

## Main features

**The cable runs** in any intercom or video intercom system must be kept separate from the electrical or industrial installation as required by the **International Standards**. In each Country the Installer must comply with the technical and safety regulations stated by their own Government or Technical Committee. In the following are reported only some general rules:

- A protective circuit breaker must be installed on the power supply line. A single general circuit breaker must be used in case of multiple power supply units (also with multiple entrances).
- Before connecting the power supply make sure that the rating complies with the electrical mains.

## Digital intercom system

A **FN4000** digital intercom system is composed of the following 5 wires:

- DB** serial data bus
- F1** audio from internal to door stations
- F2** audio from external to internal stations
- +** +12Vdc power supply
- ground

Two wires with appropriate cross section (see table) must be added from the power supply to the door station for electric door release and name plate lamps, if any.

If the system includes art. **4235** multiple decoding module, the maximum distance between module and intercoms is 20m (65Ft), with minimum 0.5mm<sup>2</sup> (AWG20) cross section. Connections are:

- 1** microphone
- 2** loudspeaker
- 3** ground
- 5** door release button or call to a doorkeeper exchanger
- 9** electronic call

## Digital video intercom system

Two different systems can be used to realise a **FN4000** digital video intercom system: a system with video intercoms equipped with integrated decoding module and a system with multiple decoding module. Although the two systems are compatible, choose one system for easier installation.

### a) digital system with integrated or additional decoding module:

- DB** serial data bus
- F1** audio from internal to door stations
- F2** audio from door to internal stations
- +** +12Vdc power supply
- ground
- V** video signal
- M** video signal ground

- Two wires with appropriate cross section (see table) must be added from the power supply to the door station for electric door release and name plate lamps, if any.

### b) digital system with multiple decoding modules:

*conductors of the riser connected to the decoding board and to the video intercom through floor video distributor*

- DB** serial data bus
- F1** audio from internal to door stations
- F2** audio from door to internal stations
- +** +12Vdc power supply
- ground
- V** video signal
- M** video signal ground
- H** +21Vdc video power supply

Connections from the **4235TV** or **4235TVP** multiple decoding modules to the video intercoms cannot exceed the maximum distance of 20m (65Ft), with minimum 0.5mm<sup>2</sup> (AWG20) cross section. They are:

## Studio

- 1** microphone
- 2** loudspeaker
- 3** ground
- 5** door release or call to a doorkeeper exchanger
- 9M** digital command for video intercom call
- F** video power supply ground

- Two wires with appropriate cross section (see table) must be added for electric door release and name plate lamps, if any
- 1 wire for video activation/deactivation must be added from the power supply to the door station.

## Operating current of digital units

The operating current of each unit (+12V voltage) must be known in order to determine the number of power supply units required in a digital system.

Article	Operating current in Ampere	
	stand by	in operation
<b>TD4100</b>	0.06	0.1
<b>TD4100MA/TD4100PL</b>	0.05	0.12
<b>RD4120</b>	0.05	0.05
<b>CD4130-MA, CD4134-38PL</b>	0.1	0.1
<b>PL24S-PL228S</b>	-	-
<b>PDX4000</b>	0.25	0.25
<b>4235, 4235TV, 4235TVP</b>	0.05	0.08
<b>ST4231, 4231TP</b>	0.02	0.08
<b>EH9160DG</b>	0.055	0.3
<b>ST7100W, EX3160</b>	0.02	0.4
<b>ST7100CW</b>	0.02	0.5
<b>KM8100DG-CDG</b>	0.02	0.6
<b>EX320DG</b>	0.02	0.07
<b>KM810DG</b>	0.02	0.05
<b>MD41DG/MA42DG-43DG</b>	0	0.25
<b>MD41CDG/MA42-43CDG/PL40-42PCDG</b>	0	0.4
<b>4273P</b>	0.08	0.08

## Maximum current delivered by power supply units

**PRS4220** 1.5A

The system operating current is obtained by adding the maximum current of one article to the minimum current of all the other articles of the same kind. If the result is equal or higher than the maximum load allowed by the power supply, more power supply units must be added according to the method describe above.

