

LW217 – LW218

Optical fibre modules for transmission of SSI encoder
 or sensor signals



Transmitter-Module	Module type	Input level	Power Supply
LW217	Transmitter	RS422	5 Vdc ($\pm 5\%$)
LW217-1	Transmitter	RS422	10 – 30 Vdc

Receiver Module	Module type	Output level	Power supply
LW218	Receiver	RS422	5 Vdc ($\pm 5\%$)
LW218-1	Receiver	RS422	10 – 30 Vdc

Operating instructions



Safety Instructions

- This manual is an essential part of the unit and contains important hints about function, correct handling and commissioning. Non-observance can result in damage to the unit or the machine or even in injury to persons using the equipment!
- The unit must only be installed, connected and activated by a qualified electrician
- It is a must to observe all general and also all country-specific and application-specific safety standards
- When this unit is used with applications where failure or maloperation could cause damage to a machine or hazard to the operating staff, it is indispensable to meet effective precautions in order to avoid such consequences
- Regarding installation, wiring, environmental conditions, screening of cables and earthing, you must follow the general standards of industrial automation industry
- - Errors and omissions excepted –



General instructions for cabling, screening and grounding can be found in the SUPPORT section of our website <http://www.motrona.com>

Version:	Description
LW21701a/pp/02_2012	First edition
LW21701b/pp/11_2012	Small change

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1. Description

The optical fibre modules LW217 and LW218 form together a transmission system for data transmission of industrial signals by means of optical fibres.

The system is made of an optical fibre transmitter and of an optical fibre receiver.

The optical fibre transmitter module converts the electrical data of a usual sensor or encoder equipped with a synchronous serial interface (SSI) into optical fibre signals.

The optical fibre receiver module converts the optical signals back into electrical SSI signals.

One single glass fibre is sufficient to transmit the absolute values reliably at a distance up to 1500 m.

A slide switch on the front side of the fibre optic transmitter-module allows setting of the SSI resolution with either 13 bits or 25 bits.

Both modules are equipped with LED's, allowing a wide diagnosis of operating troubles. In addition, the receiver module also has a general alarm output with galvanic isolation (optocoupler).

The modules are available in various level and supply voltage variants.

The optical fibre modules are mainly used when signals have to be transmitted in environments with strong electromagnetic interferences or when, due to high ground potential differences between the signal source and the signal processing equipment, a potential separation is necessary.

High ground potential differences generally appear also in case of large distances between the encoder/sensors and the PLC or any other processing electronics.

The optical fibre cable is failure-safe: it does not constitute any danger in case of damage. Since the light-emitting component used is not a laser, but a light-emitting diode, the transmission line is totally safe, even when looking directly into the opened connector or into the broken glass fibre.

If necessary, a level conversion can be linked with the potential separation without problem. Since all devices use the same signal transmission protocol on the optical fibre cable, any transmitter can be combined with any receiver.

A specific feature of the transfer mode used is the fact that the SSI signal is transmitted without the troubles due to the round-trip delays between the clock and the data. This allows also a quick reading of the encoder even when using cable lengths exceeding 1500 m.



The optical fibre cable can be routed through explosive areas.

2. Electrical and optical connections

2.1. Pin Assignment LW217 (transmitter)

Pin	Signal	Description
1	0 V (earth)	To the encoder
2	+ Ub	
3	+ T	
4	- T	
5	+ D	From the encoder
6	- D	
7	0 V (earth)	From the power supply
8	+ Ub	

2.2. Pin Assignment LW218 (receiver)

Pin	Signal	Description
1	0 V (earth)	From the power supply
2	+ Ub	
3	+ D	To the controller (SSI Slave)
4	- D	
5	+ T	From the controller (SSI Master)
6	- T	
7	Emitter (-)	Optocoupler alarm output
8	Collector (+)	

2.3. Electrical connections

As a principle, the input and output lines always must be routed as a pair, i.e. both wires of a signal must be routed in twisted pair cables. The use of bundle wires (called control cables) is not allowed, since this could not guarantee the correct transmission of the signal, nor the EMC features.

The cable shield must be connected at both ends, at the encoder and at the optical fibre transmitter, and at the optical fibre receiver and at the signal processing device.



For all fibre optic modules, make sure that the signal receiver has a differential input with an input resistance of 100 – 120 Ohm.

All modules are protected against reversed polarity, which avoids any damage in case of wrong polarity of the power supply.

The outputs of the modules are only short-circuit proof in certain conditions; avoid imperatively short-circuits between modules or with the earth.

