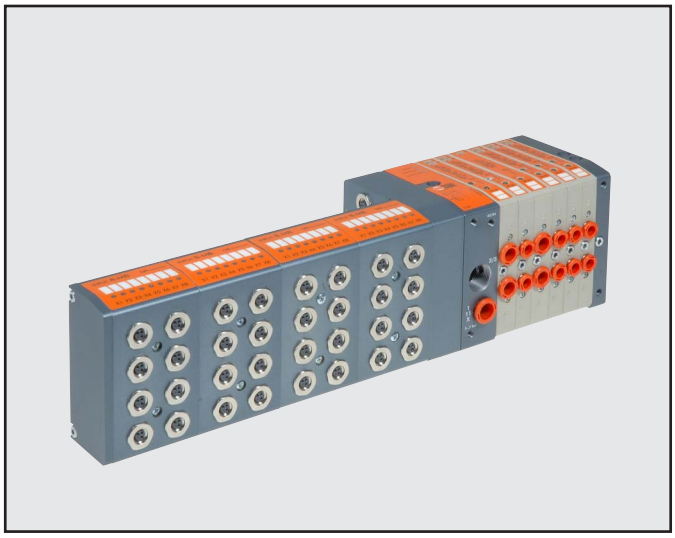
CM
CLEVER MULTIMACH

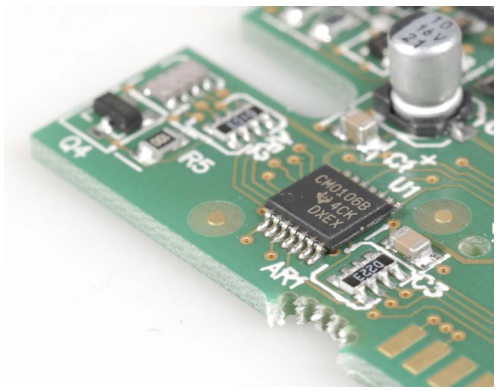
THE VALVE IN DETAIL

Clever Multimach valves can be used to form autonomous and intelligent valve island subsystems. Each valve has a microchip that performs a series of functions connected with operation and dialogue with the valves before and after it. Valves communicate via serial transmission. CM refers to the communication protocol patented by Metal Work. It is a field-bus in its own right, designed specifically for very easy control of islands of pneumatic solenoid valves.
CM valves have a diagnosis system that detects electrical faults. It can also be used to verify during installation that all connections are correct.
CMs communicate with the PC/PLC via multi-core cables, which means applications with CMs do not require the use of other field-buses or master and slaves.
Addressing of single outputs is not required as the connection number of each solenoid pilot is assigned automatically based on the position occupied by the valve.



SMART VALVE

Each valve comes with a microchip that controls operation and dialogue with the other valves.



CONNECTION BETWEEN VALVES

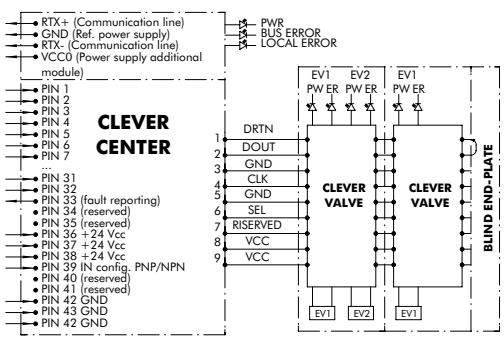
Gold-plated bronze contacts.
Only a few contacts are required to control numerous valves.

AUTOMATIC CONNECTION

Merely bring the valves into contact to establish an electrical connection.

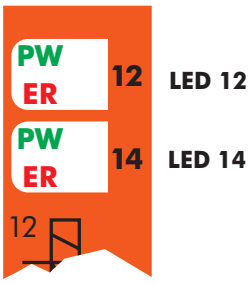
WIRING DIAGRAM

The Clever Center input terminal converts signals in parallel from the connector pins into a serial transmission to the valves. It interprets the return signals from the valve, relays signals to any slave islands and sends diagnosis messages back to the PC/PLC.



LOCAL DIAGNOSTICS

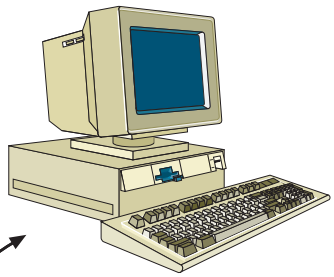
Each Clever Multimach valve has a LED diagnostic system that identifies immediately whether a pilot is energized, the contact is interrupted or there is a short-circuit.



LED 14	LED 12	
OFF	OFF	No fault, EV1-EV2=OFF
ON (green)	OFF	No fault, EV1=ON - EV2=OFF
ON (green)	ON (green)	No fault, EV1-EV2=ON
OFF	ON (green)	No fault, EV1=OFF - EV2=ON
Red (flashing)	OFF	Solenoid pilot EV1 interrupted or disconnected
OFF	Red (flashing)	Solenoid pilot EV2 interrupted or disconnected
ON (red)	OFF	Solenoid pilot EV1 short circuit
OFF	ON (red)	Solenoid pilot EV2 short circuit
Green (flashing)	OFF	Data update time out, communication faulty

DIAGNOSTIC FEEDBACK

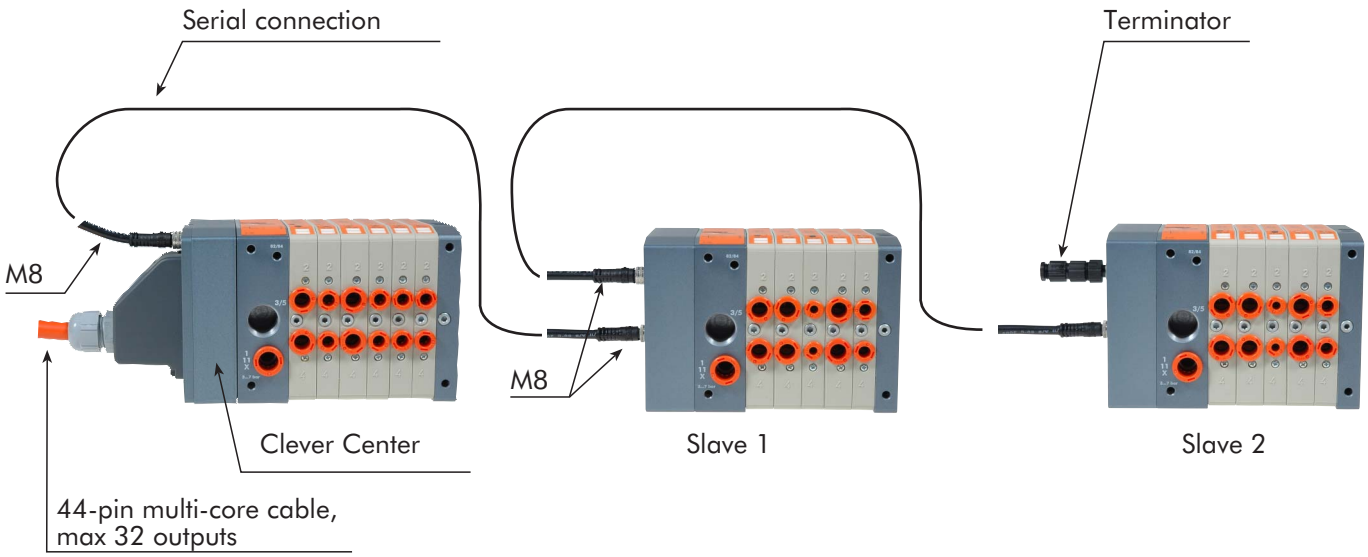
The Clever Center relays an error signal to the PC/PLC.



error signal (fault)

CONNECTION TO SLAVE ISLANDS

The Clever Center can relay command signals to other islands of "slaves". Transmission, in serial mode, is via a cable with M8 connectors. Commands can be sent from the first slave island to other slave islands in cascade, again via cables with M8 connectors. Addresses are assigned automatically, based on intuitive sequential logic. This means that other slaves can be added downstream at any time, until all 32 available outputs are in use.

