Module Description

Application

The monitoring module for master station 88 VU02 is used within a single-channel PROCONTROL master station. It serves to monitor the master station processor and does not intervene in the control of the transmission sequences. The processor of the master station signals to the monitoring module the start and the end of the transfer cycle and possible internal disturbances.

Features

The monitoring module is plugged into the single-channel master station of the PROCONTROL system. It has a standard interface to the bus of the master station and interfaces to the alarm announcement equipment (89 NUO1, control system operator station) and to the coupling module (88 TK02) of the multi-purpose processing station.

There are nine light-emitting diodes on the front side of the module. These diodes are used to indicate detected disturbances (both module-internal and system disturbances). They also indicate whether data transmission is occurring or not on the connected bus system (see "Annunciation function").

Description

All important functions of the monitoring module are described below (see "Functional diagram").

The bus system has a single-channel (non-redundant) structure. There is only one master station. 8 (max.) remote bus lines can be connected to the master station (with maximum 250 possible multi-purpose processing stations). Each processing station is connected with only one channel via the corresponding coupling equipment (88 FT01, 88 FN01/FN02, 88 TK02) to the remote bus system.

PROCONTROL 44
Transfer
Monitoring Module
for Non-redundant Master Station

88 VU02-E/R0100

SYSTEM PRIORITIES

Possible disturbances which may occur in the overall system are subdivided into three priority levels.

Priority 1 = disturbances at the master station level (e.g., processor defective or module not plugged in) and the local bus/remote bus transmission link.

Priority 2 = disturbances at the level of the processing station (e.g., control module defective or not plugged in).

Priority 3 = disturbances at the level of the input/output and processing modules.

All disturbances mentioned above are detected and evaluated by the diagnosis equipment of the master station. The result is communicated to the monitoring module 88 VU02 via the master station bus (PRT0 inputs) (see "Functional diagram").

GENERAL MONITORING TASKS OF THE MODULE

The processor of the master station (consisting of modules 88 VA01/VA02, 88 VP01/VP02, 88 VT01/VT02) handles data communication on the connected bus system automatically.

The main task of the master station monitoring module is to monitor correct, disturbance-free operation of the master station processor. The monitoring system has a single-channel structure. Information exchange between the monitoring module 88 VU02 and the master station processor is carried out via the master station interface (general-bus).

As the result of specific signals (from the processor to the 88 VU02), it is possible for the monitoring module to detect whether data transfer is being handled correctly in the master station.
CYCLE TIME MONITORING

The "START CYCLE" annunciation of the master station processor starts an adjustable time counter. If the processor does not issue the "END CYCLE" checkback signal within the set period, this is detected by the time monitoring system.

The master station monitoring module then stops the processor with an MRSI command and forces it to restart data transfer with a Start-cycle command.

Response of the time monitoring circuit is stored and indicated on module 88 VU02 (see "Annunciation functions").

The cycle time is dependent upon the system structure. This is why cycle time monitoring can be adjusted on the module (see "Operating modes").

OPERATION MONITORING

The master station processor regularly transmits pulses to the monitoring module during operation. These pulses are monitored by a watchdog circuit. This permits disturbances of the processor (e.g. "sticking" in a program loop) to be detected during cyclic mode. Even response of the watchdog circuit is signalled by the module.

MONITORING OF THE PROCESSING STATION

Regardless of the processing stations connected to the remote bus lines, a further, individual processing station can be fitted in the single-channel master station.

The module input MST of the 88 VU02 is connected to the annunciation output MST of module 88 TK02. MST is generated by module 88 TK02 in the case of disturbances in this processing station.

The input signal MST is "OR-ed" in the module with the internal general disturbance annunciation of module 88 VU02 and is available at output MST of the module 88 VU02.

MONITORING OF THE REMOTE BUS LINES

Module 88 VU02 has 8 disturbance annunciation inputs (SST) for monitoring a maximum of 8 remote bus lines. The disturbance annunciations are stored and indicated jointly (see "Annunciation functions").

DISTURBANCE ANNUNCIATION MEMORY

The individual, detected disturbance annunciations are stored on the module 88 VU02. The annunciation memories can be reset either by a signal at the module input TQ or by operating the Acknowledge key TQ (see "Operating functions"). The disturbance annunciation is reset when acknowledged if the disturbance itself is no longer pending. By contrast, if the disturbance is still present when acknowledged, the disturbance annunciation is also retained.

PRI0 1 - DETECTION

The PRI0 1 - annunciation from the diagnosis equipment of the master station is transferred as a pulse signal. The following applies: no PRI0 1 disturbance pulse present.

If the (optional) diagnosis equipment is not present in the master station, the monitoring module would continually detect PRI0 1. In order to avoid this, the plug-in jumpers X100 and X101 each with two plug-in positions are provided on the module (see "Operating modes").

Operating modes

CYCLE TIME SETTING

The cycle time monitoring circuit monitors whether the system cycle is terminated within the permitted period by the master station processor. The required cycle time is dependent upon the system configuration level (number of connected processing stations and their number of modules).

