Overload protection device in the case of collisions with the clamping arm
- Electric position monitoring and extensive self-monitoring with error message
- Clamping stroke control possible
- Low voltage 24 V
- Leakage free
- Maintenance free (500,000 cycles)
- Code class IP 67

Description

The electric swing clamp is driven by a brushless DC motor. The motor speed is transformed by means of a gear and a threaded spindle into the swing and stroke movement of the piston rod. For swinging the clamping arm by 180°, an axial stroke of only 3 mm is required.

If the clamping arm collides during the swing motion with a workpiece, the mechanism is protected against overload. The direct current motor is automatically and immediately switched off. When unclamping, the clamping arm always swings back to the off-position.

Power supply

For motor and electronic control a DC voltage of 24 V with a residual ripple of max. 10 % is required.

For the DC motor, we recommend the use of a switching power supply with a current output of 15 A per connected electric swing clamp. When operating several swing clamps at the same time, the line is to be enlarged correspondingly.

The electronic control has to be supplied by a separate power supply (24 V DC/100 mA).

Integrated control

The electronic control for the DC motor is on a board in the housing of the electric swing clamp. After removal of the protection cover for example the clamping force can be adjusted.

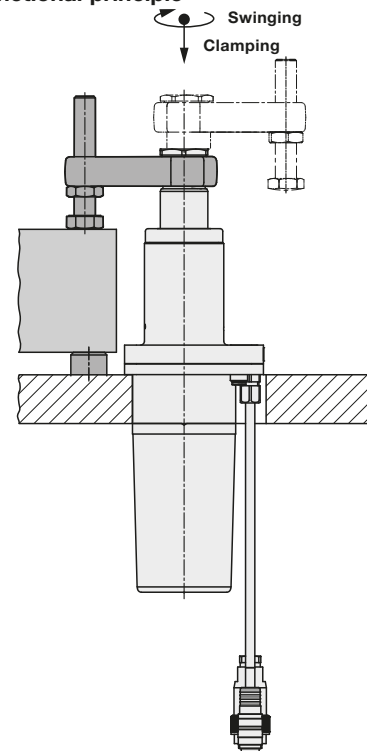
Electric connection

Power supply and signal exchange for external control are transmitted via two short cables with plug-type connector. For the customer's connection cable sockets are available (see accessories).

Not dangerous touch voltage

The used DC voltage 24 V is considered to be a "low voltage" and thus it is not dangerous for people in case of contact.

Functional principle



Adjustment and error code

Adjustments for clamping force and swing speed can be made on the integrated control board.

The clamping force can alternatively be adjusted by means of an analogue interface signal. Errors will be shown by a flash code. This can be evaluated either optically on the board or via an interface signal by a higher-level control. Further information on adjustment and interpretation of error codes is contained in the operating manual supplied with the products.

