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TECHNICAL DESCRIPTION,
INSTRUCTIONS FOR DESIGN, IN-
STALATION AND MAINTENANCE
**ELECTRONIC PHASE-SENSITIVE
RECEIVER**

EFCP1,2 / 75(275) Hz

T 75069 – replacement of DSŠ type relay

No.: 75069

TP SM HK 3/04

SKP 316 211 750 699 00.

Release: 2.
In Hradec Králové, April 2008

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1 Contents:

1	Contents:	2
2	Introduction.....	2
3	Description of function	3
4	Description of construction.....	3
5	Design	3
6	Installation.....	4
7	Maintenance.....	4
8	Annex 1: Interconnection of connectors of EFCP1 + EFCP2 - rear view (from side of wiring)	6
9	Annex 2: Block scheme of electronic phase-sensitive receiver EFCP1 and 2	7
10	Annex 3: Interconnection of alternative variant 75069o and 75069p.....	8

2 Introduction

An electronic phase-sensitive receiver EFCP1 and EFCP2 is designed as replacement of electromechanical phase-sensitive relays of DSŠ type respective DSR type, which are used as phase-sensitive receivers in track circuits (TC), used on Czech Railways infrastructure.

An aim of electromechanical phase-sensitive relay replacement by electronic receiver, with better technical features, is reduction of maintenance costs, dependence on import and improvement of technical characteristics of track circuit.

Electronic phase-sensitive receiver (further just EFCP) is mainly based on elements and circuits principles, leading to the inherent safety of its particular functional blocks. A neutral electromechanical relay makes the output of EFCP. EFCP is powered up by the voltage of local phase 230V AC.

EFCP1 contains an electronic module and output relay NM1 – 2000 inside of joint cover. The relay contacts are brought out on the connector.

EFCP2 contains separated cassette with electronics as a replacement part. As output relay can be used either internal, put into socket (75069 5 250, 75069 5 251) or external, e.g. repeater of original relay DSŠ 12P,S.

The following versions are made:

EFCP1-75Hz, var. j - (for product numbers: 1 to 5/04; 11 to 15/04 and 1 to 25/05 labeled as variant **i**), in cover of relay DSŠ is replacement of DSŠ 12P type relay for TC with signal frequency of 75 Hz

EFCP1-275Hz, var. l - (for product numbers 6 to 10/04; 16 to 20/04 and 26 to 50/05 labeled as variant **k**), in cover of relay DSŠ is replacement of DSŠ 12S type relay for TC with signal frequency of 275 Hz

EFCP2-75Hz, var. i - replacement of DSŠ 12P type relay for TC with signal frequency of 75 Hz

EFCP2-275Hz, var. k - replacement of DSŠ 12S type relay for TC with signal frequency of 275 Hz

EFCP2-75Hz, var. o - alternative design of variant **i** with added connecting board 75069 5 270

EFCP2-275Hz, var. p - alternative design of variant **k** with added connecting board 75069 5 270

3 Description of function

Realization of EFCP1 and 2 is based on substitute electric model of function of electromechanical phase-sensitive relay and its function can be seen on block diagram in annex no.2. Track phase voltage is brought through input isolation transformer Tr1 on signal input of the phase detector FD, which works as one-way synchronous detector. The reference signal is brought on control input of the synchronous detector. This signal is obtained from the local phase voltage by its transformation in Tr2 and shaped on rectangular shape voltage in shaping unit block. The part of reference voltage is also rectified to gain auxiliary dc voltage for power supply of all EFCP circuits. Output voltage from the phase detector is brought through RC low-pass filter on input of level circuit with dynamic functional monitoring (comparator). It serves as converter of analog signal on two-state output signal that is used, after its rectification, to power up the reel of output electromechanical relay.

4 Description of construction

Design EFCP1 is dimensioned the same as classic DSS type relay. Everything, i.e. cassette with electronics and output relay NM1 – 2000 is placed on common base (socket) with connectors and built-in to the same plastic cover with handle for easy handling as original phase-sensitive electromechanical DSS type relay.