## Examples:

1) *In a digital intercom system with:*

3 TD4100PL push-button panels	0.12 + 2x0.05	= 0.22A
1 PDX4000 doorkeeper exchanger	0.25	= 0.25A
98 EX320DG intercoms	0.07 + 97x0.02	= 2.01A

the total operating current is: 3.10A

For correct installation **no. 2 PRS4220 power supply units** are necessary as shown below:

1 power supply for 2 TD4100PL + 1 PDX4000 + 36 EX320DG	= 0.12+0.05+0.25+0.07+(35x0.02) = 1.19A
1 power supply for 1 TD4100PL + 62 EX320DG	= 0.12+0.07+(61x0.02) = 1.41A



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2) In a digital video intercom system with:

2 TD4100PL push-button panels + 1 PL40PCDG	0.12 + 0,4 = 0.52A
1 PDX4000 doorkeeper exchanger	0.25 = 0.25A
48 EX3160 video intercoms	0.4+47x0.02 = 1.34A

the total operating current is: 2.11A

For correct installation **no. 2 PRS4220 power supply units** are necessary as shown below:

1 for 2 TD4100PL + PL40PCDG + PDX4000	0.1+0.06+0.25+0.25 = 0.66A
1 for 48 EX3160	0.4+47x0.02 = 1.34A

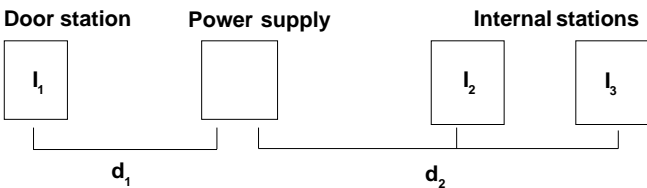
The cross section of the power supply wires (- and +) are directly proportional to the total distance and the total operating current of the units. The cross section of these 2 wires is obtained with the following formula:

$$S = I \times d \times 0.009$$

where **S** is the minimum cross section in mm<sup>2</sup>; **I** is the total current in Ampere of the units connected to that specific line; **d** is the distance in metres between the power supply and the last unit on the line.

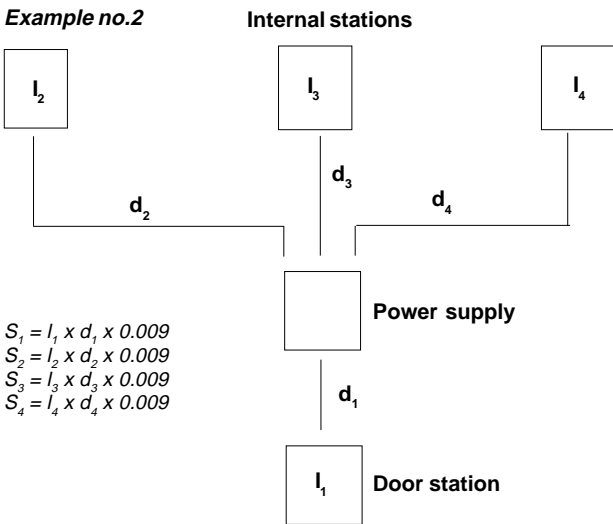
### Example of connection to calculate the cross sections of + and - wires

#### Example no.1



$$S_1 = I_1 \times d_1 \times 0.009 \quad S_2 = (I_2 + I_3) \times d_2 \times 0.009$$

#### Example no.2



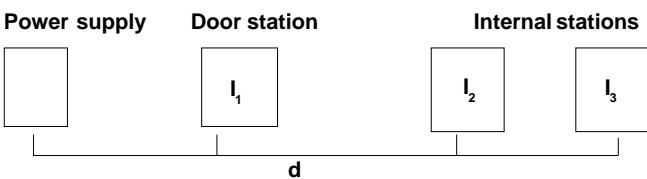
$$S_1 = I_1 \times d_1 \times 0.009$$

$$S_2 = I_2 \times d_2 \times 0.009$$

$$S_3 = I_3 \times d_3 \times 0.009$$

$$S_4 = I_4 \times d_4 \times 0.009$$

#### Example no.3



$$S = (I_1 + I_2 + I_3) \times d \times 0.009$$

## Conductors

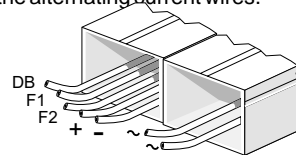
The type of wires used in the system deeply influences the functionality of a digital system.

