Module and Application Description

PROCONTROL P
Binary Control

Binary Control Module for Solenoid Valves with NAMUR Inputs, 4-fold

83SR04 – E/R2220

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Application

The module is used for stored–program binary control of solenoid valves provided with NAMUR inputs.
The module is intended for use in connection with the process operator station.
The operating mode (STR) is selected by means of function block TXT1 which is the first function block required in the structure.
In the binary control mode, up to 4 drive controls can be implemented for solenoid valves with NAMUR inputs.
The module incorporates 4 hardware interfaces for switchgear and/or process.
Direct connections are designed as monitored NAMUR inputs. Should plant–specific conditions require to acquire not only NAMUR transmitter signals but also signals from other contacts, these signals can be included via a binary input module, using the bus.

Features

The module address is set automatically by plugging the module into the PROCONTROL station.
The telegrams received from the station bus are checked by the module for error–free transfer by checking their parity bits.
The telegrams sent from the module to the bus are given parity bits in order to ensure error–free transfer.
The user program is filed in a nonvolatile memory (EEPROM). It can be loaded and changed from the PDDS using the bus.
The module is ready for operation as soon as a valid user list is loaded.
For communicating with process and switchgear, the module requires the following voltage:
USA/USB Operating voltage +24 V

branching internally into the following voltages:
UN1 Transmitter supply of process interface 1
UN2 Transmitter supply of process interface 2
UN3 Transmitter supply of process interface 3
UN4 Transmitter supply of process interface 4

The voltages UN1 ... UN4 are short–circuit–proof and designed to prevent interaction.
Operating voltages and external logic signals are related to reference conductor Z.
The following inquiries are made on the module front by light–emitting diodes:

   ST Disturbance
   SG Module disturbance

Signal lamp ST signals module disturbances as well as disturbances of data communication with the module.
Signal lamp SG signals module disturbances only.
Module design

The module essentially consists of:

- Process interfaces
- Station bus interface
- Processing section

Process interfaces

In the process interfaces, the process signals are adapted to the module—internal signal level.

Station bus interface

In the station bus interface, the module signals are adapted to the bus. This essentially involves parallel/serial conversion.

Processing section

For processing the signals coming from the process and the bus, the module is equipped with a microprocessor which cooperates with the following memory areas using a module—internal bus:

<table>
<thead>
<tr>
<th>Contents</th>
<th>Type of memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating program</td>
<td>EPROM</td>
</tr>
<tr>
<td>Function blocks</td>
<td>EPROM</td>
</tr>
<tr>
<td>User program (structure, address, parameter, and simulation lists)</td>
<td>EEPROM</td>
</tr>
<tr>
<td>User program (structure, address, parameter, and simulation lists)</td>
<td>RAM</td>
</tr>
<tr>
<td>History values</td>
<td>RAM</td>
</tr>
<tr>
<td>Current module input and output signals (shared memory)</td>
<td>RAM</td>
</tr>
</tbody>
</table>

The operating program enables the microprocessor to perform the basic operations of the module.

The memory for the function blocks contains ready programs for implementing the various functions.

The function blocks available in a particular operating mode are selected in such a way that the specified task can be performed without additional modules required.

All function blocks, together with their inputs and outputs, can be called by the user via the programming, diagnostic and display system (PDDS).

The memory for the user program contains information as to:

- how the function modules are interconnected,
- which function block inputs and outputs are assigned to which module inputs and outputs,
- which fixed values are specified to the individual inputs of the function blocks,
- which parameters are specified to the individual inputs of the function blocks,
- which plant signals are assigned to which module inputs and outputs,
- which function blocks serve the process interfaces,
- which module input signals are simulated.

These data are specified by the user depending on the specific plant requirements.

For normal operation, the complete user program is filed in an EEPROM. For optimization purposes, it is possible to work with a modified copy of the user program in the RAM, which must then be taken over into the EEPROM upon completion of the optimizing process.

Settings can either be preselected by the user directly at the appropriate function block inputs or alternatively specified in a separate parameter list.

Parameter lists can be changed (on line) any time during operation. In this case, they are stored in the RAM or the assigned EEPROM, after being assigned to the RAM or EEPROM operation respectively.

