

Compact drives

General Information		10.03.00
Fax Questionnaire		10.04.00

Compact drives with pneumatically actuated clutch/brake combined unit	0046-...-Größe-...000	10.05.00
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Compact drives with hydraulically actuated clutch/brake combined unit	0045-...-Größe-...000	10.06.00
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Control, switching and checking equipment for hydraulic clutches and brakes in press drives

Switching schematic		10.07.00
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Equipment summary		10.08.00
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E S K - Electronic slip control for wet-running multi-plate clutches	0085-648-00-010000	10.09.00
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Properties, areas of application

The Ortlinghaus compact drive is a ready to install drive unit consisting of a clutch/brake combination, a flywheel and a gearbox. These drive units are used in metal forming machinery such as eccentric presses and toggle presses in which the working capacity of the machine is taken from a fast running flywheel. In comparison to spur gearing the planetary gears used in the compact drives save installation space and have smaller rotating masses. High speeds of rotation make it possible to keep the size of the flywheels to a minimum and when used with Ortlinghaus clutch/ brake combinations gives compact drive units with high power to weight ratios.

Compact drive components

The individual components of the Ortlinghaus compact drive i.e. clutch / brake combination, fly wheel with bearings and planetary gearing with drive hub, are matched to each other in order to suit the characteristics of the machine in a space saving assembly.

Clutch/brake combination

Ortlinghaus clutch/brake combinations have proved themselves over many years in thousands of metal forming drives and comply with the relevant safety requirements.

In compact drives a choice of two different types of construction are used:

- Pneumatically actuated single plate clutch/brake combinations (dry running).
For machines which mainly work in continuous operation.
- Hydraulically actuated, multi-plate, clutch/brake combinations (wet running).
These, virtually wear free, low maintenance units are particularly well suited for medium and large presses which also work in single stroke mode.

Gearbox

The planetary gearing for compact drives is designed for the loads found in metal forming machinery. The rotating masses, which are small in comparison to spur gearing, reduce the engaging work of the clutch / brake combination and give small braking angles. The sun wheel and planetary gear are milled, case hardened and ground. The planetary gears are mounted on high quality roller bearings. The construction and design of the planetary gearing ensures uniform

distribution of loads and optimum load bearing capacity. This ensures that the important conditions for high operating reliability and a long service life are met.

With single gearing a ratio up to about $i = 10$ can be achieved. The drive hub with shrink disc forms an easy to assemble interface with the eccentric shaft or another geared shaft on the machine.

Flywheel and flywheel bearings.