Function control

Unclamped

- Clamping arm in off-position and unclamping process completed

Clamped

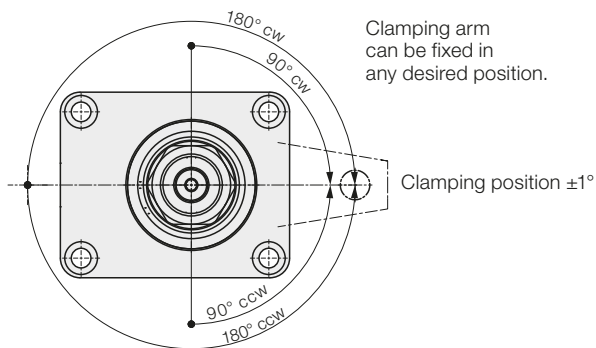
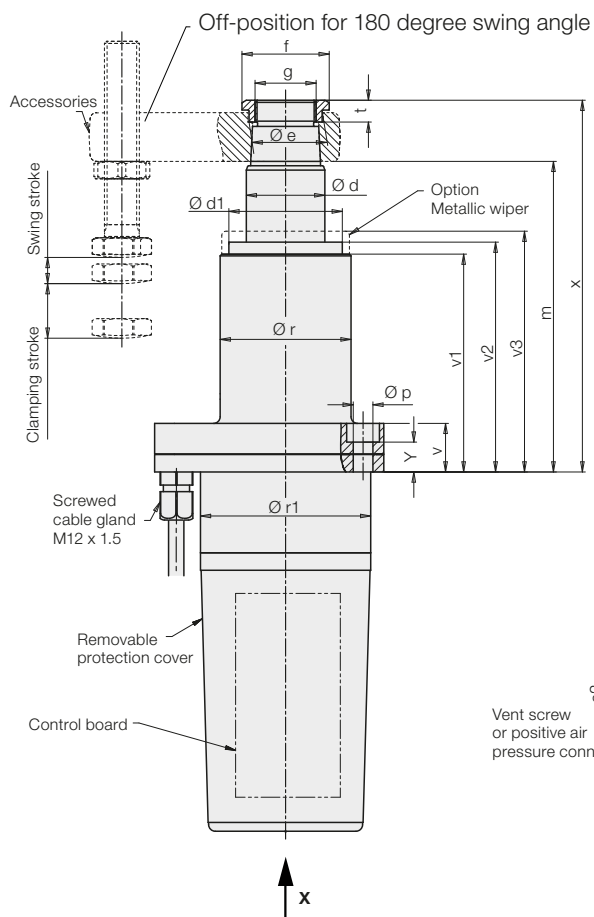
- Clamping arm within clamping area and clamping force obtained
- Clamping stroke control possible by analogue output signal

Error messages with error code

- Extensive review on error conditions.
- Signalling via error code
- Error messages can be reset
- Review display after 500,000 cycles

A description of the errors and corrective measures are included in the operating manual supplied with the clamps.

Dimensions Technical data



Cable + cable plug:
12x0,25mm² as per
Binder series 425
(79-6029-20-12)

Cable: 2x1,5mm²
(Lapp Ölflex sturdy
210 black)

Cable plug:
Hirschmann
TYPE CA3LS 3+PE

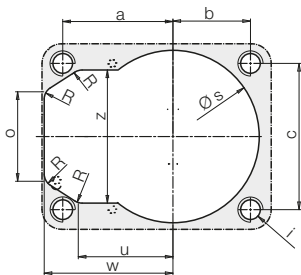
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Control line

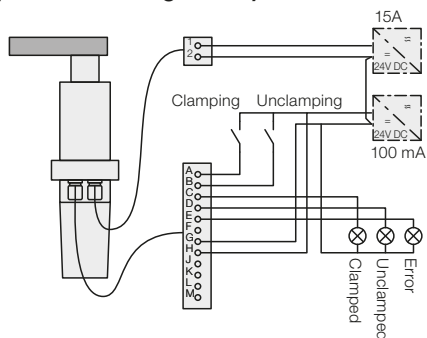
Supply voltage

Accessories see page 4

Connecting scheme



Connecting example (minimum configuration)



Connecting example with programmable logic control (PLC) and further technical characteristics and descriptions see technical information "Electric swing clamp".

Connector pinout

Supply voltage 24 VDC - 15A

Pin Function

- 1 +24 VDC
- 2 Ground (GND)

Control line

Pin Function

- A Command clamping
- B Command unclamping
- C Message clamped
- D Message unclamped
- E Message number of cycles
- F Message error code
- G GND (control)
- H +24 VDC (control)
- K Command error reset
- L Analogue input clamping force (0-10 V)
- M Analogue output clamping stroke (0-10 V)

