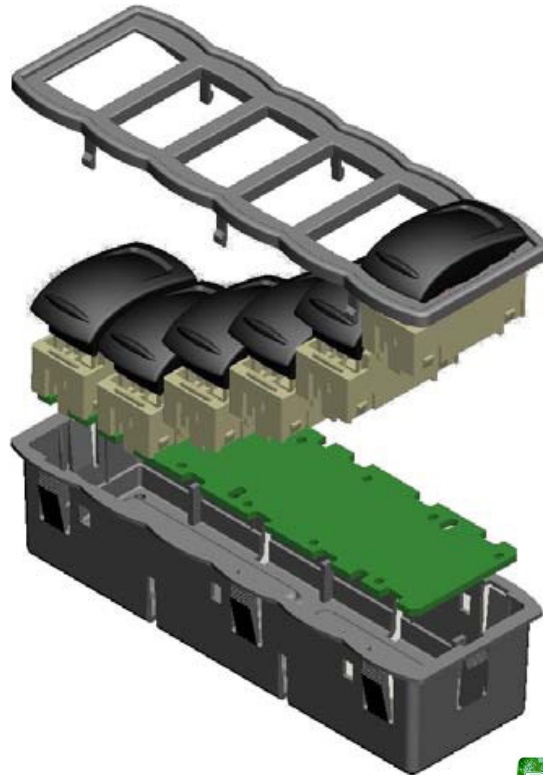


# APEM

## KS Series

### CAN Integrated Multiplex System

- CAN BUS
- Increased reliability
- Flexible and expandable system
- Reduced wiring costs



#### Applications:

- Passengers cars and buses
- Heavy duty vehicles
- Machine control panel
- Boats
- Etc...

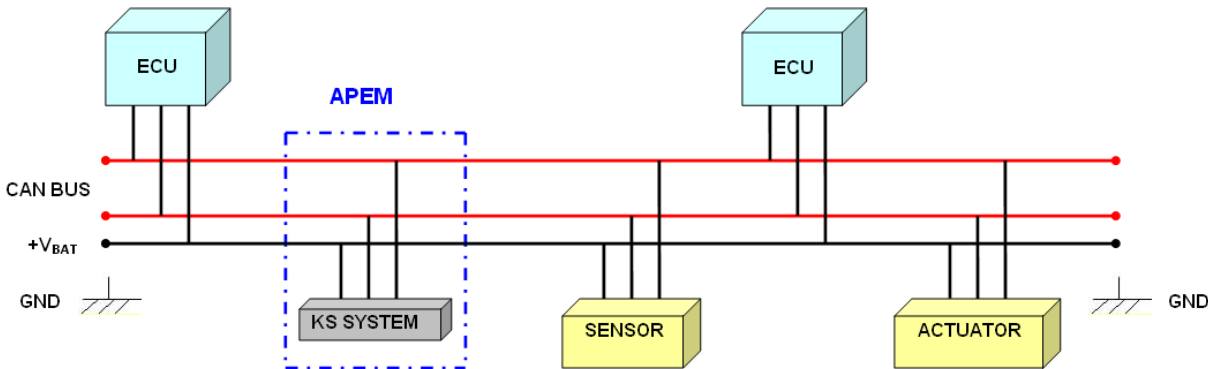


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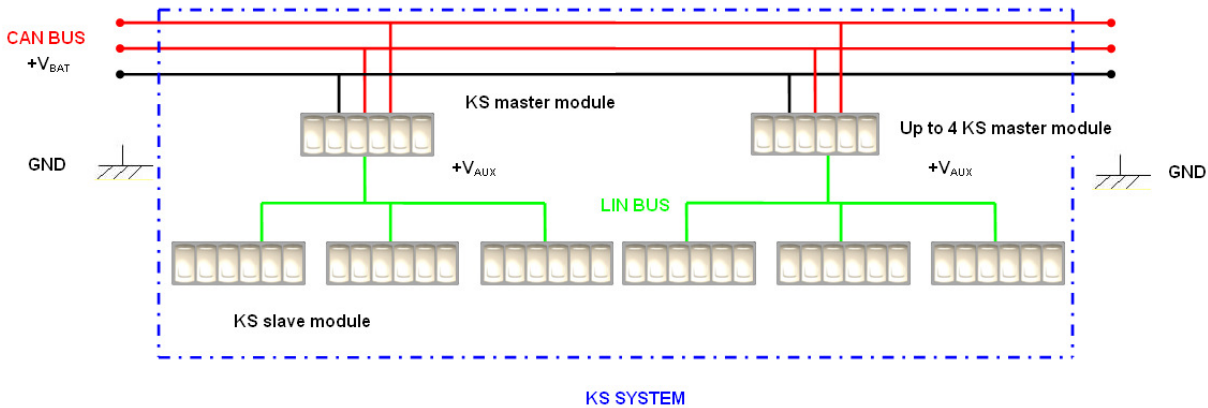
**I. KS SYSTEM**

**I.1 OVERVIEW**



The KS System communicates with ECU (Electronic Control Unit) through a multiplexed CAN network.

The KS system is described below:



The APEM KS Series is a mechatronics concept integrating rocker switches and electronics.

## I.2 MAIN FUNCTIONS OF THE KS SYSTEM

- The two main functions of the KS system are:
  - Take the information of the switches position (activated or not) and send this information on the CAN network.
  - Receive from the CAN network the information concerning the status of the LED (on, off, value of backlight).

Two module variants: master Module and Slave Module

- Up to 4 master module and up to 3 slave module per master module
- Up to 96 switches in a KS System

## I.3 ADVANTAGES OF THE KS SYSTEM

- **Increased reliability**
- **Flexible and expandable system**
- **Reduce wiring costs**

## I.4 FEATURES

The Generic KS module is an embedded electronic dashboard module.

### Main features :

- ✓ Compliant to 12V and 24V applications
- ✓ Up to 4 master KS modules on a CAN bus line
- ✓ Up to 3 slave KS modules per master KS module
- ✓ Up to 6 switches 3 positions (12 micro-switches)
- ✓ Up to 12 Leds for pictogram lighting
- ✓ 1 CAN line 250 kbaud ISO18898 on master KS module
- ✓ 1 LIN line Rev 2.0
- ✓ Wake up on CAN
- ✓ Wake up on switch
- ✓ ACTIGRAF VE 01.29 compliant
- ✓ ROHS compliant

### Typical vehicle application :

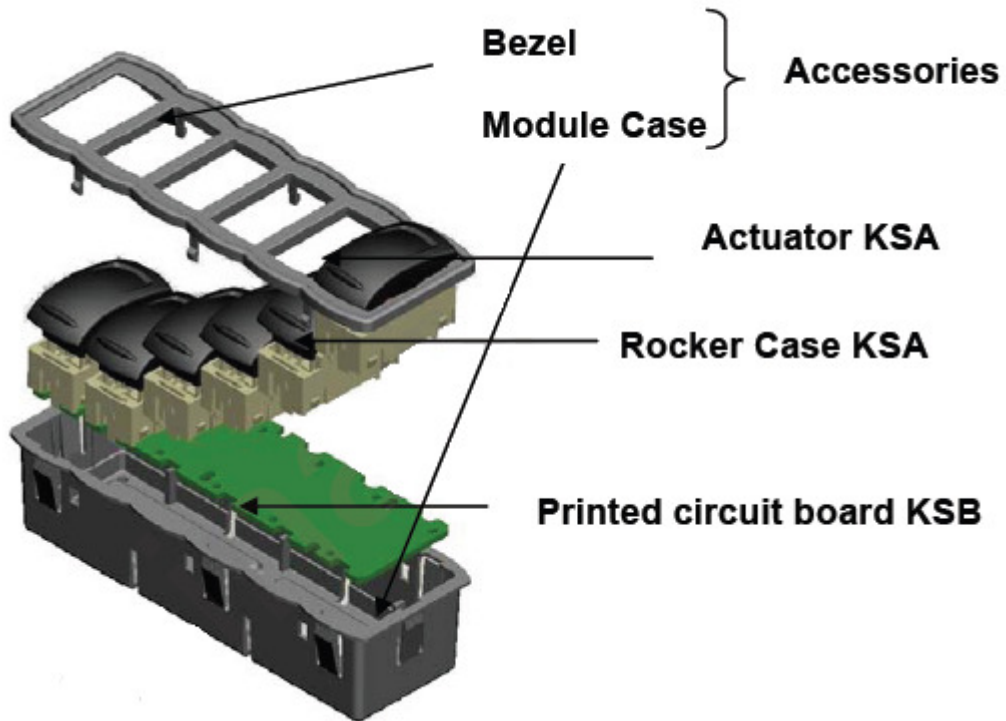
- ✓ Interior driving deck
- ✓ Dashboard extension