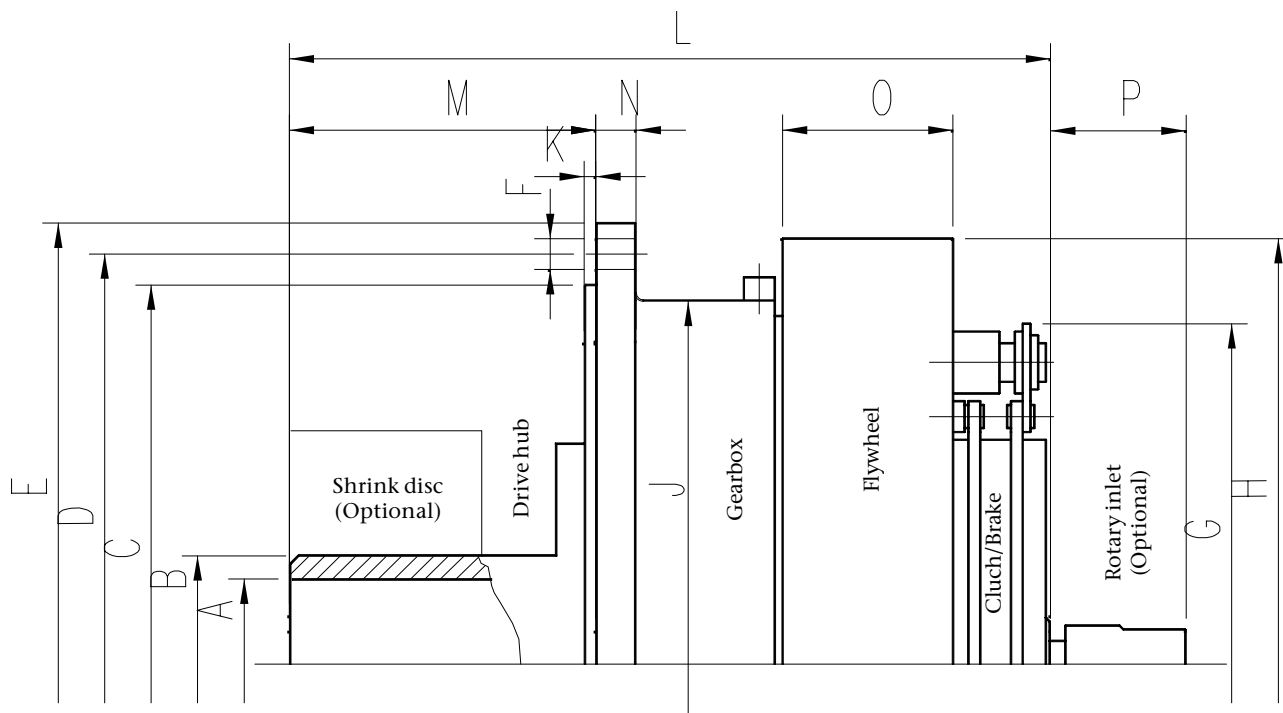
The flywheel is designed to suit the working capacity of the machine and the outside diameter can also be designed for a belt drive. The flywheel is connected to the clutch side of the clutch/brake combination. The flywheel bearings are of great importance in ensuring machine reliability, therefore, the bearing sizes are carefully calculated. Large roller bearings are used which take into account assembly and disassembly. Depending on the material of the flywheel surface speeds of up to 60 m/s are used.

Torques, reduction ratio

Ortlinghaus compact drives are available for the following drive torques:

- Reduction ratio i from approx. 4 to approx. 6
10 kNm to 1,400 kNm
- Reduction ratio i from approx. 6 to approx. 10
10 kNm to 160 kNm
- Reduction ratio $i > 10$
on request

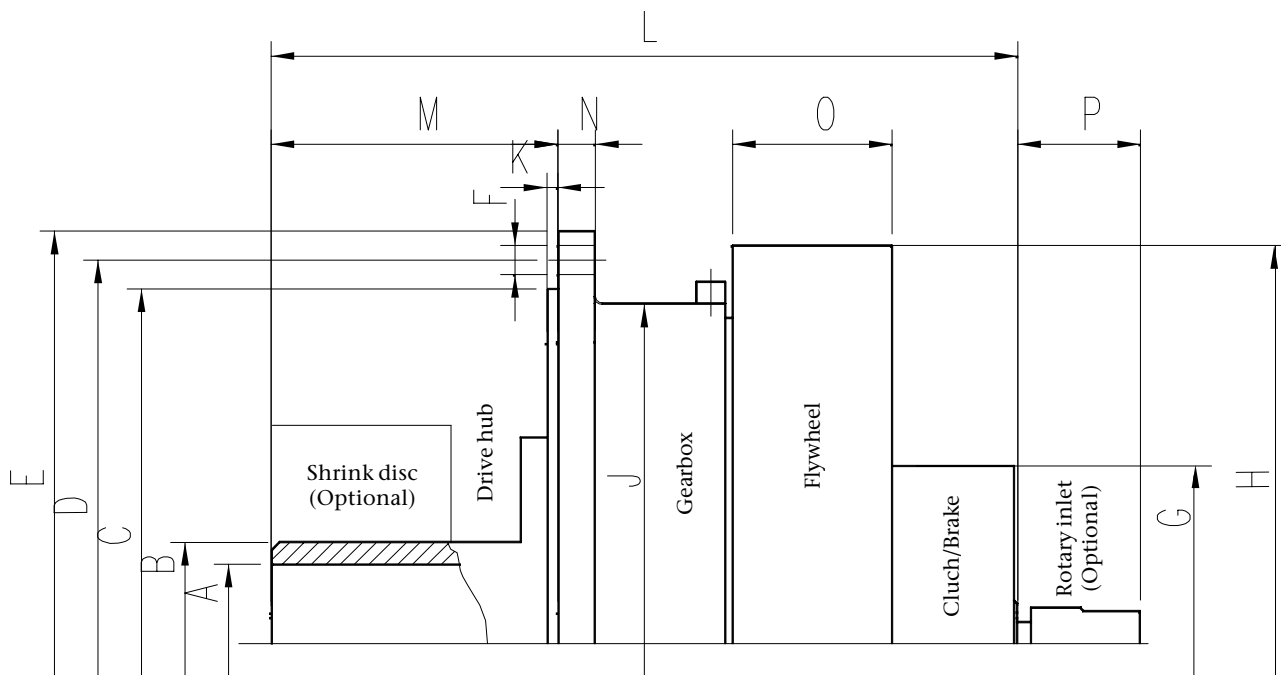
The details in the "Compact Drives" **questionnaire** on page 10.04.00 are required for quotation purposes.