Data exchange between module and bus system takes place through the memory for module input and output signals. It serves to buffer the signals.

Structuring

For the purpose of structuring, module inputs and outputs are assigned to the neutral inputs and outputs of the individual function blocks; or fixed values and parameters or outputs of other function blocks (calculated function results) are specified to the function block inputs. Structuring is performed on the basis of the data supplied by the user in the form of a so-called structure list.

The following limit values of the module have to be observed during structuring:

- max. number of module inputs 287
- max. number of simulatable module inputs 32
- max. number of module outputs 223
- max. number of calculated function results 255
- max. number of timers 128
- max. number of parameters 80
- max. number of drive control functions (binary control) ASM functions 4
- max. number of lines in structure list 2789
- length of history values list (bytes) 768
- size of shared memory (see “Addressing”)

In this case, one line stands for one entry on the PDDS.

The proper procedure to be followed for structuring the function blocks is shown in the Function Block Descriptions.
Addressing

General
Signal exchange between module and bus system takes place through a shared memory. This memory buffers arriving telegrams, which are to be received by the module, as well as calculated function results which are to leave the module.

For this reason, the shared memory uses send registers for the telegrams to be sent and receive registers for the telegrams to be received. Register numbers 0 to 63 are defined as send registers, and register numbers 64 to 199 are defined as receive registers.

The allocation of the module input and output signals to the respective registers of the shared memory is defined by user data entered via the PDDS.

The user entries are made in the form of address lists.

Address list for module inputs
In the address list for module inputs, each module input is assigned the send location or the process interface associated with the signal to be received.

For module inputs receiving their signal from the bus, addressing is done by allocating the send location address to EGn, e.g.

<table>
<thead>
<tr>
<th>Input</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG1</td>
<td>1, 32, 24, 8, 7</td>
</tr>
</tbody>
</table>

For module inputs receiving their signal from the process interface, addressing is done by allocating the process interface to EGn, e.g.

<table>
<thead>
<tr>
<th>Input</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>EG1</td>
<td>VP2</td>
</tr>
</tbody>
</table>

For all telegrams to be used by the module, the bus address list contains the respective send addresses and receive register numbers.

Incoming telegrams whose addresses are included in the bus address list, are written into the receive registers of the shared memory. Incoming telegrams, whose addresses are not included in the bus address list, are ignored by the module.

The "Allocation list for module inputs" includes, for each module input, the associated receive register number and, in the case of binary values, also the bit position.

Address list for module outputs to the bus
In the address list for module outputs, a send register is defined for each signal to be issued by the module. Additionally, a send bit is defined in the case of binary signals, e.g.

<table>
<thead>
<tr>
<th>Output Address</th>
<th>Bit no. (0 – 15)</th>
<th>Register no. (0 – 63)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG1</td>
<td>1, 5</td>
<td></td>
</tr>
</tbody>
</table>

Addressing of the process interface for the relay outputs
For module outputs supplying their signal to the relay interface, addressing is done in the structure list by allocating ARn, with n denoting the number of the relay interface, e.g.

<table>
<thead>
<tr>
<th>Signal Output</th>
<th>Relay interface 1</th>
<th>Checkback signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM2</td>
<td>AR1</td>
<td>(1 – 4)</td>
</tr>
</tbody>
</table>

Address formation
The system and station addresses are set on the station–bus control module and are transmitted by this module to all other modules belonging to a PROCONTROL station.

The module addresses are defined by connections made on the backplane so that each module is automatically set to the assigned address when being plugged into its slot.

Parameter list
The parameter list contains up to 80 values for parameters of the functions blocks. It is stored in the EEPROM or the RAM, in the case of RAM operation.

Parameter lists can be changed at any time from the PDDS or the POS by using a "job memory" (RAM). Changes are stored in the EEPROM, in the case of EEPROM operation, or in the RAM, in the case of RAM operation. When user lists are taken over from the RAM into the EEPROM, and vice versa, the parameter list is also taken over.
Simulation list

Using the PDDS, it is possible to "simulate", at up to 32 module inputs, signals normally received via the bus, by overwriting them with constant values. This simulation list is handled and stored in the same way as the parameter list.

