FFL Adapter E8655

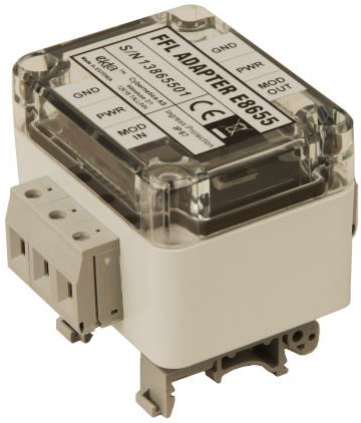
The FFL Interface Adapter E8655 is intended for conversion of the regular LED based marine aid to navigation signal lights (AtoN lanterns) for operation using fixed and flashing (FFL) rhythmic character. It connects into the low power control circuit between a light unit (lantern) and a control unit (flasher), passing through the pulses that force the lantern to produce the light signal during flash, and injecting a pulse width modulated (PWM) signal with pre-configured duty cycle during eclipses in order to produce a light signal of lower luminous intensity. PWM of the input signal is not expected to present a problem.

An E8655 consists of an electronics module sealed inside a polycarbonate enclosure, fitted with screw terminals for power, ground and modulation signal connections on top and bottom side surfaces (outputs and inputs). Controls for selecting the PWM duty cycle for producing a low level fixed mode light signal are accessible after removing the semi-transparent top lid of the enclosure. E8655 output has to be connected with the low level control input ("MOD" for "modulation") of the lantern, requiring no changes in the lantern itself.

While E8655's PWM signal output supplied to a lantern can be configured to as low as 1% of lantern's peak luminous intensity, not all existing products can be operated at such fast PWM rate. Most ekta™ lanterns manufactured in the XXI century are expected to work below 10%, many even at 3% PWM. Resulting relative luminous intensities may be even lower.

Specifications

Extent of PWM duty cycle configuration in eclipse	**1% to 30%**
Ranges for PWM duty cycle configuration (selectable by a 2-position DIP switch)	**1% to 10%** **10% to 20%** **20% to 30%**
PWM configuration step	**1%**
PWM frequency	**100 Hz**
Time to standby	**30s after input signal end**
Power supply voltage	**8 to 30 VDC**
Power consumption	**≤ 0.05 W**
Dimensions (W x H x D)	**65 x 72 x 65 mm (DIN)**
Weight	**≤ 0.15 kg**
Mounting method	**DIN rail mount (back)**
Enclosure protection class	**IP67, except terminals**
Operating environment	**-40°C to +60°C**
Front cover material	**Semi-transparent polycarbonate**
Body material	**Grey polycarbonate plastic**



Although E8655 is designed for converting ekta™ AtoN lights to FFL, we expect to be able to offer product versions tailored for operation between any flasher and lantern based on customer specifications. Please contact ekta@ekta.ee for more detailed information; product versions with other form factor as well as flashers with direct FFL support may be available.

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Notes on the Use of Fixed and Flashing Rhythmic Character on AtoN Lights

IALA definition of a fixed and flashing light (standard abbreviation: FFl) is "A light in which a fixed light is combined with a flashing light of greater luminous intensity" (IALA Recommendation E-110). For charting purposes, only a light that provides both signal components using same optical apparatus is a true FFl AtoN; AtoN with fixed and flashing components of the signal produced by separate lanterns should be marked as two lights.

Application of an FFL character improves the ability of the mariner to visually track the position of light during eclipses where it would be traditionally off. Considering that the actual sensitivity of human eye is over 100x higher than the current basis for establishing nominal range for a light, there is a good chance that even in case of a 1% fixed component, a mariner would be able to track such light once it has been discovered during flash.

IALA recommends to keep the flash duration at or under 1 s in case of using FFL character, and the low-level fixed light duration at least three times longer than flash. Use of low level fixed light allows to prolong such "lighted eclipses" that in fact reduces power consumption.

The only country that currently utilizes FFL extensively is Japan with over 250 FFL AtoN.

Examples of Fixed and Flashing Rhythmic Character use in Japan (US GIA Publication 112, 2012)

AtoN No.	Rhythmic Character	Nominal Range of Fixed Component [M]	Expected Fixed Luminous Intensity [cd]	Nominal Range of Flashing Component [M]	Expected Peak Luminous Intensity in Flash [cd]	**Relative Luminous Intensity of the Fixed Signal Component [%]**
6712	F.Fl.R, 6s	1	1	3	18	**6%**
816	F.Fl.R, 5s	2	5	5	94	**6%**
11476	F.Fl.(2)R, 10s	3	15	7	335	**5%**
11860	F.Fl.R, 5s	5	78	8	590	**14%**
9388	F.Fl.G, 4s	5	78	9	1241	**7%**
29880	F.Fl.G, 10s	7	279	9	1241	**23%**
5052	F.Fl.R, 5s	6	152	10	1681	**10%**
11772	F.Fl.G, 6s	5	78	11	2744	**3%**
11480	F.Fl.R, 3s	6	152	11	2744	**6%**
4156	F.Fl.(2)R, 8s	6	152	11	2744	**6%**
11800	F.Fl.G, 5s	7	279	11	2744	**11%**
2624	F.Fl.(2)G, 10s	5	78	12	4406	**2%**
11804	F.Fl.R, 5s	8	492	12	4406	**12%**
11440	F.Fl.R, 6s	6	152	12	4406	**4%**
7188	F.Fl.R, 3s	1	1	12	4406	**1%**
5440	F.Fl.G, 3s	5	78	12	4406	**2%**
9270	F.Fl.R, 6s	6	152	13	6978	**3%**
12420	F.Fl.R, 6s	6	152	14	10921	**2%**
3200	F.Fl.(2)R, 8s	9	1034	14	10921	**10%**
11438	F.Fl.W, 5s	10	1401	16	25972	**6%**

The F.Fl(2) character with 6 to 10s period is used in more than 40 lights of different colour, mainly at 11M to 14M nominal range. Lines marked yellow represent typical FFL settings. Relative luminous intensity estimates in the table above are calculated based on 1 s flash.

