

## DESCRIPTION

Stations of ZAT-D system are of a modular composition.

A module with printed-circuit board (dimensions 100 x 80 mm) fitted in a plastic frame is a basic element for these stations. Modules are connected (in both an electrical and mechanical way) into larger blocks – **stations**, which can be fitted to assembly bar TS 35. There are signalling elements and connectors on the front side of a module. Modules within one station communicates through internal parallel bus.

Each station contains communication and power supply module, followed by input and output modules<sup>1</sup> up to maximum number of 8.

There are both digital and analog transmitters in the assortment of input and output modules. Analog measuring transmitters perform (considering fitted RISC processors) diagnosing,

<sup>1</sup> Features of individual modules are described in separate catalogue sheets.

linearization of sensor characteristic and value rating into physical units.

Treated input data are concentrated in communication module of a station and data exchange between communication module and control unit is performed by means of serial bus PROFIBUS DP<sup>2</sup>. Output data from control unit are then transferred into output modules, where they can be possibly treated before conversion.

<sup>2</sup> **PROFIBUS** is a universal definition of communication bus for area of industrial automation, which is described in DIN 19245 standard. **PROFIBUS DP** is a variant with optimisation for transfer rate. It is determined specially for communication among control systems and decentralized peripherals or measuring transmitters. PROFIBUS-DP comes from DIN 19245 standard, part 1 and user oriented extension defined in draft of DIN 19245 standard, part 3 from 1993.

## TECHNICAL PARAMETERS

Parameter	Conditions	Min.	Type	Max.	Units
Weight	According to number and type of modules		1300		g
Dimensions			see Fig.1		
Number of I/O modules				8	
Length of communication line <sup>3</sup>	<b>Cable A:</b> <sup>4</sup>	1500 Kbit/s		200 m	
		500 Kbit/s		400 m	
		187,5 Kbit/s		1 km	
		93,75 Kbit/s		1,2 km	
		19,2 Kbit/s		1,2 km	
		9,6 Kbit/s.		1,2 km	
	<b>Cable B:</b> <sup>5</sup>	500 Kbit/s		200 m	
		187,5 Kbit/s		600 m	
		93,75 Kbit/s		1,2 km	
		19,2 Kbit/s		1,2 km	
		9,6 Kbit/s.		1,2 km	

<sup>3</sup> It is understood the length of the whole segment of communication network.

<sup>4</sup> Cable A  
 impedancy 135 - 165 Ω (3 - 20 MHz),  
 capacity < 30 pF / m,  
 line resistance 110 Ω / km.

<sup>5</sup> Cable B  
 impedancy 100 - 130 Ω (f > 100 kHz),  
 capacity < 60 pF / m.

