DRS-LIGHT

Digital Unit Decoupling Relay
Type DRS-LP824

Device Description

CAUTION

Installing, commissioning and operating of this product may be performed by thorough trained and

specialised personnel *

only. We explicitly will not take any responsibility for any damage on our products caused by improper installation, configuration and handling. Internal modifications must solely be carried out by specialised personnel authorised by

ANDRITZ HYDRO GmbH / Department PRT.

* **Definition:** Specialised personnel, when authorised and properly instructed, may perform following tasks:

- Installing, mounting, commissioning and operating of the apparatus and the system when familiar with.
- Maintenance and use of safety equipment according to standard rules and regulations.
- First Aid after extensive training.

CONTENTS:

1 General Information

The digital unit decoupling relay DRS-LP824 is a member of the DRS-family of the type of DRS-LIGHT.
In addition to this description of DRS-LP824 also please refer to the following documents:

DRS-LIGHT, Operating Manual
DRS-LIGHT, Local Operation via Keypad and Display

In the case of faults near the power plant with prolonged fault clearing times large turbo-sets have to be disconnected from the power system. At return of the system voltage excessive sudden torque can develop which risks of damaging the rotor, the coupling, the windings of the generator or reduction of the unit service life. The size of the strain is dependent on the size of the negative active power step change and the duration of the short circuit fault.
The unit decoupling relay monitors the load swing of the active power. Additionally the criterions of under voltage and over current will be processed. If the line protection cannot switch off a fault in short time the unit decoupling relay has to disconnect the generator sets from the power system.

Protective functions:

power plant decouple relay

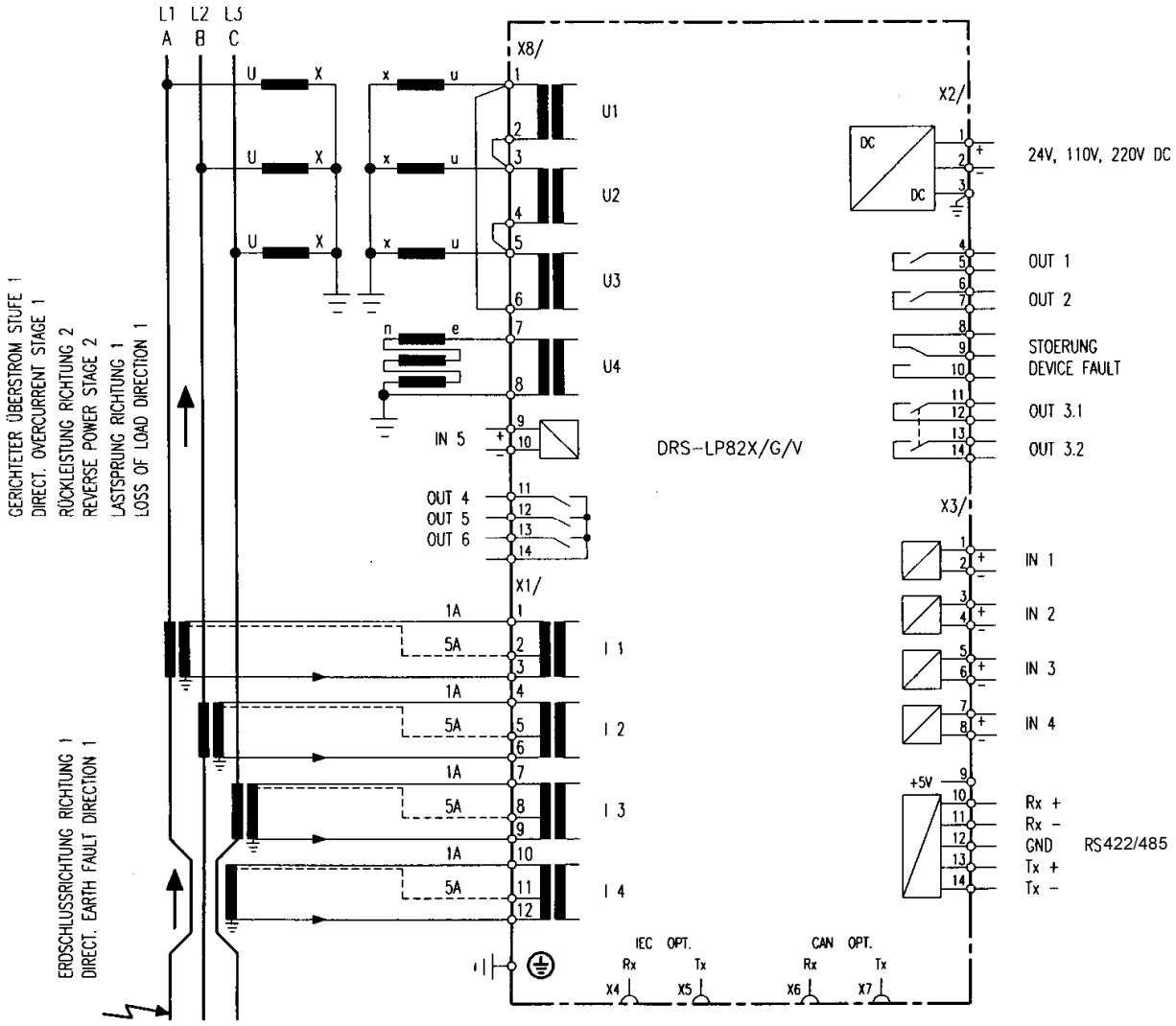
Signal function 1, SF1	(Signal functions to use as ext. blocking,
Signal function 1, SF2	trip or trip circuit supervision)
Signal function 1, SF3	
Signal function 1, SF4	
Signal function 1, SF5	
VT monitoring 3-ph. D	VT-monitoring: Balanced 3-phase system
CT monitoring 3-ph. D	CT-monitoring: Balanced 3-phase system