Series	0046-...-Size-...000											
	-124-61-...	-124-61-...	-110-61-...	-123-61-...	-221-77-...	-134-83-...	-123-77-...					
Drive torque	$M_{AB}^{1)}$		kNm		10	10	14,5	25	50	78	96	100
Reduction ratio	$i^{1)}$		4,421		4,421	7,875	10,07	5,65	4,42	4,42	10,125	
Moment of inertia Flywheel	$I^{2)}$		kgm ²		13	72	12	71	297	684	245	
Clutch size	61		61		61	61	61	77	83	83	77	
Diameters	A	100	100	100	140	170	170	170	170	170	170	
	B	140	140	140	185	220	220	220	220	220	220	
	C	350	350	530	600	580	700	1025	1025	1025	1025	
	D	450	450	450	650	630	820	1100	1100	1100	1100	
	E	480	480	530	700	680	890	1150	1150	1150	1150	
	F	18	18	18	22	21	25	25	25	25	25	
	G	560	560	560	560	780	1000	780	780	780	780	
	H ²⁾	660	850	600	900	1100	1355	1150	1150	1150	1150	
J	413	413	463	600	595	730	1025	1025	1025	1025		
Length dimensions	K	25	25	25	10	10	10	10	10	10	10	
	L	462	507	460	562	780	859	675	675	675	675	
	M	86,5	86,5	86,5	170	250	125	125	125	125	125	
	N	-	-	-	30	35	35	35	35	35	35	
	O ²⁾	151	270	170	160	232	415	234	234	234	234	
	P	-	-	128	114	-	-	-	-	-	-	

¹⁾The table shows only an **extract** of the drives already designed and supplied. Additional torque rating M_{AB} and ratios i upon request.

²⁾The inertia I is determined according to the required performance. Values H and O correspond to the stated inertia values.