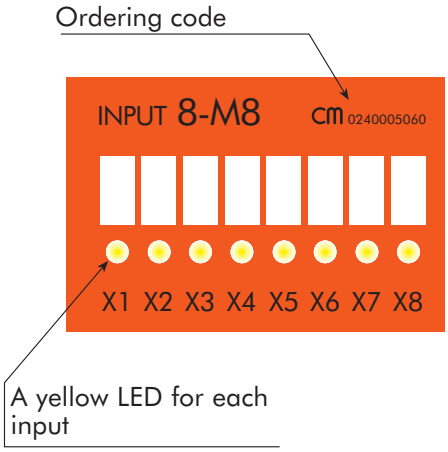


INPUT MODULES

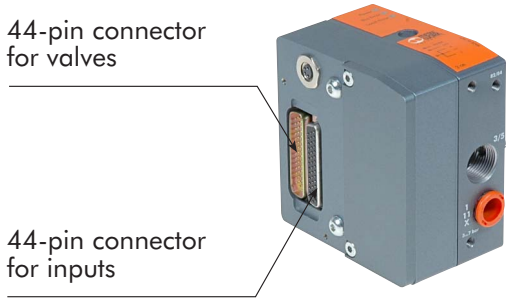
With the specially-configured Clever Center you can use input signal control modules, such as cylinder sensors.

INPUT IDENTIFICATION

Semi-removable label



CONNECTION WITH CLEVER CENTER



MAXIMUM EXPANSION

Up to 4 modules can be connected, giving a total of 32 input signals.

