Module Description

PROCONTROL P
Power Supply

Restart Module

XT374A – E/R2

Application

The restart module monitors symmetrical voltage fluctuations in three-phase systems within an upper limit value UO and a lower limit value UU. Both limit values can be set inside the module.

In conjunction with drive control modules 83SR04 (with the exception of R2220) and 83SR06, drives are automatically disconnected or reconnected by the restart module as soon as the voltage exceeds one of the set limit values.

In case busbars are monitored by restart modules, the reconnecting procedure prevents unnecessary standstills of drives due to short-time voltage supply failures. Thus, the availability of the entire plant is increased.

The module can be adjusted to all common three-phase systems (110 V, 220 V, 380 V, 660 V).

Restart modules of this kind may be used only in closed electrical operating areas complying with VDE 0100 (part 731), and the Swiss Power Regulations § 56 and § 57. For any other use, the module must be housed in an appropriate casing.

Command functions

When the monitored voltage falls below lower limit value UU, or if one of the phases L1, L2, L3 should fail (phase voltage = 0 V), the restart module will immediately issue signal UA.

After the voltage of the busbar has been restored, it is often desirable to restart the coating drives immediately.

When the monitored voltage exceeds upper limit value UO within an adjustable running time t (see "Setting values"), a pulse of typ. 2.1 sec will appear at UE and UA. After expiration of this pulse, outputs UE and UA will carry a ‘0’ signal.

If after expiration of the set running time t the upper limit value UO is not reached, a pulse of typ. 2.1 sec will appear at output BA, and a ‘0’ signal at UA. Output UE will still carry a ‘0’ signal.

A ‘1’ signal at input BF releases outputs BA, MO, MU, SMU, UA, UE.

Annunciation functions

Annunciations on the module

Two light-emitting diodes are located on the module front. They can be activated as follows:

H1 General signal SME
H2 General signal SMU

Disturbance signals to the annunciation system

Annunciations SME electronics disturbance
SMU undervoltage
are available at the module outputs and allow to identify the type of disturbance at hand. These annunciation signals are combined inside the module and are put out at output SMG.

All these outputs may be connected in parallel in the form of a general annunciation signal.

In addition to annunciation SME, floating contact LMA – LME is established.

Generation of disturbance signals

SME responds in the event of the following disturbances inside the module:

– Operating voltage US failed
– Fusing for US1 failed
– Command release BF deactivated

SMU responds when the monitored voltage falls below lower limit value UU or if one of phases L1, L2, L3 fails; in case the upper limit value is exceeded, SMU will be deactivated again.

Annunciation outputs MO, MU

If the monitored voltage is below UU, a ‘1’ signal will appear at MU; if it is above UO, a ‘1’ signal will appear at MO.
Function diagram
Application examples

**Switching devices with electrical seal-in**

In the event that the busbar voltage falls below lower limit value UU or a phase should fail, the switching devices are switched off temporarily via the connected drive control modules due to a ‘1’ signal at output UA of the restart module. Running time t starts, and the drives start to coast.

In the event that the busbar voltage exceeds upper limit value UO within running time t for restart, the switching devices are reconnected by UE and UA, unless the control module has been disconnected manually or automatically during the voltage drop or phase failure.

In case the voltage does not exceed UO within running time t, there will be no more reconnection.

**Switching devices with mechanical latching or magnetic latching**

In case the busbar voltage falls below lower limit UU or a phase should fail, the latched switching devices are not switched off. Running time t starts.

If the busbar voltage exceeds upper limit value UO again within running time t, the switching devices remain connected.

In case the voltage does not exceed UO within running time t, the switching devices are switched off via the connected drive control modules due to a pulse of typ. 2.1 sec at output BA.
Connection diagram of 83SR04 (with the exception of R2220)

*) suitable for disconnecting from power system
(short-circuit strength, inherent strength)
Connection diagram of 83SR06

*) suitable for disconnecting from power system
(short-circuit strength, inherent strength)
Setting values

Setting the system voltage

The restart module is adjusted to the three-phase system to be connected by means of jumpers:

System voltage 110 V: jumpers 51 – 54, 61 – 64, 71 – 74
System voltage 220 V: jumpers 52 – 54, 62 – 64, 72 – 74
System voltage 380 V: jumpers 52 – 55, 62 – 65, 72 – 75
System voltage 660 V: jumpers 53 – 55, 63 – 65, 73 – 75

Setting the limit values

*Indication on type label of modules up to version index A:*
Factory setting only, with the help of a three-phase transformer.

*Indication on type label of modules from version index A1 on upwards:*
Factory setting according to the procedure described below. The limit values are set at potentiometers. For this purpose, a voltmeter (Ri ≥ 100 kΩ/V) is to be connected to sockets U1 or U2 respectively, on the module.

Voltage

U1 for the lower limit value UU or
U2 for the upper limit value UO
to be set at the voltmeter is calculated as below:

\[ U_1 = 7.60 \cdot V \cdot k_1 \]
\[ U_2 = 7.84 \cdot V \cdot k_2 \]

7.60 V = module constant for lower limit value
7.84 V = module constant for upper limit value

\[ k_1 = \frac{UU}{UN_{ref}} \quad UU = \text{lower desired limit value} \]
\[ k_2 = \frac{UO}{UN_{ref}} \quad UO = \text{upper desired limit value} \]
\[ UN_{ref} = \text{Reference voltage of the busbar to be monitored (see page 8).} \]

Limit values UU and UO are to be selected so that k1 and k2 are within 0.4 ... 0.95, and k2 − k1 ≥ 0.1.
Values UU, UO including running time t are indicated inside the cover of the restart module.

