

# Hydraulic locking unit HLU LE-X (M)

Size	LE-X (M)
Type RE	Blocking against retraction
Stroke	110 mm, 140 mm, 150 mm



## Product characteristics

The hydraulic locking units HLU LE (25/32) as well as HLU LE-X (M/E) are specially developed for amusement rides and flying constructions and can be configured to meet individual customer requirements. They ensure maximum safety in shoulder restraints, lap restraints, and abdominal restraints of passenger restraint systems. A check valve in the hydraulic locking unit blocks the cylinder movement and thus reliably locks the restraint bar.

### Features and advantages

- delivery Plug & Play - simple installation and immediately ready for use
- closed and low-maintenance hydraulic system
- electric unlocking and manual emergency operation
- easier acceptance process through TÜV-Süd component certificate according to current standards
- high passenger comfort through stepless and silent bar adjustment
- comfort locking: restraint bars can be used as an aid for getting in and out (depending on model)
- easier bar opening: energy applied during closing is used to open the bar (depending on model)

### Intended applications

- amusement rides and flying constructions (e. g. roller coasters, VR rides, robot simulations)

## Table of Contents

Technical data.....	3
Dimensions and connections.....	7
Circuit diagram.....	8
Order information.....	9

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## Technical data

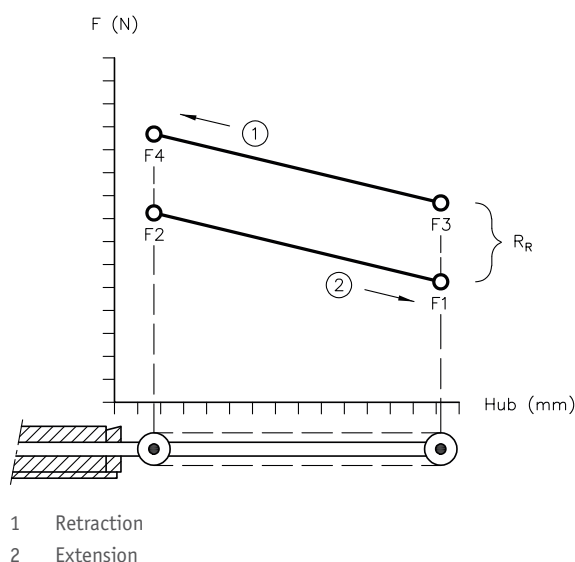
### General

blocking direction	against retraction				
comfort lock	no				
weight (incl. hydraulic fluid), size, RoHs		size	weight	RoHs	Predecessor of size LE 25 / 32
	860-7006-1	LE-X (M)	5.3 kg	✓	
	860-7002-1	LE-X (M)	6.1 kg	✓	
	862-7008-0	LE-X (M)	5.9 kg	✓	850-8003-X *
	862-7012-0	LE-X (M)	5.9 kg	✓	850-8003-X *
* If the LE 25 / 32 size is to be exchanged for LE-X (M), it is essential to consult HAWE Sales due to technical peculiarities.					
material	steel, aluminium, acrylonitrile-butadiene (NBR), polytetrafluorethylene (PTFE), polyurethane				
operating temperature	-10 to + 60 °C				
ambient and storage temperature	-10 to + 60 °C				
outside dimensions cartonage (LxWxH)	630 mm x 250 mm x 200 mm				
mounting position	arbitrary				
behavior in case of power failure	closed/locked				
corrosive category	C2 up to 10 years (M) DIN EN ISO 12944-2				
<p><b>! NOTICE</b></p> <p>The specified corrosion protection classes were tested by means of a salt spray test according to DIN EN ISO 9227 under laboratory conditions. This neutral salt spray test only serves as quality control for the coatings / materials used and does not reflect the behavior in natural environments. An earlier occurrence of corrosion - than assumed according to the corrosion protection class - can therefore not be ruled out.</p>					