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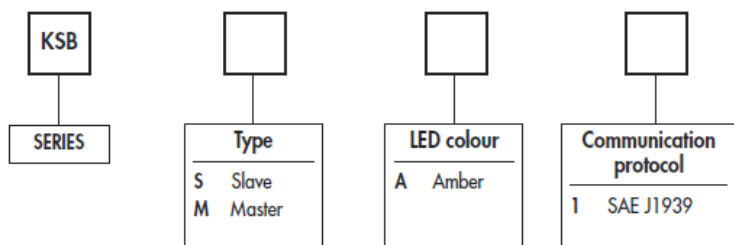
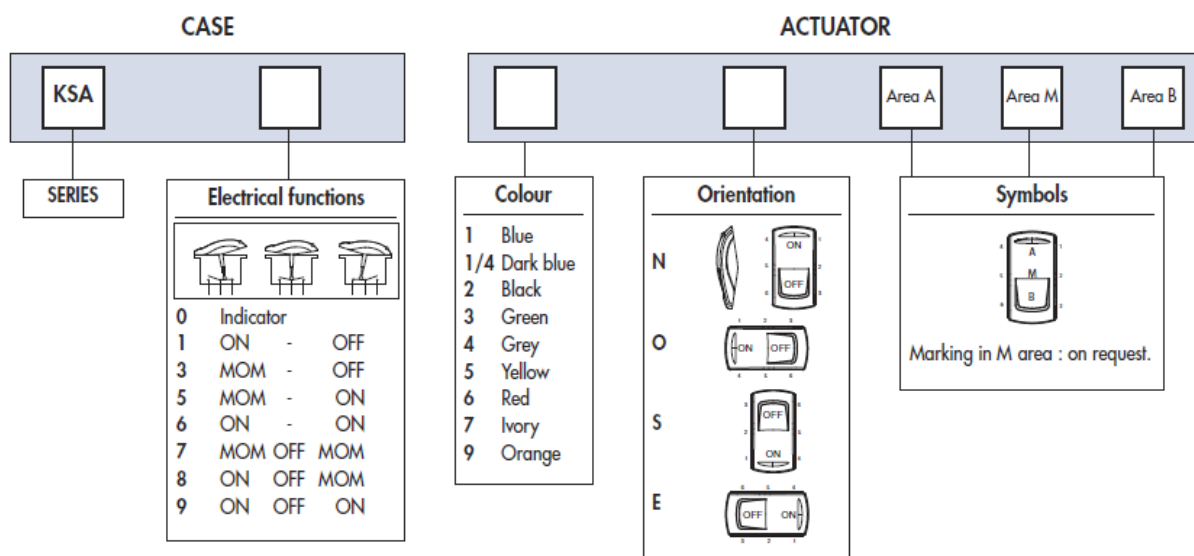
## II. KS MODULE

### II.1 DESCRIPTION

#### Module (slave or master)

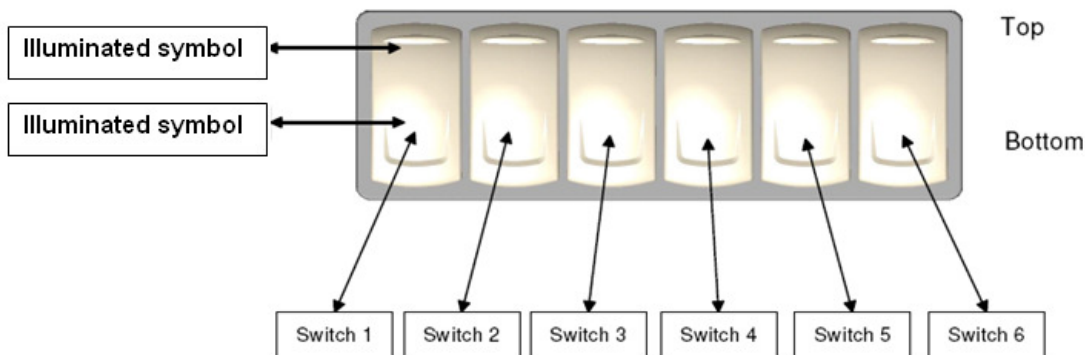


## II.2 MODEL STRUCTURE



## II.3 SLAVE AND MASTER MODULE COMMON SPECIFICATIONS

- up to 6 switches x 3 positions



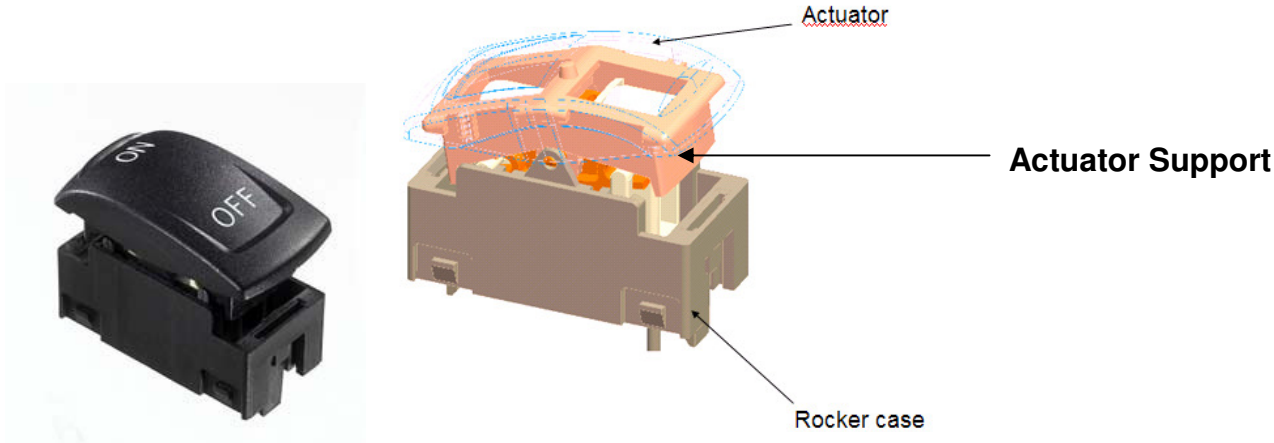
The rocker switch

- Wide choice of actuator colours (up to 9)
- Laser etched symbols
- Illuminated or non-illuminated
- Full separation of the electrical and mechanical parts

**III. ROCKER SWITCH KSA**

**III.1 OVERVIEW**

The KSA rocker switch is made up of 2 different parts: an actuator and a rocker case. It is possible to order the complete rocker (actuator + rocker case) or separately the actuator and the rocker case.