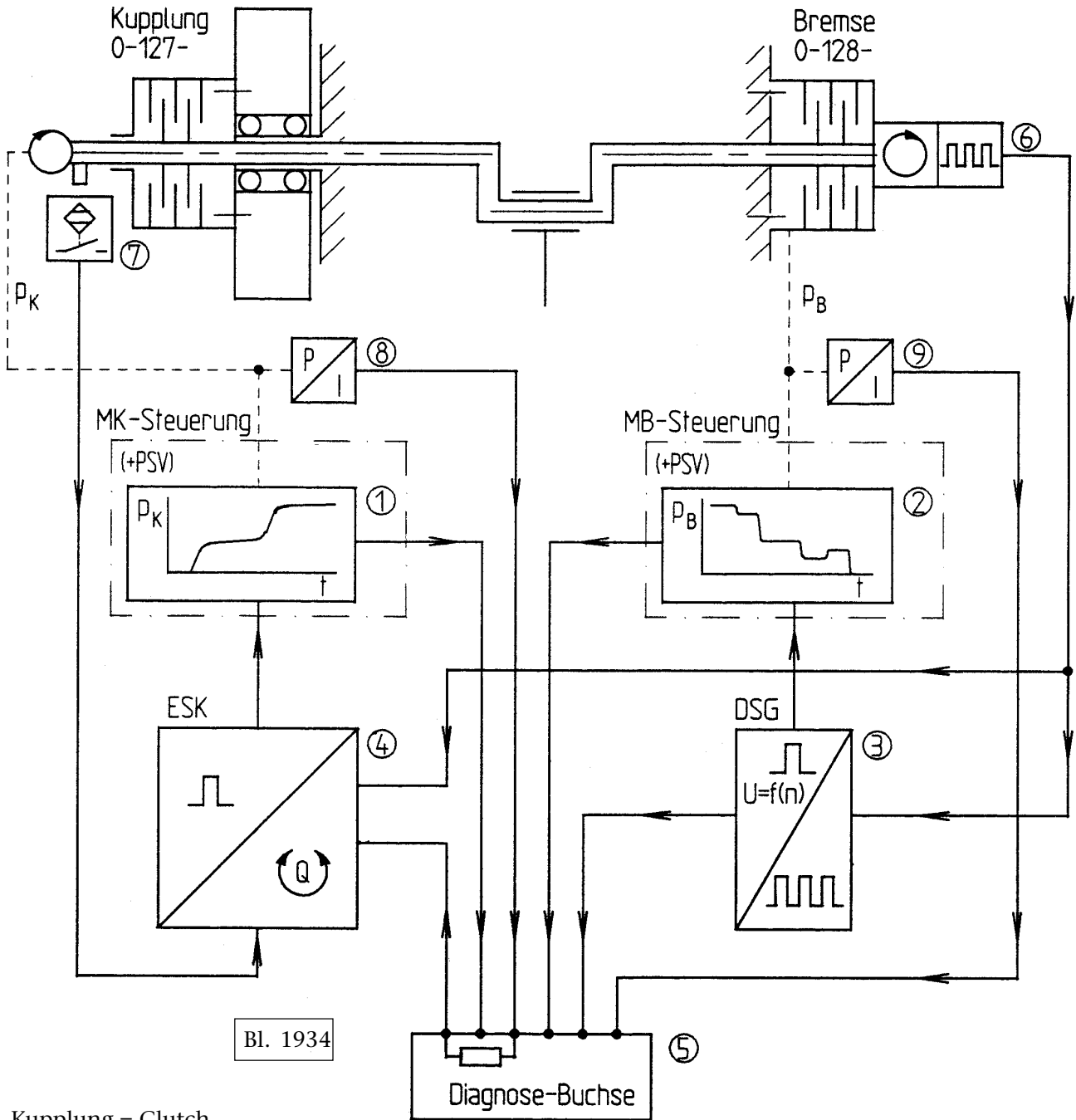
Series	0045-...-Size-...000								
	-102-86-...		-132-86-...		-132-86-...		-124-90-...		
Drive torque	$M_{AB}^{1)}$		kNm		130 150		230 275		
Reduction ratio	$i^{1)}$		4,94 4,42 5,33		5,333		5,333 4,13 4,615 7 29,318		
Moment of inertia Flywheel	$I^{2)}$		kgm ²		430		1270 1270 3800		
Clutch size	86 90 90		86		86		90 94 90 86		
Diameters	A	240		260		260		320	
	B	300		320		320		400	
	C	700		850		850		1090	
	D	820		1050		1050		1350	
	E	890		1100		1100		1420	
	F	25		32		32		39	
	G	660		890		890		970	
Length dimensions	H ²⁾	1190		1495		1495		1830	
	J	730		965		965		1270	
Length dimensions	K	10		26		26		41	
	L	877		1400		1430		1595	
	M	184		290		290		375	
	N	35		50		50		60	
	O ²⁾	300		350		350		400	
	P	231		228		228		228	