Connector is however different from original relay. The socket, which also serves for mechanical fixation, as well as in the past, is exchanged during installation for new, supplied with EFCP1 as no. 75069 5 130. Clamp No.1 is labeled with colored mark. The rule of mutually opposite positions of lead-wires to local and track phase for different frequencies (75 and 275 Hz) was kept. In addition, clamps for power supply of the local phase are, for both frequencies, offset and serve as key of non-interchangeability.

In contradistinction to original DSS relay, which has 2 closing and 2 circuit-opening contacts, the 4 double throw contacts of output relay are here brought-out on output connector.

Design EFCP2 – differ from EFCP1 in used output relay, which is here NMS1- 2000. Output relay is either placed right on the socket 75069 5 250, 75069 5 251 (internal relay) or is placed in stand (external relay) and interconnected with socket 75069 5 250, 75069 5 251 by twisted couple of wires. The electronics forms separate block, which is fixed in its own socket and it is possible to exchange it without the help of tools. Both these parts (resp. their sockets) are placed on common base, which has same dimensions as socket of original DSS relay. Again, the rule of mutually opposite positions of lead-wires to local and track phase (clamps 1, 2, 3 and 4) for different frequency (75 and 275 Hz) is kept the same as with original DSS relay. In contrast with it, all 8 double throw contacts can be used here. All connecting points are on the rear side of the socket and are intended for soldering.

If relay EFCP 2 is used as a direct replacement of DSS 12 (reconstruction of existing track circuits e.g. at the time of short lockout), it is advisable to order and use alternative variant with connecting board no. 75069 5 270. The variant **o** should be used instead of **i** for 75 Hz and the variant **p** instead of **k** should be used for 275 Hz. This accessory makes it possible to use existing lead-wires from local distribution cable. It is placed at the bottoms of the socket and includes distribution frame VAGO as output extension - see annex No.3.

EFCP1 is equipped with seals against unauthorized intervention. The block electronics is only treated this way in EFCP2, the NMS1- 2000 relay is sealed by its producer.

5 Design

The EFCP1 and 2 is safe and highly reliable replacement of electromechanical phase-sensitive relay of DSS-12P and DSS-12S type. Electric characteristics are however different, because they were optimized to suit for the design of track circuits with better properties, without

the need of additional transformers. For regulation of track circuits with these receivers, the adjustment tables of authorized track circuits, intended for this equipment, are used.

6 Installation

EFCP1 – is fixed to the panel DSŠ by means of socket, which is part of the product delivery. Leading wires are attached to appropriate positions – see fig. in annex. The wiring of the local and track part of EFCP1 has to be carried out in accordance with adjustment tables of the track circuit.

If in original build-up were wires distributed over stands and single relays in a way from one's to second ("multiplex" – mostly the power supply of local phase) it's now necessary respect the fact, that the clamps WAGO (distribution frame of the new socket) are intended only for one wire. Therefore it's necessary the two wires intended for one clamp first put together in the appropriate manner and afterwards bring it on clamp.

Earth conductor (frame) EFCP1 is as well brought out on connector and it's necessary to connect it through the earth of the stand.

EFCP2 – socket has to be fixed to the panel DSŠ, the wires are connected to appropriate positions – see fig. in annex 1 (var. i, k) and 3 (var. o, p). If the external output relay is used, it is **connected with output of the receiver by twisted pair of wires**. Maximum length of the wires is 10 m. The wiring of the local and track part of EFCP2 has to be carried out in accordance with adjustment tables of the track circuits.

The earthing point (frame) forms pin M6 and it's necessary to connect it through the earth of the stand.

7 Maintenance

EFCP1 is subject to same regime of maintenance (including periodic checkups) as relay packages according to rules of operator.

– at failure, the basic block of EFCP1 has to be sent to be repaired to the service of manufacturer or to the accredited service.

EFCP2 - the preventive maintenance is not carried out (except output relay). Output relay NMŠ1-2000 is subject to standard regime of maintenance (including periodic checkups) according to the rules of operator.

