

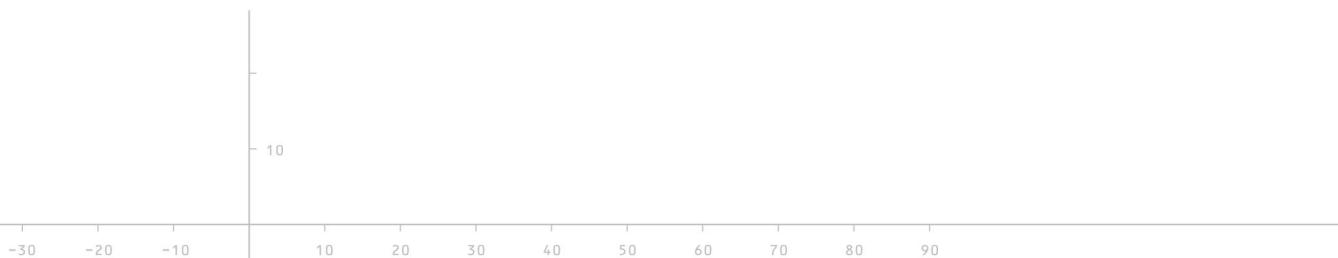
Differential Current Relay DSR-6.2





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1 General remarks

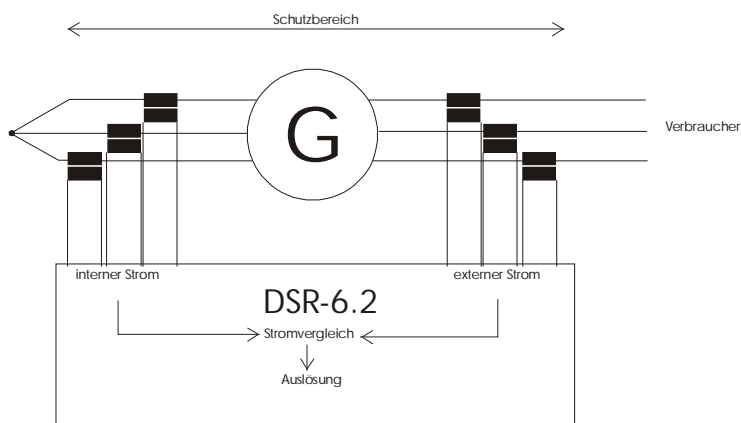
The DSR-6.2 differential current relay is a measuring instrument controlled by a micro-controller for the protection of three-phase, synchronous and asynchronous motors or three-phase generators. It monitors the differential currents and triggers a switch-off when set limit values are reached. Advance warning can be given by way of a second relay contract.

Triggering can be suppressed for an adjustable period to avoid faulty triggering, e.g. when starting up large electrical drives. Reset after triggering or advance warning can be automatic following an adjustable time or by way of an external input.

2 recorder outputs (1 x 0 .. 10V and 1 x 0(4) .. 20mA) are envisaged as an extension. Print-out of the trigger values and parameters can be retrofitted at the request of the client. The DSR-6.2 is available as a 5A or 1A variant model. Als Anzeige-Sprache sind Deutsch oder Display is selectable in German or English (see under Parameterisation).

2 Measurement

Measurement in 6 current paths is by simultaneous scanning of all 6 measuring circuits at a rate of 16 scans per period and path. After the expiry of a set period, the real effective value is calculated and evaluated for each current value. The minimum trigger delay is approx. 130ms. 3 instrument transformer circuits record the current related to the generator's star point (the phase currents, internal current), while the other 3 instrument transformer circuits can be configured on the consumer side to record the consumer current (external current).