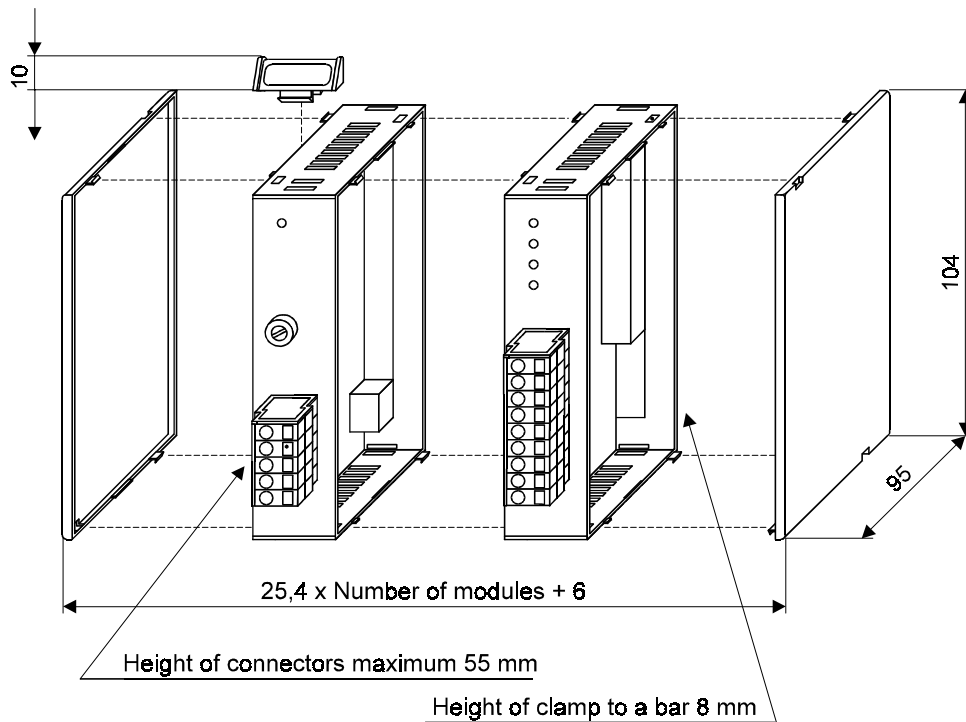


FIG.1

## APPLICATION PRINCIPLES

ZAT-D stations are delivered in a set according to specification in purchase order. Design engineer specifies requested configuration by means of letter and digit code, which is described further. Using program DP\_PAR (which makes possible to print the specification of used stations from the mechanism project) the purchase order could be made up more easily. Separate modules are delivered only as spare parts or for extension of existing stations. Changing module or extending a station there is necessary to set an address of a new module (see further pages). Extending a station there is necessary also to replace bus cable (use a longer one) and change configuration file in communication module CP 5480 DP in control unit. Program DP\_PAR serves for creating and editing of configuration file. The program also makes possible to load a network address of the station and perform diagnosing during activating.

## Identification

Station identification consists of letter and number code, which specifies composition of station modules according to following table.

<b>Code</b>	01	-	1C	1C	..	39
<b>Meaning</b>	Version of set DZD-DKM <sup>6</sup>		Identification codes of modules separated by space in HEX form, in <b>increasing order</b> of their values.			

Code **01** is reserved for DZD001 + DKM001.

**Codes for individual modules are shown in a following table:**

Type	Description	ID code
DKM001	Communication module for PROFIBUS DP	-----
DZD001	Power source 24 / 5 V	-----
DLO001	Binary output module (normally open contact 220 V)	<b>34</b>
DLO002	Binary output module (normally closed contact 220 V)	<b>35</b>
DLO003	Binary output module (open contacts)	<b>30</b>
DLO004	Binary output module (closed contacts)	<b>31</b>
DLO005	Binary output module (open contacts – eight outputs with common ground)	<b>32</b>
DLI001	Binary input module (24 V)	<b>38</b>
DLI002	Binary input module (230 V)	<b>39</b>
DLI003	Binary input module (24 V)	<b>3A</b>
DLI004	Binary input module (24 V – eight inputs with common ground))	<b>3B</b>
DAI001	Thermocouple module for temperature measurement (J,K,E,T,S,R,B)	<b>18</b>
DAI002	RTD temperature measurement module	<b>19</b>
DAI003	Analog input 0 - 20 mA with current loop feeding	<b>1 A</b>
DAI004	Analog input –10 to +10 V	<b>1 B</b>
DAI005	Analog input 0 - 20 mA without current loop feeding	<b>1 C</b>
DAO001	Analog output 4 - 20 mA with current loop feeding	<b>14</b>
DLC001	Impulse logic inputs 24 V	<b>20</b>

### Set of Modules Addresses

There is necessary for each ZAT-D module (excluding DZD001 and DKM001) to set a code (module address) by means of four jumpers inside the module. The code determines logical order of the module, absolute value of the code is not important - only order of values is evaluated. For numbering of jumpers see catalogue sheets of individual modules<sup>7</sup>. This order must be the same with physical order of modules. Recommended populating of jumpers is shown in following table.

Order	Jumper 1	Jumper 2	Jumper 3	Jumper 4
1	+	+	-	-
2	+	-	+	-
3	+	-	-	+
4	+	-	-	-
5	-	+	-	-
6	-	-	+	+
7	-	-	+	-
8	-	-	-	+

**Legend :** + jumper populated, – jumper not populated

<sup>7</sup> Jumper 4 represents the lowest bit, jumper 1 represents the highest bit. Populated jumper represents logic 0, not populated jumper represents logic 1.

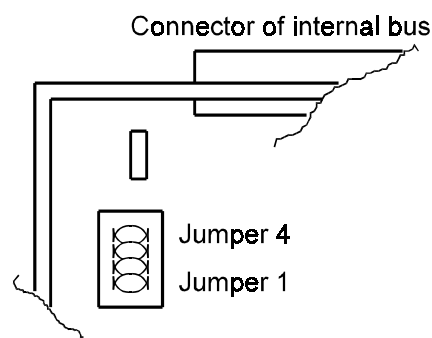


Fig. 1

## Station Built up

After fitting of address interconnections it is necessary to put the modules together in the order, which is specified by the code of the station. It is necessary also to interconnect the modules by fitting the rear flat cables and complete the station by supplying of rear carriers and side covers.