CABLES AND CONNECTORS

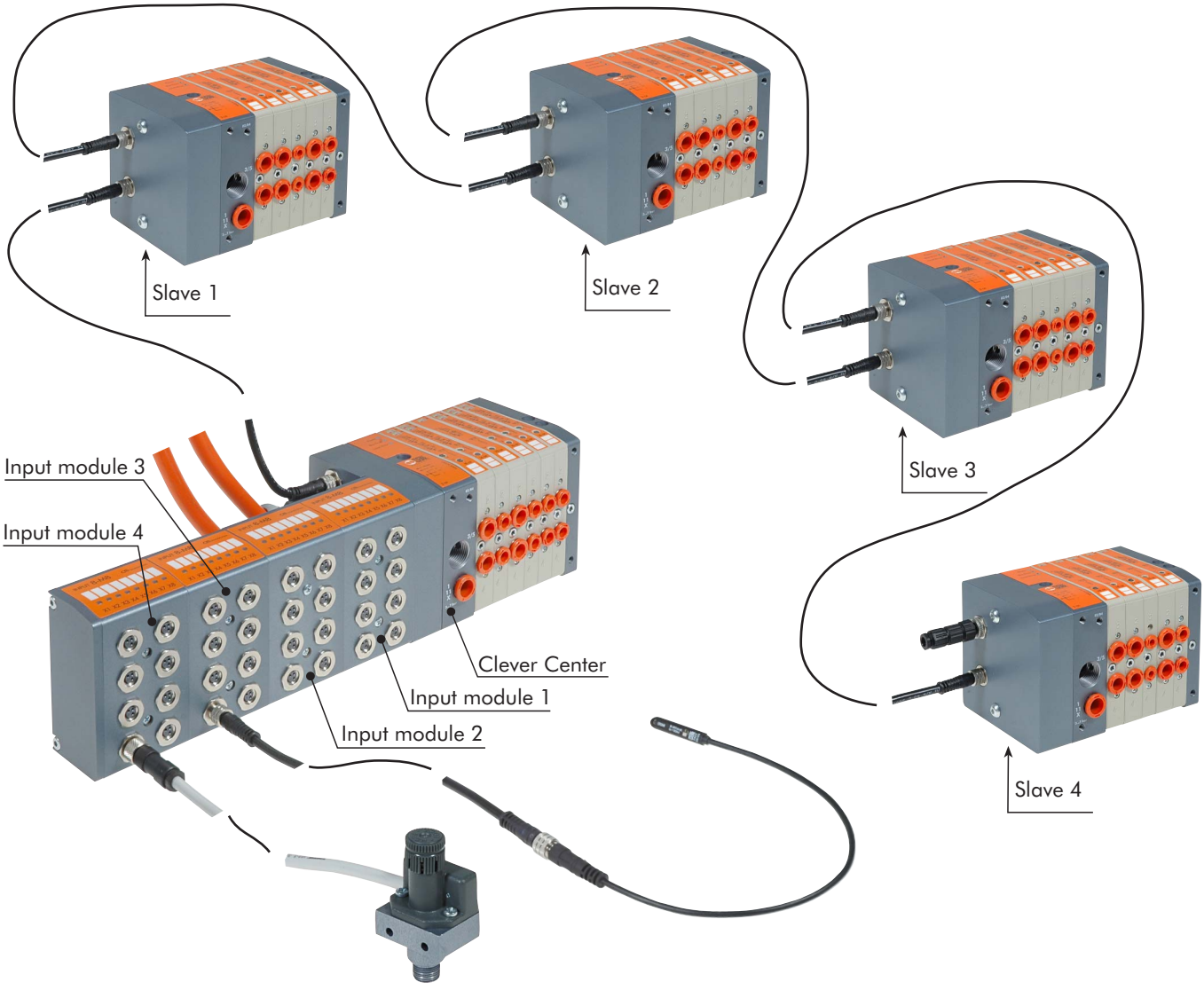
44-pin connector for valves

44+44-pin connector for valves and inputs

M8 master-slave and slave-slave connector

M8 connector for inputs

EXAMPLE OF A CM LAYOUT

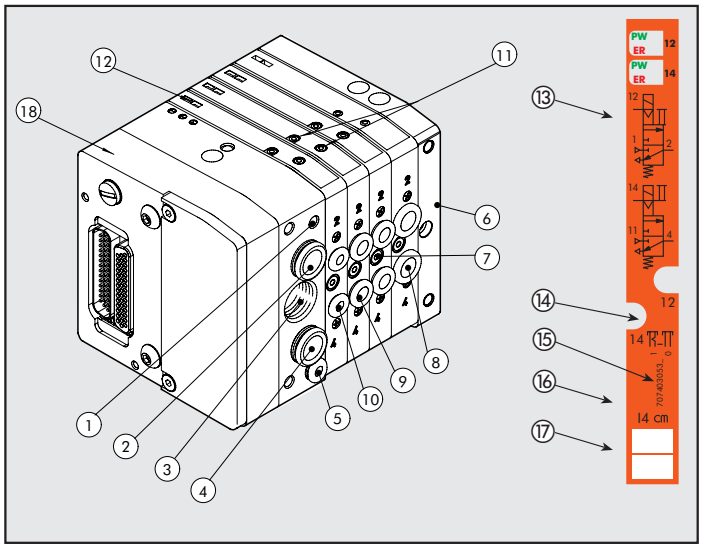


TECHNICAL DATA

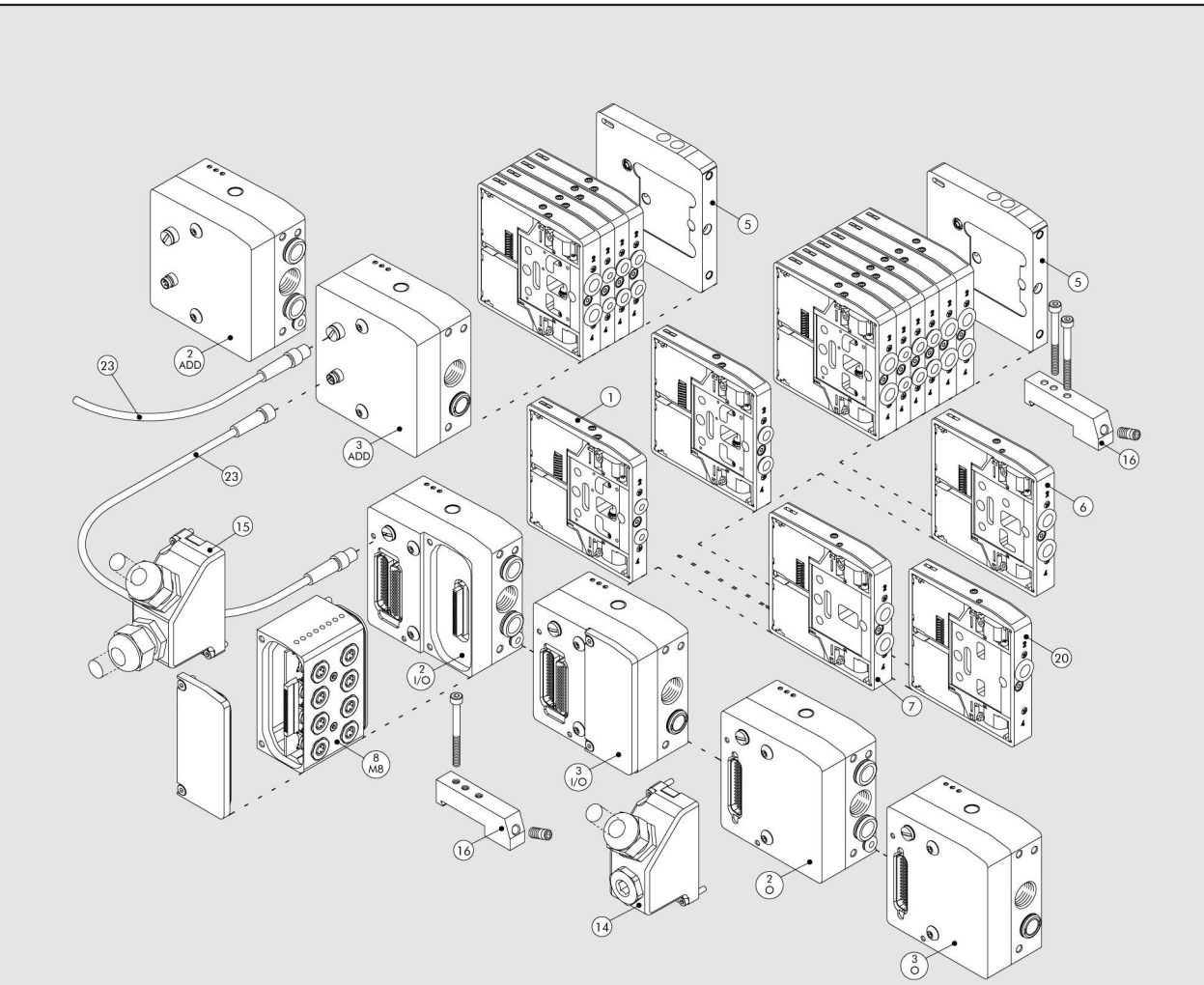
Valve port connections		Ø 4,6,8 mm fitting for ports 2 and 4 / Ø8 fitting for inlet port		
		thread 3/8 or Ø8 fitting for exhaust port		
Connection on the end-plate 1-11 for the supply of pilots		Automatic fitting Ø 4 mm		
Maximum number of pilots		32		
Maximum number of valves		32 (same as the max. no. of pilots)		
Operating temperature range	°C	-10 ÷ +60		
Fluid		Filtered air without lubrication; lubrication, if used, must be continuous		
Flow rate at 6 bar ΔP 1bar	Nl/min	11mm Ø 4 = 200	11mm Ø 6 = 500	14mm Ø 8 = 800
Pressure range		X (pilot supply)		1-11 ((valve supply)
	- terminal 1-11	3 ÷ 7 bar		vacuum at 10 bar
	- terminal 1	3 ÷ 7 bar		
Voltage range		24 VDC ±10%		
		(slave protected against overload and reverse polarity)		
Power for each pilot	W	0,9		
Solenoid Pilot Insulation class		F155		
Degree of protection		IP65 (with conveyed exhust, and that - in case of no use)		
DC input current without valve modules		Nominal Icc 30 mA - Instantaneous Icc (+≤ 25 ms) 650 mA		
Max input current with all valves ON	A	1.5		
Diagnosis		Local through LED and OUT fault reporting. For defects signalled look at the manual.		
		Outlets protected against overload and short-circuit		
Solenoid rating		100% ED		
Maximum latency time of the serial transmission	ms	10		
TRA/TRR 2X3/2 monostable at 6 bar	ms	8 / 45		
TRA/TRR 5/2 monostable at 6 bar	ms	8 / 33		
TRA/TRR 5/2 bistable at 6 bar	ms	20 / 20		
TRA/TRR 5/3 cc monostable at 6 bar	ms	20 / 20		
Note on use		Insert the pipes in the fittings, before passing air through the valves, otherwise the gasket may be pulled out of its seat by the flow of air.		
Compatibility with oils		see GENERAL CATALOGUE page 6.1/08 or webpage www.metalwork.it/eng/materiali_compatibilita.html		
Modulo INPUT per valvole CM				
Sensor supply voltage		24 VDC ±10%		
Max sensor power (distributed over eight connectors)	mA	200		
Input impedance	KΩ	3.9		
Max input voltage	Vcc	-5 ÷ +30		
Type of input		PNP/NPN configurable via dip switch		
Protection		Protected inputs against overload and short-circuit		
Active input signalling		One LED for each INPUT		

COMPONENTS

① Exhaust – Solenoid pilot 82/84
② Valve supply – port 1
③ Threaded connection of exhausts 3/5
④ Valve supply – port 11
⑤ Electrical control supply X
⑥ Blind end-plate
⑦ Screw for valve wall-mounting
⑧ Utility port for pipe Ø 8 mm
⑨ Utility port for pipe Ø 6 mm
⑩ Utility port for pipe Ø 4 mm
⑪ Manual control
⑫ LED (LED on, solenoid valve energised)
⑬ Pneumatic symbol
⑭ Identification of the monostable or bistable manual control
⑮ Valve ordering code
⑯ Valve identification code
⑰ Blank space for valve number
⑱ Clever Center terminal

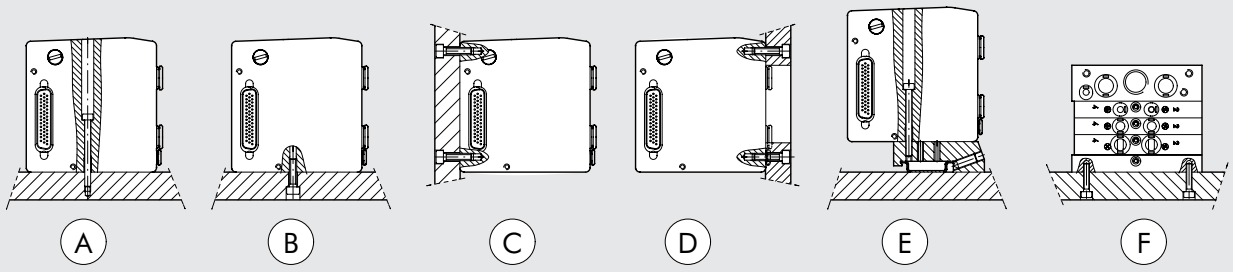


THE CLEVER MULTIMACH WORLD: FLEXIBILITY



THE NUMBERS PERMIT RAPID IDENTIFICATION
OF THE FUNCTION AND ASSEMBLY POSITION
OF THE SINGLE ELEMENTS REPRESENTED AS FOLLOWS

FIXING THE BASE

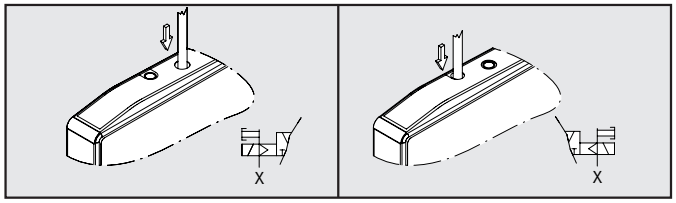


A: Fixing from above using the 1 or 1-1 input terminal and the blind terminal.
B-C: Fixing from above using the 1 or 1-1 input terminal and the blind terminal, using the M5 threads on the bottom and the rear of the terminals.
D: Fixing from above using the 1 or 1-1 input terminal and the blind terminal, using the M5 threads on the front of the terminals. An opening for the pipes is made in the plate.
E: Fixing on the DIN bar with end-plate 1 or 1-11 and blind and plate , using the push-in bracket code 0227301600.
F: Lateral fixing using the blind terminal, and its the M4 threads on the side lateral.
Note: The sole fixing admitted is the one showed.

