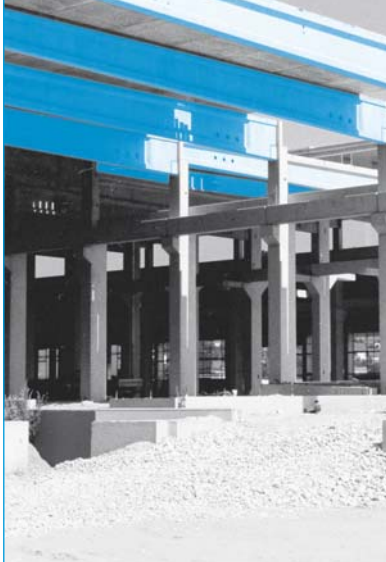


P R E S T R E S S E D  
C O N C R E T E  
T E C H N O L O G Y



# Automatic Single-Wire Stressing Jack

## Four-Hose Design



## Over 50 years of experience

Since the end of the 1950s essentially one type of stressing jack has prevailed as the market leader for single-wire or strand stressing: the four-hose stressing jack that PAUL were the first to develop and deliver. By pressing a button the operator can actuate all four functions - gripping, stressing, lock-off and retraction - directly from the stressing jack.

By stressing one prestressing steel after the other the single-wire jack ensures that equal tension is applied to each steel. It allows measurement of both the prestressing force and elongation and so complies with the DIN 1045-3 requirement.

This method offers the advantage over multi-stressing that it is extremely versatile in use,

whether for the production of small joists or of the largest roof trusses or bridge beams.



Production of HP roof shells at the end of the fifties

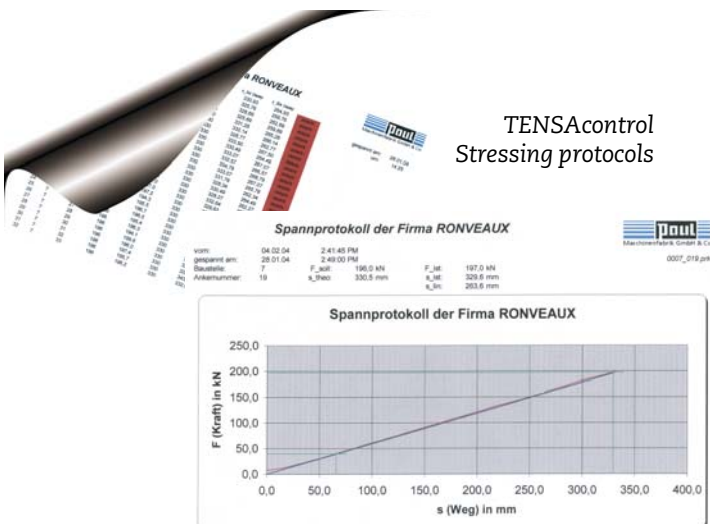
## Possible applications

Based on proven technology the four-hose stressing jacks have been continuously developed. The latest models incorporate computer control to record the prestressing force and elongation for a quality-conscious production. They guarantee equal tension in all prestressing steels and meet all requirements and standards applicable in the prestressed concrete production.



Roof trusses at the construction site

### TENSAcontrol Stressing protocols



160 kN/500 mm stroke for 1/2" strand with TENSACONTROL unit used for stressing roof trusses



Transport of bridge beams



300 kN/400 mm stroke for 0.6" strand with TENSACONTROL unit on stressing bridge beams

## The functions

PAUL single-wire stressing jacks are controlled by only one operator and allow fast and efficient operation. All functions are actuated by means of two push-buttons and carried out automatically:

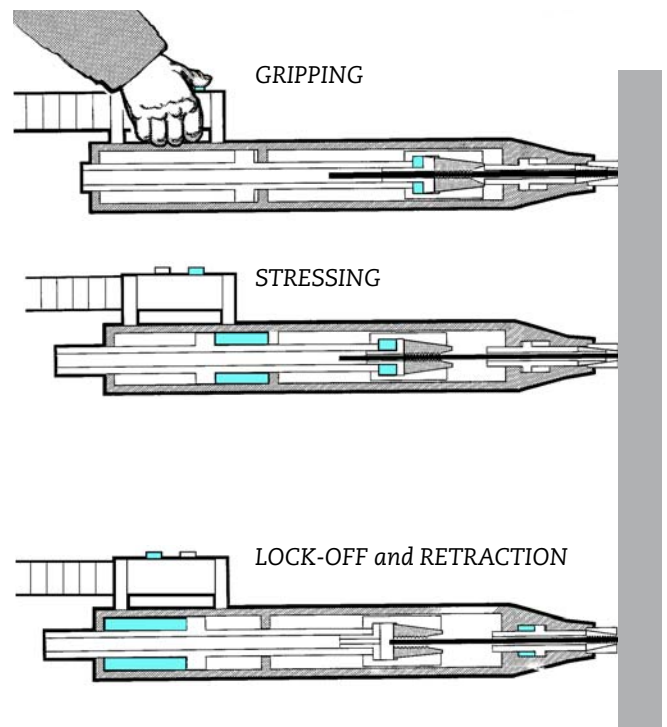
### "Stress" button:

The prestressing steel, under a high hydraulic force, is gripped before it is automatically stressed. The stressing operation stops on reaching the required stressing force that has been preset on the hydraulic pump unit.

### "Retract" button:

The wedges are hydraulically seated inside the grip barrel to anchor the prestressing steel without pull-in loss before retraction takes place automatically.

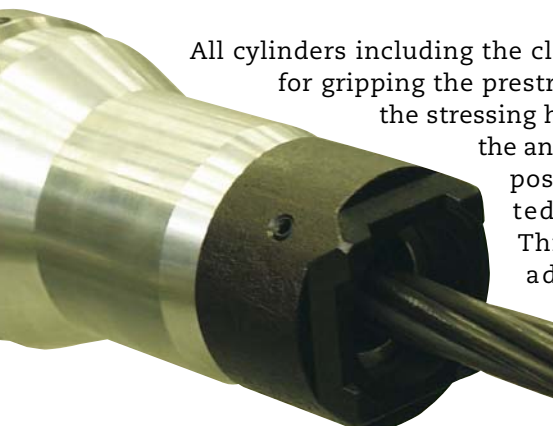
By repeating this sequence any total elongation required can be obtained.



## The benefits

All cylinders including the clamping cylinder for gripping the prestressing steel and the stressing head for pressing the anchor wedges into position are actuated hydraulically. This offers several advantages over mechanical actuation:

- The hydraulic gripping operation ensures an extended service life of the clamping jaws and also achieves a larger clamping range.
- The hydraulic stressing head provides secure power seating of the anchor wedges without pull-in loss. This adds to the service life of the wedges.