## EMC

ZAT-D system is determined for an operation in industrial environment, where intensified level of interference are occurring. The design of modules and even all the station responses to this fact. To reduce an interference in an effective way, there is necessary to follow in an unquestioning way following principles when installing the equipment:

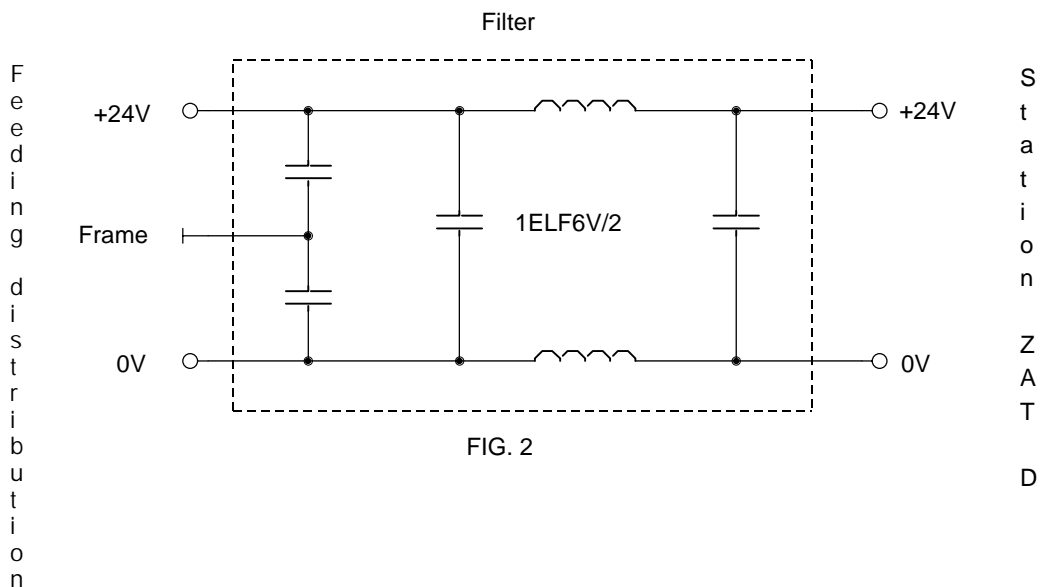
### **Station Placement**

Stations are placed separately in metal boxes (box 3E94-0210 manufactured by ZAT is recommended), or in groups in large cubicles. Station could be placed also in power switchboard, in a space divided by shielding separation wall. All the construction parts of cubicles, where the ZAT-D stations are placed, must be well connected in a conductive way in all joints - welds are the best variant. More interconnection by wire (which is performed as protection against electrical accident) is not satisfactory.

Station in a cubicle is fastened in the bar TS 35 mm. Fastening parts of the station serve also for leading the interference out of the station. Therefore a fastening bar must be properly interconnected in a conductive way with the frame of the cubicle in both ends of the bar.

### **Feeding**

ZAT-D stations are fed by voltage 24 V DC, which is obtained from central feeding source and is led by cable to individual stations or local small feeding source 220 V AC / 24 V DC placed at the station. When using central feeding source, a filter according to Fig. 2 (maximum one filter for four stations) in feeding inlet is recommended to use in the cubicle where station or stations group are placed. Recommended filter is of type ELFIS 1ELF6V/2. Filter earthing is in the side of inlets and is connected with frame of the cubicle through **as short as possible** way.



**Inlet Conductors and Shielding**

There is necessary to interconnect a shielding of inlet cables with the frame of the cubicle in a place where cables come into cubicle or box with a station or a group of stations. The interconnection is done by means of plastic tightening strips. The strips fastens the part of the cable with bare shield to earthing bar 3E94-0110 (see Fig. 3). Earthing bar must be connected as short as possible way with frame of the cubicle in both ends of the bar as a minimum.

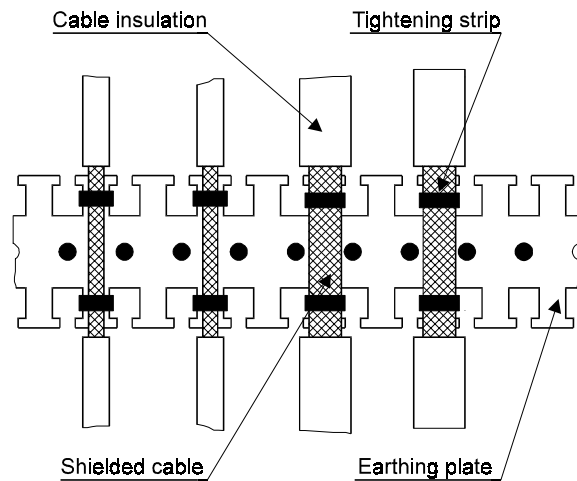


Fig. 3

Cable shielding could continue (but it is not necessary) inside the cubicle<sup>7</sup>. If shielding is fastened continuously, there is no need to connect the shielding with anything inside the cubicle. The only exception represents communication cable, which is always fastened continuously to the earthing plate. For connection of shielding inside SIEMENS connectors see Fig. 4.