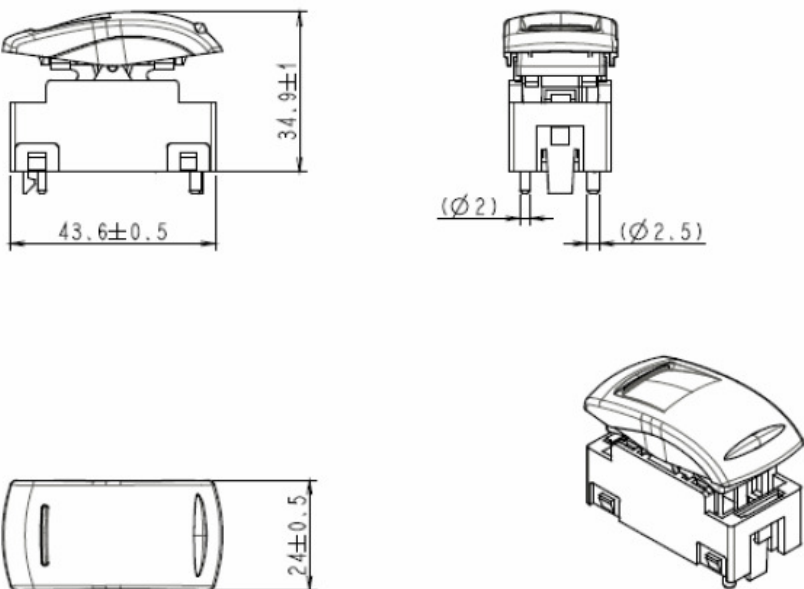
**III.2 MECHANICAL SPECIFICATIONS**

- 1.000.000 cycles min

**III.3 MATERIALS**

- Case : PA 6-6
- Actuator : ABS

**III.4 DIMENSIONS**

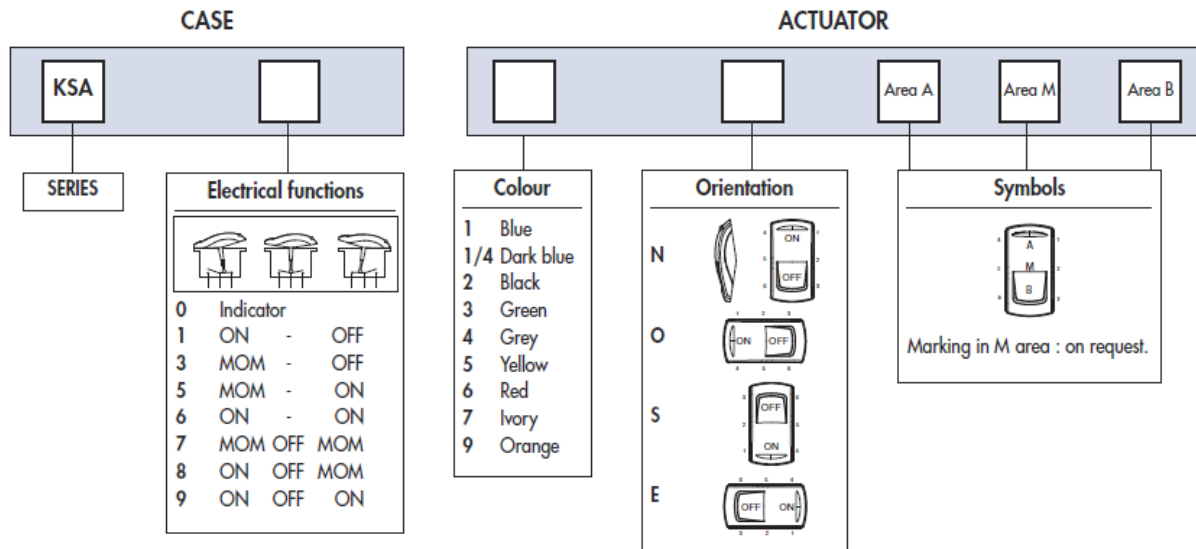


# KS Series CAN Integrated Multiplex System

## III.5 SELECTION GUIDE

### HOW TO ORDER

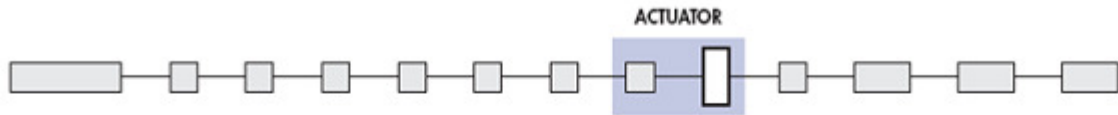
- To order a complete product, fill in all the boxes of the following order guide.
- To order actuator only (without case), begin the order number with code KSR, then follow the order format from "actuator colour" until the end of the options.





# KS Series CAN Integrated Multiplex System

## ACTUATOR COLOUR



Code	Colour
1	Blue
1/4	Dark blue
2	Black
3	Green

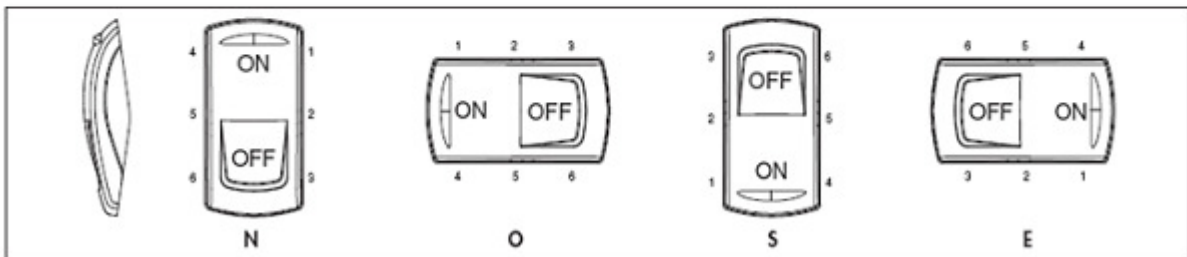
Code	Colour
4	Grey
5	Yellow
6	Red
7	Ivory

Code	Colour
9	Orange

Note : colours A, 5 and 7 not available on illuminated versions.  
A soft-touch varnish can be added. Consult us.



## MARKING ORIENTATION If no marking required, leave box blank.



Other orientations : on request

# KS Series CAN Integrated Multiplex System

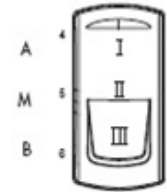
## SYMBOLS



White marking for illuminated rockers and non-illuminated black rockers.  
Black marking for non-illuminated colour rockers. Other : on request.  
Marking in M area : on request.

Most symbols meet the ISO 7000 standard "graphical symbols for use on equipments" (code given in bracket in the description).  
Contact us for symbols not featured in the following tables.

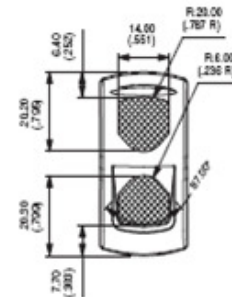
ACTUATOR MARKING



CODE	SYMBOL	DESCRIPTION	CODE	SYMBOL	DESCRIPTION
XX	None	-	14		Traveller lighting
01	<b>ON</b>	-	15		Driver lighting (1421)
02	<b>OFF</b>	-	16		Revolving light
03	<b>O</b>	-	17		Rear ventilator
04	<b>I</b>	-	18		Heating (0637)
05	<b>II</b>	-	19		Door opening
06	<b>STOP</b>	-	20		Windshield demister/defroster (0635)
07	<b>A</b>	Stop	21		Windshield wiper (0086)
08	<b>M</b>	Motion	22		Windshield washer (0088)
09		Up motion	23		Ventilator fan (0089)
10		Down motion	24		Side mirror defroster
11		Hot	25		Restarting pump
12		Cold	26		Front fog lights (0633)
13		Hazard warning (0085)	27		Rear fog lights (0634)

### Marking area

For illuminated versions.  
The symbol will be included in the hatched area.



Symbol scale : 1:1 (standard).  
Other : on request.

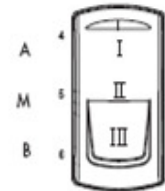
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Other : on request.

CODE	SYMBOL	DESCRIPTION
28		-
29		Beacon (1141)
30		-
31		Electric motor (0011)
32		Emergency first aid vehicle (2565)
33		Load tipping (1557)
34		Loading light (2457)
35		Tractor, rear-ward (0089)
36		Combine, direction of movement (1678)
37		Use no forks (2406)
38		Transmission (1166)
39		Working spot light (1145)
40		Engine (0634)
41		Horn (0244)

CODE	SYMBOL	DESCRIPTION
42		lock (1656)
43		Taxi sign light (2551)
44		Flood light (1024)
45		-
46		-
47	<b>ASM</b>	-
48		-
49		Differential lock (1662)
50		-
51		-
52		-
53	<b>N</b>	-
54		Rear window wiper (0097)
55		Rear window washer (0099)

CODE	SYMBOL	DESCRIPTION
56		Lower load (2223)
57		Cab lock (1560)
58		Extraction
59		Pumping in
60		Rear PTO (1572)
61		Front PTO
62		Rockshaft down
63		Rockshaft up
64		Indicator

# KS Series CAN Integrated Multiplex System

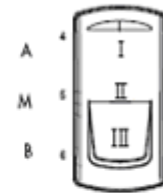
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Contact us for symbols not featured in the following tables.



CODE	SYMBOLE	DESCRIPTION	CODE	SYMBOLE	DESCRIPTION
65		Desserer le frein Iso 0021	77		Pump
66		baggage room left door	78	WC	Toilet
67		baggage room right door	79		Toilet Decontamination
68		Power blinds	80		Front windshield heating
69		Engine idle control	81	AUS	AUS
70	CRUISE RES/SET	CRUISE RES/SET	82		Radiator FAN
71		Driver windows up/down	83		Remove retarder
72		Middle door opening	84		Restricted speed
73		Front door opening	85		Preheater Iso 0457
74		Lighting in baggage room	86		ABS detection Iso 1407
75	CRUISE ON/OFF	CRUISE on/off	87		ECAS detection
76	TV	TV	88		Engine Stop Iso 1180
			89	CRUISE RES/CAN	CRUISE RES/cancel

Symbol scale : 1:1 (standard).  
Other : on request.