2 Operating Principle of Unit Decoupling Protection

The unit decoupling relay DRS-LP824 measures from the supplied secondary currents and the secondary phase to phase voltages from a three phase CT set and a three phase VT set the positive sequence current and voltage components. With this two values you can calculate the active power of the positive sequence which is decisive for the load of the machine units. At unsymmetrical faults the positive sequence is no criterion for this turbo-set strain.
At a decrease of the active power which is bigger than the selectable parameter “load swing” and will the selectable "under voltage" also decreasing and the selectable “over current” increasing the protection function unit decoupling will operate. As long as over current and under voltage remain the alarm is being operated until after the selectable "trip time" a trip impulse with selectable length "latch-in time OFF", will be set. The over current interlock prevent false tripping during loss of VT voltage since in this case a negative load swing and under voltage will occur.

3 Connections

The typical external connections of DRS-LP824 is shown in drawing no. 3-538.680:



If the unit decoupling relay is connected in this form and the increasing active power supply (Generator down, mains up) the setting parameter of the unit decoupling relay “directional power” = direction 1 is to set.

Auxiliary supply:

Uh = 24/110/220 VDC, as one chooses (to give in case of order)
power consumption standby approx. 10W, max. approx. 15W

Analog signals:

4 CT inputs: nominal current 1 or 5A selectable, 50/60Hz
4 VT connections: nominal voltage 100(110)V, 50/60Hz

Binary signals:

5 binary inputs: control voltage = auxiliary supply
BI 1: test KER, simulated initiation of the unit decoupling protection
BI 2: Blk.Res., can be also configured as direct blocking input for KER
BI 3: CB=off, blocking input via BO27
BI 4: Y-Dist.off, blocking input via BO27
BI 5: SF3, starts the signal function SF3

Binary outputs:

3 output relays

OUT1	1 N/O contact	
OUT2	1 N/O contact	
OUT3.1; OUT3.2	2 N/O contacts	
OUT4	1 N/O contact	common root
OUT5	1 N/O contact	
OUT6	1 N/O contact	

Contact specifications in techn. short description of ELIN DRS-LIGHT

Virtual binary outputs V010 to V015: are copied virtual binary inputs VI
Virtual binary outputs V017 to V024 : are copied virtual binary inputs VI

for blocking:	VI17 = VO17	VI18 = inv. VO18
	VI19 = VO19	VI20 = inv. VO20
for signal functions:	VI21 = VO21	VI22 = inv. VO22
	VI23 = VO23	VI24 = inv. VO24

Fault alarm:
Failure 1 C/O contact

4 Unit decoupling Setting Parameters

Load step change: range 10% to 200% nominal relay power, steps 1%
Is the sudden power reduction which has to occur to produce operation of the unit decoupling relay.
Nominal relay power at 1A nominal current in secondary values:

1 A x 100V x √3 x cos 0°	= 173,2 W	= 100 % Pn
1 A x 100V x √3	= 173,2 VA	= 100 % Sn

e.g. conforms in primary values at CT/VT ratios of 25kA/1A and 21kV/100V

25kA x 27kV x √3	= 909,3 MVA	= 100 % Sn

Power loss time: range 3 to 10 periods, 1 periods steps
Is the time within which the set load change has to occur

Overcurrent: range 0.05 to 5.00 x I_N, 0,05 x I_N steps
Is a necessary interlock for the unit decoupling relay. Faults near the power plant will cause overcurrent conditions.

Undervoltage: range 2.0 to 200.0 V, 1.0 V steps
Is a necessary interlock for the unit decoupling relay. Faults near the power plant will produce undervoltage conditions.

Tripping time: range 0 to 990 ms, 10 ms steps
As long as the criterions overcurrent and undervoltage are present the relay will stay initiated and will trip after the set time delay.

