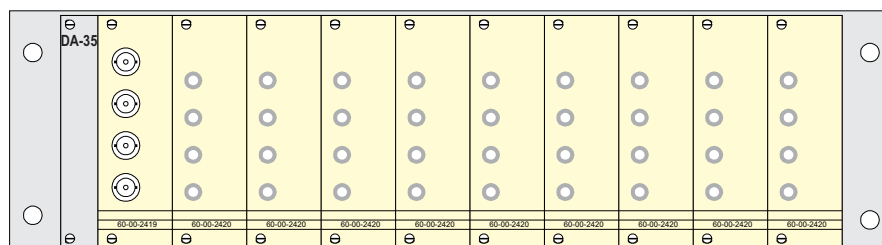


DA-35 and DA-36

Frequency distribution amplifiers

OPTICAL FIBER DISTRIBUTION

- Low-noise and long-distance distribution of reference frequencies
- Drive up to 2 km of optical fiber
- Eliminate ground current loop problems
- Low-loss distribution
- No noise and interference pick-up
- Easy to install - flexible, light-weight and small-diameter cable
- EMP-proof
- Flexible solution
- Economical solution



The DA-35 and DA-36 frequency Distribution Amplifiers offer an economical solution to the problem of low-jitter transfer of frequency reference signals over longer distance. Whether the need is to distribute between remote buildings, floors or rooms, or whether the need is a big point-to-multipoint system with thousand of receivers, or just one single point-to-point distribution, DA-35 and DA-36 will do the job.

The Distribution Amplifier systems DA-35 and DA-36 solve the problem of distributing a reference frequency from a central frequency standard to one or several receiving points.

They offer frequency distribution via optical fiber, or coax cable, with minimal jitter and are designed for reference signals, between 200 kHz and 16 MHz. The standard frequency is 10 MHz (sine). The distribution is completely analog, without the use of PLLs or other types of frequency recovery circuits that may introduce jitter or wander. The signal is reconstructed with the help of a narrow-band, high-Q filter, which heavily suppresses noise and distortion

Advantages of using fiber optics

By using a fiber optic cable as the transmitting medium, a galvanic isolation is created between the transmitting element and the receiving element, which totally eliminates ground current loops - a common problem with coax distribution systems. The fiber is insensitive to crosstalk and ESD, and will not pick up any noise or interference like long-line coax cables do. Optical fibers are easy to install, with their small diameter and highly flexible structure, compared to expensive, bulky and stiff low-loss coax cables.

System structure

The DA-35 and DA-36 are designed to work with any Pendulum Frequency Standard (GPS-12R, 6688, 6689, GPS-88, GPS-89), but will also fit all other brands, that produces a sine wave reference with an amplitude between 0.2 and 2 Vrms.

Pendulum Instruments offers two distribution systems:

- The modular DA-35 for multipoint distribution via up to 36 fibers from the central source.
- The compact DA-36, a cost-effective point-to-point distribution solution.

DA-35 point-to-multipoint distribution

DA-35 is modularly constructed, with plug-in boards to a rack backplane. There are two types of rack enclosures; with 10 card slots or 2 card slots. Both rack enclosures can be used either as "stand-alone" or in a 19" rack stand.

The plug-in boards are either transmitting or receiving the reference signal. Transmitting boards include 4x BNC-output or 4x opto-output connectors. Receiving boards include BNC-input and a combined input/output board with 1x opto-input and 4x BNC-outputs on the same module. See figure 1 for an overview of a typical medium sized DA-35 system.

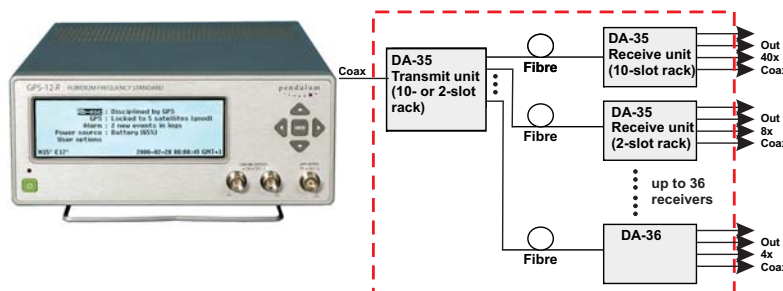


Fig. 1 Point-to-multipoint distribution. DA-35 has a flexible configuration. DA-35 or DA-36 can be used as receivers

DA-36 point-to-point distribution

DA-36 is designed for point-to-point distribution of frequency from one room to another, from one floor to another or from one building to another.

The unit is a combined transmit/receive module and has one fiber and one coax input and one fiber plus 4 coax outputs

This compact unit is very easy to operate. There are no front panel controls, but status LEDs that give the user immediate feedback about the status of the distribution link. The DA-36 can be bench or wall mounted.

The system is very flexible. 1 piece of DA-36 acts as a local coax distribution amplifier with 4 coax outputs.

The typical standard configuration for long distance distribution involves 2 pieces of DA-36, see figure 2.

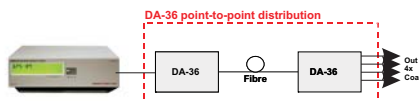


Figure 2: Point-to-point distribution

And when you need a multi-point distribution, you can cascade more DA-36:s. See figure 3.

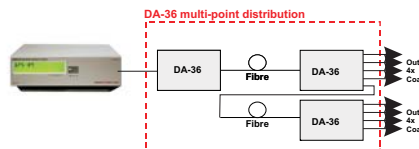


Figure 3: Multi-point distribution via cascading

Designed for safety and redundancy

The DA-36 has two reference inputs, one electrical and one optical. In a typical situation, the central reference frequency (from e.g. a Cesium, GPS or Rubidium clock) has been distributed by fiber to the receivers optical input. At the receivers electrical input you could connect a secondary back-up standard e.g. an oven controlled crystal oscillator (OCXO). As long as there is a valid input signal, the optical reference has priority and will be distributed. If it should fail for some reason, the back-up clock at the electrical input will automatically take over and assure that a clock signal is distributed to the outputs, see fig. 4.