dimensions	nominal stroke	piston diameter	rod diameter
	860-7006-1	110 mm	30 mm
860-7002-1	150 mm	30 mm	18 mm
862-7008-0	140 mm	30 mm	18 mm
862-7012-0	140 mm	30 mm	18 mm
	installation length when piston rod is retracted (L <sub>0</sub> )	installation length when piston rod is extended	nominal bore diameter of rod end bearing
860-7006-1	361 mm	471 mm	17-0.008 mm
860-7002-1	401 mm	451 mm	17-0.008 mm
862-7008-0	413 mm	553 mm	15-0.008 mm
862-7012-0	413 mm	553 mm	15-0.008 mm
rod end angle foot side	angle		
	860-7006-1	0°	
	860-7002-1	0°	
	862-7008-0	0°	
	862-7012-0	90°	
speed at 20 °C	max. extending speed	max. retracting speed	
	860-7006-1	55 mm/s	-
	860-7002-1	75 mm/s	-
	862-7008-0	70 mm/s	-
	862-7012-0	70 mm/s	-

retraction and extension forces at 20 °C

	F1 (±10 % tolerance)	progression
860-7006-1	85 N	29 %
860-7002-1	140 N	25 %
862-7008-0	120 N	23 %
862-7012-0	120 N	23 %



- F2:  $F_1 + F_1 \times \text{progression (XX \%)}$
- F3 and F4: Contact between seal and piston rod and the piston on the inside of the pressure tube generates frictional force. The frictional force counteracts the direction of movement of the piston rod. To push the piston rod in, a force increased by the friction must be applied. Additionally, F3 and F4 depend on the insertion speed of the piston rod. The higher the insertion speed, the higher the forces required for insertion.

load cases\*

\*calculation base DIN EN 13814:2019 / ISO 17842-01:2015 / compatible to ASTM F 2291-15

	static load	fatigue load	panic load
860-7006-1	30,000 N	10,500 N	39,000 N
860-7002-1	30,000 N	10,500 N	39,000 N
862-7008-0	30,000 N	10,500 N	39,000 N
862-7012-0	30,000 N	10,500 N	39,000 N

**Primary function: lap bar locking**

The piston rod of the hydraulic cylinder extends when the restraint system is closed. The check valve prevents the cylinder from retracting during operation, thereby locking the restraint system.

**Secondary function: none**

As an inherent feature of the design, type RE locking systems generate only very low piston extension forces. It is not possible to drive the opening motion of the restraint system with the locking system. The low extension forces bring about a force that closes the restraint system. This makes an additional system (e. g. gas spring, torsion spring) necessary to drive the opening motion and maintain the restraint system in the open position.

## Hydraulic parameters

filling gas	nitrogen			
hydraulic medium	hydraulic fluid DIN 51524 - RSL 22			
fill volume (hydraulic medium)	860-7006-1	~0.14 l		
	860-7002-1	~0.21 l		
	862-7008-0	~0.21 l		
	862-7012-0	~0.21 l		
pressure at 20 °C* *The pressures stated are calculated values, i. e. they may deviate in reality.		<b>P0 pneumatic preload pressure</b>	<b>P1 filling pressure (hydraulic fluid) with piston rod extended (piston side)</b>	<b>P2 filling pressure (hydraulic fluid) with piston rod retracted (piston side)</b>
	860-7006-1	3.1 bar	3.4 bar	4.5 bar
	860-7002-1	5.0 bar	5.6 bar	7.1 bar
	862-7008-0	4.3 bar	4.8 bar	6.0 bar
	862-7012-0	4.3 bar	4.8 bar	6.0 bar

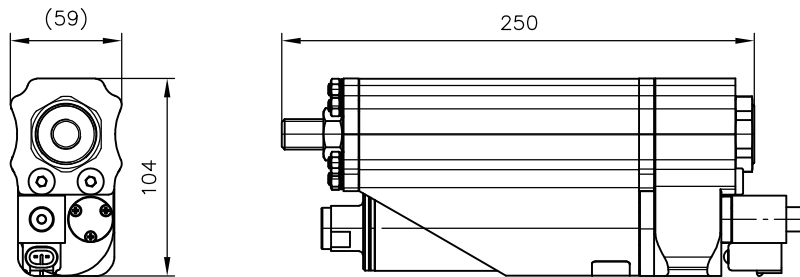
## Electrical parameters

rated voltage seated valve	24 VDC +/- 10 %
coil V1 power consumption	22 W
power supply	socket AMP-Superseal 1.5 2 poles
protection class (with appropriate connector)	IP 65*
duty cycle	depending on the environment up to 100 % of duty cycle