# KS Series CAN Integrated Multiplex System

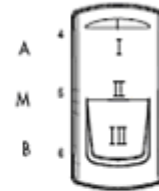
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 Other : on request.

CODE	SYMBOLE	DESCRIPTION	CODE	SYMBOLE	DESCRIPTION
90		ECAS Reset	A3		Rotation cabine anti horaire
91		Driver windows heating	A4		Repliage faucheuse
92		CRUISE set	A5		Dépliage faucheuse
93		Air bag up/down	A6		Frein de parking Iso 0238
94		Read lighting	A7		Relevage tapis
95		Lighting main switch	A8		Descente tapis
96		heating using water	A9		Amplificateur de voix
97		Feux de croisement Iso 0093	AA		Sortie rampe latérale droite
98		Feux de position Iso 0456	AB		Rentrée rampe latérale droite
99		Diesel Accélération	AC		Sortie rampe latérale gauche
A1		Mode manuel	AD		Rentrée rampe latérale gauche
A2		Rotation cabine horaire	AE		Déverrouillage

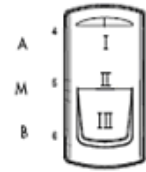
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Marking in M area : on request.

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Contact us for symbols not featured in the following tables.



Symbol scale : 1:1 (standard).  
Other : on request.

CODE	SYMBOLE	DESCRIPTION
AF		Spécifique client
AG		Condition de charge de batterie
AH		Indicateurs de direction
AJ		Feux de route
AK		Blocage du différentiel
AL		Brossage au moyen d'une brosse circulaire
AM		Véhicule 4 x 4 à boîte de transfert à blocage de différentiel central
AN		Godet de chargeuse, libre/flottant
AP		Godet de chargeuse
AQ		Essuie-glace et lave-glace de lunette arrière
AR		Godet de chargeuse
AS		Pelle rétrocaveuse déport de la flèche
AT		Traitement chimique de l'eau

CODE	SYMBOLE	DESCRIPTION
AU		Debusqueuse a grappin, flèche simple fonction
AV		Spécifique client
AW		Spécifique client
AY		Spécifique client
AZ		Spécifique client
B1	HIGH	Spécifique client
B2	LOW	Spécifique client
B3		Spécifique client
B4	SOS	
B5		Spécifique client
B6		Spécifique client
B7		Spécifique client
B8		Spécifique client

CODE	SYMBOLE	DESCRIPTION
B9		Spécifique client
BA		Spécifique client
BB		Spécifique client
BC		Spécifique client
BD		Spécifique client
BE		Spécifique client

# KS Series CAN Integrated Multiplex System

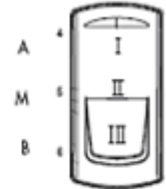
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Contact us for symbols not featured in the following tables.



Symbol scale : 1:1 (standard).  
Other : on request.

CODE	SYMBOLE	DESCRIPTION	CODE	SYMBOLE	DESCRIPTION
BF	AUTOPILOT	Spécifique client	BU	!	Défaillance du système de freinage
BG	DEVICE	Spécifique client	BV	ADD WATER	Add Water
BH	DEVICE	Spécifique client	BW	PUMP OUT	Pump out
BJ	CABIN HEATER	Spécifique client	BY	R	Reverse Horn
BK	WEATHER	Spécifique client	BZ	T°	T° du fluide de refroidissement du moteur
BL	STANDBY VACUUM	Spécifique client	C1		Epannage
BM	STANDBY ALT	Spécifique client	C2		Groupage
BN	BATTERY MASTER	Spécifique client	C3		Moteur alternatif à combustion interne
BP	AVIONICS MASTER	Spécifique client	C4	+	Plus, augmentation, polarité positive
BQ	ALTERNATOR	Spécifique client	C5	-	Moins, diminution, polarité négative
BR	FUEL PUMP	Spécifique client	C6	XENON	Xénon
BS	AUX	Spécifique client	C7		Spécifique client
BT	REV	REVERSE	C8		Lièvre

# KS Series CAN Integrated Multiplex System

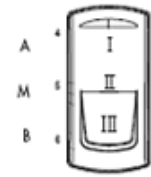
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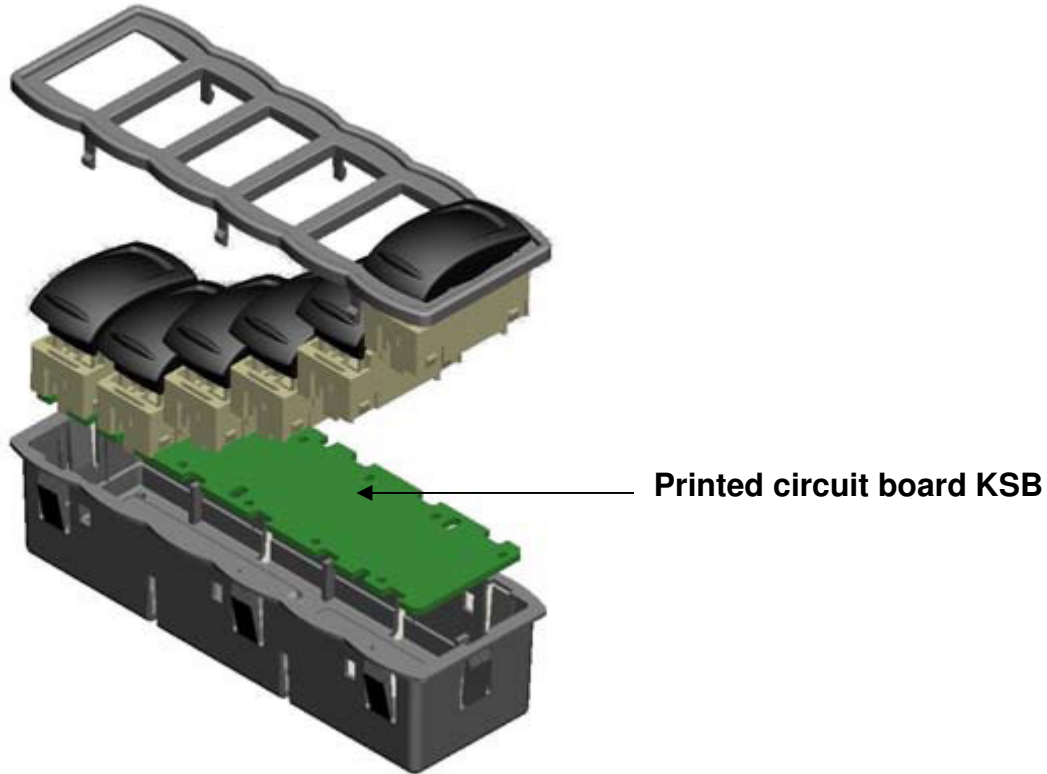
CODE	SYMBOLE	DESCRIPTION	CODE	SYMBOLE	DESCRIPTION
C9		Tortue	CN		Spécifique client
CA		Déverrouillage godet	CP		Spécifique client
CB		Montée / Descente	CQ		Spécifique client
CC		Aucune réponse de l'opérateur de la station éloignée Iso 1951	CR		Spécifique client
CD		Point lumineux	CS		Spécifique client
CE		Emergency pump	CT		Alarme iso 2301
CF	TEST	Test	CU	CAFS	Cafs
CG		Stairs light Iso 1144	CV		Spécifique client
CH	CLUTCH	Clutch	CW		Spécifique client
CJ		Eclairage du tableau de bord / des instruments Iso 1556	CY		Spécifique client
CK		Refroidissement / conditionnement d'air Iso 0027	CZ	CLOSED	Closed
CL		Overloading free	D1	OPEN	Open
CM		Winch speed	D2		Spécifique client