– at failure of EFCP2, only the block of electronics is exchanged and the defective one is sent to repair to the service of manufacturer or to the accredited service. The warning is necessary that the blocks of electronics for 75 Hz and 275 Hz versions **are not interchangeable**.

The repairs during guarantee period and afterwards are carried out by service workplace of Signal Mont, Ltd in Hradec Králové. The necessary condition for claiming the right for guarantee repair is the certification of quality (supplied with every product) and completeness of the product.

When sending EFCP to the repairs (handover of request on repair), it's necessary to mention:

- place of deployment
- when claiming the right for guarantee repair the certification of quality and completeness of the product has to be included
- real time of operation
- brief description of failure
- correct address, incl. phone number of sender

List of supplied components of EFCP1 and EFCP2:

Product name - design	Product number	Note
Socket EFCP1 - 75 Hz	<i>75069 5 130</i>	
Socket EFCP1 - 275 Hz	<i>75069 5 130</i>	
Basic block EFCP1 - 75 Hz	<i>75069 5 100</i>	
Basic block EFCP1 - 275 Hz	<i>75069 5 101</i>	
Socket EFCP2 - 75	<i>75069 5 250</i>	
Socket EFCP2 - 275	<i>75069 5 251</i>	
Electronic module of EFCP2 - 75 Hz	<i>75069 5 260</i>	
Electronic module of EFCP2 - 275 Hz	<i>75 069 5 261</i>	
Connecting board	<i>75069 5 270</i>	<i>In configuration with EFCP2 it creates variant 75069o, p</i>

Annexes

Annex 1: Interconnection of connectors of EFCP1 + EFCP2

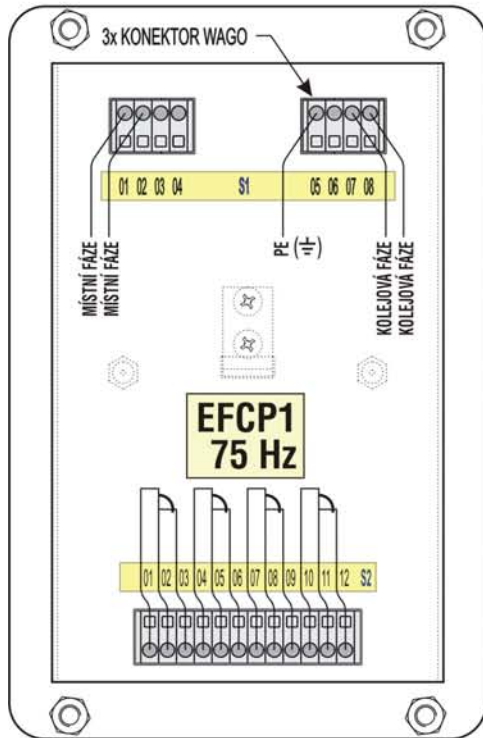
Annex 2: Block scheme

Annex 3: Interconnection of alternative variant o, p

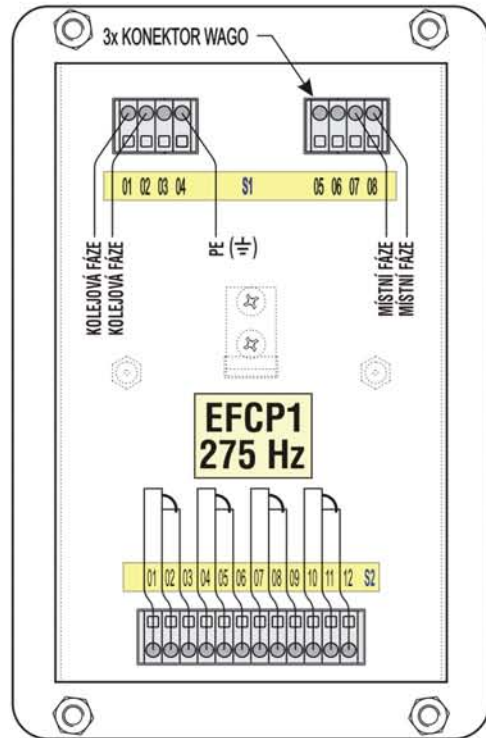
8 Annex 1: Interconnection of connectors of EFCP1 + EFCP2 - rear view (from side of wiring)