Event generation

The module is requested by the PROCONTROL system once every cycle to transmit the information filed in the send registers of the shared memory.

If any values change during a cycle, this change will be treated as an event.

The module recognizes the following occurrences as events:

- Change of status in the case of binary values

Whenever an event occurs, cyclic operation is interrupted and the new values are given priority when being transferred to the bus.

Disturbance bit evaluation, receive monitoring

The telegrams received from the bus may be provided with a fault flag on bit position "0". This fault flag is generated by the send module based on plausibility checks, and the disturbance bit is set to "1" in the event that specific disturbances are present (see Function Block Descriptions).

In order to be able to recognize errors during signal transfer, the module also incorporates a feature that monitors the input telegrams for cyclic renewal. If a telegram has not been renewed within a certain time (e.g. due to failure of the send module), bit "0" is set to "1" in the allocated receive register of the shared memory. In binary value telegrams, all the binary values are simultaneously set to "0".

A set disturbance bit does not automatically involve a reaction in the receive module. If the disturbance bit of a telegram is to be evaluated, provision must be made for this during structuring.

In the case of "Drive control for solenoid valves with NAMUR inputs", disturbance bits of received telegrams can only be used within the module. They are not included in telegrams to be transmitted.

Diagnosis and annunciation functions

Disturbance annunciations on the module

The following annunciations are made on the module front by light-emitting diodes (LED):

<table>
<thead>
<tr>
<th>Designation of LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td>Disturbance</td>
</tr>
<tr>
<td>SG</td>
<td>Module</td>
</tr>
</tbody>
</table>

Light-emitting diode ST signals all disturbances inside the module as well as of data communication with the module.

Light-emitting diode SG signals module disturbances only.

Disturbance annunciation signals to the alarm annunciation system

The alarm annunciation system and the control diagnosis system CDS receive disturbance signals from the binary control module via the bus.

Diagnosis

In the processing section of the module, incoming telegrams, generation of telegrams to be transmitted as well as internal signal processing are monitored for errors (self-diagnosis).

In the event of a disturbance, the type of disturbance is filed in the diagnosis register and, at the same time, a general disturbance signal is sent to the PROCONTROL system.

When requested, the module transfers a telegram containing the data stored in the diagnosis register (register 246) (see Fig.1).

The contents of the diagnosis register, the signals sent over the general disturbance line, the annunciations on the CDS and annunciation ST are shown in Fig.1.
Module operating

Diagnosis register 246

<table>
<thead>
<tr>
<th>Bit</th>
<th>Type</th>
<th>CDS messages *)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>S Parameter fault</td>
<td>6615</td>
</tr>
<tr>
<td>14</td>
<td>S Process channel fault</td>
<td>6600</td>
</tr>
<tr>
<td>13</td>
<td>S Processing fault</td>
<td>6601</td>
</tr>
<tr>
<td>12</td>
<td>S Checksum error detected</td>
<td>6602</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>S Timer defective</td>
<td>6604</td>
</tr>
<tr>
<td>9</td>
<td>D Module restart executed</td>
<td>6605</td>
</tr>
<tr>
<td>8</td>
<td>S Bus deactivation defective</td>
<td>6606</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>S Receive monitoring responded</td>
<td>6610</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>S Event mode fault</td>
<td>6612</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Module not operating

Incorrect firmware PROM
Hardware defect of processing section
EEPROM not valid
Processing initialization active
Module not accessible from bus
Module transmitter switched off by 88TV0x
Module address not within 0 – 58
Hardware defect of bus interface

D = Dynamic annunciations are cancelled after the contents of the diagnosis register has been transmitted
S = Static annunciations disappear automatically upon deactivation
0 = Not used

Figure 1: 83SR04 diagnosis messages

If the annunciation "Process channel fault" appears in the diagnosis register, this may be due to any of the following causes:
- Short-circuit at outputs UN1...UN4
- Wire break, transmitter wire break or earth short-circuit in the NAMUR inputs
- Short-circuit in the binary control circuit (transmitter short-circuit)

*) The control diagnosis system (CDS) provides a description for every annunciation number. This description provides, among other data,
- Information on cause and effect of the disturbance
- Recommendations for its elimination.