The relevant, required cycle time is set with switches. The location and designation of the switches on the module are specified in section "Mechanical design".
Witch housing "ZTW" is provided on the printed circuit board. It has 5 contacts. The table below shows the possible contact combinations and the resultant set times. Two basic times can be set with contact 5:

Basic time a = 1 sec, basic time b = 0.5 sec.
Thus, the table is also subdivided into columns "Contact 5" and "Set time" in columns a and b. In general, the following applies: "0" = contact open, "1" = contact closed (position ON on switch housing).

<table>
<thead>
<tr>
<th>ZTW/1:2</th>
<th>1 : 2 : 3 : 4 : 5</th>
<th>Set time [s]</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1 1 1 1 0 1</td>
<td>15.2 7.6</td>
<td>a</td>
<td>b</td>
<td></td>
</tr>
<tr>
<td>0 1 1 1 1 0 1</td>
<td>14.15 7.676</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 0 1 1 1 0 1</td>
<td>13.1 6.552</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 1 1 1 0 1</td>
<td>12.5 .028</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1 0 1 1 0 1</td>
<td>11 5.503</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 0 1 1 0 1</td>
<td>9.95 4.979</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 0 0 1 1 0 1</td>
<td>8.91 4.485</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 0 1 1 0 1</td>
<td>7.86 3.931</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1 1 0 1 0 1</td>
<td>6.61 3.407</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 1 0 1 0 1</td>
<td>5.76 2.882</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 0 1 0 1 0 1</td>
<td>4.71 2.358</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 1 0 1 0 1</td>
<td>3.66 1.834</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 1 0 0 1 0 1</td>
<td>2.62 1.31</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 1 0 0 1 0 1</td>
<td>1.57 0.786</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 0 0 0 1 0 1</td>
<td>0.524 0.262</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0 0 0 0 1 0 1</td>
<td>Illegal</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following assignments apply (for both jumpers; X100 stands for PRI0 12, X101 stands for PRI0 11):

X100/X101 (PRI012/PRI011)
A - B: evaluation by diagnosis modules present
B - C: no evaluation, no diagnosis modules present

Jumpers X102, X103 and X104 are related to the following disturbances which can be detected by module 88 VU02:

- hardware disturbance "MHW" (X102)
- master station disturbance "MVS" (X103)
- remote bus disturbance "MFB" (X104).

There is an LED on the front side of the module for each type of disturbance (see "Annunciation functions"). These individual annunciations can also be made available at module outputs in the form of a general disturbance annunciation via relay contacts by OR-ing.

All three plug-in jumpers X102, X103 and X104 have pins A, B and C. The following uniform assignment applies:

Position: Function:
A - B Indication of the disturbance via LED and output via relay contact
B - C Only LED indication; no relay output

Operating functions

The pushbutton T0 (see "Mechanical design") is provided on the front side of the module. This button permits the memories for the disturbance annunciations to be reset, provided the disturbances themselves are no longer pending.

Annunciation functions

ANNUNCIATIONS TO THE MODULE

The monitoring module receives disturbance annunciations from various, other modules of the master station.

Via the master station bus, it receives the priority disturbance annunciations (PRI0 11, PRI0 12, PRI0 21, PRI0 22, PRI0 3) and the general disturbance annunciation SST from the central modules of the master station.

JUMPER SETTINGS

The plug-in jumpers X100 to X104 are provided on the printed circuit board. Each plug-in jumper has the possible positions A-B-C.

In addition, the following are provided:

- A "test jumper". This must always be connected during operation.
- "Test points" (1,2). These serve for testing purposes at the factory and must be open during operation.

Section "Mechanical design" specifies the location and designation of all jumpers.

Jumpers X100 and X101 are related to evaluation of the PRI0 1 annunciation by the diagnosis modules provided (optionally) in the master station.
The module receives the (maximum) 8 disturbance announcements of the local bus coupling modules 88 FN01 (monitoring of transmit and noise level) via a further 8 inputs SST of the connector X21.

Via input MSTE, the module receives a "General annunciation processing station" from the coupling module 88 TK02 of any processing station which may possibly be incorporated in the same cubicle.

ANNUNCIATIONS ON THE MODULE

There are one green light-emitting diode and eight red light-emitting diodes on the front side of the module.

The three red light-emitting diodes PRI 1, PRI 2, PRI 3 light when the corresponding system disturbances are detected from the master station.

The green light-emitting diode SYS lights provided the system cycle for data transfer is occurring in the master station.

The red light-emitting diode MFB lights when disturbances are detected on one (or more) of the connected (maximum 8) remote bus lines.

The red light-emitting diode MVS lights when module disturbances of the master station are detected.

The red light-emitting diode MHW lights when specific hardware disturbances are detected in the master station by the master station processor.

The red light-emitting diode MWD lights when the watchdog monitoring circuit responds.

The red light-emitting diode MZQ lights when the cycle time monitoring circuit responds.

ANNUNCIATIONS FROM THE MODULE

The module has the three two-pole signal outputs PRIOX/PRIOXR (X = 1, 2, 3). These signal outputs are used to transfer priority disturbances detected with potential-isolation to the potential control system operator station.