CODE	SYMBOLE	DESCRIPTION
D3		Spécifique client



## IV. PRINTED CIRCUIT BOARD KSB

### IV.1 OVERVIEW

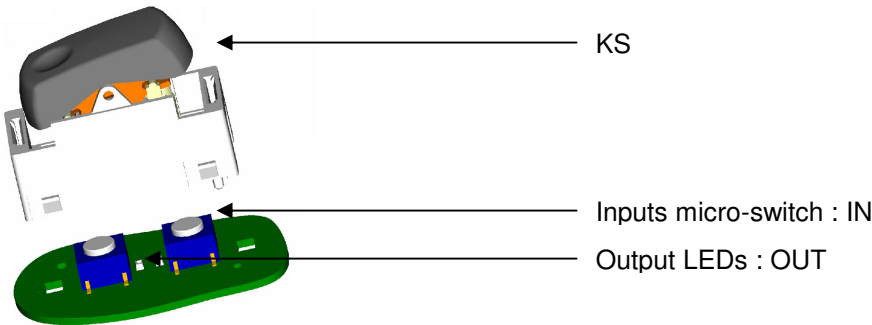


### IV.2 ABSOLUTE MAXIMUM RATINGS

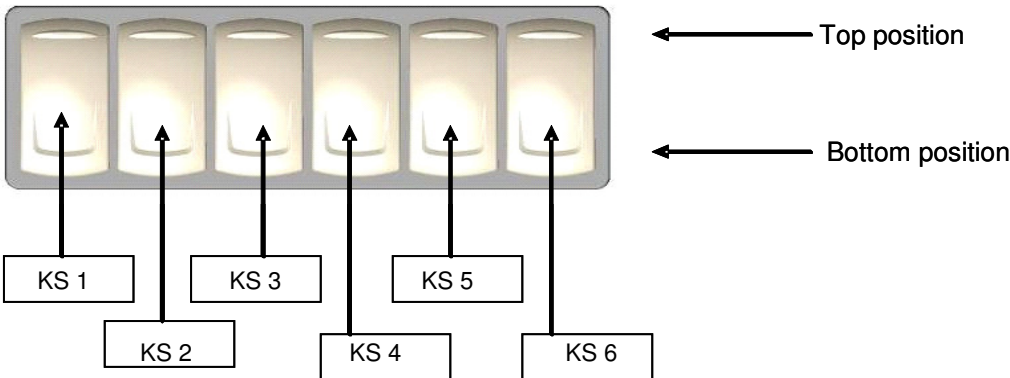
Power supply and temperature parameters:

	Unit	min	Typ	Max	Conditions
Storage temperature	°C	- 40	-	+85	
Working temperature	°C	- 40	-	+70	-
Power supply voltage	V	8	-	32	-
Overtoltage	V	-	-	36	5 min
Load dump	V			58	

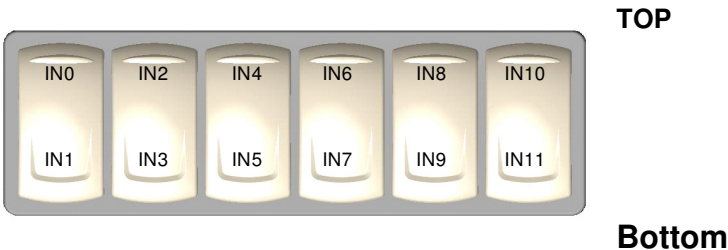
IV.3 MACHINE INTERFACE



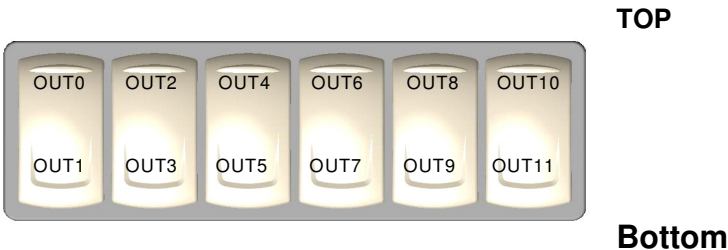
IV.3.1 KS position:



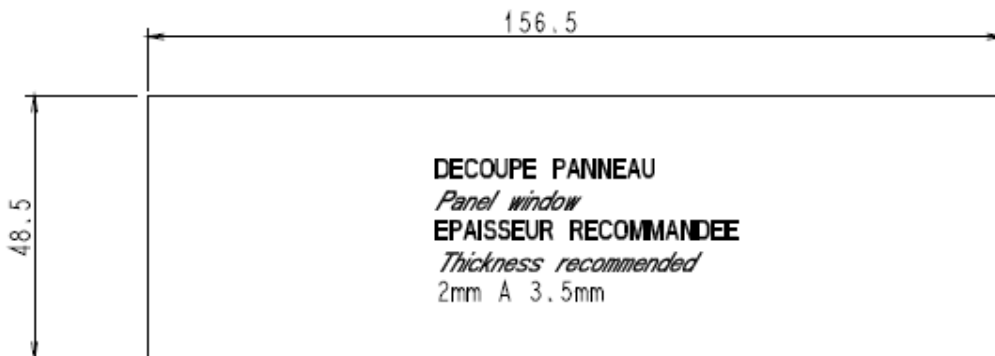
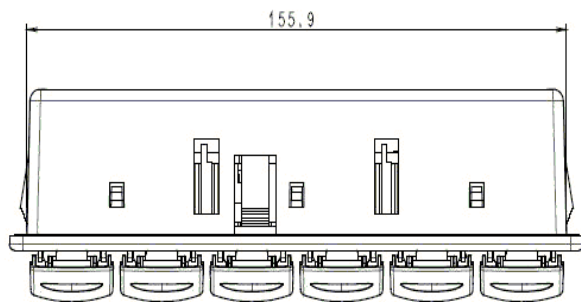
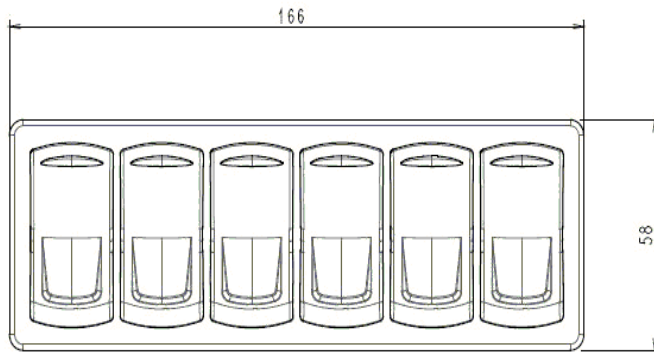
IV.3.2 Input labels :



IV.3.3 Output labels :



IV.4 MECHANICAL INTERFACES



## IV.5 ELECTRICAL INTERFACES

### IV.5.1 power supply

Designation:	Value min	Value typ	Value max	Condition
+VBAT	+8V	+14V or +28V	+32V	
Normal mode current consumption			+500mA	
Sleep mode current consumption	-	-	1.5mA	+VBAT =24V
Sleep mode current consumption	-	-	1mA	+VBAT =12V

### IV.5.2 communication

#### IV.5.2.1 CAN interface

Complies with SAE J1939 communication protocole

Designation:	Value min	Value typ	Value max	Condition
Recessive state on CAN H :	2.0V	2.5V	3.0V	no load
Recessive state on CAN L	2.0V	2.5V	3.0V	no load
Dominant state on CAN H	2.75V	3.5V	4.5V	Load : 60 ohms between CAN H and CAN L
Dominant state on CAN L	0.5V	1.5V	2.25V	Load : 60 ohms between CAN H and CAN L
Recessive state on differential voltage	-1.0V	-	0.5V	no load
Dominant state on differential voltage	1.5V	2.0V	3.0V	Load : 60 ohms between CAN H and CAN L
Bitrate		250 kbaud		

#### IV.5.2.2 CAN addressing lines

Four masters KS modules can be connected on the same CAN bus. To differentiate them, 2 addressing lines defines the KS modules number depending on their connection to ground:

AD_CAN1	AD_CAN0	MASTER number
nc	nc	1
nc	GND	2
GND	nc	3
GND	GND	4

where:

AD\_CAN0, AD\_CAN1: CAN addressing lines

nc: not connected

GND: connected to ground

## KS Series CAN Integrated Multiplex System

### IV.5.2.3 LIN interface

Designation:	Value min	Value typ	Value max	Condition
VLin DC Voltage on LIN Bus	+8V	+14V	+16V	
LIN recessive output voltage	+4.8V	-	-	
LIN dominant output voltage	-	-	3.2V	
Bitrate		20 kbauds		

### IV.5.2.4 LIN addressing lines

Up to 3 slaves KS modules can be connected to a master KS module.