This makes for fast elimination of disturbances.
Operating statuses of the module

Initialization and bootstrapping with user lists

Initialization is activated either by plugging the module into its slot or after connecting the voltage.

The initialization process causes the module to assume a defined initial state. Light-emitting diodes ST and SG are on during this process.

No user program is available when the module is started up for the first time. As a result, the module signals "Processing fault", and the light-emitting diodes ST and SG are on.

As a first step, it is necessary to transfer the user program from the PDDS, via the bus, to the RAM of the module. If this operation is started with the structure list, the PDDS calls all other lists automatically. To avoid the transmission of incorrect lists, the PDDS checks location and address before each transmission job. The module checks every incoming list for plausibility.

Now, the complete user program can be transferred to the EEPROM by a PDDS command.

Following this, the module is ready for operation, and the light-emitting diodes ST and SG are deenergized.

Normal operation

The module processes the user program filed in the EEPROM.

During normal operation, the signals arriving from the bus and the process interface are processed in accordance with the instructions contained in the structure list.

In line with these instructions, commands are output to the switchgear, and checkback signals indicating the process status are transmitted via the bus.

Modification of parameter lists

Parameters can be changed from the PDDS and, if they have been configured using the POS, from the POS (see "Limit value list" and "Parameter list").

Modification of structure and address lists

Structure and address lists can be transferred to the PDDS, modified there and transferred back to the module. To do so, the following procedure should be followed:

- The module should be in the EEPROM mode,
- copy the complete user program from the EEPROM into the RAM using PDDS command "COP",
- transfer the list to be changed from the EEPROM (or RAM) to the PDDS and modify it,
- transfer the modified list to the module, thus, effecting automatic storage in the RAM,
- switch the module from EEPROM operation over to RAM operation by using PDDS command "SWI", and test the new list,
- to make further changes, switch again to EEPROM operation, repeat procedure.

Upon successful completion of the test, the complete user program can be transferred from the RAM to the nonvolatile EEPROM, using either of the following commands:

- PDDS command “Save” (SAV) or
- PDDS commands “Copy from RAM to EEPROM” (COP) and "Switch over from RAM to EEPROM" (SWI)

"Save" effects copying of the lists and subsequent automatic switchover to the EEPROM, impairing neither processing on the module nor command output.

Following a switchover operation with command SWI (from RAM to EEPROM and from EEPROM to RAM), the user lists in the RAM and EEPROM are compared. Should any deviation be detected, the controllers are switched to "Manual", memories and timers are reset, and the commands present at the process interface are deactivated. For changed addresses of module inputs (EgN), the associated entries in the shared memory are set to zero until new data are received for the first time after switchover.

Simulation

The PDDS permits constant values to be specified to the module for a maximum of 32 individual module input signals which in normal operation arrive from the transfer system. In this case, the receive registers entered in the allocation list for module inputs are overwritten by constants. These simulation data and the previously entered receive register numbers are stored in the EEPROM in the case of EEPROM operation, or in the RAM in the case of RAM operation.

The simulation data are also copied when the user lists are transferred from the RAM to the EEPROM, and vice versa.

On cancellation of a simulation process via the PDDS, the receive register number is written back into the allocation list, and the module continues to operate with the value transferred by the bus.
Command functions

**Actuation from the control room**
The module does not incorporate control room interfaces.

**Actuation by a higher—level automatic system**
A higher—level automatic system actuates the module via the bus.

**Release and protective commands**
The logic combinations for release and protective commands are specified as required for the plant involved.

**Command output**
The commands for the drive control functions for solenoid valves with NAMUR inputs, to which the process interfaces have been assigned, are issued through relay outputs B12 ... B42. In conjunction with command outputs BV1 ... BV4, the relay outputs actuate coupling relays on a two—channel basis.

The voltage for the command outputs B12 ... B42 is derived for each function unit from a separate, module—internal voltage.

The outputs are short—circuit—proof, protected against mutual interference, and provided with a protective circuit.

**Checkback signals from the process**
The drive—related checkback signals from the process are connected via the NAMUR inputs.