Stressing head



## Internal stressing grip

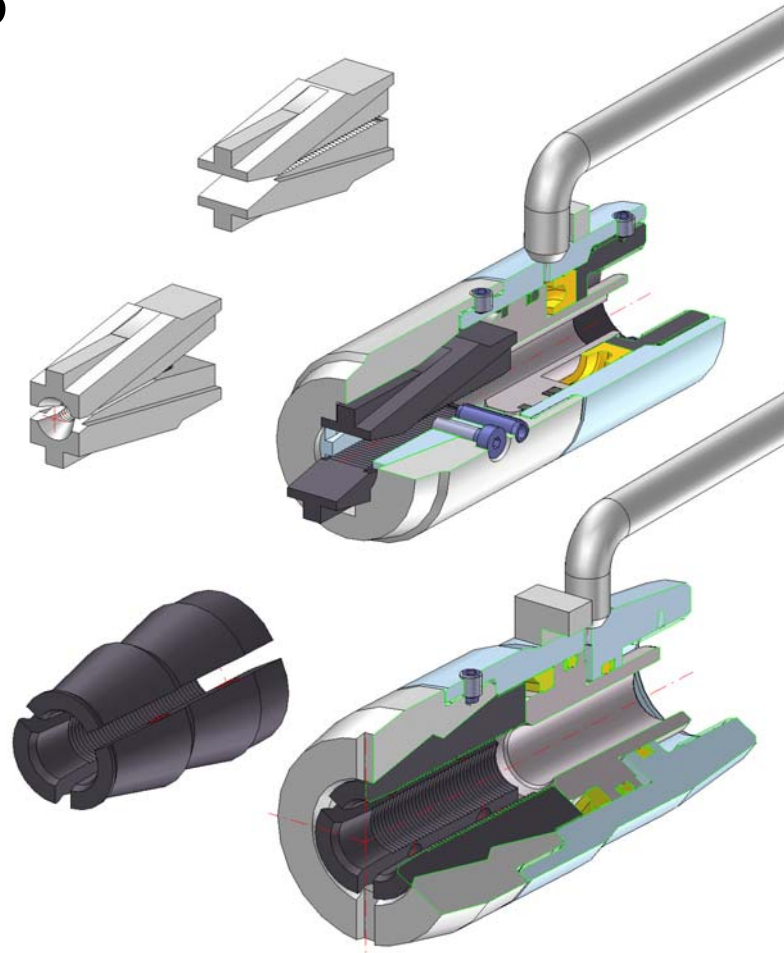
The automatic single-wire stressing jacks incorporate a stressing grip which grips and pulls the prestressing steel. The stressing grip must be suited to the prestressing steel used to provide for the smooth entry of the prestressing steel into the stressing jack and to ensure that it is safely gripped.

The criteria for the selection of the clamping jaws are the type and diameter of the wire or strand to be stressed and the maximum prestressing force to be applied.

Flat clamping jaws are available with either flat teeth or round teeth (round tooth jaws are used for small diameter two-wire and three-wire strand).

Basically each stressing jack can be equipped with flat or round clamping jaws. The 30 and 60 kN stressing jacks are fitted as standard with flat jaw stressing grips and the 120, 160 and 300 kN jacks with round jaw stressing grips.

Hydraulically actuated clamping jaws offer a long service life. Lubrication interval: approx. 1000 stressing operations.

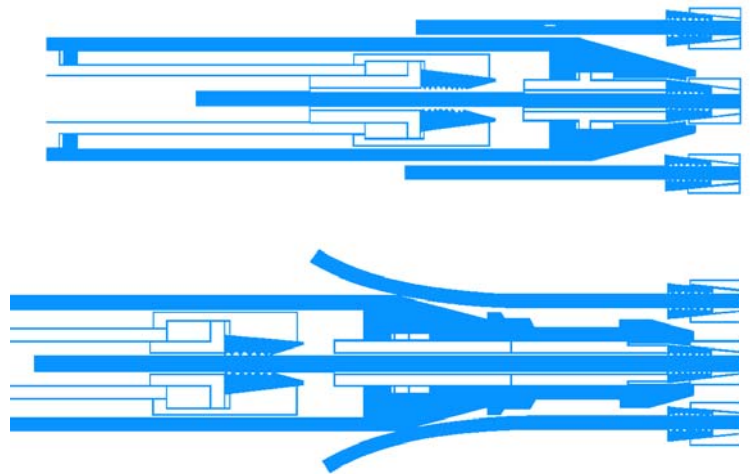


## Stressing head

The stressing head is the front part of the stressing jack. It serves to seat the wedges into the grip barrel to anchor the prestressing steel.

The stressing head must be suited to the design and dimensions of the anchor grips used. If anchor grips of a different make are to be used, we will adapt the stressing head accordingly.

The stressing heads are available with or without extension. Closely spaced or rigid wires or strands require an extension (normally 120 mm). The longer projecting steel length required in this case will, however, involve a larger amount of waste.



# The connection

The PAUL stressing jacks are fitted as standard with a special coupling so that they can be connected to or disconnected from the pump unit very easily by means of two screws. In this way the four hydraulic connections as well as all electrical connections are established at the same time.

Where the reinforcement of a prestressed concrete element consists of different wire or strand diameters which require different clamping jaws, the pump unit can be equipped with a double or triple connection enabling two or three stressing jacks to be connected to one common pump unit. The double connection is available with manual or electrical change-over facility.



Connecting the stressing jack



Double connection (electrical change-over)



Double connection (manual change-over)

# Automatic Pump Unit 77-024.00

This automatic, hydraulic pump unit has been specially designed for the operation of four-hose stressing jacks. By using a special coupling piece it is also possible to connect two-hose stressing jacks, cutters and other equipment. Special valves are provided to control the automatic operation. The unit is equipped with a radial piston pump and is controlled from the stressing jack by means of two push buttons (24 V control).

The instrument panel at the front end incorporates the following control elements:

- 1) Indicating instrument (pressure gauge or optional digital display)
- 2) Adjustable pressure relief valve for setting the requested stressing pressure, i.e. stressing

force

- 3) Return-flow indicator for checking the proper function of the unit (see page 5)

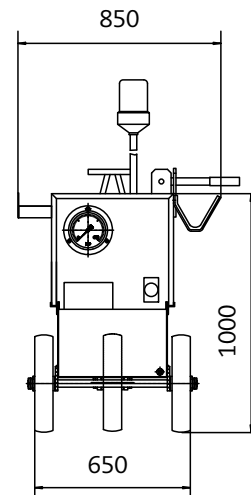
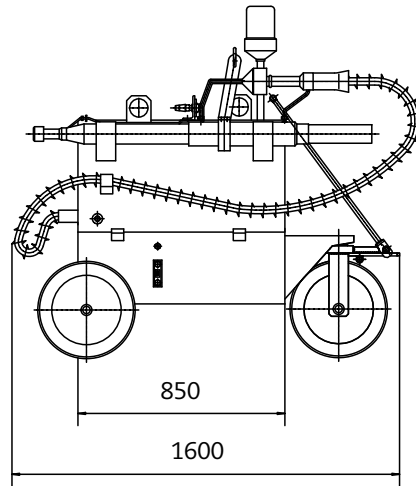
A large-volume 100 litre tank (useful oil capacity 50 litres) prevents excessive oil heating and so ensures a long service life of the hydraulic oil which reduces wear of the hydraulic elements to a minimum. The hood can be tilted forward and backward for quick and easy access to the electric and hydraulic part of the unit.

Large wheels provide ease of movement even over rough ground.

The electric warning light flashes when the unit is in operation and so contributes to increased safety.

The optional jack lifting unit is recommended for the "weightless" suspension of stressing jacks from approx. 25 kg in weight.

The pump unit is available with various high-pressure pumps with flow rates from 5.8 to 11.6 l/min. and associated driving motors (motor groups).



Scheme of automatic hydraulic pump unit



## Useful accessories

The automatic stressing jacks and pump unit 77-024.00 are available with a variety of accessories.



Digital display



Pneumatic tyres



Pressure recorder



Special control for presetting several stressing pressures

## Technical Data

### Drive of automatic pump unit

Three-phase motor, 3.0 kW, 5.5 kW or 7.5 kW  
Standard 400 V / 50 Hz; other voltages and frequencies on inquiry.  
Control voltage: 24 V

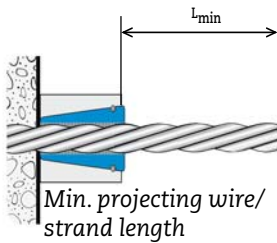
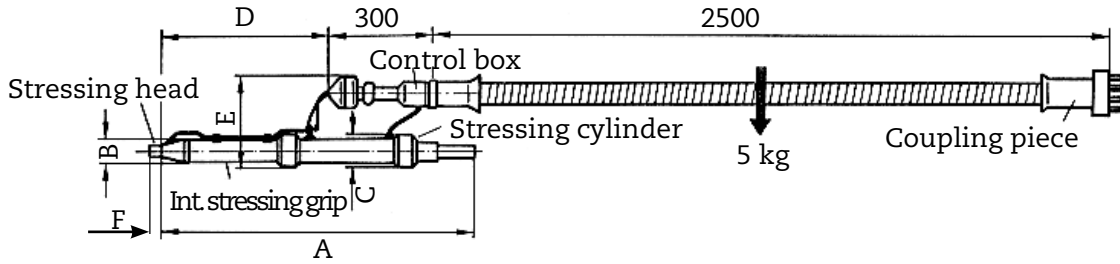
### Pump

Delivery flow 5.8, 8.4 or 11.6 l/min. (at 60 Hz 20% higher in each case)  
Oil reservoir NG100, oil filling 90 litres, useful oil capacity 50 litres  
Operating pressure: 420 bar  
Recommended hydraulic oil: see Lubricant Chart

Weight of pump unit without oil filling, without stressing jack		
l/min	without jack lifting unit	incl. jack lifting unit
5.8	217 kg	420 kg
8.4	227 kg	430 kg
11.6	242 kg	445 kg

Packing data of 77-024.00 (L x W x H)		Weight
without jack lifting unit	139 cm x 91 cm x 129 cm	106 kg
incl. jack lifting unit	150 cm x 115 cm x 129 cm	125 kg

# Technical Data of Stressing Jack



Stressing jack kN	Short stressing head		Long stressing head	
	F (mm)	L <sub>min</sub>	F (mm)	L <sub>min</sub>
30/60	30	180	140	290
120/160	30	190	140	300
300	60	240	150	330

Stressing jack kN	Stroke mm	External dimensions mm					Cylinder ∅ mm	Bore mm	Center hole mm		Weight kg
		A	B	C	D	E			standard	possible	
30	200	975	63	71	510	290	30/46	19	5	16	18.5
	500	1860	63	71	910	290	30/46	19	5	16	24.0
60	200	975	63	70	510	290	30/55	19	8	16	19.5
	400	1575	63	70	810	290	30/55	19	8	16	25.0
120	200	1010	82	90	520	315	35/75	17	14	16	29.0
	500	1910	82	90	920	315	35/75	17	14	16	45.0
160	200	990	82	98	520	325	35/82	17	14	16	31.0
	300	1290	82	98	620	325	35/82	17	14	16	34.0
	500	1890	82	98	920	325	35/82	17	14	16	47.0
300	200	985	90	122	510	330	46/105	27	24	26	39.0
	400	1585	90	122	810	330	46/105	27	24	26	50.0
	600	2185	90	122	1100	330	46/105	27	24	26	61.0

Stressing jack kN	Piston area cm <sup>2</sup>	Stressing force without friction at 420 bar approx. kN	Wedge-seating force at 350 bar approx. kN	Retracting force at 200 bar approx. kN	Theoretical piston speed in cm/s					
					5.8 l/min.		8.4 l/min.		11.6 l/min.	
					Sp	R	Sp	R	Sp	R
30	9.5	40	18	11	10.2	18.3	14.7	26.5	-	-
60	16.7	70	18	22	5.8	8.6	8.3	12.5	11.5	17.3
120	34.6	145	18	41	2.8	4.7	4.0	6.8	5.6	9.5
160	43.3	182	18	49	2.2	3.9	3.2	5.7	4.4	8.0
300	70.0	294	35	62	1.4	3.1	2.0	4.5	2.7	6.2

Sp = Stressing, R = Retraction