

Internationale Fachzeitschrift für die Technologie
von Aufzügen und Fahrtreppen
International trade magazine for the technology
of elevators and escalators



lift *report*



Belegexemplar/Copy

Bitte beachten Sie Seite/ 20
Please, take a look to page



Liftmaterial
a WITTUR brand

IoT application for lift cars

Gateway, the magic mirror

Fabio Liberali¹⁾ und Alessandro Cremaschi²⁾

We present here Gateway, an IoT (Internet of Things) technology applied to glass mirrors in lift cars (patented in Italy – European patent pending). It transforms common lift car mirrors into interactive touch-screen displays (managed remotely via internet).

Unlike traditional lift cars video screens, the system (Gateway) has many different purposes:

- ▶ touch-screen interactive display;
- ▶ digital signage and communication;
- ▶ emergency connection to 24-hour servicing (through an additional micro camera);
- ▶ maintenance support (direct video/audio connection between HQ and maintenance personnel on site).

The system is extremely light and thin, with no impact on lift car weight and space. Gateway is a tailor-made product that can be easily adapted to all situations (new cars and modernisation).

1. Introduction

1.1 Traditional lift cars

Lift cars are traditionally equipped with pushbutton to control the lift operation and to handle emergencies. However, these facilities in cars have the drawback of limiting communications between the user and the operational centre merely to an audio system.

Furthermore, warnings, messages, information and similar, are traditionally displayed in the lift car by means of posting paper notices or using closed-circuit screens, exclusively devoted to this function.

The main object of Gateway is to provide a lift car where, unlike traditional equipment of this type, communication is not limited to audio signals but also includes video signals and internet connection, to provide features allowing the user to interact with the outside world and vice versa.

Another object of the invention is to provide a car, of the above-mentioned type, having, within a single system of communication, the function of displaying notices and general informa-

tion messages, both useful for the user and commercially relevant, whose dimensions do not affect the interior design or are undesirable in the smallest cars.

This new feature is particularly relevant, as provides the lift owner the possibility to sell commercial communication/advertising with a quick pay-back for his investment.

1.2 The IoT revolution

The Internet of Things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and connectivity which enables these objects to connect and exchange data. Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing internet infrastructure [1][2][3].

Experts estimate that the IoT will consist of about 30 billion objects by 2020 [4]. It is also estimated that the global market value of IoT will reach \$7.1 trillion by 2020 [5].

A growing portion of such IoT devices are created for consumer use. Examples of consumer applications include connected car, entertainment, home automation, wearable technology, quantified self, connected health, and appliances such as washer/dryers, robotic vacuums, air purifiers, ovens, or refrigerators/freezers that use Wi-Fi for remote monitoring [6].

Gateway applies such technology to lift cars.

2. Connect the Lift Car to the Outside world

Traditional lift systems, cars are passive, i.e. they lack means suitable for communication, able to provide the user with audio and video signals or similar. If present, the auxiliary communication means (traditional TV screen, touchpad, etc) affects the appearance and design of the space inside the lift car. Such devices have a limited quality in terms of design opportunities, video dimensions and brightness, tailor-made solutions. Moreover, TV screens



Figure 1: Connecting the lift car to the outside world

and touchpad are exposed to various risks (e.g. vandalism and robbery).

Gateway provides new solutions. It hides the whole hardware behind a mirror (see above for glass protection technical details), avoiding the above-mentioned risks. It provides architects and designers a new opportunity to create elegant and luxury lift cars, there included the "Wow effect", deriving from the new communication and digital signage system.

Furthermore, Gateway opens the door to multiple and real-time management of communication on every single lift car, from a single remote point.

The invention relates to a car for lift and similar having enhanced communication and interactive features. The field of the invention is the field of cars for lifts and goods lifts (Lift Directive 2014/33/EU) and the field of carriers for lifting platforms (Machinery Directive 2006/42/EC).

Gateway applies the IoT technology to lift car mirrors, transforming them into new, powerful, revolutionary devices. Turns a normal mirror into a completely new multimedia tool, connected to the internet.

The external aspect (if switched off) is a traditional car lift mirror, but unlike conventional systems, this new solution offers new functions never seen before in a car, coupled with an elegant layout.

2.1 Video with touch-screen technology

As an optional Gateway becomes a full

1) LU-VE Group, Italy
2) TGD, Italy



Figure 2: Gateway rendering

screen touch video which can create interaction between the user and the outside virtual world (via the web). This feature consent maintenance operators to read operational parameter directly on site and open the door to many other options and services that need an interaction between the system and the user.

2.2 System features

The system integrates professional display, specially designed to operate 24 hour a day and 7 days a week with high brightness efficiency.

The video system can be permanently active, or (depending on owner need/requirements) be activated by sensors (proximity, light, weight, etc).

The touch mode can be activated/deactivated remotely or locally (depending on owner need/requirements).

The displays features are as follows:

- ▶ Full HD (1920x1080 resolution);
- ▶ Connectivity options (either offline or online connection): LAN, Wi-Fi, HDMI, DVI-D, OPS, USB, SD CARD, IR, Audio, RJ45;
- ▶ Displays dimensions (touch-screen video area - standard options): 42", 49" and 55" (other options available);
- ▶ Display orientation: horizontal or vertical.

2.3 Frame & mirror structure

2.3.1. Frame

The magic mirror is a tailor-made product that can be easily adapted to all situations (new cars and modernisation).

It has a frame made of special aluminium profiles that support the whole structure, its weight and gives the fixing point to the wall of the car. The frame holds the tempered mirror and the digital display.

Gateway-Display Technical Specifications				
	Feature	42"	49"	55"
Power	Power supply	100-240 V~, 50/60 Hz	100-240 V~, 50/60 Hz	100-240 V~, 50/60 Hz
	Power type	Built in	Built in	Built in
	Power consump.	110 W	125 W	140 W
Display	Dimensions	949 x 555 x 32 mm	1095 x 637 x 32 mm	1230 x 714 x 32 mm
	Resolution	1.920 x 1.080 (FHD)	1.920 x 1.080 (HD)	1.920 x 1.080 (FHD)
	Contrast ratio	1.300:1	1.300:1	1.300:1
Weight	850 x 2130	35 kg	39 kg	45 kg
	950 x 2130	37 kg	41 kg	47 kg
	1100 x 2130	41 kg	45 kg	51 kg

Table 1 – Gateway display technical specifications (see appendix for more details)

It can be installed on new car as well on existing ones (modernisation) simply adapting the fixing system. The fixing system might be personalized considering the single design situation. Owing to the rigidity of the whole system, fixing point are at the top and bottom transoms and their screws can be easily hidden.

The whole structure is lightweight, slim and elegant:

- ▶ negligible impact on rated load;
- ▶ negligible impact on lift car area (mirror thickness 35/40 mm).

The car frame structure is provided on top transom with an air space to evacuate the heat generated by the electronic hardware.

2.3.2 Glass

The mirror glass is tough and reliable. It is based on the LU-VE Group/TGD technology used in doors for refrigerated cabinet in shops and supermarkets (intensive use, impact resistant, high reliability over time). The glasses are tempered according to EN 12 150 (Glass in buildings – Thermally toughened soda lime silicate safety glass) which is specific for the tempering of flat glass. The tensile strength of the tempered glass is 150 N/mm², which is about five times the one of a normal glass. Moreover, in case of breakage, the glass shatters into small blunt-edged fragments that do not cause damage and injuries to people.

The glass panel has a reflective treatment providing a mirror-like effect when the screen is dark (or turned off), while it is transparent when the screen is lit, i.e. turned on.

2.3.3 Adaptable design

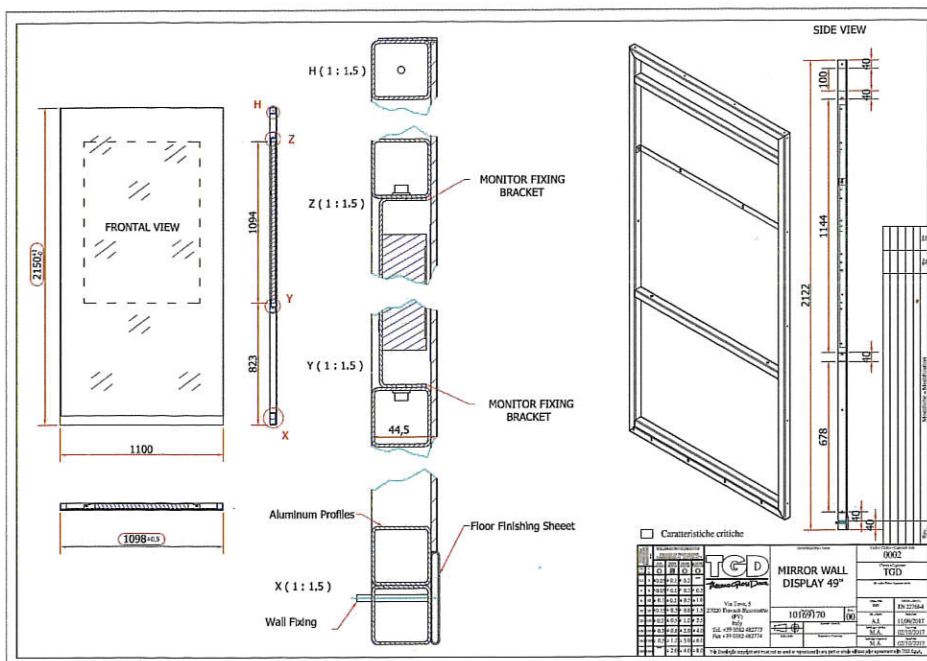
The system design is customizable both for the mirror and for finishing.

Elegance and adaptability are a very important aspect of the structure design, as the magic mirror is supposed to be installed in high end lift systems. It is possible to customize the mirror and the finishes. It is also possible to customize the mirror serigraphy (silk screening), according to customer needs and requirements (e.g. logo).

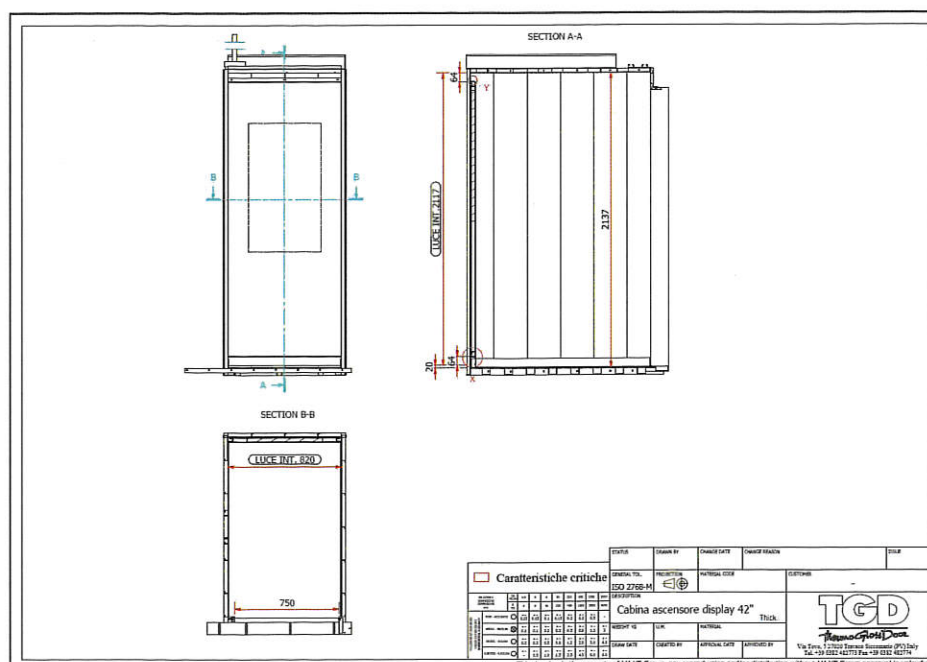
For further display's technical specifications, see Appendix.

3. Connectivity

The Gateway system has multiple pos



Graphic 1: Frame & mirror structure (dimensions: 1100 x 2150 - 49")



Graphic 2: Mirror Car Integration (dimensions: 820 x 2137 - 42")

sibilities of connection with the digital world. Once is plugged to the power with a simple PC cable it can be connected to local network (by LAN or Wi-Fi) and then have access to the internet.

Once it is connected, the system becomes a real interface that displays an infinite variety of contents that can be managed on three different levels.

3.1 Entry level

Once connected to the local LAN (by cable or Wi-Fi), the system performs a basic software with a certain number of templates that is possible to customize through a remote PC, connect-

ed to the same network. Once the contents are completed, the system asks for the scheduling time and duration and it transfers the contents to the display. It is possible to schedule many different contents at different times. At this level it is possible to personalize only existing templates, with pictures and videos (no connection to RSS feed).

3.2 Pro level

This level has all the features of the Entry Level, but has a wider range of templates. It also provides the opportunity to create new contents lay-out and connection to RSS feed. It still operates on

a local network but the system can manage a group of displays logged on the same network. The user can manage the contents distribution, from a single PC, for all the connected devices giving different scheduling and layout to every single device.

3.3 Advanced level

This level has all the features of the Pro Level and in addition provides the opportunity to manage a network of devices that are connected to different local network and are physically located far away one from the other (e.g. international hotel chain). Using a dedicated hardware and software, it connects all devices through the internet, so it allows to create, schedule and distribute contents from a central office. This level is mandatory when the system integrates a TV camera or any other interface system controlled from a remote place.

4. Applications & Functions

The magic mirror is a new clever solution for lifts installed in hotels, shopping malls, office buildings, high rise buildings, public buildings, cruise ships, airports, railway stations, hospitals, exhibition centres, high-end private lifts and homelifts, etc.



Figure 3: First Gateway delivered (courtesy: Wittur Spa)



Figure 4: Alessandro Cremaschi & the magic mirror, interlift 2017

4.1 Communication and digital signage

Digital signage is defined as a "remotely managed digital display typically tied in with sales, advertising and marketing" [7] or as "a network of electronic displays that are centrally managed and individually addressable for the display of text, animated or video messages for advertising, information, entertainment and merchandising to targeted audiences." [8]

Digital signage is a sub-segment of electronic signage. Digital displays use technologies such as LCD, LED and projection to display content such as digital images, video, streaming media, web pages, weather data, restaurant menu, or text. They can be found in public spaces, transportation systems, museums, stadiums, retail stores, hotels, restaurants, and corporate buildings etc., to provide wayfind-



Figure 5 and 6: Communication examples

ing, exhibitions, marketing and outdoor advertising [9].

In this case, the Gateway mirror becomes a communication and digital signage device opening the lift car to the outside world. The mirror becomes a new channel of communication towards users. The system is able to transmit information, photographs, videos, web pages, advertising and much, much more, with the possibility of remotely changing the contents in real time.

The user can also ask and receive customised information focused on the user's needs, within the services provided by the manager.

4.2 Emergency mode

Calm passengers are safe passengers. In the event of an alarm, the new system might improve the safety of users, becoming a new bi-directional commu-

nication channel between the passenger and the outside world (emergency connection to 24-hour rescue service).

Through the application of a micro web-cam, the car has an audio/visual communication between the safety/assistance service and the passenger. The safety operator might see what's going on inside the car: health emergency, special needs (i.e. writing messages on the video screen for hearing impaired passenger); presence of children etc.

On the passenger side, the possibility to see a human face (rather than just an audio conversation) might reduce panic, fear and better understand communication from the safety/assistance service.

4.3 Maintenance support

Given the possibility to transform the mirror into the touch-screen of a re-

AUFZUGSANTRIEBE - PERMANENT ERREGT JETZT NOCH EFFIZIENTER UND SPARSAMER!

Swiss Traction
A brand of PARTZSCH

PARTZSCH
Elektromaschinenbau

6 Baugrößen als patentierte Permanent-Synchronantriebe

Besondere Merkmale und Vorteile:

- ✓ Nutzlast von 300 kg bis 13000 kg
- ✓ energieeffizient mit hohem Wirkungsgrad
- ✓ kompakt, hohe Leistungsdichte
- ✓ wartungs- und geräuscharm
- ✓ große Dreh- und Stillstandsmomente
- ✓ hohe Positionsgenauigkeit durch implementiertes Gebersystem



PARTZSCH Elektromaschinenbau GmbH • Am Fuchsloch 12 • 04720 Döbeln Mail: info.emb@partzsch-emaschinenbau.de
Tel.: +49 (3431) 60 212 18 • Fax: +49 (3431) 60 212 97 Web: www.swisstraction.de

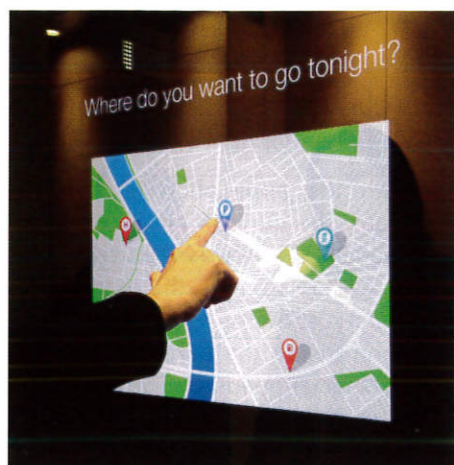


Figure 7: Touch screen feature

note computer (i.e. servicing HQ, control room etc.) Gateway is a new tool to support the maintenance personnel on site.

Audio-video communication coupled with touch-screen technology allows maintenance staff to connect to the service centre, access files (manuals, instructions, documents, navigate technical information to facilitate and speed up operations on the lift system, etc.). It also might provide technical information regarding the lift system on a large, user-friendly touch screen.

Due to its interactivity, Gateway might also turn to be a powerful device to support programmed and predictive maintenance service, displaying useful information/tools (graphics, video recording, working parameters, etc.) to the operator on site.

5. Conclusions

Gateway applies IoT technology to lift car mirrors, transforming them into new, powerful, revolutionary devices. The system can be installed not only inside the lift car but also in the lift lobby, and on floor's doors to inform, entertain and guide users.

See video at http://gateway.luve.it/?page_id=2

The system derives from a LU-VE Group/TGD technology which has been applied to the doors for refrigerated cabinet in shops and supermarkets. In this application field:

- ▶ digital signage (product information, advertising and promotion, brand building, etc.);
- ▶ audience measurement systems (how many people in front of a fridge, gender, age group, opening/closing cycles, etc.);
- ▶ user activity (gaming, fidelity cards activities, unlocking special offers, interaction activated by proximity sensors, mobile social engagement, etc.) the Gateway system play a new important role.

Some, if not all, of these new features might be applied to lift cars, to improve information, safety and maintenance.

Lifts might provide real-time user-friendly:

- ▶ public & internal information (news, weather forecast, local information, building directory with a map, corporate messages, etc.);
- ▶ commercial advertising on promotions, sales and other services close to lift location (in building or in the area);
- ▶ information to enhance the customer service experience in special buildings (tourist and cultural attractions, museums, exhibitions, etc.);



- ▶ enhancing customer experience (an interactive video might reduce perceived wait time, inside lift cars and in lift lobby);
- ▶ safety information (emergency exit, building map, passenger behaviour guidelines, etc);
- ▶ maintenance (user-friendly and easy to reach technical information during service operation, remote file access, diagrams and functions display, etc);
- ▶ passenger tracking (gender, age group, boarding modes, etc.);
- ▶ ask and receive customised information/service focused on the user's needs (e.g. turning the touch screen into a very large push button for people with impaired view).

In the end, when dealing with IoT possibilities, the only limit is... imagination.

Biographical Details

Fabio Liberali is co-owner, member of the Board of Directors and head of the Communication and Public Relations Department at LU-VE Group (an international HVAC company, listed in Milan Stock Exchange). He has been the editorial manager of "Elevatori – The European Elevator Magazine" for some 22 years and a contributor to several international lift industry magazines. He is member of Elevatori Technical Committee, on honorary basis. He has been the Team Leader of the Italia Magnifica/Interlift 2013. He has been a consultant for several communication departments, trade associations, trade fair organisers, companies and others. He is the founder partner and

co-owner at Ekuota (online, corporate finance risk management).

Alessandro Cremaschi is co-founder at TGD SpA (a member company of LU-VE Group). He is member of the TGD Board of Directors and head of New business development. He got Civil Engineer University Degree (1992) and he has registered, as inventor, seven European Patents, regarding improvement of glass doors for refrigeration including LED technologies for product illumination and product branding and advertising. He has a 25 year-long experience in the use of glass and aluminium both for architectural application (curtain walls – windows – interior partition) and commercial refrigeration doors for negative and positive temperature cabinet.

Acknowledgements

The authors would like to thank Emanuele Eusebio (LU-VE Group R&D Tech Dept.) and Luca Pasqualotto (LU-VE

Group web & marketing consultant) for their support and help in preparing this paper. Thanks to Wittur Group for providing us the images of the first Gateway in service. Thanks to Kenneth John Allan (Professors Language Services) for his long-term support and his brilliant ideas. Special thanks to Dr. Eur-Ing Gina Barney (Gina Barney Associates, UK) for her wise advice, her disinterested help, but most of all for her friendship.

References

1. Brown, Eric (13 September 2016). "Who Needs the Internet of Things?". Linux.com. Retrieved 23 October 2016.
2. Brown, Eric (20 September 2016). "21 Open Source Projects for IoT". Linux.com. Retrieved 23 October 2016.
3. "Internet of Things Global Standards Initiative". ITU. Retrieved 26 June 2015.
4. Nordrum, Amy (18 August 2016). "Popular Internet of Things Forecast of 50 Billion Devices by 2020 Is Outdated".
5. Hsu, Chin-Lung; Lin, Judy Chuan-Chuan. "An empirical examination of consumer adoption of Internet of Things services: Network externalities and concern for information privacy perspectives".

6. "How IoT's are Changing the Fundamentals of "Retailing". Trak.in – Indian Business of Tech, Mobile & Startups. 30 August 2016. Retrieved 2 June 2017.
7. Schaeffler, J., Digital Signage: Software, Networks, Advertising and Displays: A Primer for Understanding the Business, [NAB Executive Technology Briefings], 1st edition, Focal Press, 2013, p. 1
8. Schaeffler, J., Digital Signage: Software, Networks, Advertising and Displays: A Primer for Understanding the Business, Focal Press, 2013, pp 3-4
9. https://en.wikipedia.org/wiki/Digital_signage

This paper was presented at **ELEVCON** Berlin 2018, the international Congress on Vertical Transportation Technologies and first published in IAAE book "Elevator Technology 22", edited by A. Lustig. It is a reprint with permission from The international Association of Elevator Engineers **IAAE**.

GATEWAY - DISPLAY TECHNICAL SPECIFICATION				
		55"	49"	42"
PANEL	Screen Size	54.64 inches (1387.80mm) diagonal	48.50 inches (1232.00mm) diagonal	41.92 inches (1064.67mm) diagonal
	Panel Technology	IPS	IPS	IPS
	Aspect Ratio	16:09	16:09	16:09
	Native Resolution	1,920 x 1,080 (FHD)	1,920 x 1,080 (FHD)	1,920 x 1,080 (FHD)
	Brightness	700cd/m2	700cd/m2	700cd/m2
	Contrast Ratio	1,300:1	1,300:1	1,300:1
	Viewing Angle (H x V)	178 x 178	178 x 178	178 x 178
	Response Time	1ms (G to G), 8ms (MPRT)	8ms (G to G BW) typ.	8ms (G to G BW) typ.
	Surface Treatment	Hard coating (3H), Anti-glare treatment of the front polarizer (Haze 10%)	Hard coating (3H), Anti-glare treatment of the front polarizer (Haze 10%)	Hard coating (3H), Anti-glare treatment of the front polarizer (Haze 10%)
	Life time (Typ.)	50,000 Hrs min.	50,000 Hrs min.	50,000 Hrs min.
	Operation Hours	24 Hrs / 7 Days	24 Hrs / 7 Days	24 Hrs / 7 Days
	Orientation	Portrait & Landscape	Portrait & Landscape	Portrait & Landscape
CONNECTIVITY	Input	HDMI (2), DP, DVI-D, Audio in, OPS		
	External Control	RS232C in/out, RJ45, IR / Light sensor, Pixel sensor, USB 3.0		
PHYSICAL SPECIFICATION	Output	DP, External Speaker out		
	Bezel Color	Black	Black	Black
	Bezel Width	7.4 mm (T/L/R/B even)	7.4 mm (T/L/R/B even)	7.4 mm (T/L/R/B even)
	Monitor Dimension (W x H x D)	1,230 x 714 x 32 mm	1,095 x 637 x 32 mm	949 x 555 x 32 mm
	Weight (Head)	20.7 kg	15.6 kg	12.5 kg
	Monitor with Optional Stand Dimension (W x H x D)	1,230 x 776 x 298 mm	1,095 x 700 x 298 mm	949 x 618 x 298 mm
	Weight (Head+Stand)	22.1 kg	17.0 kg	13.9 kg
	VESA Standard Mount Interface	400 x 400 mm	400 x 400 mm	400 x 400 mm
ENVIRONMENTAL CONDITION	Operating Temperature	0°C to 40°C	0°C to 40°C	0°C to 40°C
	Operating Humidity	10% to 80%	10% to 80%	10% to 80%
POWER	Power Supply	100-240V~, 50/60Hz	100-240V~, 50/60Hz	100-240V~, 50/60Hz
	Power Type	Built-In Power	Built-In Power	Built-In Power
	Power Consumption Typ.	140 W (TBD)	125 W (TBD)	110 W (TBD)
	Power Consumption Saving	100 W (TBD)	90 W (TBD)	80 W (TBD)
STANDARD (CERTIFICATION)	Safety	UL / cUL / CB / TUV / KC	UL / cUL / CB / TUV / KC	UL / cUL / CB / TUV / KC
	EMC	FCC Class "A" / CE / KCC	FCC Class "A" / CE / KCC	FCC Class "A" / CE / KCC
MEDIA PLAYER COMPATIBILITY	ErP / Energy Star	NA / Yes (Energy Star 7.0)	NA / Yes (Energy Star 7.0)	NA / NA
	OPS Type Compatible	Yes	Yes	Yes
SOFTWARE COMPATIBILITY	External Media player Attachable	Yes (MP500/MP700)	Yes (MP500/MP700)	Yes (MP500/MP700)
	SuperSign W/Lite	Yes	Yes	Yes
ACCESSORIES	SuperSign C	Yes	Yes	Yes
	Basic	Remote controller (2ea batteries included), Power cord, IR/Light sensor receiver, QSG, Regular book (depend on regional standard), HDMI cable Optional		
	Optional	SP-2100 (External speaker), ST-200T, LSW440S, AN-WF500 (Wi-Fi USB dongle), KT-OPSA (OPS kits), KT-SPD (Pixel sensor)		
SPECIAL FEATURES		Temperature sensor, Auto brightness sensor, Tile Mode, DPM select, DPM wake up, Energy saving, Smart energy saving, File play with USB, PIP/PBP(2), internal memory 16GB (System 4GB + Available 12GB), Wi-Fi dongle ready (802.11n), USB		

Figure 8: Interactive mirror with touch screen