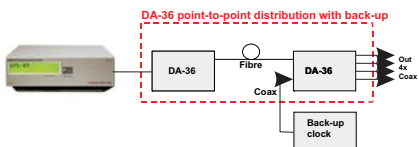


Figure 4: Point-to-point distribution with back-up clock

Technical Specifications

Inputs

| | |
|-------------------------|--|
| Electrical: | BNC coax connector |
| Optical | ST connector |
| Priority (DA-36) | Optical input signal has priority over electrical input signal |

Input signal range

| | |
|-------------------------------|--|
| Bandwidth: | 200 kHz to 16 MHz sine (10 MHz standard, other frequencies on request) |
| Impedance: | 50 ohm nominal |
| Amplitude (BNC input): | 200 mVrms to 2 Vrms (sine) |

Outputs

| | |
|---------------------------------|--|
| Electrical: | BNC coax connector |
| Optical: | ST connector |
| Period-to-period Jitter: | For 10 MHz output: <(50 ps + optical jitter). For 2.048 MHz output: jitter <0.01 UI (PRC requirements acc. to G.811). Optical jitter is due to optical attenuation and depends on quality and length of fiber used and = 0ps for 1m and is typically <100 ps for 1km fiber of good quality |
| Amplitude (coax output): | DA-35: 1 V _{p-p} nominal DA-36: 1 V _{rms} nominal |

Fiber characteristics

| | |
|---------------------------------|-----------------|
| Fiber type: | Multimode fiber |
| Connector type: | ST |
| Max length: | 2 km |
| Max optical attenuation: | < 3.5dB |

Configuration - DA-35

(A DA-35 mainframe is configured to either transmit or receive the reference frequency)

| | |
|-----------------------------|---|
| Mainframe: | DA-35/10 10-slot 19" rack DA-35/02 2-slot minirack |
| Transmitter modules: | DA-35/22 4x BNC-out DA-35/24 4x opto out |
| Receiver modules: | DA-35/21 4x BNC-in DA-35/24 1x opto in plus 4x BNC out |

Configuration - DA-36

(DA-36 is a combined transmit/receive unit with no other configuration possible)

| | |
|-----------------|---------------------------|
| Inputs: | 1x opto in 1x BNC-in |
| Outputs: | 1x opto out 4x BNC out |

User interface - DA-36

| | |
|-------------------------|--|
| Coax Status LED: | Green: A valid electrical signal is present on the input. Red: Input signal is lost or too weak |
| Opto Status LED: | Green: A valid optical signal is present on the input Red: Received light level below threshold |

Power supply

| | |
|----------------|----------------------|
| Safety: | EN60950, UL 1950, CE |
|----------------|----------------------|

| | |
|---------------------------|---|
| Line voltage: | 100-240V, 47-63 Hz |
| Power Consumption: | DA-36: <35W DA-35: depends on configuration, max 75W |

Environmental Conditions

| | |
|-------------------------------|----------------|
| EMC: | EN55022, CE |
| Operating Temperature: | 0°C to +50°C |
| Storage Temperature: | -40°C to +70°C |

Dimensions and weight - DA-35/10

| | |
|-------------------------|----------------|
| WxDxH | 446x300x135 mm |
| Weight | 6.6 kg |
| Shipping weight: | < 10 kg |

Dimensions and weight - DA-35/02

| | |
|-------------------------|---------------|
| WxDxH | 375x240x50 mm |
| Weight | 4 kg |
| Shipping weight: | < 6 kg |

Dimensions and weight - DA-36

| | |
|-------------------------|----------------------------------|
| WxDxH | 125x170x30 mm |
| Weight | 650g (1.1 kg incl power adapter) |
| Shipping weight: | < 2kg |

Ordering information

10 MHz standard configuration:

| | |
|-----------------|-------------------------------------|
| DA-35/10 | 10-slot mainframe incl power supply |
| DA-35/02 | 2-slot mainframe incl power supply |
| DA-35/21 | 4x BNC inputs |
| DA-35/22 | 4x BNC outputs |
| DA-35/23 | 1x opto input, 4x BNC outputs |
| DA-35/24 | 4x opto outputs |
| DA-35/11 | Blindpanel (for unused slots) |
| DA-35/12 | Rackmount kit for DA-35/02 |

| | |
|--------------|--|
| DA-36 | Distribution amplifier incl power supply |
|--------------|--|

| | |
|--------------------|----------------------------------|
| DA-35/cx-5M | 5MHz sine, 50W distribution |
| DA-35/cx-2M | 2.048 MHz sine, 75W distribution |
| DA-36-5M | 5MHz sine, 50W distribution |
| DA-36-2M | 2.048 MHz sine, 75W distribution |

Included with shipment

18 months warranty
Wall mount kit (DA-36 only)
Users Manual on CD

NOTE: Fiber cable is not included

4031 600 36101 - rev. 27 July 2007

US: Pendulum Instruments Inc

5811 Racine Street; Oakland, CA 94609-1519, USA
Voice: (510)-428-9488 Fax: (510)-428-9469

International: Pendulum Instruments AB

PO Box 20020, SE-16102 Bromma, Sweden
Voice: +46 8 598 51057 Fax: +46 8 598 51040

Pendulum Instruments
www.pendulum-instruments.com

- Experts in time & frequency calibration,
measurement and analysis