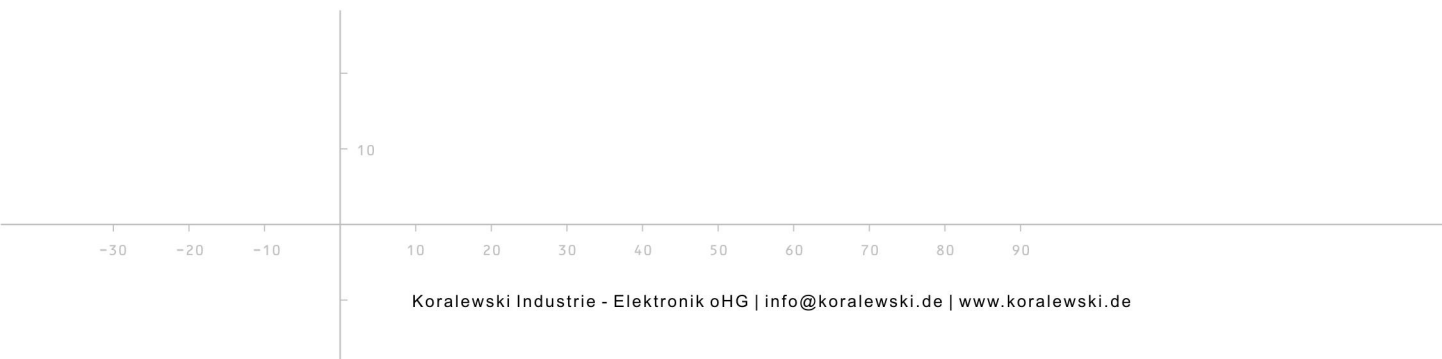
The DSR-6.2 operates with a rated frequency defined by parameterisation. 50Hz or 60Hz are adjustable as rated frequencies. Joint instrument transformer factors are adjustable for internal and external current paths.

3 Operation

The following values are used for measurement and switch-off:

- Rated current eingestellter Nennstrom des Generators
- Stable current $I_s = (I_{Intern} + I_{Extern}) / 2 \text{ [A]}$
 $I_s = ((I_{Intern} + I_{Extern}) / 2) / I_{Nenn} * 100 \text{ [%]}$
- Differential current $I_d = I_{Intern} - I_{Extern} \text{ [A]}$
 $I_s = (I_{Intern} - I_{Extern}) / I_{Nenn} * 100 \text{ [%]}$

The difference between internal and external currents is calculated from the momentary current values so that a phase fault can be additionally detected and evaluated.





3.1 Display

Depending on the given parameterisation, the DSR-6.2 displays during operation the phase currents of differential currents in ampere or % related to I_{rated} . The selected display has no influence on the triggering characteristics. The following displays can be selected:

Is 1	Is 2	Is 3
350	380	365 A

Phase currents display in A:
The mean value of the internal and external current of each phase is displayed here.

Is 1	Is 2	Is 3
5	8	7%

Phase currents display in per cent:
The mean value of the internal and external current of each phase is displayed here in relation to the adjusted rated current.

Id 1	Id 2	Id 3
2.4	2.6	2.3 A

Differential currents display in A:
The current difference between internal and external current is displayed here in ampere. The dependency of the rated current is displayed as I_{dx} with or without a decimal point. At $I_{rated} \leq 100$ display is with a decimal point.

Id 1	Id 2	Id 3
1	2	1 %

Differential currents display in per cent:
The current difference between internal and external current is displayed here in per cent in relation to the rated current.

Different displays can be selected with the ENT key when there is no trigger. After approx. 10 seconds the DSR-6.2 will return to standard display.

3.2 Paging in the display

One of the displays described under Operation is selected as the standard display. Furthermore the 'UP' key can be depressed to select one of the following displays:

Rated current and instrument transformer factors:	I-NOM. : 100 A Wandler: 200:5
Break point and trigger values:	KINK: 100% A1: 15 % A2 : 30 %
Internal current:	In I1 in I2 in I3 10 11 10 A
External current:	ex I1 ex I2 ex I3 10 11 10 A
Fundamental frequency:	NOM. FREQ. 50 CY A3: OPERATION

After approx. 10 seconds the DSR-6.2 returns to the set standard display.

