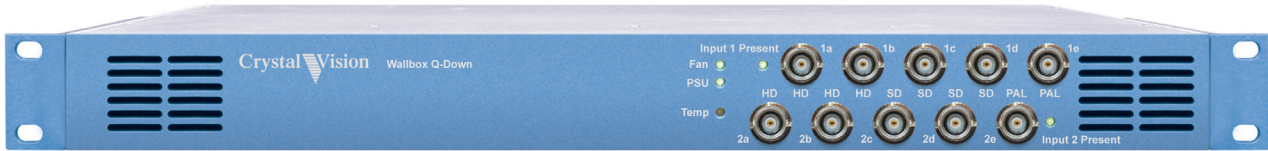# CRYSTAL VISION BROCHURE

Wallbox Q-Down
Dual channel wallbox short-delay broadcast down converter and distribution amplifier

There's no product like Wallbox Q-Down, providing a convenient mixture of easily accessible down converted signals and input loop-throughs at the front of the wallbox – making it easy to swap signals around as required.

This dual channel down converter and distribution amplifier gives a useful selection of outputs, with each channel providing two input loop-throughs, along with two SDI and one PAL/NTSC output.

Wallbox Q-Down includes all the benefits of Crystal Vision's acclaimed down conversion, including broadcast quality conversion and short processing delay as well as numerous useful features including four group audio handling, AFD insertion and reading, variable video delay and signal probe.

- Dual channel wallbox broadcast down converter and distribution amplifier
- Two independent 3Gb/s, HD or SD fibre inputs
- Provides easily accessible down converted signals and input loop-throughs on the wallbox front panel
- Five outputs per channel: two input loop-throughs, two down converted SDI digital outputs and one down converted PAL/NTSC analogue output
- Excellent image quality, thanks to sophisticated two dimensional filtering, four vertical filter characteristics and video proc-amp
- Short processing delay (just 16 or 52 SD lines)
- Passes four groups of embedded audio
- Flexible aspect ratio conversion, including custom aspect ratios and AFD insertion and reading
- Match other delays in system with two fixed delay settings plus variable video delay
- Flag up faulty video and audio signals with signal probe
- Flexible remote control, including web browser, remote control panel and SNMP

THE WAY TO GET ACCESSIBLE SIGNALS

Wallbox Q-Down is a convenient way to distribute signals within a studio for local monitoring. This 1U high, 439mm wide and 200mm deep wallbox has been designed to sit on wall-mounted shallow racks, which reduce the amount of space lost on the studio floor.

Taking in the SDI video sources that have distributed to the studio floor over fibre, Wallbox Q-Down provides easily accessible HD, SD and PAL/NTSC signals via BNC connectors on the front panel, with these outputs used as and when needed and easily swappable. The studio operator will get the video signal of interest routed to a specific Wallbox Q-Down and then pick up the format they need to get it on to their display, to help them do whatever they need to do – whether providing a feedback monitor for the presenter or allowing the microphone boom operator to check the microphone is not in shot.

WHAT OUTPUTS DO YOU GET?

Wallbox Q-Down has two fibre inputs carrying 3Gb/s, HD or SD video, which meet the SMPTE 297-2006 short-haul specification, allowing operation with single-mode and multi-mode fibre.

As a down converter, Wallbox Q-Down can convert 1080p, 720p and 1080i video to SD digital and analogue composite. The down converter is bypassed when the input and output are the same standard so that the signal is passed without degradation. As a distribution amplifier, it provides two reclocked loop-throughs of each input.

A set of five fixed outputs are provided for each channel: two input loop-throughs, two down converted SDI digital outputs and one down converted PAL/NTSC analogue output. These outputs are conveniently available via BNCs on the wallbox front panel, with the outputs clearly labelled so you can see what you've got.

EXCEPTIONAL PERFORMANCE

Wallbox Q-Down is designed for broadcasters who want to keep the maximum quality of their 3Gb/s or HD signals when down converting.

Using Crystal Vision's proprietary processing, Wallbox Q-Down provides a high level of image quality – avoiding aliasing while retaining picture sharpness. The sophisticated two dimensional filtering gives broadcast results without the complication of looking at multiple fields or movement detection – resulting in reliable, artefact-free conversion. There's the choice of four alternative vertical bandwidth filter characteristics for those who want to optimise the performance for their material. RGB and YUV lift and gain controls are available to help maintain colour fidelity.

SHORT PROCESSING DELAYS AND VARIABLE VIDEO DELAYS

With Wallbox Q-Down there is no need to compensate audio or other signals for the video delay. The short processing delay of just 16 SD lines (or 52 lines with Letterbox conversions) keeps everything in sync, making your system design much simpler – and makes it easy to detect real lip-sync errors when you're monitoring the video and listening to separate audio.

For those that want to match other equipment delays in the system there are two fixed video delay settings: 'minimum' (16 or 52 SD lines processing delay, depending on the conversion) and 'frame' – which can be used to match a variety of equipment or alternatively to connect with equipment that has no delay. There is also a fully flexible variable video delay of up to one video frame, adjustable in one line steps.

ASPECT RATIO CONVERSION

Wallbox Q-Down includes the ability to deal with any 3Gb/s or HD to SD aspect ratio conversion requirements. You can select a 16:9 Anamorphic output for 16:9 SD systems and either a 16:9 to 4:3 Letterbox, 16:9 to 14:9 Letterbox compromise or 16:9 to 4:3 Full Screen with centre cut for 4:3 SD systems.

It will also allow you to customise the shape of your output picture. Each of the standard aspect ratios can be individually adjusted away from the default values to create customised versions by using four independent sets of size, position and crop controls.

Wallbox Q-Down will ensure the picture is always the right shape by coping with both analogue and digital SD blanking widths – particularly useful for feeds that are up and down converted multiple times. When used with an Anamorphic conversion, the analogue blanking width option puts the active 1920 pixels from a 1080i or 1080p picture into 702 pixels of SD (rather than 720 pixels), with the rest of the pixels used to represent analogue blanking – which prevents the SD signal from losing the sides of the picture. All other aspect ratios are adjusted by a similar amount.

Wallbox Q-Down additionally offers AFD code activated aspect ratio conversion.

ACTIVE FORMAT DESCRIPTION AND WIDESCREEN SIGNALLING

You can let Wallbox Q-Down automatically choose the appropriate aspect ratio for you according to the SMPTE 2016 AFD data embedded in the 3Gb/s or HD input video.

HD programmes are often made of a mixture of true High Definition sources and SD-originated sources that have been up converted, and the SMPTE 2016 AFD code in the signal gives information about which areas of the screen contain a picture and which areas have black 'padding'. The down converter needs to read this signal and select the correct aspect ratio conversion to be used with the down conversion.

It offers three options for the SD output. With Auto 16:9 mode the SD outputs can be set to be always 16:9 and in this case it will do the down conversion without ever changing the aspect ratio. Alternatively the SD output can be set to be always 4:3 (Auto 4:3 mode), in which case it will down convert and perform either a Letterbox or centre cut, depending on the source material. There is also a third, adaptive option: Auto Adaptive mode. Here, if the HD input is 16:9 full frame the picture is down converted with no aspect ratio conversion and is output as 16:9 SD. If the SMPTE 2016 data indicates that the HD input is a 16:9 Pillarbox, however, a centre cut is performed and the output is 4:3 SD.

Although it would normally be a requirement for an automatic system to label all the 3Gb/s or HD video images to show their format and control the down converter, with Wallbox Q-Down it is only necessary to label those that are not full frame 16:9 images. When the input is not labelled the down converter uses its default assumption that an HD image is a full frame 16:9. It is therefore possible to have a powerful system with the majority of signals not containing SMPTE 2016 information.

It can also be used to provide picture format information to downstream equipment, by inserting either Widescreen Signalling or one of 16 SMPTE 2016 AFD codes. The WSS can be inserted into the SD analogue and digital outputs either manually or by automatically following the incoming AFD.

FOUR GROUP EMBEDDED AUDIO HANDLING
Wallbox Q-Down can be used with up to four groups of embedded audio per video channel. With a 3Gb/s or HD input it will de-embed the four groups of audio, converting them to the appropriate format before re-embedding them into the digital SD output. With a Standard Definition input it will pass the four groups of embedded audio transparently to the digital SD output.

FLAG UP ANY FAULTY VIDEO OR AUDIO SIGNALS
Wallbox Q-Down also includes signal probe functionality, making it useful for flagging up faulty signals. The 14 status indications available include input missing, video black, video frozen, aspect ratio information, audio input missing, audio silent and input incompatible, with warnings of any problems available using SNMP traps. All parameters, apart from Input Missing and Input Incompatible, can be delayed before an alarm is asserted to prevent false alarms during quiet audio periods or brief video pauses.

CONTROL
Wallbox Q-Down is very straightforward to operate, with control options including the VisionPanel remote panel, SNMP and the VisionWeb web browser control. There are also helpful visual indications of the wallbox status provided on the front panel, with two input present LEDs, plus LEDs indicating the state of the PSU, fan and temperature.

Up to 16 user-defined presets per channel, containing the board setup data, may be stored and recalled.

SPECIFICATION

MECHANICAL
Crystal Vision wallbox. Height 44.5mm (1U), width 439mm, depth 200mm
Weight: 2.75kg
Power consumption: 30 Watts
Includes one 80 Watt power supply, with processor to report the PSU status and wallbox fan status

Power input 90-264VAC, 47-63Hz
Connectors: Ten easily accessible BNCs on the front for the video signals
Mounting: Designed to fit in a shallow 19" rack

VIDEO INPUTS
One 3Gb/s or HD or SD fibre input per channel with reclocking
270Mb/s or 1.5Gb/s or 3Gb/s serial compliant to EBU 3267-E, SMPTE 259M, SMPTE 292M and SMPTE 424M
Fibre inputs meet the SMPTE 297-2006 short-haul specification, allowing operation with single-mode and multi-mode fibre
Connector type: Dual LC
Optical wavelength: 1260-1620nm
Input level maximum: -1dBm
Input level minimum: Typical -20dBm (-18dBm 3Gb/s pathological)

VIDEO OUTPUTS
Outputs are accessed via the ten BNCs on the front of the wallbox (five BNCs per channel)
Per channel: two equalised and reclocked loop-throughs of the 3Gb/s, HD or SD input, plus two down converted SDI digital outputs and one down converted PAL/NTSC analogue output
Output frame rate same as input frame rate
Setting the digital output to a higher format than the input will be flagged as incompatible and the output will be replaced with black, blue or muted as selected in the output incompatibility mode menu
Composite: SD only. 1 Volt +/- 2% with syncs into 75 ohm. Selectable setup and Betacam levels

DOWN CONVERSIONS
1080p50 to 625/50
1080p59.94 to 525/59.94
720p50 to 625/50
720p59.94 to 525/59.94
1080i50 to 625/50
1080i59.94 to 525/59.94

ANALOGUE COMPOSITE PERFORMANCE (SD ONLY)
Sampling: Video input is 10 bit processed for 12 bit output DACs
Frequency response:
Luminance: +/- 0.3dB to 5.5 MHz.
Chrominance: +/- 0.4dB to 2.5 MHz
Noise: <-67dB weighted luminance or chrominance
Differential gain: <2% typ
Differential phase: +/- 1 degree typ.

PICTURE PROCESSING WHEN DOWN CONVERTING
Sophisticated two dimensional filtering gets broadcast results and avoids the complication of looking at multiple fields or movement detection, resulting in reliable, artefact-free conversion with broadcast filter quality
When down converting the performance can be optimised by choosing one of four alternative filter characteristics (sharpest, sharp, soft, softest)
When the input and output are the same standard the wallbox processing can be bypassed, so that the signal is passed without degradation
RGB and YUV lift and gain controls allow independent digital image adjustments in both the RGB and YUV domains, essential for maintaining colour fidelity. In normal operation the RGB and YUV proc-amps are active simultaneously on both the digital and analogue outputs. In bypass mode the proc-amps will only be active on the analogue output

Each video channel can be adjusted independently

HD TO SD ASPECT RATIO CONVERSION
16:9 Anamorphic (for 16:9 SD systems) and either 16:9 to 4:3 Letterbox, 14:9 to 4:3 Letterbox compromise or 16:9 to 4:3 Full Screen with centre cut (for 4:3 SD systems) The four standard aspect ratios can be adjusted from their default values by using four independent sets of size, position and crop controls:
Vertical and horizontal picture size adjustment: continuous adjustment of approximately +/- 10% of nominal image size
Vertical and horizontal picture position adjust + or - 50 lines and pixels
Vertical and horizontal picture crop adjust + or - 100 lines and pixels
The colour of any picture border present can be adjusted by varying its RGB component
Copes with both analogue and digital SD blanking widths. When used with an Anamorphic conversion, the analogue blanking width option puts the active 1920 pixels from a 1080i or 1080p picture into 702 pixels of SD (rather than 720 pixels), with the rest of the pixels used to represent analogue blanking – which prevents the SD signal from losing the sides of the picture. All other aspect ratios are adjusted by a similar amount
Each video channel can be adjusted independently

ACTIVE FORMAT DESCRIPTION AND WIDESCREEN SIGNALLING
With 3Gb/s or HD sources it can select its SD output aspect ratio according to the SMPTE 2016 AFD data embedded in the input video
Response to SMPTE 2016 AFD codes:
Auto 16:9 mode: Will give an Anamorphic aspect ratio conversion for all SMPTE 2016 AFD input codes and the output WSS will be set to full format 16:9
Auto 4:3 mode: Output aspect ratio and WSS data will depend on the input AFD code. Undefined/reserved and full frame AFD codes will produce a Letterbox aspect ratio with the output WSS set to box 16:9 centre. The Pillarbox 4:3, Pillarbox 14:9 and Letterbox >16:9 AFD codes will give a centre cut conversion and set the output WSS to full format 4:3
Auto Adaptive mode: Will give an Anamorphic aspect ratio for any full frame input, with the output WSS set to full frame 16:9. The Pillarbox 4:3 code will give a centre cut conversion and set the output WSS to full format 4:3. The undefined/reserved, Pillarbox 14:9 and Letterbox >16:9 codes will make no change and the previous conversion will remain. On power up the default conversion will be Anamorphic
SMPTE 2016 AFD data can also be inserted into the output video for aspect ratio correction by downstream equipment. One of 16 AFD codes is embedded in an ANC data packet, which is carried in the vertical blanking. It inserts the data in the default line
Widescreen signalling information can be inserted into the analogue and SDI outputs (625 line applications only). WSS can be inserted manually or be set to automatically follow the incoming AFD data. If WSS data should be present on the input video this can either be passed to the output unchanged or substituted for a user selectable code. WSS data can also set to be blanked
Each video channel can be adjusted independently

FIXED AND VARIABLE VIDEO DELAYS
There are two fixed video delay settings available:
- 'minimum' – the video processing delay. With a 3Gb/s or HD input the delay is 16 SD lines (Anamorphic or Full Screen) or 52 SD lines (Letterbox). With an SD input the delay is 3.8us
- 'frame' – can be used to match a variety of equipment or to connect with equipment that has no delay
An additional variable video delay of up to one video frame, adjustable in one line steps, is also available to match other equipment in the system
Each video channel can be adjusted independently

EMBEDDED AUDIO PASSING

Down conversion: De-embeds and re-embeds the first four numbered audio groups on each video channel. The minimum audio delay is 2.5ms. The audio delay will be 2.5ms if the video delay is less than 2.5ms – otherwise the audio delay will equal the video delay

Bypass: Audio bypassed in HANC space, with the same delay as the video

SIGNAL CHECKS

Checks can be performed on 14 video and audio parameters per channel, with warnings of any problems able to be provided via SNMP traps

The parameters for each video channel are: Input Missing, Input Incompatible, Video Black, Video Frozen, Aspect Ratio Information, Input Audio Missing, Silence Group 1 Channels 1 and 2, Silence Group 1 Channels 3 and 4, Silence Group 2 Channels 1 and 2, Silence Group 2 Channels 3 and 4, Silence Group 3 Channels 1 and 2, Silence Group 3 Channels 3 and 4, Silence Group 4 Channels 1 and 2, Silence Group 4 Channels 3 and 4

All parameters, apart from Input Missing and Input Incompatible, can be delayed before an alarm is asserted to prevent false alarms during quiet audio periods or brief video pauses

OPERATING CONDITIONS

0 to 40°C non-condensing

Fan on front panel, with ventilation front to front

WALLBOX LED INDICATION OF:

Input 1 present

Input 2 present

Power supply present

Fan working

Wallbox temperature okay

PRESETS

Each channel has 16 presets available, where the current channel settings can be saved in one of 16 locations to be recalled as required
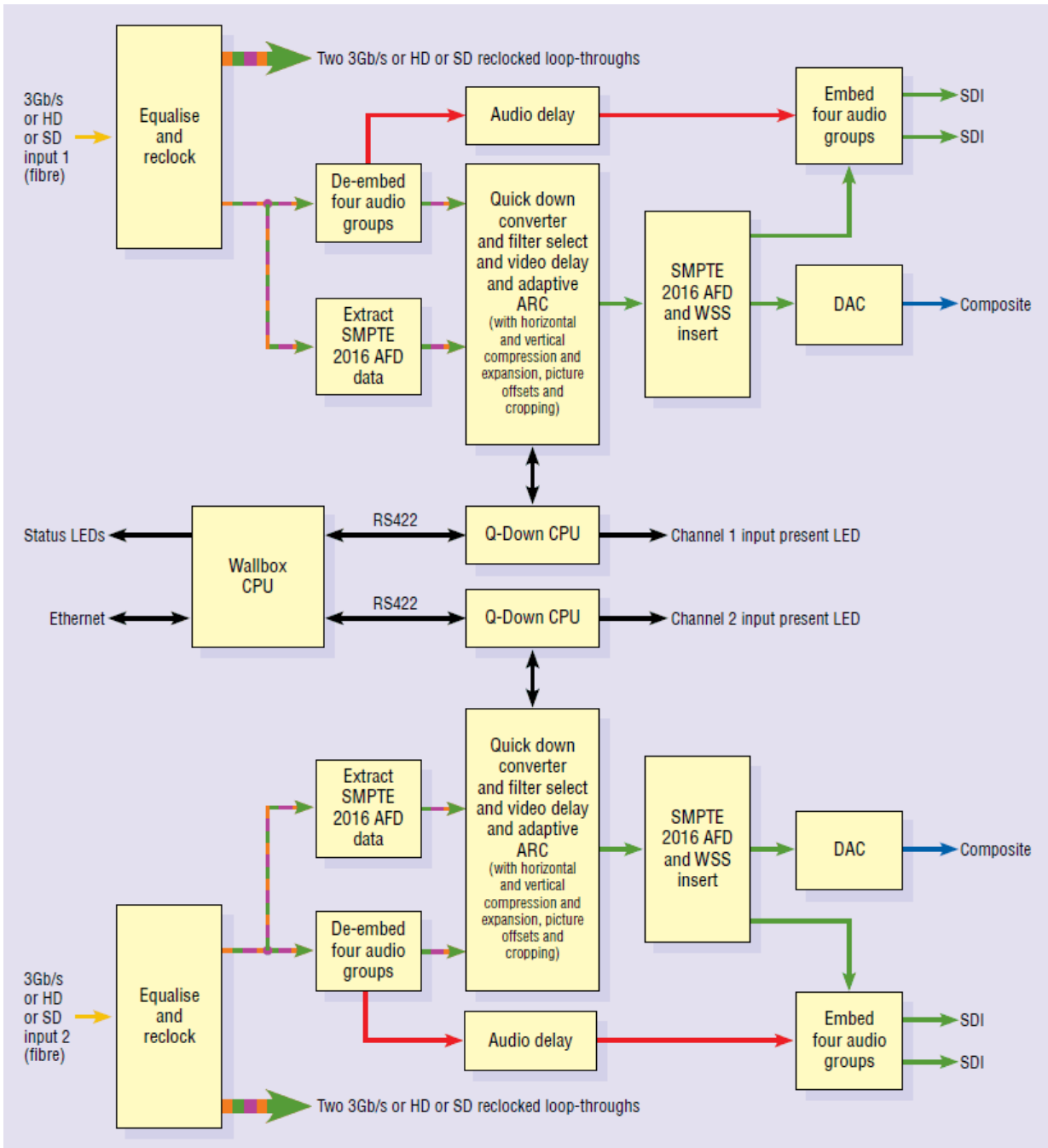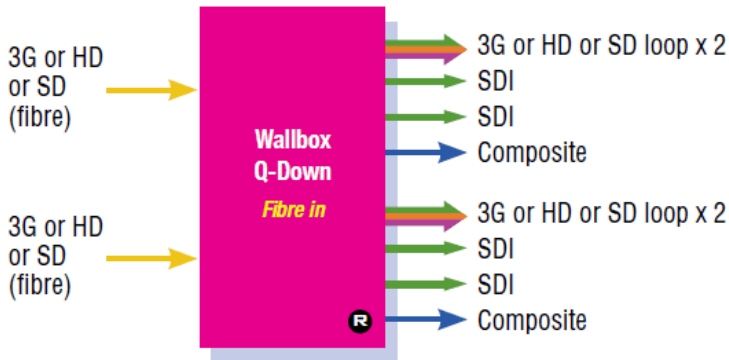
REMOTE CONTROL AND MONITORING

Remote control over 10/100 Ethernet link

VisionWeb Control is available via the web server on the wallbox and allows operation using a standard web browser on a PC or tablet

Control available from VisionPanel remote panel

SNMP monitoring and control included as standard

THE INPUTS AND OUTPUTS

Wallbox Q-Down (Fibre in) block diagram

- Input: 3G or HD or SD (fibre)
  - 3G or HD or SD loop x 2
  - SDI
  - SDI
  - Composite
- Input: 3G or HD or SD (fibre)
  - 3G or HD or SD loop x 2
  - SDI
  - SDI
  - Composite

Detailed Q-Down signal-flow diagram

- 3Gb/s or HD or SD input 1 (fibre) → Equalise and reclock
  - Two 3Gb/s or HD or SD reclocked loop-throughs
  - De-embed four audio groups
  - Extract SMPTE 2016 AFD data
  - Audio delay
  - Quick down converter and filter select and video delay and adaptive ARC (with horizontal and vertical compression and expansion, picture offsets and cropping)
  - SMPTE 2016 AFD and WSS insert
  - Embed four audio groups → SDI, SDI
  - DAC → Composite

- Status LEDs ← Wallbox CPU
- Ethernet ← Wallbox CPU
- Wallbox CPU — RS422 — Q-Down CPU → Channel 1 input present LED
- Wallbox CPU — RS422 — Q-Down CPU → Channel 2 input present LED

- 3Gb/s or HD or SD input 2 (fibre) → Equalise and reclock
  - Two 3Gb/s or HD or SD reclocked loop-throughs
  - Extract SMPTE 2016 AFD data
  - De-embed four audio groups
  - Audio delay
  - Quick down converter and filter select and video delay and adaptive ARC (with horizontal and vertical compression and expansion, picture offsets and cropping)
  - SMPTE 2016 AFD and WSS insert
  - DAC → Composite
  - Embed four audio groups → SDI, SDI

ORDERING INFORMATION

Wallbox Q-Down   Dual channel wallbox short-delay broadcast down converter and distribution
amplifier for 3Gb/s, HD and SD
VisionPanel   3U Ethernet remote control panel with touch screen
VisionWeb Control   VisionWeb web browser control included within wallbox software

Performance and features are subject to change. Figures given are typical measured values. WALLBOXQ-DOWNPROV0416