KEY TO CODES – CLEVER MULTIMACH CM

C M	2	I/O	M	I6-W8-W6-O4-L8-5	M8-M8-15-16
VALVE	INPUT END-PLATE	FUNCTION	MANUAL TYPE	TYPE OF VALVE	FURTHER DETAILS
Clever Multimach	**2** End-plate1-11 **3** End-plate1	**O** Only Output **I/O** Input and Output **ADD** Additional (slave)	**M** Monostable manual control **B** Bistable manual control	**I** n° 2 3/2 NC **W** n° 2 3/2 NO **L** 3/2 NO + 3/2 NC **V** 5/2 monostable **K** 5/2 bistable **O** 5/3 monostable **5** blind end-plate **6** Passing-intermed. **7** Blind intermediate **20** exhaust section. **4** cartridge 4 **6** cartridge 6 **8** cartridge 8	**M8** Module 8 input M8 **14** Shell 44 pin **15** Shell 44+44 pin **16** n° 2 brackets for DIN bar

MANUAL CONTROLS



MONOSTABLE OVERRIDE PORT 2
servo-assisted

- Press and hold the manual control in position (not necessary for bistable type K valve)
- Release the manual control:
  - The manual control returns to the home position.
  - Valves type I, W, L, V and O reposition.
  - The type K valve remains switched

N.B.: The pilot power supply X must be present.

- The reference code for the monostable control ends in 0.

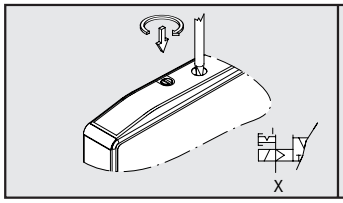
Example: 707403053_ 1 0

MONOSTABLE OVERRIDE PORT 4
servo-assisted

- Press and hold the manual control in position (not necessary for bistable type K valve)
- Release the manual control:
  - The manual control returns to the home position.
  - Valves type I, W, L , V and O reposition.
  - The type K valve remains switched

With type V valves, this manual control is not present.

N.B.: The pilot power supply X must be present.



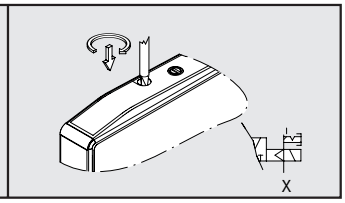
BISTABLE OVERRIDE PORT 2
servo-assisted

- Press the manual control right in then turn it clockwise 90 degrees and Leave it in position.
- Rotate the manual control 90 degrees anticlockwise, and then release it.
  - The manual control returns to the home position.
  - Valves type I, W, L, V and O reposition.
  - The type K valve remains switched

N.B.: The pilot power supply X must be present.

- The reference code for the monostable control ends in 1.

Example: 707403053_ 1 0



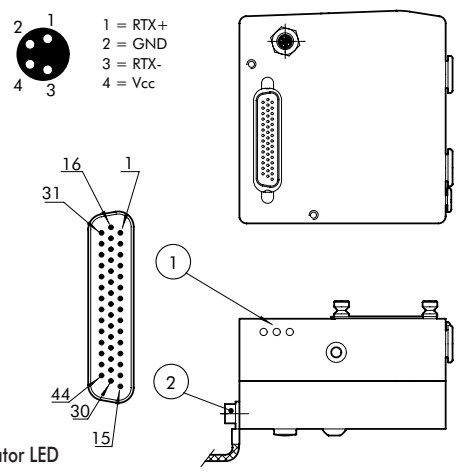
BISTABLE OVERRIDE PORT 4
servo-assisted

- Press the manual control right in then turn it 90 degrees clockwise and Leave it in position.
- Rotate the manual control 90 degrees anticlockwise, and then release it:
  - The manual control returns to the home position.
  - Valves type I, W, L V and O reposition.
  - The type K valve remains switched

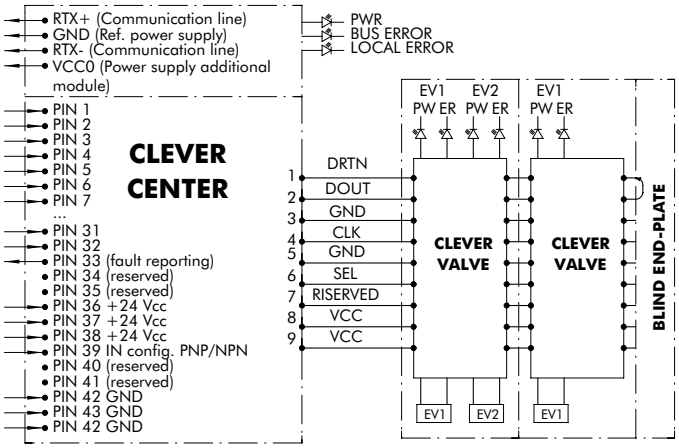
With type V valves, this manual control is not present.

N.B.: The pilot power supply X must be present.