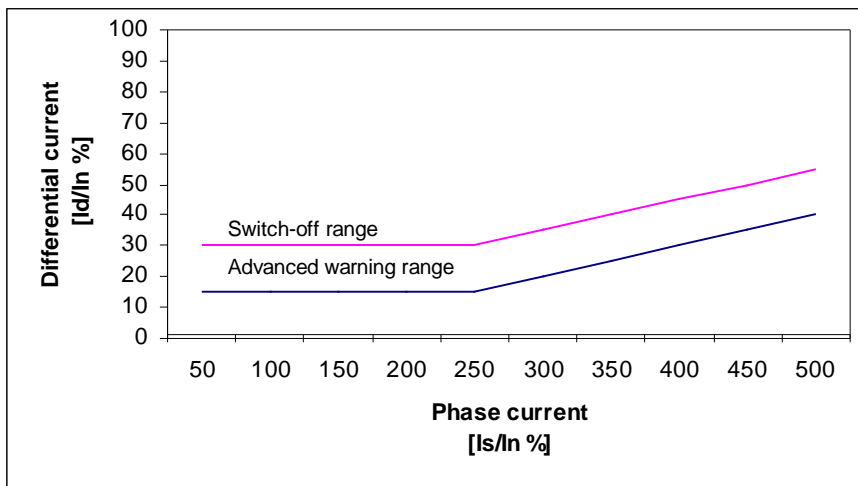




3.3 Triggering

The values measured after each measuring interval (100 ms at 50 Hz) during operation are compared with the set values for advance warning and switch-off. The corresponding relay is activated when the limit values are exceeded. The switch-off function is designed according to the following diagram:

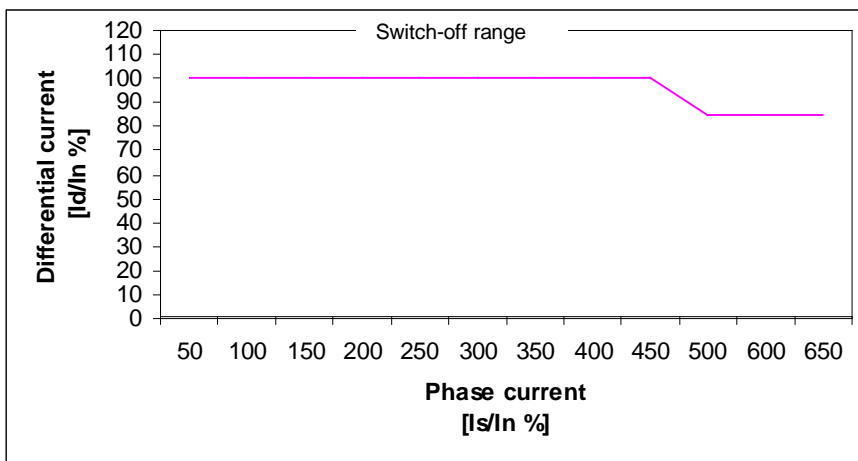
Advance warning 15 % I_d
 Switch-off 30 % I_d
 Bend point 250 % I_{rated}



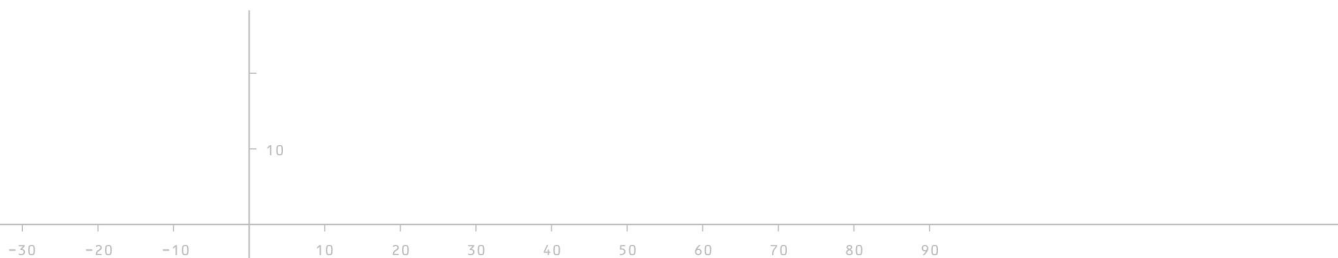
The A1 relay (advance warning) picks up after expiry of the set delay time when the differential current I_d exceeds the set value for advance warning (here 15 %). A2 picks up after the set delay time when I_d exceeds the limit value. The bend point is adjustable within a range of 50 % to 500 %. If the phase current exceeds the set bend point, then the advance warning and switch-off characteristic curves are each raised by 10 % per 100 % I_s/I_d .