Latch-in time TRIP: range100 to 990 ms, 10 ms steps
Duration of the of trip command.

Blocking: normal or inverse
You can select whether for function blocking the blocking signal (blocking voltage) to the binary input has to be HI (normal) or LO (inverse).

Max. blocking time: range 1min to 20min, 1min steps
Monitors the duration of a blocking signal and will produce an alarm when the time expires.

Phase rotation: right or left
Adaptation to the actual phase rotation of the generator for measuring the correct negative phase sequence. With incorrect phase rotation active power indication will remain zero although the generator will supply power to the system. The same applies when voltages and currents are connected or configured counter clockwise.

Directional power: direction 1 or direction 2
Adaptation to the actual power direction of the machine. With correct settings and power export of the generator the active power indication has a positive value. (display or PC).
Under reverse power conditions the real power display will be negative.
Is the voltage or current phase rotation reversed an active power display of –50% will be shown for +100% power export (display or PC).

5 Influencing Quantities and Tolerances of Measured Values

Voltage supply: range	80 – 120 % U_N:	≤0,5%
Temperature: range	-5 - +45°C:	≤0,5%/10K
Frequency: range	6 Hz – f_{max}:	≤1%

Reset ratio unit decoupling:	1,03
Accuracy unit decoupling:	≤3% of setting range or 0,5% P_n
Response time control impulse:	≥2 periods, typ. 55ms (at 50Hz)
Duration control impulse:	≤3% of setting range ± 10ms

6 Measured Values Display of unit decoupling Relay

Actual active power in % of the relay rated power
Last effective load step change in % of the relay rated power

The internal measured value of the unit decoupling function always refer to the % of the relay rated power. The actual measured values for currents and voltages may be displayed optionally as secondary values, %-values or primary values.

7 Notes

The time supervision of the blocking signal was introduced in order to recognise a wire break in the blocking circuit (external blocking signal = 1 at no blocking) for inverse blocking. With normal blocking (external blocking signale = 0 at no blocking) the supervision of the maximum blocking time can be omitted and configured in a way that the blocking supervision will not act onto the trip matrix to initiate an alarm nor onto the LED matrix. In this case the functioning of external blocking has to be verified periodically.

When the individual alarms are analysed in the event record the signals of the unit decoupling relay are stored as follows:

Unit decoupling relay [] St.1	=	KER alarm
Unit decoupling relay [] St.1	=	KER trip
Unit decoupling relay [] St.2	=	blocking time (exceeded)
Unit decoupling relay [] St.3	=	I> - interlock
Unit decoupling relay [] St.4	=	U< - interlock

The signal functions SF1 – SF6 can be used as control inputs for external blocking, trips or as trip circuit supervision (tripping voltage = power supply voltage). For double pole trip circuits with 220VDC one of the two contacts (+ or – trip contact) has to be paralleled with a 56kOhm, 4W resistor. Two signal functions ins series as a trip circuit supervision is not possible.

Generally the technical data of the DRS-LIGHT Series are applicable.

COPYRIGHT, REMARKS

The data contained in this literature should be considered as product information only. We would like to advise that short term modifications of our production range are possible due to our aim to continuously improve the performance of our products for the benefit of our customers so there may be differences between the products supplied and the corresponding descriptive literature.

According to our experience following the instructions outlined in this document will provide the most satisfactory service performance.

In case of unusual troubles, which cannot be resolved by referring to this literature, please contact our nearest agent or our Head Office.

When commissioning, the operating instructions and also the applicable Local Safety Standards have strictly to be observed.

This edition of the document has been carefully checked regarding up-to-date contents and correctness. Should there be any discrepancies or contradictory information in this descriptive literature, could you please inform us. In case of problems please do not try to solve them on your own but contact our nearest agency or our Head Office, which will be glad to be of any assistance to you.

All agreements, legal rights, obligations, performance and scope of supply for ANDRITZ HYDRO GmbH and also conditions, governing the warranty, are without expectation, regulated according to the Contract Agreement and are not, in any way, influenced by the contents of the descriptive literature or operating instructions.

Urgent information will be conveyed by telephone or fax.

Our address:

ANDRITZ HYDRO GmbH
Dept. PRT
Wienerbergstraße 41D
A-1120 VIENNA
AUSTRIA

Phone: ++43 1 81195 Ext. 6936
Fax: ++43 1 81195 Ext. 6950

E-mail: martin.hantsch@andritz.com
http://www.andritz-hydro.com/

To

ANDRITZ HYDRO GmbH
Dept. PRT / attn. Mr. Hantsch
Wienerbergstraße 41D
A-1120 VIENNA

Please inform us at your earliest convenience if you have any additional requests and suggestions or in case of errors.

We thank you for your co-operation.

Drawing No. of the documentation: _____ revision (+date):_____

Remarks:

From:
Address:

Phone:
Fax:
E-mail: