

## Interoperability List for REX 521 IEC 60870-5-103 Slave

1MRS 752157-RTI, Issued: 05.10.2000, Version: A

Not supported by REX 521

Supported by REX 521

### 1= Physical layer

#### 1.1= Electrical interface

EIA RS-485

Number of loads ..... for one protection equipment

NOTE - EIA RS-485 standard defines unit loads so that 32 of them can be operated on one line. For detailed information refer to clause 3 of EIA RS-485 standard.

#### 1.2= Optical interface

Glass fibre

Plastic fibre

F-SMA type connector

BFOC/2,5 type connector

#### 1.3= Transmission speed

9 600 bit/s

19 200 bit/s

### 2= Link layer

There are no choices for the link layer.

### 3= Application layer

#### 3.1= Transmission mode for application data

Mode 1 (least significant octet first), as defined in 4.10 of IEC 60870-5-4, is used exclusively in this companion standard.

#### 3.2= COMMON ADDRESS of ASDU

One COMMON ADDRESS OF ASDU (identical with station address)

More than one COMMON ADDRESS OF ASDU

### 3.3 Selection of standard information numbers in monitor direction

#### 3.3.1 System functions in monitor direction

##### INF Semantics

|   |     |                              |
|---|-----|------------------------------|
| ■ | <0> | End of general interrogation |
| ■ | <0> | Time synchronization         |
| ■ | <2> | Reset FCB                    |
| ■ | <3> | Reset CU                     |
| ■ | <4> | Start/restart                |
| □ | <5> | Power on                     |

#### 3.3.2 Status indications in monitor direction

##### INF Semantics

|   |      |                           |
|---|------|---------------------------|
| ■ | <16> | Auto-recloser active      |
| □ | <17> | Teleprotection active     |
| □ | <18> | Protection active         |
| □ | <19> | LED reset                 |
| □ | <20> | Monitor direction blocked |
| ■ | <21> | Test mode                 |
| ■ | <22> | Local parameter setting   |
| □ | <23> | Characteristic 1          |
| □ | <24> | Characteristic 2          |
| □ | <25> | Characteristic 3          |
| □ | <26> | Characteristic 4          |
| ■ | <27> | Auxiliary input 1         |
| ■ | <28> | Auxiliary input 2         |
| ■ | <29> | Auxiliary input 3         |
| ■ | <30> | Auxiliary input 4         |

### 3.3.3 Supervision indications in monitor direction

#### INF Semantics

- <32> Measurand supervision I
- <33> Measurand supervision V
- <35> Phase sequence supervision
- <36> Trip circuit supervision
- <37> I>> back-up operation
- <38> VT fuse failure
- <39> Teleprotection disturbed
- <46> Group warning
- <47> Group alarm

### 3.3.4 Earth fault indications in monitor direction

#### INF Semantics

- <48> Earth fault L<sub>1</sub>
- <49> Earth fault L<sub>2</sub>
- <50> Earth fault L<sub>3</sub>
- <51> Earth fault forward, i.e. line
- <52> Earth fault reverse, i.e. busbar

### 3.3.5 Fault indications in monitor direction

|                                     | <b>INF</b> | <b>Semantics</b>                     |
|-------------------------------------|------------|--------------------------------------|
| <input type="checkbox"/>            | <64>       | Start /pick-up L <sub>1</sub>        |
| <input type="checkbox"/>            | <65>       | Start /pick-up L <sub>2</sub>        |
| <input type="checkbox"/>            | <66>       | Start /pick-up L <sub>3</sub>        |
| <input checked="" type="checkbox"/> | <67>       | Start /pick-up N                     |
| <input type="checkbox"/>            | <68>       | General trip                         |
| <input type="checkbox"/>            | <69>       | Trip L <sub>1</sub>                  |
| <input type="checkbox"/>            | <70>       | Trip L <sub>2</sub>                  |
| <input type="checkbox"/>            | <71>       | Trip L <sub>3</sub>                  |
| <input type="checkbox"/>            | <72>       | Trip I>> (back-up operation)         |
| <input type="checkbox"/>            | <73>       | Fault location X in ohms             |
| <input type="checkbox"/>            | <74>       | Fault forward/line                   |
| <input type="checkbox"/>            | <75>       | Fault reverse/busbar                 |
| <input type="checkbox"/>            | <76>       | Teleprotection signal transmitted    |
| <input type="checkbox"/>            | <77>       | Teleprotection signal received       |
| <input type="checkbox"/>            | <78>       | Zone 1                               |
| <input type="checkbox"/>            | <79>       | Zone 2                               |
| <input type="checkbox"/>            | <80>       | Zone 3                               |
| <input type="checkbox"/>            | <81>       | Zone 4                               |
| <input type="checkbox"/>            | <82>       | Zone 5                               |
| <input type="checkbox"/>            | <83>       | Zone 6                               |
| <input checked="" type="checkbox"/> | <84>       | General start/pick-up                |
| <input checked="" type="checkbox"/> | <85>       | Breaker failure                      |
| <input type="checkbox"/>            | <86>       | Trip measuring system L <sub>1</sub> |
| <input type="checkbox"/>            | <87>       | Trip measuring system L <sub>2</sub> |
| <input type="checkbox"/>            | <88>       | Trip measuring system L <sub>3</sub> |
| <input type="checkbox"/>            | <89>       | Trip measuring system E              |
| <input checked="" type="checkbox"/> | <90>       | Trip I>                              |
| <input checked="" type="checkbox"/> | <91>       | Trip I>>                             |
| <input checked="" type="checkbox"/> | <92>       | Trip IN>                             |
| <input checked="" type="checkbox"/> | <93>       | Trip IN>>                            |