2 switch-offs are ranked higher than these setting possibilities:

- A differential current of $I_d/I_n > 100$ % results in immediate switch-off without delay time.
- A differential current of $I_d/I_n > 85$ % at $I_s/I_n \geq 5$ likewise results in immediate, undelayed switch-off.



There is no trigger with very small currents ($I_s < 5\%$ from I_{rated}).





3.4 Trigger blocking

There are 2 different ways to block a trigger.

- Blocking by E1 input for the time set by parameterisation. The blocking time commences with the rising flank of E1 and ends after the time specified by parameterisation (parameter 17). Renewed blockage is possible after removal of the signal to E1 (flank triggering).
- Blockage by changing the differential current. If, from one measuring interval to the next, the differential current change exceeds the limit value specified during parameterisation (parameter 7), then the trigger is likewise blocked for the set time (parameter 17). This blockage can be switched off by setting the value at 0 %.

The LED for release is turned off during the blockage time.

3.5 Reset after triggering

Für die Vorwarnung und die Auslösung gibt es die Möglichkeit das Rücksetzen durch den Reseteingang (E2) als externen Reset zu parametrieren. Wird der externe Reset gewählt, ist das Zurücksetzen nur durch den Reseteingang möglich.

Reset after an advance warning / triggering will occur automatically after expiry of the time specified by parameterisation (parameter 16) of 2 seconds. The reset time is adjustable between 0.0 and 99.9 sec. The reset for advance warning and triggering can also be parameterised as an external reset by the reset input (E2). If external reset is selected, reset is only possible through the reset input.

3.6 Fault message

DSR-6.2 output via relay 3 is optional either by a collective fault message or status message. If a collective fault is selected then this relay 3 drops out when the advance warning time or switch-off value is exceeded. Relay 3 remains picked up when a status message is selected.

4 Parameterisation

Parameterisation is necessary for correct adaptation to the given application. The trigger values must be parameterised and set before setting into operation.

4.1 Parameter setting

Transfer to parameterisation is achieved when DIL-S2 is set at ON, and is left when DIL-S2 returns to OFF. The current input has to be terminated before parameterisation can be left.

All set values are stored in an EEPROM to ensure the highest possible data safety.

4.1.1 Parameter selection

When in parameterisation it is possible to page through the parameters on the display with the UP key until the value that is to be changed is reached.

4.1.2 Input

Parameter input, or changing the selected parameter, is effected with the ENT key. The cursor position is also changed with the EBT key. The figure standing at the cursor position is counted upwards with the UP key. Return to parameter selection is effected with the ENT key after all cursor positions have been scanned.

4.1.3 Coding

**PARAMETER SELECT
CODING WITH ENT**

Parameterisation can also be left in a coded manner so that unauthorised changing is made more difficult (see *Text window at the left side*), → thereafter press ENT key.

Transfer to parameter selection in the following manner after coding:

Confirm DIL-S2, hold down the ENT key and press the UP key 3 times.



4.2 Basic setting

The DSR-6.2 is supplied by the works with the values specified in the 'ex works' column of the parameter list.

The 6 measuring paths are adapted to a reference current of 5 A (1 A with the 1 A variant). The tolerance between the measuring paths is maximum 0.5 %. Subsequent correction is possible for adaptation to a connected current transformer.

The measuring paths can be adapted to the actual local conditions with the parameters 27 to 32.

5 Parameter list

The parameters of DSR-6.2 are summarised into 3 groups.