The cross section of the wires depends on the distance between the units and on the number of modules to be connected. During the designing and computation of the system if the cross section of wires becomes too big or if the current required by the units is close to the maximum current delivered by the power supply, a suitable number of power supply units must be added in order to optimise the power distribution and divide the power consumption.

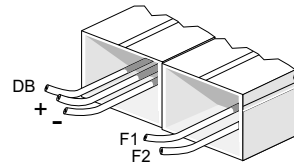
Make sure not to use more wires in parallel to reach the required cross section (i.e. multi-pair telephone cables). Only use one wire with suitable cross section. When using multipolar cables, they must be characterised by low parasite parameters (low capacity per metre, low inductance on Ohm).

When designing a large installation, it is advisable to divide it in sub-installations with their own power supply and connected in a single point (star connection) to the other sub-installations. Priority must be always given to the shortest connections with the required wire cross-sections. If the installation includes additional power supply units, make sure to place them in the proximity of the unit to be powered.

To avoid possible noise on the audio line, place the power supply in the proximity of the door station to avoid a long distance for the two alternate voltage wires of the electrical door release button. Alternatively, use separate raceways for the alternating current wires.



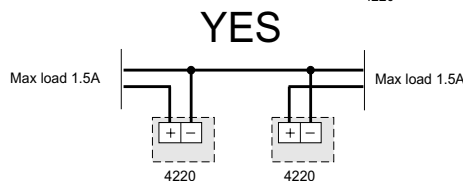
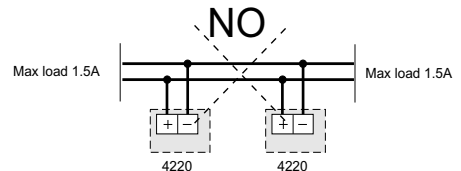
In case of long distances (>800m - >2620ft), in order to avoid possible noise of data signals on the audio, it is advisable to keep audio wires separate from power supply and serial data bus wires.



If the raceway between the push-button panel and the decoding modules exceeds 10 metres (33ft) outside the building, wires must be protected with systems for the suppression of extra currents caused by lightning or other electromagnetic phenomena.

The cable runs in intercom and video intercom systems must be kept separate from the electrical or industrial installation as required by the International Standards.

Each power supply must power a separate group of modules. The only connection to be made between power supply units is the ground reference (- wire). **Never connect the + output between power supply units.**



# INSTALLATION NOTES

## WIRE CROSS SECTION

### Digital intercom system

Distance		Terminals								
		DB; F1; F2			+; - (*)			~ (*)		
m.	Ft	mm <sup>2</sup> S	mm Ø	AWG	mm <sup>2</sup> S	mm Ø	AWG	mm <sup>2</sup> S	mm Ø	AWG
100	330	0.35	0,7	21	0.75	1	18	1	1,2	16
200	660	0.5	0,8	20	1	1,2	16	2	1,6	14
400	1310	0.75	1	18	2	1,6	14	4	2,3	11
600	1970	1	1,2	16	3	2	12	-	-	-
800	2620	1.5	1,4	15	4	2,3	11	-	-	-

### Digital video intercom system

Distance		Terminals								
		DB; F1; F2; EC; 4; RV; SV; H; A			+; -; 14; H; F (*)			~ (*)		
m.	Ft	mm <sup>2</sup> S	mm Ø	AWG	mm <sup>2</sup> S	mm Ø	AWG	mm <sup>2</sup> S	mm Ø	AWG
50	164	0.35	0,7	21	0.75	1	18	0.75	1	18
100	330	0.35	0,7	21	1	1,2	16	1	1,2	16
200	660	0.5	0,8	20	1.5	1,4	15	2	1,6	14
300	990	0.75	1	18	2	1,6	14	3	2	12
400	1310	1	1,2	16	2.5	1,8	13	4	2,3	11

**Notice:** For + and - wires the table shows cross sections for 1A load. For higher currents (not exceeding the maximum allowable by the

power supply) see the formula illustrated previously.