Dimensions Technical data

Electric swing clamp		1835
Axial pulling force adjustable	[kN]	3...9
Effective clamping force	[kN]	see diagram
Clamping stroke (usable)	[mm]	20
Swing stroke	[mm]	3
Total stroke (mechanical)	[mm]	26
Swing angle	[°]	0°/90°/180° *
Clamping time max.	[s]	3.5
Unclamping time max.	[s]	3.5
Special clamping arm		
Max. clamping arm length	[mm]	150
Max. radial torque	[Nm]	0.4
Max. moment of inertia	[kgm ²]	0.012
Nominal voltage	[V DC]	24
Operating range	[V DC]	22...30
Residual ripple	[%]	< 10
Max. current consumption	[A]	15
Power consumption in standby mode approx.	[W]	1.2
Duty cycle	[%]	25 (S3)
Code class	[s]	IP 67
Positive air pressure connection max.	[bar]	0.2
Environmental temperature	[°C]	-10 +40
Mounting position		preferably vertical**
Weight, approx.	[kg]	8
a	[mm]	50.5
b	[mm]	35.5
b1	[mm]	41.5
b2	[mm]	50
c	[mm]	67
c1	[mm]	9
c2	[mm]	23.5
Ø d	[mm]	36
Ø d1	[mm]	52
Ø d2	[mm]	58.5
Ø e	[mm]	33.5
f	[mm]	40
g	[mm]	M28 x 1.5
h	[mm]	164.5
h1	[mm]	334
i	[mm]	M8
k	[mm]	85
l	[mm]	105
m - 1	[mm]	142
n	[mm]	45
o	[mm]	41
Ø p	[mm]	9
Ø r - 0.1	[mm]	60
Ø r 1	[mm]	78
R max.	[mm]	6
Ø s ± 0.5	[mm]	79
t	[mm]	10
u	[mm]	43.4
v	[mm]	22
v1	[mm]	99.5
v2	[mm]	105
v3	[mm]	110
w	[mm]	59
x	[mm]	170
y	[mm]	13.5
z	[mm]	61

Part no.

Swing direction 90° clockwise	1835-B090-R26M
Swing direction 90° counterclockwise	1835-B090-L26M
Swing direction 180° clockwise	1835-B180-R26M
Swing direction 180° counterclockwise	1835-B180-L26M
0 degree	1835-B000-026M

M = Option metallic wiper

* Further swing angles are available on request (min. 45°).

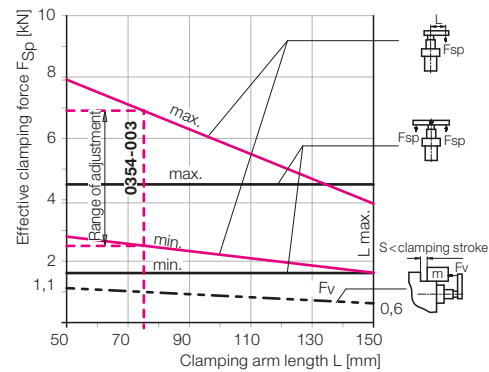
** For horizontal mounting position, please note page 4.

Important notes!

For cable lengths of more than 10 m or electromagnetic interference the cables must be shielded.

The connecting cables should be laid and fixed so that damages are excluded.

Effective clamping force F_{Sp} an admissible displacement force F_v as a function of the clamping arm length L



Important note!

The effective clamping force is a function of the clamping arm length L . To avoid that the admissible bending moment will be exceeded, the clamping force must be reduced for longer clamping arms. The adjustment is made on a control board by means of a chart and is precisely described in the operating manual.

Ex works, the clamping force is adjusted to 6.9 kN. That is the admissible clamping force for the accessory clamping arm $L = 75$ mm.

Example

Accessory clamping arm 0354-003: $L = 75$ mm

As per diagram:

- max. clamping force 6.9 kN
- min. clamping force 2.5 kN

The clamping force F can be set with the trimmer between 2.5 and 6.9 kN (see operating manual).

- max. displacement force F_v 1.0 kN

To position a workpiece, the electric swing clamp can obtain a maximum displacement force of 1 kN during the clamping stroke.

Conditions:

The displacement force F_v can only be used, if the clamping force for the following clamping cycle is set to at least 5 kN.

Accessories

Cable socket Binder 423 12 POL

Part no. 3141-992



Cable socket Hirschmann CA3LD

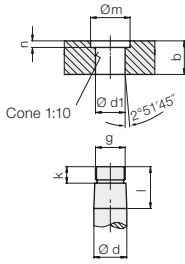
Part no. 3141-991



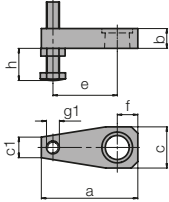
Connecting cable

Control	12 x 0.25 mm ²
Supply voltage	
Cable length	Cable cross section
< 7 m	2 x 1 mm ²
< 12 m	2 x 1.5 mm ²
< 20 m	2 x 2.5 mm ²
< 30 m	2 x 4 mm ²

