DIGITIAL PROTECTION COUPLER

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Engineering Department

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Update of Revision – 4

1. The commands are now **8 nos.** Instead of **4 nos.** at Clause no. 1, 3 and 4(ii).

2. The no. of contacts is now **4 nos.** Instead of **2 nos.** at Clause no. 4(vi)

Update of Revision – 4.1

1. DPC panel detail modified in clause no. 3

TECHNICAL SPECIFICATION
FOR
DIGITIAL PROTECTION COUPLER

1. Digital protection coupler for protection signalling through optical fibre cable system.

The Digital protection signalling equipment is required to transfer the trip commands from one end of the line to the other end in the shortest possible time with adequate security and dependability. It shall also monitor the healthiness of the link from one end to the other and give alarms in case of any abnormality. The protection signalling equipment shall have a proven operating record in similar application over EHV systems and shall operate on 48V DC (+10%, -10%). It shall provide minimum **Eight** commands. These commands shall be suitable for Direct tripping, Intertripping and Blocking protection schemes of EHV lines.

The protection signalling equipment shall communicate to the remote end interfacing with SDH terminal equipment at its 2Mbps port. It shall provide suitable interfaces for protective relays, which operate at 220/110V DC. Power supply points shall be immune to electromagnetic interface.

2. Principle of operation

During normal operation, protection signalling equipment shall transmit a guard signal/code. In case Protection signalling equipment is actuated by protective relays for transmission of commands, it shall interrupt the guard signal/code and shall transmit the command code to the remote end. The receiver shall recognize the command code and absence of the guard code and will generate the command to the protective relays.

All signal processing i.e. generation of tripping signal and the evaluation of the signals being received shall be performed completely digital using Digital Signal Processing techniques.

3. Loop testing

An automatic loop testing routine shall check the teleprotection channel.

It shall also be possible to initiate a loop test manually at any station by pressing a button on the front of the equipment.

Internal test routine shall continuously monitor the availability of the protection signalling equipment.

Proper tripping signal shall always take the priority over the test procedure.

The high speed digital protection signalling equipment shall be designed and provided with following features.

- Shall work in conjunction with SDH terminal equipment.
- It shall communicate on G 703 (E1, 2 Mbps)
- Full Duplex operation
- Auto loop facility shall be provided
- Shall meet IEC 60834-1 standard
- Shall be able to transmit upto **8** commands with trip counter simultaneously or sequentially in one 2Mbps channel.
- DPC unit must have visible Trip counters for all the **8** commands**.**

Bidder shall quote for protection signalling equipment suitable for **8** commands with separate trip counters for transmit and receive. Licensed software in CD or Pendrive & all accessories to configure, download events including carrier receipt and transmit shall have to be provided with each DPC**.**

High security and dependability shall be ensured by the manufacturer. Probability of false tripping and failure to trip shall be minimum. Statistical curves/figures indicating above mentioned measures shall be submitted along with the bid.
The DPC shall be housed on swing front door of separate/ new/ own panel. Opening of the swing front door, the backside of DPC module and terminal blocks will be accessed for future installation and maintenance purpose. Panel dimension should be minimum 1800 mm height, 700 mm width, 600 mm depth. All panels should have 3 pin 220 V AC plug point and provision of illumination light with front door on/off operation switch. Carrier healthy indication & unhealthy alarm and DC fail alarm should be on the outside on the cabinet along with existing alarms of DPC module.
There must be 2(two) nos. DPC per circuit per direction, for 220KV and above system. There must be 1(one) no. DPC per circuit per direction, for 132KV system. Maximum 2(two) nos. DPC of same circuit shall be housed in a single panel for 220KV and above system. Maximum 2(two) nos. DPC of same direction shall be housed in a single panel for 132KV system. Each DPC rack shall have redundant Power supply unit & both Power supply unit must feed from separate DC source.

Reports of the following tests as per clause 9.2 of Chapter 2-GTR shall be submitted for approval for protection signalling equipment and relays associated with the protection signalling equipment and interface unit with protective relay units, if any.

i) <u>General equipment interface tests</u> :

a) Insulated voltage withstand tests
b) Damped oscillatory waves disturbance test
c) Fast transient bursts disturbance test
d) Electrostatic discharge disturbance test
e) Radiated electromagnetic field test
f) RF disturbance emission test

ii) Specific power supply tests

a) Power supply variations
b) Interruptions
c) LF disturbance emission
d) Reverse polarity

iii) Tele-protection system performance tests

a) Security
b) Dependability
c) Jitter
d) Recovery time
e) Transmission time
f) Alarm functions
g) Temperature and Humidity tests (As per IEC 68-2)
- Dry heat test (50°C for 8 hours)
- Low temperature test (-5°C for 8 hours)
- Damp heat test (40°C/95%RH for 8 hours)

All the above tests at i, ii & iii (except temperature & humidity tests) shall be as per IEC 60834-1 and the standards mentioned therein.

iv) Relays

a) Impulse voltage withstand test as per IEC 60255.

b) High frequency disturbance test as per IEC 60255.

The protection signalling equipment shall be of modular construction and preferably mounted in the Relay panels.

The input/output interface to the protection equipment shall be achieved by means of relays and the input/output rack wiring shall be carefully segregated from other shelf/cubicle wiring.

The isolation requirements of the protection interface shall be for 2kV rms.

4. Major technical Particulars

The major technical particulars of protection signalling equipment shall be as follows.

i) Power supply 48V DC +10%, -10% (Dual Power Supply Card for each DPC)

ii) Number of commands **8** (**Eight**)

iii) Operating time <7 ms

iv) Back to back operate time without propagation delay ≤ 8 ms

v) Interface to Protection relays

Input:		Contact Rating:
Rated voltage	:	48 volts DC to 250 volts DC
Maximum current rating:		5 amps
Output:		Contact Rating:
Rated voltage	:	48 volts DC to 250 volts DC
Rated current	:	0.1A DC
Other parameters	:	As per IEC-255-0-20

vi) Alarm contact

Rated voltage	:	48 volts DC to 250 volts DC
Rated current	:	0.6 A DC
Other parameters	:	As per IEC-255-0-20
No. of contacts :		i. Alarm output contacts – **4** Nos. ii. Unblocking output contacts- **4** Nos iii. Spare auxiliary contact-02 nos.

vii) Digital communication interface: G 703(E1) Interface-suitable for 75 & 120 ohms

5. Additional requirement

i) If the distance between DPC & existing MUX is beyond permissible limit, the supplier has to introduce media converter or any other means to overcome the loss of signal for E1 port for successful commissioning of DPC.

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