5.1 Group 1 (DIL-S2) at ON

No.	Parameter	Display	Unit	Setting range	Ex works	Set
1	Rated generator current	I NOM	A	0 .. 9999	1000	_____
2	Transformer factor	IN-TRANSF		1 .. 9999	1000	_____
3	Switch-off value	SHUTOFF	%	0 .. 100	20	_____
4	Switch-off value delay time (t=0 minimum delay)	T-SHUTO	S	00.0 .. 99.9	0.00	_____
5	Basic frequency	NOM.-FREQ.	Hz	50 / 60	50	_____
6	Current change f. auto blockage 0 = switched off	ID-Max	%	0 .. 100%	25%	_____
7	Languages change-over for Display text	LANGUAGE ENGLISH		Sprach Deutsch Language English	Sprache Deutsch	_____
8	Coding	CODING WITH ENT			CODING WITH ENT	_____

5.2 Group 2 (DIL-S2 + DIL-S3) at ON

No.	Parameter	Display	Unit	Setting range	Ex works	Set
9	Advance warning value	PREWARN	%	0 ... 100	10	_____
10	Advance warning delay time (t=0 minimum delay)	T-PREW.	S	00.0 ... 99.9	5.0	_____
11	Bend point of trigger characteristic curve	I-KINKP	%	50 ... 500	100	_____
12	Operating relay	A3 OPERATION A3 COLL FAULT		A3 OPERATION A3 COLL FAULT	A3 OPE- RATION	_____
13	Advance warning reset	PREWARNRES.E2 PREWARNR.AUTO		PREWARNRES.E2 PREWARNR.AUTO	E2	_____
14	Switch-off reset	SHUTOFFRES.E2 SHUTOFFR.AUTO		SHUTOFFRES.E2 SHUTOFFR.AUTO	E2	_____



No.	Parameter	Display	Unit	Setting range	Ex works	Set
15	Reset time	T-RESET	s	00.0 ... 99.9	1.0	_____
16	Trigger lock	T-LOCK	s	00.0 ... 99.9	0.2	_____
17	Standard indication	INDICATION		I s[A] / I s [%] I d [A] / I d [%]	I d [%]	_____
18	Voltage output Analog 1 0 ... 10 V or 2 ... 10 V	ANALOG 1:0.10V ANALOG 1:2.10V	V	ANALOG 1:0.10V ANALOG 1:2.10V	2 ... 10 V	_____
19	Assignment Analog 1 0(2) ... 10 V	ANALOG 1 I1 INT			I1int	_____
20	Start value 0(2) V	AN1 START [A]		0 ... 9999	0000A	_____
21	End value 10 V	AN1 END [A]		0 ... 9999	1000A	_____
22	Current output Analog 2 0 ... 20 mA oder 4 ... 20 mA	ANALOG 2:0.20mA ANALOG 2:4.20mA	mA	ANALOG 2:0.20mA ANALOG 2:4.20mA	4 .. 20 mA	_____
23	Assignment Analog 2 0(4) ... 20 mA	ANALOG 2 I1 int			I1int	_____
24	Start value 0(4) mA	AN2 START [A]		0 ... 9999	0000A	_____
25	End value 20 mA	AN2 END [A]		0 ... 9999	1000A	_____