Should plant—specific conditions require acquisition not only of the NAMUR transmitter signals, which are connected directly to the module, but also of signals from other contacts, it is possible to transfer those signals through a binary input module using the bus.

Voltage supply for the transmitters is provided for each hardware interface by a common feed—in (UN1 ... UN4).

In the event of a short—circuit on the common transmitter supply line, the connected transmitters associated with this process interface are indicated as being in the state of "Disturbance".

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**Binary control mode**
The module incorporates all function blocks enabling the drive control functions for solenoid valves with NAMUR inputs.

Up to 4 drive control functions for solenoid valves can be created per module.

Function module TXT1 must be listed at the top of the structure list. Next follow TXT text elements for main function designations, function designations, and processing functions.

<table>
<thead>
<tr>
<th>Operating mode</th>
<th>Module cycle time</th>
<th>Input TXT1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Binary control</strong></td>
<td>variable up to max. 700 ms</td>
<td>STR</td>
</tr>
</tbody>
</table>

"STR" is set automatically by the PDDS.

The module cycle time is determined by number and type of the function blocks entered in the structure list. The actually required time is filed in register 205 and can be read out from the PDDS.

The 4 process interfaces of the module including command outputs are assigned to drive control function ASM whose inputs for process annunciations (PRO) are marked "VPn" in the address list. The following assignments apply:

\[ n = 1 \quad \text{Process interface 1} \\
 n = 2 \quad \text{Process interface 2} \\
 n = 3 \quad \text{Process interface 3} \\
 n = 4 \quad \text{Process interface 4} \]

The module is connected to the control room through the process operator station.
Function blocks for the binary control of solenoid valves (STR)

This operating mode provides all function blocks for the binary control functions of "Drive control of solenoid valves with NAMUR inputs".

The module cycle time is variable, i.e. it is strictly determined by the function blocks used.

In this operating mode, no disturbance bits are transmitted, except in the standard checkback telegrams.

<table>
<thead>
<tr>
<th>Function blocks</th>
<th>Abbrev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BINARY FUNCTIONS</td>
<td></td>
</tr>
<tr>
<td>2–out-of–3 selection, binary</td>
<td>B23</td>
</tr>
<tr>
<td>M–out-of–N selection</td>
<td>BMN</td>
</tr>
<tr>
<td>Dynamic OR gate</td>
<td>DOD</td>
</tr>
<tr>
<td>Switch–on delay element</td>
<td>ESV</td>
</tr>
<tr>
<td>Monostable flipflop &quot;Constant&quot;</td>
<td>MOK</td>
</tr>
<tr>
<td>OR gate</td>
<td>ODR</td>
</tr>
<tr>
<td>RS flipflop</td>
<td>RSR</td>
</tr>
<tr>
<td>AND gate</td>
<td>UND</td>
</tr>
<tr>
<td>DRIVE CONTROL</td>
<td></td>
</tr>
<tr>
<td>Drive control function for solenoid valve</td>
<td>ASM2</td>
</tr>
<tr>
<td>PUSHBUTTON SELECTION FUNCTIONS</td>
<td></td>
</tr>
<tr>
<td>Pushbutton selection</td>
<td>TAW</td>
</tr>
<tr>
<td>ORGANIZATION FUNCTIONS</td>
<td></td>
</tr>
<tr>
<td>Text element for designation and note</td>
<td>TXT</td>
</tr>
<tr>
<td>Text element for operating mode indication</td>
<td>TXT1</td>
</tr>
<tr>
<td>PROCESS INPUT/OUTPUT FUNCTIONS</td>
<td></td>
</tr>
</tbody>
</table>

Note:

The process input/output function blocks are available from version P0004 on upwards.