The annunciation voltage UM generated centrally in the master station (generated by module 89 NU01) activates a relay on module 88 Vu02. Failure of the annunciation voltage UM is signalled on the basis of the closed-circuit principle via its contact outputs MW, MS, MQ.

Module 88 Vu02 has one further relay. It is activated by an OR function via which the individual, detected and edited disturbance announcements are combined to form a general announcement. These signals are available via potential-isolated changeover contacts of the relay at output MSD 1/2 and MSS 1/2 for further processing in the alarm annunciation system. The routes of the relay contacts are led out to outputs MSW 1/2 of the module.

The module-internal general disturbance annunciation (output of the OR-ing circuit) is also gated via a further OR function with the disturbance annunciation MSTE of the 88 TK02 of any processing station which may be present in the master station (see "Announcements to the module"). The resultant signal is available for further processing by module 89 NU01 at the electronic output MST (e.g. activation of the cubicle disturbance annunciation lamps).
MONITORING FUNCTIONS for:
cycle time, disturbance master station (SST), hardware disturbance,
watchdog, disturbance remote bus (SST) and Prio 1 – 3 annunciations.

88 VU02-E/R0100

Disturb. annunc.
inputs of the up to
8 remote bus lines

Potential-isolated output to the
control system operator station

≥1

ZTW : 1 : 2 : 3 : 4 : 5

Input/output logic to the
master station bus

Master station bus
Connection diagram in the master station

- Monitoring module for master station 88 VU02
  - UD +
  - ZD

- Telegram handling module 88VT01/VT02
  - VSS
  - UD +
  - ZD

- Control module for transfer procedure 88 VA01/VA02
  - VSS
  - UD +
  - ZD

- Master station processor module 88 VP01/VP02
  - VSS
  - UD +
  - ZD

- Coupling module for master station (1) 88 VK01
  - VSS
  - UD +
  - ZD

- Coupling module for master station (8) 88 VK01
  - VSS
  - UD +
  - ZD
Mechanical design

Board size: 6 units, 1 division, 220 mm deep

Contactor: In accordance with DIN 41 612

2 x 48-pole, edge-connector, Type F
(for X11 and X21)

Weight: approx. 0.34 kg

POSITION OF SWITCH AND PLUG-IN JUMPERS ON PRINTED CIRCUIT BOARD AND FRONT SIDE
Technical data

In addition to the system data, the following values apply:

POWER SUPPLY

Operating voltage
Current consumption
Power dissipation, typical
External annunciation voltage
Reference potential for UM
Reference potential (BUS)

<table>
<thead>
<tr>
<th>Voltage/Current</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>UD+</td>
<td>+5 V</td>
</tr>
<tr>
<td>ID</td>
<td>1 A</td>
</tr>
<tr>
<td>PV</td>
<td>5 W</td>
</tr>
<tr>
<td>UM</td>
<td>+24 V</td>
</tr>
<tr>
<td>IM (max)</td>
<td>20 mA</td>
</tr>
<tr>
<td>Z</td>
<td>0 V</td>
</tr>
<tr>
<td>ZD</td>
<td>0 V</td>
</tr>
</tbody>
</table>

INPUT SIGNALS

SST:
- general disturbance (from VST-BUS)
- general disturbance (from the 88 FNO1)

PRIO 1X (X=1,2):
- priority annunciation "1"
  from the VST-BUS

PRIO 2X (X=1,2):
- priority annunciation "2"
  from the VST-BUS

PRIO 3:
- priority annunciation "3"
  from the VST-BUS

MSTE:
- disturbance annunciation from the station diode-decoupled input

MO/MS:
- annunciation contact NC/NO voltage supply UM correct

MS01/MS02:
- annunciation contact NC

MSS1/MSS2:
- annunciation contact NO

1/2 general disturbance

TQ:
- key command acknowledged
  4.8 mA (3 NL)

OUTPUT SIGNALS

MRST:
- Master-reset signal (to the 88 VPD1/VPO2)

MST:
- General disturbance

MSW1/MSW2:
- Annunciation contact general disturbance

MW:
- Annunciation contact voltage UM correct

PRIOX/PRIOR
(X = 1 ... 3):
- Potential-isolated signal
  output to the ZBP

<table>
<thead>
<tr>
<th>Voltage/Current</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U</td>
<td>60 V</td>
</tr>
<tr>
<td>I</td>
<td>0.5 A</td>
</tr>
<tr>
<td>U</td>
<td>60 V</td>
</tr>
<tr>
<td>I</td>
<td>0.5 A</td>
</tr>
<tr>
<td>U</td>
<td>60 V</td>
</tr>
<tr>
<td>I</td>
<td>0.5 A</td>
</tr>
<tr>
<td>U</td>
<td>45 V</td>
</tr>
<tr>
<td>I</td>
<td>10 mA</td>
</tr>
</tbody>
</table>

ORDERING DATA

Type designation: 88 VU02-E/R0100
Order number: GJR2367500R0100

Technical data are subject to change without notice!