There are 2 addressing lines which allows the slave software to determine its slave number as showed below:

AD_LIN1	AD_LIN0	SLAVE number
nc	nc	1
nc	GND	2
GND	nc	3

where:

AD\_LIN0, AD\_LIN1: LIN addressing lines

nc: not connected

GND: connected to ground

## IV.6 SOFTWARE INTERFACES

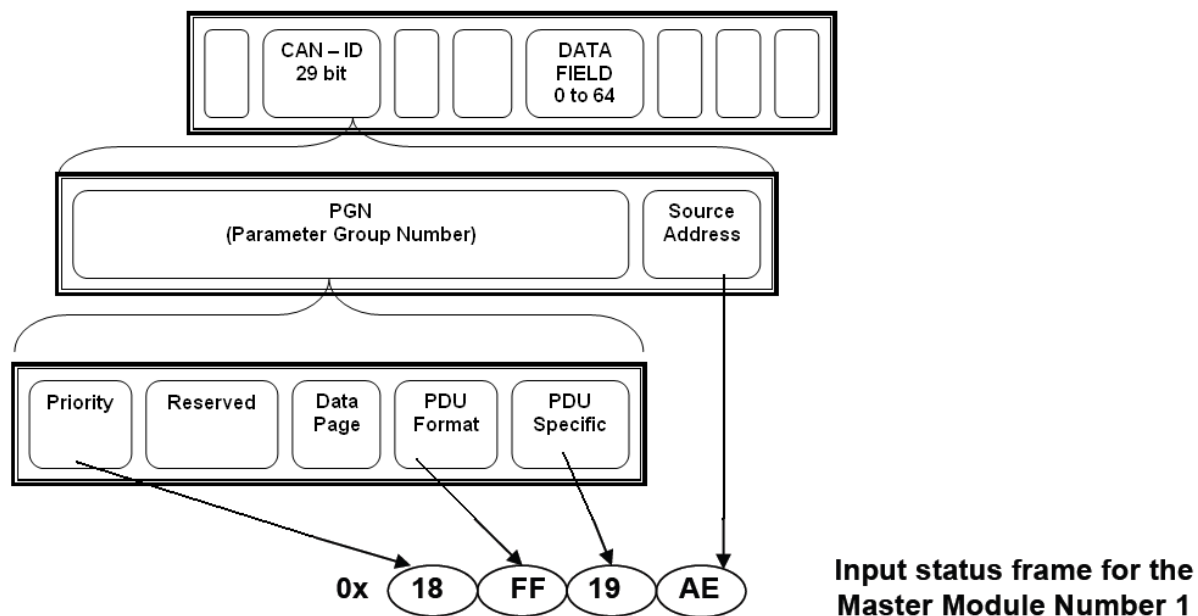
### IV.6.1 Input status frame

The input status frame is transmitted by the master KS module with the appropriate proprietary frame identifier:

MASTER number	Input Status Frame Identifier
1	0x18FF19AE
2	0x18FF1AAE
3	0x18FF1BAE
4	0x18FF1CAE

The frame cycle is specified to 1s or upon input status change.

#### J1939 message format



## KS Series CAN Integrated Multiplex System

The frame contains the following information spreads on 8 data bytes:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	M_IN7	M_IN6	M_IN5	M_IN4	M_IN3	M_IN2	M_IN1	M_IN0
2	S1_IN3	S1_IN2	S1_IN1	S1_IN0	M_IN11	M_IN10	M_IN9	M_IN8
3	S1_IN11	S1_IN10	S1_IN9	S1_IN8	S1_IN7	S1_IN6	S1_IN5	S1_IN4
4	S2_IN7	S2_IN6	S2_IN5	S2_IN4	S2_IN3	S2_IN2	S2_IN1	S2_IN0
5	S3_IN3	S3_IN2	S3_IN1	S3_IN0	S2_IN11	S2_IN10	S2_IN9	S2_IN8
6	S3_IN11	S3_IN10	S3_IN9	S3_IN8	S3_IN7	S3_IN6	S3_IN5	S3_IN4
7	WKO_IN11	WKO_IN9	WKO_IN7	WKO_IN5	WKO_IN3	WKO_IN1	WKO_SWP	
8	<i>not used</i>	S3_LINErr	S2_LINErr	S1_LINErr	<i>not used</i>	<i>not used</i>	<i>not used</i>	WKO_CAN

'1' = Active.

'0' = Inactive.

where:

M\_IN0 to 11: Master SWP input status

S1\_IN0 to 11: Slave SWP#1 input status

S2\_IN0 to 11: Slave SWP#2 input status

S3\_IN0 to 11: Slave SWP#3 input status

WKO\_SWP: SWP related to the wake up origin information

WKO\_SWP = 0 : Master SWP

WKO\_SWP = 1 : Slave SWP 1

WKO\_SWP = 2 : Slave SWP 2

WKO\_SWP = 3 : Slave SWP 3

WKO\_IN1 to 11: wake-up input status at wake-up of the SWP indicated by WKO\_SWP

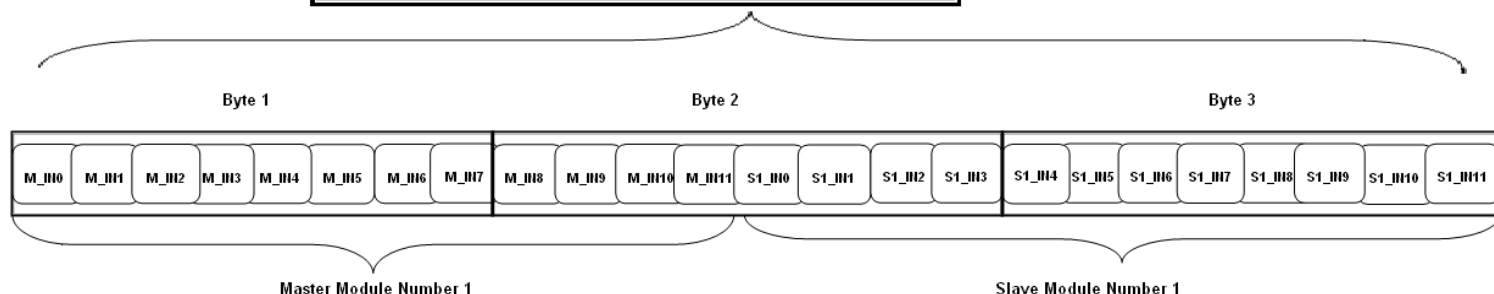
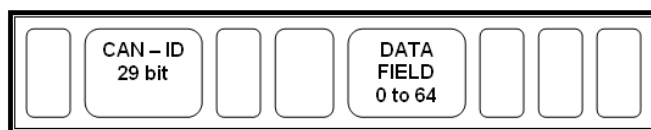
WKO\_CAN : CAN wake-up origin

S1\_LINErr: Slave SWP#1 LIN error

S2\_LINErr: Slave SWP#2 LIN error

S3\_LINErr: Slave SWP#3 LIN error

See §IV.3.2 for input physical location.

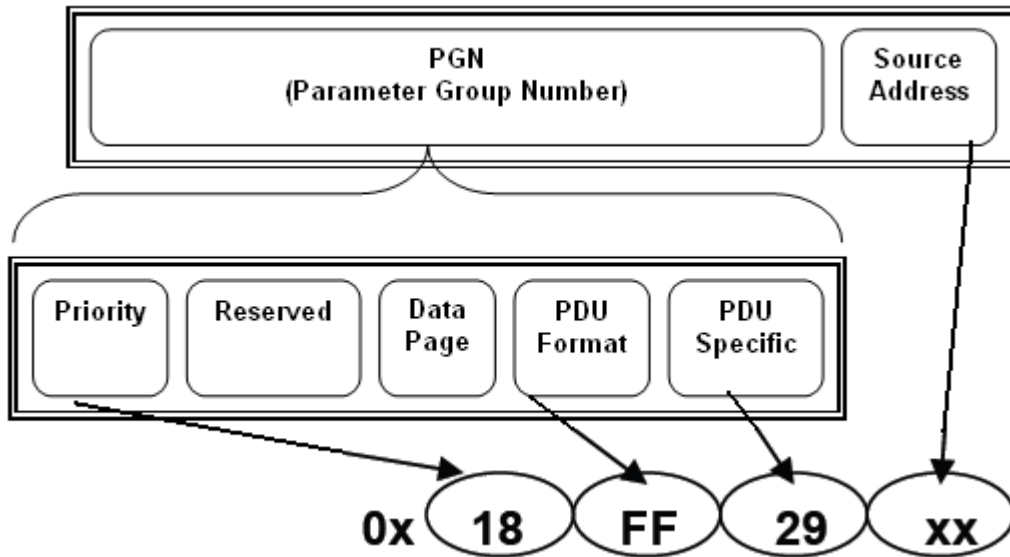


## IV.6.2 Output Commands frame

The output commands frame is received by the master KS module with the appropriate proprietary frame identifier:

MASTER number	Output Command Frame Identifier
1	0x18FF29xx
2	0x18FF2Axx
3	0x18FF2Bxx
4	0x18FF2Cxx

Where xx is the Source Address (SA) of the transmitting unit.  
The frame cycle is specified at 50ms.