### 3.3.6 Auto-reclosure indications in monitor direction

#### INF Semantics

- <128> CB 'on' by AR
- <129> CB 'on' by long-time AR
- <130> AR blocked

### 3.3.7 Measurands in monitor direction

#### INF Semantics

- <144> Measurand I
- <145> Measurands I, V
- <146> Measurands I, V, P, Q
- <147> Measurands  $I_N$ ,  $V_{EN}$
- <148> Measurands  $I_{L1,2,3}$ ,  $V_{L1,2,3}$ , P, Q, f

### 3.3.8 Generic functions in monitor direction

#### INF Semantics

- <240> Read headings of all defined groups
- <241> Read values or attributes of all entries of one group
- <243> Read directory of a single entry
- <244> Read value or attribute of a single entry
- <245> End of general interrogation of generic data
- <249> Write entry with confirmation
- <250> Write entry with execution
- <251> Write entry aborted
- 

## 3.4 Selection of standard information numbers in control direction

### 3.4.1 System functions in control direction

#### INF Semantics

- <0> Initiation of general interrogation
- <0> Time synchronization

### 3.4.2 General commands in control direction

#### INF Semantics

- <16> Auto-recloser on/off
- <17> Teleprotection on/off
- <18> Protection on/off
- <19> LED reset
- <23> Activate characteristic 1
- <24> Activate characteristic 2
- <25> Activate characteristic 3
- <26> Activate characteristic 4

### 3.4.3 Generic functions in control direction

#### INF Semantics

- <240> Read headings of all defined groups
- <241> Read values or attributes of all entries of one group
- <243> Read directory of a single entry
- <244> Read value or attribute of a single entry
- <245> General interrogation of generic data
- <248> Write entry
- <249> Write entry with confirmation
- <250> Write entry with execution
- <251> Write entry abort

### 3.5 Basic application functions

- Test mode
- Blocking of monitor direction
- Disturbance data
- Generic services
- Private data

### 3.6 Miscellaneous

Measurands are transmitted with ASDU 3 as well as with ASDU 9. As defined in 7.2.6.8 of the protocol specification, the maximum MVAL can either be 1,2 or 2,4 times the rated value. All measurands available in each standard configuration of REX 521 use 1,2 or 2,4 as a scaling factor, which is selectable with a parameter.

| Measurand                               | Max. MVAL = rated value times |    |     |
|---|-------------------------------|----|-----|
|   | 1,2                           | or | 2,4 |
| Current L <sub>1</sub>                  | ■                             |    | ■   |
| Current L <sub>2</sub>                  | ■                             |    | ■   |
| Current L <sub>3</sub>                  | ■                             |    | ■   |
| Voltage L <sub>1-E</sub>                | ■                             |    | ■   |
| Voltage L <sub>2-E</sub>                | ■                             |    | ■   |
| Voltage L <sub>3-E</sub>                | ■                             |    | ■   |
| Active power P                          | ■                             |    | ■   |
| Reactive power Q                        | ■                             |    | ■   |
| Frequency f                             | ■                             |    | ■   |
| Voltage L <sub>1</sub> - L <sub>2</sub> | ■                             |    | ■   |