Example for 220 V system voltage:

\[ UN_{ref} = 231 \text{ V} \]
\[ UU = 70 \% \text{ of } 220 \text{ V} = 154 \text{ V} \]
\[ UO = 85 \% \text{ of } 220 \text{ V} = 187 \text{ V} \]
\[ k_1 = \frac{154 \text{ V}}{231 \text{ V}} = 0.667 \]
\[ k_2 = \frac{187 \text{ V}}{231 \text{ V}} = 0.81 \]
\[ U_1 = 7.60 \text{ V} \cdot 0.667 = 5.07 \text{ V} \]
\[ U_2 = 7.84 \text{ V} \cdot 0.81 = 6.35 \text{ V} \]

| \( U_N \) | 231 V |
| \( U_U \) | 70 % |
| \( U_O \) | 85 % |

Running time \( t \) in s

Location

Setting running time \( t \) for restart

Using jumpers and resistors, running time \( t \) can be set within 0.16 sec and 25.4 sec.

Resistors:
\[ R_{1007} + R_{1008} = R \quad R = 100 \text{ kΩ} \ldots 1 \text{ MΩ} \]

Jumpers:
\[ 1009 \quad t = 1.6 \text{ sec} \cdot \frac{R}{M\Omega} \]
\[ 1010 \quad t = 6.4 \text{ sec} \cdot \frac{R}{M\Omega} \]
\[ 1011 \quad t = 25.4 \text{ sec} \cdot \frac{R}{M\Omega} \]
Mechanical design

Sheet metal mounting plate with cover for screw-type attachment or snapping onto mounting rails to DIN 46 277, sheet 3.

Terminal connections:
- **X1**: 8 flat-pin plug 6.3 x 0.8
- **X2**: 28 flat soldering pins 2.8 x 0.8
All connections suitable for receptacles to DIN 46 247.

Weight: approx. 3.3 kg
Technical data

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

**Power supply**

**Operating voltage**

US = 24 V–

**Signal voltage**

UM = 24 V–

**Current consumption**

\[ I_{S} = 33 \text{ mA} + \text{Output current of active outputs} \]

UA, UE, BA, SMU, MU, MO, US1

\[ I_{M} = 6 \text{ mA} + 6 \text{ mA (LED) + Output current of active outputs SME, SMG} \]

at maximum output loading

\[ I_{S} = 200 \text{ mA} \]

\[ I_{M} = 15 \text{ mA} \]

**Power dissipation**

\[ P = 0.95 \ldots 4.5 \text{ W} \]

**Fusing for US1**

0.25 A fast

**Fuse type**

Fuse unit 5 x 20 mm acc. to XN 400 325

**Maximum admissible output current**

\[ I_{S1} = 20 \text{ mA} \]

**Input values**

A – Screen earth

BF – Command release

1 NL

L1, L2, L3 – Power connection

**System voltage**

110 V, + 10 %

220 V, + 10 %

380 V, + 10 %

660 V, + 10 %

Setting range

60 ... 127 V

100 ... 231 V

231 ... 400 V

400 ... 700 V

\[ U_{N_{ef}} = 127 \text{ V} \]

**System frequency**

45 ... 66 Hz

**Current consumption per phase**

\[ I_{ph} = 8.2 \text{ mA}_{eff} \]

\[ I_{ph} = 6.1 \text{ mA}_{eff} \]

\[ I_{ph} = 2.8 \text{ mA}_{eff} \]

\[ I_{ph} = 2.0 \text{ mA}_{eff} \]

**Output values**

BA – Switch–off command for drives with mechanical latching or magnetic latching

50 NL

LMA, LME – Floating contact, e.g. for signal lamp

\[ \leq 250 \text{ V}, \leq 20 \text{ W} \]

MO – "Upper limit value exceeded" signal

10 NL

MU – "Lower limit value exceeded" signal

10 NL

SME – General "Electronics disturbance" signal

1 NL

SMG – General "Module disturbance" signal

1 NL

SMU – General "Undervoltage" signal

1 NL

UA – Switch–off command for drives with electrical seal–in

50 NL

UE – Switch–on command for drives with electrical seal–in

50 NL

**Transmission values**

Internal function locking during switch–on of operating voltage

\[ 25 \ldots 180 \text{ msec (typ. 70 msec)} \]

Switch–off pulse to BA

\[ 0.89 \ldots 3.9 \text{ sec (typ. 2.1 sec)} \]

Switch–on pulse to UE/UA

\[ 0.89 \ldots 3.9 \text{ sec (typ. 2.1 sec)} \]

Delay of command release

\[ 7.5 \ldots 42 \text{ msec (typ. 16 msec)} \]

The module is insensitive to busbar voltage failure

\[ < 0.3 \text{ msec} \]
ORDERING DATA

Order no. for complete module:
Type designation: XT 374A–E/R2

Order number: GJR2255200R0002

Technical data subject to change without notice!