## KS Series CAN Integrated Multiplex System

The frame contains the master and the slave KS module output commands spread on 8 data byte as defined below:

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	M_OUT7	M_OUT6	M_OUT5	M_OUT4	M_OUT3	M_OUT2	M_OUT1	M_OUT0
2	S1_OUT3	S1_OUT2	S1_OUT1	S1_OUT0	M_OUT11	M_OUT10	M_OUT9	M_OUT8
3	S1_OUT11	S1_OUT10	S1_OUT9	S1_OUT8	S1_OUT7	S1_OUT6	S1_OUT5	S1_OUT4
4	S2_OUT7	S2_OUT6	S2_OUT5	S2_OUT4	S2_OUT3	S2_OUT2	S2_OUT1	S2_OUT0
5	S3_OUT3	S3_OUT2	S3_OUT1	S3_OUT0	S2_OUT11	S2_OUT10	S2_OUT9	S2_OUT8
6	S3_OUT11	S3_OUT10	S3_OUT9	S3_OUT8	S3_OUT7	S3_OUT6	S3_OUT5	S3_OUT4
7	Cab Illumination (1% / bit, 0 offset)							
8	SLEEP	<i>not used</i>	<i>not used</i>	<i>not used</i>	BKL	<i>not used</i>	<i>not used</i>	<i>not used</i>

Output symbol description:

M\_OUT0 to 11: Master SWP output commands

S1\_OUT0 to 11: Slave SWP#1 output commands

S2\_OUT0 to 11: Slave SWP#2 output commands

S3\_OUT0 to 11: Slave SWP#3 output commands

Cab Illumination: output PWM ratio for backlight

Resolution: 1% / bit, 0 offset

Binary								Decimal	Resolution
0	0	0	0	0	0	0	0	0	0%
0	0	0	0	0	0	0	1	1	1%
0	0	0	0	0	0	1	0	2	2%
...									

Range: 0-99%

BKL: Backlight command

0: Backlight not activated

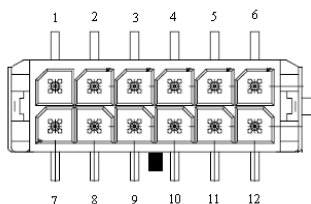
1: Backlight activated

SLEEP: Sleep command

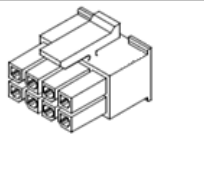
See §IV.3.3 for output physical location.

# KS Series CAN Integrated Multiplex System

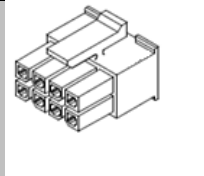
## IV.7 PIN ALLOCATION



### IV.7.1 Master connector

<b>CN100 :</b>			
<b>Part number:</b>	Molex 43045-1218		
<b>Pins quantity :</b>	12		
<b>Harness connector :</b>	Molex 43025-1200		
<b>Pins reference :</b>	Molex 43030-0007		
Signal name	pin	Function	
GND	1	Ground	
+VBAT	2	Battery voltage	
CAN_ADR0	3	CAN adresse line 0	
CAN_ADR1	4	CAN Adresse line 1	
CAN_H	5	CAN signal H	
CAN_L	6	CAN signal L	
GND	7	Ground (to connect another KS module)	
+VBAT	8	Battery voltage (to connect another KS module)	
LIN	9	LIN signal	
Wake up Line	10	Wake up line	
NC	11	Not connected	
TERM_CAN_L	12	120 resistor between CAN H and CAN L if pin connected to CAN_L	

### IV.7.2 Slave connector

<b>CN100 :</b>			
<b>Part number:</b>	Molex 43045-1218		
<b>Pins quantity :</b>	12		
<b>Harness connector :</b>	Molex 43025-1200		
<b>Pins reference :</b>	Molex 43030-0007		
Signal name	pin	Function	
GND	1	Ground	
+VBAT	2	Battery voltage	
LIN_ADR0	3	LIN adresse line 0	
LIN_ADR1	4	LIN Adresse line 1	
NC	5	Not connected	
NC	6	Not connected	
GND	7	Ground (to connect another KS module)	
+VBAT	8	Battery voltage (to connect another KS module)	
LIN	9	LIN signal	
Wake up Line	10	Wake up line	
LIN	11	LIN signal	
Wake up Line	12	Wake up line	

### IV.8 CABLES

The maximum length of the cable (0.5 mm<sup>2</sup> multi-wire) between the master module and the farthest slave module is 5 meters.

#### **RESPONSE TIME DELAY**

- The time delay between a switch status change and the associated CAN frame emission is less than 100 ms.
- The time delay between a CAN frame reception with a LED status change and the associated LED command is less than 100 ms.

#### **WAKE UP FUNCTION**

- There are two different ways to wake up the KS system: an activity on the CAN line or a switch associated to a wake up function in 'ON' position.
- The bottom position of switch 1, 2, 3 and 4 of the master module can be associated to a wake-up function (optional).

## KS Series CAN Integrated Multiplex System

### IV.9 ENVIRONMENT CHARACTERISTICS

#### IV.9.1 EMC tests

EMC tests	Standard	Level
Pulse on power supply lines	ISO7637-2	Pulse 1: -450V; Ri=50Ω; td=1ms, t1=1s Pulse 2a: +50V; Ri=2Ω; td=0.05ms, t1=1s Pulse 2b: +20V; Ri=0.05Ω; td=0.5s, Pulse 3a,3b: ± 200V; Ri=50Ω; td=0.1μs, pulse 4 : Vs= - 16V; Va = -12V; t6 = 100 ms; t8 = 10s Pulse 5a: +58V; Ri=1.5Ω; td=480ms
Pulse on signal supply lines	ISO 7637-3	Pulses a and b: ± 200V
ESD	ISO10605	Direct discharges on the connector pins through 2 kV and 330 pF: ± 2 kV Air discharges: ± 8 kV Contact discharges: ± 4 kV
Conducted immunity BCI	ISO11452-4	100mA Class A 200mA Class C
Radiated immunity	ISO11452-2	100V/m 200MHz to 2GHz
Radiated emission	CISPR25	Class 3
e marking	2006/28/CE	KS module modules are compliant with e marking 2006/28/CE standard

#### IV.9.2 Mechanical tests

Mechanical tests	Standard	Level
Sinusoidal vibration	CEI 68-2-6, test Fc	Band [5 Hz, 27.3 Hz], with +/- 1 mm displacement Band [27.3 Hz, 100 Hz], with 3G acceleration, 1 octave/min, Test duration: 20 hours power off on the 3 axes
Random vibration	CEI 68-2-64 test Fda	Acceleration: 0.02g <sup>2</sup> /Hz between 5Hz à 100Hz. Sweep : 1 octave /minute. Test duration 20 h on each axes : power ON
Protection index	EN 60529	- Protection index for front side area : IP30
Shocks	CEI 68-2-27 test Ea	The system must withstand 50g during 11ms (½ sinus), 3 shocks on each axes in the directions (total of 18 shocks) The instrument is power off during the test.
Salt mist	CEI 68-2-52	Test duration : 10 hours Solution 5% sodium chloride (NaCl)
Chemical substances	ISO16750-5	The following tests are performed according to the ISO16750-5 : 2004 standard : Battery fluide, cafeine and sugar, fuel diesel, IPA 70% (brush) Interior cleaner and galss cleaner (spray) After chemical substance exposure all products are exposed at +70°C during 96 hours.