Exceeding the supply voltage of the modules LW217 and LW218 above a value of about 6 V leads to the destruction of the fuse located inside of the device and must thus be avoided.

For the modules LW217-1 and LW218-1, this value is 33 V.



The fuse must be replaced in the manufacturer's factory. Any attempt to repair the device will void the guarantee.

2.4. Optical connections

Connecting the modules together may be carried out using a cord set multimode optical fibre cables of motrona or alternatively any multimode optical fibre cable 50/125 µm or 62.5/125 µm.



Single-mode optical fibre cables cannot be used.

Please keep the dust protection covers of the optical transmitters and receivers, and put them back in place when no optical fibre cable is connected to the modules, in order to avoid any soiling by dust or any other substance.



Make sure here that the connector of the optical fibre cable is correctly in place and that the bayonets catch is locked.

It must also be noted that the used ST connector is indexed and has an orientation spigot which must engage the slots of the optical emitter and of the optical receiver. Please never force!

3. Operation and LED-function

3.1. LW217 (transmitter)

After connecting all lines, set the DIP switch located on the front side of the device as required:

DIP - SW1	Sensor-/Encodertype
on	13 Bit
off	25 Bit

LED Signalisation:

LED	Operating Condition
Power (green)	• Power supply is applied and polarity is correct
Error (red)	• One or both clock lines to the encoder is or are short-circuited with the earth or together; • Interruption of the data or clock lines; • When the LED lights up and then goes off when the encoder rotates, the slide switch is in the wrong position or the encoder requires another number of clock pulses.



When a short-circuit is detected, the operating voltage must be disconnected from the input of the fibre optic module, and the failure must be removed. The driver circuit of the clock lines is not permanently short-circuit resistant.

Short-circuits with the operating voltage must absolutely be avoided, since they might damage the driver immediately.

3.2. LW218 (receiver)

The LW - receiver requires no settings. The number of encoder clock pulses (13 or 25) is set at the LW - transmitter and transmitted to the LW - receiver in addition to the data package. Care must simply be taken in order to set the right number of pulses (13 or 25) on the connected controller to enable it to read the LW receiver data.

Uninterrupted sending of clock signals by the controller for constant encoder reading is possible. However, the absolute value will not be updated in this case, since the delay will be shorter than the monoflop time. The monoflop time of the LW receiver is 16 μ s.

LED Signalisation:

LED	Operating Condition
Power (green) steadily on	Supply voltage is applied to the LW218 and polarity is correct
Power (green) blinking	- Supply voltage of fibre optic transmitter LW217 is missing or - Optical fibre interrupted or wrongly connected
Remote Error (red) Duplication of the error LED of the LW - transmitter	- One or both clock lines to the encoder is or are short-circuited with the earth or together; - Interruption of the data or clock lines of the encoder; - When the LED lights up and then goes off when the encoder rotates, the slide switch is in the wrong position or the encoder requires another number of clock pulses.
Local Error (red)	- One or both data lines to the control is or are short-circuited with the earth or together; - Interruption or short-circuit of the clock lines of the controller



When a short-circuit is detected, the operating voltage must be disconnected from the input of the fibre optic module, and the failure must be removed. The driver circuit of the clock lines is not permanently short-circuit resistant.

Short-circuits with the operating voltage must absolutely be avoided, since they might damage the driver immediately.

The LW - receiver has a general alarm output. This output is isolated galvanically from all other circuit elements by means of an optocoupler.

All error messages of the LW - transmitter and of the LW - receiver according to the table are combined in a logical OR function and set the transistor output of the optocoupler in passing mode.