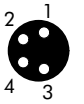
WIRING DIAGRAM FOR THE CLEVER CENTER TERMINAL - OUTPUTS ONLY



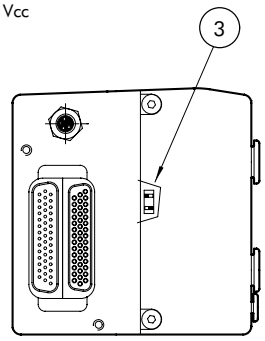
① Indicator LED
② Grounding



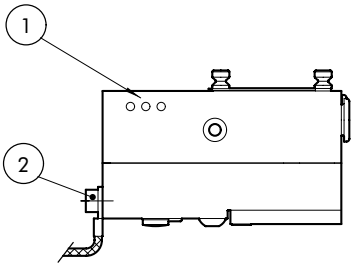
WIRING DIAGRAM FOR THE CLEVER CENTER TERMINAL - INPUTS AND OUTPUTS

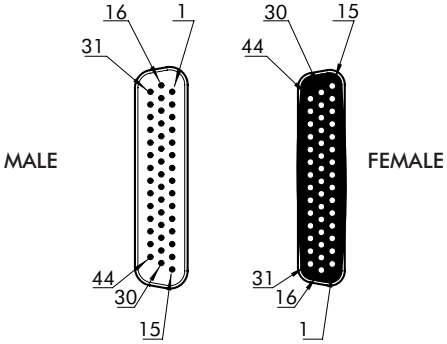


1 = RTX +
2 = GND
3 = RTX -
4 = Vcc

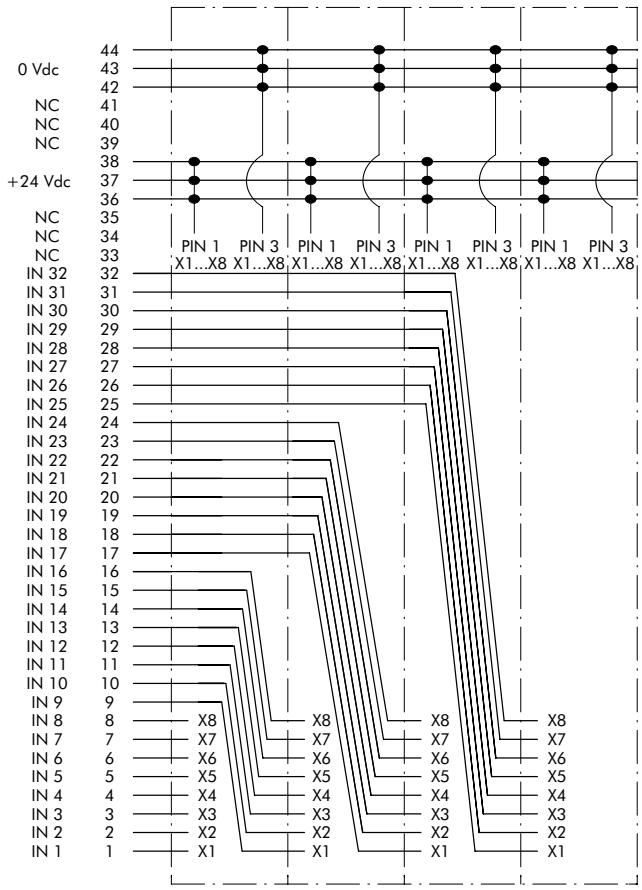


① Indicator LED
② Grounding
③ Input selector type
PNP/NPN

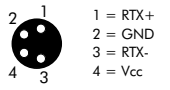




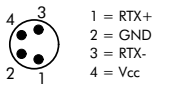
INPUT CONNECTION DIAGRAM



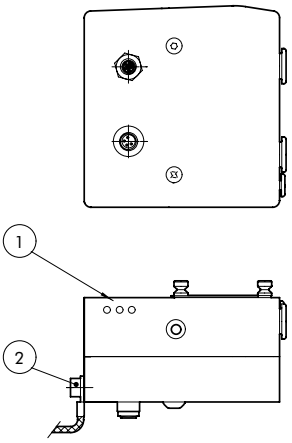
WIRING DIAGRAM FOR THE ADDITIONAL TERMINAL

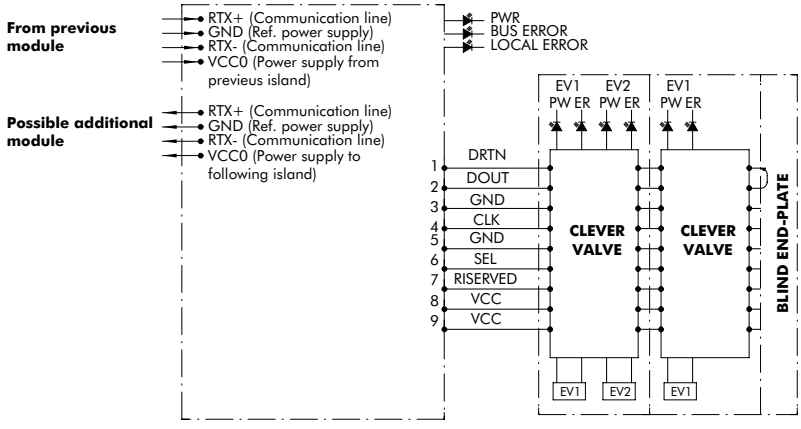


1 = RTX+
2 = GND
3 = RTX-
4 = Vcc



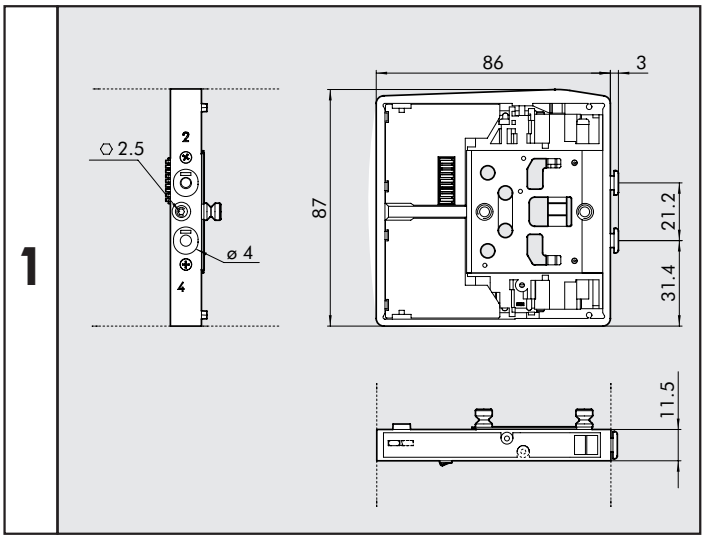
1 = RTX+
2 = GND
3 = RTX-
4 = Vcc





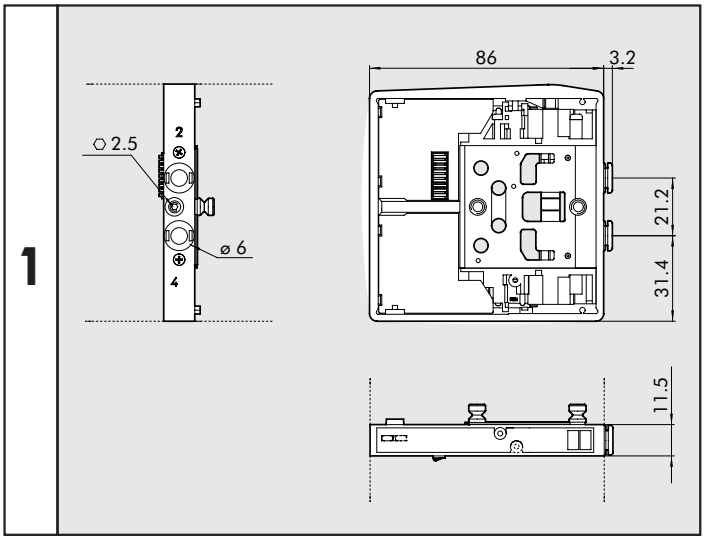
① Indicator LED
② Grounding

VALVE DIMENSIONS CM Ø 4



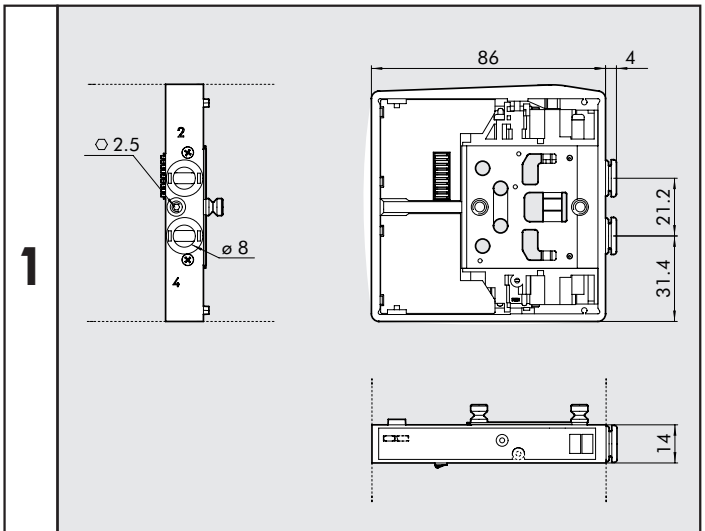
Symbol	Manual Control	Code	Weight [g]
I4 cm	monostable	7074030530	130
	bistable	7074030531	
W4 cm	monostable	7074030630	130
	bistable	7074030631	
L4 cm	monostable	7074030730	130
	bistable	7074030731	
V4 cm	monostable	7074030130	115
	bistable	7074030131	
K4 cm	monostable	7074030110	130
	bistable	7074030111	
O4 cm	monostable	7074030210	130
	bistable	7074030211	

VALVE DIMENSIONS CM Ø 6



Symbol	Manual Control	Code	Weight [g]
I6 cm	monostable	7075030530	130
	bistable	7075030531	
W6 cm	monostable	7075030630	130
	bistable	7075030631	
L6 cm	monostable	7075030730	130
	bistable	7075030731	
V6 cm	monostable	7075030130	115
	bistable	7075030131	
K6 cm	monostable	7075030110	130
	bistable	7075030111	
O6 cm	monostable	7075030210	130
	bistable	7075030211	

VALVE DIMENSIONS CM Ø 8

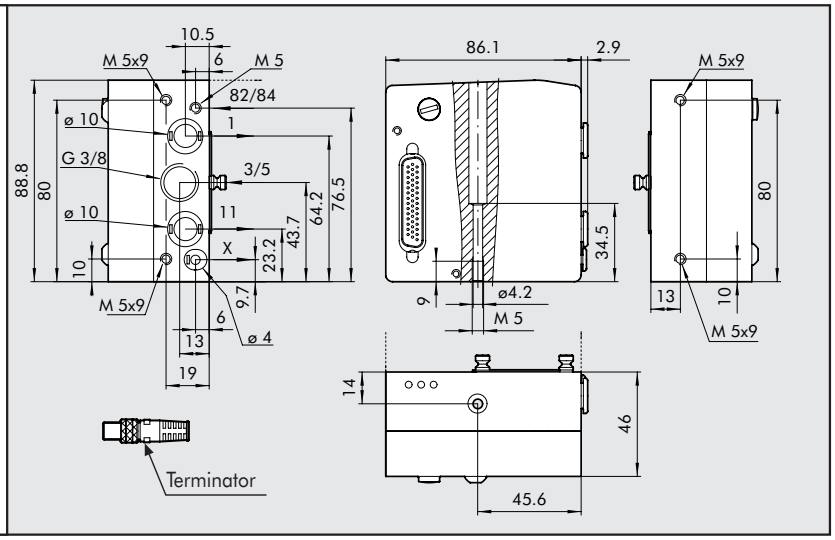


Symbol	Manual Control	Code	Weight [g]
I8 cm	monostable	7076030530	140
	bistable	7076030531	
W8 cm	monostable	7076030630	140
	bistable	7076030631	
L8 cm	monostable	7076030730	140
	bistable	7076030731	
V8 cm	monostable	7076030130	130
	bistable	7076030131	
K8 cm	monostable	7076030110	140
	bistable	7076030111	
O8 cm	monostable	7076030210	140
	bistable	7076030211	