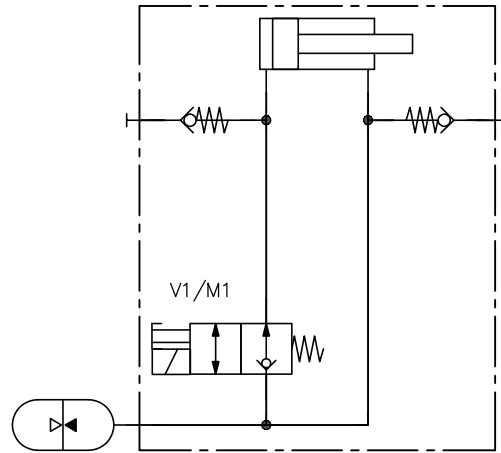
\*with optional accessories up to IP 67

## Dimensions and connections

Dimensions are given in mm.



## Circuit diagram





## Order information

order number	lot size "spare parts Fastlane" (delivery time 5 days)	lot size "standard" (delivery time 6 weeks)					
860-7006-1 860-7002-1 862-7008-0 862-7012-0	1-5*	1-36	37-72	73-108	109-144	145-180	>180

\*monthly max. 5 spare parts per order number possible

## Accessories, spare & tear parts

designation	details	order number	
packaging set HLU	Standard	063-6003-0 *	
Hydraulic locking unit set	<b>HLU remote unlocking set 1 m</b>		
	1 m push-pull cable	390-6001-0 *	
	clamping	390-2045-0 *	
	cylinder head screw (2x) DIN912-M 3x 10-8.8-A2A	390-2048-0 *	
		KNS.0230 *	
	<b>HLU remote unlocking set 2 m</b>	390-6002-0 *	
	2 m push-pull cable	390-2046-0 *	
	clamping	390-2048-0 *	
	cylinder head screw (2x) DIN912-M 3x 10-8.8-A2A	KNS.0230 *	
	<b>HLU remote unlocking set 3 m</b>	390-6003-0 *	
	3 m push-pull cable	390-2047-0 *	
	clamping	390-2048-0 *	
	cylinder head screw (2x) DIN912-M 3x 10-8.8-A2A	KNS.0230 *	
	plug AMP Superseals & wire 1.5 m without jacket, up to IP 65, UL/CSA-certified	<b>2-way cable</b> ▪ resistant to hydraulic fluid	325.6001 *
	plug AMP Superseals & wire 2 m with jacket, with protective sleeve, up to IP 67, UL/CSA-certified	<b>control wire</b> ▪ cross section 2x0.75 mm <sup>2</sup> ▪ wire end 2 mm stripped ▪ black/red	014-3017-1 *
plug AMP Superseals & wire 5 m with jacket, with protective sleeve, up to IP 67, UL/CSA-certified	<b>max. bending radius</b> ▪ once 5x outside diameter ▪ several times 15 x outside diameter	014-3011-2 *	
coil of 2/2-way valve	24 VDC 22 W	390-2007-0 *	
coil casing		330-2012-0 *	
protective cap		390-1000-0 *	
rod end bore diameter 17-0,008 mm (applies only to 860-7006-1, 860-7002-1)	rod side	085-1023-0 *	
	foot side	085-1024-0 *	

designation	details	order number
rod end bore diameter 15-0,008 mm (applies only to 862-7008-0, 862-7012-0)	rod side	085-1018-0 *
	foot side	085-1016-0 *
lock nut M16	on both sides	850-2113-0 *
auxiliary tool for manual operation	type A/E	850-7046-0 *
	filling adapter	860-1000-0 *
	filling device HAWE DFM 400	860-6000-0 *
	gas filling screw	007-1021-0 *
accumulator	USIT ring	007-1022-0 *

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