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Control, switching and checking equipment

for hydraulic clutches and brakes in press drives



- Kupplung = Clutch
- Bremse = Brake
- MK-Steuerung = MK controller
- MB-Steuerung = MB controller
- Diagnose-Buchse = Diagnostic socket
- Diagnose-Stecker = Diagnostic plug

Control, switching and checking equipment

for hydraulic clutches and brakes in press drives

Item	Description	Function	Effect, Benefit
1	Art.-No. 0086-095-000 MK controller (Modular Clutch Controller)	Controls the pressure when actuating the clutch	Shock-free starting of the machine, safe working due to integral press safety valve (PSV)
2	Art.-No. 0086-095-000 MB controller (Modular Brake Controller)	Controls the braking torque - soft braking - hard braking - second soft braking stage (option)	Soft braking in normal operation, full braking effect in emergencies and at rest, safe working due to integral press integriertes Pressen-safety valve (PSV). Option: second soft braking stage to optimised retardation ramp with short braking time and shock-free stopping at top dead centre (Item 3 speed switching device necessary).
3	Art.-No. 0085-680-03-000002 DSG - speed switching device	Provides the switching pulse for the second soft braking stage.	Allows for optimum retardation with soft braking by means of an adjustable switching threshold which activates the second soft braking stage.
4	Art.-No. 0085-648-00-010000 ESK - electronic slip control	Monitors the engagement work of the clutch	Protects the clutch from thermal overload and thus from wear and damage.
5	Art.-No. 0085-360-24-000000 Diagnostic socket	Brings together all the signals required for diagnosis in a 24 pin socket	Considerably reduces the preparation time required for diagnostic measurements (a matching plug on the measuring cable will be required).
6	Art.-No. 0085-690-00-000000 . Incremental sender	Provides speed signal from the drive shaft	Control and measurement signal for diagnosis, second soft braking stage and ESK - electronic slip control.
7	Art.-No. 0085-699-00-002000 Pulse sender	Provides speed signal from the clutch drive shaft (flywheel speed)	Control and measurement signal for ESK - electronic slip control
8	Art.-No. 0086-047-00-032000 Pressure sensor - clutch	Measurement of the actuation pressure of the clutch	Control and measurement signal for diagnosis and ESK - electronic slip control, pipe - breakage sensor
9	Art.-No. 0086-047-00-032000 Pressure sensor - brake	Measurement of the brake back pressure	Measurement signal for diagnosis, pipe breakage sensor