ACCESSORIES

OUTPUT END-PLATE 1-11

2 O



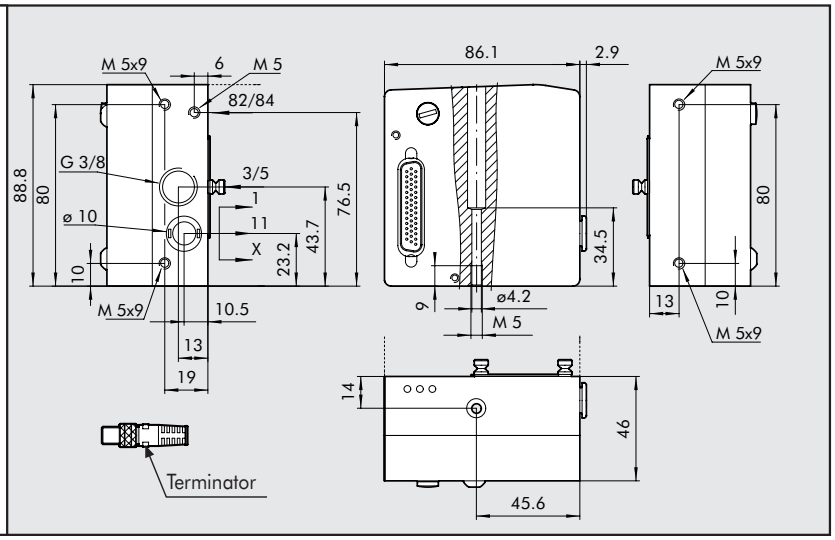
Code	Description	Weight [g]
0227302200	END-PLATE CM KIT 1-11 OUT	722

This end-plate allows for supplies to be differentiated
– Port 2
– Port 4
– Pilot supply

Note: terminator included

OUTPUT END-PLATE 1

3 O

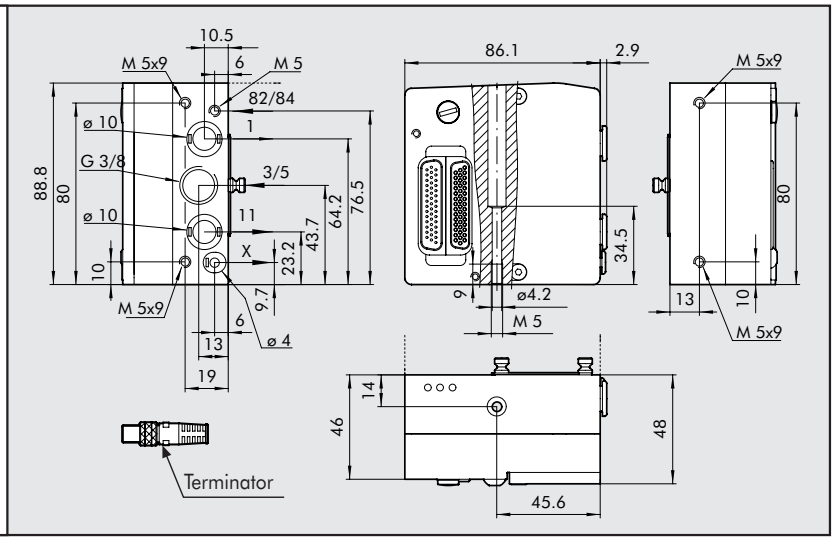


Code	Description	Weight [g]
0227302201	END-PLATE CM KIT 1 OUT	722

Note: terminator included

INPUT END-PLATE 1-11

2 I/O



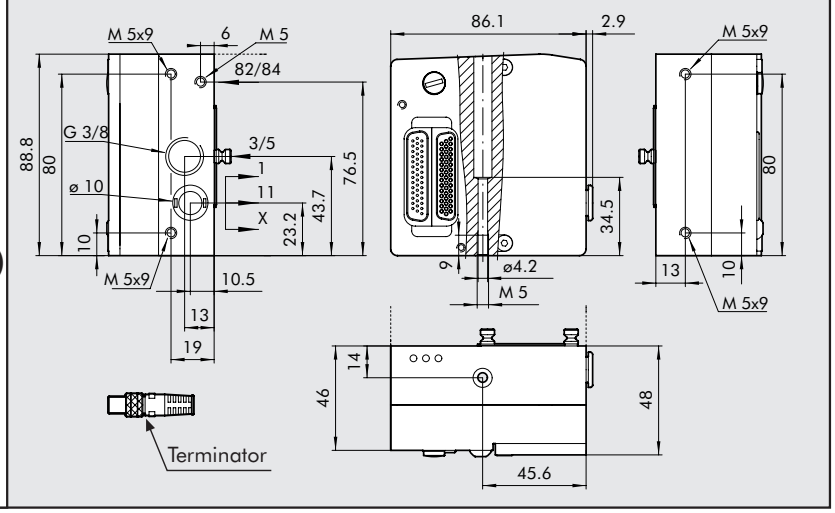
Code	Description	Weight [g]
0227302223	END-PLATE CM KIT 1-11 IN	722

This end-plate allows for supplies to be differentiated
– Port 2
– Port 4
– Pilot supply

Note: terminator included

INPUT END-PLATE 1

3 I/O

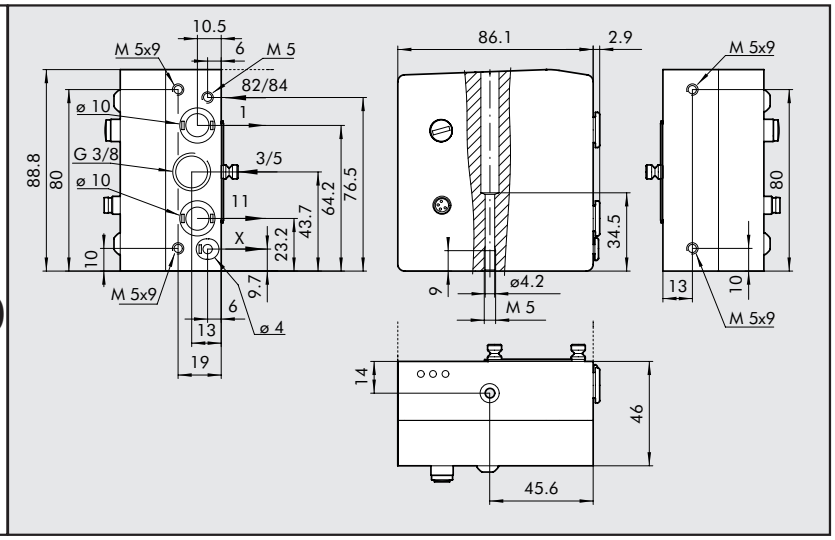


Code	Description	Weight [g]
0227302225	END-PLATE CM KIT 1 IN	722

Note: terminator included

ADDITIONAL END-PLATE 1-11

2 ADD

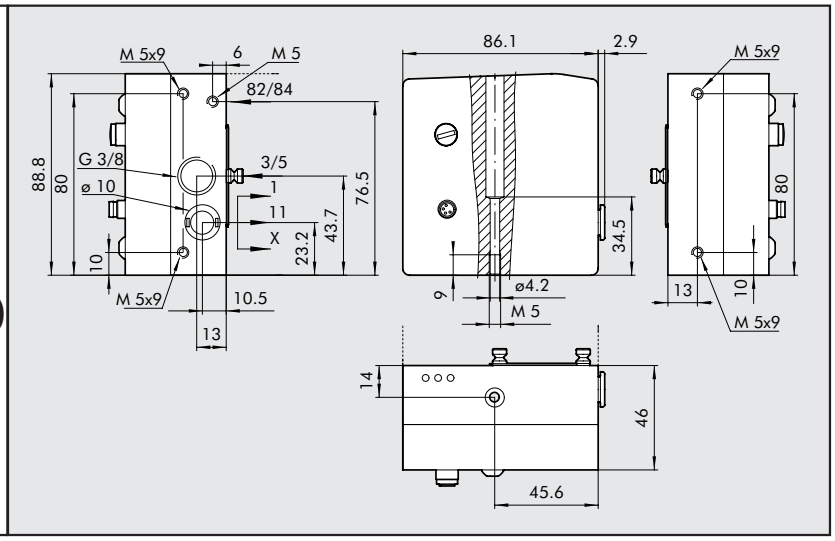


Code	Description	Weight [g]
0227302224	END-PLATE CM KIT 1-11 ADD	770

This end-plate allows for supplies to be differentiated
- Port 2
- Port 4
- Pilot supply

ADDITIONAL END-PLATE 1

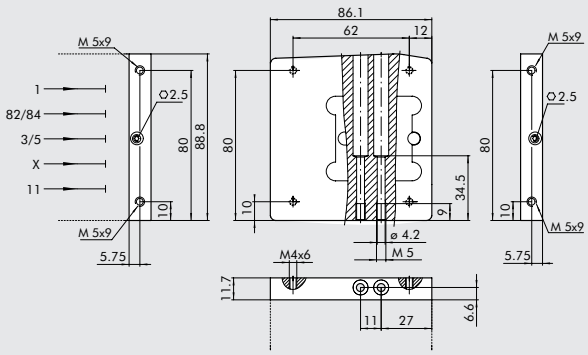
3 ADD



Code	Description	Weight [g]
0227302226	END-PLATE CM KIT 1 ADD	770

BLIND EN-PLATE

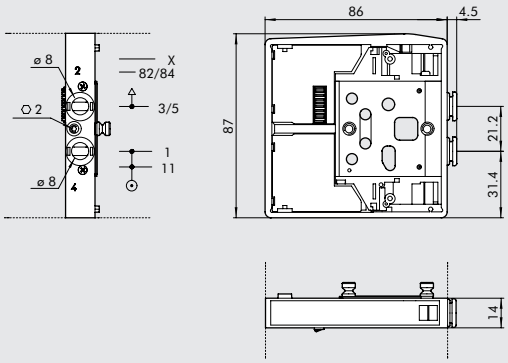
5



Code	Description	Weight [g]
0227302500	BLIND END-PLATE CM	230

INTERMEDIATE THROUGHT

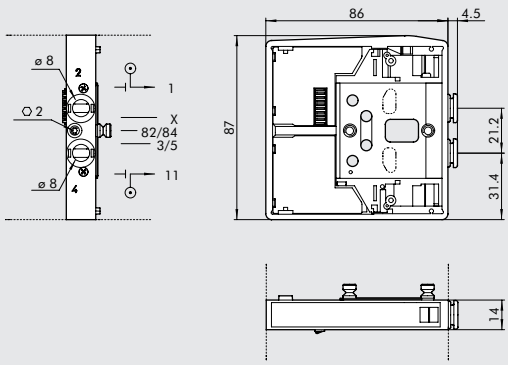
6



Code	Description	Weight [g]
0227302301	INTERMEDIATE THROUGHT CM	120

INTERMEDIATE BLIND

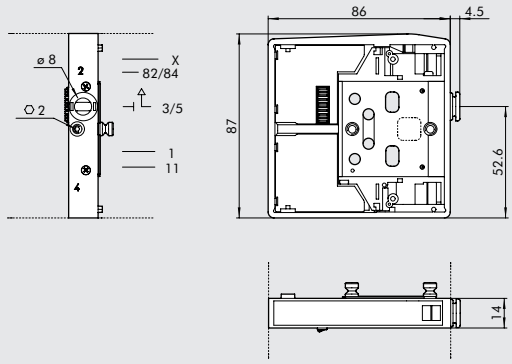
7



Code	Description	Weight [g]
0227302302	INTERMEDIATE BLIND CM	117

INTERMEDIATE EXHAUST SWITCH

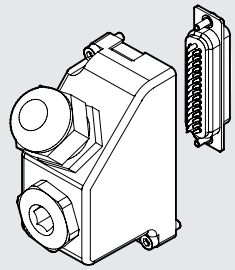
20



Code	Description	Weight [g]
0227302303	INTERMEDIATE EXHAUST SWITCH CM	125

44-PIN CUP CONNECTOR KIT IP 65

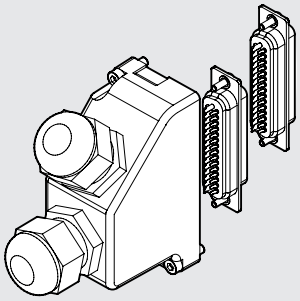
14



Code	Description	Weight [g]
0226180108	44-PIN CUP CONNECTOR KIT IP 65	60

44+44 PIN CUP CONNECTOR KIT IP 65 FOR I/O

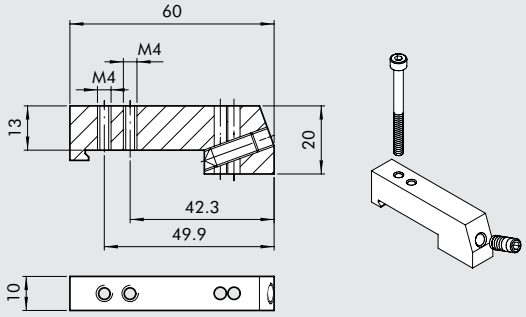
15



Code	Description	Weight [g]
0226180109	44+44 PIN CUP CONNECTOR KIT IP 65 FOR I/O	80

CONNECTION BRACKETS ON DIN BAR

16

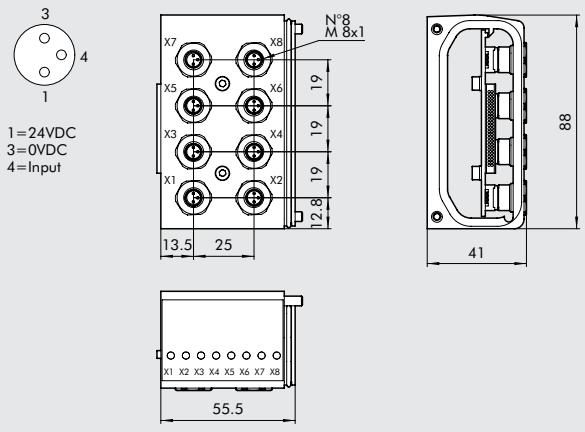


Code	Description	Weight [g]
0227301600	CONNECTION BRACKETS ON DIN BAR HDM/CM	30

supplied complete with one M4x45 screws and one grub screw
Individually packed

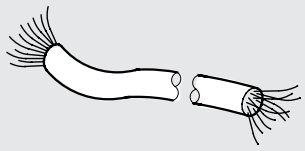
M8 8-INPUT MODULE

M 8



Code	Description	Weight [g]
0227302900	M8 8-INPUT MODULE CM	273

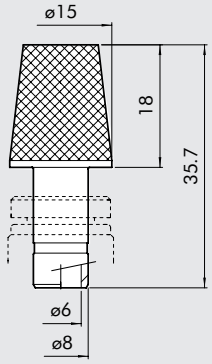
CABLES



Code	Description	Weight [g/m]
0226107201	10-WIRE CABLE	86
0226107101	19-WIRE CABLE	122
0226107102	25-WIRE CABLE	130
0226107103	44-WIRE CABLE	160

Specify the number of metres desired

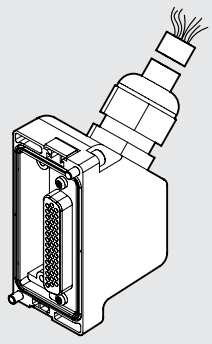
SILENCER FOR FITTING, Ø 8



Code	Description	Weight [g]
W0970530084	SILENCER FOR FITTING, Ø 8	15

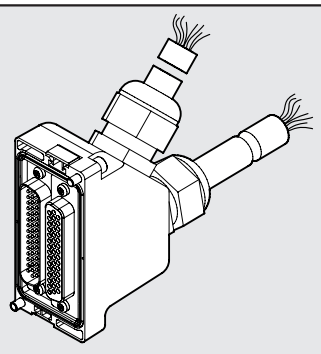
At the 3/5-exhaust port of the intermediate through reference 6
and the exhaust switch reference 20

44-PIN PRE-WIRED CUP CONNECTOR



Code	Description	Weight [g]
0226950500	ACC. CONNET. IP 65 + CABLE 44-WIRE L = 5 MT	740