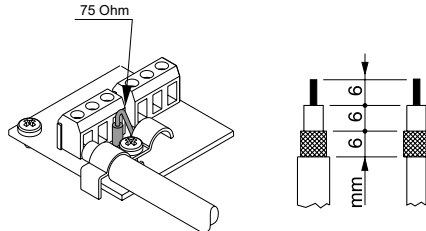
(\*) Wires in bold.

## VIDEO SIGNAL DISTRIBUTION

For the video signal use a TV 75Ω low loss coaxial cable.

### Video intercom terminal board

The resistor for closing of video signal (75Ω) is located on the PCB of the video intercom wall bracket.

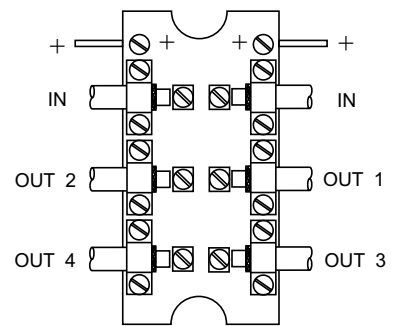


### DV2-DV4. VIDEO DISTRIBUTORS.

They allow for the distribution of the video signal from the riser on 2 or 4 outputs. It can be installed on the wall, on a wall box, with expansion plugs or it can be placed in the junction box.

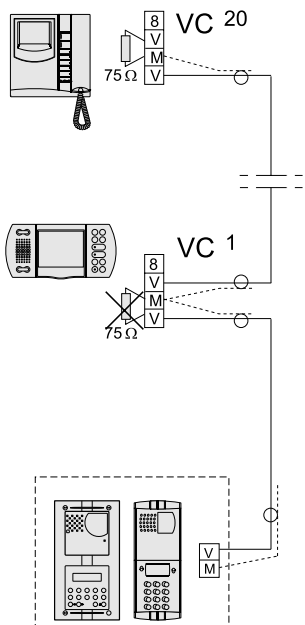
#### Technical data

Power supply 12Vdc±2  
 Operating current **DV2** 50mA  
**DV4** 100mA  
 Insertion loss 0.8dB  
 Maximum input signal 2Vpp  
 Bandwidth >5MHz



### Serial connection of the coaxial cable (input and output from video intercom)

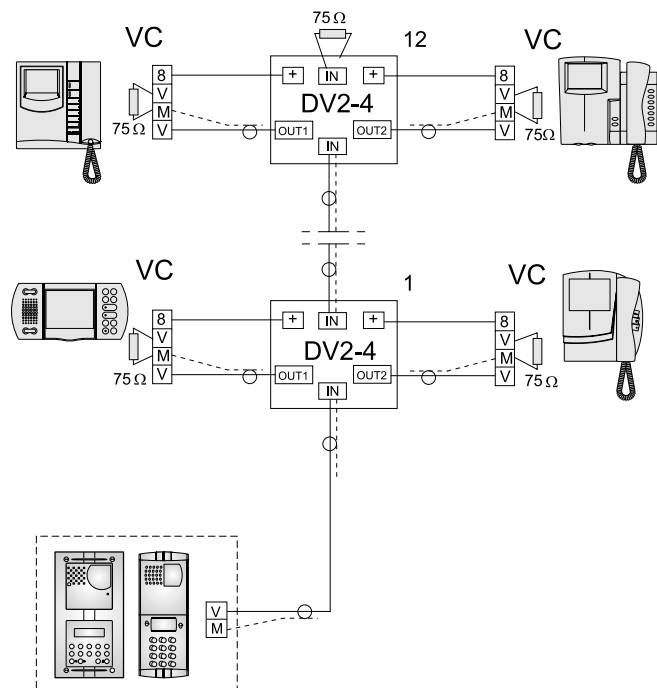
To carry out the video connection in a serial mode it is necessary to cut the 75Ω resistor located on the wall bracket. Leave it only on the last video intercom. A maximum number of 20 video intercoms can be connected serially. In case of more units, a suitable number of art. 476 video-amplifier distributors must be added (see page 106).



### Connection of the coaxial cable with video distributors

For digital video systems it is advisable to use video distributors. Being powered by the video intercoms connected to them (terminal 8), they do not create overloads on the video power supply. Unused outputs must be closed with

75Ω resistor supplied in the kit. A maximum of 12 video distributors can be used. For more units a suitable number of art. 476 video-amplifier distributors must be added (see page 106).



# INSTALLATION NOTES

## 476. VIDEO DISTRIBUTOR-AMPLIFIER.

It allows for the distribution of the video signal coming from the camera on 5 independent lines. It can also be used as video amplifier for long distance installations by connecting one output only.

### Terminals

- F** General ground
- 14** Positive power supply
- IN** Video signal input
- 1-2-3-4-5** Video signal outputs
- Video ground (shield of coaxial cable)

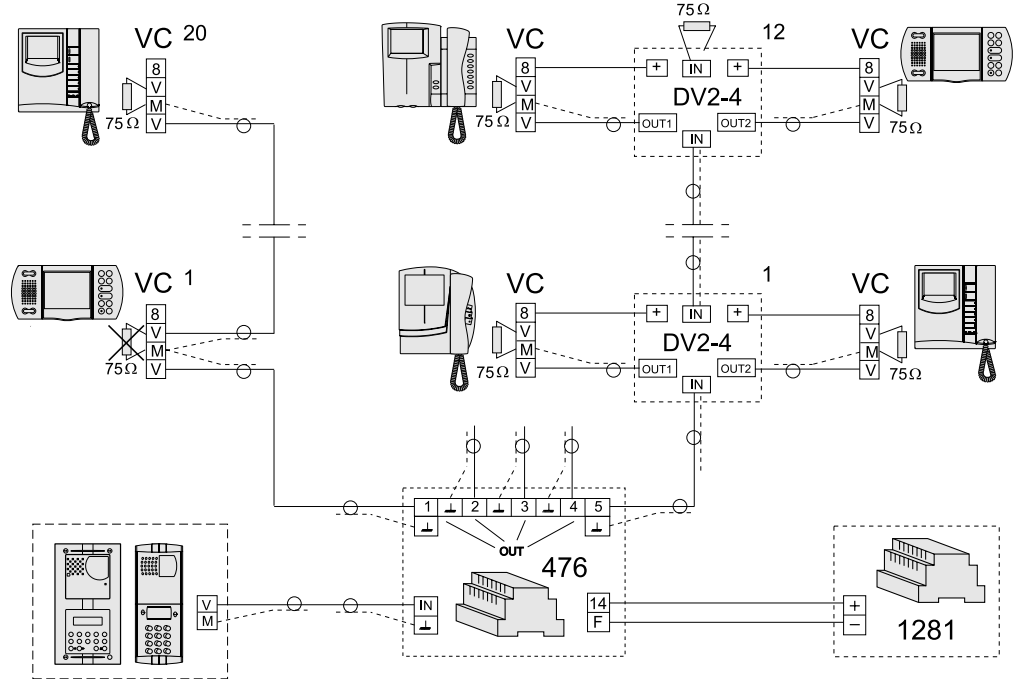
### Technical data

- Power supply 21 ± 3Vdc
- Max. operating current 250mA
- Gain:
  - at max. load from 0 to 3,5dB (adjustable)
  - with 1 output closed to 75Ω from 0 to 9dB (adjustable)
- Bandwidth >5MHz
- Operating temperature: 0°±+50°C
- Maximum permissible humidity: 90% RH
- Housing DIN 8 modules A

### Connection of the coaxial cable with distribution on max. 5 risers (serial and/or with video distributors)

In videosystems with different riser or with a high number of users, it is necessary to use the video distributor-amplifier art.476.

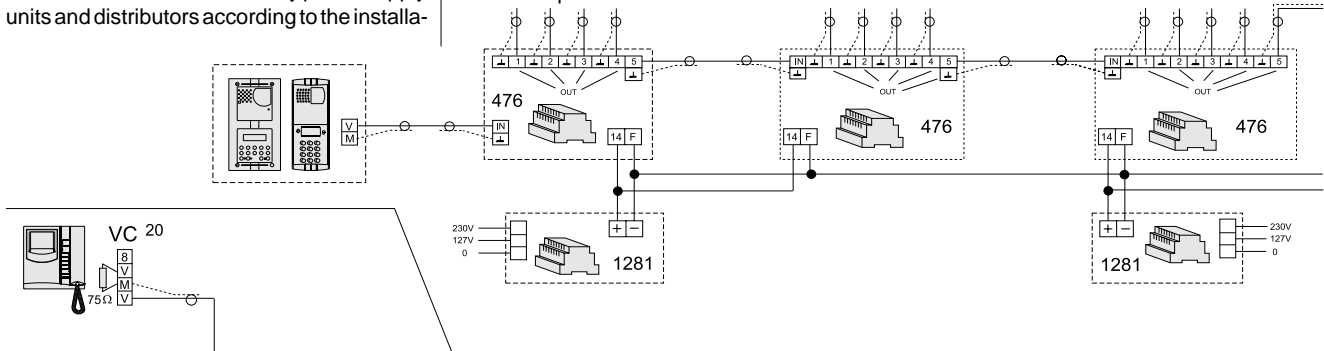
It is not necessary to close the unused outputs on the 75Ω resistor.



### Connection of the coaxial cable with distribution of the video signal on more than 5 risers

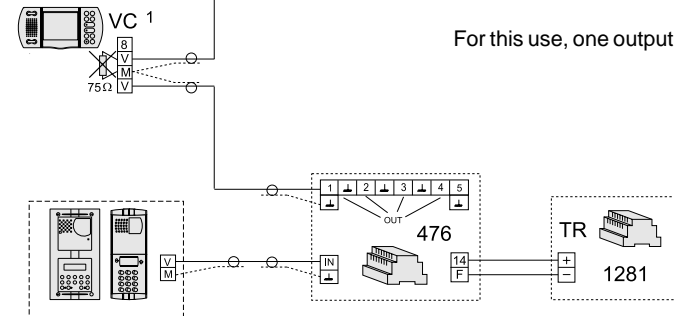
The power supply art. 1281 can power max. no.2 art.476. Add the necessary power supply units and distributors according to the installa-

tion to be made. It is not necessary to close the unused outputs on the 75Ω resistor.



### Connection of the video distributor as video amplifier for long distance systems

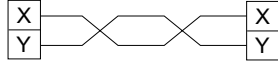
For this use, one output is to be connected; do not close the other outputs on the 75Ω resistor.



# INSTALLATION NOTES

## VIDEO SIGNAL DISTRIBUTION WITH TWISTED PAIR (only series Studio)

If the distance between the camera and the last video intercom in the system is lower than 200m (660ft), the connection can be made with 2x0.35mm<sup>2</sup> wires ( $\varnothing=0,6mm$ ; AWG22) instead of the coaxial cable. For distances from 100m (330ft) to 200m (660ft) a twisted pair must be used.

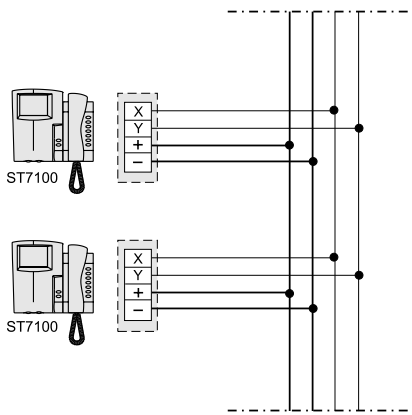


For the connection of the video signal you can choose from:

- connection with junction box
- serial connection (input and output)
- connection with floor distributor

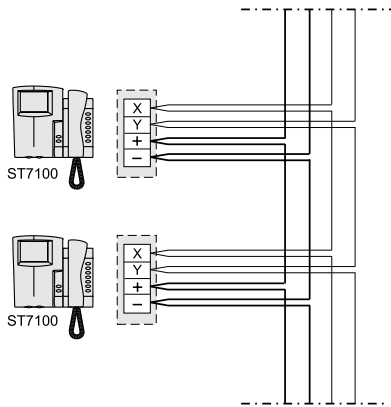
### CONNECTION WITH JUNCTION BOX

All wires are distributed in the floor junction box. Due to the signal loss introduced by each connection, the maximum number of video intercoms that can be connected in serial mode is 20. Two 75Ω resistances must be inserted between X and F and between Y and F in the last video intercom. The maximum distance between the video intercoms and the connector block is 2.5 metres.



### SERIAL CONNECTION

Connections are made on the video intercom brackets, and not in the junction box. Due to the signal loss introduced by each connection, the maximum number of video intercoms that can be connected in serial mode is 20. Two 75Ω resistances must be inserted between X and F and between Y and F in the last video intercom.



### CONNECTION WITH FLOOR DISTRIBUTOR

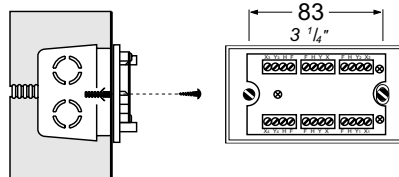
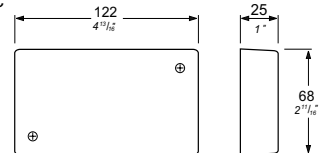
The video wires of each video intercom are insulated from the riser. Connections are made on the DV2D or DV4D floor video signal distributor box.

### DV2D-DV4D. FLOOR VIDEO SIGNAL DISTRIBUTORS.

They allow for the distribution of the video signal taken from the riser on 2 or 4 outputs. They can be installed on the wall on a wall box, with expansion plugs or it can be placed in the junction box.

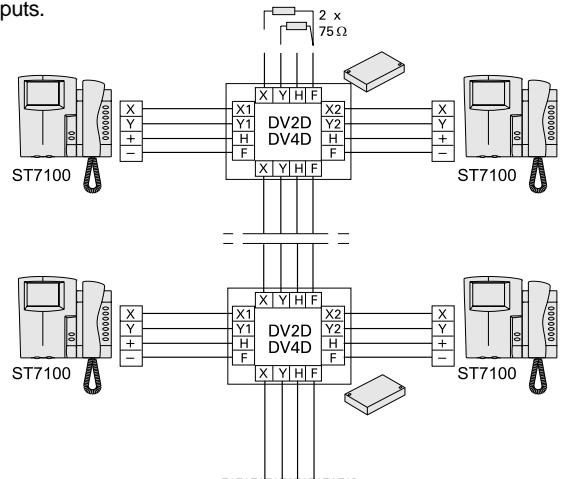
#### Technical data

Power supply	15±21Vdc
Operating current	60mA
Max. input video signal	2Vpp
Insertion loss	0.8dB
Bandwidth	>5MHz



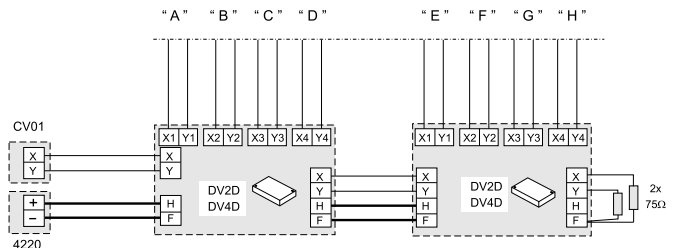
### Connection of the video signal on a single riser

Terminals X and Y of the last distributor must be terminated with the 75Ω resistances supplied with the article. It is not necessary to terminate the unused outputs.



### Connection of the video signal with distribution on several risers

In video systems with different risers you must use 1 or more video distributors art. DV2D or DV4D. Terminals X and Y of the last distributor must be terminated with the 75Ω resistances supplied with the article. It is not necessary to terminate the unused outputs.



Example of connection on 8 risers