ZAPOJENÍ PATICE 75069 5 130 (POHLED ZE ZADU)

EFCP1 75Hz - 75069j

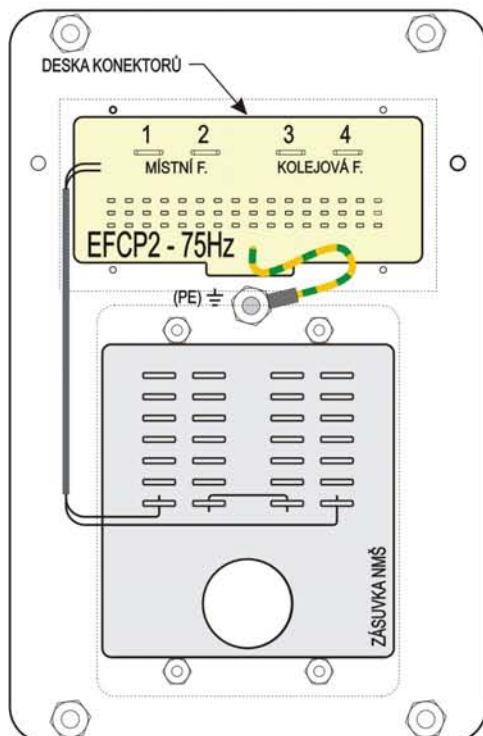


EFCP1 275Hz - 75069I



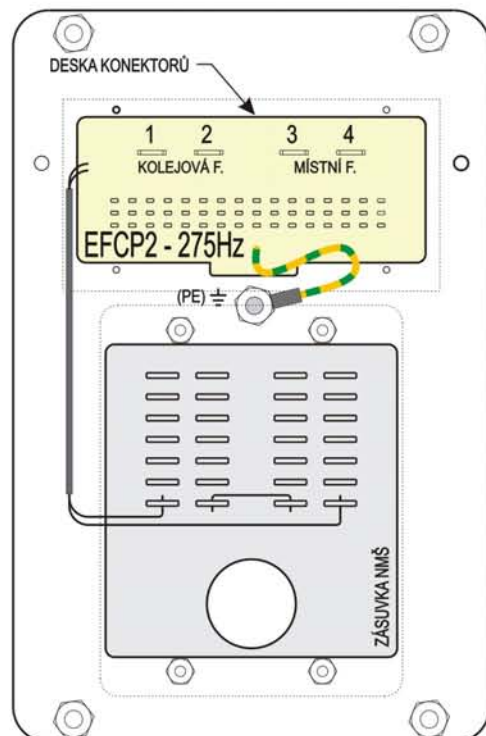
ZAPOJENÍ PATICE 75069 5 250 (POHLED ZE ZADU)