## KS Series CAN Integrated Multiplex System

### IV.9.3 Climatics tests

Climatic tests	Standard	Level
Dry heat	CEI 600 68-2-2	70°C during 72 hours
Cold	CEI 600 68-2-1	-40°C during 72 hours
Damp heat	CEI 600 68-2-30	Test duration : 10 cycles described hereafter :
Slow temperature variation	CEI 600 68-2-14 test Nb	Test duration : 8 cycles described hereafter with : t1 = 3h TA=-40°C TB=+70°C
Quick temperature variation	CEI 600 68-2-14 test Na	Instrument power OFF 10 cycles (t1 = 1H ; t2 < 3 min ; TA=-40°C ; TB=+70°C)

### IV.10 MASTER FULL EQUIPPED

The master full equipped variant is defined by the table below:

#### IV.10.1 Function description

Function	Quantity	Description
CAN	1	J1939
LIN	1	LIN 2.0
Wake up *	3	CAN, KS n°1, KS n°6

#### IV.10.2 Switch description

KS (See §V)	Function
1	3 Positions
2	3 Positions
3	3 Positions
4	3 Positions
5	3 Positions
6	3 Positions

#### IV.10.3 LED description

LED/ KS	KS1	KS2	KS3	KS4	KS5	KS6
Top Led	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Bottom Led	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

\* Wake up event = bottom position

### IV.11 SLAVE FULL EQUIPPED

The slave full equipped variant is defined by the table below:

#### IV.11.1 Function description

Function	Quantity	Description
CAN	0	NA
LIN	1	LIN 2.0
Wake up	0	NA

#### IV.11.2 Switch description

KS	Function
1	3 Positions
2	3 Positions
3	3 Positions
4	3 Positions
5	3 Positions
6	3 Positions

#### IV.11.3 LED description

LED/KS	KS1	KS2	KS3	KS4	KS5	KS6
Top Led	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Bottom Led	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

### IV.12 MASTER LIGHT

The master light variant is defined by the table below:

#### IV.12.1 Function description

Function	Quantity	Description
CAN	1	J1939
LIN	1	LIN 2.0
Wake up *	3	CAN, KS n°1, KS n°6

#### IV.12.2 Switch description

KS	Function
1	3 Positions
2	3 Positions
3	2 Positions
4	2 Positions
5	2 Positions
6	2 Positions

#### IV.12.3 LED description

LED/ KS	KS1	KS2	KS3	KS4	KS5	KS6
Top Led	Yellow	Yellow	X	X	X	X
Bottom Led	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

\* Wake up event = bottom position

## IV.13 SLAVE LIGHT

The slave light variant is defined by the table below:

### IV.13.1 Function description

Function	Quantity	Description
CAN	0	NA
LIN	1	LIN 2.0
Wake up	0	NA

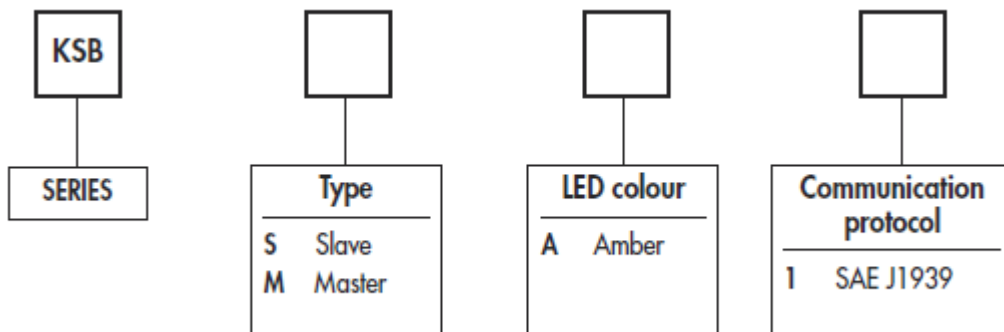
### IV.13.2 Switch description

KS	Function
1	3 Positions
2	3 Positions
3	2 Positions
4	2 Positions
5	2 Positions
6	2 Positions

### IV.13.3 LED description

LED/KS	KS1	KS2	KS3	KS4	KS5	KS6
Top Led	Yellow	Yellow	X	X	X	X
Bottom Led	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow

## IV.14 SELECTION GUIDE





## IV.15 ACCESSORIES

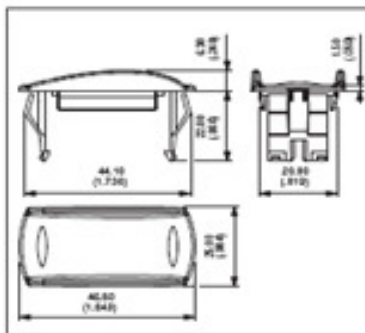
### IV.15.1 Hole plug

Usefull for future extensions.

Code	Colour
U2271	Blue
U2271/4	Dark blue
U2272	Black
U2273	Green

Code	Colour
U2274	Grey
U2275	Yellow
U2276	Red
U2277	Ivory

Code	Colour
U2279	Orange



Recommended panel thickness :  
1,50 mm to 6 mm

### IV.15.2 Actuator Removing Tool



2 tools are supplied

#### EXTRACT ACTUATOR

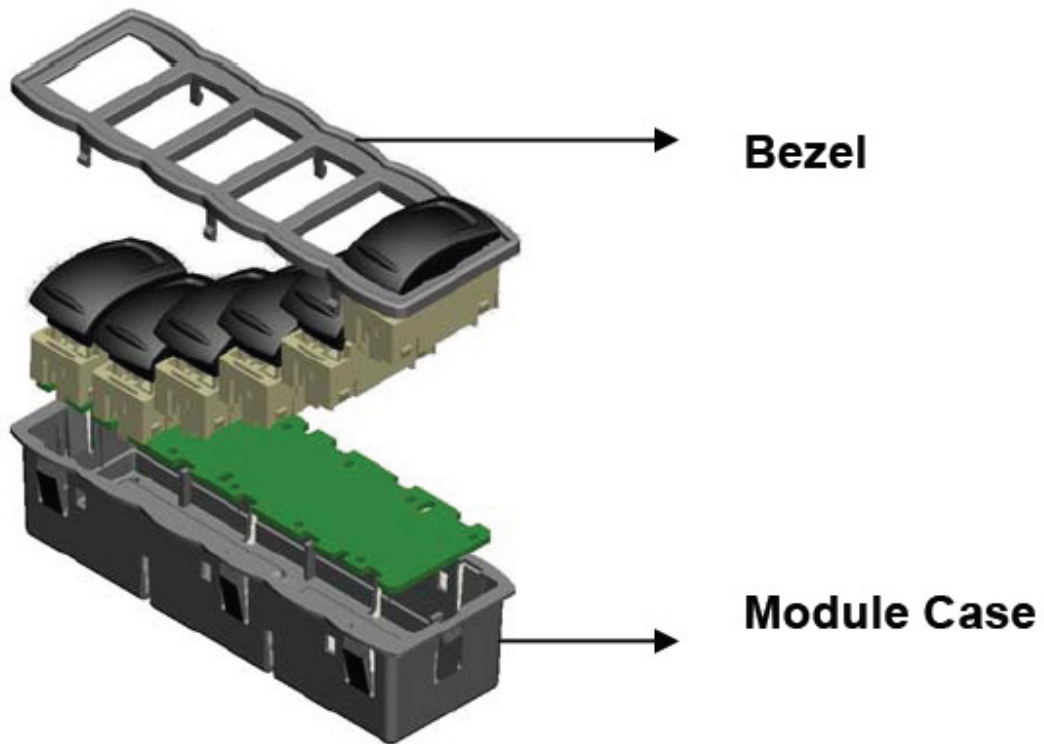
Allows the extraction of the rocker / rocker support assembly.  
Place the 2 claws under the support and push as indicated by the arrow.

#### EXTRACT ROCKER

Allows to separate the rocker from its support.  
Insert the tool between rocker and support as indicated by the arrow. Pull out the tool in the opposite direction.

#### EXTRACT SWITCH

Allows to extract switch from panel mounting units. 2 tools are necessary.  
Insert the tools between switch and panel mounting units from the rear to compress the snap-in device. Pull off switch manually.



#### IV.15.3 Bezel

Code	Colour
U6802	black
U680x	...

#### IV.15.4 Module Case

Code	Colour
U6742	black
U674x	...

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地址：深圳市南山区南海大道海王大厦A座19E

电话：86-755-23881000

传真：86-755-23881777

邮箱：info@sanpum.com



4008 824 824  
WWW.SANPUM.COM