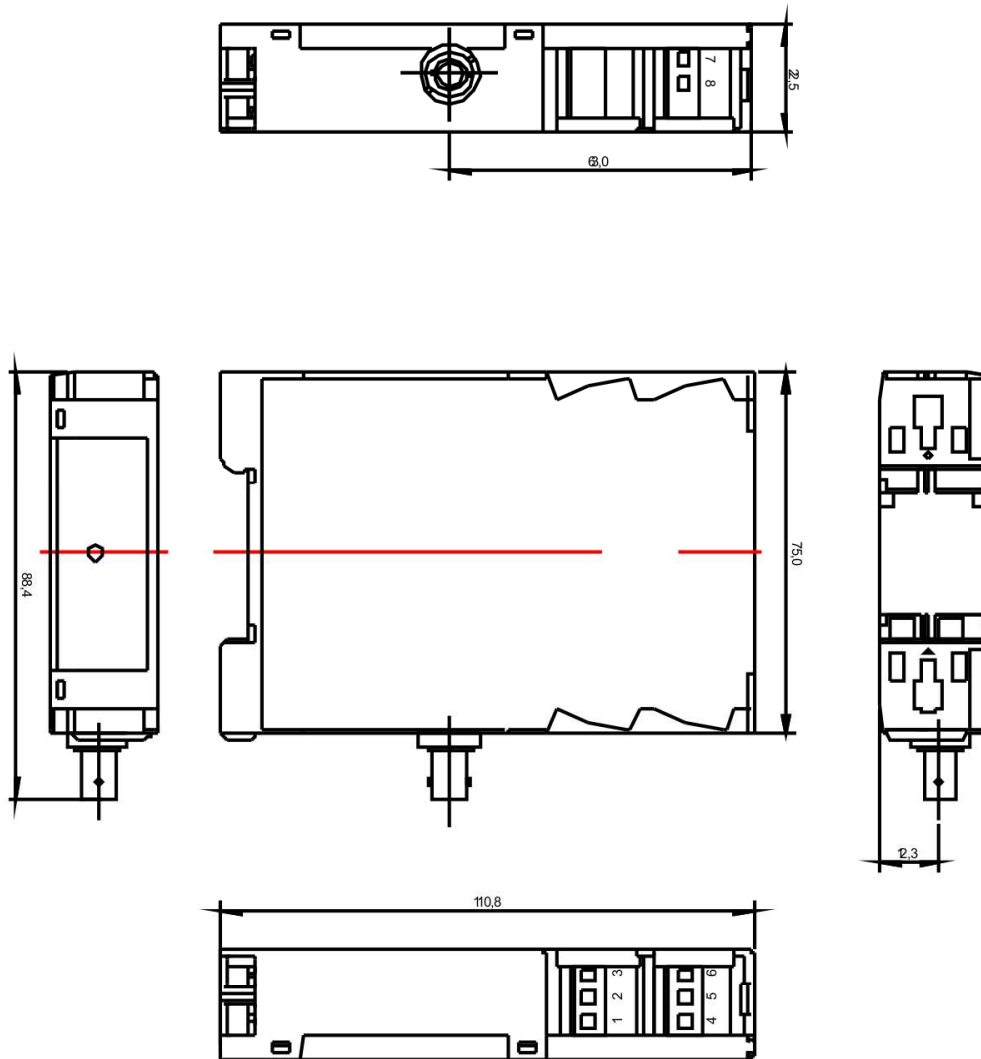
The output withstands 50 mA and has an own internal series resistor of 33 Ohm. The withstand voltage is 40 V. The emitter-collector line includes an antiparallel protector diode, so there must be taken care of the correct polarity of the connected circuit in order to ensure the correct operation of the alarm output.

Alarm Output LW - receiver:

Klemme	Betriebszustand
7	Optocoupler emitter, minus side of the signal circuit
8	Optocoupler collector, plus side of the signal circuit

4. Dimensions and technical characteristics

4.1. Dimension drawing:



Gehäusematerial: Polyamid PA 6,6, UL 94 V0
Gehäusefarbe: hellgrau, RAL 7035
Druckfarbe: schwarz
Schutzart Gehäuse: IP 40/EN 60529
Schutzart Klemmen: IP 20/EN 60529

4.2. Technical characteristics

Designation	Characteristic
Construction	Housing for DIN rail mounting acc. to EN 50 022
Dimensions (W x L H)	22.5 x 110.8 x 88.4 mm
Housing Colour:	Light grey, RAL 7035
Protection:	IP 40, terminals IP 20
Optical fibre connection	ST connector, 13 mm, Ø 9 mm, on the bottom side of the housing
Terminals:	Protected against contact, max. conductor diameter: 2.5 mm ²
Glass fibre	Multimode fibre, 50/125 µm, 62.5/125 µm
Max. optical transmission distance	1500 m
Supply voltage	10 – 30 V or 5 V ± 5%
Power consumption per module	< 2 W
Operating voltage reverse connection protection	available
Electrical inputs of the transmitter and electrical outputs of the receiver	-T, +T, sowie -D, +D
Max. clock frequency of fibre optic transmitter and receiver	500 kHz
Input level - optical fibre transmitter	10 - 30 V or RS 422
Optical wavelength	840 nm (infrared)
Optical transmission rate	120 MBit/s
Operating temperature range	-10 °C to +60 °C
Noise immunity:	EN 61000-6-2 : 2006
Noise emission:	EN 55011 Class B