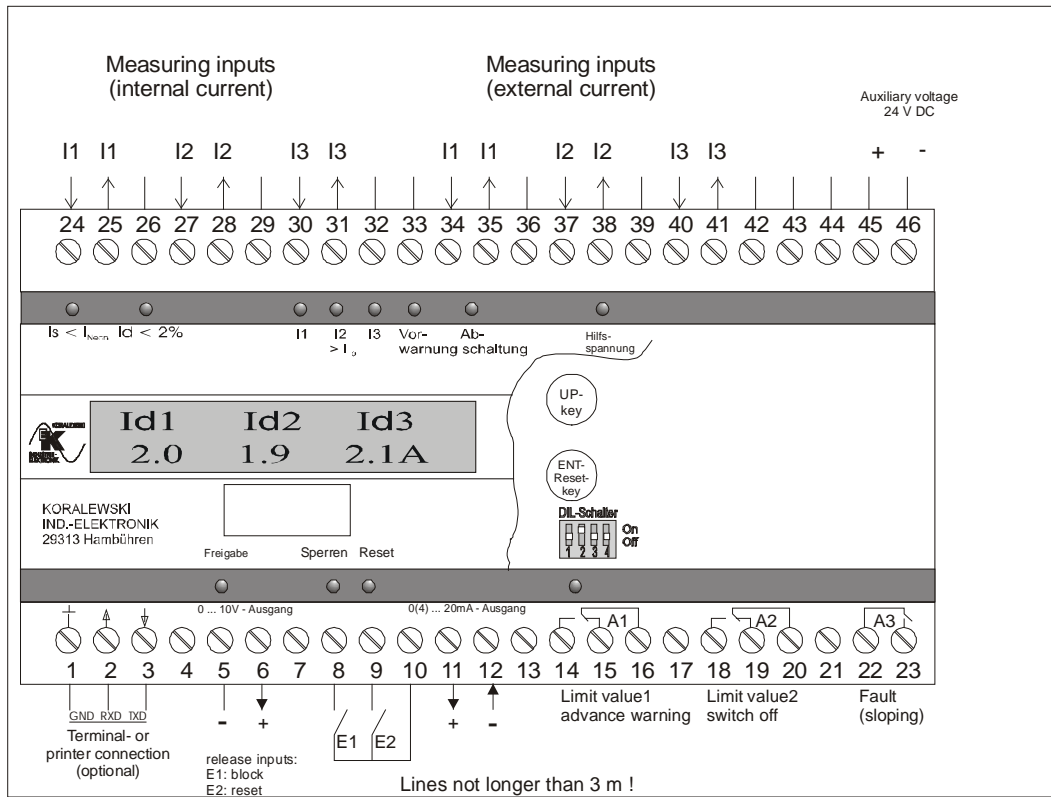
5.3 Group 3 (DIL-S2 + DIL-S4) at ON

No.	Parameter	Display	Unit	Setting Range	Ex works	Set
26	Instrument transformer path I1 Internal current	IK1 INTERN		0.500 ... 1.500	1.000	_____
27	Instrument transformer path I1 External current	IK1 EXTERN		0.500 ... 1.500	1.000	_____
28	Instrument transformer path I2 Internal current	IK2 INTERN		0.500 ... 1.500	1.000	_____
29	Instrument transformer path I2 External current	IK2 EXTERN		0.500 ... 1.500	1.000	_____
30	Instrument transformer path I2 Internal current	IK3 INTERN		0.500 ... 1.500	1.000	_____
31	Wandlerkorrektur Pfad I3 External current	IK3 EXTERN		0.500 ... 1.500	1.000	_____





6 Terminal diagram



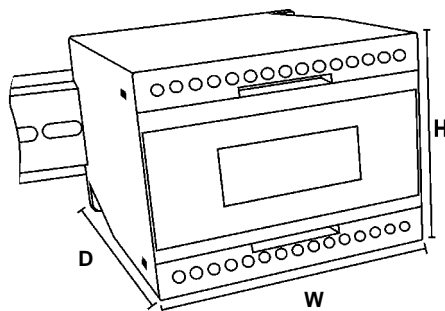


7 Technical data



**Installation and commissioning only by trained specialists
Connection according to VDE 0160**

Auxiliary voltage	24 V DC (18 ... 36 V)
Power consumption	approx. 5 W at 24 V DC
Digital inputs	12 V, 5 mA (opto-decoupled), lines not longer than 3m
Relay outputs	230V / 50Hz / 2A (potential free)
Ambient temperature	-20 ... +55 °C
Measuring range	0,4 A to 25 A (5 A variant) 0,1 A to 7,5 A (1 A variant) ($I_s > 5\%$ of I_{rated})
Load	< 0,01 Ohm
Fault (rated frequency)	< 0,5% of end value
Overload resistance	$3,5 * I_{rated}$ continuous
Measuring inputs	$50 * I_{rated}$ 1 ms
Protective system	IP20
Case dimensions	W / H / D : 150 x 75 x 110mm 35 mm standard bus bar or screw mounting



Rated current range $I_{rated} = 1 A$ (1 A - Version) $I_{rated} = 5 A$ (5 A - Version)

Technical reference:



When operated in the vicinity of magnetic fields with energy-technical frequencies the measured values can be falsified at a field strength of > 100A/m.

With intense HF irradiation (80 - 1000 MHz ≥ 10 V/m) we recommend the use of screened measuring lines to ensure that measuring accuracy is maintained.

7.1 Ordering information

Differential Current Relay DSR-6.2	Part number
1 A - Version:	E1085
5 A - Version:	E1086