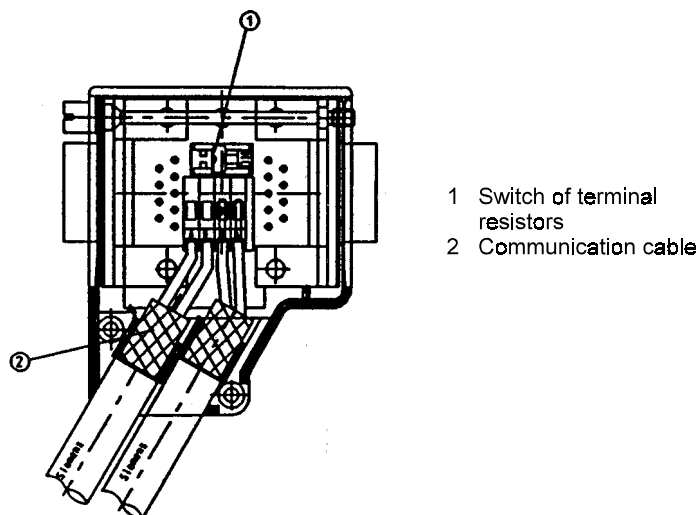


Fig. 4

<sup>7</sup> Some cables have their shielding from metal-plated plastic film. Sometimes a conductive layer could be found in the inner side. In that case there is necessary to finish the shielding in the place of interconnection and pull it back over the cable insulation this way, that conductive layer stays in the upper side. Then the termination (performed through above described way) is fastened by means of plastic strips to earthing plate.

## Communication Line

Individual ZAT-D stations are connected with control unit<sup>8</sup> by means of serial communication bus. The interconnection is performed by means of special cable with one twisted shielded pair of conductors. Line is terminated by resistors with characteristic impedancy at both ends.

Individual stations and control units are connected into the line by means of connectors SIEMENS 6ES5 762-1AA12 or 6ES5 762-2AA12 (see Fig.4), which differ only in color of cover. The connector includes line terminal resistor, which could be disconnect by means of switch. Conductors of communication cable are connected into connector by means of terminals placed inside the connector. Red conductor is attached into terminal A, green conductor into terminal B. The other pair of terminals serves for cable connection to the other station. If the station is the last in a network, line must be adjusted in an impedancy way - termination resistors are connected by switching the switch inside the connector to position ON. Through station has the switch in position OFF.

Recommended cable types for communication line are shown in a following table. All the cables are of A type and have the same electrical features.

Cable identification	Manufacturer	Performance type
6XV1 830-0AH10	SIEMENS	for regular environment
6XV1 830-3AH10	SIEMENS	for more difficult climatic conditions, for embedding below the ground. <sup>9</sup>
PCCJE 150-1x2x0,64	VÚKI, a.s. Bratislava	for more difficult climatic conditions, for embedding below the ground. <sup>10</sup>
PLCJ(PUR) 150-1x2x0,65	VÚKI, a.s. Bratislava	for more difficult climatic conditions, for flexible inlets.

## Mechanical Placement of Station

ZAT-D stations are mounted into assembly bar TS 35. To make the station fastening possible, there is necessary to have free space at least 70 mm among top edge of the station and other elements in the cubicle and at least 50 mm below the bottom edge of the station. Inlet conductors are led to the station from bottom, usually in a cable tray placed below the station. Cable tray is to be placed this way so as conductors come from it in a plane, which is 30 mm in front of the front station plane.

<sup>8</sup> D352 unit in performance type as insertable card of large euro-format represents the control unit in ZAT-D system, however also module performance type of control unit (CD350) exists, where module type is the same as the ZAT-D stations have.

<sup>9</sup> Concerning rigidity of plastic cable sheath there is recommended to remove the sheath in a length at least 20 cm before terminating the cable into connector. Shielding must stay undamaged yet.

<sup>10</sup> Concerning rigidity of plastic cable sheath there is recommended to remove the sheath in a length at least 20 cm before terminating the cable into connector. Shielding must stay undamaged yet.