EFCP2 75Hz - 75069i

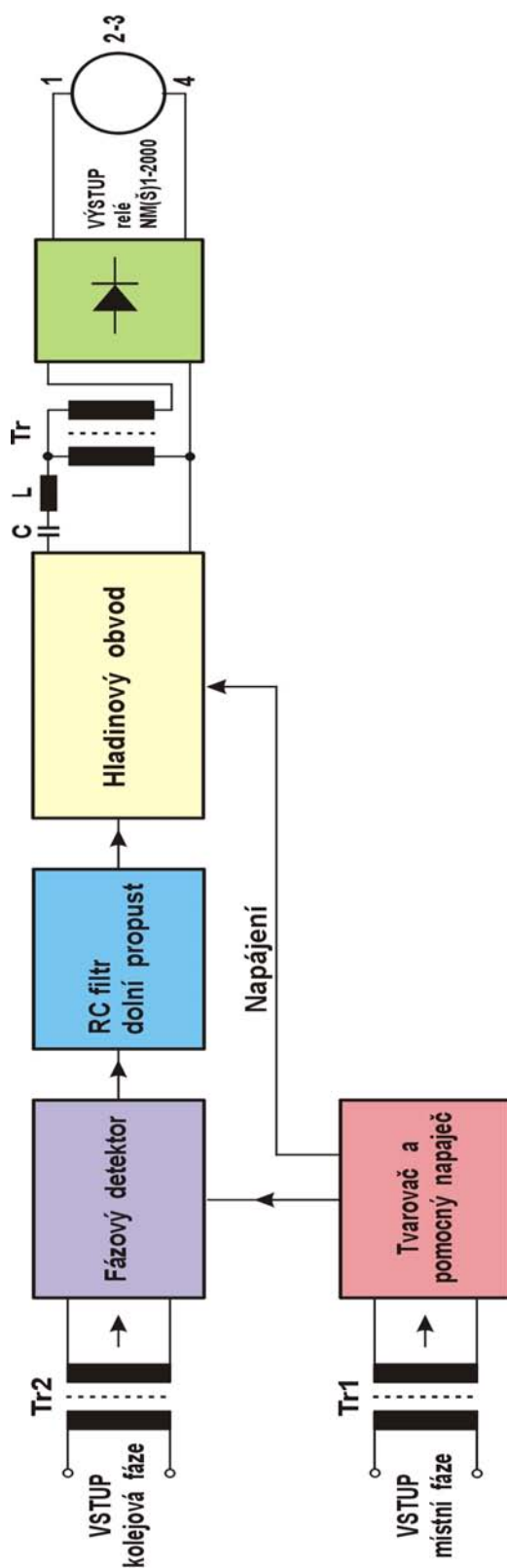


ZAPOJENÍ PATICE 75069 5 251 (POHLED ZE ZADU)

EFCP2 275Hz - 75069k

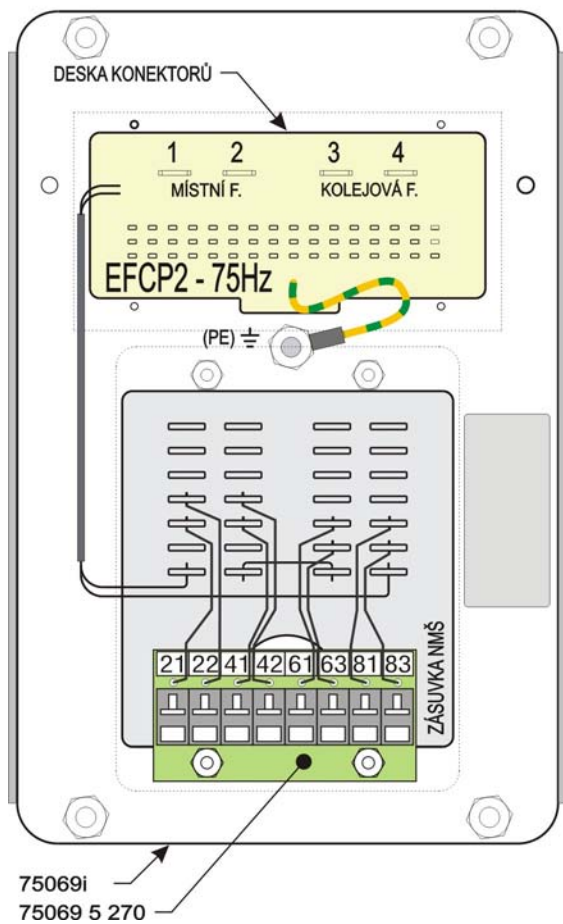


9 Annex 2: Block scheme of electronic phase-sensitive receiver EFCP1 and 2 (EFCP2 – all 8 double-throw contacts are used)



10 Annex 3: Interconnection of alternative variant 75069o and 75069p

**ZAPOJENÍ EFCP2 75Hz - 75069o
(POHLED ZE ZADU)**



**ZAPOJENÍ EFCP2 275Hz - 75069p
(POHLED ZE ZADU)**