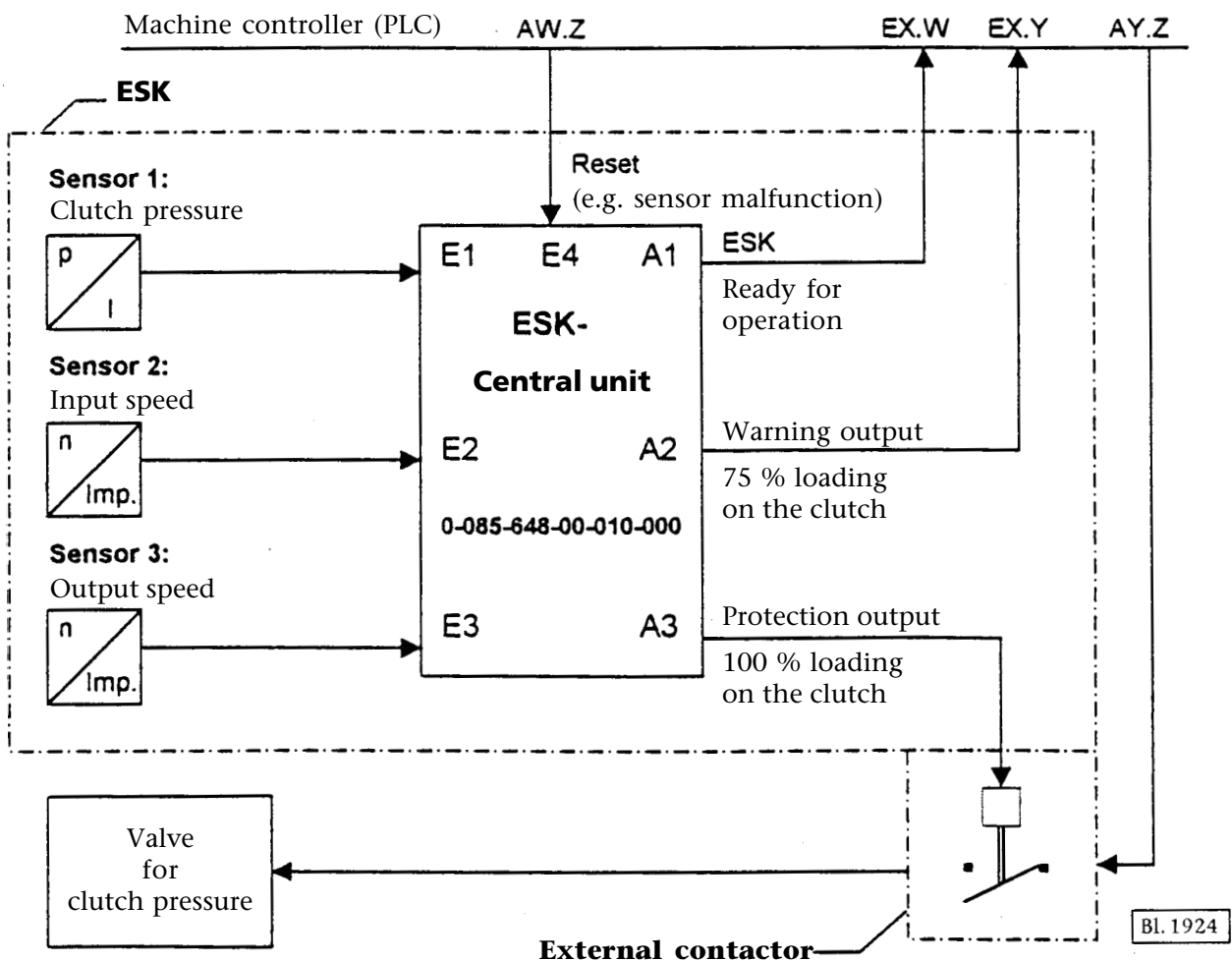
Function

The ESK is a system for the protection of oil cooled multi-plate clutches from thermal overload which can, for example, be caused during engagement or disengagement processes by too high a load torque or too high a switching frequency. In this way damage such as for instance dishing of the plates can reliably be avoided. The monitoring function is based on a comparison of the frictional energy accumulated in the clutch with the limit for the clutch.

By continually recording the actual frictional work done taking into account the cooling of the clutch – both for single actuations and also for multiple actuation – the full power of the clutch can be constantly utilised, without the risk of thermal overload.

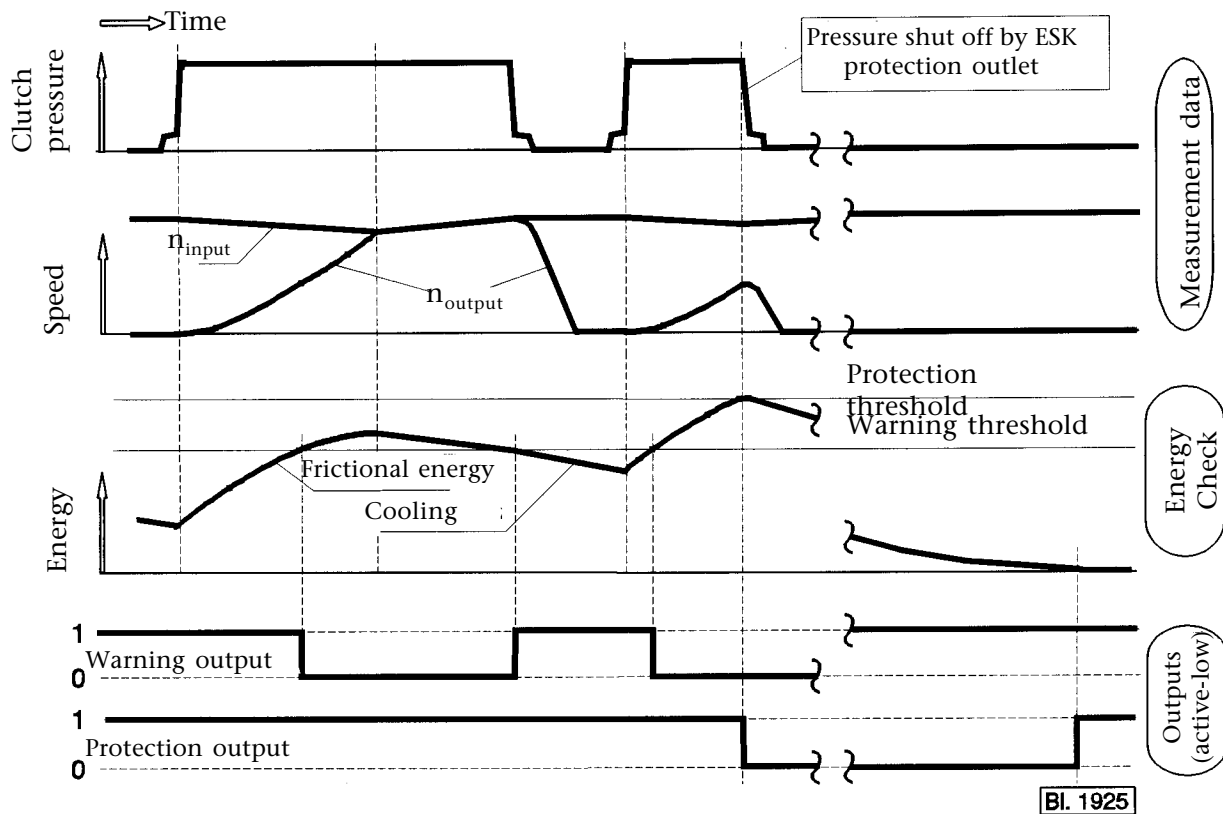
An essential precondition for the proper function of the ESK is that the designed flow rate of the cooling oil is maintained.

Block circuit diagram



Operation

The schematic diagram below shows an example of two clutch processes and the changes in the measurement values of actuation pressures and speeds, the calculated energy balance and the characteristics of the ESK outputs.



Warning output:

On reaching an adjustable warning threshold (e.g. 75% of the permissible thermal loading) the ESK warning output will be switched off. This will trigger a visual/ acoustic signal to gain the attention of the user.

Protection output

1. On reaching 100% of the permissible thermal loading the ESK protection output will be switched off. This will open a contactor and thus interrupt the ready signal for the clutch pressure.
2. After a single, unusually high, loading (without triggering the protection) the possibility exists to block the clutch pressure until, after the drive shaft has come to a standstill, the full loading capability of the clutch is again reached (this means waiting for the cooling process to take place).

Automatic resetting of the warning and protection output

Due to the clutch cooling being taken into account internally the outputs are automatically reset as follows:

The warning function is deactivated when the workload of the clutch has again dropped below the warning threshold

The protective function is deactivated when the clutch has regained its full power capability. This process requires a period of around 30...80 seconds depending on the type of clutch. The clutch can then be actuated again without the risk of an overload.