44+44-PIN PRE-WIRED CUP CONNECTOR



Code	Description	Weight [g]
0226980500	ACC. CONNET. IP 65 + CABLE 44+44-WIRE L = 5 MT	1550

WIRING TABLE FOR 44-PIN PRE-WIRED CUP CONNECTOR FOR VALVE

44 PIN FEMALE

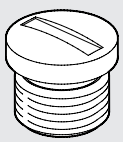
Position of electrical contact	Corresponding wire colour	Function	Position of electrical contact	Corresponding wire colour	Function	Position of electrical contact	Corresponding wire colour	Function
1	white	Out 1	16	gray/brown	Out 16	31	green/red	Out 31
2	brown	Out 2	17	white/pink	Out 17	32	yellow/red	Out 32
3	green	Out 3	18	pink/brown	Out 18	33	green/black	Fault reporting
4	yellow	Out 4	19	white/blue	Out 19	34	gray/blue	NC
5	gray	Out 5	20	brown/blue	Out 20	35	gray/red	NC
6	pink	Out 6	21	white/red	Out 21	36	red	+24Vdc
7	blue	Out 7	22	brown/red	Out 22	37	red	+24Vdc
8	violet	Out 8	23	white/black	Out 23	38	red	+24Vdc
9	gray/pink	Out 9	24	brown/black	Out 24	39	yellow/black	Config. PNP/NPN
10	red/blue	Out 10	25	gray/green	Out 25	40	pink/red	NC
11	white/green	Out 11	26	yellow/gray	Out 26	41	pink/blue	NC
12	brown/green	Out 12	27	pink/green	Out 27	42	black	0 Vdc
13	white/yellow	Out 13	28	yellow/pink	Out 28	43	black	0 Vdc
14	yellow/brown	Out 14	29	green/blue	Out 29	44	black	0 Vdc
15	white/gray	Out 15	30	yellow/blue	Out 30			

WIRING TABLE FOR 44-PIN PRE-WIRED CUP CONNECTOR FOR INPUT

44 PIN MALE

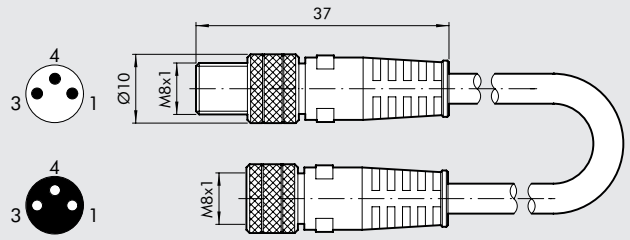
Position of electrical contact	Corresponding wire colour	Function	Position of electrical contact	Corresponding wire colour	Function	Position of electrical contact	Corresponding wire colour	Function
1	white	In 1	16	gray/brown	In 16	31	green/red	In 31
2	brown	In 2	17	white/pink	In 17	32	yellow/red	In 32
3	green	In 3	18	pink/brown	In 18	33	green/black	NC
4	yellow	In 4	19	white/blue	In 19	34	gray/blue	NC
5	gray	In 5	20	brown/blue	In 20	35	gray/red	NC
6	pink	In 6	21	white/red	In 21	36	red	+24Vdc
7	blue	In 7	22	brown/red	In 22	37	red	+24Vdc
8	violet	In 8	23	white/black	In 23	38	red	+24Vdc
9	gray/pink	In 9	24	brown/black	In 24	39	yellow/black	NC
10	red/blue	In 10	25	gray/green	In 25	40	pink/red	NC
11	white/green	In 11	26	yellow/gray	In 26	41	pink/blue	NC
12	brown/green	In 12	27	pink/green	In 27	42	black	0 Vdc
13	white/yellow	In 13	28	yellow/pink	In 28	43	black	0 Vdc
14	yellow/brown	In 14	29	green/blue	In 29	44	black	0 Vdc
15	white/gray	In 15	30	yellow/blue	In 30			

M8 PLUG



Code	Description
0240009039	PLUG M8

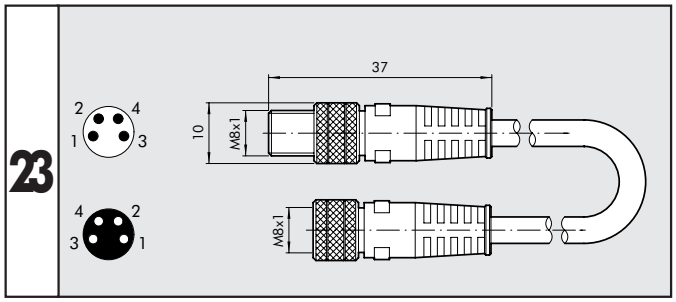
M8 INPUT CONNECTOR



Code	Description
0240009009	M8-M8 straight connector with 3m cable

Pin	Cable Colour
1	Brown
3	Blue
4	Black

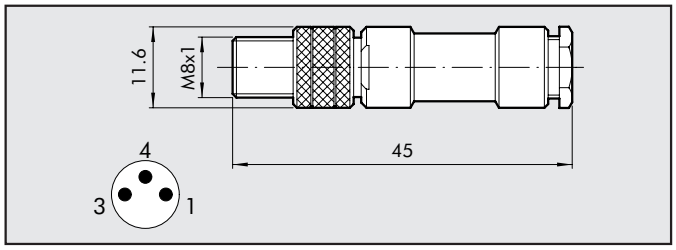
M8 PREWIRED CONNECTOR FOR VALVE ISLANDS CONNECTIONS



Code	Description
0240005003	ACC. M8 PREWIRED CONNECTOR FOR VALVE ISLANDS CONN. CM L=5m
0240005005	ACC. M8 PREWIRED CONNECTOR FOR VALVE ISLANDS CONN. CM L=1m
0240005006	ACC. M8 PREWIRED CONNECTOR FOR VALVE ISLANDS CONN. CM L=3m
0240005008	ACC. M8 PREWIRED CONNECTOR FOR VALVE ISLANDS CONN. CM L=10m

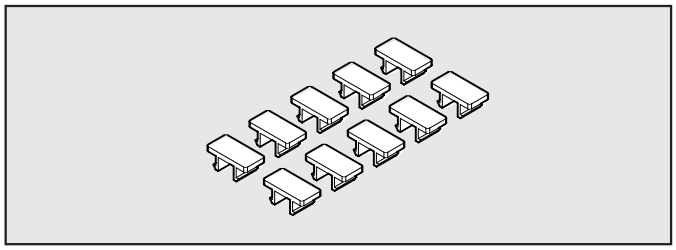
Pin	Cable Colour
1	Brown
2	White
3	Blue
4	Black

M8 INPUT CONNECTOR



Code	Description
0240009010	M8 3-pin straight connector

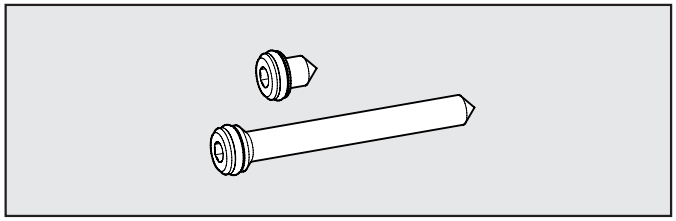
IDENTIFICATION PLATE KIT



Code	Description
0226107000	IDENTIFICATION PLATE KIT

Comes in 10-pc. packs

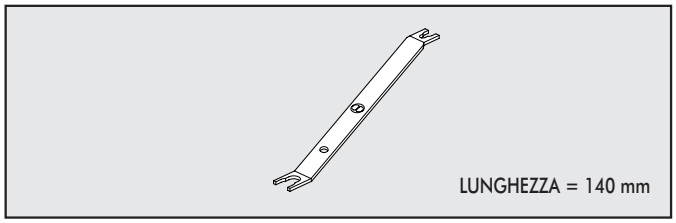
GRUB SCREW KIT



Code	Description
0227301800	GRUB SCREW FOR MULTIMACH HDM/CM

Confezione 1+1 pezzi

R17 - DISASSEMBLY KEY



Code	Description	Ø Tube	Notes
2L17001	RL17	from Ø 3 to Ø 10	For R fitting and fox fitting

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www.metalwork.it - metalwork@metalwork.it