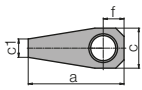
Dimensions for special clamping arms



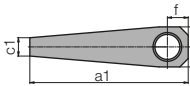
Clamping arm with contact bolt



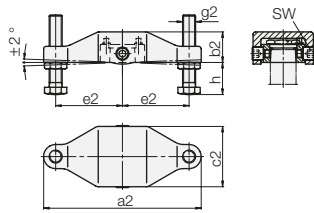
Clamping arm without thread g1



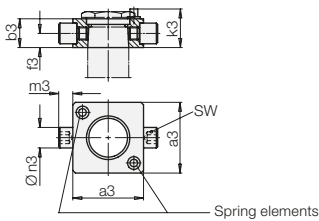
Clamping arm blank



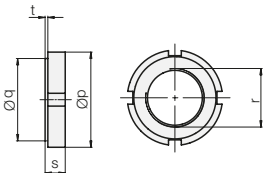
Double clamping arm complete with carrier
GGG 40



Carrier for double clamping arm
42CrV4 hardened and tempered



Collar nut



Horizontal mounting position

The electric swing clamp can be operated with the accessory clamping arm 0354-003 (e = 75 mm) in every mounting position.

In the case of longer and heavier special clamping arms, the admissible radial torque of 0.4 Nm will be exceeded, which can lead to malfunctions and increased wear.

Remedy:

Provide the clamping arm with a counterweight as explained in the opposite example.

Electric swing clamp

		1835
a	[mm]	115
a1	[mm]	190
a2	[mm]	196
a3 ±0.1	[mm]	55
b	[mm]	23
b2	[mm]	38
b3 ±0.1	[mm]	23
c	[mm]	48
c1	[mm]	22
c2	[mm]	75
Ød f7	[mm]	32
Ød1 +0.05	[mm]	31.85
e	[mm]	75
e2	[mm]	83
f	[mm]	25
f3	[mm]	11
g	[mm]	M28x1.5
g1	[mm]	M16
g2	[mm]	M16
h min...max	[mm]	15...79
k	[mm]	12
k3**	[mm]	29
l	[mm]	28
Ø m	[mm]	34
m3	[mm]	11
n	[mm]	5
Ø n3 g6	[mm]	16
Ø p	[mm]	90
Ø q -0.2	[mm]	68
r	[mm]	M60x1.5
s	[mm]	13
t	[mm]	4
SW	[mm]	8

Part no.

Clamping arm with contact bolt		0354-003
Weight, approx.	[kg]	0.8
Moment of inertia	[kgm ²]	0.002295
Radial torque	[Nm]	0.32
Clamping arm without thread g1		3921-017
Weight, approx.	[kg]	0.65
Moment of inertia	[kgm ²]	0.00134
Radial torque	[Nm]	0.20
Clamping arm blank		3548-902
Weight, approx.	[kg]	1.15
Moment of inertia	[kgm ²]	0.00798
Radial torque	[Nm]	0.74
Material: High alloy steel 1000....1200 N/mm2		
Double clamping arm, complete*		0354-132
Weight, approx.	[kg]	2
Moment of inertia	[kg·m ²]	0.00765
Carrier for double clamping arm		0354-142
Weight, approx.	[kg]	0.46
Spare nut		3527-021
Seating torque max.	[Nm]	500
Weight, approx.	[kg]	0.25
Metallic wiper		0341-231

* Complete with threaded bolt and spring elements

** Height stop surface for spring elements

Clamping arm with weight compensation

$$\text{Required counterweight } m2 = \frac{M1}{l2} \quad [\text{kg}]$$

M1 = First-order torque around the piston axis (control of the CAD model) [kgm]

m2 = Weight of counterweight [kg]

l2 = Centre of gravity of the mass m2 [m]

Important note

The additional counterweight increases the moment of inertia J around the piston axis, what can be easily determined by querying of the CAD model. To avoid an overload of the swing drive, the flow rate has to be reduced: The setting is described in the operating manual.

Mounting position - horizontal