Input of binary process signals                      | EP02    |
Output of binary process signals                     | AP02    |

The exact specification of the function blocks as well as the procedure for structuring are shown in the function block descriptions.
* To ensure proper functioning of the module, terminal X11/d18 has to be connected to ZD (once per rack).
Connection diagram for solenoid valve (function unit 1)
**Mechanical design**

- **Board size:** 6 units, 1 division, 160 mm deep
- **Connector:** to DIN 41 612
  - 1 x for station bus connection, 48-pole edge-connector, type F (connector X11)
  - 1 x for process connection, 32-pole edge-connector, type F (connector X21)
- **Weight:** approx. 0.55 kg

**Contact assignments of process connector X21**

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>E11</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>E12</td>
<td>B12</td>
</tr>
<tr>
<td>06</td>
<td></td>
<td>BV1</td>
</tr>
<tr>
<td>08</td>
<td>UN1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>E21</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>E22</td>
<td>B22</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>BV2</td>
</tr>
<tr>
<td>16</td>
<td>UN2</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>E31</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>E32</td>
<td>B32</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>BV3</td>
</tr>
<tr>
<td>24</td>
<td>UN3</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>E41</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>E42</td>
<td>B42</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>BV4</td>
</tr>
<tr>
<td>32</td>
<td>UN4</td>
<td></td>
</tr>
</tbody>
</table>
Side view and view of module front

EPROM programmed, order number: GJR2392641Pxxx
xxxx = Position number indicating the applicable program version
Technical data

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

**Power supply**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage of module</td>
<td>USA/USB = 24 V</td>
</tr>
<tr>
<td>Current consumption</td>
<td>IS = 145 mA + output currents</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>PV = 3.5 W</td>
</tr>
<tr>
<td>Reference potential of process section</td>
<td>Z = 0 V</td>
</tr>
<tr>
<td>Reference potential of bus section</td>
<td>ZD = 0 V</td>
</tr>
</tbody>
</table>

**Input values**

- Direct connections for NAMUR inputs Ex1 and Ex2 of the 4 function units (FE)
  - Based on DIN 19234
- Internal resistance
  - $R_i = (1010 \pm 10) \, \Omega$
- Response range for short-circuit in binary control circuit
  - $I_k = (6.75 \pm 0.75) \, mA$ at $U_{Nx} = 8.4 \, V$
- Response range for changes of control state
  - $I_s = (1.65 \pm 0.45) \, mA$
- Response range for wire-break/transmitter wire-break or earth short-circuit monitoring
  - $I_b = (0.2 \pm 0.15) \, mA$
- Line resistance (outgoing and return line)
  - $R_l \leq 50 \, \Omega$
- Length of line (outgoing and return line)
  - $L \leq 1000 \, m$ (at 0.5 mm²)

  (x from 1 to 4)

**Output values**

**NAMUR TRANSMITTER SUPPLY**

- Transmitter supply for NAMUR inputs Ex1 and Ex2
  - Based on DIN 19234
- No-load voltage
  - $U_{Nx} = (7 - 9.5) \, V$
- Rated voltage
  - $U_{Nx} = 8.4 \, V$
- Output current
  - $I_x \leq 40 \, mA$
- The outputs are short-circuit-proof and non-interacting.

  (x from 1 to 4)

**PROCESS INTERFACE**

- Voltage supply of the 4 function units for command output Bx2
  - 24 V
- The outputs are short-circuit-proof, non-interacting, and are provided with a protection circuit

- Loading capacity

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Loading capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bx2 Command output for OPEN</td>
<td>$I_S \leq 80 , mA$</td>
</tr>
<tr>
<td>BVx Command output for Bx2 (wired return line)</td>
<td>$I_S \leq 80 , mA$</td>
</tr>
</tbody>
</table>

- Regarding the connected load resistor the following limits apply
  - $360 \, \Omega \leq R_{load} \leq 15 \, k\Omega$
- Service life of the relay output stages
  - $\geq 20$ million switching cycles

**COUPLING RELAYS AND POWER DRIVERS**

**IN THE SWITCHGEAR**

- Wiring:
  - The wiring from the 83SR04 to the switchgear is defined in a cable specification to suit the plant-specific requirements.
  - The max. length of the line (outgoing plus return line) is 600 m for a cross-section of 0.5 mm².
  - The following coupling relays and power drivers may be used:
    - Coupling relay R513
    - or coupling relays or power drivers with identical technical data.
ORDERING DATA

Order number for complete module:
Type designation: 83SR04–E/R2220

Order number: GJR2392600R2220

Technical data are subject to change without notice!